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REPORT OF THE BALTIC INTERNATIONAL FISH SURVEY WORKING GROUP (WGBIFS)

4–8 APRIL 2005

ROSTOCK, GERMANY

International Council for the Exploration of the Sea
Conseil International pour l'Exploration de la Mer

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Contents

Executive Summary

The Baltic International Fish Survey Working Group (WGBIFS) meeting in Rostock, Germany, considered research on ten terms of reference.

An important aspect of the meeting of the working group was the combination of the results of the acoustic and trawl surveys carried out in the Baltic Sea in summer and autumn 2004 and spring 2005. The quality of data was checked and the national parts of the international coordinate surveys combined to present stock indices for the tuning fleets for herring, sprat, cod and flounder used for the stock assessment by WGBFAS. The data of the acoustic and bottom trawl surveys are stored in databases.

Furthermore, the acoustic and trawl surveys in summer and autumn 2004 and the trawl surveys in 2005 were planned. New design of acoustic surveys was discussed to reduce the possible effects of rectangles which were covered with different intensity by more than one vessel. It was agreed that each rectangle, which is used as strata by the acoustic surveys, is mandatory assigned to one vessel that means that the standard intensity of acoustic measurements and the required number of control hauls are realized by the vessel as described in the manual. Furthermore, additional rectangles can be optionally covered by the different vessels. These data can be used for comparing the estimates of different vessels.

Studies related to the quality of the data of demersal trawl surveys stored in the DATRAS database have shown that intensive quality checks are necessary. Therefore, subgroup was established which realize the different steps of quality check between the meetings.

Studies were presented which analyse the procedures which are used during the acoustic surveys for combining the different types of data (acoustic measurements and control hauls) and the uncertainty of the estimates. Based in these results special studies were planned until the next meeting.

New inter-calibration experiments between the gear types TV3#930 and Foto were carried out by Sweden. The conversion factors were presented in the report. Because new tuning fleet for cod was established by the stock assessment working group which based on the time period from 2001 to 2004 where only the new standard gears were used during the trawl surveys it was agreed by the working group that additional inter-calibration experiments are not necessary.

Preliminary results were presented to quantify the proportion of cod in the pelagic water, above the vertical opening of the use trawls, during the trawl surveys in areas where oxygen deficiency exist close to the bottom. Because the number of experiments was low final assessments related to the importance of the cod in the pelagic waters were not possible. Therefore, additional experiments were suggested.

The proposed 2006 meeting of the WGBIFS will take place in ICES headquarter in Copenhagen, Denmark, from 3 to 7 April to consider nine terms of reference.

1 Introduction

1.1 Participation

Uwe Böttcher	Germany
Claus-Christian Friess (part time)	Germany
Valeri Feldmann (part time)	Russia
Eberhard Götze	Germany
Tomas Gröhsler	Germany
Wlodzimierz Grygiel	Poland
Joackim Hjelm	Sweden
Igor Karpoushevski (part time)	Russia
Svetlana Kasatkina (part time)	Russia
Niklas Larson	Sweden
Juha Lilja	Finland
Hildrun Müller	Germany
Rainer Oeberst (Chair)	Germany
Jukka Pönni	Finland
Tiit Raid	Estonia
Vladimir Severin (part time)	Russia
Ivo Sics	Latvia
Daniel Stepputtis	Germany
Fausts Svecsovs	Latvia
Sarunas Toliusis	Lithuania
Jonna Tomkiewicz (part time)	Denmark

1.2 Terms of Reference

According to Annual Science Conference Resolution (2G04) in Vigo, Spain last year, the Baltic International Fish Survey Working Group [WGBIFS] (Chair: R. Oeberst, Germany) will meet in Rostock, Germany from 4–8 April 2005 to undertake the tasks as specified in (C.Res 2004/2G086 :

a) Combine and analyse the results of the 2004 acoustic surveys and experiments and report to WGBFAS;

b) Update the hydro-acoustic databases BAD1 and BAD2 for the years 1991 to 2004;

c) Plan and decide on acoustic surveys and experiments to be conducted in 2005 and 2006;

d) Discuss the results from BITS surveys made in autumn 2004 and spring 2005;

e) Plan and decide on demersal trawl surveys and experiments to be conducted in spring and 2006;

f) Update and correct the Clear Tow database;

g) Continue to study the proposed model for estimating the conversion factors between the new and old survey trawls under inclusion of the new inter-calibration experiments;

h) Update, if necessary, the Baltic International Trawl Survey manual (BITS);

i) Update, if necessary, the Baltic International Acoustic Survey manual (BIAS);

j) Study the vertical distribution of cod during BITS survey in a situation with oxygen deficiency close to the bottom.

WGBIFS will report by 30 April 2005 for the attention of the Living Resources, the Baltic, and the Resource Management Committees.

The **work of the Group** is essential to the development of internationally coordinated trawl surveys and research on medium- and long-term changes of population structure of Baltic cod, herring and sprat stocks. These stocks are key elements of the Baltic ecosystems.

The **above Terms of Reference** are set up to provide ACFM with information required to respond to requests for advice/information from the International Baltic Fishery Commission and Science Committee.

The **main objective of the WGBIFS is** to co-ordinate and standardise national research surveys in the Baltic for the benefit of accurate resource assessment of 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. In recent years activities have been devoted to coordinate international coordinated demersal trawl surveys using the new standard gear TV3 and to continue the analyses of the conversion factors between the new and old survey trawls.

The most important future activities are to combine and analyze acoustic survey data for the Baltic Fisheries Assessment Working Group, develop a disaggregated hydro-acoustic database, plan and decide on acoustic surveys and experiments to be conducted. The quality assurance of ICES will require achievements towards a fully agreed calibration of processes and internationally agreed standards. [Action Numbers a): 1.2.1, 1.2.2 b): 1.2.2, 1.13.3 c): 1.11 d): 1.2.1, 1.2.2 e): 1.11, f): 1.11, g): 1.11, h): 1.13.4, 1.11 i): 1.13.4, j): 1.13.4]

Activity is related to the maintenance and strengthening of partnership with national science institutes and to the elaboration and development of our knowledge of the stock structure, dynamics and trophic relationships.

1.3 Overview of WGBIFS activities in 1996–2004

The WGBIFS activities was initiated in 1996 to promote co-ordination and standardization of national research surveys in the Baltic (ICES CM 1995/J:1). The first Working Group meeting (ICES CM 1996/J:1) considered the design of trawl surveys for cod assessment, established a bottom trawl manual and outlined problems in hydro-acoustic surveys. The second meeting (ICES CM 1997/J:4) gave advice on inter-calibration between research vessels, described sampling protocols of sprat and flounder and evaluated historical data from hydro-acoustic estimates on herring. Both meetings dealt with the introduction of modern standard bottom trawls for resource surveys in the Baltic. Expertise advise on the choice of standard trawls has been provided by two workshops (ICES CM 1997/J:6; 1998/H:1). During the meeting in 1998 (ICES CM 1998/H:4) the use of standard trawls was again recommended and inter-calibration experiments were planned. Furthermore, international coordinated survey design was discussed. Critical inventory of the current coding procedures for fish maturity stages was carried out and the effects of biological sampling and TS conversion formulas on the results of acoustic stock levels and biomass estimates were reviewed. During the meeting the Manual for Baltic International Acoustic Surveys (BIAS) was updated based on a draft made by the Study Group on Baltic Acoustic Data (SGBAD).

The fourth meeting (ICES CM 1999/H:2) propose detailed protocols on fishing methods, sampling, report formats, etc. for trawl surveys in the Baltic in order to implement a quality assurance to the Baltic International Trawl Survey (BITS). It also preliminary compared the results from concurrent survey activities by the traditional and the new standard trawls and planned inter-calibration programs. WGBIFS has established an acoustic database BAD2 (including the information on Elementary Sampling Distance Unit (ESDU) and biological sampling), which should replace the existing database BAD1. The meeting of WGBIFS in 2000 (ICES CM 2000/H:2) updated protocols on fishing methods, sampling, report formats, etc. for trawl surveys and both manuals (BITS, BIAS) and data exchange formats for the international acoustic survey database (BAD2). WGBIFS also recommended some routines to be used in

the future for demersal trawl survey design. The results of inter-calibration experiments between the national gears and the new standard bottom gears TV3#930 and TV3#520 were studied and preliminary conversion factors were estimated during the next meeting of WG BIFS (ICES CM 2001/H:2). Furthermore, the Clear Tow Database (CTD) was presented which is used for planning the trawl surveys. The establishment of the CTD was supported by the EU study project ISDBITS (Anon. 2001a). The coordination of the acoustic surveys and the analyses of their results, as well as the update of the manuals (BIAS, Anon. 2001b, BITS Anon. 2001c) were carried out by the working group.

The seventh meeting of WGBIFS (ICES CM 2002/G:05 Ref. H) co-ordinated the planned international surveys. Furthermore, analyses were presented and discussed which estimate the conversion factors between the national gears and the new standard gears based on new inter-calibration experiments. It was agreed that new inter-calibration experiments are necessary. The results of the acoustic and trawl surveys carried out in autumn 2002 and spring 2003 were studied and the subsequent surveys to be conduct in autumn 2003 and spring 2004 were planned. Based on the analyses it was recommended that the estimated indices can be used by WG BFAS without any restrictions (ICES CM 2003/G:05 Ref. D, H). Proposed algorithm for selecting hauls from the Clear Tow Database which takes into account the spatial heterogeneity of available stations was discussed. Based on the feedback from the trawl surveys concerning the selected stations was used for updating the Clear Tow Database. The methods for estimating the conversion factors were discussed and new versions of conversion factors were estimated based on the total number of realized inter-calibration experiments.

The main areas of discussion during the meeting in 2004 (ICES CM 2004/G:08 Ref. D, H) were besides the planning of the next surveys the improvement of the analyses of the available survey data. Based on the current hydrographical situation in the Baltic Sea which is characterized by large areas with oxygen deficiency close to the bottom available data of acoustic surveys were used to carry out first studies concerning the vertical distribution of cod in the pelagic waters during the trawl surveys. The group agreed and planned special experiments in November 2004.

2 Combine and analyse the results of the 2004 acoustic surveys and experiments and report to WGBFAS

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

In 2004 the following acoustic surveys were conducted during September until November:

Vessel	Country	Area
ARGOS	Sweden	27 and parts of 25, 28, 29S
ATLANTNIRO	Russia / Latvia	26, 28
BALTICA	Poland	24 (part), 25, 26
SOLEA	Germany / Denmark	21, 22, 23, 24
EMMA	Estonia	28, 29, 32 (part)

The results from the different cruises are stored in the database BAD1. The cruise reports are presented in Annex 2 using the suggested standard format (ICES CM 2002/G:05 Ref. H. Annex 5)

2.1.1 Overlapping areas

During the international acoustic survey in 2004, sixteen rectangles were investigated by more than one vessel. Most of the investigations were carried out in October (Figure 2.1.1).

For each rectangle the following data were compared between vessels:

- the covered area of the rectangle.
- the number of hauls in the rectangles.

If a rectangle was investigated by two vessels the number of hauls and the area covered by each ship was compared and used as input in the decision process resulting in which ships data that should be used. The cruise made by Emma was given less weight due to that it was conducted in November compared to mid October for most other cruises. Table 2.1.1.1 presents the results of the different decisions. In Tables 2.1.1.2 and 2.1.1.3 you will find the abundance for herring and sprat in numbers by rectangle. These tables are furthermore described in 2.1.3.

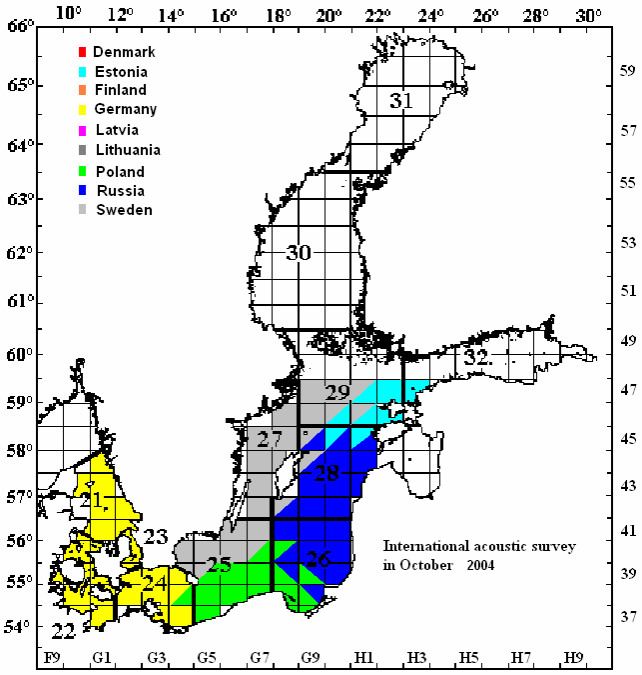


Figure 2.1.1: Covered area during the acoustic survey in October 2004.

2.1.2 Total results

The results of the international acoustic survey 2004 are summarized Tables 2.1.2.1 to 2.1.2.4. The overlapping areas were treated as described in Section 3.1.1 (Table 2.1.1.1).

Tables 2.1.2.1 and 2.1.2.2 are presenting the abundance estimates for herring and sprat per subdivision and age group. The corresponding biomass estimates of herring and sprat are given in the Tables 2.1.2.3 and 2.1.2.4, respectively.

2.1.3 Area corrected data

The coverage of the investigated area differs from year to year. In order to compare the results only the fish density and not the absolute abundance estimates were calculated. A correction for each subdivision expressing the degree of coverage was introduced. This factor gives the ratio between total and covered area. The calculated factor for 2004 per subdivision is given in Table 2.1.3.1. The area corrected abundance estimates for herring and sprat per subdivision are summarised in Tables 2.1.3.2 and 2.1.3.3, respectively.

2.1.4 Tuning fleets for WGBFAS

2.1.4.1 Sprat in Subdivisions 22–32

The following tuning fleets are used in the sprat assessment:

1) acoustic in subdivisions 22–29
2) acoustic in subdivisions 26 and28

The results for 2004 for both tuning fleets are shown in Table 2.1.4.1 and 2.1.4.2 (including the results for the period 1991–2003). It should be noted that the results for subdivisions 26 and 28 could be multiplied by 2.3 in order to get a similar estimate in absolute terms compared to the overall results in Subdivisions 22–29.

2.1.4.2 Herring in Subdivisions 25–29+32 (excluding Gulf of Riga)

In the herring assessment for the Stock in Central Baltic only one tuning fleet is applied from the October acoustic survey. The area corrected combined results of Subdivisions 25–29 are presented in Table 2.1.4.3

2.1.4.3 Recommendation to WGBFAS

WGBIFS recommends that the area corrected data from 2004 can be used in the assessment of the herring and sprat stocks in the Baltic Sea.

2.2 Results of the 2004 acoustic spring surveys

2.2.1 General

Since 2001 a multinational Survey for abundance estimation of sprat has been carried out in May/June. In 2004 following acoustic surveys were conducted during May and June:

Vessel	Country	Area
WALTHER HERWIG III	Germany	24, 25, 26 (part), 27 (part), 28 (part)
ATLANTNIRO	Russia. Latvia	26 (part), 28 (part)

At the WGBIFS meeting in 2003 the need to enlarge the covered area of the hydroacoustic spring survey was emphasized in order to cover the main distribution area of sprat in the Baltic Sea. This aim was not reached until now. Only Germany, Russia, and Latvia took part on this survey. Because of that it was not possible to cover the whole ICES- Subdivision 28. The rectangles investigated in 2004 are showed in Figure 2.2.1.

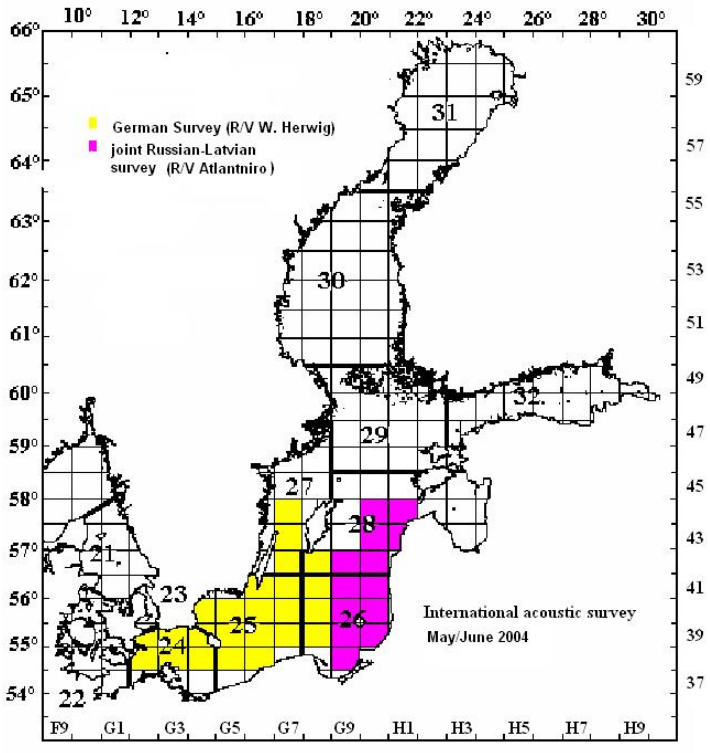


Figure 2.2.1: The covered area of the hydroacoustic spring survey 2004.

The results from the different cruises are stored in the database BASS (Baltic acoustic spring survey). Detailed information are presented in the cruise reports (Annex 4) using the standard format (ICES CM 2002/G:5, Ref. H. Annex 5)

2.2.2 Results

The results of the international acoustic survey 2004 are summarized Table 2.2.2.1. This table gives the abundance estimate of sprat by investigated ICES rectangle and age group.

2.2.3 Recommendation to WGBFAS

The working group recommends that further extension of the covered area will results in an improvement of the quality of the estimated stock indices. Furthermore, it is recommended that studies related to sources of uncertainty of the survey results are necessary.

2.3 Experiments related to target strength estimation

In situ target strength measurements were made on 11 October 2004 and 12 October 2004 in ICES SD 25 by the Swedish RV Argos. However, the results have not yet been analysed. The results will be presented during the next meeting of the WGBIFS.

Table 2.1.1.1: Treatment of data from rectangles with overlapping October 2004.

ICES SD	ICES RECT.	VESSEL A	SA VALUES	NUMBER OF HAULS	VESSEL B	SA VALUES	NUMBER OF HAULS	SUGGESTION
24	38G4	Solea	Whole area	2	Baltica	E part	1	Sol data
25	39G4	Argos	NE area	1	Solea	SW part	3	Sum area
25	39G5	Argos	Whole area	9	Baltica	S part	2	Arg data
25	40G7	Argos	Whole area	2	Baltica		1	Arg data
26	38G9	Baltica	W part	1	Atlantida	Whole area	4	Sum of areas
26	39G8	Baltica	Whole area	3	Atlantida	Whole area	3	Arithm. Mean
26	39G9	Baltica	W part	1	Atlantida	Whole area	4	Atl data
26	40G8	Baltica	Whole area	3	Atlantida	Whole area	3	Arithm. Mean
28	42G8	Argos	Whole area	1	Atlantida	E part	2	Arithm. Mean
28	44G9	Argos	Whole area	2	Atlantida	Whole area	2	Arithm. Mean
28	45G9	Argos	Whole area	2	Atlantida	Whole area	2	Arithm. Mean
28	45H0	Atlantida	Whole area	3	Emma	NE part	0	Atl data*
28	45H1	Emma	Whole area	2	Atlantida	W part	2	Arithm. Mean
29	46H0	Argos	Whole area	2	Emma	E part	1	Arg data*
29	46H1	Argos	W part	1	Emma	Whole area	2	Arithm. Mean*
29	47H1	Argos	Whole area	2	Emma	Whole area	2	Arg data*

*** The Emma cruise was 3 weeks later than the average cruise date.**

Table 2.1.1.2: Estimated numbers (millions) of herring October 2004 by rectangle.

SD	RECT	TOTAL	AGE 0	AGE 1	AGE 2	AGE 3	AGE 4	AGE 5	AGE 6	AGE 7	AGE 8+
21	41G1	11.9	5.7	5.3	0.9	0.0	0.0	0.0			
21	41G2	115.3	45.3	48.0	16.4	3.2	0.9	1.5	0.1	0.0	0.0
21	42G1	40.8	6.4	24.7	8.0	1.0	0.6	0.1			
21	42G2	1.6	0.2	1.0	0.3						
21	43G1	50.4	11.5	27.7	10.1	0.5	0.6	0.1			
21	44G0	1.9	1.6	0.3	0.1	0.0		0.0			
21	44G1	32.5	19.2	11.3	1.5	0.2	0.2	0.3			
21 Total		254.5	89.9	118.3	37.2	4.8	2.3	1.9	0.1	0.0	0.0
22	37G1	733.0	618.6	73.4	30.1	3.6	5.0	1.6	0.7		
22	38G0	191.7	141.1	35.1	13.0	1.6	0.9				
22	38G1	62.6	40.4	14.5	6.3	0.6	0.7	0.1	0.1		
22	39F9	0.3	0.2	0.1	0.0						
22	39G0	22.7	20.2		0.9			0.8	0.8		
22	39G1	9.2	5.9	2.4	0.9						
22	40G0	2.1	0.7	1.1	0.2		0.0				
22 Total		1021.6	827.0	126.6	51.5	5.8	6.7	2.5	1.6	0.0	0.0
23	40G2	868.3	0.0	258.9	235.0	134.9	81.5	74.2	60.4	14.0	9.5
23 Total		868.3	0.0	258.9	235.0	134.9	81.5	74.2	60.4	14.0	9.5
24	37G2	45.6	30.4	8.9	3.0	2.0	0.7	0.6	0.1		0.0
24	37G3	533.5	528.1	1.5	2.0	1.2	0.3	0.2	0.2		0.1
24	37G4	514.7	282.1	74.6	53.3	49.0	24.1	21.3	6.0	3.3	1.1
24	38G2	457.2	364.2	52.3	17.9	13.0	4.6	4.4	0.8	0.1	
24	38G3	1021.5	758.6	127.1	61.7	41.0	14.3	13.4	3.8	1.3	0.5
24	38G4	343.4	54.7	107.6	73.9	54.1	23.3	20.1	6.4	2.5	0.8
24	39G2	267.6	198.7	41.7	11.0	10.0	2.8	2.9	0.2	0.2	
24	39G3	494.1	143.5	120.5	98.1	71.7	26.0	22.0	7.0	4.5	0.9
24	39G4	122.6	23.8	45.1	24.0	16.8	5.7	5.1	1.1	0.6	0.3
24 Total		3800.2	2383.9	579.3	344.9	258.5	101.7	90.1	25.5	12.6	3.8
25	37G5	310.0	109.2	35.4	54.7	39.8	30.9	29.2	3.1	3.6	4.3
25	38G5	813.0	232.5	98.9	163.0	117.6	88.0	81.6	8.7	10.2	12.4
25	38G6	606.0	62.4	69.2	126.4	112.4	91.7	86.0	11.9	20.6	25.4
25	38G7	170.0	63.4	15.4	24.5	20.8	17.0	18.0	2.1	3.5	5.3
25	39G4	105.6	16.1	16.6	16.9	30.4	20.0	4.1	0.6	0.0	1.1
25	39G5	369.5	37.6	24.9	117.3	78.5	80.5	22.8	5.2	2.1	0.7
25	39G6	800.0	60.7	78.4	131.1	147.1	141.9	142.3	18.2	35.1	45.2
25	39G7	1008.0	157.6	112.8	203.9	175.0	140.5	141.6	15.8	26.0	34.8
25	40G4	408.3	77.8	27.4	122.8	77.4	41.0	40.3	17.3	2.7	1.6
25	40G5	153.3	21.9	46.7	36.4	20.1	16.0	8.6	2.4	1.4	0.0
25	40G6	330.0	13.1	33.9	92.1	81.1	59.8	32.1	16.9	1.0	0.0
25	40G7	1033.4	14.1	98.2	304.5	302.5	186.8	96.8	24.7	4.6	1.2
25	41G6	957.4	1.8	60.9	307.1	272.3	172.5	83.7	28.7	18.6	11.9
25	41G7	411.8	4.7	35.0	170.9	92.1	55.2	45.5	5.8	2.7	0.0
25 Total		7476.5	872.9	753.5	1871.6	1567.0	1141.6	832.7	161.2	132.0	143.9
26	37G8	67.0	42.3	4.6	4.5	3.9	4.1	3.2	0.9	1.6	1.8
26	37G9	111.0	70.1	7.5	7.5	6.5	6.8	5.3	1.6	2.7	3.0
26	38G8	502.0	136.4	23.4	50.0	66.7	60.4	62.4	19.6	40.8	42.3
26	38G9	1018.4	307.3	75.2	118.0	132.3	116.1	109.4	52.2	59.7	48.4
26	39G8	660.1	18.2	42.9	91.7	114.0	112.5	108.5	40.4	66.9	64.9
26	39G9	1281.3	138.2	53.3	182.3	204.6	200.9	218.8	131.3	77.8	73.9
26	39H0	332.1	82.3	28.4	35.1	57.0	37.7	28.7	30.4	21.1	11.4
26	40G8	205.4	1.7	20.0	39.5	40.9	42.7	31.5	11.0	10.0	8.0

SD	RECT	TOTAL	AGE 0	AGE 1	AGE 2	AGE 3	AGE 4	AGE 5	AGE 6	AGE 7	AGE 8+
26	40G9	169.2	3.6	6.7	27.5	36.7	40.3	27.3	12.4	6.0	8.7
26	40H0	209.7	2.4	7.0	34.4	46.1	57.8	31.4	16.1	6.4	8.0
26	41G8	106.7	0.0	2.7	35.7	19.9	15.9	15.9	5.4	4.7	6.5
26	41G9	256.8	0.7	16.3	36.3	39.6	52.6	45.3	29.3	6.3	30.2
26	41H0	55.1	0.1	1.5	9.1	12.3	17.3	7.6	4.4	1.4	1.4
26 Total		4974.8	803.4	289.4	671.9	780.5	765.3	695.4	355.0	305.3	308.6
27	42G6	253.0	0.0	74.1	91.3	42.6	28.6	13.5	0.9	0.9	1.0
27	42G7	195.0	0.0	43.0	100.6	26.8	13.5	9.1	0.6	1.4	0.0
27	43G7	892.8	0.0	225.2	406.8	143.9	68.5	32.2	8.7	4.5	3.1
27	44G7	747.9	0.0	134.4	472.4	100.5	34.3	6.4	0.0	0.0	0.0
27	44G8	1657.0	0.0	350.8	1098.2	66.3	123.4	17.7	0.6	0.0	0.0
27	45G7	1403.4	0.0	134.2	657.7	436.5	121.7	34.4	14.4	4.5	0.0
27	45G8	1572.8	0.0	279.4	773.2	309.2	153.7	41.3	15.3	0.8	0.0
27	46G8	715.3	0.0	102.0	466.5	92.7	33.6	17.4	3.1	0.0	0.0
27 Total		7437.2	0.0	1343.0	4066.7	1218.5	577.3	171.9	43.7	12.1	4.0
28	42G8	746.0	0.3	17.8	208.4	161.9	188.7	80.5	56.1	0.0	32.4
28	42G9	550.4	3.4	31.2	151.2	107.8	141.4	50.6	35.1	13.0	16.6
28	42H0	1120.1	9.1	47.7	263.6	236.6	231.1	113.2	153.0	25.9	39.9
28	43G8	308.7	0.0	11.7	57.2	72.9	109.4	31.8	13.3	11.1	1.3
28	43G9	656.3	0.0	36.7	346.7	120.8	95.6	29.9	8.0	13.1	5.6
28	43H0	741.2	1.3	27.0	198.6	218.7	216.4	45.9	13.1	15.8	4.5
28	43H1	74.6	1.9	16.6	36.6	6.9	8.6	1.7	1.6	0.0	0.7
28	44G9	325.4	0.4	16.9	128.6	55.6	67.1	23.7	16.8	2.9	13.4
28	44H0	2241.6	0.0	84.5	419.2	684.3	496.7	203.3	186.6	69.7	97.3
28	44H1	245.3	0.0	43.0	117.6	29.1	35.4	10.6	4.1	0.8	4.7
28	45G9	479.9	0.1	73.6	250.4	75.9	47.0	24.1	3.7	1.6	3.7
28	45H0	687.0	0.0	39.0	390.9	116.4	65.1	29.5	26.4	13.5	6.2
28	45H1	307.8	8.4	27.7	115.6	89.9	30.4	20.8	9.5	1.5	3.9
28 Total		8484.3	24.9	473.4	2684.6	1976.6	1732.9	665.5	527.2	169.0	230.2
29	46G9	1491.5	0.0	376.5	885.0	132.9	55.2	25.1	16.9	0.0	0.0
29	46H0	484.3	0.0	138.2	222.3	85.5	28.3	8.1	1.8	0.0	0.0
29	46H1	641.2	0.9	83.2	242.6	174.9	102.2	26.7	4.8	3.1	2.8
29	46H2	118.1	2.5	20.2	52.8	27.9	9.2	2.6	0.6	0.7	1.5
29	47G9	51.8	0.4	13.7	34.7	1.3	1.4	0.4	0.0	0.0	0.0
29	47H0	717.9	0.0	399.5	245.8	62.1	10.5	0.0	0.0	0.0	0.0
29	47H1	941.9	1.6	152.1	576.7	124.1	61.3	18.8	7.3	0.0	0.0
29	47H2	433.0	4.7	126.1	211.3	63.4	23.7	3.4	0.1	0.1	0.1
29 Total		4879.6	9.9	1309.6	2471.3	672.0	291.7	85.2	31.5	3.9	4.4
32	47H3	86.3	1.0	25.5	42.5	12.3	4.5	0.6	0.0	0.0	0.0
32 Total		86.3	1.0	25.5	42.5	12.3	4.5	0.6	0.0	0.0	0.0
Grand Total		39283.3	5012.8	5277.5	12477.1	6631.0	4705.4	2619.9	1206.1	648.9	704.4

Table 2.1.1.3: Estimated numbers (millions) of sprat October 2004 by rectangle.

SD	RECT	TOTAL	AGE 0	AGE 1	AGE 2	AGE 3	AGE 4	AGE 5	AGE 6	AGE 7	AGE 8+
21	41G1	32.8	9.4	20.8	1.5	1.0	0.1				
21	41G2	43.8	18.0	18.3	4.2	2.7	0.6	0.0	0.1	0.0	0.0
21	42G1	0.4	0.0	0.1	0.1	0.1	0.0		0.0		
21	42G2	0.0									
21	43G1	67.5	24.4	12.2	11.2	12.8	5.7	0.6	0.7		
21	44G0	205.8	194.6	9.2	1.1	0.7	0.1				
21	44G1	1218.5	1061.5	109.4	29.8	14.9	2.8		0.3		
21 Total		1568.7	1307.8	169.9	47.9	32.3	9.2	0.7	1.0	0.0	0.0
22	37G1	1200.2	6.7	1013.0	120.1	48.7	7.9	1.8		2.1	
22	38G0	412.8	15.6	345.1	36.9	12.4	2.5	0.2			
22	38G1	41.7		37.0	3.7	0.9	0.1	0.0			
22	39F9	127.5	118.1	9.2	0.2	0.0					
22	39G0	22.7	6.8	14.4	1.2	0.3					
22	39G1	101.1	46.0	44.0	8.1	2.1	0.4	0.4			
22	40G0	126.3	114.9	11.0	0.5	0.0					
22 Total		2032.1	308.1	1473.6	170.7	64.3	10.9	2.5	0.0	2.1	0.0
23	40G2	64.8	0.8	32.6	11.6	11.5	6.2	1.9	0.2		
23 Total		64.8	0.8	32.6	11.6	11.5	6.2	1.9	0.2	0.0	0.0
24	37G2	220.0	0.7	205.7	12.0	0.6	0.9	0.1	0.1	0.0	0.0
24	37G3	153.8	110.9	42.0	1.0						
24	37G4	449.5	163.6	248.8	21.5	7.5	5.8	1.0	0.8	0.3	0.3
24	38G2	516.3	9.5	446.0	40.0	8.9	9.5	0.9	1.1	0.3	0.3
24	38G3	1452.2	263.3	1067.7	84.1	15.4	16.8	2.1	1.9	0.5	0.5
24	38G4	813.3	2.7	609.9	98.2	53.1	32.1	9.1	5.1	1.6	1.6
24	39G2	100.0	0.9	88.2	7.6	1.0	2.1	0.1	0.1	0.0	0.0
24	39G3	706.1	20.7	514.1	86.5	42.1	30.8	5.4	4.4	1.0	1.0
24	39G4	665.7	0.5	468.6	90.9	55.2	33.4	6.8	6.4	1.9	1.9
24 Total		5076.9	572.7	3690.9	441.7	183.8	131.3	25.4	19.8	5.7	5.7
25	37G5	797.0	8.7	430.4	156.7	83.3	72.7	27.8	9.2	4.9	3.4
25	38G5	1372.0	10.8	722.4	274.8	151.8	132.9	50.3	16.6	6.2	6.3
25	38G6	187.0	0.0	107.8	33.5	19.4	17.2	6.0	2.2		0.8
25	38G7	424.0	2.1	285.0	61.5	33.1	27.8	10.6	2.7		1.3
25	39G4	282.6	0.0	155.3	83.0	8.5	28.0	0.0	0.0	5.8	2.1
25	39G5	921.5	0.0	456.3	117.5	111.0	118.7	22.7	63.7	21.8	10.0
25	39G6	1132.0	0.0	745.5	171.8	90.6	78.8	28.1	10.0	3.7	3.6
25	39G7	1697.0	3.8	1183.7	237.5	118.7	102.7	36.5	9.3		4.8
25	40G4	537.3	0.0	308.6	55.2	31.7	43.5	38.6	41.1	2.7	15.9
25	40G5	1358.3	0.0	601.9	233.2	98.7	149.8	136.5	62.2	33.3	42.7
25	40G6	1094.5	0.0	552.2	222.4	54.0	101.4	41.6	41.5	9.9	71.5
25	40G7	894.2	0.0	343.6	142.1	133.2	113.1	41.8	75.2	16.6	28.5
25	41G6	2250.3	0.0	490.4	466.7	283.1	371.6	81.4	253.9	63.3	239.8
25	41G7	4281.4	0.0	2110.2	859.7	489.3	438.3	91.7	125.7	74.8	91.7
25 Total		17229.2	25.4	8493.2	3115.5	1706.3	1796.4	613.5	713.4	243.0	522.6
26	37G8	477.0	31.7	294.7	126.5	14.3	5.6	2.2	1.4	0.6	
26	37G9	794.0	52.7	490.6	210.6	23.8	9.3	3.7	2.3	1.0	
26	38G8	881.0	7.8	523.1	283.8	47.5	11.6	3.7	2.4	1.1	
26	38G9	3650.1	309.1	1771.5	968.6	351.3	97.7	87.5	24.7	32.3	7.3
26	39G8	1841.8	4.1	1061.3	521.7	157.3	32.7	40.4	7.2	13.4	3.7
26	39G9	4885.7	246.0	2107.3	1359.7	600.9	86.8	282.9	52.0	88.1	62.2
26	39H0	1206.0	662.3	379.5	70.1	55.5	1.1	27.3	1.0	5.6	3.6
26	40G8	5298.9	11.5	1870.9	2143.6	703.3	151.5	266.4	39.3	83.2	29.3

SD	RECT	TOTAL	AGE 0	AGE 1	AGE 2	AGE 3	AGE 4	AGE 5	AGE 6	AGE 7	AGE 8+
26	40G9	3939.7	318.1	2332.6	792.8	267.8	38.9	139.0	5.7	33.0	11.8
26	40H0	4799.8	132.1	3110.8	878.0	359.3	16.7	223.8	5.0	51.1	22.9
26	41G8	2434.2		1374.0	293.7	274.0	112.0	166.6	50.6	101.1	62.1
26	41G9	4437.7	14.9	3100.8	614.3	229.6	130.1	184.4	40.8	54.1	68.7
26	41H0	2219.6	27.7	1492.2	225.7	201.1	70.1	100.2	32.5	28.2	42.0
26 Total		36865.5	1817.9	19909.2	8489.2	3285.8	764.1	1528.1	264.9	492.8	313.4
27	42G6	808.9	0.0	356.7	188.5	51.0	147.2	4.0	33.2	4.0	24.3
27	42G7	3337.8	0.0	1505.3	1368.3	103.5	149.0	46.4	77.8	27.8	59.8
27	43G7	2959.0	0.0	1246.2	1126.8	135.0	258.1	57.1	57.4	6.5	72.0
27	44G7	5622.9	0.0	3010.9	1211.6	245.5	599.1	99.2	206.6	56.1	193.8
27	44G8	698.0	0.0	133.3	163.1	59.0	151.7	31.7	73.0	5.1	81.2
27	45G7	1735.5	0.6	1043.7	459.7	45.8	59.0	42.2	30.3	16.2	38.0
27	45G8	4174.4	0.0	2073.5	1195.4	245.6	202.7	72.6	169.3	149.2	66.2
27	46G8	3284.4	0.0	1327.5	1352.8	163.1	160.8	0.0	110.2	0.0	170.0
27 Total		22620.9	0.6	10697.0	7066.1	1048.5	1727.5	353.4	757.8	264.9	705.2
28	42G8	3923.9	6.4	1502.3	832.6	427.1	394.4	289.0	50.4	193.2	228.5
28	42G9	6552.7	17.0	4063.4	1182.6	415.9	367.2	270.4	12.3	103.6	120.4
28	42H0	1603.2	41.2	790.9	295.3	155.9	70.8	89.1	32.3	67.8	59.9
28	43G8	1754.8	0.0	863.2	431.6	146.4	122.5	34.3	91.1	40.3	25.4
28	43G9	5844.2		3440.2	1089.3	482.1	154.7	260.2	34.4	137.0	246.4
28	43H0	4203.6	45.9	2830.6	812.5	191.2	97.8	86.3	22.2	67.2	49.8
28	43H1	3210.5	69.6	2146.5	645.8	175.6	70.6	23.2	7.7	27.8	43.8
28	44G9	2113.9	0.0	1468.4	379.3	40.5	66.1	42.6	22.0	41.9	53.1
28	44H0	3521.0		2435.8	480.4	232.8	74.0	126.4	25.0	61.3	85.3
28	44H1	12000.7	187.0	8234.0	2471.1	592.4	154.4	188.5		26.8	146.7
28	45G9	9724.7	0.0	5801.4	2287.9	571.1	369.9	242.3	64.5	191.3	196.4
28	45H0	7704.3	14.1	4756.2	1516.3	724.0	25.6	285.2	22.9	146.8	213.2
28	45H1	4832.8	30.0	2907.5	1419.8	194.9	168.8	84.6	3.2	10.0	13.9
28 Total		66990.4	411.2	41240.5	13844.3	4349.8	2136.7	2022.1	388.1	1115.0	1482.7
29	46G9	1972.0	10.4	698.1	798.7	135.2	157.9	57.5	42.8	45.2	26.1
29	46H0	5547.9	61.3	4144.8	918.7	66.8	124.7	55.7	46.8	62.4	66.8
29	46H1	6046.8	37.2	4285.4	1461.4	72.6	115.6	33.1	12.5	3.3	25.9
29	46H2	213.3	148.0	48.2	13.1	1.5	1.4	0.1	0.5	0.0	0.6
29	47G9	4535.1	29.5	3352.5	948.4	52.9	66.7	46.7	0.0	24.6	14.1
29	47H0	5577.5	42.3	2915.6	2404.5	73.4	66.6	29.5	15.2	0.0	30.4
29	47H1	4078.2	0.0	2691.2	1064.3	155.1	86.0	9.9	9.9	17.5	44.4
29	47H2	2999.3	3.0	2364.0	557.8	35.5	19.4	5.1	8.0	2.2	4.2
29 Total		30970.2	331.6	20499.9	8166.8	593.0	638.4	237.5	135.6	155.0	212.5
32	47H3	4475.2	8.3	3464.7	855.4	133.4	5.5	2.4	2.5	2.4	0.6
32 Total		4475.2	8.3	3464.7	855.4	133.4	5.5	2.4	2.5	2.4	0.6
Grand Total		187894.0	4784.4	109671.4	42209.1	11408.6	7226.3	4787.5	2283.2	2280.9	3242.7

Table 2.1.2.1: Estimated numbers (millions) of herring October 2004.

SD	TOTAL	AGE 0	AGE 1	AGE 2	AGE 3	AGE 4	AGE 5	AGE 6	AGE 7	AGE 8+
21	254.48	89.86	118.29	37.16	4.83	2.26	1.94	0.13	0.00	0.01
22	1021.63	826.98	126.58	51.53	5.80	6.72	2.45	1.57	0.00	0.00
23	868.26	0.00	258.89	234.97	134.85	81.45	74.20	60.37	14.00	9.53
24	3800.19	2383.89	579.31	344.93	258.50	101.69	90.06	25.50	12.56	3.75
25	7476.52	872.90	753.51	1871.57	1567.05	1141.63	832.74	161.21	131.96	143.94
26	4974.83	803.41	289.42	671.89	780.50	765.27	695.42	354.98	305.35	308.57
27	7437.16	0.00	1343.01	4066.70	1218.51	577.31	171.89	43.66	12.06	4.02
28	8484.28	24.92	473.36	2684.62	1976.61	1732.90	665.50	527.18	169.02	230.18
29	4879.64	9.92	1309.62	2471.27	672.04	291.71	85.18	31.52	3.93	4.45
32	86.31	0.95	25.51	42.49	12.27	4.51	0.57	0.00	0.00	0.00
Total	39283.30	5012.83	5277.50	12477.13	6630.97	4705.44	2619.94	1206.12	648.88	704.44

Table 2.1.2.2: Estimated numbers (millions) of sprat October 2004

SD	TOTAL	AGE 0	AGE 1	AGE 2	AGE 3	AGE 4	AGE 5	AGE 6	AGE 7	AGE 8+
21	1568.74	1307.80	169.90	47.88	32.27	9.24	0.66	0.99	0.00	0.00
22	2032.07	308.07	1473.55	170.65	64.33	10.88	2.47	0.00	2.12	0.00
23	64.80	0.76	32.58	11.62	11.45	6.23	1.94	0.22	0.00	0.00
24	5076.94	572.74	3690.88	441.68	183.82	131.31	25.44	19.77	5.65	5.65
25	17229.25	25.35	8493.19	3115.53	1706.30	1796.42	613.55	713.35	242.97	522.58
26	36865.45	1817.90	19909.21	8489.20	3285.80	764.09	1528.11	264.89	492.83	313.42
27l	22620.90	0.61	10696.99	7066.08	1048.46	1727.52	353.36	757.78	264.91	705.20
28	66990.37	411.21	41240.47	13844.32	4349.77	2136.74	2022.06	388.11	1114.96	1482.74
29	30970.24	331.62	20499.87	8166.76	593.01	638.42	237.52	135.58	155.00	212.47
32	4475.24	8.34	3464.74	855.35	133.35	5.48	2.42	2.53	2.42	0.60
Total	187894.01	4784.41	109671.37	42209.07	11408.56	7226.32	4787.53	2283.22	2280.87	3242.65

Table 2.1.2.3: Estimated biomass (in tonnes) of herring October 2004.

SD	TOTAL	AGE 0	AGE 1	AGE 2	AGE 3	AGE 4	AGE 5	AGE 6	AGE 7	AGE 8+
21	15564.8	2412.2	6755.8	2838.3	488.8	190.2	268.9	17.1	0.0	1.1
22	12647.6	7548.2	3070.8	1364.0	194.0	259.9	144.5	68.0	0.0	0.0
23	89100.8	0.0	13829.9	18062.1	15830.0	13199.0	12915.3	10945.1	2543.5	1779.1
24	87807.7	17438.2	18599.9	17544.1	15801.8	7721.2	6815.0	2155.7	1357.0	378.4
25	239226.9	9811.2	16502.9	45949.7	53848.5	48068.3	36286.4	8381.4	7423.6	7827.5
26	209449.3	8548.5	7913.9	22240.6	34614.2	35152.5	36661.1	19712.3	19333.5	21729.2
27	131605.8	0.0	14198.3	61218.5	25327.0	13544.0	4721.7	1372.2	380.6	185.9
28	188742.5	162.4	5965.3	45382.1	42690.9	45791.4	19825.1	17077.8	5652.6	6887.3
29	69315.5	40.4	11811.9	31634.2	12748.2	6467.3	1871.1	755.0	73.5	101.9
32	980.0	4.5	235.6	441.8	201.4	84.7	12.0	0.0	0.0	0.0
Total	1044440.9	45965.6	98884.2	246675.5	201744.9	170478.4	119520.9	60484.6	36764.4	38890.4

Table 2.1.2.4: Estimated biomass (in tonnes) of sprat October 2004.

SD	TOTAL	AGE 0	AGE 1	AGE 2	AGE 3	AGE 4	AGE 5	AGE 6	AGE 7	AGE 8+
21	9892.2	4617.5	3170.1	1009.2	727.2	216.5	19.4	21.8	0.0	0.0
22	20404.2	1032.3	16176.1	2044.8	869.8	181.5	37.4	0.0	59.4	0.0
23	1108.1	2.7	477.0	217.1	233.1	131.8	39.5	7.0	0.0	0.0
24	57164.7	2235.0	43145.2	5998.1	2895.9	1959.7	423.7	313.7	94.9	94.9
25	183248.2	103.9	75547.4	32727.5	21217.9	22344.5	8653.5	9974.2	3094.2	7102.0
26	319183.9	6762.9	150839.6	82325.7	37112.1	9878.5	18327.3	3502.8	5988.7	3328.1
27	188640.9	1.8	60488.0	55886.6	10790.1	19142.9	3898.0	8135.7	3089.3	8308.2
28	452051.5	936.6	228783.3	101355.8	39122.4	22333.0	20324.5	4136.7	11663.6	15778.5
29	204019.0	719.1	102210.1	59003.6	5357.8	6632.5	2345.2	1478.4	1474.4	2266.9
32	22681.1	23.5	16874.2	4834.1	819.1	51.8	23.6	24.7	23.6	6.5
Total	1458393.7	16435.4	697710.9	345402.4	119145.6	82872.8	54092.0	27595.0	25488.1	36885.0

Table 2.1.3.1: Calculated correction factor for 2004 per Subdivision.

SD	AREA	MAX	CORR. FACTOR
21	4390	4604	1.05
22	2781	3459	1.24
23	236	367	1.55
24	5665	5665	1.00
25	11889	12277	1.03
26	10705	10829	1.01
27	6393	7784	1.22
28	10918	14866	1.01
29	5637	10154	1.80
32	536	7497	13.98

Tables 2.1.3.2: Corrected numbers (millions) of herring October 2004.

SD	TOTAL	AGE 0	AGE 1	AGE 2	AGE 3	AGE 4	AGE 5	AGE 6	AGE 7	AGE 8+
21	266.94	94.26	124.08	38.98	5.07	2.37	2.03	0.14	0.00	0.01
22	1270.92	1028.77	157.47	64.10	7.22	8.36	3.05	1.95	0.00	0.00
23	1349.06	0.00	402.25	365.08	209.52	126.55	115.29	93.80	21.75	14.81
24	3800.25	2383.93	579.32	344.94	258.50	101.69	90.06	25.50	12.56	3.75
25	7720.91	901.43	778.14	1932.75	1618.27	1178.95	859.96	166.48	136.27	148.65
26	5032.19	812.67	292.76	679.64	789.50	774.09	703.44	359.07	308.87	312.13
27	9055.81	0.00	1635.31	4951.79	1483.71	702.96	209.30	53.16	14.68	4.89
28	8579.38	25.20	478.67	2714.71	1998.77	1752.32	672.96	533.09	170.91	232.76
29	8789.27	17.87	2358.90	4451.28	1210.49	525.43	153.43	56.77	7.08	8.02
32	1206.80	13.28	356.68	594.10	171.56	63.06	7.97	0.00	0.00	0.00
Total	47071.53	5277.41	7163.58	16137.37	7752.61	5235.78	2817.49	1289.96	672.12	725.02

Tables 2.1.3.3: Corrected numbers (millions) of sprat October 2004.

SD	TOTAL	AGE 0	AGE 1	AGE 2	AGE 3	AGE 4	AGE 5	AGE 6	AGE 7	AGE 8+
21	1645.56	1371.84	178.22	50.22	33.85	9.69	0.69	1.04	0.00	0.00
22	2527.92	383.24	1833.11	212.29	80.03	13.53	3.07	0.00	2.64	0.00
23	100.68	1.18	50.62	18.05	17.79	9.68	3.01	0.34	0.00	0.00
24	5077.02	572.75	3690.93	441.69	183.82	131.31	25.44	19.77	5.65	5.65
25	17792.44	26.18	8770.82	3217.37	1762.08	1855.14	633.61	736.67	250.91	539.66
26	37290.48	1838.86	20138.75	8587.07	3323.68	772.90	1545.73	267.94	498.51	317.03
27	27544.18	0.74	13025.11	8603.96	1276.65	2103.50	430.27	922.71	322.57	858.68
28	67741.23	415.82	41702.71	13999.49	4398.53	2160.69	2044.72	392.46	1127.46	1499.36
29	183194.20	4754.71	103841.72	39981.47	12600.67	7805.21	5395.11	2476.93	2598.44	3739.97
32	1645.56	1371.84	178.22	50.22	33.85	9.69	0.69	1.04	0.00	0.00
Total	344559.27	10737.16	193410.21	75161.83	23710.95	14871.34	10082.34	4818.90	4806.18	6960.35

Table 2.1.4.1: Tuning fleet results for sprat (22–29).

YEAR	AGE 1	AGE 2	AGE 3	AGE 4	AGE 5	AGE 6	AGE 7	AGE 8+	TOTAL
1991	45804	39734	44324	3152	8857	2019	1944	2958	204984
1992	44309	31419	27078	10898	2207	3129	757	759	171656
1993	47033	67557	30226	24919	10416	2324	3028	1561	194111
1994	21011	60888	48563	19396	13346	5816	1035	1631	240162
1995	158397	17638	45989	24981	12957	5973	2329	1540	321359
1996	82298	158131	24987	30569	16173	8032	4575	1535	330612
1997	24681	97716	78960	14134	10084	3095	2629	1223	305748
1998	112155	24373	62469	39864	8747	5016	1680	1163	258588
1999	5951	96075	16669	36568	39142	5342	3361	1816	236815
2000	65256	3547	54088	6027	14556	16014	1604	2858	170653
2001	13107	38715	9343	37473	5567	13435	9248	4249	141295
2002	41508	17964	44393	7545	22231	2945	6067	5358	243356
2003	121293	41533	30502	25937	9685	14807	6157	10107	436714
2004	193053	75061	23643	14851	10080	4816	4806	6960	341268

Table 2.1.4.2: Tuning fleet results for sprat (26 and 28).

YEAR	AGE 1	AGE 2	AGE 3	AGE 4	AGE 5	AGE 6	AGE 7	AGE 8+	TOTAL
1991	33320	17331	14153	369	2878	344	248	666	105331
1992	37946	23839	19543	7753	1253	2103	199	478	139783
1993	29932	29719	15050	12330	4523	967	1433	1161	99813
1994	19541	48259	21794	8680	4654	1739	106	535	146473
1995	106726	11388	31041	14912	7189	4651	1724	958	208563
1996	59104	96174	15794	16036	6692	2921	2259	645	201977
1997	5631	52389	47279	5032	6012	2106	1596	411	166234
1998	85272	10766	29671	19713	4181	2785	1049	1132	155332
1999	4395	52089	7045	12775	10648	1770	1652	1223	114968
2000	52970	2502	40460	2715	8480	7128	1016	1885	122085
2001	8711	24519	4276	23050	2522	6147	4120	1429	81642
2002	33369	9201	30643	3681	15163	760	3791	2431	140328
2003	64882	23090	9774	16500	3675	8720	1471	5333	208093
2004	61841	22586	7722	2933	3590	660	1625	1816	105031

Table 2.1.4.3: Tuning fleet results for herring (25–29).

YEAR	AGE 1	AGE 2	AGE 3	AGE 4	AGE 5	AGE 6	AGE 7	AGE 8+	TOTAL
2004	5544	14730	7101	4934	2599	1169	638	706	39178

Table 2.2.2.1: Estimated numbers (millions) of sprat May/June 2004 by rectangle.

ICES SD	RECT	AGE 1	AGE2	AGE 3	AGE 4	AGE 5	AGE 6	AGE 7	AGE 8+	TOTAL
24	38G2	13.9	1.7	4.6	5.8	5.3	3.8	1.7	0.3	37.1
24	38G3	643.4	79.1	79.4	104.5	70.9	20.7	16.0	3.8	1017.8
24	38G4	306.1	57.8	56.7	68.6	43.9	10.7	9.2	2.2	555.0
24	39G2	5.4	0.7	1.8	2.3	2.1	1.5	0.7	0.1	14.3
24	39G3	364.5	37.1	31.3	39.1	25.5	6.4	5.1	1.5	510.3
24	39G4	129.1	36.1	40.4	48.3	30.9	7.2	6.3	1.6	300.0
24	Total	1462.3	212.4	214.1	268.5	178.4	50.2	39.0	9.5	2434.6
25	37G5	34.7	34.7	34.7	34.7	34.7	34.7	34.7	34.7	34.7
25	38G5	315.9	315.9	315.9	315.9	315.9	315.9	315.9	315.9	315.9
25	38G6	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5
25	39G4	223.9	223.9	223.9	223.9	223.9	223.9	223.9	223.9	223.9
25	39G5	591.2	591.2	591.2	591.2	591.2	591.2	591.2	591.2	591.2
25	39G6	152.1	152.1	152.1	152.1	152.1	152.1	152.1	152.1	152.1
25	39G7	557.9	557.9	557.9	557.9	557.9	557.9	557.9	557.9	557.9
25	40G4	1646.0	1646.0	1646.0	1646.0	1646.0	1646.0	1646.0	1646.0	1646.0
25	40G5	1043.2	1043.2	1043.2	1043.2	1043.2	1043.2	1043.2	1043.2	1043.2
25	40G6	1881.6	1881.6	1881.6	1881.6	1881.6	1881.6	1881.6	1881.6	1881.6
25	40G7	1903.5	1903.5	1903.5	1903.5	1903.5	1903.5	1903.5	1903.5	1903.5
25	41G6	198.9	198.9	198.9	198.9	198.9	198.9	198.9	198.9	198.9
25	41G7	1295.6	1295.6	1295.6	1295.6	1295.6	1295.6	1295.6	1295.6	1295.6
25	Total	9851.8	9851.8	9851.8	9851.8	9851.8	9851.8	9851.8	9851.8	9851.8
26	38G9	5286.8	1743.6	520.2	165.4	594.3	11.7	343.6	193.0	8858.7
26	39G8	1068.0	1556.6	950.8	911.6	99.5	96.5	128.2	6.0	4817.1
26	39G9	3434.4	1089.1	788.3	94.8	695.7	57.8	372.0	106.0	6638.1
26	39H0	8352.7	128.8	29.2	0.0	23.0	0.0	10.7	0.0	8544.4
26	40G8	1003.2	1601.7	806.4	679.3	86.3	85.1	90.8	2.4	4355.2
26	40G9	8871.6	2344.9	1985.6	732.3	703.9	431.5	437.8	311.3	15819.1
26	40H0	9354.8	450.9	239.1	26.3	117.6	0.0	99.1	33.4	10321.2
26	41G8	687.9	1200.3	458.4	521.6	63.9	61.9	70.0	4.0	3067.8
26	41G9	6309.2	2872.3	756.8	239.5	810.0	43.1	311.2	292.1	11634.2
26	41H0	11532.5	2145.1	588.0	97.1	176.1	0.0	654.3	290.8	15484.0
26	Total	55901.0	15133.3	7122.8	3467.8	3370.3	787.5	2517.7	1239.1	89539.9
27	42G7	348.2	285.7	83.0	267.0	134.9	117.5	16.4	69.1	1321.7
27	43G7	1584.2	1173.1	149.3	428.6	246.0	172.6	20.0	118.4	3892.1
27	44G7	3387.8	1588.9	127.6	361.2	169.2	111.3	10.4	72.6	5829.1
27	Total	5320.2	3047.8	359.9	1056.7	550.1	401.3	46.8	260.1	11042.9
28	42G8	562.9	1327.4	51.5	127.5	32.9	74.5	26.9	0.0	2203.5
28	42G9	1753.1	1923.2	127.5	297.6	102.0	197.1	60.3	4.6	4465.5
28	42G9	11439.1	2884.9	67.3	64.4	291.3	16.1	174.6	88.8	15026.5
28	42H0	1564.9	3358.2	979.9	212.2	509.6	17.2	618.7	391.6	7652.2
28	43H0	4567.5	5864.1	382.4	218.4	939.4	0.0	710.8	1153.1	13835.7
28	43H1	626.1	1518.2	260.2	24.3	300.7	85.0	150.4	72.9	3037.9
28	44H0	12166.1	7379.0	431.0	27.5	1552.0	31.3	679.3	443.7	22709.8
28	44H1	3224.3	1544.8	40.8	3.8	70.6	13.3	93.9	199.1	5190.7
28	Total	35904.0	25799.8	2340.6	975.6	3798.6	434.5	2514.9	2353.8	74121.8

3 Update of the hydroacoustic database BAD1 and BAD2 for the years 1991 to 2004

3.1 Status of the BAD1 database

The old version of the database was updated by the results of the year 2004. Changes at the past data were not accomplished. The BAD1 revision 8 contains now the results of the hydroacoustic surveys from the years 1991 to 2004. In 2004 the coverage of the investigation area was comparable to the last years. Only in the Kattegat (SD 21) and the Arkona Sea (SD 24) the number of investigated rectangles were extended. The coverage of the northern Baltic is still insufficient. The participation and covering of all vessels by subdivision in the surveys 1991 to 2004 is depicted in Table 3.1.1.

The analysis of the BAD1 data was continued and a working document is given in Annex 2 “Sprat abundance estimates from Baltic International Acoustic Surveys”. The WG recommends that further investigations of the results of hydroacoustic surveys should be continued.

3.2 Status of the BAD2 database

Since last year the content of the database BAD2 has not essential changed. Only data from Latvia, Sweden and Germany are loaded into the database but also these sets are not complete. The former problems with the access to the database and the structure and definition of fields are widely solved. It should be possible now to load the data to BAD2. All participants are requested to deliver the missing data.

Table 3.1.1: Participation and number of ICES squares covered.

YEAR	SHIP	21	22	23	24	25	26	27	28	29	30	31	32	TOTAL
1991	Baltijas Petnieks					10	11	6	10	7				44
	Solea		9	2	7	9								27
1991	total		9	2	7	19	11	6	10	7				71
1992	Argos			2	1	8	4	8	2	5				30
	Monokristal					2	11		9					22
	Solea		10		7	1								18
1992	total		10	2	8	11	15	8	11	5				70
1993	Baltijas Petnieks						5		7					12
	Solea	6	9	2	8									25
1993	total	6	9	2	8		5		7					37
1994	Argos					9	1	9	3	6				28
	Baltica					8	8							16
	Monokristal						8		11					19
	Solea	6	10	2	7	2								27
1994	total	6	10	2	7	19	17	9	14	6				90
1995	Baltica				1	12	7	5						25
	Monokristal						10		12					22
	Solea	3	9	2	7									21
1995	total	3	9	2	8	12	17	5	12					68
1996	Argos				2	10	2	9	2	5				30
	Atlantniro						9		11					20
	Baltica				1	12	7							20
	Solea	4	9	2	7									22
1996	total	4	9	2	10	22	18	9	13	5				92
1997	Atlantniro						9		12					21
	Baltica					6	7							13
	Solea	4	11	2	7									24
1997	total	4	11	2	7	6	16		12					58
1998	Argos				1	9	1	9	5	4				29
	Atlantniro						10		9					19
	Baltica				2	8	7							17
	Solea	4	8	2	7									21
1998	total	4	8	2	10	17	18	9	14	4				86
1999	Argos					8	1	8	2	7				26
	Atlantida						8		12					20
	Baltica				2	8	7							17
	Julanta									6	16	8	9	39
	Solea	6	8	2	7									23
1999	total	6	8	2	9	16	16	8	14	13	16	8	9	125
2000	Argos					8	1	8	3	5				25
	Atlantida						10		12					22
	Baltica				2	8	7							17
	Julanta									5	25		11	41
	Solea	4	10	2	7									23
2000	total	4	10	2	9	16	18	8	15	10	25		11	128
2001	Argos			2	4	8	1	9	3	5				32
	Atlantida						10		12					22
	Baltica				1	8	7							16
	Solea	7	10		7									24
	Solveig								2	5			1	8
2001	total	7	10	2	12	16	18	9	17	10			1	102

YEAR	SHIP	21	22	23	24	25	26	27	28	29	30	31	32	TOTAL
2002	Argos				2	8		7	1	6				24
	Atlantniro						10		12					22
	Baltica				1	8	7							16
	Solea		9	2	7									18
	Solveig								2	5				7
	Zane						2		5					7
2002	total		9	2	10	16	19	7	20	11				94
2003	Amazon								2	5			1	8
	Argos					8		8	4	6				26
	Atlatida						10		11					21
	Baltika				1	8	6							15
	Solea	4	9	2	7									22
2003	total	4	9	2	8	16	16	8	17	11			1	92
2004	Argos					8		8	4	6				26
	Atlantniro						10		12					22
	Baltica				1	8	7							16
	Emma								2	5			1	8
	Solea	7	7	2	9									25
2004	total	7	7	2	10	16	17	8	18	11			1	97
Total		55	128	28	123	202	221	94	194	93	41	8	23	1210

4 Plan and decide on acoustic surveys and experiments to be conducted in 2005 and 2006

4.1 Planned acoustic survey activities

All the Baltic Sea countries (except Finland) intend to take part in acoustic surveys and experiments in 2005. The list of participating research vessels and periods are given in the following table:

VESSEL	COUNTRY	AREA OF INVESTIGATION (ICES SUB-DIVISIONS)	(PRELIMINARY) PERIOD OF INVESTIGATIONS	DURATION (DAYS)
WALTHER HERWIG III	Germany	24, 25, 26 (part), 27 (part)	06.05–25.05.2005	19
BALTICA	Latvia, Poland	26 (part), 28	15.05–24.05.2005	10
DARIUS	Lithuania	26 (Lithuanian EEZ)	May	2
ATLANTIRO	Russia	26	15.05–31.05.2005	16
BALTICA	Poland	24(part), 25, 26	21.09–11.10.2005	21
ARGOS	Sweden	25(N), 27, 28 (W), 29 (W)	03.10–21.10.2005	19
SOLEA	Germany, Denmark	21, 22, 23, 24	04.10–-24.10.2005	21
BALTICA	Latvia, Poland	26(part), 28	14.10–25.10.2005	12
CHARTER	Estonia	28(part), 29SE, 32 (part)	October	10
ATLANTNIRO	Russia	26	October	21
DARIUS	Lithuania	26 (Lithuanian EEZ)	October	2–3
CHARTER	Latvia, Estonia	28 (Gulf of Riga)	25.07–02.08.2005	10

The preliminary plan for acoustic surveys and experiments in 2006 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 SUB-DIVISIONS)	(PRELIMINARY) PERIOD OF INVESTIGATIONS	DURATION (DAYS)
BALTICA	Latvia+Poland	26(W), 28	May	10
Walther Herwig III	Germany	24, 25, 26 (part), 27 (part)	May	19
DARIUS	Lithuania	26 (Lithuanian EEZ)	May	2
ATLANTIDA/ ATLANTNIRO	Russia	26	May	15
BALTICA	Poland	24(part), 25, 26	September-October	21
BALTICA	Latvia, Estonia, Finland, Poland	SD26 (W), 28, 29, 32 (W)	October, November	21

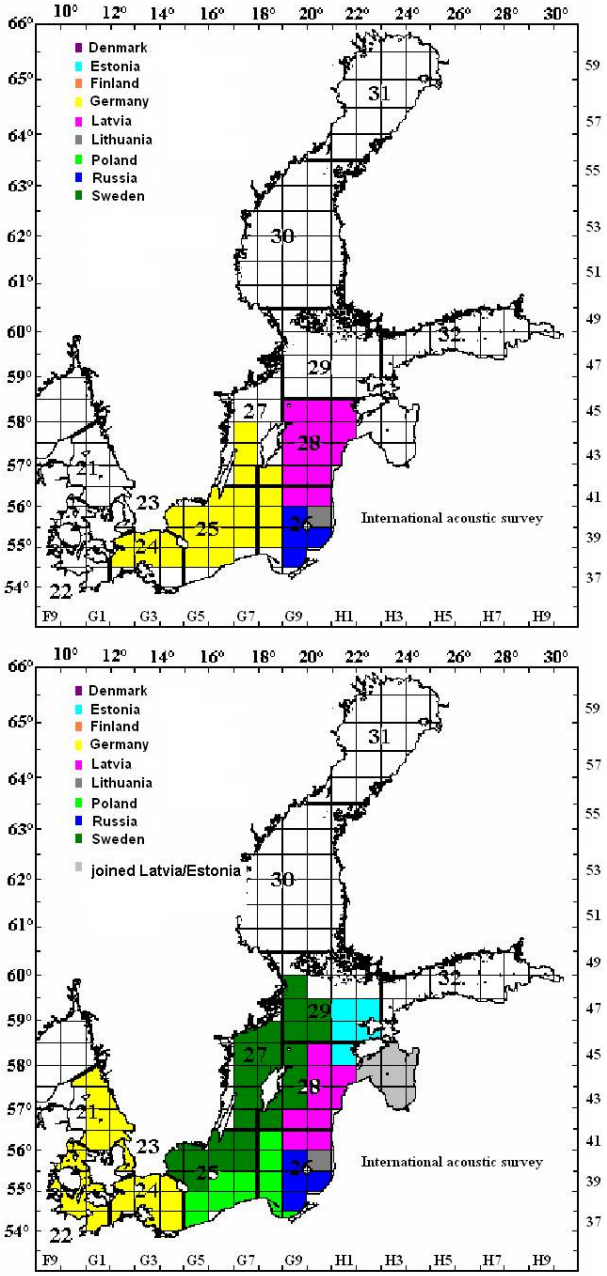
VESSEL	COUNTRY	AREA OF INVESTIGATION (ICES SUB-DIVISIONS)	(PRELIMINARY) PERIOD OF INVESTIGATIONS	DURATION (DAYS)
ARGOS	Sweden	25(N), 27, 28 (W), 29 (W)	September-October	19
SOLEA	Germany/Denmark	21, 22, 23, 24	October	21
DARIUS	Lithuania	26 (Lithuanian EEZ)	October	2–3
ATLANTIDA/ ATLANTNIRO	Russia	26	October	17
CHARTER	Latvia, Estonia	28 (Gulf of Riga)	25.07.-02.08.2005	10

4.2 New design of acoustic surveys

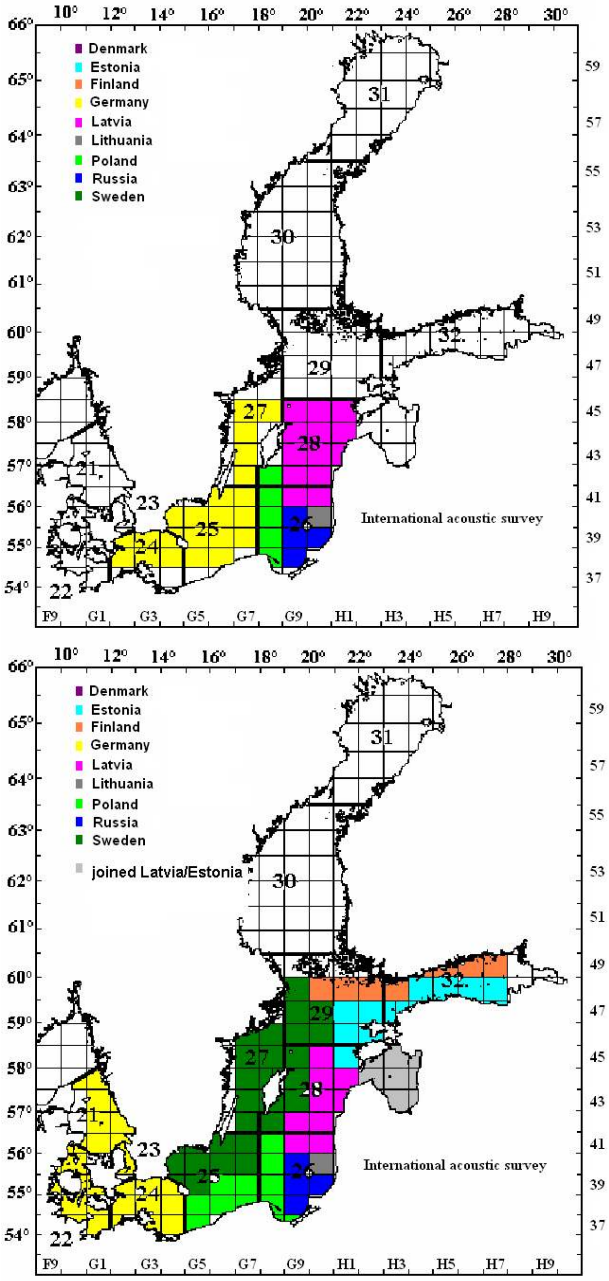
The working group discussed and agreed a new surveys design of acoustic surveys due to the following reasons. The stock indices are estimated by ICES-rectangle. Then the estimates of the rectangles are added to estimate stock indices by ICES-subdivision. The current method for planning the acoustic surveys is based on the agreement of periods of the national surveys and a more general description of the covered areas by nation. In most cases the national zones are the boundaries of the covered areas. This survey design results in a lot of ICES-Rectangles which were covered by two or more nations with different intensities. On the other hand rectangles exist where only a part of the total area was covered. This situation results in uncertainties of the stock indices.

To solve the problem a new survey design was discussed during the meeting. The basic idea is that each ICES-Rectangle is assigned to one nation. That means that the mandatory nation carried 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,..). These data can be used for comparing the results of different vessels. The advantage of this survey design is that all rectangles are covered with the same intensity and the estimated indices have the same quality. Furthermore, it is easier to estimate the stock indices by subdivision. The disadvantage is that in some cases permissions for national zones are necessary.

The proposed mandatory rectangles assignment of the nations to rectangles) of the acoustic surveys in 2005 are presented in Figure 4.1.1 and 4.1.2. The planned coverage of the Baltic Sea and the assignment of nations to the rectangles during the acoustic surveys in 2006 are presented in Figure 4.1.3 and 4.1.4.



Figures 4.1.1–4.1.2: Proposed partitioning (assignment of the nations to rectangles) for the May and the October surveys in 2005 (from left to right).



Figures 4.1.3–4.1.4: Proposed preliminary partitioning (assignment of the nations to rectangles) for the May and the October surveys in 2006 (from left to right).

Furthermore, the ICES-rectangles presented in the table below have to be additionally covered by more than one nation for inter-calibration purposes.

Following table defines these rectangles for the May survey in 2005 and 2006:

COUNTRY	RECTANGLE	MANDATORY/OPTIONAL
Russia	39G8; 40G8; 41G9; 41H0; 40H0	mandatory
Russia	41G8	Optional

Following table defines these rectangles for the October survey in 2005 and 2006:

COUNTRY	RECTANGLE	MANDATORY/OPTIONAL
Russia	39G8; 40G8; 41G9; 41H0; 40H0	mandatory
Russia	41G8	optional
Latvia	45G9; 45H1	mandatory

The main results of both acoustic surveys in May/June and October 2005 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 co-ordinator **(Niklas Larson, niklas.larson@fiskeriverket.se)** and the BAD1 manager **(Eberhard Götze, eberhard.goetze@ifh.bfa-fisch.de)** not later than one month before the ICES WGBIFS meeting of the next year. These results are intended for the information of the ICES Assessment Working Groups.

5 Discuss the results from BITS surveys conducted in autumn 2004 and spring 2005

5.1 Reports of the trawl surveys conducted in autumn 2004 and spring 2005

The following tables summarize the period of investigations and the number of realized catch stations by the ICES Subdivision and nation:

BITS in autumn 2004

COUNTRY	PERIOD/ICES SD	21	22	23	24	25	26	27	28
Denmark -Havfisken	19/10–06/11/04	26	12	2					
Denmark - Dana	03–18/11/04					33	9		
Germany	22/10–4/11/04		9		49				
Latvia	02–08/11/04						10		15
Poland	15–30/11/04					16	15		
Russia	03–07/11/04						16		
Lithuania	26–27/11/04						6		
Sweden	25–29/10/04 and 15–25/11/04					8		8	

BITS in spring 2005

COUNTRY	PERIOD/ICES SD	21	22	23	24	25	26	27	28
Denmark -Havfisken	28/02–15/03/05	26	12	2					
Denmark – Dana*	04–19/03/05					43	6		
Germany	11–25/02/05		9		46				
Latvia	09–17/03/05						9		24
Poland	15/02–03/03/05					26	16		
Russia	11/02–05/03/05						52		2
Lithuania	24–25/02/05						5		
Sweden	28/02–12/03/05					20	1	10	11

***) – additionally the 14 hauls were made for fishing gear calibration purposes.**

Figures 5.1.1 and 51.2 present the planned stations of both bottom trawl surveys. In some cases selected positions for the Danish RV. DANA were not carried out dependent on oxygen deficiency close to the bottom. In this cases zero catches were added to the BITS database. Furthermore, some selected positions were replaced by other positions when it was not possible to carry out the hauls due to wrecks, extreme rocky bottom or other reasons. All these information were used for improving the ICES Tow Database (TD). In the following text details descriptions of the cruises are presented.

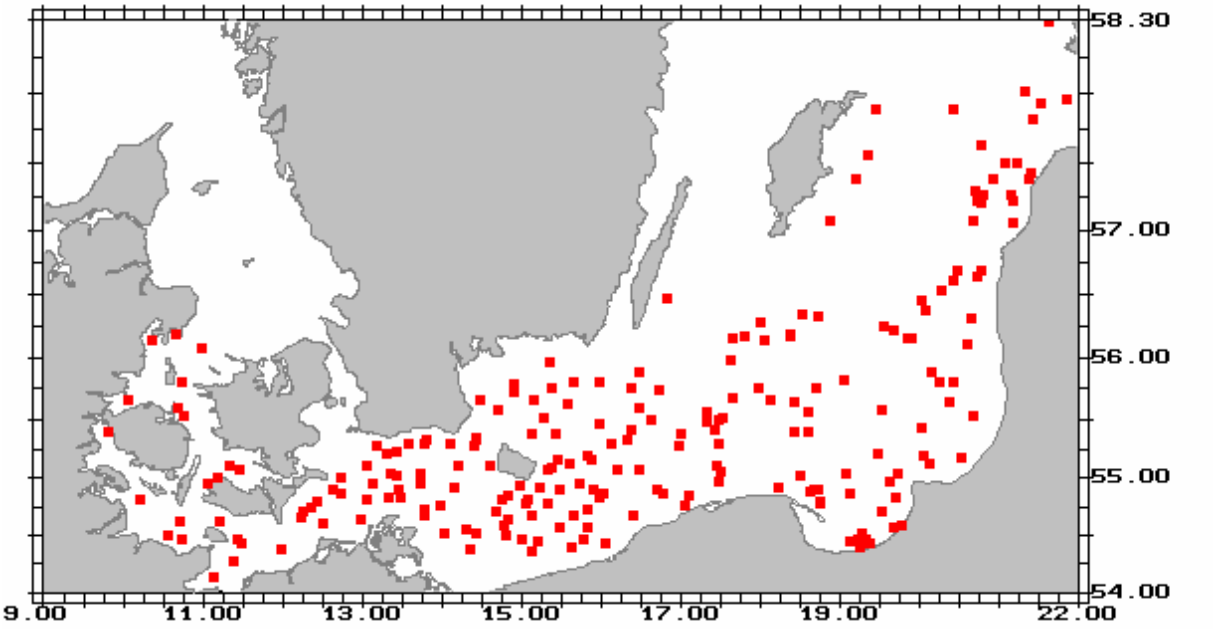


Figure 5.1.1: Hauls planned for the BITS in November 2004.

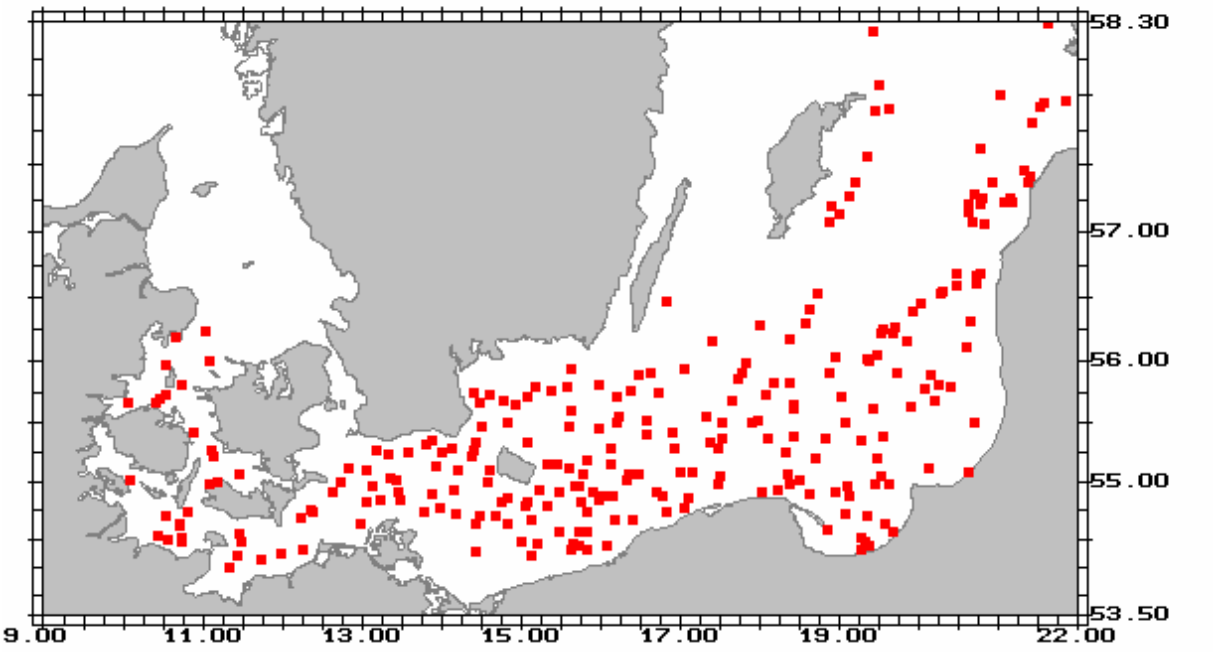


Figure 5.1.2: Hauls planned for the BITS in spring 2005.

Denmark

RV Dana

In the period from 3–18/11–2004 RV. DANA took 32 hauls using TV-3#930 standard trawl and 10 hauls using TV-3 rockhopper gear. In the ICES Subdivisions 25 the 33 catch stations were taken and in SD 26 - 9 hauls. Totally 49 CTD stations were made in connection with the trawl stations.

In the period 4–19/03–2005 RV DANA took 49 hauls using the standard TV3#930 trawl. On the position of six catch stations oxygen content near bottom was considerable below minimum 1.5 ml/l. The TV-3 rockhopper trawl was not used during this cruise. In the ICES Subdivisions 25 the 43 hauls were taken and in SD 26 - 6 hauls. Totally the 50 CTD stations were made in connection with the trawl stations.

Furthermore, 14 additional hauls were taken for calibration purposes, *i.e.* the 7 hauls with standard trawl TV3#930 and 7 hauls with TV3 rockhopper (TV3R#930). Echograms were obtained on all fished stations.

RV Havfisken.

In the period 19/10–6/11–2004 RV. HAVFISKEN took 40 hauls in total. In the ICES Subdivisions 21 the 26 hauls were conducted, the 12 hauls in SD 22 and in SD 23 — 2 hauls. The CTD stations were made in connection with the trawl stations. In all cases the small TV3#520 standard trawl was used.

In the period 28/02–15/03/2005 RV. HAVFISKEN took 40 hauls in total. In the ICES Subdivisions 21 totally 26 hauls were made, in SD 22 — 12 hauls and in SD 23 — 2 hauls. The CTD stations were made in connection with the trawl stations.

Poland

The Polish RV. BALTICA conducted the BITS surveys in the periods of 15–30 November 2004 and 15 February — 03 March 2005. According to BIFSWG plans on November 2004 and February-March 2005, the Polish vessel was obliged to cover the part of the ICES Subdivisions 25 and 26 (within the Polish EEZ) with 31 and 40, respectively randomly selected control hauls. The RV "Baltica" realized all catch stations assigned by the mentioned ICES WG. The trawl stations carried out in November 2004 were localised on the depth range from 17 to 92 m. In February-March 2005 hauls were localised on the depth range from 16 to 105 m.

Difficulties related to fishing gear and trawling positions were as follow.

In November 2004 on the position — 55°04.5'N, 17°21.7'E of the primary selected haul No. 25069 (depth 40 m) in the ICES SD 25, the trawl was damaged. Due to a low level of oxygen content near the bottom in the Gdansk Deep the position of two deep water (>90 m) catches were shifted from the central part to the south-eastern part. Due to the stormy wind the long-time stoppages in work on vessel appear a few times. Each catch station, with the exception of one mentioned haul (damaged net), can be accepted as representative.

In February-March 2005 the location of hauls No. 25010, 25048, 25060 and 25061 were slightly modified due to gill-nets appearance on the primary selected positions. Moreover, the positions of hauls No. 26171 and 26183 were slightly changed due to not stable required trawling depth (rough bottom). The site of haul No. 25017 was modified because recommended 30-m depth for trawling did not appear in the primary selected area (was only 12 m depth). The primary selected position of haul No. 25039 should be eliminated from the ICES TD because a net was damaged. Recommended haul No. 26179 is situated very close to the gas pipeline and it should be deleted from the ICES TD. Each haul, with the exceptions of two mentioned catch stations can be accepted as representative.

Trawling was done with the standard rigging ground trawl type TV-3#930 (without bobbins and additional chains connected with foot-rope), with 10 mm bar length in the codend. The trawling time always lasted for 30 minutes. At each hauling position a CTD profile was taken.

The detailed description of the results of both ground surveys is presented in Annex 5.

Germany

The autumn 2004 as well as the spring 2005 BITS surveys were carried out by the RV SOLEA using the TV3/520 trawl. The duration of the hauls was 0.5 hours. In most cases the hauls were realized at positions selected from the Clear Tow Database. Small shift of some positions were necessary depending on territorial waters and other reasons. At each hauling position a CTD profile was taken. The hauls incorporated in the BITS database can be used without any restrictions. Numbers of valid hauls are given in the following table.

DATE OF SURVEY	SD 22	SD 24
22 Oct. – 4 Nov. 2004	9	46
11–25 Feb. 2005	12	45

November 2004

In the ICES Subdivision 24 only 16 cod individuals where larger than 37 cm and only 2 cod where found larger than 50 cm (mean values per haul). The bycatch of undersized cod (<38 cm l.t.) in the Arkona Sea (SD 24) amounted 95%. Cod in the length range 21–37 cm (mostly from age group 1) dominated in samples. The mean length was 27.6 cm and the mean weight 211 g.

In SD 22 only 6 cod per station were larger than 37 cm. The amount of undersized cod by numbers was 94.6%. Cod from age group 1 (year class 2003) dominated in samples collected in SD 22. The mean length was 29.2 cm and the mean weight 241 g.

Spring 2005

The number of cod larger than 38 cm was very low as it was also observed in November 2004. The length distribution was dominated by the year class 2003 in both investigated the ICES Subdivisions.

The hydrographical conditions were characterized by bottom temperature between 3 and 4°C in the deepest areas of SD 22 and between 5 and 6°C in the Arkona Basin. In the Kiel Bay and in the Mecklenburg Bay the salinity was higher than 15 PSU and the oxygen content was higher than 4 ml/l. The minimum value of oxygen content in the deepest areas of the Arkona Basin was 2.99 ml/l, but in the most areas the oxygen content was higher than 4 ml/l.

Sweden

According to the BIFSWG plans on November 2004, the Swedish vessel was oblige to cover the parts of the ICES SDs 25, 26, 27 and 28 with 30 randomly selected control hauls with the standard TV-3#930 trawl. The RV ARGOS realized the 16 catch stations assigned by the mentioned WG. Four replacement hauls were made to compensate for that the tow database includes stations, which are impossible to trawl using the standard TV-3 trawl. In addition, 12 inter-calibration, 10 complementary and 11 hauls with a new pelagic trawl were realized during this expedition. Overall, the RV ARGOS made 53 hauls in above mentioned the ICES Subdivisions.

The RV ARGOS realized less BITS hauls then normally because the survey included three different tasks: ordinary BITS hauls; calibration between the TV-3#930 and the midwater Fotö trawls; hauls with a pelagic cod trawl. The calibration between the TV-3#930 trawl and the Fotö trawl was performed to give additional data for the calibration between old and new towing gears used in the Baltic. The pelagic cod trawl was used at different depth, including the bottom, to determine the proportion of cod in different depth layers as a function of oxygen concentration. The cod trawl was used in combination with acoustic measurements. The data can be used for assessment.

In February-March 2005 Sweden was assigned of 44 randomly selected hauls of which the RV ARGOS realized 42. Five replacement hauls were made to compensate for that the tow database includes stations, which are impossible to trawl using the standard TV3 trawl. Overall, the Swedish vessel covered parts of the ICES Subdivisions 25, 26, 27 and 28 this survey.

Latvia

Latvian Fish Resources Agency conducted the BITS surveys both in autumn 2004 and in spring 2005. The surveys were carried out onboard of the Latvian commercial vessels using the standard TV3#520 trawl. The chartered vessels for both surveys were of similar type, *i.e.* MRTK (medium size trawlers). The CTD stations were not taken during surveys.

In autumn 2004 the 15 hauls were performed in the ICES Subdivision 28 and 10 hauls in the northern part of the ICES Subdivision 26. One catch station was not valid because of damaged net.

In spring 2005 survey the 24 catch stations were made in the ICES SD 28 and additionally 9 hauls in the northern part of the ICES Subdivision 26. The biological information from these additional hauls will be included in BITS database.

Dates and realized haul numbers during the Latvian surveys in 2004 and 2005 are as follow:

VESSEL	DATE	ICES SUBDIVISION	NUMBER OF HAULS
CLV "UKRI"	02–08.11.2004	26	10
		28	15
CLV "PRIEDAINE"	09–17.03.2005	26	9
		28	24

Russia

During the periods 3–7 November2004 and 11 February—5.March 2005 RV. Atlantniro conducted the BITS surveys. In November 2004 the 16 catch stations were carried out in the Russian EEZ using standard trawl TV3#930.

In February-March 2005 the survey was conducted in the Russian, Lithuanian, southern part of the Latvian, southern part of the Swedish and eastern part of the Polish EEZs (52 hauls in SD 26, 2 hauls in SD 28). At each hauling position a CTD profile was taken.

The detailed description of the results of both ground surveys is presented in Annex 5.

Finland

Finland has not performed own BITS survey, but Finnish scientist has participated in the November 2004 survey with the Danish institute (DIFRES) on board of the RV. Dana as continuation of the co-operation and research activities established in 1983. In February-March 2005 no BITS survey was conducted by Finland.

Estonia

Estonia was not participated in the BITS surveys in November 2004 and February-March 2005.

Lithuania

Lithuania began the standard BITS surveys in 2004, after receiving the TV3#520 trawl from Germany. The surveys were carried out onboard of the RV DARIUS (ownership of the Lithuanian State Fishery Research and Pisciculture Centrum, Fishery Research Laboratory in Klaipeda).

In November 2004 survey was conducted in the ICES Subdivision 26 (within the Lithuanian EEZ), namely in the ICES rectangle 40H0 and totally 6 hauls were carried out in the depth range from 8 to 65 m.

During February 2005 survey 5 ground-trawl catches were made in the depth ranged 8–60 m (haul on the depth 65 m was not possible to conduct due to strong wind).

In autumn 2004 and spring 2005 surveys the CTD profiles were not taken.

The bycatch of undersized cod amounted 75% on average, and specimens from the length classes 23–25 dominated in samples. A number of cod larger than 38 cm was very low (<5%).

Recommendation to WGBFAS:

The WGBIFS stated that the data of the BITS surveys in autumn 2004 and spring 2005 could be used without restrictions.

5.2 Presentation of BITS results

The extended reports from BITS surveys, conducted in November 2004 and February-March 2005, were submitted by Poland and Russia. These working papers can be treated as an example of basic text for future national/international reports from BITS surveys. The Power-point presentation of the some peculiarities concern of both the Polish ground trawl surveys was demonstrated for the WG.

The WGBIFS recommends for all institutes participating in the BITS surveys (autumn and spring) should present the results as working documents during the next BIFSWG meetings. The text of reports will be appended to WGBIFS report.

Furthermore, the WGBIFS agreed that all institutes which participating in the BITS get full access of the data and the estimated indices of part of the DATRAS database related to BITS.

6 Plan and decide on bottom trawls surveys and experiments to be conducted in autumn 2005 and spring 2006

The allocation of stations to the ICES Subdivisions and depth layers based on the method is described in Annex 3 "Method used for planning the Baltic international trawl survey". The BITS Database (version from March 2004) was used to estimate the running means of distribution pattern of both cod stocks by depth layer and ICES Subdivision. The conversion factors (version from 2003) were used for the period 2001–2003 and the estimates of fishing power were used for 1999 and 2000.

In autumn 2005 and spring 2006, the haul allocation scheme by country (vessels) and depth stratum will be modified according to updated results of the spatial distribution of cod in spring 2004. Tables 6.1 and 6.2 present the basic data for distributing the planned total number of hauls by ICES Subdivision and by depth layers. The running means of the BITS indices of age group 1+ of cod from 2000–2004 were used based on the current used version of conversion factors of DATRAS database of ICES.

The total number of planned stations by countries is given in Table 6.3 for the spring and the autumn survey in 2005.

Table 6.1: Basic data for allocating the hauls of the survey by the ICES Subdivision.

ICES	Total area of the depth layer 10–120 m	Proportion of the SD (weight=0.6)	Running mean of the CPUE value of age groups 1+ (2000–2004)	Proportion of the index values (weight=0.4)	Proportion of the stations	Special decisions (additional stations)
Sub-div.	[nm²]	[%]		[%]	[%]	
22	3673	39	280	36	38	
23	0	0	0	0	0	3
24	5724	61	503	64	62	
Total	9397	100	783	100		
25	13762	43	397	53	47	
26	9879	31	275	37	33	
27	0	0	0	0	0	10
28	8516	26	70	9	20	
Total	32156	100	742	100	100	

Table 6.2: Basic data for allocating the hauls according to the depth layer for the survey by the ICES Subdivision.

ICES Sub-div.	Depth layer [m]	Total area of the depth layer [nm²]	Proportion of the depth layer (0.6) [%]	Running mean of the CPUE value of age group 1+ (2000–2004)	Proportion of the depth layer (0.4) [%]	Proportion of the depth layer [%]
24	10 – 39	4174	73	219	11	48
	40 – 59	1550	27	821	40	32
	60 – 79	29	0.50	993	49	20
	Total	5724	100	2033	100	100
25	10 – 39	4532	37	42	3	23
	40 – 59	3254	26	614	39	32
	60 – 79	3037	25	614	39	31
	80 –	1461	12	289	19	15
	Total	12284	100	1559	1000	100
26	10 – 39	2379	23	12	1	14
	40 – 59	1519	15	174	14	14
	60 – 79	1911	19	557	44	29
	80 – 100	2872	28	334	26	27
	100 – 120	1504	15	198	16	15
	Total	10185	101	1274	100	100
27	10 – 39	1642	31		0	18
	40 – 59	1101	21		0	12
	60 – 79	996	19	49	19	19
	80 –	1596	30	213	81	50
	Total	5335	100	262	100	100
28	10 – 39	2589	39	4	1	24
	40 – 59	1598	24	36	10	18
	60 – 79	1101	16	93	25	20
	80 – 100	1389	21	231	63	38
	Total	6677	100	364	100	100

Table 6.3: Total number of the stations planned for the BITS in spring and autumn 2005.

COUNTRY	VESSEL	NUMBER OF PLANNED STATIONS IN AUTUMN 2005	NUMBER OF PLANNED STATIONS IN SPRING 2006
Germany	Solea	57	60
Denmark	Havfisken	15	15
	Total 22 + 24	72	75
Denmark	Dana	50	50
Estonia	Commercial vessel	10	
Finland			
Latvia	Chartered vessel	25	25
Lithuania	Darius	5	5
Poland	Baltica	34	38
Russia	Atlantniro	15	44
Sweden	Argos	30	45
	Total 25 - 28	169	207

The most institutes plan the same numbers of hauls during BITS surveys in autumn 2005 and spring 2006 as in the years before. Only Poland slightly decreased the number of planned stations from 75 to 72. After first experimental hauls in November 2004 Lithuania will start in November 2005 with the regular participation during the international co-ordinated trawl surveys and will carry out 5 hauls in spring and autumn.

The total number of available stations was used in the combination with the results of Tables 6.1 and 6.2 to allocate the number of stations by the ICES Subdivision and depth layer for the different surveys. Tables 6.4 and 6.5 present the allocation of hauls by the ICES Subdivision and the depth layer for the autumn survey in 2005. Furthermore, the number of hauls to be carried out by countries in the different Subdivisions is given. Tables 6.6 and 6.7 show the corresponding data for the survey in spring 2006.

The allocation of station by country and the ICES subdivision is 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 the coast line (at least 12 nm) will be covered by the nation of the territorial waters to reduce problems with national permissions.

Russia will only cover the Russian zone during the autumn survey 2005.

Table 6.4: Allocation of the planned stations by country and the ICES Subdivision in autumn 2005.

		ICES SUBDIVISION						
Country	**Total**	**22**	**23**	**24**	**25**	**26**	**27**	**28**
Denmark	65	12	3		39	11		
Estonia	10							10
Finland	0							
Germany	58	16		42				
Latvia	25					10		15
Lithuania	5					4		
Poland	34				22	12		
Russia	15					15		
Sweden	30				14		10	6
Total	242	28	3	42	75	53	10	31

Table 6.5: Allocation of the planned stations by ICES Subdivision and depth layer in autumn 2005.

ICES SUBDIV.	**22**	**23**	**24**	**25**	**26**	**27**	**28**
Depth layer [m]							
10 – 39	28	3	20	17	8	3	7
40 – 59			14	24	8	2	6
60 – 79			8	23	17	2	6
80 – 100				11	16	3	12
100 – 120					5		
Total	28	3	42	75	53	10	31

Table 6.6: Allocation of the planned stations by country and ICES Subdivision in spring 2006.

SUBDIVISION								
Country	**Total**	**22**	**23**	**24**	**25**	**26**	**27**	**28**
Denmark	65	12	3		45	5		
Estonia								
Finland								
Germany	60	15		45				
Latvia	25							25
Lithuania	5					5		
Poland	38				24	14		
Russia	44					42		2
Sweden	45				23		10	12
Total	282	27	3	45	92	66	10	39

Table 6.7: Allocation of the planned stations by ICES Subdivision and depth layer in spring 2006.

ICES SUB-DIV.	**22**	**23**	**24**	**25**	**26***	**27**	**28**
Depth layer [m]							
10 – 39	27	3	22	21	9	3	9
40 – 59			15	29	10	2	7
60 – 79			9	28	19	2	8
80 – 100				13	18	3	15
100 – 120					10		
Total	27	3	45	92	66	10	39

*** When the check of the DATRAS database shows that the estimated fish densities in SD 26 are not correct updating of the planned stations by depth layers is possible.**

7 Update and correct the Tow Database

7.1 Reworking of the Tow Database

The use and the reworking of the Tow Database have shown that changes of the structure can improve the handling of the database and can make the structure more understandable. With this aim Latvia and Russia proposed after the meeting of WGBIFS in April 2004 to change the sequence of the data of the database.

The structure used until spring 2004 stored the latitude data of all positions (degrees and minutes) beginning in Column E. The longitude data of the positions followed beginning with column Z (Table 7.1.1). The structure is difficult to handle by the crew of research vessels and cutters. Therefore, the sequence of the position data was changed. The first position is stored beginning with column E latitude (degrees and minutes) followed by the longitude (degrees and minutes) of the first position. Then all data of position 2 follows etc. The currently used structure is given in Table 7.1.2. Additional change was agreed. Instead of the old haul number which was stored in Column A, this place was used to store the last use of the station using the notation type "Qxjj", with x describing the quarter and jj describing the year. The information can be used for presenting the stations which were realized during the survey.

The feedbacks from the BITS surveys in November 2004 and spring 2005 were used for improving the Tow Database. Some stations were deleted due to wrecks, rocky bottom etc. Positions and/or depth data were corrected. Some additional stations in the "white areas" were added. The incorporation of the reported back information concerning the realization of hauls, the "feedback", in the Tow Database has shown that the used structure of the haul number SDxxx.yy (Column B) is difficult to handle. It was proposed to mark the different parts of long distance hauls.

SD represents the subdivision, xxx represents a haul number and yy represents the segment number of long distance hauls (see Report of WG BIFS 2004). Unfortunately, the data of yy were not given in the feedback in many cases. That means that the use of the "feedback" related to these stations is difficult. To reduce the problem it was agreed that following structure of the haul number is used SD xxx (SD – subdivision, xxx – number of haul).

For all hauls where yy was equal 01 the figures after the dot were deleted. When yy was larger than 01 a new haul number of type SDxxx was generated and the old haul number was stored in Column "Source". The advantage of these changes is that the haul number is easier to understand. The history of the hauls which are based on the splitting of long distance hauls is also given and can be pursued back.

7.2 Actual version of Tow Database TD_2005V1.XLS used for planning the BITS in November 2005 and spring 2006

The actual version of the Tow Database is based on the feedback submitted until 31 March 2005. Table 7.2.1 presents the number of available stations by subdivision and depth layer. Checks of the database have shown that more than 65% of the hauls are already successfully used in most subdivisions. The damage of gears at some stations has shown that special checks of the tracks in the database are necessary based on the experience of the different nations. Sweden plans such special reworking of all hauls which were proposed by Sweden. Until this reworking is finished the old haul positions are used for the selection of stations of the trawl surveys in autumn 2005. Then all hauls which were proposed by Sweden years ago are deleted and the reworked data are used for further surveys.

The available hauls are presented in Figure 7.2.1. The figure shows “white areas” where additional hauls are necessary. Especially, the depth layer from 10 to 20 meters is covered by a very low number of available hauls.

7.3 Feedback from BITS

The feedback from the BITS surveys is the most important factor for improving the Tow database. An update of the Tow Database is essential to reduce the probability of damaged gears, the use of hauls in the wrong depth layer and to optimize the assignment of the hauls to the different nations. However, it is necessary that the feedback is available as soon as possible after the surveys because of the period between the realization of the surveys and the selection of hauls for the subsequent survey is short and due to the problems with the vessels permission which are necessary to work within the 12 nm zones of other nations. It is also important that the feedback has standard structure.

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 ground rope 1 – standard ground rope, 2 – rock hopper ground rope
- 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 due to weather condition,...
b	1	The position is suitable, depth must be corrected
b	2	Depth is ok, position must be corrected (reason)
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

Position of new hauls should be submitted using the standard structure of the Tow Database (Table 7.1.1). It must be pointed out that additional stations are necessary in the “white areas”, especially in the shallow waters.

Recommendations:

The described changes of the database were discussed during the WGBIFS meeting and it was agreed that:

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

- The standard ground rope must be used when the station was successfully carried out during earlier surveys with this gear (see the columns TV3 and ground rope 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".

7.4 Allocation of the hauls for the Baltic International Trawl Survey (autumn 2005)

The selection of hauls for the trawl survey in autumn 2005 will be carried out after the meeting and the selected stations will be submitted to the countries. The selection of hauls for the trawls survey in spring 2006 will be carried out based on the feedback of the November survey in December 2005.

Column	Table 7.1.1: Structure of Tow Database valid until spring				Table 7.1.2: Structure of Tow Database valid since autumn 2004			
A	Position	Haul nr.		1140	**Last realization**			Q404
B		NrHaul		26002	Position	NrHaul		28002
C		Rectangle		3964		Rectangle		4265
D		ICES SD		26		ICES SD		28
E	1	Latitude	Degree	54	1	Latitude	Degree	56
F			Minutes	24			Minutes	36.5
G	2	Latitude	Degree	54		Longitude	Degree	20
H			Minutes	24			Minutes	41.3
I	3	Latitude	Degree	0	2	Latitude	Degree	56
J			Minutes	0			Minutes	36.9
K	4	Latitude	Degree	0		Longitude	Degree	20
L			Minutes	0			Minutes	41.9
M	5	Latitude	Degree	0	3	Latitude	Degree	56
N			Minutes	0			Minutes	37.2
O	6	Latitude	Degree	0		Longitude	Degree	20
P			Minutes	0			Minutes	42.6
Q	7	Latitude	Degree	0	4	Latitude	Degree	56
R			Minutes	0			Minutes	37.6
S	8	Latitude	Degree	0		Longitude	Degree	20
T			Minutes	0			Minutes	43.2
U	9	Latitude	Degree	0	5	Latitude	Degree	0
V			Minutes	0			Minutes	0
W	10	Latitude	Degree	0		Longitude	Degree	0
X			Minutes	0			Minutes	0
Y					6	Latitude	Degree	0
Z	1	Longitude	Degree	19			Minutes	0
AA			Minutes	3.8		Longitude	Degree	0
AB	2	Longitude	Degree	19			Minutes	0
AC			Minutes	1	7	Latitude	Degree	0
AD	3	Longitude	Degree	0			Minutes	0
AE			Minutes	0		Longitude	Degree	0
AF	4	Longitude	Degree	0			Minutes	0

Column	Table 7.1.1: Structure of Tow Database valid until spring				Table 7.1.2: Structure of Tow Database valid since autumn 2004			
AH			Minutes	0	8	Latitude	Degree	0
AI	5	Longitude	Degree	0			Minutes	0
AJ			Minutes	0		Longitude	Degree	0
AK	6	Longitude	Degree	0			Minutes	0
AL			Minutes	0	9	Latitude	Degree	0
AM	7	Longitude	Degree	0			Minutes	0
AN			Minutes	0		Longitude	Degree	0
AO	8	Longitude	Degree	0			Minutes	0
AP			Minutes	0	10	Latitude	Degree	0
AQ	9	Longitude	Degree	0			Minutes	0
AR			Minutes	0		Longitude	Degree	0
AS	10	Longitude	Degree	0			Minutes	0
AT			Minutes	0				
AU	Mean depth			31		Mean depth		38
AV	1			30	Position	1		0
AW	2			30		2		0
AX	3			0		3		0
AY	4			0		4		0
AZ	5			0		5		0
BA	6			0		6		0
BB	7			0		7		0
BC	8			0		8		0
BD	9			0		9		0
BE	10			0		10		0
BF	Source			Polish		Source	Latvia	
BG	TV3			P		TV3		L
BH	Ground	rope		1		Ground	rope	1
BI	Direction			1		Direction		0
BJ	Distance			1.6299		Distance		1.5255

Table 7.2.1: Number of available station by subdivision and depth layer

SD		DEPTH LAYER					
	Total	< 20	20 - 39	40 - 59	60 - 79	80 - 99	100 - 120
22	109	24	84	1			
24	109	4	62	42	1		
25	206	4	28	73	87	14	
26	151	2	13	23	50	51	12
27							
28	74		6	19	23	14	12

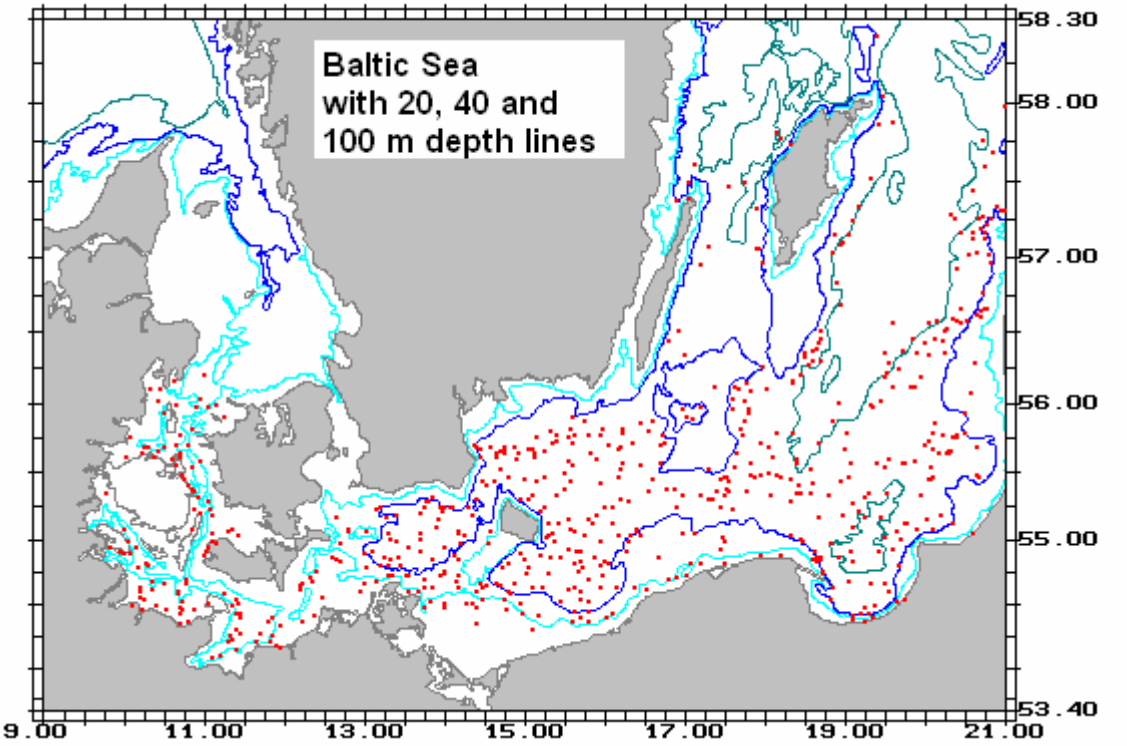


Figure 7.2.1: Available hauls in the Tow Database.

8 Continue to study the proposed model for estimating the conversion factors between the new and old survey trawls under inclusion of the new inter-calibration experiments

The BIFSWG recommended, *inter alia* in its 2004 report:

- The countries should undertake certain effort to investigate the parameters which
- Comparisons of conversion factors based on 5 cm length intervals and the total length range should be carried and presented during the next meeting.

It was also recommended to conduct additional experiments between two versions of the new standard gear TV3#930 and TV3#520 in the western part of the Baltic Sea using two vessels (Dana and Havisken or Dana and Solea). Also, Denmark promised to perform special inter calibration experiments for comparing the catchability of the TV3#930 with and without rock-hopper. These proposed experiments were not realized between the meetings in 2004 and 2005, partly because the cruise periods of Denmark and Germany did not overlap.

The group was introduced to 3 sets of new information obtained in order to estimate the effect of different factors on the quality of conversion factors.

8.1 New inter-calibration experiments performed for TV3#930 and Fotö trawls by Sweden

Sweden carried out inter-calibration experiments between the large new standard gear TV3#930 and the former used trawl Fotö. Table 8.1 summarises the number of realized inter-calibration experiments by type of inter-calibration experiments. Type 2 notates the sequence Tv3#930 followed by Fotö and type 3 notates the sequence TV3#930 follows by TV3#930. Furthermore, the mean catch per haul is presented by type of experimenter. Methods to estimates the conversion factor is presented by Lewy *et al.* (2004).

Table 8.1: Summary data from inter-calibration experiments between TV3#930 and Fotö trawls.

LENGTH	TYPE 2		TYPE 3	
Midpoints in cm	**Number of stations**	**Average number of** fish/h	**Number of stations**	**Average number of** fish/h
12.5	12	39.3	5	4.8
17.5	12	468.8	7	69.4
22.5	12	474.1	11	229.3
27.5	12	165.8	11	221.0
32.5	12	49.7	11	287.5
37.5	12	58.7	11	121.3
42.5	12	57.3	11	37.6
47.5	11	28.1	10	19.7
52.5	11	5.8	10	3.6

The estimates of conversion factors and with 95% confidence limits are presented in Table 8.2 and Figure 8.1.

Table 8.2: Conversion factors for TV3#930 and Fotö trawls.

LENGTH	CONVERSION factor	LOWER 95% CL	UPPER 95% CL
12.5	5.61	0.12	264.54
17.5	0.90	0.34	2.38
22.5	0.57	0.37	0.87
27.5	0.88	0.53	1.47
32.5	0.79	0.36	1.73
37.5	0.92	0.38	2.21
42.5	0.78	0.24	2.49
47.5	0.34	0.04	2.72
52.5	0.49	0.01	16.77

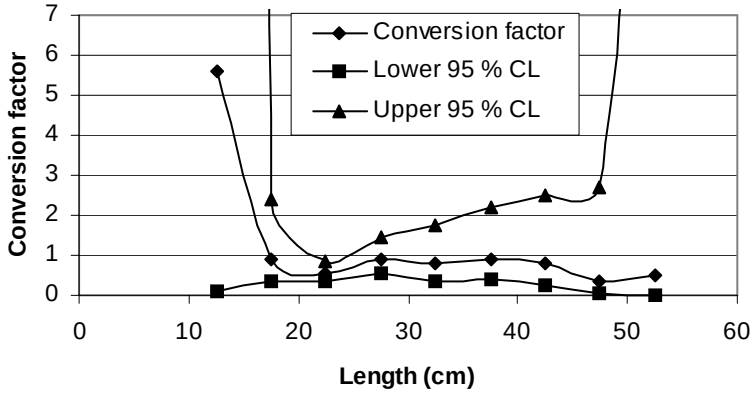


Figure 8.1: Conversion factors for TV3#930 and Fotö trawls.

8.2 Estimates of conversion factors between the new standard trawls and the national trawls based on the mean horizontal net opening

The mesh size of trawls that were former used during the national bottom trawl surveys in the Baltic Sea varied between 10 mm (Hake, Russia) and 40 mm (Sonderburger trawl, Germany). The new standard gear uses a cod end mesh size of 20 mm. Based on these data it can be assumed that all cods larger than 20 cm are caught by the trawls. Besides the selectivity of the cod end the vertical net opening in relation to the vertical density distribution of target species influences the catchability of trawls**.** Assuming that the vertical net opening covers the main part of the vertical density distribution the draft conversion factors can be estimated based on the mean horizontal net opening measured during the haul. Following this hypothesis the mean horizontal net opening data of the new standard trawls and the former use national trawls in the Baltic Sea were compared and estimates of conversion factors were approximated. These estimates do not include the variability of the horizontal net opening in relation to the warp length (ICES 2002, Addendum, BITS Manual).

The currently used conversion factors by 5 cm length classes are given in Table 8.3. (version 14.03.2005) and the conversion factors by 5 cm length class of alternative model (ICES, 2003) are given in Table 8.4. These estimates based on the standardization of the catch per hour. The mean conversion factors for cod larger than 20 cm of the currently used data and of the alternative model based on the means of the 5 cm length classes are given in Table 8.5. Further-

more, the mean conversion factors were given for the inter-calibration experiments between the TVL and TVS as well as TVS and H20 using CPUE values with were standardized by a haul distance of 1.5 nm. The table also contains conversion factors based on the horizontal net opening.

Table 8.3: Current used conversion factors in the DATRAS database (version 14.03.2005).

SHIP	ARG	ARG	ATL	DAN2	BAL	MON		SOL	ZBA
New gear	TVL	TVL	TVL	TVL	TVL	TVL	TVL	TVS	TVS
Old gear	FOT	GOV	HAK	GRT	P20	DT	TVS	H20	LBT
Length class [mm]									
50	0.73	0.73	0.57	8.10	0.82	0.57	1.68	0.79	3.10
100	0.60	0.60	0.57	8.10	2.69	0.57	1.06	0.83	3.10
150	0.33	0.33	0.13	5.31	1.62	0.13	1.15	0.86	1.82
200	0.39	0.39	0.94	4.16	1.12	0.94	0.98	0.79	2.46
250	0.44	0.44	1.16	2.77	1.59	1.16	0.91	0.80	1.59
300	0.45	0.45	0.55	2.29	1.75	0.55	0.80	0.81	0.63
350	0.38	0.38	0.49	2.45	1.11	0.49	0.81	0.63	0.18
400	0.48	0.48	0.32	2.33	1.83	0.32	0.61	0.61	0.09
450	0.30	0.30	0.36	2.15	1.69	0.36	1.12	0.68	0.03
500	0.57	0.57	0.29	1.22	0.73	0.29	1.29	0.63	0.10
550	0.57	0.57	0.29	1.22	0.73	0.29	1.29	0.63	0.10

Table 8.4: Current used conversion factors based on alternative model presented in ICES, 2003.

SHIP	ARG	ARG	ATL	DAN2	BAL	MON		SOL	ZBA
New gear	TVL	TVL	TVL	TVL	TVL	TVL	TVL	TVS	TVS
Old gear	FOT	GOV	HAK	GRT	P20	DT	TVS	H20	LBT
Length class [mm]									
50		1.02			1.11		1.39	0.56	
100		1.10		0.09	0.57		1.06	0.76	
150		0.74		0.17	0.67		1.15	0.90	
200		0.61	0.53	0.16	0.71		0.89	0.90	0.56
250		0.83	0.42	0.13	0.68		0.79	0.92	0.48
300		0.81	0.38	0.20	0.56		0.56	0.90	1.22
350		0.76	0.28	0.20	0.69		0.66	1.02	0.93
400		0.87	0.61	0.27	0.46		0.58	1.04	0.89
450		0.72	0.84	0.42	0.41		0.71	0.88	1.54
500		0.71	0.42	0.56			0.80		0.71

Table 8.5: Mean conversion factors for cod larger than 20 cm for the current used data, based on the alternative model and based on the relation between the horizontal net openings.

SHIP	ARG	ARG	ATL	DAN2	BAL	MON		SOL	ZBA
New gear	TVL	TVL	TVL	TVL	TVL	TVL	TVL	TVS	TVS
Old gear	FOT	GOV	HAK	GRT	P20	DT	TVS	H20	LBT
Current used data	0.43	0.43	0.59	2.48	1.40	0.59	0.93	0.71	0.73
Alternative model		0.76	0.50	0.28	0.59		0.71	0.94	0.90
Alternative model using CPUE of 1.5 nm haul distance							0.64	0.96	
Expected conversion factors based on the vertical net opening for cod larger than 20 cm									
TVS								0.89	
TVL			0.44		0.58		0.65	0.58	

The data show that the current used estimates and the estimates based on the alternative model in many cases differ (TVL – GOV; TVL – GRT, TVL – P20, TVL – TVS). On the other hand the estimates based on the alternative model correspond with the estimates based on the horizontal net opening in most cases. The reason for the different estimates (alternative model and horizontal net opening) of the inter-calibration between TVL and TVS is probably the high variability of the haul distances during the experiments because the conversion factors between the new standard gear TVL and TVS using CPUE values based on a standard distance of 1.5 nm correspond with the estimates based on the net opening.

These studies have shown that the use of the mean horizontal net opening is suitable for estimating preliminary draft conversion factors. Furthermore, the differences between the currently used conversion factors and the estimates based on different independent methods suggests that it seems to be useful to study the effects of the different conversion factors on stock indices based on BITS.

8.3 Conversion factors between TV3 gears and HG20/25 as well as TVL and TVS using CPUE values, based on constant haul distance.

Studies have shown that the distances covered by the German inter-calibration hauls strongly varied in some cases although the defined duration of the hauls of 30 minutes and the defined velocity during the experiments were met (ICES, 2004). These differences in the areas covered by the gears can significantly influence the estimated means and standard deviation of the conversion factors in paired hauls.

For evaluating the possible effects of different haul distances catch data available from German Type 2 and Type 2 trawl experiments for the trawls TVS – HG 20/25 were standardized for the distance of 1.5 nm instead of catch per hour as used for the current estimates. The distance of 1.5 nm was used because this distance is the expected value based on the required velocity of 3 knots and the required haul duration of 30 minutes. The model for estimating the conversion factors given in Oeberst *et al*. (2000) were used.

Figure 8.2 presents the conversion factors between TVS and HG 20/25 based on catch per hour and catch per 1.5 nm and Figure 8.3 shows the same data for inter-calibration experiment between TVL and TVS.

The studies have shown that the type of standardization of the catch did not influence the conversion factors between TVS and HG 20/25. On the other hand the estimates of the conversion factors between TVL and TVS differ for large cod.

These results have shown that the variability of the distance of the hauls of paired station can significantly influence the conversion factors and that an evaluation of all inter-calibrations experiments is useful.

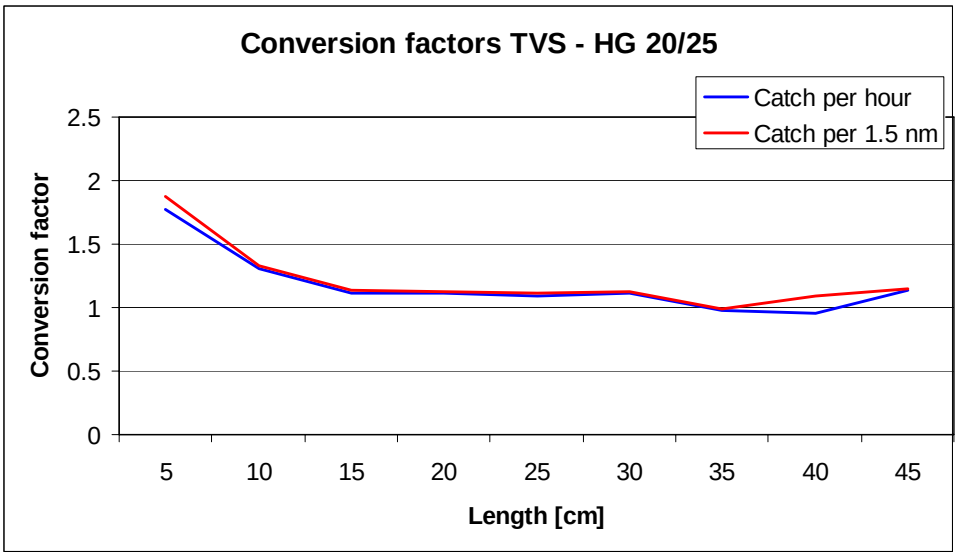


Figure 8.2: Conversion factors by 5 cm length between TVS and HG 20/25.

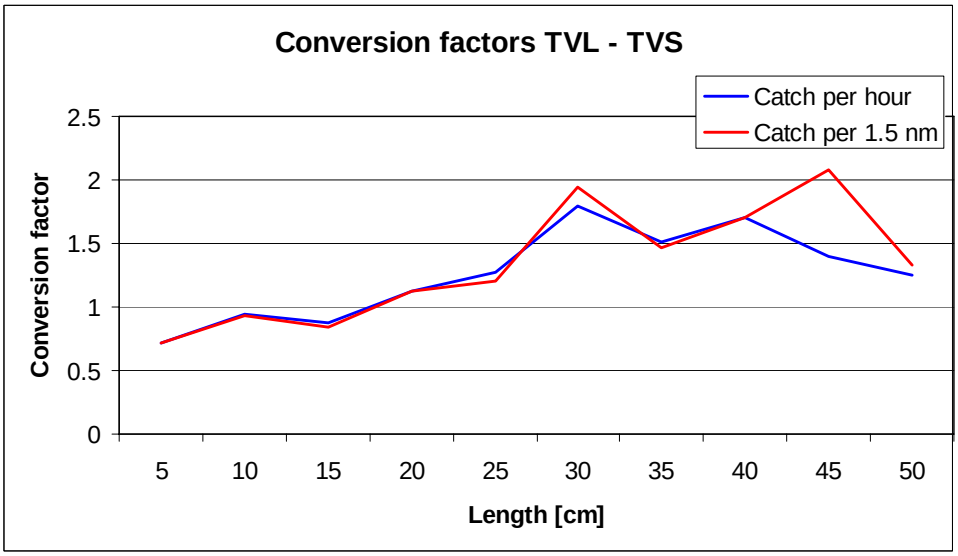


Figure 9.3: Conversion factors by 5 cm length between TVL and TVS.

The WGBIFS agreed that there is still a need to check the quality on conversion factors. Therefore, further investigations of the parameters, which influence the quality of the estimates of conversion factors, should be encouraged. However, additional inter-calibration experiments between new and old gear types on national level are not needed, because a new tuning fleet, obtained using the new standard gears in 2001–2004 has become available for the cod stock assessment.

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Oeberst, R., and Grygiel, W. 2002. Analyses of conversion factors. *In* Report of the Baltic International Fish Survey Working Group, ICES Headquarters 8–12 April 2002. ICES CM 2002/G:05 (Annex 3).

9 Update, if necessary, of the Baltic International Trawl Survey Manual (BITS)

9.1 Update of the BITS manual

Discussions related to the BITS manual have shown that small updates are necessary (adding of codes of new used vessels). Furthermore, it was pointed out that description of the DATRAS format should be incorporated in the manual because this database structure has been used since November 2004. The incorporation of the DATRAS structure was not possible during the meeting. Therefore, it was agreed that the description of DATRAS database will be prepared until the next meeting and that the Version April 2002 (Addendum to ICES CM 2002/G:05) is still valid.

Furthermore, the quality of the data stored in the BITS database was checked. Because the analyses have shown that intensive evaluation is necessary.

9.2 Application of the BITS database and detected problems

9.2.1 Validity code

All hauls which are stored in the BITS database are marked with validity code (Record type HH, Position 56). Four options are allowed:

I invalid haul

V valid haul

N no oxygen at planned station (that means zero catch)

C calibrated – inter-calibration hauls

Besides the realization of the inter-calibration experiments during special cruises (in this cases all hauls are marked with C) it was allowed that inter-calibration experiments were carried out during the normal BITS surveys. That means that it is possible that the first haul is marked with V as valid haul and the second haul of the inter-calibration experiments is marked with C as calibration haul.

However, it was necessary to pay attention to the changes between 2000 and 2001. Until 2000 the former national gears were used during the normal BITS. That means that all hauls with the national gear with validity V or N are used for the estimation of stock indices. Since 2001 the new standard gears have been used during the normal BITS surveys. Consequently, the strategy for marking the hauls changed.

Until 2000 validity code was used in the following way:

Validity V: CPUE(former national gears, when it was used as first during inter-calibration experiments)

Validity C: CPUE(new standard gear independent of the sequence) and CPUE(former national gear when it was used as a second during inter-calibration experiments)

In these experiments the validity cods should also be checked.

During the discussion was also pointed out, hauls which were not realized due to very low oxygen content must be submitted to ICES using the validity code N.

The Working Group agreed that necessary corrections will be submitted to ICES.

9.2.2 Weight and maturity data

The Baltic Fisheries Assessment Working Group (WGBFAS) applies time series of weight at age in the stock (WEST) and maturity ogives that are derived from the BIT and Kattegat surveys for estimating the of spawning stock biomass of the different cod stocks. The Study Group on Multispecies Assessment in the Baltic (SGMAB), similarly apply area-specific maturity ogives for both the western and eastern Baltic models. Analyses carried out by a WGBFAS sub-group in 1997 (Tomkiewicz *et al*. 1998) are based on time series and data collation. These time series have, however, not been updated since then and therefore, the WGBFAS and SGMAB have suggested an update using the BITS database. Such an analysis has been integrated as part of the EU-BECAUSE project and growth models to predict weight at age and maturity at age are intended in a proposed EU-project (UNCOVER).

The single fish data on cod in the BITS database principally includes fish length, age, sex, maturity, and round weight. A preliminary data check of these data, however, revealed a number of errors in the database (typing errors, etc.) as well as a more limited coverage in time and space compared to the analysis carried out in 1997. This analysis covered SD 21–28. Danish data for SD 21 (Kattegat) are included in the BITS database at present, but only to a limited extent and data from the Swedish IBTS in Kattegat providing the best available information for this area are not included. It would be of benefit to WGBFAS to include these data as Kattegat cod is assessed by this group. The Danish data do not include weight for any Subdivision, but weight is routinely sampled and more Danish data exist than those in the database. The data on weight in the database are not always on single fish level but may represent averages by length. The database starts in 1991, but data for previous years exist and could beneficially be applied in reanalysis of data. The WGBIFS decided to establish a sub-group to check the quality of data stored in the database and to evaluate the potential for including more data in the analysis and extending the database.

The sub-group will include representatives from all institutes participating in the Kattegat and Baltic surveys. The subgroup is intended to work by correspondence intersessionally to check data. Workshop or special meeting of the sub-group is suggested in January to perform analyses of the maturity and weight data stored in the database. The database includes data from all quarters of the year but for the planned analyses the data of first quarter have the highest priority. Therefore, these data have the highest priority during the data check. The term of reference for the sub-group will be to:

- ascertain the data quality of data stored in the database,
- improve the database coverage in time and space and,
- perform initial analysis of cod weight and maturity at age for use in the assessment WGs.

The work in the sub-group will be organised by Jonna Tomkiewicz and Rainer Oeberst in collaboration. The sub-group reports to the WG during the ordinary meeting in 2006.

9.3 Check of the new standard gears

In 2003 WG BIFS recommended that all countries should check the measurements of the standard gears (Appendices XIII and XIV, ICES 2002). Poland carried out these check October 2004. The results are given in Table 9.3.1. The measured distances and mesh size do not significantly differ from the values given in the manual. These observations suggest that CPUE values presented in the BITS database are not significantly influenced by changes of the gear parameters.

Table 9.3.1: Results of the Poland gear check.

TYPE OF FISHING GEAR	TV3#930
Nation	Poland
Date of measurements	28.10.2004
Name of operators	Moderhak, Grygiel, Modrzejewski
Number of realized hauls	over 200, permanently used
Comments concerning the use	

MANUAL TV3#930 PAGE 11 PARAMETER	MEASURED DISTANCE [M]	MESH SIZE [MM]
Section 1 - 1B1	21.90	200*
Section 1 - 1A1	20.69	198*
Section 1 - 1A2	20.95	198*
Section 1 - 1B2	21.50	201*
Section 1 – 1C1	21.51	110
Section 1 – 1C2	21.65	110
Section 2 – 2B1	3.00**	151
Section 2 - 2A	2.70	147
Section 2 – 2B2	3.07**	153
Section 2 – 2C1	2.83	112
Section 2 – 2C2	2.85	111
Section 3 – 3B1	2.89**	112
Section 3 – 3A	2.75	110
Section 3 – 3B2	2.97**	111
Section 3 – 3C	2.78	112
Section 4 – 4B1	7.90**	78
Section 4 – 4A	7.84	78
Section 4 – 4B2	7.93**	78
Section 4 – 4C	8.04	78
Section 5 – 5B1	5.64**	56
Section 5 – 5A	5.64	55
Section 5 – 5B2	5.70**	57
Section 5 – 5C	5.68	58
Section 6 – 6B1	11.81	39.5
Section 6 – 6A	11.80	41
Section 6 – 6B2	11.81	41
Section 6 – 6C	11.80	39
Section 7		19.5
Section 8		19

Notes: * - mesh opening measured with a ruler, others measured with use of the ICES gauge,
**** - measured along selvedges.**

Table 9.3.1. Continued

MANUAL TV3#930 PAGE 13 PARAMETER	MEASURED DISTANCE [M]
Head line extension Port.	3.99
Head line wing section Port.	28.60
Head line bossom section	2.60
Head line wing section Stbd.	28.60
Head line extension Stbd.	3.93
Fishing line extension Port.	0.53
Fishing line wing section Port.	30.60
Fishing line bossom section	1.70
Fishing line wing section Stbd.	30.63
Fishing line extension Stbd.	0.54
Lower wing line Port.	2.70
Lower wing line Stbd.	2.72
Upper wing line Port.	2.63
Upper wing line Stbd.	2.65

10 Update, if necessary, of the Baltic International Acoustic Survey Manual (BIAS)

10.1 Combination of control hauls

During the last meeting of WGBIFS it was pointed out that studies are required related to the combination of control hauls during acoustic surveys. The target species are distributed in scattering layers in the Baltic Sea and it is not possible to identify the species composition by acoustic equipment until now. Therefore, control hauls are used for estimating the relative distribution of the species. Until now the estimated mean proportions of species of strata are based on the combination of the proportion of the species of all hauls realized in the strata by arithmetic mean. Preliminary studies have shown that this procedure can produce biased estimations of the mean proportions of the target species.

Studies using mathematical analyses and simulations were presented during the meeting related to this topic (see Annex 2, working document Oeberst). The main factors which influence the combination of the results of control hauls are:

- Control hauls are realized in areas where the total fish density is high enough to get representative samples. That means that hauls are normally not realized in areas with low density.
- The catch per unit of the control hauls is not correlated with the total density.
- The relation between the densities of the species can differ from area to area and from year to year. Especially, during the acoustic surveys in May the total density is dominated by one species, sprat. That means the areas with high density are areas with high density of sprat. The other species which are detected by the acoustic equipment are relative stable distributed in the total area with low density. On the other hand it is possible that the densities of the target species are correlated.

Using reduced model was calculated, which is based on two species analyses of the different relations between the species. The studies have shown that the arithmetic mean of the proportion of species of all control hauls can be used when the densities of the species are correlated, that means that the proportion of the species related to the total density is independent of the total density. However, when the total density is dominated by one species the use of arithmetic mean produce an overestimation of the proportion of the dominate species. These studies have shown that it is necessary to analyse the relations between the densities of the species and to use different algorithm for combining the results of the control hauls dependent on the relations of the fish densities as given in Annex 2. The group agreed that data of May surveys should be used to study the effects of the different methods. The results will be presented during the next meeting. Dependent on the outcome of the studies the further working steps will be discussed.

10.2 Uncertainty of estimates based on acoustic surveys

Studies related to the uncertainty of survey results and proposals for improving the estimated stock indices based on acoustic surveys were presented and discussed (Annex 2, Working Documents Kasatkina, Kasatkina and Gasjukov). The use of geostatistical methods which incorporate the autocorrelation of the fish densities into the estimation of the means and standard deviations as well as the use of bootstrap methods can result in an improvement of the quality of the stock indices. It was agreed that studies which use geostatistical method and estimated the uncertainty of the data and which are based on national data sets should be carried out until the next meeting.

10.3 Different mesh sizes in the codend

At the 2005 ICES WGBIFS-meeting it became clear, that different mesh sizes in the cod end (between 6 and 20mm) were used during the autumn hydroacoustic-survey (see Table 10.1.1) despite clear definitions in the manual. The different mesh size results in uncertainties of estimated indices for comparisons of results at least for the younger/smaller fishes.

It was discussed whether the used mesh sizes should be adopted and equalized for all participating countries. There was a common agreement, that the mesh size of 20 mm, used by Sweden is to large to catch young of the year (YOY) and partly 1-group sprat quantitatively. Therefore, a reduction of Swedish mesh size is strongly recommended.

Furthermore, reduction of mesh sizes for western Baltic-surveys to 6mm was discussed, too. Arguments against this reduction in the western part are:

- expected exponential trend for declining abundances with age are found (see Working document Annex 2). This means that the YOY are properly representatively observed.
- YOY-sprat is slightly bigger in the western part of the Baltic than in the eastern part.
- the proportion of bigger (and therefore faster) herring in the western part is higher, which could result in underestimation of these fraction due to net avoiding in case of further reduction of mesh size.

Table 10.1.1: So far mesh sizes by different countries in the BIAS

COUNTRY	EDGE TO EDGE MESH-SIZE [MM]	STRETCHED MESHSIZE [MM]	APPROX. L50 [CM]
Germany	10	20	4
Poland	10	20	4
Sweden	20	40	8.5
Latvia	6	12	2.5
Russia	6	12	2.5
Lithuania	10	20	4
Estonia	10	20	4

It was agreed and documented in the manual of the acoustic surveys that species with a density lower than 1% is not used for the estimation of the stock indices. Studies have shown that this procedure can significantly influence the estimates. The group agreed that studies based on data of different year and areas will be carried out to quantify the possible effects. Based on these studies the procedure described in the manual will be updated during the next meeting.

The **WGBIFS** recommends following:

- During the acoustic surveys in May/June the mesh size in the cod end of the trawls must be less or equal to 10 mm.
- During the acoustic surveys in October the mesh size in the cod end must be 6 mm in ICES Subdivision 25–32 and less or equal to 10 mm in ICES Subdivisions 21–24.

11 Agree on a procedure investigating the vertical distribution of fish during the BITS survey in a situation with oxygen deficiency close to the bottom

In certain years, the distribution of cod in the basins of the Baltic Sea is influenced by a pronounced lack of oxygen near the bottom. It is generally accepted that cod may avoid oxygen content below 1. 5–2 ml/l. This has been verified several years at different depth strata, and areas. Two behavioural responses are possible related to low oxygen content in the water close to the bottom: horizontal or vertical migration (Figure 11.1). The type of migration pattern is probably influenced by the physiological stage of cod.

A significant amount of fish biomass has been observed in the water column during acoustic surveys for some time. By interpreting the echograms, it is likely to assume that part of the biomass observed in the water column is cod (ICES, 2003, report of WGBIFS).

That cod can be abundant in the pelagic under good and poor oxygen conditions at the bottom is supported by significant catches of cod using mid water trawls. On the other hand, fishermen trawl closer to the shore when poor oxygen conditions at the bottom have been observed, which also suggests that cod migrate horizontally. The behavioural responses of cod in situations of low oxygen conditions can have an effect on the indices of the cod stock based on the trawl surveys. So far the estimation of the survey indices assumes that the proportion of cod above the vertical opening of the used standard gears is very low and can be neglected and therefore these individuals are not incorporated.

Assuming that cod migrates vertically to avoid water layer with oxygen deficiency will lead to an underestimating of the cod biomass. In cases where cod move horizontally, higher level of aggregation can be expected in the shallower waters in combination with larger variability of the cod density in these areas.

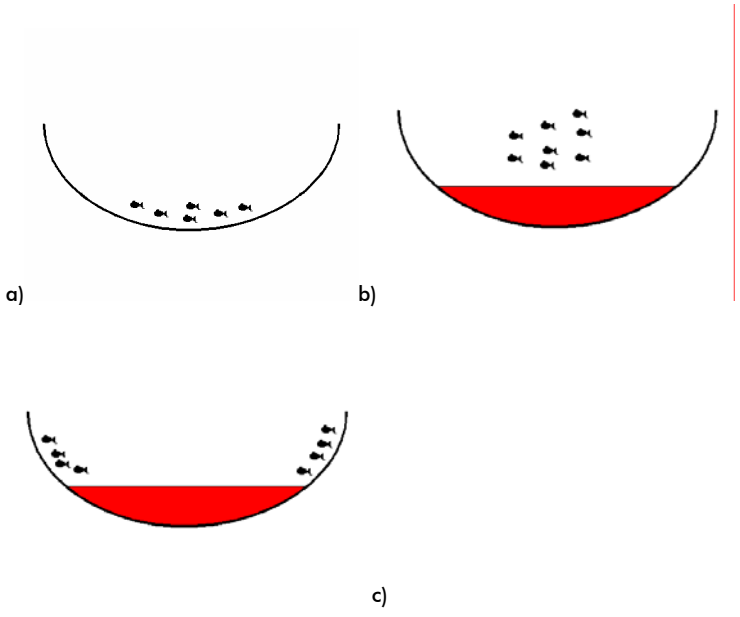

Figure 11.1: The two different scenarios if oxygen depletion occurs. a) cod before a situation of oxygen depletion, b) vertical migration if oxygen depletion occurs and c) horizontal migration if oxygen depletion occurs.

During the meeting studies were presented which explored the spatial distribution of Baltic cod. In an ICES paper by Hjelm *et al.* (ICES, 2004) tried to explore the spatial distribution of Baltic cod in relation to abiotic factors. Their results suggests that the distribution of 1-, 3- and

5-year old cod in relation to oxygen, salinity, and temperature between 1988 and 2004 (first quarter) in Subdivisions 25–28 in the Baltic Sea. They explored the spatial distribution of cod analytically and graphically. The results suggest that the highest abundance of cod of all ages during all years was in Subdivision 25, independently of oxygen and total biomass of cod (based on VPA estimates). At a smaller spatial scale, within subdivision 25, 3- and 5-year old cod had similar distributions, offshore in deep waters, whereas 1-year old cod occurred at more coastal areas. Within the other three subdivisions explored, no clear patterns could be detected.

Positive correlations were found between oxygen content, as well as salinity, and the total abundance of cod (all age-classes), independent of total biomass of cod and recruits. It was also shown that oxygen in the main factor which affects the cod density and distribution.

Furthermore, there was a negative correlation between oxygen content and a scaled catch rate of 3- and 5-year old cod (scaled to the total catch rate of the specific age class; VPA) indicating that oxygen content at the bottom affects the survey abundance index used in cod assessment.

This suggest that at low oxygen content at the bottom influences the efficiency to catch cod possibly because the cod are move closer to the coast where trawling is not possible or alternatively cod has vertically migrated into the pelagic zone above low oxygen bottoms.

In contrast, at high oxygen concentrations, cod were dispersed over a larger area, which resulted in a relatively lower density and lower catch efficiency. However, when the different Subdivision was separately explored, the pattern was not apparent suggesting that the relationship between oxygen and cod abundance is area specific. For example this relationship was hump-shaped in area Subdivision 27. The reason why our catch efficiency is higher in intermediate concentrations of oxygen can possibly be explained by the fact that we use haul positions given to us from fishermen that target cod, i.e. high cod density areas independent of oxygen concentration. Overall, their analysis suggests that cod moves horizontally in a sub optimal oxygen environment.

To quantify the proportion of cod which is vertically moving when oxygen deficiency exists close to the bottom Sweden performed a set of hauls in an area with low oxygen concentration at bottom. In the autumn 2004 RV “Argos” applied a new trawl that can easily be used both on the bottom and in the pelagic waters. The trawl experiment was backed up by hydro-acoustics measurements during the hauls, as well along two transects through the oxygen low area. Unfortunately, the weather conditions were extremely windy so Argos only managed a total of 11 hauls (five paired hauls, bottom and pelagic and one pelagic haul above a bottom with zero oxygen at the bottom) during this week. The empirical analyses based on these few hauls suggest that proportion of cod in the pelagic zone, both in numbers and in total weight, was higher in areas with oxygen around 2 ml/l compared to areas with zero oxygen. The relative size distribution calculated as bias from the total average (based on the 11 hauls) also suggested that smaller cod (< ca 30 cm) avoid low oxygen-layer at a higher extent that larger cod i.e. smaller cod carries out a vertical distribution with high probability compared to large cod. Considering the possibility that the behaviour of cod could be different at the edge of low oxygen area (an area where the oxygen content is lower than 2 ml/l at the bottom) than in the centre of a low oxygen area, the analyses was also made as a function of the distance from centre of low oxygen area. The results suggest that the proportion of cod at the edge of an area at the bottom is relatively high even if oxygen concentration is very low compare to areas closer to the centre of the low oxygen area. These facts suggest that hauls must be realized even at the edge of areas with oxygen content less than 1.5 ml/l.

The acoustic data are being analysed but the results are not easy to analyse and not conclusive.

Overall, the empirical study suggests that cod is mainly distributed in oxygen rich environments but the trawl experiment also suggest that oxygen concentration at the bottom will affect the proportion of cod at the bottom. Furthermore, the trawl experiment also suggests that trawling should be performed even in situations when the oxygen concentration is less than 1.5 ml/l at the bottom.

Additional investigations concerning the vertical distribution of cod in areas with oxygen depletion, were realized from Matthias Schaber (Leibniz-Institute for Marine Science Kiel), see Annex 2 – Working Documents.

11.1 Recommendations

The Working Group recommends that Sweden continues the experiment with their combitrawl (pelagic and demersal) during the autumn survey and if possible also during their acoustic survey. This would mean that Sweden would be appointed fewer hauls for this survey. The WG further recommends that Sweden, Germany and Russia analyse their acoustic data but also that they perform a set of experiments

1) to determine the difference in proportion of cod in the pelagic zone/bottom zone in areas with oxygen concentration < 1 ml/l during night and day and

2) to determine whether acoustic data could be used for assessment of cod.

It is suggested that Sweden, Germany and Russia sample trawl and acoustic data accordingly to Figure 11.2 during their BITS survey. The suggested design should be applied at different depth strata. Overall, the analysis of the proportion of cod in the pelagic zone must be analysed in relationship to hydrographical data.

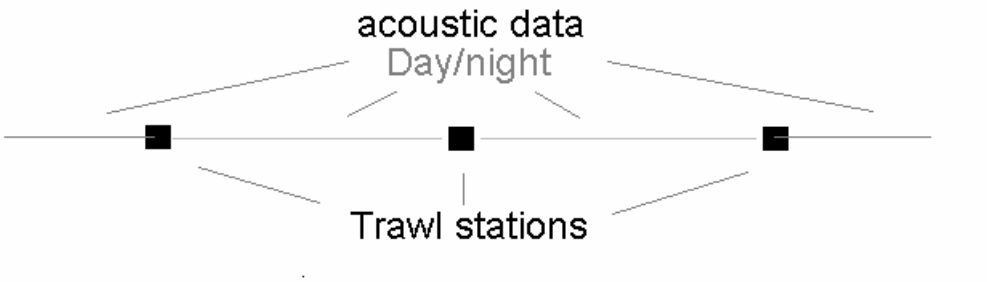

Figure 11.2: The suggestion of the design to be used to determine to what degree acoustic equipment can be used do detect cod during day and also verify the results by trawl data and acoustic during night.

12 Recommendations

12.1 General recommendations

The Working Group recommends that the hydrographical data of the last surveys, acoustic and trawl surveys, will be send to Eberhard Götze (acoustic surveys) and Rainer Oeberst (BITS surveys) until beginning of June 2005. The preferred format of data is the Ocean Data View format, but formats used by the institutes are also accepted, taking into account that the positions of the stations are needed. (Comments concerning Ocean Data View are available in the report of 2004). The database will be submitted to all countries for carrying out special analyses and presentations. Tools for presentations and analyses will by developed by Eberhard Götze and Rainer Oeberst.

The Working Group recommends that all countries, which participate in the BITS, get a full access to password-protected source and aggregated data which are stored in the DATRAS and BAD1 database. The working group further agreed that analyses based on the data which were carried out by authors outside of the institutes must be checked by participating countries and can only be publish when the analyses are accepted by the majority of contributed institutes. It is required that copy of the final articles is submitted to the Chair of the WG BIFS and that the WG BIFS is acknowledged.

The Working Group recommends that following studies based on the both, acoustic and trawl surveys, should be carried out and results will be presented during the next WGBIFS meeting in 2006:

- Evaluation of analytical methods used in Baltic acoustic survey data processing with special attention to the design of survey transects and the skewness of the distribution of acoustic data (Russia).
- Studies of sampling variance in biomass and abundance estimates of acoustic surveys based in simulations and recommendations of ICES WGFAST and WGSAD. Uncertainty of the results of acoustic surveys carried out by different vessels will be studied (Russia).
- Modification of procedures for pooling acoustic survey data obtained by different vessels in overlapped rectangles taking into consideration the statistical characteristics of acoustic and biological data (Russia).
- Development of proposals for improving the acoustic database by means of SonarData EchoView software (Russia).
- Studying the effects of different type of combinations of the results of control hauls carried out during acoustic surveys in May/June (Germany)
- Studying the time series of BITS surveys (Germany)
- Studying the vertical and horizontal distribution of cod in the course of the year based on acoustic and trawl methods (Germany, Sweden)
- Establishing a sub-group for evaluating and improving of the quality of data stored in the BITS/DATRAS database. The sub-group will work by correspondence and meet for common analyses of maturity and weight data in collaboration with ICES in January 2005.

12.2 Acoustic surveys

The following important working items must be considered for the future and the WG BIFS therefore recommends that:

- In Subdivision 22: 24 trawls should be used with a cod end bar length of 10 mm during the acoustic surveys in October. In Subdivisions 25–32 the bar length of 6 mm is required during the same type of survey. For

the acoustic surveys in May a bar length of 10 mm in the codend is required in all subdivision, however, it also possible to use insert with 6 mm bar length in the codend.

- The coverage of the Baltic Sea with acoustic survey by different institutes should be maintained at the actual high level. It is recommended that Estonia and Finland reconsider the possibilities to cover SD 29N and SD 32 in October 2005, and that Latvia, Lithuania and Russia carry out acoustic surveys in the shallow waters of SD26 in October
- In order to get a complete picture of herring and sprat distribution in the Western Baltic areas (Skagerrak, Kattegat, ICES subdivisions 22–24) the whole area should be covered at the same time. At present the Western Baltic areas are covered by two separate surveys in different time of the year. One is carried out in July (Skagerrak, northern Kattegat) and the other in September/October (southern Kattegat, ICES Subdivisions 22 to 24). The July survey is connected with the North Sea acoustic summer survey whereas the October survey is linked to the Baltic Sea acoustic survey.
- The results of the acoustic surveys in May/June and October should be submitted to Eberhard Götze, Germany and Niklas Larson, Sweden in the BIAS exchange format at least one month before the WGBIFS meeting starts.
- The database BAD1 should be updated and the intensive studies of the data from this database should be continued.
- ICES should examine the possibilities to hold the BAD2 data within the frame of an existing database system (DATRAS).
- The spring hydroacoustic survey should be extended to cover the main distribution area of sprat in the Baltic Sea (ICES subdivisions 25, 26, 28 and 29S)
- The Working Group recommends, that the acoustic survey of the Gulf of Riga herring, performed by Estonia and Latvia since 1999 should be included to list the surveys handled by the WGBIFS as a separate international survey. Accordingly, a standard survey report should be presented to the next WGBIFS meeting.

12.3 BITS

Following stages are recommended by the WGBIFS related to the bottom trawl surveys:

- The feedback from the surveys should be submitted to Germany using the above format not later than 20 December (autumn survey) and immediately after the spring survey.
- Information about additional hauls should be submitted to Rainer Oeberst (Rostock, Germany). Especially hauls in the “white areas” of the Baltic Sea are necessary to cover the total distribution area of the target species. It is proposed to use short periods of the future surveys to detect regions in the “white areas” where hauls are possible.
- From 2004 all institutes start to deliver data to ICES in the new exchange format and screen the data with the new data screening program. The working group recommends that a workshop/meeting of the subgroup is necessary e.g. in Gdynia (Poland) to discuss the problems of the DATRAS database in Poland before the next BITS starts. Furthermore, the DATRAS format will be described in the BITS manual during the next meeting.

12.4 Next meeting in 2006

12.4.1 Time and venue

The Working Group discussed its next meeting recommends that it will meet five days from 3 to 7 of April 2006 in the ICES headquarter in Copenhagen (Chair: Rainer Oeberst), to assist WGBFAS and ACFM.

12.4.2 Terms of reference

According to Annual Science Conference Resolution in Aberdeen, Scotland (C.Res.2005/x:xx), the Baltic International Fish Survey Working Group [WGBIFS] (Chair: Rainer Oeberst) will meet at ICES Headquarters from 3–7 of April 2006 to:

1) combine and analyse the results of the 2005 acoustic surveys and experiments and report to WGBFAS;
2) update the hydro-acoustic databases BAD1 and BAD2 for the years 1991 to 2005;
3) plan and decide on acoustic surveys and experiments to be conducted in 2006 and 2007;
4) discuss the results from BITS surveys performed in autumn 2005 and spring 2006;
5) plan and decide on demersal trawl surveys and experiments to be conducted in autumn 2006 and spring 2007;
6) update and correct the Tow database
7) evaluate and improve of the quality of data stored in the BITS/DATRAS database and analyse of maturity and weight data
8) update, if necessary, the Baltic International Trawl Survey (BITS) manual;
9) update, if necessary, the Baltic International Acoustic Survey (BIAS) manual.
10) study the vertical distribution of the cod during the BITS survey in a situation with oxygen deficiency close to the bottom.

The above Terms of Reference are set up to provide ACFM with information required to respond to requests for advice/information from the International Baltic Sea Fishery Commission and Science Committees. WGBIFS will report to the Baltic Committee and Resource Management Committees at the 2006 Annual Science Conference.

Justifications

The **main objective of the WGBIFS is** to co-ordinate and standardise national research surveys in the Baltic for the benefit of accurate resource assessment of 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. In recent years activities have been devoted to coordinate international coordinated demersal trawl surveys using the new standard gear TV3 and to continue the analyses of the conversion factors between the new and old survey trawls.

The most important future activities are to combine and analyze acoustic survey data for the Baltic Fisheries Assessment Working Group, develop a disaggregated hydro-acoustic database, plan and decide on acoustic surveys and experiments to be conducted. The quality assurance of ICES will require achievements towards a fully agreed calibration of processes and internationally agreed standards. [Action Numbers a): 1.2.1, 1.2.2 b): 1.2.2, 1.13.3 c): 1.11 d): 1.2.1, 1.2.2 e): 1.11, f): 1.11, g): 1.11, h): 1.13.4, 1.11 i): 1.13.4 j): 1.13.4, 1.11]

Activity is related to the maintenance and strengthening of partnership with national science institutes and to the elaboration and development of our knowledge of the stock structure, dynamics and trophic relationships.