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

30 March – 3 April 2009

Lysekil, Sweden

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CIEM 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 Fiskeriverket, Havsfiskelaboratoriet, Lysekil, Sweden 30 March – 3 April 2009 to compile the survey results from second half of 2008 and first half of 2009 and to coordinate and plan the schedule for surveys in second half of 2009 and first half of 2010. Furthermore, the common survey manuals were updated according to decisions made during the meeting. All fish stock assessment relevant surveys in the Baltic and the Kattegat area with international participation (both bottom-trawl surveys and acoustic surveys - nine in total) are coordinated. The number of participants was 17 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. More extensive and basic results of acoustic surveys are given in Annex 5.

A number of additional issues were discussed during the meeting. Previously it has been verified that a significant number of cod is in the pelagic out of reach for the bottom trawl. Very little is known about the dynamic of this fraction of the cod stock. Is it at fixed fraction of the stock? Are the biological characteristics of the fraction similar to the characteristics of the bottom fraction? Is the pelagic fraction influenced by the extent of the oxygen depleted areas? The data series produced by the bottom surveys can be seriously biased depending on the answer on those questions. A strategy for how to provide the necessary information was discussed and agreed. The plan includes comparable hauls between bottom trawling and pelagic trawling and the compare of trawl- and acoustic results. A restructure of the surveys in Kattegat was discussed and linked together with the wish of a better coverage of the Western Baltic area. It was agreed to move some effort from Kattegat to the Western Baltic. The decision on a final strategy in Kattegat has to await the decision on how much new survey effort Sweden will be adding to the Kattegat area in 2009 and on. Comparable hauls are planned to be carried out between RV "Solea" and RV "Havfisken" during 4th quarter 2009 and 1st quarter 2010 in order to establish some information on fishing power of the two research vessels. The lack of well investigated values for target strength of less important but occasionally frequent specimens can be source of bias for the indices based on acoustic surveys. A strategy for obtaining these values was agreed and will be carried out intercessional. Furthermore, an improved method for calculating acoustic indices by including a simulation model in the calculations was suggested and supported by a working document. The final decision concerning the change in procedure is postponed until more evidence of the improvement is provided during next meeting (2010) by the authors.

1 Opening of the meeting

The meeting took place in Lysekil, Sweden from 30 March to 3 April 2009. The meeting was opened by the Chair at 10 am. The Chair welcomed the participants and Nils Håkansson (IMR) informed the participants about the house rules.

The Terms of Reference for the meeting were:

2008/2/LRC05 The **Baltic International Fish Survey Working Group** [WGBIFS] (Chair: Henrik Degel, Denmark) will meet in Lysekil, Sweden from 30 March to 3 April 2009 to:

a) combine and analyse the results of spring and autumn 2008 acoustic surveys and experiments and report to WGBFAS;

b) update the hydroacoustic databases BAD1 and FishFrame for the years 1991 to 2008;

c) plan and decide on acoustic surveys and experiments to be conducted in 2009 and 2010;

d) discuss the results from BITS surveys performed in autumn 2008 and spring 2009;

e) plan and decide on demersal trawl surveys and experiments to be conducted in autumn 2008 and spring 2009;

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) study the vertical distribution of the cod during the BITS survey in a situation with oxygen deficiency close to the bottom;

j) upload and development status of DATRAS and FishFrame;

k) discuss the implementation of rules for acoustic dealing with species of less important (i.e. unknown target strength)

WGBIFS will report by 1 May 2009 for the attention of the SCICOM, SGISUR and ACOM.

2 Adoption of the agenda

The agenda was presented by the chair together with a "Task list" based on the agenda and the requests directed to WGBIFS from other groups. The agenda (Annex 2) was adopted without any changes. To each task one person was assigned as "Leader" together with a number of participants. The subgroup was responsible for the discussion of the issue, the preparation of the draft text and the presentation in plenary.

3 Combine and analyse the results of the 2008 acoustic surveys and experiments and report to WGBFAS

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

In 2008 the following acoustic surveys were conducted between September and November:

VESSEL	COUNTRY	AREA
Argos	Sweden	27 and parts of 25, 28, 29
Argos	Sweden/Finland	30
Atlantniro	Russia	Parts of 26
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 cruise reports are presented in Annex 6 using the suggested standard format (ICES CM 2002/G:05 Ref. H, Annex 5)

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 control hauls. However, it is allowed for all nations to cover also other areas, but it is the results from the responsible country that are used. 16 rectangles were investigated by more than one vessel (Figure 3.1) during the international acoustic survey in October 2008. The figure illustrates that the planned coverage of the Baltic Sea during the acoustic survey in October was not totally realized as a consequence of unfavourable weather conditions, especially, during joint survey of Estonia-Finland-Poland.

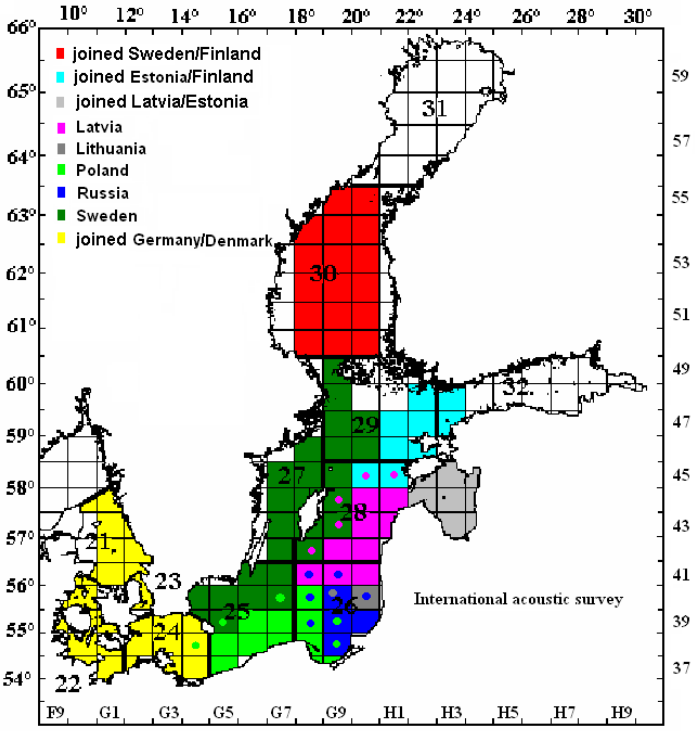


Figure 3.1. Map of surveys conducted in October 2008. Colours indicate the countries, which covered specific ICES-rectangles and delivered data to BAD1-database, thus was responsible for this rectangle. Coloured dots within a rectangle explain additional data in BAD1 partly or totally covered by other countries.

3.1.2 Total results

The abundance estimates which are based on the international acoustic survey in October 2008 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.

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 calculated factors for 2008 are given in Table 3.1.5 by subdivision. The area corrected abundance estimates for herring per subdivision are summarized in Tables 3.1.6 and 3.1.7 respectively. Biomass for herring and sprat per subdivision were given in Tables 3.1.8 and 3.1.9

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,

1991–2008 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, 1997 and 1995 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 Subdivsions 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, 1991–2008 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, 1997 and 1995 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 cause is not yet explainable. These data should not be used until these differences are elucidated.

3.1.5 Recommendation to WGBFAS

WGBIFS recommends that the new dataset 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, 1997 and 2000.

WGBIFS recommends that the new dataset can be used 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 October 2008 by rectangle.

SD	RECT	TOTAL	AGE 0	AGE 1	AGE 2	AGE 3	AGE 4	AGE 5	AGE 6	AGE 7	AGE 8+
21	41G0	2,6	0,1	2,3	0,2						
21	41G1	63,4	2,4	55,4	5,2	0,5					
21	41G2	19,2	18,9	0,3							
21	42G1	67,5	66,9	0,5							
21	42G2	38,1	36,2	1,9							
21	43G1	514,8	510,9	3,9							
21	43G2	51,9	51,5	0,4							
21	44G0	24,1	24,1	0,0							
21	44G1	344,1	285,8	49,2	7,6	1,5					
22	37G0	5,8	5,8	0,0							
22	37G1	345,4	323,0	21,4	0,4	0,3	0,3				
22	38G0	92,5	90,5	2,0							
22	38G1	113,5	111,7	1,7							
22	39F9	7,1	7,1	0,0							
22	39G0	1,3	1,0	0,1	0,3						
22	39G1	10,9	10,9	0,0							
22	40F9	1,1	1,0	0,1							
22	40G0	12,2	10,7	1,4	0,1						
22	40G1	3,0	2,6	0,3							
22	41G0	0,0		0,0							
23	39G2	181,2	148,6	9,8	5,7	4,3	3,1	4,2	3,7	1,3	0,5
23	40G2	168,7	39,1	41,5	17,6	25,5	16,5	17,5	7,7	0,5	3,0

SD	RECT	TOTAL	AGE 0	AGE 1	AGE 2	AGE 3	AGE 4	AGE 5	AGE 6	AGE 7	AGE 8+
23	41G2	13,9	11,3	2,3	0,2	0,1					
24	37G2	357,7	343,7	8,2	2,7	1,6	0,4	0,7	0,1	0,4	
24	37G3	18,0	8,6	1,4	1,1	1,8	2,1	1,8	0,8	0,3	0,1
24	37G4	183,1	34,9	24,8	24,8	28,5	23,6	24,1	13,8	6,0	2,6
24	38G2	322,3	288,2	20,9	6,1	3,2	0,4	2,0	1,0	0,6	
24	38G3	149,9	87,3	14,6	9,1	12,2	9,2	8,8	5,9	1,9	1,0
24	38G4	557,4	66,2	83,4	85,5	94,9	73,8	78,1	46,1	20,4	8,9
24	39G2	334,8	274,6	18,1	10,5	7,9	5,8	7,7	6,9	2,4	0,9
24	39G3	169,1	77,1	35,2	19,7	11,1	6,1	8,7	7,2	3,3	0,9
24	39G4	406,0	125,7	71,4	50,2	47,4	34,3	38,8	23,1	11,4	3,7
25	38G6	324,0	61,8	33,4	21,5	40,0	19,5	48,0	64,8	23,2	11,8
25	38G7	114,0	6,5	14,2	4,3	22,6	11,5	24,6	20,3	5,6	4,5
25	39G4	46,5	2,9	26,0	7,4	6,9	2,0	0,9	0,4		
25	39G5	184,2	7,9	14,9	33,1	41,2	16,6	51,9	14,4	3,2	0,9
25	39G6	517,1	100,1	52,1	33,5	63,8	31,5	77,2	103,0	37,0	18,9
25	39G7	779,0	7,7	68,0	76,0	142,3	80,8	186,0	147,6	38,1	32,6
25	40G4	73,2	19,1	12,9	15,0	10,4	6,9	5,9	1,8	1,1	
25	40G5	204,6	52,9	32,7	48,6	27,6	3,4	27,6	10,1	1,8	
25	40G6	407,4	58,7	59,2	101,6	81,6	55,7	9,9	36,6	1,8	2,3
25	40G7	485,6	9,7	66,7	64,8	65,3	48,5	104,9	88,3	22,3	15,1
25	41G6	899,8	10,1	72,5	87,7	137,8	14,0	298,8	198,3	45,4	35,2
25	41G7	237,7	2,0	7,7	9,0	53,4	23,9	64,7	52,5	15,7	8,8
26	37G8	124,1	23,7	8,8	20,5	16,3	3,5	17,8	21,3	7,0	5,1
26	37G9	268,9	20,1	22,4	53,2	41,4	8,0	44,3	52,9	17,3	9,2
26	38G8	798,3	312,4	37,1	67,4	69,5	30,3	87,1	89,7	35,3	69,6
26	38G9	129,1	32,2	10,2	16,1	12,9	14,0	15,6	15,3	4,7	8,1
26	39G8	146,6	6,0	7,9	11,8	23,4	9,1	31,0	28,3	10,3	18,7
26	39G9	739,9	13,1	62,1	90,9	112,6	88,6	162,2	112,9	37,0	60,5
26	39H0	24,6	16,9	2,7	1,2	0,8	1,0	0,9	0,4	0,2	0,6
26	40G8	208,3	1,2	20,5	17,7	22,6	20,5	58,2	44,9	14,1	8,6
26	40G9	658,3		94,5	136,4	114,1	115,3	90,2	62,2	22,7	22,8
26	41G8	492,8	2,8	0,0		23,3	44,0	91,3	198,9	61,7	70,9
26	41G9	532,0	2,8	30,5	81,6	110,1	60,0	102,3	91,0	36,9	16,9
26	41H0	718,0		13,2	45,3	75,5	112,4	125,5	220,4	48,0	77,6
27	42G6	79,4	4,8	36,4	21,5	8,1	1,0	6,3	1,5		
27	42G7	500,5	14,0	91,4	93,4	98,4	23,1	144,1	26,9	2,3	6,7
27	43G6	763,7	137,5	121,6	82,1	100,2	75,1	168,0	60,6	9,4	9,2
27	43G7	1312,2	66,6	529,2	211,3	192,0	54,7	145,8	100,1	2,2	10,3
27	44G7	1340,1	287,0	300,6	234,1	327,3	91,0	58,4	38,1		3,5
27	44G8	266,8	31,2	144,6	74,9	2,8		4,4	8,1	0,8	
27	45G7	1735,7	56,8	587,7	385,7	271,1	105,0	254,4	75,1		
27	45G8	729,8	52,9	219,6	210,3	82,6	81,5	58,7	20,9	3,4	
27	46G8	1208,6	263,9	301,9	293,9	207,5	69,1	35,5	35,4	1,3	
28	42G8	263,2	0,6	7,8	38,0	76,4	30,7	56,1	41,0	6,9	5,6
28	42G9	871,3		38,5	180,2	184,4	110,1	246,8	91,0	19,1	1,3

SD	RECT	TOTAL	AGE 0	AGE 1	AGE 2	AGE 3	AGE 4	AGE 5	AGE 6	AGE 7	AGE 8+
28	42H0	486,7		62,9	41,2	97,3	69,0	63,7	86,6	28,4	37,6
28	43G8	131,5	2,2	3,2	24,5	33,5	29,6	14,5	19,9	1,4	3,0
28	43G9	119,7	1,4	7,3	13,1	37,7	17,8	18,6	19,9	2,1	1,7
28	43H0	1444,2		182,5	238,8	310,5	252,4	137,9	197,6	89,4	35,0
28	43H1	188,0		41,2	44,8	44,6	18,5	11,8	7,7	10,9	8,4
28	44G9	505,0	13,4	48,7	109,7	143,8	55,9	98,3	33,3		1,8
28	44H0	203,8		9,4	32,7	47,5	22,9	45,4	37,6	5,5	2,9
28	44H1	958,2	4,0	127,8	178,3	193,5	159,7	124,9	117,7	47,7	4,6
28	45G9	449,3	241,2	21,0	60,5	52,3	41,0	6,2	24,4	2,6	
28	45H0	261,6	82,2	7,5	16,4	45,7	36,7	18,9	43,5	7,1	3,8
28	45H1	164,7	154,4	1,2	0,9	1,8	2,1	0,5	3,1	0,2	0,5
29	46G9	820,4	9,6	199,3	184,1	109,6	88,3	193,9	33,6		2,0
29	46H0	234,4	30,6	30,2	51,5	52,2	43,3	19,6	7,1		
29	46H1	147,0	115,7	4,8	5,5	10,2	4,7	2,5	2,8	0,4	0,5
29	46H2	43,1	42,5	0,0		0,1	0,2	0,2	0,2		0,1
29	47G9	1638,3	307,5	183,0	304,5	427,5	210,5	170,7	31,1		3,6
29	47H0	2268,2		368,0	752,1	627,4	300,4	158,7	39,0		22,5
29	47H1	186,3	22,0	26,6	30,1	55,5	23,5	11,4	12,7	2,3	2,1
29	47H2	1732,6	351,9	239,3	263,4	479,0	191,3	80,4	97,8	17,5	12,1
29	48G9	2028,4	559,4	288,4	169,9	556,4	59,6	281,1	108,4		5,3
29	48H0	689,1	388,5	111,4	73,6	70,1	27,6	13,2	4,6		
29	48H2	5467,9	3755,1	576,5	401,4	476,0	135,1	44,8	64,2	9,3	5,6
29	49G9	903,7	2,9	269,6	210,0	119,9	105,9	115,8	30,4	21,1	28,1
30	50G8	1238,4	216,7	34,0	151,7	239,4	115,6	45,4	158,9	151,7	124,8
30	50G9	1563,8	25,7	99,2	287,0	474,2	135,4	23,1	352,1	14,2	152,9
30	50H0	2350,0		943,1	807,0	420,0	23,4	67,9	76,8	3,1	8,8
30	51G8	790,9	211,2	165,8	257,5	78,5	22,8	6,5	25,9	11,1	11,6
30	51G9	866,8	23,8	191,1	447,2	26,8	98,9	26,5	18,7	4,7	29,2
30	51H0	955,7		183,7	146,1	227,5	72,6	91,4	124,2	23,9	86,3
30	52G8	715,0	32,0	93,8	460,6	108,0	8,2	1,5	10,9		
30	52G9	177,5	81,6	42,7	37,3	4,4	0,7	0,9	5,9	2,0	2,0
30	52H0	1086,6	90,3	26,9	26,1	3,3	76,0	153,6	350,2	162,9	197,4
30	53G8	946,7		20,3	25,6	70,6	71,9	118,1	347,6	76,2	216,4
30	53G9	1113,1	10,0	58,7	180,7	188,7	101,8	126,8	257,8	33,4	155,2
30	53H0	1042,8	4,9	73,9	33,3	43,5	29,6	194,2	71,2	82,6	509,7
30	54G8	864,5	2,5	0,0	27,3	70,3	67,9	77,6	271,2	101,0	246,7
30	54G9	1059,3		0,0	3,0	53,6	107,4	158,0	327,1	159,9	250,4
30	54H0	1903,7		178,4	903,3	519,5	41,0	60,7	79,0	23,0	98,9
30	55G9	775,4		5,7	25,8	94,7	192,9	120,4	96,6	65,5	173,8
30	55H0	1639,7	17,6	108,6	221,1	200,6	209,3	249,2	214,5	140,2	278,4
32	47H3	854,1	182,6	109,7	101,0	166,1	97,2	27,9	111,2	28,8	29,7
32	48H3	547,1	136,2	74,9	62,7	100,3	56,5	16,8	65,8	16,7	17,1

Table 3.1.2. Estimated numbers (millions) of sprat October 2008 by rectangle.

SD	RECT	TOTAL	AGE 0	AGE 1	AGE 2	AGE 3	AGE 4	AGE 5	AGE 6	AGE 7	AGE 8+
21	41G0	0,2			0,2						
21	41G1	6,4		0,6	4,5	0,7	0,6	0,1			
21	41G2	12,8	11,6	0,6	0,5	0,1					
21	42G1	0,0									
21	42G2	5,0	4,8	0,1	0,1						
21	43G1	2,0	2,0								
21	43G2	0,2	0,2								
21	44G0	128,9	125,1	1,7	2,0	0,1					
21	44G1	0,0									
22	37G0	8,4	6,8	0,1	0,9	0,2	0,2	0,1			
22	37G1	47,8	42,4	1,1	2,9	0,4	0,5	0,2		0,3	
22	38G0	279,6	261,7	2,7	9,9	2,1	2,3	1,0			
22	38G1	0,2	0,2								
22	39F9	140,7	140,7								
22	39G0	22,1	20,1		0,9	0,4	0,5	0,2			
22	39G1	136,0	136,0								
22	40F9	9,1	5,1	0,6	2,3	0,4	0,5	0,2			
22	40G0	96,8	54,2	6,4	24,2	4,6	5,1	2,3			
22	40G1	23,5	13,1	1,5	5,9	1,1	1,2	0,6			
22	41G0	0,0									
23	39G2	33,0	20,3	1,9	6,1	3,1	1,1	0,4	0,1	0,1	
23	40G2	71,8	0,3	3,6	28,1	23,9	10,6	4,9	0,3		
23	41G2	3,2	2,7	0,1	0,3	0,2					
24	37G2	67,3	58,8	3,4	3,2	1,1	0,5	0,3			
24	37G3	79,1	75,5	1,7	1,2	0,3	0,3	0,1			
24	37G4	382,4	220,8	33,3	71,6	32,9	17,5	5,4	0,4	0,4	
24	38G2	449,4	443,7	2,0	2,2	0,8	0,6	0,1			
24	38G3	1522,6	663,3	222,8	374,6	154,3	79,5	24,8	1,6	1,6	
24	38G4	1046,8	505,5	108,6	241,0	111,6	58,9	18,2	1,5	1,5	
24	39G2	61,0	37,5	3,5	11,3	5,7	2,1	0,8	0,1	0,1	
24	39G3	527,3	147,0	30,9	186,9	97,9	41,3	16,3	3,5	3,5	
24	39G4	908,9	229,7	73,9	325,7	177,7	71,0	24,2	3,4	3,4	
25	37G5	52,0	2,4	1,9	23,3	8,9	6,8	7,3	1,3		
25	38G5	99,7	1,3	5,8	47,1	20,0	11,7	12,0	1,9	0,1	
25	38G6	293,3		24,3	136,1	56,9	41,8	29,5	4,6		
25	38G7	22,1	0,3	2,5	10,3	4,2	1,5	3,2			
25	39G4	97,2	1,7	7,3	75,1	2,0	0,7	5,1	5,3		
25	39G5	493,0	6,5	37,5	310,0	86,4	4,4	43,8	4,4		
25	39G6	469,8		39,0	218,0	91,1	67,0	47,3	7,4		
25	39G7	30,5	5,8	2,3	12,6	4,3	2,7	2,6	0,1		
25	40G4	679,2	29,6	62,2	364,4	66,7		114,4	18,2		23,7
25	40G5	658,8	89,6	2,6	301,2	69,2	1,3	100,2	65,9	18,5	10,5
25	40G6	396,4	177,0	6,1	65,6	26,1	1,0	98,3	20,4	1,0	0,8
25	40G7	848,9	291,9	49,6	242,5	194,4	0,6	69,9			

SD	RECT	TOTAL	AGE 0	AGE 1	AGE 2	AGE 3	AGE 4	AGE 5	AGE 6	AGE 7	AGE 8+
25	41G6	520,0	83,3	59,3	173,5	70,4		96,1	6,3		31,1
25	41G7	296,8	11,6	12,6	136,5	33,4	0,6	75,0	6,0	20,0	1,0
26	37G8	401,9	147,7	46,8	90,8	81,2	26,4	7,5		1,5	
26	37G9	640,6	402,1	54,3	89,1	69,9	18,5	5,8		0,9	
26	38G8	5201,6	694,5	787,8	1646,8	1430,6	480,3	135,9		25,7	
26	38G9	5965,6	1953,5	785,3	1565,4	1094,3	0,3	365,8	180,7	20,0	0,3
26	39G8	227,8	0,9	18,0	119,9	54,8	26,1	8,0			
26	39G9	2298,4	992,0	155,3	409,1	393,1	23,3	264,9	43,4	1,8	15,4
26	39H0	5275,9	3796,7	885,1	324,3	152,2	7,3	103,4	6,9		
26	40G8	23,9	0,5	3,1	12,6	5,2	1,8	0,7			
26	40G9	4444,8	2780,0	404,9	469,6	456,4	4,1	228,2	90,1	0,6	10,9
26	41G8	102,8		2,8	36,2	37,7	3,0	18,2	4,4		0,5
26	41G9	2065,8	1497,0	113,6	219,9	70,0	17,6	103,6	29,2	6,3	8,7
26	41H0	1566,8	619,8	508,6	220,6	120,4	4,0	58,8	0,8	19,3	14,7
27	42G6	1884,9	81,0	254,8	777,5	226,8		300,4	200,3	36,8	7,4
27	42G7	1114,2	687,1	53,7	228,5	58,5	12,1	49,0	23,5	1,8	
27	43G6	472,5	247,8	39,0	81,0	23,7	10,5	40,8	15,4	10,5	3,7
27	43G7	3482,1	1223,3	216,6	1155,3	439,6		291,9	126,5	15,1	13,8
27	44G7	2323,5	947,6	41,9	388,9	357,0		350,2	176,4		61,5
27	44G8	3192,2	390,8	93,2	1589,4	234,5		559,8	149,1	156,4	19,1
27	45G7	2439,1	1931,2	29,9	165,2	151,0		80,2	25,1	29,6	27,0
27	45G8	2155,6	320,7	66,4	881,7	120,6	118,4	334,1	250,1	47,8	15,7
27	46G8	1709,5	1222,5	60,2	213,2	11,4	34,3	86,3	52,6	10,9	18,0
28	42G8	988,9	4,9	57,6	400,7	220,6		229,0	37,3	8,3	30,4
28	42G9	0,0									
28	42H0	3125,7	404,3	985,9	798,3	729,8		61,2	146,2		
28	43G8	483,7		36,2	215,6	54,8	30,5	120,6	9,7		16,3
28	43G9	1544,1	257,3	247,4	247,2	106,8		348,1	312,0	12,6	12,6
28	43H0	4658,1	1957,3	893,7	921,7	400,3	57,0	225,4	101,4	80,4	20,9
28	43H1	2362,8	518,1	229,1	760,7	459,1	26,1	292,3	52,2	12,6	12,6
28	44G9	1335,2	1223,6	10,6	60,2	19,6	5,3	15,9			
28	44H0	10580,1	3611,8	1067,8	2155,0	1652,9	240,9	1325,5	198,8	283,4	43,9
28	44H1	13177,1	5224,0	1980,5	2193,6	1619,2	413,3	1515,2	192,3		39,0
28	45G9	2883,4	2699,6	35,8	50,8	5,4	10,9	58,3	8,6	8,6	5,3
28	45H0	11952,3	7133,0	1973,3	1328,0	390,5	84,0	763,4	170,2	4,8	105,2
28	45H1	21820,4	15058,7	2867,7	1873,6	496,4	91,7	1054,9	234,2	14,7	128,5
29	46G9	2128,4	1515,7	94,3	281,9	135,7		68,0	32,8		
29	46H0	6205,4	2840,0	858,8	1174,3	664,4	126,8	367,7	162,9		10,4
29	46H1	15159,6	11945,4	799,3	1164,3	368,4	223,5	465,8	149,6	7,9	35,5
29	46H2	4771,1	4246,3	139,9	192,4	61,2	37,4	69,6	24,4		
29	47G9	10250,6	8509,0	240,7	307,3	678,2	72,2	355,4		70,8	17,0
29	47H0	1444,8	12,2	106,1	746,2	124,4		211,5	220,1	6,1	18,3
29	47H1	14535,5	4417,6	2380,5	3631,2	1144,9	690,5	1560,1	471,6	43,3	195,7
29	47H2	25113,0	7416,0	4894,6	6168,0	1843,4	1049,7	2595,5	712,4	63,7	369,7
29	48G9	758,4	658,6	42,6	40,8			10,8	2,2	1,8	1,6

SD	RECT	TOTAL	AGE 0	AGE 1	AGE 2	AGE 3	AGE 4	AGE 5	AGE 6	AGE 7	AGE 8+
29	48H0	4147,2	2745,1	76,3	759,4	106,6	87,5	162,6	77,4	24,7	107,7
29	48H2	8012,4	753,6	1388,3	2344,3	771,0	531,0	1456,9	392,6	63,2	311,5
29	49G9	0,0									
30	50G8	233,8		7,8	38,1	15,9	13,4	37,1	109,3		12,3
30	50G9	15,4			4,3			0,7	6,2	0,8	3,4
30	50H0	36,0			5,1	1,4		7,5	14,5		7,6
30	51G8	977,5		22,4	126,6	35,9	52,0	399,5	163,6	16,1	161,5
30	51G9	137,8	0,5	6,5	22,9			38,4	51,5		17,9
30	51H0	21,6			2,0	1,8	1,4	6,2	6,7		3,6
30	52G8	709,0		17,6	39,8	4,9		278,1	254,9	11,3	102,4
30	52G9	1432,9		11,6	150,0			717,2	315,8	95,0	143,3
30	52H0	131,0	0,4	0,5	13,6	11,8		30,8	53,2	1,3	19,5
30	53G8	60,4			4,8	2,2		10,8	25,8	2,2	14,7
30	53G9	719,1		41,7	62,3	36,3		258,5	255,8		64,5
30	53H0	116,6		2,5	11,9	7,5		37,4	32,7	4,8	19,8
30	54G8	0,3									0,3
30	54G9	1,1		0,4					0,8		
30	54H0	651,8		49,1	22,8			168,3	290,2	28,7	92,6
30	55G9	11,8		0,4	0,6			3,8	3,4	0,5	3,1
30	55H0	138,5		2,9	13,3	5,3		30,9	55,8	3,7	26,7
32	47H3	5524,6	1558,9	1157,3	1299,3	378,9	103,5	684,5	245,3	9,6	87,2
32	48H3	5178,5	941,5	1115,8	1370,2	450,7	136,7	798,7	257,4	12,1	95,3

Table 3.1.3. Estimated numbers (millions) of herring October 2008.

SD	TOTAL	AGE 0	AGE 1	AGE 2	AGE 3	AGE 4	AGE 5	AGE 6	AGE 7	AGE 8+
21	1126	997	114	13	2	0	0	0	0	0
22	593	564	27	1	0	0	0	0	0	0
23	364	199	54	24	30	20	22	11	2	4
24	2498	1306	278	210	209	156	170	105	47	18
25	4273	339	460	503	693	314	900	738	195	130
26	4841	431	310	542	622	507	826	938	295	369
27	7937	915	2333	1607	1290	501	876	367	19	30
28	6047	499	559	979	1269	846	843	723	221	106
29	16160	5586	2297	2446	2984	1190	1092	432	51	82
30	19090	716	2226	4041	2823	1375	1522	2788	1056	2542
32	1401	319	185	164	266	154	45	177	45	47

Table 3.1.4. Estimated numbers (millions) of sprat October 2008.

SD	TOTAL	AGE 0	AGE 1	AGE 2	AGE 3	AGE 4	AGE 5	AGE 6	AGE 7	AGE 8+
21	156	144	3	7	1	1	0	0	0	0
22	764	680	13	47	9	10	5	0	0	0
23	108	23	6	35	27	12	5	0	0	0
24	5045	2382	480	1218	582	272	90	11	11	0
25	4958	701	313	2116	734	140	705	142	40	67
26	28216	12885	3766	5204	3966	613	1301	356	76	50
27	18774	7052	856	5481	1623	175	2093	1019	309	166
28	74912	38093	10385	11005	6155	960	6010	1463	426	415
29	92526	45060	11021	16810	5898	2819	7324	2246	281	1067
30	5395	1	163	518	123	67	2025	1640	164	693
32	10703	2500	2273	2669	830	240	1483	503	22	183

Table 3.1.5. Calculated correction factor for 2008 per subdivision.

SUB_DIV	CORR_FACTOR
21	1 000 000
22	1 020 621
23	1 000 000
24	1 000 000
25	1 201 573
26	1 117 153
27	1 180 383
28	1 072 553
29	1 101 072
30	1 199 357
32	6 508 551

Table 3.1.6. Area corrected numbers (millions) of herring October 2008.

SD	TOTAL	AGE 1	AGE 2	AGE 3	AGE 4	AGE 5	AGE 6	AGE 7	AGE 8+
21	129	114	13	2	0	0	0	0	0
22	29	28	1	0	0	0	0	0	0
23	165	54	24	30	20	22	11	2	4
24	1192	278	210	209	156	170	105	47	18
25	4727	553	604	832	378	1082	887	234	156
26	4926	346	606	695	566	923	1048	330	412
27	8289	2754	1897	1523	591	1034	433	23	35
28	5950	600	1050	1361	908	905	776	237	114
29	11643	2529	2693	3285	1311	1203	476	56	90
30	22037	2670	4846	3386	1649	1825	3344	1266	3049
32	7045	1201	1065	1734	1000	291	1153	296	305

Table 3.1.7. Area corrected numbers (millions) of sprat October 2008.

SD	TOTAL	AGE 1	AGE 2	AGE 3	AGE 4	AGE 5	AGE 6	AGE 7	AGE 8+
21	12	3	7	1	1	0	0	0	0
22	86	13	48	9	11	5	0	0	0
23	85	6	35	27	12	5	0	0	0
24	2663	480	1218	582	272	90	11	11	0
25	4393	323	2184	757	145	727	146	41	69
26	17127	4207	5814	4430	684	1453	397	85	56
27	13836	1010	6469	1916	207	2470	1203	365	196
28	39490	11139	11804	6602	1029	6446	1569	456	445
29	52264	12135	18509	6494	3103	8064	2473	310	1175
30	6469	196	621	147	80	2429	1967	197	831
32	53387	14795	17374	5399	1563	9654	3272	142	1188

Table 3.1.8: Estimated biomass (in tons) of herring October 2008.

SD	TOTAL	AGE 1	AGE 2	AGE 3	AGE 4	AGE 5	AGE 6	AGE 7	AGE 8+
21	8793	7407	1175	210					
22	1056	979	53	11	11				
23	18255	2581	2093	3982	3092	3779	1808	221	698
24	74214	11131	10632	14276	12439	13443	7456	3490	1348
25	177453	14070	20236	29131	16537	41806	36905	10762	8005
26	157491	9394	19472	20553	16214	30058	31619	12309	17873
27	186470	40929	39058	39353	15309	34469	14795	970	1586
28	109188	9353	18086	25607	16512	17811	15194	4336	2289
29	242152	36172	57233	69664	30958	31902	12646	1121	2454
30	501372	33855	82236	65615	34205	42549	86404	34247	122261
32	18647	2252	2612	4632	2945	767	3320	1022	1097

Table 3.1.9. Estimated biomass (in tons) of sprat October 2008.

SD	TOTAL	AGE 1	AGE 2	AGE 3	AGE 4	AGE 5	AGE 6	AGE 7	AGE 8+
21	172	34	108	17	13	1			
22	1261	159	690	152	179	76		6	
23	1623	84	624	529	258	116	10	1	
24	41934	6525	19430	9658	4420	1514	193	193	
25	66183	3921	31984	11603	2355	12077	2353	673	1217
26	183180	39057	63174	49336	8144	16955	4686	1158	669
27	137202	7788	60575	19771	2041	27250	13339	3977	2462
28	415874	106459	125190	73795	11675	71013	17176	5380	5185
29	469385	96299	165259	61850	28916	76398	24105	3385	13173
30	71811	1626	5746	1422	922	26409	22328	2430	10928
32	76755	19082	24962	8353	2578	14734	4676	242	2127

3.2 Combined results of the 2008 Baltic Acoustic Spring Surveys (BASS)

In May–July 2008, the following acoustic surveys were conducted:

VESSEL	COUNTRY	ICES SUBDIVISION
Walther Herwig III	Germany	24, 25, 27, parts of 29
Atlantniro	Russia	Parts of 26
Baltica	Latvia–Poland	Parts of 26 and 28
Darius	Lithuania	Parts of 26

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 in most areas is much smaller than 10%. These numbers should not be used for a real investigation of abundance. Therefore, only the distribution of sprat is examined in farther. The estimated numbers per age group and ICES square are combined in Table 3.2.1.

The cruise reports are presented in the Annex 6 or Annex 8 if presented as working documents.

3.2.1 Area under investigation and overlapping areas

Each ICES statistical rectangle of the monitored area was allocated to one country (ICES, 2005), thus each country participate in the survey has a mandatory responsible area. All rectangles were acoustically investigated over about 60 miles and normally two hauls were realized in this area. However, it is allowed for all participants to cover also other areas, but the results from the responsible country were used in the final assessment. In 2008 only one rectangle (41G8) was investigated by two vessels. The estimated numbers per age group agree fairly well (see Table 3.2.6).

The planned investigation area was completely covered. Three rectangles, 46G8 (SD27) and 46G9–46H0 (SD29) were additionally examined. Figure 3.2.1 illustrates the coverage of the Baltic Sea during the BASS surveys in 2008.

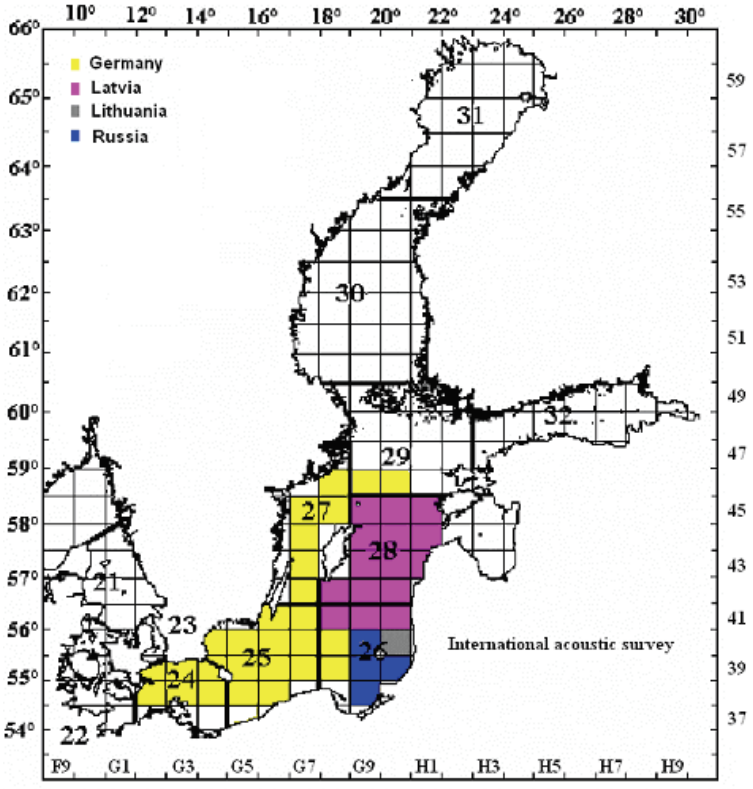


Figure 3.2.1. Map of BASS surveys conducted in May/July 2008. Colours indicate the countries, which covered particular ICES-rectangles and delivered data to BASS_DB, thus was responsible for this rectangle. Coloured dots within a rectangle explain additional data in partly or totally covered by other countries.

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 2008 are given in Table 3.2.3. The area corrected abundance estimates for sprat per ICES Subdivision are summarized in Tables 3.2.4. The corresponding biomass estimates of sprat are given in the Table 3.2.5.

3.2.3 The Baltic sprat stock in 2008

In 2008 the total quantity of sprat in Subdivisions 24 to 28 was $120*10^9$. This is nearly the same low level as in the last year. With $10*10^9$ young sprat the recruitment was very low but the age group 1 can be slightly underestimated in this survey. The sprat stock was dominated by the age-class 2 with about 40% of the total stock size. Also the strong year-class 2004 was represented with about 20%.

3.2.4 Tuning Fleets for WGBFAS

The complete time-series (2001 to 2008) of the corrected sprat abundance in SD 24, 25, 26 and 28 (without Bay of Riga) is given in Annex 5 table 5 and in Figure 3.2.2. Only

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

In the old index tables the origin of the numbers was partially unknown. The table 5 is a new estimate for the years 2001 – 2008 based on the corrected database BASS_DB. Therefore the figures do not necessarily correspond to the numbers of last year.

WGBIFS recommends that the May/June 2001–2008 BASS index (Table 3.2.7) can be applied as additional source of data (fleet) for tuning in the final assessment of the Baltic sprat stock biomass.

3.2.5 Reference

ICES. 2005. Report of the Baltic International Fish Survey Working Group. ICES CM 2005/G:08, Ref.: D, H: 254 pp.

Table 3.2.1. Estimated abundance of sprat (millions) per age groups and ICES rectangle; May/July 2008.

SD	RECT	TOTAL	AGE1	AGE 2	AGE 3	AGE 4	AGE 5	AGE 6	AGE 7 7 7	AGE 8 8+
24	38G2	112,8	14,1	56,0	16,3	8,2	13,2	4,4	0,5	0,1
24	38G3	1357,0	129,9	713,8	186,4	90,5	174,7	56,4	3,3	2,0
24	38G4	1024,0	43,5	551,0	164,3	81,1	130,4	48,1	4,1	1,5
24	39G2	79,1	9,9	39,3	11,4	5,8	9,3	3,1	0,4	0,0
24	39G3	511,0	47,2	274,1	71,2	35,5	61,0	20,5	1,0	0,5
24	39G4	595,5	53,8	314,9	83,2	45,6	66,7	28,8	1,8	0,8
25	38G5	2875,7	14,4	909,3	555,7	393,7	846,0	51,4	55,6	49,5
25	38G6	1578,1	22,9	578,0	289,1	191,1	431,9	26,6	19,0	19,6
25	39G4	439,0	1,9	192,0	84,6	45,0	106,8	4,3	2,2	2,3
25	39G5	2287,3	6,0	968,1	446,0	247,9	567,0	19,9	14,2	18,2
25	39G6	2601,3	16,5	1030,1	515,9	291,4	681,4	29,6	22,9	13,5
25	39G7	2599,7	15,3	1213,4	476,3	248,4	611,8	21,0	6,1	7,5
25	40G4	1092,9	12,2	503,5	193,3	108,2	255,9	9,7	4,0	6,2
25	40G5	715,1	3,2	302,2	129,6	77,0	185,7	7,8	5,2	4,4
25	40G6	2171,5	22,5	952,8	396,4	219,4	537,1	22,7	9,5	11,1
25	40G7	1155,6	68,3	565,0	185,7	96,8	229,1	7,2	1,3	2,2
25	41G6	2115,6	42,3	995,3	361,0	200,7	478,6	21,4	6,5	9,9
25	41G7	3112,5	339,7	1753,9	389,3	235,6	382,7	8,1	0,9	2,3
26	38G9	3794,0	468,2	1206,9	1271,4	71,2	539,4	193,8	33,5	9,6
26	39G8	1436,2	5,0	575,2	260,5	252,8	204,3	131,0	1,7	5,6
26	39G9	3890,8	157,8	1100,5	1217,9	49,7	975,7	376,6	12,6	0,0
26	39H0	7093,7	867,8	2390,6	2550,1	132,3	860,6	288,6	1,9	1,9
26	40G8	1170,3	70,9	502,0	219,1	154,9	148,9	71,4	1,2	1,8
26	40G9	3066,6	420,4	826,0	825,4	75,7	729,5	153,0	14,7	21,9
26	41G8	1714,3	66,3	709,0	456,2	57,5	311,8	91,1	5,1	17,5
26	41G9	4515,7	933,3	1704,8	634,0	138,6	916,0	117,1	18,9	53,2
26	41H0	2735,2	1057,4	993,7	277,0	60,3	256,7	39,1	9,8	41,2
27	42G7	1697,9	89,7	823,0	181,4	272,5	216,4	78,8	33,8	2,3
27	43G7	407,9	11,2	154,7	45,5	81,7	70,2	27,3	14,9	2,4
27	44G7	1774,2	52,4	771,1	191,6	337,2	255,7	112,1	49,6	4,4
27	45G7	2640,3	454,7	1333,8	261,9	265,9	247,0	60,8	15,7	0,5
27	45G8	1693,8	110,3	780,7	185,5	277,3	222,1	78,2	35,8	3,8
27	46G8	1933,1	428,2	855,3	176,7	217,0	173,3	59,2	20,3	3,2
28	42G8	1577,3	38,3	629,7	209,8	43,4	446,4	124,0	60,2	25,5
28	42G9	2535,7	92,8	1105,8	619,3	73,5	486,8	93,0	8,3	56,2
28	42H0	2762,3	249,2	1140,5	361,7	199,2	568,9	144,3	64,8	33,7
28	43G9	4057,6	85,4	1807,8	849,6	49,4	1062,5	188,7	0,0	14,3
28	43H0	3056,6	107,5	1358,0	607,2	146,0	646,8	145,5	4,3	41,3
28	43H1	791,9	262,6	188,1	93,4	12,5	140,9	75,3	15,1	4,0
28	44G9	3673,6	0,0	1649,6	570,5	38,4	992,0	296,5	36,5	90,1
28	44H0	2370,8	19,4	925,1	181,5	235,2	371,9	190,5	17,5	429,7
28	44H1	1401,4	414,2	357,8	180,7	15,4	266,4	126,5	26,6	13,7

SD	RECT	TOTAL	AGE1	AGE 2	AGE 3	AGE 4	AGE 5	AGE 6	AGE 7 7 7	AGE 8 8+
28	45G9	4087,2	459,6	2186,6	458,2	166,7	755,1	40,7	20,3	0,0
28	45H0	5134,8	324,6	2356,4	855,3	222,2	1214,0	83,9	10,2	68,1
28	45H1	3883,6	135,9	809,1	814,3	84,2	1481,0	286,1	57,0	216,2
29	46G9	3593,0	156,2	1686,9	515,7	606,3	283,7	319,1	17,2	7,8
29	46H0	3848,6	342,7	1773,9	528,3	639,2	251,1	294,7	10,1	8,7
SD	RECT	Total	age1	age 2	age 3	age 4	age 5	age 6	age 7	age 8+
24	38G2	112,8	14,1	56,0	16,3	8,2	13,2	4,4	0,5	0,1
24	38G3	1357,0	129,9	713,8	186,4	90,5	174,7	56,4	3,3	2,0
24	38G4	1024,0	43,5	551,0	164,3	81,1	130,4	48,1	4,1	1,5
24	39G2	79,1	9,9	39,3	11,4	5,8	9,3	3,1	0,4	0,0

Table 3.2.2. Estimated abundance of sprat (million) per age groups and the ICES Subdivisions May/July 2008.

SD	TOTAL	AGE 1	AGE 2	AGE 3	AGE 4	AGE 5	AGE 6	AGE 7	AGE 8+
24	3679	298	1949	533	267	455	161	11	5
25	22744	565	9964	4023	2355	5314	229	147	147
26	29417	4047	10009	7712	993	4943	1462	99	153
27	10147	1147	4719	1043	1452	1185	416	170	17
28	35333	2190	14514	5802	1286	8433	1795	321	993
29	7442	499	3461	1044	1246	535	614	27	17

Table 3.2.3. Calculated correction factor of covered areas for: May/July 2008 per ICES Subdivisions.

SD	CORR
24	1,27887
25	1,13868
26	1,22622
27	1,38949
28	1,10246
29	5,43703

Table 3.2.4. Corrected abundance of sprat (million) May/July 2008.

SD	TOTAL	AGE 1	AGE 2	AGE 3	AGE 4	AGE 5	AGE 6	AGE 7	AGE 8+
25	25899	644	11345	4581	2682	6051	261	168	167
26	36072	4963	12273	9456	1217	6061	1792	122	187
27	14099	1593	6556	1449	2017	1646	579	236	23
28	38953	2414	16002	6396	1418	9297	1979	354	1094
29	40460	2712	18817	5676	6772	2908	3337	149	90

Table 3.2.5. Estimated sprat biomass (in tonnes) of sprat; May/July 2008.

SD	TOTAL	AGE 1	AGE 2	AGE 3	AGE 4	AGE 5	AGE 6	AGE 7	AGE 8+
24	47551	2306	25204	7050	3444	6923	2302	217	105
25	231674	2998	94267	42336	26273	58473	2894	2256	2177
26	275519	24334	92082	77971	10235	52075	15835	1251	1735
27	85767	5038	38204	9430	14447	11951	4374	2026	297
28	307221	10374	121802	51826	12458	78441	17431	3424	11467
29	63566	2114	29071	9134	10836	5723	6049	387	252

Table 3.2.6. Rectangles covered by two countries and estimated sprat abundance.

VESSEL	TOTAL	AGE 1	AGE 2	AGE 3	AGE 4	AGE 5	AGE 6	AGE 7	AGE 8+
WAH3	2047	55	847	372	325	273	167	2	6
BAL	1714	66	709	456	57	312	91	5	17

***) Baltica was responsible for acoustic investigations in the ICES rectangle 41G8, however also "Walther Herwig III" covered this area in the May 2008 BASS survey.**

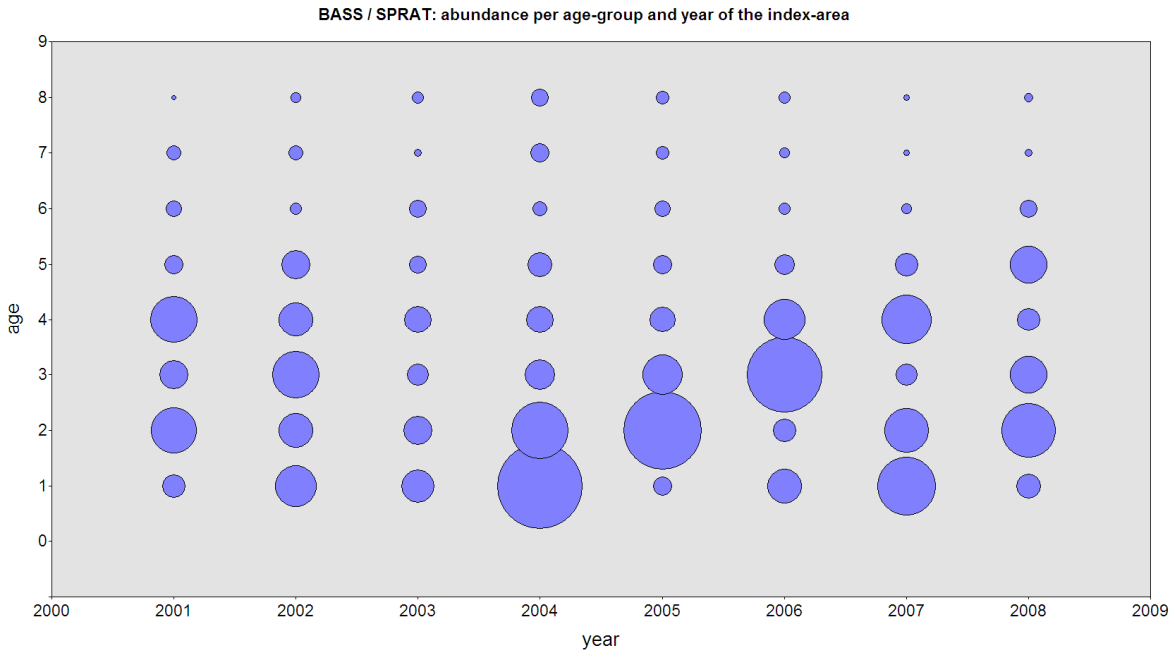


Figure 3.2.2. Sprat abundance per age group and year in SD 24, 25, 26 and 28.

3.3 Quality assessment of tuning fleet index time-series

WGBFAS recommended that WGBIFS should on routine basis provide quality assessment of each tuning fleet index time-series pointing out both general and year specific characteristics of the surveys (BIAS and BITS) and the indices provided.

Since year 2004 WGBIFS has provided WGBFAS with area corrected acoustic data. All the acoustic indices from previous years have been calculated without area corrections. Therefore the latest versions of BIAS and BASS data in BAD1 format were used to calculate the area corrected abundance and biomass estimates for herring and

sprat for the years 1991–2008 using BIAS data and for the years 2001–2008 using BASS data. In following tables the quality of these data are commented.

Acoustic indices from autumn surveys (BIAS) given for the area of SD 22–32 (the subdivisions not covered by survey in certain year are not included in the index e.g. the area of these subdivisions is not compensated in index calculations)

YEAR	COMMENTS
1991	SD 30–32 have not been covered by the survey
1992	SD 30–32 have not been covered by the survey, the area coverage of SD 29 has been low
1993	SD 25, 27, 29 and 30–32 have not been covered by the survey, the area coverage of SD 26 has been low
1994	SD 30–32 have not been covered by the survey
1995	SD 29–32 have not been covered by the survey
1996	SD 30–32 have not been covered by the survey, the area coverage of SD 29 has been low
1997	SD 27 and 29–32 have not been covered by the survey, the area coverage of SD 25 has been low
1998	SD 30–32 have not been covered by the survey, the area coverage of SD 29 has been low
1999	As a result of bad weather conditions the indices calculated for SD 30–32 are biased
2000	SD 31 has not been covered by the survey
2001	SD 30–31 have not been covered by the survey, the area coverage of SD 32 has been low
2002	SD 30–32 have not been covered by the survey
2003	SD 30–31 have not been covered by the survey, the area coverage of SD 32 has been low
2004	SD 30–31 have not been covered by the survey, the area coverage of SD 32 has been low
2005	SD 30–31 have not been covered by the survey, the area coverage of SD 32 has been low
2006	SD 30–31 have not been covered by the survey, very high sprat concentrations were recorded in SD 32
2007	SD 31 has not been covered by the survey, very high sprat concentrations were recorded in SD32, in SD 28 high sprat concentrations were recorded in shallow areas, which are mostly not covered by BIAS
2008	SD 31 has not been covered by the survey, the area coverage of SD 32 has been low

Acoustic indices from spring surveys (BASS) given for the area of SD 24–28

YEAR	COMMENTS
2001	The area coverage of SD 27 has been low (not included in the index)
2002	**The area coverage of SD 27 has been low (not included in the index)**
2003	SD 27 has not been covered by the survey (not included in the index), the area coverage of SD 28 has been low
2004	The area coverage of SD 27 has been low (not included in the index)
2005	SD 27 has not been covered by the survey (not included in the index)
2006	(SD 27 not included in the index)
2007	(SD 27 not included in the index) High sprat concentrations were recorded in the northern part of surveyed area
2008	(SD 27 not included in the index) High sprat concentrations were recorded in the northern part of surveyed area and in SD 29 which is not included in the index

4 Acoustic survey in the Gulf of Bothnia

In 2006, the WGBFAS pointed out the need for an acoustic survey in SD 30 and 31 to get independent indices of stock size of pelagic species. WGBFAS recommended WGBIFS to organize an annual fish survey into the Gulf of Bothnia from 2007 onwards in order to obtain fishery-independent data and spatial distribution on the herring and sprat populations in the Gulf of Bothnia. According to this recommendation Sweden prolonged their acoustic survey up to the SD 30 in autumn 2007. In autumn of 2008 Sweden and Finland started to perform this acoustic survey in SD 30 jointly and on regular basis.

The area covered by the SD 30 survey in 2008 was 13682 NM^2 in 17 rectangles and 24 trawl hauls were carried out. The track chart for the survey and catch compositions by trawl haul are presented in the Swedish survey report in Annex 6. The distribution of herring and sprat biomasses by rectangle and by age group in 2007 and 2008 are presented in Figure 4.1.

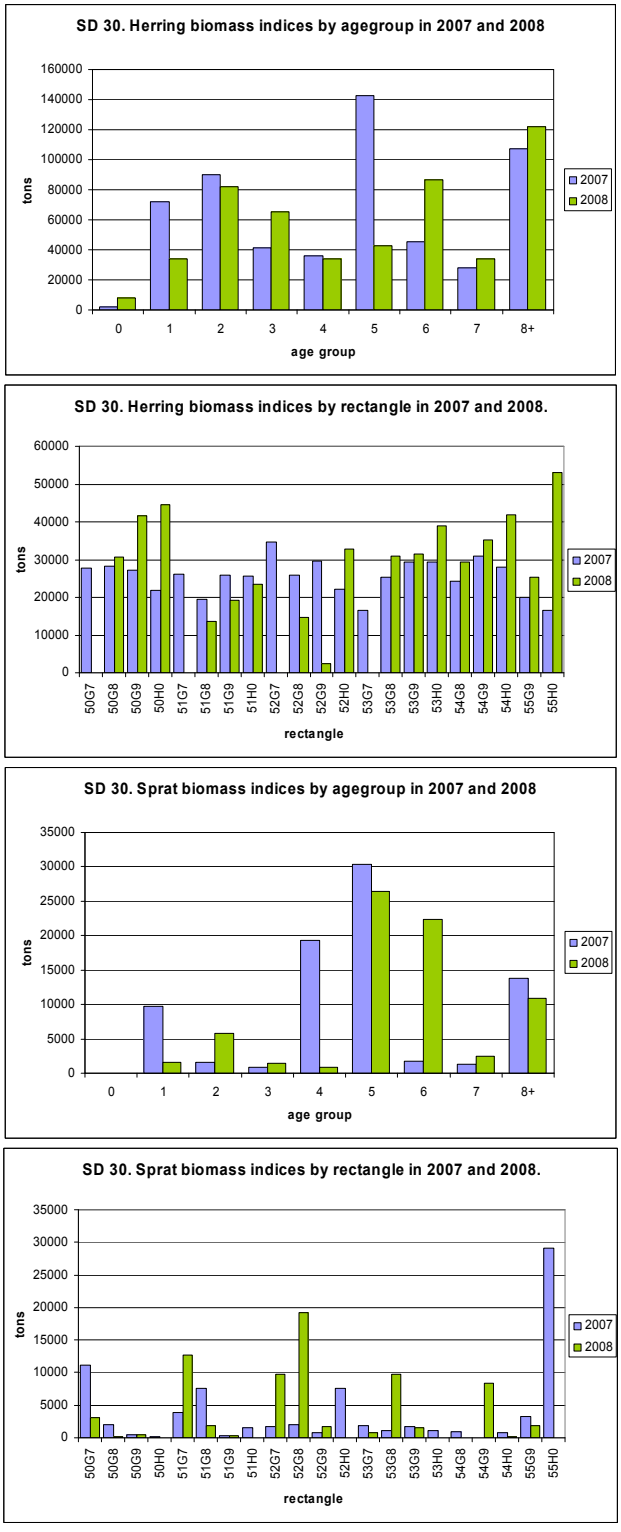


Figure 4.1. The distribution of herring and sprat biomasses by rectangle and by age group.

5 Working documents presented during the meeting

5.1 Suggestion for incorporating simulation model to estimate abundance indices for acoustic surveys. Presented by: Svetlana Kasatkina

The working documents entitled "Calculating statistical characteristics of abundance indices from bias 2004–2006 using traditional and new Baltic clupeids target strength estimates" (authors S. Kasatkina and P. Gasyukov) and "Estimating statistical characteristics of sprat and herring abundance indices by years and age groups using simulation method with the polish surveys in 2004–2006 as the examples" (authors: P. Gasyukov., S. Kasatkina and W. Grygeil) show the possibility to incorporate the developed simulation model into the BIAS data processing. Presented results demonstrated that the acoustically derived abundance indices can be accompanied by uncertainty estimates (mean values, variances, standard errors, coefficients of variation, confidence intervals) providing important information for stock-assessment model. Besides, implementation of developed simulation model will allow standardizing and unifying BIAS data processing.

It was recognized that improvement of BIAS data processing by applying simulation model is in compliance with the WGBFAS recommendation for WGBIFS that the BIAS results should be commented with a statement on the quality of the calculated estimates» (ICES WGBFAS 2008 Report, Annex 2).

The Working Group recommends that estimating and analysing statistical characteristics of abundance estimates from BIAS data should be continued. For summarizing abundance indices by age group from BIAS it is recommended that age-length keys for herring and sprat for BIAS 2004–2006 will be submitted to Gasyukov P. and Kasatkina S. (Russia). Results of estimating statistical characteristics for total abundance indices by age groups and years from BIAS 2004–2006 as example should be presented to the WGBIFS 2010.

5.2 How does BIAS data processing correspond to the Manual? Presented by: Svetlana Kasatkina

The BIAS data were processed strictly according to the current Manual and compared with data from Cruise Reports presented in the Reports of ICES WGBIFS (2005, 2006, and 2007). Selected Results of this comparative analysis including examples of ICES Rectangles covered by each vessel participated in surveys 2004–2006, are demonstrated in the working document "How does BIAS data processing correspond to the Manual?" The authors indicate that BIAS data processing is not often regulated by the current Manual. The working document discusses approaches to the unification of BIAS data processing including proposals for improvement the Manual.

The developed simulation method for estimating statistical characteristics (mean values, variances, standard errors, coefficients of variation, confidence intervals) of fish abundance indices by age group based on BIAS data is demonstrated in the working document "Estimating statistical characteristics of sprat and herring abundance indices using simulation method with Polish surveys in 2004–2006 as the example". The obtained results are discussed by authors in the context of using abundance indices estimated from BIAS data as the input information for fish stock assessment (XSA method).

Uncertainty estimates in fish abundance values obtained from data of Poland, Latvia, Germany, Estonia, Sweden, Russia participated in Baltic acoustic survey is presented in the working document " Evaluating statistical characteristics of abundance indices

from BIAS 2004–2006 using traditional and new Baltic Clupeids target strength estimates". The authors show that the estimates of the total fish abundance and abundance indices by age groups for sprat and herring obtained from data of the vessels-participants of BIAS have different accuracy varying from survey to survey. These differences in accuracy may be stipulated by significant spatial variability of fish distribution on the survey area. Introduction of new TS regressions into BIAS data processing will allow to improve the abundance indices reliability in the young fish age group forming recruitment, as well as to assess more realistically the abundance dynamics by years for each age group, providing the most important information for tuning stock assessment models.

5.3 Combining data from trawl and acoustic surveys to improve stock assessment of demersal fish: example of mackerel icefish (Ch. gunnari) survey. Presented by: Svetlana Kasatkina

The main aspects of method developed to improve demersal fish stock assessment by estimating its bottom and pelagic components are presented in the working document "Combining data from trawl and acoustic surveys to improve stock assessment of demersal fish: example of mackerel icefish (Ch. gunnari) survey". It was highlighted that the bottom trawl survey data can not represent the length structure of the demersal fish population. Combined results of the trawl and acoustic surveys may provide important data for recruitment and TAC calculations. The author assumes that developed method can be use as tool for fish stock assessment in the cases when the traditional near-bottom distribution of demersal fish changes as a result of environment factors (e.g. cod migration from the near-bottom layer with depleted oxygen).

5.4 Vertical and horizontal distribution of cod (Gadus morhua L.) in the Bornholm Basin in relation to ambient hydrography as resolved by hydroacoustics. Presented by: Matthias Schaber

The assumption of no catches of cod in areas with oxygen depleted zones near the bottom (< 1.5 ml/l) as realized in BITS survey can lead to a bias in cod stock assessment indices. Cod are known to be distributed pelagically in the water column, especially in deep areas of the central Baltic with extended oxygen depleted zones towards the bottom layers. In order to enhance the knowledge of habitat preferences and limits of Baltic cod, hydroacoustically based analyses were conducted clearly showing different distribution behaviour in different hydrographic regimes (inflow in 2003 vs. stagnation in 2005). Single-target echotracking revealed a clear influence of salinity as upper and oxygen concentration as lower habitat limit. Cod in both years analysed inhabited a wide range of salinity and oxygen concentration but significantly preferred habitats with a salinity of more than 11.5, whereas in 2005 a clear avoidance of deep water layers with less than 1.5 ml/l O2 was obvious. Thus, in years with well oxygenated deep water layers, cod are distributed on a broader vertical scale than in years with oxygen depletion near the seabed when cod are distributed exclusively pelagic above the low-oxygen zones. The vertical distribution characteristics of cod during spawning time as derived from hydroacoustics were validated with data-storage-tag recordings showing a similar depth distribution. Preliminary results of single-fish echotracking along hydroacoustic transects covering the Bornholm Basin conducted in May and August 2006–2008 clearly show that this distribution behaviour is also visible on a larger scale with significant fractions of cod being distributed pelagically in the central Basin in years/areas with oxygen depletion near the seabed. The distribution patterns mostly followed the clines identified as threshold levels in the previous study.

The following discussion on the presentation revealed that the "problem" of pelagic cod has been known for a while but so far has not been considered in the production of cod stock indices based on BITS as "pelagic" cod are out of the layers covered by the bottom-trawlnet applied. Thus, indices for cod have to be produced additionally by acoustic surveys. This however requires knowledge of differences and similarities respectively of age, length and sex distribution of pelagic cod compared to "normally" distributed demersal cod surveyed during BITS. For more detailed information see Chapter 15 of this report.

5.5 An attempt of estimation the time-effort consumption during the Baltic fishes routine length measurements and documentation" (Presented by: Wlodzimierz Grygiel

Presentation entitled "An attempt of estimation the time-effort consumption during the Baltic fishes routine length measurements and documentation" (author: W. Grygiel – SFI in Gdynia/Poland) given at the BIFSWG meeting in Lysekil contains results of an experiment conducted on board of the Polish RV "Baltica", during the BITS 4Q – 2008 and BITS 1Q – 2009 surveys.

The evaluation of the time-effort consumption for 100 specimens of the Baltic main fishes (already sorted out by species) routine length measurements, the data registration and manipulation with the boxes by two-person experienced team (at relatively good weather condition) per species is as follow:

- cod – 7.5÷9.0 minutes,
- herring – 13.0÷14.5 minutes,
- sprat – 8.0÷9.5 minutes,
- flounder – 17.0÷18.0 minutes,
- bycatch (three species) – 19.0÷23.0 minutes,
- totally – 64.5÷74.0 minutes per one catch-station.

Presentations entitled "The international acoustic investigations of clupeid stocks size and distribution in the southern and eastern Baltic – based on the RV "Baltica" BASS and the BIAS surveys in 2008" (author: W. Grygiel – SFI in Gdynia/Poland) given at the BIFSWG meeting in Lysekil contains summary of the results obtained from the Latvian-Polish BASS survey in the central-eastern Baltic (14–25.05.2008), the Polish BIAS survey in the southern Baltic (13–30.09.2008), the Latvian-Polish BIAS survey in the central-eastern Baltic (07–17.10.2008) and the Estonian-Finnish-Polish BIAS survey in the northeastern Baltic (19–30.10.2008). In the Polish waters the position of sprat as dominant, regarding biomass, in recent three years changed to herring. In September-October 2006–2008 the proportion of herring and sprat in mass of the research catches as well as the cpue and stocks size of biomass in the southern Baltic significantly contrasted with clupeids stocks size in the northeastern Baltic. In the northeastern Baltic sprat stock biomass density and the total biomass in October 2008 were about 7-times higher than herring stock resources. In autumn 2006–2008, herring stock biomass distribution was characterized by a few concentration zones, which were more stable in the warmer southern Baltic waters and sprat was concentrated mostly in the northern part of the Baltic, with variable southern limit range. Differences in the clupeids share in research catches and fishing efficiency as well as in their biomass spatial distribution within the southern and eastern parts of the Baltic can resulted from a relatively high a seawater temperature (14–18ºC) appeared in autumn 2006–2008 in the 0–40 m depth zone of the southern Baltic. In the Gotland Basin and adjacent waters, temperature in the above-mentioned layer was lower and

ranged from 10 to 14ºC. The Baltic clupeid stocks distribution peculiarities and differentiated abundance of recruiting year-classes created problems in the local commercial fishery in given season.

5.6 Reference collection of otoliths and re-reading historical otoliths for flounder. Presented by: Ulrich Berth

The re-reading of historical otoliths is the basis for a new analytical assessment for Baltic flounder. To assure international consistency in the age reading, a reference collection of typical otoliths with agreed ages and individual data should be available. Such a reference collection should consist of the original otolith slices, images of the whole otolith and the slice, biological data for the individual specimen as well as position, depth and time of capture.

The processes of the selection of candidates to be sliced for the reference collection and the re-reading may be combined. From all available historical otoliths, candidates to be sliced for the re-reading should be selected randomly stratified by subdivision, depth, year, season, sex, maturity and length.

After the slicing, typical specimen may be selected for the reference collection then submitted an international comparative reading. The re-reading can start after having the reference collection available.

In the presentation, an example calculus is given how the time-series grows when assuming a strategy of reading each year the otoliths of the present and re-reading the otoliths of two past years.

6 Update of FishFrame acoustic

FishFrame ver. 4.3 has a maximum size (1 MB) for files to be uploaded. The new version 5.0 of FishFrame (to be released in July 2009) does not have this kind of limit on file sizes but unfortunately no acoustic module has been included in version 5.0 as a result of lack of funds It is still at present not known when or if the acoustic module is to be included in ver. 5.0. The final decision awaits an internal meeting in DTU.Aqua clarifying the future of FishFrame. If the lack of funds from international sources is a permanent situation, DTU.Aqua will consider changing the purpose of FishFrame from a database having a regional perspective to a national perspective giving priority to output having primary national interest only. The decision in DTU.Aqua about the future of FishFrame awaits the final decision from The EU Commission.

6.1 Minimum vertical resolution of the NASC

The agreed vertical resolution causes a significant increase of the file size of the exchange files to more than 1MB which is the maximum file size for the present version of FishFrame ver. 4.3. There are ways to get around this (splitting the file into two files) but this is not satisfying for future routine use.

6.1.1 Background

During the WGBIFS meeting 2008 it was recommended to supply data to the FISHFRAME ACOUSTIC DATABASE as follows:

The WG has discussed the vertical resolution of the NASC values. A minimal resolution of 10 m is recommended in future. Already existing data can be kept as a total NASC from the surface to the bottom but a later rearrangement to the standard is strongly advised.

Since uploading of these data are not possible as a result of technical problems in the FISHFRAME ACOUSTIC DATABASE this recommendation has not been followed.

7 Plan and decide on acoustic surveys and experiments to be conducted in 2009 and 2010

7.1 Planned acoustic survey activities

All the Baltic Sea countries intend to take part in acoustic surveys and experiments in 2009. 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	24, 25, 26 (part), 27 (part)	05.04–05.25	21
DARIUS	Lithuania	26 (Lithuanian EEZ)	May	2
ATLANTNIRO	Russia	26	June - July	12
BALTICA	Poland	24(SE), 25, 26	22–24.09. and 20–31.10.	15
ARGOS	Sweden, Finland	30	09.21–10.02.	10
ARGOS	Sweden	25(N), 26(NW), 27, 28 (W), 29 (W)	10.12–10.30	15
SOLEA	Germany, Denmark	21, 22, 23, 24	10.02–10.21	19
BALTICA	Latvia, Poland	26(N), 28	09.25–10.04	10
BALTICA	Estonia, Finland, Poland	28(N), 29 (part), 32(W)	10.05–10.16.	12
ATLANTNIRO	Russia	26	11.-23.10.	12
DARIUS	Lithuania	26 (Lithuanian EEZ)	October	2
CHARTER	Latvia, Estonia	28 (Gulf of Riga)	July, August	10

The preliminary plan for acoustic surveys and experiments in 2010 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 (N), 28	May	12
Walther Herwig III	Germany	24, 25, 26 (part), 27 (part)	May	22
DARIUS	Lithuania	26 (Lithuanian EEZ)	May	2
ATLANTIDA/ ATLANTNIRO	Russia Uncertain	26	May	10
BALTICA	Poland	24 (SE), 25, 26	October	15
BALTICA	Latvia, Estonia, Finland, Poland	SD26 (N), 28, 29 (part), 32 (W)	September/October	22
ARGOS	Sweden	25(N) , 26(NW), 27, 28 (W), 29 (W)	September-October	20
ARGOS	Sweden, Finland	30	September-October	13
SOLEA	Germany/Denmark	21, 22, 23, 24	October	22
DARIUS	Lithuania	26 (Lithuanian EEZ)	October	2
ATLANTIDA/ ATLANTNIRO	Russia Uncertain	26	October	12
CHARTER	Latvia, Estonia	28 (Gulf of Riga)	July	10

7.2 On the extended acoustic survey in the Gulf of Bothnia

In order to maintain the proper coverage of the herring stocks it is recommended to continue the joined Swedish and Finish coverage of Sub-division 30.

7.2.1 Recommendations

WGBIFS recommends that the coverage of SD 30 by the Gulf of Bothnia survey is continued.

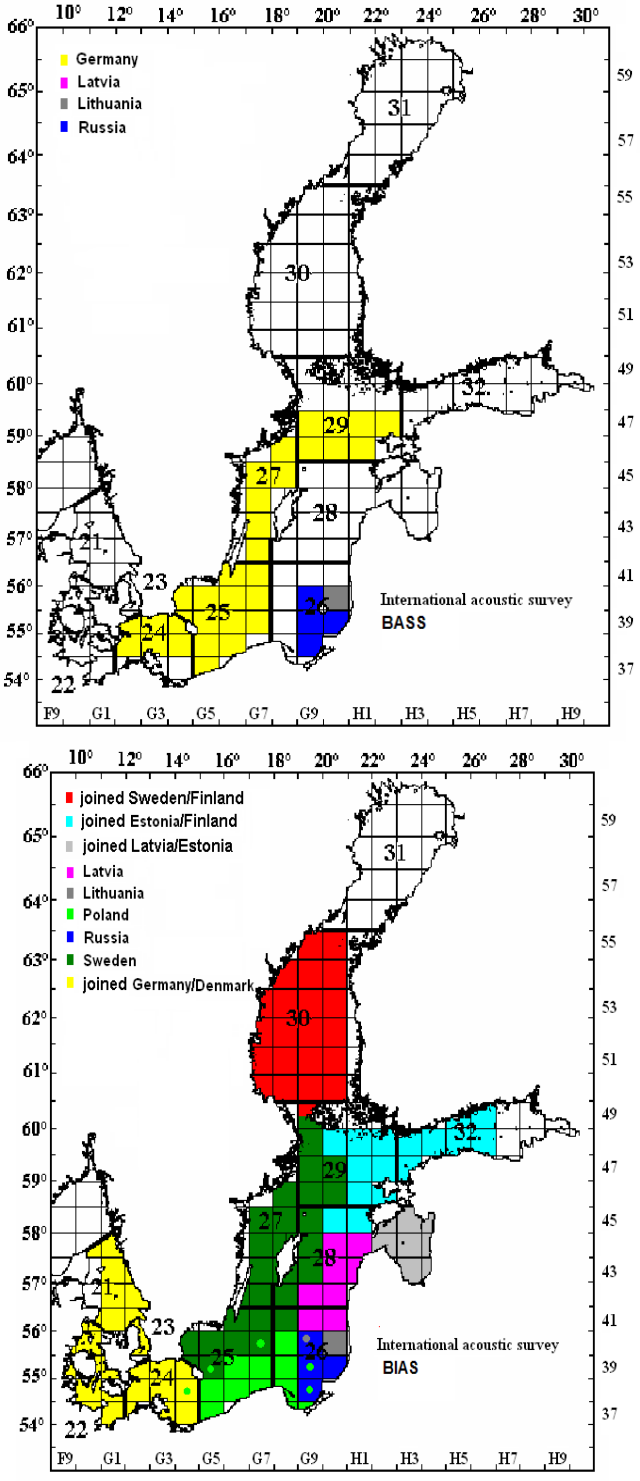
7.3 New design of acoustic surveys (proposed in 2005)

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).

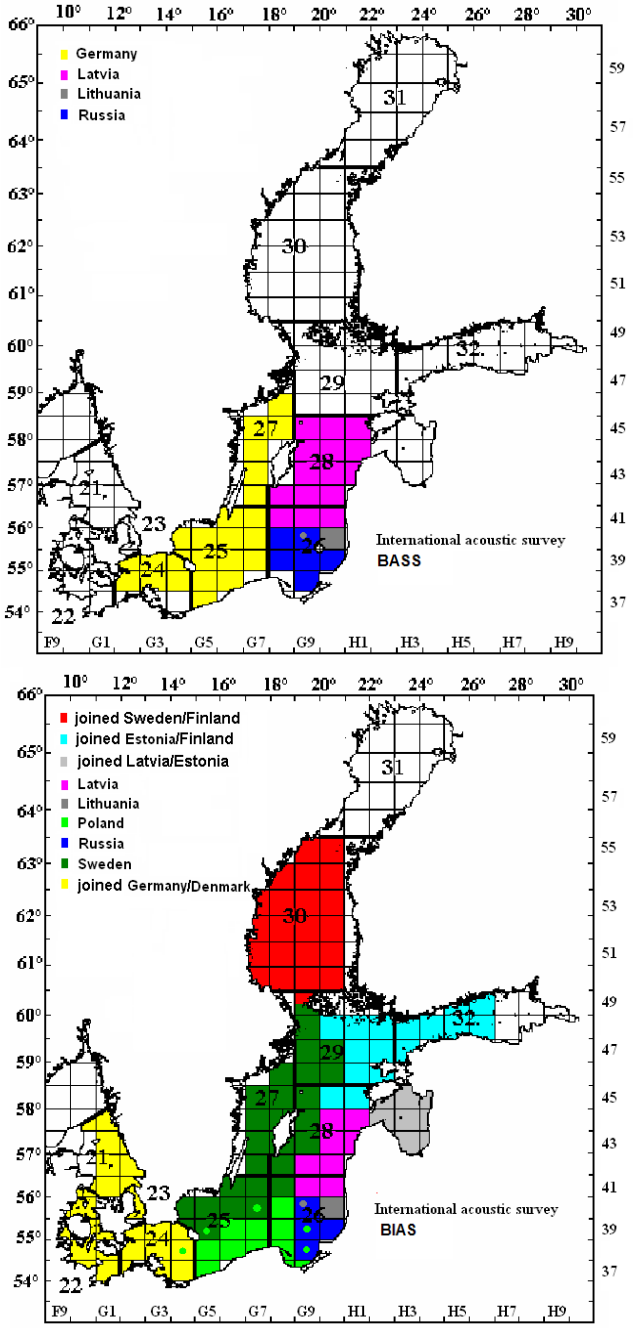
As many countries are performing joint acoustic surveys and the data are presented to the WGBIFS on survey basis, therefore the ICES-Rectangles are assigned on national/joint survey basis for 2008 and 2009.

The planned coverage of the Baltic Sea and the assignment of the national/joint acoustic surveys to the rectangles in 2009 are presented in Figures 7.3.1 and 7.3.2. The uncovered rectangles in BASS 2009 are because of funding problems. This will have a severe affect on the quality of the sprat index calculated for BASS 2009. The planned coverage of the Baltic Sea and the assignment of national/joint surveys to the rectangles during the acoustic surveys in 2010 are presented in Figures 7.3.3 and 7.3.4. The

planned assignment of rectangles may be changed. This is likely for BASS 2009 and very likely for both surveys in 2010.



Figures 7.3.1–7.3.2. 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 2009 (from left to right). 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).



Figures 7.3.3–7.3.4. Proposed preliminary partitioning (assignment of the national/joint surveys to rectangles) for the May and the October surveys in 2010 (from left to right). 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)

The main results of both acoustic surveys in May/June and October 2009 should be summarized and reported in standard report format (ICES CM 2008/LRC:08, Addendum 2) and in BAD1 format to the acoustic surveys co-ordinator **(Niklas Larson, niklas.larson@fiskeriverket.se)** and the BAD1 manager **(Eberhard Götze, eberhard.goetze@ifh.bfa-fisch.de)** not later than 1 March (one month before the ICES WGBIFS meeting of the next year). These results are intended for the information of the ICES Assessment Working Groups.

8 Rules for acoustic dealing with non target species

8.1 Background

A long list of species is caught during the survey. In the BIAS manual (ICES CM 2008/LRC:08, Addendum 2), Table 5.7, target strength (TS) parameters are only given for some few species. In order to be able to interpret the data collected correct it must be demonstrated that the TS values of the species do not differ significantly from the species in the manual or all acoustic important species have to be assigned to species-specific TS values. Species specific TS values have to be identified by special field experiments to the extent that international agreed values are not available in the literature. The sources of the TS parameters should be given in the Table 5.7.

This study of available literature and WGFAST reports should be done before the next WGBIFS meeting. Germany will study fish species in SD 21–24 and Sweden will study fish species in SD 25–30. If data are available it will be circulated among WGBIFS members by e-mail in due time before the next WGBIFS meeting.

8.2 Recommendations

To WGBIFS:

a) The table 5.7 in the BIAS manual should be updated for fish species found in the survey area either with internationally agreed target strength parameters or assumed parameters for species or species groups where a target strength has not been established. Germany will study fish species in SD 21–24 and Sweden will study fish species in SD 25–30.

b) Until new TS parameters are agreed the following is suggested. Gadoids should be treated as cod. Salmonids and 3-spined stickleback should be treated as herring. Fish without swimbladder should be treated as mackerel. Other fish species should be treated as cod.

To WGFAST and ICES ASC:

A new Study Group for the investigation of target strength properties of Baltic fish species should be established. This Study Group should cover the acoustically important fish species and not only commercially important fish species. The Study Group should also give advice on procedures for determination of TS for Baltic species like 3-spined stickleback and lump sucker.

9 Suggestion for updating the procedure for calculating indices for acoustic surveys

Based on the Working document entitled "HOW DOES BIAS DATA PROCESSING CORRESPOND TO THE MANUAL?" (authors: S.M. Kasatkina and P.S. Gasyukov) it can be conclude that BIAS data processing is not always regulated by the current BIAS Manual. Presented results demonstrated that deviations from the Manual can be found at all stages of the data processing including estimates of the species and length composition, mean weighted Sigma and fish abundance. The source for these deviations is the situations where fish appear in mixed aggregations, where herring, sprat and cod do not constitute the basic species composition. In this case the data processing in the current Manual is developed insufficiently, including lack of target strength equations for species with less commercial importance.

Selected results of data processing in the ICES rectangles covered by each vessel participated in surveys 2004–2006 show that the BIAS data processing is not unified.

The following questions appear in relation to the current practice of BIAS data utilization:

- whether the formation of BAD1 is correct without unification of BIAS data processing?
- Whether the pooled abundance indices obtained without proper unification of BIAS data processing are correct as the basis for estimating sprat and herring stocks in the Baltic Sea?

To clear up the differences between the real procedures of BIAS data processing and those from the current Manual could be made by submission of the detailed description of the used methods by all participants of BIAS.

It was recognized that the problem of unification and standardization of BIAS data processing may be solved by two approaches:

- On the basis of the adopted current Manual for BIAS;
- On the basis of a new version of the Manual developed to improve the BIAS methodology in compliance with advanced methods of data processing and ICES WG's recommendations (i.e. WGFAST, WFBFAS).

The first step in revising the Manual for BIAS should include the following:

1) Implementation of the rules for acoustic dealing with species of less commercial importance including recommendations on TS-length relationships for these species.

2) Improvement of the algorithms which are used for estimating species composition and fish length distribution by combining trawl catches within each stratum in compliance with the commonly used methods of sampling techniques (Cochran G., 1963, Manual for the Baltic International Trawl Surveys; Gdynia, March/April 2008).

10 On the coordinated bottom-trawl surveys in 2008 and 2009

10.1 Results from the BITS performed in autumn 2008 and spring 2009

10.1.1 BITS 4th quarter 2008

Altogether 219 hauls were planned for this survey. 191 hauls were carried out successfully using standard TV3 or rock-hopper TV3. 5 of those were hauls were replaced. 8 hauls were invalid. Additional 20 hauls were assumed as zero catch because of low oxygen content at the bottom. The deviation in number of hauls by depth strata and Sub-div is given below (Figure 10.1.1.1). All in all, 11 hauls fewer than planed were carried out as a result of hard weather. The deviation was most significant in SD 25 where 32 hauls out of 75 hauls planed were not carried out. The calculation of indices stratify both on Sub-division and depth strata which means that although the coverage is biased compared to the planed, the indices is not. Therefore, it is the conclusion from WGBFAS that the index value is fully valid. All collected data are submitted to DATRAS database. The Latvian survey with the chartered Polish RV "Baltica" did not get the permission for working in Latvian territorial waters. Tows within 12 miles zone were moved to the appropriate depth strata in the Polish/International zone. Most countries performed acoustic logging during the survey.

	ICES Sub-division						Grand
Depth Strata	22	24	25	26	27	28	Total
<20m			-1				-1
>100m			0	3	3	1	7
10-19 m	0						0
20-29 m	0						0
20-39m			-7	0		0	-7
40-59m			-15	2	0	1	-12
60-79 m				0			0
60-79m			-14	11	0	-2	-5
80-99m			5	-3	1	6	9
10-19m		0					0
20-29m		-1					-1
30-39m		-1					-1
40-49m		0					0
50-59m		0					0
Grand Total	0	-2	-32	13	4	6	-11

Figure 10.1.1.1. BITS 4th quarter 2008. Deviation of number of hauls carried out from number of hauls planed.

10.1.2 BITS 1st quarter 2009

Altogether 250 hauls were planned for this survey. 230 hauls were carried out successfully using standard TV3 or rock-hopper TV3. 17 of those hauls were replaced. 4 hauls were invalid and additionally 14 hauls were assumed as zero catches. The deviation in number of hauls by depth strata and Sub-div is given below (Figure 10.1.2.1). It can be concluded that this survey was performed only with minor deviations which did not affect the coverage. Most countries performed acoustic logging during survey.

Depth Strata	ICES Sub-division						Grand Total
	22	24	25	26	27	28	
<20m			0				0
20-39m			0	0		0	0
40-59m			-1	2	0	0	1
60-79m			1	9	0	1	11
80-99m			1	6	1	6	14
>100m			0	-5	3		-2
10-19m	0	0					0
20-29m	0	0					0
30-39m		0					0
40-49m	0						0
50-59m		0					0
Grand Total	0	0	1	12	4	7	24

Figure 10.1.2.1. BITS 1st quarter 2009. Deviation of number of hauls carried out from number of hauls planed.

Standard reports giving overviews of the result of 1st and 4th quarter surveys from each country can be found in Annex 7. More detailed descriptions of most of the individual surveys can be found in Annex 6 (or Annex 8 if the report is presented as a working document).

10.1.2.1 Recommendation to WGBFAS

The results of the BITS 4th quarter 2008 and BITS 1st quarter surveys 2009 can be used as basis for calculation of the indices.

10.1.3 Danish Sole Survey

All 120 planned stations were covered in 2008, but one station was rejected as a result of technical problems. The surveys are conducted with trawls designed for sole fishery. Never the less, cpue, biomass, abundance and length frequencies are also estimated for cod, plaice and Norway lobster. The estimated values are hence probably underestimated, but because the trawl and the fishing stations are the same from year to year the values can be considered as indices.

10.1.3.1 Recommendation to WGBFAS

The results of the Danish sole survey 2009 can be used as basis for calculation of the indices.

10.1.4 Havfisken

No reports were available from the Havfisken survey.

10.2 Inclusion of Ancylus and Havfisken data in DATRAS

As the Ancylus survey is to be discontinued, no attempt has been made to modify DATRAS in order to be able to hold Ancylus survey data.

DATRAS has been adapted in order to hold survey data from Havfisken. All Havfisken survey data from the 1st and 4th quarters from 1995 and on are uploaded to DATRAS as routine.

10.3 Suggestion for revision of the survey plans for the scientific surveys covering Kattegat and Western Baltic

10.3.1 Present coverage

10.3.1.1 Kattegat

The Kattegat has in 1st and 4th quarter been covered from 1996 and on by "Havfisken" performing a bottom-trawl survey using the small standard TV3 trawl (TV3–520#). One haul has been made in each relevant ICES statistical Rectangle per survey. The time serial is an important input for the Kattegat cod stock assessment.

The Swedish "Ancylus Survey" is to be discontinued and succeeded by a new Swedish standard survey covering the whole Kattegat. The new survey will be designed to provide tuning series for assessment of the Kattegat cod stock as well as designed with special considerations to the monitoring of the closed areas in Kattegat. The survey gear will be the small standard trawl (TV3–520#). The survey will be conducted every quarter and each survey will carry out approximately 50 hauls. Detailed strategy of the survey is not yet decided.

The Danish Sole Survey covers the all part of Kattegat relevant to the sole indices and is targeting sole. The survey is done in 4th quarter and the gear used is the "Icelandic-sole-trawl".

Furthermore, Argos covers the Kattegat in 1st and 3rd quarters as part of the IBTS survey coordinated by the IBTSWG.

10.3.1.2 Western Baltic

In the Western Baltic four indices series are maintained.: The German "Solea index" in 1st and 4th quarter which covers the central and southern part of the area and the Danish "Havfisken" index in 1st and 4th quarter which covers the northern part of the area. The 1st and 4th quarter surveys are carried out as internationally coordinated surveys in accordance with the BITS Manual and use the small standard TV3 trawl (TV3–520#).

10.3.1.3 Revision of the coverage

The WGBIFS has in 2008 recommended that both the 1st and 4th quarters of the two surveys in the Western Baltic are combined and one common index is calculated. It is believed that the two surveys combined provide a better spatial coverage of the cod distribution. The WKROUND (Benchmark assessment of selected round fish stocks) has in 2009 recommended that in order to use the combined surveys in future assessment a larger spatial overlap between vessels is needed to account for the vessel affect. This recommendation is based on the observation that Solea catch significantly more cod than "Havfisken" when the catches are compared for the few hauls made in the same Statistical Rectangle. It is not known if the difference is caused by the different spatial distribution (different fishing depth) or if it is caused by different fishing power of the two vessels. It is to some extend questioned if Havfisken is able to maintain the correct velocity during fishing as a result of lack of sufficient machine power.

In order to clarify the difference in catch amount between Solea and Havfisken it is suggested that some effort of Havfisken is moved from Kattegat to Western Baltic and that some calibration hauls are made between the two vessels. Because the abundance of cod is higher and more constant in Sub-division 24 than in Subdivision 22, a number of calibration hauls are suggested to be made in SD 24 during the 4th quarter

BITS survey. The arrangement will be bilateral agreed by Germany and Denmark before the start of the 4th quarter survey in 2009

Havfisken will continue enough fishing activity in Kattegat in order to maintain the time-series established. It will be investigated if it is possible to combine the results of Havfisken and the results of the new Swedish survey into a new index. The coverage of Kattegat will be arranged bilaterally between Sweden and Denmark as soon as the planning of the new Swedish survey is decided.

10.4 Extended data collection of flounder, plaice, turbot, dab and brill

To improve the data of flounder, plaice, turbot, dab and brill, sex separated length distribution and maturity information are needed. Therefore, it is recommended that this is done on the BITS survey. Each country should obtain at least 20 specimens per length class per ICES Subdivision, per survey. Alternatively, a complete separate standard biological analysis on board the vessel can be carried out for each sex.

10.4.1 Recommendations from the WKARFLO concerning age reading of flounder

Till 2005, an exploratory assessment for flounder was presented. WGBFAS stated in 2006 the age data of flounder inconsistent and postponed any analytical assessment until a better data basis can be demonstrated. Consequently, in 2006 the Workshop on Alternative Strategies for the Assessment of Baltic Flounder (WKAFAB, see report in the Background and Working Documents folder/appendix) was held in Öregrund in Sweden. In 2007 and 2008 Workshops on Age Reading of Flounder (WKARFLO, see reports in the Background and Working Documents folder/appendix) were held in Öregrund and Rostock, Germany. One of the main outcomes of these workshops was that the ages read from whole flounder otoliths were too low for the older fish. This was found to occur as a result of a stacking of growth zones, i.e. that the zones in older fish can be seen only in transects. This has the consequence that flounder otoliths should be sliced and stained or at least burnt and broken before reading.

The sampling of flounder otoliths during the BITS surveys and the subsequent age determination will continue to be coordinated within the BIFSWG.

10.4.1.1 Recommendation to WGBIFS:

It is recommended to continue to sample flounder regularly for sex, maturity, age and length during the BITS survey and apply the slicing and staining or the burning and breaking methods to determine the age. Reading whole otoliths is not considered as appropriate.

On WKARFLO 2008, it was stated that the age reading of flounder would benefit from a reference collection of otoliths with internationally agreed ages.

For that purpose, each country is encouraged to establish a collection of typical otoliths and produce images as well as sets of individual data for them. The collection should show examples for the variability of the region, season, age and sex strata. The collection of otoliths for this Reference Collection should be started from survey catches.

10.4.1.2 Recommendation to WGBIFS:

The group recommends the collection, preparation and age-agreement of typical otoliths with the aim to establish a Reference Collection as support for consistent age reading of the Baltic flounder.

To produce the better data basis needed for a future flounder assessment, a re-reading of historical otoliths is necessary. To achieve consistency in the ages, the re-reading should already base on the reference collection. The best strategy for the re-reading would be to prepare and read the otoliths of the current year and successively read selected otoliths from one or two previous years until the time-series is long enough for starting a new analytical assessment.

Establishment of the schedule for re-reading of flounder otoliths is considered as out of the remedy of WGFIFS, but the group supports the initiative and forward the request to WGBFAS.

10.4.1.3 Recommendation to Baltic RCM/PGCCDBS:

WGBIFS recommends that the re-reading of historical flounder otoliths in order to establish a consistent data basis for a new analytical assessment of flounder in the southern Baltic is initiated by the Baltic RCM or if of more general interest by the PGCCDBS.

11 Plan and decide on demersal trawl surveys and experiments to be conducted in autumn 2009 and spring 2010

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 2009) was used to estimate the 5 years - running means of distribution pattern of both cod stocks by depth layer and the ICES Subdivision. The running mean of the BITS indices of age-group 1+ of cod from 2004 - 2008 in spring 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 2009 and spring 2010 as in the years before. The small variations did not lead to a significantly decrease of the total number of stations by surveys.

The total number of available stations (Table 11.1) was used in the combination with the results of relative distribution of stations by the ICES Subdivision and depth layer (Tables 11.2 and 11.3) to allocate the number of total planned stations by the ICES Subdivision and depth layer for the different surveys. Tables 11.4 and 11.5 present the allocated hauls by the ICES Subdivision and the depth layer for autumn survey in 2009. Furthermore, the number of hauls to be carried out by countries in the different Subdivisions is given. Tables 11.6 and 11.7 show the data corresponding for the survey in spring 2010.

The planned stations by country and the 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 2009. During spring survey in 2010 Russia is able to work in the Polish and Swedish zone, too. Latvia can only work in the Latvian zone during both planned surveys. The number of hauls for Latvia is preliminary.

Table 11.1. Total numbers of stations planned by country during BITS in autumn 2009 and spring 2010.

Country	Vessel	Number of planned stations in autumn 2009	Number of planned stations in spring 2010
Germany	Solea	60	57
Denmark	Havfisken	23	23
	Total 22 + 24	83	80
Denmark	Dana	50	50
Estonia	Commercial vessel	10	
Finland			
Latvia	Chartered vessel	25	25
Lithuania	Darius	8	8
Poland	Baltica	24	34
Russia	Atlantniro/Atlantida	15	33
Sweden	Argos	30	50
	Total 25 - 28	162	200

Table 11.2. Basic data for allocating hauls for survey by ICES Subdivision.

ICES Sub-div.	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+ (2004 – 2008)	Proportion of the index values (weight=0.4) [%]	Proportion of the stations [%]	Special decisions (additional stations)
22	3673	39	180	19	31	
23	0	0	0	0	0	3
24	5724	61	760	81	69	
Total	9397	100	940	100	100	
25	13762	43	601	60	50	
26	9879	31	305	30	31	
27	0	0	0	0	0	10
28	8516	26	95	9	20	
Total	32156	100	1001	100	100	2

Table 11.3. Basic data for allocating hauls according to depth layer for survey by ICES Subdivision.

ICES Sub-div.	Depth layer	Total area of the depth layer	Proportion of the depth layer (0.6)	Running mean of the cpue value of age-group 1+ (2004 - 2008)	Proportion of the depth layer (0.4)	Proportion of the depth layer
	[m]	[nm²]	[%]		[%]	[%]
24	10 - 39	4174	73	622	17	50
	40 – 59	1550	27	1036	28	27
	60 – 79	29	0.50	2044	55	22
	Total	5724	100	3702	100	100
25	10 - 39	4532	37	199	7	25
	40 - 59	3254	26	1216	42	33
	60 - 79	3037	25	1182	41	31
	80 -	1461	12	310	11	11
	Total	12284	100	2907	100	100
26	10 - 39	2379	23	156	10	18
	40 - 59	1519	15	588	37	24
	60 - 79	1911	19	549	35	25
	80 - 100	2872	28	172	11	21
	100 - 120	1504	15	122	8	12
	Total	10185	101	1587	100	100
27	10 - 39	1642	31			18
	40 - 59	1101	21	16	15	18
	60 - 79	996	19	75	69	39
	80 -	1596	30	17	16	24
	Total	5335	100	108	199	100
28	10 - 39	2589	39	3	1	24
	40 - 59	1598	24	37	9	18
	60 - 79	1101	16	234	57	33
	80 - 100	1389	21	139	34	26
	Total	6677	100	413	100	100

Table 11.4. Allocation of planned stations by country and ICES Subdivision in autumn 2009.

		Subdivision						
Country	Total	22	23	24	25	26	27	28
Denmark	73	20	3		50			
Estonia	10							10
Finland								
Germany	60	5		55				
Latvia	25					13		12
Lithuania	8					8		
Poland	24				14	10		
Russia	15					15		
Sweden	30				12		10	8
Total	245	25	3	55	76	46	10	30

Table 11.5. Allocation of planned stations by ICES Subdivision and depth layer in autumn 2009.

Sub-div.	22	23	24	25	26	27	28
Depth layer [m]							
10 – 39	25	3	28	19	8	3	7
40 – 59			15	25	11	2	5
60 – 79			12	23	12	2	10
80 – 100				9	10	3	8
100 – 120					5		
Total	25	3	55	76	46	10	30

Table 11.6. Allocation of planned stations by country and ICES Subdivision in spring 2010.

		Subdivision						
Country	Total	22	23	24	25	26	27	28
Denmark	73	20	3		40	10		
Estonia								
Finland								
Germany	57	4		53				
Latvia	25					3		22
Lithuania	8					8		
Poland	34				19	15		
Russia	33				13	20		
Sweden	50				22	2	10	16
Total	280	24	3	53	94	58	10	38

Table 11.7. Allocation of planned stations by ICES Subdivision and depth layer in spring 2010.

SUB-DIV.	22	23	24	25	26	27	28
DEPTH LAYER [M]							
10 – 39	24	3	27	23	10	3	9
40 – 59			15	31	14	2	7
60 – 79			11	29	15	2	12
80 – 100				11	12	3	10
100 – 120					7		
Total	24	3	53	94	58	10	38

12 Update and correct the tow database

12.1 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 2008 and partly of the survey in spring 2009 were used to improve the quality of the Tow Database. Some stations were deleted (stones, wrecks, area with munitions, …) or were corrected dependent on the information of the different countries. More than 90% of the stations which are stored in the Tow Database were already successfully used at least one time. The realization of the surveys showed that gear can be destroyed at stations which were already successfully used during the previous surveys. 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 2008 was not available before the meeting started. The missing feedback will be used immediately after submission by the countries. Then the version TD_2009V1.XLS will be made available for all countries.

12.2 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

12.2.1.1 Agreed guidelines to follow:

It was agreed that:

- The feedback of realized surveys should be submitted to Germany using the proposed standard format not later than **20 December** (autumn survey) **and immediately after spring survey.**
- It is not allowed to use the rock-hopper groundrope in the following areas:
- southern part of ICES Subdivision 24
- ICES Subdivision 25
- southwestern part of ICES Subdivision 26
- The standard groundrope 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".

12.3 Review and update THE BALTIC INTERNATIONAL ACOUSTIC SURVEYS (BIAS) MANUAL

Review of the text of the BIAS manual (updated in 2008) as well as presentations and discussion during WGBIFS meeting has resulted in following agreed changes:

a) "DATA EXCHANGE AND DATABASE" – "Exchange of survey results" – current survey data should be submitted to the Baltic Acoustic Surveys coordinator at following e-mail address: niklas.larson@fiskeriverket.se, in the BAD 1 format using the Excel spreadsheet; name of the file, e.g. BAD1POL2008.xls should contain the abbreviation of the database i.e. BAD1, three letters code of the country delivered, e.g.: POL – for Poland, SWE – for Sweden, etc., and year of survey realization.

b) The Table 5.7 in the BIAS Manual should be updated for fish species (e.g. stickleback, salmonids, lumpfish, *Petromyzoniformes*) found in the survey area either with internationally agreed target strength (TS) parameters or

with assumed parameters for species or species groups where the target strength has not been established. The sources of the TS parameters should be given in the Table 5.7. This will be done as a study of available literature and the WGFAST reports and should be updated before the next WGBIFS meeting. Germany will recognize the TS data for fish species in the ICES Subdivisions 21–24 and Sweden for fish species in the ICES Subdivisions 25–30. If data are available, it will be circulated among WGBIFS members by e-mail even before the next WGBIFS meeting.

13 Review and update the Baltic International Trawl Surveys (Bits) Manual

The following issues, discussion before and during WGBIFS meeting, did result in change of procedures during the BITS survey. The changes are reflected in the following updating of the text in the current version of the BITS Manual (last updated in 2008):

Update of the coding of the H_Val variable

Depending on the solution selected by ICES (see Section 16.1) the BITS exchange format shall be updated to one of the following alternatives:

If H_Val is split into two variables:

HaulVal	24	1	char	I, V	Invalid =I, Valid =V

HaulType	25	1	char	S, C, N, A, M	Standard haul using standard gear=S, Calibration haul =C No oxygen at bottom =N Extra haul (not allocated using standard procedure) =A Pelagic haul using mid water gear = M

If H_Val is not split into two variables:

HaulVal	24	1	char	VS, VC, VN, VA, VM, IS, IC, IN, IA, IM	Code of the following values: Valid=V, Invalid=I, Standard haul using standard gear=S, Calibration haul=C No oxygen at bottom=N Extra haul (not allocated using standard procedure)=A Pelagic haul using mid water gear=M

a) Sex separated length distribution and maturity information are needed in order to improve the assessment input data of flounder, plaice, turbot, dab and brills (The relevant species from the DCF type 2 species list). Therefore, the group recommends that such procedure be adopted on the BITS survey. Each country should obtain at least 20 specimens per length class per ICES Subdivision, per survey. However, the standard biological analysis can separately be carried out for each sex for the same purpose.

14 Review and update The Baltic International Acoustic Surveys (Bias) Manual

Review of the text of the BIAS manual (updated in 2008) as well as presentations and discussion during WGBIFS meeting has resulted in following agreed changes:

a) "DATA EXCHANGE AND DATABASE" – "Exchange of survey results" – current survey data should be submitted to the Baltic Acoustic Surveys co-ordinator at following e-mail address: niklas.larson@fiskeriverket.se, in the BAD 1 format using the Excel spreadsheet; name of the file, e.g. BAD1POL2008.xls should contain the abbreviation of the database i.e. BAD1, three letters code of the country delivered, e.g.: POL – for Poland, SWE – for Sweden, etc., and year of survey realization.

b) The Table 5.7 in the BIAS Manual should be updated for fish species (e.g. stickleback, salmonids, lumpfish, Petromyzoniformes) found in the survey area either with internationally agreed target strength (TS) parameters or with assumed parameters for species or species groups where the target strength has not been established. The sources of the TS parameters should be given in the Table 5.7. This will be done as a study of available literature and the WGFAST reports and should be updated before the next WGBIFS meeting. Germany will recognize the TS data for fish species in the ICES Subdivisions 21–24 and Sweden for fish species in the ICES Subdivisions 25–30. If data are available, it will be circulated among WGBIFS members by e-mail even before the next WGBIFS meeting.

15 Vertical distribution of cod

15.1 Background

The Baltic International Trawl Survey (BITS) is by tradition used to produce indices for a tuning fleet for cod used in the stock assessment (XSA). The BITS is a bottom-trawl survey using standards described in the BITS manual ((ICES CM 2008/LRC:08, Addendum 1). However, it is known that cod in the Baltic not only has a demersal component, possible to catch with a bottom trawl, but also a pelagic component, not monitored by BITS. This fact is demonstrated in working papers and presentations given at this and previous WGBIFS meetings. The pelagic component would not create erratic indices if:

a) it is stable and proportional to the demersal component or negligible.

b) has the same length, age, sex and maturity composition as the demersal component if not negligible.

Investigations have demonstrated that the above assumptions probably are untrue. An extreme is when the demersal component does not exist as when there is near bottom oxygen deficiency. So far, oxygen deficiency (=below 1.5 ml/l) in the layer of vertical net opening led to the assumption of "zero catches", i.e. the assumption that no cod are distributed in near bottom layers in corresponding areas. This may lead to a bias in index calculation as previous trial examinations agreed upon in the 2006 and 2007 WGBIFS meetings showed that there is a significant fraction of cod distributed pelagically over the low-oxygen zones, sometimes in densities comparable to near-bottom densities observed in well-oxygenized areas (WGBIFS 2008).

Investigations according to the following recommendations were made since the 2008 WGBIFS meeting.

a) In ICES Subdivision 25 the RV "Dana" should store acoustic data and make transects during daylight so that pelagic cod density above the area(s) where the bottom-water is oxygen deficient can be assessed using the standard method described in the BIAS Manual (Anon. 2008) with the exception that the ping interval should be 0.3 s and the pulse duration 0.256 ms in order to make it possible to analyse the acoustic data using echo tracking. The size of the area is determined using oxygen sampling at bottom and 5 m above. Pelagic control hauls during daylight must be performed to obtain a species and length composition. The hauls should be made in the fish layer immediately above the oxygen deficient layer, no matter that the Sa-values may be higher in the water layers above. Only Sa-values from the water layer(s) fished should be used for the BIAS standard density estimation. Data for echo tracking can be recorded day and night and will be analysed by Niklas Larson at the IMR, Lysekil. The RV "Dana" study will be performed both in quarter 4, 2008 and quarter 1, 2009.

b) The RV "Argos" should in ICES Subdivisions 25 and 28 make acoustic transects during daylight and darkness in order to perform echo tracking. These transects should go along the gradient between good oxygen conditions at bottom and no oxygen at bottom. A ping interval of 0.3 s and a pulse duration of 0.256 ms should be used. Frequent oxygen observations along these transect should be done. No pelagic trawl samples are needed but TVL hauls in darkness at stations with good oxygen conditions should be done to give an idea of how much cod migrates vertically and how

much stays at the bottom. This study will be performed both in quarter 4, 2008 and quarter 1, 2009. There is a need to reduce the number of planned TVL hauls in order to accomplish these tasks.

c) During the whole BITS cruises in quarter 4, 2008 and quarter 1, 2009, acoustic data using a ping interval of 0.3 s and a pulse duration of 0.256 ms should be collected by the RV "Argos", the RV "Dana" and the RV "Atlantniro". Other vessels may collect data according to their standard procedure.

The analysis of these performed investigations was not completed at the time of the present meeting.

15.2 Need for further knowledge

Relations between the demersal and pelagic component of cod under various conditions (e.g. environmental, geographic, diurnal and seasonal) should be established. The assumptions a) and b) in the previous section must be verified. If at least one of them is false a new survey strategy must be considered. One possible new survey strategy, used for Antarctic icefish, was presented during the meeting by Svetlana Kasatkina.

Additionally, it is required to know if the fraction of cod distributed pelagically over oxygen deficient zones is comparable to corresponding distribution characteristics in well-oxygenized zones or whether there are horizontal migration movements away from low-oxygen regions leading to irregular distribution patterns along horizontal gradients.

15.3 Recommendations

The WGBIFS concludes that actions must be taken to verify the veracity of the assumptions made to justify the BITS methods and strategy. The following recommendations were adopted during the meeting

To WGBIFS:

a) Existing datasets from the Baltic International Acoustic Survey (BIAS) should be reworked in order to complete the survey statistics table in BAD1 with percentage of cod. The possibility to create a valid index of cod abundance from BAD1 data in the pelagic water should then be tested.

b) Data from already performed experiments and data collection on pelagic distribution of cod during the BITS should be worked up further in order to enlighten the justification of the BITS assumptions.

c) As a bilateral task for Denmark and Sweden, it should be investigated if in ICES Subdivision 25 the RV "Dana" could make demersal hauls and the RV "Argos" could make pelagic hauls at the same BITS trawl stations within a limited and simultaneous time period. Standard acoustic sampling according to the BIAS manual (ICES CM 2008/LRC:08, Addendum 2) should be made in order to find a relation between the cod abundance at the bottom as found by bottom trawling and the abundance in pelagic water, also above low oxygen concentrations, calculated using acoustic methods. Details will be agreed between DIFRES, Denmark, and IMR, Sweden.

d) During the whole BITS cruises in quarter 4, 2009 and quarter 1, 2010, acoustic data using a ping interval of 0.33 s and a pulse duration of 0.256 ms should be collected by the RV "Argos", the RV "Dana" and the RV "At-

lantniro". Other vessels may collect data according to their standard procedure.

To DTU Aqua:

a) The database FishFrame Acoustics with disaggregated data should be put in an operative state in order to make it possible to do more detailed studies of pelagic distribution of cod using BIAS data.

16 DATRAS

16.1 Update of the coding of the H_Val variable

The introduction of midwater trawling using midwater/pelagic gears has made it necessary to elaborate in the way the codes are used. As the H_Val code is used now, it expresses a mix of two types of information: a general information of the validity of the haul in respect to how the gear has performed during the haul. (i.e. do the results represent the population fished) indicated by "V" and "I" and an indication of what type of haul it is indicated by "C", "N". Until now it has been unlikely to experience a conflict between the two information types, but the introduction of the midwater trawling and an additional need for indicating that extra stations are made compared to the stations allocated according to the station allocating procedure used for the BITS has changed that; e.g. if a midwater haul has been carried out un-successfully.

To account for this it is recommended that the variable is separated into two variables:

- H_Val ("V"=Valid, "I"=Invalid) and
- Station_type ("S"= Standard haul, "C"=Calibration haul, "N"=No oxygen at bottom (assumed zero catch), "A"= extra haul not allocated according to standard haul allocation procedure, "M"= trawling in the pelagic zone with midwater trawl).

Well knowing that it is not easy for ICES to introduce new variables in the common DATRAS exchange format, the second best solution is to extent the list of allowed values in the existing H_Val to all possible combination of the above mentioned values in two information types.

The selection of which stations should be included in calculation of standard indices for assessments will then be defined based on the combination of the two information types by the following rules:

included= "V" and ("S" or "N"),

not included= "I" and/or ("A" or "C" or "M")

16.2 Modification in DATRAS for accepting Ancylus data

16.2.1 Background

During the WGBIFS meeting 2008 the following recommendation was made.

The WG recommends that the necessary changes in DATRAS are done in order to allow the Ancylus and the Kattegat sole survey data to be uploaded in DATRAS.

Since RV "Ancylus" is now being replaced by the new RV "Mimer" using the TVS trawl and following the BITS manual and the Ancylus survey is discontinued, the relevance of including the old closed species list data from RV "Ancylus" into DATRAS is low.

16.2.2 New recommendation to ICES Data Centre and WGBIFS

The new RV "Mimer" should be added to the list of Swedish research vessels.

16.3 Follow up on the recommendations from last year

In WGBIFS report 2008 it was recommended to change the DATRAS database so it was possible to record haul duration = 0 minutes (in record type HH) if the haul validity was "N" (trawl not realized as a result of the oxygen deficit on the bottom). During the 2009 meeting this request was still not fulfilled. The data section in ICES secretary is kindly asked to make the change before the 4 quarter BITS data shall be uploaded in 2009. Until the change is made the value of 5 minutes is used to indicate the fishing time when the validity code is „N".

17 Status of the use of data collected under WGBIFS

Baltic Fisheries Assessment Working Group (WGBFAS) is at present the main consumer of data collected under WGBIFS. Data provided to WGBFAS represent calculated indices of pelagic fish (sprat and herring) and also data on cod from BITS surveys stored in ICES managed DATRAS system used by WGBFAS to calculate indices of cod. Data on individual weights of cod stored in DATRAS is applied for calculating cod weights-in-stock (WECA) directly used in the assessment of that species. WGBIFS is also potential source of data for estimating cod maturity ogives.

Data collected under WGBIFS has also been frequently utilized by number of EU co-funded projects like UNCOVER, BALANCE, BECAUSE etc. WGBIFS data are frequently used at the national level to determine changes in fish distribution as well as to estimate biomass of fish in individual countries' fishing zones.

ICES datacentre is supplied with detailed hydrological parameters of the environment from WGBIFS surveys. These data are used for investigating changes in ecosystem in relation to environmental situation. There have also been conducted many studies at national level on fish distribution vs. environmental changes.

WGBIFS data as a whole is a significant source of information in any ecosystem based approach and also the major source of fisheries independent data.

The survey data from the surveys coordinated by WGBIFS is used for tuning in assessment of the following stocks:

- Cod in Kattegat (Havfisken in Kattegat)
- Cod in the western Baltic (BITS)
- Cod in the eastern Baltic (BITS)
- Sole in IIIa (Danish Sole survey)
- Herring in SD 25–27, 28.2, 29 and 32 and (BIAS)
- Gulf of Riga herring (SD 28.1; BIAS)
- Sprat in SD 22–32 (BASS and BIAS)

Annex 1: List of Participants

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Annex 2: Agenda and Internal Recommendations from 2008

WGBIFS, Lysekil, Sweden 30/3–3/4 – 2009.

Agenda

Acoustic

1. combine and analyse the results of spring and autumn 2008 acoustic surveys and experiments and report to WGBFAS (including indices for 0-class sprat including the area of SD 24–29, numbers at-age 0 shifted to age 1 (thousands);
2. Provide the requested quality assessment of the acoustic time-series used for tuning (maps etc.);
3. update the hydroacoustic databases BAD1 and FishFrame for the years 1991 to 2008;
4. plan and decide on acoustic surveys and experiments to be conducted in 2009 and 2010;
5. review and update the Baltic International Acoustic Survey (BIAS) manual;
6. discuss the implementation of rules for acoustic dealing with species of less important (i.e. unknown target strength);
7. Suggestion for updating the procedure for calculating indices for acoustic surveys;
8. Status of joint Swedish and Finish acoustic survey in SD 30 (starts 4q 2008)

Trawl survey

9. discuss the results from BITS surveys performed in autumn 2008 and spring 2009;
10. plan and decide on demersal trawl surveys and experiments to be conducted in autumn 2009 and spring 20010;
11. update and correct the Tow Database;
12. Survey reports and standard survey reports
13. review and update the Baltic International Trawl Survey (BITS) manual

    b) Including:

    a. Maturity ogives and sex ratio of new type II (DCR) species
    b. Rules for how many individuals to be aged during survey;
    c. According to WGBIFS report 2008 (section 10).
14. study the vertical distribution of the cod during the BITS survey in a situation with oxygen deficiency close to the bottom;
15. upload and development status of DATRAS (Including coding of Hal_Val);
16. Establish and plan inter calibration between R/S Solea and R/S Havfisken in subdivision 22;
17. Combined Indices for Havfisken and Solea.
18. Inclusion of Havfisken and Ancylus survey in DATRA.

Any other business

19. Follow up on external and internal recommendations to WGBIFS
    a. Modifications in DATRAS for accepting Ancylus data
    b. Consistent work up procedure on Ancylus survey.
    c. Coordinate the Ancylus and the Havfisken survey in Kattegat.
    d. Minimum resolution at the NASC.
    e. Additional field in FishFrame (cod-fraction).
20. Which BIFS data were used in assessments last year.
21. Manual on age determination of Baltic flounder.
22. Reference collections of flounder otoliths
23. Revision of protocol for update of historical flounder data.
24. Venue next year.

Internal recommendations to WGBIFS (2009)

RECOMMENDATION:	ADRESSED TO:
1. The main results of both acoustic surveys in May/June and October 2008 should be summarized and reported in standard report format (ICES CM 2002/G:05 Ref. H, Annex 5) and in BAD1 format to the acoustic surveys coordinator (Niklas Larson, niklas.larson@fiskeriverket.se) and the BAD1 manager (Eberhard Götze, eberhard.goetze@vti.bund.de) not later than one month before the ICES WGBIFS meeting of the next year.	WGBIFS (WK 2008) to WGBIFS (WK 2009)
2. It is recommended that the RV Dana and RV Argos should carry out acoustic investigations of the pelagic to clarify the vertical distribution of cod during bottom near oxygen deficiency. Both 4th quarter, 2008 and 1st quarter, 2009 should be included. Data will be analysed by Niklas Larson at the IMR, Lysekil.	WGBIFS (WK 2008) to WGBIFS (WK 2009)
3. It is recommended that the data collected during the Ancylus survey are uploaded to DATRAS for documentation, data check and further analysis.	WGBIFS (WK 2008) to WGBIFS (WK 2009)
4. It is recommended that all fish species are worked up during the Ancylus survey following the same procedure as established for the BITS.	WGBIFS (WK 2008) to WGBIFS (WK 2009)
5. It is recommended that some work is done intercessional looking into the possibility to coordinate the Ancylus and the Havfisken survey in Kattegat to such degree that a combined index can be developed.	WGBIFS (WK 2008) to WGBIFS (WK 2009)
6. During the whole BITS cruises in quarter 4, 2008 and quarter 1, 2009, acoustic data using a ping interval of 0.3 s and a pulse duration of 0.256 ms should be collected by the RV Argos, the RV Dana and the RV Atlantniro. Other vessels may collect data according to their standard procedure.	WGBIFS (WK 2008) to WGBIFS (WK 2009)
7. It is recommended that an additional field in FishFrame acoustic table AB is added. The field should hold the fraction of cod in the species distribution.	WGBIFS (WK 2008) to WGBIFS (WK 2009)
8. A minimal resolution of 10 m is recommended in future in the NASC. Already existing data can be kept as a total NASC from the surface to the bottom but a later rearrangement to the standard is strongly advised.	WGBIFS (WK 2008) to WGBIFS (WK 2009)
9. It is recommended to complete the datasets in FishFrame Acoustic level 1 by uploading the missing data before the end of 2008.	WGBIFS (WK 2008) to WGBIFS (WK 2009)
10. The feedback from the 4th quarter BITS surveys should be submitted to Germany using the proposed standard format not later than 20 December. Feedback from the 1st quarter survey should be submitted immediately after the survey.	WGBIFS (WK 2008) to WGBIFS (WK 2009)
11. WGBIFS recommends that the area corrected stock indices from 2007 can be used in the assessment of the herring and sprat stocks in the Baltic Sea without any restrictions.	WGBFAS
12. WGBIFS recommends that the area corrected stock indices based on the acoustic surveys in May/June from 1999 to 2007 can be applied as additional time-series (fleet) for tuning in the final assessment of the Baltic sprat stock biomass.	WGBFAS
13 The WG recommends that the acoustic surveys in May should be continued.	WGBFAS

RECOMMENDATION:	ADRESSED TO:
14. WGBIFS recommends that the May/June 1999–2007 BASS data can be applied as additional source of data (fleet) for tuning in the final assessment of the Baltic sprat stock biomass. As the survey was conducted with only insignificant deviations from the plan the WGBIFS recommends that the result from the 4th quarter BITS survey in 2007 can be used without any restrictions by the WGBFAS.	WGBFAS
15. As the survey was conducted with only insignificant deviations from the plan the WGBIFS recommends that the result from the 1st quarter BITS survey in 2008 can be used without any restrictions by the WGBFAS.	WGBFAS
16. WGBIFS recommends that the Sweden recalculates BAD 1 data before 2000 until end of 2008 and upload the recalculated data to FishFrame.	WGBFAS
17. The WG recommends that the necessary changes in DATRAS are done in order to allow the Ancylus and the Kattegat sole survey data to be uploaded in DATRAS.	ICES secretariat
18. The WG recommends that text of the BITS manual is updated according to the instructions given in the WGBIFS report (Section 10).	ICES secretariat
19. It was request to ICES to calculate a combined index for cod based on the Solea survey in the western Baltic area and the Havfisken survey in the same area. The method for calculation of the index shall be the same as the method used for the BITS on Eastern cod.	ICES secretariat

External recommendations to WGBIFS (2009)

RECOMMENDATION:	ADDRESSED TO:
Recommendations from WGBFAS (WG 2008)	
20. WGBFAS recommends that WGBIFS on routine basis provides quality assessment of each index series pointing out both general and year specific characteristics of the surveys (BIAS and BITS) and the indices provided. The current procedure does not provide the WGBFAS with sufficiently background information to be able to interpret the tuning inputs. WGBFAS should be provided with the following area corrected acoustic data as far as possible going back in the time-series: 1. Autumn survey for Herring/Sprat in SD 22–32, ages 0–8+: - numbers by SD (thousands) - mean weight by SD (kg) - biomass by SD (t) 2. Autumn tuning fleet index for Central Baltic Herring including the area of SD 25–29, numbers at-ages 1–8+ (thousands). 3. Autumn recruitment index for Central Baltic herring including the area of SD 25–29, numbers at-age 0 (thousands). 4. Autumn tuning fleet index for Baltic Sprat including the area of SD 24–29, numbers at-ages 1–8+ (thousands). 5. Autumn recruitment index for Baltic sprat including the area of SD 26 and SD 28, numbers at-age 0 shifted to age 1 (thousands). 6. Spring survey for Sprat in SD 24–28, ages 0–8+: - numbers by SD (thousands) - mean weight by SD (kg) - biomass by SD (t) 7. Spring tuning fleet index for sprat including the area of SD 24–28, numbers at-ages 1–8+ (thousands). When supplying these data all years should be commented with a statement on the quality of the calculated estimates.	
Recommendations from WKARFLO (WK 2008)	
21. WKARFLO recommends that the manual on age determination of Baltic flounder should be updated annually. The work should be coordinated within the WGBIFS and results should be reported to the PGCCDBS.	
22. WKARFLO encourages that national laboratories establish reference collections of otoliths with known age (tagging results) or of otoliths with unknown age but displaying typical growth patterns. Images of these otoliths should be made available to flounder age reader experts.	
23. WKARFLO recommends that a protocol for updating historical data should be further developed and reported to WGBIFS 2009.	

RECOMMENDATION:	ADDRESSED TO:
Recommendations from WKREFBAST (WK 2008)	
24. WKREFBAST recommends in relation with Section 3: An internationally coordinated stomach sampling and field programme should be agreed and undertaken in the Baltic Sea.	
Recommendations from WKROUND (WK 2009)	
25. To use the combined surveys in future assessment a larger spatial overlap between vessels is needed to account for the vessel affect.	

Annex 3: WGBIFS terms of reference for the next meeting

The **Baltic International Fish Survey Working Group** [WGBIFS] (Chair: Henrik Degel, Denmark) will meet in Klaipeda, Lithuania from 22–26 March 2010 to:

a) combine and analyse the results of spring and autumn 2009 acoustic surveys and experiments and report to WGBFAS;

b) update the hydroacoustic databases BAD1 and FishFrame for the years 1991 to 2009;

c) plan and decide on acoustic surveys and experiments to be conducted in 2010 and 2011;

d) discuss the results from BITS surveys performed in autumn 2009 and spring 2010;

e) plan and decide on demersal trawl surveys and experiments to be conducted in autumn 2010 and spring 2011;

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.

WGBIFS will report by 15 May 2010 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 and relation to action plan:	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 shown 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.
Linkages to advisory committees:	The indices provided by the surveys coordinated by WGBIFS are of significant importance for the drawn up of the biological advice.
Linkages to other committees or groups:	The data produced by the surveys coordinated by WGBIFS is a major source for information on Environmental Indicators and therefore important for the Working Group on Ecosystem Effects of Fisheries.
Linkages to other organizations:	No direct linkage to other organizations.

Annex 4: Recommendations

RECOMMENDATION	FOR FOLLOW UP BY:
1. WGBIFS recommends that the October acoustic survey dataset 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, 1997 and 2000. WGBIFS recommends that the October acoustic survey dataset can be used 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.	WGBFAS
2. WGBIFS recommends that the May/June 2001–008 BASS index can be applied as additional source of data (fleet) for tuning in the final assessment of the Baltic sprat stock biomass	WGBFAS
3. The database FishFrame Acoustics with disaggregated data should be put in an operative state in order to make it possible to upload data of the agreed resolution	DTU. Aqua
4. WGBIFS recommends that the coverage of SD 30 by the Gulf of Bothnia survey is continued.	WGBFAS
5. The Table 5.7 in the BIAS manual should be updated for fish species found in the survey area either with internationally agreed target strength parameters or assumed parameters for species or species groups where target strength has not been established. Germany will study fish species in SD 21–4 and Sweden will study fish species in SD 25–0. Until new TS parameters are agreed the following is suggested. Gadoids should be treated as cod. Salmonids and 3-spined stickleback should be treated as herring. Fish without swimbladder should be treated as mackerel. Other fish species should be treated as cod	WGBFAS, Germany and Sweden.
6. A new study group for the investigation of target strength properties of Baltic fish species should be established. This study group should cover the acoustically important fish species and not only commercially important fish species. The study group should also give advice on procedures for determination of TS for Baltic species like 3-spined stickleback and lump sucker	WGFAST and ICES ASC
7. It is recommended that-age-length keys for herring and sprat for BIAS 2004–006 shall be submitted to Gasyukov P. and Kasatkina S. (Russia) Results of estimating statistical characteristics for total abundance indices by age groups and years from BIAS 2004–006 as example should be presented to the WGBIFS 2010.	National Institutes carrying out acoustic surveys in the Baltic and Gasyukov P. and Kasatkina S. (Russia)
8. The results of the BITS 4th quarter 2008 and BITS 1st quarter surveys 2009 can be used as basis for calculation of the indices.	WGBFAS
8. The results of the Danish sole survey 2009 can be used as basis for calculation of the indices	WGBFAS
8. It is recommended to sampling flounder regularly for sex, maturity, age and length and applying the slicing and staining or the burning and breaking methods to determine the age. Reading whole otoliths is not considered as appropriate.	WGBIFS
8. The group recommends the collection, preparation and age-agreement of typical otoliths with the aim to establish a Reference Collection as support for consistent age reading of the Baltic flounder.	WGBIFS

RECOMMENDATION	FOR FOLLOW UP BY:
8. WGBIFS recommends that the re-reading of historical flounder otoliths in order to establish a consistent data basis for a new analytical assessment of flounder in the southern Baltic is initiated by the Baltic RCM or if of more general interest by the PGCCDBS.	Baltic RCM or PGCCDBS
8. Existing datasets from the Baltic International Acoustic Survey (BIAS) should be reworked in order to complete the survey statistics table in BAD1 with percentage of cod. The possibility to create a valid index of cod abundance from BAD1 data in the pelagic water should then be tested. Data from already performed experiments and data collection on pelagic distribution of cod during the BITS should be worked up further in order to enlighten the justification of the BITS assumptions.	WGBIFS
8. As a bilateral task for Denmark and Sweden, it should be investigated if in ICES Subdivision 25 the RV Dana could make demersal hauls and the RV Argos could make pelagic hauls at the same BITS trawl stations within a limited and simultaneous time period. Standard acoustic sampling according to the BIAS manual (ICES CM 2008/LRC:08, Addendum 2) should be made in order to find a relation between the cod abundance at the bottom as found by bottom trawling and the abundance in pelagic water, also above low oxygen concentrations, calculated using acoustic methods. Details will be agreed between DIFRES, Denmark, and IMR, Sweden. During the whole BITS cruises in quarter 4, 2009 and quarter 1, 2010, acoustic data using a ping interval of 0.33 s and a pulse duration of 0.256 ms should be collected by the RV Argos, the RV Dana and the RV "AtlantNIRO". Other vessels may collect data according to their standard procedure.	WGBIFS
8. The database FishFrame Acoustics with disaggregated data should be put in an operative state in order to make it possible to do more detailed studies of pelagic distribution of cod using BIAS data.	DTU. aqua
The new RV "Mimer" should be added to the list of Swedish research vessels.	ICES Datacentre

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	44432	3998	13905	10085	7410	4613	2411	1209	801
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	30390	5428	6718	3076	4330	7304	1753	920	860
2008	35535	6782	6850	7697	3753	5146	3619	880	807

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	11436
2008	7770

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	149790	46757	40678	43961	2636	8949	1806	1936	3066
1992	103439	37198	26995	24210	9383	1927	2448	717	562
1993	101442	31334	31898	16612	13118	4747	998	1520	1215
1994	137752	12419	44951	43375	17270	11992	5135	1031	1579
1995	237215	136473	16574	40534	22667	11572	5771	2184	1439
1996	272991	71098	133404	20743	23382	12833	6453	3742	1337
1997	146371	9314	58292	57451	8653	7855	2649	1717	440
1998	232939	102117	22027	56075	36949	8177	4856	1675	1062
1999	197795	4800	91193	15963	36152	39243	5294	3364	1787
2000	156760	59850	5247	51137	5716	14279	16174	1599	2760
2001	108773	12106	36310	6893	30750	4052	9741	6474	2446
2002	121283	31609	14576	37804	5810	19245	2654	5167	4419
2003	216672	100952	32807	24208	23605	8072	13417	4866	8745
2004	201448	120369	47660	11822	8040	4992	2472	2452	3640
2005	206134	7133	125952	48898	10167	5194	3051	2391	3349
2006	205395	37156	11959	105232	32994	8164	4692	2165	3031
2007	144824	55269	27616	10481	33036	14113	1274	664	2370
2008	129774	29294	45998	20783	5440	19251	5799	1267	1942

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

YEAR	AGE 0
1991	32738
1992	39847
1993	2221
1994	38555
1995	27810
1996	3285
1997	39334
1998	682
1999	22249
2000	3466
2001	6410
2002	31780
2003	61462
2004	2074
2005	18202
2006	23831
2007	2876
2008	50977

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