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Manual for the Baltic International Trawl Surveys (BITS)

Version 2.0

ICES Baltic International Fish Survey Working Group (WGBIFS)

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CIEM Conseil International pour l'Exploration de la Mer

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1 Introduction

First fish trawl surveys in the Baltic Sea focusing on the evaluation of cod recruitment and its spatial distribution were carried out by Poland in 1962 (Netzel, 1974). Most of the Baltic countries also developed their national trawl surveys during subsequent years. However, it was difficult to combine the results of these national surveys because the fishing gears, the realization of fishing hauls and the survey periods varied.

The first attempts to coordinate national surveys of Baltic fish were made in 1985 (ICES, 1985), and they were continued with varying intensity in subsequent years. Several attempts were made to determine the conversion factors among different fishing gears (Schulz and Grygiel, 1984, 1987; ICES, 1987; Oeberst and Frieß, 1994; Oeberst and Grygiel, 2004; Grygiel, 2011, 2014). A robust method for compiling trawl survey data used in the assessment of cod inhabiting in the central Baltic Sea was developed by Sparholt and Tomkiewicz (2000). The authors applied generalized linear models to calculate the "fishing power" of national bottom trawls. The "fishing power" factors were used to transform the national catch per unit of effort into cpue-values of the former standard GOV trawl.

A further attempt to establish internationally coordinated trawl surveys in the Baltic Sea was made in 1995 (ICES, 1995). The first meeting of the ICES Working Group on Baltic International Fish Survey (ICES, 1996) considered the design of bottom-trawl surveys for cod year-class abundance assessment and started the development of appropriate manual. The EU Study Project No. 98/099 (Anon, 2001a) provided funding for the development of new standard fishing gears (type TV-3#520 and TV-3#930). In 1999, and successive years, different fishery laboratories of the Baltic countries conducted intercalibration experiments between national and new standard gear (ICES, 2001a, 2003) and to estimate conversion factors between the fishing efficiency (cpue) of both types of gears (Anon, 2001a; ICES, 2002; Oeberst and Grygiel, 2002, 2004; Lewy *et al.*, 2004; Grygiel, 2011, 2014).

New coordinated survey design was established in 2001 (ICES, 2001). Randomly stratified fishing-stations location is based on ICES subdivisions and their depth layers as strata to reflect the variability of the Baltic target species temporal-spatial distribution pattern. Besides the traditional Baltic International Trawl Survey (BITS-Q1) in February-March additional coordinated, routine survey (BITS-Q4) has been conducted in November, since 2001. The above-mentioned demersal trawl surveys are coordinated by the ICES WGBIFS. The surveys aimed to the monitoring of the spatial distribution and year-classes abundance of the demersal species, i.e. cod (*Gadus morhua*), flounder (*Platichthys flesus*) and other flatfish (plaice - *Pleuronectes platessa*, turbot - *Scophthalmus maximus*, dab - *Limanda limanda*, brill - *Scophthalmus rhombus*) and to some extent to clupeids (sprat - *Sprattus sprattus* and herring - *Clupea harengus*) in the Baltic Sea. WGBIFS agreed in 2009, that data of all analysed fish are uploaded to the ICES Database of Trawl Surveys (DATRAS) to support the Baltic ecosystem analyses, taking into consideration ICES subdivisions and rectangles codes (Figure 1.1).

Different steps for improving the survey design were initiated at the consecutive meetings of the WGBIFS, because it was necessary that vessels work in areas where own experiences did not exist. The above-mentioned actions were documented in the WGBIFS reports and in the BITS Manual. Tow-Database was established in 2001 (ICES, 2001) and was updated based on the feedbacks from the realized catch-stations. This Tow-Database contains a list of geographical positions, where fishing-stations with the standard trawl, can be realized without any natural difficulties.

Eight countries have been participating in realization of the BITS surveys: Denmark, Germany, Latvia, Poland, Sweden (all from 1991), Estonia (from 1996), Lithuania (from 2005), and Russia (from 1995).

2 The fishing method

2.1 Main target species

The aim of the BITS surveys is to provide fishery-independent fish stocks size indices for the stock assessment, mainly of cod (*Gadus morhua*), flounder (*Platichthys flesus*) and to some extent to plaice (*Pleuronectes platessa*), turbot (*Scophthalmus maximus*), dab (*Limanda limanda*), brill (*Scophthalmus rhombus*), sprat (*Sprattus sprattus*) and herring (*Clupea harengus*). In addition, the recorded distribution of less abundant species in the Baltic benthic zone is reflecting the temporal-spatial changes in fish biodiversity. Moreover, materials collected during the BITS surveys are used as the input data for analysis fluctuation of Baltic fish year-classes abundance, including recruits. Hydrographical parameters like those that seawater temperature, salinity and oxygen content are sampled to analyse the relation between fish temporal distribution and density and current hydrological conditions.

The international coordinated BITS type of ground-trawl surveys are currently directed to all fish species however, giving preferences to Baltic cod, flounder, and other flatfish. Principally from 2009, the data of all analysed fish are uploaded to the DATRAS, however, individual countries have uploaded complete data for up to six years earlier List of fish species accepted for uploading data of the BITS surveys is given at the ICES website (http://vocab.ices.dk/?CodeTypeRelID=365&CodeID=137906). The list is used in the DATRAS screening program.

2.2 Survey periods

National parts of the BITS surveys should be carried out in the first quarter, between 15 February and 31 March (winter/spring BITS-Q1 survey) and in the fourth quarter, between 1 and 30 November (autumn BITS-Q4 survey). However, if the accessibility of a research vessel is limited in time, the BITS-Q4 survey exceptionally can be realized in the first days of December.

2.3 Survey area and stratification of the Baltic Sea

The intention of BITS surveys is to cover the total distribution area of cod in the Baltic Sea. It was agreed by the responsible WGBIFS members, that the ICES Subdivisions 22–28 should be covered with fishing-stations during the BITS surveys because the stock size of the eastern Baltic cod at present is relatively low and is concentrated mainly in the ICES Subdivisions 25–26. Expansion of the area under investigation in the northern part of the Baltic Sea (ICES Subdivisions 29–32) is possible dependent on the development of the eastern Baltic cod stock size and its spatial distribution pattern. It should be underlined that in the recent seasons (2015-Q4, 2016-Q1), similarly like in previous years, fish catches were accomplished by Denmark also in the ICES Subdivision 21 (borders of the a.m. subdivision are not clarified so far), however these activities are not coordinated by WGBIFS, but data are stored in the DATRAS database.

The international trawl surveys use a random stratified design with catch-stations selected from a set of known trawlable sites. The ICES subdivisions and depth layers within ICES subdivision define the strata. Only depth layers from 10 to 120 m depending on ICES subdivision are covered by the surveys. The areas aggregated on 10-m depth layers per ICES-rectangle are given in Annex 2. Following strata are used:

ICES Subdivision	Strata
21	10–19 m, 20–39 m
22	10–19 m, 20–39 m
23	10–19 m, 20–39 m
24	10–19 m, 20–39 m, 40–59 m
25	20–39 m, 40–59 m, 60–79 m, 80–99 m
26	20–39 m, 40–59 m, 60–79 m, 80–99 m, 100–120 m
27	20–39 m, 40–59 m, 60–79 m, 80–99 m, 100–120 m
28	20–39 m, 40–59 m, 60–79 m, 80–99 m

See: http://www.ices.dk/marine-data/data-portals/Pages/DATRAS-Docs.aspx; Calculation procedures and relevant documents – BITS index calculation procedure.

It was agreed by WGBIFS that the Denmark and Germany realize all hauls in the ICES Subdivisions 22-24 in order to reduce the effects of the conversion factors between the small and large version of the standard trawls (see section 2.4 Fishing gears).

WGBIFS (March 2017), based on the examination of some CTD profiles in depth strata with low oxygen content, have concluded, that even at the stations with oxygen levels around 0.5 ml/l the catches (including those of cod) were significantly larger than expected. Therefore, it was determined that until the WGBIFS-2018 meeting, the new minimum level of oxygen content in waters nearby the seabed, i.e. from 1.5 to 0.5 ml/l as threshold is initially proposed. Because the TV-3 trawl vertical opening is between 3 and 6 m depending on depth, wind velocity and sea-currents, the WG decided that when the oxygen content on the depth interval from 0 to 10 m over the seabed is 0.5 ml/l, fishing will be not realized. After one year of transition, the final decision about newly proposed the threshold minimum oxygen level nearby a seabed will be taken.

2.4 Fishing gears

The TV-3 bottom trawl must be used as the standard fishing gear during the BITS surveys. Two types of the TV-3 trawl were developed for different sizes of research vessels:

- the small of 520 meshes (TVS) in circumference; the trawl type TV-3#520 should be used for vessels with engine power less than 600 kW;
- the large of 930 meshes (TVL) in circumference; the trawl type TV-3#930 is designated for vessels with engine power more than 600 kW.

The description and use of the trawls are given in Annexes 3 and 4, respectively. These trawls have been used since 2001. Conversion factors to transfer cpue values of cod captured with TVS and former used national gears into cpue of TVL are available at ICES website: http://www.ices.dk/marine-data/data-portals/Pages/DATRAS-Docs.aspx; Calculation procedures and relevant documents – BITS fishing power (TVL) based on Oeberst (2013).

Since 2004 until the 1st quarter 2016 small adaptation to the large TV-3 was carried out by Denmark. The "stone escape device" has been installed in the Danish standard fishing gear (TV-3L) used during the BITS surveys. The trap has the purpose to let big rocks escape through an opening in the lower panel of the belly of the trawl. Under normal conditions, the opening is covered with net of the same dimensions as the surrounding net in the lower, let no fish out, and therefore does not change the geometry or the selectivity of the trawl. The scheme of construction is shown in Figure 4.1.1 (Annex 4.1). From the 4th quarter in 2016 the stone trap device is no longer in use at it was deemed ineffective in avoiding the capture of large stones. Comments from the fishing gear manufacturer support the decision to omit the panel.

The WGBIFS at the meeting in 2017 recommended to equip the TV-3 trawl with the wings spread sensors, which are accepted as a standard, supplementary device during the BITS surveys. The above-mentioned device provides more precise measurements of the trawl opening during each control-catch, needed as the input data for a swept-area calculations.

The Danish RV "Havfisken-Old" and RV "Havfisken-New", and the German RV "Solea" use the small version of the standard TV-3 trawl. Latvia and Estonia can use the TV-3S trawl if small commercial vessel is operated during the BITS surveys in the ICES Subdivision 28.2. Estonian commercial vessel is using also TV-3S trawl in small part of the ICES Subdivision 29. Part of the ICES Subdivision 26 is covered by Lithuania (RV "Darius") with TV-3S. The large version of the standard trawl is used by Denmark (RV "Dana"), Poland (RV "Baltica"), Russia (various large vessels) and Sweden (currently commercial vessel) in the ICES Subdivisions 25-28. During the Latvian surveys on chartered the Polish RV "Baltica", the large TV-3L with rock-hopper installed to footrope is used because of the very hard bottom appearance in the Latvian marine waters. Information about which vessels and gears are used by countries during BITS surveys is included in DATRAS database.

2.4.1 Quality control

Used trawls have to be technically checked at regular intervals according to the list of measurements (e.g. the geometry, mesh sizes, rope lengths of the trawl, etc.) given in the manuals of TV-3S and TV-3L; see the Annexes 3 and 4.

2.5 Fishing operation

Trawling shall be performed using a standard towing speed of 3 knots. The speed should be measured as the speed over the seabed.

The standard duration of the haul is 30 minutes. The start of the haul is defined as the moment, when the vertical and horizontal net opening is stabilized.

After the complete shooting of the warps and the braking of the winches, a relatively high speed (5–6 knots) will be maintained for around 1 minute to allow the trawl to fully deploy in length and in width.

The speed will then be strongly reduced (even to 0) to allow the trawl-doors reaching the seabed. Once the doors are on the ground a speed lower than the normal one (2.5–2.7 knots) should be maintained to allow the trawl to get down to the bottom.

Once the net is well stabilized, the speed will be increased towards the standard speed (3 knots); this moment is defined as the real start of trawling.

The end of the trawling is defined as the moment of the beginning of warps hauling. Sensors should (if possible) verify start and end of the haul.

For the vessels, using a trawl monitoring devices like SCANMAR the haul can be considered as well stabilized as soon as its vertical opening is between 2 and 3 m.

For the vessels without such a device, preliminary trials should be performed before the survey. These trials will determine, ship by ship, the time needed to achieve the appropriate configuration, taking the depth and working practice of each skipper into account.

It is important that the gear stay in good contact with the seabed during the whole hauling. This point should be checked regularly either by acoustic device during the haul, by the observation of the chains and trawl-doors wear or by the observation of benthic organisms in the catches after trawling.

Trawling shall only take place during daylight, which is defined as the time between 15 minutes after sunrise and until 15 minutes before sunset. Daylight is the time when the solitary fish, schools of fish etc. have stopped aggregate in patches. The sunrise/sunset calculations procedure applied for the IBAS surveys (potentially can be used for the BITS surveys too) is described in Annex 9 (see also Annex 4.B in the WGBIFS 2017 Report).

The horizontal distance between the upper wing-ends must be monitored if possible during the whole tow. The wingspread per haul should be reported in the submission of data to DATRAS. The following table gives the limits of the wing-ends distance and the corresponding height of the trawl at the centre of the headline.

Trawl measurements at 3 knots in metres	**Distance between upper wing-ends**	**Approximate corresponding height at centre of headline**
TV-3, #520 meshes	13.5–14.5	2.2–2.5
TV-3, #930 meshes	26–27	5.5–6.5

2.6 Allocation of trawl stations

The aim of the BITS surveys is to cover the main distribution area of the target Baltic species - cod (*Gadus morhua*) and flatfish (*Platichthys flesus*, *Scophthalmus maximus*, *Pleuronectes platessa*, *Limanda limanda*, *Scophthalmus rombus*). However, principally from 2009, the WGBIFS recommended submission to the ICES Data Centre (to the DATRAS database) the data of all processed species. Survey effort allocation is annually determined according to the expected spatial distribution of cod in the survey area. The method for allocating catch-stations to ICES SDs was adapted according to the new definition of the stock structure of cod in the Baltic Sea during WKBALTCOD in March 2015 (for details see the Annex ToR e in the WGBIFS 2015 Report). Both, the relative size of fish stocks and the hydrographical conditions may influence the spatial distribution of the target species. These aspects should be considered during the process of allocation of hauls to the different strata. However, the relationship between the hydrographical parameters and the cod distribution cannot currently be accurately predicted, nor is it not possible to predict prevailing hydrographic conditions ahead of the survey. It was agreed during the WGBIFS meeting in February 2001, that a running 5-year mean of the cpue derived from the BITS surveys in winter/spring should be used for describing the distribution of cod. Moreover, the number of planned catch-stations should be distributed dependent on the size of the areas of ICES subdivisions and used depth ranges from 10 to 120 m. The significant decrease of the eastern Baltic cod stock

resources in the period of 1985–1990 suggests that the trawl-stations should be allocated also according to the distribution and density pattern of the cod stocks.

The factors - area of ICES subdivision and the spatial distribution pattern of cod - are used with different weights. A weighting factor of 0.6 was defined for area, and a weighting factor of 0.4 was defined for mean distribution of cod (the mean of running 5-years). The running mean of the cod (age group 1+) cpue should be adapted every year based on the results of winter/spring surveys (BITS-Q1). The same weights were used for the parameters - area and running mean of the distribution pattern - for allocating the number of catch-stations in all the depth layers for the different ICES subdivisions. The areas by ICES rectangles, in nm^2 of 10-m depth layers are given in Annex 2.

At first the numbers of planned trawl stations per given survey of all participating countries are summarized for the western Baltic (the ICES Subdivisions 22–24) and for the eastern region (the ICES Subdivisions 25–28). Then the total number of planned trawl stations is allocated to ICES subdivisions according to the area and the 5-year running mean as mentioned above for each region. The number of planned catch-stations of each ICES subdivision is then allocated to the depth layers. Final evaluation of the number of fishing-stations to be carried out by countries in given BITS survey, in the different ICES subdivisions and depth stratums is listed in the separate tables, incorporated to the current WGBIFS Report. In the case if, some country is not able to conduct part of already designated fish catches or even whole BITS survey, then should promptly to inform the WGBIFS chair about problems with suggestion who from involved institutes can replace their effort and finalize the planned number of hauls.

2.7 Fishing positions

The new BITS survey design, which was introduced in 2001, requires that vessels need to work also in the areas, where they may not have experience with the bottom types and possible dangers for the trawls condition, like rocky bottom, wrecks, new cables connection, etc. Furthermore, large areas are closed for fishing activities in the Baltic Sea because of dumped munitions, electrical cables, gas pipelines, dense ships traffic, military trainings, etc. Therefore, the ICES Tow-Database, under auspices of WGBIFS was established. This database contains possible geographical positions, where demersal trawling can be successfully realized at particular depths with the different versions of the standardized fishing gear. The feedback from the last years BITS surveys were used to update the quality of the Tow-Database. Unfortunately, the available haul positions are heterogeneously distributed in many depth layers. Therefore, it is not possible to use a random numbers generator to select fishing-stations from the Tow-Database for a planned BITS survey, because such an algorithm produces a biased selection due to different probability of areas to come into the selected pool of hauls (ICES, 2002, 2003). Method for selecting hauls from the Tow-Database was proposed in 2003 (Oeberst, 2003). The WGBIFS stated in 2004 (ICES, 2004) that the proposed method is suitable to solve the problem of heterogeneity of hauls, which are available in the Tow-Database. The analyses have revealed that the use of an area unit size of 10′N x 20′E is the best compromise for the trawl surveys in the Baltic Sea if it is taken into account that the same unit size should be used for selecting hauls in depth layers of all ICES subdivisions. The first step of selection hauls position from the Tow-Database for a given depth layer of an ICES subdivision is a random selection of an area unit (10′N x 20′E) within the same depth layers, where a generator of equally distributed random numbers is used. Then one of the haul positions within the selected unit is randomly selected.

The selected hauls are assigned to the participating countries in such a way that the distance between the planned fish catch-stations is as short as possible and that the national zones are covered if possible. When the selected catch-stations cannot be realized because of appearance of wrecks, gillnets, navy military training or other reasons, the substituting hauls should be realized in the same depth layer as close as possible to the selected fishing-station.

Selected hauls should be omitted in the case when the results of at least two catch-stations in the same depth layers have revealed that fish not appeared in the zone which was covered by the net opening and when hydrographical observations have revealed that oxygen content is less than 0.5 ml/l in the layer of vertical net opening. However, it is necessary that datasets must be added to the DATRAS database with the haul position and the validity code "N" to avoid biased estimated of the fish stock indices in the depth layer. It should be underlined, that in many hauls made near very deep seabed, where oxygen content was above 0.5 ml/l, appearances of Baltic cod and to some extent, other fish were noticed.

2.8 Tow-Database

The use and the reworking of the Tow-Database have demonstrated that some changes of the structure, which were made until 2005, can improve the handling of the database and can make the structure more understandable. The current structure is given in the subsequent table.

The first column contains the notation of the survey, when the given catch-station was used the last time. The haul number (HrHaul) summarizes two parts. The first two digits present the number of ICES subdivision. The following three digits present the haul-number-ID in given ICES subdivisions. The two next columns contain the notation of ICES rectangles and of ICES subdivision. Then the latitude of the first position is stored in two columns (degree and decimal-minutes separately) followed by the longitude of the first position (degree and decimal-minutes separately). This structure is used for maximum ten possible positions of the fishing-stations. Then the depth data are given. The first value presents the mean depth of the haul in metre. This value is used for the assignment of the haul to the depth stratum. Then up to ten depths, data in metre can be stored. The column "source" informs wherefrom the data have been made available. The column "TV3" is used to store the countries, which have already realized the stations. These data can be used for assigning selected catch-stations to the certain participating of the Baltic countries. The next column informs whether a standard groundrope can be used (1) or the rock-hopper equipment (2) must be used. Then the main direction of trawling (zero – main direction from west to east) and the distance between the first and last position of the haul in nautical miles follow.

Column	Structure of the Tow-Database - valid since autumn 2004			
A	Last realization			Q404
B		NrHaul		28002
C		Rectangle		42H0
D		ICES SD		28
E	1. position	Latitude	Degree	56
F			Minutes	36.5
G		Longitude	Degree	20
H			Minutes	41.3
I	2. position	Latitude	Degree	56
J			Minutes	36.9
K		Longitude	Degree	20
L			Minutes	41.9
M	3. position	Latitude	Degree	56
N			Minutes	37.2
O		Longitude	Degree	20
P			Minutes	42.6
Q	4. position	Latitude	Degree	56
R			Minutes	37.6
S		Longitude	Degree	20
T			Minutes	43.2
U	5. position	Latitude	Degree	0
V			Minutes	0
W		Longitude	Degree	0
X			Minutes	0
Y	6. position	Latitude	Degree	0
Z			Minutes	0
AA		Longitude	Degree	0
AB			Minutes	0
AC	7. position	Latitude	Degree	0
AD			Minutes	0
AE		Longitude	Degree	0
AF			Minutes	0
AH	8. position	Latitude	Degree	0
AI			Minutes	0
AJ		Longitude	Degree	0
AK			Minutes	0
AL	9. position	Latitude	Degree	0
AM			Minutes	0
AN		Longitude	Degree	0
AO			Minutes	0
AP	10. position	Latitude	Degree	0
AQ			Minutes	0
AR		Longitude	Degree	0

Column	Structure of the Tow-Database - valid since autumn 2004			
AS			Minutes	0
AT				
		Mean depth	Metre	38
AU	1. position	Depth	Metre	0
AV	2. position	Depth	Metre	0
AW				0
AX				0
AY				0
AZ				0
BA				0
BB				0
BC				0
BD	10. position		Metre	0
BE		Source	Latvia	
BF		TV3		L
BG		Ground	rope	1
BH		Direction		0
BI		Distance	nm	1.62

3 Sampling of trawl catches

The following guidelines are to be used for each fishing-station during the BITS survey. All forms should be filled in using a pencil in order to allow correcting and stay water-proof if not using electronic registration. The working up of the catch can be seen as a number of processes succeeding each other.

3.1 Estimating the total weight of the catch

3.1.1 Purpose

Measurement and/or eventual estimation of the total mass of the fish and "other marine organisms" in the given catch-station.

3.1.2 Methods

The total mass (weight) of fished species in given haul can be estimated by one of the following methods:

- Weighing the total catch by use of a sea compensated balance;
- Counting the number of standard filled baskets/boxes. The average weight of the baskets/boxes is estimated by weighing at least five random selected baskets/boxes;
- By adding up the total estimated mass or weighed mass of each species (will often be achieved during an estimation of the species composition).

The results are recorded in kilogrammes.

3.2 Estimating of the catch by species

3.2.1 Purpose

Measurements or eventual estimation of the total mass (weight) and number of specimens of a given species in a single catch.

3.2.2 Methods

Total catch should be sorted out by species, storing different species separately in boxes or baskets for further analyses. In order to simplify further working up of the catch, only boxes or baskets of same size and material should be used.

Certain species that are difficult to distinguish from each another may be grouped by genus or higher taxonomic units. Because of respected high resolution of data from the research surveys like e.g. BITS, is strongly recommended sorting catch, and in some cases subsample only, by particular species for estimating their catch and fishing efficiency (cpue). In the case of difficulties in a proper identification of certain fish species, the samples of that particular species should be taken to coastal laboratory for further examination.

In cases of exceptionally large catches (e.g. over 500 kg) or other circumstances, which do not allow the sorting out of total catch, the species composition should be estimated using subsampling. The procedure for subsampling is one of the following depending on the circumstances:

- If all species appear fairly frequently in the catch, simultaneous subsampling of all species in the whole catch should be used:

  - Three subsamples each weighing app. 100 kg, depending of the impression of the species included in the catch are sorted out by species. The samples must be taken from the first, middle and last sections of the trawl codend. Be aware of, that the three subsamples together should represent the whole catch.
  - Each species from the three subsamples are pooled and each species are weighed separately. The weights are recorded.
  - The total mass (weight) of all species (c) in the three subsamples is estimated by adding the weight of the three samples.
  - The total mass (weight) of each species in catch-station is estimated by raising the mass of subsample for a given species with the ratio between the total catch weight and the summed mass of all subsamples.
  - All total and subsample masses (weights) are recorded.
- If some species appears in very small numbers in the catch, although other species appears in large numbers, subsampling of only the frequent species in the catch may be applied.
  - The species appearing with low frequency are sorted out of the whole catch by species and weighed.
  - The rest of the catch is treated as specified in the method 1.
  - All total and subsample masses (weights) are recorded on the species-form.

Non-fish species should be recorded as well. This group might be aggregated and recorded as invertebrates, botanicals or just "Other1". Non-organic materials (anthropogenic origin) should be recorded as the marine litter (previously as "Other2").

The sorted and weighed fish are then used for the following: length, age, sex, maturity, stomachs fullness (feeding status) as well as food components sampling.

3.3 Length composition

3.3.1 Purpose

Measurements or eventual estimation of the absolute or relative length frequency by species.

3.3.2 Methods

Length distribution should be recorded for all detected fish species, and transfer the data to the ICES DATRAS database.

If the number of a given species does not exceed the number recommended in the table below all individuals are measured.

If the number of individuals of a given species significantly exceed the number recommended in the table below the following procedure must be adapted:

- All individuals of a given species in the catch are subdivided into a number of subsamples. Each subsample should approximately have the size, which is recommended in the table below.
- One of the subsamples is randomly selected for the length measurements.

Always measure the whole subsample. Never stop in the middle because you have realized that your subsample is too large. In most cases, a biased length distribution will be the result.

If you realize that, your subsample is too small then randomly selects another of the subsample and continues obtaining the length frequency measuring all of it. If you must, divide this subsample into a number of sub-subsamples and continue the measuring procedure by measuring one or more randomly selected sub-subsamples completely.

Length of the fish is defined as the total length (*longitudo totalis*), measured from the tip of the nose to the tip of caudal fin (Figure 13.1 in the Annex 13).

Length is measured to 0.5 cm below for herring and sprat, e.g. lengths in the range of 10.0–10.4 cm are equal to 10.0-cm class and lengths of 10.5–10.9 cm is equal to 10.5 cm class. For all other species the length is measured to 1 cm below, e.g. lengths in the range of 20.0–20.9 cm are equal to 20.0 cm class.

If a certain species is caught in two clearly distinct size categories, both of these size categories should be sampled separately. The number of fish from each sample should follow the sample sizes given below.

Minimum number of individuals to be length measured (in sample or subsample):

Number of length-classes	**Number of individuals**
1–10	100
11–20	200
more then 20	300

The relation between number of length-classes of the total length range and the number of individuals to be measured is illustrated in Figure 3.3.1 (Müller, 1996).

During the length measurements, the number of fish of each species per length group, as specified either in the table above or Figure 3.3.1, are collected and stored separately by the length-classes for age, sex, individual mass, maturity, and stomachs fullness estimations.

To improve the data of flounder, plaice, turbot, dab and brill, sex separated length distribution and maturity information are needed. Therefore, sex based length frequencies are recommended for these species. Each participating country should collect at least 10 specimens per sex, length class, ICES subdivision and survey. The sample of ca. 60 kg is recommended to use for the length measurements in order to obtain the length structure of the catch. It should be underlined that for the standard biological analysis of flatfish the very same number of specimens as the above-mentioned should be inspected too.

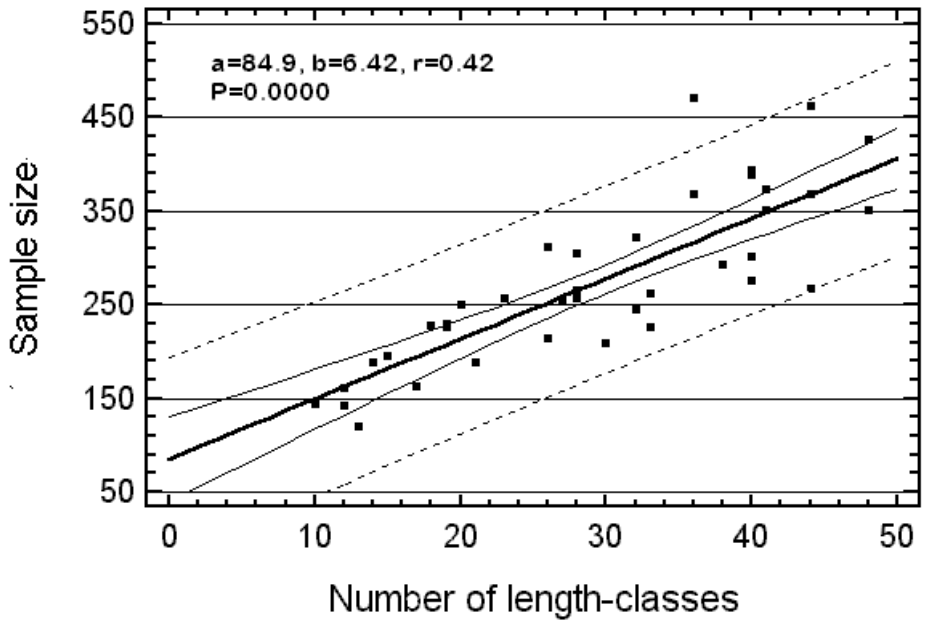

Figure 3.3.1. Relationship between the number to be measured and the number of length-classes of the total length range, in the sample of the catch-station (after Müller, 1996).

3.4 Age, sex, individual weight, and maturity sampling procedure

3.4.1 Purpose

Estimation of the fractions of age groups, sex ratio, mass, and fractions of the different maturity stages by length-class and species.

Age, sex, mass, and maturity estimates were at least required for the main Baltic target species however, in nowadays all species should be investigated for the same purpose.

The complete number of age determinations is used to establish age–length-keys (ALK) by the ICES subdivision and quarter. ALKs are used for converting the length distribution of given aggregation level into an age distribution. The determination of sex and maturity stage is performed to produce maturity ogives for estimating the Spawning-stock biomass (SSB). The individual mass is used for calculating the mean mass per length class, to convert catch in weight into catch in numbers and the mean mass of age groups for calculating the SSB and total biomass. Apart from the mentioned purposes, there might be additional intention, identifying stock components and biological status of given population, e.g. fish body condition applying the Fulton´s formula: $k = (W \times 100)/L^3$.

If one the Baltic country realizes less than 5% of the total number of hauls made by all participants of the BITS survey in a given ICES subdivision, then collection of fish age samples is not necessary.

3.4.2 Methods

The fish samples are collected based on country, quarter and ICES subdivision stratification.

It is recommended that each Baltic country collect otoliths by each haul to ensure that sampled otoliths come from all parts of inspected ICES subdivisions.

The biological parameters like - length, weight, sex, sexual maturation, stomachs fullness and ageing (based on unique morphological structure of otoliths) should be realized at the same individuals to provide the relations between the different parameters.

Estimating individual/mean mass (weight)

After length measuring, the individual mass of each fish is weighed and recorded. If it is impossible to achieve the individual weight, the number and total mass of group of individuals with the same length are recorded to calculate the mean mass of the individuals in the length class. The mass (weight) is estimated by use of an electronic marine balance (scales). The mass (weight) is measured in grammes. A minimum of five specimens must be weighed although fewer specimens are used for ageing (collecting of otoliths).

Estimation of sex and maturity stage

The ventral part of each individual is cut open and the gonads are visually examined in order to estimate the sex, gonads development and stomach fullness. If the individual is mature or maturing, the sexes can easily be distinguished, but for immature individuals the task is difficult and special literature about the subject should be consulted; for Baltic cod and herring is suggested adequately: Tomkiewicz *et al.* (2002) and Bucholtz *et al.* (2008). More citation you can find in References and in Annexes 5 and 6.

In the same process, the maturity stage is determined according to the classification description of the different stages given in Annex 5 or according to the code practised on the national level. Fish maturity stages are reported to ICES database according to national maturity key (see Annex 6). The national codes are transferred into the ICES code in DATRAS.

Obtainment of otoliths and their preparation for fish age determination

Some helpful information how to effectively sample otoliths from various species can be found in the WGBIFS 2015 Report and for flounder is suggested to use the ICES Report of the second Workshop on Age Reading of flounder (WKARFLO; 2008).

The optimum number of otoliths per length class and ICES subdivision cannot be given in a universal form. A description of the optimum sample size of age readings and length measurements dependent on a universal cost function is given e.g. in Oeberst (2000) and Aanes and Vølstad (2015).

The analyses showed that the necessary number of age readings in a length class depends on:

- the share of the length class within the length frequency;
- the maximum variance of the portions of the age groups within the length class.

The table below gives the minimum number of otoliths by the length class, which must be collected and analysed for a given fish species per country, BITS survey and ICES subdivision, based on the length distribution.

Length class	Minimum number of age readings
With probably only one age group (age group 0, 1)	2 to 5
With probably more than one age group:	
Portion of the length class less than 5%	10
Portion of the length class more than 5%	20

In the case when potentially, more than one age group can occur in given length class following action is needed:

- for a given fish species, calculation of what is a numerical share in each individual length class vs. the total number of all specimens in all length classes - based on the last 1–3 surveys,
- based on the above, selection of portion (group) of length classes, in which the sum of number of fish constitute ca. 5% of the total number of fish in all length classes and then;
  - for those group of length classes below 5% of share, otoliths shall be taken from at least 10 specimens;
  - for those group of length classes above 5% of share, otoliths shall be taken from at least 20 individuals.

The above-mentioned approach can be explained on an example of the BITS-Q1/2017 survey:

Cod fished by Poland in the ICES Subdivision 26 with length ranged from 5 to 75 cm was represented overall in 71 length classes (denominator flexible over surveys) with 1-cm interval; from the set of samples, seven length classes was with frequency above 5%, and during the BITS survey from this group at least 20 specimens per each 1-cm class needs to be taken for ageing per country and ICES subdivision however, from each of remaining less numerous length classes at least 10 fish should be biologically analysed.

Because the collection of otoliths should be distributed over the whole survey time in the ICES subdivision, the actual length frequency of the survey can be used to choose the number of otoliths per length-class. If this is not possible, the length frequency from the last 1 to 3 surveys in the same subdivision and quarter should be used. The otoliths may be:

- Read during the survey, if proper facilities and experienced age readers are available on board; store the otoliths in ice-boxes, envelopes or other suitable containers, e.g. black plastic plates;
- Stored for later age determination in the coastal laboratory.

In both cases, the containers must be labelled with indication of: species, cruise number, date, haul number, ICES subdivision, and length class.

4 Environmental data

4.1 Purpose

Measurements of environmental parameters, which might influence the temporal and spatial distribution of the different fish species.

4.2 Methods

As minimum following hydrographical data should be collected at each catch-station:

- seawater temperature and salinity in the surface layer;
- seawater temperature, salinity, and oxygen content in the bottom layer.

The measurements of the above-mentioned hydrological parameters should be realized directly before each fishing station. The sampling procedure of the hydrographical data should be implemented according to the standards specified by the ICES. If possible, the CTD profiles from the surface to the bottom should be sampled. These data should be delivered to the ICES oceanographers and surface and bottom data should be uploaded to DATRAS as described in HH data format below.

5 Other standard data to be collected during BITS

5.1 Baltic cod stomachs sampling

5.1.1 Purpose

Baltic cod stomachs collected during the BITS surveys improve the basic knowledge concerning the species interactions in relation to the multispecies approach. The data are collected for multispecies assessment of Baltic fish species resources, using details information on predation intensity and preys species composition and distribution (WGSAM advice).

5.1.2 Methods

The materials collected at sea should originate from feeding fish showing no evidence of regurgitation and from non-feeding fish. A wide geographical coverage of samples should be obtained whenever possible. The Baltic cod stomachs fullness at various level and food components should be regularly investigated and recorded. The state of cod gall bladder should be also determined and recorded using the 4-stages scale described in Table 5.1.2. WGBIFS recommends the exchange format directly linked with fish stomachs sampling (Table 5.1.3). Detailed methodological description of Baltic cod stomach sampling and reporting can be found in the WGBIFS-2015 Report, incl. Addendum 1 (draft). Baltic cod stomachs sampling was implemented as the routine procedure by all countries during BITS surveys (BITS-Q1, BITS-Q4), starting from autumn 2015, however in some countries this type of sampling was initiated in the previous years. The above-mentioned additional task of BITS surveys was suggested by WGSAM, which should conduct the compilation of materials transferred by WGBIFS members and will to do further study. However, during the WGBIFS/2016 meeting, delegates decided that Baltic cod stomachs sampling and analysing the food components will be no longer internationally coordinated by the WGBIFS. The national laboratories can continue the Baltic cod stomachs sampling and analysing, based on their experiences, personal and financial possibilities.

5.1.2.1 Selection of cod stomachs at sea

Baltic cod sampled for stomachs analyses must be selected with care to obtain reliable data. The classification of stomachs is used to estimate the relative frequency of the occurrence of stomach content categories. The content of stomachs is estimated based on subsamples of cod with the categories 3–5. Stomachs samples of each 1-cm length classes should be selected randomly in the completely sampling unit. To assure random selection within size classes, and as additional single-fish data are needed anyways, it is recommended to use fish selected for single-fish data, otoliths and maturity sampling whenever possible.

5.1.2.2 Sampling procedure at sea

The WGBIFS recommends to all countries participating in the BITS-Q1 and BITS-Q4 surveys collecting Baltic cod stomachs every winter/spring and autumn for food spectrum and feeding intensity analyses, accordingly to the format agreed during the WGBIFS 2015 meeting. The sampling unit is the ICES subdivision. That means, that numbers of proposed samples given below have to be realized for each unit covered during the BITS surveys. The stomachs samples should be frozen individually in plastic bags. Group of stomachs collected in one bigger plastic bag for each haul, should be labelled with additional information attached (Table 5.1.1).

The follow basic procedures at sea should be obeyed during Baltic cod stomachs sampling:

- Sample randomly 10 cod stomachs per each 1-cm length class for cod ≥15 cm. Two individuals per haul are required for each 1-cm length class for cod <15 cm and whole individual should be frozen in the plastic bag including a label as mentioned above. No more than two stomachs may be taken per 1-cm length class per haul and day (an exception: in ICES subdivisions with few stations and/or low catches, a higher sampling frequency may be needed).
- The 10 stomachs per length class should be comprised of the categories (3) feeding, (4) empty or (5) containing only skeletal remains. Stomachs that are everted or showing evidence of regurgitation (categories 1 and 2) are not collected, but it should be noted how many stomachs were in these conditions. The sampling should continue until one stomach classified as either empty, containing only skeletal remains or feeding is obtained.
- Preserving stomachs samples by freezing. The stomach samples should be individually frozen in plastic bag with marked a label, which provides the link to individuals (haul number and fish ID) with their morphometric parameters and other relevant single-fish and environmental (CTD) data.
- The state of cod gall bladder should be determined and recorded.

5.1.2.3 Categorization of stomachs

The stomachs should be categorized as follows:

1. **Everted stomachs.** Some fish have everted stomachs. Since it is not known whether these stomachs contained food or not, such fish must not be used for stomach sampling.
2. **Regurgitated stomachs.** Some fish have regurgitated all or part of their stomach contents and these fish must not be collected for analyses. However, the number of regurgitated stomachs encountered during the examination must be recorded to ensure that the proportion of feeding fish in the sample is accurately defined. In practice, it is often difficult to detect whether regurgitation has taken place, but in situations where the stomach is flaccid or distended, but contains a small portion of food, experimental work by Robb (1992) indicates that the size of the gall bladder is a useful practical indicator of the recent feeding process of the fish. A large densely-coloured gall bladder indicates that a stomach has been empty for some time and has not recently lost its content by regurgitation. The criterions are summarized in Table 5.1.2 and should be applied when assessing whether a fish stomach should be classified as regurgitated or empty.
3. **Stomachs of feeding fish showing no signs of regurgitation**. These should be collected for analyses. It should be noted that not all feeding fish have grossly distended stomachs, i.e. feeding does not necessarily mean full.
4. **Empty stomachs** – no any traces of food items.
5. **Stomachs with only indigestible skeletal remains** (*polychaete* bristles, *mollusc* shells and *opercula*, fish bones and otoliths, etc).

5.1.2.4 Information to be sampled

The classified category must be recorded in the protocol together with the mandatory parameters like: total length in cm, weight in gramme, gutted weight in gramme and sex and the optional parameters, i.e. maturity stage, gonad weight in gramme, liver weight in grammes and age/otolith samples. The state of gall bladder should also be

recorded using the scale presented in Table 5.1.2. In addition, the cruise parameters ship, cruise number, haul number, data, ICES rectangle and species are required in the protocol. The results of the stomach analyses should be reported in exchange format structure, which is adapted to the DATRAS format.

5.1.2.5 General haul information

For each catch-station, the general information should be given; see the section 1 in the suggested exchange format (Table 5.1.3).

5.1.2.6 Single-fish (prey) data that needs to be collected

For each fish stomach, the following corresponding single-fish data should be collected (section 2 in Table 5.1.3):

Mandatory:

1. total length
2. weight
3. gutted weight
4. sex

Optional:

1. maturity stage
2. gonad weight
3. liver weight
4. age/otolith samples

For each prey in a given stomach the following information should be given:

Stomach samples are analysed individually and fish prey identified to species. Length of fish and crustacean prey is measured or estimated to nearest cm below (eggs are recorded as having length 0) and digestive stage is recorded. Invertebrates are identified to larger groups. Total prey weight and weight of individual prey (fish and crustaceans) or prey groups is recorded.

Measurement of fish and invertebrate prey lengths

Prey type	Length measure
Fish	Total length / standard length
Crab	Carapace width
Shrimp	Distance between bases of rostrum and uropods
Isopod (*Saduria entomon*)	Total length (excl. antennae); pleotelson for partially digested individuals

Table 5.1.1. Label to be included with fish stomach sample for each haul.

ICES stomach sampling programme
Ship
Cruise number
Haul number
Catch date
ICES rectangle
Species

Table 5.1.2. Condition of gall bladder and hindguts used to differentiate between empty and regurgitated stomachs.

Stage	Gall bladder	Bile colour	Hind gut	State
1	Shrunken, empty or with small amount of bile	Pale	Contains large amounts of bile and digested food material	Feeding*
2	Elongate	Pale green to light emerald green	Contains some bile and digested food particles	Feeding*
3	Elongate	Dark green	Empty or contains some food particles	Empty
4	Round	Dark blue	Empty	Empty

***If fish satisfying these criteria are found without food in their stomach they should be classified as regurgitated.**

WGBIFS recommends the exchange format presented in Table 5.1.3.

Table 5.1.3. Exchange format for fish stomach samples

Field number	Field name	Field type	Example	Comments	
Part A – summary of the haul					
1	Record_type	M	SS	Stomach sampling	
2	Year	M	2014		HH.Year
3	Month	M	03		HH.Month
4	Day	M	06		HH.Day
5	Quarter	M	1		HH.Quarter
6	Country	M	POL		HH.Country
7	Ship	M	BAL		HH.Ship
8	Trip number	M	22		
9	Haul_number	M	2	Sequential numbering by cruise	HH.Haul No.
10	Method	M	DEM	DEM = demersal trawl; PEL = pelagic trawl	
11	Square	M	41G9	ICES rectangle	HH.StatRec
12	Start time	M		UTC time	HH.TimeShot
13	Start position latitude	M			HH.Lat
14	Start position longitude	M			HH.Lon
15	Depth	M			HH.Depth
16	Remarks	M			
17	Temperature	M			HH.BotTemp
18	Salinity	M			
19	Oxygen content on the seabed	M			
Part B – data of individuals					
20	Predator_code	M	126436	Worms code	
21	Fish_ID*	M	1	Individual fish number	
22	Length**	M	33	in cm	CA.LengthClass
23	Weight	M	331.5	in grammes	CA.IndWgt

Field number	Field name	Field type	Example	Comments	
24	Gutted weight	M	280	in grammes	
25	Sex	M			CA.Sex
26	Gall_bladder_class	O		Table 2	
27	Maturity stage	O			CA.Maturity
28	Gonad weight	O			
29	Liver weight	O			
30	Age	O		data of single fish	
31	Stomach number with food	M	1		
32	Stomach number regurgitated	M	0		
33	Stomach number with skeletal remains	M	0		
34	Number_empty	M	0	data related to a sample of different individuals	
Part C – data of stomach content					
35	Prey_species_code	M	126425	Worms code	
36	Prey Latin name	M	*Sprattus sprattus*		
37	Prey size group code	M	E	E=1 cm groups, F=1 mm groups below 2 cm, 1 cm groups above 2 cm	
38	Prey_size	M	11		
39	Prey weight	M	9.9		
40	Prey_number	M	1		
41	Stage_of_digestion	M	1	0 = intact prey; 1 = partially digested prey; 2 = skeletal material	

***) Is not available in CA**

****) Length class code is missing, if different predator species are possible**

5.2 Marine litter sampling and reporting

5.2.1 Aim of the sampling

Systematically monitoring of the spatial and temporal distribution of marine litter in the Baltic Sea as one parameter of the Marine Strategy Framework Directive – can be source of the Baltic environment status evaluation in time and space (MSFD descriptor; Report of the joint MEDPOL/Black Sea/JRC/ICES Workshop on Marine Litters; WKMAL/2011). The about 300 fishing-stations, which are realized during BITS-Q1 and BITS-Q4 can be used to improve the sample intensity related to marine litter distribution.

5.2.2 Methods

WGBIFS at the meeting in 2015 agreed that since autumn 2015, the marine litter data will be collected during the BITS-Q1 and BITS-Q4 surveys as regular procedure obeyed by all participated countries. The standard protocol, which was developed for the IBTSWG was adapted for WGBIFS purposes and is used for the exchange of marine litter data sampled in the Baltic Sea (see also Annex 12). The running, indispensable information about sampling will be noticed by the cruise leader during surveying. Once collected, these data can be sending by each institutes delegate to the WGBIFS or by the marine litter co-coordinator. Standard form is accessible from the WGBIFS 2017 SharePoint site. Data submitters will transfer data using the DATRAS Trawl litter format, described in the suitable manual, downloadable here: http://www.ices.dk/marine-data/data-portals/Pages/DATRAS-Docs.aspx. Submitters will transfer the data using the new standard format specifically developed for DATRAS users, implementing ICES vocabulary and classification coding, or via the Litter Reporting Format (ERF3.2; *vide* Annex 12).

The sheet and description of the marine litter categories that need to be collected at each catch-station are attached. Each type of litter that is collected will be submitted in the format mentioned below (Table 5.2.1) and then uploaded to DATRAS. All data should be uploaded by haul, number, weight and size.

Table 5.2.1. Exchange format of marine litter data uploaded within the DATRAS structure.

Column	Column definition	Options	Mandatory	Format
RecordType	Record identification	"LT"	Yes	Fixed value "LT"
Quarter	Quarter	http://vocab.ices.dk/?ref=12	Yes	See options
Country	Country	http://vocab.ices.dk/?ref=4	Yes	See options
Ship	Ship	http://vocab.ices.dk/?ref=3	Yes	See options
Gear	Gear	http://vocab.ices.dk/?ref=2	Yes	See options
Survey	Survey type	http://vocab.ices.dk/?ref=102	Yes	See "datasets" abbreviations
Reserved1	Reserved field	report -9		
Reserved2	Reserved field	report -9		
StNo	Station number		Yes	National coding system, not defined by ICES.
HaulNo	Haul number		Yes	Sequential numbering by cruise
Year	Year		Yes	"1900-2099"
LTREF	Litter reference list	http://vocab.ices.dk/?ref=1381	Yes	"C-TS-REV"
PARAM	Parameter		Yes	
LTSZC	Litter size	http://vocab.ices.dk/?ref=1380	No	
UnitWgt	Weight units	Restricted units: g/haul, kg/haul, kg/km^2	*Yes*	Request other units from accessions@ices.dk
LT_Weight	Weight value		*Yes*	
UnitItem	Item units	Restricted units: items/haul, items/km^2	*Yes*	Request other units from accessions@ices.dk
LT_Items	Number of items		*Yes*	
LTSRC	Litter source	http://vocab.ices.dk/?ref=1382	No	See options

Column	Column definition	Options	Mandatory	Format
TYPPL	Type of polymer	http://vocab.ices.dk/?ref=1385	No	See options
LTPRP	Litter properties	http://vocab.ices.dk/?ref=1403	No	See options. Multiple options possible (separate multiple entries with "~" (ascii 126))
ERF3.2 format linkage		Values obtained from DATRAS	In DATRAS	
LATIT	Latitude	Shooting latitude	Yes	Shooting latitude in decimal degrees
LONGI	Longitude	Shooting longitude	Yes	Shooting longitude in decimal degrees
SDATE	Sampling date	Year/Month/Day	Yes	
STIME	Sampling time/start (UTC)	TimeShot	Yes	
ETIME	Sampling end time (UTC)	Calculated	No	
MXDEP	Maximum (lower) depth of gear (m).	Depth	Yes	in metres
		Default values		
MATRX	Matrix	http://vocab.ices.dk/?ref=56	No	Determined by gear
POSYS	Positioning system	http://vocab.ices.dk/?ref=40	No	"HLS"
PURPM	Purpose of Monitoring	http://vocab.ices.dk/?ref=42	No	"F"
MPROG	Monitoring Programme	http://vocab.ices.dk/?ref=147	No	"FS"

Arrangement should be adapted to the format of HH, etc. – new version of the format is provided by the ICES Secretariat at the website: http://www.ices.dk/marine-data/data-portals/Pages/DATRAS-Docs.aspx; "DATRAS Litter reporting format".

Categories to describe litter types are given in Table 5.2.2, and Table 5.2.3 proposed EXCEL data sheet to protocol marine litter of a catch-station.

Table 5.2.2. Categories of marine litter types.

CodeType	**C-TS-REV**		
A: Plastic	B: Metals	Related size category	
A1. Bottle	B1. Cans (food)	A: <5*5 cm= 25 cm^2	
A2. Sheet	B2. Cans (beverage)	B: <10*10 cm= 100 cm^2	
A3. Bag	B3. Fishing related	C: <20*20 cm= 400 cm^2	
A4. Caps/ lids	B4. Drums	D: <50*50 cm= 2500 cm^2	
A5. Fishing line (monofilament)	B5. appliances	E: <100*100 cm= 10000 cm^2= 1 m^2	
A6. Fishing line (entangled)	B6. car parts	F: >100*100 cm = 10000 cm^2= 1 m^2	
A7. Synthetic rope	B7. cables		
A8. Fishing net	B8. other		
A9. Cable ties			
A10. Strapping band			
A11. Crates and containers			
A12. Diapers			
A13. Sanitary towel/tampon			
A14. Other plastic			
C: Rubber	**D: Glass/ Ceramics**	**E: Natural products**	**F: Miscellaneous**
C1. Boots	D1. Jar	E1. Wood (processed)	F1. Clothing/ rags
C2. Balloons	D2. Bottle	E2. Rope	F2. Shoes
C3. bobbins (fishing)	D3. piece	E3. Paper/ cardboard	F3. other
C4. tyre	D4. other	E4. pallets	
C5. glove		E5. other	
C6. other			

Table 5.2.3. Proposal of EXCEL sheet to protocol marine litter data of BITS fishing-station.

Litter Record Sheet								
Cruise:	Station:				Date:			
Litter Type (A1; B2; C...)	Description (Label/ Brand)	Size category (A; B; C..)	Weight (kg)	Picture (number)	attached organisms (yes/no) Taxonomy Info	Comments (Item description if other under litter type)		

6 Estimation of stock indices

6.1 Stock indices

Following notations are used for describing the algorithms.

$C_{l,h,s,t}$ denotes the catch per hour of species with length l, in haul h of strata s captured with trawl type t. The number of trawl stations in strata s is denoted by n_s, and A_s denotes the area of strata s.

The calculation of $C_{l,h,s,t}$ is described at DATRAS website of ICES http://www.ices.dk/marine-data/data-portals/Pages/DATRAS-Docs.aspx, BITS index calculation procedure.

Conversion factors for cod were estimated based on inter-calibration experiments to combine the cpue values of different gears (Anon, 2001a; ICES, 2002; Oeberst and Grygiel, 2002, 2004; Lewy *et al.*, 2004).

The recent used conversion factors are given at following the ICES website: http://www.ices.dk/marine-data/data-portals/Pages/DATRAS-Docs.aspx; Calculation procedures and relevant documents – BITS fishing power (TVL) based on Oeberst (2013).

The conversion factors ($conf_t$) are used to transform the cpue values of trawl type t in standard cpue's which are expressed in units of the larger TVL.

$$C_{l,h,s} = c_{l,h,s,t} * conf_t$$

Different ways are possible the aggregate the data of the hauls in stock indices by age group and ICES subdivision. One option is that $C_{l,h,s}$ are transformed in cpue by age group for each haul $C_{a,h,s}$. where a denotes age group. Then the means by depth layers and ICES subdivision are estimated. Second way, which is described here, estimates the mean of cpue by length for depth layer and ICES subdivision. The mean length frequency of the stock in ICES subdivision is then transformed in stock indices by age groups. Both ways estimate the same stock indices.

Using the $C_{l,h,s}$ the mean standardized cpue of species with length l in strata based on ns hauls by depth layers is estimated.

$$\overline{C}_{l,s} = \frac{1}{n_s}\sum_{k=1}^{n_s} C_{l,k,s}$$

The stratified mean of ICES subdivision by length class ($\hat{C}_{st,l}$) uses the areas of the strata (depth layer) as weighting factors and can be calculated by:

$$\hat{C}_{st,l} = \frac{1}{\sum_s A_s}\sum_s A_s \overline{C}_{l,s}$$

.

$\hat{C}_{st,l}$ presents the length distribution of the stock in ICES subdivision.

The variance (V) of $\hat{C}_{st,l}$ can be estimated by:

$$V(\hat{C}_{st,l}) = \frac{1}{(\sum_s A_s)^2}\sum_s A_s^2 V(\overline{C}_{l,s})/n_s$$

where, $V(\overline{C}_{l,s})$ presents the variance of the cpue values by length interval in strata s.

The mean length frequency in ICES subdivision can then be transformed in cpue values by age group using the data of ALK key.

X_{la} may be the number of aged individuals with length l and age a and

$X_{l.} = \sum_a X_{ja}$ denotes the total number of individuals aged in length class l.

Proportion of age group in the stock can be estimated by

$$p_a = \sum_l \frac{\hat{C}_{st,l}}{\sum_l \hat{C}_{st,l}} \frac{X_{la}}{\sum_j X_{la}}$$

Stock index of age group a, C_a, is estimated by

$$C_a = p_a \sum_l \hat{C}_{st,l}$$

C_a is biased in cases where $\hat{C}_{st,l} > 0$ for length class l and age data are not available for this length class ($X_{la} = 0$ for all a). Relative age frequencies in length classes without age data cannot be estimated due to missing data. Method to approximate the missing relative age frequencies based on available data of other length classes was discussed and agreed during WGBIFS in 2014 (Oeberst, 2014a). The method was supported by WGBFAS in the same year. It was suggested that the method should be implemented in DATRAS.

6.2 Weight-at-age

Weight of individuals, which is stored in CA data, is used to estimate the mean weight-at-age, where weight samples are stratified by the length class. Mean weights per length class is required for converting the length based cpue for selected aggregation level x, like depth layer of ICES subdivision (as depth layer or ICES subdivision) into mean weight-at-age (ICES, 2002).

$\overline{W}_{l,a}$ - donates the mean weight of individuals in length class l with age a based on CA data. Missing mean weights of length class where $\overline{C}_{X,l}$ exist are substituted by the length-weight relationship of the corresponding data.

$$W = kL^b$$

where, *k* and *b* denote the parameter of the length-weight relationship (Oeberst, 2014a).

Mean weight-at-age, $\overline{W}_a$, of the aggregation level is calculated by

$$\overline{W}_a = \frac{\sum_l \overline{W}_{a,l} * \overline{C}_{X,l}}{\sum_l \overline{C}_{X,l}}$$

6.3 Maturity-at-age

The maturity ogive is calculated as the fraction of mature fish at age group for selected aggregation level, X, (depth layer or ICES subdivision). Mean fraction of matured fish per length class of individuals must be used for converting the length distribution of

the cpue on a given aggregation level, X into mean fraction of matured individuals at age (ICES, 2002).

In the DATRAS system, the maturity stages have different code, which were changed over time. Maturity stages from 1 to 5 was used until 2003. New codes were defined in 2004 with 61 to 66. Direct relations were possible between stage 1 and 61, stage 2 and 62 etc., but, stage 66 was added (Annex 5). Both codes were parallel used until 2009. Since 2010, it has been possible to upload national code of fish maturation scale to DATRAS. Tables to transfer national codes of maturity into the ICES code system 61–66 are given in Annex 6. The codes from 61 to 66, where 61 - is immature and 62 - resting, 63–65 are different stages of mature fish, 66 - fish with abnormal gonads development, e.g. because of diseases, atresia or intersexes. To create maturity ogive, the codes 61 to 66 is transferred into a two aggregated codes – mature (M) and immature (I) (Annex 5).

$N_{M,l,a,s}$ - denotes the number of matured individuals in length class l with age *a* and sex *s* and $N_{I,l,a,s}$ - denotes the number of immature individuals in the same length class and age group with the same sex.

The fraction of matured individuals by length class, age group and sex can be estimated by

$$p_{M,l,a,s} = \frac{N_{M,l,a,s}}{N_{M,l,a,s} + N_{I,l,a,s}}$$

Relative proportion of spawners in length classes without age and maturity data cannot be estimated due to missing data in some cases. Method to approximate the missing relative proportion of spawner based on available data of other length classes was discussed and agreed during the WGBIFS and WGBFAS meetings in 2014 (Oeberst, 2014b).

The fraction of matured age group for a given aggregation level X, $p_{M,X,a,s}$ can be calculated by:

$$p_{M,X,a,s} = Ogive_{M,X,a,s} = \frac{\sum_l p_{M,X,l,a,s}\overline{C}_{X,l}}{\sum_l C_{X,l}}$$

Selections:

__Year
__Survey
__Aggregation level (depth layer or ICES subdivision)
__Species

7 Exchange specifications for the Baltic International Trawl Survey data

Data of BITS are used for estimating different fish stock indices and stock parameters, particularly for the Baltic cod and flatfish. For this purpose, DATRAS system was developed which stores the sampled data, checks the data quality by screening tools and estimates different stock parameters. It was agreed by WGBIFS in 2009 that participating countries submit all data in DATRAS exchange format to the ICES Data Centre. The recent version of the structure of all data is given at the ICES website: https://datras.ices.dk/Data_products/ReportingFormat.aspx. Links to explanations of the fields are added.

7.1 Deadlines of reporting

It was agreed that data should be submitted to the following deadlines:

Data	Deadlines
Preliminary data 1q (HL and CA records mostly for cod, flounder, herring, sprat)	Before WGBFAS meeting in April
Final data from Q1	1 June
Final data from Q4	1 April

The option of submitting preliminary data of the first quarter survey was made available to support the Baltic Fisheries Assessment Working Group (WGBFAS) with most updated data. In some cases, it is not possible to prepare final version of the data because the surveys ended late in March and the ICES WGBFAS begin meeting in the first days of April next year. However, it is pointed out that final data should be available until the agreed deadline.

7.2 Screening of data

Before the data file (in ASCII coding) is submitted to the ICES Secretariat (ICES Data Centre), they are checked by the screening procedures of the DATRAS system in order to verify and provide information about quality of the data file. The screening produces are described at the ICES Secretariat website: http://www.ices.dk/marine-data/Documents/DATRAS/How_to_upload_data_to_DATRAS.pdf. The detailed description of the procedures including guidelines how to upload the BITS data to the DATRAS database are accessible in separate document "DATRAS Guidelines Document – How to upload data to DATRAS. A short step-by-step guide with pictures", prepared by the ICES Secretariat Data experts. After the submitted survey data passes the screening utility, then can be uploaded to DATRAS located on the own home page and next select "Upload survey data". The maximum capacity of the data file selected to screen can have of 6 Mb's memory.

Furthermore, the CA data should be screened based on ICES and additional agreed tools, which are defined by WGBIFS.

7.3 Format of data

Three distinct types of computer records are defined for standard storage of the DATRAS data:

- HH: Record with detailed haul information;
- HL: Length frequency data;
- CA: Sex-maturity-age–length keys (SMALK's) for ICES subdivision.

The detailed formats of these three record types are given in Sections 7.4.1-7.4.3 of the present manual. For the reference, codes please check the ICES website: https://datras.ices.dk/Data_products/ReportingFormat.aspx

Details of environmental data should be submitted to the Hydrographic Service of ICES according to established procedures. The national hydrographical station number should be reported in record type HH to allow the link to be made between haul data and environmental data.

7.4 File structure and name

When delivering the data to the ICES Secretariat, one file should only contain data from one year and one survey (e.g. 02POL15) in csv format. Available data of one year and one survey are deleted in DATRAS, if data of the same year and survey are uploaded again. It is not possible to add data of a year and survey to available datasets in DATRAS.

The records must be ordered in such a way that each record of TYPE HH be followed by all records of TYPE HL of the same haul, ordered by species. The number and kind of species recorded must agree with the species recording code as specified in record TYPE HL. For examples of the various fish species codes (Annex 11). The DATRAS accepts WoRMS AphiaID codes only, and TSN or NODC codes are not valid.

Records of TYPE CA should follow at the end of the file after the last species record of TYPE HL for the last haul.

7.4.1 File preparation

Make sure that the following rules apply to your data file.

- Each data file name has a unique combination of country, vessel, fishing gear, year, and quarter references;
- A valid file should contain at least two record types:
  - HH – Haul Information
  - HL – Length based information; and, when applicable, a third record type
  - CA – Age based information
- The data should be compiled in a comma-separated file (CSV);
- Each record is reported in a separate line, no empty lines or lines with headers are allowed;
- Every record should have the amount of fields as defined in the survey format. So make sure that the data file complies with the survey format;
- Each field is separated by commas, while decimal values are reported with points;
- Do not report empty fields, use '-9' for the absent values. For fields-specific information like data type, species codes, etc. refer to DATRAS FAQ documentation.

7.4.2 Record type HH

The different fields of HH record type are described below. Links to detailed descriptions of the fields can be found at the ICES website: https://datras.ices.dk/Data_products/ReportingFormat.aspx is marked by underline. Detailed descriptions are also given at the ICES website: http://vocab.ices.dk/?CodeTypeRelID=1&CodeID=33964

Mandatory Record HH - Haul Information, fields are separated by comma

Field	Start	Width	Mandatory	Key	Range	Comments, unit, ICES website	Example
RecordType	1	2	✓	char	HH	Fixed value: HH	HH
Survey[1]							
Quarter	2	1	✓	int	1 to 4		1
Country	3	3	✓	char	See Annex 8	TS_Country	GFR
Ship	4	4	✓	char	See Annex 8	TS_Ship	SOL
Gear	5	6	✓	char	See Annex 9	Gear	TVS
SweepLngt	6	3		int	0 to 999.0		-9
GearExp	7	2		char		TS_GearExp	S
DoorType	8	2		char		TS_DoorType	-9
StNo	9	6	✓	char		Coding system of Tow Database	22 005
HaulNo	10	6	✓	int	1 to 999	Sequential numbering by cruise	1
Year	11	4	✓	char	1900 to 2099		2008
Month	12	2	✓	Int	1 to 12.0		11
Day	13	2	✓	Int	1 to 28/29/30/31		12
TimeShot	14	4	✓	char	0001 to 2400	In UTC	0830
Stratum	15	4		char		TS_DepthStratum	-9
HaulDur	16	3	✓	int	0 to 90*)	In minutes	30
DayNight	17	2	✓	char	D, N	TS_DayNight (link tolNOAA website)	D
ShootLat	18	8	✓	decimal4	53.0000 to 66.0000	Shooting latitude in decimal degrees	54.6248
ShootLong	19	9	✓	decimal4	9.0000 to 30.0000	Shooting longitude in decimal degrees	10.7238
HaulLat	20	8	✓	decimal4	53.0000 to 66.0000	Hauling latitude in decimal degrees	54.6052

Field	Start	Width	Mandatory	Key	Range	Comments, unit, ICES website	Example
HaulLong	21	9	✓	decimal4	9.0000 to 30.0000	Hauling longitude in decimal degrees	10.7532
StatRec	22	4		char	See Annex 1		36G0
Depth	23	4	✓	int	5 to 300, -9	Depth from surface in metres, -9 = not known	18
HaulVal	24	1	✓	char	I, V[1], N[1], C, A, M [1] used for estimating cpue	Invalid = I, Valid = V or no oxygen = N, C = calibration, A = additional haul, M = pelagic haul TS_HaulVal	V
HydroStNo	25	8	✓	char		Station No. as reported to the ICES hydrographer	22 005
StdSpecRecCode	26	1	✓	char	See Annex 10	Use position 26 for standard and 27 for bycatch codes TS_StdSpecRecCode	1
BycSpecRecCode	27	1	✓	char		TS_BySpecRecCode	1
DataType	28	2	✓	char		TS_DataType	R
Netopening	29	4		decimal1	1.5 to 10.0	in metre	-9
Rigging	30	2		char		*Not used in this format*	-9
Tickler	31	2		int		*Not used in this format*	-9
Distance	32	5		int	0 to 9999.0	Distance towed over ground (m)	2896
Warplngt	33	4		int	75 to 999	in metre	100
Warpdia	34	2		int	10.0 to 60.0	in millimetre	-9
WarpDen	35	2		int	0.50 to 2.00	See BITS manual	-9
DoorSurface	36	4		decimal1	1.0 to 10.0	in square metre	-9
DoorWgt	37	4		int	50 to 2000	in kilogramme	-9
DoorSpread	38	5		decimal1	48 to 180	in metre	-9
WingSpread	39	4		decimal1	12 to 30		-9

Field	Start	Width	Mandatory	Key	Range	Comments, unit, ICES website	Example
Buoyancy	40	4		int	50 to 220	in kilogramme	-9
KiteDim	41	3		decimal1	0.5 to 2.0	in square metre	-9
WgtGroundRope	42	4		int	0.0 to 800.0	in kilogramme	-9
TowDir	43	3		int	1 to 360, 999	999 = varying	148
GroundSpeed	44	3		decimal1	2.0 to 6.0	ground speed of trawl in knots	-9
SpeedWater	45	3		decimal1	1.0 to 9.0	trawl speed through in knots	-9
SurCurDir	46	3		int	0 to 360	Slack water = 0	-9
SurCurSpeed	47	4		decimal1	0.0 to 10.0	metre per sec	-9
BotCurDir	48	3		int	0 to 360	slack water = 0	-9
BotCurSpeed	49	4		decimal1	0.0 to 10.0	metre per sec	-9
WindDir	50	3		int	0 to 360, 999	0 = calm, 999 = varying	273
WindSpeed	51	3		int	0 to 100	metre per sec	6
SwellDir	52	3		int	0 to 360.		-9
SwellHeight	53	4		decimal1	0.0 to 25.0	in metre	-9
SurTemp	54	4	✓	decimal1	-1.0 to 30.0	in °C	11.0
BotTemp	55	4	✓	decimal1	-1.0 to 20.0	in °C	12.5
SurSal	56	5	✓	decimal2	5.00 to 30.00	in PSU	18.43
BotSal	57	5	✓	decimal2	5.00 to 30.00	in PSU	24.31
ThermoCline	58	2		char		TS_ThermoCline	-9
ThClineDepth	59	4		int	5 to 100	in metre	-9
DateofCalculation[1]							

***) 15 to 90 minutes if the validity code is "V". Zero minutes if the haul validity is "N". Zero to 90 minutes if haul validity is "I".**

1 Added by DATRAS during download of data

7.4.3 Record type HL

Mandatory Record HL - Length frequency distribution, fields are separated by comma

Field	Start	Width	Mandatory	Key	Range	Comments ICES website	Example
RecordType	1	2	✓	char	HL	Fixed value: HL	HL
Survey[1]							
Quarter	2	1	✓	int	1.0 to 4.0		4
Country	3	3	✓	char	See Annex 8	TS_Country	GFR
Ship	4	4	✓	char	See Annex 8	TS_Ship	SOL
Gear	5	6	✓	char	See Annex 9	Gear	TVS
SweepLngt	6	3		int	0 to 999		-9
GearExp	7	2		char		TS_GearExp	S
DoorType	8	2		char		TS_DoorType	-9
StNo	9	6	✓	char			22 005
HaulNo	10	6	✓	int	1 to 999		5
Year	11	4	✓	char	1900 to 2099		2008
SpecCodeType	12	1	✓	char	T	T – TSN code TS_SpecCodeType	T
SpecCode	13	10	✓	char	See Annex 12	Official TSN code	161 722
SpecVal	14	2	✓	char	See Annex 11	TS_SpecVal	1
Sex	15	2		char	F, M, U, -9	Male = M, Female = F, Unsexed = U, -9 = un-known, TS_Sex	-9
TotalNo	16	10		decimal2	1.00 to 9999999.00	No specimen caught per hour	56
CatIdentifier	17	2	✓	int	1 to 5		1
NoMeas	18	4	✓	int	1 to 5000		56
SubFactor	19	9	✓	decimal4	1.0000 to 1000.0000	Raising factor*)	1

SubWgt	20	6		Int	0 to 500000.0		-9
CatCatchWgt	21	8	✓	Int	0 to 99999999		839
LngtCode	22	2	✓	char	., 0, 1, 9	-9 – missing value, . 1mm, 0–0.5 cm, 1–1cm TS_LngtCode	0
LngtClass	23	4	✓	Int	1 to 999	Identifier of lower bound of length distribution, e.g. 65–70 cm = 65 For classes less than 1 cm there will be an implied decimal point after the second digit, e.g. 30.5–31.0 cm = 305	105
HLNoAtLngt	24	10	✓	Decimal2	1.00 to 999999.00	Length classes with zero catch should be excluded from the record (no/hour equals the sum of no at length).	1
DateofCalculation[1]							
Valid_Aphia[1]							

***) raising factor for converting catch of subsample into total catch**

[1] Added by DATRAS during download of data

7.4.4 Record type CA

Optional Record CA - SMALK, fields are separated by comma

Field	Start	Width	Mandatory	Key	Range	Comments ICES website	Example
RecordType	1	2	✓	char	CA	Fixed value: CA	CA
Survey[1]							
Quarter	2	1	✓	int	1 to 4		1
Country	3	3	✓	char	See Annex 8	TS_Country	GFR
Ship	4	4	✓	char	See Annex 8	TS_Ship	SOL
Gear	5	6	✓	char	See Annex 9	Gear	TVS
SweepLngt	6	3		int	0 to 999, Standard = 75		-9
GearExp	7	2		char		TS_GearExp	S
DoorType	8	2		char		TS_DoorType	-9
StNo	9	6	✓	char			22 005
HaulNo	10	6	✓	int	1 to 999		5
Year	11	4	✓	char	1900 to 2099		2008
SpecCodeType	12	1	✓✓	char	T	TS_SpecCodeType	T
SpecCode	13	10	✓	char	See Annex 12	Official TSN code	161 722
AreaType	14	2	✓	char	-9, 0, 4	-9 – not provided, 0 – ICES statistical rectangle, 4 – Baltic ICES subdivision, TS_AreaType	0
AreaCode	15	5	✓	char			37G0
LngtCode	16	2	✓	char	-9, ., 0, 1	-9 – missing value, . 1mm, 0–0.5 cm,	1

						1–1cm TS_LngthCode	
LngtClass	17	4	✓	int	1 to 999	Identifier of lower bound of length distribution, e.g. 65–70 cm = 65 For classes less than 1 cm there will be an implied decimal point after the second digit, e.g. 30.5–31.0 cm = 305	27
Sex	18	2	✓	char	-9, M, F, U	-9 – unknown, M – Male, F – Female, U – Unsexed TS_Sex	F
Maturity*)	19	4	✓	char	-9, 1 to 6	-9 – missing value and Annex 1, TS_Maturity	5
PlusGr	20	2		char	+, -9	Plus group = +, else -9 TS_PlusGR	-9
AgeRings	21	3	✓	int	0. to 99, -9	Unknown age =-9	5
CANoAtLngt	22	3	✓	int	1 to 999		1
IndWgt	23	5		Decimal1	1.0 to 99999.0	The mean weight of the number of fish in the record (in gramme).	238
DateofCalculation[1]							
Valid_Aphia[1]							

[1] Added by DATRAS during download of data

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Annex 1: Baltic Sea with ICES subdivisions and rectangles codes

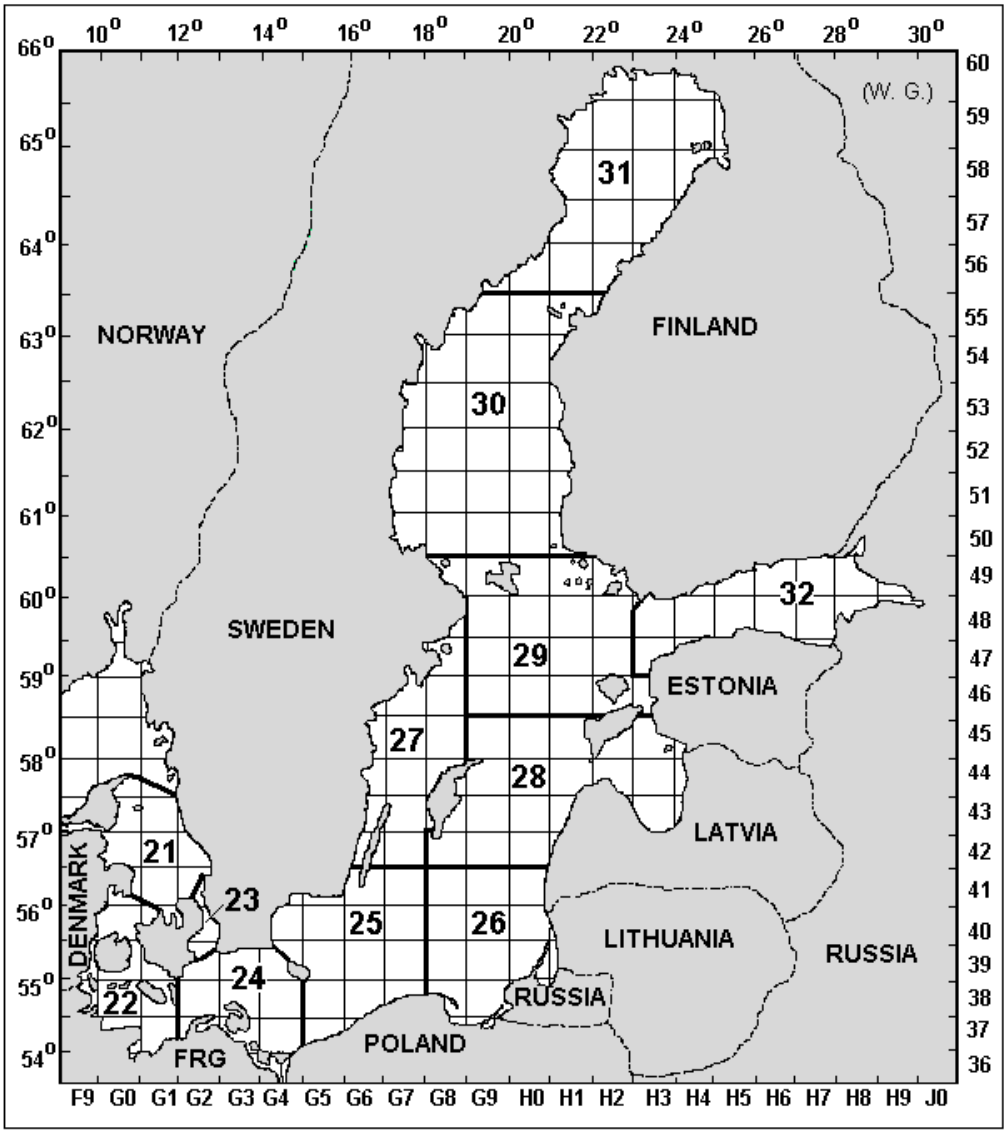


Figure 1.1. The ICES subdivisions border and ICES rectangles codes in the Baltic Sea. On the x-axis (e.g. G4, G5) are rectangle coordinates in longitude dimension at 1° intervals and on the right y-axis (e.g. 38, 39) are rectangle coordinates in latitude dimension at 0.5° intervals. Thus, rectangles are named e.g. 38G4, 39G5; remark - borders of the ICES Subdivision 21 are not fixed so far.

Annex 2: Areas in nm² by 10-m depth layer and rectangle

Strata	SD 21	44G0	44G1	43G0	43G1	43G2	42G0	42G1	42G2	41G0	41G1	39G0
Depth interval												
total	**6123.3**	**233.7**	**612.6**	**507.4**	**926.1**	**143.9**	**662.3**	**980.3**	**647.0**	**62.2**	**993.3**	**354.4**
0–9	**1166.6**	12.8	79.0	278.0	214.2	35.7	355.3	92.1	37.3	13.3	31.1	17.8
10–19	**1677.5**	39.5	44.8	143.9	121.2	37.9	307.0	438.6	154.6	41.1	298.9	50.0
20–29	**1419.5**	100.3	12.8	46.5	77.9	27.0	0.0	182.0	198.5	7.8	575.6	191.1
30–39	**846.8**	75.8	81.1	31.4	109.3	15.1	0.0	196.3	162.3	0.0	83.3	92.2
40–49	**467.7**	5.3	120.6	7.6	168.8	16.2	0.0	58.1	83.3	0.0	4.4	3.3
50–59	**255.1**	0.0	106.7	0.0	123.3	11.9	0.0	3.3	9.9	0.0	0.0	0.0
60–69	**100.1**	0.0	43.8	0.0	50.8	0.0	0.0	4.4	1.1	0.0	0.0	0.0
70–79	**79.4**	0.0	47.0	0.0	30.3	0.0	0.0	2.2	0.0	0.0	0.0	0.0
80–89	**46.1**	0.0	28.8	0.0	16.2	0.0	0.0	1.1	0.0	0.0	0.0	0.0
90–99	**32.1**	0.0	23.5	0.0	7.6	0.0	0.0	1.1	0.0	0.0	0.0	0.0
100–150	**32.1**	0.0	24.5	0.0	6.5	0.0	0.0	1.1	0.0	0.0	0.0	0.0
> 150	**0.0**	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

strata	SD 22	41G0	40F9	40G0	40G1	39F9	39G0	39G1	38F9	38G0	38G1	37G0	37G1	36G0
Depth interval														
total	**5162.8**	**186.7**	**90.0**	**790.1**	**282.5**	**263.3**	**338.6**	**412.7**	**90.0**	**928.1**	**528.7**	**278.1**	**820.2**	**153.7**
0–9	**1489.5**	32.2	21.4	238.6	117.1	83.2	99.2	161.9	27.7	166.2	334.8	72.4	99.3	35.5
10–19	**2132.9**	55.6	67.5	327.5	159.8	91.2	142.5	206.3	30.0	417.9	105.0	171.8	243.0	114.7
20–29	**1436.9**	94.4	1.1	184.6	4.5	84.4	90.1	31.9	32.3	312.8	85.4	33.9	477.9	3.5
30–39	**92.3**	3.3	0.0	32.6	1.1	4.6	6.8	9.1	0.0	31.2	3.5	0.0	0.0	0.0
40–49	**10.1**	1.1	0.0	6.8	0.0	0.0	0.0	2.3	0.0	0.0	0.0	0.0	0.0	0.0
50–59	**0.0**	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
60–69	**1.1**	0.0	0.0	0.0	0.0	0.0	0.0	1.1	0.0	0.0	0.0	0.0	0.0	0.0
70–79	**0.0**	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
80–89	**0.0**	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
90–99	**0.0**	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
100–150	**0.0**	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
> 150	**0.0**	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

strata	SD 23	41G2	40G2	39G2
Depth interval				
total	**896.5**	**186.7**	**384.9**	**324.9**
0–9	**319.2**	32.2	200.3	86.6
10–19	**403.4**	55.6	165.5	182.4
20–29	**166.1**	94.4	15.8	55.9
30–39	**6.7**	3.3	3.4	0.0
40–49	**1.1**	1.1	0.0	0.0
50–59	**0.0**	0.0	0.0	0.0
60–69	**0.0**	0.0	0.0	0.0
70–79	**0.0**	0.0	0.0	0.0
80–89	**0.0**	0.0	0.0	0.0
90–99	**0.0**	0.0	0.0	0.0
100–150	**0.0**	0.0	0.0	0.0
> 150	**0.0**	0.0	0.0	0.0

strata	SD 24	39G2	39G3	39G4	38G2	38G3	38G4	37G2	37G3	37G4
Depth interval										
total	**6509.3**	**430.9**	**819.7**	**598.5**	**948.9**	**939.6**	**1038.9**	**266.4**	**461.5**	**1004.9**
0–9	**785.4**	88.9	31.9	21.7	85.4	78.5	2.3	92.3	271.1	113.3
10–19	**2461.5**	205.2	76.4	83.2	557.5	99.3	255.1	136.7	182.3	865.8
20–29	**1091.3**	127.7	114.0	63.8	252.8	170.8	292.0	37.4	8.2	24.5
30–39	**621.4**	9.1	176.7	65.0	49.6	152.4	167.4	0.0	0.0	1.2
40–49	**1396.6**	0.0	420.7	328.3	3.5	438.6	205.5	0.0	0.0	0.0
50–59	**124.3**	0.0	0.0	28.5	0.0	0.0	95.8	0.0	0.0	0.0
60–69	**28.8**	0.0	0.0	8.0	0.0	0.0	20.8	0.0	0.0	0.0
70–79	**0.0**	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
80–89	**0.0**	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
90–99	**0.0**	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
100–150	**0.0**	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
> 150	**0.0**	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

strata	**SD 25**	41G4	41G5	41G6	41G7	40G4	40G5	40G6	40G7	39G4	39G5	39G6	39G7	38G5	38G6	38G7	37G5	37G6
Depth interval																		
total	**12615.9**	**113.3**	**307.8**	**876.7**	**1000.0**	**747.4**	**1013.0**	**1013.0**	**1013.0**	**249.7**	**986.1**	**1026.0**	**1026.0**	**1038.9**	**940.8**	**475.6**	**657.8**	**130.9**
0 - 9	**332.5**	41.1	88.9	88.9	0.0	39.4	1.1	0.0	0.0	2.3	4.6	0.0	0.0	1.2	10.4	20.8	24.5	**9.3**
10 - 19	**1110.7**	21.1	57.8	132.2	26.7	122.7	7.9	0.0	63.0	2.3	4.6	8.0	0.0	3.5	188.2	118.9	289.8	**64.3**
20 - 29	**1324.6**	20.0	61.1	101.1	140.0	135.1	11.3	0.0	115.9	11.4	6.8	51.3	0.0	4.6	207.8	277.0	140.2	**40.9**
30 - 39	**2096.5**	31.1	82.2	250.0	358.9	86.7	88.9	185.7	318.5	10.3	9.1	67.3	78.7	33.5	301.3	58.9	119.2	**16.4**
40 - 49	**1749.4**	0.0	17.8	128.9	231.1	162.1	221.7	261.1	118.2	36.5	18.2	78.7	183.5	86.6	151.2	0.0	53.7	**0.0**
50 - 59	**1504.4**	0.0	0.0	96.7	184.4	70.9	139.6	174.5	129.4	47.9	34.2	109.4	189.2	249.3	48.5	0.0	30.4	**0.0**
60 - 69	**1531.6**	0.0	0.0	72.2	57.8	46.1	180.1	171.1	243.1	53.6	49.0	199.5	119.7	322.1	17.3	0.0	0.0	**0.0**
70 - 79	**1505.4**	0.0	0.0	6.7	1.1	75.4	228.5	197.0	24.8	73.0	169.9	249.7	239.4	223.9	16.2	0.0	0.0	**0.0**
80 - 89	**797.5**	0.0	0.0	0.0	0.0	9.0	115.9	23.6	0.0	12.5	212.0	158.5	151.6	114.3	0.0	0.0	0.0	**0.0**
90 - 99	**638.2**	0.0	0.0	0.0	0.0	0.0	18.0	0.0	0.0	0.0	457.1	103.7	59.3	0.0	0.0	0.0	0.0	**0.0**
100 - 150	**25.1**	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20.5	0.0	4.6	0.0	0.0	0.0	0.0	**0.0**
> 150	**0.0**	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**

strata	SD 26	41G8	41G9	41H0	41H1	40G8	40G9	40H0	40H1	39G8	39G9	39H0	39H1	38G8	38G9	38H0	37G8	37G9
Depth interval																		
total	**10967.1**	**1000.0**	**1000.0**	**982.2**	**15.6**	**1013.0**	**1013.0**	**1013.0**	**69.8**	**1026.0**	**1026.0**	**877.8**	**11.4**	**698.4**	**922.3**	**40.4**	**107.5**	**150.7**
0–9	**218.0**	0.0	0.0	37.8	8.9	0.0	0.0	4.5	28.1	0.0	0.0	11.4	4.6	60.0	21.9	9.2	18.7	12.9
10–19	**475.3**	2.2	0.0	123.3	6.7	0.0	0.0	28.1	14.6	0.0	0.0	46.7	4.6	110.8	50.8	23.1	46.7	17.5
20–29	**713.9**	85.6	0.0	157.8	0.0	0.0	0.0	48.4	27.0	4.6	0.0	177.8	2.3	121.2	48.5	8.1	15.2	17.5
30–39	**1189.8**	142.2	0.0	355.6	0.0	0.0	0.0	208.2	0.0	25.1	2.3	274.7	0.0	78.5	68.1	0.0	11.7	23.4
40–49	**674.0**	78.9	7.8	81.1	0.0	0.0	0.0	203.7	0.0	17.1	9.1	177.8	0.0	35.8	32.3	0.0	5.8	24.5
50–59	**844.5**	72.2	95.6	101.1	0.0	39.4	65.3	206.0	0.0	36.5	17.1	101.5	0.0	31.2	54.3	0.0	7.0	17.5
60–69	**966.4**	32.2	137.8	58.9	0.0	85.5	182.3	141.8	0.0	69.5	76.4	66.1	0.0	46.2	38.1	0.0	2.3	29.2
70–79	**944.4**	47.8	63.3	36.7	0.0	68.7	194.7	100.2	0.0	148.2	102.6	17.1	0.0	39.2	117.7	0.0	0.0	8.2
80–89	**1488.2**	48.9	54.4	18.9	0.0	168.8	328.7	72.0	0.0	438.9	204.1	4.6	0.0	45.0	103.9	0.0	0.0	0.0
90–99	**1383.4**	104.4	61.1	10.0	0.0	210.5	192.5	0.0	0.0	283.9	336.3	0.0	0.0	71.6	113.1	0.0	0.0	0.0
100–150	**2069.2**	385.6	580.0	1.1	0.0	440.1	49.5	0.0	0.0	2.3	278.2	0.0	0.0	58.9	273.6	0.0	0.0	0.0
> 150	**0.0**	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

strata	SD 27	42G6	42G7	43G6	43G7	43G8	44G6	44G7	44G8	45G6	45G7	45G8	46G6	46G7	46G8	47G8
Depth interval																
total	**8826.6**	**427.7**	**986.9**	**389.5**	**945.6**	**189.3**	**331.9**	**960.5**	**435.4**	**194.7**	**947.2**	**947.2**	**78.2**	**598.1**	**915.9**	**478.6**
0–9	**1014.8**	150.2	0.0	108.2	26.0	66.0	121.7	0.0	8.5	117.9	28.4	0.0	36.5	121.9	28.1	201.4
10–19	**700.5**	111.8	0.0	60.6	45.4	53.0	61.9	1.1	10.7	42.1	36.8	0.0	28.1	102.1	28.1	118.6
20–29	**525.3**	31.8	3.3	114.7	41.1	30.3	44.8	1.1	11.7	20.0	46.3	0.0	8.3	91.7	20.8	59.3
30–39	**415.7**	23.0	14.3	70.3	47.6	38.9	27.7	3.2	8.5	10.5	33.7	1.1	4.2	74.0	20.8	37.8
40–49	**538.2**	23.0	24.1	32.5	92.0	1.1	55.5	24.5	18.1	4.2	92.6	13.7	1.0	75.0	54.2	26.6
50–59	**562.5**	25.2	205.1	3.2	76.8	0.0	17.1	45.9	9.6	0.0	52.6	13.7	0.0	51.1	45.8	16.4
60–69	**463.9**	23.0	168.9	0.0	66.0	0.0	3.2	39.5	10.7	0.0	52.6	11.6	0.0	26.1	57.3	5.1
70–79	**532.3**	38.4	190.8	0.0	100.6	0.0	0.0	50.2	23.5	0.0	57.9	23.2	0.0	14.6	26.1	7.2
80–89	**634.0**	1.1	201.8	0.0	110.4	0.0	0.0	64.0	54.4	0.0	91.6	42.1	0.0	19.8	43.8	5.1
90–99	**961.6**	0.0	154.6	0.0	145.0	0.0	0.0	233.7	124.9	0.0	90.5	144.2	0.0	15.6	53.1	0.0
100–150	**1782.0**	0.0	24.1	0.0	194.7	0.0	0.0	399.1	154.7	0.0	280.0	521.0	0.0	6.3	201.1	1.0
> 150	**695.8**	0.0	0.0	0.0	0.0	0.0	0.0	98.2	0.0	0.0	84.2	176.8	0.0	0.0	336.6	0.0

strata	SD 28	42G8	42G9	42H0	42H1	43G8	43G9	43H0	43H1	44G8	44G9	44H0	44H1	45G9	45H0	45H1
Depth interval																
total	**11398.4**	**963.9**	**986.9**	**982.5**	**75.7**	**347.3**	**973.7**	**973.7**	**434.9**	**100.3**	**923.1**	**960.5**	**887.9**	**937.7**	**947.2**	**903.0**
0–9	**353.5**	9.9	0.0	18.6	28.5	41.1	1.1	0.0	38.9	13.9	34.2	0.0	72.6	16.8	0.0	77.9
10–19	**733.7**	62.5	0.0	66.9	30.7	56.3	2.2	5.4	117.9	22.4	44.8	4.3	180.4	28.4	0.0	111.6
20–29	**974.3**	239.0	0.0	84.4	16.4	59.5	10.8	40.0	114.7	39.5	30.9	4.3	151.5	25.3	0.0	157.9
30–39	**881.0**	227.0	0.0	102.0	0.0	56.3	18.4	64.9	49.8	24.5	63.0	2.1	112.1	31.6	14.7	114.7
40–49	**772.7**	117.3	0.0	89.9	0.0	35.7	19.5	97.4	26.0	0.0	60.8	25.6	112.1	62.1	23.2	103.1
50–59	**825.2**	68.0	0.0	112.9	0.0	33.5	30.3	94.1	28.1	0.0	65.1	37.4	149.4	46.3	25.3	134.7
60–69	**621.4**	23.0	0.0	73.5	0.0	17.3	40.0	51.9	54.1	0.0	57.6	55.5	76.8	51.6	41.0	78.9
70–79	**479.7**	48.2	0.0	65.8	0.0	11.9	44.4	49.8	5.4	0.0	53.4	52.3	14.9	53.7	42.1	37.9
80–89	**614.3**	36.2	0.0	38.4	0.0	8.7	59.5	82.2	0.0	0.0	73.6	60.8	13.9	58.9	147.3	34.7
90–99	**774.5**	37.3	0.0	37.3	0.0	8.7	71.4	73.6	0.0	0.0	105.7	122.7	4.3	89.5	175.8	48.4
100–150	**2935.0**	95.4	540.6	219.3	0.0	18.4	440.3	135.2	0.0	0.0	265.7	470.6	0.0	301.0	445.2	3.2
> 150	**1433.1**	0.0	446.3	73.5	0.0	0.0	235.9	279.1	0.0	0.0	68.3	124.9	0.0	172.6	32.6	0.0

Annex 3: Manual of the construction and use of the International Standard Trawl for the Baltic Demersal Surveys, TV-3#520 meshes

Reference:

Anonymous 1998. Report of the Baltic International Fish Survey Working Group. Karlskrona, 8–13 June 1998. ICES CM 1998/H:4.

Contents

Two types of ground trawls are specified as International Standard Trawls for Baltic Demersal Surveys:

- TV-3#520 meshes in the circumference for vessels with the main engine power less than 600 KW,
- TV-3#930 meshes in the circumference for vessels with the main engine power more than 600 KW.

This manual includes:

- Parts list
- A plot of the specifications of the net
- Three pages of detailed drawings of selected items
- Check lists
- Check guide

Notes to the construction

The nets should be made from good quality polyethylene netting, except the codend, which is made from polyamide. It will however not be possible for the net manufacturer always to obtain sheet netting of exactly the same length as specified in this manual. Thorough care must be taken to obtain materials with properties as close as possible to the ones specified here. The denomination of the sheet netting differs from manufacturer to manufacturer, but the following table should give the most common 'translations'.

	Chemical Composition	Construction	Diameter	International denomination	Trade 'name'
Front part and front belly	PE	Twisted	2.17	500/36	3/12
Rear belly	PE	Twisted	1.71	500/24	3/8
Codend	PA	Twisted	1.32	210/30	no. 10

IMPORTANT: It is very important to maintain the original relationship (hanging ratio, difference in length) between the netting lengths and the framing ropes along the headline and footrope. Therefore, if the headline in a section shall be 10% longer than the net according to this manual, it must be so, also if the dimensions of the net differ from the present specification.

Operation of the standard trawls

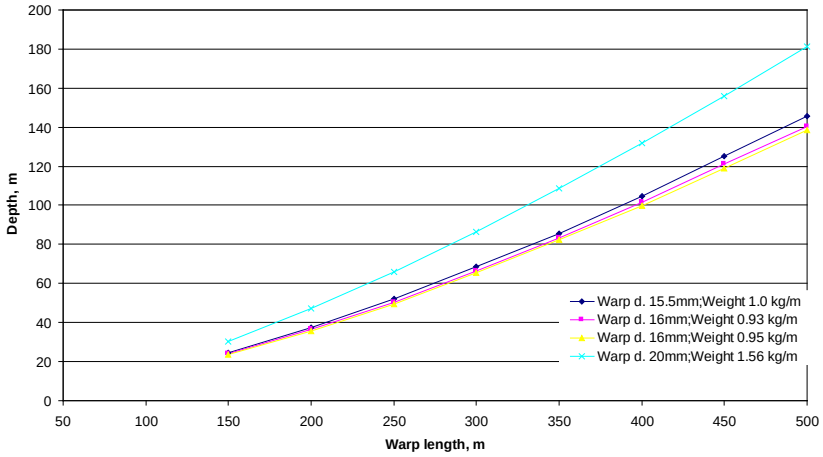
Towing speed

The towing speed should be 3.0 knots.

Warp length

It is recommended to use the following table for finding the correct warp length to be used at various fishing depths. The table gives different warp lengths for a range of warp constructions given by diameter and weight per metre.

It is recommended according to practical experience that the warps length should not less than 125 m, as it will decrease the door spread too much.



(The figures have been obtained using software developed at Kaliningrad State Technical University, by Professor Rosenstein).

The recommended warp length in the upper figure for warp diameter 15/16 mm should be taken as maximum. When using warps 15/16 mm their length could be less the results from the figure, but not less than the results from the curve of 20 mm.

Trawl geometry

The shape of the trawl is depending on many parameters of which some are being standardized here by using the same procedures. Nevertheless, when working on different depths and using different lengths of towing warp the door spread will change, and therefore also the height of the net. Table 2 below shows the relationship between the basic geometric parameters for the standard trawl using the specified 97.2 m distance between trawl door and the net (8 + 75 + 2.1 + 9.1 + 3 m). They are based on model measurements and full-scale measurements at sea using acoustic measuring devices.

Door spread, m	**50**	**55**	**60**	**65**
Trawl vertical opening, m	2,3	2.1	1.8	1.7
Headline spread, m	13	14.5	16	17.5
Angle of sweeps, degrees	11	12	13	14

If the trawl monitoring instruments (like SCANMAR) are used, the table can be used to check the trawl working condition. Care should be taken that the instruments are neutrally buoyant in water.

Maintenance

The net should be regularly checked for wear and tear and all damages shall be repaired upon discovery.

The net will eventually stretch under normal fishing conditions. It is important for its fishing performance and for maintaining a constant fishing efficiency at regularly intervals to check the length of the bridles, sweeps, extensions, netting sections etc.

The overall status for the net should be checked at the beginning of every cruise. Every year a detailed check should be made of nets and rope dimensions. (The interval between checks is depending on the time the net is in use. An annual check is regarded sufficient if the net is used for one or two normal surveys a year). The special check guide attached to this manual can be used.

IMPORTANT: Special attention should be given to ensure that the relationship (difference) between the length of the netting sections in the top and bottom panels are maintained. Lower sections are a half mesh or a full mesh longer than the corresponding top section. These differences have to be maintained by monitoring the net at regular intervals.

In the case, that the difference is larger than 1 mesh size the bottom section must be shortened to the proper size.

In addition, the relationship between the length of the framing ropes and the nets in the wings and arms must be retained. The percentage the net is stretched on the headline and footrope is given in the specification. When the netting after a period of use loses its stretch, the headline and footrope must be cut off, the net in the wings and arms shortened and remounted on the ropes again.

TV-3#520

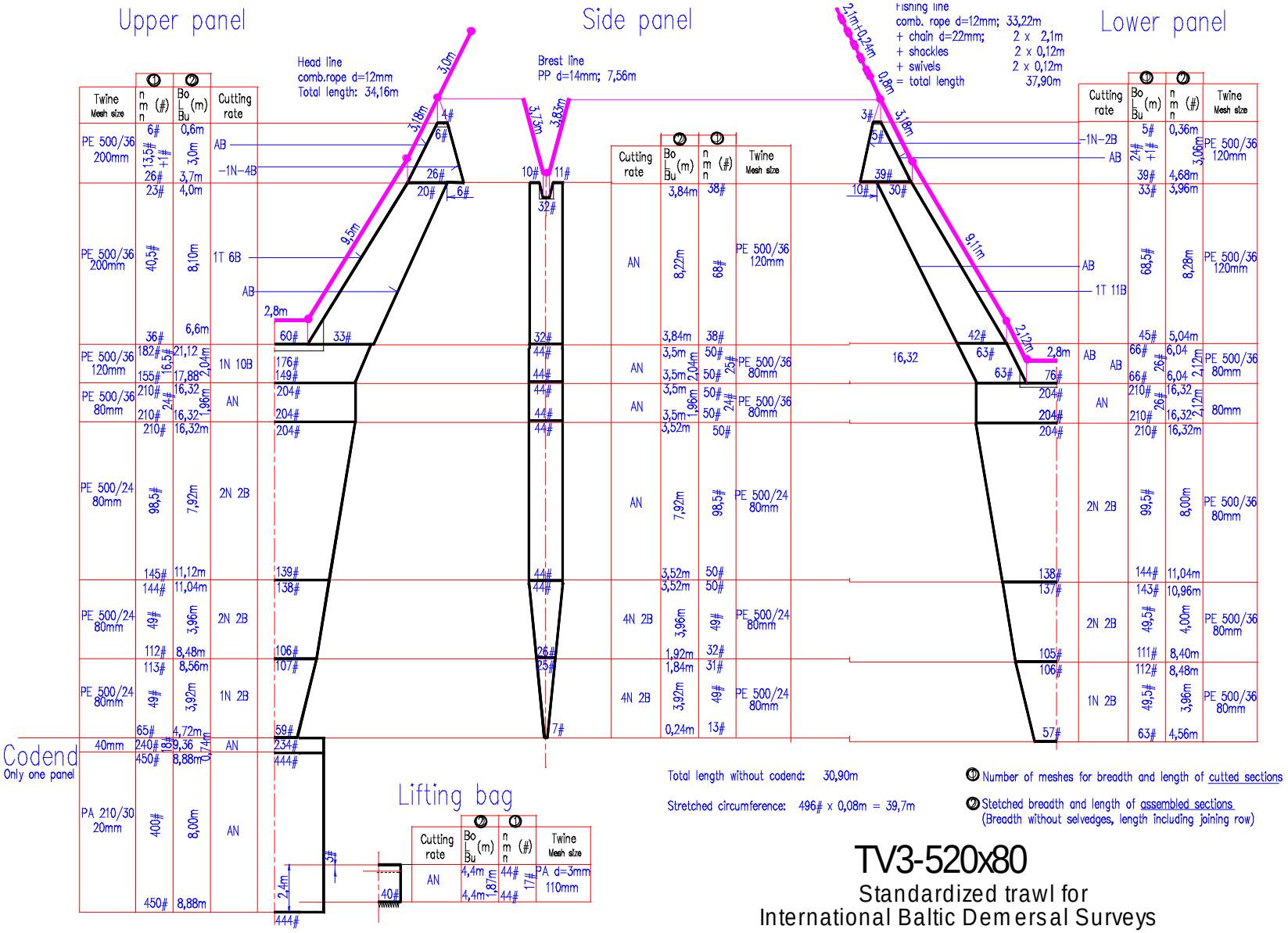
Parts List

International Standard Trawl for Baltic Demersal Surveys

Note: In this list, the term weight is used for mass and the unit is kg.

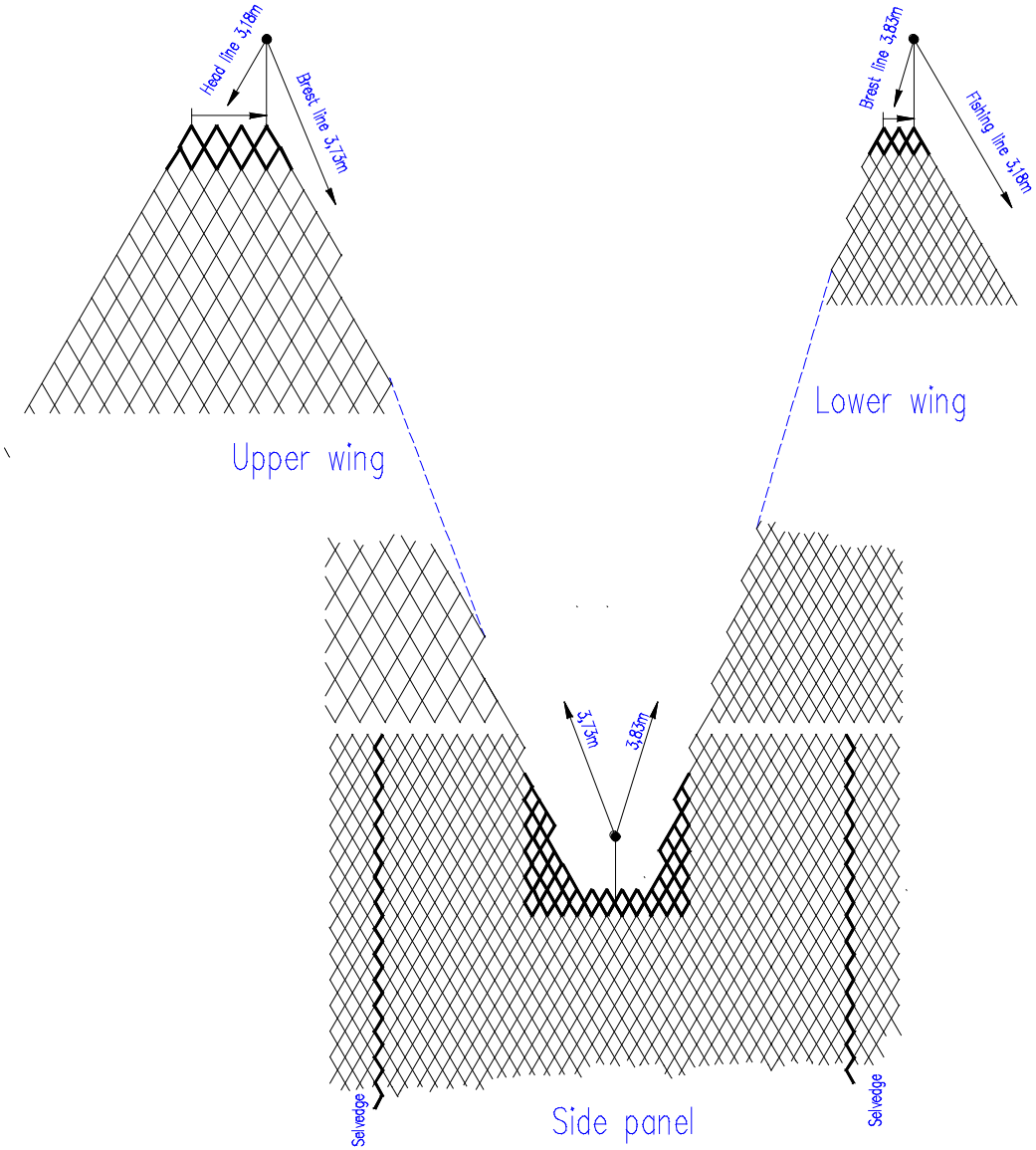
No	Item	Description	Size
Trawl doors			
2	Doors	Cambered V-doors, Type: Thyborøn Trawl Doors Type 2	1.78 m² (63 inch) Weight 205 kg
	Front Chain	Recommended setting: 18 links using link 3 for warp attachment	Inside length of link 80 mm
	Back Chain	Recommended setting Top chain: 7 links Horizontal chain: 18 links Bottom chain: 5 links	Inside length of link: 63 mm
2	Back strop	Combination rope	Ø = no standard Length 8 m
Sweeps			
2	Sweep	Wire Rubber disks	Ø = 10 mm Length 75 metre Weight per metre 0.36 kg Ø = 35 mm
Chain between sweeps and bridles			
2	Chain	Iron	Length 2.1 m Weight: 20 kg
Bridles			
4	Upper bridle	Combination rope	Ø = 12 mm Length: 9.1 m Weight per metre 0.2 kg
2	Lower bridle	Wire Rubber discs Lead weights with centre hole distributed evenly, every 40 cm	Ø = 10 mm Length 9.1 m Weight per metre 0.36 Ø = 35 mm 22 pieces of 250 g each on each lower bridle
Floats			
(11)	Floats	(4 litre (same as 200 mm, 8 inch) plastic floats)	Total lifting force: 38.5 kg (equivalent to 11 pcs. of 200 mm plastic floats)

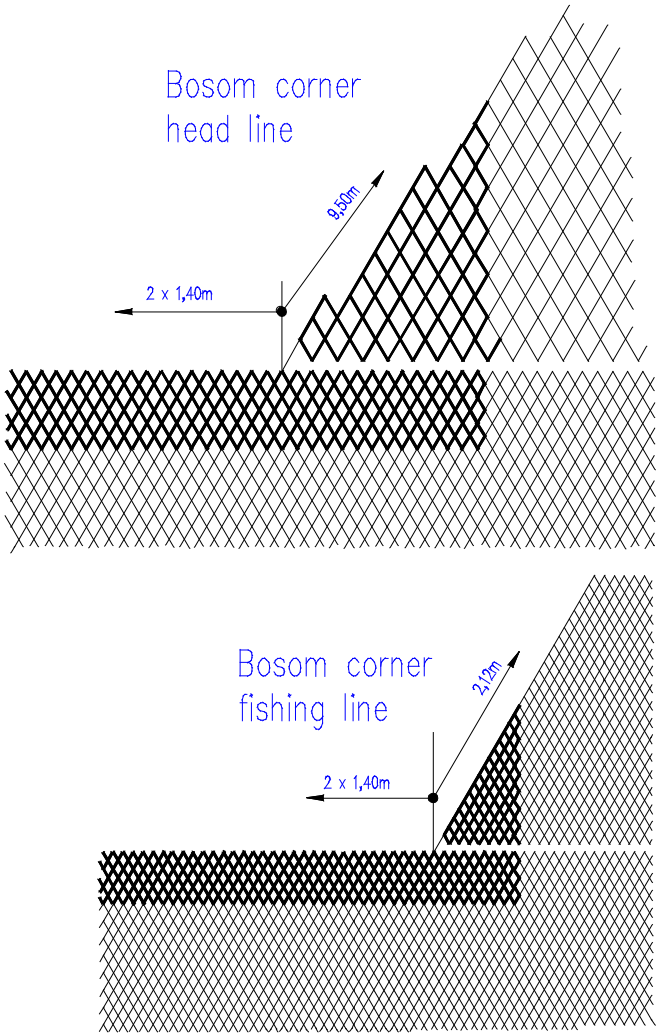
Headline and Fishing line			
1	Headline	Combination rope, stainless	Ø = 12 mm Length 34.16 m incl. extension Weight per metre 0.2 kg
1	Fishing line	Combination rope, stainless Chain weight	Ø = 12 mm Length 37.66 m incl. extension and weight Weight per metre 0.2 kg Length 2.1 m Weight 20 kg
Footrope			
	Centre Wire	Stainless steel wire	Ø = 9.5 mm Weight per metre 0.34 kg
108	Rubber discs	Rubber discs with side hole	100 mm
	Filling the space between rubber discs	Plastic or rubber tube Rubber discs on each side of rubber disc 28 pcs. of lead, (1 every third space)	Ø = 12 mm/14 mm Ø = 35 mm 250 g each piece
	Rope to mount the gear	Danline mounted in bights on the fishing line and through the rubber discs.	Ø = 12 mm The size of the bights makes the footrope disc periphery hang 4 cm below the fishing line
Attachments			
	Lazy deckie	No standard	
	Tackle strop	No standard	



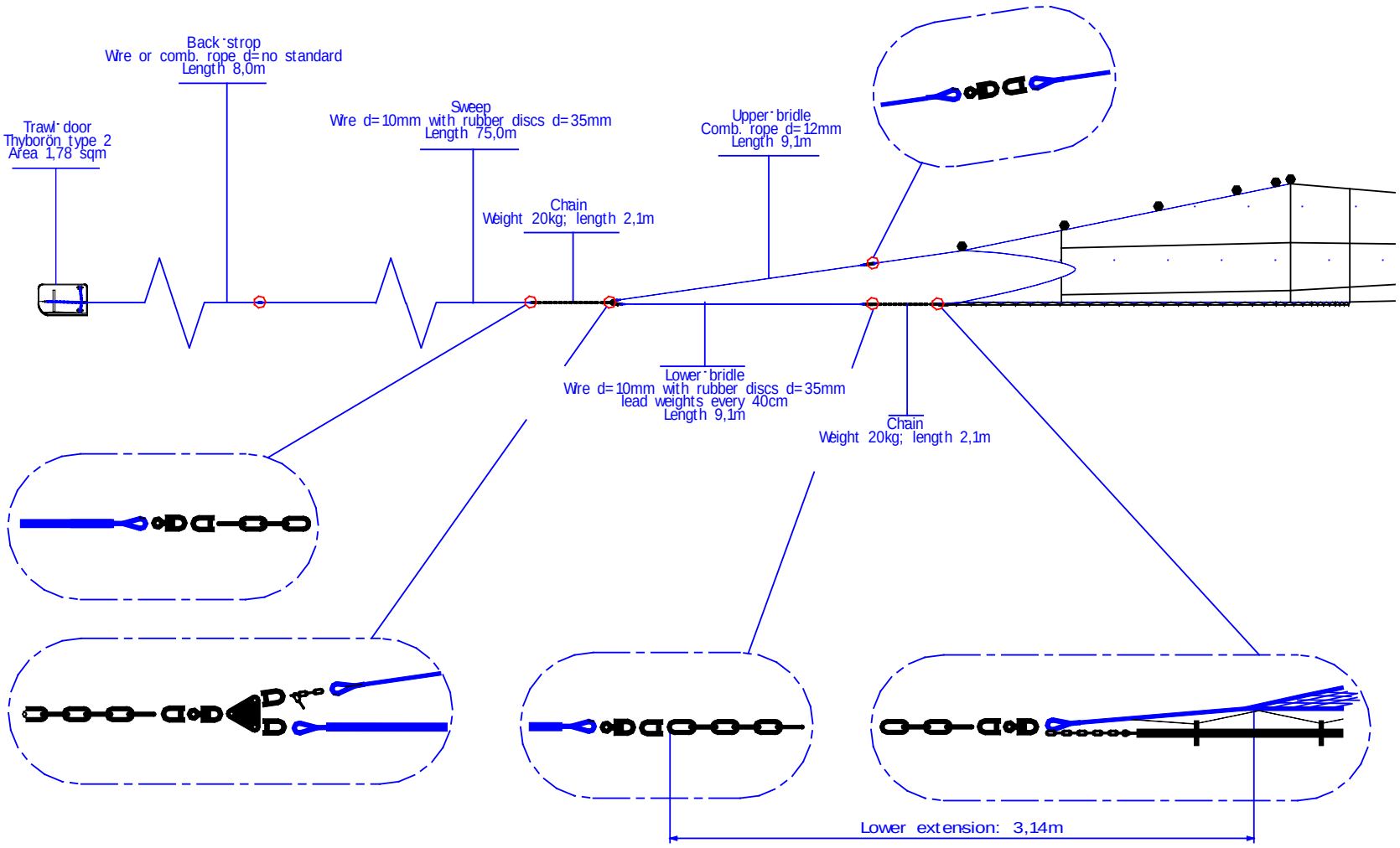
TV3-520x80

Standardized trawl for
International Baltic Demersal Surveys

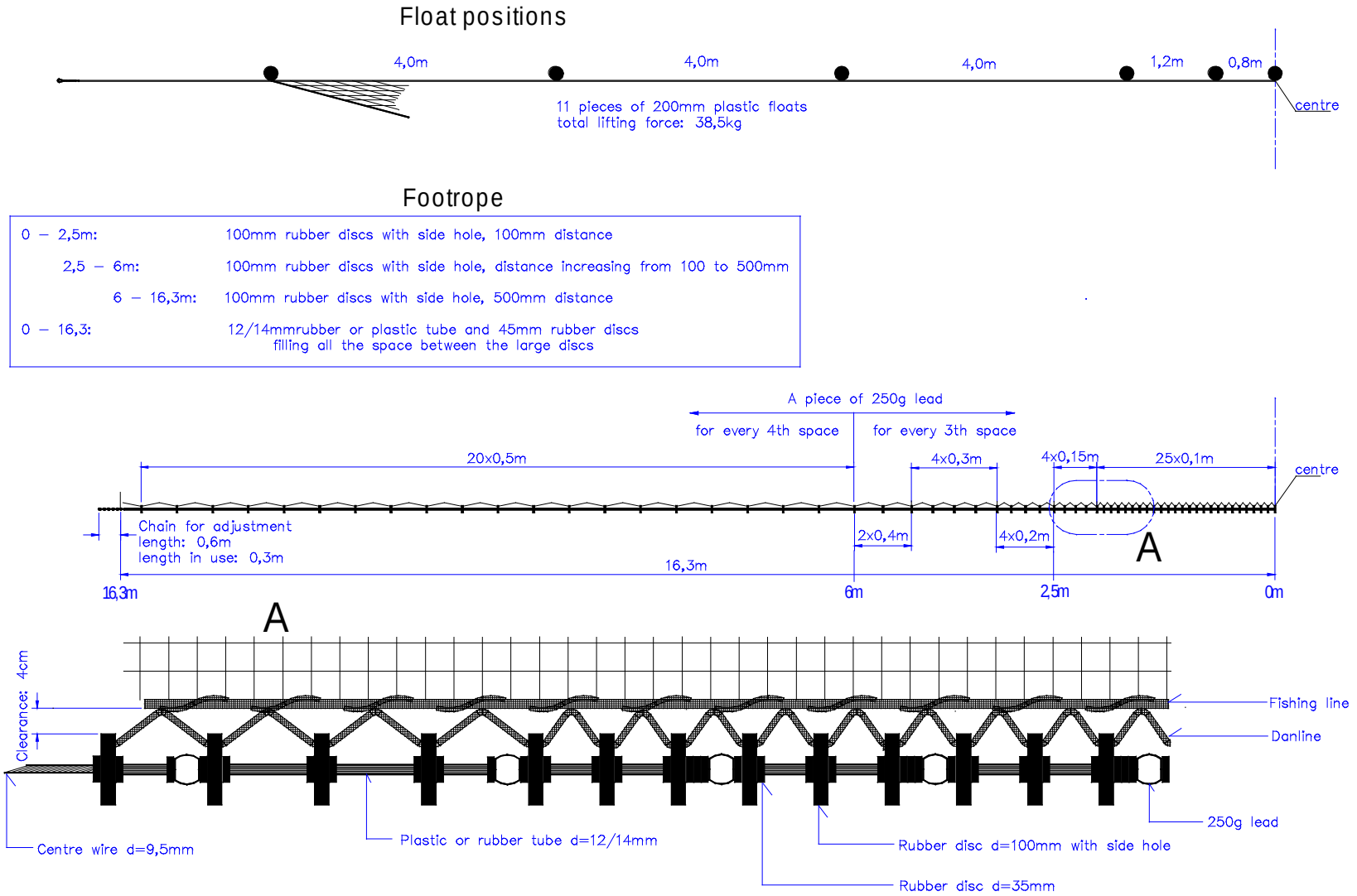




Details for trawl TV3-520x80



Rigg details (1) for trawl TV3- 520x80



Rigg details (2) for trawl TV3- 520x80

Section 1

1B1	1A1	1A2	1B2	1C1	1C2
8,22m	8,10m	8,10m	8,22m	8,28m	8,28m

Section 2

2B1	2A	2B2	2C1	2C2
2,04m	2,04m	2,04m	2,12m	2,12m

Section 3

3B1	3A	3B2	3C
1,96m	1,96m	1,96m	2,12m

Section 4

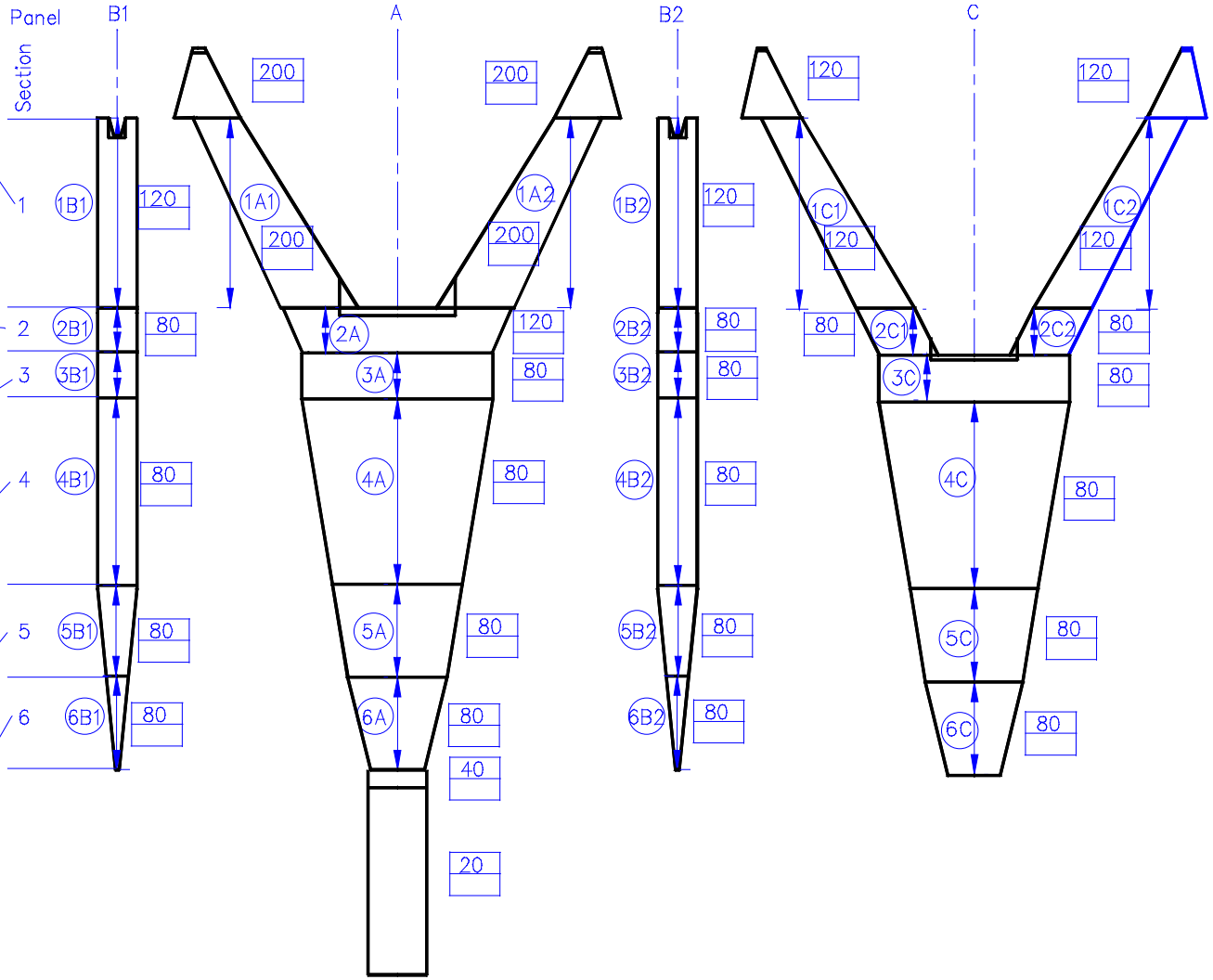
4B1	4A	4B2	4C
7,92m	7,92m	7,92m	8,00m

Section 5

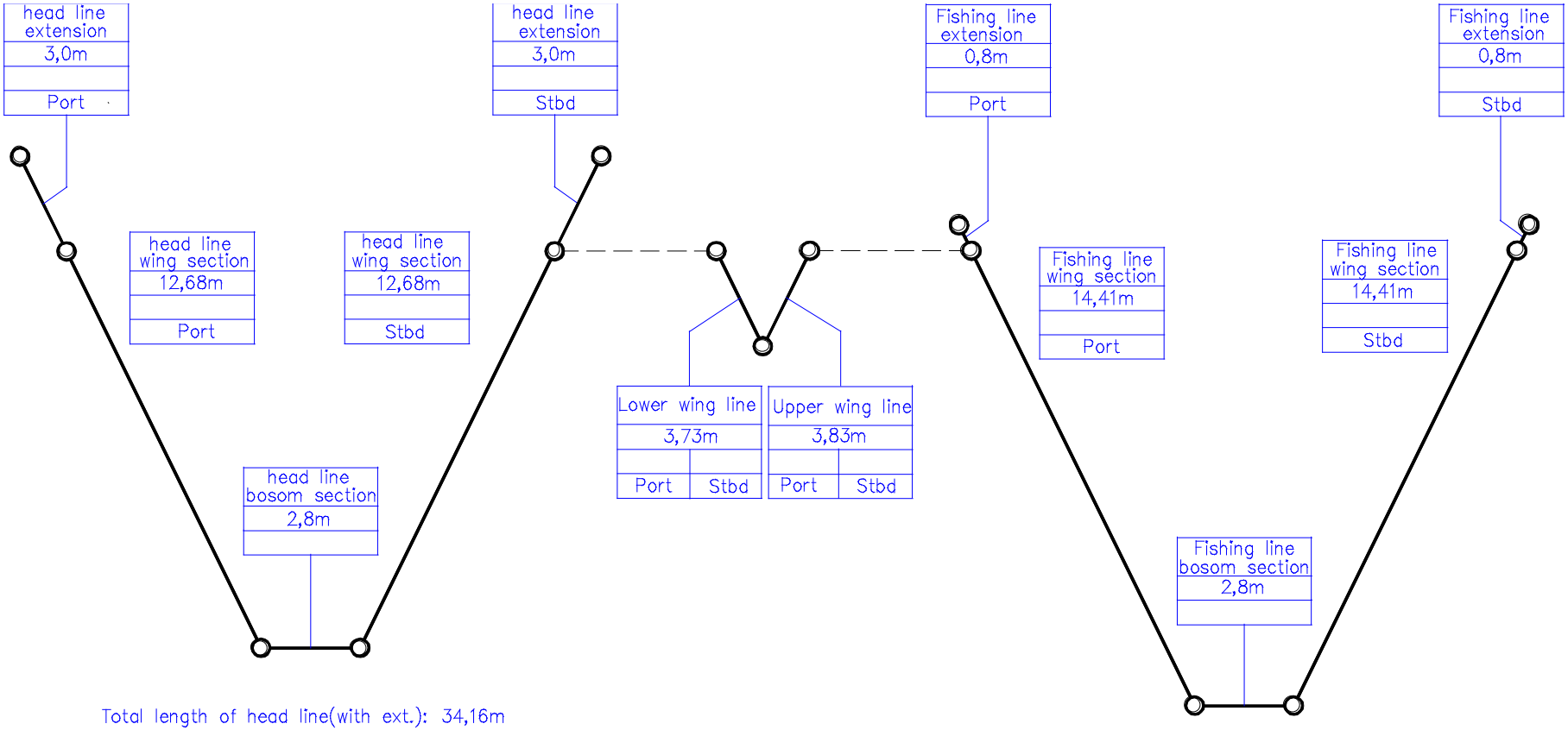
5B1	5A	5B2	5C
3,96m	3,96m	3,96m	4,00m

Section 6

6B1	6A	6B2	6C
3,92m	3,92m	3,92m	3,96m



Check list for trawl TV3-520x80



Check list for frame ropes of trawl TV3-520x80

TV-3 520#

Check Guide

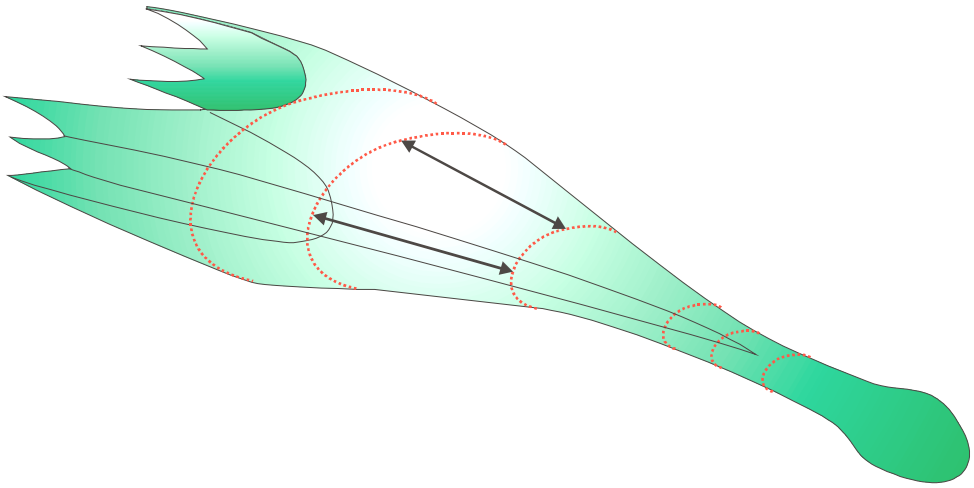
International Standard Trawl for Baltic Demersal Surveys

In order to maintain the properties and performance of the net it must be checked at regular intervals.

Before every cruise

Length of net sections

The trawl consists of four panels: top, bottom and side panels. Each panel has several sections. It is necessary to check the relative length of each netting section. They are all compared with the corresponding sections in the other panels in the way that the top and bottom panel sections are checked against the side panel sections.



Comparison of the lengths of two sections from the top and side panels – indicated by arrows: Approx 10 meshes from around the centre line of the top panel is hold against approx. 10 meshes from around the centre line of the side panel.

The best method to compare two sections is to let two persons – one in each end of the section – take around 10 meshes from the centre line of one section in one hand and hold it against 10 meshes from the centre line of the other section in the other hand. The sections must then be stretched and the difference in length observed.

- Length of side and top panel sections must be equal;
- Length of bottom panel sections must be about 1 mesh longer than corresponding side panel sections.

The procedure is repeated for each section. In case if the discrepancy is more than 4 cm (or half a mesh) from the specified difference, a skilled netmaker should be consulted to evaluate a possible shortening

Length of wings

The specified shortening of the side wing shall be measured from the joining round between the wing and arms to the eye at the end of the headline, footrope and breastline extensions respectively.

- The length of side wing must be 0.65 m shorter than the top wing and bottom wing.

Length of groundrope

The length of the groundrope and fishing line must be compared by holding the two together. The length is adjusted by means of the adjustment chain on the groundrope.

- The groundrope must be two links shorter than the fishing line (equal to shortening the groundrope one link in each side).

Annex 4: Manual for the construction and use of the International Standard Trawls for Baltic Demersal Surveys, TV-3#930 meshes

Reference:

Anonymous 1998: Report of the Baltic International Fish Survey Working Group. Karlskrona, 8 – 13 June 1998. ICES CM 1998/H:4.

Contents

Two types of ground trawls are specified as International Standard Trawls for Baltic Demersal Surveys:

- TV3#930 meshes in the circumference for vessels with the main engine power more than 600 KW,
- TV3#520 meshes in the circumference for vessels with the main engine power less than 600 KW.

This manual includes:

- Parts list
- A plot of the specifications of the net
- Detailed drawings of selected items
- Check lists
- Check guide
- Optional stone excluding panel for lower panel

Notes to the construction

The nets should be made from good quality polyethylene netting, except the codend that is made from polyamide. It will however not be possible for the net manufacturer always to obtain sheet netting of exactly the same length as specified in this manual. Thorough care must be taken to obtain materials with properties as close as possible to the ones specified here. The denomination of the sheet netting differs from manufacturer to manufacturer, but the following table should give the most common 'translations'.

	Chemical composition	Construction	Diameter	International denomination	Trade 'name'
Front part and front belly	PE	Braided	3.0	500/36	3/12
Central belly	PE	Twisted	1.71	500/24	3/8
Rear belly and codend	PA	Twisted	1.32	210/30	no. 10

IMPORTANT: It is very important to maintain the original relationship (hanging ratio, difference) between the netting lengths and the framing ropes along the headline and footrope. Therefore, if the headline in a section shall be 10% longer than the net according to this manual, it must be so, also if the dimensions of the net differ from the present specification.

Operation of the standard trawls

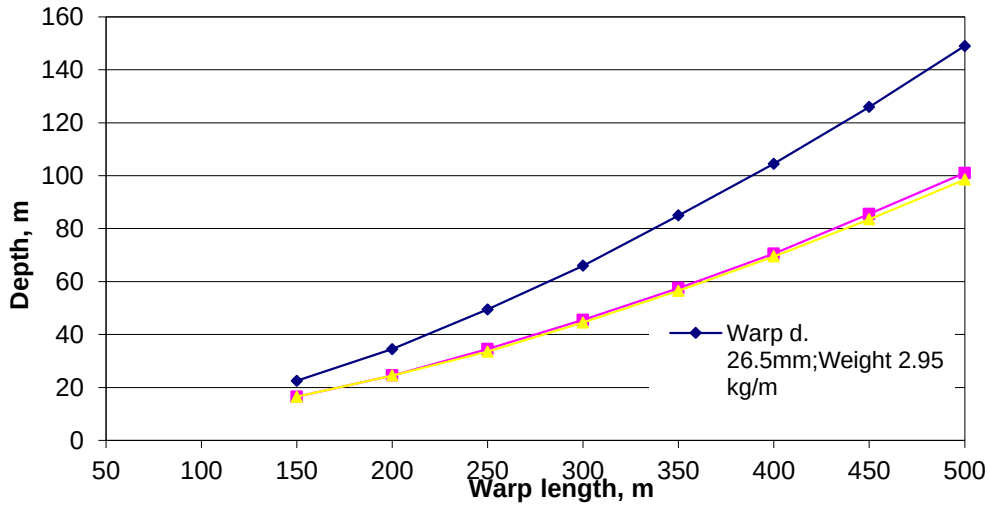
Towing speed

The towing speed should be 3.0 knots.

Warp length

It is recommended to use the following table for finding the correct warp length to be used at various fishing depths. The table gives different warp lengths for a range of warp constructions given by diameter and weight per metre.

The tables are calculated based on the specifications of the net and doors. They should be taken as a starting point. Preliminary tests during the year 2000 suggest that the warp length should be 50 metres more than the table specifies. In addition, it is recommended that the warps length should not less than 200 metres, as it will decrease the door spread too much.



(The figures have been obtained using software developed at Kaliningrad State Technical University, by Professor Rosenstein).

Trawl geometry

The shape of the trawl is depending on many parameters of which some are being standardized here by using the same procedures. Nevertheless, when working on different depths and using different lengths of towing warp the door spread will change, and therefore also the height of the net. Table 2 below shows the relationship between the basic geometric parameters for the standard trawl using the specified 118,1 m distance between trawl door and the net (8 + 75 + 3.6 + 27.5 + 4 m). They are based on model measurements and full-scale measurements at sea using acoustic measuring devices.

Door spread, m	**60**	**70**	**80**	**90**
Trawl vertical opening, m	7.3	6.7	6.1	5.6
Headline spread, m	no data	22.5	26	no data
Angle of sweeps, degrees	11	12	14	16

If the trawl monitoring instruments (like SCANMAR type) are used, the table can be used to check the trawl proper working condition. Care should be taken that the instruments are neutrally buoyant in water.

Maintenance

The net should be regularly checked for wear and tear and all damages shall be repaired upon discovery.

The net will eventually stretch under normal fishing conditions. It is important for its fishing performance and for maintaining a constant fishing efficiency at regularly intervals to check the length of the bridles, sweeps, extensions, netting sections etc.

The overall status for the net should be checked at the beginning of every cruise. Every year a detailed check should be made of nets and rope dimensions. (The interval between checks is depending on the time the net is in use. An annual check is regarded sufficient if the net is used for one or two normal surveys a year). The special checklists attached to this manual can be used.

IMPORTANT: Special attention should be given to ensure that the relationship (difference) between the length of the netting sections in the top and bottom panels are maintained. Lower sections are a half mesh or a full mesh longer than the corresponding top section. These differences have to be maintained by monitoring the net at regular intervals. In the case, that the difference is too small the particular bottom section must be shortened be cutting up the joining round and cut away half a mesh or a full mesh from the length.

In addition, the relationship between the length of the framing ropes and the nets in the wings and arms must be retained. The percentage the net is stretched on the headline and footrope is given in the specification. When the netting after a period of use loses its stretch, the headline and footrope must be cut off, the net in the wings and arms shortened and remounted on the ropes again.

TV-3#930

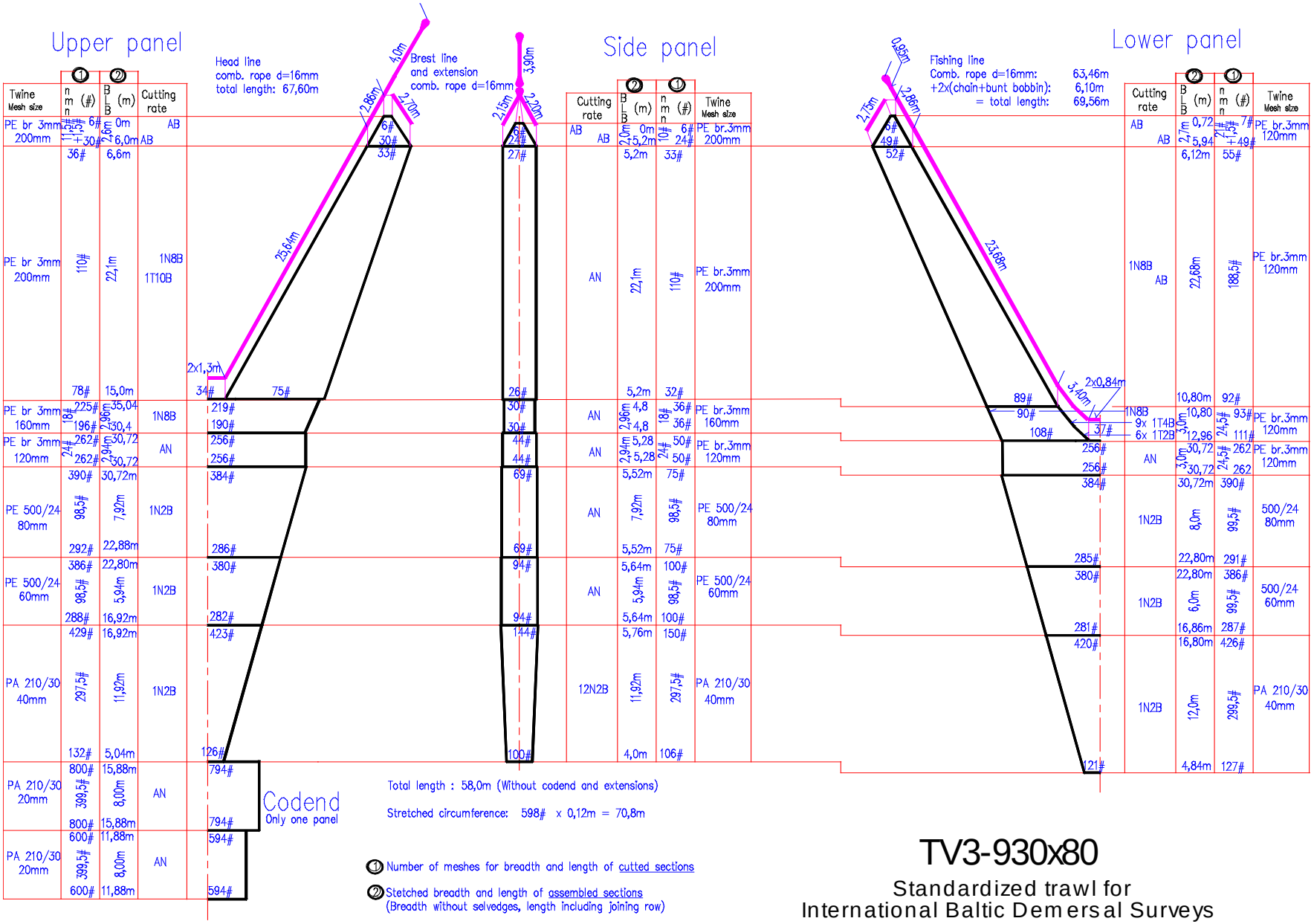
Parts List

International Standard Trawl for Baltic Demersal Surveys

Note: In this list, the term weight is used for mass and the unit is kg.

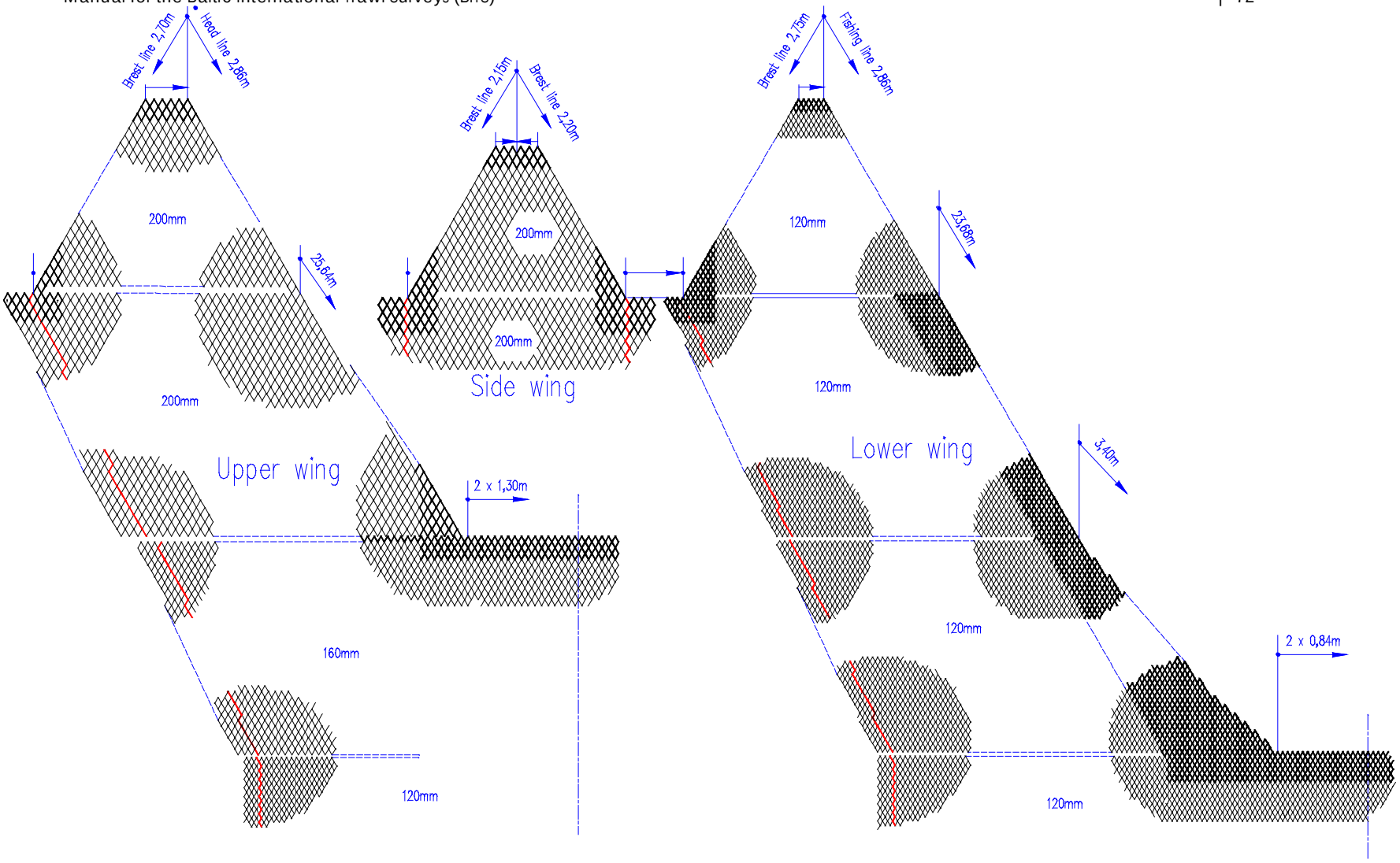
No	Item	Description	Size
Trawl doors			
2	Doors	Cambered V-doors, Type: Thyborøn Trawl Doors Type 2	4.35 m² Weight 520 kg
	Front Chain	Recommended setting: 23 links using link 6 for warp attachment	Inside length of link 100 mm
	Back Chain	Top chain: 10 links Horizontal chain: 24 links Bottom chain: 9 links	Inside length of link: 80 mm
2	Back strop	Wire or combination rope	Ø = no standard Length 8 m
Sweeps			
2	Sweep	Combination rope (light)	Ø = 40 mm Length 75 metre Weight per metre 1.60 kg
Chain between sweeps and bridles			
2	Chain	Iron	Length 3.02 m Weight: 50 kg
Bridles			
4	Upper and centre bridles	Combination rope	Ø = 18 mm Length: 27.5 m Weight per metre 0.46 kg
2	Lower bridle	Wire Rubber discs	Ø = 16 mm Length 27,5 m Weight per metre 0.95 kg Ø = 50 mm
Floats			
(25)	Floats	(11 litre (same as 280 mm, 11 inch) plastic floats)	Total lifting force: 212.5 kg equivalent to 25 pcs. of 280 mm plastic floats)
Headline and Fishing line			
1	Headline	Combination rope, stainless	Ø = 16 mm Length 67.60 m incl. extension Weight per metre 0.39 kg
1	Fishing line	Combination rope, stainless	Ø = 16 mm Length 69.64 m incl. extension and weight Weight per metre 0.39 kg
2		Chain weight at bosom corner	14 kg each side
2			14 kg each arm
2		Chain weight at mid-arm	Length 3.02 m

2		Chain weight at wing-end Semi-spherical rubber bunt bobbins	Weight: 50 kg each wing-end Ø = 230 mm
Footrope			
	Centre Wire	Wire, stainless steel	Ø = 13 mm Weight per metre 0.66 kg
	Large rubber discs		Ø = 200 mm
	Small rubber discs		Ø = 150 mm
	Filling	rubber discs	Ø = 45 mm
	Rope to mount the gear	Combination rope mounted in bights on the fishing line and through the rubber discs	Ø = 12 mm Weight per metre 0.20 kg The length of the bights shall make the disc periphery hang 4 cm from the fishing line
	Wire lockers	To mount the wire to the fishing line	
Attachments			
	Lazy deckie	No standard	
	Tackle strop	No standard	

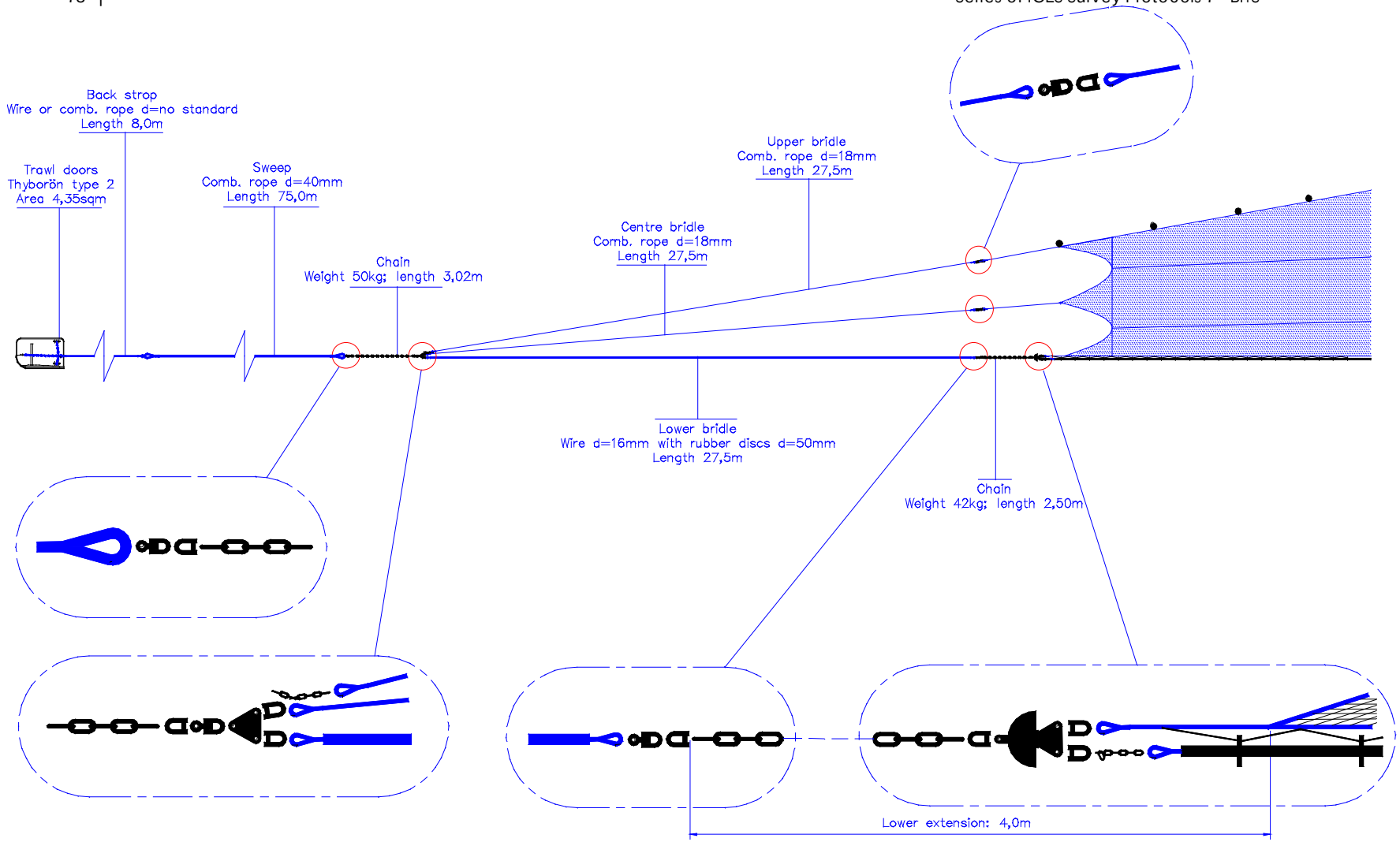


TV3-930x80

Standardized trawl for International Baltic Demersal Surveys

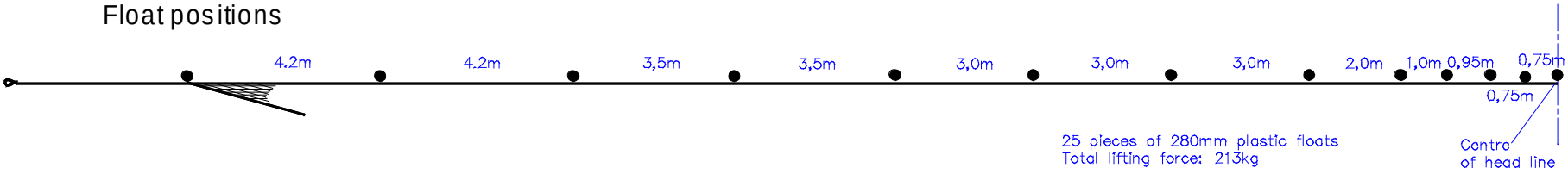


Details for trawl TV3-930x80



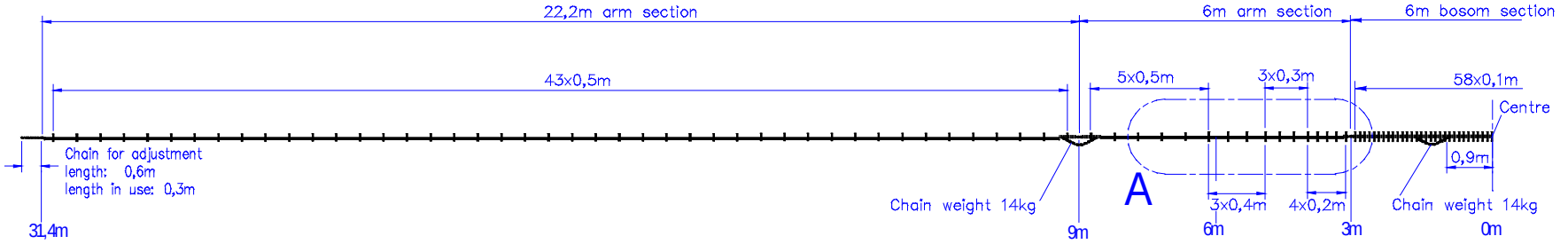
Rigg details (1) for trawl TV3- 930x80

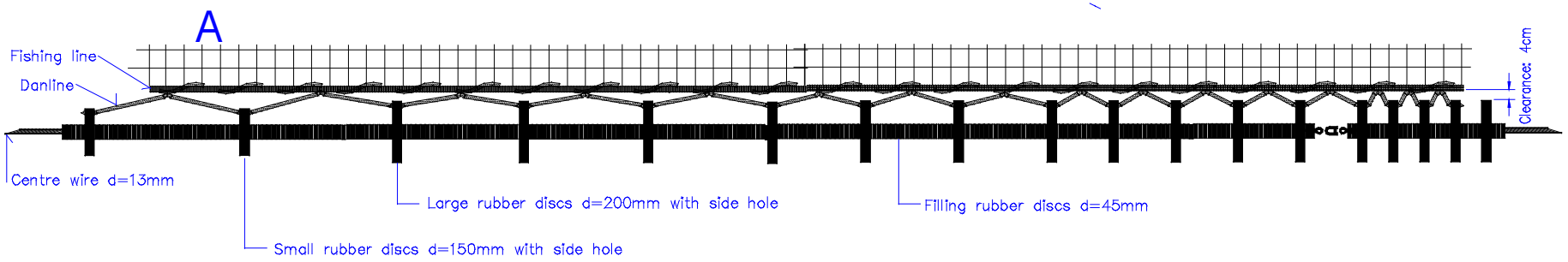
Float positions



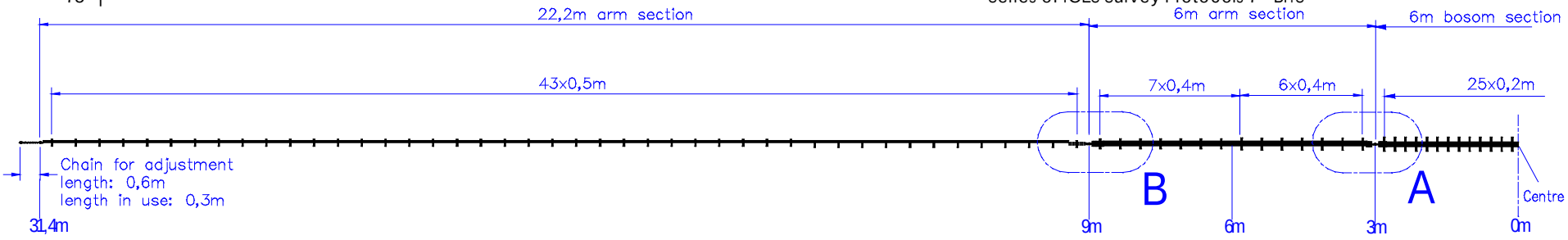
Normal standard footrope

0 – 3m:	200mm rubber discs with side hole, 100mm distance
3– 6m:	200mm rubber discs with side hole, distance increasing from100mm to 500mm
6 – 31,4m:	150mm rubber discs with side hole, 500mm distance
0 – 31,4m:	45mm rubber discs filling all the space between the large discs

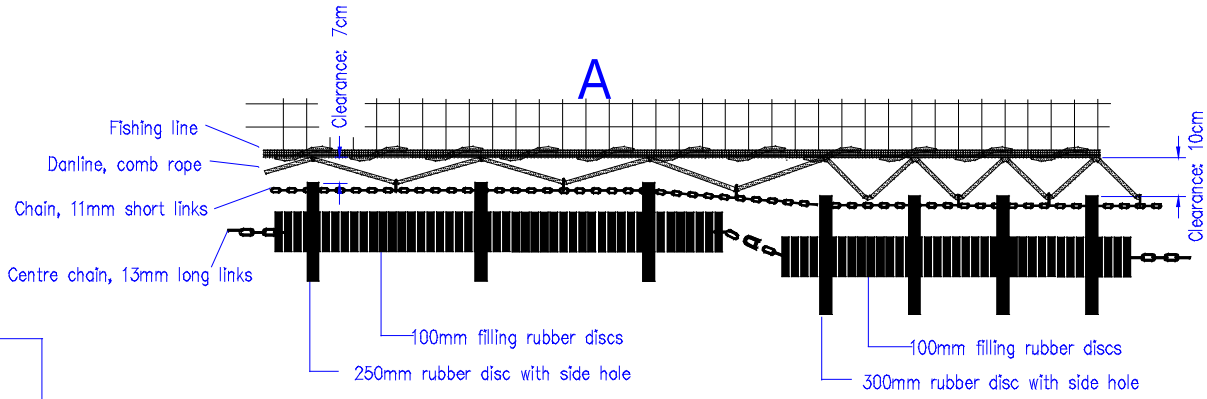




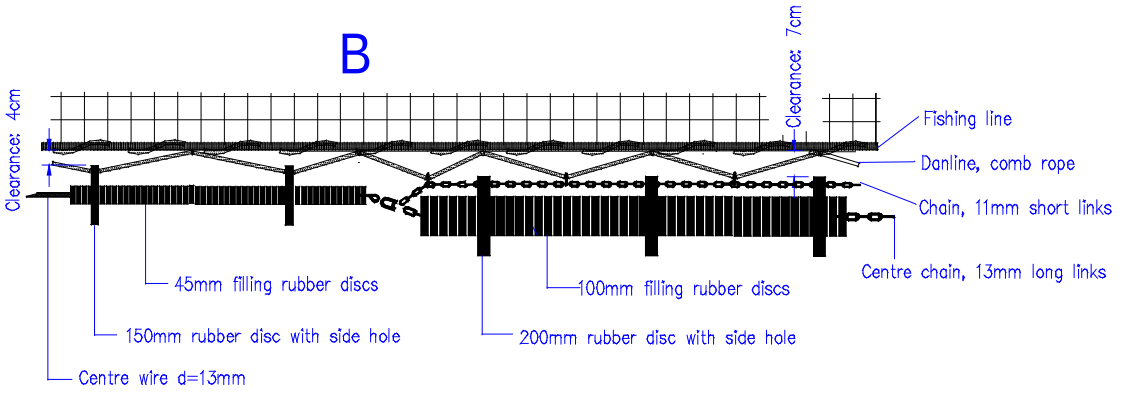
Rigg details (2) for trawl TV3- 930x80



Hard bottom footrope



0 – 3m:	300mm rubber discs with side hole, 200mm distance
3 – 6m:	250mm rubber discs with side hole, 400mm distance
6 – 9m:	200mm rubber diiscs with side hole, 400mm distance
0 – 9m:	100mm rubber discs filling all the spaces between the large discs
9 – 31,4m:	150mm rubber discs with side hole, 500mm distance
9 – 31,4m:	45 mm rubber discs filling all the spaces between the large discs



Rigg details (3) for trawl TV3- 930x80

Section 1

1B1	1A1	1A2	1B2	1C1	1C2
22,10m	22,10m	22,10m	22,10m	22,10m	22,10m

Section 2

2B1	2A	2B2	2C1	2C2
2,96m	2,96m	2,96m	3,00m	3,00m

Section 3

3B1	3A	3B2	3C
2,94m	2,94m	2,94m	3,00m

Section 4

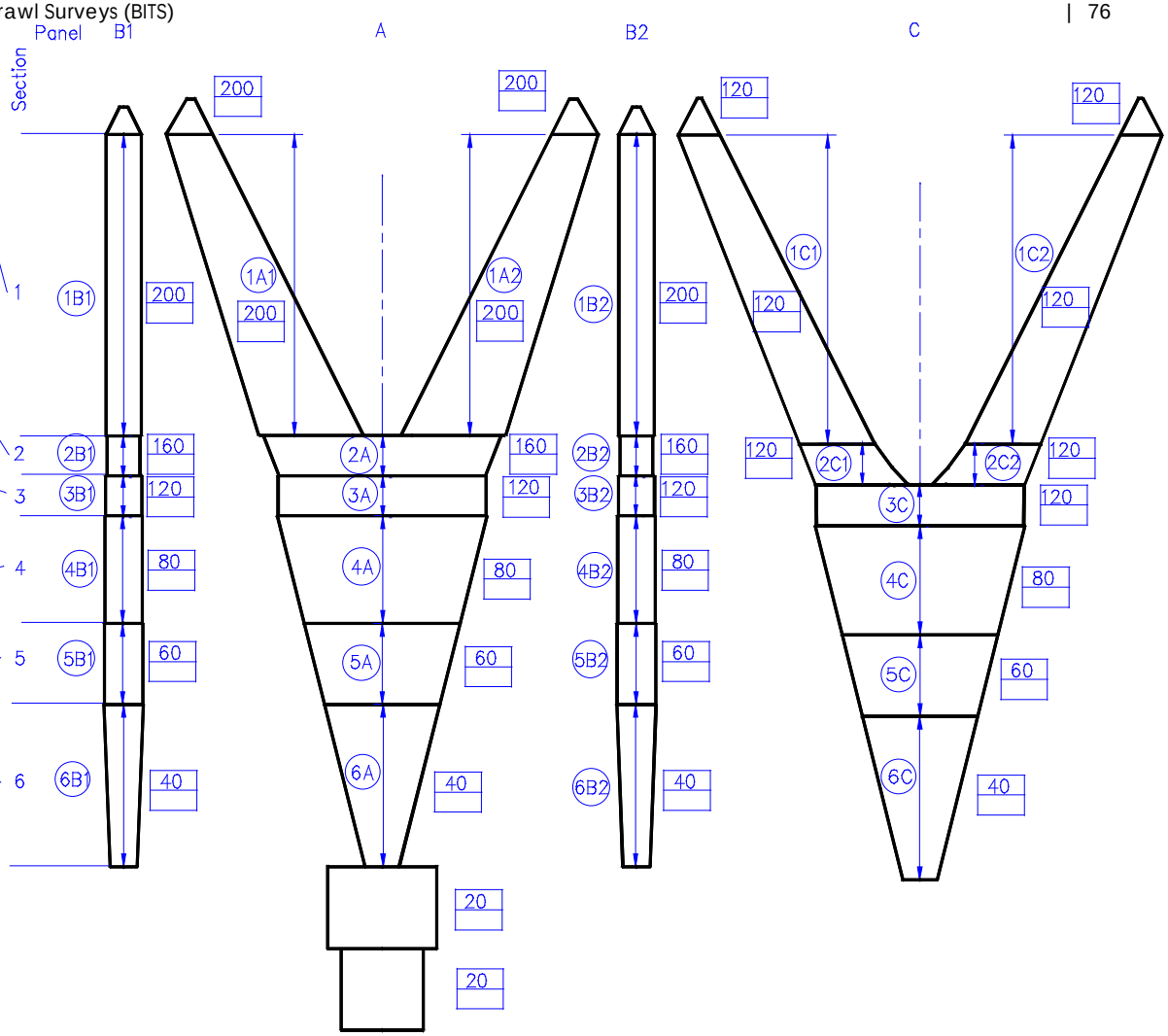
4B1	4A	4B2	4C
7,92m	7,92m	7,92m	8,00m

Section 5

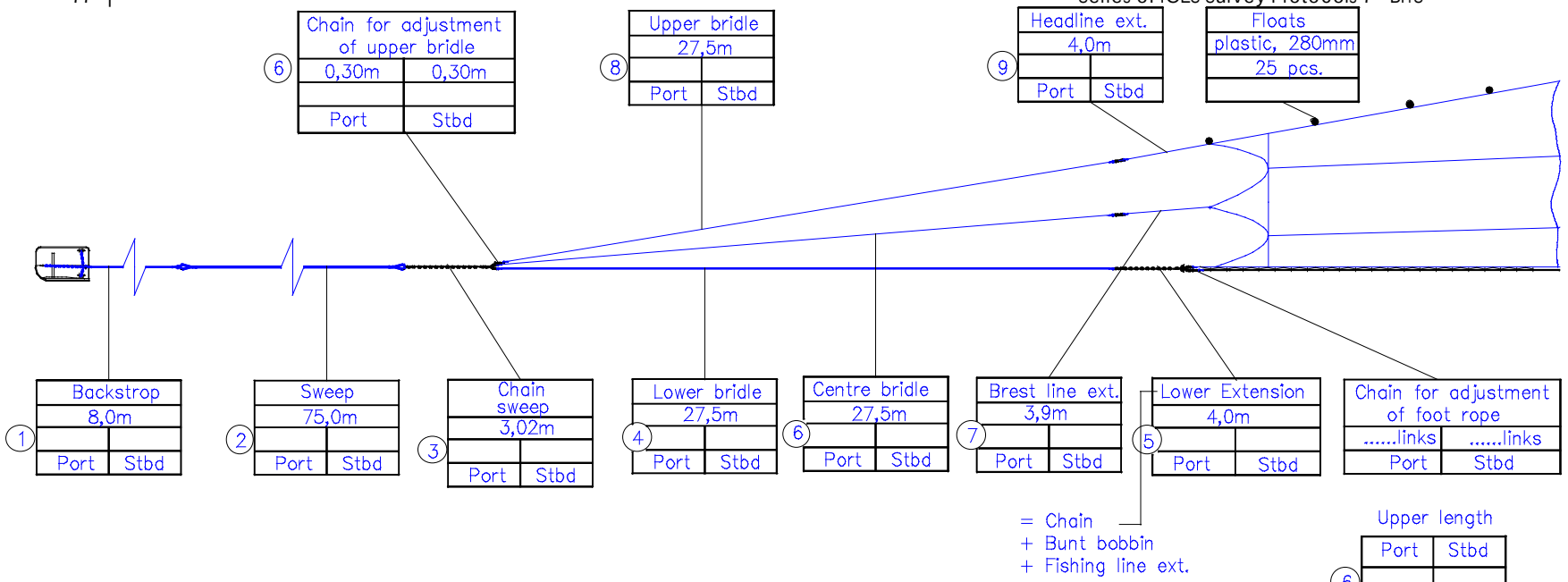
5B1	5A	5B2	5C
5,94m	5,94m	5,94m	6,00m

Section 6

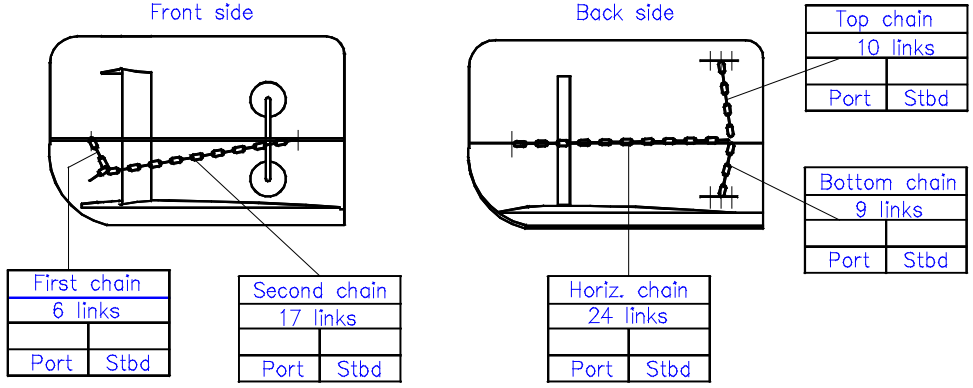
6B1	6A	6B2	6C
11,92m	11,92m	11,92m	12,00m



Check list for trawl TV3-930x80



Otterboard: Thyborön Typ 2; 4,35sqm



Lower total length

	Port	Stbd
1		
2		
3		
4		
5		
Summary		

Upper length

	Port	Stbd
6		
8		
9		
Summary		

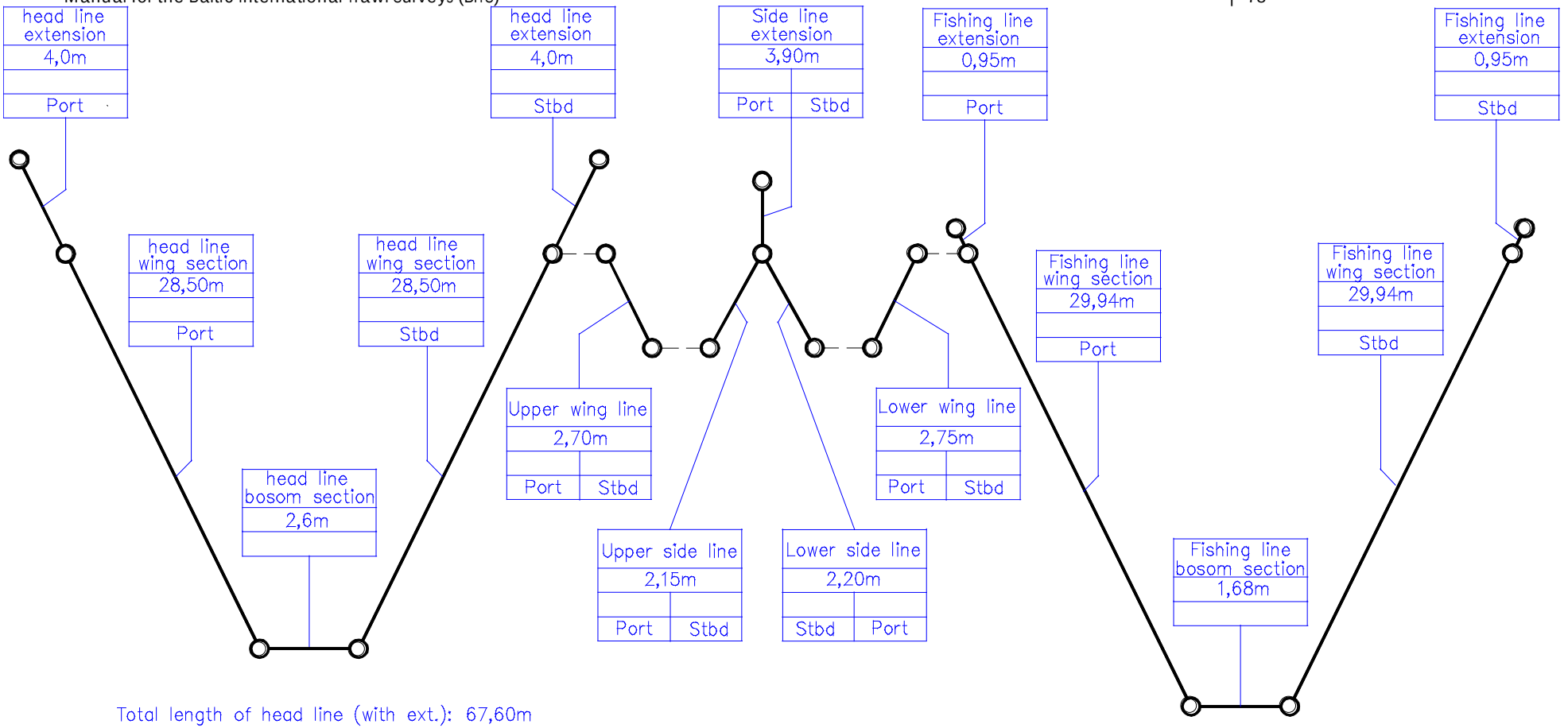
Centre length

	Port	Stbd
6		
7		
Summary		

Lower length

	Port	Stbd
4		
5		
Summary		

Check list for rigg of trawl TV3-930x80



Check list for frame ropes of trawl TV3-930x80

TV-3#930

Check Guide

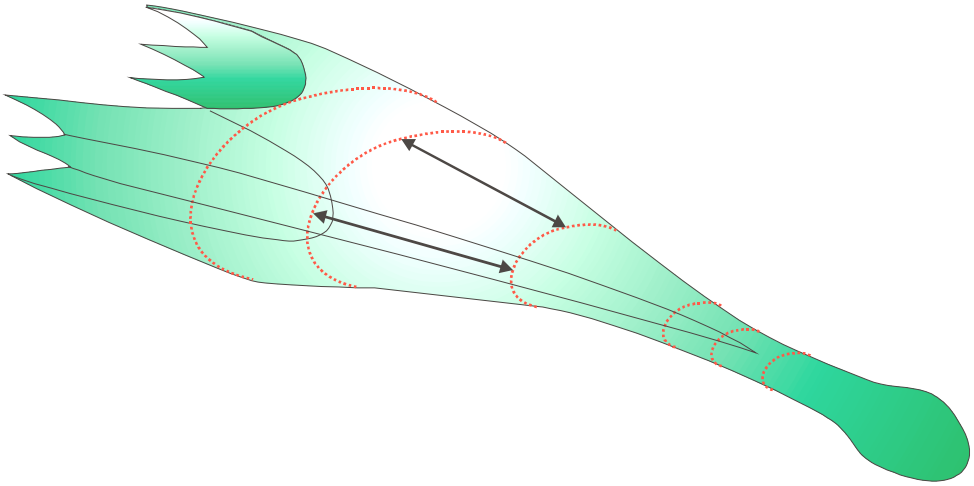
International Standard Trawl for Baltic Demersal Surveys

In order to maintain the properties and performance of the net it must be checked at regular intervals.

Before every cruise

Length of net sections

The trawl consists of four panels: top, bottom and side panels. Each panel has several sections. It is necessary to check the relative length of each netting section. They are all compared with the corresponding sections in the other panels in the way that the top and bottom panel sections are checked against the side panel sections.



Comparison of the lengths of two sections from the top and side panels – indicated by arrows: Approx 10 meshes from around the centre line of the top panel is hold against approx. 10 meshes from around the centre line of the side panel.

The best method to compare two sections is to let two persons – one in each end of the section – take around 10 meshes from the centre line of one section in one hand and hold it against 10 meshes from the centre line of the other section in the other hand. Then the sections must be stretched and the difference in length observed.

- Length of side and top panel sections must be equal;
- Length of bottom panel sections must be about one mesh longer than corresponding side panel sections.

The procedure is repeated for each section. In case if the discrepancy is more than 4 cm (or half a mesh) from the specified difference, a skilled netmaker should be consulted to evaluate a possible shortening.

Length of wings

The specified shortening of the side wing shall be measured from the joining round between the wing and arms to the eye at the end of the headline, footrope and breastline extensions respectively.

- The length of side wing must be 0.65 meter shorter than the top wing and bottom wing.

Length of groundrope

The length of the groundrope and fishing line must be compared by holding the two together. The length is adjusted by means of the adjustment chain on the groundrope.

- The groundrope must be two links shorter than the fishing line (equal to shortening the groundrope one link in each side).

Annex 4.1: The scheme of Danish stone panel

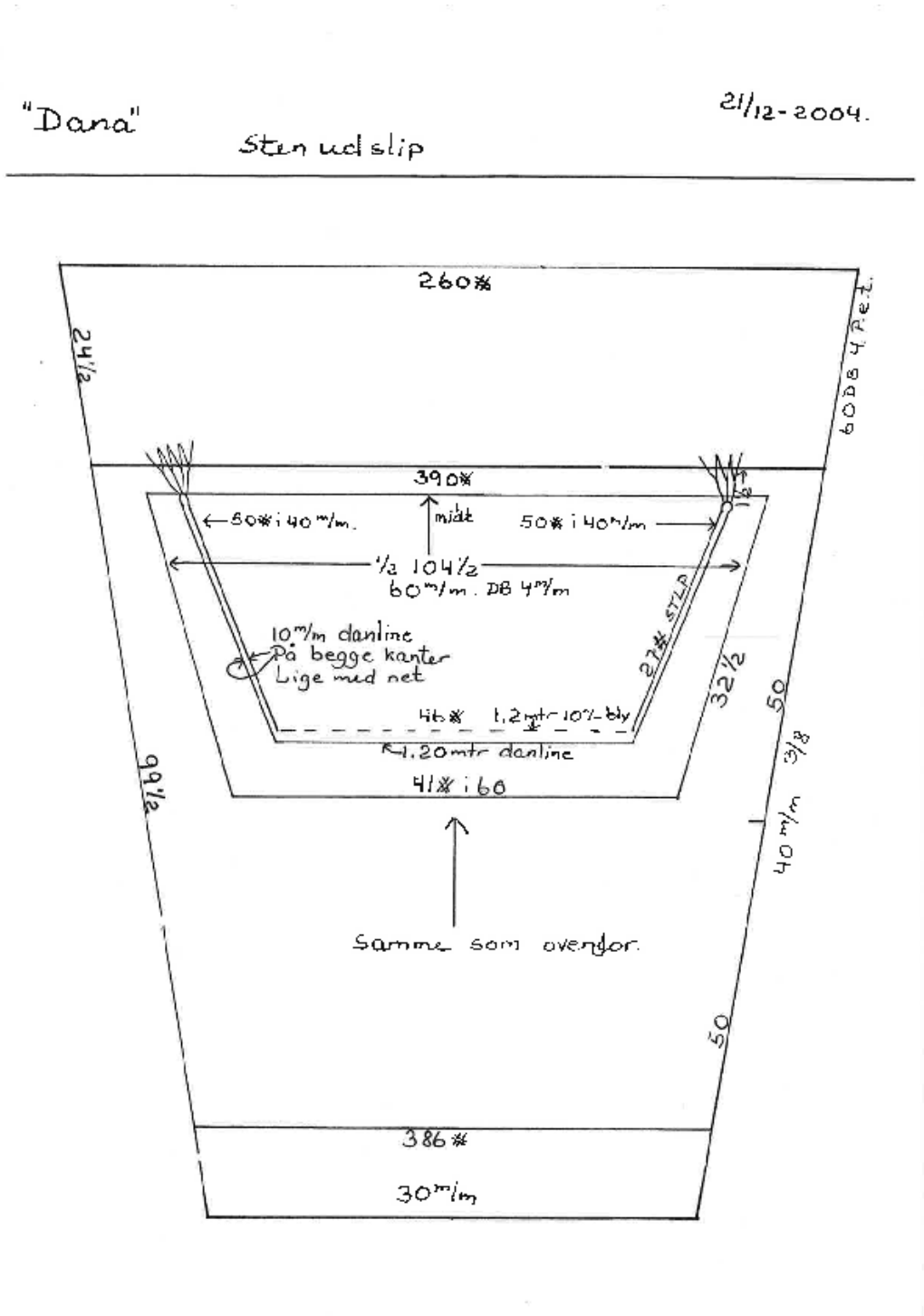


Figure 4.1.1. The scheme of the Danish-stone-escape-panel installed in the TV-3L on the RV Dana and used only in 2004–2005 and the 1st quarter of 2016 during the BITS surveys. The stone escape device from the BITS-Q4/2016 was not installed to the TVL.

Annex 5: ICES maturity key

Key	MATURITY STAGE	Male	Female
61	Virgin	Testes very thin translucent ribbon lying along an un-branched blood vessel. No sign of development.	Ovaries small, elongated, whitish, translucent. No sign of development.
62	Maturing	Development has obviously started, colour is progressing towards creamy white and the testes are filling more and more of the body cavity but sperm cannot be extruded with only moderate pressure.	Development has obviously started, eggs are becoming larger and the ovaries are filling more and more of the body cavity but eggs cannot be extruded with only moderate pressure.
63	Spawning	Will extrude sperm under moderate pressure to advanced stage of extruding sperm freely with some sperm still in the gonad.	Will extrude eggs under moderate pressure to advanced stage of extruding eggs freely with some eggs still in the gonad.
64	Spent	Testes shrunken with little sperm in the gonads but often some in the gonoducts, which can be extruded under light pressure.	Ovaries shrunken with few residual eggs and much slime.
65	Resting	Testes firm, not translucent, showing no development.	Ovaries firm, not translucent, showing no development.
66	Abnormal	Fish with abnormal gonads, e.g. as a result of disease, atresia or intersexes	Fish with abnormal gonads, e.g. as a result of disease, atresia or intersexes

Notes: for ICES maturity key see: http://vocab.ices.dk/?CodeTypeRelID=96&CodeID=33964, and for term "resting" – see remarks in ICES CM 1997/J:4, Section 2.5.

Possibilities to classify the maturity stages of the BITS key:

Maturity stage	Purpose of classification	
(BITS code)	Estimation of	
	spawning stock size	sexual maturity
6.1. VIRGIN	immature (non-spawner)	immature
6.2. MATURING	mature (spawner)	mature
6.3. SPAWNING	mature (spawner)	mature
6.4. SPENT	mature (spawner)	mature
6.5. RESTING	'immature' (non-spawner)	'mature/immature'
6.6. ABNORMAL	(non-spawner)	(non-spawner)

Annex 6: Conversion tables to transfer national for maturity keys into ICES key

The table converts the codes of the national maturity keys into the codes of the BITS key for cod.

Country	BITS	Denmark	Estonia	Finland	Germany	Latvia	Poland	Russia	Sweden	Lithuania
Species	All	Cod	All		Cod	Cod	Cod	Cod	Cod	Cod
Source	ICES (1997)	Modif. from Maier (1908),	Kiselevich (1923),	Modif. from Maier (1908),	Modif. from	Kiselevich (1923),	Maier (1908),	Sorokin (1957, 1960)	Modif. from	
		Berner (1960)	Pravdin (1966)	Berner (1960)	Maier (1908), Berner (1960)	Pravdin (1966)	Chrzan (1951)	Mod. by Alekseev, Allekseeva (1996)	Maier (1908)	Mod. by Alekseev, Allekseeva (1996)
Maturity stage	Code									
VIRGIN	61	I, II	I	I, II	I	I	I	I, II	I, II	I, II
(immature)										
MATURING	62	III–V	II–IV	III-V	III, IV	III, IV	III–V	III, IV	III–V	III-IV
(mature)										
SPAWNING	63	VI, VII	V	VI, VII	V, VI, VII	V	VI, VII	V, VI_V,	VI	V
(mature)								VI_{IV}		
SPENT	64	VIII	VI	VIII	VIII	VI	VIII	VI	VII	VI
(mature)										
RESTING	65	IX	VII	IX	II	II	II	VI_{II}	VIII	VII
(mature/										
immature)										
ABNORMAL	66	X	VIII	X	IX, X	VII	IX	VII	IX	A

3) maturing stages with a subscript is a sub-stage at a given maturity stage

The table converts the codes of the national maturity key into the codes of the BITS key for herring.

Country	**BITS**	**Denmark**	**Estonia**	**Finland**	**Germany**	**Latvia**	**Poland**	**Russia**	**Sweden**	**Lithuania**
Species	All		All		Herring	Herring	Herring	Herring	Herring	Herring
Source	ICES (1997)		Kiselevich (1923)	ICES (1962)	Modif. from	Kiselevich (1923)	Modified from Maier scale.	Kiselevich (1923)	ICES (1962)	
		not available	Pravdin (1966)		Heincke (1998)		Popiel (1955), Strzyzewska (1969); Grygiel & Wyszynski (2002, 2003)			
Maturity stage[1]	Code									
VIRGIN	61		I	I, II	I	I	I, II	I, II	I, II	I, II
(immature)										
MATURING	62		II–IV	III-V	III, IV	III, IV	III–V	III, IV	III–V	III, IV
(mature)										
SPAWNING	63		V	VI	V, VI	V	VI, VII	V	VI	V
(mature)										
SPENT	64		VI	VII	VII, VIII	VI (VI-II)[a]	VIII	VI	VII	VI
(mature)										
RESTING	65		VII	VIII	II, IX	II	-	VI_{II}	VIII	VII
(mature/										
immature[2])										
ABNORMAL	66		VIII	IX			IX		IX	VIII

1) sexual maturity for estimating the proportion of spawners.

2) should be used when the investigation was during the prespawning and early spawning time (still no spent individuals). Individuals will not contribute to the spawning stock in the present year.

3) maturing stages with a subscript is a sub-stage at a given maturity stage

a) in the casa of Latvia – herring with gonads development VI and symptoms of changing to resting is coded as VI-II

The table converts the codes of the national maturity key into the codes of the BITS key for sprat.

Country	BITS	Denmark	Estonia	Finland	Germany	Latvia	Poland	Russia	Sweden	Lithuania
Species	All		All		Sprat	Sprat	Sprat	Sprat	Sprat	Sprat
Source	ICES(1997)	No estimations	Kiselevich (1923), Pravdin (1966)		Rechlin (unpublished)	Aleksjeev, Aleksjeeva (1996), modified	Maier (1908), Elwertowski (1957); Grygiel & Wyszynski (2002, 2003)	Alekseev, Alekseeva (1996)		
Maturity stage[1]	Code									
VIRGIN	61		I	I, II	I	I	I	I, II	I, II	I, II
(immature)										
MATURING	62		II–IV	III-V	III,IV	III, IV	III–V	III, IV	III-V	III, IV
(mature)										
SPAWNING	63		V	VI	V, VI	V	VI, VII	V, VI_V	VI	V
(mature)								VI_{IV}		
SPENT	64		VI	VII	VII, VIII	VI, (VI-II, VI-III, VI-IV, VI-V)[a]	VIII	VI	VII	VI
(mature)										
RESTING	65		VII	VIII	II	II	II	VI_{II}	VIII	VII
(mature/										
immature[2])										
ABNORMAL	66		VIII	IX		VII	IX	VII	IX	VIII

1) Sexual maturity for estimating the proportion of spawners (mature individuals).

2) Should be used when the investigation was during the prespawning and early spawning time (still no spent individuals). Individuals will not contribute to the spawning stock in the present year.

3) Maturing stages with a subscript is a sub-stage at a given maturity stage

a) in the casa of Latvia – sprat with various levels of gonads development VI is coded as VI-II i.e. spent, but changing to rest, VI-III i.e. spent and maturing a next portion of eggs, VI-IV i.e. spent and maturing more visible a next portion of eggs, VI-V i.e. spent and spawning a last portion of eggs (usually not detected).

The table converts the codes of the national maturity key into the codes of the BITS key for flatfish.

Country	BITS	Denmark	Estonia	Finland	Germany	Latvia	Poland	Russia	Sweden	Lithuania
Species	All		All		Flatfish		Flatfish			
Source	ICES (1997)		Kiselevich (1923), Pravdin (1966)		Maier (1908)	Kiselevich (1923), Pravdin (1966)	Maier (1908)	Alekseev, Alekseeva (1996)	not available	
Maturity stage [1]	Code									
VIRGIN	61	I	I	I	I	I	I	I, II	I, II	I, II
(immature)										
MATURING	62	II	II–IV	II	III–IV	III, IV	III–V	III, IV	III, IV	III, IV
(mature)										
SPAWNING	63	III	V	III	V, VI,VII	V	VI,VII	V, VI_V	V, VI	V
(mature)								VI_{IV}		
SPENT	64	IV	VI	IV	VIII	VI	VIII	VI	VII	VI
(mature)										
RESTING	65	V	VII	V	II	II	II	VI_{II}	VIII	VII
(mature/										
immature[2])										
ABNORMAL	66	VI	VIII	VI	IX, X	VII	IX	VII	IX	VIII

1) Sexual maturity for estimating the proportion of spawners (mature individuals).

2) Should be used when the investigation was during the prespawning and early spawning time (still no spent individuals). Individuals will not contribute to the spawning stock in the present year.

3) Maturing stages with a subscript is a sub-stage at a given maturity stage

Annex 7: Alpha codes for countries and vessels

The recent version of the Alpha codes of countries and vessels are available at different ICES websites: http://vocab.ices.dk/?CodeTypeRelID=4&CodeID=33964

ICES if necessary will update the table. However, the table does not contain data of vessels which were used in the past and which occur in DATRAS database.

COUNTRY	ICES CODE 1)	SHIP´S NAME	BITS CODE
Denmark	DEN	Dana (old)	DAN
		Dana (new)	DAN2
		J.C. Svabo	JCS
		Havfisken (old)	HAF
		Havfisken (new)	26HF
		Havkatten	HAK
Germany	GFR	Anton Dohrn (old)	AND
		Anton Dohrn (new)	AND2
		Solea	SOL
		Solea	SOL2
		Walther Herwig	WAH
		Clupea	CLP
		Eisbär (old)	EIS
Sweden	SWE	Thesis	THE
		Skagerrak	SKA
		Argos	ARG
		Ancylus	ACY
		Dana	DANS
Estonia	EST	Koha	KOH
		Solveig Charter	SLG CEV
Finland	FIN		
Latvia	LAT 1)	Baltijas Petnieks (old)	BPE
		Commercial Latvia Vessel	CLV
		Baltica	BALL
Poland	POL	Baltica	BAL
Russia	RUS	ATLANTIDA	ATLD
		ATLANTNIRO	ATL
Lithuania	LTU 1)	Darius	DAR

Note 1). Country code for Latvia and Lithuania codes refer to the FAO, ISO Alpha 3 code system.

Annex 8: Alphanumeric codes (preliminary) for demersal trawl gears

TRAWL SPECIFICATION	TRAWL POPULAR NAME	RESEARCH VESSEL
DT	Russian bottom trawl	Monokristal
LPT	Latvian Pelagic Trawl	Baltijas Petnieks, Zvezda Baltiki
LBT	Latvian Bottom trawl	Baltijas Petnieks
GOV	Grand Overture Verticale	Argos, Dana
DBT	Danish bottom trawl	Dana
EXP	Danish winged bottom trawl	Dana
SON	Sonderborg trawl	Clupea, Solea
H20	Herring ground trawl (H20/25)	Solea, Eisbär
P20	Herring bottom trawl (P20/25)	Commercial vessel, Baltica
TV1	Large TV trawl	Havfisken
TV2	Small TV trawl	Havkatten
FOT	Fotö bottom trawl	Argos
LCT	Lithuanian cod trawl	Darius
ESB	Estonian small bottom trawl	Koha
HAK	Hake-4M	AtlantNIRO, Atlántida
CHP	Cod Hopper	Solea
MWT	Mid water trawl 664	Solea
TV3	TV trawl	All vessels
TVL	TV3 930 meshes New standard gear since 2001	All vessels participating in the BITS besides vessels using TVS
TVS	TV3 520 meshes New standard gear since 2001	Havfisken, Solea, Solveig, CEV (Estonian Commercial Vessel), LAT – commercial vessel (very temporary)

Within the gear field the following positions have been reserved for recording various types of rigging:

Position 14–16: Sweep length in m. (Numeric, right justified, zero filled. Spaces for unknown. Code 000 indicates the semi-pelagic rigging; this specification is associated with the GOV.)

Position 17: Exceptions (B = Bobbins used, D = Double sweeps, space = standard or not known).

Position 18: Door type (P = Polyvalent, V = Vee F = Flat, K = Karm Waco, space = others or not known).

Further quantitative numeric information on rigging of gear is defined in positions 74–95, in Record Type HH.

Annex 9: Recorded species codes used in the record Type HL and CA

Fish species have been recorded in WoRMS code since 2011 and since 2012 as standard. TSN code is used in data submitted before 2011. Relation between common name, Latin name, TSN code and WoRMS code is available at ICES website https://datras.ices.dk/Data_products/qryspec.aspx, and a link to the World Register of Marine Species (WoRMS) is available at ICES website http://www.ices.dk/marine-data/vocabularies/Pages/default.aspx.

List of fish species accepted by DATRAS for BITS is available at ICES website: http://vocab.ices.dk/?CodeTypeRelID=365&CodeID=137906

Any species deliberately excluded from a subset, or an invalid species for a particular haul, should be included for each haul with a species validity code 0.

RECORDED STANDARD SPECIES LIST CODES

1 = All (4) standard species recorded
3 = Bottom (2) standard species recorded 1)
4 = Individual (1) standard species recorded 2)

RECORDED BYCATCH SPECIES LIST CODES (POSITION 66)

0 = No bycatch species recorded
1 = Open ended bycatch list - All species recorded
4 = Closed bycatch list - Only flatfish (4) species recorded 1)

1) For definition, see Annex 11.

2) If this code is applied, zero catches of the species recorded must be recorded in Record Type 2 format.

Annex 10: Species validity code

0	INVALID INFORMATION	Information lost. A note should be given with the cause for the classification as invalid.
1	VALID INFORMATION	No per hour and total length composition recorded; applies also when No per hour is zero.
4	TOTAL NO PER HOUR ONLY	Catch sampled for No per hour only; no length measurements.

Annex 11A: Species names, WoRMS AphiaID codes that are used in the DATRAS checking program

Code	Latin name	Code	Latin name	Code	Latin name
101170	*Myxine glutinosa*	126501	*Phycis blennoides*	127139	*Limanda limanda*
101172	*Lampetra fluviatilis*	126503	*Urophycis chuss*	127140	*Microstomus kitt*
101174	*Petromyzon marinus*	126505	*Gasterosteus aculeatus*	127141	*Platichthys flesus*
105814	*Scyliorhinus canicula*	126507	*Pungitius pungitius*	127143	*Pleuronectes platessa*
105821	*Mustelus asterias*	126508	*Spinachia spinachia*	127146	*Lepidorhombus whiffiagonis*
105865	*Amblyraja radiata*	126525	*Regalecus glesne*	127149	*Scophthalmus maximus*
105869	*Dipturus batis*	126555	*Lophius piscatorius*	127150	*Scophthalmus rhombus*
105883	*Raja clavata*	126715	*Argentina silus*	127151	*Zeugopterus punctatus*
105923	*Squalus acanthias*	126716	*Argentina sphyraena*	127153	*Buglossidium luteum*
107254	*Nephrops norvegicus*	126736	*Osmerus eperlanus*	127160	*Solea solea*
107276	*Cancer pagurus*	126751	*Ammodytes marinus*	127178	*Coregonus albula*
11707	*Cephalopoda*	126752	*Ammodytes tobianus*	127180	*Coregonus lavaretus*
125464	*Clupeidae*	126755	*Hyperoplus immaculatus*	127186	*Salmo salar*
125537	*Gobiidae*	126756	*Hyperoplus lanceolatus*	127187	*Salmo trutta*
125541	*Labridae*	126758	*Anarhichas lupus*	127190	*Agonus cataphractus*
125581	*Soleidae*	126792	*Callionymus lyra*	127196	*Cottus gobio*
125589	*Cottidae*	126793	*Callionymus maculatus*	127203	*Myoxocephalus scorpius*
125909	*Ammodytes*	126822	*Trachurus trachurus*	127204	*Taurulus bubalis*
125911	*Hyperoplus*	126868	*Aphia minuta*	127214	*Cyclopterus lumpus*
125930	*Callionymus*	126892	*Gobius niger*	127219	*Liparis liparis*
125999	*Pomatoschistus*	126916	*Neogobius melanostomus*	127259	*Chelidonichthys cuculus*
126160	*Liparis*	126927	*Pomatoschistus microps*	127262	*Chelidonichthys lucerna*
126281	*Anguilla anguilla*	126928	*Pomatoschistus minutus*	127312	*Maurolicus muelleri*
126375	*Belone belone*	126930	*Pomatoschistus pictus*	127379	*Entelurus aequoreus*

Code	Latin name	Code	Latin name	Code	Latin name
126415	*Alosa fallax*	126957	*Acantholabrus palloni*	127385	*Nerophis ophidion*
126417	*Clupea harengus*	126961	*Centrolabrus exoletus*	127387	*Syngnathus acus*
126421	*Sardina pilchardus*	126964	*Ctenolabrus rupestris*	127389	*Syngnathus rostellatus*
126425	*Sprattus sprattus*	126965	*Labrus bergylta*	127393	*Syngnathus typhle*
126426	*Engraulis encrasicolus*	126975	*Dicentrarchus labrax*	127427	*Zeus faber*
126436	*Gadus morhua*	126977	*Chelon labrosus*	150637	*Eutrigla gurnardus*
126437	*Melanogrammus aeglefinus*	126985	*Mullus barbatus*	151302	*Gymnocephalus cernua*
126438	*Merlangius merlangus*	126986	*Mullus surmuletus*	151308	*Sander lucioperca*
126440	*Pollachius pollachius*	126996	*Pholis gunnellus*	151353	*Perca fluviatilis*
126441	*Pollachius virens*	127023	*Scomber scombrus*	154210	*Esox lucius*
126444	*Trisopterus esmarkii*	127072	*Leptoclinus maculatus*	154388	*Lota lota*
126445	*Trisopterus luscus*	127082	*Trachinus draco*	154675	*Lumpenus lampretaeformis*
126446	*Trisopterus minutus*	127118	*Lycodes vahlii*	159267	*Zoarces americanus*
126448	*Ciliata mustela*	127123	*Zoarces viviparus*	254529	*Myoxocephalus quadricornis*
126450	*Enchelyopus cimbrius*	127126	*Arnoglossus laterna*	272030	*Atherina presbyter*
126458	*Gaidropsarus vulgaris*	127136	*Glyptocephalus cynoglossus*	273571	*Symphodus melops*
126461	*Molva molva*	127137	*Hippoglossoides platessoides*	274967	*Argyropelecus olfersii*
126484	*Merluccius merluccius*	127138	*Hippoglossus hippoglossus*	416357	*Alosa agone*

Note: see the ICES website: (http://vocab.ices.dk/?CodeTypeRelID=365&CodeID=137906; access 06.10.2015)

Annex 11B: Species names, TSN and NOCD codes and max. recorded length of fish species used historically in the DATRAS checking program

TSN code	NODC code	Latin name	English name	Max. length [cm]
161722	8747010201	*Clupea harengus*	Herring	40
161789	8747011701	*Sprattus sprattus*	Sprat	17
161716	8747010109	*Alosa fallax*	Twaite shad	50
161831	8747020104	*Engraulis encrasicolus*	European anchovy	25
161997	8755010306	*Salmo trutta*	Sea trout	95
161989	8755010211	*Oncorhynchus mykiss*	Rainbow trout	50
161950	8755010115	*Coregonus lavaretus*	Whitefish = powan	65
162039	8755030301	*Osmerus eperlanus*	Smelt	29
162139	8758010101	*Esox lucius*	Pike	120
164712	8791030402	*Gadus morrhua*	Cod	135
164748	8791031501	*Enchelyopus cimbrius*	Fourbeard rockling	40
164758	8791031801	*Merlangius merlangus*	Whiting	60
172894	8857041402	*Platichthys flesus*	Flounder	52
172902	8857041502	*Pleuronectes platessa*	Plaice	57
172881	8857040904	*Limanda limanda*	Common dab	40
616195 or 172748	8857030402	*Psetta maxima*	Turbot	60
168510	8835200403	*Stizostedion lucioperca*	Pikeperch/Zander	85
168470	8835200202	*Perca fluviatilis*	Perch	40
168520	8835200601	*Gymnocephalus cernua*	Ruffe	15
171645	8842130209	*Pholis gunnellus*	Butterfish	20
631023 or 171588	8842120905	*Lumpenus lampretaeformis*	Serpent blenny= snakeblenny	35
165324	8793012001	*Zoarces viviparus*	Viviporous eelpout	40
171676	8845010105	*Ammodytes tobianus*	Lesser sandeel	20
171682	8845010301	*Hyperoplus lanceolatus*	Greater sandeel	35
172414	8850030302	*Scomber scombrus*	Mackerel	65
168588	8835280103	*Trachurus trachurus*	Horse mackerel	45
172072	8847017505	*Neogobius melanostomus*	Round goby	20
167318	8831022207	*Myoxocephalus scorpius*	Sea scorpion = Shorthorn sculpin	25
167454	8831080803	*Agonus cataphractus*	Pogge	20
167612	8831091501	*Cyclopterus lumpus*	Lumpfish	35
167578	8831090828	*Liparis liparis*	Sea snail	10
166365	8818010101	*Gasterosteus aculeatus*	Threespine stickleback	8
163666	8776014901	*Abramis brama*	Bream	60
639696	8776010601	*Vimba vimba*	vimba	40
163761	8776017401	*Rutilus rutilus*	Roach	30
161128	8741010102	*Anguilla anguilla*	Eel	180
159722	8603010301	*Petromyzon marinus*	Sea lamprey	90
159719	8603010217	*Lampetra fluviatilis*	River lamprey	65

Note: the Latin name of some fish occurred in the Baltic Sea, are not yet listed on the ICES Data Centre website: http://www.ices.dk/datacentre/datsu/rptSpc.asp?Id=59.

Annex 12: Fisheries bottom-trawl surveys marine litter data reporting format

Methods

Data submitters will transfer data using the DATRAS Trawl litter format, described in the suitable manual, downloadable here: http://www.ices.dk/marine-data/data-portals/Pages/DATRAS-Docs.aspx. Submitters will transfer the data using the new standard format specifically developed for DATRAS users, implementing the ICES vocabulary and classification coding. According to the new information from the ICES Secretariat, there is no need (onwards from April 2016) to include hauls with 0-catches for the marine litter database.

The sheet and description of the categories that need to be collected at each catch-station are attached. Each type of litter that is collected will be submitted in the format mentioned below and then uploaded to DATRAS. Once collected these data can be sent to each institutes marine litter co-coordinator. All data should be uploaded by haul, number, weight and size.

The new revised marine litter reference list that all the countries will use is C-TS-REV. Found here: http://vocab.ices.dk/?ref=1381

All countries will upload data according to the template provided by DATRAS.

All countries will use the revised template as of next the BITS survey Q4-2016. The revised litter reference list, provided below will also be downloadable from DATRAS: https://datras.ices.dk/Data_products/ReportingFormat.aspx

Size categories aren't any different. Six categories (A-F), for other categories see extensive list at DATRAS http://vocab.ices.dk/?ref=1380

Formatting and reporting procedures

Each of the submitted files must contain unique information about survey, country, vessel, fishing gear, year, and quarter. Partial submissions within these key values will be not acceptable. Avoid headers in data files.

Each record should be reported in a separate row. Fields within a record should be separated with commas. For numbers requiring decimals, report with decimal points, not decimal commas. Empty fields are not allowed. Report -9 instead.

Codes can be found in the respective code lists in the ICES vocabulary at vocab.ices.dk. If additional codes are required or if there are any questions, contact accessions@ices.dk.

Field LTPRP allows simultaneous reporting of several codes, which should be separated with ~. No other fields allow the reporting of multiple codes.

For reporting zero litter catches, report LTREF = RECO-LT, PARAM = LT-TOT, UnitItem = items/haul, LT_Items = 0.

If the litter reporting units are 'per haul', wingspread value of given trawl must be reported. Make sure that the existing submissions in DATRAS have the valid information for the HH.WingSpread.

Annex 13. Fish length measurements

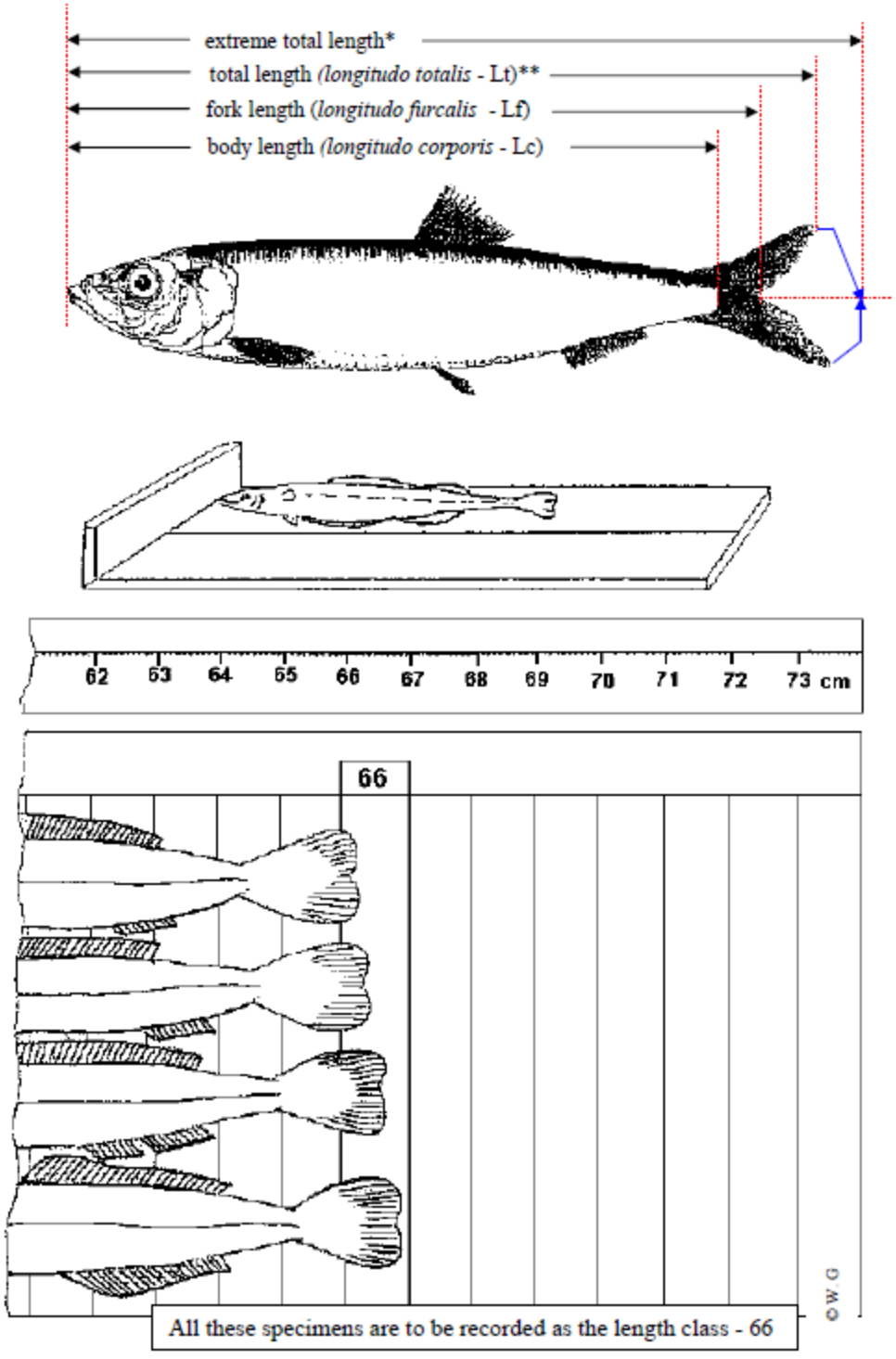


Figure 13.1. The fish length measuring scheme; symbols used: * - during measuring upper and lower lobes of caudal fin are getting together (Anon. 1974), ** - during measuring caudal fin is in the natural position.