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Report of the Baltic International Fish Survey Working Group (WGBIFS)

21–25 March 2011

Kaliningrad, Russia

ICES International Council for the Exploration of the Sea

CIEM Conseil International pour l'Exploration de la Mer

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Conseil International pour l'Exploration de la Mer

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Executive summary

The ICES Working Group on Baltic International Fish Surveys (WGBIFS) met at Atlantic Scientific Research Institute of Marine Fisheries and Oceanography (AtlantNIRO), Kaliningrad, Russia 21–25 March 2011 to compile the survey results from second half of 2010 and first half of 2011 and to coordinate and plan the schedule for surveys in second half of 2011 and first half of 2012. Furthermore, the common survey manuals were updated according to decisions made during the meeting. All fish stock assessment relevant surveys in the Baltic Sea with international participation (both bottom-trawl surveys and acoustic surveys) are coordinated. The number of participants was 22 including eight countries around the Baltic Sea. The group was chaired by Henrik Degel, Denmark.

The results of the standard data compilation can be found under the relevant sections for bottom-trawl and acoustic surveys respectively. Time-series of acoustic tuning fleets are presented in Annex 5.

The evaluation of the realized trawl and acoustic surveys showed that stock indices based on the surveys present realistic estimates of the current stocks. The discussion of the survey results and the planning of the next surveys clearly showed that it is necessary that the cruise leaders inform the coordinaters of the surveys very fast if planned stations cannot be realized or planned areas cannot be covered due to technical failure of weather conditions to offer the opportunity of alternative solutions.

Different methodical aspects of the acoustic surveys were discussed. However, statistical analyses were commonly based on a subset of the data because the database of acoustic source data does not work. The group strongly recommends that ICES hosts this database and realizes necessary further development. Based on an available database methods can be developed and validated to improve the quality of the stock indices based on the acoustic surveys.

Large part of the working time was committed by discussions of additional terms of reference based on recommendations of other expert groups of EU. Unfortunately, the requests very general in some cases like the requirement of stomach samples without information concerning the required spatial and temporal resolution, clear definition of the required analyses, etc. so that clear decision by WGBIFS were not possible to avoid changes of the survey design. Changes of the survey design (lower coverage) influence the quality of the stock indices. Therefore, very clear defined demands are necessary as basis for discussing possible effects of the additional work concerning the survey design.

1 Opening of the meeting

The meeting took place from 21 March to 25 March 2011 at Atlantic Scientific Research Institute of Marine Fisheries and Oceanography (AtlantNIRO) in Kaliningrad, Russia. The meeting was opened by the Chair at 10 am. The participants Deputy Director Dr Vyacheslav Sushin from AtlantNIRO and the Chair welcomed the participants. Dr Igor Karpushevskiy, Head of Baltic Sea Laboratory at AtlantNIRO informed about the household roles.

The Terms of Reference for the meeting were:

The **Baltic International Fish Survey Working Group** (WGBIFS), chaired by Henrik Degel, Denmark, will meet in Kaliningrad, Russia, 21–25 March 2011 to:

a) Combine and analyse the results of spring and autumn 2010 acoustic surveys and experiments and report to WGBFAS;

b) Update the hydro acoustic databases BAD1 and FishFrame for the years 1991 to 2010;

c) Plan and decide on acoustic surveys and experiments to be conducted in autumn 2011 and spring 2012;

d) Discuss the results from BITS surveys performed in autumn 2010 and spring 2011;

e) Plan and decide on demersal trawl surveys and experiments to be conducted in autumn 2011 and spring 2012;

f) Update and correct the Tow Database;

g) Review and update the Baltic International Trawl Survey (BITS) manual;

h) Review and update the Baltic International Acoustic Survey (BIAS) manual;

i) Review of new results on the vertical distribution of the cod during the BITS;

j) Review of the upload and development status of DATRAS and FishFrame;

k) Discuss the descriptions and the documentation of various methods for weighting procedures when combining hauls in compilation of acoustic indices;

l) Evaluating the new results of uncertainty estimates of the BIAS abundance indices applying simulation model;

m) Review the results of the scrutinizing of the data from the Baltic region uploaded in DATRAS with special reference to the issue of correct species identification and consistency across countries;

n) Prepare methods for delivery of the following information to assessment working groups in 2012:

  i) Proportion of fish larger than the mean size of first sexual maturation

  ii) Mean maximum length of fish found in research vessel surveys

  iii) 95th % percentile of the fish length distribution observed

The information should be provided for all major fish stocks covered by the survey.

Additional Terms of Reference were added to all Experts groups by **Marine Strategy Directive Framework Steering Group** (MSFDSG) and **Strategic Initiative on Area**

Based Science and Management (SIASM) through a joint request from ACOM and SCICOM:

- Identify elements of the EGs work that may help determine status for the 11 Descriptors set out in the Commission Decision.
- Provide views on what good environmental status (GES) might be for those descriptors, including methods that could be used to determine status.
- take note of and comment on the Report of the Workshop on the Science for area-based management: Coastal and Marine Spatial.

2 Adoption of the agenda and organization of the meeting

The agenda was presented by the Chair (see Annex 2) and was adopted without any changes. To each task one person was assigned as "Text responsible" and one or more as "Assistant text responsible.

Two subgroups were formed; the first one dealing with demersal trawl survey issues and the other one dealing with issues related to acoustic surveys. Plenary were held whenever needed and always before.

Another subgroup consisting of a mix of persons from both the Acoustic survey subgroup and the Bottom trawl survey subgroup were formed in order to deal with the additional agenda issues requested by SCICOM and ACOM.

3 Combine and analyse the results of the 2010 acoustic surveys and experiments and report to WGBFAS

3.1 Combined results of the Baltic International Acoustic Surveys (BIAS)

In 2010 the following acoustic surveys were conducted between September and November:

Vessel	Country	Area
Argos	Sweden	27 and parts of 25, 26, 28, 29
Argos	Sweden/Finland	30
Baltica	Poland	Parts of 24, 25 and 26
Baltica	Latvia/Poland	Parts of 26 and 28
Baltica	Estonia/ Finland/ Poland	Parts of 28, 29 and 32
Darius	Lithuania	Part of 26
Solea	Germany/Denmark	21, 22, 23, 24

Stock indices of herring and sprat by age groups of the different cruises are stored in the database BAD1. The standard cruise reports are presented in Annex 8 using the standard format.

3.1.1 Area under investigation and overlapping areas

Each statistical rectangle of the area under investigation was allocated to one country during the meeting in 2005, thus each country has a mandatory responsible area. That means that area shall be investigated by about 60 miles and at least two controls hauls. However, it is allowed for all nations to cover also other areas, the results from the responsible country are used if these data are available.

The figure illustrates that the planned coverage of the Baltic Sea during the acoustic survey in October 2010, was realized.

In 2010 8 statistical rectangles were investigated by more than one vessel (Figure 3.1). Differences in the results of these overlapped areas can be explained by the coverage of different depth ranges and the temporal variability in fish distribution. These differences, however, have no significant effect on the calculation of the tuning fleet indices. Therefore, in the calculation of the indices, the data from the country responsible for specific rectangle was used.

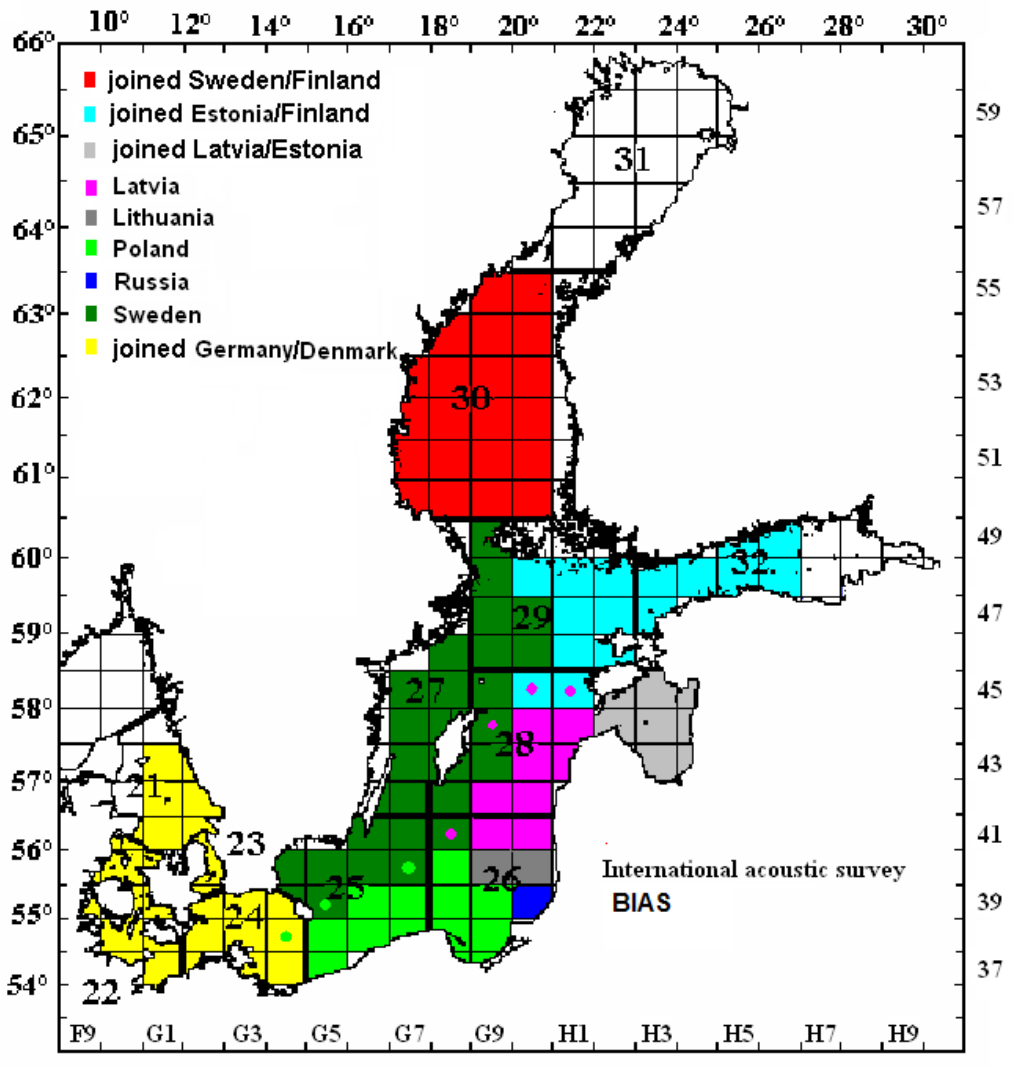


Figure 3.1. Map of surveys conducted in October 2010. Colors indicate the countries, which covered specific ICES-rectangles and delivered data to BAD1-database, thus was responsible for this rectangle. Colored dots within a rectangle explain additional data in BAD1 partly or totally covered by other countries.

3.1.2 Total results

The abundance estimates which are based on the international acoustic survey in October 2010 are presented per rectangle and age group in Tables 3.1.1 and 3.1.2 for herring and sprat, respectively. In addition, the abundance estimates for herring and sprat are presented in Tables 3.1.3 and 3.1.4 per subdivision and age group. Figures 3.1.1 and 3.1.2 present the abundance in number of herring and sprat during the BIAS in October 2010, respectively. The sizes of the circles are proportional to the abundance. The different colors are related to ICES Subdivisions.

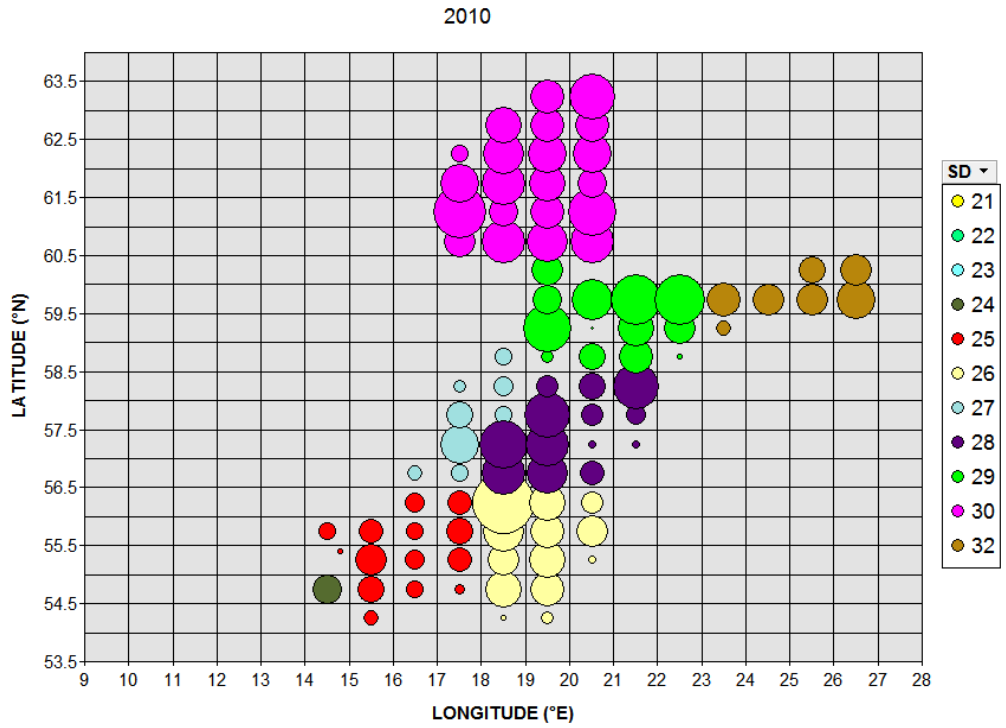


Figure 3.1.1. Covered ICES-Rectangles in 2010 with the abundance of herring in number (the area of the circles indicates the estimate number of herring in the rectangle with a maximum of 2246 10^6., the colour indicates the subdivisions).

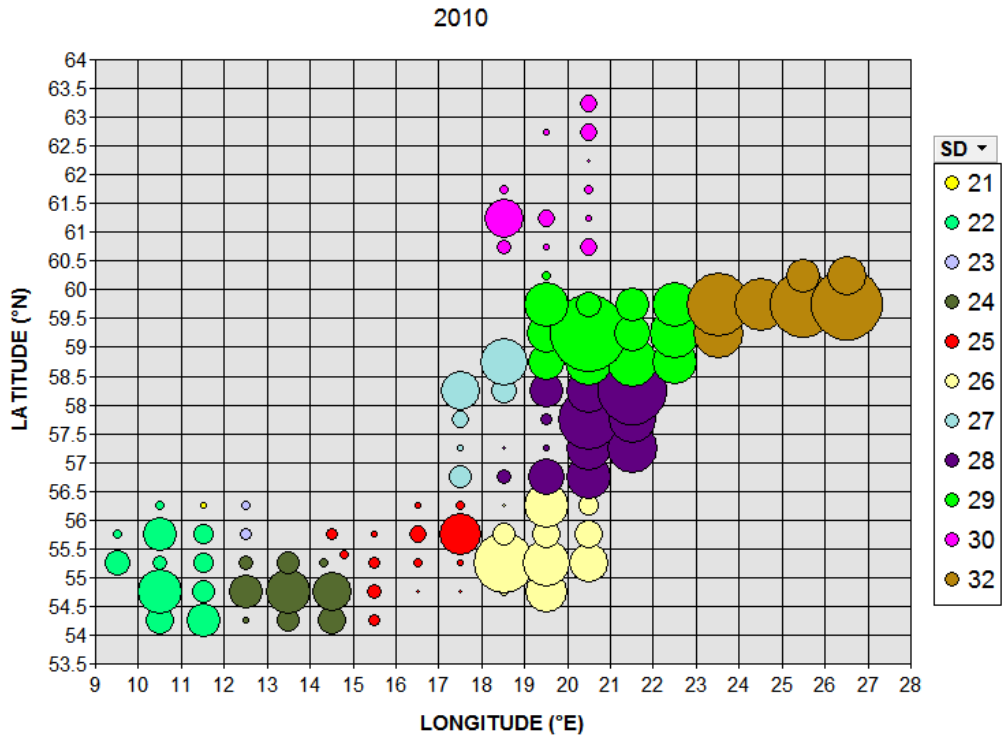


Figure 3.1.2. Covered ICES-Rectangles in 2010 with the abundance of sprat in number (the area of the circles indicates the estimate number of sprat in the rectangle with a maximum of 6340 10^6., the colour indicates the subdivisions).

3.1.3 Area corrected data

During WGBIFS meeting 2006 possible improvement of presenting the results from acoustic surveys was discussed, and correction factor for each subdivision and year was introduced because of the coverage of the investigated area differed in the years. This factor is the proportion between the total area of the subdivision that are presented in the BIAS manual (see Table 2.2 in BIAS manual) and the area of rectangles which was covered during the survey. Some disagreements appeared about the appropriate area of SD28. It was agreed that the Gulf of Riga must be excluded from the total area of SD 28. All other subdivision kept their areas from the manual. (See section 3.3). The area corrected abundance estimates for herring and sprat per subdivision are summarized in Tables 3.1.5 and 3.1.6 respectively. Biomass for herring and sprat per subdivision were given in Tables 3.1.7 and 3.1.8

3.1.4 Tuning fleets for WGBFAS

3.1.4.1 Sprat in Subdivisions 24–29

Tuning fleet is presented from the October acoustic survey for the sprat assessment of the Stock in Central Baltic, the area corrected combined results of Subdivisions 24–29, 1991–2010 are presented in Annex 5: Table 3 and recruitment index for sprat (age 0) in Subdivisions 26 + 28 is presented in Annex 5: Table 4. Older data than for 1991 does not exist in the current BAD1 database. In the years 1993, 1995 and 1997 the coverage was very poor. The results were therefore not recommended to be used. It is recommended that these data should also not be used in future.

3.1.4.2 Herring in Subdivisions 25–29

Tuning fleet is presented from the October acoustic survey for the herring assessment of the Stock in Central Baltic, the area corrected combined results of Subdivisions 25–29, 1991–2010 are presented in Annex 5: Table 1 and recruitment index for herring (age 0) is presented in Annex 5: Table 2.

In the years 1993, 1995 and 1997 the coverage was very poor. The results were therefore not recommended to be used. It is recommended that these data should also not be used in future.

In 2000 a large discrepancy between old and new dataset is observed. The high herring abundance values occur in year 2000 because of the very large numbers of herring in the northern part of SD 29 (SD 29N). The BIAS survey has covered this area only in years 1991, 2000 and 2005–2010, however, in years 1991, 2005 and 2006 the area coverage of SD 29N was low. Nevertheless, high density of herring has been recorded there always. In response to WGBFAS recommendation a new tuning index was calculated with the exclusion of the data from inconsistently covered area of SD 29N. In the calculations the data from consistently covered SD 29S was used instead and extrapolated for whole area of SD 29. This new tuning fleet is presented in Annex 5: Table 6. An alternative solution would be to exclude whole SD 29 from the tuning index, but this cannot be recommended because the SD 29 is the core area of Central Baltic Herring stock, and the BIAS survey has consistently covered the area 29S at high degree of coverage.

3.1.5 Recommendation to WGBFAS

i) WGBIFS recommends that the BIAS-dataset including the data of 2010 can be used in the assessment of the herring stocks in the Baltic Sea with

the restriction that the following years are excluded from the index series: 1993, 1995 and 1997.

ii) WGBIFS recommends that the new BIAS-dataset can be used including the data of 2010 in the assessment of the sprat stock in the Baltic Sea with the restriction that the following years are excluded from the index series: 1993, 1995 and 1997.

Table 3.1.1. Estimated numbers (millions) of herring by age group and rectangle in October 2010.

SD	RECT	total	age 0	age 1	age 2	age 3	age 4	age 5	age 6	age 7	age 8+
25	37G5	212.3	55.3	16.2	15.7	63.0	14.2	22.8	7.9	12.8	4.5
25	38G5	582.7	72.9	49.9	48.4	208.7	46.3	77.1	23.6	42.9	12.8
25	38G6	217.8	48.5	16.5	15.3	73.5	15.9	24.8	6.4	13.1	3.8
25	38G7	73.9	5.9	6.6	6.8	26.3	6.6	8.6	4.5	5.5	3.1
25	39G4	32.0	13.9	4.9	2.3	5.2	3.7	1.5		0.5	
25	39G5	496.3	27.8	35.9	64.6	182.6	85.1	71.7	6.0	22.6	
25	39G6	339.1	27.1	30.2	31.3	120.9	30.2	39.4	20.8	25.1	14.2
25	39G7	509.7	2.4	61.1	53.0	211.9	49.8	61.9	21.2	35.1	13.5
25	40G4	228.6	65.3	30.4	34.5	67.6	16.8	4.2	0.7	8.8	0.4
25	40G5	454.0	8.1	80.5	83.5	101.6	81.3	44.7	6.8	23.4	24.3
25	40G6	274.0	5.5	17.1	19.6	99.5	55.7	35.0	21.0	15.9	4.8
25	40G7	510.1		9.9	64.7	201.1	108.2	64.3	16.8	32.7	12.5
25	41G6	291.5		8.4	45.7	83.2	34.1	56.1	34.0	19.9	10.2
25	41G7	476.1		10.4	57.1	181.4	106.3	55.2	12.8	30.2	22.6
26	37G8	25.8	0.6	2.2	2.2	6.4	4.2	3.7	1.4	3.0	2.0
26	37G9	146.4	8.0	4.7	11.0	30.5	22.6	20.1	10.0	20.8	18.9
26	38G8	1009.1	43.1	133.1	99.2	266.5	171.3	130.5	39.8	80.7	45.0
26	38G9	165.6	38.3	18.4	10.9	34.2	20.5	16.7	9.2	9.9	7.5
26	39G8	548.3	48.9	68.2	46.5	148.1	86.5	69.6	20.6	40.7	19.2
26	39G9	367.7	26.1	18.4	31.0	92.9	67.7	44.5	33.9	34.8	18.4
26	39H0	57.2	10.4	9.2	3.4	12.2	7.7	5.0	2.7	1.6	5.2
26	40G8	606.7	2.6	52.3	41.9	141.6	92.1	75.3	36.9	82.9	81.2
26	40G9	722.9	4.8	12.1	24.1	200.0	151.8	130.1	79.5	67.5	53.0
26	40H0	757.4	205.2	86.7	80.3	179.3	109.5	26.2	37.2	16.5	16.4
26	41G8	776.2	2.2	21.2	85.9	212.6	173.4	140.7	59.4	61.2	19.7
26	41G9	1031.3		15.8	65.6	359.4	180.9	174.8	90.2	93.4	51.2
26	41H0	409.9		5.3	19.1	92.3	85.7	80.7	43.9	49.5	33.5
27	42G6	207.6	0.7	14.6	20.4	40.4	31.8	40.1	26.8	23.3	9.6
27	42G7	245.0	0.2	4.6	91.0	108.6	19.2	2.0	12.9	1.0	5.6
27	43G7	1135.1		24.4	268.5	391.9	277.0	81.5	26.9	33.4	31.5
27	44G7	610.9	0.2	40.5	288.5	211.6	35.1	14.0	5.3	10.7	5.3
27	44G8	253.4	0.8	7.3	56.2	107.8	43.5	11.2	6.2	17.7	2.7
27	45G7	150.4	3.4	36.3	44.5	50.2	9.3	1.6	2.5	2.2	0.4
27	45G8	297.0	3.0	26.0	141.8	118.6	4.9		1.1	0.5	1.1
27	46G8	265.8	13.2	68.0	141.9	31.8		2.3	8.4		0.0
28A	42G8	1443.9			98.7	557.5	453.1	120.5	78.9	62.3	73.0
28A	42G9	1303.7		20.7	72.2	239.1	253.6	195.8	147.1	211.7	163.6
28A	42H0	492.4		7.0	21.7	77.7	93.9	73.7	62.6	87.5	68.4
28A	43G8	1864.7			431.7	539.6	368.1	368.1	98.3	9.6	49.2
28A	43G9	1450.9			338.5	641.5	176.6	98.4	113.1	71.1	11.7
28A	43H0	44.1		1.8	9.5	18.7	6.3	1.5	3.1	2.5	0.8
28A	43H1	59.6		2.4	12.8	25.2	8.4	2.1	4.2	3.4	1.1
28A	44G9	1595.1	1.7	14.0	305.0	524.0	300.9	242.9	66.7	103.0	37.0
28A	44H0	373.7		16.9	86.1	136.0	56.7	30.3	33.9	11.1	2.8
28A	44H1	308.1		19.1	83.8	112.4	51.7	16.9	9.1	10.1	5.1
28A	45G9	413.3	4.5	17.7	74.5	173.5	78.0	43.7	10.2	7.1	4.1
28A	45H0	604.7		17.2	248.2	199.5	43.2	23.4	17.7	14.7	40.8
28A	45H1	892.2		24.5	364.3	297.3	64.3	35.5	26.1	20.8	59.3
29	46G9	143.2	5.5	42.7	33.9	46.2	14.3	0.6			
29	46H0	558.6	5.7	82.3	108.1	294.1	36.6	17.3	6.6	6.4	1.7
29	46H1	896.6	1.6	54.8	248.3	314.4	62.3	74.2	15.4	43.5	82.3

SD	RECT	total	age 0	age 1	age 2	age 3	age 4	age 5	age 6	age 7	age 8+
29	46H2	23.5	1.2	7.1	6.7	6.2	0.5	0.6	0.2	0.5	0.5
29	47G9	1915.5		191.2	804.6	615.8	126.1	101.8	70.2		5.8
29	47H0	5.2	3.3			1.9					
29	47H1	1074.8	37.0	281.9	285.8	290.3	40.0	42.3	12.9	34.2	50.4
29	47H2	825.2	9.2	103.1	240.3	295.9	46.6	33.6	11.8	35.8	48.9
29	48G9	680.2	0.7	144.9	294.9	164.0	34.7	20.2	18.6	0.7	1.5
29	48H0	1360.7	141.8	271.7	373.9	362.7	53.9	49.1	15.5	36.6	55.6
29	48H1	2070.0	69.6	640.6	549.5	503.0	69.7	71.0	23.0	57.0	86.7
29	48H2	1968.4	116.4	450.1	410.1	513.2	117.6	108.7	25.2	75.1	152.3
29	49G9	794.7		218.5	292.8	208.2	34.9	14.0	24.2	2.1	
30	50G7	849.0	10.8	363.2	240.0	68.1	55.9	3.6	10.8	19.3	77.4
30	50G8	1432.1	34.5	289.1	549.2	293.2	181.3	24.9	2.2		57.7
30	50G9	1303.9		123.6	700.7	294.1	121.5	22.0	5.4	6.5	30.1
30	50H0	1416.1	58.1	645.9	515.9	185.4	6.9	3.8			
30	51G7	2246.0		278.4	1179.5	255.5	231.3	96.8	13.5	117.0	73.9
30	51G8	691.7	201.6	284.6	167.9	29.9	7.6				
30	51G9	969.6	27.5	69.1	536.1	151.6	130.4	1.9	18.3	1.1	33.8
30	51H0	1776.6	18.1	509.4	505.1	227.6	191.9	99.4	56.6	12.0	156.5
30	52G7	1211.1		16.8	120.4	295.5	267.3	129.5	133.3	85.3	163.0
30	52G8	1525.4	11.0	44.9	221.2	84.6	112.7	98.8		57.7	894.6
30	52G9	1011.8	1.2	3.2	140.1	77.8	243.1	34.0	44.9	29.5	438.0
30	52H0	685.5	41.9	18.4	130.4	101.9	42.6	66.4	65.5	35.9	182.5
30	53G7	262.9		1.9	61.5	61.9	46.4	45.4	19.9		25.9
30	53G8	1368.7		6.7	68.3	154.3	253.9	199.0	125.7	58.6	502.2
30	53G9	1121.8	2.5	22.2	49.7	44.6	100.0	119.0	100.2	119.4	564.3
30	53H0	1225.1		226.6	455.1	277.4	176.0	19.6		21.2	49.3
30	54G8	1061.6			43.0	80.3	231.6	152.6	132.0	134.5	287.7
30	54G9	972.5	2.5	10.3	14.7	143.6	245.0	46.8	81.0	30.8	397.7
30	54H0	895.2	10.5	57.0	47.8	102.2	187.9	143.9	36.5	92.1	217.3
30	55G9	954.7			121.6	192.9	323.5	124.4	80.4	23.0	89.0
30	55H0	1582.3	8.4	806.3	319.3	192.5	190.8	61.2	3.9		
32	47H3	185.7	12.3	69.3	37.3	39.9	7.9	9.7	1.5	0.5	7.4
32	48H3	876.8	129.8	575.0	75.8	63.5	11.0	10.2	1.8	1.2	8.6
32	48H4	761.8	47.0	382.4	118.5	129.0	24.7	31.0	4.2	2.6	22.5
32	48H5	826.0	22.5	384.9	145.6	166.1	30.8	40.0	6.4	2.6	27.2
32	48H6	1186.2	36.3	642.5	179.9	203.2	36.7	47.6	7.8	2.4	29.8
32	49H5	585.4	16.7	311.3	89.7	103.4	19.0	24.5	4.0	1.4	15.5
32	49H6	846.5	24.1	449.3	130.0	149.8	27.5	35.6	5.7	2.1	22.5

Table 3.1.2. Estimated numbers (millions) of sprat by age group and rectangle in October 2010.

SD	RECT	total	age 0	age 1	age 2	age 3	age 4	age 5	age 6	age 7	age 8+
21	41G0	145.3	144.6	0.7							
21	41G1	81.5	75.9	3.8	1.3	0.4	0.1				
21	41G2	2.7	2.0		0.2	0.2	0.1	0.1			
21	42G1	6.6	1.3	2.8	1.5	0.8	0.3	0.0			
21	42G2	5.1		1.4	1.6	0.7	1.0	0.4			
21	43G1										
21	43G2										
22	37G0	1257.8	1236.2	15.3	4.5	1.8					
22	37G1	1813.4	1807.6	4.6	0.6	0.6					
22	38G0	3221.5	3214.4	3.0	3.0	1.2					
22	38G1	845.9	845.9								
22	39F9	1027.1	1027.1								
22	39G0	347.6	347.6								
22	39G1	728.4	728.4								
22	40F9	178.7	178.7								
22	40G0	1856.4	1856.4								
22	40G1	622.9	622.9								
22	41G0	115.3	115.3								

SD	RECT	total	age 0	age 1	age 2	age 3	age 4	age 5	age 6	age 7	age 8+
23	39G2	353.2	347.5	3.7	1.5	0.4	0.2				
23	40G2	224.9		16.3	57.8	63.6	58.6	19.4	8.2		1.0
23	41G2	167.8	166.9	0.8	0.1	0.0		0.0			
24	37G2	50.7	47.1	2.9	0.7	0.0					
24	37G3	972.1	951.2	10.3	8.1	1.7	0.9				
24	37G4	1419.4	748.3	355.3	213.4	70.2	31.0	0.4	0.8		
24	38G2	1989.1	1966.3	13.7	7.0	1.4	0.7				
24	38G3	3258.8	2768.4	317.9	120.4	38.8	12.2	0.4	0.7		
24	38G4	2375.6	1252.4	594.7	357.2	117.4	51.9	0.7	1.4		
24	39G2	331.1	325.7	3.4	1.4	0.4	0.2				
24	39G3	828.5	598.5	89.0	81.6	40.0	18.3	0.8	0.4		
24	39G4	179.4	46.1	48.4	49.9	23.7	10.8	0.1	0.3		
25	37G5	199.4	65.7	55.7	49.3	15.6	7.5	4.0	1.3	0.3	
25	38G5	320.9	46.0	83.6	91.5	49.7	29.6	15.5	3.2	1.8	
25	38G6	16.4	2.2	5.6	5.2	1.8	0.9	0.4	0.1	0.0	
25	38G7	19.4	0.6	4.1	6.9	3.6	2.5	1.1	0.3	0.2	
25	39G4	190.4	6.8	56.9	41.7	40.2	22.3	22.6			
25	39G5	164.0	0.7	14.4	34.6	34.7	45.6	6.8	15.9	4.8	6.4
25	39G6	121.9	3.5	26.0	43.5	22.7	16.0	7.1	1.7	1.4	
25	39G7	94.0	3.9	28.7	33.0	14.1	8.7	4.0	1.0	0.6	
25	40G4	245.9	18.4	30.1	88.5	47.0	35.5		2.0	18.8	5.6
25	40G5	50.0	0.3	4.7	20.6	6.3	11.3	0.5	0.5	3.3	2.4
25	40G6	503.3	1.8	21.5	314.0	70.4	84.4	7.8		1.6	1.6
25	40G7	313.3	1.6	7.2	146.9	30.2	103.9	0.6	10.8	11.5	0.6
25	41G6	72.5		2.5	33.1	8.1	14.5		11.7	2.6	
25	41G7	170.7	0.5	16.3	96.3	28.1	24.0	3.7	0.9	0.9	
26	37G8										
26	37G9	0.6	0.0	0.3	0.2	0.0					
26	38G8	178.8	49.3	52.7	54.4	11.8	4.3	3.4	0.5	2.5	
26	38G9	2644.3	374.4	1120.8	717.3	69.2	287.6	27.0	13.1	18.5	16.5
26	39G8	366.8	3.3	110.3	176.0	38.8	20.3	7.1	2.4	8.6	
26	39G9	3439.9	267.6	1233.2	870.5	266.7	698.4	29.8	8.4	62.3	3.0
26	39H0	2485.6	698.2	494.5	774.5	208.7	286.8	6.7	6.1	10.1	
26	40G8	9.1	0.3	1.4	4.6	1.2	1.0	0.2	0.1	0.3	
26	40G9	771.7	31.4	126.0	320.8	70.9	171.4	20.1	10.6	15.3	5.2
26	40H0	1345.2	932.0	92.9	67.1	124.4	74.7	27.7	17.1	6.0	3.4
26	41G8	32.3	6.0	4.6	12.8	5.4	2.0		1.5		
26	41G9	3150.5	902.2	100.2	1469.3	380.9	85.0	130.8		67.8	14.3
26	41H0	639.9	96.2	138.3	245.7	62.7	41.1	32.9	16.0	4.7	2.4
27	42G6	2.2	0.2		0.7	0.4	0.2	0.4	0.2	0.2	
27	42G7	867.4	3.6	33.4	657.9	52.3	70.1	24.1	21.9	2.1	2.1
27	43G7	51.1	2.3	2.1	31.2	4.8	7.3	0.6		1.7	1.1
27	44G7	557.1	11.2	5.8	480.6	12.8	27.6		1.6	8.4	9.2
27	44G8	9.4		1.1	4.0	1.6	1.3	0.2	0.5	0.3	0.3
27	45G7	2467.3	336.1	39.4	1969.0	62.8	12.3		9.3	38.4	
27	45G8	1206.4	23.0	1.3	678.2	266.0	137.9		5.1	21.6	73.3
27	46G8	3608.2	571.0	409.2	2120.8	144.4	33.0	55.7	199.2	18.8	56.0
28A	42G8	383.8	6.4	6.9	185.2	101.8	15.6		52.8	15.1	
28A	42G9	2303.5	173.6	178.6	888.5	339.9	286.0	173.8	67.7	130.8	64.7
28A	42H0	3189.6	111.2	360.2	1813.6	320.9	166.3	274.1	2.0	78.1	63.1
28A	43G8	28.0			26.8						1.2
28A	43G9	81.6		0.4	49.5	9.5	4.1	0.6	9.2	2.5	5.7
28A	43H0	3162.4	193.1	102.6	1950.6	609.0	147.3	51.2	36.4	33.8	38.4
28A	43H1	4271.0	260.8	138.5	2634.4	822.5	198.9	69.2	49.2	45.7	51.9
28A	44G9	272.4	22.9	24.9	179.5	11.3	8.5	4.7		18.5	2.1
28A	44H0	6186.0	966.9	598.6	3089.7	867.7	427.1	76.6	14.1	117.3	28.0
28A	44H1	3904.2	1582.2	145.2	1071.1	552.8	292.0	91.5	11.0	100.7	57.8
28A	45G9	1828.5	20.6		1355.6	133.2	151.7		130.4	35.6	1.3
28A	45H0	3433.4	1020.2	311.9	1256.4	319.0	142.4	68.5	123.2	123.4	68.3
28A	45H1	3372.3	950.5	332.8	1257.5	311.5	137.7	66.9	123.1	127.6	64.7
29	46G9	2123.2	174.1	235.4	1439.9	133.4	10.7		83.0	38.5	8.3
29	46H0	3740.7	1429.5	179.9	1289.4	557.9	178.4		6.0	22.1	77.5

SD	RECT	total	age 0	age 1	age 2	age 3	age 4	age 5	age 6	age 7	age 8+
29	46H1	4317.0	2139.1	281.2	1490.1	195.3	104.8	21.3	25.6	47.3	12.5
29	46H2	3308.5	1666.6	215.9	1131.9	144.9	75.7	15.4	18.4	33.5	6.2
29	47G9	2560.0	134.6	499.9	1241.9	324.7	284.3	10.6	38.5	14.8	10.6
29	47H0	10162.1	1643.1	731.3	6340.4	420.1	132.7	19.4	326.3	548.9	
29	47H1	2319.0	60.4	119.3	1228.1	322.7	262.6	59.2	72.3	114.4	80.0
29	47H2	4075.5	352.8	290.2	2426.9	437.8	268.8	53.5	68.1	118.6	58.8
29	48G9	3334.6	498.3	507.9	1567.3	283.9	170.0	17.0	102.4	143.2	44.7
29	48H0	1105.8	349.7	47.7	404.5	109.2	88.5	19.3	23.9	38.3	24.6
29	48H1	1764.9	128.8	91.8	928.0	227.2	174.6	38.8	47.4	77.2	51.2
29	48H2	3131.6	1396.3	104.7	1007.6	232.2	169.6	39.1	46.6	78.8	56.7
29	49G9	114.7		2.8	19.3	2.1	9.6	3.6	6.2	43.8	27.4
30	50G7	1.8				0.9					0.9
30	50G8	374.0	2.9	13.7	60.1	13.8	19.8	13.8	37.4	130.5	82.0
30	50G9	81.8	7.6	6.3	23.1		4.3		6.7	22.0	11.9
30	50H0	557.2	1.0	32.9	89.9	125.7	74.9	16.8	38.8	107.7	69.6
30	51G7										
30	51G8	2480.1	22.1	35.7	243.9	295.2	152.5			635.8	1094.9
30	51G9	521.5		12.8	91.3	57.0	25.0	25.0	82.8	105.9	121.8
30	51H0	108.3		0.5	11.9	19.5	12.9	10.1	13.5	15.6	24.4
30	52G7	6.8			1.7					1.7	3.4
30	52G8	179.0		1.7	48.3	18.0	27.6		18.8	24.4	40.2
30	52G9	10.7			0.8		0.6		0.5	1.8	7.1
30	52H0	138.8		1.8	28.8	12.8	6.5	6.4	2.2	34.0	46.4
30	53G7										
30	53G8	2.2			0.6			0.6			1.1
30	53G9	7.0		0.5	0.5				1.0	1.5	3.5
30	53H0	17.3			2.5	0.7	0.9	1.2	2.6	2.5	6.8
30	54G8										
30	54G9	67.5		3.9	7.9	2.3	2.3	1.4	3.6	18.9	27.3
30	54H0	519.7		29.8	69.6	16.3	20.2	37.9	45.8	144.1	156.1
30	55G9										
30	55H0	491.0		11.0	36.0	18.4	48.7	18.9	8.8	136.8	212.6
32	47H3	4158.2	792.6	152.3	2445.0	363.0	195.4	22.9	75.7	82.7	28.5
32	48H3	7030.0	4015.1	256.1	2205.1	257.8	132.7	16.4	57.7	69.2	19.7
32	48H4	4761.2	1160.8	214.1	2711.5	336.2	151.5	20.3	69.9	77.8	19.1
32	48H5	7079.1	362.9	453.4	4988.6	620.8	291.3	41.4	129.5	139.7	51.4
32	48H6	8857.6	557.5	694.8	6079.0	714.7	376.5	39.0	163.4	178.9	53.8
32	49H5	1883.8	175.8	76.7	1216.7	180.0	116.2	10.6	42.3	45.0	20.6
32	49H6	2711.7	253.9	110.4	1750.8	258.9	167.1	15.3	60.8	64.8	29.6

Table 3.1.3. Estimated numbers (millions) of herring by age group and subdivision in October 2010.

SD	total	age 0	age 1	age 2	age 3	age 4	age 5	age 6	age 7	age 8+
25	4698	333	378	542	1626	654	567	182	288	127
26	6625	390	448	521	1776	1174	918	465	562	371
27	3165	22	222	1053	1061	421	153	90	89	56
28A	10846	6	141	2147	3542	1955	1253	671	615	517
29	12317	392	2489	3649	3616	637	533	224	292	485
30	24563	429	3778	6187	3315	3348	1493	930	844	4241
32	5268	289	2815	777	855	157	198	31	13	134

Table 3.1.4. Estimated numbers (millions) of sprat by age group and subdivision in October 2010.

SD	total	age 0	age 1	age 2	age 3	age 4	age 5	age 6	age 7	age 8+
21	241	224	9	5	2	2	1			
22	12015	11980	23	8	4					
23	746	514	21	59	64	59	19	8		1
24	11405	8704	1436	840	294	126	2	4		
25	2482	152	357	1005	372	407	74	49	48	17

SD	total	age 0	age 1	age 2	age 3	age 4	age 5	age 6	age 7	age 8+
26	15065	3361	3475	4713	1241	1672	286	76	196	45
27	8769	947	492	5942	545	290	81	238	91	142
28A	32417	5308	2201	15758	4399	1978	877	619	829	447
29	42058	9973	3308	20515	3391	1930	297	865	1319	459
30	5565	34	150	717	581	396	132	262	1383	1910
32	36482	7319	1958	21397	2731	1431	166	599	658	223

Table 3.1.5. Area corrected numbers (millions) of herring by age group and subdivision in October 2010.

SD	AREA_CORR_FACTOR	total	age 0	age 1	age 2	age 3	age 4	age 5	age 6	age 7	age 8+
25	1.03199	4848	343	390	560	1678	675	585	188	298	131
26	1.01154	6701	395	453	527	1796	1187	928	470	569	375
27	1.23074	3895	27	273	1296	1306	518	188	111	109	69
28A	1.07255	11633	7	151	2303	3799	2096	1344	720	659	554
29	1.03974	12806	407	2588	3794	3759	663	555	232	303	505
30	1.05618	25943	453	3990	6535	3501	3536	1577	982	891	4479
32	1.69478	8929	489	4770	1316	1449	267	336	53	22	226

Table 3.1.6. Area corrected numbers (millions) of sprat by age group and subdivision in October 2010.

SD	AREA_CORR_FACTOR	total	age 0	age 1	age 2	age 3	age 4	age 5	age 6	age 7	age 8+
21	1.00000	241	224	9	5	2	2	1			
22	1.02062	12263	12227	23	8	4					
23	1.00000	746	514	21	59	64	59	19	8		1
24	1.00000	11405	8704	1436	840	294	126	2	4		
25	1.03199	2561	157	369	1037	384	420	77	51	50	17
26	1.01154	15238	3400	3515	4768	1255	1692	289	77	198	45
27	1.23074	10792	1166	606	7314	671	357	100	293	113	175
28A	1.07255	34768	5693	2360	16902	4718	2121	941	664	889	480
29	1.03974	43729	10370	3439	21330	3526	2007	309	899	1372	477
30	1.05618	5877	35	159	757	613	418	139	277	1461	2017
32	1.69478	61828	12404	3318	36263	4629	2425	281	1016	1115	377

Table 3.1.7. Estimated biomass (in tons) of herring by age group and subdivision in October 2010

SD	AREA_CORR_FACTOR	total	age 1	age 2	age 3	age 4	age 5	age 6	age 7	age 8+
25	1.03199	161725	10886	16541	53173	28930	24157	9858	11079	7100
26	1.01154	228350	11674	14624	55308	42145	35174	20251	27145	22029
27	1.23074	89748	4168	18312	35259	16133	7907	4441	652	2876
28A	1.07255	321461	2482	44523	87446	64717	46204	27055	25992	23042
29	1.03974	230981	34048	68567	75355	15549	14199	4391	6450	12421
30	1.05618	577059	56802	49090	86221	92256	40097	30055	31383	191155
32	1.69478	108037	49608	19818	23033	4406	5917	834	431	3990

Table 3.1.8. Estimated biomass (in tons) of sprat by age group and subdivision in October 2010.

SD	AREA_CORR_FACTOR	total	age 0	age 1	age 2	age 3	age 4	age 5	age 6	age 7	age 8+
21	1.00000	1256	987	118	77	35	31	10			
22	1.02062	35696	35257	286	106	47					
23	1.00000	5633	2207	250	1060	184	1257	457	194		24
24	1.00000	66626	32390	15845	11474	4789	2097	21	10		
25	1.03199	30041	733	1980	12490	5762	6399	1213	512	669	283
26	1.01154	141629	12281	31569	52766	14701	21750	4053	1106	2677	727

SD	AREA_CORR_FACTOR	total	age 0	age 1	age 2	age 3	age 4	age 5	age 6	age 7	age 8+
27	1.23074	87855	4952	4515	65456	4622	4194	443	1059	1470	1144
28A	1.07255	285099	19273.5	20457	160724	35952	16747	9958.5	6496.4	9851.8	5639.5
29	1.03974	343749	33887.9	29667	200028	23412	22374	3439.1	9202.7	15694	6044.9
30	1.05618	79911	115.98	592.4	6820.7	8212.6	5335.6	2043.5	3801.4	21749	31240
32	1.69478	474482	42738.1	24144	312476	43203	24855	2854.2	9432.3	10503	4275.6

3.2 Combined results of the Baltic Acoustic Spring Surveys (BASS)

In 2010 the following acoustic surveys were conducted in May–June.

Vessel	Country	ICES Subdivision
Walther Herwig III	Germany	24, 25, parts of 26, 27 and 28
Darius	Latvia/Lithuania	Parts of 26 and 28
Darius	Lithuania	Parts of 26

Stock indices of sprat by age groups of the different cruises are stored in the database BAD1. The standard cruise reports are presented in Annex 8 using the standard format.

3.2.1 Area under investigation and overlapping areas

Russia could not participate in the Baltic Acoustic Spring Survey in 2010. Therefore, in two rectangles of the Russian EEZ (39G9 and 49G9) the investigations were carried out by the German RV "Walther Herwig". The German research vessel obtained, however, only permission for hydroacoustic measurements from the Russian authorities. Collection of fish biological data with control hauls was not permitted. The numbers of fish individuals in these two rectangles were therefore calculated on the basis of biological data of the adjacent rectangles.

Latvia and Lithuania are using the Lithuanian research vessel "DARIUS" for the Baltic Acoustic Spring Survey. As a consequence of its small size, the performance of Darius depends strongly on the weather conditions. Since in May 2010 RV DARIUS did not lose any survey time because of weather conditions, the remaining survey time was used for the investigations in the adjacent rectangles in the Swedish EEZ. This leaded to a double coverage of 6 statistical rectangles during the acoustic survey in May 2010 (Figure 3.2.1). There are no serious deviations between the values estimated by both vessels. Therefore, in the calculation of the indices, the data from the country responsible for specific rectangle was used.

The area coverage of Subdivision 24 during the Baltic Acoustic Spring Survey in 2011 was less than required by the BIAS manual. However, the available data show that this area has in 2010 only a very small effect on the tuning indices.

The estimated numbers of sprat per age group and ICES square are presented in Table 3.2.1. The spatial distribution of the sprat abundance is demonstrated in Figure 3.2.2.

During late spring the sprat is concentrated in the deeper basins for spawning. Herring stays at this time primarily in shallow water areas close to coasts. The portion of herring is much smaller than 10% in most areas. These numbers should not be used for a real investigation of abundance. Therefore, only the distribution of sprat is examined in farther.

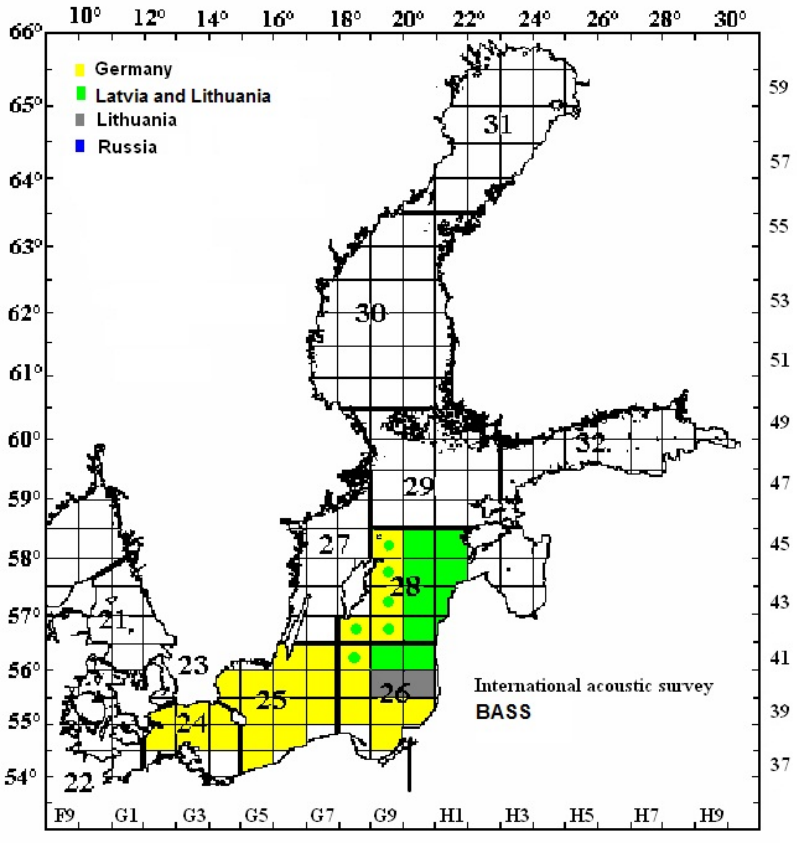


Figure 3.2.1. Map of surveys conducted in May 2010. Colors indicate the countries, which covered specific ICES-rectangles and delivered data to BAD1-database, thus was responsible for this rectangle. Colored dots within a rectangle explain additional data in BAD1 partly or totally covered by other countries.

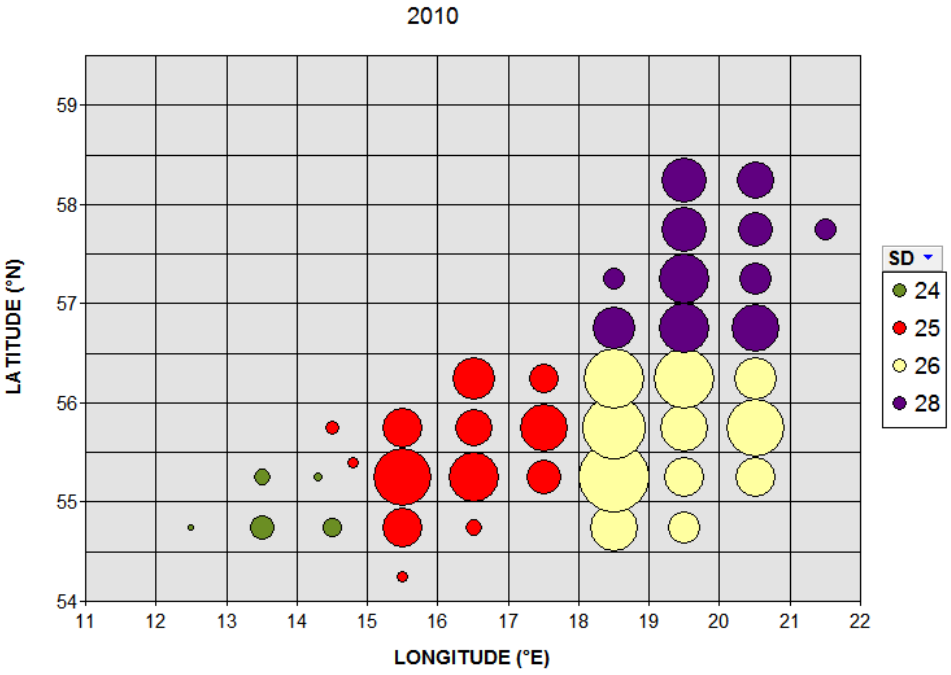


Figure 3.2.2. Covered ICES-Rectangles in 2010 with the abundance of sprat in number (the area of the circles indicates the number of sprat e with a maximum of 8052 10^6., the colour indicates the subdivisions).

3.2.2 Combined results and area corrected data

The Baltic sprat stock abundance estimates per ICES Subdivisions and age groups are presented in Table 3.2.2.

During the WGBIFS 2006 meeting possible improvement of the results from acoustic surveys were discussed, and a correction factor for each ICES Subdivision and year was introduced because of the coverage of the investigated area differed in the years. This factor is the proportion to the total area of the ICES Subdivision (see BIAS manual) and the area of rectangles covered during the survey. The correction factors, calculated by ICES Subdivisions for 2010 are included in Table 3.2.3 and 3.2.4. The area corrected abundance estimates for sprat per ICES Subdivision are summarized in Tables 3.2.3. The corresponding biomass estimates of sprat are given in the Table 3.2.4.

3.2.2.1 Sprat in subdivisions 24 to 26 and 28

Correction of the data from year 2009

The consistency check of cohort development indicated a significant underestimation of the year-class 2004 in 2009. An analysis showed that it was caused by the difficulties in age determination of elder sprats. After appropriate discussion with the specialists responsible for the age reading, the age reading was repeated and the new abundance and average weight estimates were calculated on the basis of these new results. The dataset from the year 2009 of the tuning fleet index (Annex 5, Table 5) has been corrected accordingly.

Tuning Fleets for WGBFAS

The complete time-series (2001 to 2010) of the area-corrected sprat abundance in SD 24, 25, 26 and 28 (without Gulf of Riga) is given in Annex 5 Table 5 and in Figure 3.2.3.

SD 27 was not sufficiently covered and therefore the results from SD 27 data should not be utilized for the index.

3.2.3 Recommendation to WGBFAS

- *WGBIFS recommends that the BASS-dataset with new calculated values of 2009 and the data of 2010 can be used in the assessment of the sprat stock in the Baltic Sea.*

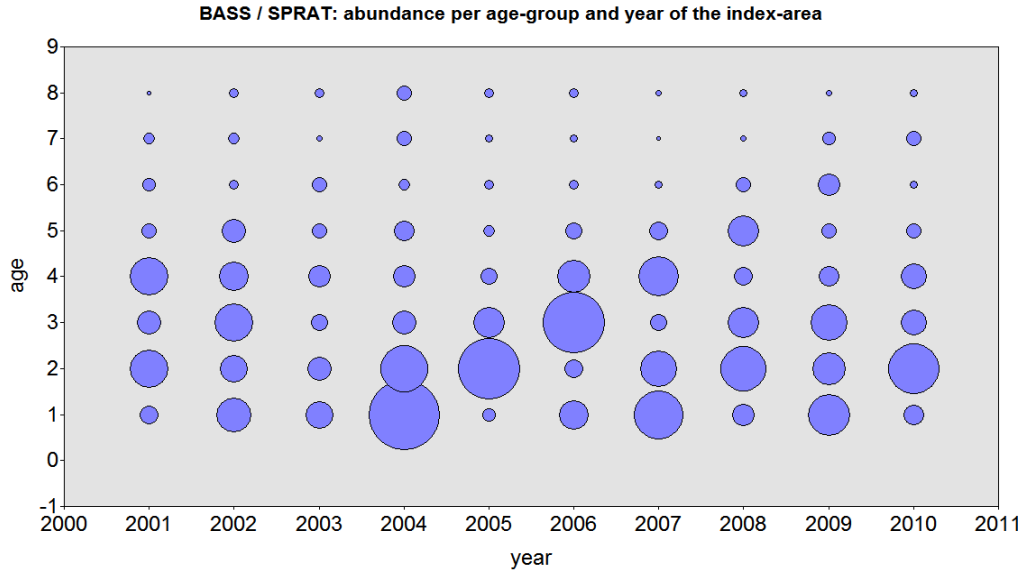


Figure 3.2.3. Spring tuning fleet index for sprat in SD 24, 25, 26 and 28.

Table 3.2.1. Estimated abundance of sprat (millions) by age groups and rectangle in May 2010.

SD	rect	total	age 1	age 2	age 3	age 4	age 5	age 6	age 7	age 8+
24	38G2	91.8	1.4	13.6	18.0	38.0	2.6	5.2	9.4	3.6
24	38G3	915.8	14.1	135.6	179.3	379.7	26.1	51.8	93.3	35.9
24	38G4	601.0	9.3	89.0	117.7	249.2	17.1	34.0	61.3	23.6
24	39G3	410.0	6.3	60.7	80.3	170.0	11.7	23.2	41.8	16.1
24	39G4	170.4	2.6	25.2	33.3	70.6	4.8	9.6	17.4	6.7
25	37G5	200.3	7.4	67.8	28.3	49.0	18.8	6.7	15.9	6.5
25	38G5	2418.6	89.0	754.3	326.8	606.8	254.0	89.1	218.2	80.2
25	38G6	460.0	17.1	176.1	72.5	103.7	39.3	14.0	27.7	9.6
25	39G4	172.2	4.6	42.0	23.2	49.7	18.5	6.5	20.0	7.8
25	39G5	5543.3	257.3	2561.2	867.1	1071.4	347.4	107.6	247.9	83.3
25	39G6	3990.9	111.4	1683.0	682.1	860.7	303.2	95.7	194.1	60.6
25	39G7	2006.2	72.3	970.3	342.6	367.0	124.6	34.9	75.2	19.3
25	40G4	274.5	7.3	67.0	37.0	79.4	29.5	10.3	32.0	12.0
25	40G5	2637.6	122.2	1301.8	417.9	455.7	159.7	46.7	107.1	26.5
25	40G6	2321.7	100.3	1274.7	377.1	360.3	106.4	26.0	62.5	14.3
25	40G7	3602.8	203.4	2096.6	548.8	491.8	140.2	33.8	70.3	17.9
25	41G6	2966.2	285.7	1884.6	354.6	299.1	77.5	17.0	38.7	8.9
25	41G7	1485.6	70.0	838.7	239.3	220.0	63.8	13.3	33.6	6.9
26	38G8	3601.8	84.5	1455.0	633.2	797.8	222.1	45.3	340.5	23.4
26	38G9	1804.0	1.9	674.9	339.1	446.4	124.6	24.2	179.3	13.6
26	39G8	8052.5	96.5	3430.2	1302.3	1763.2	527.8	119.0	772.6	40.8
26	39G9	2462.6	82.2	1053.6	410.1	507.8	140.4	30.0	224.6	14.0
26	39H0	2554.6	59.9	1031.7	449.0	565.7	157.5	32.1	241.5	17.2
26	40G8	6595.1	193.0	3704.7	865.8	1026.2	258.8	54.7	475.6	16.5
26	40G9	4134.6	1386.5	1890.4	368.8	222.3	182.6	28.1	55.3	0.7
26	40H0	5547.4	4584.8	724.6	169.1	40.7	9.8	4.7	7.3	6.5
26	41G8	4142.3	40.7	2721.7	491.7	500.1	105.3	20.0	254.6	8.2
26	41G9	5989.8	172.3	3668.4	778.8	780.4	185.7	88.6	298.4	17.2
26	41H0	2755.4	190.1	2311.9	68.3	115.4	43.6		19.6	6.5
28A	42G8	857.9	12.2	277.8	154.4	167.5	72.3	54.3	90.7	28.7

SD	rect	total	age 1	age 2	age 3	age 4	age 5	age 6	age 7	age 8+
28A	42G9	3124.0	54.7	1995.7	498.1	256.7	136.5	38.3	88.9	55.1
28A	42H0	3472.6	138.5	2488.1	302.1	244.3	95.8	76.4	43.8	83.6
28A	43G8	729.6	4.4	304.3	121.5	121.8	53.4	36.5	64.6	23.1
28A	43G9	4913.5	80.7	3563.1	598.5	291.1	156.0	53.8	104.3	65.8
28A	43H0	1577.5	68.4	935.3	229.1	155.8	53.9	47.6	41.3	46.1
28A	44G9	3358.3	23.2	2223.7	491.3	268.8	138.2	52.6	104.5	55.9
28A	44H0	2039.5	94.6	1289.5	187.0	175.3	90.7	25.7	133.6	43.1
28A	44H1	790.0	50.4	434.0	62.4	67.8	64.0	12.8	81.0	17.6
28A	45G9	3089.1	55.0	2358.8	349.2	141.4	79.1	20.4	43.1	42.1
28A	45H0	2510.4	83.8	1657.5	398.9	119.7	57.7		127.6	65.1

Table 3.2.2. Estimated numbers of sprat (million) by age group and subdivision in May 2010.

SD	total	age 1	age 2	age 3	age 4	age 5	age 6	age 7	age 8+
24	92477	12818	9037	38027	13229	7630	11326	205	205
25	437421	44588	96645	159479	39429	9719	60161	24351	3048
26	381599	31862	71034	108626	30254	20905	106323	12595	
27	282679	72308	64309	73194	23513	15572	30380	1571	1832
28A	464009	90473	78348	93724	40699	37176	92944	23174	7469
24	44609	261	5294	8567	18784	1246	3803	4806	1850
25	311699	11128	133581	48779	64993	23142	7848	16957	5271
26	397561	25491	186559	57003	70053	22159	5226	29345	1726
28A	251324	3185	150087	36762	24252	11791	6504	11741	7002

Table 3.2.3. Area corrected numbers of sprat (million) by age group and subdivision in May 2010.

Sub_Div	AREA_CORR_FACTOR	total	AGE1	AGE2	AGE3	AGE4	AGE5	AGE6	AGE7	AGE8
24	1.27887	6646	1819	661	2395	839	405	511	8	8
25	1.07463	42019	8446	9725	13531	3216	665	4292	1942	202
26	3.56331	33974	7108	7666	10721	2627	1944	2703	1205	
27	2.07790	42683	20659	8231	7943	2552	1497	1513	123	165
28A	1.36752	60347	23332	9157	10172	4094	3492	6988	2314	799
24	1.40796	3082	47	456	603	1278	88	174	314	121
25	1.07463	30175	1449	14742	4640	5389	1809	539	1229	380
26	1.03450	49284	7130	23449	6079	6999	2026	462	2968	170
28A	1.20995	32018	806	21208	4105	2432	1207	506	1117	637

Table 3.2.4. Corrected biomass of sprat (in tonnes) by age group and subdivision in May 2010.

Sub_Div	AREA_CORR_FACTOR	total	age 1	age 2	age 3	age 4	age 5	age 6	age 7	age 8+
24	1.27887	92477	12818	9037	38027	13229	7630	11326	205	205
25	1.07463	437421	44588	96645	159479	39429	9719	60161	24351	3048
26	3.56331	381599	31862	71034	108626	30254	20905	106323	12595	
27	2.07790	282679	72308	64309	73194	23513	15572	30380	1571	1832
28A	1.36752	464009	90473	78348	93724	40699	37176	92944	23174	7469
24	1.40796	44609	261	5294	8567	18784	1246	3803	4806	1850
25	1.07463	311699	11128	133581	48779	64993	23142	7848	16957	5271
26	1.03450	397561	25491	186559	57003	70053	22159	5226	29345	1726
28A	1.20995	251324	3185	150087	36762	24252	11791	6504	11741	7002

3.3 Mixing of Western Baltic Spring Spawning herring (WBSS) and Central Baltic Herring (CBH) in the Arkona Sea during the acoustic surveys in October

Herring (*Clupea harengus*) resources in the Baltic are assessed annually based on results from the ICES coordinated autumn Baltic International Acoustic Survey (BIAS). In addition, the sprat (*Sprattus sprattus*) stock in the Baltic Sea is also estimated on BIAS results. A second annual international acoustic survey in spring (Baltic Acoustic Spring Survey, BASS) additionally produces estimates of the sprat stocks as well as additional information concerning the central Baltic herring (CBH) stock.

In the Baltic Sea, several herring stocks are surveyed and managed separately. The Western Baltic Spring Spawning herring (WBSS), which is generally distributed in the Skagerrak/Kattegat area (ICES Division IIIa) and in ICES Subdivisions (SD) 21–24 and mainly spawns in spring in the Greifswalder Bodden. The easterly adjacent areas of the southern Baltic Sea (SD 25–32) are inhabited by the Central Baltic Herring (CBH) stock. Spatial stock separation for assessment purposes so far is based on ICES Subdivisions with SD 21–24 being allocated to WBSS and SD 25–32, among others, to CBH.

The German/Danish joint acoustic survey in autumn (GERAS) is surveying Subdivisions 21–24, thus covering (northwest to east) the Kattegat (SD 21), the western Baltic belt sea (SD 22), the Öresound (SD 23) and the Arkona Sea (SD 24).

Survey results of GERAS since 2007 have shown a decline in mean weights per age group. Additionally, there is an uncharacteristic decrease in mean weight with increasing age obvious in the age-classes >3. The 2010 survey results also showed a distinct peak in age-class 3 as compared to previous years. However, no signs of an extraordinarily strong year class 2007 are evident. Instead, the year classes 2007 and 2008 are among the lowest observed since 2002. Checks and comparisons of Subdivision-based length distributions of herring in the 2009 and 2010 surveys showed nothing conspicuous – both in SD 21 and 22 young year classes (0–2) dominated with lengths rarely exceeding 20 cm. As in previous years, large fractions of adult herring were identified in SD23 (Öresound) with overall lengths partly exceeding 30 cm and smaller length groups (corresponding to age-classes 0 to 2) only contributing a small fraction. In SD 24, overall length distributions were different but in accordance with the distributions measured in 2009 with the majority of fish between 8.25 cm and ca. 15.25 cm (~age 0 and 1) and a smaller fraction between ca. 15.25 and 22.25 cm (~age 2 and 3). Older and bigger herring only marginally contributed to the measured population in SD 24. Analysis of the mean weight at-age however showed that the decline in weight with increasing age is mostly pronounced in SD 24. This led to the interpretation and conclusion that in SD 24 an increase in contribution of older, slow growing herring apparently has taken place in recent years. These herring originate in easterly adjacent areas and belong to the Central Baltic Herring stock.

Apparently, this trend has been present for some years implying that biomass and abundance estimates for WBSS based on autumn surveys conducted in SD 21–24 in 2010 and in previous years possibly might be biased due to a variable fraction of undetected CBH mistakenly included in the assessment.

Obviously, measures are needed to discern between herring from both stocks in areas where mixing of stocks occurs. Both WBSS and CBH stocks can be discerned by several criteria: WBSS are generally fast growing reaching up to 15 cm at-age 1, whereas CBH at 15 cm length can be up to 6 years old. Additionally, the eye diameter in CBH

is distinctly increased compared to WBSS. Other, more subjective criteria include a rather "ailing" appearance of CBH resulting from a rather skinny look whereas WBSS seem to be in much better condition as referred to body proportion.

Method for assigning individual herring to one of the stock was presented and discussed during the meeting WGBIFS (Gröhsler *et al.*, 2011, Annex 9). Herring which were sampled in SD 21 – 23 during the acoustic survey in October and in SD 26 – 29 during the acoustic survey in May from 2005 to 2010 were used as baseline data. Individuals which were captured in SD 24 and 26 were not used in the baseline sample because mixing of both stocks seems to be possible. The studies showed that the Age – length relation significantly differed at least for older herring.

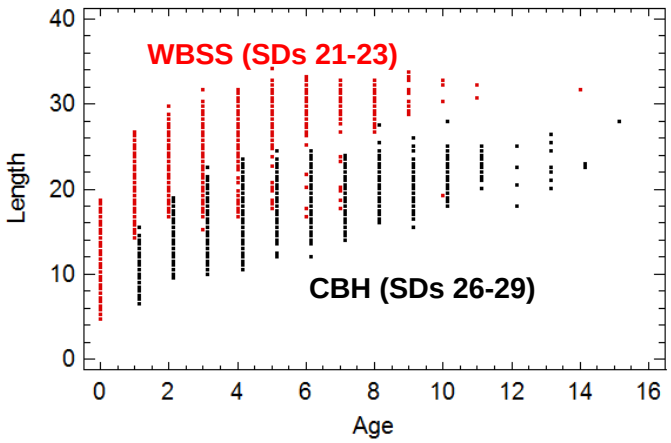


Figure 1. Age – length data of WBSS and CBH sampled between 2005 and 2010 during the acoustic surveys in October (WBSS) and May (CHB).

Age in moth was used in the analyses to incorporate the different period of the surveys. V. Bertalanffy growth curves were estimated for both stocks on yearly basis. In addition, the data of the total period were pooled together because the variability of the growth curves of both stocks were low during the analysed period. Stock separation function was estimated

$$SSF = 26.361*(1-e^{(-0.348*(age*12+T)/12-0.240)})$$

To assign individuals to one of the stock by comparing total length (cm) with SSF (see Figure 2):

$$L < SSF \rightarrow CBH$$

$$TL > SSF \rightarrow WBSS$$

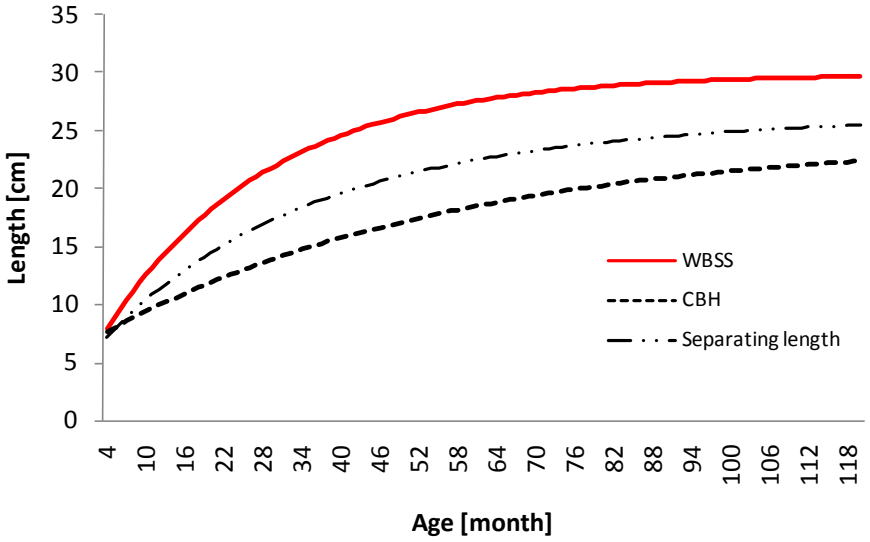


Figure 2. von Bertalanffy Growth Function (BGF) curves for Baltic herring (*Clupea harengus*) stocks including stock separation function (SSF) based on stock-specific BGF parameters.

The study showed that increasing fraction of older herring in SD 24 can be assigned to the CBH. The results improved the results of the BIAS in SD 24.

3.4 Recommendation

WGBIFS agreed that the structure of the BIAS database must be adapted to incorporate the estimates of two herring stocks ion one subdivision. A proposal concerning the change of the structure of BIAS should be presented during the next WGBIFS based on a discussion of a subgroup. The discussion will be led by Uwe Böttcher.

WGBIFS further proposed the proportions of WBSS in SD 25 and SD 26 during BIAS should be evaluated based on the available data from the BIAS by means of the presented stock separation function. The results should be presented during the next meeting to assess the importance of mixing of both stocks during BIAS in these subdivisions.

3.5 Reference

Gröhsler, T., Oeberst, R., Schaber, M. 2011. Mixing of two herring (*Clupea harengus*) stocks in ICES Subdivision 24 (Arkona Sea, Western Baltic) – Implications and consequences for stock assessment. Working document of WGBIFS 2011, Kaliningrad Russia, 17 pp.

4 Update of the hydro acoustic databases BAD1 and FishFrame for the years 1991 to 2010

4.1 Update of BAD1

The aggregated results from the acoustic surveys in the Baltic Sea were hold in Excel-files until the year 2009. In 2010 the former storage of the data in "Excel" (BAD1) was converted to "Access" format. The data of the Baltic Acoustic Spring Survey (Mai-June, BASS) are stored now in the BASS_DB.mdb and the data of the Baltic International Acoustic Survey (October, BIAS) in the BIAS_DB.mdb.

Compared to the last year the structure of the database has not changed. Additionally to the standard queries which deliver summaries and reports from the dataset, three further queries were added to the database to produce the figures with spatial distribution of fish abundance (see Figures 3.1.1, 3.1.2 and 3.2.1).

Only an update of the sub-database BIAS_DB.mbd was done in 2011. The data from year 2010 were added to the database after validation. The herring data from SD 21–24 are not included yet in the BIAS database. There are clear indications that the herring stocks of the Western Baltic/Kattegat and the Baltic Sea occur mixed in this area. The possibilities of stock separation in this area are currently still under investigated and discussion. If appropriate, a separate data collection for these two herring stocks is required (see Working Paper Gröhsler *et al.*, WGBIFS 2011).

An update of the sub-database BASS_DB.mbd was done in 2011 accordingly. The data from year 2010 were added to the database after validation. Additionally the correction of the data from year 2009 was done in 2011 (see in chapter 1.2.2.1 for more information).

4.2 Update of FishFrame (Acoustic)

The discussions about the problems to upload the acoustic data in recommended format into the "FishFrame" database have lasted for many years. This situation has not changed until now and the data cannot be uploaded into FishFrame at present time.

WGBIFS pointed once more out the urgent need for a regional database for the basic data of the hydro-acoustic surveys.

4.3 General comments concerning the database of acoustic surveys

For a couple of years ICES has worked for an implementation of an ecosystem approach in its advisory work. Also the EU Commission has launched initiatives supporting this development by defining pressure indicators.

Such approach do challenges the existing collecting programs, not just concerning the physical collection of the additional list of parameters but also challenge the way the collected results are stored, processed and made available for the assessments.

A prerequisite for efficient use of the data are that the data are easy available, consistent processed and in a format which makes it possible to be integrated together with other data types in the assessment on routine basis. The data from the commercial fishery will in most regions in few years time be on such form provided by the common regional databases and the results from most scientific bottom trawl surveys are already stored and processed in a common database (DATRAS).

Unfortunately, this is not the case for the data from the internationally coordinated acoustic surveys in the Baltic Sea. The Baltic acoustic spring survey (BASS) is conducted in May and the Baltic international acoustic Survey (BIAS) is conducted in October. The time-series of stock indices are at present used by the Baltic Fisheries Assessment working group (WGBFAS) of the ICES as fishery-independent tuning fleet. Only the stock indices of the surveys are stored in the common BIAS and BASS databases by rectangles, while the source data of the surveys are stored in national databases and not easy available for standard quality checks, extraction of pressures indicators, post stratification etc. as is the case for e.g. the Baltic International Trawl Surveys (BITS) in the DATRS system.

It is the opinion of the WGBIFS that information collected during traditional bottom trawl survey as well as information collected during acoustic surveys will be able to produce valuable information which potentially will be of support for an ecosystem approach in the advisory work, but this will only be realistic on routine basis if the acoustic data in future are stored in an international database holding both raw data and which provides the facilities for easy access, flexible processing and the possibility of prober integrating with other data types.

The regional database (FishFrame) will if upgraded to handle acoustic data provide the possibility for such integrating of acoustic data with other data types and therefore the WGBIFS strongly supports the idea that acoustic data from the Baltic region together with acoustic data from other regions are included in FishFrame in future.

Different approaches were realized and presented during the meetings of WGBIFS to improve the outcome from the acoustic surveys in the past (the list of working documents below illustrates the intensive work with the available data). However, the studies are based on the source data. These data are not available in an international database. Therefore the studies were only realized based only on subsamples of data which were provided by countries for some areas and years. However, the studies showed that improvement of the quality of the stock indices based on acoustic data are possible by adaptation of the presented results to the total area.

Kasastkina and Gasjukov showed that the variance of the stock indices is highly correlated with the stock index based on the results of the acoustic surveys in October during the meeting in 2011. This is in disagreement with the requirement of the XSA stock assessment method. Oeberst (2011) presented models for combining the result of trawling stations realized during the acoustic surveys which evaluate the relationship between acoustic values of the different target types. The effect of the proposed models related to the stock indices were presented based on a subsample of the covered area.

All these studies which have high potential to improve the stock assessment of sprat and herring in the Baltic Sea require the availability of acoustic database which contains all source data (acoustic and fish data). Preliminary version of such a database was developed within FISHFRAME, but until now this database is not fully implemented and usable. WGBIFS requires the highest priority for the finalization of the acoustic database (after evaluation of the current status) if the FISHFRAME database is taken over by the ICES. At least one member of the WGBIFS should be a member of steering group which is responsible for the finalization of the acoustic database.

4.4 Recommendation

WGBIFS strongly recommend to ICES that extended capacities will be made available for updating and finalizing the acoustic database which is a part of the FISHFRAME database.

4.5 References

Oeberst, R. 2011. Species composition in scattered layers during acoustic surveys estimated by means of trawling stations. Working document for the WGBIFS 2011, Kaliningrad, Russia, 10 pp.

Kasatkina, S. 2009. Combining data from trawl and acoustic surveys to improve stock assessment of demersal fish: example of Mackerel icefish *(C.gunnari*) survey.

Gasyukov, P., Kasatkina, S., Grygiel, W. 2009. Estimating statistical characteristics of sprat and herring and abundance indices by year and age groups using simulation method with the Polish surveys in 2004 – 2006 as examples.

Gasyukov, P., Kasatkina, S. 2009. How does BIAS data processing correspond to the manual?

Kasatkina, S., Gasyukov, P. 2007. Analysis of the Acoustic Sa Index Statistical Characteristics Based on the Data Obtained from the Vessels, Participants in the International Acoustic Surveys in the Baltic Sea.

Kasatkina, S., Gasyukov, P. 2007.Estimation of Abundance Index Uncertainty from the Data of the Baltic International Acoustic Survey at Different Level of its Area Stratification.

Kasatkina, S., Gasyukov, P. 2007.Analysis of the Acoustic Index Field Structure with Geostatistical Methods Based on Bias Data - Preliminary Results of Geostatistical Methods Utilization.

Oeberst, R., Götze, E. 2006 Combination of Trawl Results during Acoustic Surveys – Case Study.

Kasatkina, S. 2006. Improvement of the Bias Acoustic Survey Procedures for Estimating Species and Length Composition from Trawls Data.

Kasatkina, S., Gasyukov, P. 2006. Improvement of the Bias Survey Data Utilization in Relation to Overlapping Areas.

5 Plans, decisions and experiments to be conducted in 2011 and 2012 acoustic surveys

5.1 Planned acoustic survey activities

All the Baltic Sea countries intend to take part in acoustic surveys and experiments in 2011. The list of participating research vessels and periods are given in the following table:

Vessel	Country	Area of investigation (ICES Subdivisions)	(Preliminary) period of investigations	Duration (days)
WALTHER HERWIG III	Germany, Russia	24, 25, 26 (part), 28 (part)	2. 5. – 22.5.	21
DARIUS	Lithuania, Latvia	26 (Lithuanian EEZ), 26 (N) 28	10.5. – 25.5.	13
BALTICA	Poland	24(N), 25, 26	19.9. – 6.10.	18
ARGOS	Sweden, Finland	30	26.9. – 7.10.	10
ARGOS	Sweden	25(N), 27, 28 (W), 29 (W)	17.10. – 4.11.	15
SOLEA	Germany, Denmark	21, 22, 23, 24	4.10. – 24.10.	21
BALTICA	Latvia, Poland	26(N), 28	11.10. – 20.10.	10
BALTICA	Estonia, Finland, Poland	28(part), 29 (N), 32(W)	22.10. – 2.11.	12
Fishing trawler MRTk type Baltica	Russia	32 (E)	26.9. – 10.10.	5 - 6
ATLANTNIRO / ATLANTIDA	Russia	26	15.10. – 4.11.	20
DARIUS	Lithuania	26 (Lithuanian EEZ)	1.10. – 15.10.	3
CHARTER	Latvia, Estonia	28 (Gulf of Riga)	July	10

The preliminary plan for acoustic surveys and experiments in 2012 for majority of institutes is presented in the text table below. However, the final outline of plans will be available after verification of budgets.

Vessel	Country	Area of investigation (ICES SubDivisions)	(Preliminary) period of investigations	Duration (days)
BALTICA	Latvia/Poland	26 (W), 28	May	12
Walther Herwig III	Germany	24, 25, 26 (part), 27 (part)	May	22
DARIUS	Lithuania	26 (Lithuanian EEZ)	May	2
ATLANTNIRO / ATLANTIDA	Russia	26	May	15
BALTICA	Poland	24 (part), 25, 26	September-October	18
BALTICA	Latvia, Estonia, Finland, Poland	SD26 (W), 28, 29 (N), 32 (W)	October - November	22
ARGOS	Sweden	25(N), 27, 28 (W), 29 (W)	September-October	20

Vessel	Country	Area of investigation (ICES SubDivisions)	(Preliminary) period of investigations	Duration (days)
Fishing trawler MRTk type Baltica	Russia	32 (E)	September-October	5 - 6
ARGOS	Sweden, Finland	30	September-October	13
SOLEA	Germany/Denmark	21, 22, 23, 24	October	22
DARIUS	Lithuania	26 (Lithuania EEZ)	October	3
ATLANTNIRO / ATLANTIDA	Russia	26	October, November	20
CHARTER	Latvia, Estonia	28 (Gulf of Riga)	July	10

5.2 Acoustic survey in the Gulf of Bothnia

There is a possibility in 2011, that Sweden will not be able to use RV "Argos" for the acoustic survey in Gulf of Bothnia as in earlier years. There is already a series of 4 years of acoustic indices in the SD 30 out of the minimum of 5 years needed for a tuning series in herring stock-assessment. Breaking of this time-series would make the previous four years work futile. The upcoming SD 30 herring Benchmark assessment in 2012 is also highly dependent on the new tuning series. The survey coverage of SD 30 is strongly recommended to be continued and therefore it is of utmost importance that Sweden will prepare Argos to be in workable condition for the 2011 BIAS survey, or present an alternative vessel before June.

5.3 New design of acoustic surveys (proposed in 2005)

During the WGBIFS-Meeting in 2005, the working group discussed and agreed a new surveys design of acoustic surveys (see WGBIFS-report 2005). The basic idea was that each ICES-Rectangle is assigned to one nation. That means that the mandatory nation will carry out about 60 miles of acoustic measurements covering the complete rectangle and at least 2 control hauls. The data of the nation, which is responsible for the rectangle, are used for estimating the stock indices. However, it is allowed for all nations to cover also other areas (rectangles, part of rectangles).

As many countries are performing joint acoustic surveys and the data are presented to the WGBIFS on survey basis, the ICES-Rectangles have been assigned on national- or joint survey basis. This rule is still basically effective in 2011 and 2012.

During the 2010 May survey, Latvia had extra time and covered rectangles in subdivision 28 that were assigned to Germany. Due to lack of communication between the countries, that area was consequently double-covered, instead of allocating the extra effort to non-covered areas. In order to avoid such situations in future, all the countries are advised to report their realized coverage to other operating countries immediately after, or even during the survey if possible. All the countries are also advised to make all applications for entering other nation's EEZ in due time and follow closely the progress in dealing with these applications. Other countries should be alerted as early as possible in case of insuperable problems in survey realization or any other last minute changes, e.g. extra time for covering larger area as planned, in order to be able to make new plans in time.

In 2010 the WGBIFS nominated two persons to coordinate such work if needed:

- Uwe Böttcher for BASS
- Niklas Larson for BIAS

It is also advised to inform the Chair of the WGBIFS of any changes in plans.

The planned coverage of the Baltic Sea and the assignment of the national/joint acoustic surveys to the rectangles in 2010 are presented in Figures 5.3.1 and 5.3.2. The planned coverage of the Baltic Sea and the assignment of national/joint surveys to the rectangles during the acoustic surveys in 2011 are presented in Figures 5.3.3 and 5.3.4. The planned assignment of rectangles may be changed.

5.4 Extension and ensuring of the coverage of BASS survey

The coverage of the BASS survey has diminished because Russia has not been able to participate to the survey in SD 25 and 26. Thus leaving especially the SE parts of SD26 uncovered. Additionally, for Lithuania and Latvia only a relatively small vessel (RV Darius) is available for the survey. In the case of bad weather conditions, there exists a high risk of survey failure which would lead to a further reduction of area coverage. Possible involvement of other countries into BASS was discussed within the acoustic subgroup, which resulted with a suggestion that Sweden could participate in BASS and cover at least SD 27 starting from year 2012. This would allow Germany to concentrate with "RV W. Herwig" to southern and eastern parts of the Baltic Sea, and to cover there the rectangles which cannot be studied by the RV DARIUS in difficult weather conditions, and maybe even to cover the parts which were formerly covered by Russia. It is, however, quite difficult to arrange foreign vessels to operate in Russian EEZ. Therefore WGBIFS recommends that Russia should participate again in the BASS survey.

New surveys are not automatically accepted to be co-financed by DCF, but they need a statement of the need of it from the expert group and recommendation from RCM.

To ensure a long time coverage of BASS core index area, WGBIFS recommends to Sweden and Baltic RCM that Sweden participates on BASS with the aim to cover at least the Subdivision 27.

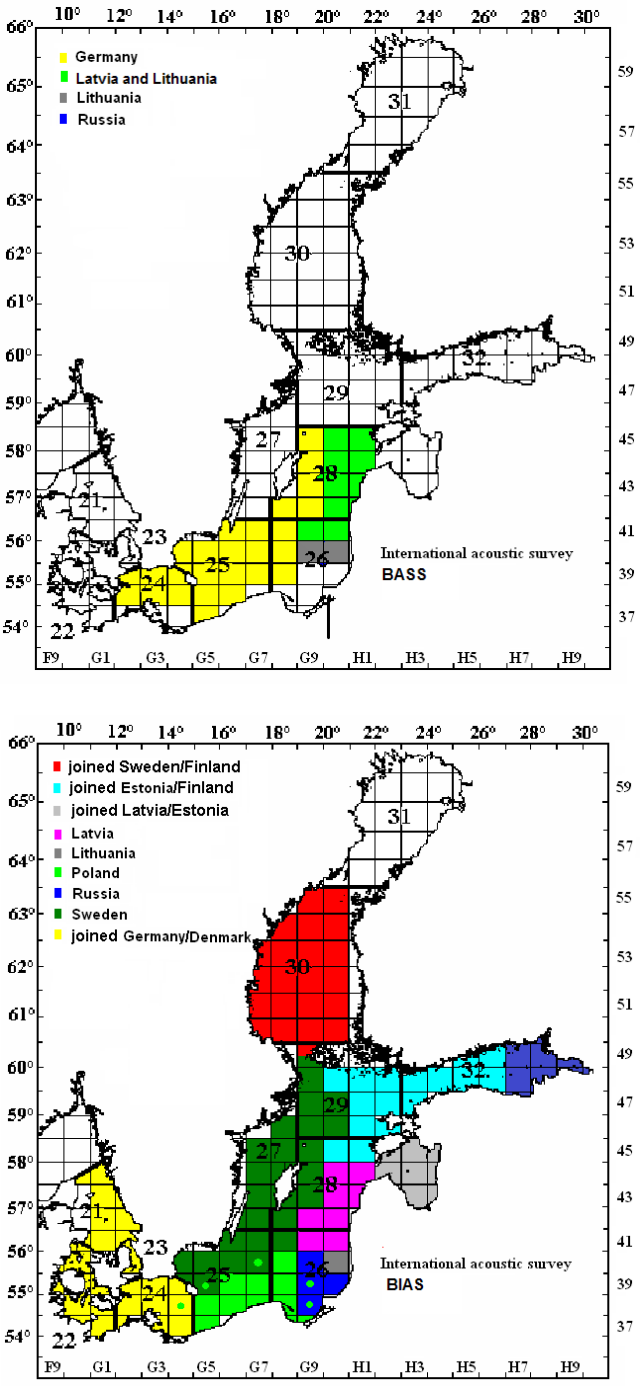
5.5 The Baltic international Acoustic survey (BIAS) in the eastern part of the Gulf of Finland – planned incorporation of Russia in 2012

Since 2006, the Baltic International Acoustic Survey is covering the Gulf of Finland (SD 32) only partly, i.e. in the Estonian and Finnish EEZs. The recent BIAS surveys were performed on the Polish RV"BALTICA". The WGBIFS discussed the proposal of the Russian delegate from the GosNIORH, St Peterburg, to be included the above-mentioned institute as a participant in the BIAS.

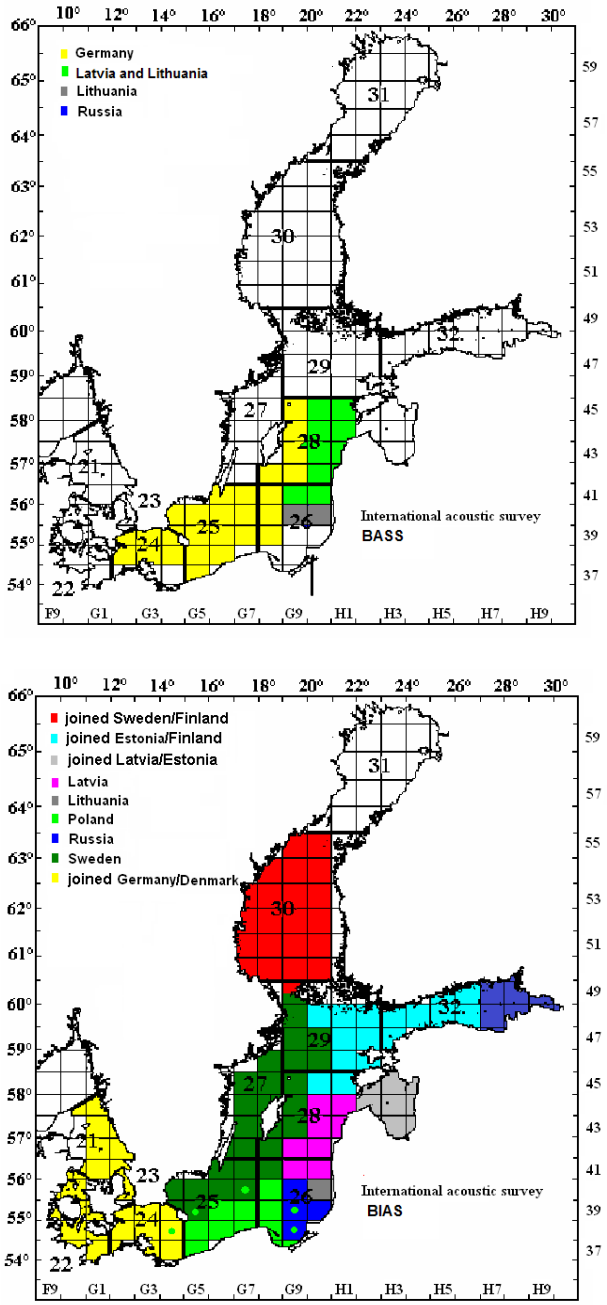
According current proposal of the GosNIORH, they will carry out the BIAS survey on the Russian commercial vessel, inside the Russian EEZ (ICES SD 32; Figure 5.3.5). During planned survey, the standard acoustical, hydrological and mesh size in the codend of the fishing gear as well as investigations methods (see the current BIAS manual) will be applied.

The WGBIFS welcomed the idea since this would allow the full coverage of the Gulf of Finland with the acoustic monitoring, which is one of the most productive herring fishing ground in the Baltic Sea. The WGBIFS suggest that the best way to incorporate the Russia would be the prolongation of the present EST-POL-FIN survey by around 3–4 days. This would allow to cover the full area (SD 32) with same methodology and equipment settings, in order to avoid the additional time and expenses consuming for intercalibration.

The WGBIFS also suggested that the new coverage scheme, including the Russian EEZ in Subdivision 32, would only functioning if the formal permission for operating vessel with the research works inside the Russian EEZ will be granted in due time.



Figures 5.3.1–5.3.2. The planned coverage of the Baltic Sea and the assignment of the national/joint acoustic surveys to the rectangles during the May and the October surveys in 2011 (from top to bottom). Base colours of rectangles indicate the country or joint survey, which is responsible for this ICES-rectangle. Coloured dots indicate overlapping coverage by other countries (sometimes only parts of rectangle are covered).



Figures 5.3.3–5.3.4. Proposed preliminary partitioning (assignment of the national/joint surveys to rectangles) for the May and the October surveys in 2012 (from top to bottom). Base colours of rectangles indicate the country or joint survey, which is responsible for this ICES-rectangle. Coloured dots indicate overlapping coverage by other countries (sometime only parts of rectangle are covered).

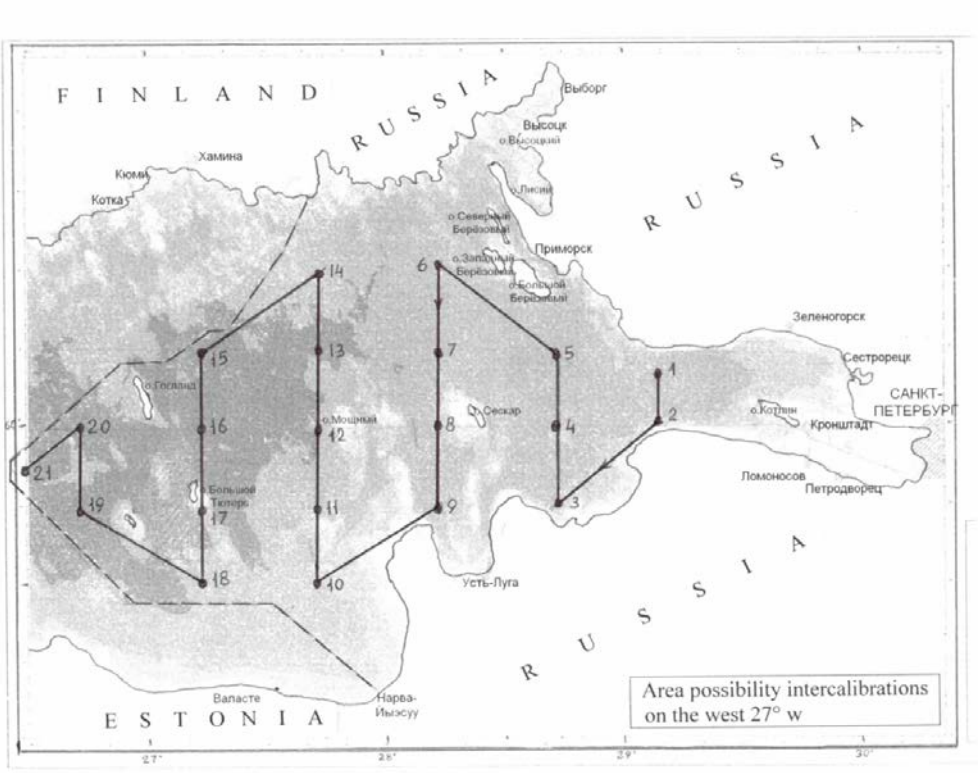


Figure 5.3.5. The intended tracks and trawl stations of the planed Russian hydroacoustic survey in the eastern part of SD 32 in the frame of BIAS.

5.6 Data delivery and analysis

The main results of both acoustic surveys in May/June and October 2010 should be summarized and reported in standard report format (ICES CM 2008/LRC:08, Addendum 2) and in BAD1 format to the acoustic surveys coordinator **(Niklas Larson, niklas.larson@fiskeriverket.se)** and the database manager (**Uwe Böttcher, uwe.bottcher@vti.bund.de)** one month before the ICES WGBIFS meeting of the next year.

Before the meeting of WGBIFS the data must be integrated into the database by the database manager. The integrated data are checked for errors and preliminary analysis will be performed in order to present the data to the WGBIFS meeting for further discussions and evaluations. If the countries do not send the data to database manager in good time, this work cannot be done with the required quality during the meeting.

The inclusion of the data, which are not delivered by the agreed deadline of before the meeting, into the relevant evaluation/tuning index calculation is considered by WGBIFS only in exceptional cases.

5.7 Recommendations

- WGBIFS recommends that Sweden will prepare RV "Argos" to be in workable condition for the 2011 BIAS survey, or present an alternative vessel before June.
- WGBIFS recommends Sweden and Baltic RCM to advocate that in 2012 Sweden will start participating to BASS survey covering at least subdivision 27.

- WGBIFS recommends that Russia participates in BASS survey covering the SE parts of SD 26.
- WGBIFS recommends that in cooperation with the Russian GosNIORH the BIAS area was extend to the Russian EEZ in Subdivision 32

6 Discuss the results from BITS performed in autumn 2010 and spring 2011

6.1 BITS 4th quarter 2010

During quarter 4th BITS in 2010, the level of realized valid hauls represented 82% of the planned stations (Table 6.1.1). This level of valid hauls realization was considered by BIFSWG to produce results appropriate for tuning series calculation and can therefore be recommended for the WGBFAS for the Baltic cod stocks assessment.

In terms of geographical distribution, slightly higher level of realization of valid hauls was obtained in the ICES Subdivisions 25–32 (84%) as compared to ICES Subdivisions 22–24 (77%). Smaller number of valid stations realized in Western Baltic is explained by severe weather conditions and technical problems which resulted in unusual large number of interruptions for German vessel. In the Eastern Baltic, weather conditions mostly affected Latvian survey, what resulted in 80% of the hauls realized as compared to planned number. Within the recent five years, exceptional unfavourable meteorological conditions appeared in the central-eastern Baltic in every autumn, and relatively large monitored area as well as very short daily light duration in December in general, created a need of modification the bottom catch-stations spatial distribution pattern and verification the number of planned hauls within the next BITS-Q4 surveys. During quarter 4th BITS in 2010 rough weather was also observed in second part of the Danish survey. It is clearly indicated by number of valid hauls realized with regard to Subdivisions. Level of valid hauls realized in ICES Subdivision 25 was the lowest and amounted to 76%, while in the other Subdivisions of the Eastern Baltic the level exceeded 90%.

The realization of valid hauls with respect to planned hauls, according to depth stratification was also relatively high. In Western Baltic, deeper waters (depth strata codes 4–5) were covered with valid hauls amounting to 76% and 83% realization of the plan, respectively. However, the level of valid hauls realization in the shallower waters varied considerably, and in depth strata 1, 2 and 3 amounted 57%, 90% and 57% respectively. Following the results of the valid hauls realization in terms of depth layers stratification, it can be concluded, that the coverage during the BITS in autumn 2010 corresponds to the planned coverage.

Table 6.1.1. Comparison of the planed and realized fishing stations by ICES Subdivision and depth layer during BITS 4th quarter 2010.

ICES SubDivisions	Gear (TVL,TVS)	Depth strata (1 -6)	Number of hauls planed	Number of valid hauls realized	Number of assumed zero-catch hauls	Number of replacement hauls	Number of invalid hauls	% stations fished
22	TVS	1	2	2		1	1	100
22	TVS	2	12	12				100
24	TVS	1	5	2				40
24	TVS	2	8	6		1		75
24	TVS	3	7	4		1		57
24	TVS	4	17	13				76
24	TVS	5	6	5				83
25	TVL	1	1	1				100
25	TVL	2	18	18				100
25	TVL	3	32	25		2	1	81
25	TVL	4	20	15		2		75
25	TVL	5	11	3	3			27
26	TVL	1	1	1				100
26	TVL,TVS	2	10	9		1		90
26	TVL,TVS	3	11	9		1		82
26	TVL,TVS	4	8	8	1	1		100
26	TVL,TVS	5	7	6		1	1	86
26	TVL	6	4	4	2			100
27	TVL	3	2	2				100
27	TVL	4	4	3				75
27	TVL	5	1	1	1			100
27	TVL	6	3	3	3			100
28	TVL	2	3	3				100
28	TVL,TVS	3	8	7				88
28	TVL,TVS	4	13	12		2	1	92
28	TVL,TVS	5	5	5	3			100
29	TVS	2	2	2				100
29	TVS	3	2	2				100
29	TVS	4	1	1				100
29	TVS	5	1	1				100

6.2 BITS 1th quarter 2011

During quarter 1st BITS in 2011, the level of realized valid hauls was much higher as compared to 4th BITS in 2010 and represented 99.4% of the planned stations (Table 6.2.1). Similarly to 4th BITS in 2010, the level of valid hauls realization was considered by the BIFSWG to produce results appropriate for tuning series calculation and can therefore be recommended for the WGBFAS for the Baltic cod stocks assessment.

The lack of ice coverage and relatively good weather conditions during quarter 1st BITS in 2011 positively influenced on the planned hauls realization. In addition only one haul was reported as invalid one (ICES Subdivision 25). Only 8 hauls realized were conducted as a replacement hauls of the planned ones. Their realization of the replacement hauls, however corresponded to the same depth and ICES statistical rectangle as the hauls planned. Consequently, it can be concluded that the realization of the planned hauls both in terms of geographical distribution and depth stratification is represents the plan.

Table 6.2.1. Comparison of the planed and realized fishing stations by ICES Subdivision and depth layer during BITS 1st quarter 2011*).

ICES SubDivisions	Gear (TVL,TVS)	Depth strata (1 -6)	Number of hauls planed	Number of valid hauls realized	Number of assumed zero-catch hauls	Number of replacement hauls	Number of invalid hauls	% stations fished
22	TVS	2	13	13		4		100
24	TVS	1	7	7				100
24	TVS	2	8	8				100
24	TVS	3	4	4		1		100
24	TVS	4	19	19		1		100
24	TVS	5	5	5		1		100
25	TVL	1	1	1				100
25	TVL	2	12	12				100
25	TVL	3	16	15			1	93.8
25	TVL	4	10	10	1			100
25	TVL	5	1	1				100
26	TVL	1	1	1				100
26	TVL	2	5	5				100
26	TVS	3	4	4				100
26	TVS	4	11	11				100
26	TVL	5	3	3				100
26	TVL	6	2	2	2			100
27	TVL	3	2	2				100
27	TVL	4	4	4				100
27	TVL	5	1	1	1			100
27	TVL	6	3	3	3			100
28	TVL	2	5	5				100
28	TVL	3	10	10				100
28	TVL	4	16	16				100
28	TVL	5	5	5	2	1		100

***) – Danish data not included**

Standard reports giving overviews of the result of 1st and 4th quarter surveys from each country can be found in Annex 6. More detailed descriptions of most of the individual surveys can be found in Annex 7.

7 Plan and decide on demersal trawl surveys and experiments to be conducted in autumn 2010 and spring 2011

The procedure which is used for allocating stations to the ICES Subdivisions and depth layers is described in Annex 3 "Method used for planning the Baltic International Trawl Survey" of the WGBIFS report in 2004. The DATRAS Database (version from March 2010) was used to estimate the five years – running means of distribution pattern of both cod stocks by depth layer and the ICES Subdivision. The running mean of spring BITS indices of age-group 1+ of cod from 2006 – 2010 was used based on the current used version of conversion factors which are stored in the DATRAS system.

The most institutes plan the same numbers of hauls during BITS surveys in autumn 2011 and spring 2012 as in the years before. Small variations did not lead to a significantly changed of the total number of stations by surveys. The stable total number of stations of the quarter 1 and 4 surveys gives the opportunity that most countries can realized the planned fishing stations within the own national economic zone. However, it must be pointed out that all countries are able to work also in economic zones of other countries to fulfill the requirements of the international coordinated surveys.

The total number of available stations (Table 7.1) was used in the combination with the results of relative distribution of stations by ICES Subdivision and depth layer (Tables 7.2 and 7.3) to allocate the number of total planned stations by ICES Subdivision and depth layer for the different surveys. Tables 7.4 and 7.5 present the allocated hauls by ICES Subdivision and the depth layer for autumn survey in 2011. Furthermore, the number of hauls to be carried out by countries in the different Subdivisions is given. Tables 7.6 and 7.7 show the data corresponding for the survey in spring 2012.

The planned stations by country and ICES Subdivision are preliminary. It is possible that the number of stations can be slightly changed to minimize the total distance between the assigned hauls by country. Furthermore, it is required that hauls are planned within the national zones if possible (at least in the 12 nm zones) to reduce problems with national permissions.

Russia will only cover the Russian zone during autumn survey 2011. During spring survey in 2011 Russia is able to work in the Polish and Swedish zone, too.

Estonia is participating at the 4 quarter BITS survey, performing 10 trawl hauls in the Estonian EEZ of Sd 28 and 29 only using the chartered commercial vessels. In order to charter the vessel the particular tendering rules applicable in Estonia should be followed. Due to that the particular survey vessel will be known only very shortly before the planned survey which does not allow necessary period to apply for the permission for the working in foreign EEZ. Therefore, five stations are planned in SD 28 and five stations within SD 29.

Table 7.1. Total numbers of stations planned by country during BITS in autumn 2011 and spring 2012.

Country	Vessel	Number of planned stations in autumn 2011	Number of planned stations in spring 2012
Germany	Solea	56	60
Denmark	Havfisken	23	23
	Total 22 + 24	**79**	**83**
Denmark	Dana	50	50
Estonia	Commercial vessel	10	
Finland			
Latvia	Chartered vessel	25	25
Lithuania	Darius	8	8
Poland	Baltica	31	43
Russia	Atlantniro/Atlantida	15	33
Sweden	Argos	30	50
	Total 25 - 28	**169**	**209**

Table 7.2. Basic data for allocating hauls for survey by ICES Subdivision.

ICES Subdiv.	Total area of the depth layer 10–120 m [nm²]	Proportion of the SD (weight=0.6) [%]	Running mean of the cpue value of age-groups 1+ (2005 – 2009)	Proportion of the index values (weight=0.4) [%]	Proportion of the stations [%]	Special decisions (additional stations)
22	3673	39	259	33	37	
23	0	0	0	0	0	3
24	5724	61	534	67	63	
Total	**9397**	**100**	**793**	**100**	**100**	
25	13762	43	996	64	51	
26	9879	31	510	33	32	
27	0	0	0	0	0	10
28	8516	26	53	3	17	
Total	**32156**	**100**	**1560**	**100**	**100**	

Table 7.3. Basic data for allocating hauls according to depth layer for survey by ICES Subdivision.

ICES Sub-div.	Depth layer [m]	Total area of the depth layer [nm²]	Proportion of the depth layer (0.6) [%]	Running mean of the cpue value of age-group 1+ (2005 - 2009)	Proportion of the depth layer (0.4) [%]	Proportion of the depth layer [%]
24	10 - 39	4174	73	391	29	55
	40 – 59	1550	27	937	71	44
	60 – 79	29	0.50	0	0	0
	Total	5724	100	100	100	100
25	10 - 39	4532	37	271	6	25
	40 - 59	3254	26	1398	33	29
	60 - 79	3037	25	1668	39	30
	80 -	1461	12	953	22	16
	Total	12284	100	100	100	100
26	10 - 39	2379	23	167	6	17
	40 - 59	1519	15	822	62	22
	60 - 79	1911	19	704	27	22
	80 - 100	2872	28	618	24	26
	100 - 120	1504	15	288	11	13
	Total	10185	101	100	100	100
27	10 - 39	1642	31	0	0	18
	40 - 59	1101	21	12	9	16
	60 - 79	996	19	110	85	45
	80 -	1596	30	8	6	20
	Total	5335	100	130	100	100
28	10 - 39	2589	39	3	1	24
	40 - 59	1598	24	41	13	20
	60 - 79	1101	16	107	34	24
	80 - 100	1389	21	160	51	33
	Total	6677	100	311	100	100

Table 7.4. Allocation of planned stations by country and ICES Subdivision in autumn 2011.

		Subdivision						
Country	**Total**	**22**	**23**	**24**	**25**	**26**	**27**	**28**
Denmark	73	20	3		50			
Estonia	10							5
Finland								
Germany	56	8		48				
Latvia	25					13		12
Lithuania	8					8		
Poland	31				18	13		
Russia	15					15		
Sweden	30				10		10	10
Total	243	28	3	48	78	49	10	27

Table 7.5. Allocation of planned stations by ICES Subdivision and depth layer in autumn 2011.

Sub-div.	**22**	**23**	**24**	**25**	**26**	**27**	**28**
Depth layer [m]							
10 – 39	28	3	27	19	8	3	6
40 – 59			21	23	11	2	5
60 – 79			0	24	11	2	6
80 – 100				12	12	3	10
100 – 120					7		
Total	28	3	448	78	49	10	27

Table 7.6. Allocation of planned stations by country and ICES Subdivision in spring 2012.

					Subdivision			
Country	**Total**	**22**	**23**	**24**	**25**	**26**	**27**	**28**
Denmark	73	20	3		50			
Estonia								
Finland								
Germany	60	9		51				
Latvia	25					13		12
Lithuania	8					8		
Poland	43				26	17		
Russia	33				8	25		
Sweden	50				18		10	22
Total	292	29	3	51	102	63	10	34

Table 7.7. Allocation of planned stations by ICES Subdivision and depth layer in spring 2012.

Sub-div.	22	23	24	25	26	27	28
Depth layer [m]							
10 – 39	29	3	28	25	10	3	8
40 – 59			23	30	14	2	7
60 – 79			0	31	14	2	8
80 – 100				16	17	3	11
100 – 120					8		
Total	29	3	5142	102	63	10	34

8 Update and correct the tow database

8.1 Reworking of the Tow Database

Feedbacks of the last surveys have demonstrated that the structure of the Tow Database is suitable for the routine use. Changes of the structure were not proposed and discussed. The current used structure was described in the report of the WG BIFS meeting in 2005 and in the BITS manual.

The feedbacks of the surveys in November 2010 and partly of the survey in spring 2011 were used to update the Tow Database. Some stations were deleted (stones, wrecks, area with munitions, …) or were corrected dependent on the information of the different countries (correction of depth, shift of the positions, etc.). New hauls were provided by the most countries in areas where the density of available stations was low. More than 90% of the stations which are stored in the Tow Database were already successfully used at least one time. On the other hand trawls were damaged at stations which were already successfully used at least one time. Those hauls were further used in the Tow Database, but the datasets are marked. The stations are deleted if similar problems were found during the next surveys.

Final version of the Tow Database was not available during the meeting because the feedback of the BITS in spring 2011 was not available before the meeting started. The missing feedback will be used immediately after submission by the countries. Then the version TD_2011V1.XLS will be made available for all countries. To speed up this process it is necessary that all countries submit the feedback according to the given description mentioned below immediately after the survey. The EXCEL file "Feedback.xls" will be provided for the standard reports.

8.2 Feedback of the BITS

Structure of feedback of the BITS was agreed two year ago. This structure should be used for reporting the information from the realized hauls. The aim of the structure is to make it easy as possible to rework the Tow Database. The experiences of the last years made it necessary to explain some codes more detailed.

The following information of all realized stations of BITS should be submitted to Germany.

- New version of haul number for the Tow Database
- ICES Subdivision
- Start position (latitude, longitude)
- Mean depth
- Depth range
- TV3 version 1 – TV3#520, 2 – TV3#930
- Used groundrope 1 – standard groundrope, 2 – rock-hopper groundrope
- Code of the haul
- Reason for deleting the haul

Set of codes (see table below) for characterizing the different type of realization of hauls was defined.

Code		Case
A		The position and the mean depth are suitable. Small changes of the positions are possible as a result of weather condition, gillnets, …. Data of the Tow database must not be changed in these cases.
B	1	The position is suitable, depth must be corrected. Small differences of the water depth which not significantly influence the assignment of the haul to the depth layer and which probably are determined by the variability of the surface layer must not be marked by this code.
B	2	Depth is ok, position must be corrected (reason). This code must be used when the position must be permanent changed as a result of reasons which will not be changed in future
B	3	The required depth is not stable, new position is proposed with flat bottom
C		The position is not suitable and it should be deleted (reason)
D		New haul for the database

It was agreed that:

- The feedback of realized surveys should be submitted to Rainer Oeberst, Germany using the proposed standard format not later than **20 December** (autumn survey) **and immediately after spring survey.**
- The standard ground rope must be used when the station was successfully carried out during earlier surveys with this gear (see the columns TV3 and groundrope in the TD).
- New haul positions should be submitted to Germany as soon as possible. Especially, hauls in the "white areas" are necessary to cover the total distribution area of the target species. It was proposed that time should be used during surveys to allocate new haul positions in the "white areas".

EXCEL file was provided to the group which contains standard structure of feedback.

9 Review and update the Baltic International Trawl Survey Manual (BITS)

The Manual for the Baltic International Trawl Surveys (BITS) from the WGBIFS meeting in March 2010 was reviewed and updated to reflect the present methods and newly introduced conditions to use in the surveys. The new version of the manual is found in Addendum 1 in this report.

Revision and some minor changes and descriptions of the DATRAS exchange format in the BITS manual are dealt with Section "Review of the upload and development status of DATRAS and FishFrame" in this report.

The DATRAS database manager should clarified the discrepancy between the DATRAS scanning procedures and one of the recommendation from the current BITS manual, which allows to use -9 in the field Age-Rings in record CA, when the age group of fish is unknown.

The information set concerns the name of fish species orders was deleted from the Addendum 1, because the DATRAS scanning program does not accept the name of order instead of name of species.

The Latin name of some fish occurred in the Baltic Sea, which are marked in red (see Addendum 1), are not listed on the ICES Data Centre web side: http://www.ices.dk/datacentre/datsu/rptSpc.asp?Id=59 and due to this fact, the DATRAS database manager is requested to solve occurred discrepancy.

The areas located close to the Latvian – Estonian marine border are in the 1st quarter of the year usually covered with ice float, which practically not allowed trawling at some locations. This area can be incorporated in the next BITS-Q1 surveys plans however, could be realized as optional ones, after decision about trawling taken jointly by the captain of surveying vessel and the scientific team leader.

The WKMSSPDF recommended, in the case of time allows during a survey, to analyse the content of main fish species gonads under a microscope in the case of disagreement or doubt on the maturity stage of a particular fish.

Beginning from November 2011, the WGBIFS allows using the ground trawl type TV-3#520 with additional rigging, i.e. the rock-hopper for heavy bottom in ICES Subdivision 24. Reason for changes is resulted from the fact that relatively large area with a rocky bottom (particularly the northern part of ICES Subdivision 24) was excluded as area monitored for fish distribution during the BITS surveys.

10 Review and update the Baltic International Acoustic Surveys (BIAS) Manual

Current review of the text of the BIAS manual (previously updated in 2010) as well as presentations and discussion during WGBIFS-2011 meeting indicated that any significant update and corrections are not needed.

However, due to the fact that in the control-catches of some research vessels operated in the western part of the Baltic, two "visiting fish species" i.e. *Trachurus trachurus* and *Scomber scombrus* are relatively frequently appeared, the WGBIFS recommend to use recently calculated the values of the TS parameter (Table 5.7 in the BIAS surveys manual) for both species for preparation of the standard dataset from acoustic surveys.

Information about any changes in the planned acoustic transects pattern for given survey (vessel) as well as any difficulties concern the acoustic survey realization should by immediately transferred to the acoustic surveys coordinators within the WGBIFS, i.e. Niklas Larson, Lysekil – Sweden (niklas.larson@fiskeriverket.se) and Uwe Boettcher, Rostock – Germany (uwe.boettcher@vti.bund.de), with copy to the WGBIFS Chair.

Because the share of cod in the pelagic control-catches, realized during the BIAS surveys in some areas, is very low and every accessible information about cod spatial-temporal distribution in the Baltic are requested, the WGBIFS recommend to put more attention on this species occurrence, even if this species is marginal in given area. Data on the share of cod and clupeids in samples as well as their abundance per the ICES rectangle should be delivered in at least two decimals rounding format, to the acoustic surveys data coordinators, for a final calculation of fish stocks resources.

11 Review of new results on the vertical distribution of the cod during the BITS

During the meeting countries have reported their recent information on cod from pelagic catches during BITS surveys. No pelagic hauls were performed during 1st quarter 2011 Dana (Denmark) survey due to inappropriate trawl rigging for pelagic catches and unsuitable doors aboard that vessel. It is however planned to conduct pelagic hauls in autumn 2011 with new doors installed on the vessel. Sweden has not made any pelagic hauls for two recent years awaiting for the elaboration of the already existing data on cod in pelagic hauls from BITS surveys. A brief summary on simple analysis on cod pelagic catches in Swedish BITS surveys was presented during 2009 BIFSWG meeting. Since then no further, more thorough data analysis was made. The results of the acoustic experiments carried out by Denmark and Sweden in SD 25 and by Russia in SD 26 during the BITS of the last years, where acoustic estimations were carried out in combination with midwater trawls in areas with oxygen deficiency close to the bottom suggests that a substantial biomass of cod is aggregated in the pelagic. This is not taking into account in the indices calculated based on the traditional standard hauls using the standard bottom trawl. The Group has confirmed its concern about cod pelagic component occurring in some areas during BITS surveys requiring continuous investigations. To initiate studies on cod in the pelagic zone, the Group has decided to request all the countries to deliver to Uwe Böttcher the cod data from the hydroacoustic surveys since 2005 onwards. The data on cod can be submitted in the format of the acoustic database BIAS where number of cod is given by age.

12 Review of the upload and development status of DATRAS and FishFrame

During the BIFSWG meeting, DATRAS website was visited to examine status of data uploaded for 2010–2011. All countries, except Lithuania have uploaded data from both 1st and 4th quarter surveys, carried out in 2010. Species uploaded varied between countries. Germany, Sweden and Denmark have uploaded all the species recorded in both surveys. Poland uploaded all species from the 4th quarter survey, while from the Ist quarter survey, only cod has been uploaded. Further efforts have been undertaken with the intention to include all the species occurred in the Polish survey. Latvia uploaded cod, herring, sprat and flounder from 1st quarter survey, while from 4th quarter survey all the species were uploaded. Russia has uploaded cod, herring, sprat and flounder from both of the surveys. Estonia has uploaded cod and flounder only.

Uploading the data from 1st quarter 2011 is still in progress due to the late termination time of some countries surveys. It is planned however to upload the data immediately after the WGBIFS meeting. During the WGBIFS meeting only German data has been available in the DATRAS including all species.

The examination of the DATRAS exchange format revealed some developments in the database like the inclusion of the codes for the new 6 stages maturity scale. The Group was not informed about the changes implemented in DATRAS. The very thorough testing of the screening program against proposed codes was done last year on the request of the ICES Secretariat. These were addressed in the section 16.2 of the 2010 WGBIFS report.

13 Discuss the descriptions and the documentation of various methods for weighting procedures when combining hauls in compilation of acoustic indices

Acoustic surveys are widely used for estimating stock indices of pelagic species like herring, squid, krill as well as for nekton and plankton. Acoustic estimates are also used to improve the assessments based on trawl surveys. Data-driven approaches were used to interpret acoustic measurements between bottom trawl stations by Neville *et al.* (2004) who used artificial neuronal networks, and by Mackinson *et al.* (2005) who applied fuzzy logical relationships. Technical and methodical aspects of fishery acoustics were summarized by Simmonds and MacLennan (2005). Kimura and Somerton (2006) condensed statistical aspects of trawl and acoustic surveys with special regard for the acoustic transects.

An important issue of the acoustic surveys is to assign the backscattering energy to species detected by acoustic signals, especially if the composition of species and their acoustic characteristics are highly variable. Trawling stations are commonly used to estimate species composition of the scattered target. However, results of trawling stations only present the relative distribution of targets, because only a part of the total area recorded by the acoustic signal is covered by the gear. Furthermore, the results of trawling stations are influenced by selectivity of the gear and possible avoidance of the targets.

The echo integrals can partition to the species level via reference to the composition of the trawling stations (Nakken and Dommasnes, 1975). However, statistical models concerning the combination of the results of trawling stations are not available yet. Three methods were proposed by Simmonds and MacLennan (2005) for combining the results of trawling stations in which the station results are combined with different weighting factors. The weight which is given to each sample is varied depending on the characteristics of the concentration sampled by the trawling gear. The following weighting methods were applied: a) weight is equal to the proportion in each catch, b) weight is equal to each catch-rate and c) echo integrals observed in the vicinity of the trawl stations are used as weight. Simmonds and MacLennan (2005) recommended method b) as most generally applicable.

Two models were presented during the meeting to combine the results of the trawling stations dependent on the relations between the acoustic values (S_A) of the target types.

Model I assumes that the acoustic values of the different target types are correlated. Figure 13.1 illustrates the assumption based on simulated data of two target types.

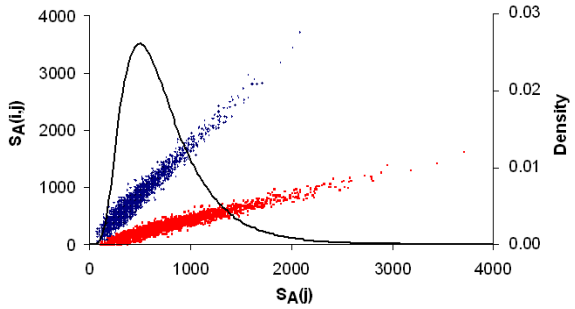


Figure 13.1. Nautical area backscattering coefficients, $S_A(i,j)$, of two target types. $S_A(1,j$; blue dots) and $S_A(2,j$; red dots) based on 3000 simulated datasets where $S_A(1,j)$ is lognormally distributed with a mean of 6 and a standard deviation of 0.5. $S_A(2,j)$ values are related to $S_A(1,j)$ according Model 1 with $S_A(2,j) = 0.7 * S_A(1,j) + \varepsilon(j)$. The mean of the normally distributed variable $\varepsilon(j)$ is zero and the standard deviation is 100.

In this case the mean fraction of the S_A values of the first target type in relation to the total S_A values is independent of the total S_A values (Figure 13.2) and the arithmetic mean of the results of trawling stations can be used.

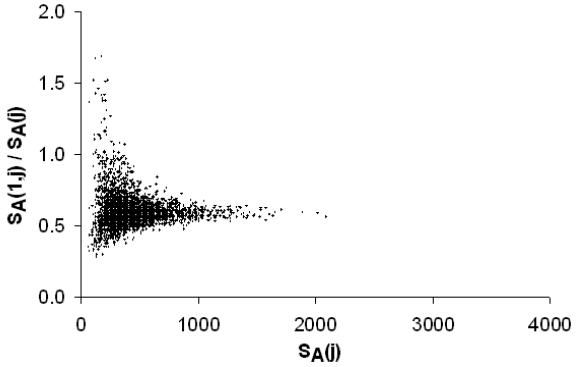


Figure 13.2. Fraction of $S_A(1,j)/S_A(j)$ related to $S_A(j)$ based the simulated data presented in Figure 13.1.

Model II assumes that the S_A values of at least one target types is independent of the total S_A values as illustrated in Figure 13.3 based on simulated data of two target types.

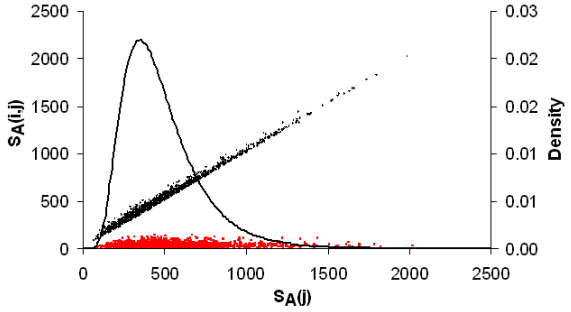


Figure 13.3. Nautical area backscattering coefficients, $S_A(i,j)$, of two target types. $S_A(1,j$; blue dots) and $S_A(2,j$; red dots) based on 3000 simulated datasets where $S_A(1,j)$ is lognormally distributed with a mean of 6 and a standard deviation of 0.5. $S_A(2,j)$ and SA(1,j) values are uncorrelated according to Model 2. Mean of lognormal distributed SA(2,j) is 3.5 and the standard deviation is 0.5.

As consequence the S_A values of this target type (target type 2 in Figure 13) are not correlated with total S_A values and the fraction of the S_A values of target type 1 depend on the total S_A values (Figure 13.4) and the arithmetic mean of the results of the trawling stations depend on total SA values were the stations were realized. That means different estimates will be produced if the trawling stations are realized at positions with different total S_A values. Mathematical background was presented in the working document how the data are to combine to get unbiased stock indices (Oeberst, 2011, see Annex 9).

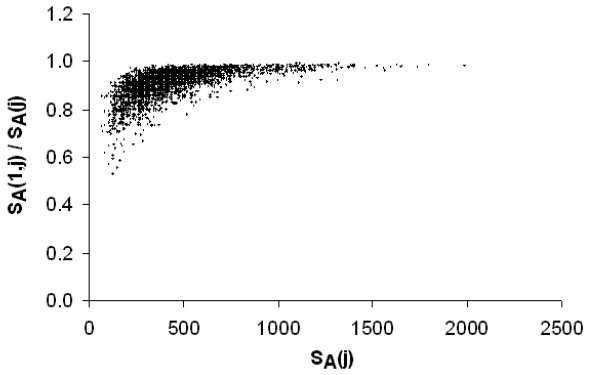


Figure 13.4. Fraction of $S_A(1,j)/S_A(j)$ related to $S_A(j)$ based the simulated data presented in Figure 13.3.

The estimated stock indices of sprat in SD 25 in 2003 and 2004 based on both models significantly differed. The group supports the proposal to realize the analyses for the acoustic surveys in SD 21 – 24 in October from 2005 to 2011 and for the acoustic survey in SD 25 in May from 2005 to 2011 based on the German data. Extend of the analyses into the other areas requires a working database of acoustic data which is still not working.

A further reason of uncertainty of the stock indices based on the acoustic surveys was discussed during the meeting. The used of the trawling stations to estimate the proportions of targets which are measured by the acoustic signal assumes that the relative species and length composition within the water column ahead of the gear and in the catch are proportional. This assumption does not consider the selectivity characteristics of the codend and the differential catchability of the total gear. Therefore, it

may more correct to estimate the length and species composition distribution ahead of the gear by raising up of the length frequency observed in the catch based on the catchability and selectivity characteristics. The new length and species compositions then are be used to describe the backscattering characteristics of target within the observed water column (Kasatkina and Ivanova, 2009). Therefore, investigations are required to evaluate effects of trawl on the stock indices during the acoustic surveys.

The two proposed procedures present two separate steps of the processing of the results of trawling stations which can be used separately or together to evaluate their effects concerning the stock indices.

The group agreed that additional investigations are required to assess the effect of the different national gears used in BIAS and BAS. It is important to understand how the vertical distribution of target species corresponds to trawl vertical opening which range from 10 m to 31 m for the national gears and how different trawl constructions result in acoustically derived abundance indices.

The group also suggests that additional analyses should be realized based on the total survey data and requires the fast finalization of the acoustic database to evaluate the consequences of the proposed method concerning the stock indices.

13.1 References

Oeberst, R. 2011. Species composition in scattered layers during acoustic surveys estimated by means of trawling stations. Working document of WGBIFS in Kaliningrad, Russia, 10 pp.

Kasatkina S., and Ivanova, V. 2009. Modeling study of catchability properties of research and commercial trawl to identify sources of uncertainty in resource surveys indices. ICES CM 2009/I:13.

14 Evaluation of the new results of uncertainty estimates of the BIAS abundance indices applying simulation model

14.1 Relation between the variance and the mean of stock indices based on the acoustic surveys

The need for estimating accuracy of abundance indices based on BIAS data and further integrating this accuracy estimates into the Baltic fish stock assessment models (XSA) was shown in above mentioned document. Traditionally, the XSA realized in the ICES software is based on the hypothesis that the abundance indices variance is constant by years for each age-group (Darby, Flatman, 1994). To verify this hypothesis the statistical characteristics of fish abundance indices were obtained by processing the BIAS data from 2004–2006 using the simulation method (Kasatkina and Gasyukov, 2006, 2009). The relationships between the abundance indices variance and indices value for all age-groups of herring and sprat were revealed. Therefore, it seems that the stock assessment model accounting this fact will describe the Baltic fish dynamics more realistically. To take into account variability of abundance indices variances by years for each fish age group the new version of the XSA was developed as the XSA with the weighted regression. The XSA software used by ICES WGs was modified by replacement of the traditional linear regression to the regression with the known accuracy of predictors-abundance indices. The authors compared the results of stock assessment by means of the traditional XSA and the new XSA version on the base the same information used by WGBFAS 2009.

Application of the new XSA version was resulted not only in new estimates of fish stocks and population parameters (recruitment, total and spawning biomasses, mean fishing mortality rate), but also changed the temporal trends in fish stocks dynamics (Figures 14.1 and 14.2). It demonstrated that estimating variance of acoustically derived abundance indices based on BIAS surveys and subsequent integration of these accuracy estimates into the stock assessment model are very important in view of ICES initiatives to revise stocks assessment methods.

14.1.1 References

Darby C., Flatman S. 1994. Virtual Population Analysis. Version 3.1. User Guide. Copenhagen, Denmark. ICES press, 1994. 85 p.

Kasatkina, S. M., Gasyukov, P. G. 2006. Estimating uncertainty in the Baltic acoustic survey results applying geostatistics techniques and simulation //ICES Annual Science Conference, Maastricht, Netherlands, 17–26 September 2006. ICES Document CM 2006/I: 14. 2006. 17p.

Kasatkina, S. M., Gasyukov, P. G. 2009. Quality of abundance indices based on international acoustic surveys in context of input data for stock-assessment models: example of Baltic International Acoustic Surveys // I ICES Annual Science Conference, Berlin, German, 21–25 September 2009. ICES Document CM 2009/N:12. 2009. 23 p.

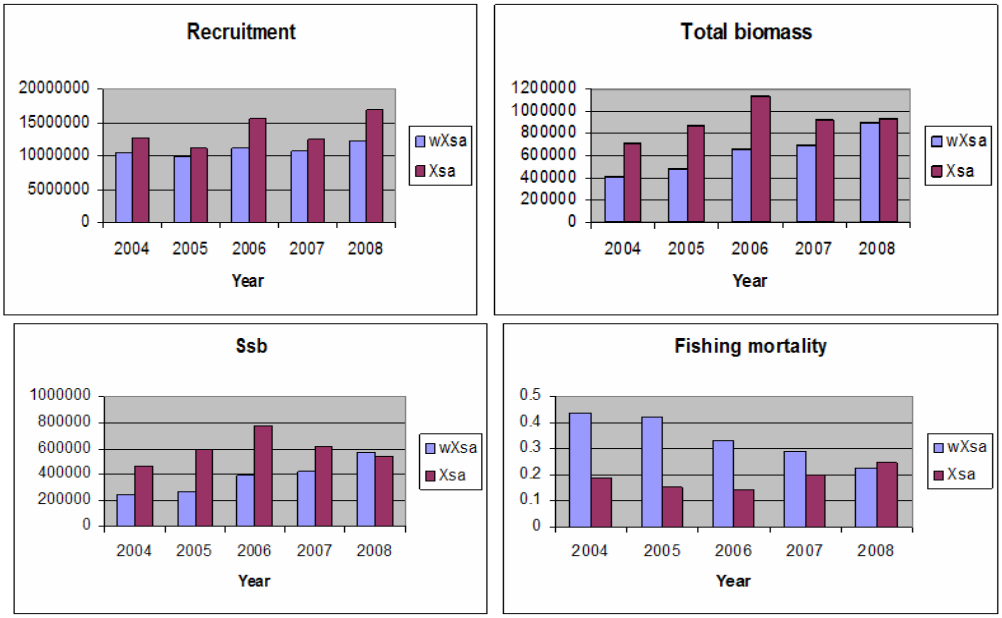


Figure.14.1.Estimates of herring stocks and population parameters (recruitment, total and spawning biomasses, mean fishing mortality rate) in the Central basin of the Baltic Sea based on traditional XSA (brown color) and new XSA version (blue color).

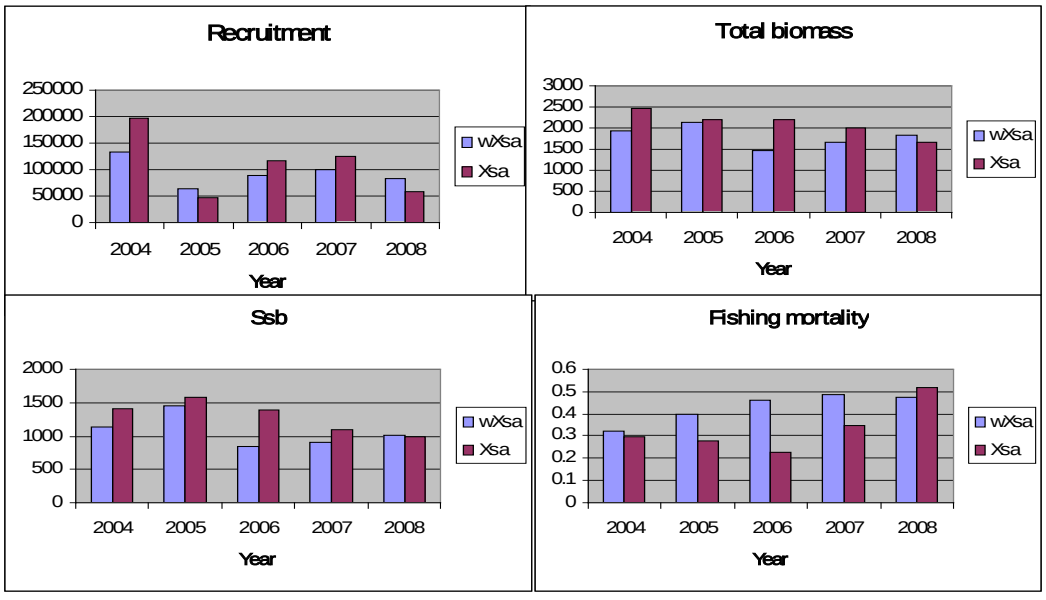


Figure.14.2.Estimates of the Baltic sprat stocks and population parameters (recruitment, total and spawning biomasses, mean fishing mortality rate) based on traditional XSA (brown color) and new XSA version (blue color).

Working document Kasatkina S. and Gasyukov P. ”Improved approach to stock assessment of the Baltic herring and sprat based on data from international surveys (BIAS)”.

14.2 Application of the principle-component analysis in research of spatial-temporal distribution of the east cod in the Baltic Sea

Development of measures for commercial fish stocks management requires the quantitative understanding of the basic characteristics of fish spatial patterns and temporal changes in these patterns being the key information used in stock assessment models, population models, etc. The model of non-stationary random field is sufficiently general presentation of the temporal-spatial fish distribution. However, it is rather difficult to describe such field and in particular to use its values in models, because it is impossible to obtain observation data for the entire field: the surveys provide only individual observations in discrete points (at the trawl stations and transects).

Nevertheless, at present the vast sets of data from the surveys fulfilled for many years in the fish habitat areal have been accumulated and stored. These sets of observations are represented with the raw data for describing fish spatial-temporal distributions. However, application of these raw data in models requires preliminary processing with suitable methods to detect and characterize the abundance dynamics in time and space, and in the latter case the features of this distribution in space – zones of high and low densities, correlation of field values in space, temporal dynamics. At the same time, the compact presentations of these processed data are very important for their application in the models.

The model of the non-stationary random field was used to describe the spatial-temporal distribution of the Eastern cod stock in the Baltic Sea (Gasyukov and Kasatkina, 2010). The basic purpose of the study is to describe fish spatial -temporal distribution pattern taking in account the spatial correlation. The field digitization is fulfilled by the depths strata adopted in the international bottom surveys of fish. The field realization covers the period from 1991 to 2009 and describes the age groups 2, 3–4 and 5–7 in ICES Subdivisions 25, 26 and 28. The analysis includes the data for 12 depths strata. The mean long term estimates of density and diagonal elements of covariance matrix by subdivisions and depths strata for different age groups of cod were investigated. It is shown that high values and high variability of density are typical in Subdivisions 25 and 26 and associate with several depths strata (41–60 and 61–80 m). The high correlation of density estimates (0.4–0.7) for the age groups 2, 3–4 is also associated with these and adjacent depths strata. The patterns of temporal and spatial distributions of cod are described by the components of the fields in the expansion by Karunen-Loeve (which is similar to the principle-component analysis for the assumed field digitization). It was revealed that the mean field value and two components of the extension are sufficient to describe 90% of variance of the field for the age 2 (recruitment) distributions. The same procedure for the age groups 3–4 and 5–7 requires three components. The spatial distribution structure is represented by the eigenfunction values, while the temporal dynamics is represented by the expansion coefficients.

The suggested techniques developed as the further part of this study may be useful for solving some practical tasks connected with improvement cod stock assessments applying rebuilding missed observations and filtering observed data. As the examples the missed data for cod recruitment in the 25 SD in depth layer 81–100m were rebuild for 2002–2007 years. In addition estimates of the eastern cod recruitment in ICES Subdivisions 25, 26 and 28 for 1991–2009 years based on observed and filtered data were compared assuming that relative accuracy were more than 90% of total variance. It was revealed that in most depth strata number of cases when estimated recruitment from bottom surveys was lesser as compared with filtered estimates. The

existence of pelagic component of cod recruitment became unavailable to bottom surveys is possible explanation of this fact.

Another probable application of the principle-component analysis is more precise estimation of cod abundance indices on the basis of the spatial correlation consideration.

14.2.1 Reference

Gasyukov, P. S., Kasatkina, S. M. 2010. Application of the principle-component analysis in research of spatial-temporal distribution of the east cod in the Baltic Sea. ICES CM 2010/G:07.

15 Review the results of the scrutinizing of the data from the Baltic region uploaded in DATRAS with special reference to the issue of correct species identification and consistency across countries

The BITS manual describes that data of cod, herring, sprat and flatfish are required for uploading. For these species correct species identification and consistency across countries is guaranteed. The countries have also the option to upload data of all species which were captured during the BITS. This option is differently used by the countries. Therefore, misreporting of the species code is of minor importance.

An intensive screening of the data are realized by ICES DATRAS system before the data can be uploaded. This screening contains the check of the species code against the list of accepted species for the Baltic Sea. In addition, length of the individuals is checked against the maximum observed length of the species which is stored in the DATRAS database. In cases where the species code is not accepted or the length is above the maximum value the screening procedure of DATRAS gives information. Therefore, evaluation of the species stored in the DATRAS system is in agreement with the accepted species list of the Baltic Sea.

16 Prepare methods for delivery of additional information to WGBFAS in 2012

The group discussed about the potential additional information that the WGBIFS could deliver to the WGBFAS. There is plenty of information handled within the WGBIFS that may potentially be used for stock assessment and advice, and therefore the relevant specific requests should come from the WGBFAS.

The WGBIFS group emphasized that the meetings are already very intensive and the amount of ToRs and analyses often overwhelming. However, the WGBIFS can evaluate the request of additional information, but only provided that the members have the appropriate expertise to deal with the analyses required to deliver such information.

If the WGBIFS members will evaluate that the requests are unfeasible within the few ordinary meeting days, or if the proper expertise is lacking within the group, the WGBIFS will demand the WGBFAS to send to the WGBIFS meeting a person specifically responsible for such work. In this case this person will have all the support and assistance from the WGBIFS group to meet the recommendation. As alternative, additional WGBIFS members would be necessary to meet the specific requests.

It is recommended that WGBFAS prepares a list of the additional essential information, in priority order, that the WGBIFS is recommended to provide for the forthcoming assessments.

17 Evaluation and modification of the standard gears TVL and TVS used during BITS

17.1 Detailed check of the TVS used by Germany

The measuring of the TV3–520 # trawls of the German RV "Solea" were carried out in September and October 2010 inside a storehouse of the Department of Agriculture and Rural Areas in Rostock

The deviation of the measured values in relation to the standard values given in the BITS manual was expressed by the relative error. Actual and standard measurements were compared by calculating the relative error:

$$\text{Relative error [\%]} = \frac{[\text{Actual measurement distance (m)} - \text{standard measurement distance (m)}] \times 100}{\text{standard measurement distance (m)}}$$

A relative error of more than 5% indicates a significant difference between the checked parameters and standard values (see BITS "Check Guide"

The results are presented in the working document Oeberst *et al.* (2011, this report). In some cases relative errors of more than 5% were observed for one gear. To avoid uncertainties of the stock indices based on gears which do not correspond to the defined standard given in the BITS manual the group recommends that all BITS standard gear (TV3-520 # and TV3-930 #) are detailed measured onward at least once a year according to the requirements of the BITS manual. The results will be presented at the meeting of WGBIFS.

17.2 Hard bottom footrope for TVS

ICES Subdivision 24 is only covered by RV "Solea" during Baltic International Trawl Surveys in quarter 1 and quarter 4. The reason for this agreement is the use of the small TV by RV "Solea". To avoid problems with the conversion factors between the small and large TV it was decided that the larger vessels "Argos", "Baltica" and "Dana" which use the large TV realize the trawling stations in SD 25.

"Three different gears (small TV3, large TV3 with standard rope and large TV3 with rock-hopper) are in use in the western areas (Subdivisions 22–24) at present. However, only the limited number of the trawl hauls with small TV3 has been carried out in this area. In order to increase the accuracy of the conversion factor between small and large TV3 trawls, it was proposed that in future trawl surveys of German research vessel with small TV3 will be carried out in Sub division 22–24, while the vessels with large TV3 will be operating in the eastern areas. The group came to the conclusion that no rock-hopper should be used in control hauls on the tracks listed in the CTD. The rock-hopper should be used only in the areas, which are well known by the heavy grounds." (ICES, 2002)

For the larger TV a hard bottom footrope was developed to work also in areas with rocky bottom. This was not the case for the small TV (see BITS manual, version 2010). The use of the standard footrope by TVS results in an strong restriction of the area covered by RV "Solea" in SD 24 due to rocky bottom, especially in the northern area of SD 24 with consequences concerning the selection of fishing stations during the BITS. Figure 17.1 shows trawl stations stored in the Tow database of Version 2010. The red marked positions presents stations where the standard footrope can be used.

The blue marked positions which are mostly located in the northern part of the Arkona Sea have a high probability of damaged gear. The map does not show the stations which were already deleted in the Tow database due to damage of the TVS. To avoid a further reduction of the possible trawling station in SD 24 as well as to offer the option to work also in areas with hard bottom it is proposed that a hard bottom footrope can be used by RV "Solea" in SD 24. The footrope is adapted to the version of the large TV (see BITS manual) and is presented in Figure 17.2. The red marked figures present the corresponding values for the TVS.

The WGBIFS agreed that RV "Solea" can use the above mentioned hard bottom footrope in SD 24 at stations with rocky bottom. However, according to the role for TVL, the standard groundrope has to be used if possible (ICES, 2002).

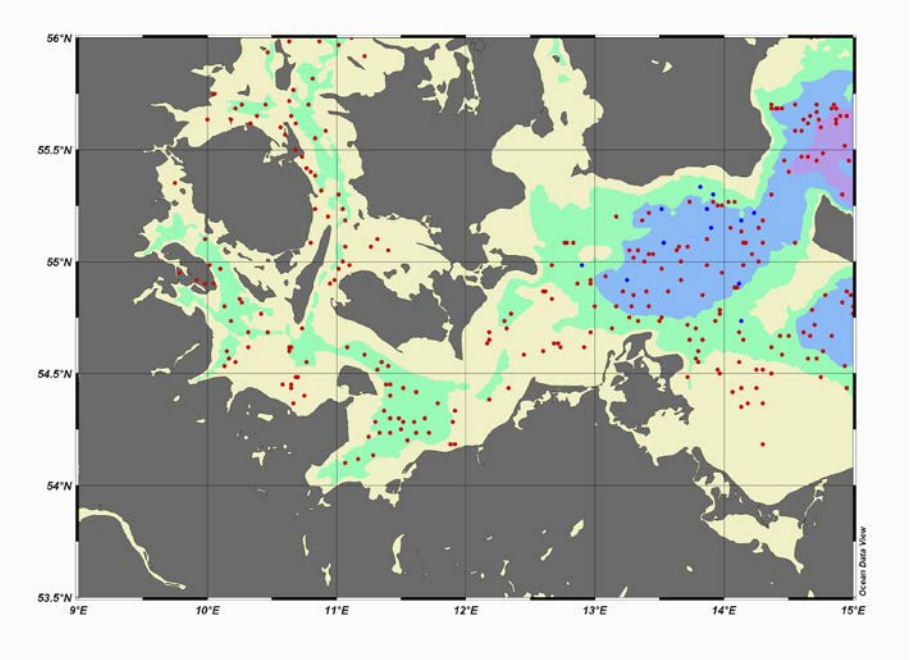


Figure 17.1. Trawling stations in ICES Subdivision 22 and 24 which are available in the Tow Database (red dots – fishing is possible with TVS standard version, blue dots – fishing with standard groundrope is danger or impossible).

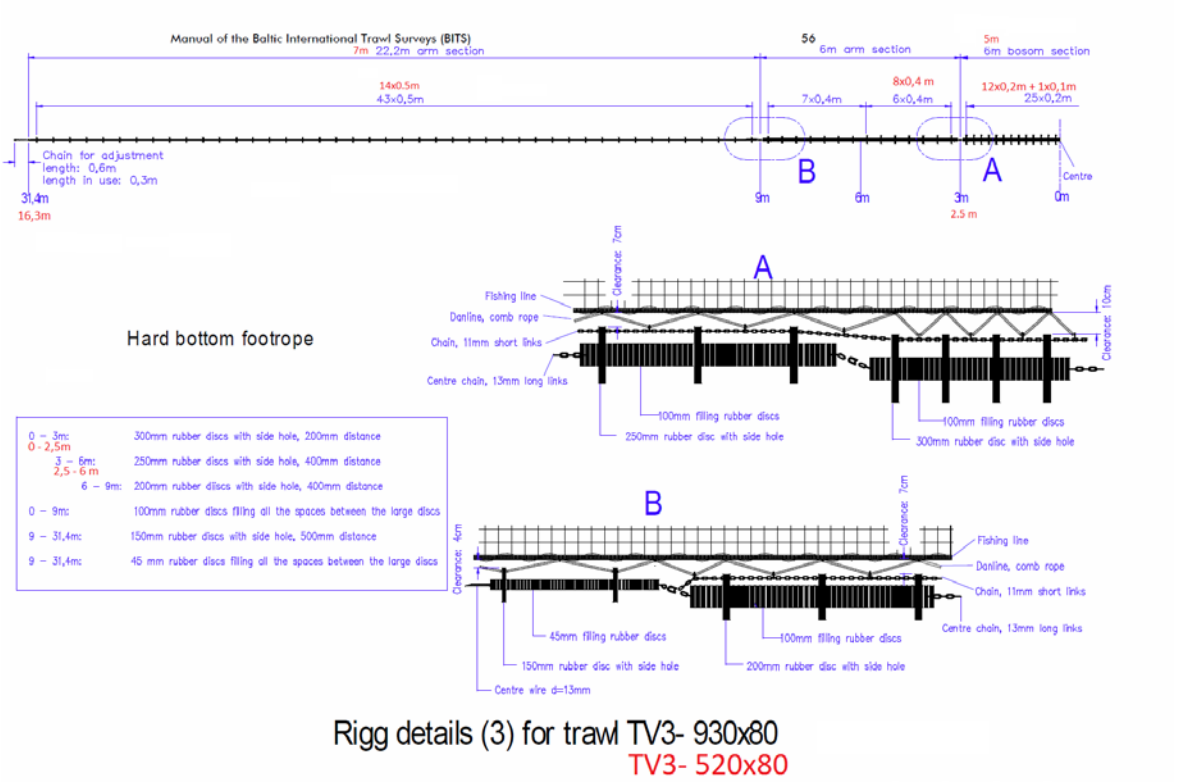


Figure 17.2. Proposed hard bottom footrope for the TVS based on the version for TVL (red figures are the adapted values for the TVS).

17.2.1 Reference

ICES. 2002. Report of the Baltic International Fish Surveys Working group. ICES CM 2002/G05, 202 pp.

17.3 Modification of codend bottom trawl standard gear TVL

Denmark realized fishing stations with RV "Dana" mainly in ICES Subdivision 25 during the BITS in quarter 1 and 4. Due to the row bottom the gear was damage many times. To improve the usability of the standard trawl it is suggested by Denmark to use more wear-resistant material in the codend of the TVL. During the last meeting it was agreed by the group the final decision is only possible based on detail description of the proposed changes because significant effects concerning the selectivity characteristics are possible. During this meeting the group agreed that Denmark can provide the missing description to the participants of the survey between the meetings. Dependent on the comments a final decision can be made by e-mail.

18 Inquires from other Expert Groups

18.1 Discuss the implementation of the stomach sampling program framed by WGSAM

The Working group on Multispecies Assessment Methods (WGSAM) in 2010 proposed the realization of stomach samples of the main predators in the North Sea and the Baltic Sea to improve the basic knowledge concerning the species interactions in relation to the multispecies approach. The group proposed that cod is only important for the Baltic Sea and also proposed standard procedures for sampling.

Five stomachs are required per 5 cm length intervals beginning with 5 cm in all ICES SD's according to the extended sampling level proposed by WGSAM. The group agreed that the amount of the sampling is realized by each subdivision because of the strong changes from west to east of the Baltic Sea due to the high salinity gradient. However, the special situation in the Baltic Sea requires an adaptation of the sampling procedure. Different vessels cover different areas of the same ICES Subdivision during the BITS (like SD 25 – "Argos", "Dana" and "Baltica"). To get the best possible spatial distribution of the stomach samples it is necessary that all vessels which work in the same SD carry out sampling. About 80 stomach samples are required for each ICES SD and in total, about 560 stomach samples during each BITS.

To avoid a strong oversampling the group proposed that each vessel samples total amount of planned sample (5 stomachs per 5 cm length intervals beginning with 5 cm) in each SD and stores the samples in freezer to protect the samples for extended analyses level in the lab. The sampling of the vessels takes into account that high spatial dispersion is required. All samples of the same SD are summarized and a random subsample is selected for the analyses taking into account the spatial and temporal distribution of the available samples.

The group proposes two options for processing the stomach samples:

- The national labs get support for the processing of the stomachs by expertise and financial support
- All stomach samples are analysed in one institute which get support by expertise and financial support.

The planning of the support related to the first version is difficult because the sampling amount by country can only be assessed with high uncertainty. The second version provides the opportunity to establish high level expertise in one institute which support the quality of the analysed data.

The group further points out, that stomach samples from bottom trawl surveys are only available for the periods middle of February to end of March and November based on the BITS and requested whether additional stomach data are required for other period because the multi species assessment is based on quarter. During the acoustic surveys in May (BASS) and October (BIAS) cod is also captured in the pelagic layer. If sampling is also required from these internationally coordinated surveys it must be clearly pointed out which sampling intensity is required.

The WGBIFS recommended to WGSAM that clear decisions are required related to the proposed procedure of stomach sampling and the analyses of the stomachs until August 2011 to start with the sampling during the BITS in November 2011.

18.2 Discuss the suggested new maturity scale of flounder presented in the "Report of the Workshop on Sexual Maturity Staging of sole, plaice dab and flounder (WKMSSPDF)" held in IJmuiden 22–26 February 2010

WKMSSPDF proposed mew codes for describing the maturity stages of flatfish (sole, plaice, dab and flounder) in the report of 2001 (ICES, 2010). The new 5 scale code was described in the report for the four species by sex and was defined as standard. Unfortunately, neither member if WGBIFS participated nor WGBIFS was informed concerning the proposal.

The proposal of WKMSSPDF and the consequences related to the database used for Baltic fish data (DATRAS – results of bottom trawl surveys, hosted by ICES, FISHFRAME – results of commercial samples, hosted in ATU Aqua) were intensively discussed before and during the meeting of WGBIFS in 2011.

Following critical points were detected:

The definition of the maturity stages by species is not fully consistent concerning the occurrence of first fully developed eggs. The descriptions for female sole and plaice are given below marked by yellow colour.

Stage 2 female Sole: Eggs can be from grains through to non hydrated fully developed eggs

Stage 2 female Plaice: Gonad rounder and firming, granulation at start of stage through to fully developed opaque eggs visible

The maturity stage is stored in DATRAS – BITS and FISHFRAME in a five scale code which was agreed before 2000 by WGBIFS (see BITS manual, ICES, 2010). It was also agreed by WGBIFS that the countries can used the national code of maturity stages to continue the national time-series. In addition, table was prepared and presented in the BITS manual, which documents the relation between the national code and the ICES – DATRAS code (Table 1). The group agreed that gonads are assigned to ICES stage 2 (prespawning) is used if ovaries completely non-transparent. Ovaries are very large and eggs completely round. Few hyaline ripe eggs are visible. (According to the adapted Maier scale, Bleil and Oeberst, 2002) at least for German and Poland (see Table 18.1). The same code of maturity stages is used for the data of the commercial fishery which are stored in FISHFRAME. In addition, new uploading of InterCatch data are required.

This is in contrast to the definition given in the proposal of WGMSSPDF). The different assignment to prespawning (ICES-DATRAS) and spawning (WKMSSPDF) results in a break of the time-series of maturity data for describing the temporal and spatial maturity development.

To avoid such a break of the time-series the uploading of the surveys data and data of the commercial samples from 1991 onward (partly) is necessary because the then ICES – DATRAS code cannot directly transferred to WKMSSPDF code without errors. Therefore, the WGBIFS proposes more generic approach to include national maturity scales into the existing international databases to avoid the additional amount of work and further possible unexpected changes in the maturity scales. In this case an adaptation to new proposals relate to the interpretation of the maturity stages can be realized without new uploading of the data.

Due to the very long tradition to use national maturity scales by the countries which open the option of more detailed description of the temporal and spatial develop-

ment of maturation the institutes will further used the national coding in future independent on different aggregation levels in the international databases.

Recommendation:

The group proposes the change of the DATRAS system related at least for the BITS in such a way that the national maturity codes can be used and that the transfer of the national code into the current international code is realized by the DATAS system based on the national transfer keys given in the BITS manual. After the implementation of the new version upload of the data will be started by the different countries.

Table 18.1. The table convert the codes of the national maturity key into the codes of the BITS key for flatfish (BITS manual).

Country	BITS	Denmark	Estonia	Finland	Germany	Latvia	Poland	Russia	Sweden
Species	All		All		Flatfish		Flatfish	Alekseev,	
Source	ICES (1997)	not available	Kiselevich (1923)	not available	Maier (1908)	Kiselevich (1923),	Maier (1908)	Alekseeva (1996)	not available
			Pravdin (1966)			Pravdin (1966)			
Maturity stage	Code								
(1)									
VIRGIN	1		I		I	Juvenis, II	I	Juv., II	
(immature)									
MATURING	2		II–IV		III–V	III, VI	III–V	III, IV	
(mature)									
SPAWNING	3		V		VI,VII	V	VI,VII	V, VI (V),	
(mature)								VI (IV)	
SPENT	4		VI		VIII	VI	VIII	VI	
(mature)									
RESTING	5		II		II	II	II	VI (II)	
(mature/									
immature2)									

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.

18.2.1 Reference

ICES. 2010. Report of the Workshop on Sexual Maturity Staging of sole, plaice dab and flounder (WKMSSPDF). ICES CM 2010/ACOM:50, 96 pp.

18.3 Identify elements of the EGs work that may help determine status for 11 Descriptors set out in the Commission decision

WGBIFS can deliver, based in the surveys conducted under its coordination, relevant information for the determination of the status for the following Descriptors of the MSFD. This information refers to the practices used currently during the surveys, and not the practices that can be potentially implemented in future activities (ex. following the WGISUR report).

The group stresses that the production and delivery of this information should be authorized by ICES. For the BITS survey (Bottom Trawl Survey) the DATRAS database and the new ICES EcoSystemData could be used for this purpose for standardizing the procedures. For BIAS and BASS surveys (Acoustic Surveys), ICES is strongly recommended to create a database as platform for the analysis and delivery of such information:

Descriptor 1: Biological diversity is maintained. The quality and occurrence of habitats and the distribution and abundance of species are in line with prevailing physiographic, geographic and climate conditions.

Species level

1.1. Species distribution

— Distributional range of cod, flounder, herring and sprat, and by the other sampled species (1.1.1)

— Distributional pattern within the latter (1.1.2)

— Area covered by cod, flounder, herring and sprat, and by the other sampled species (1.1.3)

1.2. Population size

— Population abundance and/or biomass of cod, flounder, herring and sprat (1.2.1)

1.3. Population condition

— Demographic characteristics of cod, flounder, herring and sprat (body size and age-class structure, sex ratio; 1.3.1)

Habitat level

1.4. Habitat distribution

— Distribution of salinity and oxygen condition suitable for cod (1.4.1)

— Distributional pattern within the latter (1.4.2)

1.5. Habitat extent

— Area with salinity and oxygen condition suitable for cod (1.5.1)

— Habitat volume, where relevant (1.5.2)

1.6. Habitat condition

— Hydrological conditions from CTD sampling (1.6.3).

Ecosystem level

1.7. Ecosystem structure

— Composition and relative proportions of ecosystem components (demersal and pelagic fish species; 1.7.1).

Descriptor 2: Non-indigenous species introduced by human activities are at levels that do not adversely alter the ecosystem.

2.1. Abundance and state characterization of non-indigenous species, in particular invasive species

— Trends in temporal occurrence and spatial distribution in the wild of non-indigenous fish species, particularly invasive non-indigenous species (2.1.1)

2.2. Environmental impact of invasive non-indigenous species

— Ratio between invasive non-indigenous species and native species in the fish community (2.2.1)

Descriptor 3: Populations of all commercially exploited fish and shellfish are within safe biological limits, exhibiting a population age and size distribution that is indicative of a healthy stock.

3.3. Population age and size distribution

Primary indicators. Healthy stocks are characterized by large proportion of old, large individuals. Indicators based on the relative abundance of large fish include:

- Proportion of cod, flounder, herring and sprat larger than the mean size of first sexual maturation (3.3.1)

- Mean maximum length across all commercial species found in research vessel surveys (3.3.2)

- 95 % percentile of the fish length distribution observed in research vessel surveys (3.3.3).

Secondary indicator:

- Size at first sexual maturation, which may reflect the extent of undesirable genetic effects of exploitation (3.3.4).

Descriptor 4: All elements of the marine foodwebs, to the extent that they are known, occur at normal abundance and diversity and levels capable of ensuring the long term abundance of the species and the retention of their full reproductive capacity.

4.2. Proportion of selected species at the top of foodwebs

— cod (by weight; 4.2.1).

4.3. Abundance/distribution of key trophic groups/species

— Abundance trends of functionally important selected groups/species: ex. cod and sprat

(4.3.1).

Descriptor 5: Human-induced eutrophication is minimized, especially adverse effects thereof, such as losses in biodiversity, ecosystem degradation, harmful algal blooms and oxygen deficiency in bottom waters.

5.3. Indirect effects of nutrient enrichment

— Dissolved oxygen, i.e. changes due to increased organic matter decomposition and size of the area concerned (5.3.2).

Descriptor 7: Permanent alteration of hydrographical conditions does not adversely affect marine ecosystems.

7.2. Impact of permanent hydrographical changes

— Spatial extent of habitats affected by the permanent alteration (anoxic and hypoxic conditions at bottom, salinity; 7.2.1)

— Changes in habitats due to altered hydrographical conditions: changes in cod spatial distribution due to anoxic and hypoxic conditions at seabed (7.2.2).

18.4 Provide views on what good environmental status (GES) might be for those descriptors, including methods that could be used to determine status

Good environmental status is a broad and complicated subject that we can learn much about. In a far future we may have learned enough so that we are able to manage our seas into a state where GES is where we want it to be. Most certainly that will take a long time and much can be gained if we act before that, for instance we can

gain more knowledge in a process that aims to improve GES right now although we do not have all knowledge or all of us agree on what or how GES is reached and maintained.

If we want to make GES manageable in an effective way we need to concentrate on those variables that we can change today and are closest at hand. In order to determine and describe a GES scenario for the Baltic Sea, and to propose measures and assess the status of the environment according to the 11 descriptors provided through the Marine Strategy Framework Directive, it is important to understand that the changes undergone by the fish populations, which have had a big impact on the ecosystem, have mainly been caused by intensive fishery pressure (Cardinale and Svedäng, 2011). Additionally the measures related to the control and continuous assessment of the fishing efforts is probably the quickest accessible tool we have and a key factor in the achievement of the desired GES. Historical data show dramatic changes in both the spatial distribution and abundance of species, as well as in the size distribution of many of the species. Historical dataseries might provide a good clue for the establishment of health indices to be reached as a goal for a GES.

Using these historical series, a general objective might be phrased as the need to recover the status of fish populations to levels at earlier times. In a more specific way, the managers should work within a multistep process that will be flexible and mainly concern the species that are managed and evaluated by any of the current ICES workgroups.

The first line would have as a goal to achieve and maintain a certain abundance level of each species, in order to reach desired standards of biological diversity, as mentioned in the first of the 11 descriptors of the Marine Strategy Framework Directive. This index could be determined a priori, using the historical dataset to establish a "GES mean abundance index" for each species that would be a threshold for the minimum abundance of the species. The index could be defined as:

MAI = (max-abundance + min-abundance)/2

Here the max and min are taken from ICES publicized historical data for each species.

The second and third line would have as a target the achievement and maintenance of a certain age structure and spatial distribution pattern for each species. This would as well be determined a priori using historical datasets that would be studied for each species to determine when the spatial distribution and size structure of the population started a directional changing process. For instance GES size distribution models for each species should mirror those wider size distributions found before the start of the changing trend.

The assessment process of these GES MAI should be a dynamic one, and through continuous monitoring, values for each species should be revised to fit the target size distribution model, so that if a situation in which the GES MAI for a certain species was achieved, but not its size distribution model, a new, weighted GES MAI should be calculated to replace the original one aiming to better mirror all of the lines, abundance, age structure and spatial habitat distribution.

It is of key importance to understand that GES cannot be attained without a focus on modifying the current commercial fishing practices and allowances. Very little can be done in the specific case of the Baltic Sea through the modification of other environmental factors, so a set of measures restricting the fishing pressure might be the only

way to reach the status demanded by the 11 descriptors of the Marine Strategy Framework Directive.

Additionally to improve GES management tools are today available that currently is not being used mainly because of economical management reasons. One example is Multifrequency Acoustics, a tool that can add important information, but is not being used, in many situations due to that it is considered expensive. Although compared to survey costs it is a quite small expense, especially if the additional information achieved is considered. Other tools and data collecting procedures have similar more "short-sighted" economical problems.

18.4.1 Reference

Cardinale, M., Svedäng H. 2011. The beauty of simplicity in science: Baltic cod stock improves rapidly in a 'cod hostile' ecosystem state. Mar Ecol Prog Ser, Vol. 425: 297–301.

18.5 Take note of and comment on the Report of the Workshop on the Science for area-based management: Coastal and Marine Spatial Planning in Practice (WKCMSP)

WGBIFS considers important the use of spatial information in future work within ICES. The survey data collected under the coordination of the WGBIFS can serve a vast range of purposes enlighten by the SIASM.

The group stresses that the production and delivery of this information should be automated by ICES. For the BITS survey (Bottom Trawl Survey) the DATRAS database and the new ICES EcoSystemData could be used for this purpose for standardizing the procedures. For BIAS and BASS surveys (Acoustic Surveys), ICES is strongly recommended to create a database as platform for the analysis and delivery of such information

Relevant information that can be extracted by the surveys coordinated by WGBIFS:

BITS survey (demersal trawling)

- Maps of cod and flounder distribution and average size, total or by age. 1st and 4th quarter.
- Maps of prespawning cod and flounder distribution and average size. Catch combined with maturity stage information. 1st quarter.
- Maps of the distribution of other species caught in the trawls.
- Habitat mapping for cod (oxygen >1.5 ml/l, salinity at bottom). CTD measurements.

BIAS and BASS surveys (acoustic and pelagic trawling)

- Maps of sprat and herring distribution and average size at feeding period. Autumn.
- Maps of sprat distribution and average size at spawning time. Spring.
- Maps of the distribution of other species caught in the trawls.

18.6 Provide information that could be used in setting pressure indicators that would complement biodiversity indicators currently being developed by the Strategic Initiative on Biodiversity Advice and Science (SIBAS)

During the meeting of WGBIFS in 2010 study was initiated related to the biodiversity in the Baltic Sea based on the data of Baltic International Trawl Surveys (BITS). Sub-

group of WGBIFS members evaluated the usability of data stored in the DATRAS database for this issue.

The BITS manual describes all processes during the working up of the catch as well as the parameters which have to be sampled for the different species.

The international coordinated trawl surveys are directed to the demersal species i.e. cod and flounder and other flatfish in the Baltic Sea. Besides target species as mentioned above all other fish are analysed with lower intensity of recorded data to support ecosystem analyses. Length distribution should be recorded for all main fish species caught, at least for cod, flounder herring, sprat and flatfish. Age, sex, mass and maturity estimates are at least required for the main target species cod and flounder. However, same data should be sampled for herring, sprat and flatfish when capacities are available.

It was agreed by WG BIFS that participating countries submit all data in DATRAS exchange format to the ICES Secretariat in Copenhagen.

Data from 2006 to 2010 were used for the analyses. Inquiry to all participating countries however showed that in many cases data were submitted to ICES data centre for cod, flounder, herring and sprat. All sampled data were only submitted by Denmark, Germany and Sweden for the period 2006 to 2010. Poland submitted data of all species for both surveys in 2010. This means that information concerning the biodiversity of fish species is not available for large parts of the eastern Baltic Sea (ICES SD 26 and SD 28). Due to this lack of information further analyses for describing the biodiversity were stopped.

However, WGBIFS agreed that the availability of data in the DATRAS database of all species captured during the BITS with at least cpue (number of caught individuals per time) and the length frequency based on subsamples can improve the usability of the BITS in relation to the ecosystem analyses. Therefore, it is recommended that from quarter 4 BITS in 2011 onward all countries sample and submit data of all species sampled during the BITS.

Additional data related to all species captured during BITS are available in the national databases or on protocols. Table 18.6.1 summarizes the data available in the institutes. The group agreed that data stored in the national databases should be uploaded as fast as possible to make the information available for analyses of the biodiversity and studies related to the ecosystem approach.

Table 18.6.1. Beginning of the storage of all species information during BITS at different levels.

Country	Upload of all species sampled during BITS to DATRAS Yes / No	Storage of all species information from BITS in national database	Storage of all species information from BITS in protocols
Denmark	1991		
Estonia			
Germany	1991		
Latvia	2010 Q4	-	-
Lithuania	-	2004	
Poland	-	-	1996
Russia	-	-	1996
Sweden			

18.7 Identify spatially resolved data, for e.g. spawning grounds, fishery activity, habitats, etc.

During the meeting of WGBIFS a request from WKCATDAT/WGISUR concerning the evaluation of the prioritized catalogue of potential data needs for the EAFM (Ecosystem Approach to Fisheries Management was submitted. Unfortunately, the report of WGISUR was not available during the meeting. Therefore, this issue was postponed to the next meeting of WGBIFS. In addition, Latvia will prepare analyses of the hydro acoustic surveys according to the following issues and will present the results during the meeting of WGBIFS 2012.

- Data on distribution of sprat and herring separately for different age groups (t=0;1,t≥ 2);
- Data on spatial distribution of herring fishery for periods (months or seasons);
- Data on location of herring spawning grounds and nursery areas (such a data owns specialists from Lithuania);

The results can support the planning of further investigations for the development of rational fishery's methods, in order to avoid a negative impact on spawning grounds and nursery areas for juvenile fish.

19 Election of new Chair

The group elected Olavi Kaljuste from the Swedish Board of Fisheries Institute of Coastal Research as new Chair

20 References

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Annex 2: Agenda

Introduction

1) Welcome and introduction

2) Households remarks

3) Discussion and adoption of the agenda

4) Allocation of tasks between participants

5) Presentation of time schedule

Acoustic surveys and data

6) Combine and analyse the results of spring and autumn 2010 acoustic surveys and experiments and report to WGBFAS; (ToR a).

7) Update of BAD1 and FishFrame data. (ToR b).

8) Planning of acoustic surveys in second half of 2011 and 1st half of 2012 (ToR c). Sweden part of spring sprat survey?

9) Review and update the Baltic International Acoustic Survey (BIAS) manual; (ToR h).

10) Evaluation of the new results of uncertainty estimates of the BIAS abundance indices applying simulation model. (ToR l). (Working document from 2009 uploaded to SharePoint)

11) Discuss the descriptions and the documentation of various methods for weighting procedures when combining hauls in compilation of acoustic indices. (ToR k). (Working document from 2009 uploaded to SharePoint)

Bottom trawl surveys and data

12) Discuss the results from BITS surveys performed in autumn 2010 and spring 2011 (ToR d).

12½) Review of the upload and development status of DATRAS (and FishFrame; ToR j).

13) Review of new results on the vertical distribution of the cod during the BITS (ToR i).

14) Plan and decide on demersal trawl surveys and experiments to be conducted in autumn 2011 and spring 2012. (ToR e).

15) Review the results of the scrutinizing of the data from the Baltic region uploaded in DATRAS with special reference to the issue of correct species identification and consistency across countries (ToR m)

16) Prepare methods for delivery of additional information to WGBFAS in 2012 (ToR n).

17) Review and update the Baltic International Trawl Survey (BITS) manual. (ToR g). Correction of Russian vessel code and see rec. from PGCCDBS below.

18) Update and correction of the Tow Database (ToR f).

19) Status of standard survey reports.

20) Discuss the implementation of the stomach sampling program framed by WGSAM (External request from WKMSSPDF; Report uploaded to SharePoint).

21) Discuss the suggested new maturity scale for flounder (Outcome of WKMSSPDF; Report uploaded to SharePoint).

21½) Modification of bottom trawl survey standard gear. It is suggested to allow a more wear-resistant material to be used in the codend of the standard trawl (TV3). (Hanging issue from last year)

Final issues

22) Selection of new Chair and next meeting

Additional issues from external groups

From the SG of Marine strategy Framework Directive (MSFDSG), the following ToRs are added to all EGs during 2011:

23) Identify elements of the EGs work that may help determine status for the 11 Descriptors set out in the Commission Decision (available at http://eurlex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2010:232:0014:0024:EN:PDF;

24) Provide views on what good environmental status (GES) might be for those descriptors, including methods that could be used to determine status.

From SIASM, the following ToRs are added to all EGs for 2011:

25) Take note of and comment on the Report of the Workshop on the Science for area-based management: Coastal and Marine Spatial Planning in Practice (WKCMSP)

http://www.ices.dk/reports/SSGHIE/2011/WKCMSP11.pdf

26) Provide information that could be used in setting pressure indicators that would complement biodiversity indicators currently being developed by the Strategic Initiative on Biodiversity Advice and Science (SIBAS). Particular consideration should be given to assessing the impacts of very large renewable energy plans with a view to identifying/predicting potentially catastrophic outcomes.

27) Identify spatially resolved data, for e.g. spawning grounds, fishery activity, habitats, etc.

WGBIFS	SCICOM	PGCCDBS	PGCCDBS recommends that survey planning groups (WGBIFS, IBTSWG, WGBEAM) review the WKMSSPDF recommendation to 'put the content of a gonad under a microscope in case of disagreement or doubt on the maturity stage of a fish (if time allows during a survey)', and include it in sampling manuals if appropriate.
WGBIFS		WGBFAS	It was found that the discrepancies in 2000, compared to old indices could be caused by inconsistent coverage of SD 29N and SD29S. WGBIFS is recommended to revisit the area coverage of the BIAS survey and decide if the area coverage should be changed or corrected by recalculations. It would be useful with a recalculation of the time-series comparing inclusion/exclusion of area 29N.

Annex 3: WGBIFS terms of reference for the next meeting

The **Baltic International Fish Survey Working Group** (WGBIFS) chaired by Olavi Kaljuste*, Sweden, will meet in Finland from 26–31 March 2012 to:

a) Combine and analyse the results of spring and autumn 2011 acoustic surveys and experiments and report to WGBFAS;

b) Update the hydro acoustic databases BAD1 and FishFrame;

c) Plan and decide on acoustic surveys and experiments to be conducted in autumn 2012 and spring 2013;

d) Discuss the results from BITS surveys performed in autumn 2011 and spring 2012 and review the upload and development status of DATRAS;

e) Plan and decide on demersal trawl surveys and experiments to be conducted in autumn 2011 and spring 2012;

f) Update and correct the Tow Database;

g) Review and update the Baltic International Trawl Survey (BITS) manual;

h) Review and update the Baltic International Acoustic Survey (BIAS) manual;

i) review of new results on the vertical distribution of the cod during the BITS;

j) Discuss the indices of acoustic surveys based on different methods for combining the data of fishing stations in compilation of acoustic indices;

k) Evaluating the new results of uncertainty estimates of the BIAS abundance indices applying simulation model;

l) Evaluation of the characteristics of TVL and TVS standard gears used in BITS based on the details gear check according to the BITS manual;

m) Evaluation of the BITS data stored in DATRAS for describing biodiversity in the Baltic Sea covers by BITS in spring and autumn.

WGBIFS will report by 15 May 2012 to the attention of the SCICOM.

Supporting Information

Priority	The scientific surveys coordinated by this Group provide major fishery-independent tuning information for the assessment of several fish stocks in the Baltic area. Consequently, these activities are considered to have a very high priority.
Scientific justification	The main objective of WGBIFS is to coordinate and standardize national research surveys in the Baltic for the benefit of accurate resource assessment of Baltic and Kattegat fish stocks. From 1996 to 2003 attention has been put on evaluations of traditional surveys, introduction of survey manuals and consideration of sampling design and standard gears as well as coordinated data exchange format. Since 1995 activities have been devoted to coordinate international coordinated demersal trawl surveys using the new standard gear TV3. Experiments have revealed the presence of a significant number of cod in the pelagic waters above the reach of the bottom-trawls particularly in areas with oxygen deficiency may bias the stock indices calculated. The issue will be further investigated in the years ahead.

Resource requirements	The research programmes which provide the main input to this group are already underway, and resources are already committed. The additional resource required to undertake additional activities in the framework of this group is negligible.
Participants	The Group is normally attended by some 15–20 members and guests.
Secretariat facilities	None.
Financial	No financial implications.

Annex 4: Recommendations

Recommendation	For follow up by:
1. WGBIFS agreed that the structure of the BIAS database must be adapted to incorporate the estimates of two herring stocks ion one subdivision. A proposal concerning the change of the structure of BIAS should be presented during the next WGBIFS based on a discussion of a subgroup. The discussion will be led by Uwe Böttcher.	WGBIFS
2. WGBIFS proposed that the proportions of WBSS in SD 25 and SD 26 during BIAS should be evaluated based on the available data from the BIAS by means of the presented stock separation function. The results should be presented during the next meeting to assess the importance of mixing of both stocks during BIAS in these subdivisions.	WGBIFS
3. WGBIFS recommends that Sweden will prepare RV "Argos" to be in workable condition for the 2011 BIAS survey, or present an alternative vessel before June.	WGBIFS
4. WGBIFS recommends Sweden to advocate that in 2012 Sweden will start participating to BASS survey covering at least Subdivision 27.	WGBIFS
5. WGBIFS recommends that Russia participates in BASS survey covering the SE parts of SD 26. WGBIFS recommends that in cooperation with the Russian GosNIORH the BIAS area was extend to the Russian EEZ in Subdivision 32	WGBIFS
6. WGBIFS recommends that all BITS standard gear (TV3-520 # and TV3-930 #) are detailed measured onward at least once a year according to the requirements of the BITS manual. The results will be presented at the meeting of WGBIFS.	WGBIFS
7. WGBIFS strongly recommend to ICES that extended capacities will be made available for updating and finalizing the acoustic database which is a part of the FISHFRAME database	ICES
8. The group proposes the change of the DATRAS system related at least for the BITS in such a way that the national maturity codes can be used and that the transfer of the national code into the current international code is realized by the DATAS system based on the national transfer keys given in the BITS manual. After the implementation of the new version upload of the data will be started by the different countries.	ICES
9. The WGBIFS recommended to WGSAM that clear decisions are required related to the proposed procedure of stomach sampling and the analyses of the stomachs until August 2011 to start with the sampling during the BITS in November 2011.	WGSAM
10. WGBIFS recommends that the BIAS-dataset including the data of 2010 can be used in the assessment of the herring stocks in the Baltic Sea with the restriction that the following years are excluded from the index series: 1993, 1995 and 1997.	WGBFAS
11. WGBIFS recommends that the new BIAS-dataset can be used including the data of 2010 in the as-sessment of the sprat stock in the Baltic Sea with the restriction that the following years are excluded from the index series: 1993, 1995 and 1997.	WGBFAS
12. WGBIFS recommends that the BASS-dataset with new calculated values of 2009 and the data of 2010 can be used in the assessment of the sprat stock in the Baltic Sea	WGBFAS

Annex 5: Whole time-series for tuning indices

Table 1. Autumn tuning fleet index for Central Baltic Herring in SD 25–29.

year	total	age 1	age 2	age 3	age 4	age 5	age 6	age 7	age 8+
1991	58981	6739	19731	11477	4029	9728	2508	2295	2474
1992	46617	7445	9217	13327	7256	4217	2346	1595	1214
*1993	29157	727	4661	7008	8047	3697	2107	1117	1793
1994	58093	3939	11992	20607	11770	5804	2158	965	858
*1995	28519	4693	2279	4560	6012	5385	3214	1532	845
1996	44521	4000	13914	10105	7435	4631	2419	1213	803
*1997	15770	1452	1561	5314	3318	2214	1118	475	318
1998	25338	4312	2199	6717	6643	2651	1558	816	443
1999	20757	1762	4772	3233	4293	3740	1461	852	643
2000	41109	10168	2571	9931	4855	5226	3262	3022	2073
2001	24482	4053	8242	3308	4704	1583	1251	869	473
2002	20977	2699	4298	6581	2883	2386	895	763	471
2003	49940	16868	9204	10887	6819	2378	1812	778	1193
2004	35018	4942	13388	6905	4774	2539	1163	613	694
2005	42352	1929	8302	15543	7243	4455	2604	1121	1156
2006	62947	7346	8107	12793	21290	7386	3095	1712	1219
2007	30020	5424	6657	3025	4276	7205	1724	892	816
2008	34933	6756	6776	7615	3677	4989	3478	843	798
2009	39243	6429	12300	6958	5658	2107	3026	2138	627
2010	38706	3855	8479	12339	5139	3600	1721	1939	1634

*** In the years 1993, 1997 and 1995 the coverage was very poor. It is recommended that these data should not be used.**

Table 2. Autumn recruitment index for Central Baltic Herring in SD 25–29.

YEAR	age 0
1991	10467
1992	1297
1993	589
1994	4916
1995	1214
1996	312
1997	2363
1998	480
1999	2485
2000	1241
2001	1794
2002	11289
2003	7308
2004	1546
2005	4480
2006	1611
2007	11456
2008	7870
2009	3262
2010	1142

*** In the years 1993, 1997 and 1995 the coverage was very poor. It is recommended that these data should not be used.**

Table 3. Autumn tuning fleet index for Baltic Sprat in SD 24–29.

year	total	age 1	age 2	age 3	age 4	age 5	age 6	age 7	age 8+
1991	150054	46989	40690	43970	2637	8953	1806	1936	3072
1992	104248	37345	27356	24438	9433	1945	2452	717	563
1993	101924	31432	32078	16755	13164	4754	1005	1520	1215
1994	138642	12557	45137	43656	17478	12051	5149	1034	1579
1995	238711	137383	16894	40591	22762	11648	5789	2194	1451
1996	274611	71379	133914	21098	23648	12968	6493	3770	1341
1997	147144	9431	58497	57746	8766	7888	2659	1717	440
1998	234015	102572	22213	56369	37065	8201	4856	1675	1064
1999	198198	4904	91316	16083	36201	39247	5296	3364	1787
2000	156948	59895	5321	51166	5753	14282	16174	1599	2760
2001	109135	12224	36403	6973	30796	4064	9749	6477	2449
2002	121626	31811	14641	37845	5831	19258	2656	5167	4419
2003	216860	100928	32803	24306	23675	8099	13435	4867	8747
2004	203288	121935	47843	11895	8053	4995	2472	2454	3640
2005	207222	7200	126586	49268	10179	5197	3051	2392	3348
2006	206196	37280	12054	105751	33052	8168	4692	2167	3031
2007	122749	52489	22128	8331	26627	9980	1105	479	1610
2008	129253	29422	45772	20500	5407	19177	5765	1267	1942
2009	147439	78186	25771	21329	6728	4751	7197	2070	1407
2010	89272	11769	52258	10916	6781	1737	1995	2621	1195

*** In the years 1993, 1997 and 1995 the coverage was very poor. It is recommended that these data should not be used.**

Table 4. Autumn recruitment index for sprat in SD 26 + 28 from BIAS.

YEAR	SummevonN_corr
1993	2221
1994	38555
1995	27810
1996	3287
1997	39334
1998	682
1999	22249
2000	3466
2001	6410
2002	31780
2003	61462
2004	2074
2005	18202
2006	23831
2007	3144
2008	53263
2009	6363
2010	8669

Table 5. Spring tuning fleet index for sprat in SD 24, 25, 26 and 28.

year	total	age 1	age 2	age 3	age 4	age 5	age 6	age 7	age 8+
2001	111233	8322	36412	13010	37889	5449	4804	4717	630
2002	126777	27439	19133	37184	19104	14974	2547	3711	2685
2003	86865	27313	16662	8514	15855	5668	7364	1720	3769
2004	266052	139812	68118	16020	11115	13050	3296	8068	6572
2005	137452	4402	91314	23823	7313	3593	2827	1873	2308
2006	133843	13783	8242	78851	21526	5847	2008	1570	2016
2007	136190	53027	29438	6506	36976	7692	1292	540	720
2008	104881	9163	41157	20519	5706	21703	4320	777	1538
2009	142986	40705	27209	36819	10775	6506	14494	5469	1009
2010	114559	9432	59855	15427	16098	5129	1682	5628	1308

Table 6. Autumn tuning fleet index for Central Baltic Herring in SD 25–29 (data from SD 29N are excluded).

year	total	age 1	age 2	age 3	age 4	age 5	age 6	age 7	age 8+
1991	50 953	5 740	16 984	9 175	3 834	8 619	2 172	2 095	2 334
1992	46 617	7 445	9 217	13 327	7 256	4 217	2 346	1 595	1 214
*1993	29 157	727	4 661	7 008	8 047	3 697	2 107	1 117	1 793
1994	58 093	3 939	11 992	20 607	11 770	5 804	2 158	965	858
*1995	28 519	4 693	2 279	4 560	6 012	5 385	3 214	1 532	845
1996	44 521	4 000	13 914	10 105	7 435	4 631	2 419	1 213	803
*1997	15 770	1 452	1 561	5 314	3 318	2 214	1 118	475	318
1998	25 338	4 312	2 199	6 717	6 643	2 651	1 558	816	443
1999	19 992	1 721	4 440	3 064	4 165	3 699	1 441	845	619
2000	17 856	2 788	1 476	5 144	1 874	2 754	2 231	962	628
2001	24 482	4 053	8 242	3 308	4 704	1 583	1 251	869	473
2002	20 977	2 699	4 298	6 581	2 883	2 386	895	763	471
2003	49 940	16 868	9 204	10 887	6 819	2 378	1 812	778	1 193
2004	35 018	4 942	13 388	6 905	4 774	2 539	1 163	613	694
2005	38 901	1 559	7 563	14 078	6 858	4 187	2 451	1 061	1 144
2006	58 868	6 351	6 981	11 794	20 857	7 006	3 035	1 680	1 165
2007	22 819	3 405	4 696	2 378	3 759	5 664	1 430	783	705
2008	30 106	5 384	5 835	6 269	3 316	4 488	3 249	810	755
2009	30 309	2 385	9 517	5 964	5 019	1 974	2 826	2 035	588
2010	31 900	2 061	6 481	10 518	4 816	3 326	1 610	1 760	1 326

*** In the years 1993, 1997 and 1995 the coverage was very poor. It is recommended that these data should not be used.**

Annex 6: Standard Reports of BITS in quarter 4 in 2010 and quarter 1 in 2011

Extended cruise reports of BITS with more detailed descriptions are summarized in Annex 7.

BITS in quarter 4 in 2010

Nation:	Estonia	Vessel:	CEV
Survey:	BITS10IVQRT	Dates:	6–10 December 2010

Cruise	
Gear details:	The small (530) standard TV3 trawl was used. The construction of the trawl follows the specifications in the manual.
Notes from survey (e.g. problems, additional work etc.):	The survey was carried out as planned. Weather conditions were good and no major problems were encountered during the survey. Total 10 hauls were performed.

ICES Subdivisions	Gear (TVL,TVS)	Depth strata (1–6)	Number of hauls planed	Number of valid hauls realized using "Standard" ground gear	Number of valid hauls realized using Rock-hoppers	Number of assumed zero-catch hauls	Number of replacement hauls	Number of invalid hauls	% stations fished
28	TVS	40–59m	1	1	0	0	0	0	100
28	TVS	60–79m	2	2	0	0	0	0	100
28	TVS	80–99m	1	1	0	0	0	1	100
29	TVS	20–39m	2	2	0	0	0	0	100
29	TVS	40–59m	2	2	0	0	0	0	100
29	TVS	60–79m	1	1	0	0	0	0	100
29	TVS	80–99m	1	1	0	0	0	0	100

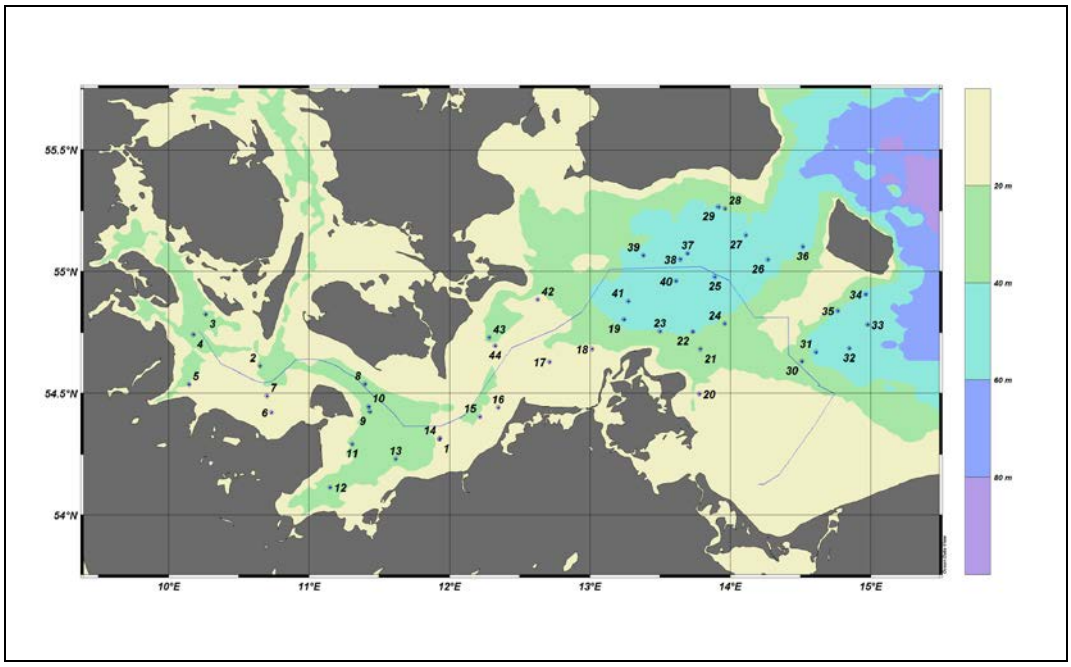
Number of biological samples (maturity and age material, *maturity only):		
Species	Age	Length
Gadus morhua	131	131
Clupea harengus	332	1920
Platichthys flesus	411	932

Nation:	Germany	Vessel:	RV "Solea"
Survey:	BITS Q4 2010	Dates:	28/10 - 8/11 – 15–19/11/2010

Cruise	
Gear details:	The small (520#) standard TV3 trawl was used. All Tow Database stations are fished without rock-hoppers. The construction of the trawl follows the specifications in the manual.
Notes from survey (e.g. problems, additional work etc.):	Severe weather conditions and technical problems caused an unusual large number of interruptions. Thanks to an extension of the journey, about 80% of the survey's programme could still be performed. Total 44 hauls in 57 stations were performed. Two stations were on rocky bottom, so they weren't performed. We performed two additional hauls near of this.
Aditional comments:	

ICES Sub Divisions	Gear (TVL, TVS)	Depth strata (2–6)	Number of hauls planed	Number of valid hauls realized using "Standard" ground gear	Number of valid hauls realized using Rock-hoppers	Number of assumed zero-catch hauls	Number of replace-ment hauls	Number of invalid hauls	% stations fished
22	TVS	10–19 m	2	2			1	1	100
22	TVS	20–29 m	12	12			-	-	100
24	TVS	10–19 m	5	2			-	-	40
24	TVS	20–29 m	8	6			1	-	75
24	TVS	30–39 m	7	4			1	-	57
24	TVS	40–49 m	17	13			-	-	76
24	TVS	50–59 m	6	5			-	-	83

Number of biological samples (maturity and age material, *maturity only):		
Species	Length	Age
Gadus morhua	9953	893
Platichthys flesus	3146	759
Limanda limanda	5513	775
Pleuronectes platessa	3146	907
Psetta maxima	174	174
Scophthalmus rhombus	11	18
Clupea harengus	4127	-
Sprattus sprattus	3567	-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Nation:	Latvia	Vessel:	RV "Baltica"
Survey:	BITS Q4 2010	Dates:	04–13/12/2010

Cruise	
Gear details:	The big (930#) standard TV3 trawl with rock-hoppers was used. The construction of the trawl follows the specifications in the manual.
Notes from survey (e.g. problems, additional work etc.):	Due to bad weather conditions during the survey 20 (80%) of planed tracks were realized only
Aditional comments:	

ICES Sub-Divisions	Gear (TVL, TVS)	Depth strata (2–6)	Number of hauls planed	Number of valid hauls realized using "Standard" ground gear	Number of valid hauls realized using Rock-hoppers	Number of assumed zero-catch hauls	Number of replace-ment hauls	Number of invalid hauls	% stations fished
25	TVL	3	3						
26	TVL	3	4		2				50
26	TVL	4	2		2	1			100
26	TVL	5	1		1				100
26	TVL	6	2		2	2			100
28	TVL	2	2		2				100
28	TVL	3	2		2				100
28	TVL	4	7		7				100
28	TVL	5	2		2	2			100

Number of biological samples (maturity and age material, *maturity only):		
Species	**Length**	**Age**
Gadus morhua	1484	302
Platichthys flesus	2345	238
Clupea harengus	1832	
Sprattus sprattus	1731	
Psetta maxima	10	
Pleuronectes platessa	3	
Zoarces viviparus	5	
Triglopsis quadricornis	1	
Cyclopterus lumpus	15	
Engraulis encrasicholus	1	
Pomatoschistus minutus	1	
Myoxocephalus scorpius	66	
Osmerus eperlanus	76	
Gasterosteus aculeatus	2	

Nation:	Lithuania	Vessel:	RV "DARIUS"
Survey:	BITS10IVQ	Dates:	2010.12.08–12.15

Cruise	
Gear details:	The small (530) standard TV3 trawl was used. The construction of the trawl follows the specifications in the manual.
Notes from survey (e.g. problems, additional work etc.):	7 haul stations out of 8 were trawled because the trawl was damaged at one station. The survey was separated in to difrents days 8'th and 15'th of december because trawl was damage and later the wether was very bad.
Additional comments:	

ICES Sub-Divisions	Gear (TVL,TVS)	Depth strata (2 -6)	Number of hauls planed	Number of valid hauls realized using "Standard" ground gear	Number of valid hauls realized using Rock-hoppers	Number of assumed zero-catch hauls	Number of replacement hauls	Number of invalid hauls	% stations fished
26	TVS	20–39 m	2	2			-	0	100
26	TVS	40–59 m	2	2					100
26	TVS	60–79 m	3	3			-	-	100
26	TVS	80–99 m	1	0				1	0

Number of biological samples (maturity and age material, *maturity only):			
Species	Length	Age	Maturity
Gadus morhua	1586	417	-
Platichthys flesus	738	252	252
Psetta maxima	3	3	
Clupea harengus	1041	-	-

Nation:	POLAND	Vessel:	RV "BALTICA"
Survey:	16/2010/MIR–NP/G3/BITS	Dates:	18–29.11.2010

Cruise	BITS-Q4/2010
Gear details:	Trawling was done with the standard rigging ground trawl type TV-3#930 (large version of trawl without bobbins and additional chains connected with footrope), with 10 mm mesh bar length in the codend. A standard vertical sounder monitored the trawling depth. Usually a 5÷7 m vertical net opening was achieved.
Notes from survey (e.g. problems, additional work etc.):	According to WGBIFS plans, the Polish vessel was recommended to cover in November 2010, parts of ICES Subdivisions 25 and 26, with respectively - 19 and 10 randomly selected bottom control-hauls. The RV "Baltica" realized totally 31 catch-stations, including primary not selected two hauls in the Gulf of Gdańsk.All control hauls designated to the RV "Baltica" were realized and can be accepted as representative from a technical point of view. The trawling position of the haul No 25042 was modified due to a rocky bottom found at original haul location and a new haul's coordinates should be incorporated to the ICES Tow-Database.
Aditional comments:	

ICES Sub-Divisions	Gear (TVL, TVS)	Depth strata (1–6)	Number of hauls planed	Number of valid hauls realized using "Standard" ground gear	Number of valid hauls realized using Rock-hoppers	Number of assumed zero-catch hauls	Number of replace-ment hauls	Number of invalid hauls	% stations fished
25	TVL	1	1	1			-	-	100
25	TVL	2	14	14			-	-	100
25	TVL	3	4	4			1	-	100
26	TVL	1	1	1			-	-	100
26	TVL	2	5	5			-	-	100
26	TVL	3	2	2			-	-	100
26	TVL	4	1	1			-	-	100
26	TVL	5	1	1			-	-	100

Number of biological samples (maturity and age material, *maturity only):		
Species	**Length**	**Age**
Gadus morhua	6657	330
Platichthys flesus	1597	257
Pleuronectes platessa	134	93
Psetta maxima	20	20
Clupea harengus	4134	551
Sprattus sprattus	4353	380

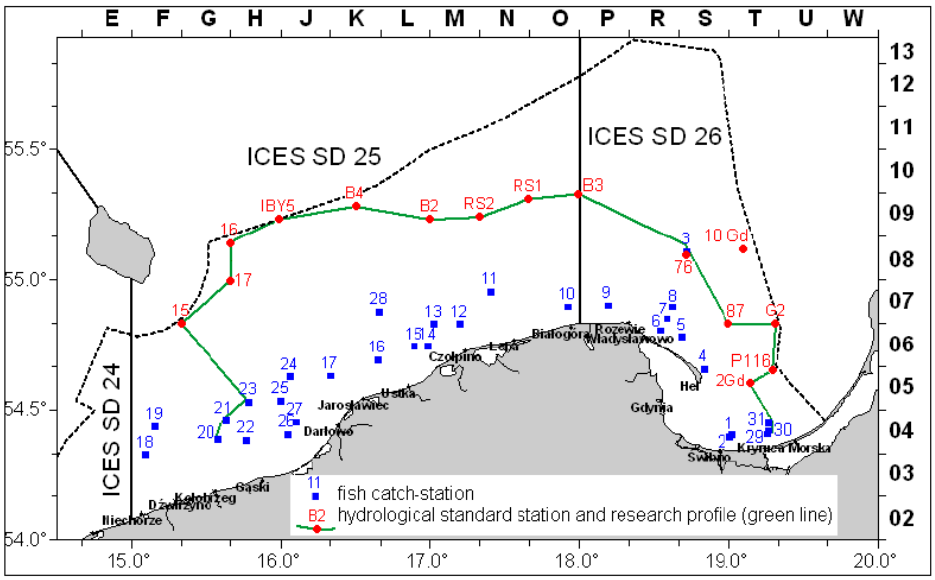


Figure 1. Location of the fish control-catches, hydrological stations (both, the standard stations and connected with hauls starting position) and hydrological research profile determined within the Polish EEZ (the r.v. "Baltica" BITS-Q4 survey; November 2010).

Nation:	Russia	Vessel:	RV "Atlantida"
Survey:	BITS 2010, quarter IV	Dates:	17–25 November 2010

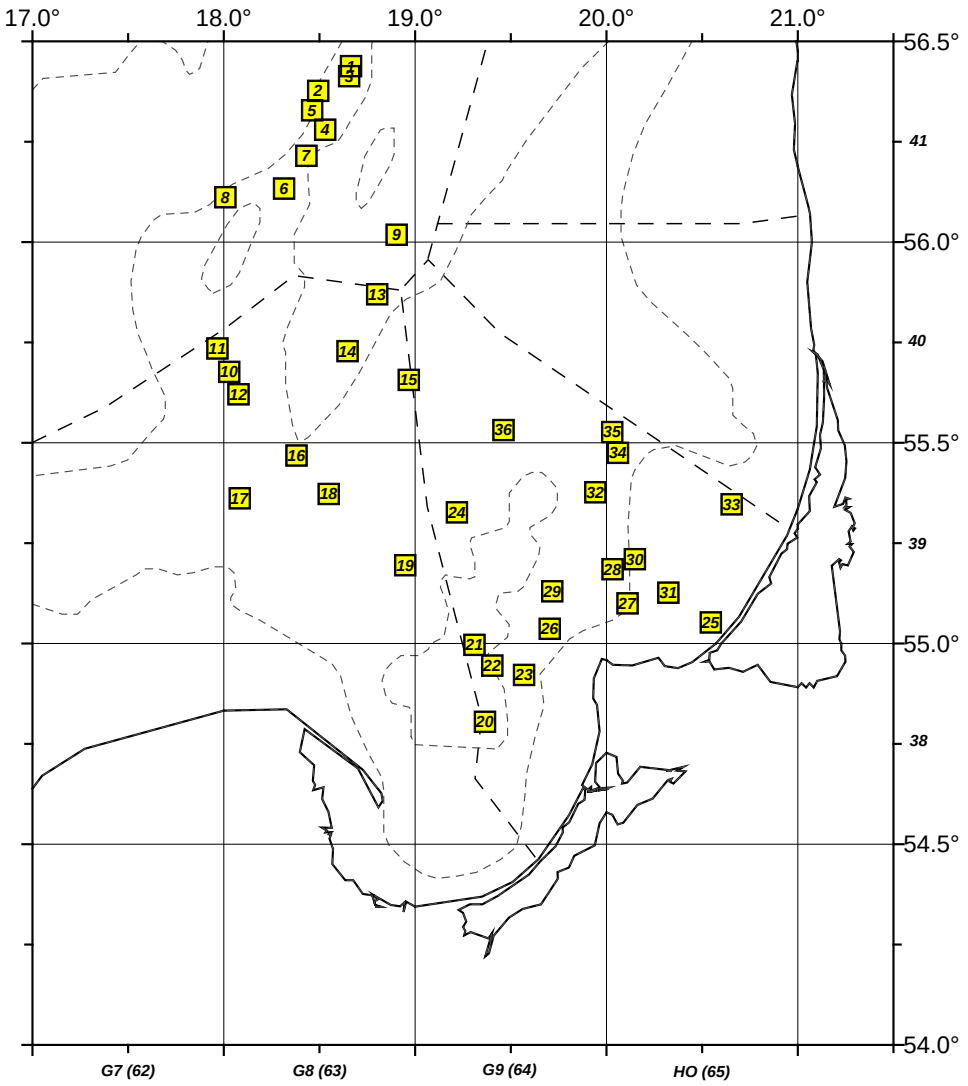
Cruise	
Gear details:	The large standard TV3 trawl is used. Following the recommendations in the TOW database stations are fished either without rock-hoppers. The construction of the trawl follows the specifications in the manual.
Notes from survey (e.g. problems, additional work etc.):	No problems were experienced during the survey. 1). Low content of oxygen in one trawl station 26109 (depth 95 m) – therefore hydrological researches have been made only. Trawl station 26109 (depth 95 m) replaced on trawl station 26151 (depth 86 m). 2). Trawl stations 26017 (depth 46 m), 26127 (depth 30 m), 26146 (depth 21 m) break down – military zone. Trawl station 26017 (depth 46 m) replaced on trawl station 26023 (depth 42 m).Trawl station 26127 (depth 30 m) replaced on trawl station 26128 (depth 25 m). Trawl station 26146 (depth 21 m) is not performed. 3). Trawl station 26036 (depth 66 m) replaced on trawl station 26042 (depth 65 m).
Additional comments:	The national scientific program causes performance of trawl stations 26039 (depth 73 m), 26107 (depth 86 m), 26111 (depth 87 m), 26097 (depth 82 m), 26092 (depth 81 m). These trawl stations have been made in addition to the planned BITS stations. Should be excluded trawl stations 26017 (depth 46 m), 26127 (depth 30 m) and 26146 (depth 21 m) from the Tow Database - military zone.

Stations fished

ICES Sub-Divisions	Gear (TVL, TVS)	Depth strata (1 -6)	Number of hauls planed	Number of valid hauls realized using "Standard" ground gear	Number of valid hauls realised using Rock-hoppers	Number of assumed zero-catch hauls	Number of replacement hauls	Number of invalid hauls	% stations fished
26	TVL	2	3	2			1		67
26	TVL	3	3	3			1		100
26	TVL	4	2	3			1		150
26	TVL	5	4	8			1		200
26	TVL	6	2	2					100

Number of biological samples (maturity and age material, *maturity only):			
Species	**Length**	**Maturity**	**Age (otoliths)**
Clupea harengus	3345	421	421
Gadus morhua	6941	1406	716
Platichthys flesus	1859	660	352
Psetta maxima	15	15	15
Sprattus sprattus	400	101	101

Other species may need to be added for your survey.



Trawl positions for RV "ATLANTNIRO" in February-March 2010.

Nation:	Sweden	Vessel:	RV "Argos"
Survey:	BITS 2010, quarter 4	Dates:	15 - 26 November

Cruise	
Gear details:	Sweden uses the standard TV-3 trawl. No tows are done with the rockhopper groundgear on harder ground stations. The trawl construction is according to the specifications in the BIFS manual.
Notes from survey (e.g. problems, additional work etc.):	29 haul stations out of the 31 allocated were trawled because of bad weather condition.

ICES Sub-Divisions	Gear (TVL, TVS)	Depth strata (1 -6)	Number of hauls planed	Number of valid hauls realised using "Standard" ground gear	Number of valid hauls realised using Rock-hoppers	Number of assumed zero-catch hauls	Number of replacement hauls	Number of invalid hauls	% stations fished
25	TV3	2	1	1					100
		3	7	7					100
		4	1	1					100
27	TV3	3	2	2					100
		4	4	3					75
		5	1	1		1			100
		6	3	3		3			100
28	TV3	2	1	1					100
		3	5	4					80
		4	4	4			2	1	100
		5	2	2		1			100

Number of biological samples (maturity and age material, *maturity only):			
Species	Age (otoliths)	Length	Maturity
Gadus morhua	676	5441	647
Clupea harengus		6123	
Sprattus sprattus		1806	
Platichthys flesus	1011	5863	1011

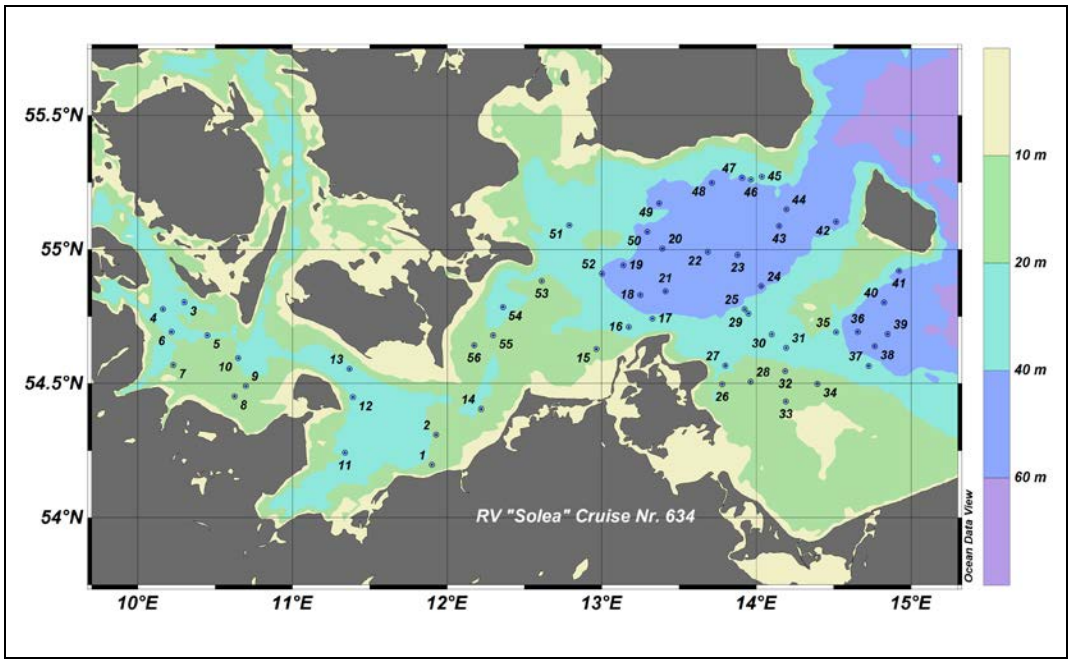
BITS in quarter 1 in 2011

Nation:	Germany	Vessel:	RV "Solea"
Survey:	BITS Q1 2011	Dates:	09/02– 26/02/2011

Cruise	
Gear details:	The small (520#) standard TV3 trawl was used. All Tow Database stations are fished without rock-hoppers. The construction of the trawl follows the specifications in the manual.
Notes from survey (e.g. problems, additional work etc.):	Two stations were on rocky bottom, so they weren't performed. We performed two additional hauls near of this. Total 56 hauls in 56 stations were performed.
Aditional comments:	

ICES Sub-Divisions	Gear (TVL, TVS)	Depth strata (2–6)	Number of hauls planed	Number of valid hauls realized using "Standard" ground gear	Number of valid hauls realized using Rock-hoppers	Number of assumed zero-catch hauls	Number of replace-ment hauls	Number of invalid hauls	% stations fished
22	TVS	10–19 m	0	0			-	-	-
22	TVS	20–29 m	13	13			4	-	100
24	TVS	10–19 m	7	7			-	-	100
24	TVS	20–29 m	8	8			-	-	100
24	TVS	30–39 m	4	4			1	-	100
24	TVS	40–49 m	19	19			1	-	100
24	TVS	50–59 m	5	5			1	-	100

Number of biological samples (maturity and age material, *maturity only):		
Species	**Length**	**Age**
Gadus morhua	8936	1292
Platichthys flesus	3281	735
Limanda limanda	2522	630
Pleuronectes platessa	2821	774
Psetta maxima	79	79
Scophthalmus rhombus	17	17
Clupea harengus	8708	-
Sprattus sprattus	4666	-


55.5°N
55°N
54.5°N
54°N
10°E
11°E
12°E
13°E
14°E
15°E
RV "Solea" Cruise Nr. 634
Ocean Data View
10 m
20 m
40 m
60 m

Nation:	Latvia	Vessel:	RV "Baltica"
Survey:	BITS Q1 2011	Dates:	07–15/03/2011

Cruise	
Gear details:	The big (930#) standard TV3 trawl with rock-hoppers was used. The construction of the trawl follows the specifications in the manual.
Notes from survey (e.g. problems, additional work etc.):	Due to unsafe ground, haul no 28024 was replaced by new track. During the survey 5 additional trawls were made in SD 26.
Aditional comments:	

ICES Sub-Divisions	Gear (TVL, TVS)	Depth strata (2–6)	Number of hauls planed	Number of valid hauls realized using "Standard" ground gear	Number of valid hauls realized using Rock-hoppers	Number of assumed zero-catch hauls	Number of replace-ment hauls	Number of invalid hauls	% stations fished
26	TVL	4	2		7				100
26	TVL	5	1		1				100
26	TVL	6	2		2	2			100
28	TVL	2	4		4				100
28	TVL	3	5		5				100
28	TVL	4	8		8				100
28	TVL	5	3		3	2	1		100

Number of biological samples (maturity and age material, *maturity only):		
Species	Length	Age
Gadus morhua	727	344
Platichthys flesus	3413	272
Clupea harengus	2819	
Sprattus sprattus	1333	
Psetta maxima	9	
Pleuronectes platessa	2	
Zoarces viviparus	182	
Triglopsis quadricornis	3	
Cyclopterus lumpus	127	
Twite Shad	4	
Pomatoschistus minutus	1	
Myoxocephalus scorpius	427	
Osmerus eperlanus	275	
Gasterosteus aculeatus	49	
Gasterosteus pungitius	2	

Nation:	Lithuania	Vessel:	RV "DARIUS"
Survey:	BITS11IQ	Dates:	2011.03.19–03.20

Cruise	
Gear details:	The small (530) standard TV3 trawl was used. The construction of the trawl follows the specifications in the manual.
Notes from survey (e.g. problems, additional work etc.):	8 haul stations out of 8 were trawled. The survay was planed in fabruary, but all trawling zone was ice closed until 10'th of march. From 11 to 19 of march was very strong wind.
Additional comments:	

ICES Sub-Divisions	Gear (TVL, TVS)	Depth strata (2 -6)	Number of hauls planed	Number of valid hauls realised using "Standard" ground gear	Number of valid hauls realised using Rock-hoppers	Number of assumed zero-catch hauls	Number of replacement hauls	Number of invalid hauls	% stations fished
26	TVS	40–59 m	2	2					100
26	TVS	60–79 m	6	6			-	-	100

Number of biological samples (maturity and age material, *maturity only):			
Species	**Length**	**Age**	**Maturity**
Gadus morhua	550	434	-
Platichthys flesus	341	252	341
Psetta maxima	3	3	-
Clupea harengus	1505	-	-
Sprattus sprattus	1656	-	-
Myoxocephalus scorpius	9	-	-
Cyclopterus lumpus	2		-
Osmerus eperlanus	16	-	-

Nation:	POLAND	Vessel:	RV "BALTICA"
Survey:	3/2011/MIR	Dates:	14/02– 01/03/2011

Cruise	BITS Q1 2011
Gear details:	Trawling was done with the standard rigging ground trawl type TV-3#930 (large version of trawl without bobbins and additional chains connected with footrope), with 10 mm mesh bar length in the codend. A standard vertical sounder monitored the trawling depth. Usually a 5÷7 m vertical net opening was achieved.
Notes from survey (e.g. problems, additional work etc.):	According to WGBIFS plans, the Polish vessel was recommended to cover in February-March 2011, parts of ICES Subdivisions 25 and 26, with respectively - 26 and 13 randomly selected bottom control-hauls. The RV "Baltica" realized totally of 46 catch-stations, including seven primary not selected hauls in the Gdańsk Basin. All control-hauls designated to the RV "Baltica" were realized and can be accepted as representative from a technical point of view. Due to obstacles on the ground, hauls Nos. 25394 and 26183 were shortened to 10 and 5 minutes, respectively.
Aditional comments:	

ICES Sub-Divisions	Gear (TVL, TVS)	Depth strata (1–6)	Number of hauls planed	Number of valid hauls realized using "Standard" ground gear	Number of valid hauls realized using Rock-hoppers	Number of assumed zero-catch hauls	Number of replace-ment hauls	Number of invalid hauls	% stations fished
25	TVL	1	1	1			-	-	100
25	TVL	2	11	11			-	-	100
25	TVL	3	8	8			-	-	100
25	TVL	4	5	5			-	-	100
25	TVL	5	1	1			-	-	100
26	TVL	1	1	1			-	-	100
26	TVL	2	5	5			-	-	100
26	TVL	3	2	2			-	-	100
26	TVL	4	3	3			-	-	100
26	TVL	5	2	2			-	-	100

Number of biological samples (maturity and age material, *maturity only):		
Species	**Length**	**Age**
Gadus morhua	9965	495
Platichthys flesus	1495	355
Pleuronectes platessa	422	160
Clupea harengus	6086	538
Sprattus sprattus	5799	554

Nation:	Russia	Vessel:	RV "Atlantida"
Survey:	56	Dates:	10 – 31 March 2011

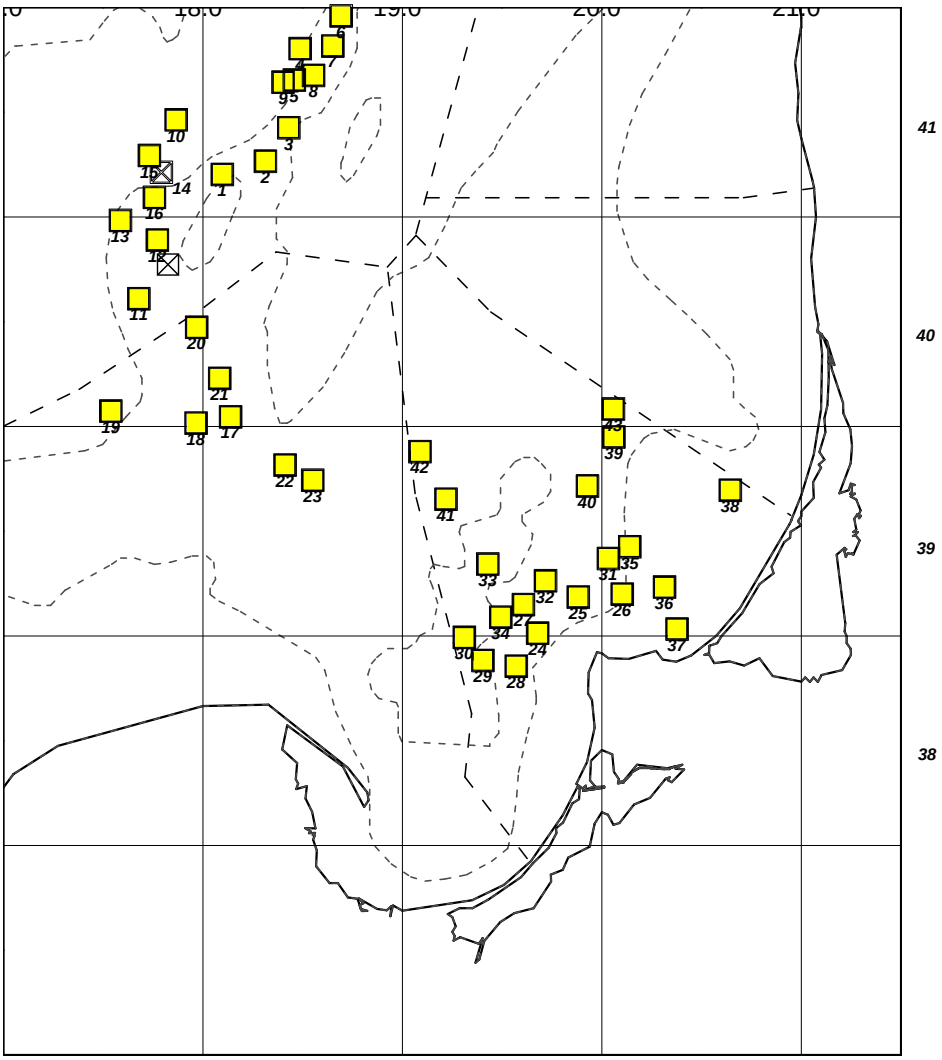
Cruise	
Gear details:	The large standard TV3 trawl is used. Following the recommendations in the TOW database stations are fished either without rock-hoppers. The construction of the trawl follows the specifications in the manual.
Notes from survey (e.g. problems, additional work etc.):	No problems were experienced during the survey. Nine subsidiary trawl stations and four hauls originally allocated to Sweden have been made. Low content of oxygen in one trawl station 26221 (depth 108 m) – therefore hydrological researches have been made only.
Additional comments:	The national scientific program causes performance of trawl stations 26050, 26104 – Poland; 26039, 26022, 26148, 26092, 26147, 26048, 26118 – Russia. These trawl stations have been made in addition to the planned BITS stations. Also four additional trawl stations in Sweden were made: 26225, 25159, 25038, and 25314. Trawl station 25314 – invalid, 25311 have been made instead of 25314. Trawl station 26172 - exclusion zone (radius of 2.5 miles), was made fifteen minutes trawling. Trawl 26050 has been made instead of 26172. Trawl stations 26017, 26127, 26146 break down – military zone.

Stations fished

ICES Sub-Divisions	Gear (TVL, TVS)	Depth strata (1 -6)	Number of hauls planed	Number of valid hauls realised using "Standard" ground gear	Number of valid hauls realised using Rock-hoppers	Number of assumed zero-catch hauls	Number of replacement hauls	Number of invalid hauls	% stations fished
26	TVL	2	5	5	0	0	0	0	
26	TVL	3	5	5	0	0	0	0	
26	TVL	4	7	10	0	0	1	0	
26	TVL	5	7	12	0	1	0	0	
26	TVL	6	3	2	0	0	1	0	
25	TVL	3	3	5	0	0	0	0	
25	TVL	4	3	4	0	0	1	1	

Number of biological samples (maturity and age material, *maturity only):			
Species	**Length**	**Maturity**	**Age (otoliths)**
Clupea harengus	7975	1456	1456
Gadus morhua	8043	2539	1552
Platichthys flesus	3484	1441	989
Psetta maxima			
Sprattus sprattus	3032	621	220

Other species may need to be added for your survey.



Trawl positions for RV "ATLANTIDA" in March 2011.

Nation:	Sweden	Vessel:	RV "Argos"
Survey:	BITS 2011, quarter 1	Dates:	9–28 March

Cruise	
Gear details:	Sweden uses the standard TV-3 trawl. No tows are done with the rockhopper groundgear on harder ground stations. The trawl construction is according to the specifications in the BIFS manual.
Notes from survey (e.g. problems, additional work etc.):	40 haul stations out of the originally allocated 50 were trawled because of the unavailability of the Swedish RV Argos. The smaller Swedish RV Mimer was used. The haul duration needed to be shortened to 20 minutes. Ten stations were trawled by Denmark (6 stations) and Russia (4 stations). The table below shows the results of the 40 haul stations planned for RV Mimer.

ICES Sub-Divisions	Gear (TVL, TVS)	Depth strata (1 -6)	Number of hauls planed	Number of valid hauls realised using "Standard" ground gear	Number of valid hauls realised using Rock-hoppers	Number of assumed zero-catch hauls	Number of replacement hauls	Number of invalid hauls	% stations fished
25	TV3	2	1	1					100
		3	8	7					87.5
		4	5	5		1			100
27	TV3	3	2	2					100
		4	4	4					100
		5	1	1		1			100
		6	3	3		3			100
28	TV3	2	1	1					100
		3	5	5					100
		4	8	8					100
		5	2	2					100

Number of biological samples (maturity and age material, *maturity only):			
Species	**Age (otoliths)**	**Length**	**Maturity**
Gadus morhua	366	10170	366
Clupea harengus		6486	
Sprattus sprattus		3574	
Platichthys flesus	637	2589	637

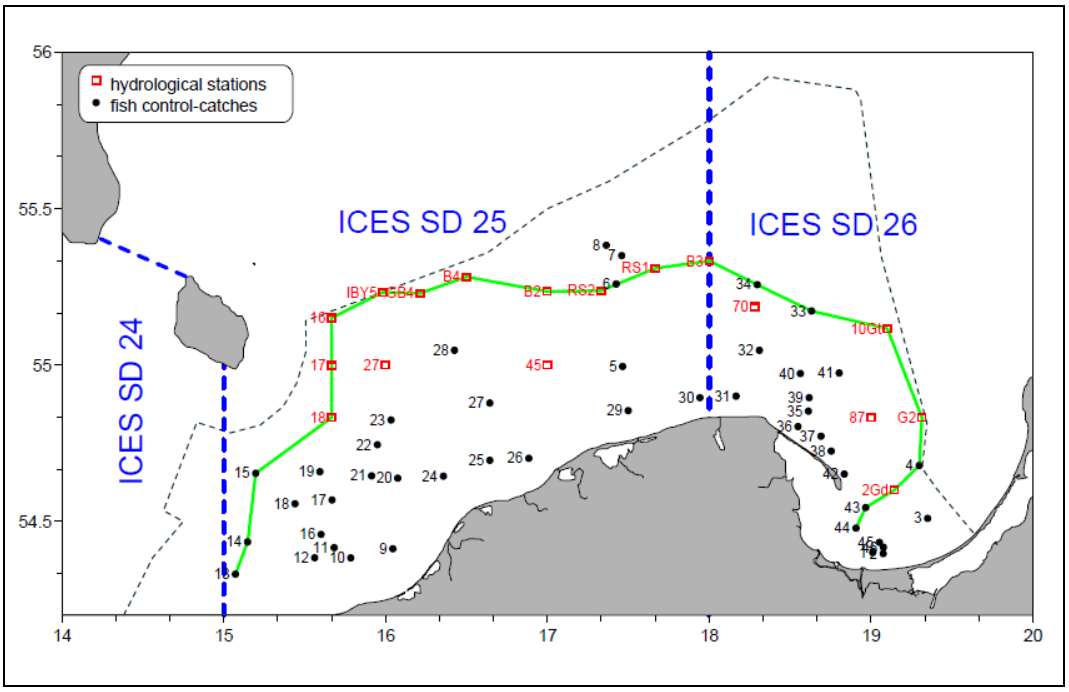


Figure 1. Location of the fish control-catches, hydrological stations (both, the standard stations and connected with hauls starting position) and hydrological research profile determined within the Polish EEZ (the RV "Baltica" BITS-Q1/2011 survey).