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REPORT OF THE

Baltic International Fish Survey Working Group

Kaliningrad, Russia
5–9 February 2001

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1.1 Participation

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1.2 Terms of Reference

According to Council Resolution (C.Res.2000/2H:01), the Baltic International Fish Survey Working Group [WGBIFS] (Chair: E. Aro, Finland) will meet at Kaliningrad, Russia from 5–9 February 2001 to:

a) combine and analyse the results of the 2000 acoustic surveys and report to the Baltic Fisheries Assessment Working Group;
b) correct errors in and update the hydroacoustic database BAD1 for the years 1991 to 2000;
c) plan and decide on acoustic surveys and experiments to be conducted in 2001 and 2002.
d) update, if necessary both Baltic International Trawl Survey (BITS) and Baltic International Acoustic Survey (BIAS) manuals;
e) continue the comparison and analysis of results from concurrent survey activities by the traditional and the new standard trawls;
f) consider and analyse conversion factors between new and old trawls, on national level and develop methods to estimate the proper conversion factors.
g) continue the evaluation of the survey design strategies for future BITS surveys.
h) continue to establish acoustic database BAD2;
i) take note of the report of the Study Group on Herring Assessment Units in the Baltic Sea.

WGBIFS will report by 18 February 2001 for the attention of the Baltic and Resource Management Committees.

Some of the above Terms of Reference are set up to provide the Baltic Fisheries Assessment Working Group with information required to respond to requests for advice from the International Baltic Sea Fishery Commission.

Linkage to advisory functions in ICES include the quality assurance of basic data for stock assessments and management of Baltic herring, sprat and cod stocks. Establishing a checking procedure on the data that are submitted into the BITS database and BAD1- and BAD2 databases are one important task for the Working Group in the future.

The quality assurance of the primary data will require achievements towards a fully agreed calibration of processes and internationally agreed standards. (C.Res.1999/2:61).

The main objectives of the Working Group is to co-ordinate and standardise national research surveys in the Baltic for the benefit of accurate resource assessment of Baltic fish stocks. From 1996 to 1999 attention focused on evaluations of traditional surveys, introduction of survey manuals and considerations of sampling design and standard gears as well as co-ordinated data exchange format.

Last year activities were devoted to implementation of the use of new standard gears for demersal surveys, biological sampling regimes and analysis of both demersal and acoustic trawl survey results. During 1999 and 2000 all national surveys have adopted the new standard demersal gear (TV3-trawl) for surveys in the Baltic. Practical tests were made to optimise gear behaviour and rigging as well as to calibrate research vessels in order to obtain relevant assessment data in time for the Baltic Fisheries Assessment Working Group in April 2001. These activities have been completed under the umbrella of European Union project ISDBITS.

Dissolving the Study Group on Baltic Acoustic Data (SGBAD) two years ago increased the tasks of the Working Group and in practice, and the Working Group has continued analysis of acoustic survey data for Baltic Fisheries Assessment Working Group. The Working Group has also developed hydroacoustic databases and has made plans for future acoustic surveys and experiments to be conducted.

1.3 Overview of Working Group Activities 1996–2000

The Working Group activities were initiated in 1996 to promote co-ordination and standardisation 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 hydroacoustic surveys. The second meeting (ICES CM 1997/J: 4) gave advice on intercalibration between research vessels, described sampling protocols of sprat and flounder and evaluated historical data from hydroacoustic investigations on herring. Both meetings dealt with the introduction of modern standard bottom trawls for resource surveys in the Baltic.

Expert advice on the choice of standard trawls has been provided by two gear Workshops (ICES CM 1997/J6; 1998/H:1). The third meeting (ICES CM 1998/H:4) adopted the recommendation on standard trawls for Baltic International Fish Surveys. They also made a plan intercalibration programmes for the introduction of new standard gears. They also evaluated the continuation of existing survey practice, optimised the sampling procedures for both cod and other target species including a critical inventory of the current coding procedures for maturity stages and reviewed the effects of biological sampling and TS conversion formulas on the results of acoustic stock levels and biomass estimates. The meeting also finalised and updated the Manual for Baltic International Acoustic Surveys (BIAS) 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 intercalibration programmes. The Working Group 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. This process is still going on.

The fifth meeting of the Working Group (ICES CM 2000/H:2) updated protocols and both Baltic International Trawl Survey (BITS) and Baltic International Acoustic Survey (BIAS) manuals and data exchange formats for international acoustic survey database (BAD2 database). The Working Group also recommended some routines to be used in the future for demersal trawl survey design.

A number of supporting scientific projects and study projects has been going on in recent years in the Baltic and neighbouring areas. The Terms of References of the Working Group this year were again closely linked to these projects. These European Union and nationally funded projects are now concluding their work and thus it was considered appropriate to organise also this year a co-ordination meeting of three of the projects during the Working Group meeting. In general the Working Group has benefited very much from these projects. EU-Study Projects, which had their short co-ordination meetings in Kaliningrad, were:

1) **ISDBITS**-project: “Implementation and calibration of standard survey trawls and standardisation of survey design of the Baltic international bottom trawl surveys for fishery resource assessment” co-ordinated by J. Rasmus Nielsen (Hirtshals, Denmark) (Project has been completed 31.12.2000). Report will be available in late spring 2001.

2) **BITS**-project: “Establishing a Baltic Trawl Survey (BITS) database” co-ordinated by Yvonne Walther (Karlskrona, Sweden). (Project will be completed by 30.04.2001). Report will be available in summer 2001.

3) **BALTDAT**-project: “Surveying the pelagic fish resources and establish an acoustic database in the Baltic Sea”-coordinated by Fredrik Arrhenius (Lysekil, Sweden). (Project will be completed by 31.03.2001). Report will be available in late spring or early summer 2001.

2 RESULTS OF THE 2000 BALTIC ACOUSTIC SURVEYS

In 2000 the following acoustic surveys were conducted during the time period September/October:

Vessel	Country	Area
Argos	Sweden	27(parts 25,26,28,29S)
ATLANTIDA	Russia, Latvia	26,28
BALTICA	Poland	25,26 (parts 24)
SOLEA	Germany, Denmark	22,23,24 (parts21)
JULANTA	Estonia, Suomi	29N, 30,32

The results from the individual vessels are found in the database BAD1.

2.1 R/V ARGOS

The Swedish R/V Argos carried out an acoustic survey in ICES Sub-division 27 and parts of Sub-divisions 25, 26, 28 and 29S from 9 to 25 October 2000.

The equipment used was an SIMRAD EK500 echo sounder and the BEI (Bergen Echo Integrator) system. A hull mounted 38 kHz split beam transducer was used. Integration and fishing was performed around the clock. Samples of fish were taken from the trawl catches to estimate species composition and length-frequency distribution of target species. For this purpose a *Macro 4* midwater trawl was used with a vertical opening of 17–22 m and a stretch mesh size of 21 mm in the codend. As last year, *Dangren* trawl doors were used, with an area of 5.3 m^2 and weight of 950 kg. The trawling speed was 3–4.5 knots, and haul duration 30–60 minutes. Totally 30 trawl hauls were made. One haul was excluded from the analysis.

The hydroacoustic equipment was calibrated directly before the survey against a standard copper sphere at a calibration site at Högön, Västervik.

The survey covered 15 350 nm^2. The survey grid and position of the trawl hauls are shown in Figure 2.1.1.

The acoustic energy was allocated to species based on the catch composition in the hauls and converted to number per length group using following target strength regressions

for clupeoides:	TSind.= 20.0 log L(cm) - 71.2 dB
for gadoids:	TSind.= 20.0 log L(cm) – 67.5 dB
and for fish without swim bladder	TSind.= 20.0 log L(cm) - 77.2 dB

where L is the fish length in cm.

Salmonids and 3-spined stickleback were assumed to have the same acoustic properties as herring.

2.2 R/V ATLANTIDA

Russian and Latvian scientists carried out an acoustic survey aboard R/V “ATLANTIDA” in Sub-divisions 26 and 28 from 5 to 25 of October 2000 year. The integration covered 20482 square nautical miles and the integrated track was 1390 nautical miles. The survey grid and position of trawl hauls are shown in Figure 2.2.1.

The hydroacoustic equipment used was SIMRAD EK-500 echosounder, working at the 38 kHz, and SonarData Echo View software for post processing integrated data. The vessel speed on the survey was 8 – 8.5 knots, trawling speed was 4.2 knots and the integrated interval was one nautical mile.

The hydroacoustic equipment was calibrated directly before the survey, against with standard copper sphere, at the place near the Baltyisk harbour at the depth of 30 meters.

The integrated and hauling were made during the daytime. R/V "ATLANTIDA" used the midwater trawl RT/TM 70/300 with a vertical opening 28 – 32 meters and bar length in the codend of 6.5 mm. Totally 60 sample hauls were made.

The backscattered energy was allocated to species on the basis of the catch and its length composition, using the following target strength regression for clupeoids:

$$TS = 20.0 \log L(cm) - 71.2 \text{ [dB]}$$

2.3 R/V BALTICA

The Polish acoustic survey was carried out by r.v. BALTICA in the Polish EEZ in Sub-divisions 24, 25 and 26 from 7–25 October, 2000.

The acoustic measurements were conducted both during day and night with EY500 sounder and stored on HDD for time intervals corresponding to a distance of 1 N.M. (ESDU=1 N.M.). The working speed of the vessel was 4–8 knots. The calibration was carried out during the cruise by SIMRAD at 10th October 2000 (Bogen, Norway).

A modified midwater trawl WP53/64x4 with 11 mm bar length in the codend was used to collect biological samples. The trawling speed was 3–4 knots, and haul duration 30–60 minutes.

Fish numbers were estimated using the TS-LENGTH regressions:

clupeoids: $TS = 20\log L - 71.2$
gadoids: $TS = 20\log L - 67.5$

Total number of fish was divided into species and age groups according to the species and age composition of the catch. ALKs were made for each Sub-division for sprat and herring.

Data: 1198 ESDU; 38 hauls; herring - length 38 samples (7575 ind.), age 34 samples (1117 ind.); sprat - length 37 samples (7119 ind.), age 24 samples (498 ind.). Quality of data was good due to reasonable weather conditions.

Acoustic track and trawl stations are presented in Figure 2.3.1.

2.4 R/V JULANTA

A joint Finnish-Estonian acoustic survey was carried out with R\V "Julanta" from 30 August to 2 October 2000 in the Northern Baltic. The vessel has a total length of 27 m and propulsion power 750 kW. The survey covered ICES Sub-divisions 30, 32 and northern part of 29. Estonia is responsible for the part of the survey carried out from 26 September to 2 October 2000 in the Gulf of Finland (Sub-division 32).

The acoustic equipment used was an SIMRAD EY500 portable sounder system. A 38 kHz split beam SIMRAD transducer ES38–12 was deployed in a side mounted rack. The hydroacoustic equipment was calibrated immediately before the survey near Kytö Island to south-west of Helsinki, using the standard copper sphere with 60 mm diameter. All studies were performed during the night time. The area back-scattering strength was averaged over 1 nautical mile intervals. The length of survey track was 349 NM and integration covered 5521 square nautical miles in the Gulf of Finland. The fish samples were taken with a commercial midwinter trawl (Finflyder combi type). The trawl has a vertical opening of ca. 25 m and a stretch mesh size of 22 mm in the codend. Altogether 8 trawl hauls were made in the Gulf of Finland. The vessel speed on the survey was 7–8 knots. The trawling speed was 2.2 – 2.4 knots, and the duration of each was 15–30 minutes.

Fish numbers were estimated using the TS-LENGTH regression for all fish species:

$$TS = 20\log L - 71.2,$$

where L is the fish length in cm. For age-length keys 1914 herrings and 1283 sprats were measured and 165 herrings and 92 sprats were aged.

The cruise track and trawl positions are given in Figure 2.4.1.

2.5 R/V JULANTA

The joint Finnish-Estonian acoustic survey was carried out with the Finnish fishing vessel "Julanta" from 30 August to 2 October 2000 in the Northern Baltic. The survey covered ICES Sub-divisions 30, 32 and northern part of 29. Finnish Game and Fisheries Research Institute was responsible for the data analysis on Sub-divisions 29N and 30. Estonian Marine Institute Estonia was responsible for the analysis on SD 32.

In this research, the SIMRAD EY500 portable sounder system was used. A 38 kHz split beam SIMRAD transducer ES38–12 was deployed in a side mounted rack. The hydroacoustic equipment was calibrated in the beginning of the survey with a standard 60 mm copper sphere at Kytö Island to the south-west of Helsinki. Making another calibration during the survey also later ensured the correct operation of the acoustic equipment. The integration interval was 1 nautical mile. All investigations were performed during night time.

In SD 29N and 30 the he length of the survey track was 1325 nautical miles. In SD30 and SD 29N, 20 and 4 trawl hauls were made, respectively. The trawling speed was 2.2–2.4 knots, and haul duration was 15–32 minutes. For the age-length keys 5775 herring and 2532 sprat were measured for total length, and 459 herring and 226 sprat were aged.

The fish biomass estimates for areas 29N and 30 were very high. Obviously, the presently applied TS-equation (TS = 20logL-71.2, where L is length in cm) was not suitable for herring in Northern Baltic Sea and a new target strength equation should be derived.

Acoustic track and trawl stations are presented in Figure 2.5.1.

2.6 R/V SOLEA

A joint German-Danish acoustic survey was carried out with R/V "SOLEA" from 29 September–20 October 2000 in the Western Baltic. The survey covered ICES Sub-divisions 22, 23, 24 and the southern part of the Kattegat. All investigations were performed during night as in previous years.

The acoustic equipment used was an EK500 Echo sounder connected to the BI500 Bergen-Integrator. The specific settings of the hydroacoustic equipment were used as described in the 'Manual for the Baltic International Acoustic Surveys (BIAS)' (Annex 4 in the 'Report of the Baltic International Fish Survey Working Group', ICES CM 2000/H:2). A 38kHz transducer 38–26 was deployed in a towed body. The towed body had a lateral distance of about 30 m to reduce escape reactions of fish. The transducer was calibrated before this survey in Warnemünde and during the cruise in Abenrade/Denmark.

The cruise track (Figure 2.6.3.1) reached in total a length of 996 nautical miles. 50 trawl hauls were carried out. 1478 herring and 532 sprat were frosted for further age determination in the lab.

In general the catch composition was dominated by herring and to a lower extent by sprat. Both for herring and sprat the contribution of the new incoming year class is less pronounced compared to last year's results. The herring stock in Sub-divisions 21 to 24 was estimated to be 3.9×10^{9} individuals or 180 000 tonnes, which represents a reduction of 38% and of 82%, respectively, compared to last year's results. The decrease was mainly caused by the low abundance of the 0-year class. Low herring densities were found in the Belt Sea and the southern Kattegat (Sub-divisions 21 and 22), while the biomass in the Arkona basin exceeded the estimates of the last years. The overall estimate of the sprat stock in the covered area was 1.9×10^{9} individuals or 27 000 tonnes biomass. This year's results are on the lowest level recorded during the last years. The main reason for the drastic decrease is the very low abundance of young sprat in all areas. The present estimate of 0-group sprat was 1790 tonnes. Last year's biomass estimates of juvenile sprat were more than 30 times higher.

2.7 Combined Results

2.7.1 Overlapping areas

During the international acoustic survey 2000, twelve squares were investigated by two vessels. The investigations were carried out within the time interval of some days to some weeks. For the further use of these data it was necessary to propose how these data should be used in the estimates for the ICES Sub-divisions.

For each square the following data were compared

- the covered area of the square and
- the number of hauls in the squares.

The differences between the species and length composition were being supposed as stochastic variations. If the whole square were investigated by both vessels and the number of hauls were more than one the arithmetic mean of both data sets were used. If the coverage of the squares were quite different or the number of hauls were zero for one vessel the handling of the data were discussed. The Table 2.7.1.1 presents the results of this analysis. In Tables 2.7.1.2 and 2.7.1.3 you will find the abundance in numbers by rectangle for herring and sprat. Overlapping survey in rectangles is labelled grey.

2.7.2 Total results

As a summary of the results of the international acoustic survey 2000 the Tables 2.7.2.1 to 2.7.2.4 are presented. The overlapping areas are used as described in Table 2.7.1.1.

The Table 2.7.2.1 and 2.7.2.2 give the abundance estimates for herring and sprat for ICES Sub-divisions and age groups. The biomass estimates are presented in Tables 2.7.2.3 and 2.7.2.4 for herring and sprat. These data are also given by ICES Sub-divisions and age groups.

The Working Group recommends that the data from 2000 can be used for the estimation of the herring and sprat stocks. For a comparison of the estimation of different years it seem to be better to use the acoustic estimates as index values in number per NM^2.

The following estimations of the acoustic survey in the Baltic Sea area must be regarded with care:

- Estimation of the herring 2+ age group in SD 22, 23 and 24. It is known from tagging experiments that in autumn older herring (2+ age group) is migrating from the feeding areas in the North Sea and Skagerrak through the Kattegat (SD 21) for over wintering in the Sound (SD 23) to the main spawning grounds around Rügen, reaching this area during spring time. Since the corresponding acoustic survey is not covering the whole area at the same survey time (excluding the Skagerrak and northern Kattegat area, respectively), the older herring (2+ age group) may be underestimated.

- Estimation of the young herring and young sprat in the eastern Baltic Sea (Sub-divisions 25–32). The young herring and sprat stay partly in the shallow water of the eastern Baltic Sea. These areas can not be investigated with the used vessels. Therefore the portion of theses groups is unknown.

Table 2.7.1.1 Treatment of data from rectangles with overlapping.

ICES rect.	Vessel A	Sa values	Number of hauls	Vessel B	Sa values	Number of hauls	Suggestion
38G4	Solea	Whole area	3	Baltica	Whole area	2	Arithm. mean
39G5	Argos	Whole area	3	Baltica	SE part	1	Argos data
39G6	Argos	Whole area	1	Baltica	Whole area	2	Arithm. mean
40G7	Argos	Whole area	2	Baltica	Small part in S	1	Argos data
38G9	Baltica	W part	4	Atlantida	NE part	4	Arithm. mean
39G8	Baltica	Whole area	4	Atlantida	Whole area	2	Atlantida data
39G9	Baltica	Small part in W	2	Atlantida	Whole area	4	Atlantida data
40G8	Baltica	Whole area	5	Atlantida	Whole area	3	Arithm. mean
41G8	Argos	Whole area	2	Atlantida	Whole area	3	Arithm. mean
42G8	Argos	E part	2	Atlantida	E part	2	Arithm. mean
44G9	Argos	Whole area	1	Atlantida	Whole area	3	Atlantida data
45G9	Argos	Whole area	0	Atlantida	E part	2	Atlantida data

Table 2.7.1.2 Estimated numbers (millions) of herring October 2000.

Vessel	SD	rect	total	age 0	age 1	age 2	age 3	age 4	age 5	age 6	age 7	age 8+
SOL	21	41G1	71	27	43	0	0	0	0	0	0	0
SOL	21	41G2	34	19	15	1	0	0	0	0	0	0
SOL	21	42G1	61	5	55	1	0	0	0	0	0	0
SOL	21	42G2	297	70	216	9	1	0	0	0	0	0
	21 Total		464	122	329	11	1	0	0	0	0	0
SOL	22	37G0	63	16	46	1	0	0	0	0	0	0
SOL	22	37G1	324	142	146	18	4	7	5	1	0	0
SOL	22	38G0	88	28	57	2	0	0	0	0	0	0
SOL	22	38G1	8	1	7	0	0	0	0	0	0	0
SOL	22	39F9	0	0	0	0	0	0	0	0	0	0
SOL	22	39G0	8	0	7	1	0	0	0	0	0	0
SOL	22	39G1	3	0	3	0	0	0	0	0	0	0
SOL	22	40F9	3	0	2	0	0	0	0	0	0	0
SOL	22	40G0	34	0	28	4	2	0	0	0	0	0
SOL	22	41G0	3	0	3	0	0	0	0	0	0	0
	22 Total		534	188	298	27	7	7	5	1	0	0
SOL	23	40G2	383	13	201	107	35	16	7	3	1	0
SOL	23	41G2	110	46	52	11	1	0	0	0	0	0
	23 Total		493	60	253	118	36	16	7	3	1	0
SOL	24	37G2	14	3	8	2	1	1	0	0	0	0
BAL	24	37G4	187	94	28	18	23	6	14	3	1	1
SOL	24	38G2	642	337	178	53	40	21	8	3	0	0
SOL	24	38G3	628	152	135	97	105	86	30	18	3	2
BAL&SOL	24	38G4	403	150	100	56	56	19	16	5	1	1
SOL	24	39G2	89	3	6	12	26	25	9	6	1	1
SOL	24	39G3	222	72	78	32	24	11	4	1	0	0
SOL	24	39G4	224	37	92	50	29	11	5	1	0	0
	24 Total		2409	848	624	320	305	179	85	37	6	5
BAL	25	37G5	150	1	20	13	37	15	29	19	5	12
BAL	25	38G5	489	55	75	38	109	42	81	51	13	25
BAL	25	38G6	440	9	78	37	105	44	82	49	15	22
BAL	25	38G7	93	4	17	8	25	9	15	9	3	4
ARG	25	39G5	67	6	19	8	18	5	5	4	1	1
ARG&BAL	25	39G6	492	9	41	65	84	46	90	82	48	29
BAL	25	39G7	491	22	88	41	132	49	78	47	13	22
ARG	25	40G4	292	13	79	63	65	17	19	18	12	5
ARG	25	40G5	217	16	37	27	42	18	22	15	20	20
ARG	25	40G6	414	1	45	61	101	36	81	70	12	7
ARG	25	40G7	252	5	49	26	59	25	34	26	18	9
ARG	25	41G6	110	4	25	10	45	5	9	8	2	2
ARG	25	41G7	343	3	44	32	123	29	52	35	21	5
	25 Total		3850	147	615	429	945	339	597	434	181	163
BAL	26	37G8	201	128	18	4	17	5	9	12	4	4
BAL	26	37G9	283	181	25	6	24	7	12	17	6	5
BAL	26	38G8	206	29	39	10	42	13	21	30	10	12
ATL&BAL	26	38G9	770	289	137	35	91	31	59	78	22	28
ATL	26	39G8	844	7	143	52	165	130	144	121	51	31
ATL	26	39G9	541	1	48	26	124	59	95	106	52	30
ATL	26	39H0	106	4	36	8	15	7	13	10	6	7
ATL&BAL	26	40G8	428	4	58	23	111	46	72	71	26	18
ATL	26	40G9	196	0	41	15	45	22	30	30	6	5
ATL	26	40H0	500	2	143	40	98	52	75	61	13	17
ARG&ATL	26	41G8	73	0	5	6	25	10	9	10	4	4
ATL	26	41G9	462	0	51	34	129	61	54	74	32	28

Table 2.7.1.2 Continued

Vessel	SD	rect	total	age 0	age 1	age 2	age 3	age 4	age 5	age 6	age 7	age 8+
ATL	26	41H0	343	0	22	21	48	37	57	80	44	34
	26 Total		4953	644	765	279	933	481	652	701	276	222
ARG	27	42G7	188	0	6	4	37	44	46	34	18	0
ARG	27	43G7	234	0	20	5	54	44	49	42	19	0
ARG	27	44G7	211	0	92	13	80	10	7	8	0	0
ARG	27	44G8	192	0	36	8	62	49	15	11	11	1
ARG	27	45G7	480	0	169	44	108	98	20	25	15	0
ARG	27	45G8	400	0	31	0	136	22	122	83	7	0
ARG	27	46G7	81	0	19	4	22	10	10	13	2	0
ARG	27	46G8	56	1	24	2	9	4	4	10	1	1
	27 Total		1841	1	398	80	509	281	272	226	73	2
ARG&ATL	28	42G8	388	0	14	16	47	48	102	81	28	53
ATL	28	42G9	46		1	2	13	7	7	8	4	3
ATL	28	42H0	454		31	19	160	50	48	62	47	37
ATL	28	43G9	167		13	8	70	21	19	21	8	7
ATL	28	43H0	45		4	2	13	6	5	7	5	4
ATL	28	43H1	147	81	26	8	9	4	6	5	4	3
ATL	28	44G9	766		39	48	268	57	103	150	64	37
ATL	28	44H0	270		30	11	57	25	37	48	33	29
ATL	28	44H1	284	171	42	14	15	8	11	10	7	6
ATL	28	45G9	412		36	27	182	43	49	38	26	12
ATL	28	45H0	170		25	11	78	17	14	11	9	5
ATL	28	45H1	156	30	11	14	35	6	16	18	15	11
	28 Total		3305	283	272	179	946	291	417	459	250	208
JUL	30	50G7	928	0	0	0	21	82	52	89	253	429
JUL	30	50G8	2257	0	1	1	51	199	126	217	616	1044
JUL	30	50G9	979	0	106	44	112	256	122	131	128	81
JUL	30	50H0	552	10	75	29	60	139	62	67	63	47
JUL	30	51G7	741	0	0	0	12	53	31	60	134	452
JUL	30	51G8	1920	0	1	2	51	201	117	216	422	911
JUL	30	51G9	1596	0	1	3	55	182	107	170	345	734
JUL	30	51H0	1137	39	186	67	117	277	115	126	111	98
JUL	30	51H1	495	17	81	29	51	121	50	55	48	43
JUL	30	52G7	861	0	0	0	6	39	22	48	125	621
JUL	30	52G8	1887	0	6	1	54	251	132	242	419	782
JUL	30	52G9	1008	0	1	1	28	84	54	82	220	538
JUL	30	52H0	1796	0	273	133	189	479	204	203	154	160
JUL	30	52H1	417	0	55	25	34	85	36	42	52	88
JUL	30	53G7	341	0	12	2	16	44	24	36	62	145
JUL	30	53G8	881	0	9	4	42	121	65	88	155	396
JUL	30	53G9	1288	0	56	37	113	278	112	147	190	355
JUL	30	53H0	521	0	214	27	50	84	34	33	36	43
JUL	30	53H1	66	0	27	3	6	11	4	4	4	5
JUL	30	54G7	35	0	1	1	2	6	3	4	6	13
JUL	30	54G8	1282	0	42	21	69	215	105	144	213	473
JUL	30	54G9	1526	0	193	57	95	274	121	171	230	384
JUL	30	54H0	1595	0	434	108	171	326	123	106	120	208
JUL	30	55G8	172	0	51	13	14	32	12	14	14	22
JUL	30	55G9	2138	24	1172	170	199	278	86	77	43	88
JUL	30	55H0	1556	9	638	115	156	260	91	80	74	133
	30 Total		27973	98	3636	894	1774	4378	2009	2652	4239	8294
JUL	32	47H3	6580	222	3987	713	470	459	419	158	99	53
JUL	32	47H4	334	7	164	23	33	37	39	19	7	5
JUL	32	47H7	274	29	178	15	13	13	14	9	2	2
JUL	32	48H3	3841	130	2327	416	274	268	245	92	58	31

Table 2.7.1.2 Continued

Vessel	SD	rect	Total	age 0	age 1	age 2	age 3	age 4	age 5	age 6	age 7	age 8+
JUL	32	48H4	6757	98	4411	428	469	496	489	223	87	55
JUL	32	48H5	2928	12	1395	228	345	351	304	155	73	64
JUL	32	48H6	4323	287	2589	309	341	315	288	136	38	21
JUL	32	48H7	2596	270	1687	143	121	122	132	82	20	20
JUL	32	49H4	716	6	583	42	28	26	20	7	3	1
JUL	32	49H5	1578	13	760	142	185	179	148	74	35	42
JUL	32	49H6	2571	70	1405	227	289	256	214	81	26	5
	32 Total		32499	1143	19486	2686	2568	2523	2312	1034	448	298
JUL	29N	48G9	3785	57	1883	206	723	301	297	42	172	104
JUL	29N	48H0	5087	51	1582	235	1017	623	536	218	469	356
JUL	29N	48H1	4143	21	515	157	865	685	549	309	576	467
JUL	29N	48H2	4786	0	1625	235	1041	665	502	214	348	156
JUL	29N	49G9	201	4	67	9	32	16	15	9	19	30
	29N Total		18002	133	5672	841	3678	2290	1899	793	1584	1113
ARG	29S	46G9	282	11	76	16	120	15	24	20	0	0
ARG	29S	46H0	428	6	75	38	180	34	56	33	7	0
ARG	29S	47G9	771	11	134	68	324	62	100	60	13	0
ARG	29S	47H0	1173	5	117	157	399	124	239	75	56	0
ARG	29S	47H1	489	2	49	65	166	52	100	31	23	0
	29S Total		3142	35	451	343	1189	286	520	220	99	0

Table 2.7.1.3 Estimated numbers (millions) of sprat October 2000.

Vessel	SD	rect	Total	age 0	age 1	age 2	age 3	age 4	age 5	age 6	age 7	age 8+
SOL		21 41G1	3	0	1	1	1	0	0	0	0	0
SOL		21 41G2	0	0	0	0	0	0	0	0	0	0
SOL		21 42G1	0	0	0	0	0	0	0	0	0	0
SOL		21 42G2	3	0	1	0	0	0	0	0	0	0
	21 Total		6	0	3	2	1	0	0	0	0	0
SOL		22 37G0	6	5	0	0	0	0	0	0	0	0
SOL		22 37G1	332	83	77	80	42	43	7	0	0	0
SOL		22 38G0	7	4	1	1	0	1	0	0	0	0
SOL		22 38G1	7	2	2	1	1	1	0	0	0	0
SOL		22 39F9	96	96	0	0	0	0	0	0	0	0
SOL		22 39G0	0	0	0	0	0	0	0	0	0	0
SOL		22 39G1	0	0	0	0	0	0	0	0	0	0
SOL		22 40F9	0	0	0	0	0	0	0	0	0	0
SOL		22 40G0	1	0	1	0	0	0	0	0	0	0
SOL		22 41G0	0	0	0	0	0	0	0	0	0	0
	22 Total		449	190	81	82	44	45	7	0	0	0
SOL		23 40G2	3	0	1	1	1	0	0	0	0	0
SOL		23 41G2	3	1	0	1	0	0	0	0	0	0
	23 Total		6	1	1	2	1	0	0	0	0	0
SOL		24 37G2	7	1	2	1	2	1	0	0	0	0
BAL		24 37G4	94	1	8	16	32	19	10	7	1	0
SOL		24 38G2	62	16	21	6	11	6	3	0	0	0
SOL		24 38G3	417	119	171	31	59	26	11	0	0	0
BAL&SOL		24 38G4	152	23	32	20	37	22	11	6	1	0
SOL		24 39G2	21	0	8	3	6	2	1	0	0	0
SOL		24 39G3	435	0	206	60	98	45	26	0	0	0
SOL		24 39G4	341	8	210	32	48	25	17	0	0	0
	24 Total		1529	168	659	169	292	146	81	13	1	0
BAL		25 37G5	2	0	1	0	1	0	0	0	0	0
BAL		25 38G5	117	0	30	14	43	13	11	4	0	1
BAL		25 38G6	25	1	10	3	8	1	1	0	0	0
BAL		25 38G7	127	10	59	13	35	5	4	2	0	0
ARG		25 39G5	233	0	51	16	92	4	25	30	11	4
ARG&BAL		25 39G6	211	1	90	22	71	9	9	6	3	0
BAL		25 39G7	672	51	312	67	185	26	22	8	0	0
ARG		25 40G4	45	0	18	0	16	2	3	4	1	1
ARG		25 40G5	649	0	164	0	244	30	51	85	45	29
ARG		25 40G6	276	0	52	0	130	18	38	25	6	8
ARG		25 40G7	469	0	124	0	165	12	80	55	15	18
ARG		25 41G6	1093	0	312	0	413	50	192	85	0	40
ARG		25 41G7	458	0	64	2	227	5	49	86	0	25
	25 Total		4376	63	1289	137	1629	176	485	390	81	126
BAL		26 37G8	42	12	15	1	10	2	0	1	0	0
BAL		26 37G9	59	17	21	2	14	3	0	1	0	0
BAL		26 38G8	806	5	428	36	267	50	5	15	1	0
ATL&BAL		26 38G9	2795	284	1154	205	828	100	172	49	0	2
ATL		26 39G8	4845	48	3078	165	1311	73	157	12	0	0
ATL		26 39G9	6456	168	4122	275	1376	181	253	77	2	2
ATL		26 39H0	8574	777	6783	180	684	1	113	36	0	1
ATL&BAL		26 40G8	2048	8	754	78	735	131	219	94	19	9
ATL		26 40G9	5759	15	3111	253	1816	71	226	159	42	67
ATL		26 40H0	6507	540	4161	277	1297	90	106	26	0	11
ARG&ATL		26 41G8	1355	0	127	5	533	81	213	225	45	126
ATL		26 41G9	1984	153	846	10	527	21	170	129	56	72

Table 2.7.1.3 Continued

Vessel	SD	rect	total	age 0	age 1	age 2	age 3	age 4	age 5	age 6	age 7	age 8+
ATL	26	41H0	5560	753	3400	0	1175	38	144	26	0	25
	26 Total		46791	2781	27999	1488	10574	840	1778	849	166	315
ARG	27	42G7	390	0	74	12	115	35	79	51	12	12
ARG	27	43G7	720	1	128	16	231	44	134	134	17	14
ARG	27	44G7	2506	11	370	0	947	0	372	762	22	22
ARG	27	44G8	369	4	6	17	102	54	74	91	4	17
ARG	27	45G7	3208	0	660	0	1066	175	375	811	87	35
ARG	27	45G8	3926	39	518	0	1229	648	893	510	39	49
ARG	27	46G7	989	3	154	3	326	98	138	238	18	9
ARG	27	46G8	2899	0	376	44	974	224	245	943	59	33
	27 Total		15007	58	2286	92	4991	1278	2310	3540	259	193
ARG&ATL	28	42G8	768	1	56	7	356	52	100	131	25	38
ATL	28	42G9	1493	0	350	20	676	46	155	170	30	46
ATL	28	42H0	5206	89	2168	17	1825	72	450	400	78	107
ATL	28	43G9	1772	0	351	19	790	59	267	153	37	97
ATL	28	43H0	3387	7	875	37	1536	83	429	259	89	71
ATL	28	43H1	2846	413	1389	28	641	76	166	55	50	28
ATL	28	44G9	4363	0	388	0	2317	126	601	549	114	268
ATL	28	44H0	6272	20	2047	57	2583	105	663	577	64	156
ATL	28	44H1	5416	524	2943	55	1392	79	201	166	25	32
ATL	28	45G9	3456	0	508	23	1638	106	478	588	21	95
ATL	28	45H0	13994	12	4584	59	5931	260	1173	1462	196	317
ATL	28	45H1	12204	372	3848	259	5375	191	1037	1042	0	79
	28 Total		61176	1439	19506	583	25059	1256	5719	5552	729	1333
JUL	30	50G7	12	0	0	0	0	0	0	8	0	3
JUL	30	50G8	30	0	0	0	0	1	1	20	1	7
JUL	30	50G9	219	0	2	0	24	21	19	148	1	5
JUL	30	50H0	253	0	12	0	25	23	22	165	1	4
JUL	30	51G7	13	0	0	0	1	1	1	9	0	2
JUL	30	51G8	45	0	0	0	3	2	2	30	1	8
JUL	30	51G9	9	0	0	0	1	1	1	7	0	0
JUL	30	51H0	925	0	80	0	87	78	78	585	5	12
JUL	30	51H1	402	0	35	0	38	34	34	254	2	5
JUL	30	52G7	18	0	0	0	1	1	1	13	0	1
JUL	30	52G8	37	0	0	0	1	2	2	24	1	6
JUL	30	52G9	147	0	0	0	13	7	7	110	2	7
JUL	30	52H0	538	0	2	0	60	45	44	375	4	7
JUL	30	52H1	285	0	1	0	27	19	19	205	3	10
JUL	30	53G7	42	0	1	0	4	4	3	27	0	3
JUL	30	53G8	25	0	1	0	2	1	1	18	0	1
JUL	30	53G9	50	0	0	0	4	3	3	37	1	2
JUL	30	53H0	489	0	0	0	52	39	39	348	4	8
JUL	30	53H1	62	0	0	0	7	5	5	44	1	1
JUL	30	54G7	0	0	0	0	0	0	0	0	0	0
JUL	30	54G8	13	0	0	0	1	1	1	10	0	1
JUL	30	54G9	47	0	0	0	5	2	2	36	0	1
JUL	30	54H0	29	0	0	0	3	2	2	21	0	0
JUL	30	55G8	39	0	3	0	4	3	3	25	0	1
JUL	30	55G9	284	0	16	0	29	24	23	186	1	6
JUL	30	55H0	119	0	3	0	12	9	9	83	1	2
	30 Total		4131	0	156	0	404	328	322	2788	32	102
JUL	32	47H3	9189	909	4849	920	953	661	791	32	55	20
JUL	32	47H4	148	2	40	25	30	21	24	3	2	1
JUL	32	47H7	59	0	25	10	10	7	7	0	0	0
JUL	32	48H3	5363	531	2830	537	556	386	461	18	32	12
JUL	32	48H4	2650	118	942	433	462	314	318	30	21	12

Table 2.7.1.3 Continued

Vessel	SD	rect	total	age 0	age 1	age 2	age 3	age 4	age 5	age 6	age 7	age 8+
JUL	32	48H5	726	0	264	119	129	93	90	15	11	5
JUL	32	48H6	675	8	269	117	118	74	83	3	3	1
JUL	32	48H7	560	3	235	92	98	62	66	2	2	1
JUL	32	49H4	252	19	112	39	37	24	19	1	1	0
JUL	32	49H5	800	0	383	121	116	87	78	4	7	3
JUL	32	49H6	253	4	95	46	44	28	32	1	2	0
	32 Total		20677	1594	10043	2459	2553	1757	1970	109	137	56
JUL	29N	48G9	1418	49	559	20	194	45	93	421	5	32
JUL	29N	48H0	12132	439	3396	219	1938	513	883	4339	48	358
JUL	29N	48H1	9916	374	1639	220	1812	525	794	4146	47	360
JUL	29N	48H2	2420	180	1459	26	177	39	166	347	0	26
JUL	29N	49G9	2409	0	858	38	346	107	187	817	4	51
	29N Total		28295	1042	7911	522	4467	1228	2122	10070	103	829
ARG	29S	46G9	2761	19	402	0	1107	188	561	371	47	65
ARG	29S	46H0	1422	15	237	0	540	133	281	148	24	44
ARG	29S	47G9	2562	27	427	0	973	240	506	267	44	79
ARG	29S	47H0	1035	26	152	0	382	154	186	44	22	67
ARG	29S	47H1	432	11	63	0	160	64	78	19	9	28
	29S Total		8213	98	1281	0	3161	781	1612	849	147	284

Table 2.7.2.1 Estimated numbers (millions) of herring October 2000.

SD	total	age 0	age 1	age 2	age 3	age 4	age 5	age 6	age 7	age 8+
21	464	122	329	11	1	0	0			
22	534	188	298	27	7	7	5	1		
23	493	60	253	118	36	16	7	3	1	0
24	2409	848	624	320	305	179	85	37	6	5
25	3850	147	615	429	945	339	597	434	181	163
26	4953	644	765	279	933	481	652	701	276	222
27	1841	1	398	80	509	281	272	226	73	2
28	3305	283	272	179	946	291	417	459	250	208
30	27973	98	3636	894	1774	4378	2009	2652	4239	8294
32	32499	1143	19486	2686	2568	2523	2312	1034	448	298
29N	18002	133	5672	841	3678	2290	1899	793	1584	1113
29S	3142	35	451	343	1189	286	520	220	99	
Total	99463	3702	32799	6207	12890	11071	8776	6559	7156	10304

Table 2.7.2.2 Estimated numbers (millions) of sprat October 2000.

SD	total	age 0	age 1	age 2	age 3	Age 4	age 5	age 6	age 7	age 8+
21	6	0	3	2	1	0				
22	449	190	81	82	44	45	7			
23	6	1	1	2	1	0	0			
24	1529	168	659	169	292	146	81	13	1	
25	4376	63	1289	137	1629	176	485	390	81	126
26	46791	2781	27999	1488	10574	840	1778	849	166	315
27	15007	58	2286	92	4991	1278	2310	3540	259	193
28	61176	1439	19506	583	25059	1256	5719	5552	729	1333
30	4131		156		404	328	322	2788	32	102
32	20677	1594	10043	2459	2553	1757	1970	109	137	56
29N	28295	1042	7911	522	4467	1228	2122	10070	103	829
29S	8213	98	1281		3161	781	1612	849	147	284
Total	190656	7435	71215	5535	53176	7837	16405	24160	1656	3237

Table 2.7.2.3 Estimated biomass (in tonnes) of herring October 2000.

SD	total	age 0	age 1	age 2	Age 3	age 4	age 5	age 6	age 7	age 8+
21	17474	2555	14061	685	105	45	22			
22	16318	2386	10983	1450	444	510	467	77		
23	30268	1108	10849	9117	4245	2689	1288	675	208	87
24	110777	10723	24418	17998	23338	20100	8128	4734	986	748
25	173841	2347	21545	19419	41478	16552	28354	22706	10381	10814
26	169461	7387	20109	9672	33549	17978	26522	30245	14271	12447
27	43618	6	6155	1645	11114	6957	7673	7243	2765	60
28	89235	2451	5436	4547	24089	8798	12970	15238	8126	7559
30	794348	486	47464	13276	34005	93896	46601	68174	130492	359455
32	466607	8357	230138	40582	47889	48777	47594	23948	10346	8977
29N	342560	624	80046	13990	69439	49886	39059	19810	36963	34374
29S	68539	134	6244	6390	26258	6633	13404	6547	2927	
Total	2323044	38565	477449	138771	315952	272823	232083	199398	217465	434520

Table 2.7.2.4 Estimated biomass (in tonnes) of sprat October 2000.

SD	total	age 0	age 1	age 2	age 3	age 4	age 5	age 6	age 7	age 8+
21	110	3	41	31	24	11				
22	5690	670	1334	1629	915	985	158			
23	94	6	18	41	17	11	1			
24	22823	1000	9636	2966	5121	2520	1414	241	22	
25	59572	292	15544	1985	22543	2554	7219	6006	1267	2147
26	460721	11408	263647	16268	122284	10329	22415	10730	2088	4025
27	162131	220	20364	856	52464	13233	27687	41329	3442	2537
28	607883	6146	176617	6111	260627	13605	60820	59831	8234	15917
30	52551		1439		5058	3936	3874	36219	476	1547
32	169925	5030	79611	21802	23669	16733	19535	1309	1545	691
29N	255096	2395	62214	4679	43113	12420	19737	101094	1263	8464
29S	80677	296	10358		30488	7879	16681	9660	1758	3556
Total	1877272	27465	640823	56367	566322	84215	179540	266420	20095	38884

Figure 2.1.1. Survey transects and pelagic trawl stations of R/V “Argos”, during October, 2000.

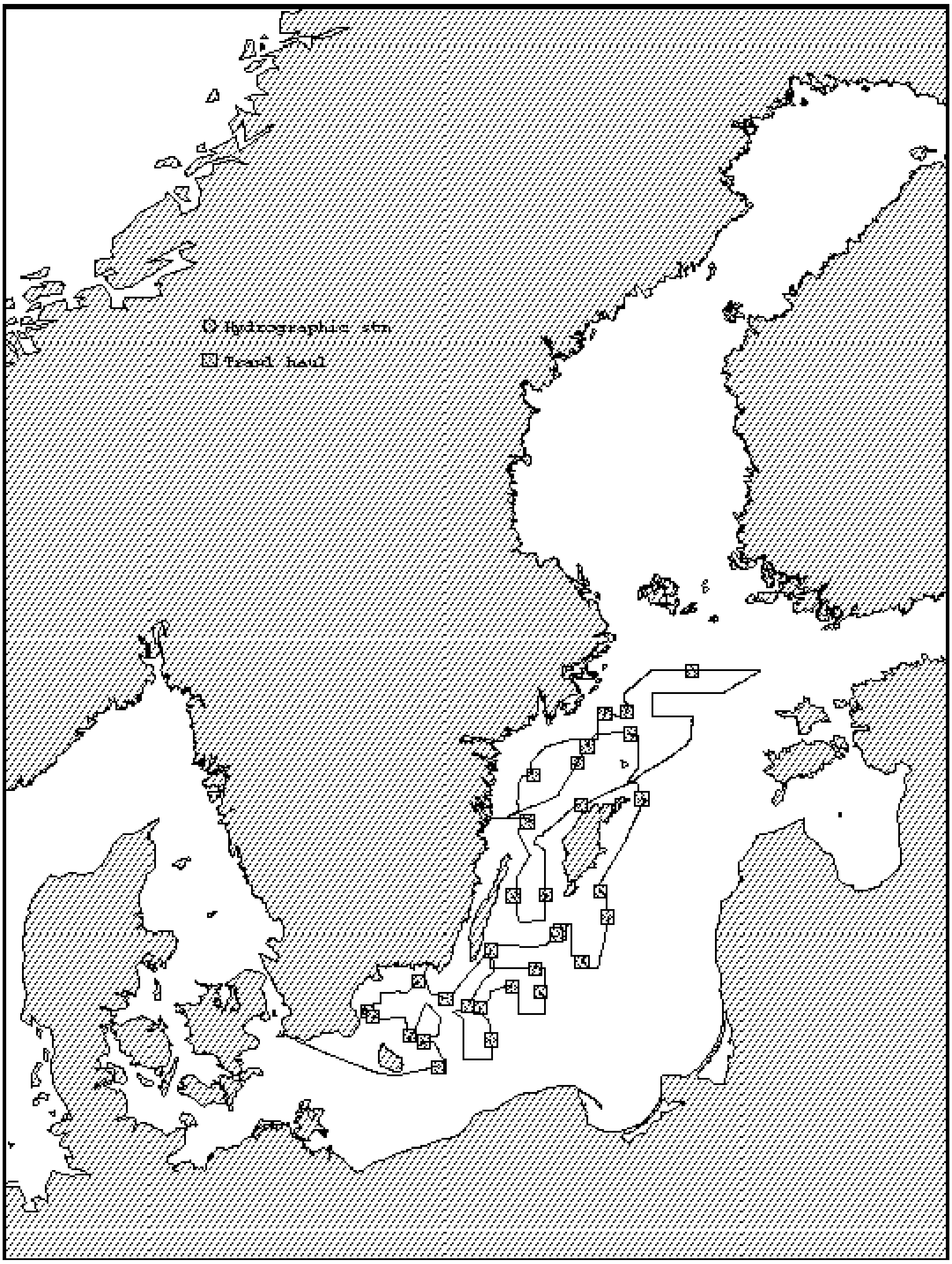


Figure 2.2.1. Cruise track and trawl stations for R/V “ATLANTIDA” (05-25.10.2000 г.).

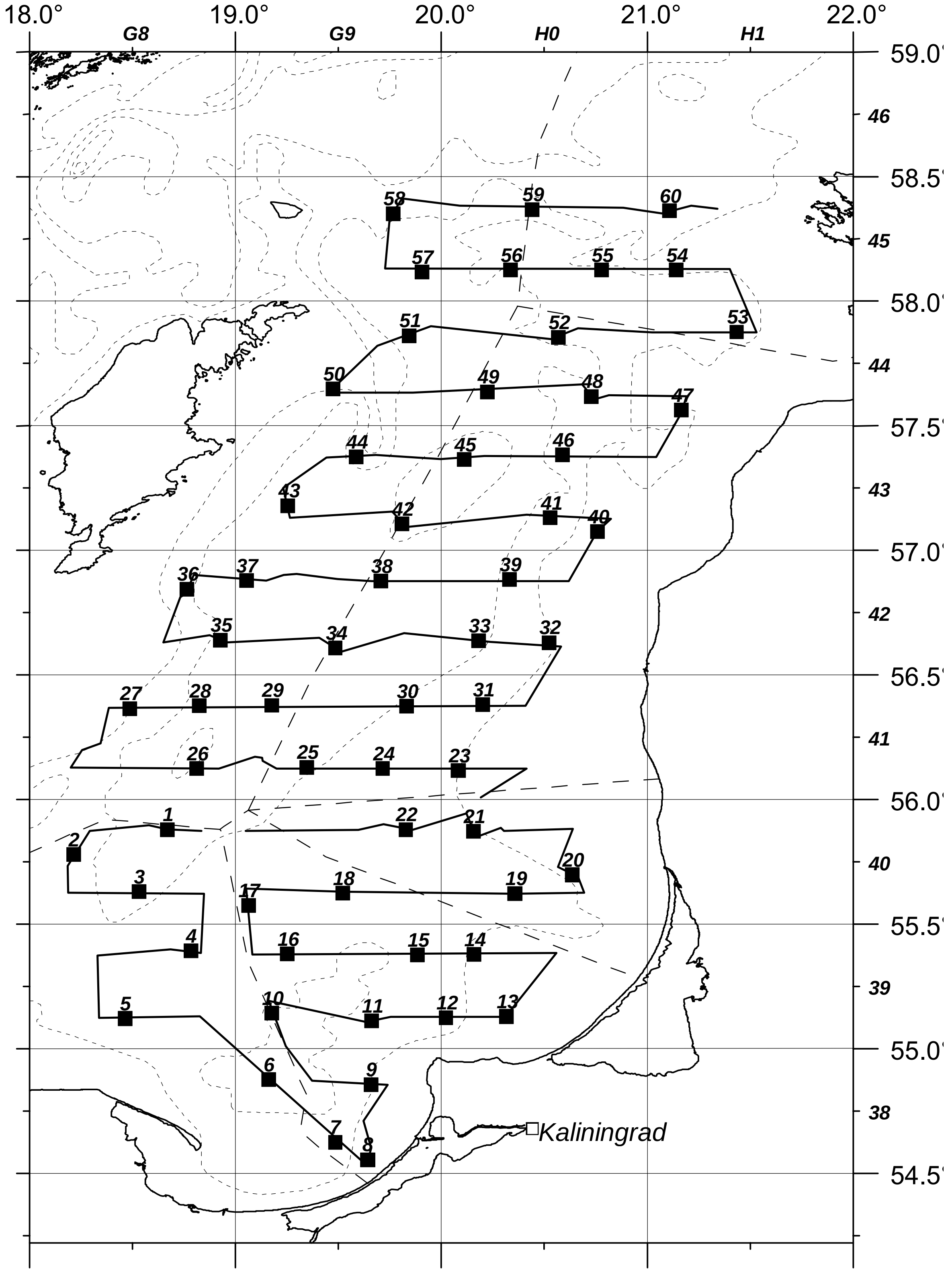


Figure 2.3.1 Cruise track and trawl stations of R/V Baltica (7–25 October 2000).

Figure 2.4.1. Survey transects and pelagic trawl stations of R/V "Julanta" in Gulf of Finland.

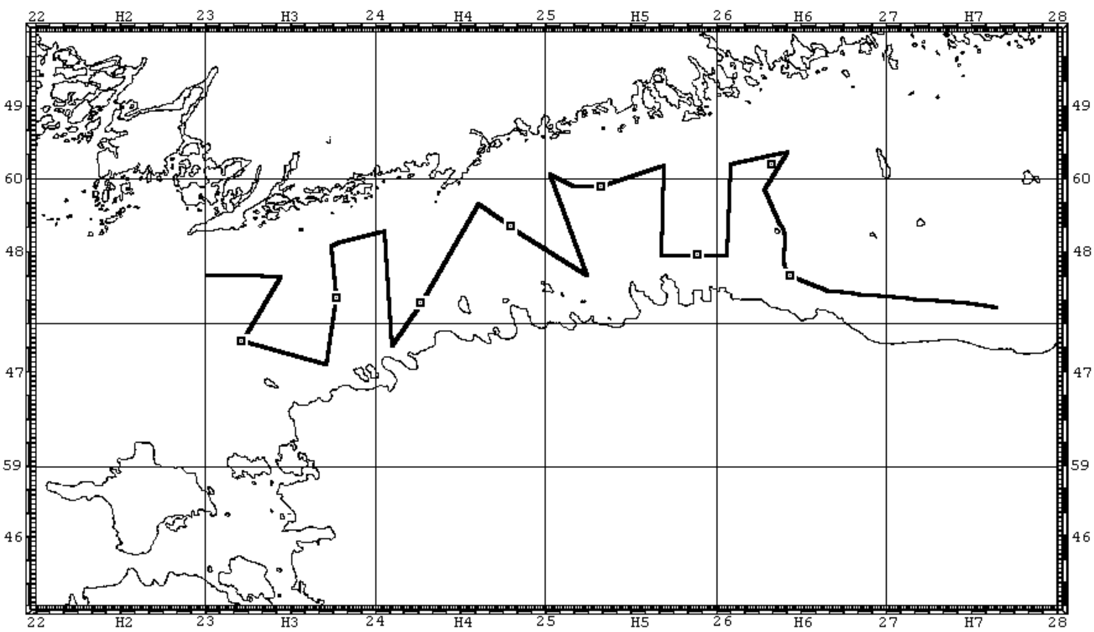
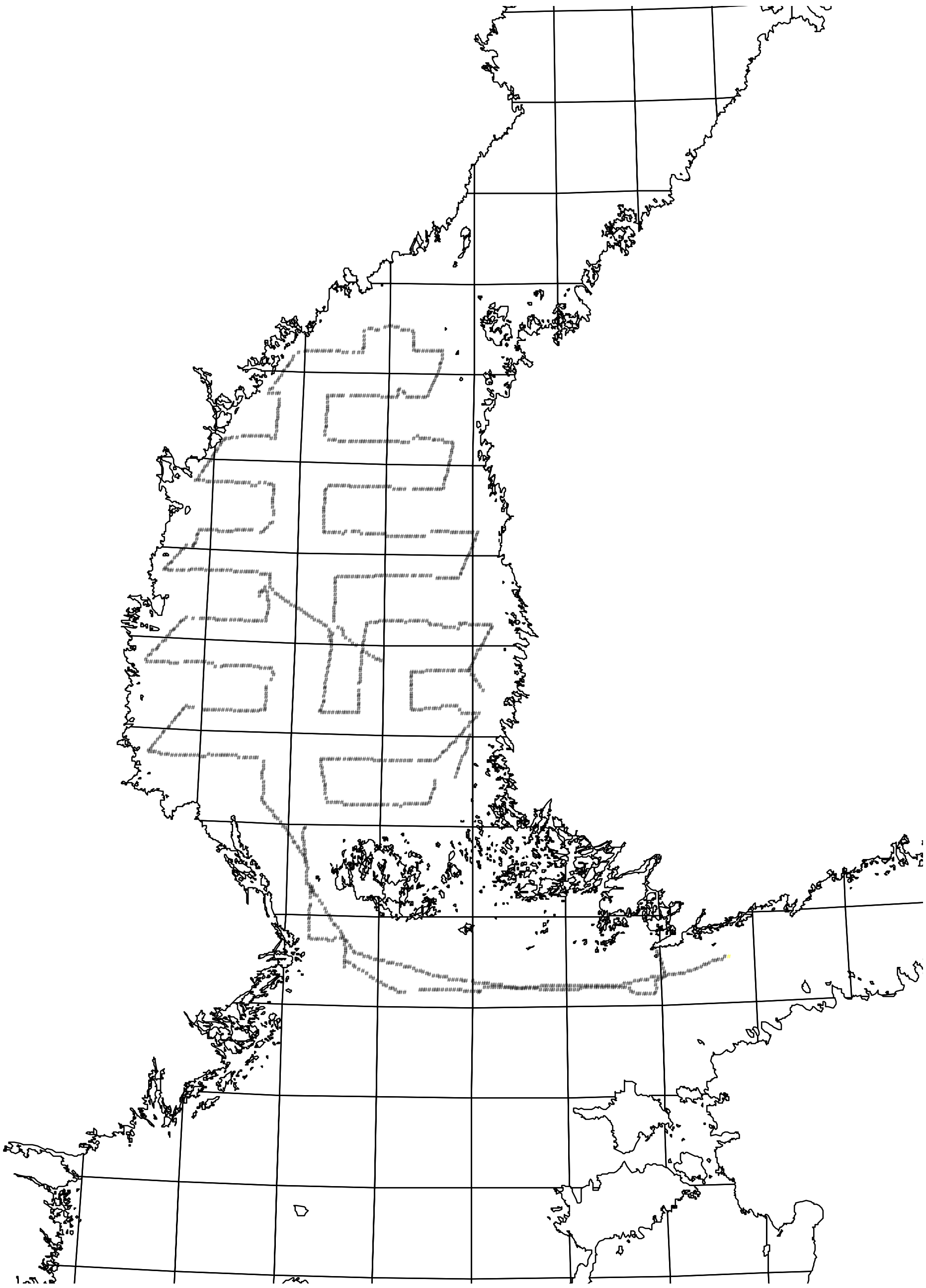


Figure 2.5.1. Survey transects and pelagic trawl stations of R/V "Julanta" in Gulf of Bothnia



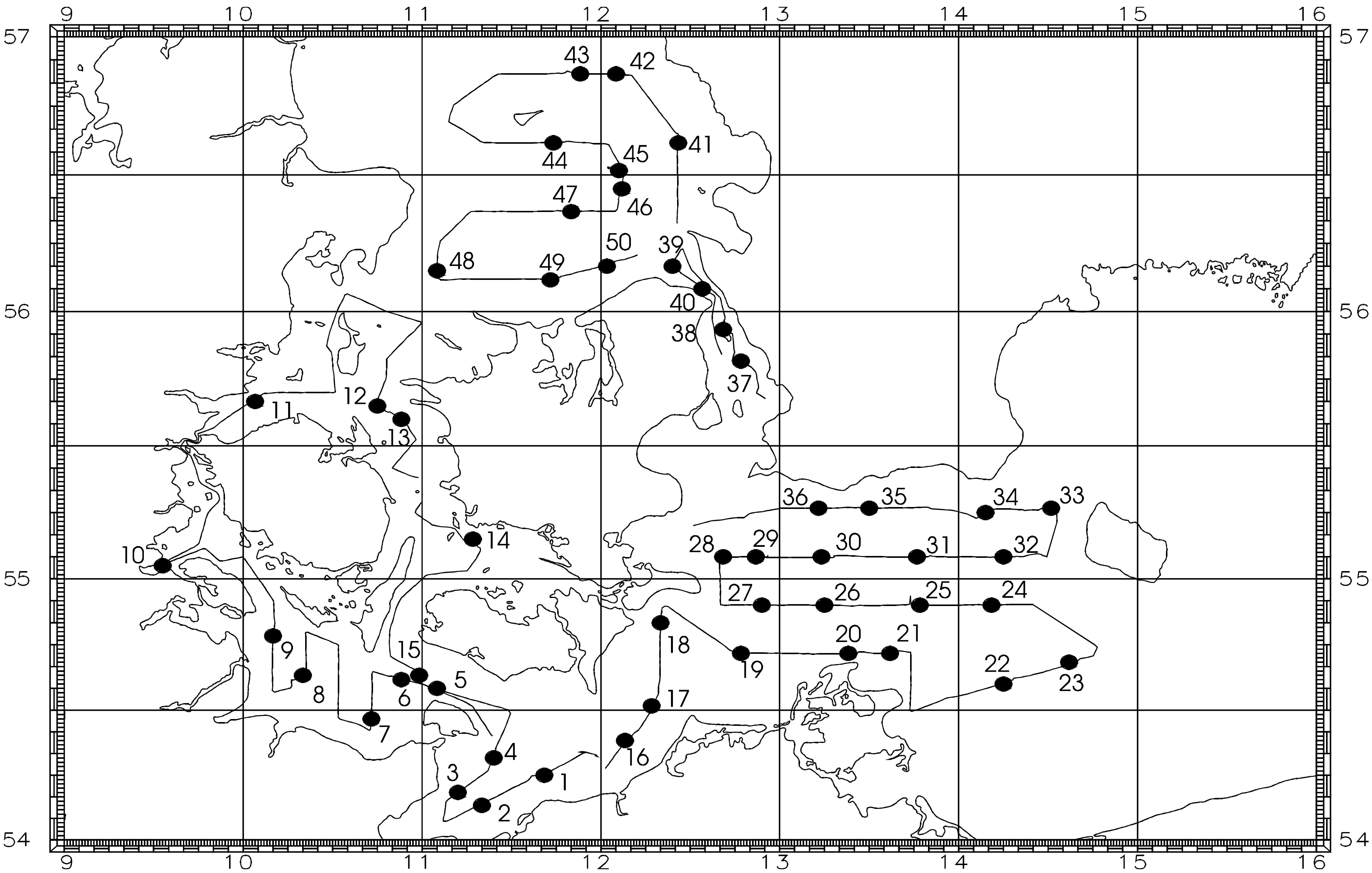


Figure 2.6.3.1. Cruise track and trawl positions of RV ‚SOLEA‘ in October 2000.

3 CORRECTIONS AND UPDATE OF THE HYDROACOUSTIC DATABASE BAD1 FOR THE YEARS 1991–2000

The database BAD1 contains now the revised results of the Baltic acoustic surveys for the years 1991 to 2000. This data set enables a simple and fast access to the abundance and biomass estimates for herring and sprat per age group and ICES statistical rectangle in the Baltic Sea. It must be noted that the rules of the BIAS manual were not followed in all cases. One problem was the use of unofficial areas for the statistical rectangles. To get a consistent data set the respective estimates must be recalculated within the areas depicted in the manual. The revised parts of BAD1 from all participants should be sent to E. Götze until 1 June 2001.

The participation and covering of all ships by Sub-division in the surveys 1991 to 2000 is depicted in Table 3.1. In Table 3.2 all available statistical areas are summarised.

It must be noted that the coverage in some years was different especially in the early nineties. In this case the Working Group proposes to compare for simple analysis only the fish density and not the abundance. For the future work more advanced methods for the treatment of this missing values should be developed.

The database contains also overlapping areas. For the estimation of total sums the arithmetic mean of the overlapping areas should be used.

Table 3.1 Baltic Acoustic Surveys in 1991–2000

Participation and number of statistical squares covered

		Sub-divisions												
YEAR	**SHIP**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**31**	**32**	
1991	**Baltijas Petnieks**					**10**	**11**	**6**	**10**	**7**				**44**
	Solea		**9**	**3**	**7**	**8**								**27**
1992	**Argos**			**2**	**1**	**8**	**4**	**8**	**2**	**5**				**30**
	Monokristal					**2**	**11**		**9**					**22**
	Solea		**10**		**7**									**17**
1993	**Baltijas Petnieks**						**5**		**7**					**12**
	Solea	**6**	**8**	**2**	**8**									**24**
1994	**Argos**					**9**	**1**	**9**	**3**	**6**				**28**
	Baltica					**8**	**8**							**16**
	Monokristal						**8**		**11**					**19**
	Solea	**6**	**10**	**2**	**7**	**2**								**27**
1995	**Baltica**				**1**	**12**	**7**	**5**						**25**
	Monokristal						**10**		**12**					**22**
	Solea	**3**	**10**	**2**	**7**									**22**
1996	**Argos**				**2**	**10**	**2**	**9**	**2**	**5**				**30**
	Atlantniro						**9**		**11**					**20**
	Baltica				**1**	**12**	**7**							**20**
	Solea	**4**	**9**	**2**	**7**	**3**								**25**
1997	**Atlantniro**						**9**		**12**					**21**
	Baltica					**6**	**7**							**13**
	Solea	**4**	**10**	**2**	**7**									**23**
1998	**Argos**				**1**	**9**	**1**	**9**	**5**	**4**				**29**
	Atlantniro						**10**		**9**					**19**
	Baltica				**2**	**8**	**7**							**17**
	Solea	**4**	**8**	**2**	**7**									**21**
1999	**Argos**					**8**	**1**	**8**	**2**	**7**				**26**
	Atlantida						**8**		**12**					**20**
	Baltica				**2**	**8**	**7**							**17**
	Julanta									**6**	**17**	**8**	**9**	**40**
	Solea	**6**	**8**	**2**	**7**									**23**
2000	**Argos**					**8**	**1**	**8**	**3**	**5**				**25**
	Atlantida						**10**		**12**					**22**
	Baltica				**2**	**8**	**7**							**17**
	Julanta									**5**	**26**		**11**	**42**
	Solea	**4**	**10**	**2**	**7**									**23**

Table 3.2 Baltic Acoustic Surveys in 1991–2000

Number of statistical squares covered by Sub-divisions

Sub-divisions

Year	21	22	23	24	25	26	27	28	29	30	31	32	Total
1991		9	3	7	11	11	6	10	7				64
1992		10	2	7	9	11	8	10	5				62
1993	6	8	2	8		5		7					36
1994	6	10	2	7	12	12	9	13	6				77
1995	3	10	2	7	12	13	5	12					64
1996	4	9	2	7	13	12	9	11	5				72
1997	4	10	2	7	6	13		12					54
1998	4	8	2	8	14	13	9	11	4				73
1999	6	8	2	8	13	13	8	12	13	17	8	9	117
2000	4	10	2	8	13	18	8	12	10	26		11	122

4 THE HYDROACOUSTIC DATABASE BAD2: THE STATE OF THE ART

The database BAD2 is planned to contain acoustic results based on nautical mile and the catch results for each fishery station. The contents and the field formats has been discussed over several years. The data should be by now be available on a server at the DIFRES, Hirtshals and be accessed by XML documents.

However, just before the meeting of the Working Group this year, a new revision of the Exchange Format Specification (Rev.VI, September 2000) was distributed by DIFRES, Hirtshals. This new revision still contains some old inconsistencies and even new errors were added. This is totally unacceptable and the those responsible for these activities should correct these immediately.

Recommendations made by the Working Group in 2000 report for the improvement of the Exchange Format Specifications has not been taken into account and they were not fulfilled.

When the present format specification is tested for uploading data into the HERSUR database, the transfer is not working. Up to now it has not been possible to test data transmission because of missing access to the BALTDAT server at DIFRES, Hirtshals.

Thus the Working Group strongly recommends that:

- the Format Specification must be corrected and improved
- the BALTDAT database must be accessible immediately, otherwise no data could be transferred to the database BAD2.

The BALTDAT project is ending March 2001 and the participants must have the possibility to transfer the data before the end of the BALTDAT study.

The new exchange format Version I, Revision VI is given as Annex 3 in this report and the Manual for International Acoustic Database is given in Annex 4.

5 PLANS FOR HYDROACOUSTIC EXPERIMENTS AND SURVEYS IN 2001 AND 2002

In 2001 all Baltic Sea countries (except Lithuania and Finland) intend to take part in acoustic surveys and experiments. The list of participating research vessels and period of investigation are as follow:

Vessel	Country	Area of investigation (ICES Sub-divisions)	Preliminary period of investigation
ARGOS	Sweden	25, 27, 29S	8–26.10. 2001
ATLANTIDA	Russia, Latvia	26, 28	4–30.10. 2001
ATLANTNIRO	Russia	26	15.05–5.06. 2001
BALTICA	Poland	24, 25, 26 (within the Polish EEZ)	1–19.10. 2001
chartered Estonian vessel	Estonia	Gulf of Finland-32	15–25.09. 2001
Walther Herwig III	Germany	25 and parts of SD 26 and 27	26.05–10.06. 2001
SOLEA	Germany, Denmark	21S, 22, 23, 24	01–24.10. 2001
ZANE	Estonia, Latvia	Gulf of Riga	15–23.07. 2001
ZANE	Latvia	28 (within 12 Nm only)	25–30.09. 2001

The preliminary plan for acoustic surveys and experiments in 2002 for majority of institutes will be taken after verification of budget plans, but for example Finland, Latvia, Poland and Russia intend to perform hydroacoustic surveys.

The main results of BIAS should be summarised and reported to the acoustic surveys co-ordinator (F. Arrhenius, Sweden) not later than two months before the Working Group meeting of the next year. These results are intended for the information of the ICES Baltic Fisheries Assessment Working Group.

In October 2001 two experiments will obviously be conducted to analyse Baltic Sea sprat and herring target strengths. Connected to the acoustic assessment of sprat in May 2001, a Russian research vessel will try to catch sprat only and the dependence of TS on length will be analysed. The study will at best produce a TS-length conversion model for sprat suitable for certain sampling conditions (scattered layers in the evening in spring). A different model may be needed for autumn surveys. Although, at the moment no other suggestions for TS experiments are given, an obvious starting point for TS analyses would be to utilise the existing acoustic and biological material (possibly considering the selectivity of the fishing gear) to find out the performance and discrepancies of the present approach of a fixed target strength equation. The methodology of target strength measurements has recently been summarised in ICES Co-operative Research Report edited by E. Ona (1999; ICES Cooperative Research Report No. 235). In the analyses of the historical material, for example the maximum resolution densities (Ona and Barange 1999) should be considered to select isolated targets for the analyses.

The Study Group on Target Strength Estimation in the Baltic Sea has been established. First meeting will take place in Seattle - USA, between 21 to 22 April, 2001. The main tasks are as follows:

- prepare and disseminate as soon as possible a protocol for TS measurements on the Baltic herring, based upon the state of the art and especially the recommendations of the CRR on TS measurements, adapting these recommendations to the special case of the Baltic Sea;
- establish a list of the main factors affecting the herring TS and study the effects through comparative analysis and measurements on various herring stocks (e.g. Baltic and Norwegian spring spawning herring);
- collate the existing information and measurements on herring TS;
- apply modelling methods on the case of the herring and compare their results to the existing information;
- measure the variability of TS in situ under various conditions (day-night, winter-summer, etc.) using databases available from the Baltic Fisheries Assessment Working Group members;
- encourage experimental measurements through conventional and non-conventional methods.

6 MANUALS FOR BALTIC INTERNATIONAL DEMERSAL TRAWL SURVEY (BITS) AND ACOUSTIC SURVEY (BIAS)

6.1 Updates of the Baltic International Travel Survey (BITS) Manual

According to last year’s Working Group Report (ICES CM 2000/H:2 Ref.:D), unknown depth should be recorded as space and not 0. However, for some unknown reason this change has not been included in the Manual. In addition, a code C for calibration hauls has been added to the haul validity code in the HH record.

The exchange format is now implemented in the BITS database and therefore no major changes are expected to take place in the format in the future. When the ISDBITS project has concluded their work, the Manual will be updated with gear specifications for the TV3 trawl and haul allocations for each country in the surveys.

The Manual for Baltic International Trawl Surveys (BITS) is given as Annex 1 in this report.

6.2 Update of the Baltic International Acoustic Survey (BIAS) Manual

6.2.1 Modifications made during the meeting

No modifications were made during the meeting. The Manual for Baltic International Acoustic Survey is given as Annex 2 in this report.

6.2.2 Problems to be solved between meetings and to agree in the next meeting

The following problems are still to be solved:

Section 2: Survey design

Basic aspects/requirements of survey design

The objective of acoustic surveys is to get an unbiased estimates of herring and sprat abundance in the area sampled. In order to achieve this, a clearly defined sampling strategy is necessary. Each specimen should have the same probability to be sampled. For any future sampling design for acoustic surveys it is a prerequisite to define optimal sample sizes (number and length of transects), measures of abundance (estimation method) and errors (variance, and bias in the data collections). Aspects of randomisation, sequential sampling and quality assurance and control should be also taken into account.

Section 4: Fishery

Gear

A significant problem within acoustic surveys is the ability to obtain representative trawl samples to be associated with allocated acoustic information. The problem is related to this specific selectivity of the applied trawl gear which may bias (1) the species composition and (2) the length distribution of target species and (3) the age distribution.

Length distribution, weight distribution, age distribution

Sample sizes for a representative length distribution per trawl haul have to be evaluated. Sample sizes for a representative weight/age distribution per rectangle/sub-division have also to be evaluated.

Section 5: Data analysis

Species composition and length distribution

Currently an unweighted mean is used for estimating the species composition and the length distribution. In cases where catches are not representative it might be more appropriate to give those catches a minor weight. In order to clarify whether equally or unequally weighted means should be used, it seems necessary to define the representativeness and how to derive plausible calculation methods and weighting criteria from this definition.

Target strength of an individual fish

Target Strength is the keystone of fisheries acoustics and needs further work for the clupeoids stocks in the Baltic Sea. The Study Group on Target Strength Estimation in the Baltic Sea, which will have a meeting in Seattle – USA, between 21 and 22 April 2001 (see Section 5) was established this purpose.

Lack of sample hauls

The interpolation method must be evaluated.

7 RESULTS FROM THE INTER-CALIBRATION EXPERIMENTS BETWEEN THE TRADITIONAL AND NEW BITS SURVEY TRAWLS

7.1 Purpose of the National Inter-calibrations

The aim is to obtain direct, national inter-calibration between the existing gears and the new standardised gears in full scale for each of the relevant research vessels in relation to the current research vessel standard surveys in 1st and 4th quarter of the year. Furthermore, to inter-calibrate two different sizes of the new TV3-trawl on board one of the medium sized research vessels. Finally, to test different types of gear rigging for the large TV3 trawl for soft and hard bottom localities, respectively. Task description:

1. In between gear inter-calibration on a national basis:
    - 1.1. Field tests and national inter-calibration between the currently used national trawls and the new standardized large, full-scale TV3-trawls in relation to the current standard surveys.
    - 1.2. Field tests and inter-calibration of large and small, full scale TV3 trawls, respectively.
    - 1.3. Field tests and inter-calibration of different types of gear rigging (light and intermediate ground-gear construction) for soft and hard (rocky) bottom, respectively, for large, full scale trawls.

1.4. Analysis of the field test inter-calibrations to link new and old data time series on national level, presentation of results and preliminary reporting.

Consequently, the units of the new trawls and the new standard can be linked to existing national survey data time series, and can be used together with the historical survey data time series from the current BITS in the Baltic Sea when using the data for resource assessment purposes. Inter-calibration is necessary in order to assure that the existing national time series can be directly used as historical research data with the new trawl design and that the surveys and time series can be continued based on an international standard.

7.2 Gear Inter-calibration on National Level

Under the ISDBITS project field tests and between gear inter-calibrations on a national level between the currently used trawl gears and the new standardized full scale TV3-trawls gears in relation to the current BITS surveys have been carried out in 1st and 4th quarter of the year in both 1999 and 2000. In general, the field tests of the trawls have followed the recommended requirements and design given in ICES 3rd and 2nd (and 1st) Workshop on Standard Trawls for Baltic International Fish Surveys (Anon., 1999a; 1998a; 1998e; 1997a) as well as followed the recommendations given in Anon. (1999b) and the Working Group Report from year 2000 (ICES 2000).

The design of making the inter-calibrations based on repeated parallel (overlapping) hauls at the same locality as well as the selection of optimal localities for this were described in “Report of the Baltic International Fish Survey Working Group” April 2000 (ICES CM 2000/H:2, Ref.:D). These principles have been followed in the 1999 and 2000 inter-calibrations.

In Tables 7.1 and 7.2 an overview of the performed inter-calibration activities in 1999 and 2000 is given including information of country, research vessel, national trawl gear, type of TV3-trawl, area as ICES Sub-Division, time (month), number of inter-calibration days (per survey / month), number of inter-calibration hauls, number of stations as well as comments on the type of inter-calibration performed.

7.3 Overview of Standard BITS Survey Activities in 1999 and 2000 Performed in Addition to Inter-calibration Survey Activities

Tables 7.3 and 7.4 summarises the national standard BITS survey activities performed in addition to the inter-calibration experiments during the spring and autumn 1999 and 2000 surveys.

7.4 Analysis of Inter-Calibration Data (paired hauls) and Estimation of Conversion Factors Between the New and the Traditional National Trawls

Under the ISDBITS project there was established a database for the analysis of the inter-calibration data (CPUE by length group by trawl for the paired hauls) and for the estimation of conversion factors between the new standard trawl and the traditionally used national trawls. This database contains all inter-calibration data for all nations with respect to these trawls as well as inter-calibration data between the small and the large TV3-trawls and the inter-calibration data between the standard ground gear and the rock-hopper ground gear for the large TV3-trawl.

Several methods have been discussed and applied for these analyses and estimation of conversion factors. During the Working Group meeting in 2001 2-3 selected methods of analysis and estimation of conversion factors were presented and discussed.

In Annex 5 a full detailed background information and analysis output from these preliminary analyses is given.

Final analyses and estimated conversion factors using different methods will be presented in the final report of the ISDBITS project in March 2001 and made available for the ICES WGBAS before its meeting in April 2001.

Table 7.1 Overview tables of the inter-calibration activities in 1999

Table 7.1.1 Overview of the inter-calibration activities between the national gears and the TV3-versions

Country	Denmark		Germany	Latvia		Poland		Russia	Sweden	
Vessel	Dana	Dana	Solea	Grifs	Hoglande	Baltica	Baltica	Atlantida	Argos	Argos
National gear	Granton	Granton	HG 20/25	LBT	LBT	P 20/25	P 20/25	Hake 4M	GOV / FOTOE	GOV / FOTOE
TV3 gear, version	930	930	520	520	520	930	930	930	930	930
Area (ICES SD)	25	24 / 25	24	28	28	25 / 26	25 / 26	26	24-28	24-28
Time (Month)	March	November	November	March / April	November	Feb. / March	November	March	March	November
Number of days	4	10	3	5	1	8	5	8	8	3
Number of hauls	16	28	22	16	8	16	16	20	26	6
Number of stations	8	14	11	8	4	8	8	10	12	3
Comments	Paired hauls	Paired hauls	Paired hauls	Paired hauls	Paired hauls	Paired hauls	Paired hauls	Paired hauls	Paired hauls	Paired hauls

Table 7.1.2. Overview of the inter-calibration activities between the large, full scale TV3/930 trawl and the TV3/930-Rockhopper version

Country	Denmark
Vessel	Dana
TV3 gear, version	930/930-RH
Area (ICES SD)	24
Time (Month)	November
Number of days	3
Number of hauls	14
Number of stations	7
Comments	Paired hauls

RH=Rockhopper ground gear

Tables 7.2 Overview of the inter-calibration activities in 2000

Table 7.2.1 Overview of the inter-calibration activities between the national gears and the TV3-trawl versions

Country	Denmark		Germany		Estonia	Poland	Russia	Latvia		Sweden	
Vessel	Dana	Dana	Solea	Solea	Kootsaare [1]	Baltica	Atlantniro	Hoglande	Grifs	Argos	Argos
National gear	Granton	Granton	HG 20/25	HG 20/25	27. 8	P 20/25	Hake 4M	LBT	LBT	GOV / FOTOE	GOV
TV3 gear, version	930	930	520	520	520	930	930	520	520	930	930
Area (ICES SD)	24 / 25	24 / 25 / 26	24/25	24	28 / 29	25 / 26	26	26/28	28	24-28	24-28
Time (Month)	March	November	Feb./March	November	November	Feb/March	Feb./March	March	November	March	November
Number of days	6	4	5	6	9	8	7	6	8	7	5
Number of hauls	38	18	14	28	13	22	30	26	24	12	22
Number of stations	19	9	7	14	13	11	15	13	12	6	11
Comments	Paired hauls	Paired hauls	Paired hauls	Paired hauls	Paired hauls	Paired hauls	Paired hauls	Paired hauls	Paired hauls	Paired hauls	Paired hauls

[1] national gear damaged

Table 7.2.2 Overview of the inter-calibration activities between the small and large, full scale TV3-trawl versions

Country	Germany	
Vessel	Solea	Solea
TV3 gear, version	520 / 930	520 / 930
Area (ICES SD)	22	24
Time (Month)	March	November
Number of days	3	3
Number of hauls	20	16
Number of stations	10	8
Comments	Paired hauls	Paired hauls

Table 7.2.3 Overview of the inter-calibration activities between the large, full scale TV3/930 trawl and the TV3/930-Rockhopper version

Country	Denmark
Vessel	Dana
TV3 gear, version	930/930-RH
Area (ICES SD)	24/25/26
Time (Month)	November
Number of days	2
Number of hauls	6
Number of stations	3
Comments	Paired hauls

Table 7.3 Overview of the relevant BITS survey activities in 1999 performed in addition to the inter-calibration activities

Country	Denmark				Germany		Latvia		Poland	Russia	Sweden	
Vessel	Dana	Dana	Havfisken	Havfisken	Solea	Solea	Grifs	Hoglande	Baltica	Atlantida	Argos	Argos
National gear	Granton	Granton	TV3/520	TV3/520	HG 20/25	HG 20/25	LBT	LBT	P 20/25	Hake 4M	GOV / FOTOE	GOV / FOTOE
Area (ICES SD)	24 / 25 / 26 / 28	25	21/22/23	21/22/23	24 / 25	22 / 24	26 / 28	26 / 28	25 / 26	26	24-28	24-28
Time (Month)	Feb. / March	November	Feb./March	Oct./Nov.	February	November	March / April	November	Febr. / March	March	March	November
Number of days	16	6	19	19	17	14	6	5	17	16	12	9
Number of stations	58	22	48	35	63	51	22	20	61	41	48	33
Comments												

Table 7.4 Overview of the relevant BITS survey activities in 2000 performed in addition to the inter-calibration activities

Countries	Denmark				Germany		Latvia		Poland	Russia	Sweden	
Vessel	Dana	Dana[1]	Havfisken	Havfisken	Solea	Solea	Hoglande	Grifs	Baltica	Atlantniro	Argos	Argos
National gear	Granton	TV3/TV3-RH	TV3/520	TV3/520	HG 20/25	HG 20/25	LBT	LBT	P 20/25	Hake 4M	GOV / FOTOE	GOV / FOTOE
Areas (ICES SD)	24 / 25 / 26 / 28	24 / 25 / 26 / 28	21/22/23	21/22/23	24 / 25	22 / 24	26 / 28	26 / 28	24/25 / 26	26	24-28	24-28
Time (Month)	March	November	Feb./March	November	Feb./March	November	March	November	Feb. / March	February	March	November
Number of days	20	13	23	25	11	11	6	6	13	10	17	10
Number of stations	75	25	47	41	52	46	29	30	70	39	61	37
Comments												

8 DEMERSAL TRAWL SURVEY DESIGN STRATEGIES IN THE FUTURE

The Working Group suggests a strategy for allocation of trawl hauls by Sub-division and depth strata for the spring and autumn surveys for 2001. This allocation scheme should be running up-dated according to the principles described below. Until now the national bottom trawl surveys are carried out using different haul allocations schemes, e.g., as transects, fixed stations and randomly selected stations, the latter being based either on ICES rectangles and/or by depth strata.

A major aim of the ISDBITS EU-Study project is to reach an international agreement on a new common survey design and haul stratification for future international demersal fish surveys in the Baltic Sea. Such standardisation includes using new standard trawls and formulating the results into a manual for conducting international demersal fish surveys. This formulation contain the evaluation of the results form the performed trawl inter-calibrations, statistical evaluation of historical BITS survey data as well as evaluation of clear tow information. This evaluation and agreement of a new international survey design and haul stratification for the international BITS surveys include implementation of the new international design and operation details of the trawls (see Section 6.1 of this report). These analyses assure that the inter-calibration results obtained will be implemented in the new joint international BITS survey design on a long term basis which is similar and in line to the IBTS surveys in the North Sea. The suggestions on changes in the survey design is worked out in co-operation with the Working Group with the purpose of include a new standard survey design in the ICES BITS Manual. That is to agree on an optimum common BITS survey design and haul stratification for the joint international BITS survey using the new standard trawls.

As a consequence of the terms of reference and the progress of the ISDBITS EU-Study-Project to standardise the BITS survey design with respect to introducing a standard trawl gear as well as standardisation of survey stratification and sampling allocation the Working Group (February 2001 meeting) has discussed and decided on principles of the survey design strategies for the BITS survey.

Future BITS survey stratification and sampling allocation: Based on the discussions the working group suggest a stratified random survey strategy to be applied to the future BITS survey with a haul allocation based on ICES Sub-division and depth strata where partly the relative area sizes of these strata as well as indices of biological aggregation patterns of commercially important demersal fish species (cod as main target species) are taken into consideration. The survey stratification and haul allocation shall be flexible in order to meet potential changes in distribution patterns of the target stocks.

The selected total number of hauls reflects the recommended number of hauls to be applied in the Baltic Sea for probably obtaining low variance in the abundance and recruitment estimates (in the analyses of historical BITS data no interaction effects were found between year and depth).

8.1 Survey Stratification Schemes

Timing of the BITS survey (survey stratification according to season of year):

The new gear was introduced in 1999 for inter-calibration purposes and will be used as standard survey gear from 2001. At present several countries conduct biannual surveys in spring and autumn in accordance with the recommendation of ICES in "Report of the Baltic International Fisheries Survey Working Group (ICES CM 1996/J:1).

The Working Group in Tallinn in 1999 (ICES CM/H:1) discussed further the appropriate survey timing and recommend that:

- The spring survey shall be executed in the period 15th February to 25th March
- The autumn survey activities are to be carried out in the period 1St November to 30th November.

This survey timing has been implemented in the BITS survey from 1999 and onwards and was approved by the Working Group at the 2000 meeting in the ICES Headquarters, Copenhagen.

The above survey periods are targeting the demersal Baltic fish species. In November the Baltic herring stocks usually have migrated to the near coastal (shallow water) areas as well as to the archipelagos. These areas are difficult to cover by trawl partly because of the narrow depth ranges and also due to frequent occurrence of non-trawlable bottom conditions in these areas. February to March is also a problematic period in relation to potential coverage of Baltic herring resources as this period is a herring spawning migration period for the herring in the southern Baltic Sea.

Survey area covered, area of occurrence and BITS geographical survey stratification:

The BITS Survey should primarily be designed to target the important demersal fish resources in the Baltic Sea. That is in general cod and flatfish. For the eastern Baltic Sea (ICES SD 25–32) the main demersal fish resources are cod and flounder. For the western Baltic Sea (SD 22–24) the main demersal fish resources are cod, flounder, plaice, turbot and dab.

Historic records show occurrence of a substantial cod fisheries as far north as the Bothnian Sea (Sub-division 30). At present, however, the cod stock north of Sub-divisions 27 and 28 is considered to be insignificant. Each country are presently operating in the area south of 58° 00' N and it is recommended that the "new" survey should cover the area up till 58° 30'N (northern border of ICES SD 28) in both autumn and spring in order to cover the Baltic cod resources.

The option to alter the area surveyed should however be available if the distribution pattern of the cod stocks changes. In historical times in this century the occurrence of cod in more northern areas has been associated with big cod year classes that distribute by drift as larvae to the northern areas. Strong year classes will accordingly be recognised as 1 group in the BITS survey in the spring in the standard survey area, and also higher densities than usual will probably be detected in ICES SD 27–28. If an unusual large year class of cod is found and substantial higher catch rates in the standard survey area are detected a wider distribution area of 1-group cod is to be expected and the area surveyed should preferably be extended to the more northern ICES Sub-divisions 29–32 in the following autumn season in order to obtain an full area coverage of the 1-group cod distribution.

It is furthermore suggested that the survey area comprise ICES SD 29 and 32 during the autumn survey in order to cover the northern flounder resources. A preliminary suggestion to this will be to allocate 20 hauls in total to these ICES Sub-divisions. Substantial changes in flatfish distribution in the northern part of the eastern Baltic Sea have not been detected in recent historical time series.

In relation to survey coverage and potential occurrence of unusual strong cod year classes attention should be made to possible changes in general hydrographical conditions in the Baltic Sea area that could indicate presence of major inflow events of Atlantic water to the Baltic Sea. Such strong inflow events have the potential of producing strong cod year classes with a time lag of 0.5 to 2 years depending on the timing of the inflow.

The ICES Sub-divisions should be used as first step of the stratification of the Baltic Sea. In conclusion it is suggested that 6 major geographical BITS survey strata are used in stratification of the BITS survey both in the autumn and spring survey:

The eastern and western Baltic Sea and Kattegat is subdivided into individual ICES Sub-divisions on which the geographical stratification is based. Table 8.1 present s the different areas.

The Working Group discussed the various methods available for allocation of trawl stations.

- Estimation of the CPUE for all ICES Sub-divisions.
- Stratification of the ICES Sub-divisions using depth layers. The number of trawl stations should be chosen dependent on the mean variability of the CPUE values.
- Stratification of the ICES Sub-divisions using rectangles.

After several discussions and different analyses during the Working Group and ISDBITS meetings in Lysekil 1999, Copenhagen 2000, Wladislawowo 2000 and Pärnu 2000 it was agreed that depth layers should be used for the stratification of the hauls within ICES Sub-divisions. Table 8.2 shows the depth layer agreed during the ISDBITS meetings in Wladislawowo 2000 and Pärnu 2000.

During the meeting in Pärnu 2000 it was agreed that the ICES SD 21 and SD 23 should be handled as separated units of the stratification. In SD 21 25 stations are considered as minimum and at least 6 stations should be carried out in SD 23. Since the Sub-divisions 29 and 32 should be covered only if special distribution patterns of cod and flounder are observed or are predicted it was agreed that in this case in both Sub-divisions 10 stations should be carried out.

For the ICES Sub-divisions SD 22, 24, 25, 26, 27 and 28 together approximately 325 stations are planned for each of both survey periods. However, in the autumn 2001 it will not be possible to allocate more than approximately 200 stations in these areas.

Depth strata information available to be used in the BITS survey stratification:

At the Workshop in Rostock, January 1999 (ICES CM 1999/H:7), there was established two data sets giving estimates of the depth layers in the Baltic Sea. The international trawl survey is expected carried out in the form of a stratified random survey. As stratification criteria the squares of the ICES Sub-divisions or the depth layers are possible. In both cases the areas of the strata are necessary. Since different estimates exist for the different areas it was necessary to recommend which values should be used in the trawl surveys.

The following depth information data were available:

1) Swedish data using planimeter measurements covering the statistical rectangles of the ICES Sub-divisions 23–29, 32. The depth information is aggregated by useable for 10 m depth layers.
2) Danish data using planimeter cover parts of ICES Sub-divisions 21 and 23. These data were compiled for special investigations and do not cover the whole Sub-divisions.
3) Polish data using planimeter measurements covering parts of ICES Sub-divisions 25 and 26. These data are used for special investigations and do not cover the whole Sub-divisions.
4) . German data using vessel depth-measurements and map information which are compiled using mathematical models (Seifert *et al.* 1995) This information cover ICES Sub-divisions 21–29. The smallest resolutions of the data are 1^{o} of longitude and 0.5^{o} of latitude for the Belts and the Arkona Sea and 2^{o} of longitude and 1^{o} of latitude for all other areas. These data were made available by Dr. Hinrichsen, Institut für Meereskunde, Kiel. The depth information was provided by 5 m depth layers and quarters of statistical rectangles.

Since data from Denmark and Poland do not cover whole ICES Sub-divisions only the data from Sweden (S) and Germany (D) were considered appropriate for the present task.

A comparison between the German and Swedish data showed small differences in areas. This is to be anticipated due to the difference in approaches and maps used. The magnitudes of differences are illustrated in Table 1 of the workshop report, which summarise the areas in nm^2 for ICES Sub-divisions 24–28. The comparison is also shown in Figure 1 of the workshop report where the proportions of the depth layers are shown. ICES Sub-divisions 23 and 29 are excluded because the coverage of these areas is different between Sweden and Germany.

Table 2 in the workshop report compares the data for ICES Sub-division 24 on a square-by-square basis. These estimates are comparable. This appears clearly when the proportions of the different depth layers are compared.

The Rostock workshop was unable to evaluate which of the two data sets give the most reliable estimate of the depth layer information. For several reasons the workshop recommended that the German depth information to be used at this stage. The German approach is well documented and is based on computerised information. This implies that depth information may be manipulated easily, which allow a flexible construction of dept-strata - the depth resolution is 1m and may be defined freely by the user. The German depth information may also easily be updated by including new depth data.

However, for ICES Sub-division 32 and for some squares of ICES Sub-division 29 only Swedish data are available. The Workshop recommended that the Swedish data are used for these areas.

Appendix 1 of the Workshop Report provides the areas of the depth layers per ICES squares aggregated on 10 m depth layers. Additional information on a finer aggregation scale (areas per 5 m depth layers per quarters of the ICES squares) were delivered to the Workshop participants in the form of an EXCEL file. The Danish Institute for Fisheries Research and the Institute of Baltic Research Warnemünde are available for inquiries relating to the depth information.

The international trawl surveys are to be carried out in the form of a stratified random survey. As stratification criteria the squares of the ICES Sub-divisions or the depth layers are possible. In both cases it is necessary to know the area of the strata. Since different estimates exist for the different areas a comparison of areas of the different depth strata within all relevant ICES rectangles were carried out in Rostock, 11–14 January 1999 (Workshop on Baltic Trawl Experiments, ICES CM 1999/H:7). The Working Group meeting in Tallinn, August 1999, (ICES CM 1999/H:1) agreed that these data should be used for the international bottom trawl surveys.

Overall survey stratification

Allocation of hauls between ICES Sub-divisions:

It is necessary to guarantee good coverage of all ICES Sub-divisions that are included in the surveys. The results of the surveys are important VPA independent inputs for the stock assessments. However, the distribution patterns of cod and flounder are influenced by the development of the stock sizes and the hydrographical conditions during the surveys.

Table 8.3 presents the mean catch in tons for both Baltic cod stocks for different periods. Figure 8.1 illustrates the development of the yearly catch in tons in the western and eastern Baltic Sea. The table and the figure illustrate that the catch in the western Baltic Sea is relative constant in the total period. In contrast to this the catch in the eastern Baltic Sea varied considerably. Between 1977 and 1980 the catch increased from about 150 kiloton to more than 300 kiloton. After 1984 the catch in the eastern Baltic Sea decreased again until the current low level. These different developments illustrate the changes in the importance of both areas for the cod fishery and also the stock development. The data show also that strong variations occur within relative short time periods.

This result support that it is important to guarantee a good coverage of the total area independent of the actual stock situation.

Besides the different sizes of both cod stocks the actual hydrographical conditions influence the distribution patterns of the cod. However, the relationship between the hydrographical parameters and the distribution patterns cannot be described with the necessary accuracy up to now and the hydrographical conditions during the surveys cannot be predicted.

Based on this statement it is proposed / agreed that an important part of the number of stations planned should be distributed partly based on the size of the areas of the ICES Sub-divisions using the total depth layer from 0/10 to 100 m.

Furthermore, the dramatic changes of the eastern Baltic cod stock in the later years suggest that the hauls should also be distributed based on the distribution and density patterns of the cod stocks.

For the estimation of the distribution and density patterns of the cod stocks a running mean of CPUE for some years should be used. For the proposed haul allocation the following data were used.

The areas in nm² of the depth layer from 0 m to 100 m and from 10 m to 100 m for the ICES Sub-division based on the data of the BITS Manual. The used data are presented in Table 8.4. Additionally, the relative areas of the Sub-divisions compared to the total area under investigation are given.

The BITS database is used for estimating stock indices of cod for age groups in the different ICES Sub-divisions. Included are the catches in areas with bottom depths between 10 m and 100 m within the period from January to May. As described by Sparholt & Tomkiewics (2000) the CPUE-values of the stations were multiplied by the fishing power of the research vessels for estimation of the eastern Baltic cod stock. Then the mean CPUE-values were estimated for the used depth strata. Using the area in nm² of the depth strata a stratified mean was estimated and multiplied by the total area of the ICES Sub-division.

For estimating the number of hauls within the different ICES Sub-divisions the indices of age group 1+ were used to assess the mean index for the period from 1990 to 1999. The mean indices and the relative distribution of the stock are given in Table 8.5.

The allocation of the approximately 325 hauls with respect to ICES Sub-division is presented for different versions (see below).

The parameter P(1) describes the portion of the allocation which is based on the size of the areas of the ICES Sub-divisions. The parameter P(2) describes the portion of the allocation which is based on the distribution and density patterns of the cod stocks. It is evident that P(2) = 1 – P(1). The values of P(1) vary from 1 (Table 8.6) over 0.8 (Table 8.7) stepwise until P(1) = 0.6 (Table 8.9).

The tables include the following information for the different Sub-divisions:

- the number of stations dependent on the areas of the Sub-divisions (Area)
- the number of stations dependent on the distribution and density patterns of the cod stocks within the Sub-divisions (Stock)
- the total number of hauls allocated to the Sub-divisions

It is suggested that with increasing value of P(2) the number of years for the running mean should be decrease.

Since the strategy of P(1)=0.6 reflect more the stock development it was agreed that this version should be used where the 5 year period from 1995 to 1999 for the calculation of the mean stock size is used. This version was proposed since during the last 10 years the distribution patterns of both Baltic cod stocks changed and since a shorter period is more suitable for reflecting the possible influence of a new strong year class.

Table 8.10 presents mean indices and the relative distribution of the stock using the period from 1995 to 1999. Based on these estimates the results in Tables 8.11 to 8.13 were calculated. Table 8.11 presents the data for P(1)=0.8. Table 8.13 presents the data for P(1)=0.6.

The comparison of the two versions shows that the changes are relatively small. The maximum difference between the versions with the same values of P(1) is 5. By using the version of 5 years mean only a maximum of 5 stations are moved from ICES Sub-division 25 to ICES Sub-division 24.

Allocation of hauls by depth layers within the ICES Sub-divisions:

The haul allocation by depth within the ICES Sub-divisions was discussed during different Working Group and ISDBITS meetings (Lysekil 1999, Copenhagen 2000, Wladislawowo 2000). Different options have been discussed. During the meeting in Wladislawowo 2000 the allocation of the stations by depth were estimated by GLM analyses of the BITS database using the mean CPUE values for depth strata in combination with the estimates of the fishing power of the different research vessels (Sparholt & Tomkiewicz, 2000). The estimates were carried out for the western and for the eastern Baltic Sea. The relative distributions are given in Table 8.15 for the ICES Sub-divisions 22 to 24 and in Table 8.16 for the ICES Sub-divisions 25 – 28. Furthermore, the estimates for the ICES Sub-divisions 29 + 32 are given in Table 8.17.

A second estimation was carried out using the theory of the stratified random sample (Cochran 1972). In this case the haul allocation within the depth layer is determined by the area of the depth layer and the variance of the CPUE values. The analyses (Oeberst 2000) showed that the variances of the CPUE values are sometimes strongly influenced by single extreme values. Furthermore, the distribution patterns varied between the different dept layers from year to year and a very different coverage of the different depth layers, especially in ICES Sub-division 26 and ICES Sub-division 28, were found. These observations might suggest that corrections of the estimated number of stations for the depth layers are necessary.

1) The standard deviation of the mean CPUE values of the depth layers were truncated if standard deviation / mean CPUE > 4
2) The estimates were revised by the experience of the group.

During the present Working Group meeting it was decided to suggest the same principle in the haul allocation according to depth stratum within the ICES Sub-division as was used in the haul allocation by ICES Sub-division. That is the haul allocation was calculated based on the same method and the same data (area and stock distribution indices) as done for the haul allocation by ICES Sub-divisions and where the strategy is to weight the area of the depth stratum within the ICES Sub-division with 60 % and weight the stock indices of cod distribution for age group 1+ with 40 % where the 5 year period from 1995 to 1999 for the calculation of the mean stock size is used.

The proposed haul allocation scheme by ICES Sub-division and depth stratum is given in Tables 8.18–8.22. The tables present the area in nm² by ICES Sub-division and depth stratum as well as the relative allocation of hauls in percent based on the allocation method described by area (first column; not used), by Oeberst (2000) (second column; not used) followed by the haul allocation suggested by the Working Group (2001) (third column; used) which depends on partly the area of the strata and the distribution of stock indices based on the suggested number of total hauls.

Since no data were available for water depth of less than 10 m the layer 10 m to 39 m was used as one unit.

With respect to the suggested haul allocation by ICES Sub-division and depth stratum it is furthermore proposed that the haul allocation is up-dated yearly according to the 5 year running means of the distribution of the stock indices.

The same allocation of hauls in the autumn BITS survey as made for the spring survey is suggested for a start. That is based on the fact that only limited information and time series of data exist for the autumn period in order to evaluate the stock distribution of the demersal stocks in the Baltic Sea that the survey is targeting. The autumn survey haul allocation should be running up-dated according to new information obtained in the future on the stock distribution and density patterns in this season.

The precision of survey abundance estimates primarily depends on the effort applied and may be expected to decline proportional to the number of hauls. Cost on the other hand is dependent on the effort level implying a diminishing return of the marginal effort. Choosing the number of hauls therefore in principle requires rough evaluation of cost and benefits. The ISDBITS group and this Group have not attempted to specify criteria's for any optional stratification including information of cost and benefit as these data are not available. This would include assessment of the number of hauls per survey needed for stock assessment purposes in relation to survey costs.

Table 8.1 Geographical stratification of the Baltic Sea.

SD 21:	Kattegat
SD 22, 23 and 24	Western Baltic Sea
SD 25–28	Eastern Baltic Sea
SD 29–32	Northern Baltic Proper and Gulf of Finland

Table 8.2 Agreed depth layers for the stratification of the ICES Sub-divisions.

1	< 20 m
2	21 – 40 m
3	41 – 60 m
4	61 – 80 m
5	81 – 100 m
6	101 – 120 m
7	> 121 m

Table 8.3 Catch in tons for the two Baltic cod stocks.

Stock	Period			
	Average 1965–1989	Average 1990–1999	Average 1979–1989	Average 1965–1999
SD 22–24	43.041	30.912	39.035	39.576
SD 25–32	209.731	92.810	281.355	176.325

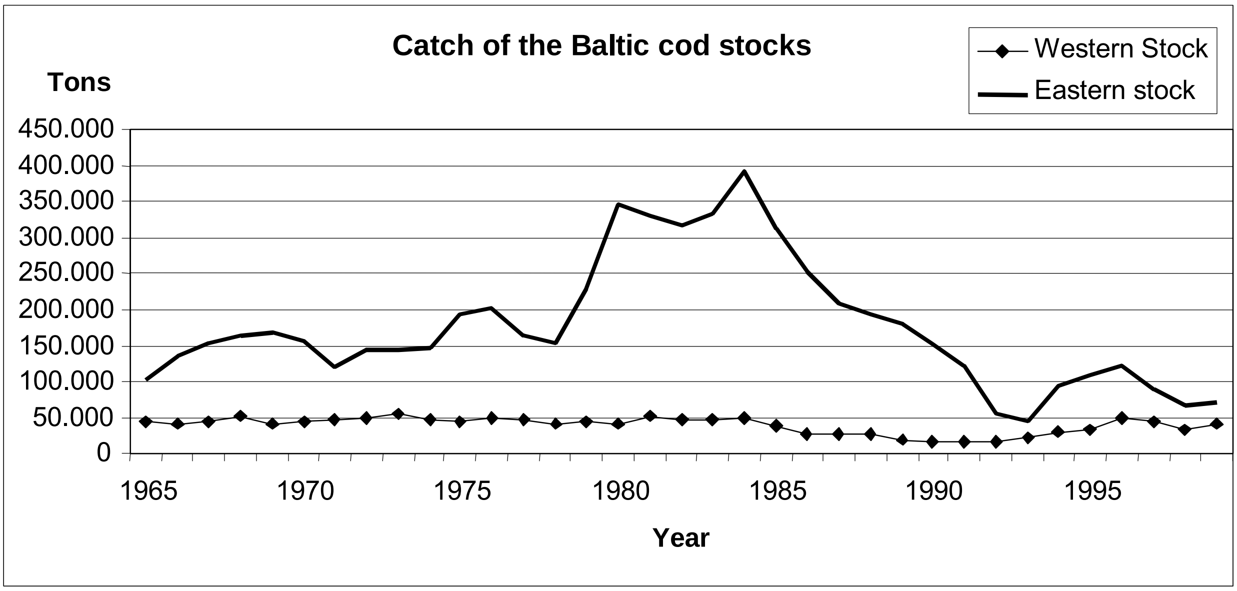


Figure 8.1 Development in the landings (ton) of both cod stocks in the Baltic Sea.

Table 8.4 Areas in nm² for 10 m depth layers and Sub-divisions based on the BITS manual.

SD	SD22	SD23	SD24	SD25	SD26	SD27	SD28	Total
Depth interval								
Total	5163		6509	12616	10967	8131	9965	53351
0 – 9	1489		785	332	218	1015	353	4194
10 – 19	2133		2462	1111	475	700	734	7615
20 – 29	1437		1091	1325	714	525	974	6066
30 – 39	92		621	2097	1190	416	881	5297
40 – 49	10		1397	1749	674	538	773	5141
50 – 59	0		124	1504	845	562	825	3861
60 – 69	1		29	1532	966	464	621	3613
70 – 79	0		0	1505	944	532	480	3462
80 – 89	0		0	798	1488	634	614	3534
90 – 99	0		0	638	1383	962	774	3758
100 – 150	0		0	25	1504	1199	1097	3824
> 150	0		0	0	565	584	1838	2987
10 – 100	3673	0	5724	12258	8680	5334	6677	42346
Portions of 0 – 100	11		14	27	19	14	15	100
Portions of 10 – 100	9	0	14	29	20	13	16	100

Table 8.5 Mean indices of age group 1+ cod for the period from 1990 to 1999 and the portion of the different Sub-divisions.

SD	SD22	SD23	SD24	SD25	SD26	SD27	SD28	Total
Stock index	542.5		4677.6	7687.4	4692.7	482.1	961.7	
Relative distribution	2.8		24.6	40.4	24.6	2.5	5.1	100

Stock Index of the stock based on the BITS database according to Sparholt & Tomkiewicz (2000)

Table 8.6 Distribution of the planned hauls if only the area of the Sub-divisions is used.

Version 1	P(1) = 1.0		P(1) = 0.0					
SD	SD22	SD23	SD24	SD25	SD26	SD27	SD28	Total
Area	30	0	47	101	72	44	55	350
Stock(1)	0	0	0	0	0	0	0	0
Total	30	0	47	101	72	44	55	350

Table 8.7 Distribution of the planned hauls if the weighting factor of the area of Sub-divisions is 80% and the estimation of the distribution of the stock is based on the period from 1990 to 1999.

Version 2	P(1) = 0.8		P(1) = 0.2					
SD	SD22	SD23	SD24	SD25	SD26	SD27	SD28	Total
Area	24	0	38	81	57	35	44	280
Stock(1)	2		17	28	17	2	4	70
Total	26		55	109	74	37	48	350

Table 8.8 Distribution of the planned hauls if the weighting factor of the area of Sub-divisions is 70% and the estimation of the distribution of the stock is based on the period from 1990 to 1999.

Version 3	P(1) = 0.7		P(2) = 0.3					
SD	SD22	SD23	SD24	SD25	SD26	SD27	SD28	Total
Area	21	0	33	71	50	31	39	245
Stock(1)	3		26	42	26	3	5	105
Total	24		59	113	76	34	44	350

Table 8.9 Distribution of the planned hauls if the weighting factor of the area of Sub-divisions is 60% and the estimation of the distribution of the stock is based on the period from 1990 to 1999.

Version 4	P(1) = 0.6		P(2) = 0.4					
SD	SD22	SD23	SD24	SD25	SD26	SD27	SD28	Total
Area	18	0	28	61	43	26	33	210
Stock(1)	4		34	57	34	4	7	140
Total	22		63	117	78	30	40	350

Table 8.10 Mean indices of age group 1+ cod for the period from 1995 to 1999 and the proportion of the different Sub-divisions.

SD	SD22	SD23	SD24	SD25	SD26	SD27	SD28	Total
Stock index	893.8	0	6617.9	8510.8	5919.8	341.0	1091.8	
Relative distribution	3.8	0	28.3	36.4	25.3	1.5	4.7	100

Stock Index of the stock based on the BITS database according to Sparholt & Tomkiewicz (2000)

Table 8.11 Distribution of the planned hauls if the weighting factor of the area of Sub-divisions is 80% and the estimation of the distribution of the stock is based on the period from 1995 to 1999.

Version 2	P(1) = 0.8		P(1) = 0.2					
SD	SD22	SD23	SD24	SD25	SD26	SD27	SD28	Total
Area	24	0	38	81	57	35	44	280
Stock(1)	3		20	25	8	1	3	70
Total	27		58	107	76	36	48	350

Table 8.12 Distribution of the planned hauls if the weighting factor of the area of Sub-divisions is 70% and the estimation of the distribution of the stock is based on the period from 1995 to 1999.

Version 3	P(1) = 0.7		P(2) = 0.3					
SD	SD22	SD23	SD24	SD25	SD26	SD27	SD28	Total
Area	21	0	33	71	50	31	39	245
Stock(1)	4		30	38	27	2	5	105
Total	25		63	109	77	33	44	350

Table 8.13 Distribution of the planned hauls if the weighting factor of the area of Sub-divisions is 60% and the estimation of the distribution of the stock is based on the period from 1995 to 1999.

Version 4	P(1) = 0.6		P(2) = 0.4					
SD	SD22	SD23	SD24	SD25	SD26	SD27	SD28	Total
Area	18	0	28	61	43	26	33	210
Stock(1)	5		40	51	35	2	7	140
Total	24		68	112	79	28	40	350

Table 8.14 Proposed version of the allocation of the number of stations for Sub-divisions for the spring survey 2001 using the mean density distribution of 5 years and P(1) = 0.6 (total number 330, in SD 27 20 stations).

Version 4	P(1) = 0.6		P(2) = 0.4					
SD	SD22	SD23	SD24	SD25	SD26	SD27	SD28	Total
Area	18		29	62	44		34	186
Stock(1)	5		36	46	32		6	124
Total	23		64	107	75	20	39	330

Table 8.15 Allocation by depth for Sub-divisions 22 – 24 in spring and in autumn.

Depth stratum	Portion of the planned stations
< 20 m	5 %
21 – 40 m	55 %
41 – 60 m	40 %

Table 8.16 Allocation by depth for Sub-divisions 25 – 28 in spring and in autumn.

Depth stratum	Portion of the planned stations
< 20 m	5 %
21 – 40 m	15 %
41 – 60 m	25 %
61 – 80 m	25 %
81 – 100 m	25 %
101 – 150 m	5 %
> 150 m	0 %

Table 8.17 Allocation by depth for Sub-divisions 29 + 32 in autumn.

Depth stratum	Portion of the planned stations
< 20 m	5 %
21 – 40 m	20 %
41 – 60 m	55 %
61 – 80 m	20 %

Table 8.18 Number of planned hauls by depth stratum of Sub-division 24 for different strategies.

		Number of stations depending on		
Depth layer	Area in nm²	The area distribution	Distribution, Oeberst 2000	The area and the mean stock distribution
10 – 39	4174	47	26	41
40 –	1550	17	38	23
Sum	5724	64	64	64

Table 8.19 Number of planned hauls by depth stratum of Sub-division 25 for different strategies.

		Number of stations depending on			
Depth layer	Area in nm²	The area distribution	Distribution, Oeberst 2000 (German data)	Distribution, Oeberst 2000 (international data)	The area and the mean stock distribution
10 – 39	4532	40	15	17	31
40 – 59	3254	28	44	42	38
60 – 79	3037	27	39	38	28
80 –	1461	13	10	11	10
Sum	12283	107	107	107	107

Table 8.20 Number of planned hauls by depth stratum of Sub-division 26 for different strategies.

		Number of stations depending on		
Depth layer	Area in nm²	The area distribution	Distribution, Oeberst 2000	The area and the mean stock distribution
10 – 39	2379	21	10	16
40 – 59	1519	13	10	17
60 – 79	1911	17	29	19
80 –99	2872	25	26	23
Sum	8680	75	75	75

Table 8.21 Number of planned hauls by depth stratum of SD 27 for different strategies.

		Number of stations depending on		
Depth layer	Area in nm²	The area distribution	Distribution, Oeberst 2000	The area and the mean stock distribution
10 – 39	1642	6		
40 – 59	1101	4		
60 – 79	996	4		
80 –99	1596	6		
Sum	5335	20		

Table 8.22 Number of planned hauls by depth stratum of SD 28 for different strategies.

		Number of stations depending on		
Depth layer	Area in nm²	The area distribution	Distribution, Oeberst 2000	The area and the mean stock distribution
10 – 39	2589	15	0	9
40 – 59	1598	9	10	7
60 – 79	1101	7	8	7
80 –99	1389	8	21	16
Sum	6677	39	39	39

Suggested distribution of hauls by country:

The following allocation of hauls by ICES Sub-division and nation performing BITS surveys are suggested in Tables 8.23 and 8.24.

Table 8.23 **Suggested haul allocation in spring BITS by ICES Subdivision and country**

Usual approximate haul allocation in spring BITS by ICES Subdivision and Country

Country / Subdivision	SD 22	SD 23	SD 24	SD 25	SD 26	SD 27	SD 28	Total
Denmark	9	1	8	28	14		6	66
Germany			31	30				61
Sweden			4	25	4	?	7	40
Russia					43		7	50
Poland			3	30	32			65
Latvia					10		15	25
Estonia								0
								0
Total	9	1	46	113	103	0	35	307
Suggested / Optimal allocation	23	3	64	107	75	20	39	331
No. of clear tows	164	12	650	697	242	16	75	

Suggested haul allocation in spring 2001

Country / Subdivision	SD 22	SD 23	SD 24	SD 25	SD 26	SD 27	SD 28	Total
Denmark	10	1	16	44			5	76
Germany	13		48					61
Sweden				20		20	12	52
Russia					43		7	50
Poland				43	22			65
Latvia					10		15	25
Estonia								0
								0
Total	23	1	64	107	75	20	39	329
Suggested / Optimal allocation	23	3	64	107	75	20	39	331
No. of clear tows	164	12	650	697	242	16	75	

Preliminary suggestion of haul allocation in spring 2002

Country / Subdivision	SD 22	SD 23	SD 24	SD 25	SD 26	SD 27	SD 28	Total
Denmark	10	3	16	44	7			80
Germany	13		48					61
Sweden				20		20	10	50
Russia					41		9	50
Poland				43	22			65
Latvia					5		20	25
Estonia								0
Total	23	3	64	107	75	20	39	
Suggested / Optimal allocation	23	3	64	107	75	20	39	331
No. of clear tows	164	12	650	697	242	16	75	

Table 8.24 **Suggested haul allocation in autumn BITS by ICES Subdivision and country**

Suggested haul allocation in autumn 2001								
Country / Subdivision	**SD 22**	**SD 23**	**SD 24**	**SD 25**	**SD 26**	**SD 27**	**SD 28**	**Total**
Denmark	7	3		35	35			80
Germany	6		39	3				48
Sweden				26		16	3	45
Russia								0
Poland								0
Latvia					10		15	25
Estonia							5	5
								0
Total	13	3	39	64	45	16	23	203
Suggested / Optimal allocation	13	3	39	64	45	16	23	203
No. of clear tows	164	12	650	697	242	16	75	

8.2 The Clear Tow Information Database

Haul allocation based on selection from a library of possible haul-tracks

Stations should be fixed on a statistical basis prior to the commencement of each survey for each season. The selection of trawl hauls and the distribution of hauls between participating countries has required international co-operation.

The collection and compilation of clear tow information has continued during the second year of the ISDBITS project. The number of tows has more than doubled during the year. This clear tow information has been compiled in relation to haul stratification based on available positioning measurements (including information from research vessels) and tracking of commercial fishing vessel trips in the Baltic Sea in order to obtain optimum haul stratification and to enhance survey planning and operation.

A large effort has been made to redesign and enlarge the database to make it user-friendlier, still based on Excel. The aim regarding coverage of the Baltic Sea has changed from 10 tows per square rectangle to a reasonable coverage of depth strata within each ICES Sub-division. Many of the tows derived from the various partners were totally missing depth information. In those cases at least one (mostly two) depth figures have been picked from sea charts and added to each tow to enable depth stratification. An attempt will be made to use digitalised high-resolution bottom charts, now available for the Baltic, with the database, to improve depth information.

A program has been developed for random sampling of tows for surveys, with ICES Sub-division and depth stratum as distribution criteria. This software is also implemented in the database as one option in one of the three output features (see below). The database is at present hosted by the Institute of Marine Research, Lysekil, Sweden, where it has been constructed and developed by Vesa Tschernij.

The database was made available for the Working Group (2001) members and consequently distributed to all involved countries in the BITS surveys.

An users manual for the database developed under the ISDBITS project is given in Annex 6 of this report.

Based on the suggested haul allocation by ICES Sub-division, depth stratum and country hauls will be selected from the database by the institute of Marine Research, Lysekil, (P.-O. Larsson), and he will accordingly pass the information on to all countries participating in the BITS survey not later than 16 February 2001.

Non-trawlable areas:

In some areas of the Baltic Sea bottom trawling is not possible for various reasons. All ISDBITS project participants have provided maps showing areas with bottom conditions preventing trawling, areas with dumped ammunition, weapons and similar, areas reserved for gillnet fishing, closed areas for military reasons, and so on. The maps have been made available for the Working Group (2001) and will be presented in the final ISDBITS report (March 2001).

9 STUDY GROUP ON HERRING ASSESSMENT UNITS IN THE BALTIC SEA (SGHAUB)

9.1 Note on the Report of the Study Group on Herring Assessment Units in the Baltic Sea (SGHAUB)

According to the Council Resolution the Study Group on Herring Assessment Units in the Baltic Sea (SGHAUB) was established and they had their meeting in ICES Headquarters 22–25 January 2001. Their task was to update, review and evaluate the available information on herring stock components and their migration in the Main Basin of the Baltic Sea (Sub-divisions 25–29, 32), propose an assessment structure for the herring stocks in Sub-divisions 25–29+32 as well as finalise the compilation of data required for assessing stock components defined.

The Terms of Reference were set up in order to improve the scheme of the herring assessment units in the Baltic Sea, because the existing assessment unit (Baltic herring in Sub-divisions 25–29 plus 32 including the Gulf of Riga) has proved to be too rough and not capable to follow the stock component changes and trends in different parts of the assessment unit.

The recent stock assessments of combined stock components have produced regularly overestimation of spawning stock biomass and somewhat impeding Baltic herring Main Basin management.

The Group was informed about of the results of SGHAUB, proposing the new assessment units of Central Baltic herring. The proposed units instead of present combined unit were:

1) Herring in Sub-divisions 25, 26 and 27
2) Herring in Sub-divisions 28, 29 and 32 (excluding Gulf of Riga herring)
3) Herring in the Gulf of Riga

The Working Group found the amendments to the herring stock assessment scheme, based on the most recent scientific information on herring biology, to be reasonably justified. By splitting the herring stock in smaller units certainly will ease the monitoring of stock component changes in the future.

9.2 Tuning Files for Baltic Herring Assessment Units

Acoustic tuning files for herring must be made for the new assessment units (see Section 10).

The new units are:

1. Herring in Sub-divisions 25, 26 and 27
2. Herring in Sub-divisions 28, 29 and 32 (excluding Gulf of Riga herring)
3. Herring in the Gulf of Riga

For hydroacoustic surveys it is most convenient to use the information in the database BAD1 for the latest 10 years, but the information cannot be taken directly to create new tuning fleets due to overlapping coverage and missing rectangles. In order to produce tuning files for the new assessment units for the period 1991–2000, the following rules should be used.

- In case of overlapping coverage in rectangles – use arithmetic mean
- Calculate an index as fish density (fish numbers/NM2) by summing the fish number in the assessment unit and divide the sum by the sum of the area in the covered rectangles
- If less than 50% of the rectangles in the assessment unit are covered - skip this year

The calculation of the aggregated abundance estimates of herring for the age groups 0–8+ for the corresponding rectangles and assessment units respectively, will be done before the Baltic Fisheries Assessment Working Group meeting in April 2001 for the period 1991–2000 by E. Götze, Germany.

For the surveys before 1991 the data will be calculated by Maris Plikshs before the Baltic Fisheries Assessment Working Group meeting in April 2001 following the rules above, if possible. In the future these tuning files should be updated annually by the Working Group.

10 RECOMMENDATIONS

10.1 Hydroacoustic Surveys

10.1.1 Background and goals of the EU studyproject BALTDAT

Each country stored the historical acoustic and biological data in different formats at their national levels. Therefore, an international database has been established. The historical data have been transferred to a standardised database and are/will be available for all participants. In consequence an international abundance estimation program based on the all the international data can be established. This data will also enable scientists to utilise the acoustic data for time series analyses and a number of other studies apart from direct stock estimation.

To be able to build up a common database a standard exchange format must be achieved. The present exchange format is a result of the work of the Danish Institute for Fisheries Research IT department. At the moment after two years of work this exchange format is incomplete and still under progress. The database should contain the acoustic basic data on Elementary Distance Sampling Units (EDSU) and all the biological fisheries data on haul level, respectively. The so-called HERSUR/BALTDAT exchange format specifies the format for the acoustic/biological data for the herring/sprat surveys in the North Sea and the Baltic Sea. The latest version (Version 1, Rev. VI, September 2000) of the HERSUR/BALTDAT exchange format has been tested and it does not work for uploading the data to the HERSUR database. The BALTDAT database at DIFRES, Hirtshals is **still not** in operation. Therefore, no data have been transferred to the BALTDAT database by the countries so far.

The EU Study Project BALTDAT will end 31 March 2001. The Working Group recommends that the initiated work initiated by this project must be continued.

10.1.2 Specific recommendations for future work

The following important working items, must be considered for the future:

- The actual yearly input of biological and hydroacoustic data to the database BAD2 should be started.
- The responsibility of the maintenance of the database BAD2 should be devoted to one research institute.
- The complete coverage of the autumn hydroacoustic survey by different nations in the Baltic Sea should be maintained at the actual high level.
- In order to get a complete picture of herring and sprat distribution in the Western Baltic area (Skagerrak, Kattegat, Sub-divisions 22–24) the whole area should be covered at the same time. At present the Western Baltic area is 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, Sub-divisions 22 to 24). The July survey is connected to the North Sea acoustic summer surveys whereas the October survey is linked to the Baltic Sea acoustic surveys.
- The main results and the cruise reports from future acoustic surveys as well as cruise descriptions from all participating vessels should devote to one research institute. The data should be submitted in the proposed exchange format (BAD1, BAD2) at least two months before the Working Group meeting to Dr. Fredrik Arrhenius, Sweden for preparing a summary of the survey results. The summary is needed for the Baltic Fisheries Assessment Working Group.
- Based on the description in the hydroacoustic Manual (BIAS) the corrected and updated database BAD1 for years 1991 to 2001 including new area values should be sent to E. Götze, Hamburg, Germany, until 1st of June 2001 and 2001 data two months in advance to Working Group meeting in year 2002.
- An evaluation must be made on how to average several hauls in a rectangle and on how to treat rectangles without hauls.
- A relevant way to publish the data from the hydroacoustic surveys should be considered and evaluated to keep record of survey results.
- The variability in the results of the acoustic surveys used for the assessment should be analysed. For this work the BAD1 must be continued and updated and the BAD2 (BALTDAT) must be put into operation.

10.2 Next Meeting in Year 2002

10.2.1 Time and venue

The Working Group discussed its next meeting (to be decided at the Statutory Meeting in Oslo, Norway) and Working Group recommends that it will meet five days from 8–12 April 2002 (Chair: To be decided, at ICES Headquarters to assist the Baltic Fisheries Assessment Working Group and ACFM.

10.2.2 Terms of reference

The Baltic International Fish Survey Working Group [WG] (Chair: to be decided) will meet in ICES Headquarters from 8–12 April 2002 to:

a) combine and analyse the results of the 2001 acoustic surveys and report to the Baltic Fisheries Assessment Working Group;
b) update the hydroacoustic database BAD1 for the years 1991 to 2001;
c) update the established acoustic database BAD2;
d) plan and decide on acoustic surveys and experiments to be conducted in 2002 and 2003.
e) continue the evaluation of the survey design strategies for future BITS surveys.
f) discuss the results from BITS surveys made in 2001 (spring surveys and autumn surveys) and evaluate the usefulness of autumn surveys for cod assessment in Sub-divisions 25–32;
g) continue to analyse conversion factors between new and old survey trawls on national level and report the conversion factors.
h) update, if necessary both Baltic International Trawl Survey (BITS) and Baltic International Acoustic Survey (BIAS) manuals;

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. The Working Group will report to the Baltic Committee and Resource Management Committees at the 2002 Annual Science Conference in Copenhagen.

Justifications

The main objective of the Working Group is to co-ordinate and standardise national research surveys in the Baltic for the benefit of accurate resource assessment of Baltic fish stocks. From 1996 to 2001 attention has been put on evaluations of traditional surveys, introduction of survey manuals and considerations of sampling design and standard gears as well as co-ordinated data exchange format. In recent years activities has been devoted to development of new standard gears for demersal surveys, biological sampling regimes and analysis of both demersal and acoustic trawl survey results. New standard trawl has now adopted (TV3-trawl) for demersal trawl surveys in the Baltic

The most important future activities are to combine and analyse acoustic survey data for Baltic Fisheries Assessment Working Group, develop disaggregated hydroacoustic 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.

10.2.3 Nomination of candidate for Chair

The present Chair informed the Working Group, that he will not be available for re-nomination and the Working Group should nominate a new Chair for the next three years. The Working Group had a long discussion in plenum, several names were mentioned, but at the end the Working Group did not have any name to put forward for Chair. This means that Baltic Committee should contact national laboratories to search and ask possible candidates and Baltic Committee should make the election during their meeting in Oslo in 2001.

11 REFERENCES

Anon. 1997. Report of the Workshop on Standard Trawls for Baltic International Fish Surveys. Gdynia, Poland, 8–10 January 1997. ICES CM 1997/J:6, 19 pp.

Anon. 1998a. Report of the 2nd Workshop on Standard Trawls for Baltic International Fish Surveys. Gdynia, Poland, 23–24 February 1998. ICES CM 1998/H:1, 11 pp.

Anon. 1998b. Report of the Baltic International Fish Survey Working Group. Karlskrona 8–13 June 1998. ICES CM 1998/H:4, 72 pp.

Anon. 1999a. Report of the Workshop of the Baltic Trawl Experiments. Rostock 11–14 January 1999. ICES CM 1999/H:7, 16 pp.

Anon. 1999b. Report of the Baltic International Fish Survey Working Group. Tallinn 2–6 August 1999. ICES CM 1999/H:1, 113 pp.

Anon. 1999c. Interim and progress report of the EU study project No. 98/099: IDSBITS project. January 1999

ICES. 1992. Report from FTFB subgroup: evaluation of sources of variability in the fishing power of the GOV trawl. ICES CM 1992/B:39.

ICES 1994b. Report of the Working Group on the Assessment of Pelagic Stocks in the Baltic. CM 1994/Assess:16.

ICES 1995. Report of the Study Group on Data Preparation for the Assessments of Demersal and Pelagic Stocks in the Baltic. CM 1995/Assess:17Ref:J. 104 p.

ICES 1997. Report of the Baltic Fisheries Assessment Working Group. CM 1997/Assess:12. 506 p.

ICES 1998. Report of the Baltic Fisheries Assessment Working Group. CM 1998/ACFM:16. 391 p.

ICES 1999a. Report of the workshop on Baltic trawl experiments. Rostock January 1999. ICES CM 1999/H:7.

ICES 1999b. Report of the Baltic Fisheries Assessment Working Group. CM 1999/ACFM:16. 505 p.

Oeberst, R. 2000. Proposal of the stratification of the Baltic Sea for the Baltic international trawl survey. ICES CM 2000/K:21

Oeberst, R.; Ernst, P.; Frieß, C.C.2000. Inter-calibrations between German demersal gears HG 20/25 and TV3/520 as well as between the gears TV3/520 and TV3/930. Incorporation of External Factors in Marine Resource Surveys. ICES CM 2000/K:20: 27 pp.

ANNEX 1

MANUAL FOR THE BALTIC INTERNATIONAL DEMERSAL TRAWL SURVEYS

Updated and agreed during the meeting of the Baltic International Fish Survey Working Group

Kaliningrad, Russia

05-09/02-2001

Version 3.01

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Section **Page No.**

1 INTRODUCTION

At the ICES Annual Science Conference in September 1995, the Baltic Fish Committee decided, that a manual to be used at trawl surveys in the Baltic area should be elaborated (C. Res. 1995/2:41). This manual should in its context follow the format of the manual used for the International Bottom Trawl Surveys (BITS). The new, updated manual was edited based on the previous version of the "Manual for the Baltic International Trawl Surveys" (Addendum to ICES CM 1996/J: 1). Based on the experiences of the ongoing national surveys the manual (Appendix to ICES CM 1998/H: 4) was discussed, improved and updated.

The objective of the BITS program is to standardise fishing gear and methods throughout all national surveys where data are used as indices for assessment purposes. However, it is anticipated that the required change from national gears to a common standard gear in some instances cannot be achieved immediately.

The participants are recommended to conduct their national surveys according to this manual. The present manual applies to all bottom trawl surveys that are conducted within the framework of the BITS. The standard sampling procedures are uniform for all surveys.

Experiences from the practical realisation and application of the surveys will be the background to evaluate the content of an uniform, Manual for the Baltic International Trawl Survey ". Based on this the manual is currently updated once a year. A crucial task is to implement all protocols into a comprehensive Quality Assured Handbook which should be mandatory for all participating national research vessels. It is expected that this work will result in further amendments to the present manual.

2 THE FISHING METHOD

2.1 Standard fishing gear

For the International Baltic Demersal trawl surveys standard trawls shall be used. The design and construction are given in the report of the Workshop on Standard Trawls for Baltic International Fish Surveys, Gdynia, 1997. (ICES CM 1997/J: 6). A complete specification will be available in early 2000, as a product of the ongoing ISDBITS project. Until then the specification and the corrections made as a result of the flume tank testing and initial full-scale testings can be obtained by contacting DIFTA, The North Sea Centre, Hirtshals, Denmark.

The type of trawl is called TV3 and come in two sizes for different sizes of research vessels, one 520 meshes in circumference and one 930 meshes.

The small trawl should be used for vessels up to around 800 HP and the larger trawl for vessels with higher towing power.

Quality control

During construction of new standard trawls the detailed specification shall be followed in detail concerning, materials used, construction and dimensions.

During use the trawls shall be checked at regular intervals by taking a number of check measurements on the geometry of the nets. (The intervals and a list of check measurements will be given in the above mentioned detailed trawl specification.)

2.2 Fishing positions

The international trawl surveys should be carried out in form of a stratified random survey. As stratification criteria the squares of the ICES Sub-divisions or/and the depth layers are possible. In both the cases the areas of the strata are necessary. Analyses of the different data sets available were carried out in the Workshop on Baltic Trawl experiments (ICES C.M. 1997/H: 7). In this report the areas of the depth layers per ICES squares aggregated on 10 m depth layers are presented. These data should be used for the international bottom trawl surveys. The tables are given in appendix XI.

Since the analyses concerning possible influences of the water depth and hydrographic parameters in relation to the fish density distribution are not finished, an exact survey plan cannot be designed now.

The proposed number of about 350 trawl stations for the whole Baltic Sea must be updated later dependent on the statistical analysis of the previous surveys.

Each year the necessary stations should be randomly selected before the beginning of the international trawl surveys from a list of clear haul data. These stations are a selected sub-sample of the database of possible trawl tracks. If the number of possible tracks is not large enough for a random selection in some strata fixed stations can be used every year.

2.3 Standard fishing operation

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

The standard haul shall last for 30 minutes. Start time is defined as the moment when the vertical net opening is stable at the stated towing speed. Stop is defined as the starts of hauling back the trawl.

Trawling shall only take place during daylight, defined in the checking program as the time between 15 minutes before sunrise until 15 minutes past sunset.

Fishing must not be directed towards fish densities or shoals located by means of fish finding equipment like echo sounder and sonar.

Quality control

The horizontal distance between the upper wing-ends should be monitored if possible during the whole tow. The following table gives the limits of the wing-end distance and the corresponding height of the trawl at the centre of the headline.

Trawl measurements at 3 knots in metres	**Distance between upper Wingends**	**Approximate corresponding height at centre of headline**
TV3, 520 meshes	13.5 – 14.5	2.2 – 2.5
TV3, 930 meshes	26 – 27	5.5 – 6.5

Note: this table may be subject to changes following check measurements in the Flume Tank in the autumn of 1999.

3 SAMPLING OF TRAWL CATCHES

The following guidelines are to be used for each haul during the survey.

All forms should be filled in using a pencil in order to allow correcting and stay waterproof.

The working up of the catch can be seen as a number of processes succeeding each other.

3.1 Estimating the total weight of the catch

Purpose.

To achieve an estimate of the total weight of the fish and "other" caught in the given haul.

Preconditions:

The fishing method and the gear performance are in accordance with the specifications given in Section 2 in this manual.

The total catch weight must be estimated by one of the following methods.

1. Weighting the total catch by use of a balance.

2. Counting the number of standard filled baskets. The estimated average weight of the baskets is estimated by weighting five random selected baskets.

3. By adding up the total estimated weight or weighted weight of each species (will often be achieved during estimation of the species composition).

The results are recorded in kilograms.

3.2 Estimating the species composition of the catch

Purpose.

Species composition of catches should express the total weight and number of specimens of given species in catch.

Preconditions:

The fishing method and the gear performance are in accordance with the specifications given in Section 2 in this manual.

Guidelines.

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

Certain species that are hard to distinguish from each another may be grouped by genus or higher taxonomic units.

In cases of exceptionally big catch (e.g. over 500 kg) or other circumstances, not allowing the sorting of all catch, the species composition should be estimated using sub-sampling.

The procedure for sub-sampling is one of the following depending on the circumstances:

1. If all species appear fairly frequently in the catch, simultaneous sub-sampling of all species in the whole catch should be used:

   A. Three sub-samples each weighting app. 100 kg's, depending of the impression of the species included in the catch, are sorted by species. The samples must be taken from the first, middle and last Sections of the trawl cod-end. Be aware of, that the three sub-samples together should represent the whole catch.

   B. Each species from the three sub-samples are pooled and each species are weighted separately. The weights are recorded.

   C. The total weight of all species (c) in the three sub-samples is estimated by adding the weight of the three samples.

   D. The total catch weight of each species is estimated by raising the sub-sample weight for a given species with the ratio between the total catch weight and the summed weight of all sub-samples.

   E. All total and sub-sample weights are recorded.

2 If some species appears in very low numbers in the catch, while other species appears in high numbers, sub-sampling of only the frequent species in the catch may be applied.

   A. The species appearing with low frequency are sorted out of the whole catch by species and weighted.

   B. The rest of the catch is treated as specified in method 1.

C. All total and sub-sample weights are recorded on the Species-form.

Non-fish species should be recorded as well. This group might be grouped and recorded as invertebrates, botanicals or just “Other”. Non-organic material (stones, barrels etc.) should be recorded as “Other”.

The sorted and weighed fish are then used for the following **length, age and maturity sampling**.

3.3 Length composition

Purpose:Length composition should express the number of specimens of given species per length croup in catch.

Preconditions: The whole catch or a representative sub-sample of the catch is sorted by species.

Guidelines.

Length distributions (length compositions) should be recorded for all fish species caught.

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

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

1. All individuals of a given species in the catch of the given species are subdivided into a number of sub-samples. Each sub-sample approximately of the size recommended below.

2. One of the sub-samples is randomly selected for length measurements.

Always measure the whole sub-sample. Never stop in the middle because you have realised that your sub-sample is too large. In most cases a biased length distribution will be the result.

If you realise that your sub-sample is to small then randomly select another of the sub-samples and continue obtaining the length frequency measuring all of it. If you must, divide this sub-sample into a number of sub-sub-samples and continue the measuring procedure by measuring one or more randomly selected sub-sub-samples).

Length of the fish is defined as total length (measured from the tip of the nose to the tip of caudal fin).

Length is measured to 0.5 cm below for herring and sprat (e.g. lengths in the range of 10.0-10.4 cm are equal to 10.0 cm and lengths 10.5-10.9 cm are equal to 10.5 cm).

For all other species the length is measured to 1 cm below (e.g. lengths in the range of 20.0-20.9 cm are equal to 20.0 cm).

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

Number of length-classes	Number of length measurements
1 - 10	100
11 - 20	200
more then 20	300

Minimum number of individuals to be length measured (in sample or sub-sample).

The number of individuals is dependent on the number of length-classes included in the length range (see figure 1).

During the length measurements, the above-specified number of fish of each species per length group are collected and stored separately by the length-groups for **age, sex, individual mean weight and maturity** estimations.

3.4 Age, sex, individual weight and maturity sampling procedure

Purpose.

The purpose is to estimate distributions of age, sex, weight and maturity for each length class

The complete number of age determinations is used to establish age-length-key (ALK) per Sub-division and quarter. ALKs is used for converting the length distribution on a given aggregation level into an age distribution. The determination of sex and maturity stage is done in order to produce maturity ogives for estimating the Spawning Stock biomass (SSB). The individual weight is used for calculating the mean weight per length class, which is used for converting catch in weight into catch in numbers and the weight at age for calculating the SSB and total biomass. Apart from the mentioned purposes, there might be additional purposes (identifying stock components etc.).

Guidelines.

The samples are collected on the basis of country, quarter and ICES Sub-division for all species.

It is recommended that each country collect otoliths by each haul, so the otoliths are distributed all over the Sub-division.

The following species are sampled for age, sex, weight and maturity estimation:

- Herring
- Sprat
- Cod
- Flounder

The procedure of re-measuring the fish, weighting, estimating of sex, maturity stage and the cutting of otoliths might be made most efficient in one work-procedure for each individual in the above-mentioned sequence.

Consequently the number of fish selected for estimating of sex, maturity stage and cutting of otoliths are equal.

<u>Estimating individual/mean weigh.</u>

After length measuring the fish, if possible the individual weight of each fish is estimated and recorded. If it is impossible to achieve the individual weight, the number and total weight is recorded in order to calculate the mean weight of the individuals in the group. The weights are estimated by use of an electronic balance. The weight is measured in grams. A minimum of five specimens must be weighted even though less is used for cutting of otoliths.

<u>Estimation of sex and maturity stage.</u>

The abdomen of each individual is cut open and the gonads are examined in order to estimate the sex. If the individual is mature the sexes can easily be distinguished, but for immature individuals the task is difficult and special literature about the subject have to consult.

In the same process the maturity stage is determined according to the classification description of the different stages given in appendix I or according to the code practised on the national level. If a national code is used the national coding must be converted into the BITS 5 stage code according to appendix II before the data are submitted to ICES.

<u>Cutting of otoliths.</u>

The technique for cutting otoliths depends on the species. For descriptions of these techniques, please consult the literature about the subject.

The optimum number of otoliths per length class and ICES Sub-division cannot be given in a universal form. A description of the optimum sample size of age readings and length measurements dependent on a universal cost function is given in Oeberst (1999).

The analyses showed that the necessary number age readings in an length class is dependent on

- the portion of the length class within the length frequency and
- the maximum variance of the portions of the age groups within the length class.

The table below gives the minimum number of otoliths from each length group, which must be cut per country, survey, Sub-division and species based on the length distribution.

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

Since the collection of the otoliths should be distributed over the whole survey time in the ICES Sub-division the actual length frequency of the survey can be used to choose the number of otoliths per length class.

The otoliths may be:

1. read during the survey, if proper facilities and experienced age readers are available on board. Store the otoliths in ice-boxes, envelopes or other suitable containers.

2. stored for later age determining.

In both cases the containers must be labelled with indication of: species, cruse number, date, sub-division, length class.

4 ENVIRONMENTAL DATA

At each haul, the following hydrographical data should be collected:

- surface temperature,
- bottom temperature,
- surface salinity,
- bottom salinity,
- bottom oxygen.

The sampling procedure of the hydrographical data should be according to the standard specified by ICES.

5 EXCHANGE SPECIFICATIONS FOR BITS DATA

5.1 Deadlines of reporting

It is the responsibility of the participating countries to bring preliminary data (age distribution by haul) in exchange format from the 1st quarter survey to the meetings of the Herring Assessment Working Group for the Area South of 62 ° N and the Baltic Fisheries Assessment Working Group meeting. At present both working groups meetings takes place in April.

Final data should be sent to ICES on 1 June at the latest, so that a report can be prepared for the Annual Science Conference.

The following deadlines were decided for sending data in exchange format to the ICES Secretariat:

Data	Deadlines
Preliminary data 1q (age distribution by haul)	Bring to the above two WG's meetings
Final data 1q	1st June
Final data 4q	1st April

When sending the data to the ICES Secretariat the form in Section 5.5 has to be filled in and send together with the records. This will provide an overview of the data for later use and help the entering of the data to the database.

5.2 Data Checking

A checking program is available from the ICES Secretariat. The program should be used to monitor and correct erroneous data by the responsible scientists of individual surveys. The first version was released in February 1999 and has during 1999 been updated on request. The ICES Secretariat expects that the checking program will fit the data when all the historical data have been delivered during 2000 and that only minor changes are needed in the future. Therefore, the program will only be updated after request of the BITS working group from 2001 and all countries will be asked to download the updated version from the ICES ftp-server.

The checking program is found on the ICES ftp-server under the directory /dist/lena/bitschk. An explanation on how to download the program is provided by ICES. In the same directory there is also a note explaining how to use the checking program.

5.3 Floppy Disk Requirements

The data has to be sent in ASCII coding on a 3.5-inch disks or by E-mail.

5.4 Format of data

Four distinct types of computer records have been defined for standard storage of the BITS data:

TYPE 1: Record with detailed haul information
TYPE 1A: Record with additional haul information
TYPE 2: Length frequency data
TYPE 4: Sex-maturity-age-length keys (SMALK's) for ICES Sub-Division.

The detailed formats of these four record types are given Section 5.4.1 - 5.4.4 of the present manual.

Details of environmental data should be submitted to the Hydrographic Service of ICES according to established procedures. The national hydrographic station number must be reported in Record TYPE 1 to enable the link to be made between haul data and environmental data.

5.5 File structure and name

When delivering the data to the ICES Secretariat one file should only contain data from one year and survey. The name of the file should be month (the first day of the survey), country (ICES country code) and year, e.g. 03EST98.csv. In addition all the fish species the country intends to report have to be included in the file when sending it to the ICES Secretariat. Later corrections and updates can be made.

The records must be ordered in such a way that each record of TYPE 1 is followed by a variable number of records of TYPE 2, ordered by species. The number and kind of species recorded must agree with the species recording code as specified in record TYPE 1. For examples of the various codes see Appendix V.

Records of TYPE 4 should follow at the end of the file after the last species record of TYPE 2 for the last haul.

Records of TYPE 1A should be submitted in a separate file.

5.5.1 Record type 1

SPECIFICATIONS FOR RECORD TYPE 1 (Haul information)

POSITION	NAME	TYPE*	M/O**	RANGE	COMMENTS
1-2	Record type	2A	M	HH	Fixed value: HH
3	Quarter	1N	M	1 to 4	
4-6	Country	3A	M	See Appendix III	ICES alpha codes for countries
7-10	Ship	4AN	M	See Appendix III	
11-20	Gear	10AN	M	See Appendix IV	Preliminary code 1)
21-26	Station number	6AN	O		National coding system
27-29	Haul no	3N	M	1 to 999	Sequential numbering by cruise
30-31	Year	2N	M	65 to 99 or 00 to 20	
32-33	Month	2N	M	1 to 12	
34-35	Day	2N	M	1 to 28/29/30/31	
36-39	Time shot	4N	M	1 to 2400, 9999	In UTC
40-42	Haul duration	3N	M	5 to 150	In minutes 2)
43	Day/night	1A	M	D, N, space	Not known = space filled
44-45	Lat. degrees	2N	M	53 to 66	Shooting position: Degree Lat.
46-47	Lat. minutes	2N	M	0 to 59	Shooting position: Minute Lat.
48-49	Lon. degrees	2N	M	11 to 31	Shooting position: Degree Lon.
50-51	Lon. minutes	2N	M	0 to 59	Shooting position: Minute Lon.
52	East/West	1A	M	E	Fixed value: E
53-55	Depth	3N	M	10 to 150, space 5 to 150 in Sub-div. 22 + 24	Depth from surface in metres, space filled=not known
56	Haul validity	1A	M	I, V, N	Invalid =I, Valid =V or no oxygen = N, C = calibrated
57-64	Hydrographic station number	8AN	O		Station no as reported to the ICES hydrographer
65-66	Species Recording Code	2N	M	See Appendix V	Use position 65 for standard and 66 for bycatch codes
67-69	Netopening	3N	O	15 to 100	In metres x 10
70-73	Distance	4N	O	1850 to 9999	Distance towed over ground (m)
74-76	Warp lenght	3N	O	100 to 999	in metres
77-78	Warp diameter	2N	O	10 to 60	In millimetres
79-81	Door surface	3N	O	10 to 100	In squaremetres x 10
82-85	Door weight	4N	O	50 to 2000	In kilogrammes
86-89	Buoyancy	4N	O	50 to 200	In kilogrammes
90-91	Kite dimensions	2N	O	5 to 20	In squaremetres x 10
92-95	Weight ground rope	4N	O	0 to 800	In kilogrammes
96-98	Door spread	3N	O	25 to 200	In metres
99-100	Paddingfield	2A	M	Spaces	Filled up with spaces

* All numeric fields (N) right justified, except when spaces are used to indicate no information.
All alpha (A) and mixed alpha/numeric fields (AN) left justified, space filled.

** M=mandatory, O=optional.
For all optional fields spaces are valid and indicate not known.

COMMENTS:

1) ICES is maintaining this code list. Laboratories should ask the Secretariat for new codes, if the gear they report is not included in the list. Numerical information on gear aspects is defined in position 67-98 and is only required for the GOV trawl.

2) For the historical data a haul duration up to 150 minutes is legal. For present data the haul duration must not be longer than 90 minutes.

5.5.2 Record Type 1A

SPECIFICATIONS FOR RECORD TYPE 1A (Haul information)

POSITION	NAME	TYPE*	M/O**	RANGE	COMMENTS
1-2	Record type	2A	M	HE	Fixed value: HE
3	Quarter	1N	M	1 to 4	
4-6	Country	3A	M	See Appendix III	ICES alpha codes for countries
7-10	Ship	4AN	M	See Appendix III	
11-20	Gear	10AN	M	See Appendix IV	Preliminary code 1)
21-26	Station number	6AN	O		National coding system
27-29	Haul no	3N	M	1 to 999	Sequential numbering by cruise
30-31	Year	2N	M	65 to 99 or 00 to 20	
32-33	Lat. degrees	2N	M	53 to 66	Hauling position: Degree Lat.
34-35	Lat. minutes	2N	M	0 to 59	Hauling position: Minute Lat.
36-37	Lon. degrees	2N	M	11 to 31	Hauling position: Degree Lon.
38-39	Lon. minutes	2N	M	0 to 59	Hauling position: Minute Lon.
40	East/West	1A	M	E	Fixed value: E
41-43	Towing direction	3N	O	1 to 360	
44-45	Ground speed	2N	O	20 to 60	Ground speed of trawl. Knots x 10
46-47	Seed through water	2N	O	10 to 99	Trawl speed through. Knots x 10
48-49	Wing spread	2N	O	12 to 30	Metres
50-52	Surface current direction	3N	O	0 to 360	Slack water =0
53-55	Surface current speed	3N	O	0 to 100	Metres per sec x 10
56-58	Bottom current direction	3N	O	0 to 360	Slack water =0
59-61	Bottom current speed	3N	O	0 to 100	Metres per sec x 10
62-64	Wind direction	3N	O	0 to 360	0 = carm
65-67	Wind speed	3N	O	0 to 100	Metres per sec
68-70	Swell direction	3N	O	0 to 360	
71-73	Swell height	3N	O	0 to 999	Metres x 10
74-100	Paddingfield	27A	M	Spaces	Filled up with spaces

* All numeric fields (N) right justified, zero filled, except when spaces are used to indicate no information.
All alpha (A) and mixed alpha/numeric fields (AN) left justified, space filled.

** M=mandatory, O=optional.
For all optional fields spaces are valid and indicate not known.

COMMENTS:

1) ICES is maintaining this code list. Laboratories should ask the Secretariat for new codes, if the gear they report is not included in the list. Numerical information on gear aspects is only required for the GOV trawl

5.5.3 Record Type 2

SPECIFICATIONS FOR RECORD TYPE 2 (Length frequency distribution)

POSITION	NAME	TYPE*	M/O**	RANGE	COMMENTS
1-2	Record type	2A	M	HL	Fixed value: HL
3	Quarter	1N	M	1 to 4	See Record Type 1
4-6	Country	3A	M	See Appendix III	See Record Type 1
7-10	Ship	4AN	M	See Appendix III	See Record Type 1
11-20	Gear	10AN	M	See Appendix IV	See Record Type 1
21-26	Station number	6AN	O		See Record Type 1
27-29	Haul no	3N	M	1 to 999	See Record Type 1
30-31	Year	2N	M	65 to 99 or 00 to 20	See Record Type 1
32-41	Species code	10 A	M	See Appendix VII	Official NODC code
42-43	Validity code	2N	M	See Appendix VIII	
44-50	No/hour	7N	M	0 to 9999999	No specimen caught per hour
51-55	Catch weight/Hour	5N	M	0 to 99999, spaces	In 100g. Not known = spaces
56-58	No measured	3N	M	0 to 999, spaces	Not known = spaces
59	Length class code	1AN	M	., 0, 1, 2, 5, 9	0.1 cm length class=. 0.5 cm length class = 0 1 cm length class = 1 2 cm length class = 2 5 cm length class = 5 +group =9
60-62	Min. length class	3N	M	1 to 999, spaces	Identifier of lower bound of length distribution, eg. 65-70 cm=65 For classes less than 1 cm there will be an implied decimal point after the 2nd digit, eg. 30.5-31.0 cm=305
63-68	No at length/hour	6N	M	1 to 999999, spaces	Length classes with zero catch should be excluded from the record (no/hour equals the sum of no at length).
69	Sex	1A	O		Male = M, Female =F
70-100	Paddingfield	31A	M	Spaces	Filled up with spaces

* All numeric fields (N) right justified, zero filled, except when spaces are used to indicate no information. All alpha (A) and mixed alpha/numeric fields (AN) left justified, space filled.

** M=mandatory, O=optional. For all optional fields spaces are valid and indicate not known.

COMMENTS:

1) Total catch weights should be given per hour fishing.
2) If the number measured is zero then the remainder of the record should be filled with spaces.
3) Size classes smaller than those defined in the BITS manual for reporting length distributions of the various species are allowed.

5.5.4 Record Type 4

SPECIFICATION FOR RECORD TYPE 4 (SMALK's)

POSITION	NAME	TYPE*	M/O**	RANGE	COMMENTS 1)
1-2	Record type	2A	M	CA	Fixed value: CA
3	Quarter	1N	M	1 to 4	See Record Type 1
4-6	Country	3A	M	See Appendix III	See Record Type 1
7-10	Ship	4AN	M	See Appendix III	See Record Type 1
11-20	Gear	10AN	M	See Appendix IV	See Record Type 1
21-26	Station number	6AN	O		See Record Type 1
27-29	Haul no	3N	M	1 to 999	See Record Type 1
30-31	Year	2N	M	65 to 99 or 00 to 20	See Record Type 1
32-41	Species code	10A	M	See Appendix VII	Official NODC code
42-43	Sub-Division area	2N	M	22 to 32, see Appendix IX	ICES Baltic Sub-Division code 7)
44-47	Rectangle area	4 AN	M	See Appendix IX	ICES Statistical Rectangles
48-51	Paddingfield	4 A	M	Spaces	Filled up with spaces
52	Length class code	1AN	M	., 0, 1, 2, 5	0.1 cm length class =. 0.5 cm length class = 0 1 cm length class = 1 2 cm length class = 2 5 cm length class = 5 (+group not allowed) 2)
53-55	Min. length class	3N	M	1 to 999, spaces	Identifier of lower bound of length distribution, eg. 65-70 cm=65 For classes less than 1 cm there will be an implied decimal point after the 2nd digit, eg. 30.5-31.0 cm=305
56	Sex	1A	M	M, F, space	Male = M, Female = F, Unknown = space
57	Maturity	1AN	M	1 to 5, space	See Appendix I 3)
58	+group identifier	1A	M	+, space	Plus group = +, else space 4)
59-60	Age	2N	M	0 to 99, spaces	Unknown age =spaces 5)
61-63	Number	3N	M	1 to 999	6)
64-68	Individual mean weight (g)	5N	O	0 to 99999, spaces	The mean weight of the number of fish in the record (in gram).
68-100	Paddingfield	32 A	M	Spaces	Filled up with spaces

* All numeric fields (N) right justified, zero filled, except when spaces are used to indicate no information.
All alpha (A) and mixed alpha/numeric fields (AN) left justified, space filled.

** M=mandatory, O=optional.
For all optional fields spaces are valid and indicate not known.

COMMENTS:

1) Otolith samples may refer to an individual haul or to groups of hauls in the same rectangle or within one sampling area, depending on the procedures on board. If detailed information is available, it would seem appropriate to refer back to the haul no and/or rectangle; these data are optional rather than mandatory.
2) See Record Type 2.
3) Sex maturity data are explicitly demanded for cod.
4) A plus group refers to the age indicated AND older, respectively to a reading of more than or equal to the specified number of rings.
5) For herring and sprat the number of rings must be recorded. For all other species the age.
6) An additional field has been reserved for no of fish, which allows the information to be presented in a more aggregated form, rather than that identical information has to be recorded for all individual fish of the same size, sex, maturity and age group.
7) Standard ICES Sub-Division (22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32)

5.6 Input BITS data

Checklist with detailed information per survey compiled by: ....date: ....

Year:

Quarter:

Country:

Vessel:

Fishing gear:

Mesh size in the codend (in mm):

Comment on gear:

Hydrography (y/n):

- Stations no.:
- CTD-probe (y/n):
- Surface temperature (y/n):
- Bottom temperature (y/n):
- Surface salinity (y/n):
- Bottom salinity (y/n):
- Bottom oxygen (y/n):

Haul duration:

Day/night (trawling):

Other comments:

ICES Sub-division:	22	23	24	25	26	27	28	29	30	31	32
Number of hauls:											

STANDARD SPECIES:	Measured (y/n)	Aged (n - no, o - otoliths, s - scale)	Aged plus group used	Grouped by what stratification? (depth or ICES-rec.)	Sex (y/n)	Maturity (y/n)	Fish health condition (y/n)	Stomach fullness (y/n)
Herring:								
Sprat:								
Cod:								
Flounder:								

BYCATCH	Measured (y/n)	Counted (y/n)	Aged (y/n)
Plaice:			
Dab:			
Turbot:			
Brill:			
Sole:			
All other bychatch:			

6 REFERENCES

Alekseev, F.E. and Alekseeva, E.I. 1996. Assessment of gonad maturity stages and study of sex cycles, fecundity, eggs production and maturity rate of marine commercial fishes. AtlantNIRO, Kaliningrad. Mimeo, 75 pp. (In Russian).

Berner, M. 1960. Untersuchungen über den Dorschbestand (*Gadus morhua* L.) der Bornholm- und Arkonasee in den Jahren 1953–1955. Zeitschrift für Fischerei IX (7–10):481–602.

Chrzan, F. 1951. Studies on the biology of cod in the Gulf of Gdansk (in Polish). Rep. Sea Fish. Inst. 6:1–28.

Elwertowski, J. 1957. Biologiczna charakterystyka polskich polowow szprota w Baltyku Poludniowym w latach 1950–1954. [Biological characteristic of Polish sprat catches in the southern Baltic in 1950–1954]. Prace Mor. Inst. Ryb. 9:175–220.

Heincke, F. 1898. Naturgeschichte des Herings. Abhandl. des Seefischverb. 2:1–223.

ICES C.M. 1997/J:4. Report of the Baltic International Fish Survey Working Group.

Kiselevich, K. 1923. Instructions for biological observations. (In Russian). Referred in Pravdin (1966).

Maier, N.N. 1908. Beiträge zur Altersbestimmung der Fische. I.Allgemeines. Die Altersbestimmung nach Otolithen bei Scholle und Kabeljau. Wissensch. Meeresunters. 8:60–115.

Müller, H. 1999. The appropriate date of samling for estimating the proportion of spawners at age. Working document to the Baltic Fisheries Assessment Working Group Meeting, April 1999, 17p.

Oeberst, R. 1999. A universal function for the optimization of the number of age readings and length measurements for Age-Length-Key-Tables. Archive for Fishery Research (in press 1999)

Popiel, J. 1955. Z biologii sledzi baltyckich. [Biology of Baltic herring]. Prace Mor. Inst. Ryb. 8:5–68.

Pravdin, I. 1966. Guidlines for fisheries investigations. Pischevaja Promyshlenost Publ., Moscow. Mimeo: 376 pp. (In Russian).

Sorokin, V.P. 1957. The oogenesis and reproduction cycle of cod (*Gadus morhua L.*). Trudy PINRO 10:125–144. (In Russian). (English translation No. 72F49, Ministry of Agriculture, Fisheries and Food, United Kingdom 1961.)

Strzyzewska, K. 1969. Studium porownawcze populacji sledzi tracych sie u polskich wybrzezy Baltyku. Prace Mor. Inst. Ryb 15 (seria A): 211–278.

APPENDIX I – MATURITY KEY

1.VIRGIN

Male: Testes very thin translucent ribbon lying along an unbranched blood vessel. No sign of development.

Female: Ovaries small, elongated, whitish, translucent. No sign of development.

2. MATURING

Male: Development has obviously started, colour is progressing towards creamy white and the testes are filling more and more of the body cavity but sperm cannot be extruded with only moderate pressure.

Female: Development has obviously started, eggs are becoming larger and the ovaries are filling more and more of the body cavity but eggs cannot be extruded with only moderate pressure.

3. SPAWNING

Male: Will extrude sperm under moderate pressure to advanced stage of extruding sperm freely with some sperm still in the gonad.

Female: Will extrude eggs under moderate pressure to advanced stage of extruding eggs freely with some eggs still in the gonad.

4. SPENT

Male: Testes shrunken with little sperm in the gonads but often some in the gonoducts which can be extruded under light pressure.

Female: Ovaries shrunken with few residual eggs and much slime. Resting condition, firm, not translucent, showing no development.

5. RESTING (see remarks in ICES CM 1997/J:4, chapter 2.5)

Male: Testes firm, not translucent, showing any development.

Female: Ovaries firm, not translucent, showing no development.

Possibilities to classify the maturity stages of the BITS key:

Maturity stage (BITS code)	Purpose of classification: Estimation of spawning stock size	Estimation of sexual maturity
1. VIRGIN	immature (nonspawner)	immature
2. MATURING	mature (spawner)	mature
3. SPAWNING	mature (spawner)	mature
4. SPENT	mature (spawner)	mature
5. RESTING	‘immature’ (nonspawner)	mature

APPENDIX II – CONVERSION TABLES FOR MATURITY KEYS

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

Country Species Source	BITS All ICES (1997)	Denmark Cod Modif. From Maier (1908), Berner (1960)	Estonia All Kiselevich (1923), Pravdin (1966)	Finland not available	Germany Cod Modif. from Maier (1908). Berner (1960)	Latvia Cod Kiselevich (1923), Pravdin (1966)	Poland Cod Maier (1908), Chrzan (1951)	Russia Cod Sorokin (1957, 1960) modified by Alekseev, Allekseeva (1996)	Sweden Cod Modif. from Maier (1908)
Maturity stage ([1])	Code								
VIRGIN (immature)	1	I, II	I		I	Juvenis, II	I	Juv., II	I
MATURING (mature)	2	III-V	II-IV		III-V	III, IV	III-V	III, IV	III-V
SPAWNING (mature)	3	VI, VII	V		VI,VII	V	VI,VII	V, VI (V), VI (IV)	VI
SPENT (mature)	4	VIII	VI		VIII	VI	VIII	VI	VII,VIII
RESTING (mature/ immature[2])	5	IX, X	II		II	II	II	VI - II	II

[1]sexual maturity for estimating the proportion of spawners.
[2]should be used when the investigation was during the prespawning and early spawning time (still no spent individuals). Individuals will not contribute to the spawning stock in the present year.

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

Country Species Source	BITS All ICES (1997)	Denmark	Estonia All Kiselevich (1923), Pravdin (1966)	Finland not available	Germany Herring Modif. from Heincke (1998)	Latvia Herring Kiselevich (1923)	Poland Herring Modif. fr. Maier. Popiel (1955) Strzyzewska(1969)	Russia Herring Kiselevich (1923)	Sweden Herring ICES (1962)
<u>Maturity stage</u> (1[1]	<u>Code</u>								
VIRGIN (immature)	1		I		I	I	I, II	Juv., II	I, II
MATURING (mature)	2		II-IV		III, IV	III, IV	III-V	III, IV	III-V
SPAWNING (mature)	3		V		V, VI	V	VI, VII	V	VI
SPENT (mature)	4		VI		VII, VIII	VI	VIII	VI	VII
RESTING (mature/ immature[2])	5		II		II, IX	II (VI)	-	VI (II)	VIII

[1]sexual maturity for estimating the proportion of spawners.
[2]should be used when the investigation was during the prespawning and early spawning time (still no spent individuals).
Individuals will not contribute to the spawning stock in the present year.

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

Country Species Source	BITS All ICES (1997)	Denmark No estimations	Estonia All Kiselevich (1923), Pravdin (1966)	Finland not available	Germany Sprat Rechlin (unpublished)	Latvia Sprat Alekseev, Alekseeva (1996)	Poland Sprat Maier (1908), Elwertowski (1957)	Russia Sprat Alekseev, Alekseeva (1996)	Sweden not available
Maturity stage ([1])	Code								
VIRGIN (immature)	1		I		I	I	I	Juv., II	
MATURING (mature)	2		II-IV		III, IV	III, IV, VI (III) VI (IV)	III-V	III, IV	
SPAWNING (mature)	3		V		V, VI	V, VI (V)	VI, VII	V, VI (V), VI (IV)	
SPENT (mature)	4		VI		VII, VIII	VI	VIII	VI	
RESTING (mature/ immature[2])	5		II		II	II	II	VI (II)	

[1]sexual maturity for estimating the proportion of spawners (mature individuals).
[2]should be used when the investigation was during the prespawning and early spawning time (still no spent individuals)
Individuals will not contribute to the spawning stock in the present year.

The table convert the codes of the national maturity key into the codes of the BITS key for flatfishes

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

[1] sexual maturity for estimating the proportion of spawners (mature individuals).
[2] should be used when the investigation was during the prespawning and early spawning time (still no spent individuals). Individuals will not contribute to the spawning stock in the present year.

APPENDIX III – ALPHA CODES FOR COUNTRIES AND SHIPS

COUNTRY	ICES CODE 1)	SHIP´S NAME	BITS CODE
Denmark	DEN	Dana (old)	DAN
		Dana (new)	DAN2
		J.C. Svabo	JCS
		Havfisken	HAF
		Havkatten	HAK
Germany	GFR	Anton Dohrn (old)	AND
		Anton Dohrn (new)	AND2
		Solea	SOL
		Walther Herwig	WAH
		Clupea	CLP
		Eisbär	EIS
Sweden	SWE	Thesis	THE
		Skagerak	SKA
		Argos	ARG
		Ancylus	ACY
Estonia	EST	Koha	KOH
Finland	FIN		
Latvia	LAT 1)	Baltijas Petnieks	BPE
		Zvezda Baltiki	ZBA
		Monokristal	MON
		Commercial Latvia Vessel	CLV
Poland	POL	Baltica	BAL
		Commercial Vessel	GDY
Russia	RUS	Monokristal	MON
		Atlantida	ATLD
		Atlantniro	ATL
Lithuania	LTU 1)	Darius	DAR

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

APPENDIX IV – ALPHANUMERIC CODES

FOR DEMERSL TRAWL GEARS

TRAWL SPECIFICATION	TRAWL POPULAR NAME	RESEARCH VESSEL
DT	Russian bottom trawl	Monokristal
LPT	Latvian Pelagic Trawl	Baltijas Petnieks, Zvezda Baltiki
LBT	Latvian Bottom trawl	Baltijas Petnieks
GOV	Grand Overture Verticale	Argos, Dana
DBT	Danish bottom trawl	Dana
EXP	Danish winged bottom trawl	Dana
SON	Sonderborg trawl	Clupea, Solea
H20	Herring ground trawl (H20/25)	Solea, Eisbär
P20	Herring bottom trawl (P20/25)	Commercial Vessel, Baltica
TV1	Large TV trawl	Havfisken
TV2	Small TV trawl	Havkatten
FOT	Fotö bottom trawl	Argos
LCT	Lithuanian cod trawl	Darius
ESB	Estonian small bottom trawl	Koha
HAK	Hake-4M	Atlantniro, Atlantida
CHP	Cod Hopper	Solea
MWT	Mid water trawl 664	Solea
TV3	TV trawl	All vessels

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

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

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

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

Further quantitative numeric information on rigging of gear is defined in positions 74-95, in Record Type 1.

NB: This code must still be considered as a preliminary one. More detailed information on the gears used in the past is required before a completely comprehensive coding system can be developed.

APPENDIX V – RECORDED SPECIES CODES USED IN RECORD TYPE 1.

Standard species for Baltic International Trawl surveys are listed in Appendix VI. NODC species codes are given in Appendix VII.

NB: Zero catches of a particular species in a haul may be included in or excluded from the file. However, any species deliberately excluded from a subset, or an invalid species for a particular haul, should be included for each haul with a species validity code 0!

RECORDED STANDARD SPECIES LIST CODES (POSITION 65)

0 = No standard species recorded
1 = All (4) standard species recorded
2 = Pelagic (2) standard species recorded Note 1)
3 = Bottom (2) standard species recorded 1)
4 = Individual (1) standard species recorded 2)

RECORDED BY-CATCH SPECIES LIST CODES (POSITION 66)

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

1) For definition see Appendix VI.
2) If this code is applied, zero catches of the species recorded must be recorded in Record Type 2 format.

APPENDIX VI – OFFICIAL 10-NUMERIC NODC SPECIES CODES FOR STANDARD AND CLOSED BY-CATCH LISTS

REPORTED GROUP	SPECIES	NODC code
Standard Pelagic species	Herring	8747010201
	Sprat	8747011701
Standard Bottom species	Cod	8791030402
	Flounder	8857041402
By-catch Flatfish	Plaice	8857041502
	Dab	8857040904
	Turbot	8857030402
	Brill	8857030403
	Sole	8858010601

APPENDIX VII – OFFICIAL NODC CODE FOR FISH SPECIES (IN TAXONOMIC ORDER)

8603010000	Petromyzonidae		
8603010200	Lampetra	8603010217	Lampetra fluviatilis
		8603010218	Lampetra planeri
8603010300	Petromyzon	8603010301	Petromyzon marinus
8606010000	Myxinidae		
8606010200	Myxine	8606010201	Myxine glutinosa
8705010000	Chlamydoselachidae		
8705010100	Chlamydoselach	8705010101	Chlamydoselach anguineus
8705020000	Hexanchidae		
8705020100	Hexanchus	8705020101	Hexanchus griseus
8707040000	Lamnidae		
8707040200	Cetorhinus	8707040201	Cetorhinus maximus
8707040300	Lamna	8707040302	Lamna nasus
8707040400	Alopias	8707040401	Alopias vulpinus
8707040500	Isurus	8707040501	Isurus oxyrhinchus
8708010000	Scyliorhinidae		
8708010200	Galeus	8708010203	Galeus melastomus
8708010300	Scyliorhinus	8708010306	Scyliorhinus caniculus
		8708010307	Scyliorhinus stellaris
8708010700	Pseudotriakis	8708010701	Pseudotriakis microdon
8708020000	Carcharinidae		
8708020100	Galeorhinus	8708020102	Galeorhinus galeus
8708020200	Galeocerdo	8708020201	Galeocerdo cuvier
8708020400	Mustelus	8708020408	Mustelus asterias
		8708020409	Mustelus mustelus
		8708020410	Mustelus punctulatus
8708020600	Prionace	8708020601	Prionace glauca
8708030000	Sphyrnidae		
8708030100	Sphyrna	8708030102	Sphyrna zygaena
		8708030103	Sphyrna lewini
		8708030105	Sphyrna tudes
8710010000	Squalidae		
8710010100	Somniosus	8710010102	Somniosus microcephalus
8710010200	Squalus	8710010201	Squalus acanthias
		8710010204	Squalus blainvillei
8710010300	Centrophorus	8710010301	Centrophorus granulosus
		8710010302	Centrophorus squamosus
		8710010303	Centrophorus uyato
8710010400	Dalatias	8710010401	Dalatias licha
8710010500	Etmopterus	8710010503	Etmopterus princeps
		8710010510	Etmopterus spinax
8710010700	Oxynotus	8710010702	Oxynotus centrina
		8710010703	Oxynotus paradoxus
8710010900	Centroscyllium	8710010901	Centroscyllium fabricii
8710011000	Echinorhinus	8710011001	Echinorhinus brucus
8710011200	Centroscymnus	8710011201	Centroscymnus coelolepis
		8710011202	Centroscymnus crepidater
8710011400	Deania	8710011401	Deania calceus
8710011600	Scymnodon	8710011601	Scymnodon ringens
		8710011602	Scymnodon obscurus
8711010000	Squatinidae		
8711010100	Squatina	8711010103	Squatina squatina
8713030000	Torpedinidae		
8713030100	Torpedo	8713030102	Torpedo nobiliana
		8713030104	Torpedo torpedo
		8713030105	Torpedo marmorata
8713040000	Rajidae		
8713040100	Raja	8713040134	Raja radiata
		8713040138	Raja brachyura

		8713040140	Raja microocellata
		8713040141	Raja montagui
		8713040142	Raja hyperborea
		8713040143	Raja batis
		8713040144	Raja nidarosiensis
		8713040145	Raja oxyrhynchus
		8713040146	Raja fullonica
8713040147	Raja circularis		
		8713040148	Raja naevus
		8713040150	Raja fyllae
		8713040151	Raja alba
		8713040153	Raja lintea
		8713040158	Raja undulata
		8713040159	Raja clavata
8713040800	Bathyraja	8713040801	Bathyraja pallida
		8713040803	Bathyraja spinicauda
8713050000	Dasyatidae		
8713050100	Dasyatis	8713050141	Dasyatis pastinacus
8713070000	Myliobatidae		
8713070200	Myliobatis	8713070204	Myliobatis aquila
8713080000	Mobulidae		
8713080200	Mobula	8713080205	Mobula mobular
8716020000	Chimaeridae		
8716020100	Hydrolagus	8716020103	Hydrolagus mirabilis
8716020200	Chimaera	8716020202	Chimaera monstrosa
8716030000	Rhinochimaeridae		
8716030200	Rhinochimaera	8716030201	Rhinochimaera atlantica
8729010000	Acipenseridae		
8729010100	Acipenser	8729010107	Acipenser sturio
8741010000	Anguillidae		
8741010100	Anguilla	8741010102	Anguilla anguilla
8741050000	Muraenidae		
8741050500	Muraena	8741050505	Muraena helena
8741120000	Congridae		
8741120100	Conger	8741120111	Conger conger
8741150000	Synaphobranchidae		
8741150100	Synaphobranchus	8741150104	Synaphobranchus kaupi
8741200000	Serrivomeridae		
8741200100	Serrivomer	8741200102	Serrivomer beani
		8741200104	Serrivomer parabeani
8741210000	Nemichthyidae		
8741210100	Avocettina	8741210102	Avocettina infans
8741210200	Nemichthys	8741210202	Nemichthys scolopaceus
8743030000	Notacanthidae		
8743030200	Polyacanthonotus	8743030204	Polyacanthonotus rissoanus
8743030300	Notocanthus	8743030301	Notocanthus chemnitzii
		8743030302	Notocanthus bonaparti
8747010000	Clupeidae		
8747010100	Alosa	8747010107	Alosa alosa
		8747010109	Alosa fallax
8747010200	Clupea	8747010201	Clupea harengus
8747011700	Sprattus	8747011701	Sprattus sprattus
8747012200	Sardina	8747012201	Sardina pilchardus
8747020000	Engraulidae		
8747020100	Engraulis	8747020104	Engraulis encrasicolus
8755010000	Salmonidae		
8755010100	Coregonus	8755010115	Coregonus oxyrhynchus
		8755010116	Coregonus albula
8755010200	Oncorhynchus	8755010201	Oncorhynchus gorbuscha
		8755010202	Oncorhynchus keta
8755010300	Salmo	8755010302	Salmo gairdneri
		8755010305	Salmo salar

		8755010306	Salmo trutta
8755010400	Salvelinus	8755010402	Salvelinus alpinus
		8755010404	Salvelinus fontinalis
8755010700	Thymallus	8755010704	Thymallus thymallus
8755010800	Hucho	8755010801	Hucho hucho
8755030000	Osmeridae		
8755030200	Mallotus	8755030201	Mallotus villosus
8755030300	Osmerus	8755030301	Osmerus eperlanus
8756010000	Argentinidae		
8756010200	Argentina	8756010203	Argentina silus
		8756010237	Argentina sphyraena
8758010000	Esocidae		
8758010100	Esox	8758010101	Esox lucius
8758020000	Umbridae		
8758020100	Umbra	8758020101	Umbra pygmaea
8758020103	Umbra krameri		
8759010000	Gonostomatidae		
8759010500	Maurolicus	8759010501	Maurolicus muelleri
8759020000	Sternoptychidae		
8759020100	Argyropelecus	8759020107	Argyropelecus olfersii
8760010000	Alepocephalidae		
8760010300	Alepocephalus	8760010302	Alepocephalus rostratus
		8760010305	Alepocephalus bairdi
8762070000	Paralepididae		
8762070200	Notolepis	8762070201	Notolepis rissoi
8762070400	Paralepis	8762070402	Paralepis coregonoides
8762140000	Myctophidae		
8762140300	Lampanyctus	8762140317	Lampanyctus crocodilus
8776010000	Cyprinidae		
8776010600	Notemigonus	8776010601	Notemigonus crysoleucas
8776014900	Abramis	8776014901	Abramis brama
8776017400	Rutilus	8776017401	Rutilus rutilus
8776019900	Vimba	8776019901	Vimba vimba
8784010000	Gobiesocidae		
8784010600	Lepadogaster	8784010601	Lepadogaster candollei
		8784010603	Lepadogaster lepadogaster
8784010700	Diplecogaster	8784010701	Diplecogaster bimaculata
8784010800	Apletodon	8784010801	Apletodon microcephalus
8786010000	Lophiidae		
8786010100	Lophius	8786010103	Lophius piscatorius
		8786010104	Lophius budegassa
8787020000	Antennariidae		
8787020200	Histrio	8787020201	Histrio histrio
8787020200	Antennarius	8787020203	Antennarius radiosus
8788030000	Himantolophiidae		
8788030200	Himantolophus	8788030201	Himantolophus groenlandicus
8788100000	Linophrynidae		
8788100100	Linophryne	8788100102	Linophryne lucifer
8791010000	Moridae		
8791010100	Antimora	8791010101	Antimora rostrata
8791010200	Laemonema	8791010203	Laemonema latifrons
8791010400	Mora	8791010401	Mora moro
8791010500	Lepidion	8791010501	Lepidion eques
8791010600	Halargyreus	8791010601	Halargyreus affinis
8791030000	Gadidae		
8791030200	Boreogadus	8791030201	Boreogadus saida
8791030400	Gadus	8791030402	Gadus morhua
8791030800	Lota	8791030801	Lota lota
8791030900	Pollachius	8791030901	Pollachius virens
		8791030902	Pollachius pollachius
8791031100	Brosme	8791031101	Brosme brosme
8791031300	Melanogrammus	8791031301	Melanogrammus aeglefinus

8791031500	Rhinonemus	8791031501	Rhinonemus cimbrius
8791031600	Phycis	8791031602	Phycis blennoides
8791031700	Trisopterus	8791031701	Trisopterus minutus
		8791031702	Trisopterus luscus
		8791031703	Trisopterus esmarki
8791031800	Merlangius	8791031801	Merlangius merlangus
8791031900	Molva	8791031901	Molva molva
		8791031902	Molva dipterygia
		8791031904	Molva macropthalma
8791032000	Gaidropsurus	8791032001	Gaidropsurus vulgaris
		8791032002	Gaidropsurus mediterraneus
8791032100	Gadiculus	8791032101	Gadiculus argenteus
8791032200	Micromesistius	8791032201	Micromesistius poutassou
8791032300	Raniceps	8791032301	Raniceps raninus
8791032400	Ciliata	8791032401	Ciliata mustela
		8791032402	Ciliata septentrionalis
8791032500	Onogadus	8791032501	Onogadus argenteus
8791032600	Antonogadus	8791032601	Antonogadus macropthalmus
8791040000	Merluccidae		
8791040100	Merluccius	8791040105	Merluccius merluccius
8792010000	Ophidiidae		
8792010600	Ophidion	8792010607	Ophidion barbatum
8792020000	Carapidae		
8792020200	Echiodon	8792020202	Echiodon drummondi
8793010000	Zoarcidae		
8793010500	Lycenchelys	8793010513	Lycenchelys sarsi
8793010700	Lycodes	8793010724	Lycodes vahlii
		8793010725	Lycodes esmarkii
8793012000	Zoarces	8793012001	Zoarces viviparus
8794010000	Macrouridae		
8794010100	Coryphaenoides	8794010117	Coryphaenoides rupestris
8794010600	Malacocephalus	8794010601	Malacocephalus laevis
8794010800	Nezumia	8794010801	Nezumia aequalis
8794011500	Trachyrhynchus	8794011501	Trachyrhynchus trachyrhynchus
		8794011502	Trachyrhynchus murrayi
8794011600	Macrourus	8794011601	Macrourus berglax
8803010000	Exocoetidae		
8803010100	Cypselurus	8803010101	Cypselurus heterurus
		8803010106	Cypselurus pinnatibarbatus
8803010500	Danichthys	8803010501	Danichthys rondeletii
8803010700	Exocoetus	8803010701	Exocoetus obtusirostris
8803020000	Belonidae		
8803020500	Belone	8803020502	Belone belone
8803030000	Scomberesocidae		
8803030200	Scomberesox	8803030201	Scomberesox saurus
8805020000	Atherinidae		
8805021000	Atherina	8805021002	Atherina boyeri
		8805021003	Atherina presbyter
8810010000	Diretmidae		
8810010100	Diretmus	8810010101	Diretmus argenteus
8810020000	Trachichthyidae		
8810020100	Gephyroberyx	8810020101	Gephyroberyx darwini
8810020200	Hoplostethus	8810020201	Hoplostethus atlanticus
		8810020202	Hoplostethus mediterraneus
8810050000	Berycidae		
8810050100	Beryx	8810050101	Beryx decadactylus
		8810050102	Beryx splendens
8811030000	Zeidae		
8811030300	Zeus	8811030301	Zeus faber
8811060000	Caproidae		
8811060300	Capros	8811060301	Capros aper
8813010000	Lampridae		

8813010100	Lampris	8813010102	Lampris guttatus
8815020000	Trachipteridae		
8815020100	Trachipterus	8815020102	Trachipterus arcticus
8815030000	Regalecidae		
8815030100	Regalecus	8815030101	Regalecus glesne
8818010000	Gasterosteidae		
8818010100	Gasterosteus	8818010101	Gasterosteus aculeatus
8818010200	Pungitius	8818010201	Pungitius pungitius
8818010500	Spinachia	8818010501	Spinachia spinachia
8819030000	Macrorhamphosidae		
8819030100	Macrorhamphosus	8819030101	Macrorhamphosus scolopax
8820020000	Syngnathidae		
8820020100	Syngnathus	8820020119	Syngnathus rostellatus
		8820020120	Syngnathus acus
		8820020123	Syngnathus typhle
8820020200	Hippocampus	8820020209	Hippocampus hippocampus
		8820020210	Hippocampus ramulosus
8820022100	Entelurus	8820022101	Entelurus aequoreus
8820022200	Nerophis	8820022201	Nerophis lumbriciformis
		8820022202	Nerophis ophidion
8826010000	Scorpaenidae		
8826010100	Sebastes	8826010139	Sebastes marinus
		8826010151	Sebastes mentella
		8826010175	Sebastes viviparus
8826010300	Helicolenus	8826010301	Helicolenus dactylopterus
8826010600	Scorpaena	8826010628	Scorpaena scropha
		8826010629	Scorpaena porcus
8826011100	Trachyscorpia	8826011101	Trachyscorpia cristulata
8826020000	Triglidae		
8826020300	Peristedion	8826020316	Peristedion cataphractum
8826020500	Trigla	8826020501	Trigla lucerna
		8826020503	Trigla lyra
8826020600	Eutrigla	8826020601	Eutrigla gurnardus
8826020700	Trigloporus	8826020701	Trigloporus lastoviza
8826020800	Aspitrigla	8826020801	Aspitrigla cuculus
		8826020802	Aspitrigla obscura
8831010000	Icelidae		
8831010100	Icelus	8831010101	Icelus bicornis
8831020000	Cottidae		
8831020300	Artediellus	8831020308	Artediellus europaeus
8831020800	Cottus	8831020825	Cottus gobio
8831022200	Myoxocephalus	8831022205	Myoxocephalus quadricornis
		8831022207	Myoxocephalus scorpius
8831023800	Triglops	8831023807	Triglops murrayi
8831024600	Taurulus	8831024601	Taurulus bubalis
		8831024602	Taurulus lilljeborgi
8831080000	Agonidae		
8831080800	Agonus	8831080801	Agonus decagonus
		8831080803	Agonus cataphractus
8831090000	Cyclopteridae		
8831090200	Careproctus	8831090232	Careproctus longipinnis
		8831090233	Careproctus reinhardi
8831090800	Liparis	8831090828	Liparis liparis
		8831090860	Liparis montagui
8831091500	Cyclopterus	8831091501	Cyclopterus lumpus
8835020000	Serranidae		
8835020100	Morone	8835020102	Morone saxatilis
8835020400	Epinephelus	8835020435	Epinephelus guaza
8835022300	Serranus	8835022316	Serranus cabrilla
8835022800	Polyprion	8835022801	Polyprion americanus
8835160000	Centrarchidae		
8835160200	Ambloplites	8835160201	Ambloplites rupestris

8835160500	Lepomis	8835160505	Lepomis gibbosus
8835160600	Micropterus	8835160601	Micropterus dolomieui
		8835160602	Micropterus salmoides
8835180000	Apogonidae		
8835180400	Epigonus	8835180403	Epigonus telescopus
8835181200	Rhectogramma	8835181201	Rhectogramma sherborni
8835200200	Perca	8835200200	Perca fluviatilis
8835200400	Stizostedion	8835200403	Stizostedion lucioperca
8835200600	Gymnocephalus	8835200601	Gymnocephalus cernua
8835270000	Echeneidae		
8835270100	Remora	8835270103	Remora remora
8835280000	Carangidae		
8835280100	Trachurus	8835280103	Trachurus trachurus
		8835280105	Trachurus mediterraneus
		8835280106	Trachurus picturatus
8835280800	Seriola	8835280801	Seriola dumerili
8835280900	Trachinotus	8835280911	Trachinotus ovatus
8835281500	Naucrates	8835281501	Naucrates ductor
8835282400	Lichia	8835282401	Lichia amia
8835330000	Caristiidae		
8835330100	Caristius	8835330101	Caristius macropus
8835430000	Sparidae		
8835430100	Dentex	8835430102	Dentex macropthalmus
		8835430105	Dentex dentex
8835430600	Pagrus	8835430601	Pagrus pagrus
8835430800	Pagellus	8835430801	Pagellus bogaraveo
		8835430804	Pagellus erythrinus
8835430900	Boops	8835430901	Boops boops
8835431100	Sparus	8835431101	Sparus aurata
		8835431102	Sparus pagurus
8835431200	Spondyliosoma	8835431201	Spondyliosoma cantharus
8835440000	Sciaenidae		
8835441100	Umbrina	8835441107	Umbrina canariensis
		8835441108	Umbrina cirrosa
8835442700	Argyrosomus	8835442701	Argyrosomus regium
8835450000	Mullidae		
8835450200	Mullus	8835450202	Mullus surmuletus
		8835450203	Mullus barbatus
8835700000	Cepolidae		
8835700100	Cepola	8835700102	Cepola rubescens
8835710000	Bramidae		
8835710100	Brama	8835710102	Brama brama
8835710300	Pterycombus	8835710301	Pterycombus brama
8835710400	Taractes	8835710401	Taractes longipinnis
		8835710403	Taractes asper
8835720000	Dicentrarchidae		
8835720100	Dicentrarchus	8835720101	Dicentrarchus labrax
		8835720102	Dicentrarchus punctatus
8836010000	Mugilidae		
8836010100	Mugil	8836010101	Mugil cephalus
8836010700	Chelon	8836010704	Chelon labrosus
8836010900	Liza	8836010901	Liza ramada
		8836010902	Liza auratus
8839010000	Labridae		
8839012300	Coris	8839012306	Coris julis
8839013300	Crenilabrus	8839013301	Crenilabrus melops
8839013400	Centrolabrus	8839013401	Centrolabrus exoletus
8839013500	Ctenolabrus	8839013501	Ctenolabrus rupestris
8839013600	Labrus	8839013603	Labrus berggylta
		8839013605	Labrus mixtus
8839013700	Acantholabrus	8839013701	Acantholabrus palloni
8840060000	Trachinidae		

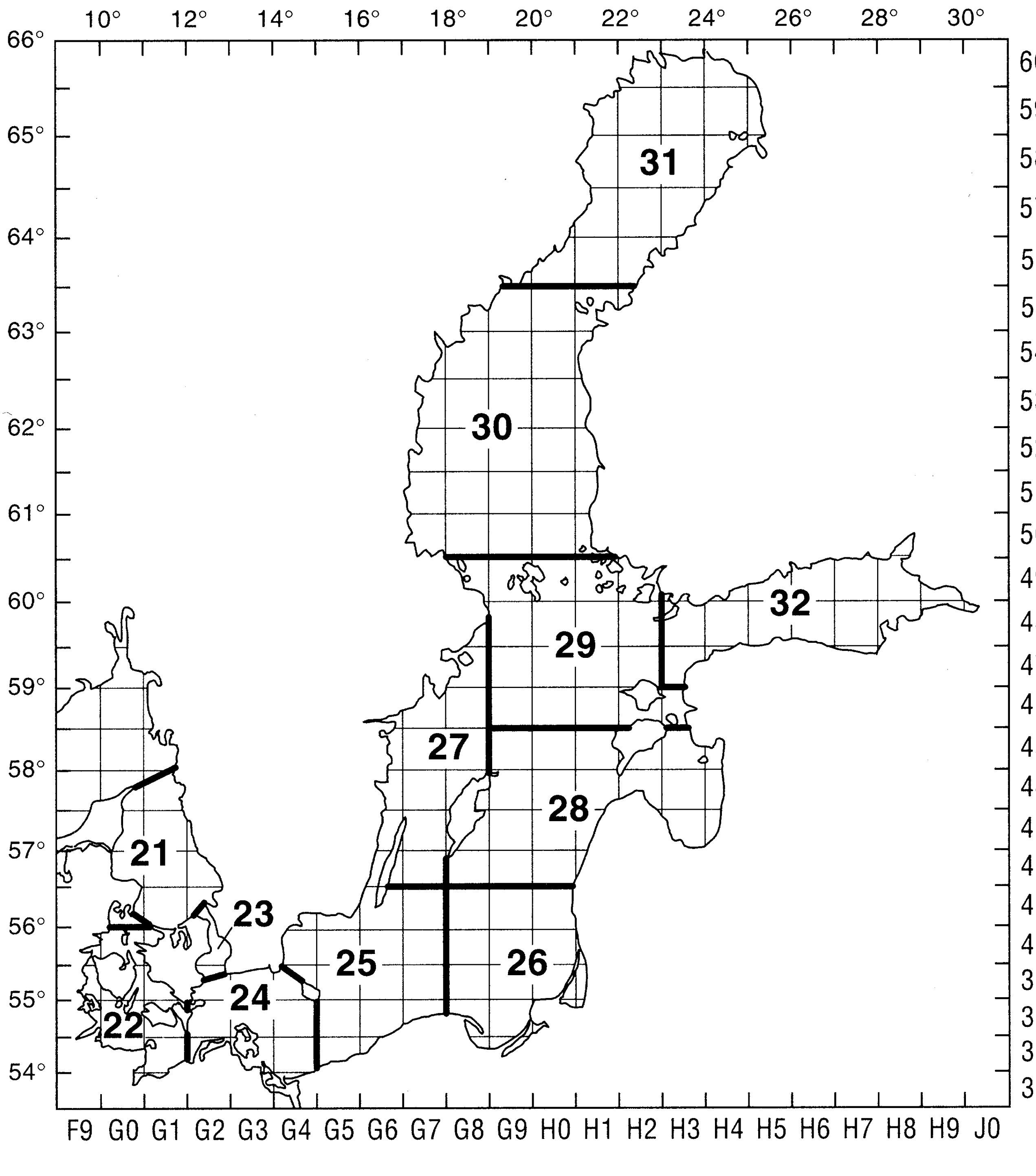
8840060100	Trachinus	8840060101	Trachinus vipera
		8840060102	Trachinus draco
8842010000	Blenniidae		
8842010100	Blennius	8842010104	Blennius ocellaris
		8842010110	Blennius gattorugine
		8842010115	Blennius pholis
8842012400	Coryphoblennius	8842012401	Coryphoblennius galerita
8842020000	Anarhichadidae		
8842020100	Anarhichas	8842020102	Anarhichas denticulatus
		8842020103	Anarhichas lupus
		8842020104	Anarhichas minor
8842120000	Stichaeidae		
8842120500	Chirolophis	8842120505	Chirolophis ascanii
8842120900	Lumpenus	8842120905	Lumpenus lampretaeformis
8842121800	Leptoclinus	8842121801	Leptoclinus maculatus
8842130000	Pholididae		
8842130200	Pholis	8842130209	Pholis gunnellus
8845010000	Ammodytidae		
8845010100	Ammodytes	8845010105	Ammodytes tobianus
		8845010106	Ammodytes marinus
8845010200	Gymnammodytes	8845010201	Gymnammodytes semisquamatus
8845010300	Hyperoplus	8845010301	Hyperoplus lanceolatus
		8845010302	Hyperoplus immaculatus
8846010000	Callionymidae		
8846010100	Callionymus	8846010106	Callionymus lyra
		8846010107	Callionymus maculatus
		8846010120	Callionymus reticulatus
8847010000	Gobiidae		
8847011300	Gobius	8847011304	Gobius auratus
		8847011307	Gobius cobitis
		8847011308	Gobius cruentatus
		8847011316	Gobius niger
		8847011320	Gobius paganellus
		8847011325	Gobius gasteveni
8847014900	Crystallogobius	8847014901	Crystallogobius linearis
8847015000	Gobiusculus	8847015001	Gobiusculus flavescens
8847015100	Pomatoschistus	8847015101	Pomatoschistus minutus
		8847015102	Pomatoschistus pictus
		8847015103	Pomatoschistus microps
		8847015104	Pomatoschistus norvegicus
8847016500	Lebetus	8847016501	Lebetus orca
		8847016502	Lebetus guilleti
8847016600	Aphia	8847016601	Aphia minuta
8847016700	Lesueurigobius	8847016702	Lesueurigobius friesii
8847016800	Buenia	8847016802	Buenia jeffreysii
8847016900	Thorogobius	8847016901	Thorogobius ephippiatus
8847017500	Neogobius	8847017500	Neogobius melanostomus
8850010000	Gemplydae		
8850010400	Ruvettus	8850010401	Ruvettus pretiosus
8850010700	Nesarchus	8850010701	Nesarchus nasutus
8850020000	Trichiuridae		
8850020100	Benthodesmus	8850020101	Benthodesmus simonyi
8850020200	Trichiurus	8850020201	Trichiurus lepturus
8850020300	Aphanopus	8850020301	Aphanopus carbo
8850020400	Lepidopus	8850020401	Lepidopus caudatus
8850030000	Scombridae		
8850030100	Euthynnus	8850030101	Euthynnus pelamis
		8850030105	Euthynnus quadripunctatus
8850030200	Sarda	8850030202	Sarda sarda
8850030300	Scomber	8850030301	Scomber colias
		8850030302	Scomber scombrus

8850030400	Thunnus	8850030401	Thunnus alalunga
		8850030402	Thunnus thynnus
		8850030403	Thunnus albacares
		8850030404	Thunnus obesus
8850030700	Auxis	8850030701	Auxis rochei
		8850030702	Auxis thazard
8850031200	Orcynopsis	8850031201	Orcynopsis unicolor
8850040000	Xiphiidae		
8850040100	Xiphias	8850040101	Xiphias gladius
8850050000	Luvaridae		
8850050100	Luvarus	8850050101	Luvarus imperialis
8850060000	Istiophoridae		
8850060100	Istiophorus	8850060101	Istiophorus platypterus
8850060300	Tetrapterus	8850060301	Tetrapterus albidus
8851010000	Centrolophidae		
8851010300	Centrolophus	8851010301	Centrolophus niger
8851020000	Nomeidae		
8851020200	Cubiceps	8851020203	Cubiceps gracilis
8851030000	Stromateidae		
8851030200	Hyperoglyphe	8851030201	Hyperoglyphe perciforma
8851030400	Schedophilus	8851030401	Schedophilus medusophagus
8857030000	Bothidae		
8857030400	Scophthalmus	8857030402	Scophthalmus maximus
		8857030403	Scophthalmus rhombus
8857031700	Arnoglossus	8857031702	Arnoglossus laterna
		8857031703	Arnoglossus imperialis
		8857031706	Arnoglossus thori
8857032100	Zeugopterus	8857032101	Zeugopterus punctatus
8857032200	Phrynorhombus	8857032201	Phrynorhombus norvegicus
		8857032202	Phrynorhombus regius
8857032300	Lepidorhombus	8857032301	Lepidorhombus boscii
		8857032302	Lepidorhombus whiffiagonis
8857040000	Pleuronectidae		
8857040500	Glyptocephalus	8857040502	Glyptocephalus cynoglossus
8857040600	Hippoglossoides	8857040603	Hippoglossoides platessoides
8857040900	Limanda	8857040904	Limanda limanda
8857041200	Microstomus	8857041202	Microstomus kitt
8857041400	Platichthys	8857041402	Platichthys flesus
8857041500	Pleuronectes	8857041502	Pleuronectes platessa
8857041800	Reinhardtius	8857041801	Reinhardtius hippoglossoides
8857041900	Hippoglossus	8857041902	Hippoglossus hippoglossus
8858010000	Soleidae		
8858010600	Solea	8858010601	Solea solea
		8858010610	Solea lascaris
8858010800	Buglossidium	8858010801	Buglossidium luteum
8858010900	Microchirus	8858010902	Microchirus azevia
		8858010903	Microchirus variegatus
8858011000	Bathysolea	8858011001	Bathysolea profundicola
8858011100	Dicologlossa	8858011101	Dicologlossa cuneata
8858020000	Cynoglossidae		
8858020200	Cynoglossus	8858020201	Cynoglossus browni
8860020000	Balistidae		
8860020200	Balistes	8860020205	Balistes carolinensis
8860020500	Canthidermis	8860020501	Canthidermis maculatus
8861010000	Tetradontidae		
8861010100	Lagocephalus	8861010102	Lagocephalus lagocephalus
8861040000	Molidae		
8861040100	Mola	8861040101	Mola mola
8861040200	Ranzania	8861040201	Ranzania laevis

APPENDIX VIII – SPECIES VALIDITY CODE

0 =	INVALID INFORMATION	Information lost. A note should be given with the cause for the classification as invalid.
1 =	VALID INFORMATION	No per hour and total length composition recorded; applies also when No per hour is zero.
4 =	TOTAL NO PER HOUR ONLY	Catch sampled for No per hour only; no length measurements.
9 =	VALID INFORMATION AVAIL-ABLE BUT NOT RECORDED ON THE FILE	Data no processed on the file

APPENDIX IX – SUB/DIVISIONS AND RECTANGELS CODES



APPENDIX X – MAXIMUM LENGTH OF FISH SPECIES IN THE BITS CHECKING PROGRAM

NODC code	Latin name	English name	Max length (cm)
	Clupeiformes		120
8747010201	*Clupea harengus*	Herring	040
8747011701	*sprattus sprattus*	Sprat	018
8747010100	*Alosa fallax*	Shad	050
8747020104	*Engraulis encrasicolus*	european anchovy	020
8755010306	*Salmo trutta*	sea trout	095
8755010302	*Salmo gairdneri*	rainbow trout	050
8755010115	*Coregonus lavaretus*	Whitefish	065
8755030301	*Osmerus eperlanus*	Smelt	029
8758010101	*Esox lucius*	Pike	120
8791030000	***Gadiformes***		120
8791030402	*Gadus morrhua*	Cod	135
8791031801	*Enchelyopus cimbrius*	four-bearded rockling	035
8791031801	*Merlangius merlangus*	Whiting	060
8857040000	***Pleuronectiformes***		060
8857041402	*Platichthys flesus*	Flounder	052
8857041502	*Pleuronectes platessa*	Plaice	057
8857040904	*Limanda limanda*	common dab	040
8857030402	*Scophthalmus maximus*	Turbot	060
	Perciformes		085
8835200403	*Stizostedion lucioperca*	Pikeperch	085
8835200202	*Perca fluviatilis*	Perch	040
8835200601	*Gymnocephalus cernua*	Ruff	015
8842130209	*Pholis gunnellus*	Butterfish	020
8842120905	*Lumpenus Lampretaeformis*	serpent blenny	035
8793012001	*Zoarces viviparus*	eel pout	040
8845010105	*Ammodytes tobianus*	sand eel	020
8845010301	*Hyperoplus lanceolatus*	greater sand eel	035
8850030302	*Scomber scombrus*	Mackerel	065
8835280103	*Trachurus Trachurus*	horse mackerel	045
8847010000	*Gobiidae*	Gobies	007
8847017505	*Neogobius melanostomus*	round goby	025
8831022207	*Myoxocephalus scorpius*	sea scorpion	035
8831080803	*Agonus cataphractus*	Pogge	020
8831091501	*Cyclopterus lumpus*	Lumpfish	045
8831090828	*Liparis liparis*	sea snail	010
8818010000	***Gasterosteiformes***		007
8818010101	*Gasterosteus aculeatus*	Stickleback	007
8776010000	***Cypriniformes***		060
8776014901	*Abramis brama*	Bream	060
8776010601	*Vimba vimba*	Vimba	040
8776017401	*Rutilus rutilus*	Roach	030
8741010000	***Anguilliformes***		180
8741010102	*Anguilla anguilla*	Eel	180
8603010000	***Petromyzoniformes***		090
8603010300	*Petromyzon sp.*	Lampreys	090

APPENDIX XI – ASSIGNMENT OF THE QUARTERS OF SQUARES TO THE ICES SUB-DIVISIONS

				10°00				12°00				14°00				16°00				18°00				20°00					
		F9	F9	G0	G0	G1	G1	G2	G2	G3	G3	G4	G4	G5	G5	G6	G6	G7	G7	G8	G8	G9	G9	H0	H0	H1	H1	H2	H2
	50																												
60°30	50																												
	49																			29	29	29	29	29	29	29	29	29	29
60°00	49																			29	29	29	29	29	29	29	29	29	29
	48																					29	29	29	29	29	29	29	29
59°30	48																				29	29	29	29	29	29	29	29	29
	47																			27	27	29	29	29	29	29	29	29	29
59°00	47																			27	27	29	29	29	29	29	29	29	29
	46																	27	27	27	27	29	29	29	29	29	29	29	29
58°30	46															27	27	27	27	27	27	29	29	29	29	29	29	29	29
	45															27	27	27	27	27	27	28	28	28	28	28	28		
58°00	45																27	27	27	27	27	28	28	28	28	28	28		
	44					21	21									27	27	27	27	27	27	28	28	28	28	28	28		
57°30	44				21	21	21										27	27	27	27	28	28	28	28	28	28	28		
	43				21	21	21	21								27	27	27	27	27	28	28	28	28	28	28	28		
57°00	43			21	21	21	21	21								27	27	27	27	27	28	28	28	28	28	28			
	42			21	21	21	21	21	21							27	27	27	27	28	28	28	28	28	28	28			
56°30	42			21	21	21	21	21	21							27	27	27	27	28	28	28	28	28	28	28			
	41				21	21	21	21	21							25	25	25	25	26	26	26	26	26	26				
56°00	41			22	22	21	21	23	23			25	25	25	25	25	25	25	25	26	26	26	26	26	26	26			
	40			22	22	22	22	23	23			25	25	25	25	25	25	25	25	26	26	26	26	26	26	26			
55°30	40		22	22	22	22		23	23			25	25	25	25	25	25	25	25	26	26	26	26	26	26	26			
	39		22		22	22		23	23	24	24	24	25	25	25	25	25	25	25	26	26	26	26	26	26	26			
55°00	39		22	22	22	22	22	24	24	24	24	24	24	25	25	25	25	25	25	26	26	26	26	26	26				
	38		22	22	22	22	22	24	24	24	24	24	24	25	25	25	25	25	25	26	26	26	26	26					
54°30	38		22	22	22	22	22	24	24	24	24	24	24	25	25	25	25	25		26	26	26	26	26	26				
	37			22	22	22	22	24	24	24	24	24	24	25	25	25					26	26	26						
54°00	37				22	22	22	24		24	24	24	24	25	25														
	36				22																								
	36																												
		F9	F9	G0	G0	G1	G1	G2	G2	G3	G3	G4	G4	G5	G5	G6	G6	G7	G7	G8	G8	G9	G9	H0	H0	H1	H1	H2	H2

APPENDIX XII – AREAS PER 10 M DEPTH RANGE BY SQUARE

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

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

strata	**SD 23**	41g2	40g2	39g2
Depth interval				
total	**896.5**	**186.7**	**384.9**	**324.9**
0 - 9	**319.2**	32.2	200.3	86.6
10 - 19	**403.4**	55.6	165.5	182.4
20 - 29	**166.1**	94.4	15.8	55.9
30 - 39	**6.7**	3.3	3.4	0.0
40 - 49	**1.1**	1.1	0.0	0.0
50 - 59	**0.0**	0.0	0.0	0.0
60 - 69	**0.0**	0.0	0.0	0.0
70 - 79	**0.0**	0.0	0.0	0.0
80 - 89	**0.0**	0.0	0.0	0.0
90 - 99	**0.0**	0.0	0.0	0.0
100 - 150	**0.0**	0.0	0.0	0.0
> 150	**0.0**	0.0	0.0	0.0

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

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

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

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

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

ANNEX 2

MANUAL FOR THE BALTIC INTERNATIONAL ACOUSTIC SURVEY

(BIAS)

Version 0.72

07.04.2000

TABLE OF CONTENTS

Section **Page**

1 INTRODUCTION

Hydroacoustic surveys have been conducted in the Baltic Sea internationally since 1978. The starting point was the cooperation between Sweden and the German Democratic Republic in October 1978, which produced the first acoustic estimates of total biomass of herring and sprat in the Baltic Main basin (Håkansson *et al*,. 1979). Since then there has been at least one annual hydroacoustic survey for herring and sprat stocks mainly for assessment purposes and results have been reported to ICES to be used for stock assessment (ICES. 1994a, 1995a, 1995b, Hagström *et al.*, 1991).

At the ICES Annual Science Conference in September 1997, the Baltic Fish Committee decided, that a manual for the International Acoustic Trawl Surveys in the Baltic area should be elaborated. The structure of the manual follows that of the Baltic International Trawl Surveys (BITS). In order to obtain a standardization for all ICES acoustic surveys some demands from the Manual for Herring Acoustic Surveys in ICES Divisions III, IV and VI (ICES, 1994b) are adopted.

The objective of the Baltic International Acoustic Surveys (BIAS) program is to standardize survey design, acoustic measurements, fishing method and data analysis throughout all national surveys where data are used as indices for assessment purposes.

2 SURVEY DESIGN

2.1 Area of observation

The acoustic surveys should cover the total area of ICES Division III. The border by subdivision is given in figure 2.1 and Table 2.1. The area is limited by the 10 m depth line.

2.2 Stratification

The stratification is based on ICES statistical rectangles with a range of 0.5 degrees in latitude and 1 degree in longitude.
The areas of all strata limited by the 10 m depth line are given in Table 2.2

2.3 Transects

Parallel transects are spaced on regular rectangle basis at a maximum distance of 15 nautical miles.
The transect density should be about 60 nm per 1000 nm².
In the vicinity of islands and in sounds the strategy of parallel transects leads to an unsuiTable coverage of the survey area. In this case a zig-zag course should be used to achieve a regular covering. The length of the survey track should be chosen proportional to the parallel case.

2.4 Observation time

The International Acoustic Survey is carried out in September/October. It is assumed that during this time of the year there is little or no emigration or immigration in the main part of the Baltic Sea so that the estimates are representing a good ‘snapshot’ of the herring and sprat resources.

In the shallow water areas of the Western Baltic a great part of the fish concentrations are close to the bottom during daytime and therefore not visible for the echosounder. This leads to an underestimation of fish. Therefore the survey should be carried out only during nighttime.

3 ACOUSTIC MEASUREMENTS

3.1 Equipment

The standard equipment used for the survey are the echosounder SIMRAD EK/EY-500 or SIMRAD EK-400.
The standard frequency used for the survey is 38 kHz.

3.2 Instrument settings

Some instrument settings will influence the acoustic measurements to a high degree. Particularly the following calibration settings in the ***Transceiver Menu*** are essential for the correct function of the acoustic device:

Max. Power
2-Way Beam Angle
Sv Transd. Gain
TS Transd. Gain

Additional in the split-beam case:

Angle Sens.Along
Angle Sens.Athw.
3dB Beamw.Along
3dB Beamw.Athw.
Alongship Offset
Athw.ship Offset

The following settings are recommended:

Pulse rate	1 sec.
Absorption coef.	3 dBkm
Pulse Length	Medium
Bandwidth	Wide

and in the ***Layer Menu***:

Threshold	-60 dB
Bottom margin	0.5 m

It is recommended to record this settings regularly to have a log about the main function of the acoustic measuring system.

It is also recommended that each year the same settings (Min Sv = -60dB) are used for the printer in order to facilitate comparison of echograms.

3.3 Sampling unit

The Elementary Sampling Distance Unit (ESDU) is the length of cruise track, where acoustic measurements are averaged to give one sample. It is recommended to use as averaging unit 1 nautical mile.

3.4 Calibration

A calibration of the transducer must be conducted at least once during the survey. If possible, the transducer should be calibrated both at the beginning and the end of the survey. Calibration procedures are described in appendix 2.

3.5 Intercalibration

When more than one ship is engaged in the same area the performance of the equipment should be compared by means of an intercalibration. Preferably the vessels should start and finish the intercalibration with fisheries hauls. A survey track should be chosen in areas with high density scattering layers. The settings of the acoustic equipment should be kept constant during the whole survey.

During the intercalibration one leading vessel should steam 0.5 nautical miles ahead of the other. The lateral distance between the survey tracks should be 0.3 nautical miles. The intercalibration track should be at least 40 nautical miles. It is stressed that the vessels have to change their position at least once during the operation.

4 FISHERY

4.1 Gear

Trawling is done with different pelagic gear in the midwater as well as in the near bottom. The collection of the trawl gears used in surveys is given in Table 4.1.

The stretched mesh size in the codend of the trawl should be 20 mm.

4.2 Method

The collection of biological samples is done to determine the species composition and length, age and weight distributions of target species detected by the echosounder system.

It is recommended to sample a minimum of 2 hauls per stratum.

Standard fishing speed is 3 - 4.5 knots.

Each haul is recommended to last for 30 minutes.

It has to be secured that all type of fish concentration is sampled for species recognition. In situations with fish vertically distributed over the whole water column, specifically in shallow waters, the whole depth range should be sampled by the trawl haul. With two or more fish layers in an area (Figure 4.2.1), all layers should be sampled by separate trawl hauls. If shoals and scattering layers are present (Figure 4.2.2), both should be sampled by separate trawl hauls.

4.3 Samples

4.3.1 Species composition

It should be achieved to sort the total catch into **all species** (Table 4.3.1). The corresponding weight per species should be registered.

In case of homogenous large catches of clupeoids a subsample of at least 50 kg should be taken and sorted for the identification of the species. The weight of the subsample, and the total weight per species in the subsample should be registered.

In case of heterogeneous large catches consisting of a mixture of clupeoids and few larger species the total catch should be partitioned into the part of larger species and that of the mixture of clupeoids. From the mixture of clupeoids a subsample of at least 50 kg should be taken. The total weight per species for the part of the larger species and the total weight of the subsample of mixed clupeoids should be registered.

Certain related species that are hard to identify down to species level may be grouped by genus levels or larger taxonomic units.

4.3.2 Length distribution

Length distributions are recorded for all fish species caught. Length is defined as total length (measured from tip of snout to tip of caudal fin). Length is measured to 0.5 cm below for herring and sprat, and to 1 cm below for all other species.

In case of large catches of clupeoids with a small length spectrum, a sub-sample should be taken containing at least 200 specimens per species to get a reasonable normal length distribution. For other species at least 50 specimens should be measured.

In case of large herring catches with a wide length spectrum, the subsamples should contain at least 400 specimens.

4.3.3 Weight distribution

Taking into account the available manpower two methods are possible:

Maximum effort method. The mean weight per length group for herring and sprat is to be measured for each trawl haul**.**

Minimum effort method. The mean weight per length group for herring and sprat is to be measured for each ICES Sub-division**.** It is recommended to cover the whole Sub-division homogeneously.

The maximum effort method should be preferred.

Herring and sprat should be sorted into 0.5 cm length groups and weighted.

4.3.4 Age distribution

Taking into account the available manpower two methods are possible:

Maximum effort method: The otolith samples are collected for herring and sprat per each trawl haul**.**

Minimum effort method: The otolith samples are collected for herring and sprat per each ICES Sub-division**.** It is recommended to cover the whole Sub-division homogeneously.

The maximum effort method should be preferred.

If otolith samples are to be taken of the 2 target species herring and sprat the number of otoliths per length-class are not fixed by a constant figure. The following minimum sampling levels should be maintained for herring and sprat per Sub-division:

- 5 otoliths per 0.5 cm length-class for l<10cm
- 10 otoliths per 0.5 cm length-class for l>=10cm.

For the smallest size groups, that presumably contain only one age group, the number of otoliths per length class may be reduced.

4.4 Environmental data

Temperature and salinity should be taken by a CTD probe after each haul, and recorded at least in 1 m intervals.

5 DATA ANALYSIS

5.1 Species composition

Trawl catches within each stratum are combined to give an average species composition of the catch. Each trawl catch is given equal weight, unless it is decided that a trawl catch is not representative for the fish concentrations sampled. In this case, the particular trawl catch is not used. The species frequency f_i of species i can be estimated by

$$f_i = \frac{1}{M}\sum_{k=1}^{M}\frac{n_{ik}}{N_k} \quad (5.1)$$

where n_{ik} the fish number of species i in the trawl k and N_k the total fish number in this haul.
A species can be excluded if the percentage is lower than one percent.

5.2 Length distribution

It is assumed that catch rates are poorly related to abundance. In this case each trawl catch is given equal weight. Very small samples are considered as non representative and excluded from the calculation. We find the length frequency f_{ij} in the length class j as the mean over all M_i trawl catches containing the species i

$$f_{ij} = \frac{1}{M_i}\sum_{k=1}^{M_i}\frac{n_{ijk}}{N_{ik}} \quad (5.2)$$

where n_{ijk} the number of fish within the length class j and N_{ik} the total number of species i in the haul k.

5.3 Age distribution

Minimum effort method: All sampled otoliths within each Sub-division are assumed to be representative for the species age distribution within this area. The age-length-key in this Sub-division can be expressed as frequencies f_{aj} or as relative quantities (fractions) q_{aj} associated with age a in length class j. The combination of the age length key q_{aj} for the whole Sub-division with the length distribution f_j from a specific stratum results in the age distribution f_a for this stratum, i.e.

$$f_a = \sum_j q_{aj} \cdot f_j \qquad (5.3.1)$$

Maximum effort method: The age distribution for each rectangle is estimated as unweighted mean of all samples, i.e.

$$f_a = \frac{1}{M} \sum_k f_{ak} \qquad (5.3.2)$$

5.4 Weight distribution

Minimum effort method: For the calculation of the weight distribution per age group W_a we use also the normalized age-length-key q_{aj} (see 5.3) and the mean weight per length group W_j.

$$W_a = \sum_j q_{aj} \cdot f_j \cdot W_j \qquad (5.4.1)$$

Maximum effort method: The weight distribution for each rectangle is estimated as unweighted mean of all samples.

$$w_a = \frac{1}{M} \sum_k w_{ak} \qquad (5.4.2)$$

5.5 Lack of sample hauls

In the case of lack of sample hauls within an individual ICES rectangle (due to small bottom depth, bad weather conditions or other limitations) a mean of all available neighbouring rectangles should be taken.

5.6 Allocation of records

During the survey herring and sprat normally cannot be distinguished from other species by visual inspection of the echogram. Both herring and sprat tend to be distributed in scattering layers or in pelagic layers of small schools, and it is not possible to ascribe values to typical herring schools.

Species allocation is then based entirely upon trawl catch composition. The estimates of total fish density are then allocated to species and age groups according to the trawl catch composition in the corresponding stratum.

5.7 Target strength of an individual fish

The mean cross section σ of an individual fish of species i should be derived from a function which describes the length-dependence of the target-strength.

$$TS = a_i + b_i \cdot \log L \qquad (5.7.1)$$

a_i and b_i are constants for the i’th species and L is the length of the individual fish in cm.

The equivalent formula for the cross-section is:

$$\sigma_{ij} = 4\pi \cdot 10^{a_i/10} \cdot L_j^{b_i/10} \qquad (5.7.2)$$

Normally we assume a quadratic relationship, that means b_i is 20. We get the simple formula:

$$\sigma_{ij} = d_i \cdot L_j^{\ 2} \qquad (5.7.3)$$

The parameters a, b and d are listed in Table 5.7 for different species.

5.8 Estimation of the mean cross section in the stratum

The basis for the estimation of total fish density F from the measured area scattering cross section S_a is the conversion factor c.

$$F = S_a \cdot c = \frac{S_a}{<\sigma>} \qquad (5.8.1)$$

The mean cross section <?> in the stratum is dependent from the species composition and the length distributions of all species. From formula 5.7.3 we get the corresponding cross section <?$_i$>

$$<\sigma_i> = \sum_j f_{ij} \cdot d_i \cdot L_j^2 \quad (5.8.2)$$

where L_j is the mid point of the j-th length class and f_{ij} the respective frequency.
It follows that the mean cross section in the stratum can be estimated as the weighted mean of all species related cross sections <?$_i$>:

$$<\sigma> = \sum f_i \sigma_i = \sum_i f_i \sum_j f_{ij} d_i L_j^2 \qquad (5.8.3)$$

5.9 Abundance estimation

The total number of fish in the stratum has to be estimated as:

$$N = F \cdot A = \frac{S_a}{<\sigma>} \cdot A \qquad (5.9.1)$$

This total abundance is split into species classes N_i by

$$N_i = N \cdot f_i \qquad (5.9.2)$$

especially in abundance of herring N_h and sprat N_s.
The abundance of the species i is divided into age-classes, $N_{a,j}$ according to the age distribution $f_{i,a}$ in each stratum

$$N_{ia} = N_i \cdot f_{ia} \qquad (5.9.3)$$

5.10 Biomass estimation

The biomass Q_{ia} for the species i and the age group a is calculated from the abundance N_{ia} and the mean weight per age group

$$Q_{ai} = N_{ai} \cdot W_a \qquad (5.10.1)$$

6 DATA EXCHANGE AND DATABASE

6.1 Exchange of survey results

The main results of BIAS should be summarized and reported to the Acoustic Survey coordinator (F. Arrhenius, Sweden) not later than January of the next year. These results are intended for the information of the Assessment Groups and should contain the following documents :

- the map of the cruise track and the fishery stations
- a short description of the survey
- the Table of the basic values for the abundance estimation (survey statistics)
- Tables of the abundance of herring and sprat per age group
- Tables of the mean weights of herring and sprat per age group

The standard exchange format for the documents is described in Table 6.1.

6.2 BAD1

The database BAD1 is the collection of results from the Baltic International Acoustic Surveys (BIAS). The sampling unit is the stratum (see 2.2). The contents of the database are similar to the standard data exchange format (6.1) for the BIAS. The database BAD1 consists of the following six Tables:

- AH Abundance (in millions) of herring per age group
- AS Abundance (in millions) of sprat per age group
- ST Basic values for the computation of the abundance
- SU Description of the different surveys
- WH Mean weights of herring per age group
- WS Mean weights of sprat per age group

The inner structure of the Tables is summarised in Table 6.2.

7 REFERENCES

ICES. 1994a. Report of the Planning Group for Hydroacoustic Surveys in the Baltic. ICES CM 1994/J:4. 18pp.

ICES 1994b. Report of the Planning Group for Herring Surveys. ICES CM 1994/H:3. 26pp.

ICES. 1995a. Report of the Study Group on Data Preparation for the Assessment of Demersal and Pelagic Stocks in the Baltic. ICES CM 1995/Assess:17. 104 pp.

ICES. 1995b. Report of the Study Group on Assessment-related Research-Activities relevant to the Baltic Fish Resources. ICES CM 1995/J:1. 59 pp.

Håkansson, N; Kollberg, S.; Falk, U.; Götze, E., Rechlin, O. 1979. A hydroacoustic and trawl survey of herring and sprat stocks of the Baltic proper in October 1978. Fischerei-Forschung, Wissenschaftliche Schriftenreihe 17(2):7–23.

Hagström, O; Palmen, L.-E., Hakansson, N.; Kästner, D.; Rothbart, H. Götze, E.; Grygiel, W.; Wyszynski, M. 1991. Acoustic estimates of the herring and sprat stocks in the Baltic proper October 1990. ICES CM 1991/J:34.

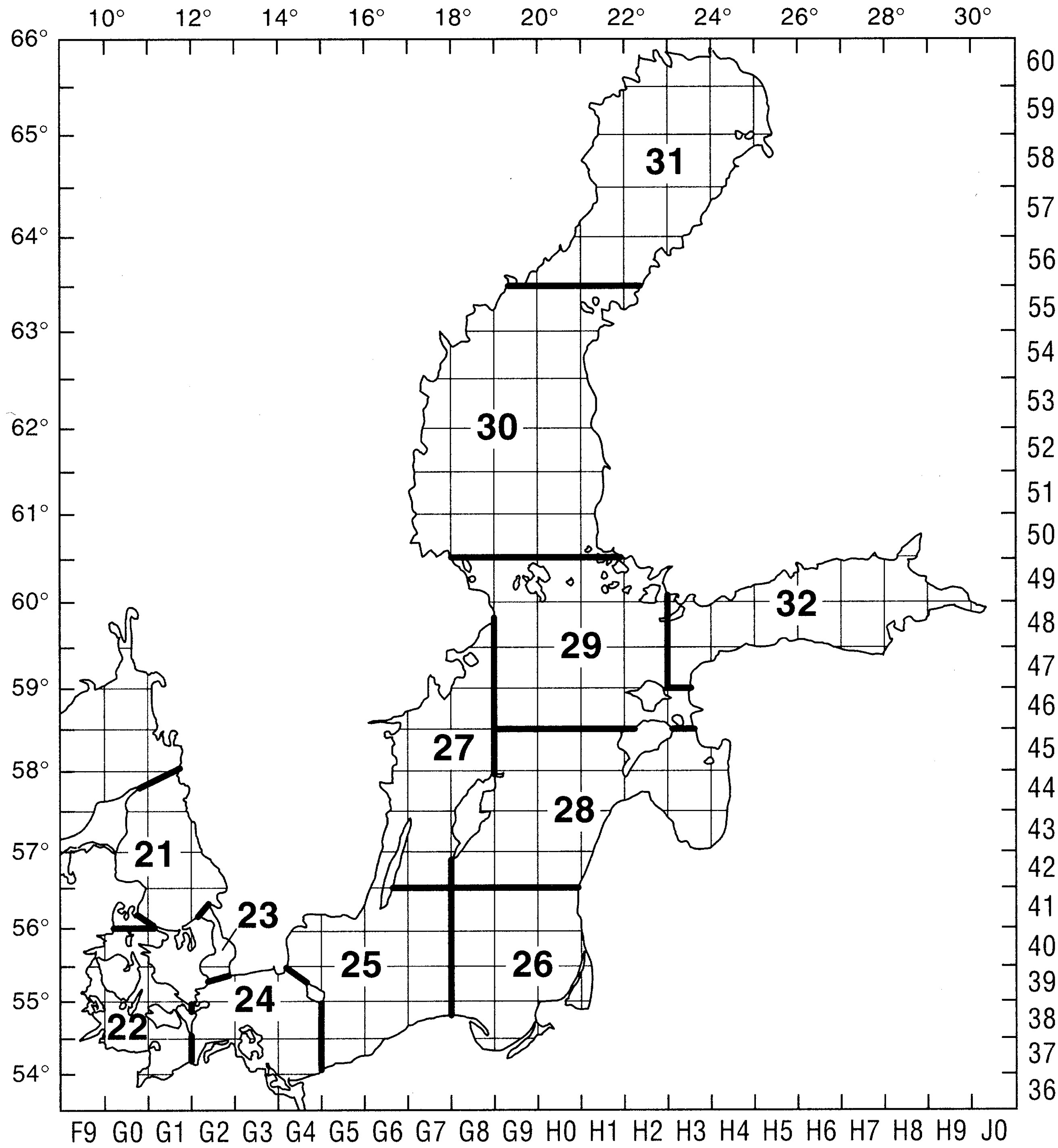


Figure 2.1. ICES Sub-division borders and rectangles codes.

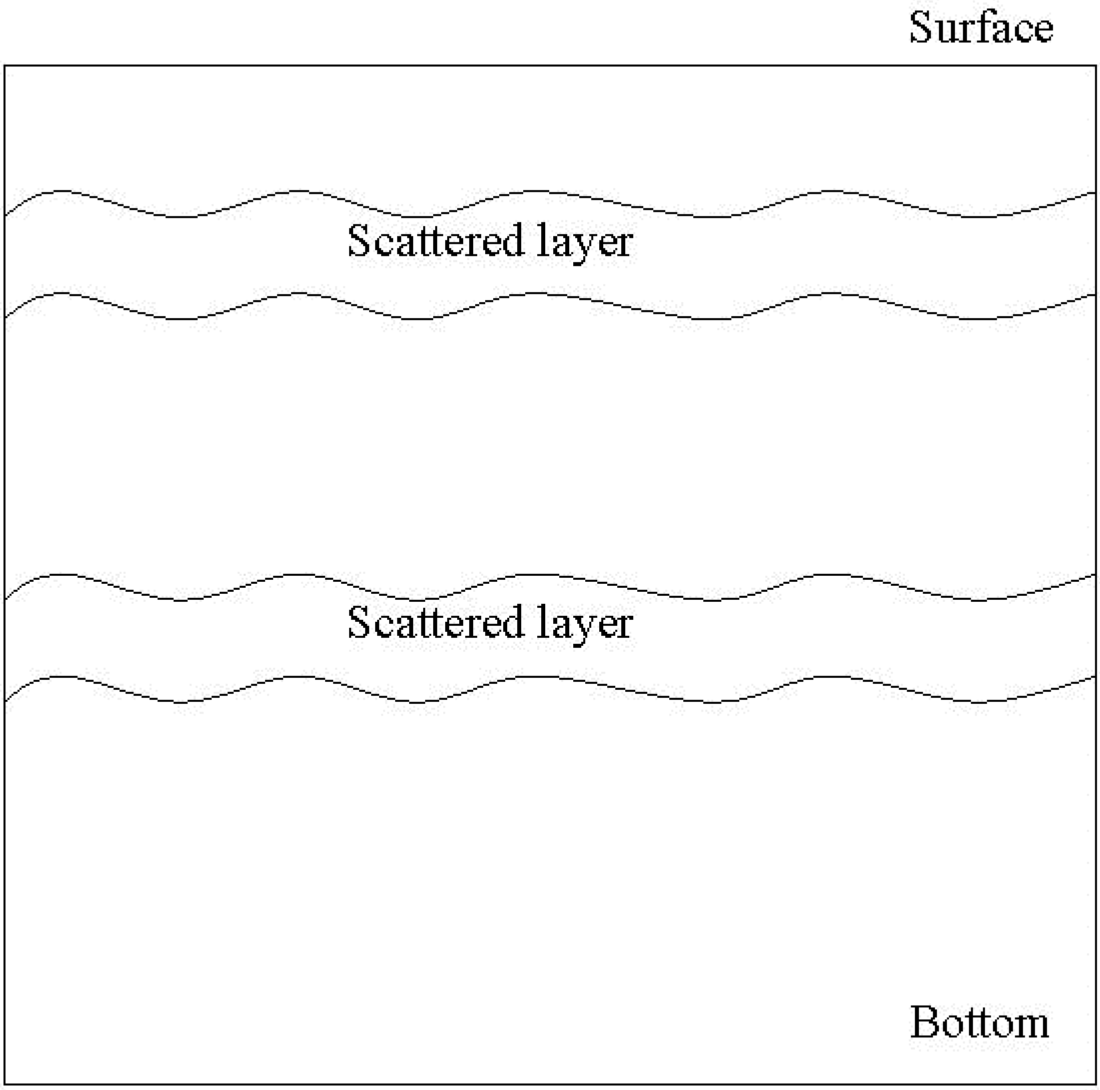


Figure 4.2.1. Multiple scattering fish layers.

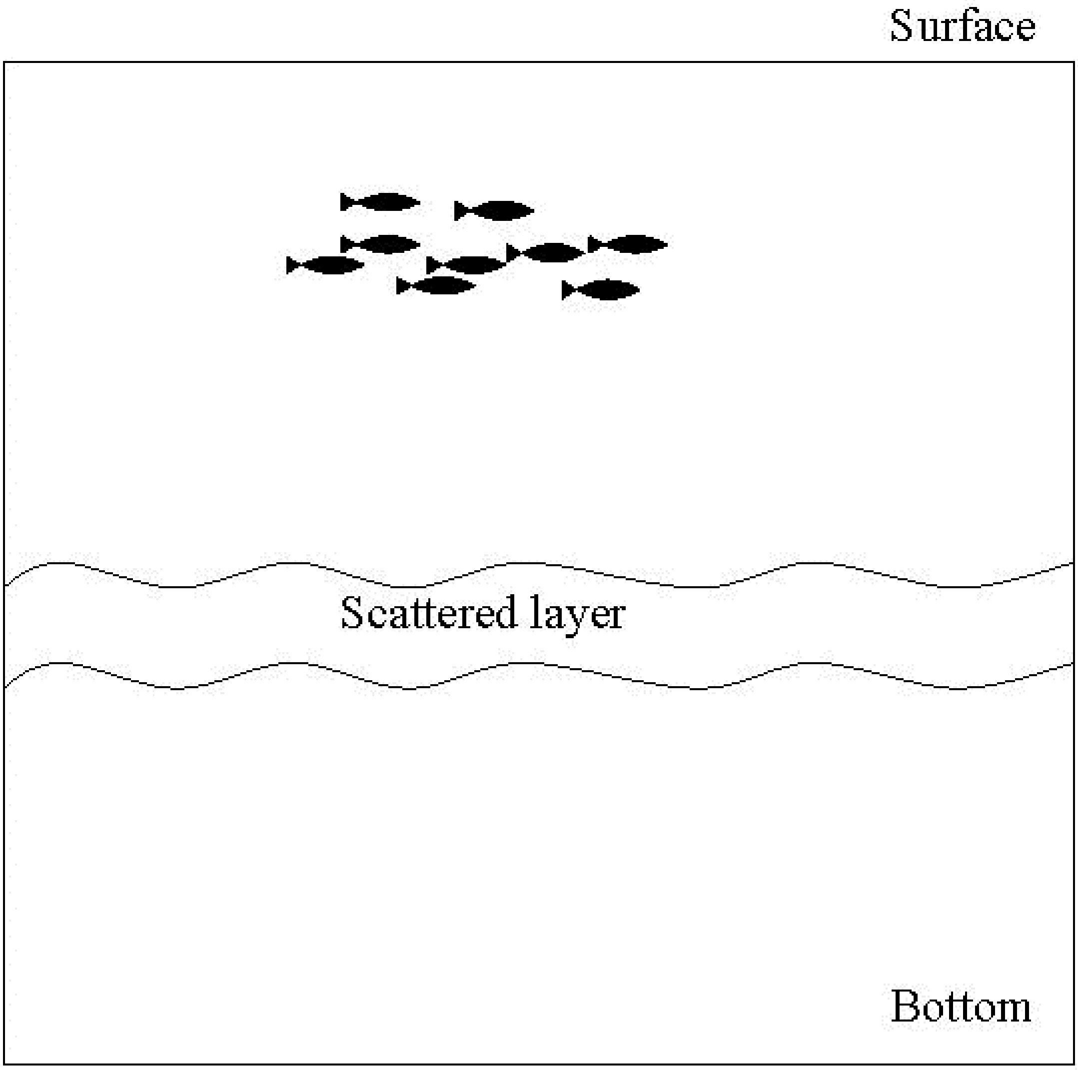


Figure 4.2.2. Shoals and scattering fish layers.

Table 2.1. The boundaries of the Sub-divisions of the Baltic Sea and the Belts.
(IBSFC Fishery Rules)

Sub-division 22

Northern boundary:	a line from Hasenore head to Gniben Point
Eastern boundary:	a line at longitude 12^o East due South from Zealand to Falster, then along the East coast of the Island of Falster to Gedser Odde (54^{o}34'N, 11^{o}58'E), then due South to the coast of the Federal Republic of Germany.

Sub-division 23

Northern boundary:	a line from Gilbjerg Head to the Kullen.
Southern boundary:	a line from Falsterbo Light on the Swedish coast to Stevns Light on the Danish coast.

Sub-division 24

The western boundaries coincide with the eastern boundary of Sub-division 22 and the southern boundary of Sub-division 23. The eastern boundary runs along the line from Sandhammeren Light to Hammerode Light and south of Bornholm further along 15^{o}E.

Sub-division 25

Northern boundary:	the latitude 56^{o}30'N.
Eastern boundary:	the longitude 18^{o}E.
Western boundary:	coincides with the eastern boundary of Sub-division 24

Sub-division 26

Northern boundary:	the latitude 56^o 30'N.
Eastern boundary:	the longitude 18^o E.

Sub-division 27

Eastern boundary:	the longitude 19^o E from 59^o 41'N to the Isle of Gotland and from the Isle of Gotland along 57^o N to 18^o E and further to the South along the longitude 18^o E.
Western boundary:	the latitude 56^{o}30'N.

Sub-division 28

Northern boundary:	the latitude 58^o 30'N.
	the latitude 56^o 30'N.
Western boundary:	north of Gotland, the latitude 19^o E and south of Gotland along 57^o N to the longitude 18^o E, and further south along the longitude 18^o E.

Sub-division 29

Northern boundary:	the latitude 60^o 30'N.
Eastern boundary:	the longitude 23^o E to 59^o N and further along 59^o N to the east Southern boundary: the latitude 58^o 30'N.
Western boundary:	from 59^o 41'N, along the longitude 19^o E to the south.

Sub-division 30

Northern boundary:	the latitude 63^o 30'N.
Southern boundary:	the latitude 60^o 30'N.

Sub-division 31

Southern boundary:	the latitude 63^o 30'N.

Sub-division 32

Western boundary:	coincides with the eastern boundary of Sub-division 29

Table 2.2. Area of strata (values of the areas of standard rectangles in nautical square miles below 10 m depth).

Estimated with a dataset from Seifert & Kayser (Seifert. T.; Kayser. B.: 1995. A high resolution spherical grid topography of the Baltic Sea. Meereswiss. Berichte (Marine Science Reports) Inst. Ostseeforschung Warnemünde. Nr. 9. 1995. S. 72 - 88.).

SD21	41G0	41G1	41G2	42G1	42G2	43G1	43G2
	108.1	946.8	432.3	884.2	606.8	699.0	107.0

SD22	37G0	37G1	38F9	38G0	38G1	39F9	39G0	39G1	40F9	40G0	40G1	41G0	41G1
	209.9	723.3	51.9	735.3	173.2	159.3	201.7	250.0	51.3	538.1	174.5	173.1	18.0

SD23	39G2	40G2	41G2
	130.9	164.0	72.3

SD24	37G2	37G3	37G4	38G2	38G3	38G4	39G2	39G3	39G4
	192.4	167.7	875.1	832.9	865.7	1034.8	406.1	765.0	524.8

SD25	37G5	37G6	38G5	38G6	38G7	39G4	39G5	39G6	39G7	40G4	40G5	40G6	40G7	41G4	41G5	41G6	41G7
	642.2	130.7	1035.7	940.2	471.7	287.3	979.0	1026.0	1026.0	677.2	1012.9	1013.0	1013.0	59.4	190.2	764.4	1000.0

SD26	37G8	37G9	38G8	38G9	38H0	39G8	39G9	39H0	39H1	40G8	40G9	40H0	40H1	41G8	41G9	41H0	41H1
	86.0	151.6	624.6	918.2	37.8	1026.0	1026.0	881.6	12.8	1013.0	1013.0	1012.1	56.3	1000.0	1000.0	953.3	16.6

SD27	42G6	42G7	43G6	43G7	43G8	44G6	44G7	44G8	45G6	45G7	45G8	46G6	46G7	46G8	47G8	48G8
	266.0	986.9	269.8	913.8	106.1	200.9	960.5	456.6	72.9	908.7	947.2	38.9	452.6	884.8	264.3	53.8

SD28	42g8	42g9	42h0	42h1	43g8	43g9	43h0	43h1	43h3	43h4	44g8	44g9	44h0	44h1	44h2	44h3	44h4	45g9	45h0	45h1	45h2	45h3	45h4
	945.4	986.9	968.5	75.0	296.2	973.7	973.7	412.7	744.3	261.9	68.1	876.6	960.5	824.6	627.3	936.1	290.6	924.5	947.2	827.1	209.9	638.2	96.5

SD29	46g9	46h0	46h1	46h2	46h3	47g9	47h0	47h1	47h2	48g9	48h0	48h1	48h2	49g8	49g9	49h0	49h1	49h2
	933.8	933.8	921.5	258.0	13.2	876.2	920.3	920.3	793.9	772.8	730.3	544.0	597.0	196.0	564.2	85.3	65.2	28.4

SD30	50G7	50G8	50G9	50H0	50H1	51G7	51G8	51G9	51H0	51H1	52G7	52G8	52G9	52H0	52H1	53G7	53G8	59G9
	403.1	833.4	879.5	795.1	41.6	614.5	863.7	865.8	865.7	237.3	482.6	852.0	852.0	852.0	263.9	354.5	838.1	838.1

SD30	53H0	53H1	54G7	54G8	54G9	54H0	55G8	55G9	55H0	55H1
cont.	838.1	126.6	13.2	642.2	824.2	727.9	103.6	625.6	688.6	86.7

SD31	56G9	56H0	56H1	56H2	56H3	57H1	57H2	57H3	57H4	58H1	58H2	58H3	58H4	59H1	59H2	59H3	59H4	60H2	60H3	60H4
	8.1	269.2	789.7	414.3	13.2	558.1	782.0	518.9	9.0	486.0	767.8	766.1	256.6	105.8	603.1	752.5	409.0	49.2	181.2	58.0

SD32	47H3	47H4	47H7	48H3	48H4	48H5	48H6	48H7	48H8	49H4	49H5	49H6	49H7	49H8	49H9	50H8
	536.2	90.9	90.0	615.7	835.1	767.2	776.1	851.4	308.5	64.8	306.9	586.5	754.6	665.1	205.2	43.0

Table 4.1. Trawl gear specification.

A	B	C	D	E	F	G	H	J	K	L	M	N2/N3												O	P
Country	Vessel	Power	Code	Name	Type	Panels	Headl	Groundr	Sweeps	Length	Circum	Mesh size												Height	Spread
		kW			B/P	2/4	m	m	m	m	m	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	m	m
GFR	WAH3	2900	GOV	GOV	B	2	36.0	52.8	110.0	51.7	76.0	200	160	120	80	50								4	23
GFR	WAH3	2900	PS205	PSN205	P	4	50.4	55.4	99.5	84.3	205.0	400	200	160	80	50								12	28
GFR	WAH3	2900	1600#	1600# Engelnetz	P	4	70.0	78.0	69.5	118.5	315.0	200	100	50										19	36
GFR	SOL	588	BLACK	Blacksprutte 854#	P	4	39.2	39.2	105.0	60.4	156.0	8/200	4/200	200	160	120								11	22
GFR	SOL	588	PS388	Krake	P	4	42.0	42.0	63.5	59.8	142.4	400	200	80										9	21
GFR	SOL	588	H20	HG20/25	B	2	25.7	39.8	63.5	41.9	51.0	120	80	40										3	15
GFR	SOL	588	AAL	Aalhopser	B	2	31.0	29.7	63.5	57.5	119.0	160	120	80	40									6	19
GFR	SOL	588	KAB	Kabeljaubomber	P	2	53.2	53.2	63.5	73.5	129.6	200	160	120										11	30
POL	BAL	1030	P20	P20/25	B	2	28.0	42.4	100.0	53.4		120	40											4	11
POL	BAL	1030	TV3	TV-3 930#	B	4	71.7	78.8			74.4	200	40											6.5	
POL	BAL	1030	WP53	WP53/64x4	P	4	53.0	53.0	88.0	86.0	217.6	800	100											22	32
RUS	MON		RTM	RTM33S	P																				
RUS	ATL	1764	RTA	70/300 project0495	P	4	70.0	70.0	75.0	101.3	300.0	7000	5000	4000	2000	800	400	200	100	80	60	45	37	28	41
FIN	JUL	750	1600'	Finflyder combi	P	4	86.0	86.0	60.0	160.3	467.2	3200	1600	800	290	120	80	40						23	38
SWE	ARG	1324	FOTOE	Fotö 3.2	P	4	60.2	60.2	108.0	98.0	260.0	6400	3200	1600	800	400	200	100	40					16	90
SWE	ARG	1324	MACRO	Macro 5A:1	P	4	86.0	86.0	108.0	98.0	205.0	6400	3200	1600	800	400	200	100	40					19	105

Table 4.3.	Species list.

NODC	Scientific name	English name
3734030201	AURELIA AURITA	COMMON JELLYFISH
5704020401	SEPIETTA OWENIANA	
5706010401	ALLOTEUTHIS SUBULATA	
6188030110	CANCER PAGURUS	EDIBLE CRAB
8603010000	PETROMYZINIDAE	LAMPREYS
8603010217	LAMPETRA FLUVIATILIS	RIVER LAMPREY
8603010301	PETROMYZON MARINUS	SEA LAMPREY
8606010201	MYXINE GLUTINOSA	HAGFISH
8710010201	SQUALUS ACANTHIAS	SPURDOG / SPINY DOGFISH
8713040134	RAJA RADIATA	STARRY RAY
8741010102	ANGUILLA ANGUILLA	EEL
8747010000	CLUPEIDAE	HERRINGS
8747010109	ALOSA FALLAX	TWAITE SHAD
8747010201	CLUPEA HARENGUS	HERRING
8747011701	SPRATTUS SPRATTUS	SPRAT
8747012201	SARDINA PILCHARDUS	PILCHARD, SARDINE
8747020104	ENGRAULIS ENCRASICOLUS	ANCHOVY
8755010115	COREGONUS OXYRINCHUS / C. LAVARETUS	WHITEFISH / HOUTING / POWAN
8755010305	SALMO SALAR	SALMON
8755010306	SALMO TRUTTA	TROUT
8755030301	OSMERUS EPELANUS	SMELT
8756010237	ARGENTINA SPYRAENA	LESSER SILVERSMELT
8759010501	MAUROLICUS MUELLERI	PEARLSIDE
8776014401	RUTILUS RUTILUS	ROACH
8791030402	GADUS MORRHUA	COD
8791030901	POLLACHIUS VIRENS	SAITHE
8791031301	MELANOGRAMMUS AEGLEFINUS	HADDOCK
8791031501	RHINONEMUS CIMBRIUS	FOUR BEARDED ROCKLING
8791031701	TRISOPTERUS MINUTUS	POOR COD
8791031703	TRISOPTERUS ESMARKI	NORWAY POUT
8791031801	MERLANGIUS MERLANGIUS	WHITING
8791032201	MICROMESTISTIUS POTASSOU	BLUE WHITING
8791040105	MERLUCCIUS MERLUCCIUS	HAKE
8793010000	ZOARCIDAE	EEL-POUTS
8793010724	LYCODES VAHLII	VAHL'S EELPOUT
8793012001	ZOARCES VIVIPARUS	EELPOUT
8803020502	BELONE BELONE	GARFISH
8818010101	GASTEROSTEUS ACULEATUS	THREE-SPINED STICKLEBACK
8818010201	SPINACHIA SPINACHIA	SEA STICKLEBACK
8820020000	SYNGNATHIDAE	PIPE FISHES
8820020119	SYNGNATUS ROSTELLATUS	NILSSON'S PIPEFISH
8820020120	SYNGNATUS ACUS	GREAT PIPEFISH
8820020123	SYNGNATUS TYPHLE	DEEP-SNOUTED PIPEFISH
8820022101	ENTELURUS AEQUOREUS	SNAKE PIPEFISH
8826020601	EUTRIGLA GURNARDUS	GREY GURNARD
8831020825	COTTUS GOBIO	BULLHEAD
8831022205	MYOXOCEPHALUS QUADRICORNIS	FOUR SPINED SCULPIN
8831022207	MYOXOCEPHALUS SCORPIUS	BULL ROUT
8831024601	TAURULUS BUBALIS	SEA SCORPION
8831080803	AGONUS CATAPHRACTUS	POGGE
8831090828	LIPARIS LIPARIS	SEA SNAIL
8831091501	CYCLOPTERUS LUMPUS	LUMPFISH
8835020101	DICETRARCHUS LABRAX	BASS
8835200202	PERCA FLUVIATILIS	PERCH

Table 4.3 continued

NODC	Scientific name	English name
8835200403	STIZOSTEDION LUCIOPERCA	ZANDER (PIKEPERCH)
8835280103	TRACHURUS TRACHURUS	HORSE MACKEREL
8835450202	MULLUS SURMULETUS	RED MULLET
8839013501	CTENOLABRUS RUPESTRIS	GOLD SINNY
8840060102	TRACHINUS DRACO	GREATER WEEVER
8842120905	LUMPENUS LAMPRETAEFORMIS	SNAKE BLENNY
8842130209	PHOLIS GUNELLUS	BUTTERFISH
8845010000	AMMODYTIDAE	SANDEELS
8845010105	AMMODYTES TOBIANUS (LANCEA)	SAND EEL
8845010301	HYPEROPLUS LANCEOLATUS	GREATER SANDEEL
8846010106	CALLIONYMUS LYRA	SPOTTED DRAGONET
8846010107	CALLIONYMUS MACULATUS	DRAGONET
8847010000	GOBIIDAE	GOBIES
8847015101	POMATOSCHISTUS MINUTUS	SAND GOBY
8847015103	POMATOSCHISTUS MICROPS	COMMON GOBY
8847016701	LESUEURIGOBIUS FRIESSII	FRIESES' GOBY
8850030302	SCOMBER SCOMBRUS	MACKEREL
8857030402	SCOPHTHALMUS MAXIMUS	TURBOT
8857030403	SCOPHTHALMUS RHOMBUS	BRILL
8857031702	ARNOGLOSSUS LATERNA	SCALDFISH
8857040603	HIPPOGLOSSOIDES PLATESSOIDES	LONG ROUGH DAB
8857040904	LIMANDA LIMANDA	DAB
8857041202	MICROSTOMUS KITT	LEMON SOLE
8857041402	PLATICHTHYS FLESUS	FLOUNDER
8857041502	PLEURONECTES PLATESSA	PLAICE
8858010601	SOLEA SOLEA	SOLE
8858010801	BUGLOSSIDIUM LUTEUM	SOLENETTE

Table 5.7 Target strength parameters

Species	a	b	d
Clupea harengus	-71.2	20	9.533E-07
Sprattus sprattus	-71.2	20	9.533E-07
Gadus morhua	-67.5	20	2.235E-06
Trachurus trachurus	-71.2	20	9.533E-07
Scomber scombrus	-84.9	20	4.066E-08

Table 6.1. Data exchange format.

Table 3.x.1 Estimated numbers (millions) of herring r/v "XXXX" October

SD	rect	total	age 0	age 1	age 2	age 3	age 4	age 5	age 6	age 7	age 8+

Table 3.x.2 Estimated mean weight (gram) of herring r/v "XXXX" October

SD	rect	total	age 0	age 1	age 2	age 3	age 4	age 5	age 6	age 7	age 8+

Table 3.x.3 Estimated numbers (millions) of sprat r/v "XXXX" October

SD	rect	total	age 0	age 1	age 2	age 3	age 4	age 5	age 6	age 7	age 8+

Table 3.x.4 Estimated mean weight (gram) of sprat r/v "XXXX" October

SD	rect	total	age 0	age 1	age 2	age 3	age 4	age 5	age 6	age 7	age 8+

Table 3.x.5 Survey statistics r/v "XXXX" October

ICES SD	ICES Rect.	Area (nm^2)	Sa (m^2/nm^2)	σ cm^2	N total (million)	herring (%)	sprat (%)

Table 6.2. Structure of BAD1.

Structure of Table AH

Field	Type	Length	Decimals	Description
CCODE	C	7		Survey code
SD	C	4		ICES Sub-division
RECT	C	5		ICES rectangle
NHTOT	N	8	2	Total herring abundance (millions)
NH0	N	8	2	Abundance of herring age group 0 (millions)
NH1	N	8	2	Abundance of herring age group 1 (millions)
NH2	N	8	2	Abundance of herring age group 2 (millions)
NH3	N	8	2	Abundance of herring age group 3 (millions)
NH4	N	8	2	Abundance of herring age group 4 (millions)
NH5	N	8	2	Abundance of herring age group 5 (millions)
NH6	N	8	2	Abundance of herring age group 6 (millions)
NH7	N	8	2	Abundance of herring age group 7 (millions)
NH8	N	8	2	Abundance of herring age group 8+ (millions)

Structure of Table AS

Field	Type	Length	Decimals	Description
CCODE	C	7		Survey code
SD	C	4		ICES Sub-division
RECT	C	5		ICES rectangle
NSTOT	N	8	2	Total sprat abundance (millions)
NS0	N	8	2	Abundance of sprat age group 0 (millions)
NS1	N	8	2	Abundance of sprat age group 1 (millions)
NS2	N	8	2	Abundance of sprat age group 2 (millions)
NS3	N	8	2	Abundance of sprat age group 3 (millions)
NS4	N	8	2	Abundance of sprat age group 4 (millions)
NS5	N	8	2	Abundance of sprat age group 5 (millions)
NS6	N	8	2	Abundance of sprat age group 6 (millions)
NS7	N	8	2	Abundance of sprat age group 7 (millions)
NS8	N	8	2	Abundance of sprat age group 8+ (millions)

Structure of Table WH

Field	Type	Length	Decimals	Description
CCODE	C	7		Survey code
SD	C	4		ICES Sub-division
RECT	C	5		ICES rectangle
WHTOT	N	7	2	Total mean weight of herring (gram)
WH0	N	7	2	Mean weight of herring age group 0 (gram)
WH1	N	7	2	Mean weight of herring age group 1 (gram)
WH2	N	7	2	Mean weight of herring age group 2 (gram)
WH3	N	7	2	Mean weight of herring age group 3 (gram)
WH4	N	7	2	Mean weight of herring age group 4 (gram)
WH5	N	7	2	Mean weight of herring age group 5 (gram)
WH6	N	7	2	Mean weight of herring age group 6 (gram)
WH7	N	7	2	Mean weight of herring age group 7 (gram)
WH8	N	7	2	Mean weight of herring age group 8+ (gram)

Table 6.2 continued

Structure of Table WS

Field	Type	Length	Decimals	Description
CCODE	C	7		Survey code
SD	C	4		ICES Sub-division
RECT	C	5		ICES rectangle
WSTOT	N	7	2	Total mean weight of sprat (gram)
WS0	N	7	2	Abundance of sprat age group 0 (gram)
WS1	N	7	2	Abundance of sprat age group 1 (gram)
WS2	N	7	2	Abundance of sprat age group 2 (gram)
WS3	N	7	2	Abundance of sprat age group 3 (gram)
WS4	N	7	2	Abundance of sprat age group 4 (gram)
WS5	N	7	2	Abundance of sprat age group 5 (gram)
WS6	N	7	2	Abundance of sprat age group 6 (gram)
WS7	N	7	2	Abundance of sprat age group 7 (gram)
WS8	N	7	2	Abundance of sprat age group 8+ (gram)

Structure of Table ST

Field	Type	Length	Decimals	Description
CCODE	C	7		Survey code
SD	C	4		ICES Sub-division
RECT	C	5		ICES rectangle
AREA	N	7	1	Area [nm²] see
SA	N	7	1	Mean Sa [m²/nm²]
SIGMA	N	7	3	Mean σ [m²/nm²] see formula (5.8.3)
NTOT	N	8	2	Total number of fish (millions) see formula (5.9.1)
HH	N	7	3	Percentage of herring
HS	N	7	3	Percentage of sprat

Struture of Table SU

Field	Type	Length	Decimals	Description
CCODE	C	7		Survey code
SHIP	C	20		Name of the vessel
YEAR	C	5		Survey year

APPENDIX 1 – LIST OF SYMBOLS

a	age group
i	species
j	length class
k	haul
a_i, b_i, d_i	parameter of the TS-length relation for species i
f_i	frequency of species i
f_a	frequency of age group a
f_j	frequency of length j
f_{ij}	frequency of length class j for species i
f_{ia}	frequency of age group a for species i
n_{ik}	fish number of species i in haul k
n_{ijk}	fish number of species i and length class j in haul k
q_{ai}	normalised age-length-key
A	Area of the stratum
F	fish density
L_j	length in class j
M	number of hauls in the stratum
M_i	number of hauls containing species i
N_k	total fish number in haul k
N_{ik}	fish number of species i in haul k
N_i	abundance of species i
N_{ia}	abundance of age group a for species i
N	total abundance
S_a	area scattering cross section
W_j	mean weight in length class j
W_a	mean weight of age group a
Q_{ai}	biomass of age group a for species i
$<\sigma>$	mean cross section
$<\sigma_i>$	mean cross section of species i

APPENDIX 2 – CALIBRATION PROCEDURES

Centering of split beam

The purpose of this operation is to move the immersed, suspended sphere onto the acoustic axis of the transducer. First the echo sounder should be set so that the echo from sphere is visible on the display.

Select the Transceiver menu and set:

Mode: Active
Pulse length: Medium
Bandwidth: Wide
Transducer depth: 0.0 m

Select the Operation menu and set:

Ping mode: Normal
Ping interval: 1.0 sec.
Noise margin: 0 dB

Select the Display/Echogram menu and set

Range: Select a range from the sea surface well below the sphere
Range start: 0.0 m
Auto range: Off
Bot. Range Pres.: Off
Presentation: Normal
Layer lines: On
Integration lines: 10 000
TVG: 40 log R
TS colour min.: -50 dB

Select the Log menu and set

Mode: Ping
Ping interval: 100

Select the Layer menu and set

Super layer: 1

Select the Layer menu/Layer-1 menu and set

Type: Surface
Range:
and Range start: The range must be wide enough to cover the sphere echo during the movements in the centering operation. Otherwise it should be as narrow as possible, in order to exclude disturbing fish echoes. Be sure that also the bottom echo as well as the trailing edge of the transmitter pulse and the echo from the additional weight are outside the layer.

Margin: 0.0 m
Sv Threshold: -80 dB
No. of sublayers: 1

The rest of the sub-layers should be turned off.

Appendix 2 continued

Select the TS-detection menu and set

Min. value: -50 dB
Min. echo length: 0.8
Max. echo length: 1.8
Max. gain comp.: 6.0 dB
Max. phase dev.: 2.0

The best value for the sound velocity should be set in the sound velocity menu in order to keep the accuracy as high as possible for the calibration exercise.

If the sphere is in the beam an echo will now be seen as a steady line in the echogram. If the sphere furthermore is inside the -6 dB limit of the beam, the echo will show up as a dot on the TS-detection window on the left side of the screen. The horizontal projection makes it easy to see which way the sphere must be moved to reach the beam center. Movement of the sphere occurs by turning various winches, always one winch at a time and on specific command by the director of this procedure, who is guided by constant observation of the echo on the screen.

s_A - measurement

A test and if necessary, a calibration of the s_A -calculation may be carried out according to the following procedure.

Check the cable connections to colour printer-1.
Switch on colour printer-1.

Select the printer menu and set

Integration Tables: Number of the transceiver in use (if EK 500)
Echogram: Slave

The echogram recording will then be similar to the one on display. Read the measured s_A - value, the red number in the integrator Table after each log interval. Calculate the theoretical s_A - value as follows:

TS sphere = target strength of the sphere
σ_{bs} = backscattering cross section of the sphere
$\sigma_{bs} = 10^{\text{TS sphere}/10}$
r = distance between the transducer and the sphere
(read from display screen, underneath the horizontal projection window).

If the recommended minimum of 15 m between the transducer and the calibration sphere for 38 kHz frequency cannot be attained, the absolute minimum distance to attain the theoretical accuracy of $\pm$0.1 dB for the s_A -calibration is 10 m (transducer type ES38B, max. TX power 2000 W).

The measured distance to the calibration sphere in the TS Detection menu will always be larger than the correct distance. The measured distance has to be reduced by the distance given in the Table below and used when calculating the theoretical s_A - value. The given data is based on medium TX pulse with Wide Bandwidth and long TX pulse with Narrow Bandwidth (frequency 38 kHz).

Reduce distance r by 0.30 m when using Wide Bandwidth and 0.9 m when using Narrow Bandwidth.

ψ = equivalent 2-way beam angle (from the measurement data delivered with the transducer).

$\psi = 10^{\text{dB–value}/10}$

$s_A \text{ (theory)} = (4\Pi r_0^2)\ \sigma_{bs}\ (1852\text{m/nm})^2 / \psi\ r^2$

where r_0 = 1 meter is the standard reference distance for backscattering

If the measured s_A -value differs from the theoretical value, this can be corrected by changing the S_V Transducer Gain in the Transceiver menu. Calculate a new transducer gain:

New trans. gain = Old trans. gain + 10 log(s_A(measured)/ s_A(theory))/2

Enter the S_V Transducer Gain in the Transducer menu, and the measured s_A -value will be correct.

The calibration conditions and results are recorder in a calibration report.

ANNEX 3

HERSUR/BALTDAT EXCHANGE FORMAT SPECIFICATION
VERSION 1
REV. VI
September 2000

TABLE OF CONTENTS

Section **Page**

1 INTRODUCTION

This document specifies the exchange format for the acoustic/biological data, for the herring/sprat surveys in the North Sea and the Baltic Sea, to be added into the international herring/sprat survey database as stated in [Working Paper 1998].

The exchange format is a result of the work of the Danish institute for Fisheries Research IT department, initiated approximately June 1. 1998 presented and revised at the working group meeting for the 'Planning group for Herring Surveys' in Hirtshals 1–5 February 1999, and at the Baltic Fisheries Assessment Working Group meeting in Copenhagen, 12-14 April 1999.

It was stated at the meeting in Hirtshals, that this is intended to be an exchange format that in time must become a standalone format, not depending on existing, for this purpose, inadequate and outdated formats. For the time being, this is merely a step in the right direction. It is important to state, that the exchange format as presented in this document, is a two part format, part one being the ASCII, fixed length record, file format with the limitations these has, and part two, the XML based exchange format.

The XML format has, in the exchange format it self, the ability to make syntax/semantics and range check. The condition of whether a field is optional or mandatory is also possible to check in the XML format (See section on 'The XML file format for data exchange').

The primary reason for this division is, that some of the member countries in the 'Planning group for Herring Surveys', do not have the man power to overcome the effort, for the time being, to make applications for extracting data, from their data sources, directly into the XML file format. The XML exchange format version is presented herein, as THE exchange format, and the ASCII files being used as a temporary solution until it's convenient for all participants to go directly from data source to XML file format.

In the definition of the biological data (fisheries data), the appendices containing the lookup tables for ships, species and other defined in [IBTS Rev. V] and [BITS 1998].

This document is based on [IBTS Rev. V], [Working Paper 1998], [BITS 1998], [Requirements Specification for the HERSUR Project, Rev. 1], decisions made at the working group meeting of the 'Planning group for Herring Surveys' in Hirtshals 1–5 February 1999, the Baltic Fisheries Assessment Working Group meeting, Copenhagen 12–14 April 1999 and the Baltic International Fish Survey Working Group meeting in Tallinn August 2–6 1999.

Note: Appendices II through VIII are taken in entirety from [IBTS Rev. V] and [BITS 1998] for the sole purpose of this document to be considered as standalone.

2 OVERALL EXCHANGE FORMAT CONSIDERATIONS

2.1 General Information

The format specification is divided into two parts, as stated in the introduction part of this document. The first part describes the ASCII file exchange format (record structure, record types, field structure, field types) that for the time being is used as the interface to the XML file format.

This ASCII file format uses the IBTS Rev. V exchange format with the HERSUR projects extensions, as basis for extracting data from the member countries data sources. The record types used are the following:

<u>Cruise</u>
Cruise info record

<u>Acoustic Data</u>
Sa record for acoustic data

<u>Biological Data</u>
Records type 1 (HH) from the IBTS exchange format: Detailed haul information.
Records type 1A (HE) from the IBTS exchange format: Additional haul information, and extended HERSUR specific add-on fields.

Records type 2 (HL) from the IBTS exchange format: Length frequency data.

Records type 4 (CA) from the IBTS exchange format: Sex-maturity-age-length keys (SMALK) and extended HERSUR specific add-on fields.

2.2 Records mutual dependencies

AS FOR FIELDS THE SAME IS THE MATTER FOR RECORDS, SOME ARE OPTIONAL, AND SOME ARE MANDATORY.

In the exchange format, the CRUISE INFO record always is mandatory. Without this record, it's impossible to place the data in the database.

As for the acoustic data, it's optional, because if it's an update, it's possible that one wants to update biological data, without updating acoustic data.

The other way around, it's possible, that you want to update acoustic information, without updating biological data. The figure below shows the dependencies.

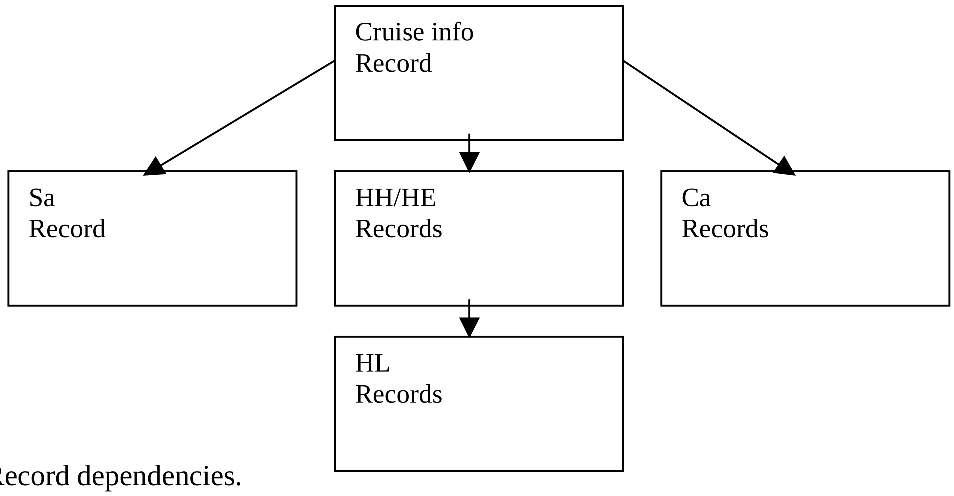


Figure 1. Record dependencies.

2.3 File Format

The record of type CRUISE_INFO is mandatory. A number of Sa-records, and/or a number of HH/HE+HL records, and/or a number of CA records MUST follow the record.

The biological records must be ordered in such a way that each record of Type 1/1A (HH/HE) is followed by a variable number of records of Type 2 (HL), ordered by species. The number and kinds of species recorded must agree with the species recording code as specified in record Type 1. For examples of the various codes see Appendix V.

The header record fields that has been altered (lengthwise) has been put into HE record as added fields to maintain compatibility with the ICES IBTS/BITS exchange formats. Changes made on ranges for some fields have been made directly in the record. Regarding ranges on gear, some of the values might need to be changed to more practical figures (for pelagic fishing).

Records of Type 4 (CA) should follow at the end of the file after the last species record of Type 2 (HL) for the last haul if present in the same transmission.

General

In some cases alpha numeric fields that were mandatory in ICES IBTS/BITS but could contain space characters as value for 'NOT KNOWN' or 'NOT MEASURED' has been converted to optional, because checking for the presence of a field gives no meaning when a value of 'NOT PRESENT' is possible.

3 GENERAL CRUISE INFO

3.1 Cruise info record (CI)

Position			Name	Type*	M/O**	Range	Unit	Description
1	-	2	Record Type	2A	M			Fixed value CI (**C**ruise **I**nfo)
3	-	5	Country	3A	M		See app. III	Country data belongs to
6	-	9	Ship	4AN	M		See app. III	Ship from which data has been collected
10	-	11	Cruise No.	2N	M			National coding system
12	-	15	Year	4A	M		YYYY	The Year in which data was collected
16	-	19	Date of cruise start	4N	M		MMDD	Date for cruise start
20	-	23	Date of cruise end	4N	M		MMDD	Date cruise ended
24	-	31	Upper right corner latitude	8AN	O		±DDDMMmmm***	Latitude of upper right corner of a square covering the entire area for the survey
32	-	39	Upper right corner longitude	8AN	O		±DDDMMmmm***	Longitude of upper right corner of a square covering the entire area for the survey
40	-	47	Lower left corner latitude	8AN	O		±DDDMMmmm***	Latitude of lower left corner of a square covering the entire area for the survey
48	-	55	Lower left corner longitude	8AN	O		±DDDMMmmm***	Longitude of lower left corner of a square covering the entire area for the survey
56	-	85	Acoustic Contact First Name	30A	O			The firstname for the contact person on the acoustic data of this survey
86	-	115	Acoustic Contact Last Name	30A	O			The first name for the contact person on the acoustic data of this survey
116	-	175	Acoustic Contact Email	60AN	O			The email address for the contact person on the acoustic data of this survey
176	-	205	Fisheries Contact First Name	30A	O			The first name for the contact person on the fisheries data of this survey
206	-	235	Fisheries Contact Last Name	30A	O			The last name for the contact person on the fisheries data of this survey
236	-	295	Fisheries Contact Email	60AN	O			The email address for the contact person on the fisheries data of this survey
296	-	297	Sounder	2AN	M	N=1-9,A=A-I	See app. IA	Sounder/integrator used on this survey

* All numeric fields (N) right justified, zero filled, except when spaces are used to indicate no information. All alpha (A) and mixed alpha/numeric fields (AN) left justified, space filled.

** M = mandatory, O = optional. For all optional fields spaces are valid and indicate not known.

*** DD = Degrees, MM = Minutes, mm = Thousands of a minute

4 ACOUSTIC DATA

4.1 Sa record (SA)

Position			Name	Type*	M/O**	Range	Unit	Description
1	-	2	Record Type	2A	M	SA		Fixed value SA (**A**coustic record)
3	-	5	Country	3A	M		See app. III	Country data belongs to
6	-	9	Ship	4AN	M		See app. III	Ship from which data has been collected
10	-	11	Cruise No.	2N	M			National coding system
12	-	15	Year	4A	M		YYYY	The Year in which data was collected
16	-	19	Date	4N	M		MMDD	Date the data of the record was collected
20	-	25	Start Time	6N	M		HHMMSS	Time the collection of data for the record started
26	-	31	End Time	6N	O		HHMMSS	Time the collection of data for the record ended
32	-	37	Log Counter	6N	M	0-999999		Number of log counts *10 (5+1 decimal value)
38	-	41	Transducer Depth	4N	O	0-9999	In Meters	Position of transducer below sea surface*10 (3+1 decimal)
42	-		Transducer Number	1N	O	0-9		What number of transducer was used (if more than one transducer is used)
43	-	46	Transducer Frequen	4N	M		In kHz	Frequency used by the current sounder*10 (3+1 decimal)
47	-		Distance/Time/Ping	1A	M	D/T/P		Field states whether sampling interval is given by distance, time or ping interval
48	-	53	Sampling Interval	6N	M			No. Miles/Time/Ping (states at which rate data is sampled)
54	-	61	Start Latitude	8AN	O		±DDDMMmmm***	The latitude of the starting position (states the position given when sampling was started)
62	-	69	Start Longitude	8AN	O		±DDDMMmmm***	The longitude of the starting position (states the position given when sampling was started)
70	-	77	End Latitude	8AN	O		±DDDMMmmm***	The latitude of the ending position (states the position given when sampling was ended)
78	-	85	End longitude	8AN	O		±DDDMMmmm***	The longitude of the end position (states the position given when sampling was ended)
86	-	89	Mean depth	4N	O		In Meters	Mean total ground depth below sea surface
90	-	99	Species Code	10A	M		See app. VII	Species code (AS for the IBTS/BITS database) MIXED=MMMMMMMMMM
100	-	109	Sa	10N	M		In m^2 per. Nm	Integrated Sa values per layer (5+5 decimal, implied decimal point) 0 values shall be included when Sa are allocated to herring and sprat. There must be **NO OVERLAPPING LAYERS**.
110	-	113	Species depth	4N	O		In Meters	The mean depth of the concentration of herring, sprat or mixed layers below sea surface. As more layers can be present in the same area.
114	-	117	Layer Top	4N	M		In Meters	Top of the layer integrated*10 (3+1 decimal) Positive: Below the sea surface Negative: Above sea bottom (**only bottom layer**)
118	-	121	Layer Thickness	4N	O		In Meters	Thickness of the layer in which integrated*10 (3+1 decimal)
122	-	123	Classification	2N	O		See app. IB	Fish classification (default 4)
124	-	127	Haul Reference	4AN	O			Either haul reference (0 + 3 decimal values) or ICES square (4 alphanumerics)

* All numeric fields (N) right justified, zero filled, except when spaces are used to indicate no information.
All alpha (A) and mixed alpha/numeric fields (AN) left justified, space filled.

** M = mandatory, O = optional. For all optional fields spaces are valid and indicate not known.

*** Position: DD = Degrees, MM = Minutes, SSS = Thousands of a minute

5 BIOLOGICAL DATA (FISHERIES)

5.1 Record type 1 (HH)

Position			Name	Type*	M/O**	Range	Unit	Description
1	-	2	Record Type	2A	M	HH		Fixed value HH
3	-		Quarter	1N	M	1-4		The quarter in which the haul was made
4	-	6	Country	3A	M		See app. III	Country data belongs to
7	-	10	Ship	4AN	M		See app. III	Ship from which data has been collected
11	-	20	Gear	10A	M		See app. IV	Gear which was used
21	-	26	Station no	6AN	O	1-999		National coding system
27	-	29	Haul no	3N	M			Haul number (sequential numbering by cruise)
30	-	31	Year	2N	M		YY	The Year in which data was collected
32	-	33	Month	2N	M	1-12	MM	The Month in which the haul was made
34	-	35	Day	2N	M	1-28/29/30/31	DD	The Day on which the haul was made
36	-	39	Time shot	4N	M	0000-2359	UTC	Haul starting time
40	-	42	Haul duration	3N	M	5-90	Minutes	Duration of the haul
43	-		Day/Night	1A	M	D,N,Space		Hauling time (day/night), not known = space
44	-	45	Lat. Degrees	2N	M	50-65	Degrees	Shooting position: latitude degrees
46	-	47	Lat. Minutes	2N	M	0-59	Minutes	Shooting position: latitude minutes
48	-	49	Lon. Degrees	2N	M	0-28	Degrees	Shooting position: longitude degrees
50	-	51	Lon. Minutes	2N	M	0-59	Minutes	Shooting position: longitude minutes
52	-		East/West	1A	M	E,W		East/West of Greenwich
53	-	55	Depth	3N	M		Meters	Bottom depth from surface (not known = 0)
56	-		Haul validity	1A	M	I,P,V		Validity of haul: Invalid = I / Partly invalid = P / Valid = V
57	-	64	Hydrographic station number	8AN	O			Station number as reported to the ICES hydrographer
65	-	66	Species recording code	2N	M		See app. V	Recorded species code (default 11)
67	-	69	Net opening	3N	O	Space filled	Space filled	**NOT USED IN THIS RECORDTYPE (SEE RECORD TYPE HE)**
70	-	73	Distance	4N	O	0-9999	Meters	Hauling distance towed over ground
74	-	76	Warp length	3N	O	0-999	Meters	Length of the trawl warp
77	-	78	Warp diameter	2N	O	10-60	Millimeters	Diameter of the trawl warp
79	-	81	Door surface	3N	O	0-100	Square meters	Surface of the trawl door * 10
82	-	85	Door weight	4N	O	100-2000	Kilograms	Weight of the trawl door
86	-	89	Buoyancy	4N	O	50-200	Kilograms	Buoyancy of the trawl door
90	-	91	Kite dimensions	2N	O	5-20	Square meters	Kite dimensions of the trawl * 10
92	-	95	Weight ground rope	4N	O	0-300	Kilograms	Weight of the trawl ground rope
96	-	98	Door spread	3N	O	50 to 180	Meters	Spread of the trawl doors
99	-	100	Padding field	2A	O	Space filled		Filled up with spaces

* All numeric fields (N) right justified, zero filled, except when spaces are used to indicate no information. All alpha (A) and mixed alpha/numeric fields (AN) left justified, space filled.

** M = mandatory, O = optional. For all optional fields spaces are valid and indicate not known.

*** DD = Degrees, MM = Minutes, mmm = Thousands of a minute

COMMENTS: **NB: FOR INVALID HAULS NO SPECIES INFORMATION NEED TO BE GIVEN**

5.2 Record Type 1A (HE)

SPECIFICATIONS FOR RECORD TYPE 1A (Haul information)

Position			Name	Type*	M/O**	Range	Unit	Description
1	-	2	Record Type	2A	M	HH		Fixed value HH
3	-		Quarter	1N	M	1-4		The quarter in which the haul was made
4	-	6	Country	3A	M		See app. III	Country data belongs to
7	-	10	Ship	4AN	M		See app. III	Ship from which data has been collected
11	-	20	Gear	10A	M		See app. IV	Gear which was used
21	-	26	Station no	6AN	O	1-999		National coding system
27	-	29	Haul no	3N	M			Haul number (sequential numbering by cruise)
30	-	31	Year	2N	M		YY	The Year in which data was collected
32	-	33	Lat. Degrees	2N	M	50-65	Degrees	Hauling position: latitude degrees
34	-	35	Lat. Minutes	2N	M	0-59	Minutes	Hauling position: latitude minutes
36	-	37	Lon. Degrees	2N	M	0-28	Degrees	Hauling position: longitude degrees
38	-	39	Lon. Minutes	2N	M	0-59	Minutes	Hauling position: longitude minutes
40			East/West	1A	M	E,W		East/West of Greenwich
41	-	43	Towing direction	3N	O	0-360	Degrees	Haul towing direction
44	-	45	Ground speed	2N	O	20-60	Knots	Trawl speed over ground * 10
46	-	47	Speed through water	2N	O	10-99	Knots	Trawl speed through water * 10
48	-	49	Wing spread	2N	O	12-30	Meters	Trawl wing spread
50	-	52	Surface current direction	3N	O	0-360	Degrees	Surface current direction (0 slack water)
53	-	55	Surface current speed	3N	O	0-100	Meters per second	Surface current speed * 10
56	-	58	Bottom current direction	3N	O	0-360	Degrees	Bottom current direction (0 slack water)
59	-	61	Bottom current speed	3N	O	0-100	Meters per second	Bottom current speed * 10
62	-	64	Wind direction	3N	O	0-360	Degrees	Wind direction
65	-	67	Wind speed	3N	O	0-100	Meters per second	Wind speed
68	-	70	Swell direction	3N	O	0-360	Degrees	Swell direction
71	-	73	Swell height	3N	O	0-999	Meters	Swell height * 10
74	-	77	Net opening***	4N	O	0000-9999	Meters	Trawl net opening * 10
78	-	80	Lat. decimals***	3N	M	000-999	Thousands of a minute	Shooting position (belongs to HH values) **If rounded=000, else truncated**
81	-	83	Lon. decimals***	3N	M	000-999	Thousands of a minute	Shooting position (belongs to HH values) **If rounded=000, else truncated**
84	-	85	Fishing Strategy***	2AN	O	A = D/N/B, N = 1-5	See app. IC	(Example: D5 = Day composite haul)
86	-	88	Headrope Depth***	3N	M	1-999	Meters	Trawl headrope depth from sea surface
89	-	100	Padding field	12A	M			

* All numeric fields (N) right justified, zero filled, except when spaces are used to indicate no information.
All alpha (A) and mixed alpha/numeric fields (AN) left justified, space filled.

** M=mandatory, O=optional.

*** Field added for the HERSUR/BALTDAT projects

For all optional fields spaces are valid and indicate not known.

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5.3 Record Type 2 (HL)

Position			Name	Type*	M/O**	Range	Unit	Description
1	-	2	Record Type	2A	M	HL		Fixed value HL
3	-		Quarter	1N	M	1-4		The quarter in which the haul was made
4	-	6	Country	3A	M		See app. III	Country data belongs to
7	-	10	Ship	4AN	M		See app. III	Ship from which data has been collected
11	-	20	Gear	10A	M		See app. IV	Gear which was used
21	-	26	Station no	6AN	O	1-999		National coding system
27	-	29	Haul no	3N	M			Haul number (sequential numbering by cruise)
30	-	31	Year	2N	M		YY	The Year in which data was collected
32	-	41	Species code	10A	M			Official NODC-code of species
42	-	43	Validity code	2N	M			Species validity code
44	-	50	No/Hour	7N	O	0-9999999		Estimated number of specimens of current species caught per hour
51	-	55	Catch Weight/Hour	5N	O	0-99999		Estimated total weight of the catch of current species per hour
56	-	58	No measured	3N	M	0-999		Actual number of fish measured from catch (not known = 0)
59			Length code	1AN	M	.,0,2,5		Class: 1mm = . 0.5 cm = 0 1 cm = 1 2 cm = 2 5 cm = 5
60	-	62	Length class	3N	M	1-999		Identifier: lower bound of size class*****. Eg. 65-70cm = 65. For classes less than 1 cm (see length codes) there will be an implied decimal after the 2nd digit, eg. 30.5-31.0 = 305
63	-	68	No at length	6N	M	1-999999		Estimated number of fish at length caught per hour (no/Hour equals the sum of No at Length). Length classes with zero catch should be excluded.
69			Sex	1A	O	M, F		M = Male, F = Female, Space for not decided
70	-	76	No	7N	M	0-9999999		Either
77	-	82	Catch weight	6N	M	0-99999	In 100 grams	Either the actual weight or an estimated total weight of the catch of the current species
83	-	100	Padding Field	18A	M	Spaces		Filled up with spaces

* All numeric fields (N) right justified, zero filled, except when spaces are used to indicate no information.

All alpha (A) and mixed alpha/numeric fields (AN) left justified, space filled.

** M = mandatory, O = optional.

For all optional fields spaces are valid and indicate not known.

*** Field added for the HERSUR/BALTDAT projects

**** If the number measured is zero the remainder of the record should be filled with spaces

***** Size classes smaller than those defined in the IYFS manual for reporting length distributions of the various species are allowed.

5.4 Record Type 4 (CA)

Position	Name	Type*	M/O**	Range	Unit	Description
1 - 2	Record Type	2A	M	CA		Fixed value CA
3 -	Quarter	1N	M	1-4		The quarter in which the haul was made
4 - 6	Country	3A	M		See app. III	Country data belongs to
7 - 10	Ship	4AN	M		See app. III	Ship from which data has been collected
11 - 20	Gear	10A	M		See app. IV	Gear which was used
21 - 26	Station no	6AN	O	1-999		National coding system
27 - 29	Haul no	3N	M			Haul number (sequential numbering by cruise)
30 - 31	Year	2N	M		YY	The Year in which data was collected
32 - 41	Species code	10A	M			Official NODC-code of species
42 - 43	Area/subarea type (North Sea/Baltic)	2N	M	0-3 20-32		ICES Statistical rectangles =0 Four Statistical rectangles =1 Standard NS Roundfish areas =2 Herring Sampling areas =3 ICES Baltic Subdivision Area
44 - 47	Area code	4AN	M			
48 - 51	Padding field	4A	M			
52	Length code	1AN	M	.,0,2,5		Class: 1mm = . 0.5 cm = 0 1 cm = 1 2 cm = 2 5 cm = 5
53 - 55	Length class	3N	M	1-999		Identifier: lower bound of size class***. E.g. 65-70cm = 65. For classes less than 1 cm (see length codes) there will be an implied decimal after the 2nd digit, egg. 30.5-31.0 = 305
56	Sex	1A	O	M, F		M = Male, F = Female, Space for not decided
57	Maturity	1AN	O	1-5	See app. II	Maturity ogive****
58	+gr. Ident	1A	M	+, space		Plus group = + else space*****
59 - 60	Age/rings	2N	O	0-99		******
61 - 63	Number	3N	M	1-999		*******
64 - 100	Padding Field					Filled up with spaces

* All numeric fields (N) right justified, zero filled, except when spaces are used to indicate no information.
All alpha (A) and mixed alpha/numeric fields (AN) left justified, space filled, except Area code which is to be right justified, space filled.

** M = mandatory, O = optional.
For all optional fields spaces are valid and indicate not known.

*** Size classes smaller than those defined in the IYFS manual for reporting length distributions of the various species are allowed.

**** Sex maturity data are explicitly demanded for roundfish.

***** A plus group refers to the age indicated AND older, respectively to a reading of more than or equal to the specified number of rings

****** North Sea: For herring and sprat the number of rings must be recorded. For all other species the age.
Baltic Sea: For all species the number of winter-rings must be recorded.

******* An additional field has been reserved for no. of fish, which allows the information to be presented in a more aggregated form, rather than that identical information has to be recorded for all individual fish of the same size, sex, maturity and age group.

COMMENTS:
Otolith samples may refer to an individual haul or to groups of hauls in the same rectangle or within one sampling area, depending on the procedures on board. If detailed information is available, it would seem appropriate to refer back to the haul no and/or rectangle; these data are optional rather than mandatory.

6 THE XML FILE FORMAT FOR DATA EXCHANGE

6.1 The XML format

XML is an acronym for e**X**tensible **M**arkup **L**anguage, and as anyone knows who have had a little bit to do with the Internet, the language in which homepages are presented to an Internet Browser, is called HTML (Hyper Text Markup Language), and are the standard for internet homepage publications. To exchange data over the Internet a group of the best Internet developers was put together, and have developed the XML exchange format.

The XML format is becoming THE internet standard for documents of ordered data (invoices, databases etc.) exchanging.

The advantages of the XML format goes way beyond the fact, that one imposes a great deal of overhead on data, when converting the traditional file formats with fixed length records to the XML tag file format. Advantages such as automatic type checking, syntax and semantics checking along with range and conditional presence of fields almost without any programming. This gives applications that are easy to maintain, as one can concentrate the efforts on essential matters.

The XML language can not be explained in half a page, but it can be reviewed at the homepage of the World Wide Web Consortium (http://www.w3.org). The handling of the XML files are done according to the ‘Document Object Model, version 1’, proposed as a standard by W3C 18. August 1998, also to be found on (http://www.w3.org).

In here the exchange file format will be explained for the clients to make the files themselves, unless the IBTSASCII2XML option, in the Internet application, is used.

6.2 The exchange format file

The exchange file consists of 'headers' (tags) and data, ordered in a way so that one can see where the data starts, and where it ends.

Example: Comments (not to be enclosed):

```
<?xml version="1.0" encoding="ISO-8859-1"?>     (this states that it's an XML
                                                  file and it's version 1.0)

<HERSURRecordUpDate xmlns="x-schema:Schema.xml">(this is the 'section header'
                                                  begin tag for the exchange
                                                  file)


</CruiseInfoRecord>
<AcousticRecords>
        <saRecord>                                (sa Record data)
        </saRecord>
        .
        .
        .
</Acousticrecords>
<FisheriesRecords>                                (Fisheries data except CA, SMALK, records)
        <HHRecord>
        </HHRecord>
        <HERecord>
        </HERecord>
        <HLRecord>
        </HLRecord>
        .
        .
        <HHRecord>
        </HHRecord>
        <HERecord>
        </HERecord>
        <HLRecord>
        </HLRecord>
        .
        .
</FisheriesRecords>
<SMALKRecords>
        <CARecord>                               (CA, SMALK, Record)
        </CARecord>
        .
        .
        .
</SMALKRecords
</HERSURRecordUpDate>                            (End of file)
```

In the file, the Cruise Info record is mandatory; but the acoustic records, the fisheries records and the SMALK records are optional as groups. They must, however, contain at least one of each child record type when present, and there MUST be at least one of the groups present in the file.

Note: For now the ranges of the individual fields can be taken directly from the 'ASCII (IBTS/BITS)' versions of the records. **BUT** :YEAR fields in XML are 4 character fields (i.e. 1999 and not 99 as in the fixed length IBTS/BITS formats).

In HH/HE/HL/CA records, GEAR field is divided into 4 separate fields (See Appendix IV Note on this issue):

- Gear Mandatory for the gear name (AlphaNumerical)
- Sweep Length Optional field with sweep length in meters (3 Numerical)
- Exceptions Optional field (1 Alpha)
- Door Type Optional field (1 Alpha)

6.2.1 The Cruise Info record

The cruise info record definition is defined as the following:

Tag			**Value Length***	**Value Unit**	**Range**	**Value Type**	**Mandatory/ Optional**
<CruiseInfoRecord RecordType="CI">							M
<Country>	[VALUE]	</Country>	3		See app. III	String	M
<Ship>	[VALUE]	</Ship>	4	See app. III	See app. III	String	M
<CruiseNo>	[VALUE]	</CruiseNo>	3	See app. III		Integer	M
<Year>	[VALUE]	</Year>	4			Integer	M
<DateStart>	[VALUE]	</DateStart>	8	YYYY		String	M
<DateEnd>	[VALUE]	</DateEnd>	8	MMDD		String	M
<UpperRightCornerLatitude>	[VALUE]	</UpperRightCornerLatitude>	9	MMDD		String	O
<UpperRightCornerLongitude>	[VALUE]	</UpperRightCornerLongitude>	9	±DDDMMmmm		String	O
<LowerLeftCornerLatitude>	[VALUE]	</LowerLeftCornerLatitude>	9	±DDDMMmmm		String	O
<LowerLeftCornerLongitude>	[VALUE]	</LowerLeftCornerLongitude>	9	±DDDMMmmm		String	O
<AcousticContactFirstName>	[VALUE]	</AcousticContactFirstName>	30	±DDDMMmmm		String	O
<AcousticContactLastName>	[VALUE]	</AcousticContactLastName>	30			String	O
<AcousticContactEmail>	[VALUE]	</AcousticContactEmail>	60			String	O
<FisheriesContactFirstName>	[VALUE]	</FisheriesContactFirstName>	30			String	O
<FisheriesContactLastName>	[VALUE]	</FisheriesContactLastName>	30			String	O
<FisheriesContactEmail>	[VALUE]	</FisheriesContactEmail>	60			String	O
<Sounder>	[VALUE]	</Sounder>	2			String	M
</CruiseInfoRecord>							M

6.2.2 The acoustics records

Tag			Value Length*	Value Unit	Range	Value Type	Mandatory/ Optional
< saRecord RecordType="SA">							M
<Country>	[VALUE]	</Country>	3	See app. III		String	M
<Ship>	[VALUE]	</Ship>	4	See app. III		String	M
<CruiseNo>	[VALUE]	</CruiseNo>	3			Integer	M
<Year>	[VALUE]	</Year>	4	YYYY		Integer	M
<Date>	[VALUE]	</Date>	4	MMDD		String	M
<StartTime>	[VALUE]	</StartTime>	6	HHMMSS		String	M
<EndTime>	[VALUE]	</EndTime>	6	HHMMSS		String	O
<LogCounter>	[VALUE]	</LogCounter>	6		0-999999	Float	M
<TransducerDepth>	[VALUE]	</TransducerDepth>	4	In Meters	0-9999	Float	O
<TransducerNumber>	[VALUE]	</TransducerNumber>	1		0-9	Integer	O
<TransducerFrequency>	[VALUE]	</TransducerFrequency>	4	In kHz		Float	M
<DistanceTimePing>	[VALUE]	</DistanceTimePing>	1		D/T/P	String	M
<SamplingInterval>	[VALUE]	</SamplingInterval>	6			Float	M
<StartLatitude>	[VALUE]	</StartLatitude>	8	±DDDMMmmm***		String	O
<StartLongitude>	[VALUE]	</StartLongitude>	8	±DDDMMmmm***		String	O
<EndLatitude>	[VALUE]	</EndLatitude>	8	±DDDMMmmm***		String	O
<EndLongitude>	[VALUE]	</EndLongitude>	8	±DDDMMmmm***		String	O
<MeanDepth>	[VALUE]	</MeanDepth>	4	In Meters		Integer	O
<SpeciesCode>	[VALUE]	</SpeciesCode>	10	See app. VII		String	M
<Sa>	[VALUE]	</Sa>	10	In m^2 per. Nm		Float	M
<SpeciesDepth>	[VALUE]	</SpeciesDepth>	4	In Meters		Integer	O
<LayerTop>	[VALUE]	</LayerTop>	4	In Meters		Float	M
<LayerThickness>	[VALUE]	</LayerThickness>	4	In Meters		Float	O
<Classification>	[VALUE]	</Classification>	2	See app. IB		Integer	O
<HaulRef>	[VALUE]	</HaulRef>	4			String	O
</saRecord >							M

6.2.3 Biological Data (Fisheries)

For each haul there must be one HH record AND one HE, and then there will be a number of HL records following.

Tag			Value Length*	Value Unit	Range	Value Type	Mandatory/ Optional
<HHRecord RecordType="HH">							M
<Quarter>	[VALUE]	</Quarter>	1		1-4	Integer	M
<Country>	[VALUE]	</Country>	3	See app. III		String	M
<Ship>	[VALUE]	</Ship>	4	See app. III		String	M
<Gear>	[VALUE]	</Gear>	5	See app. IV		String	O
<SweepLength>	[VALUE]	</SweepLength>	3			String	O
<Exceptions>	[VALUE]	</Exceptions>	1			String	O
<DoorType>	[VALUE]	</DoorType>	1			String	O
<StationNo>	[VALUE]	</StationNo>	6		1-999	String	M
<HaulNo>	[VALUE]	</HaulNo>	3			Integer	M
<Year>	[VALUE]	</Year>	2	YY		Integer	M
<Month>	[VALUE]	</Month>	2	MM	1-12	Integer	M
<Day>	[VALUE]	</Day>	2	DD	1-28/29/30/3	Integer	M
<TimeShot>	[VALUE]	</TimeShot>	4	UTC	0000-2359	Integer	M
<HaulDuration>	[VALUE]	</HaulDuration>	3	Minutes	5-90	Integer	O
<DayNight>	[VALUE]	</DayNight>	1		D,N,Space	String	M
<LatDegrees>	[VALUE]	</LatDegrees>	2	Degrees	50-65	Integer	M
<LatMinutes>	[VALUE]	</LatMinutes>	2	Minutes	0-59	Integer	M
<LonDegrees>	[VALUE]	</LonDegrees>	2	Degrees	0-28	Integer	M
<LonMinutes>	[VALUE]	</LonMinutes>	2	Minutes	0-59	Integer	M
<EastWest>	[VALUE]	</EastWest>	1		E,W	String	M
<Depth>	[VALUE]	</Depth>	3	Meters		Integer	M
<HaulValidity>	[VALUE]	</HaulValidity>	1		I,P,V	String	M
<HydrographicStationNumber>	[VALUE]	</HydrographicStationNumber>	8			String	M
<SpeciesRecordingCode>	[VALUE]	</SpeciesRecordingCode>	2	See app. V		Integer	NU
<NetOpening>	[VALUE]	</NetOpening>	3	Space filled	Space filled	Float	O
<Distance>	[VALUE]	</Distance>	4	Meters	0-9999	Integer	O
<WarpLength>	[VALUE]	</WarpLength>	3	Meters	0-999	Integer	O
<WarpDiameter>	[VALUE]	</WarpDiameter>	2	Millimeters	10-60	Integer	O
<DoorSurface>	[VALUE]	</DoorSurface>	3	Square meters	0-100	Float	O
<DoorWeight>	[VALUE]	</DoorWeight>	4	Kilograms	100-2000	Integer	O
<Buoyancy>	[VALUE]	</Buoyancy>	4	Kilograms	50-200	Integer	O
<KiteDimensions>	[VALUE]	</KiteDimensions>	2	Square meters	5-20	Float	O
<WeightGroundRope>	[VALUE]	</WeightGroundRope>	4	Kilograms	0-300	Integer	O
<DoorSpread>	[VALUE]	</DoorSpread>	3	Meters	50 to 180	Integer	M
</HHRecord >							M

For each haul there must be one HE record.

Tag			Value Length*	Value Unit	Range	Value Type	Mandatory/ Optional
<HERecord RecordType="HE">							M
<Quarter>	[VALUE]	</Quarter>	1		1-4	Integer	M
<Country>	[VALUE]	</Country>	3	See app. III		String	M
<Ship>	[VALUE]	</Ship>	4	See app. III		String	M
<Gear>	[VALUE]	</Gear>	5	See app. IV		String	O
<SweepLength>	[VALUE]	</SweepLength>	3			String	O
<Exceptions>	[VALUE]	</Exceptions>	1			String	O
<DoorType>	[VALUE]	</DoorType>	1			String	O
<StationNo>	[VALUE]	</StationNo>	6		1-999	String	M
<HaulNo>	[VALUE]	</HaulNo>	3			Integer	M
<Year>	[VALUE]	</Year>	2	YYYY		Integer	M
<LatDegrees>	[VALUE]	</LatDegrees>	2	Degrees	50-65	Integer	M
<LatMinutes>	[VALUE]	</LatMinutes>	2	Minutes	0-59	Integer	M
<LonDegrees>	[VALUE]	</LonDegrees>	2	Degrees	0-28	Integer	M
<LonMinutes>	[VALUE]	</LonMinutes>	2	Minutes	0-59	Integer	M
<EastWest>	[VALUE]	</EastWest>	1		E,W	String	M
<TowingDirection>	[VALUE]	</TowingDirection>	3	Degrees	0-360	Integer	O
<GroundSpeed>	[VALUE]	</GroundSpeed>	2	Knots	20-60	Float	O
<SpeedThroughWater>	[VALUE]	</SpeedThroughWater>	2	Knots	10-99	Float	O
<WingSpread>	[VALUE]	</WingSpread>	2	Meters	12-30	Integer	O
<SurfaceCurrentDirection>	[VALUE]	</SurfaceCurrentDirection>	3	Degrees	0-360	Integer	O
<SurfaceCurrentSpeed>	[VALUE]	</SurfaceCurrentSpeed>	3	Meters per second	0-100	Float	O
<BottomCurrentDirection>	[VALUE]	</BottomCurrentDirection>	3	Degrees	0-360	Integer	O
<BottomCurrentSpeed>	[VALUE]	</BottomCurrentSpeed>	3	Meters per second	0-100	Float	O
<WindDirection>	[VALUE]	</WindDirection>	3	Degrees	0-360	Integer	O
<WindSpeed>	[VALUE]	</WindSpeed>	3	Meters per second	0-100	Integer	O
<SwellDirection>	[VALUE]	</SwellDirection>	3	Degrees	0-360	Integer	O
<SwellHeight>	[VALUE]	</SwellHeight>	3	Meters	0-999	Float	O
<NetOpening>	[VALUE]	</NetOpening>	4	Meters	0000-9999	Float	O
<LatDecimals>	[VALUE]	</LatDecimals>	3	Thousands of a minute	000-999	Integer	M
<LonDecimals>	[VALUE]	</LonDecimals>	3	Thousands of a minute	000-999	Integer	M
<FishingStrategy>	[VALUE]	</FishingStrategy>	2	See app. IC	A = D/N/B, I	String	O
<HeadRopeDepth>	[VALUE]	</HeadRopeDepth>	3	Meters	1-999	Integer	M
</HERecord>							M

For each record, there can be any number of HL records:

Tag			Value Length*	Value Unit	Range	Value Type	Mandatory/ Optional
<HLRecord RecordType="HL">							M
<Quarter>	[VALUE]	</Quarter>	1		1-4	Integer	M
<Country>	[VALUE]	</Country>	3	See app. III		String	M
<Ship>	[VALUE]	</Ship>	4	See app. III		String	M
<Gear>	[VALUE]	</Gear>	5	See app. IV		String	O
<SweepLength>	[VALUE]	</SweepLength>	3			String	O
<Exceptions>	[VALUE]	</Exceptions>	1			String	O
<DoorType>	[VALUE]	</DoorType>	1			String	O
<StationNo>	[VALUE]	</StationNo>	6		1-999	String	M
<HaulNo>	[VALUE]	</HaulNo>	3			Integer	M
<Year>	[VALUE]	</Year>	2	YYYY		Integer	M
<SpeciesCode>	[VALUE]	</SpeciesCode>	10			String	M
<ValidityCode>	[VALUE]	</ValidityCode>	2			Integer	M
<NoHour>	[VALUE]	</NoHour>	7		0-9999999	Integer	O
<CatchWeightHour>	[VALUE]	</CatchWeightHour>	5		0-99999	Integer	O
<NoMeasured>	[VALUE]	</NoMeasured>	3		0-999	Integer	M
<LengthCode>	[VALUE]	</LengthCode>	1		.,0,2,5	String	M
<LengthClass>	[VALUE]	</LengthClass>	3		1-999	Integer	M
<NoAtLength>	[VALUE]	</NoAtLength>	6		1-999999	Integer	M
<Sex>	[VALUE]	</Sex>	1		M, F	String	O
<No>	[VALUE]	</No>	7		0-9999999	Integer	M
<CatchWeight>	[VALUE]	</CatchWeight>	6	In 100 grams	0-99999	Integer	M
</HLRecord>							M

NOTE: Before starting a sequence of HH/HE/HL records there MUST be a start-tag, and after there must be an end-tag:

<FisheriesRecords> (Fisheries data except CA, SMALK, records)
[Combination of HH/HE/HL]

</FisheriesRecords> (Fisheries data except CA, SMALK, records)

6.2.4 SMALK Records

Before starting the sequence of CA records there MUST be a <SMALKRecords> start-tag.

Tag			Value Length[*]	Value Unit	Range	Value Type	Mandatory/ Optional
<CARecord RecordType="CA">							M
<Quarter>	[VALUE]	</Quarter>	1		1-4	Integer	M
<Country>	[VALUE]	</Country>	3	See app. III		String	M
<Ship>	[VALUE]	</Ship>	4	See app. III		String	M
<Gear>	[VALUE]	</Gear>	5	See app. IV		String	O
<SweepLength>	[VALUE]	</SweepLength>	3			String	O
<Exceptions>	[VALUE]	</Exceptions>	1			String	O
<DoorType>	[VALUE]	</DoorType>	1			String	O
<StationNo>	[VALUE]	</StationNo>	6		1-999	String	M
<HaulNo>	[VALUE]	</HaulNo>	3			Integer	M
<Year>	[VALUE]	</Year>	2	YYYY		Integer	M
<SpeciesCode>	[VALUE]	</SpeciesCode>	10			String	M
<AreaSubareaType>	[VALUE]	</AreaSubareaType>	2		0-3 20-32	Integer	M
<AreaCode>	[VALUE]	</AreaCode>	4			String	M
<LengthCode>	[VALUE]	</LengthCode>	4			String	M
<LengthClass>	[VALUE]	</LengthClass>	1		.,0,2,5	Integer	M
<Sex>	[VALUE]	</Sex>	3		1-999	String	O
<Maturity>	[VALUE]	</Maturity>	1	See app. II	M, F	String	O
<grIdent>	[VALUE]	</grIdent>	1		1-5	String	M
<AgeRings>	[VALUE]	</AgeRings>	1		+, space	Integer	O
<Number>	[VALUE]	</Number>	2		0-99	Integer	M
</CARecord>							M

After a serquence of CA records there MUST be a </SMALKRecords> end-tag.

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7 REFERENCES USED IN THIS DOCUMENT

[Working Paper 1998]

International database for acoustic data and biological sampling for surveys in the North Sea and West Of Scotland, Proposal for a database structure and database exchange format, Working Paper, study Group on Baltic Acoustic Data 1998, Hersur project, Ver. 3.0 .

[IBTS Rev. V]

Manual for the international bottom trawl surveys, Revision V, addendum to Ices CM 1996/H:1.

[BITS 1998]

Manual for the Baltic International Trawl Surveys, Updated and agreed during the meeting of the Baltic International Fish survey Working Group, Karlskrona, Sweden, 8.-12. June, 1998 (Appendix II of the: 'Report of the: Baltic International Fish Survey Working Group, Karlskrona, Sweden, 8–13. June 1998', ICES CM1998/H: 4).

[Requirements Specification for the HERSUR Project, Rev. 1]

'Requirements specification for the HERSUR project, Revision I', DIFRES, Fall 1998.

APPENDIX I – HERSUR/BALTDAT SPECIFIC LOOKUP TABLES

Appendix 1.A Sounder/integrator Table, alphanumeric, 2 positions

1	EK500
2	EY500
3	EK400
4	EKS38
5	SARGAN
6	'FQ-70' FURUNO
7	EY200
8	
9	
A	BI500
B	SIORS
C	QD
D	QM
E	EKKOANNA
F	BEI
G	EK500

Appendix 1.B Classification Herring/Sprat, numeric, 2 positions

1	Herring/Sprat
2	Maybe Herring/Sprat
3	Probably not Herring/Sprat
4	Mixed

Appendix 1.C Fishing Strategy, alphanumeric, 2 positions

D	Day fishery only
N	Night fishery only
B	Both day and night fishery
1	Trawling on mixed layers
2	Trawling on shoals
3	Shoals hunting
4	Gillnet Fishery
5	Composite Haul

APPENDIX II – MATURITY KEY

1.VIRGIN

Male	Testes very thin translucent ribbon lying along an unbranched blood vessel. No sign of development.
Female	Ovaries small, elongated, whitish, translucent. No sign of development.

2. MATURING

Male	Development has obviously started, colour is progressing towards creamy white and the testes are filling more and more of the body cavity but sperm cannot be extruded with only moderate pressure.
Female	Development has obviously started, eggs are becoming larger and the ovaries are filling more and more of the body cavity but eggs cannot be extruded with only moderate pressure.

3.SPAWNING

Male	Will extrude sperm under moderate pressure to advanced stage of extruding sperm freely with some sperm still in the gonad.
Female	Will extrude eggs under moderate pressure to advanced stage of extruding eggs freely with some eggs still in the gonad.

4. SPENT

Male	Testes shrunken with little sperm in the gonads but often some in the gonoducts which can be extruded under light pressure. Resting condition firm, not translucent, showing no development.
Female	Ovaries shrunken with few residual eggs and much slime. Resting condition, firm, not translucent, showing no development.

5. RESTING

Male	Testes firm, not translucent, showing no development.
Female	Ovaries firm, not translucent, showing no development

APPENDIX III – ALPHA CODES FOR COUNTRIES AND SHIPS

COUNTRY	ICES CODE	SHIP'S NAME	IYFS CODE
Denmark	DEN	Dana (old)	- DAN
		J.C.Svabo	- JCS
		Dana (new)	- DAN2
		Havfisken	- HAF
		Havkatten	- HAK
Estonia	EST	Koha	- KOH
Finland	FIN		
France	FRA	Thalassa	- THA
		Thalassa (new)	- THA2
		La Perle	- LAP
		Cryos	- CRY
		Gwen Drez	-..GWD
Germany	GFR	Anton Dohrn (old)	- AND
		Anton Dohrn (new)	- AND2
		Solea	- SOL
		Walther Herwig	- WAH
		Walther Herwig III	- WAH3
		Clupea	- CLP
		Eisbär	- EIS
		Ernst Haeckel II	- HAE2
Ireland	IRL	Lough Beltra	- LOB
		Commercial vessel	- COMI
Latvia	LAT 1)	Baltijas Petnieks	- BPE
		Issledovatel Baltiki	- ISB
		Zvezda Baltiki	- ZBA
Lithuania	LTU 1)	Darius	- DAR
Netherlands	NED	Willem Beukelsz	- WIL
		Tridens (old)	- TRI
		Tridens (new)	- TRI2
		Isis	- ISI
		Rose-Marie	- ROS
		Nicolaas Senior	-- KLA
Norway	NOR	G.O.Sars	- GOS
		Johan Hjort (old)	- JOH
		Feiebas	- FEI
		Michael Sars	- MIC
		Eldjarn	- ELD
		Johan Hjort (new)	- JHJ
Poland	POL	Baltica	- BAL
		Birkut	- BIR
Portugal	POR	Noruega	- NOR

COUNTRY	**ICES CODE**	**SHIP'S NAME**	**IYFS CODE**
Russia	RUS	Monokristal	- MON
		Atlantniro	- ATL
Spain	SPA	Cornide de Saavedra	- CDS
United Kingdom	ENG	Clione	- CLI
(England and Wales)		Ernest Holt	- ERN
		Cirolana	- CIR
	Commercial vessel		- COME
United Kingdom	SCO	Explorer	- EXP
(Scotland)		Scotia (old)	- SCO
		Clupea	- CLU
		Scotia (new)	- SCO2
Sweden	SWE	Thesis	- THE
		Skagerak	- SKA
		Argos	- ARG
		Ancylus	- ACY

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

APPENDIX IV – PRELIMINARY ALPHANUMERIC CODE FOR IYFS / IBTS GEARS

DHT	Dutch Herring Trawl	Scotia, Cirolana	
DHT40	40 Feet	Clupea	
DHT45	45 Feet	Willem Beukelsz	
DHT48	48 Feet	Explorer	
DHT63	63 Feet	Tridens	
DHT73	73 Feet	Tridens	
HT	Herring Bottom Trawl	Dana: 3 Winged trawl	
HT120	120 Feet	Dana	
HT180	180 Feet	Anton Dohrn	
VIN	Vinge Trawl	Scotia	
INT	Industrial Trawl	G.O.Sars, Feiebas	
GRT	Granton Trawl	G.O.Sars, Feiebas, Cirolana	
HOB	High Opening Bottom Trawl	Tridens, G.O.Sars	
GOV	Grand Ouverture Verticale	Standard gear for all vessels	
ABD	Aberdeen 48 ft Trawl	Scotia	
COM	Commercial trawl with sprat bag	Irish commercial trawl	
BOX	Boris 'Goshawk' Box Trawl	England	
PHHT	Potuguese High Headline Trawl	Cirolana	
GOVS	Small GOV 20/25	Gwen Drez	
BAKA	Baka Trawl	Cornide de Saavedra	
NCT	Norwegian Campelen Trawl	Noruega	
PS366	Krake	Solea	Pelagic
AAL	Aalhopser	Solea	Bottom
KAB	Kabeljaubomber	Solea	Pelagic
Black	Blacksprutte	Solea	Pelagic
FOT	Fotö trawl	Argos	Pelagic
MAC	Macro 4	Argos	Pelagic
RTA	RT/TM	Atlantniro	Pelagic
		Atlantida	
		Monokristall	
WP53	Herring pel. Tr.	Baltica	Pelagic

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

Position 14-16 Sweep length in m. (Numeric, right justified, zero filled. Spaces for unknown.
Code 000 indicates the semi-pelagic rigging, this specification is associated with the GOV.)
Position 17: Exceptions (B=Bobbins used, D=Double sweeps, space=standard or not known).
Position 18: Door type (P=Polyvalent, V=Vee, F=Flat, K=Karm Waco, space=others or not known).

Further quantitative numeric information on rigging of gear is defined in positions 74-95, in Record Type 1.
NB: This code must still be considered as a preliminary one. More detailed information on the gears used in the past is required before a completely comprehensive coding system can be developed.

APPENDIX V – RECORDED SPECIES CODES

NB: 1) Zero catches of a particular species in a haul may be included in or excluded from the file. However, any species deliberately excluded from a subset, or an invalid species for a particular haul, should be included for each haul with a species validity code 0 !!.
2) For species codes see Appendix VI and VII.

RECORDED STANDARD SPECIES LIST CODES (POSITION 65)

0 =	No standard species recorded	
1 =	All (7) standard species recorded	
2 =	Pelagic (3) standard species recorded	1)
3 =	Roundfish (4) standard species recorded	1)
4 =	Individual (1) standard species recorded	2)

RECORDED BY-CATCH SPECIES LIST CODES (POSITION 66)

0 =	No by-catch species recorded	
1 =	Open ended by-catch list - All species, even species complexes	
2 =	Closed by-catch list - All (27) species recorded	
3 =	Closed by-catch list - Gadoid (8) species recorded	1)
4 =	Closed by-catch list - Flatfish (9) species recorded	1)
5 =	Closed by-catch list - Various (10) species recorded	1)

1) For definition see Appendix VI.
2) If this code is applied, zero catches of the species recorded must be recorded in Record Type 2 format.

EXAMPLES OF APPLICATION OF THE SPECIES RECORDING CODE AND CORRESPONDING TREATMENT IN THE ANALYSIS PHASE

1) All species are recorded. Species recording code = 1 1

Comments: All fish species incorporated in Appendix VII are reported. Records for species having zero catches may be omitted, but for species which have deliberately not been counted must be included with validity code 0.

Analysis: Zeroes are generated for a species for which no record exists. Hauls with species validity code 0 are omitted for that species.

2) All standard pelagic species are recorded and no others. Species recording code = 2 0

Comments: The catch of other species than herring sprat and mackerel is not available.

Analysis: Zeroes are generated for a standard pelagic species for which no record exists. For other species a validity code 0 is generated and the haul will thus be omitted.

3) All standard roundfish species and herring are recorded. Species recording code = 1 0

Comments: The catch of other species than cod, haddock, whiting, Norway pout and herring is not available. The non-available standard species in the reference list for code 1 (sprat and mackerel) must be included in the file showing validity code 0. Standard species having zero catches may be omitted from the file.

Analysis: Zeroes are generated for a standard species for which no record exists. For other species a validity code is generated and the haul will thus be omitted.

4) Only one species recorded (e.g. herring).

Two options exist to cope with this example:

Option A. Species recording code = 2 0

Comments: Sprat and mackerel must be recorded with validity code 0. Zero catches of herring may be omitted.

Analysis: As in example 3.

Option B. Species recording code = 4 0

Comments: For each haul a record must be given showing the herring catch, even when it is zero.

Analysis: Species validity code 0 is generated for all other species than the one reported (i.e. herring) and the haul will thus be omitted from the analysis.

APPENDIX VI –SPECIES NAMES AND NODC CODES FOR STANDARD AND CLOSED BY-CATCH LISTS

GROUP	SPECIES	NODC
Standard Pelagic	Herring	8747010201
	Sprat	8747011701
	Mackerel	8850030302
Standard Roundfish	Cod	8791030402
	Haddock	8791031301
	Whiting	8791031801
	Norway pout	8791031703
By-catch Gadoid	Saithe	8791030901
	Pollack	8791030902
	Pouting	8791031702
	Poor cod	8791031701
	Blue whiting	8791032201
	Hake	8791040105
	Ling	8791031901
	Tusk	8791031101
By-catch Flatfish	Plaice	8857041502
	Dab	8857040904
	Long rough dab	8857040603
	Lemon sole	8857041202
	Witch	8857040502
	Megrim	8857032302
	Turbot	8857030402
	Brill	8857030403
	Halibut	8857041902
	Flounder	8857041402
	Sole	8858010601
By-catch Various	Grey gurnard	8826020601
	Red gurnard	8826020801
	Spurdog	8710010201
	Horse mackerel	8835280103
	Red mullet	8835450202
	Lesser silversmelt	8756010209
	Greater silversmelt	8756010203
	Dragonet	8846010106
	Monkfish	8786010103
	Catfish	8842020103
	Sandeels	8845010000

APPENDIX VII – NODC CODES FOR FISH SPECIES (IN TAXONOMIC ORDER)

8603010000	Petromyzonidae		
8603010200	Lampetra	8603010217	Lampetra fluviatilis
		8603010218	Lampetra planeri
8603010300	Petromyzon	8603010301	Petromyzon marinus
8606010000	Myxinidae		
8606010200	Myxine	8606010201	Myxine glutinosa
8705010000	Chlamydoselachidae		
8705010100	Chlamydoselach	8705010101	Chlamydoselach anguineus
8705020000	Hexanchidae		
8705020100	Hexanchus	8705020101	Hexanchus Griseus
8707040000	Lamnidae		
8707040200	Cetorhinus	8707040201	Cetorhinus maximus
8707040300	Lamna	8707040302	Lamna nasus
8707040400	Alopias	8707040401	Alopias vulpinus
8707040500	Isurus	8707040501	Isurus oxyrhinchus
8708010000	Scyliorhinidae		
8708010100	Apristurus	8708010103	Apristurus laurussoni
8708010200	Galeus	8708010203	Galeus melastomus
		8708010204	Galeus murinus
8708010300	Scyliorhinus	8708010306	Scyliorhinus caniculus
		8708010307	Scyliorhinus stellaris
8708010700	Pseudotriakis	8708010701	Pseudotriakis microdon
8708020000	Carcharinidae		
8708020100	Galeorhinus	8708020102	Galeorhinus galeus
8708020200	Galeocerdo	8708020201	Galeocerdo cuvier
8708020400	Mustelus	8708020408	Mustelus asterias
		8708020409	Mustelus mustelus
		8708020410	Mustelus punctulatus
8708020600	Prionace	8708020601	Prionace glauca
8708030000	Sphyrnidae		
8708030100	Sphyrna	8708030102	Sphyrna zygaena
		8708030103	Sphyrna lewini
		8708030105	Sphyrna tudes
8710010000	Squalidae		
8710010100	Somniosus	8710010102	Somniosus microcephalus
8710010200	Squalus	8710010201	Squalus acanthias
		8710010202	Squalus blainvillei
8710010300	Centrophorus	8710010301	Centrophorus granulosus
		8710010302	Centrophorus squamosus
		8710010303	Centrophorus uyato
8710010400	Dalatias	8710010401	Dalatias licha
8710010500	Etmopterus	8710010503	Etmopterus princeps
		8710010510	Etmopterus spinax
8710010700	Oxynotus	8710010702	Oxynotus centrina
		8710010703	Oxynotus paradoxus
8710010900	Centroscyllium	8710010901	Centroscyllium fabricii

8710011000	Echinorhinus	8710011001	Echinorhinus brucus
8710011200	Centroscymnus	8710011201	Centroscymnus coelolepis
		8710011202	Centroscymnus crepidater
8710011400	Deania	8710011401	Deania calceus
8710011600	Scymnodon	8710011601	Scymnodon ringens
		8710011602	Scymnodon obscurus
8711010000	Squatinidae		
8711010100	Squatina	8711010103	Squatina squatina
8713030000	Torpedinidae		
8713030100	Torpedo	8713030102	Torpedo nobiliana
		8713030104	Torpedo torpedo
		8713030105	Torpedo marmorata
8713040000	Rajidae		
8713040100	Raja	8713040134	Raja radiata
		8713040138	Raja brachyura
		8713040140	Raja microocellata
		8713040141	Raja montagui
		8713040142	Raja hyperborea
		8713040143	Raja batis
		8713040144	Raja nidarosiensis
		8713040145	Raja oxyrhynchus
		8713040146	Raja fullonica
		8713040147	Raja circularis
		8713040148	Raja naevus
		8713040150	Raja fyllae
		8713040151	Raja alba
		8713040153	Raja lintea
		8713040158	Raja undulata
		8713040159	Raja clavata
8713040800	Bathyraja	8713040801	Bathyraja pallida
		8713040803	Bathyraja spinicauda
8713050000	Dasyatidae		
8713050100	Dasyatis	8713050111	Dasyatis pastinacus
8713070000	Myliobatidae		
8713070200	Myliobatis	8713070204	Myliobatis aquila
8713080000	Mobulidae		
8713080200	Mobula	8713080205	Mobula mobular
8716020000	Chimaeridae		
8716020100	Hydrolagus	8716020103	Hydrolagus mirabilis
8716020200	Chimaera	8716020202	Chimaera monstrosa
8716030000	Rhinochimaeridae		
8716030200	Rhinochimaera	8716030201	Rhinochimaera atlantica
8729010000	Acipenseridae		
8729010100	Acipenser	8729010107	Acipenser sturio
8741010000	Anguillidae		
8741010100	Anguilla	8741010102	Anguilla anguilla

8741050000	Muraenidae		
8741050500	Muraena	8741050505	Muraena helena
8741120000	Congridae		
8741120100	Conger	8741120111	Conger conger
8741150000	Synaphobranchidae		
8741150100	Synaphobranchus	8741150104	Synaphobranchus kaupi
8741200000	Serrivomeridae		
8741200100	Serrivomer	8741200102	Serrivomer beani
		8741200104	Serrivomer parabeani
8741210000	Nemichthyidae		
8741210100	Avocettina	8741210102	Avocettina infans
8741210200	Nemichthys	8741210202	Nemichthys scolopaceus
8743030000	Notacanthidae		
8743030200	Polyacanthonotus	8743030204	Polyacanthonotus rissoanus
8743030300	Notocanthus	8743030301	Notocanthus chemnitzii
		8743030302	Notocanthus bonaparti
8747010000	Clupeidae		
8747010100	Alosa	8747010107	Alosa alosa
		8747010109	Alosa fallax
8747010200	Clupea	8747010201	Clupea harengus
8747011700	Sprattus	8747011701	Sprattus sprattus
8747012200	Sardina	8747012201	Sardina pilchardus
8747020000	Engraulidae		
8747020100	Engraulis	8747020104	Engraulis encrasicolus
8755010000	Salmonidae		
8755010100	Coregonus	8755010115	Coregonus lavaretus
		8755010116	Coregonus albula
8755010200	Oncorhynchus	8755010201	Oncorhynchus gorbuscha
		8755010202	Oncorhynchus keta
8755010300	Salmo	8755010302	Salmo gairdneri
		8755010305	Salmo salar
		8755010306	Salmo trutta
8755010400	Salvelinus	8755010402	Salvelinus alpinus
		8755010404	Salvelinus fontinalis
8755010700	Thymallus	8755010704	Thymallus thymallus
8755010800	Hucho	8755010801	Hucho hucho
8755030000	Osmeridae		
8755030200	Mallotus	8755030201	Mallotus villosus
8755030300	Osmerus	8755030301	Osmerus eperlanus

8756010000	Argentinidae		
8756010200	Argentina	8756010203	Argentina silus
		8756010209	Argentina sphyraena
8758010000	Esocidae		
8758010100	Esox	8758010101	Esox lucius
8758020000	Umbridae		
8758020100	Umbra	8758020101	Umbra pygmaea
		8758020103	Umbra krameri
8759010000	Gonostomatidae		
8759010500	Maurolicus	8759010501	Maurolicus muelleri
8759020000	Sternoptychidae		
8759020100	Argyropelecus	8759020107	Argyropelecus olfersii
8760010000	Alepocephalidae		
8760010300	Alepocephalus	8760010302	Alepocephalus rostratus
		8760010305	Alepocephalus bairdi
8760010700	Conocara	8760010704	Conocara salmonea
8762070000	Paralepididae		
8762070200	Notolepis	8762070201	Notolepis rissoi
8762070400	Paralepis	8762070402	Paralepis coregonoides
8762140000	Myctophidae		
8762140300	Lampanyctus	8762140317	Lampanyctus crocodilus
8784010000	Gobiesocidae		
8784010600	Lepadogaster	8784010601	Lepadogaster candollei
		8784010603	Lepadogaster lepadogaster
8784010700	Diplecogaster	8784010701	Diplecogaster bimaculata
8784010800	Apletodon	8784010801	Apletodon microcephalus
8786010000	Lophiidae		
8786010100	Lophius	8786010103	Lophius piscatorius
		8786010104	Lophius budegassa
8787020000	Antennariidae		
8787020100	Histrio	8787020101	Histrio histrio
8787020200	Antennarius	8787020203	Antennarius radiosus
8788030000	Himantolophiidae		
8788030200	Himantolophus	8788030201	Himantolophus groenlandicus
8788080000	Ceratiidae		
8788080100	Ceratias	8788080101	Ceratias holboelli
8788100000	Linophrynidae		
8788100100	Linophryne	8788100102	Linophryne lucifer
8791010000	Moridae		
8791010100	Antimora	8791010101	Antimora rostrata
8791010200	Laemonema	8791010203	Laemonema latifrons
8791010400	Mora	8791010401	Mora moro
8791010500	Lepidion	8791010501	Lepidion eques

8791010600	Halargyreus	8791010601	Halargyreus affinis
8791030000	Gadidae		
8791030200	Boreogadus	8791030201	Boreogadus saida
8791030400	Gadus	8791030402	Gadus morhua
8791030800	Lota	8791030801	Lota lota
8791030900	Pollachius	8791030901	Pollachius virens
		8791030902	Pollachius pollachius
8791031100	Brosme	8791031101	Brosme brosme
8791031300	Melanogrammus	8791031301	Melanogrammus aeglefinus
8791031500	Rhinonemus	8791031501	Rhinonemus cimbrius
8791031600	Phycis	8791031602	Phycis blennoides
8791031700	Trisopterus	8791031701	Trisopterus minutus
		8791031702	Trisopterus luscus
		8791031703	Trisopterus esmarki
8791031800	Merlangius	8791031801	Merlangius merlangus
8791031900	Molva	8791031901	Molva molva
		8791031902	Molva dipterygia
		8791031904	Molva macropthalma
8791032000	Gaidropsurus	8791032001	Gaidropsurus vulgaris
		8791032002	Gaidropsurus mediterraneus
8791032100	Gadiculus	8791032101	Gadiculus argenteus
8791032200	Micromesistius	8791032201	Micromesistius poutassou
8791032300	Raniceps	8791032301	Raniceps raninus
8791032400	Ciliata	8791032401	Ciliata mustela
		8791032402	Ciliata septentrionalis
8791032500	Onogadus	8791032501	Onogadus argenteus
8791032600	Antonogadus	8791032601	Antonogadus macropthalmus
8791040000	Merluccidae		
8791040100	Merluccius	8791040105	Merluccius merluccius
8792010000	Ophidiidae		
8792010600	Ophidion	8792010607	Ophidion barbatum
8792020000	Carapidae		
8792020200	Echiodon	8792020202	Echiodon drummondi
8793010000	Zoarcidae		
8793010500	Lycenchelys	8793010513	Lycenchelys sarsi
8793010700	Lycodes	8793010724	Lycodes vahlii
		8793010725	Lycodes esmarkii
8793012000	Zoarces	8793012001	Zoarces viviparus
8794010000	Macrouridae		
8794010100	Coryphaenoides	8794010117	Coryphaenoides rupestris
8794010400	Coelorinchus	8794010405	Coelorinchus coelorinchus
8794010600	Malacocephalus	8794010601	Malacocephalus laevis
8794010800	Nezumia	8794010801	Nezumia aequalis
8794011500	Trachyrhynchus	8794011501	Trachyrhynchus trachyrhynchus
		8794011502	Trachyrhynchus murrayi
8794011600	Macrourus	8794011601	Macrourus berglax
8803010000	Exocoetidae		
8803010100	Cypselurus	8803010101	Cypselurus heterurus
		8803010106	Cypselurus pinnatibarbatus
8803010500	Danichthys	8803010501	Danichthys rondeletii

8803010700	Exocoetus	8803010701	Exocoetus obtusirostris
8803020000	Belonidae		
8803020500	Belone	8803020502	Belone belone
8803030000	Scomberesocidae		
8803030200	Scomberesox	8803030201	Scomberesox saurus
8805020000	Atherinidae		
8805021000	Atherina	8805021002	Atherina boyeri
		8805021003	Atherina presbyter
8810010000	Diretmidae		
8810010100	Diretmus	8810010101	Diretmus argenteus
8810020000	Trachichthyidae		
8810020100	Gephyroberyx	8810020101	Gephyroberyx darwini
8810020200	Hoplostethus	8810020201	Hoplostethus atlanticus
		8810020202	Hoplostethus mediterraneus
8810050000	Berycidae		
8810050100	Beryx	8810050101	Beryx decadactylus
		8810050102	Beryx splendens
8811030000	Zeidae		
8811030300	Zeus	8811030301	Zeus faber
8811060000	Caproidae		
8811060300	Capros	8811060301	Capros aper
8813010000	Lampridae		
8813010100	Lampris	8813010102	Lampris guttatus
8815020000	Trachipteridae		
8815020100	Trachipterus	8815020102	Trachipterus arcticus
8815030000	Regalecidae		
8815030100	Regalecus	8815030101	Regalecus glesne
8818010000	Gasterosteidae		
8818010100	Gasterosteus	8818010101	Gasterosteus aculeatus
8818010200	Pungitius	8818010201	Pungitius pungitius
8818010500	Spinachia	8818010501	Spinachia spinachia
8819030000	Macrorhamphosidae		
8819030100	Macrorhamphosus	8819030101	Macrorhamphosus scolopax
8820020000	Syngnathidae		
8820020100	Syngnathus	8820020119	Syngnathus rostellatus
		8820020120	Syngnathus acus
		8820020123	Syngnathus typhle
8820020200	Hippocampus	8820020209	Hippocampus hippocampus
		8820020210	Hippocampus ramulosus
8820022100	Entelurus	8820022101	Entelurus aequoreus
8820022200	Nerophis	8820022201	Nerophis lumbriciformis
		8820022202	Nerophis ophidion

8826010000	Scorpaenidae		
8826010100	Sebastes	8826010139	Sebastes marinus
		8826010151	Sebastes mentella
		8826010175	Sebastes viviparus
8826010300	Helicolenus	8826010301	Helicolenus dactylopterus
8826010600	Scorpaena	8826010628	Scorpaena scropha
		8826010629	Scorpaena porcus
8826011100	Trachyscorpia	8826011101	Trachyscorpia cristulata
8826020000	Triglidae		
8826020300	Peristedion	8826020316	Peristedion cataphractum
8826020500	Trigla	8826020501	Trigla lucerna
		8826020503	Trigla lyra
8826020600	Eutrigla	8826020601	Eutrigla gurnardus
8826020700	Trigloporus	8826020701	Trigloporus lastoviza
8826020800	Aspitrigla	8826020801	Aspitrigla cuculus
		8826020802	Aspitrigla obscura
8831010000	Icelidae		
8831010100	Icelus	8831010101	Icelus bicornis
8831020000	Cottidae		
8831020300	Artediellus	8831020308	Artediellus europaeus
8831020800	Cottus	8831020825	Cottus gobio
8831022200	Myoxocephalus	8831022205	Myoxocephalus quadricornis
		8831022207	Myoxocephalus scorpius
8831023800	Triglops	8831023807	Triglops murrayi
8831024600	Taurulus	8831024601	Taurulus bubalis
		8831024602	Taurulus lilljeborgi
8831060000	Cottunculidae		
8831060100	Cottunculus	8831060101	Cottunculus microps
8831080000	Agonidae		
8831080800	Agonus	8831080801	Agonus decagonus
		8831080803	Agonus cataphractus
8831090000	Cyclopteridae		
8831090200	Careproctus	8831090232	Careproctus longipinnis
		8831090233	Careproctus reinhardi
8831090800	Liparis	8831090828	Liparis liparis
		8831090831	Liparis montagui
8831091500	Cyclopterus	8831091501	Cyclopterus lumpus
8835020000	Serranidae		
8835020100	Morone	8835020102	Morone saxatilis
8835020400	Epinephelus	8835020435	Epinephelus guaza
8835022300	Serranus	8835022316	Serranus cabrilla
8835022800	Polyprion	8835022801	Polyprion americanus
8835160000	Centrarchidae		
8835160200	Ambloplites	8835160201	Ambloplites rupestris
8835160500	Lepomis	8835160505	Lepomis gibbosus
8835160600	Micropterus	8835160601	Micropterus dolomieui
		8835160602	Micropterus salmoides
8835180000	Apogonidae		
8835180400	Epigonus	8835180403	Epigonus telescopus

8835181200	Rhectogramma	8835181201	Rhectogramma sherborni
8835270000	Echeneidae		
8835270100	Remora	8835270103	Remora remora
8835280000	Carangidae		
8835280100	Trachurus	8835280103	Trachurus trachurus
		8835280105	Trachurus mediterraneus
		8835280106	Trachurus picturatus
8835280800	Seriola	8835280801	Seriola dumerili
8835280900	Trachinotus	8835280911	Trachinotus ovatus
8835281500	Naucrates	8835281501	Naucrates ductor
8835282400	Lichia	8835282401	Lichia amia
8835330000	Caristiidae		
8835330100	Caristius	8835330101	Caristius macropus
8835430000	Sparidae		
8835431000	Dentex	8835431002	Dentex macropthalmus
		8835431005	Dentex dentex
8835430600	Pagrus	8835430601	Pagrus pagrus
8835430800	Pagellus	8835430801	Pagellus bogaraveo
		8835430802	Pagellus acarne
		8835430804	Pagellus erythrinus
8835430900	Boops	8835430901	Boops boops
8835431100	Sparus	8835431101	Sparus aurata
		8835431102	Sparus pagurus
8835431200	Spondyliosoma	8835431201	Spondyliosoma cantharus
8835440000	Sciaenidae		
8835441100	Umbrina	8835441107	Umbrina canariensis
		8835441108	Umbrina cirrosa
8835442700	Argyrosomus	8835442701	Argyrosomus regium
8835450000	Mullidae		
8835450200	Mullus	8835450202	Mullus surmuletus
		8835450203	Mullus barbatus
8835700000	Cepolidae		
8835700100	Cepola	8835700102	Cepola rubescens
8835710000	Bramidae		
8835710100	Brama	8835710102	Brama brama
8835710300	Pterycombus	8835710301	Pterycombus brama
8835710400	Taractes	8835710403	Taractes asper
8835710700	Taractichthys	8835710701	Taractichthys longipinnis
8835720000	Percichthyidae		
8835720100	Dicentrarchus	8835720101	Dicentrarchus labrax
		8835720102	Dicentrarchus punctatus
8836010000	Mugilidae		
8836010100	Mugil	8836010101	Mugil cephalus
8836010700	Chelon	8836010704	Chelon labrosus
8836010900	Liza	8836010901	Liza ramada
		8836010902	Liza auratus

8839010000	Labridae		
8839012300	Coris	8839012306	Coris julis
8839013300	Crenilabrus	8839013301	Crenilabrus melops
8839013400	Centrolabrus	8839013401	Centrolabrus exoletus
8839013500	Ctenolabrus	8839013501	Ctenolabrus rupestris
8839013600	Labrus	8839013603	Labrus berggylta
		8839013605	Labrus mixtus
8839013700	Acantholabrus	8839013701	Acantholabrus palloni
8840060000	Trachinidae		
8840060100	Trachinus	8840060101	Trachinus vipera
		8840060102	Trachinus draco
8842010000	Blenniidae		
8842010100	Blennius	8842010104	Blennius ocellaris
		8842010110	Blennius gattorugine
		8842010115	Blennius pholis
8842012400	Coryphoblennius	8842012401	Coryphoblennius galerita
8842020000	Anarhichadidae		
8842020100	Anarhichas	8842020102	Anarhichas denticulatus
		8842020103	Anarhichas lupus
		8842020104	Anarhichas minor
8842120000	Stichaeidae		
8842120500	Chirolophis	8842120505	Chirolophis ascanii
8842120900	Lumpenus	8842120905	Lumpenus lampretaeformis
8842121800	Leptoclinus	8842121801	Leptoclinus maculatus
8842130000	Pholididae		
8842130200	Pholis	8842130209	Pholis gunnellus
8845010000	Ammodytidae		
8845010100	Ammodytes	8845010105	Ammodytes tobianus
		8845010106	Ammodytes marinus
8845010200	Gymnammodytes	8845010201	Gymnammodytes semisquamatus
8845010300	Hyperoplus	8845010301	Hyperoplus lanceolatus
		8845010302	Hyperoplus immaculatus
8846010000	Callionymidae		
8846010100	Callionymus	8846010106	Callionymus lyra
		8846010107	Callionymus maculatus
		8846010120	Callionymus reticulatus
8847010000	Gobiidae		
8847011300	Gobius	8847011304	Gobius auratus
		8847011307	Gobius cobitis
		8847011308	Gobius cruentatus
		8847011316	Gobius niger
		8847011320	Gobius paganellus
		8847011325	Gobius gasteveni
8847014900	Crystallogobius	8847014901	Crystallogobius linearis
8847015000	Gobiusculus	8847015001	Gobiusculus flavescens
8847015100	Pomatoschistus	8847015101	Pomatoschistus minutus
		8847015102	Pomatoschistus pictus
		8847015103	Pomatoschistus microps
		8847015104	Pomatoschistus norvegicus

8847016500	Lebetus	8847016501	Lebetus orca
		8847016502	Lebetus guilleti
8847016600	Aphia	8847016601	Aphia minuta
8847016700	Lesueurigobius	8847016702	Lesueurigobius friesii
8847016800	Buenia	8847016802	Buenia jeffreysii
8847016900	Thorogobius	8847016901	Thorogobius ephippiatus
8850010000	Gempylidae		
8850010400	Ruvettus	8850010401	Ruvettus pretiosus
8850010700	Nesarchus	8850010701	Nesarchus nasutus
8850020000	Trichiuridae		
8850020100	Benthodesmus	8850020101	Benthodesmus simonyi
8850020200	Trichiurus	8850020201	Trichiurus lepturus
8850020300	Aphanopus	8850020301	Aphanopus carbo
8850020400	Lepidopus	8850020401	Lepidopus caudatus
8850030000	Scombridae		
8850030100	Euthynnus	8850030101	Euthynnus pelamis
		8850030105	Euthynnus quadripunctatus
8850030200	Sarda	8850030202	Sarda sarda
8850030300	Scomber	8850030301	Scomber colias
		8850030302	Scomber scombrus
8850030400	Thunnus	8850030401	Thunnus alalunga
		8850030402	Thunnus thynnus
		8850030403	Thunnus albacares
		8850030405	Thunnus obesus
8850030700	Auxis	8850030701	Auxis rochei
		8850030702	Auxis thazard
8850031200	Orcynopsis	8850031201	Orcynopsis unicolor
8850040000	Xiphiidae		
8850040100	Xiphias	8850040101	Xiphias gladius
8850050000	Luvaridae		
8850050100	Luvarus	8850050101	Luvarus imperialis
8850060000	Istiophoridae		
8850060100	Istiophorus	8850060101	Istiophorus platypterus
8850060300	Tetrapterus	8850060301	Tetrapterus albidus
8851010000	Centrolophidae		
8851010200	Hyperoglyphe	8851010201	Hyperoglyphe perciforma
8851010300	Centrolophus	8851010301	Centrolophus niger
		8851010302	Centrolophus medusophagus
8851020000	Nomeidae		
8851020200	Cubiceps	8851020203	Cubiceps gracilis
8851030000	Stromateidae		
8857030000	Bothidae		
8857030400	Scophthalmus	8857030402	Scophthalmus maximus
		8857030403	Scophthalmus rhombus
8857031700	Arnoglossus	8857031702	Arnoglossus laterna
		8857031703	Arnoglossus imperialis
		8857031706	Arnoglossus thori

8857032100	Zeugopterus	8857032101	Zeugopterus punctatus
8857032200	Phrynorhombus	8857032201	Phrynorhombus norvegicus
		8857032202	Phrynorhombus regius
8857032300	Lepidorhombus	8857032301	Lepidorhombus boscii
		8857032302	Lepidorhombus whiffiagonis
8857040000	Pleuronectidae		
8857040500	Glyptocephalus	8857040502	Glyptocephalus cynoglossus
8857040600	Hippoglossoides	8857040603	Hippoglossoides platessoides
8857040900	Limanda	8857040904	Limanda limanda
8857041200	Microstomus	8857041202	Microstomus kitt
8857041400	Platichthys	8857041402	Platichthys flesus
8857041500	Pleuronectes	8857041502	Pleuronectes platessa
8857041800	Reinhardtius	8857041801	Reinhardtius hippoglossoides
8857041900	Hippoglossus	8857041902	Hippoglossus hippoglossus
8858010000	Soleidae		
8858010600	Solea	8858010601	Solea solea
		8858010610	Solea lascaris
8858010800	Buglossidium	8858010801	Buglossidium luteum
8858010900	Microchirus	8858010902	Microchirus azevia
		8858010903	Microchirus variegatus
8858011000	Bathysolea	8858011001	Bathysolea profundicola
8858011100	Dicologlossa	8858011101	Dicologlossa cuneata
8858020000	Cynoglossidae		
8858020200	Cynoglossus	8858020201	Cynoglossus browni
8860020000	Balistidae		
8860020200	Balistes	8860020205	Balistes carolinensis
8860020500	Canthidermis	8860020501	Canthidermis maculatus
8861010000	Tetradontidae		
8861010100	Lagocephalus	8861010102	Lagocephalus lagocephalus
8861040000	Molidae		
8861040100	Mola	8861040101	Mola mola
8861040200	Ranzania	8861040201	Ranzania laevis

Baltic Species

3734030201	AURELIA AURITA
5704020401	SEPIETTA OWENIANA
5706010401	ALLOTEUTHIS SUBULATA
6188030110	CANCER PAGURUS
8603010000	PETROMYZINIDAE
8603010217	LAMPETRA FLUVIATILIS
8603010301	PETROMYZON MARINUS
8606010201	MYXINE GLUTINOSA
8710010201	SQUALUS ACANTHIAS
8713040134	RAJA RADIATA
8741010102	ANGUILLA ANGUILLA
8747010000	CLUPEIDAE
8747010109	ALOSA FALLAX
8747010201	CLUPEA HARENGUS
8747011701	SPRATTUS SPRATTUS
8747012201	SARDINA PILCHARDUS
8747020104	ENGRAULIS ENCRASICOLUS
8755010115	COREGONUS OXYRINCHUS / C. LAVARETUS
8755010305	SALMO SALAR
8755010306	SALMO TRUTTA
8755030301	OSMERUS EPELANUS
8756010237	ARGENTINA SPYRAENA
8759010501	MAUROLICUS MUELLERI
8776014401	RUTILUS RUTILUS
8791030402	GADUS MORRHUA
8791030901	POLLACHIUS VIRENS
8791031301	MELANOGRAMMUS AEGLEFINUS
8791031501	RHINONEMUS CIMBRIUS
8791031701	TRISOPTERUS MINUTUS
8791031703	TRISOPTERUS ESMARKI
8791031801	MERLANGIUS MERLANGIUS
8791032201	MICROMESTISTIUS POTASSOU
8791040105	MERLUCCIUS MERLUCCIUS
8793010000	ZOARCIDAE
8793010724	LYCODES VAHLII
8793012001	ZOARCES VIVIPARUS
8803020502	BELONE BELONE
8818010101	GASTEROSTEUS ACULEATUS
8818010201	SPINACHIA SPINACHIA
8820020000	SYNGNATHIDAE
8820020119	SYNGNATUS ROSTELLATUS
8820020120	SYNGNATUS ACUS
8820020123	SYNGNATUS TYPHLE
8820022101	ENTELURUS AEQUOREUS
8826020601	EUTRIGLA GURNARDUS
8831020825	COTTUS GOBIO
8831022205	MYOXOCEPHALUS QUADRICORNIS
8831022207	MYOXOCEPHALUS SCORPIUS
8831024601	TAURULUS BUBALIS
8831080803	AGONUS CATAPHRACTUS

8831090828	LIPARIS LIPARIS
8831091501	CYCLOPTERUS LUMPUS
8835020101	DICETRARCHUS LABRAX
8835200202	PERCA FLUVIATILIS
8835200403	STIZOSTEDION LUCIOPERCA
8835280103	TRACHURUS TRACHURUS
8835450202	MULLUS SURMULETUS
8839013501	CTENOLABRUS RUPESTRIS
8840060102	TRACHINUS DRACO
8842120905	LUMPENUS LAMPRETAEFORMIS
8842130209	PHOLIS GUNELLUS
8845010000	AMMODYTIDAE
8845010105	AMMODYTES TOBIANUS (LANCEA)
8845010301	HYPEROPLUS LANCEOLATUS
8846010106	CALLIONYMUS LYRA
8846010107	CALLIONYMUS MACULATUS
8847010000	GOBIIDAE
8847015101	POMATOSCHISTUS MINUTUS
8847015103	POMATOSCHISTUS MICROPS
8847016701	LESUEURIGOBIUS FRIESSII
8850030302	SCOMBER SCOMBRUS
8857030402	SCOPHTHALMUS MAXIMUS
8857030403	SCOPHTHALMUS RHOMBUS
8857031702	ARNOGLOSSUS LATERNA
8857040603	HIPPOGLOSSOIDES PLATESSOIDES
8857040904	LIMANDA LIMANDA
8857041202	MICROSTOMUS KITT
8857041402	PLATICHTHYS FLESUS
8857041502	PLEURONECTES PLATESSA
8858010601	SOLEA SOLEA
8858010801	BUGLOSSIDIUM LUTEUM

APPENDIX VIII –SPECIES VALIDITY CODE

0 = INVALID INFORMATION	Information lost.
1 = VALID INFORMATION	No per hour and total length composition recorded; applies also when No per hour is zero.
2 = PARTLY VALID INFORMATION	Refers to haul validity code P; only valid for fish over 20 cm, because no liner has been used; applies also when No per hour is zero.
3 = LENGTH COMPOSITION INCOMPLETE	Only part of the catch has been measured.
4 = TOTAL NO PER HOUR ONLY	Catch sampled for No per hour only; no length measurements.
9 = VALID INFORMATION AVAILABLE BUT NOT RECORDED ON THE FILE	Data not processed on the file.

APPENDIX IX –FIELD SPECIFICATIONS (XML)

Field name: RecordType

Length 2

Description Contains description of record type, for identification.

Value(s) Fixed values dependent on recordtype.

Record type	**Values**
Cruise Info record	CI
Sa record	SA
Type1 Haul Information	HH
Type 1a Extended Haulinfomation	HE
Type 2 Length Freq. distribution	HL
Type 4 Size-maturity-age-length keys	CA

Field name: Country

Length 3

Description Country data belongs to

Field Value(s) See appendix III

Field name: Ship

Length 4

Description: Ship from which data has been collected from

Value(s) See appendix III

Field name: CruiseNo

Length 3

Description National coding system

Value(s)

Field name: Year

Length: 4

Description: The Year in which data was collected

Value(s):

Field name: DateStart

Length: 8

Description: Date for cruise start

Value(s):

Field name:		DateEnd
	Length	8
	Description	Date cruise ended
	Value(s)	
Field name:		UpperRightCornerLatitude
	Length	8
	Description	Latitude of upper right corner of a square covering the entire area for the survey
	Value(s)	
Field name:		UpperRightCornerLongitude
	Length	8
	Description	Longitude of upper right corner of Square covering the entire area for the Survey
	Value(s)	
Field name:		LowerLeftCornerLatitude
	Length	8
	Description	Latitude of lower right corner of a square covering the entire area for the survey
	Value(s)	
Field name:		LowerLeftCornerLongitude
	Length	8
	Description	Longitude of lower right corner of Square covering the entire area for the Survey
	Value(s)	
Field name:		AcousticContactFirstName
	Length	30
	Description	The firstname of the contactperson on the acoustic data of this survey
	Value(s)	
Field name:		AcousticContactLastName
	Length	30
	Description	The lastname of the contactperson on the acoustic data of this survey
	Value(s)	
Field name:		AcousticContactEmail
	Length	60
	Description	The email address of the contactperson on the acoustic data of this survey
	Value(s)	
Field name:		FisheriesContactFirstName
	Length	30
	Description	The firstname of the contactperson on the fisheries data of this survey
	Value(s)	

Field name:		FisheriesContactLastName
	Length	30
	Description	The lastname of the contactperson on the fisheries data of this survey
	Value(s)	

Field name:		FisheriesContactEmail
	Length	60
	Description	The emailaddress of the contactperson on the fisheries data of this survey
	Value(s)	

Field name:		Sounder
	Length	2
	Description	Sounder/integrator used in this survey
	Value(s)	

ANNEX 4

USERS MANUAL
INTERNATIONAL ACOUSTIC SURVEY DATABASE

MARCH 2000

VERSION I
REV. 1

TABLE OF CONTENTS

Section **Page**

INTRODUCTION

This document is a users guide to accessing and using the website containing the International Acoustic Survey Database, the database system described in **[Requirements Specification for the HERSUR Project, Rev. 1]** which is based on **[Working Paper 1998]**.

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The purpose of this manual is to guide the user through the process of accessing the Hersur database, uploading data to the database and downloading data from the database.

Once logged on to the website, the user will be able to read all data from the countries participating in this project, and to download the data from the respective countries, but unable to upload Your own data.

For the data exchange format, see **[HERSUR Database Exchangeformat Specification]** (latest issue).
If there's anything in this document or You are experiencing problems with the database Website, You are welcome to contact the administrators of the website. At the moment You can reach them by sending an email to the Scientific project leader, Karl-Johan Staehr (kjs@dfu.min.dk), and he will direct Your questions on to the right recipient.

1 FINDING YOUR WAY TO THE DATABASE

The database resides on the internet. At the moment it's place on a server in DIFRES (DFU), sited in Lyngby, Denmark. The URL, Uniform Resource Locator (Internet address) is:

Hersur: http://www.dfu.min.dk/hersur

Baltdat: http://www.dfu.min.dk/baltdat

When you type this address into your Internet Browser (which at he moment MUST be a Microsoft Internet Explorer version 5.0, or later (because it is the only browser that supports XML, E**x**tensible **M**arkup **L**anguage, in full), you will come to Website Logon Screen.

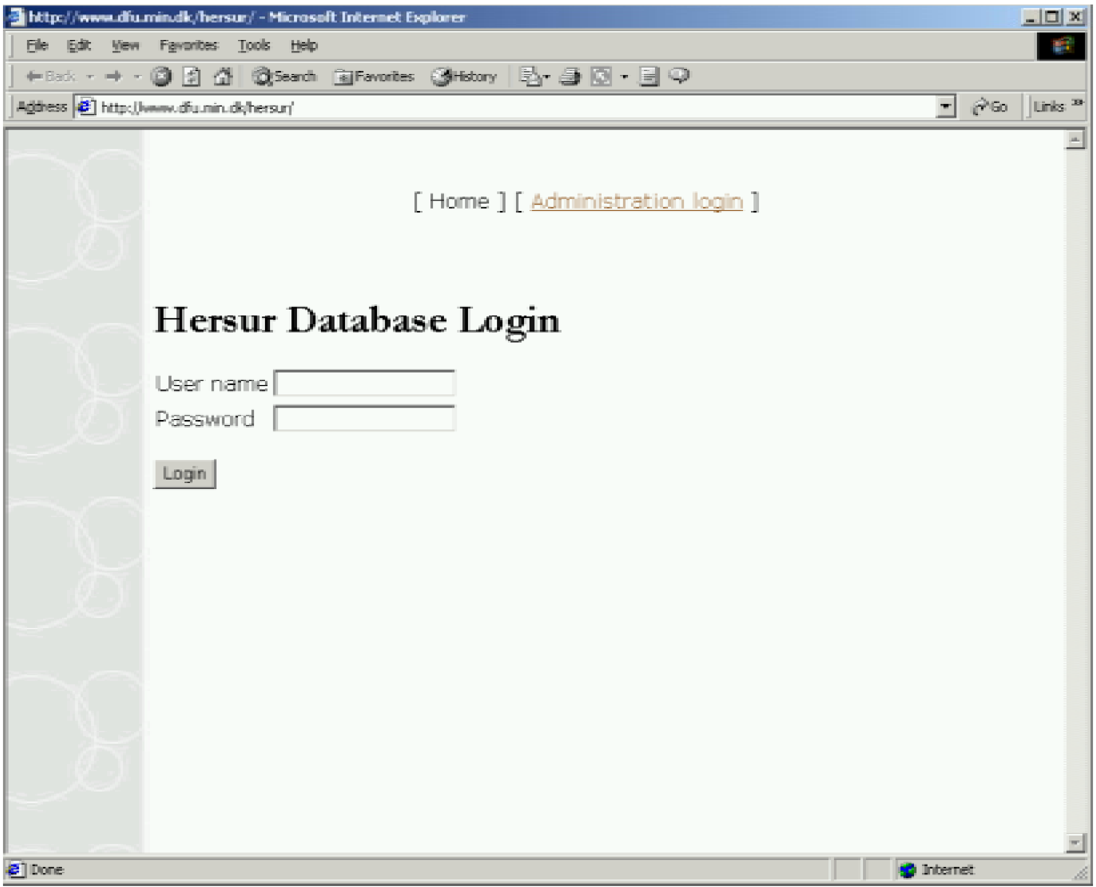


Figure The Website logon screen (here: Hersur)

At this point you most certainly want to login to the database system, but you have to get the username/password from DIFRES, so send an email (mailto://kjs@dfu.min.dk) stating the following information:

Firstname
Middlename
Last Name
Country

Email address (very important for receiving latest info and username/password)
As soon as you have been added to the user database the administrator of the database will send you a username and password by email, and you will then be able to enter the database area. Type Your username and password into the correct fields, press the Enter key on your keyboard or place the computer cursor on top of the LOGIN key on the login screen and press the mouse button.

2 VIEWING DATA IN THE DATABASE

You are now ready for using the database (viewing, converting data between formats, uploading data, and downloading data).

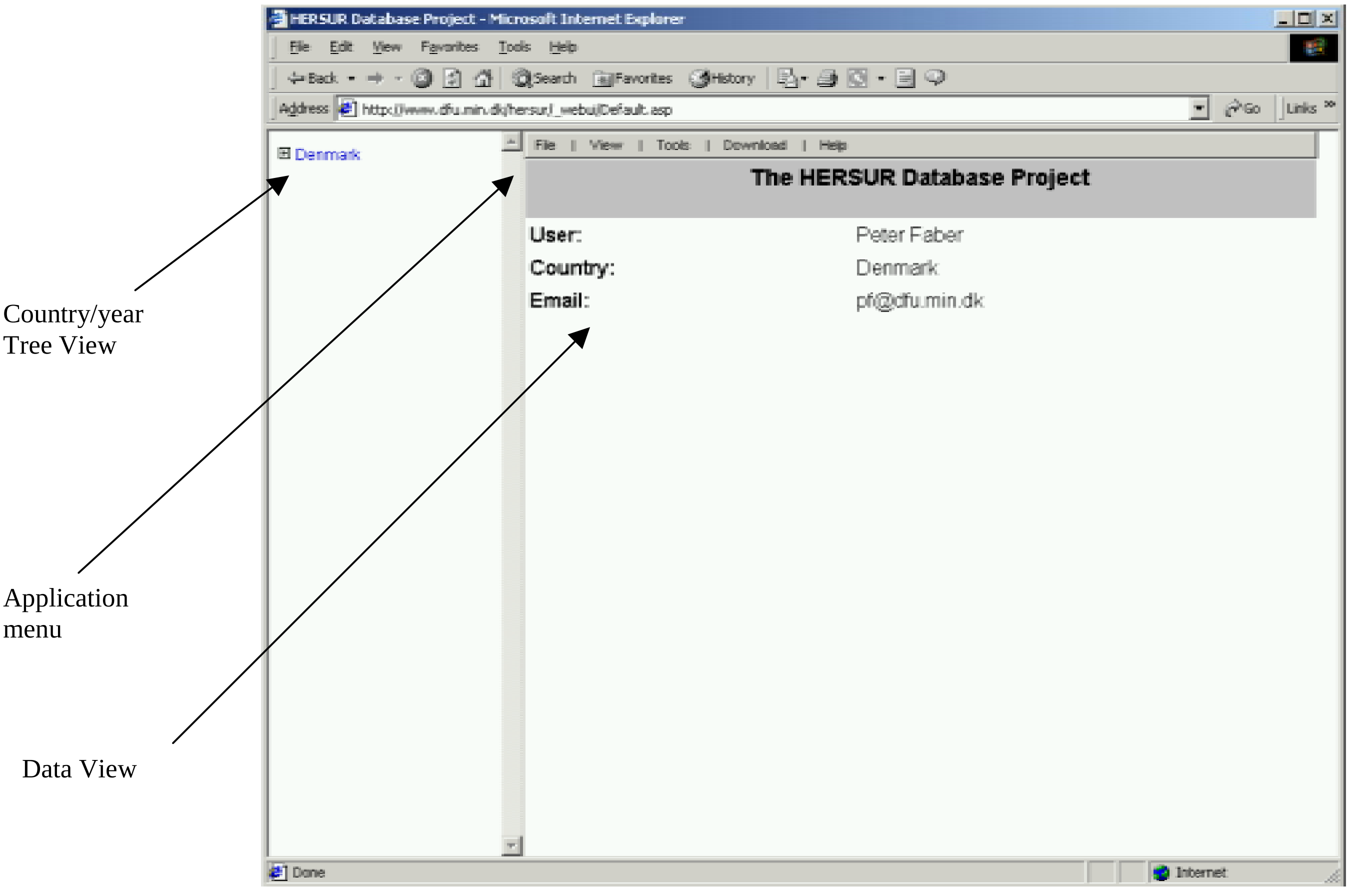


Figure The first view You will see when entering the website

As You can see, has the browser window been divided into three parts:

1. The country Year/view
2. The 'application' menu
3. The dataview

2.1 Navigating the country/year TreeView

In this part of the screen You will bee able to see a short view (overview) of the data present on the system. At first when You enter, the selected view will be by country (list sorted by country name. There is an alternative view (Year View), which You can select from the menu item 'View'.

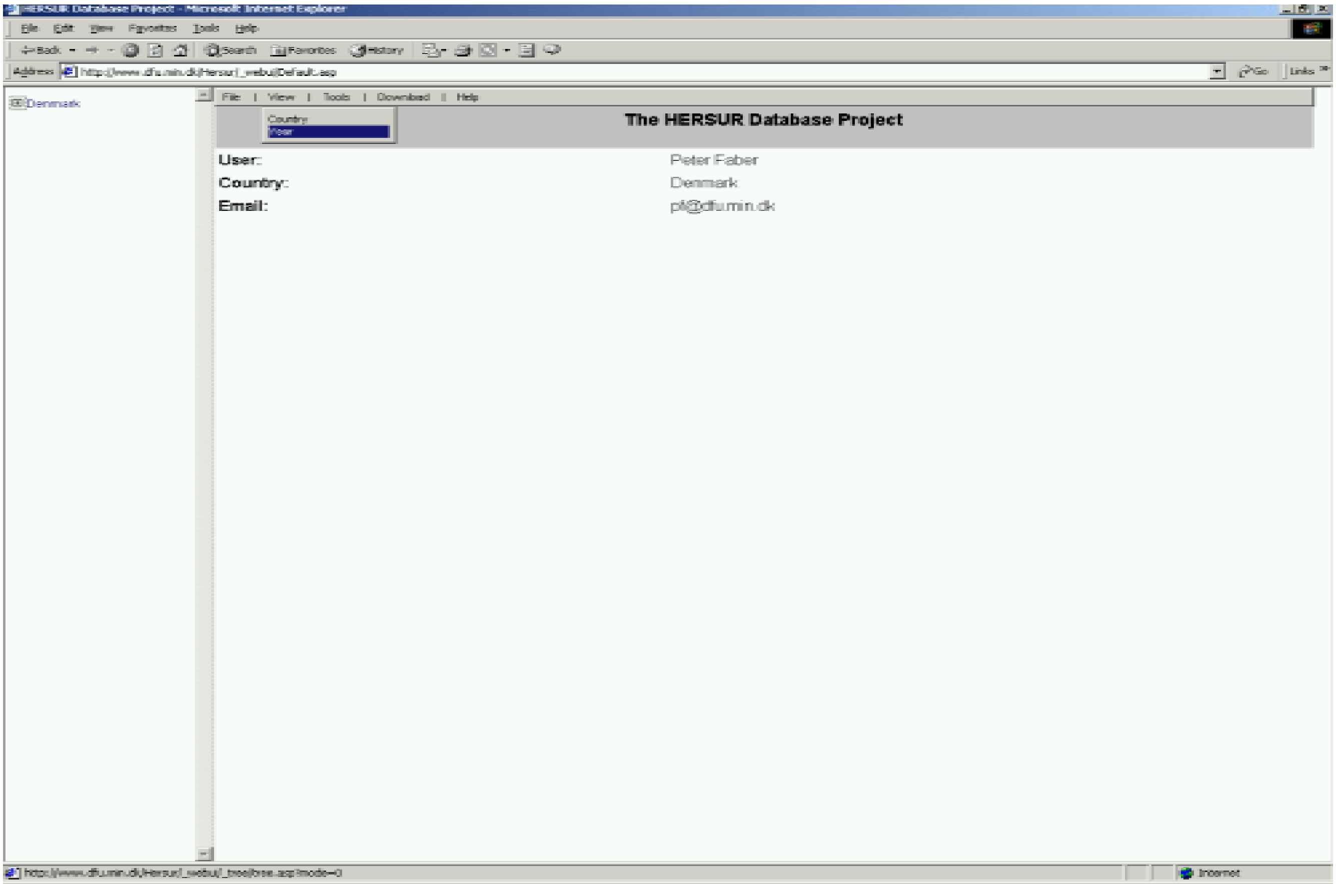


Figure Selecting either year or country view in tree view

If there's a + sign next to the line, then by clicking the + sign, the tree will expand and show a – sign (collapse again by clicking the – sign). Figure 4 shows the tree view at its maximum expansion:

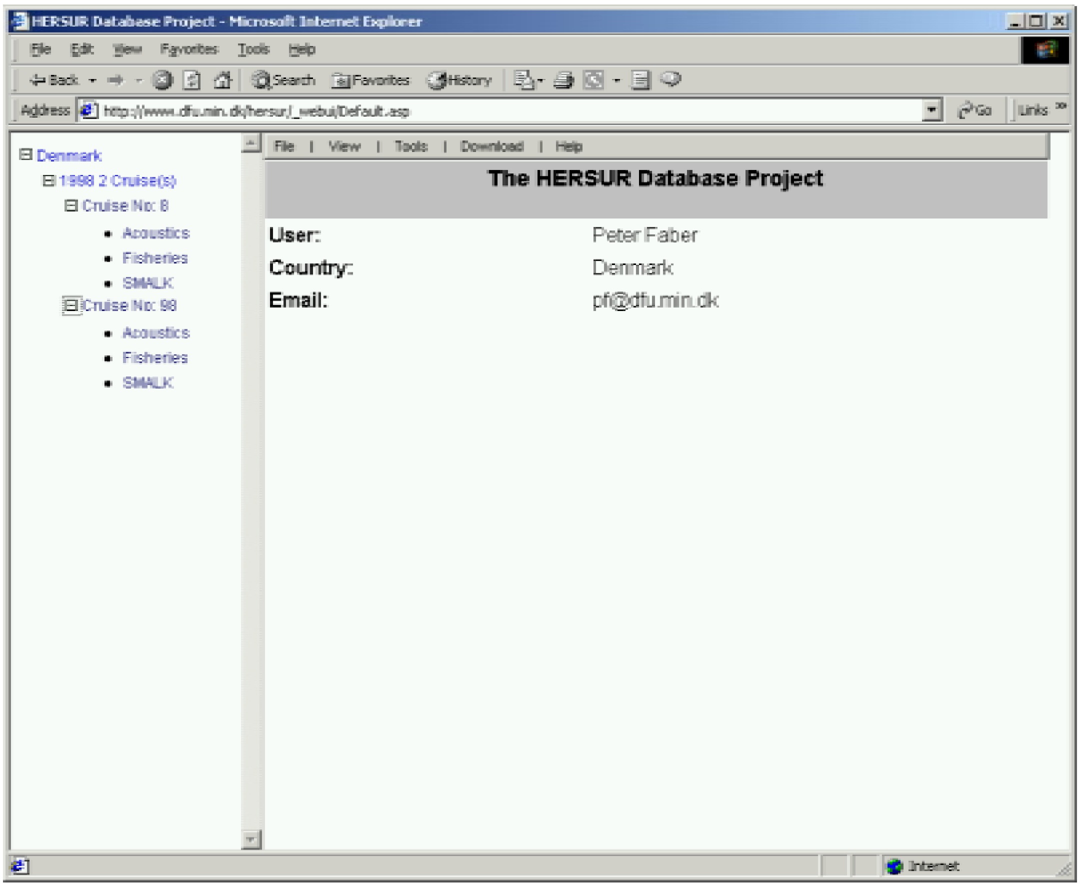


Figure Tree view maximum expanded

As the tree expands the information becomes more and more specific on the data. By selecting branches on the tree you can change from viewing your personal data, to viewing cruise specific data:

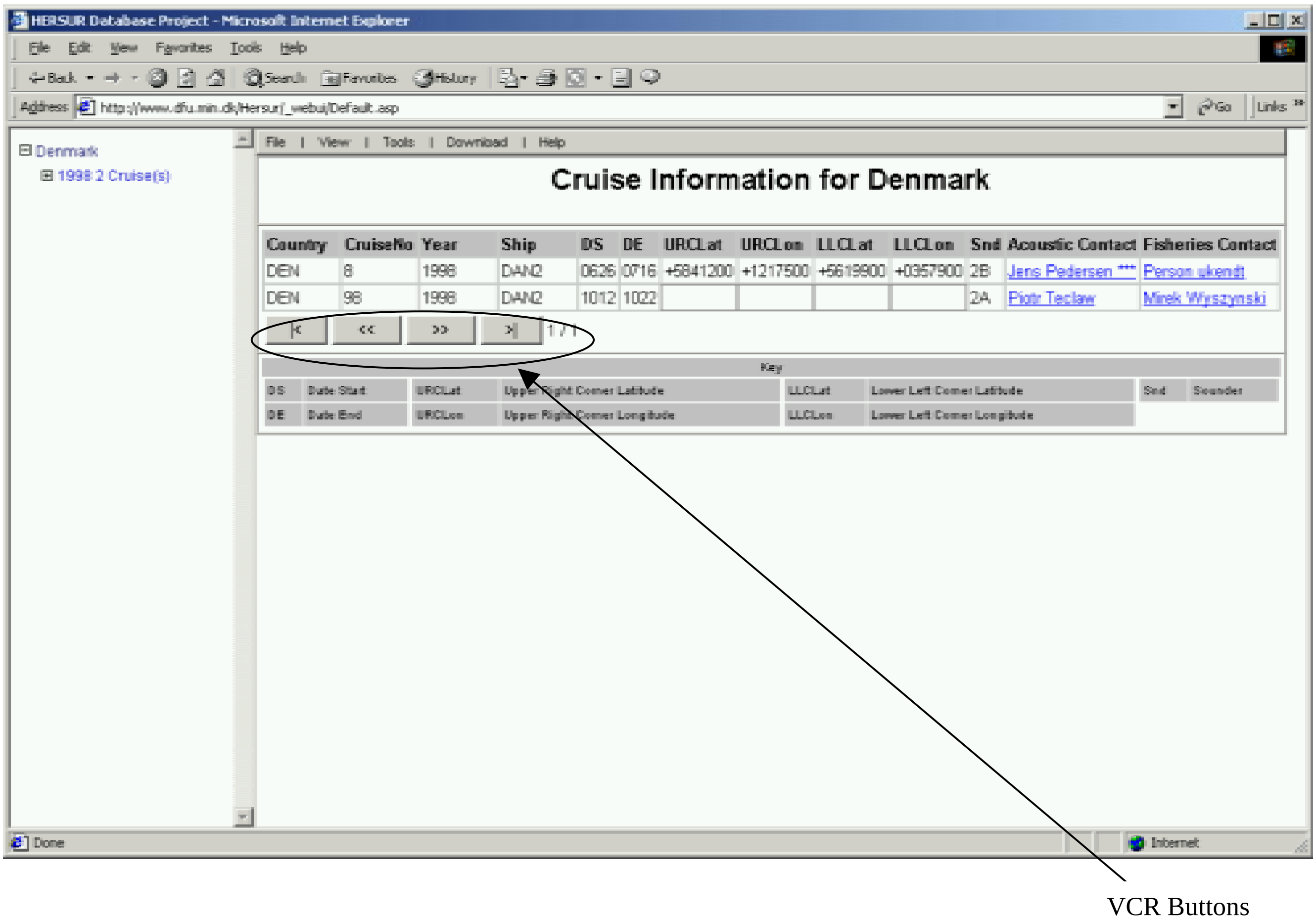


Figure Denmark 'country branch' selected on tree view

If the data shown in the view exceeds the predefined size a number of pages will be selectable with the VCR buttons (You can scroll through the data pages).

The last view that shall be mentioned here, is the data record view. Selecting the fishing records branch of a cruise, will give us data similar to the view in Figure 5. To room the entire record within the browser width, the fieldnames of the records has been abbreviated in the records field headers, but the translation tables are given in the bottom of the browser page.

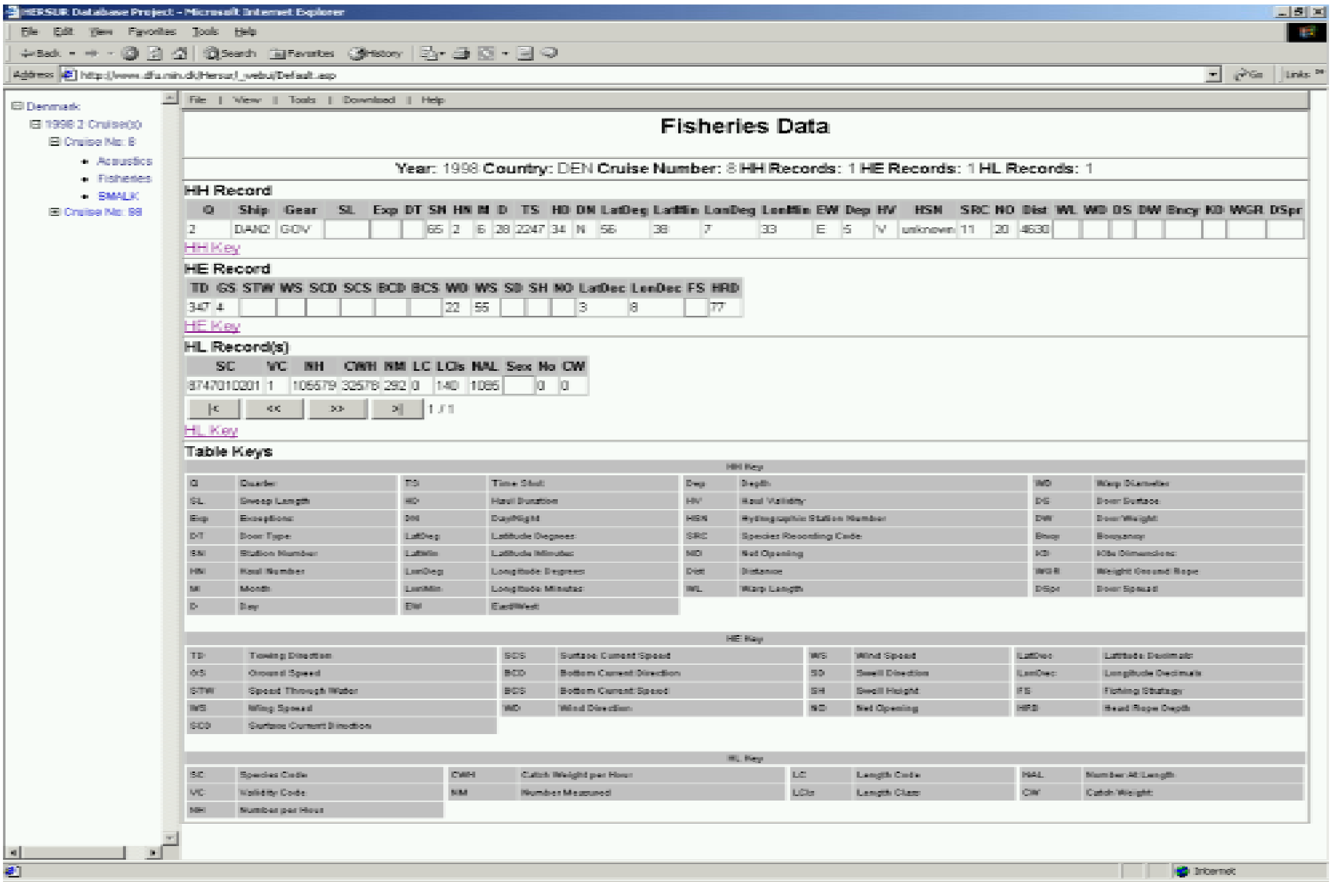


Figure Viewing a data record set, here the fisheries records of a test cruise (data are partially fictitious).

3 DOWNLOADING DATA FROM THE DATABASE

To download data from the database is very simple. you download data as an XML file, but if you want it in the IBTS fixed record length file type format, there are tools at the website to make the conversions between XML and FLR (**f**ixed **l**ength **r**ecord). In the application menu there is a download menu item, which can be selected as soon as you have chosen at minimum a Cruise branch on the country/year tree view.

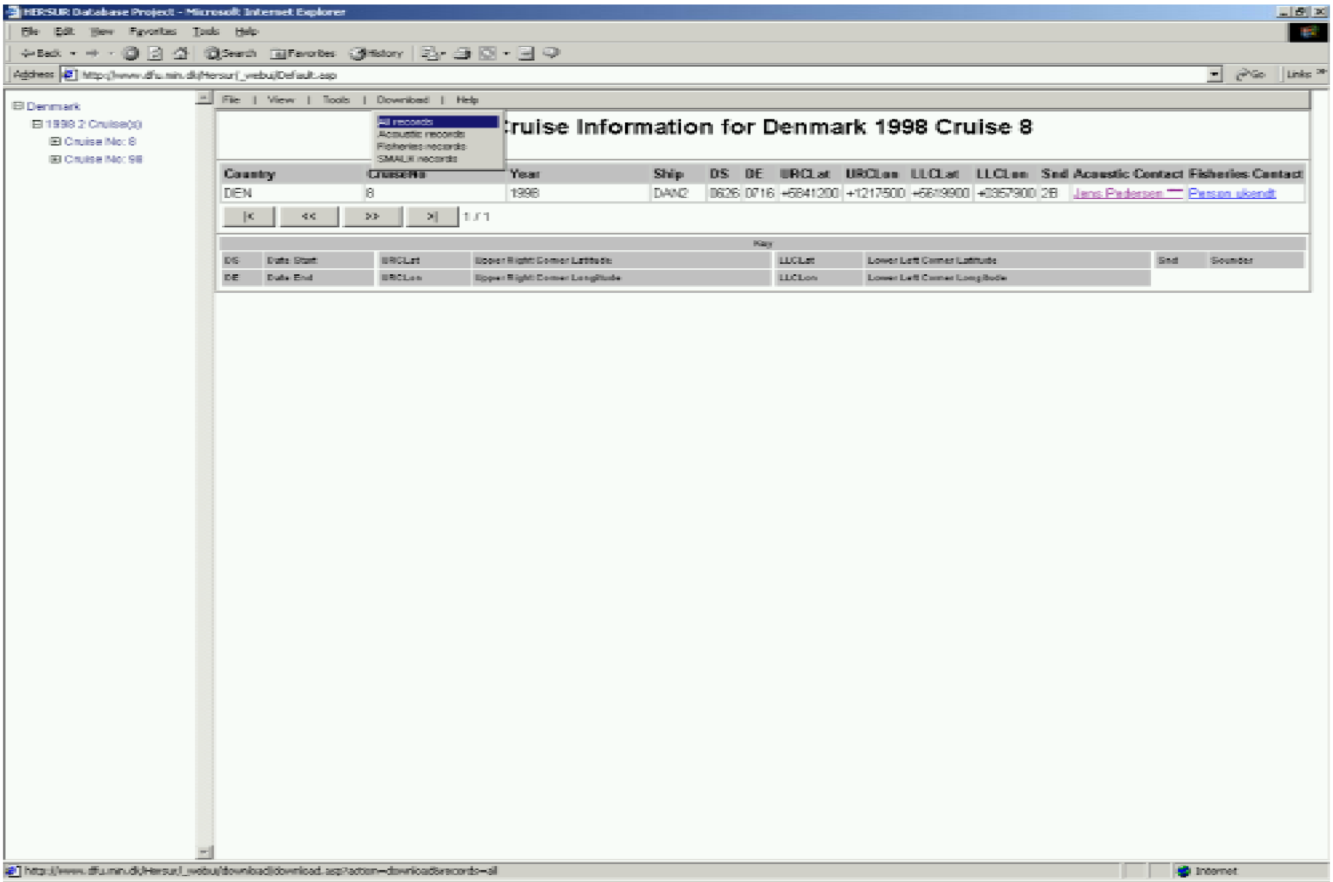


Figure Selecting to download all record types from the cruise selected in the tree view.

When you have selected the download type, the system immediately starts selecting records from the right cruise in the database. This process can take from few seconds to a few minutes, all depending on how many records of the specified type there's on the database server.

When the server has finished retrieving records it presents the files on the screen ready for download as whenever you are downloading files. Here you right-click your computermouse having placed the cursor on top of the file to download.

Notice, that there will always be a schema file present along with the data file (The purpose of this file, is that it has to be used whenever you are viewing the data file with the Internet browser to structure the data). The browser brings up a pop-up menu in which you select the “Save target as…” menu item (language dependable), and chooses where on your local computer to put the file.

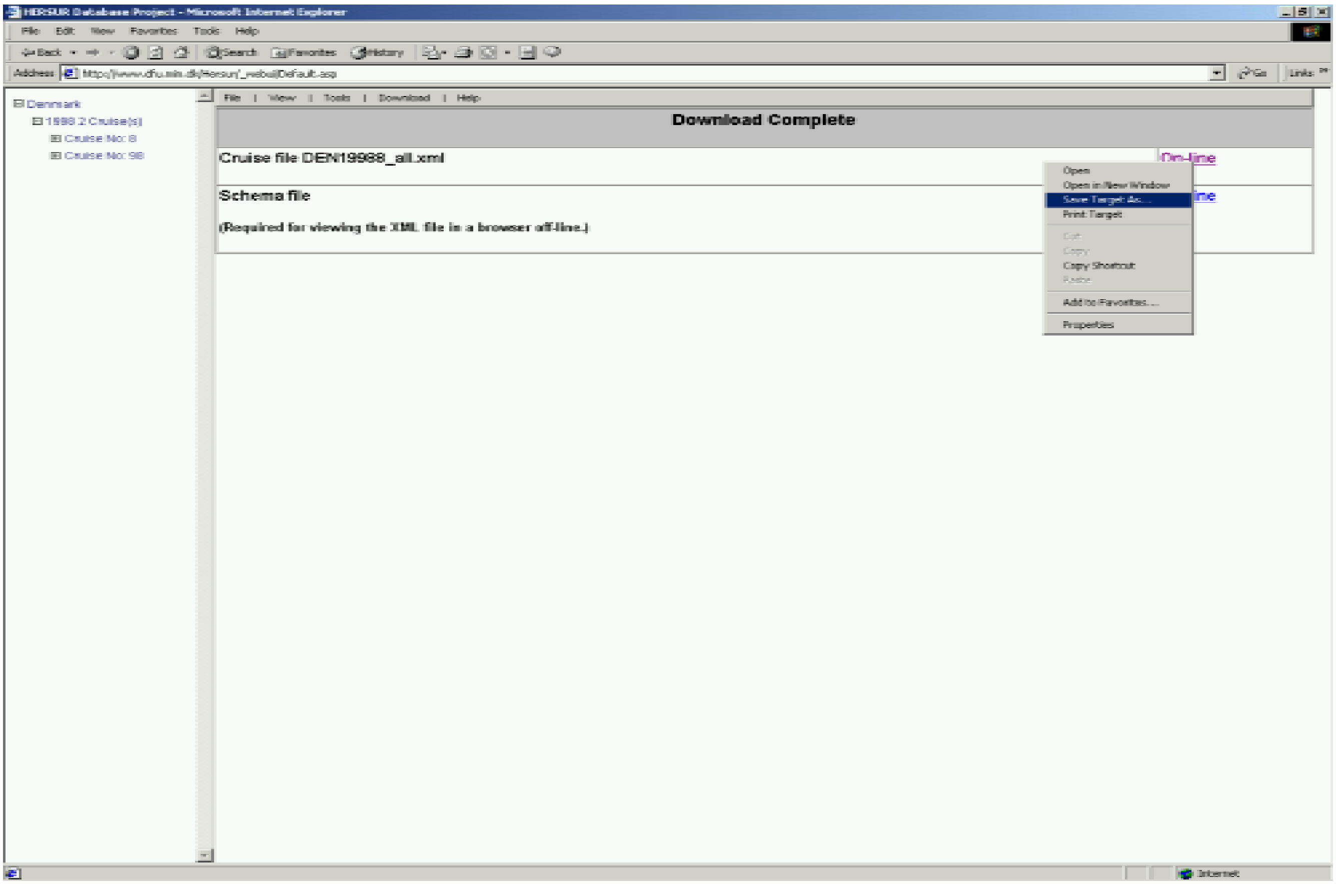


Figure Choose "Save target as...." and select download path.

Should you now be interested in converting the data file to FLR file format, then use the tools menu item on the application menu, and in the submenu choose the “Convert to ascii” (actually XML->FLR)

In the input field specify the XML file that you want to convert (the one you have just downloaded or any exchange format valid XML data file containing valid Hersur data).

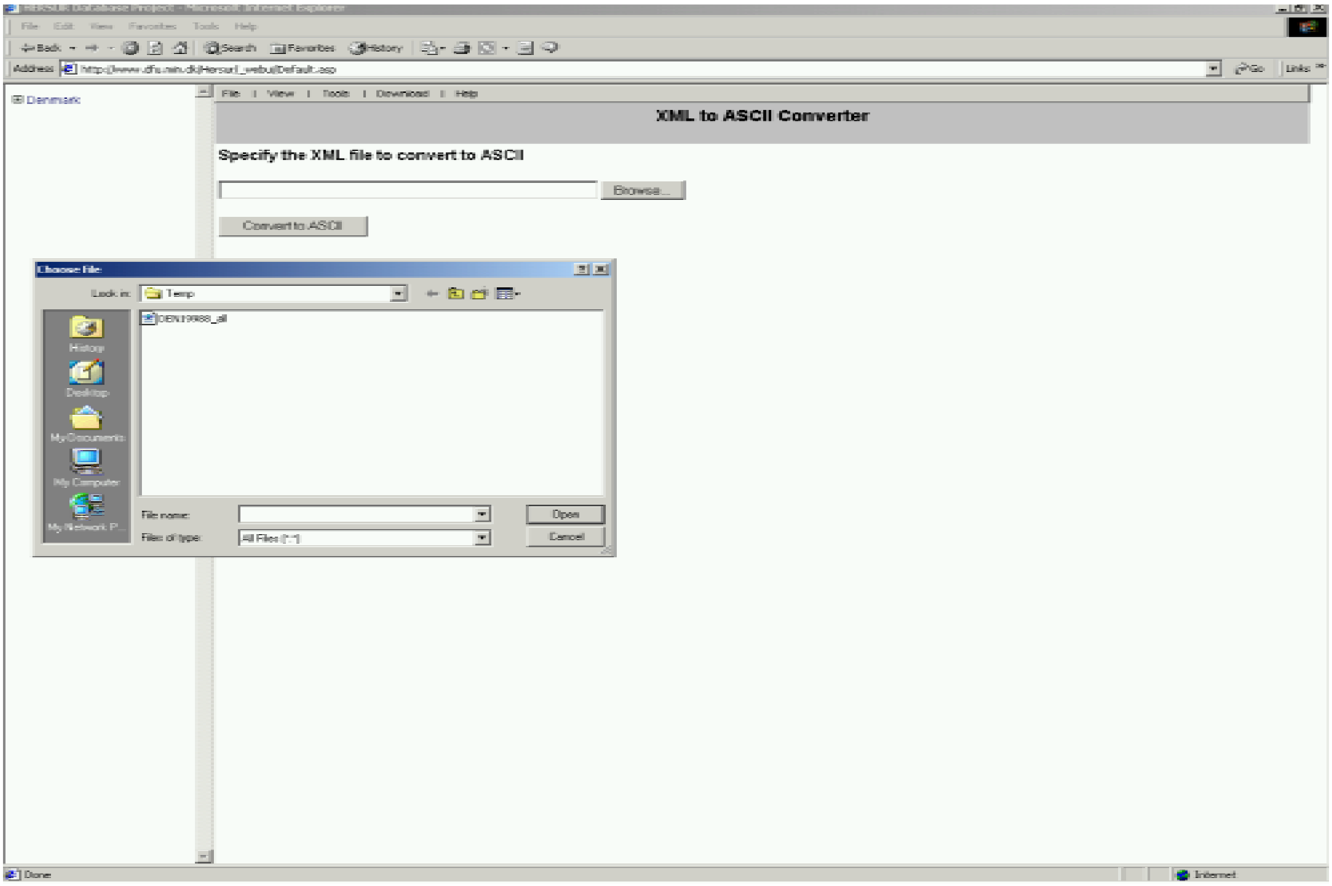


Figure Selecting XML file to convert to FLR (locally placed file)

When you select the "Convert to ASCII" button the browser uploads the file to the server, which converts the file, and prepares the file so you can download it again as you did in the previous step with the XML file.

Download this file, and you have a data file in the IBTS FLR type file format.

4 UPLOADING DATA TO THE DATABASE

Uploading data to the website is done using the application menu. Choose the 'Tools" menu item in the menu. If your datafile is an XML file then choose to "Upload cruise" (it will be validated on upload), unless You just want to check your data. On the other hand if the data is in the FLR file format, then you have to convert it to an XML file before you can upload it.

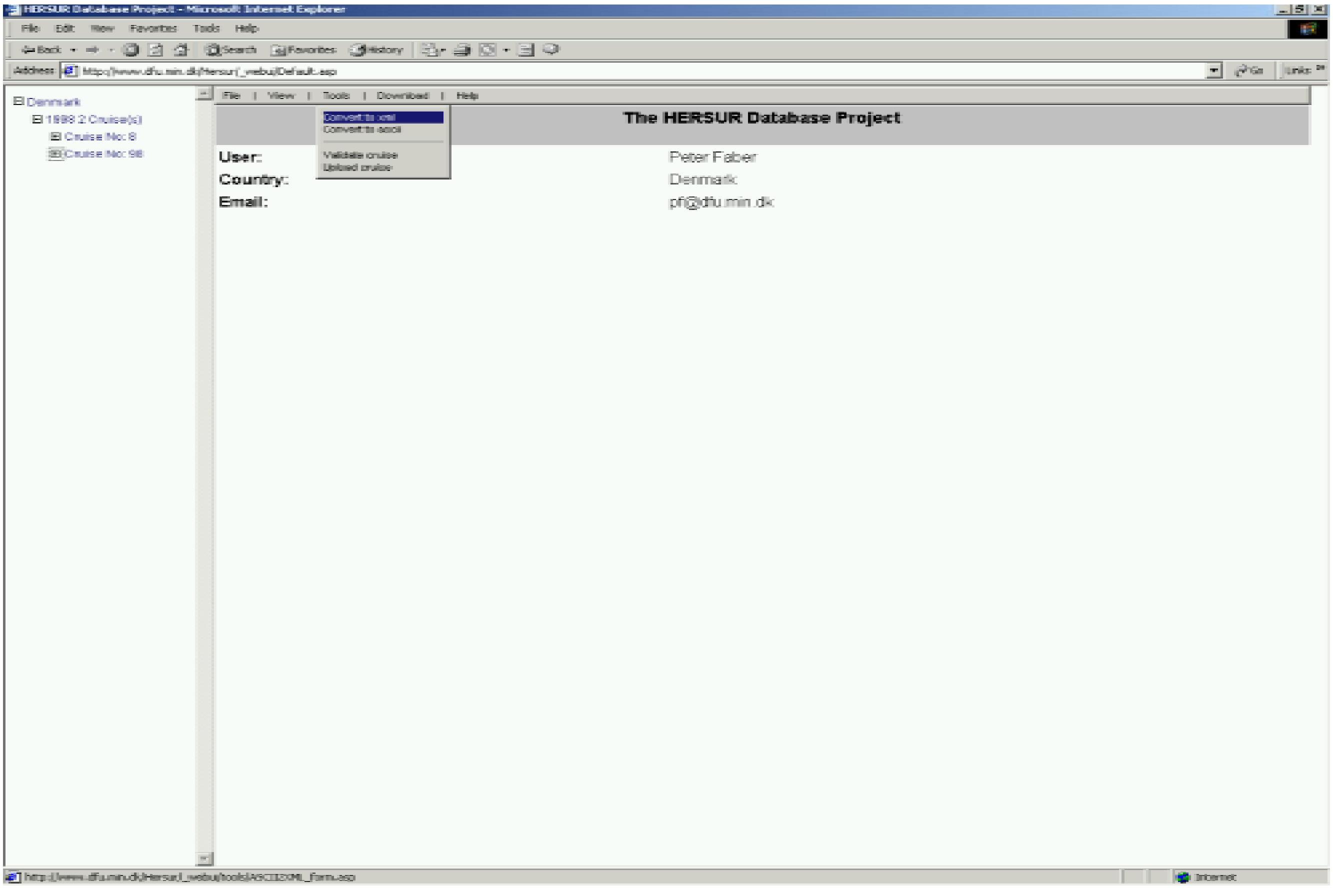


Figure Selecting to convert data before uploading

As soon as you have selected to convert your data file to an xml type file, a new screen appears, in which you can type the local path to your data file, or choose to browse for it by 'clicking' the Browse button.

When You've entered the filename in the edit field, you 'click' the Convert button to start converting your data file. This again may take some time depending on the amount of data in your file.

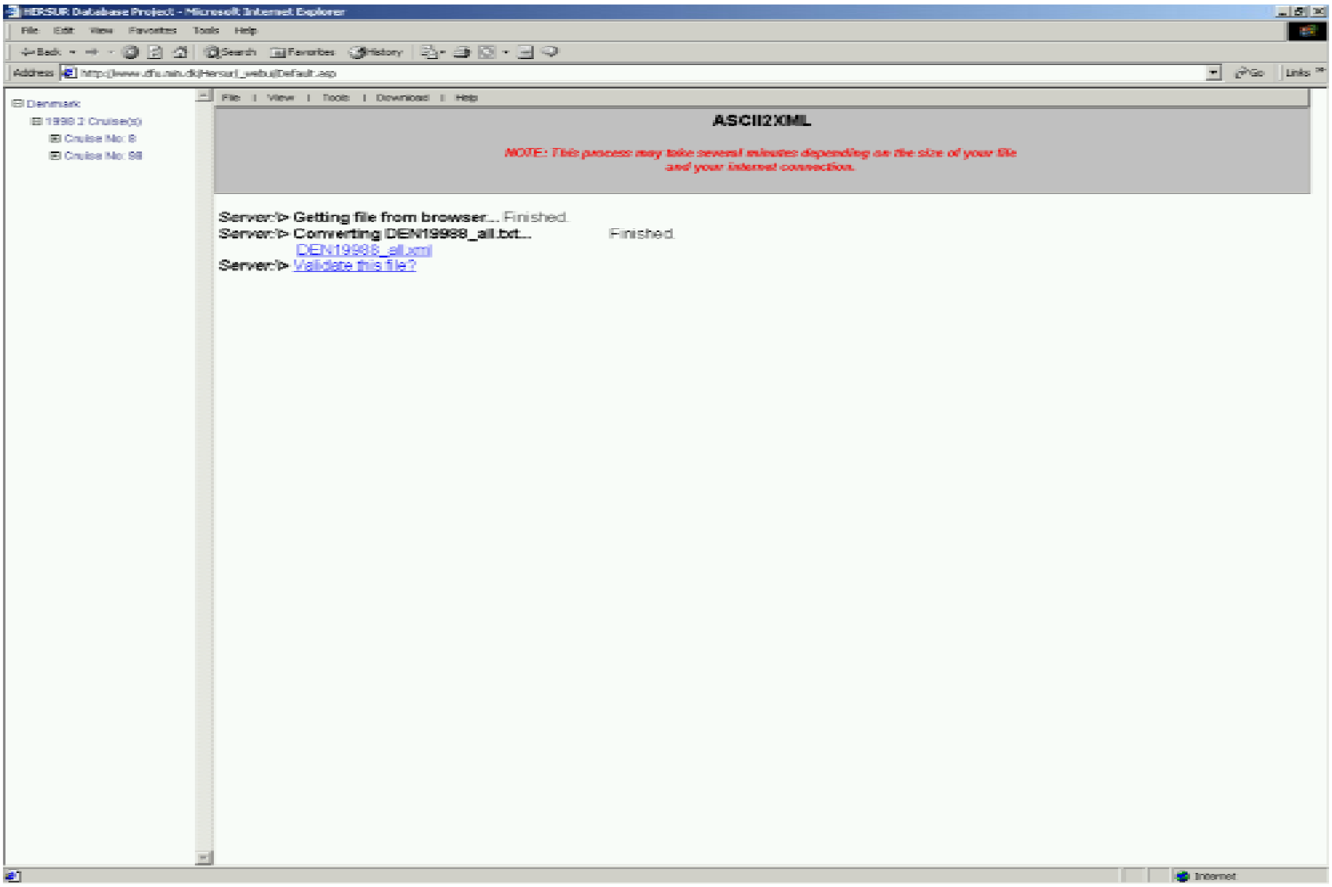


Figure The server has finished converting the data file, and you can now choose to download or continue to validate the file.

If you now select the hyperlink “Validate this file?” the system automatically proceeds with the validation of the file. In fact you save time in downloading and uploading again!

In the next process the you will receive information onscreen for every step in the validation.

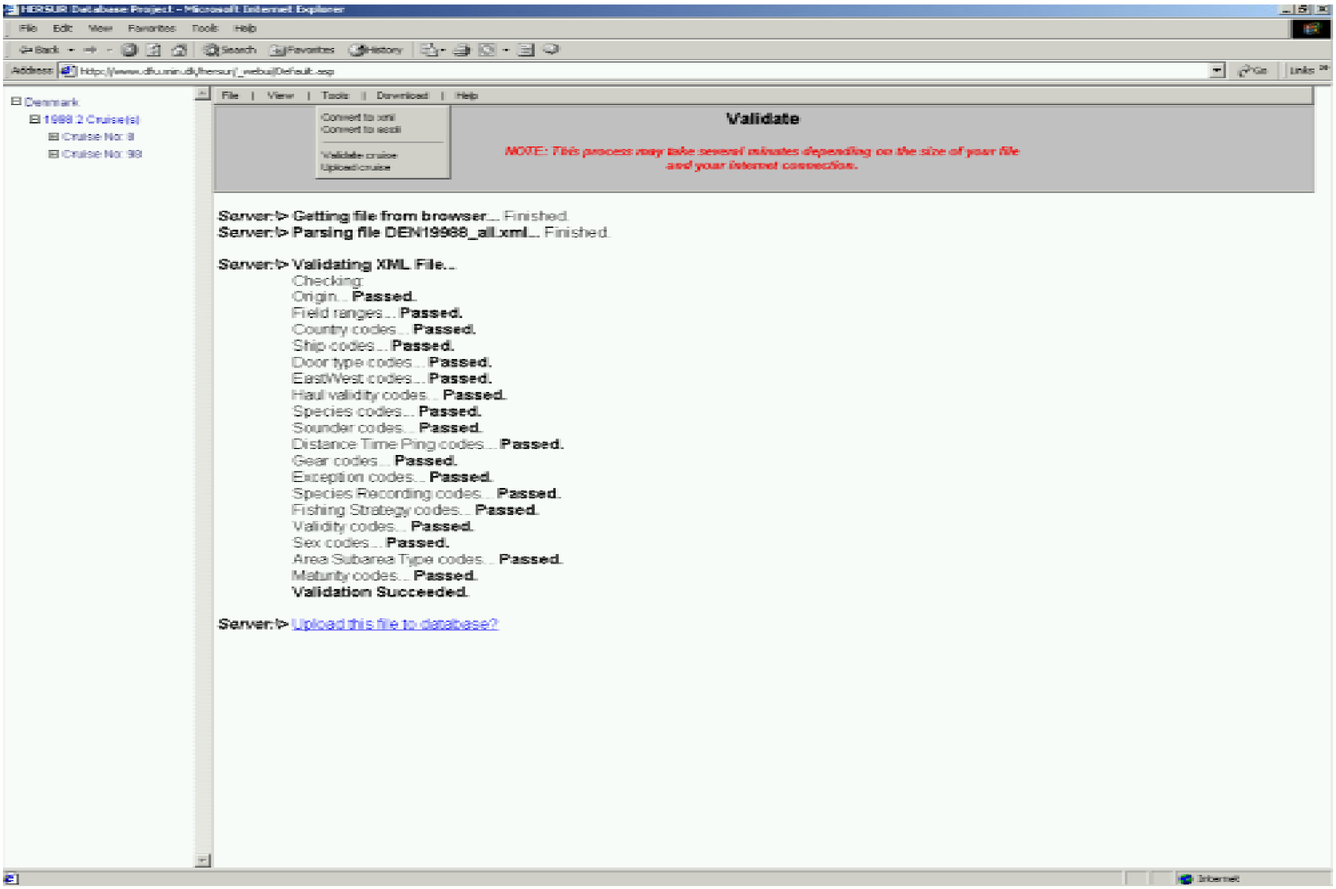


Figure The server has successfully validated the file. You can stop now or continue to update the database with the data in the file.

Should your data by accident NOT be valid you will be given the possibility to view (or download) an error file containing information on which records have errors.

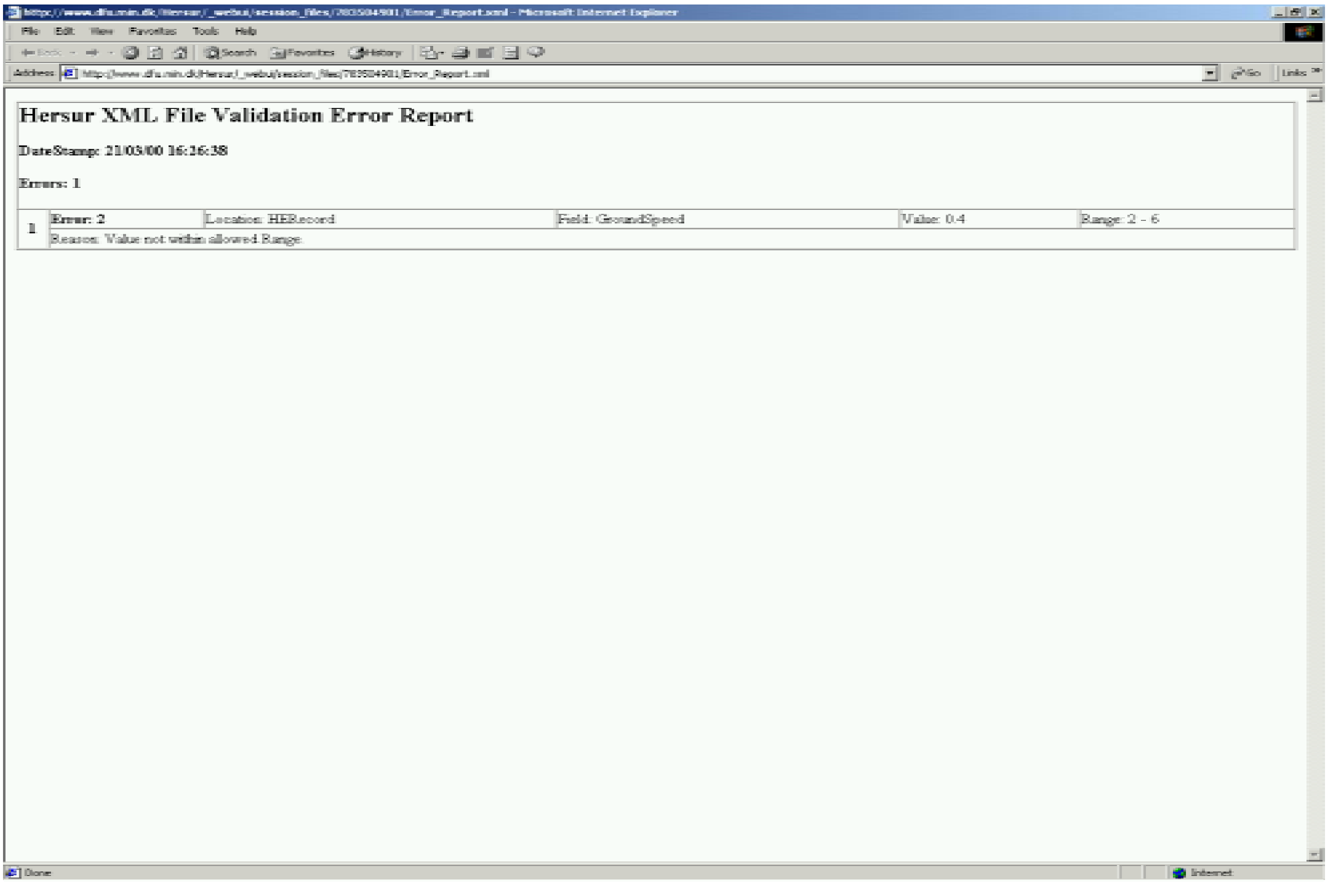


Figure Range error in data file, GroundSpeed should be between 2 and 6 knot, but is 0.4 knot!

If this happens you have to correct the data and start over again.

If successful and you proceed with the update and the data already exists in the database IT WILL BE OVERWRITTEN!

If the cruise exists and you are updating (you have put you sa records in here before, but now have prepared fisheries data and/or the SMALK records, IT WILL BE ADDED TO EXISTING DATA.

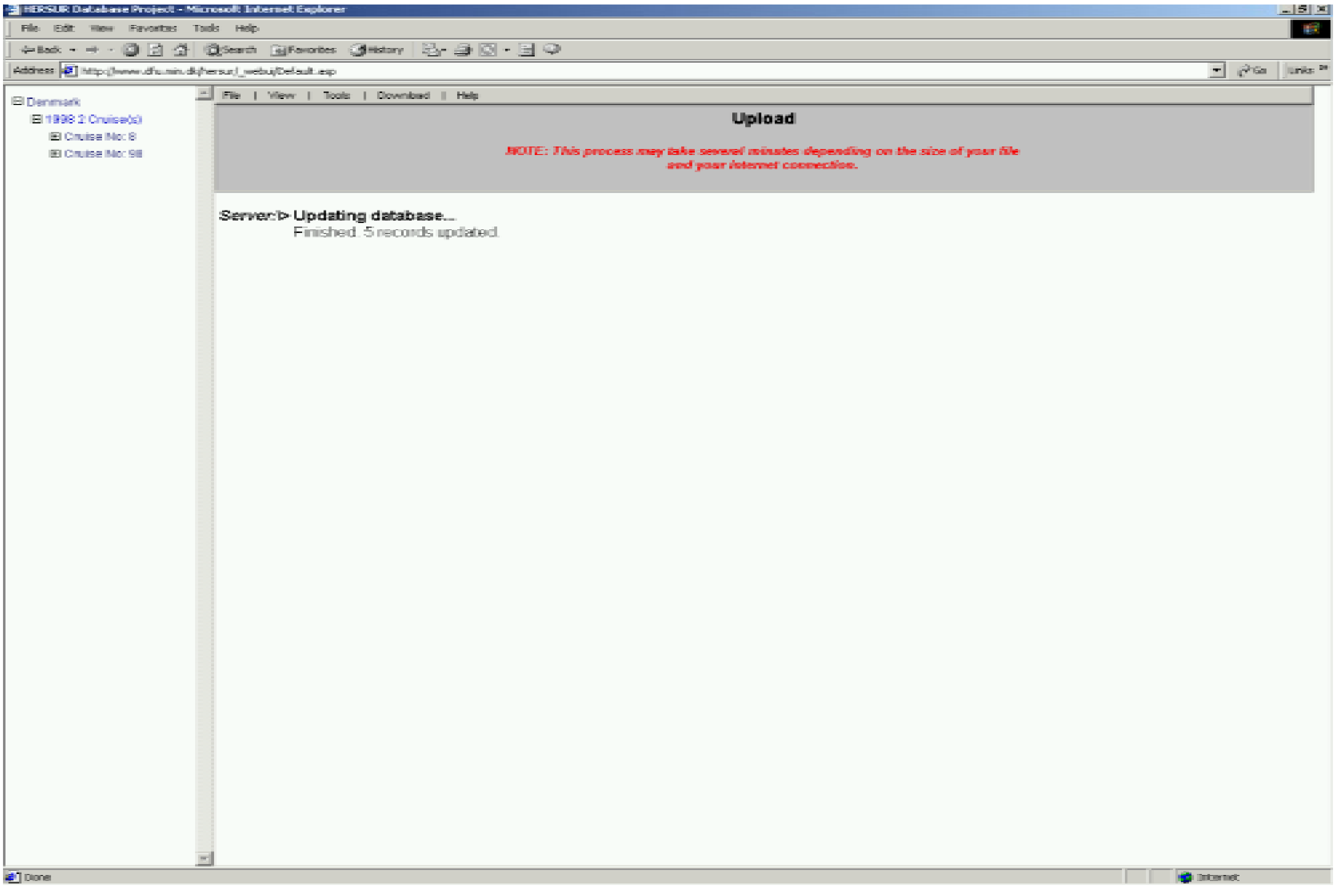


Figure The database has been successfully updated, and if you refresh your browser (F5 on I.E.), you will now be able to see your cruise on the tree view (if it wasn't already there).

5 REFERENCES

[Working Paper 1998]

International database for acoustic data and biological sampling for surveys in the North Sea and West Of Scotland, Proposal for a database structure and database exchange format, Working Paper, study Group on Baltic Acoustic Data 1998, Hersur project, Ver. 3.0 .

[Requirements Specification for the HERSUR Project, Rev. 1]

‘Requirements specification for the HERSUR project, Revision I’, DIFRES, Fall 1998

[HERSUR Database Exchangeformat Specification]

‘HERSUR/BALTDAT Exchange Format Specification, Version 1, Rev. V, March 2000’, Peter Faber, DIFRES

ANNEX 5

METHODS USED TO EVALUATE AND ESTIMATE CONVERSION FACTORS

Method 1:

Since the estimation of the corrected conversion factors is depending on the distribution function of the corrected conversion factors it was checked whether the corrected conversion factors are normal distributed or the log normal distribution must be used. The Chi-Square goodness-of-fit statistic, the Shapiro-Wilks W statistic, the Z score for skewness and the Z score for kurtosis were used for analysing the distribution function.

The analyses showed that the log-normal distribution is the most suitable distribution function for describing the distribution pattern of the conversion factors. Therefore, the model for estimating the conversion factors (Oeberst *et al*., 2000) was adapted by log-transformation of the equations for estimating the corrected conversion factor, its standard deviation and the asymmetric confidence intervals.

Figure 1.1 (of Annex 5) presents the mean length frequencies for both gears for the sequence TV3 930 followed by HG 20/25. Figure 1.2 shows the mean length frequencies for the alternative sequence of the gears. Both figures suggest that the first tow to some extent influences the result of the following tow and that this influence is probably dependent on the length. Both figures illustrate that the sequence of the gears influence the results of the hauls. Figure 1.3 illustrates the differences of the log-transformed mean conversion factors for the different sequences of the gears and the corrected log-transformed conversion factors for the different 2 cm length intervals. Figure 1.4 to 1.6 presents the same results for flounder for the same gears. The Figures 2.1 to 2.6 shows the results for the comparison between TV3 930 and TV3 520. The Figures 3.1 to 3.6 summarise the results for the comparison between TV3 930 and Granton. Figures 4.1 to 4.6 shows the results for the comparison between TV3 520 and P 20/25. The Figures 5.1 to 5.6 summarise the results for the comparison between TV3 930 and Hake 4M. Figures 6.1 to 6.6 shows the results for the comparison between TV3 930 and GOV.

Table 1.1 summarizes the results of the inter-calibration experiments between the gears TV3 520 and HG 20/25 for cod. In the first columns the distribution parameters of the log-transformed conversion factors TV3 520 / HG 20/25 are separately given for both sequences of the gear. The number of observations, the mean log-transformed conversion factors and their standard deviation are presented for the length range from 4 cm to 50 cm. The mean log-transformed conversion factors are used for estimating the influence of the sequence of the gears, C(t). The estimates of C(t) are presented in the table. The estimates of C(t) were then used for calculating the corrected log-transformed conversion factors which are independent of the sequence of the gears. The number of available stations, the mean, the standard deviations and the confidence intervals are included in the table. T-tests with a first kind of error $\alpha = 0.05$ showed that the log-transformed corrected conversion factors of the length intervals 6 cm, 34 cm and 42 cm were significantly different from zero. The different trends of the log-transformed corrected conversion factors of the length intervals 34 cm and 42 cm also illustrate that the influence of the total length regarding the conversion factors is not linear.

In the following columns of the table the back-calculated mean conversion factors, the standard deviations and the asymmetrical confidence intervals are presented. The estimates of the necessary number of paired inter-calibration stations, N*, is depending on two parameters, the error of first kind α and the required level of accuracy. For the presented estimates it was chosen that $\alpha = 0.05$ and that the half of the confidence intervals of the log-transformed data should be less or equal than 0.1. The values of N* are included in Table 1.1 for length intervals separately. The estimates suggest that about 40 data sets for each 2 cm length intervals are necessary if the proposed level of accuracy is required. However, since the total length range of cod was not caught in the paired hauls the necessary number of paired stations is probably higher.

Table 1.2 presents the same results for flounder and the following tables show the same result for the inter-calibrations of the other gears for cod and flounder in separate tables.

Table 1.1: Estimates of the inter-calibration experiment between the gears TV3 520 and HG 20/25 for cod (log-transformed conversion factors, back-transformed estimates and the necessary number of paired Stations N*)

	Log-transformed conversion factors							Log-transformed corrected conversion factors					Back-transformed conversion factors				
	Sequence 1			Sequence 2													
Length	N	Mean	Std	N	Mean	Std	C(t)	N	Mean	Std	Confidence limits		Mean	Std	Confidence limits		N*
4	1	0.30		0	0.00			1									
6	8	0.04	0.38	1	0.60		0,28	9	0.32	0.33	0.07	0.57	1.46	0.28	1.07	1.77	45
8	10	0.20	0.21	2	-0.04	0.48	-0,12	12	0.08	0.24	-0.07	0.23	1.11	0.08	0.93	1.26	24
10	10	0.10	0.28	7	-0.25	0.32	-0,17	17	-0.07	0.28	-0.22	0.07	0.97	0.08	0.81	1.07	33
12	15	0.23	0.28	10	-0.03	0.42	-0,13	25	0.10	0.33	-0.04	0.23	1.16	0.18	0.96	1.26	45
14	13	0.08	0.29	11	-0.18	0.28	-0,13	24	-0.05	0.27	-0.16	0.06	0.99	0.08	0.85	1.07	30
16	13	0.06	0.29	12	-0.08	0.25	-0,07	25	-0.01	0.26	-0.12	0.10	1.02	0.08	0.89	1.10	29
18	11	0.06	0.21	12	-0.07	0.35	-0,06	23	-0.01	0.28	-0.13	0.11	1.03	0.09	0.88	1.12	32
20	13	0.00	0.33	12	-0.17	0.30	-0,08	25	-0.09	0.30	-0.21	0.04	0.96	0.10	0.81	1.04	37
22	18	0.11	0.31	12	-0.14	0.25	-0,13	30	-0.02	0.28	-0.12	0.09	1.02	0.09	0.89	1.09	32
24	19	-0.01	0.31	12	-0.10	0.23	-0,05	31	-0.05	0.27	-0.15	0.05	0.99	0.08	0.86	1.05	31
26	19	0.01	0.27	12	-0.08	0.19	-0,05	31	-0.03	0.24	-0.12	0.05	0.99	0.06	0.89	1.05	24
28	19	-0.01	0.39	12	0.00	0.22	0,01	31	-0.01	0.33	-0.13	0.11	1.05	0.14	0.88	1.12	44
30	20	-0.02	0.36	12	-0.01	0.24	0,00	32	-0.01	0.31	-0.13	0.10	1.04	0.12	0.88	1.10	40
32	20	-0.14	0.32	11	0.01	0.29	0,07	31	-0.06	0.30	-0.18	0.05	0.98	0.10	0.84	1.05	38
34	18	-0.12	0.27	12	-0.13	0.36	0,00	30	-0.13	0.30	-0.24	-0.02	0.92	0.09	0.79	0.98	37
36	16	0.01	0.32	10	-0.09	0.25	-0,05	26	-0.04	0.29	-0.16	0.07	1.00	0.09	0.85	1.08	34
38	18	0.02	0.31	9	-0.05	0.35	-0,03	27	-0.01	0.31	-0.14	0.11	1.03	0.12	0.87	1.11	39
40	12	-0.15	0.30	7	0.05	0.18	0,10	19	-0.05	0.25	-0.17	0.07	0.98	0.07	0.84	1.07	27
42	11	0.07	0.20	6	0.12	0.17	0,03	17	0.10	0.18	0.00	0.19	1.12	0.04	1.00	1.21	15
44	10	0.05	0.23	4	-0.04	0.26	-0,05	14	0.00	0.22	-0.12	0.13	1.03	0.06	0.88	1.14	21
46	7	-0.05	0.25	1	-0.18		-0,06	8	-0.11	0.22	-0.29	0.06	0.91	0.04	0.75	1.07	20
48	3	0.00	0.17	1	0.14		0,07	4	0.07	0.12	-0.09	0.23	1.08	0.02	0.91	1.26	7
50	1	-0.01		0	0.00			1									

N number of stations, Std standard deviation

Table 1.2: Estimates of the inter-calibration experiment between the gears TV3 520 and HG 20/25 for flounder (log-transformed conversion factors, back-transformed estimates and the necessary number of paired Stations N*)

	Log-transformed conversion factors							Log-transformed corrected conversion factors					Back-transformed conversion factors				
	Sequence 1			Sequence 2													
Length	N	Mean	Std	N	Mean	Std	C(t)	N	Mean	Std	Confidence limits		Mean	Std	Confidence limits		N*
10	0	0.00		2	-0.12	0.48		2									
12	0	0.00		5	0.19	0.48		5									
14	0	0.00		6	-0.12	0.33		6									
16	0	0.00		7	-0.08	0.22		7									
18	0	0.00		7	-0.20	0.17		7									
20	1	-0.22		7	-0.26	0.16	-0.02	8	-0.24	0.16	-0.37	-0.11	0.80	0.02	0.69	0.89	12
22	1	0.30		7	-0.23	0.14	-0.27	8	0.03	0.15	-0.09	0.16	1.05	0.03	0.91	1.17	11
24	6	-0.03	0.24	7	-0.17	0.18	-0.07	13	-0.10	0.19	-0.22	0.01	0.92	0.03	0.80	1.01	17
26	13	0.04	0.26	9	-0.15	0.13	-0.10	22	-0.05	0.21	-0.15	0.04	0.97	0.04	0.86	1.04	19
28	14	-0.02	0.30	11	-0.11	0.23	-0.04	25	-0.06	0.26	-0.17	0.04	0.97	0.07	0.84	1.04	29
30	13	0.05	0.23	10	-0.10	0.25	-0.07	23	-0.02	0.23	-0.12	0.08	1.00	0.06	0.88	1.08	22
32	14	0.03	0.26	9	-0.05	0.22	-0.04	23	-0.01	0.23	-0.11	0.09	1.01	0.06	0.89	1.09	23
34	9	0.02	0.14	11	-0.02	0.25	-0.02	20	0.00	0.20	-0.09	0.09	1.02	0.04	0.91	1.10	17
36	3	-0.18	0.22	7	-0.01	0.30	0.09	10	-0.10	0.26	-0.28	0.09	0.94	0.07	0.76	1.09	28
38	2	0.32	0.44	4	0.09	0.33	-0.11	6	0.21	0.32	-0.11	0.52	1.29	0.19	0.90	1.69	41
40	0	0.00		4	0.09	0.17		4									
42	0	0.00		3	0.06	0.22		3									
44	0	0.00		4	-0.04	0.26		4									
46	0	0.00		1	-0.18			1									

N number of stations, Std standard deviation

Table 2.1: Estimates of the inter-calibration experiment between the gears TV3 930 and TV3 520 for cod (log-transformed conversion factors, back-transformed estimates and the necessary number of paired Stations N*)

	Log-transformed conversion factors							Log-transformed corrected conversion factors					Back-transformed conversion factors				
	Sequence 1			Sequence 2													
Length	N	Mean	Std	N	Mean	Std	C(t)	N	Mean	Std	Confidence limits		Mean	Std	Confidence limits		N*
4	1	0.18		0	0.00			1									
6	1	-0.88		1	-0.80		0.04	2	-0.84	0.51			0.49	0.09			102
8	2	-0.56	0.37	1	0.52		0.54	3	-0.02	0.35	-0.67	0.63	1.04	0.16	0.51	1.88	50
10	1	0.00		3	0.11	0.41	0.06	4	0.06	0.29	-0.35	0.46	1.10	0.12	0.71	1.58	35
12	6	-0.14	0.40	4	-0.12	0.34	0.01	10	-0.13	0.34	-0.37	0.11	0.93	0.12	0.69	1.12	47
14	9	-0.24	0.26	7	-0.29	0.15	-0.03	16	-0.27	0.21	-0.38	-0.15	0.78	0.03	0.68	0.86	20
16	9	0.05	0.31	8	-0.34	0.33	-0.19	17	-0.15	0.30	-0.30	0.01	0.90	0.09	0.74	1.01	37
18	8	0.06	0.41	7	-0.08	0.27	-0.07	15	-0.01	0.32	-0.19	0.17	1.04	0.13	0.83	1.18	43
20	5	0.11	0.33	6	0.03	0.19	-0.04	11	0.07	0.24	-0.09	0.23	1.11	0.08	0.92	1.26	25
22	5	0.18	0.37	4	-0.04	0.17	-0.11	9	0.07	0.27	-0.13	0.27	1.11	0.10	0.88	1.31	30
24	4	-0.10	0.38	5	0.00	0.27	0.05	9	-0.05	0.29	-0.27	0.16	0.99	0.09	0.76	1.17	34
26	5	0.25	0.21	4	-0.11	0.51	-0.18	9	0.07	0.34	-0.18	0.32	1.14	0.17	0.83	1.38	46
28	7	0.17	0.38	5	-0.04	0.31	-0.10	12	0.07	0.33	-0.14	0.27	1.13	0.16	0.87	1.31	44
30	6	0.23	0.47	7	0.13	0.22	-0.05	13	0.18	0.33	-0.02	0.38	1.27	0.21	0.98	1.46	45
32	6	0.26	0.35	7	0.06	0.35	-0.10	13	0.16	0.33	-0.04	0.36	1.24	0.20	0.96	1.43	44
34	8	0.32	0.53	7	0.03	0.35	-0.14	15	0.18	0.43	-0.06	0.41	1.31	0.42	0.94	1.51	73
36	8	0.20	0.42	7	-0.11	0.26	-0.16	15	0.05	0.34	-0.14	0.23	1.11	0.16	0.87	1.26	46
38	6	0.22	0.25	7	-0.01	0.16	-0.11	13	0.11	0.20	-0.01	0.22	1.13	0.05	0.99	1.25	17
40	6	0.20	0.24	7	0.21	0.32	0.01	13	0.21	0.27	0.04	0.37	1.27	0.13	1.04	1.44	31
42	5	0.21	0.22	6	0.20	0.22	0.00	11	0.21	0.21	0.07	0.34	1.26	0.07	1.07	1.41	19
44	5	0.36	0.22	6	-0.14	0.13	-0.25	11	0.11	0.19	-0.02	0.23	1.13	0.05	0.98	1.26	16
46	4	0.05	0.04	5	-0.02	0.21	-0.03	9	0.02	0.14	-0.09	0.12	1.03	0.02	0.92	1.13	10
48	5	0.31	0.34	4	0.06	0.20	-0.13	9	0.18	0.27	-0.02	0.39	1.24	0.13	0.98	1.47	31
50	2	0.27	0.11	4	-0.26	0.20	-0.26	6	0.01	0.18	-0.17	0.19	1.02	0.04	0.84	1.21	15

N number of stations, Std standard deviation

Table 2.2: Estimates of the inter-calibration experiment between the gears TV3 930 and TV3 520 for flounder (log-transformed conversion factors, back-transformed estimates and the necessary number of paired Stations N*)

	Log-transformed conversion factors							Log-transformed corrected conversion factors					Back-transformed conversion factors				
	Sequence 1			Sequence 2													
Length	N	Mean	Std	N	Mean	Std	C(t)	N	Mean	Std	Confidence limits		Mean	Std	Confidence limits		N*
6	0	0.00		1	-0.80			1									
8	0	0.00		1	0.52			1									
10	0	0.00		1	0.52			1									
12	0	0.00		1	0.15			1									
14	0	0.00		2	-0.35	0.09		2									
16	0	0.00		3	-0.58	0.19		3									
18	0	0.00		3	-0.06	0.39		3									
20	0	0.00		2	0.13	0.19		2									
22	2	-0.03	0.05	2	-0.13	0.36	-0.05	4	-0.08	0.18	-0.33	0.17	0.94	0.03	0.72	1.19	15
24	4	0.35	0.29	6	-0.09	0.22	-0.22	10	0.13	0.25	-0.05	0.30	1.17	0.09	0.96	1.35	26
26	5	0.39	0.32	7	-0.36	0.39	-0.38	12	0.02	0.35	-0.20	0.24	1.08	0.17	0.81	1.27	50
28	6	0.26	0.19	8	-0.06	0.25	-0.16	14	0.10	0.22	-0.03	0.22	1.13	0.07	0.97	1.25	21
30	7	0.41	0.12	6	-0.19	0.38	-0.30	13	0.11	0.27	-0.05	0.28	1.16	0.11	0.95	1.32	31
32	6	0.18	0.19	8	-0.04	0.42	-0.11	14	0.07	0.32	-0.11	0.26	1.13	0.16	0.89	1.29	42
34	5	0.38	0.43	5	0.06	0.25	-0.16	10	0.22	0.33	-0.02	0.45	1.32	0.23	0.98	1.58	46
36	1	0.30		4	-0.11	0.18	-0.20	5	0.10	0.19	-0.12	0.31	1.12	0.05	0.89	1.37	16
38	0	0.00		2	0.16	0.14		2									
40	0	0.00		2	0.10	0.29		2									
42	0	0.00		1	0.30			1									

N number of stations, Std standard deviation

Table 3.1: Estimates of the inter-calibration experiment between the gears TV3 930 and Granton for cod (log-transformed conversion factors, back-transformed estimates and the necessary number of paired Stations N*)

	Log-transformed conversion factors							Log-transformed corrected conversion factors					Back-transformed conversion factors				
	Sequence 1			Sequence 2													
Length	N	Mean	Std	N	Mean	Std	C(t)	N	Mean	Std	Confidence limits		Mean	Std	Confidence limits		N*
4	0	0.00		0	0.00			0									
6	0	0.00		0	0.00			0									
8	0	0.00		0	0.00			0									
10	1	1.10		1	0.78		-0.16	2	0.94	0.63			3.12	7.18			157
12	1	0.15		1	0.29		0.07	2	0.22	0.09			1.25	0.01			5
14	1	0.78		1	0.30		-0.24	2	0.54	0.45			1.90	0.99			80
16	3	0.77	0.58	4	0.07	0.32	-0.35	7	0.42	0.46	0.01	0.83	1.69	0.85	1.01	2.30	85
18	3	0.83	0.25	6	0.39	0.30	-0.22	9	0.61	0.37	0.33	0.89	1.97	0.64	1.40	2.43	54
20	4	0.89	0.23	8	0.37	0.52	-0.26	12	0.63	0.48	0.33	0.93	2.10	1.44	1.39	2.53	91
22	6	0.67	0.26	9	0.11	0.57	-0.28	15	0.39	0.47	0.13	0.65	1.65	0.86	1.14	1.92	88
24	7	0.91	0.14	10	0.36	0.21	-0.28	17	0.64	0.27	0.50	0.78	1.96	0.33	1.64	2.17	31
26	7	0.77	0.27	13	0.17	0.65	-0.30	20	0.47	0.55	0.21	0.73	1.86	1.65	1.24	2.07	118
28	5	0.62	0.20	10	0.12	0.80	-0.25	15	0.37	0.64	0.01	0.72	1.78	2.46	1.01	2.06	163
30	5	0.44	0.29	10	0.02	0.64	-0.21	15	0.23	0.53	-0.06	0.52	1.44	0.89	0.94	1.68	110
32	4	0.77	0.31	10	0.27	0.23	-0.25	14	0.52	0.31	0.35	0.70	1.77	0.34	1.41	2.01	39
34	3	0.82	0.07	10	0.27	0.29	-0.28	13	0.54	0.33	0.35	0.74	1.82	0.42	1.41	2.10	44
36	3	0.47	0.47	9	0.30	0.28	-0.09	12	0.39	0.33	0.18	0.59	1.55	0.30	1.20	1.81	44
38	3	0.39	0.35	10	0.25	0.43	-0.07	13	0.32	0.40	0.08	0.56	1.49	0.44	1.09	1.75	62
40	5	0.41	0.29	8	-0.01	0.21	-0.21	13	0.20	0.25	0.05	0.35	1.26	0.11	1.05	1.42	26
42	3	0.21	0.18	7	0.18	0.40	-0.01	10	0.19	0.32	-0.03	0.42	1.28	0.20	0.97	1.53	43
44	1	0.29		6	-0.05	0.40	-0.17	7	0.12	0.35	-0.20	0.44	1.20	0.22	0.82	1.55	50
46	2	0.14	0.20	7	0.02	0.38	-0.06	9	0.08	0.32	-0.16	0.32	1.14	0.15	0.86	1.38	41
48	1	0.40		3	-0.12	0.55	-0.26	4	0.14	0.43	-0.45	0.73	1.26	0.38	0.64	2.08	72
50	1	0.21		2	-0.15	0.21	-0.18	3	0.03	0.16	-0.27	0.32	1.04	0.03	0.77	1.38	

N number of stations, Std standard deviation

Table 3.2: Estimates of the inter-calibration experiment between the gears TV3 930 and Granton for flounder (log-transformed conversion factors, back-transformed estimates and the necessary number of paired Stations N*)

	Log-transformed conversion factors							Log-transformed corrected conversion factors					Back-transformed conversion factors				
	Sequence 1			Sequence 2													
Length	N	Mean	Std	N	Mean	Std	C(t)	N	Mean	Std	Confidence limits		Mean	Std	Confidence limits		N*
10	0	0.00		0	0.00			0									
12	0	0.00		0	0.00			0									
14	0	0.00		0	0.00			0									
16	0	0.00		0	0.00			0									
18	0	0.00		0	0.00			0									
20	3	0.64	0.40	4	0.56	0.27	-0.04	7	0.60	0.36	0.28	0.92	1.94	0.59	1.32	2.51	52
22	5	0.93	0.35	6	0.59	0.14	-0.17	11	0.76	0.36	0.53	1.00	2.28	0.79	1.69	2.71	51
24	6	0.55	0.48	5	0.59	0.13	0.02	11	0.57	0.37	0.33	0.81	1.89	0.59	1.39	2.26	54
26	6	0.70	0.28	5	0.72	0.22	0.01	11	0.71	0.31	0.50	0.91	2.13	0.49	1.66	2.49	39
28	8	0.64	0.30	6	0.63	0.28	0.00	14	0.63	0.32	0.45	0.82	1.98	0.47	1.57	2.26	42
30	5	0.50	0.28	5	0.63	0.21	0.06	10	0.57	0.27	0.38	0.76	1.83	0.27	1.46	2.13	30
32	3	0.35	0.47	4	0.80	0.19	0.22	7	0.57	0.31	0.30	0.85	1.86	0.38	1.35	2.34	39
34	2	0.14	0.45	2	0.87	0.13	0.36	4	0.51	0.24	0.17	0.85	1.71	0.19	1.18	2.33	25
36	2	0.68	0.40	1	0.53		-0.08	3	0.60	0.41	-0.15	1.36	1.99	0.87	0.86	3.90	67
38	0	0.00		1	0.00			1									
40	0	0.00		0	0.00			0									
42	0	0.00		1	0.93			1									
44	0	0.00		0	0.00			0									
46	0	0.00		0	0.00			0									

N number of stations, Std standard deviation

Table 4.1: Estimates of the inter-calibration experiment between the gears TV3 520 and LBT for cod (log-transformed conversion factors, back-transformed estimates and the necessary number of paired Stations N*)

	Log-transformed conversion factors							Log-transformed corrected conversion factors					Back-transformed conversion factors				
	Sequence 1			Sequence 2													
Length	N	Mean	Std	N	Mean	Std	C(t)	N	Mean	Std	Confidence limits		Mean	Std	Confidence limits		N*
4	0	0.00		0	0.00			0									
6	0	0.00		0	0.00			0									
8	1	-0.18		0	0.00			1									
10	0	0.00		0	0.00			0									
12	0	0.00		1	-0.76			1									
14	0	0.00		3	0.38	0.31		3									
16	0	0.00		3	0.16	0.49		3									
18	0	0.00		3	0.36	0.58		3									
20	2	0.00	0.00	5	0.36	0.46	0.18	7	0.18	0.35	-0.13	0.49	1.27	0.23	0.88	1.63	48
22	1	0.00		4	0.41	0.45	0.20	5	0.20	0.35	-0.20	0.61	1.30	0.25	0.82	1.83	50
24	2	0.15	0.04	4	0.54	0.27	0.20	6	0.35	0.20	0.14	0.55	1.44	0.09	1.15	1.73	18
26	1	0.08		5	0.24	0.60	0.08	6	0.16	0.49	-0.33	0.65	1.32	0.60	0.72	1.91	95
28	2	-0.09	0.44	4	0.10	0.46	0.09	6	0.00	0.37	-0.37	0.38	1.08	0.20	0.69	1.46	56
30	1	0.52		4	-0.06	0.53	-0.29	5	0.23	0.46	-0.30	0.76	1.40	0.58	0.74	2.14	84
32	1	-0.25		5	0.07	0.52	0.16	6	-0.09	0.43	-0.52	0.34	1.00	0.25	0.59	1.41	74
34	2	-0.60	0.22	4	0.05	0.26	0.32	6	-0.27	0.31	-0.58	0.03	0.80	0.07	0.56	1.03	38
36	3	-0.30	0.30	4	0.26	0.39	0.28	7	-0.02	0.32	-0.30	0.27	1.03	0.12	0.74	1.30	41
38	2	-0.70	0.40	4	0.06	0.42	0.38	6	-0.32	0.43	-0.75	0.11	0.80	0.15	0.47	1.11	73
40	2	-0.67	0.41	3	0.24	0.29	0.45	5	-0.21	0.38	-0.65	0.22	0.87	0.13	0.52	1.24	57
42	2	-1.03	0.15	4	0.04	0.46	0.54	6	-0.50	0.51	-1.00	0.01	0.69	0.19	0.37	1.01	102
44	1	-1.31		2	0.27	1.04	0.79	3	-0.52	0.89	-2.15	1.11	0.88	2.03	0.12	3.03	304
46	0	0.00		2	-0.05	0.49		2									
48	0	0.00		0	0.00			0									
50	0	0.00		1	0.40			1									

N number of stations, Std standard deviation

Table 4.2: Estimates of the inter-calibration experiment between the gears TV3 520 and LBT for flounder (log-transformed conversion factors, back-transformed estimates and the necessary number of paired Stations N*)

	Log-transformed conversion factors							Log-transformed corrected conversion factors					Back-transformed conversion factors				
	Sequence 1			Sequence 2													
Length	N	Mean	Std	N	Mean	Std	C(t)	N	Mean	Std	Confidence limits		Mean	Std	Confidence limits		N*
10	0	0.00		0	0.00			0									
12	0	0.00		0	0.00			0									
14	2	0.28	0.03	2	-0.15	0.21	-0.21	4	0.06	0.16	-0.16	0.29	1.08	0.03	0.85	1.34	13
16	6	0.12	0.27	9	-0.34	0.38	-0.23	15	-0.11	0.32	-0.29	0.07	0.94	0.11	0.75	1.07	42
18	9	0.29	0.74	13	-0.20	0.42	-0.24	22	0.03	0.56	-0.21	0.28	1.21	0.73	0.81	1.32	122
20	11	0.12	0.39	14	-0.10	0.27	-0.11	25	0.00	0.33	-0.14	0.14	1.06	0.14	0.87	1.14	44
22	14	0.23	0.49	19	-0.16	0.42	-0.20	33	0.03	0.45	-0.13	0.19	1.14	0.35	0.88	1.20	80
24	14	0.23	0.40	20	-0.08	0.29	-0.16	34	0.07	0.34	-0.05	0.19	1.14	0.18	0.95	1.21	47
26	14	0.17	0.34	21	0.06	0.54	-0.05	35	0.12	0.47	-0.04	0.28	1.25	0.48	0.96	1.32	87
28	13	0.09	0.35	20	-0.04	0.35	-0.07	33	0.02	0.35	-0.10	0.14	1.08	0.17	0.90	1.15	49
30	12	0.18	0.29	19	-0.02	0.41	-0.10	31	0.08	0.37	-0.06	0.21	1.16	0.23	0.94	1.24	55
32	11	0.24	0.39	14	-0.04	0.45	-0.14	25	0.09	0.42	-0.08	0.27	1.20	0.33	0.92	1.31	70
34	9	0.20	0.31	10	-0.05	0.51	-0.12	19	0.07	0.43	-0.14	0.27	1.17	0.34	0.87	1.31	74
36	2	-0.31	0.08	4	0.13	0.30	0.22	6	-0.06	0.25	-0.31	0.19	0.97	0.06	0.73	1.21	27
38	2	0.15	0.21	2	0.03	0.30	-0.06	4	0.09	0.19	-0.18	0.36	1.12	0.05	0.84	1.44	17
40	0	0.00		0	0.00			0									
42	0	0.00		0	0.00			0									
44	0	0.00		0	0.00			0									
46	0	0.00		0	0.00			0									

N number of stations, Std standard deviation

Table 5.1: Estimates of the inter-calibration experiment between the gears TV3 520 and P 20/25 for cod (log-transformed conversion factors, back-transformed estimates and the necessary number of paired Stations N*)

	Log-transformed conversion factors							Log-transformed corrected conversion factors					Back-transformed conversion factors				
	Sequence 1			Sequence 2													
Length	N	Mean	Std	N	Mean	Std	C(t)	N	Mean	Std	Confidence limits		Mean	Std	Confidence limits		N*
4	0	0.00		0	0.00			0									
6	2	-0.30	0.00	4	0.03	0.51	0.17	6	-0.13	0.38	-0.51	0.25	0.94	0.16	0.60	1.28	58
8	7	0.18	0.06	4	-0.31	0.40	-0.25	11	-0.06	0.22	-0.21	0.08	0.96	0.05	0.81	1.09	21
10	7	0.41	0.44	4	-0.26	0.40	-0.34	11	0.08	0.40	-0.19	0.34	1.17	0.28	0.83	1.41	64
12	6	0.29	0.47	4	-0.27	0.32	-0.28	10	0.01	0.39	-0.26	0.28	1.09	0.22	0.77	1.33	60
14	6	0.42	0.51	5	-0.16	0.35	-0.29	11	0.13	0.42	-0.15	0.41	1.24	0.36	0.86	1.51	70
16	6	0.28	0.38	6	-0.17	0.10	-0.23	12	0.06	0.26	-0.11	0.22	1.10	0.09	0.90	1.25	29
18	5	0.36	0.44	8	-0.14	0.21	-0.25	13	0.11	0.30	-0.07	0.29	1.17	0.14	0.93	1.34	37
20	7	0.15	0.23	8	-0.20	0.31	-0.17	15	-0.03	0.26	-0.17	0.11	1.01	0.07	0.84	1.12	28
22	10	0.26	0.25	6	-0.24	0.32	-0.25	16	0.01	0.27	-0.13	0.15	1.05	0.09	0.88	1.16	29
24	9	0.25	0.29	6	-0.26	0.37	-0.26	15	0.00	0.31	-0.17	0.16	1.04	0.12	0.84	1.18	38
26	9	0.34	0.37	7	-0.21	0.31	-0.27	16	0.07	0.33	-0.11	0.24	1.13	0.16	0.90	1.27	44
28	9	0.43	0.38	5	-0.22	0.37	-0.33	14	0.10	0.37	-0.11	0.31	1.19	0.23	0.90	1.37	54
30	11	0.37	0.37	6	-0.13	0.17	-0.25	17	0.12	0.31	-0.04	0.28	1.18	0.15	0.96	1.32	39
32	5	0.50	0.46	6	0.02	0.14	-0.24	11	0.26	0.33	0.04	0.48	1.37	0.24	1.04	1.61	44
34	6	0.39	0.24	6	-0.05	0.44	-0.22	12	0.17	0.34	-0.04	0.39	1.26	0.22	0.96	1.47	47
36	6	0.35	0.37	8	-0.04	0.15	-0.20	14	0.16	0.26	0.01	0.31	1.21	0.11	1.01	1.36	29
38	2	-0.08	0.00	6	-0.01	0.22	0.03	8	-0.05	0.18	-0.19	0.10	0.97	0.03	0.83	1.11	15
40	8	0.49	0.38	7	0.19	0.17	-0.15	15	0.34	0.31	0.17	0.51	1.47	0.23	1.19	1.66	38
42	4	0.55	0.01	3	-0.02	0.28	-0.29	7	0.27	0.25	0.05	0.49	1.35	0.12	1.05	1.63	25
44	2	0.25	0.00	1	0.12		-0.06	3	0.19	0.13	-0.04	0.42	1.22	0.02	0.96	1.52	8
46	4	0.39	0.10	2	0.00	0.00	-0.19	6	0.19	0.16	0.03	0.36	1.23	0.04	1.03	1.43	13
48	2	0.68	0.00	0	0.00			2									
50	2	0.65	0.00	0	0.00			2									

N number of stations, Std standard deviation

Table 5.2: Estimates of the inter-calibration experiment between the gears TV3 520 and P 20/25 for flounder (log-transformed conversion factors, back-transformed estimates and the necessary number of paired Stations N*)

	Log-transformed conversion factors							Log-transformed corrected conversion factors					Back-transformed conversion factors				
	Sequence 1			Sequence 2													
Length	N	Mean	Std	N	Mean	Std	C(t)	N	Mean	Std	Confidence limits		Mean	Std	Confidence limits		N*
10	1	0.18		0	0.00			1									
12	1	-0.40		0	0.00			1									
14	0	0.00		0	0.00			0									
16	1	0.12		0	0.00			1									
18	3	0.23	0.24	2	-0.18	0.26	-0.21	5	0.02	0.21	-0.22	0.27	1.05	0.05	0.80	1.31	20
20	4	0.13	0.13	5	-0.14	0.47	-0.13	9	-0.01	0.33	-0.25	0.24	1.05	0.14	0.78	1.27	43
22	5	-0.24	0.37	6	-0.23	0.43	0.01	11	-0.24	0.37	-0.49	0.01	0.85	0.12	0.62	1.01	56
24	6	0.17	0.43	6	-0.13	0.59	-0.15	12	0.02	0.47	-0.28	0.32	1.14	0.41	0.75	1.37	89
26	6	0.13	0.36	5	-0.15	0.51	-0.14	11	-0.01	0.39	-0.27	0.25	1.07	0.22	0.76	1.29	62
28	4	0.15	0.55	4	-0.13	0.43	-0.14	8	0.01	0.43	-0.34	0.36	1.11	0.30	0.71	1.44	73
30	2	-0.45	0.52	3	0.07	0.08	0.26	5	-0.19	0.30	-0.53	0.16	0.87	0.08	0.59	1.17	37
32	2	-0.21	0.12	2	-0.21	0.13	0.00	4	-0.21	0.13	-0.39	-0.03	0.82	0.01	0.68	0.97	9
34	4	0.19	0.07	3	-0.37	0.24	-0.28	7	-0.09	0.15	-0.23	0.05	0.92	0.02	0.80	1.05	11
36	0	0.00		0	0.00			0									
38	0	0.00		0	0.00			0									
40	0	0.00		0	0.00			0									
42	0	0.00		0	0.00			0									
44	0	0.00		0	0.00			0									
46	0	0.00		0	0.00			0									

N number of stations, Std standard deviation

Table 6.1: Estimates of the inter-calibration experiment between the gears TV3 930 and Hake 4M for cod (log-transformed conversion factors, back-transformed estimates and the necessary number of paired Stations N*)

	Log-transformed conversion factors							Log-transformed corrected conversion factors					Back-transformed conversion factors				
	Sequence 1			Sequence 2													
Length	N	Mean	Std	N	Mean	Std	C(t)	N	Mean	Std	Confidence limits		Mean	Std	Confidence limits		N*
4	0	0.00		0	0.00			0									
6	0	0.00		0	0.00			0									
8	0	0.00		0	0.00			0									
10	0	0.00		0	0.00			0									
12	0	0.00		0	0.00			0									
14	0	0.00		0	0.00			0									
16	0	0.00		0	0.00			0									
18	0	0.00		0	0.00			0									
20	0	0.00		0	0.00			0									
22	1	0.18		2	0.18	0.25	0.00	3	0.18	0.17	-0.14	0.49	1.21	0.04	0.87	1.64	13
24	2	-0.07	0.01	2	0.20	0.16	0.14	4	0.06	0.09	-0.06	0.18	1.07	0.01	0.95	1.20	4
26	4	0.27	0.31	3	0.18	0.61	-0.04	7	0.22	0.40	-0.13	0.58	1.35	0.36	0.88	1.78	62
28	5	0.28	0.41	4	0.16	0.49	-0.06	9	0.22	0.40	-0.09	0.52	1.35	0.38	0.91	1.68	65
30	4	0.26	0.33	4	0.14	0.60	-0.06	8	0.20	0.43	-0.15	0.54	1.33	0.42	0.86	1.72	72
32	5	0.18	0.20	4	0.22	0.58	0.02	9	0.20	0.37	-0.08	0.47	1.30	0.28	0.93	1.61	54
34	5	0.07	0.22	3	0.56	0.60	0.25	8	0.31	0.34	0.04	0.59	1.45	0.29	1.04	1.81	47
36	2	0.12	0.32	2	0.12	0.05	0.00	4	0.12	0.17	-0.11	0.36	1.14	0.04	0.89	1.43	13
38	2	0.07	0.37	4	0.23	0.40	0.08	6	0.15	0.32	-0.17	0.47	1.23	0.18	0.84	1.61	42
40	3	-0.21	0.36	3	-0.14	0.28	0.04	6	-0.18	0.27	-0.45	0.10	0.87	0.06	0.64	1.10	31
42	3	0.06	0.34	2	0.03	0.32	-0.02	5	0.04	0.26	-0.26	0.34	1.08	0.09	0.77	1.41	28
44	3	-0.03	0.15	2	0.17	0.23	0.10	5	0.07	0.14	-0.10	0.23	1.08	0.02	0.91	1.26	10
46	2	0.11	0.05	1	-0.40		-0.26	3	-0.14	0.06	-0.26	-0.02	0.87	0.00	0.77	0.98	2
48	1	0.12		2	-0.02	0.11	-0.07	3	0.05	0.09	-0.11	0.21	1.05	0.01	0.90	1.23	4
50	1	0.44		0	0.00			1									

N number of stations, Std standard deviation

Table 6.2: Estimates of the inter-calibration experiment between the gears TV3 930 and Hake 4M for flounder (log-transformed conversion factors, back-transformed estimates and the necessary number of paired Stations N*)

	Log-transformed conversion factors							Log-transformed corrected conversion factors					Back-transformed conversion factors				
	Sequence 1			Sequence 2													
Length	N	Mean	Std	N	Mean	Std	C(t)	N	Mean	Std	Confidence limits		Mean	Std	Confidence limits		N*
10	0	0.00		0	0.00			0									
12	0	0.00		0	0.00			0									
14	0	0.00		0	0.00			0									
16	1	0.00		0	0.00			1									
18	2	0.21	0.26	1	-0.72		-0.47	3	-0.25	0.18	-0.59	0.09	0.79	0.02	0.55	1.09	
20	6	0.17	0.18	4	-0.46	0.13	-0.31	10	-0.15	0.15	-0.26	-0.04	0.87	0.02	0.77	0.96	
22	6	0.01	0.19	4	-0.38	0.33	-0.20	10	-0.18	0.22	-0.34	-0.03	0.85	0.04	0.71	0.97	21
24	6	0.03	0.26	4	-0.42	0.31	-0.22	10	-0.20	0.25	-0.38	-0.02	0.85	0.05	0.69	0.98	27
26	6	-0.05	0.17	4	-0.29	0.24	-0.12	10	-0.17	0.18	-0.29	-0.04	0.86	0.02	0.75	0.96	14
28	6	-0.12	0.18	4	-0.29	0.16	-0.08	10	-0.21	0.16	-0.32	-0.09	0.83	0.02	0.73	0.91	12
30	6	-0.09	0.16	4	-0.36	0.22	-0.13	10	-0.23	0.17	-0.35	-0.11	0.81	0.02	0.71	0.90	13
32	6	-0.02	0.21	4	-0.45	0.25	-0.21	10	-0.24	0.20	-0.38	-0.10	0.81	0.03	0.69	0.91	18
34	5	0.00	0.25	4	-0.23	0.25	-0.11	9	-0.12	0.22	-0.28	0.05	0.91	0.04	0.76	1.05	21
36	5	-0.21	0.29	3	-0.32	0.27	-0.06	8	-0.27	0.25	-0.47	-0.06	0.79	0.04	0.62	0.94	27
38	4	0.05	0.32	2	-0.27	0.50	-0.16	6	-0.11	0.31	-0.41	0.20	0.94	0.10	0.66	1.22	
40	3	0.18	0.25	1	0.23		0.02	4	0.20	0.19	-0.06	0.47	1.25	0.06	0.94	1.60	
42	1	-0.18		1	0.45		0.31	2	0.14	0.10			1.15	0.01			
44	0	0.00		0	0.00			0									
46	0	0.00		0	0.00			0									

N number of stations, Std standard deviation

Table 7.1: Estimates of the inter-calibration experiment between the gears TV3 930 and GOV for cod (log-transformed conversion factors, back-transformed estimates and the necessary number of paired Stations N*)

	Log-transformed conversion factors							Log-transformed corrected conversion factors					Back-transformed conversion factors				
	Sequence 1			Sequence 2													
Length	N	Mean	Std	N	Mean	Std	C(t)	N	Mean	Std	Confidence limits		Mean	Std	Confidence limits		N*
4	1	-0.09		5	0.09	0.40	0.0896	6	0.00	0.33	-0.32	0.33	1.06	0.14	0.72	1.39	43
6	5	-0.04	0.30	7	-0.19	0.39	-0.08	12	-0.12	0.32	-0.32	0.09	0.94	0.11	0.73	1.09	43
8	7	-0.13	0.45	8	-0.22	0.37	-0.04	15	-0.18	0.38	-0.39	0.03	0.90	0.15	0.68	1.03	58
10	10	-0.06	0.34	6	-0.45	0.56	-0.20	16	-0.25	0.40	-0.47	-0.04	0.84	0.15	0.63	0.96	65
12	10	0.02	0.37	2	-0.54	0.14	-0.28	12	-0.26	0.33	-0.47	-0.06	0.81	0.08	0.63	0.95	43
14	7	0.03	0.28	4	-0.03	0.19	-0.03	11	0.00	0.23	-0.15	0.15	1.03	0.06	0.86	1.17	23
16	8	-0.01	0.37	6	-0.03	0.32	-0.01	14	-0.02	0.32	-0.21	0.17	1.03	0.13	0.81	1.18	42
18	11	-0.21	0.22	10	0.02	0.53	0.11	21	-0.09	0.38	-0.27	0.08	0.98	0.17	0.77	1.08	59
20	13	-0.04	0.41	12	0.08	0.42	0.06	25	0.02	0.40	-0.14	0.18	1.10	0.25	0.87	1.20	63
22	13	-0.08	0.34	13	-0.06	0.43	0.01	26	-0.07	0.37	-0.22	0.08	1.00	0.17	0.80	1.08	56
24	12	-0.12	0.32	14	0.00	0.39	0.06	26	-0.06	0.35	-0.20	0.08	1.00	0.15	0.82	1.09	49
26	12	-0.14	0.33	14	0.03	0.42	0.08	26	-0.05	0.36	-0.20	0.09	1.01	0.17	0.82	1.10	53
28	12	-0.09	0.35	12	0.00	0.41	0.04	24	-0.05	0.36	-0.20	0.11	1.02	0.17	0.82	1.11	53
30	11	-0.25	0.33	14	-0.03	0.45	0.11	25	-0.14	0.39	-0.30	0.02	0.94	0.17	0.74	1.02	61
32	10	-0.20	0.41	13	-0.03	0.37	0.08	23	-0.12	0.37	-0.28	0.04	0.95	0.16	0.76	1.05	56
34	10	-0.14	0.50	13	-0.03	0.22	0.05	23	-0.09	0.36	-0.24	0.07	0.98	0.15	0.79	1.07	51
36	10	-0.25	0.49	13	0.00	0.26	0.12	23	-0.12	0.37	-0.28	0.03	0.94	0.15	0.75	1.03	54
38	9	-0.14	0.53	13	0.12	0.26	0.13	22	-0.01	0.37	-0.17	0.16	1.06	0.19	0.84	1.17	56
40	10	-0.16	0.38	12	0.05	0.22	0.10	22	-0.05	0.29	-0.18	0.07	0.99	0.09	0.83	1.08	35
42	8	0.07	0.21	10	0.02	0.32	-0.02	18	0.05	0.26	-0.08	0.17	1.08	0.09	0.92	1.19	29
44	7	-0.04	0.42	9	0.10	0.34	0.07	16	0.03	0.35	-0.16	0.21	1.09	0.17	0.85	1.24	49
46	5	0.08	0.39	7	0.14	0.43	0.03	12	0.11	0.38	-0.13	0.35	1.20	0.26	0.88	1.42	57
48	5	-0.03	0.36	6	-0.16	0.36	-0.06	11	-0.09	0.33	-0.31	0.13	0.96	0.12	0.73	1.13	44
50	2	0.00	0.00	2	0.47	0.35	0.23	4	0.23	0.17	-0.01	0.47	1.28	0.05	0.99	1.61	14

N number of stations, Std standard deviation

Table 7.2: Estimates of the inter-calibration experiment between the gears TV3 930 and GOV for flounder (log-transformed conversion factors, back-transformed estimates and the necessary number of paired Stations N*)

	Log-transformed conversion factors							Log-transformed corrected conversion factors					Back-transformed conversion factors				
	Sequence 1			Sequence 2													
Length	N	Mean	Std	N	Mean	Std	C(t)	N	Mean	Std	Confidence limits		Mean	Std	Confidence limits		N*
10	0	0.00		0	0.00			0									
12	0	0.00		0	0.00			0									
14	0	0.00		0	0.00			0									
16	0	0.00		0	0.00			0									
18	0	0.00		1	-0.30			1									
20	0	0.00		2	-0.07	0.19		2									
22	2	0.06	0.16	2	0.03	0.10	-0.02	4	0.04	0.10	-0.09	0.18	1.05	0.01	0.91	1.20	5
24	1	-0.45		2	-0.07	0.23	0.19	3	-0.26	0.26	-0.74	0.22	0.80	0.05	0.48	1.25	29
26	3	0.02	0.08	2	-0.09	0.33	-0.05	5	-0.04	0.16	-0.22	0.14	0.97	0.02	0.80	1.15	11
28	2	0.22	0.61	2	-0.04	0.20	-0.13	4	0.09	0.33	-0.37	0.56	1.16	0.18	0.69	1.74	45
30	4	0.01	0.13	3	-0.15	0.25	-0.08	7	-0.07	0.16	-0.21	0.07	0.94	0.02	0.81	1.07	12
32	1	-0.10		3	-0.09	0.10	0.00	4	-0.09	0.08	-0.21	0.02	0.92	0.01	0.81	1.02	4
34	0	0.00		2	-0.42	0.22		2									
36	0	0.00		2	-0.48	0.06		2									
38	0	0.00		2	-0.01	0.44		2									
40	0	0.00		1	0.02			1									
42	0	0.00		1	-0.60			1									
44	0	0.00		0	0.00			0									
46	0	0.00		0	0.00			0									

N number of stations, Std standard deviation

Figures for cod

Figure 1.1. Length distributions of both gears for the sequence TV3 520 followed by HG20/25.

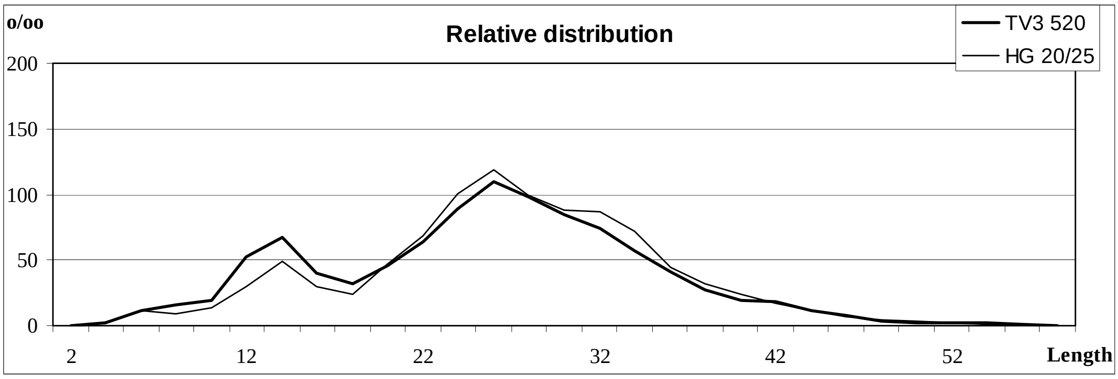


Figure 1.2. Length distributions of both gears for the sequence HG 20/25 followed by TV3 520.

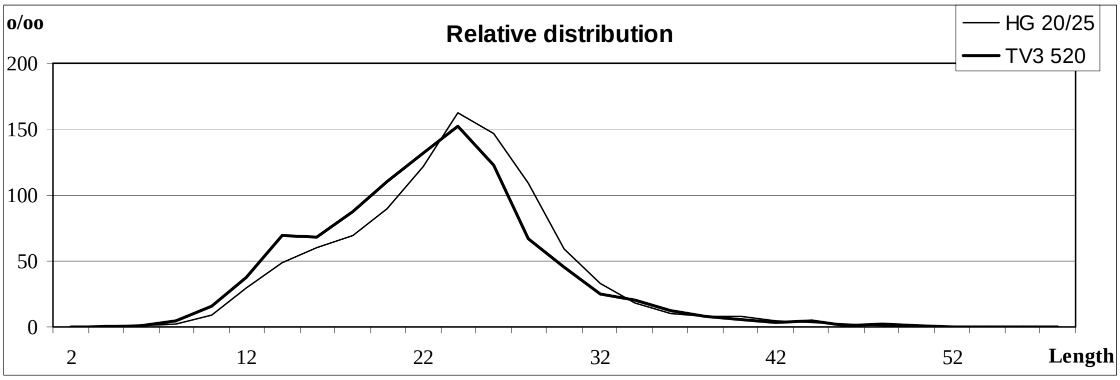
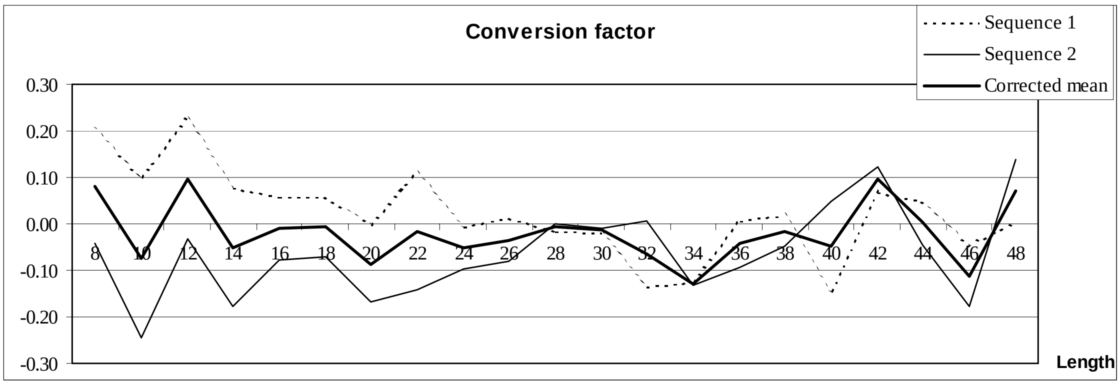


Figure 1.3. Conversion factors without and with corrections of C(t) of the log-transformed data.



Figures for flounder

Figure 1.4. Length distributions of both gears for the sequence TV3 520 followed by HG20/25.

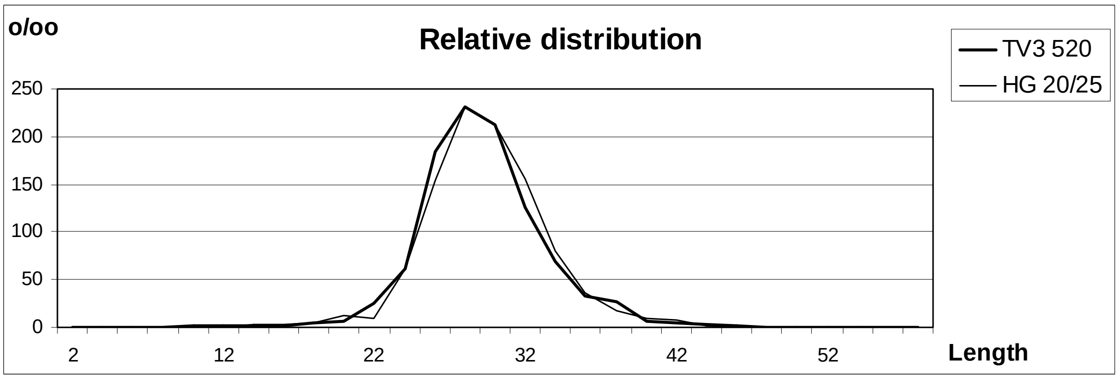


Figure 1.5. Length distributions of both gears for the sequence HG 20/25 followed by TV3 520.

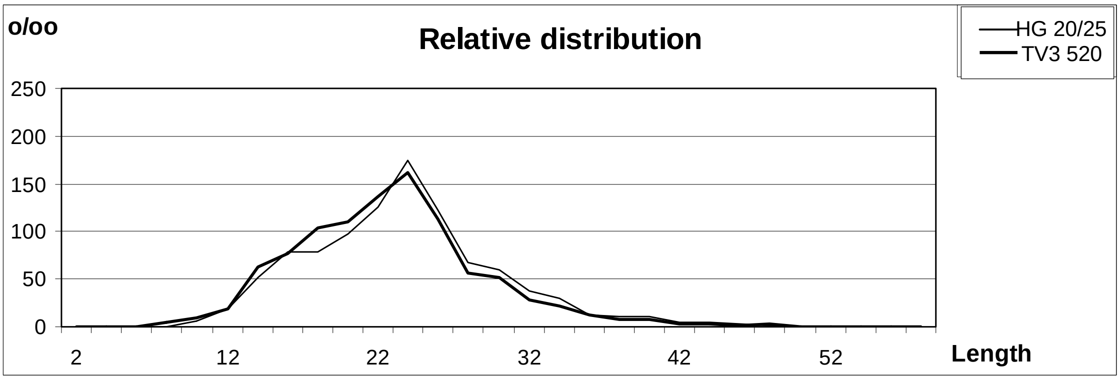
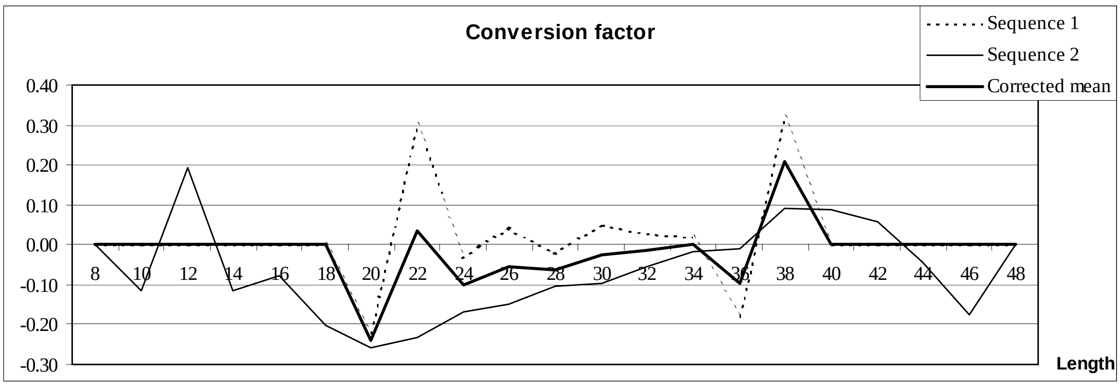


Figure 1.6. Conversion factors without and with corrections of C(t) of the log-transformed data.



Figures for cod

Figure 2.1. Length distributions of both gears for the sequence TV3 930 followed by TV3 520.

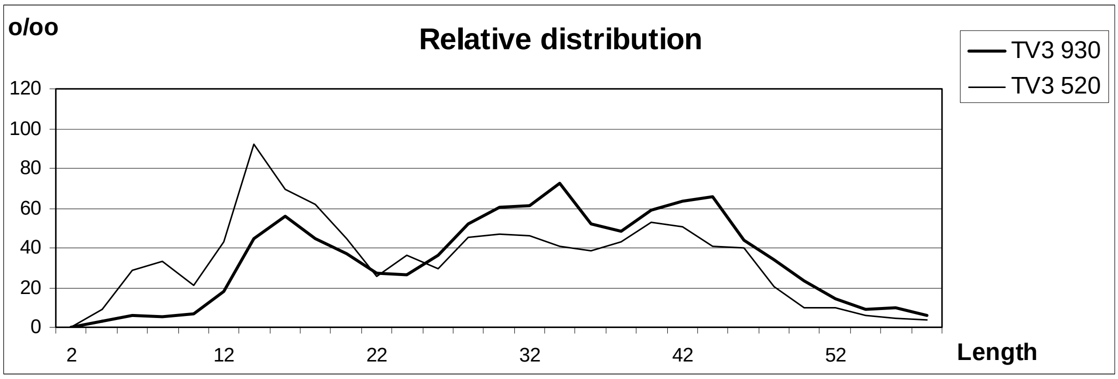


Figure 2.2. Length distributions of both gears for the sequence TV3 520 followed by TV3 930.

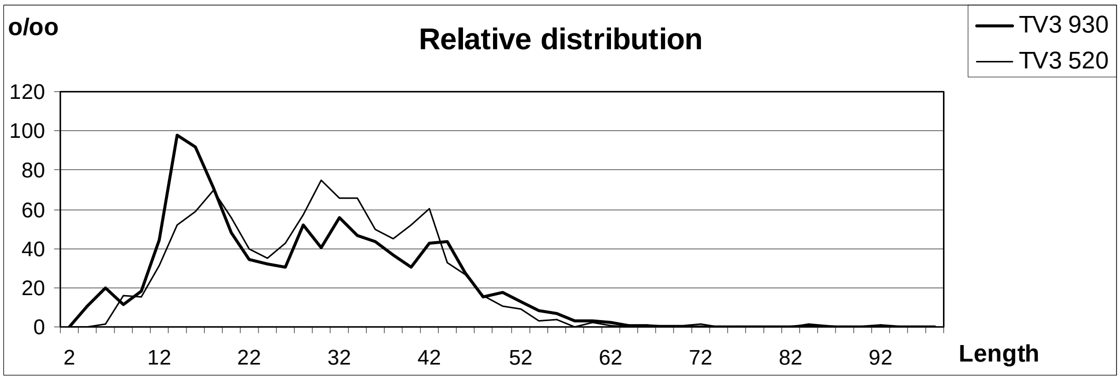
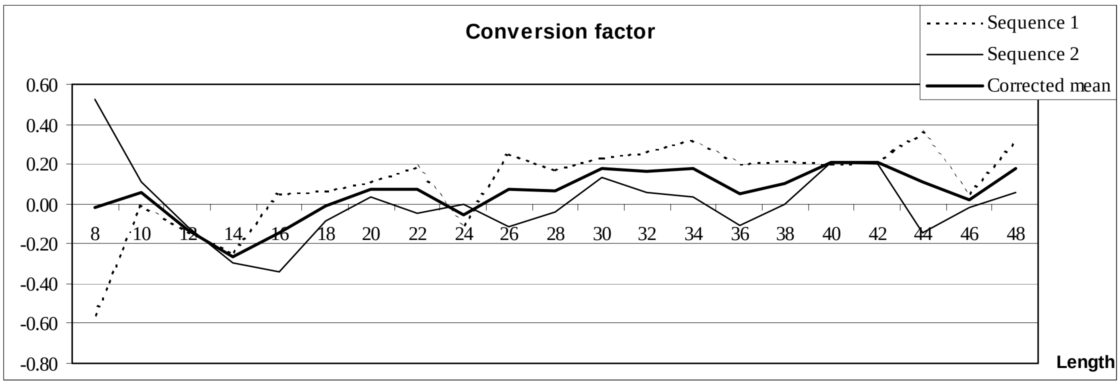


Figure 2.3. Conversion factors without and with corrections of C(t) of the log-transformed data.



Figures for flounder

Figure 2.4. Length distributions of both gears for the sequence TV3 930 followed by TV3 520.

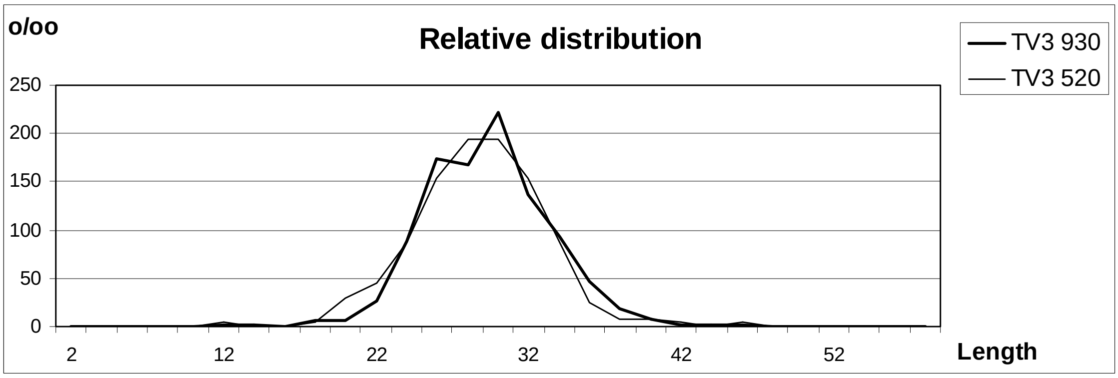


Figure 2.5. Length distributions of both gears for the sequence TV3 930 followed by TV3 520.

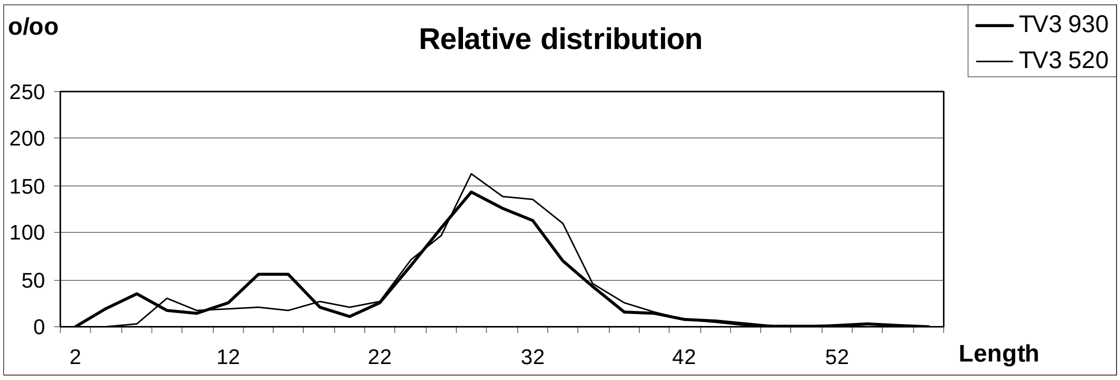
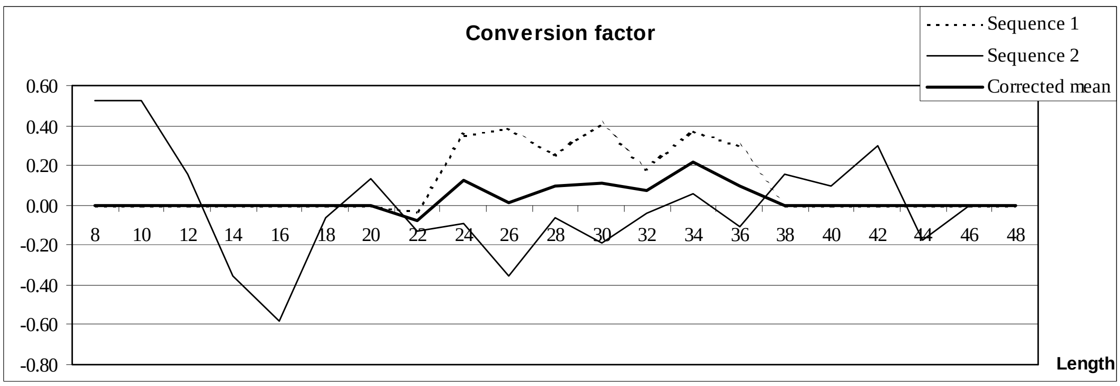


Figure 2.6. Conversion factors without and with corrections of C(t) of the log-transformed data.



Figures for cod

Figure 3.1. Length distributions of both gears for the sequence TV3 930 followed by Granton.

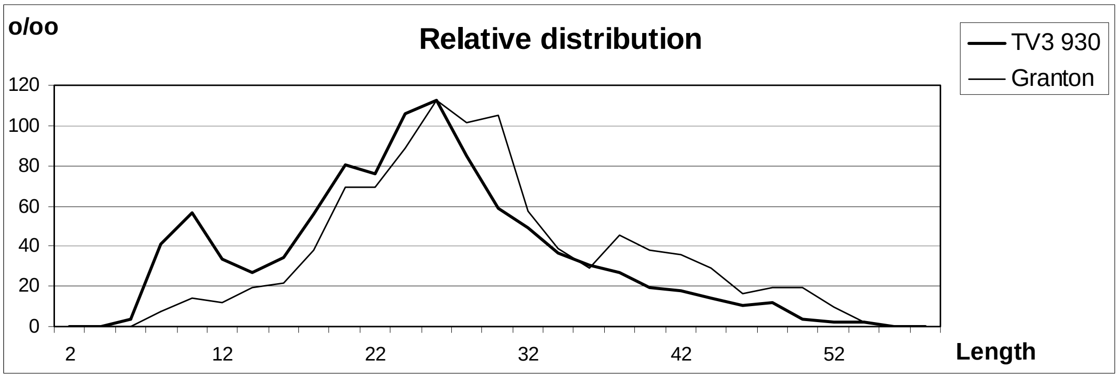


Figure 3.2. Length distributions of both gears for the sequence Granton followed by TV3 930.

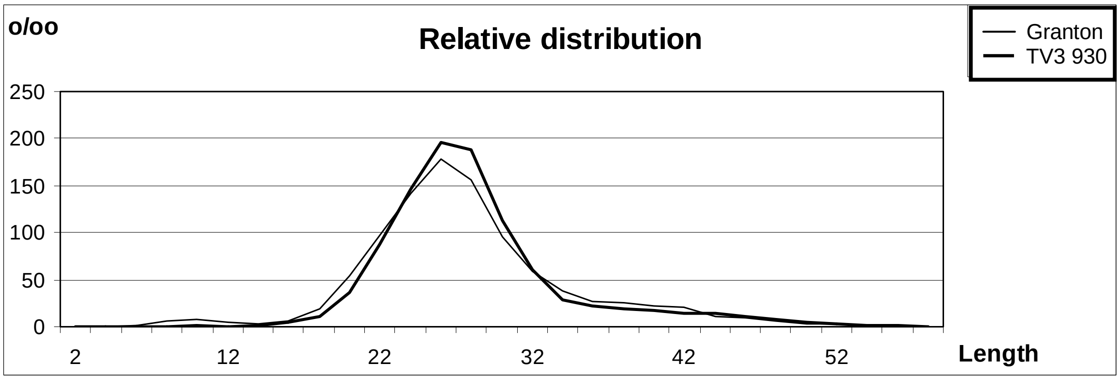
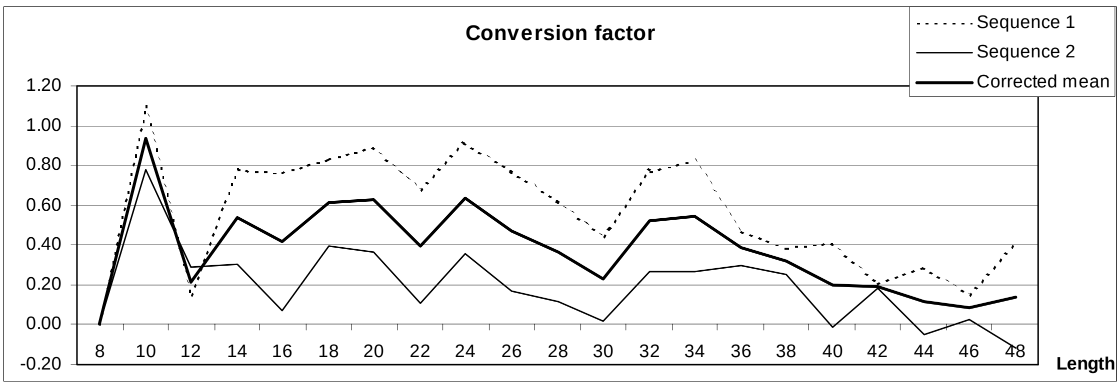


Figure 3.3. Conversion factors without and with corrections of C(t) of the log-transformed data.



Figures for flounder

Figure 3.4. Length distributions of both gears for the sequence TV3 930 followed by Granton.

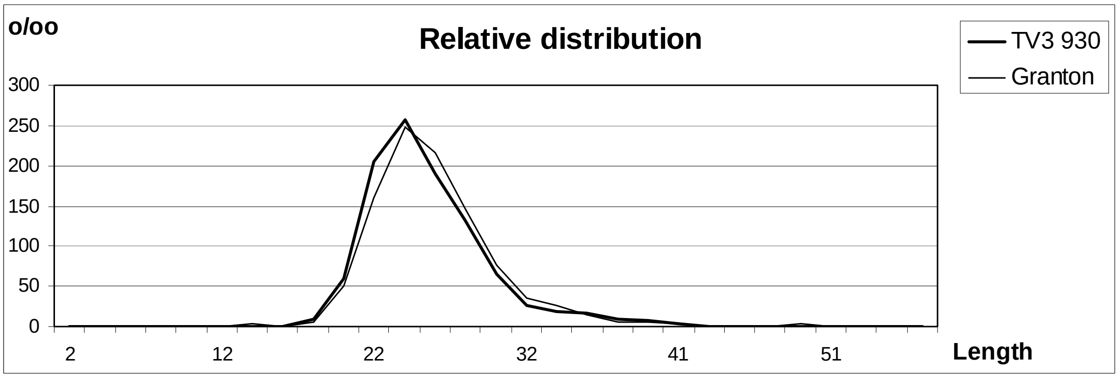


Figure 3.5. Length distributions of both gears for the sequence Granton followed by TV3 930.

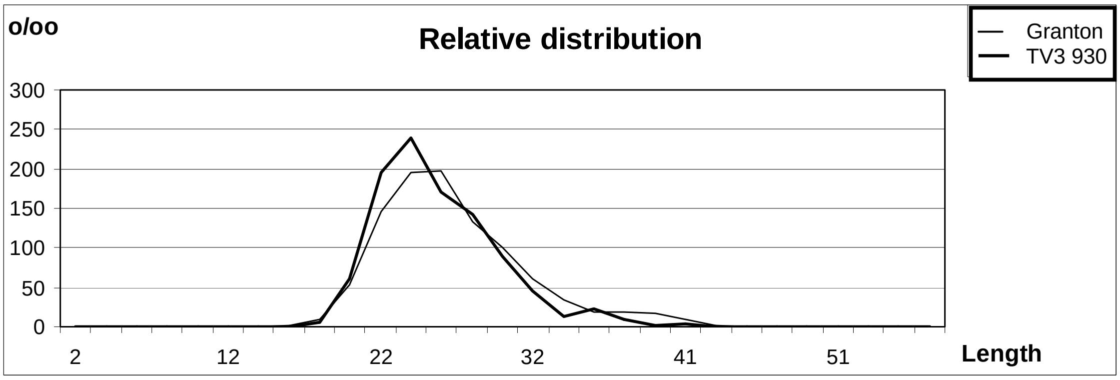
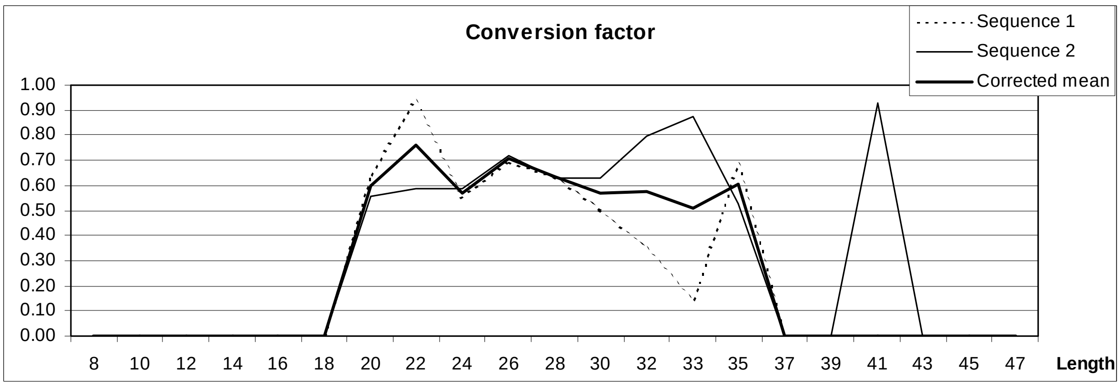


Figure 3.6. Conversion factors without and with corrections of C(t) of the log-transformed data.



Figures for cod

Figure 4.1. Length distributions of both gears for the sequence TV3 520 followed by LBT.

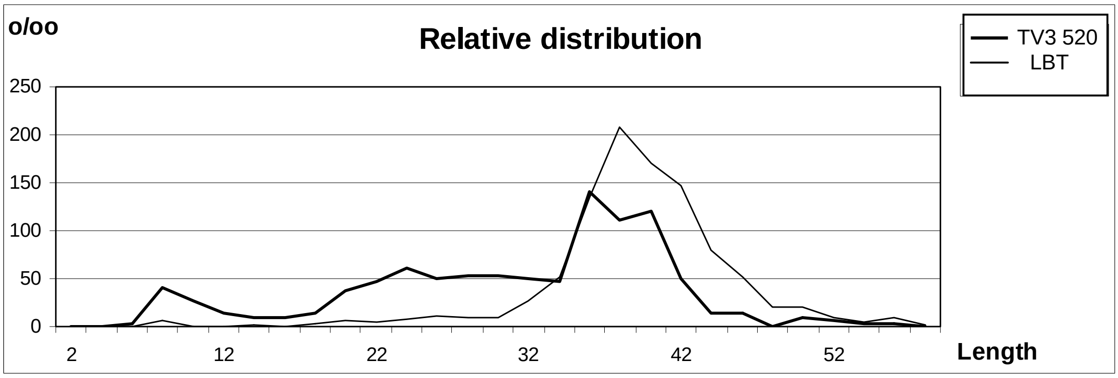


Figure 4.2. Length distributions of both gears for the sequence LBT followed by TV3 520.

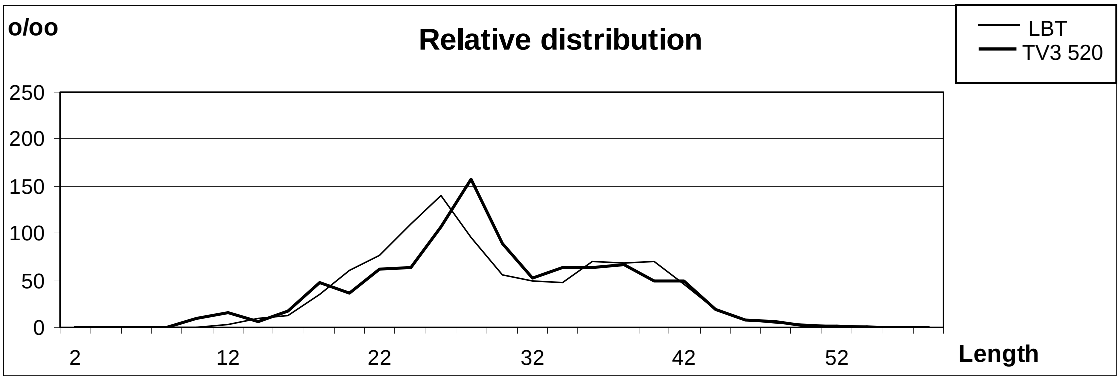
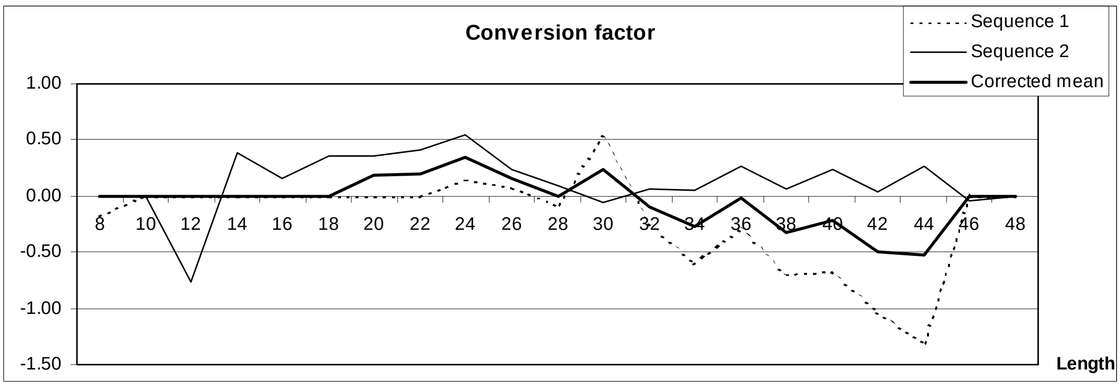


Figure 4.3. Conversion factors without and with corrections of C(t) of the log-transformed data.



Figures for flounder

Figure 4.4. Length distributions of both gears for the sequence TV3 520 followed by LBT.

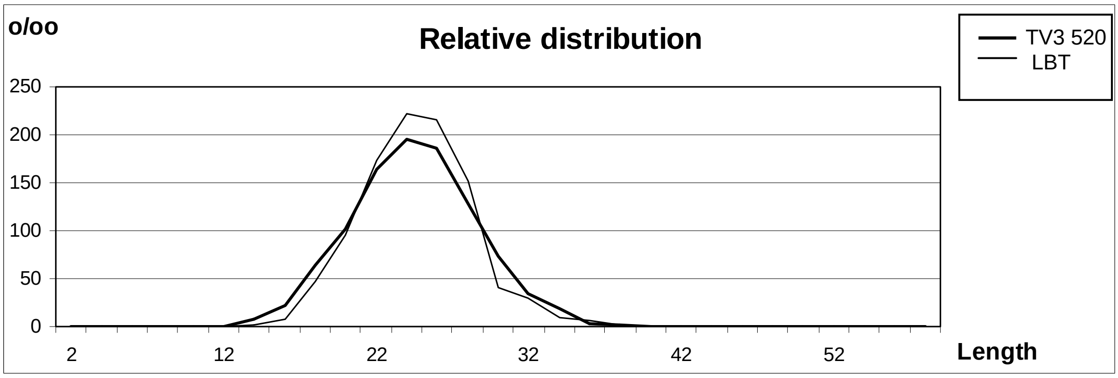


Figure 4.5. Length distributions of both gears for the sequence LBT followed by TV3 520.

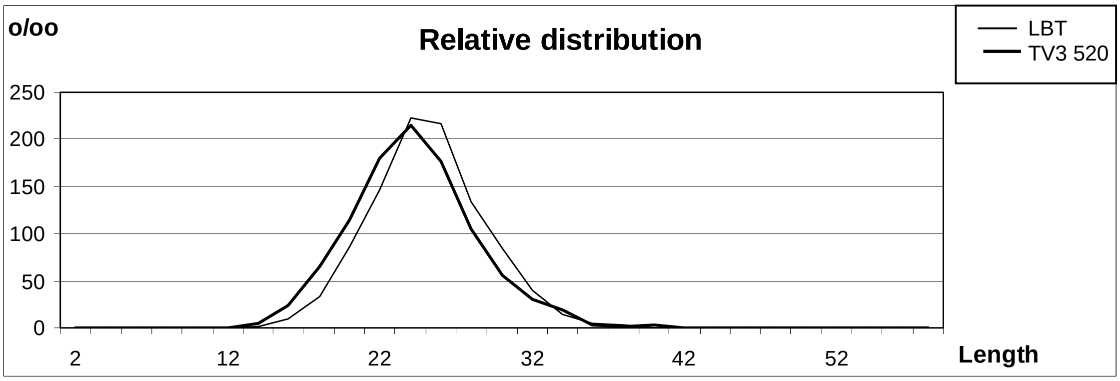
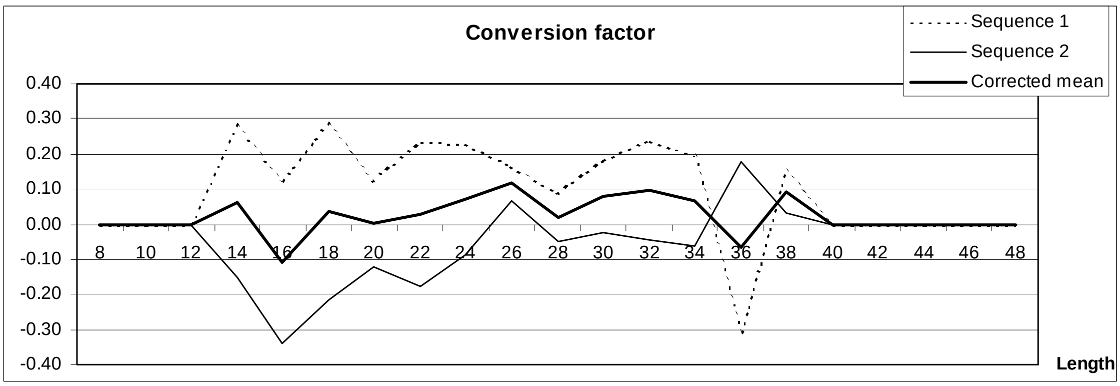


Figure 4.6. Conversion factors without and with corrections of C(t) of the log-transformed data.



Figures for cod

Figure 5.1. Length distributions of both gears for the sequence TV3 930 followed by P 20/25.

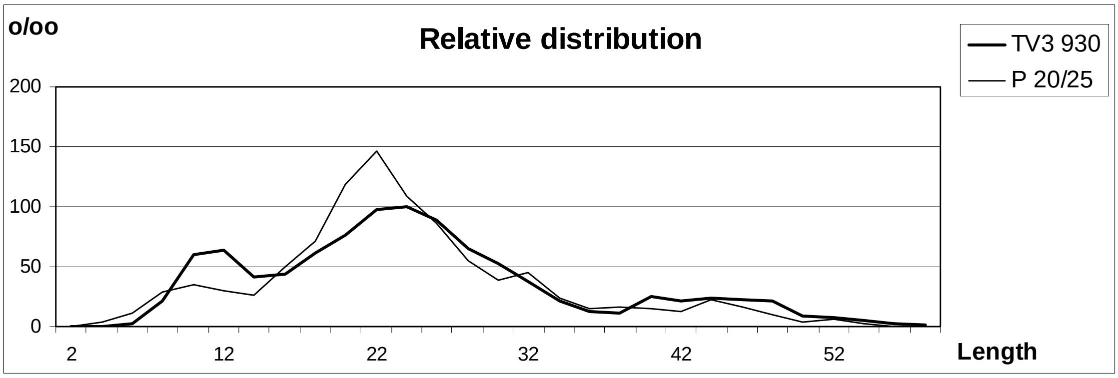


Figure 5.2. Length distributions of both gears for the sequence P 20/25 followed by TV3 930.

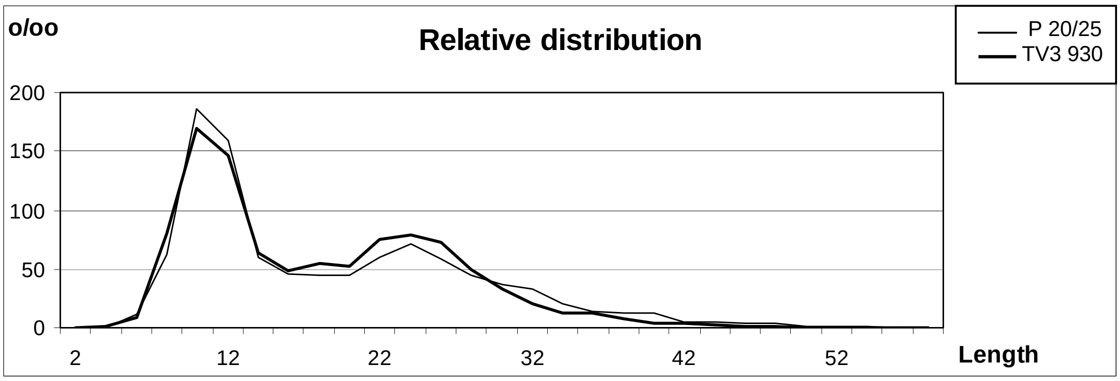
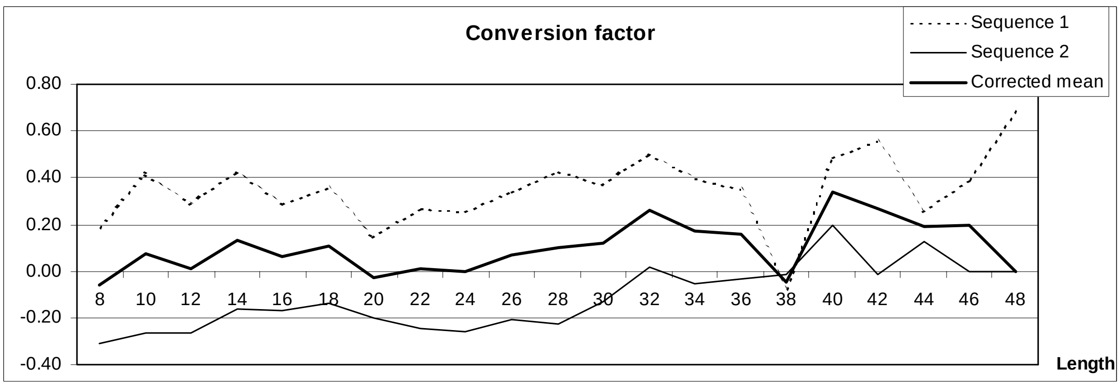


Figure 5.3. Conversion factors without and with corrections of C(t) of the log-transformed data.



Figures for flounder

Figure 5.4. Length distributions of both gears for the sequence TV3 930 followed by P 20/25.

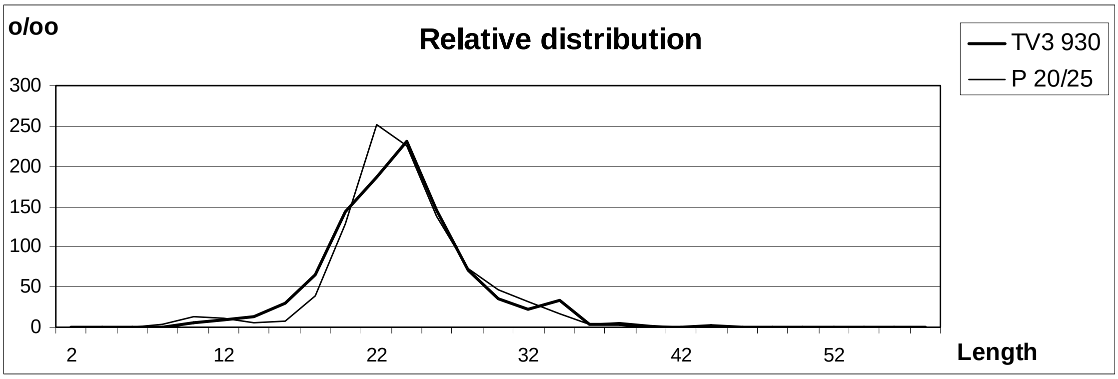


Figure 5.5. Length distributions of both gears for the sequence P 20/25 followed by TV3 930.

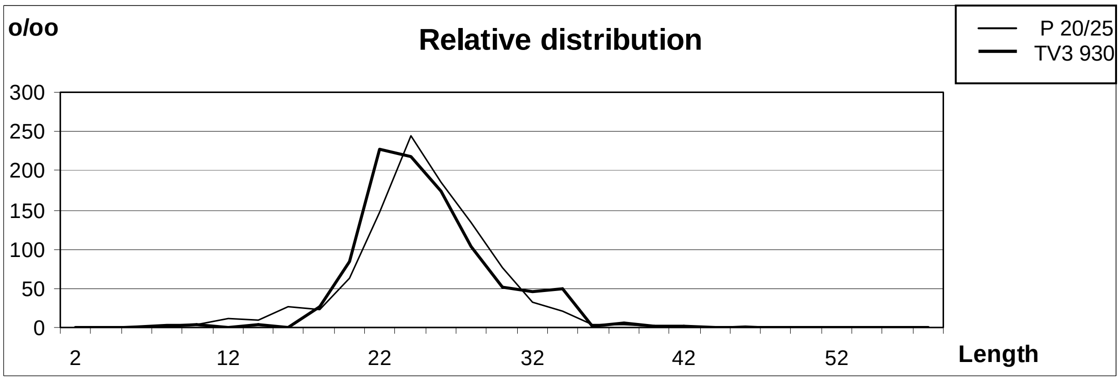
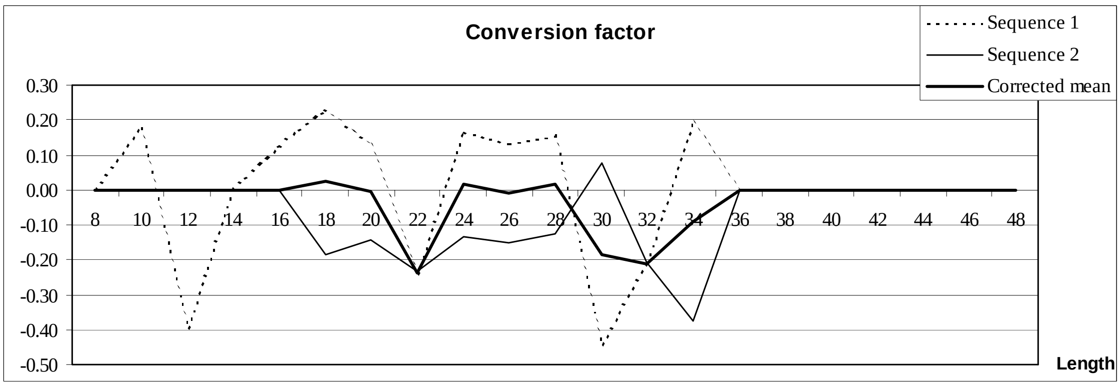


Figure 5.6. Conversion factors without and with corrections of C(t) of the log-transformed data.



Figures for cod

Figure 6.1. Length distributions of both gears for the sequence TV3 930 followed by Hake 4M.

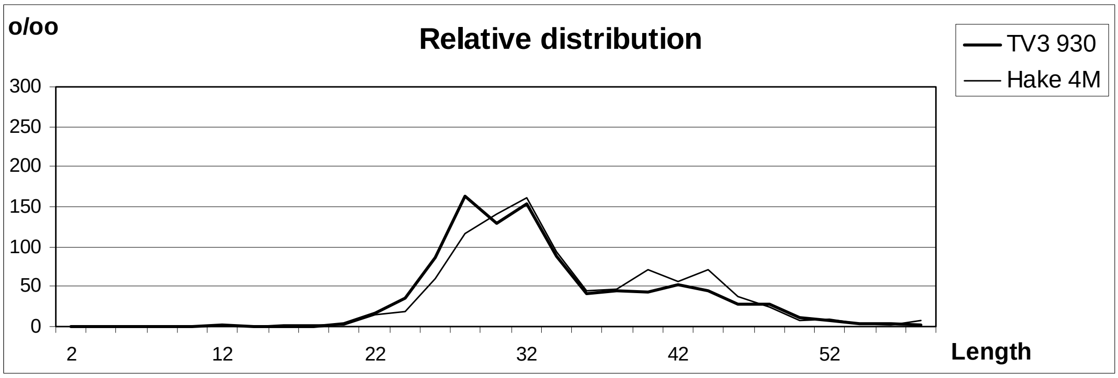


Figure 6.2. Length distributions of both gears for the sequence Hake 4M followed by TV3 930.

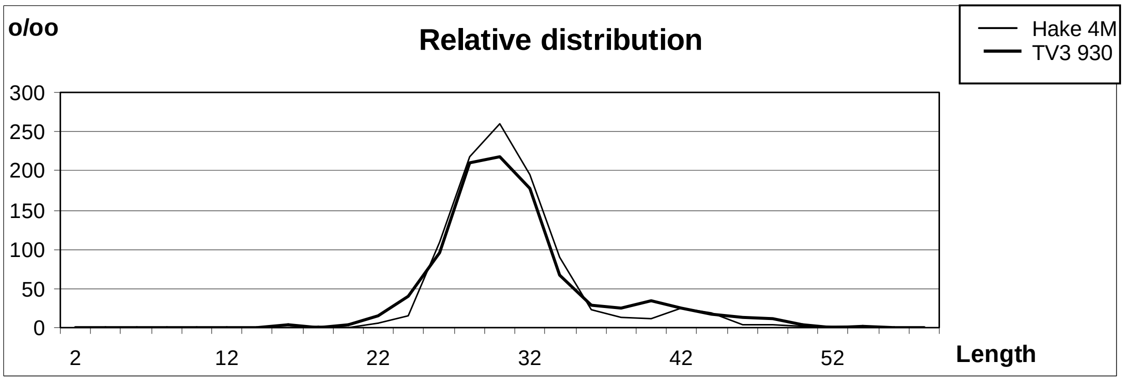
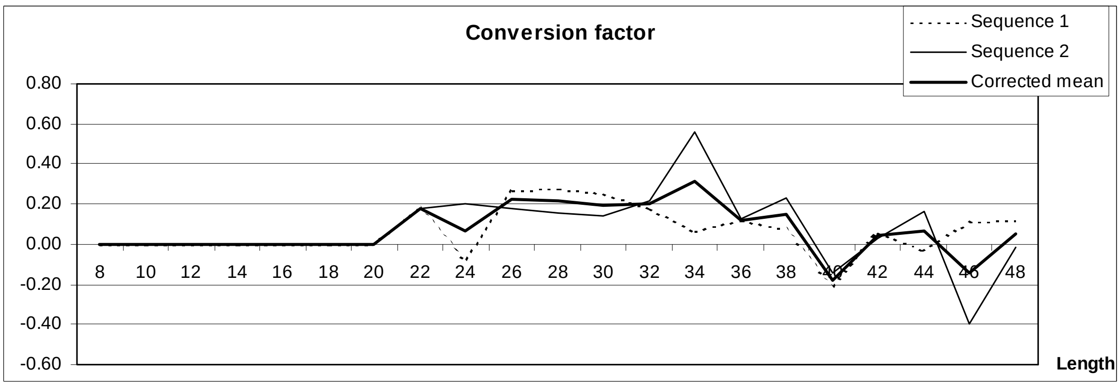


Figure 6.3. Conversion factors without and with corrections of C(t) of the log-transformed data.



Figures for flounder

Figure 6.4. Length distributions of both gears for the sequence TV3 930 followed by Hake 4M.

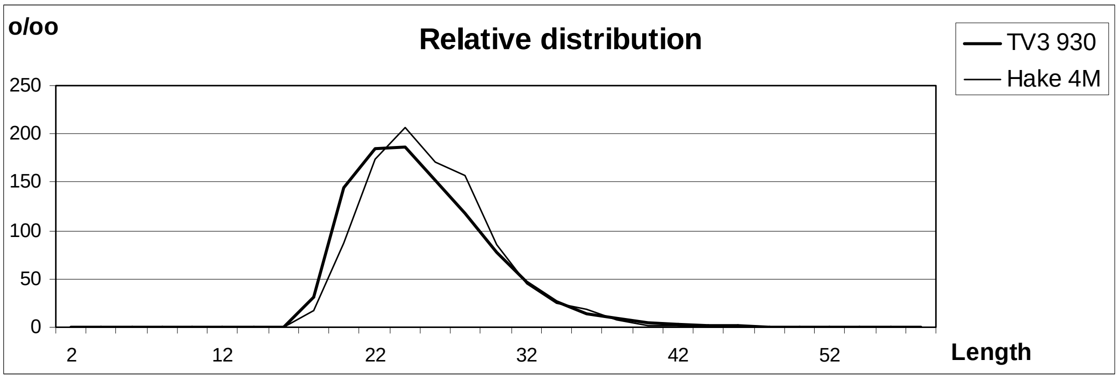


Figure 6.5. Length distributions of both gears for the sequence Hake 4M followed by TV3 930.

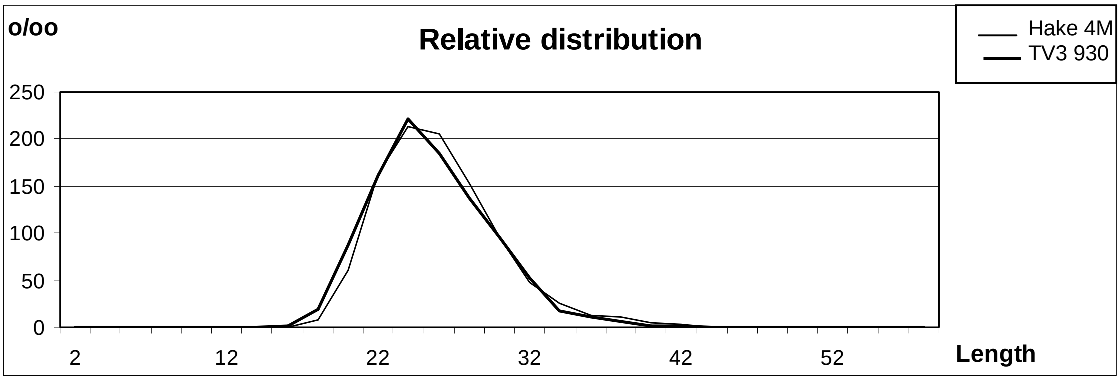
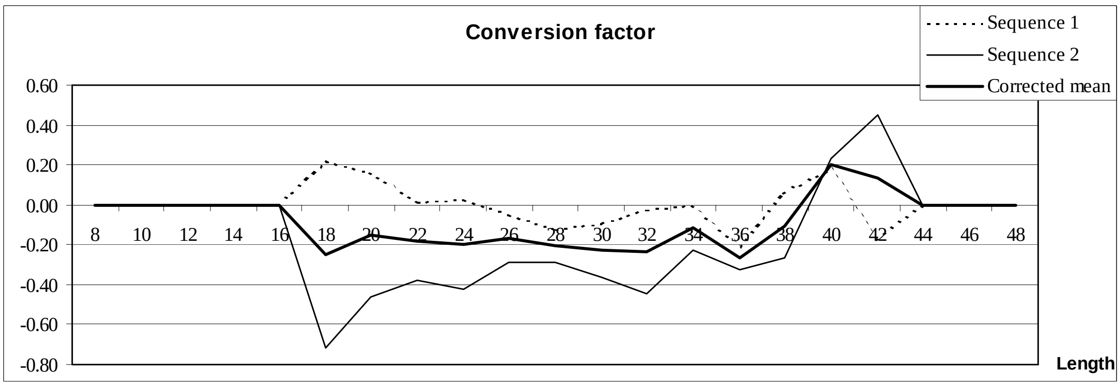


Figure 6.6. Conversion factors without and with corrections of C(t) of the log-transformed data.



Figures for cod

Figure 7.1. Length distributions of both gears for the sequence TV3 930 followed by GOV.

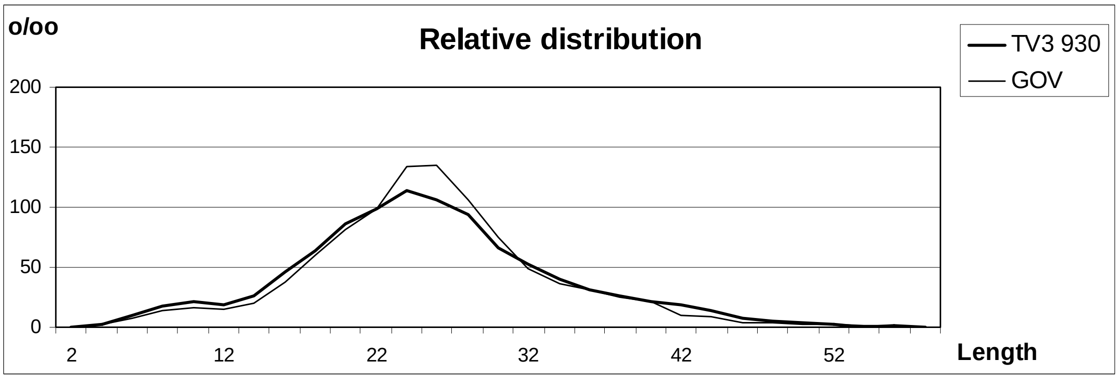


Figure 7.2. Length distributions of both gears for the sequence GOV followed by TV3 930.

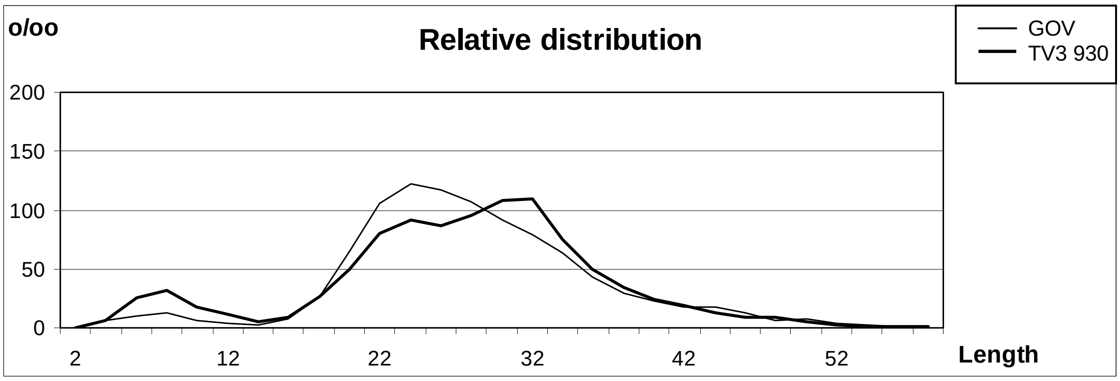
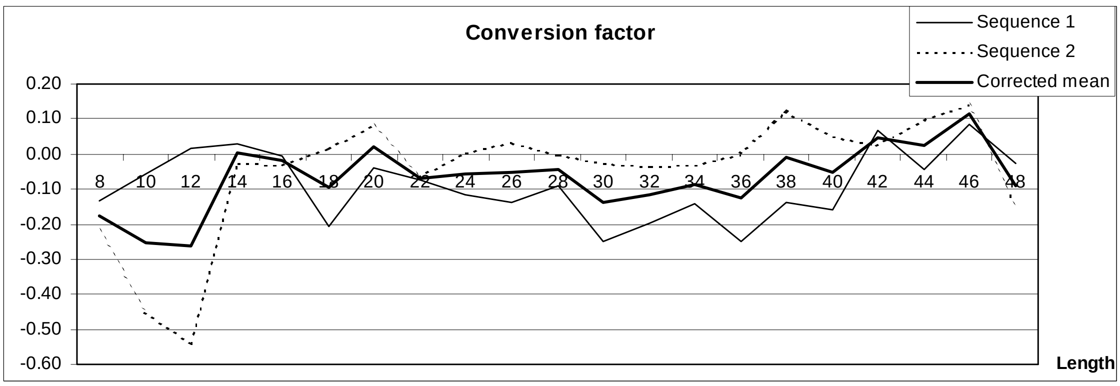


Figure 7.3. Conversion factors without and with corrections of C(t) of the log-transformed data.



Figures for flounder

Figure 7.4. Length distributions of both gears for the sequence TV3 930 followed by GOV.

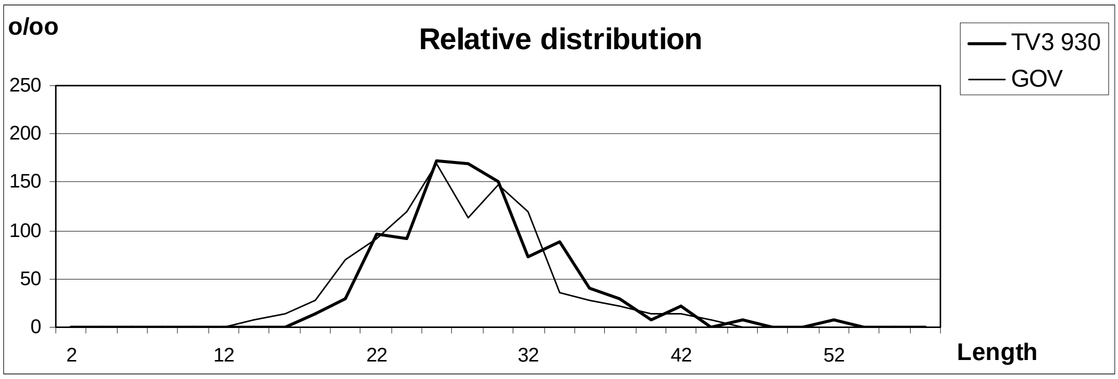


Figure 7.5. Length distributions of both gears for the sequence GOV followed by TV3 930.

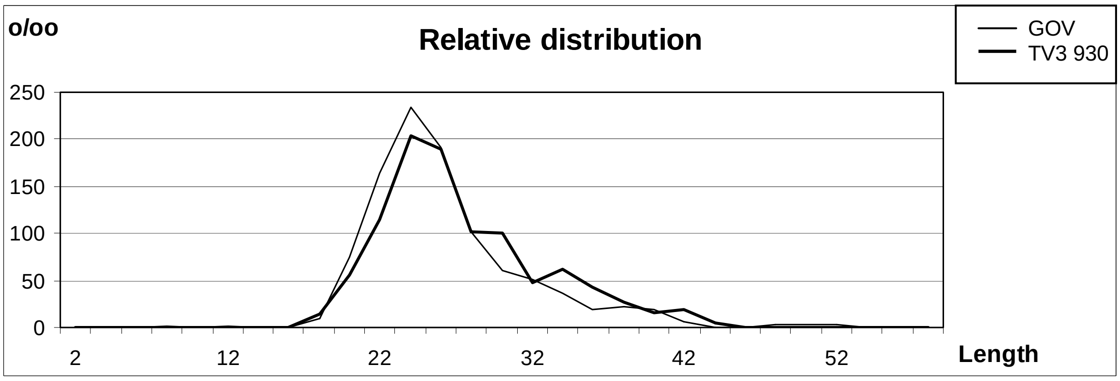
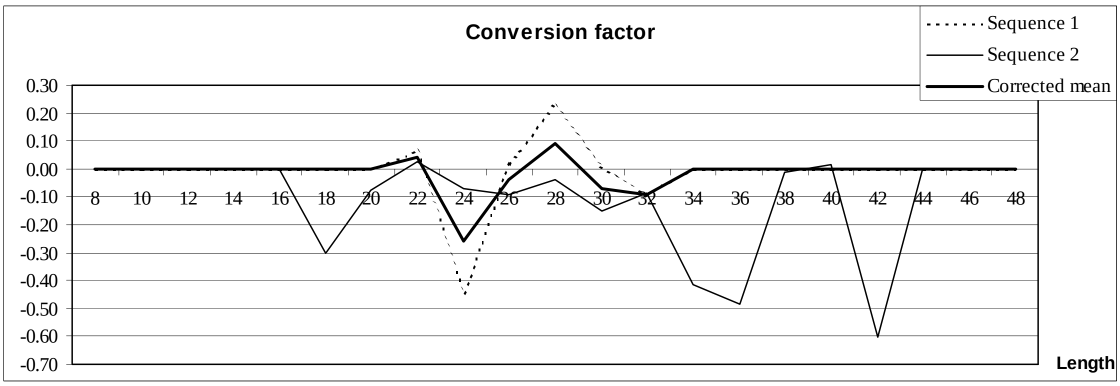


Figure 7.6. Conversion factors without and with corrections of C(t) of the log-transformed data.



Methods 2-3:

The inter-calibration data was analysed with General Linear Models (GLM), Method 2, and Generalized Linear Models (GENMOD), Method 3, procedures with the SAS Statistical Software Package.

The models applied was the following:

GLM-model:

$$\log(CPUE_{p,s,g,l}) = pairno_p + sequence_s + gear_g + length_l + gear*length_{g,l} + sequence*length_{s,l} + \log \varepsilon_{p,s,g,l}$$

GENMOD-model:

$$CPUE_{p,s,g,l} = pairno_p + sequence_s + gear_g + length_l + gear*length_{g,l} + sequence*length_{s,l} + \log \varepsilon_{p,s,g,l}$$

/ distribution=gamma
link=log
pscale
maxiter=200
type 3

Pairno: Pair number (each paired haul was numbered separately by country)

Sequence: Sequence of the gear used in a given paired haul

Gear: Trawl gear
Length: 1-cm fish length group (8-55 cm)
* : Interaction effect
ε : Model residual

The data were analysed in order to estimate statistical significance of the main effects and interaction effects as given in the models above.

The General Linear Model (GLM) analysis was performed on log-transformed CPUE-data per length group (additive model).

The distribution used in the Generalized Linear Model (GENMOD) was the gamma distribution for which the model converged for all countries. The link function used in the analysis was logarithmic. Up to 200 iterations was allowed in this model but the model also converged when only using 50 iterations.

Only the output (see below) from initial non-reduced models analysing the cod-data by nation are shown in order to illustrate the statistical significance level of the different effects. A result worth noticing is that the interaction effect between fish length and sequence of gear as well as the main effect sequence in nearly all cases were not statistically significant. Also the statistical analyses showed no clear trends in the model residuals.

From the reduced models (not shown) only containing the statistically significant effects the conversion factors between the trawls can be directly estimated based on output estimates of the effects from the models.

.

Method 2

Output from SAS GLM analysis of log-transformed inter-calibration data

New TV3-trawls versus traditional national trawls

Cod

```
Model_2: GLM Interaction effects model, vers. 1                08:29 Thursday, February 8, 2001   1
country=D
The GLM Procedure
                                                                         Class Level Information

Class         Levels    Values

pairno2           32    1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32

sequence           2    First Second

gear               2    HG20/25 TV3-520

length            48    8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44
45 46 47
                        48 49 50 51 52 53 54 55

Number of observations    3072
```

```
Model_2: GLM Interaction effects model, vers. 1                08:29 Thursday, February 8, 2001   2
country=D
The GLM Procedure
Dependent Variable: lncpue
                                        Sum of
Source                      DF         Squares     Mean Square    F Value    Pr > F

Model                      174      9872.65164        56.73938      21.21    <.0001

Error                     2897      7749.10686         2.67487

Corrected Total           3071     17621.75850

R-Square     Coeff Var      Root MSE    lncpue Mean

0.560253      149.3455      1.635504       1.095114

Source                      DF       Type I SS     Mean Square    F Value    Pr > F

pairno2                     31     1489.226522       48.039565      17.96    <.0001
sequence                     1       18.984530       18.984530       7.10    0.0078
gear                         1        5.990635        5.990635       2.24    0.1346
length                      47     8219.858994      174.890617      65.38    <.0001
gear*length                 47       68.402012        1.455362       0.54    0.9953
sequence*length             47       70.188949        1.493382       0.56    0.9936

Source                      DF     Type III SS     Mean Square    F Value    Pr > F

pairno2                     31     1489.226522       48.039565      17.96    <.0001
sequence                     1       23.335291       23.335291       8.72    0.0032
gear                         1        5.990635        5.990635       2.24    0.1346
length                      47     8219.858994      174.890617      65.38    <.0001
gear*length                 47       59.876561        1.273969       0.48    0.9991
sequence*length             47       70.188949        1.493382       0.56    0.9936
```

Model_2: GLM Interaction effects model, vers. 1 08:29 Thursday, February 8, 2001 3

country=Denmark

The GLM Procedure

Class Level Information

Class	Levels	Values
pairno2	55	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55
sequence	2	First Second
gear	2	Granton TV3-930
length	48	8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55

Number of observations 5280

Model_2: GLM Interaction effects model, vers. 1 8:29 Thursday, February 8, 2001 4

country=Denmark

The GLM Procedure

Dependent Variable: lncpue

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	197	12839.95176	65.17742	23.63	<.0001
Error	5082	14019.17234	2.75859		
Corrected Total	5279	26859.12410			

R-Square	Coeff Var	Root MSE	lncpue Mean
0.478048	55648.94	1.660901	0.002985

Source	DF	Type I SS	Mean Square	F Value	Pr > F
pairno2	54	4895.467851	90.656812	32.86	<.0001
sequence	1	227.005771	227.005771	82.29	<.0001
gear	1	2117.904793	2117.904793	767.75	<.0001
length	47	5274.474639	112.222865	40.68	<.0001
gear*length	47	255.472620	5.435588	1.97	<.0001
sequence*length	47	69.626084	1.481406	0.54	0.9960

Source	DF	Type III SS	Mean Square	F Value	Pr > F
pairno2	54	4895.467851	90.656812	32.86	<.0001
sequence	1	157.102679	157.102679	56.95	<.0001
gear	1	2117.904793	2117.904793	767.75	<.0001
length	47	5274.474639	112.222865	40.68	<.0001
gear*length	47	252.056152	5.362897	1.94	0.0001
sequence*length	47	69.626084	1.481406	0.54	0.9960

country=Latvia

The GLM Procedure

Class Level Information

Class	Levels	Values
pairno2	37	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37
sequence	2	First Second
gear	2	LBT TV3-520
length 45 46	48	8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 47 48 49 50 51 52 53 54 55

Number of observations 3552

country=Latvia

The GLM Procedure

Dependent Variable: lncpue

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	179	4831.07129	26.98923	14.64	<.0001
Error	3372	6214.69753	1.84303		
Corrected Total	3551	11045.76882			

R-Square	Coeff Var	Root MSE	lncpue Mean
0.437368	-92.70328	1.357582	-1.464438

Source	DF	Type I SS	Mean Square	F Value	Pr > F
pairno2	36	4004.256905	111.229358	60.35	<.0001
sequence	1	1.312350	1.312350	0.71	0.3988
gear	1	0.111868	0.111868	0.06	0.8054
length	47	694.191623	14.770035	8.01	<.0001
gear*length	47	99.478298	2.116560	1.15	0.2272
sequence*length	47	31.720248	0.674899	0.37	1.0000

Source	DF	Type III SS	Mean Square	F Value	Pr > F
pairno2	36	4004.256905	111.229358	60.35	<.0001
sequence	1	1.411742	1.411742	0.77	0.3815
gear	1	0.111868	0.111868	0.06	0.8054
length	47	694.191623	14.770035	8.01	<.0001
gear*length	47	99.860434	2.124690	1.15	0.2215
sequence*length	47	31.720248	0.674899	0.37	1.0000

country=Poland

The GLM Procedure

Class Level Information

Class	Levels	Values
pairno2	27	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27
sequence	2	First Second
gear	2	P20/25 TV3-930
length	48	8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55

Number of observations 2592

country=Poland

The GLM Procedure

Dependent Variable: lncpue

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	169	6472.24856	38.29733	11.62	<.0001
Error	2422	7981.52816	3.29543		
Corrected Total	2591	14453.77672			

R-Square	Coeff Var	Root MSE	lncpue Mean
0.447789	-5817.035	1.815332	-0.031207

Source	DF	Type I SS	Mean Square	F Value	Pr > F
pairno2	26	4120.548236	158.482624	48.09	<.0001
sequence	1	150.884641	150.884641	45.79	<.0001
gear	1	73.945509	73.945509	22.44	<.0001
length	47	1937.762667	41.228993	12.51	<.0001
gear*length	47	84.125218	1.789898	0.54	0.9953
sequence*length	47	104.982287	2.233666	0.68	0.9543

Source	DF	Type III SS	Mean Square	F Value	Pr > F
pairno2	26	4120.548236	158.482624	48.09	<.0001
sequence	1	109.801359	109.801359	33.32	<.0001
gear	1	73.945509	73.945509	22.44	<.0001
length	47	1937.762667	41.228993	12.51	<.0001
gear*length	47	80.246094	1.707364	0.52	0.9973
sequence*length	47	104.982287	2.233666	0.68	0.9543

Model_2: GLM Interaction effects model, vers. 1 08:29 Thursday, February 8, 2001 9

country=Russia

The GLM Procedure

Class Level Information

Class	Levels	Values
pairno2	10	1 2 3 4 5 6 7 8 9 10
sequence	2	first second
gear	2	HAKE-4M TV3-930
length	48	8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55

Number of observations 960

Model_2: GLM Interaction effects model, vers. 1 08:29 Thursday, February 8, 2001 10

country=Russia

The GLM Procedure

Dependent Variable: lncpue

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	152	3111.563594	20.470813	14.66	<.0001
Error	807	1126.681688	1.396136		
Corrected Total	959	4238.245282			

R-Square	Coeff Var	Root MSE	lncpue Mean
0.734163	-4028.245	1.181582	-0.029332

Source	DF	Type I SS	Mean Square	F Value	Pr > F
pairno2	9	269.356239	29.928471	21.44	<.0001
sequence	1	43.874957	43.874957	31.43	<.0001
gear	1	0.502337	0.502337	0.36	0.5488
length	47	2677.282651	56.963461	40.80	<.0001
gear*length	47	53.608834	1.140613	0.82	0.8052
sequence*length	47	66.938577	1.424225	1.02	0.4376

Source	DF	Type III SS	Mean Square	F Value	Pr > F
pairno2	9	269.356239	29.928471	21.44	<.0001
sequence	1	40.300121	40.300121	28.87	<.0001
gear	1	0.502337	0.502337	0.36	0.5488
length	47	2677.282651	56.963461	40.80	<.0001
gear*length	47	56.826763	1.209080	0.87	0.7256
sequence*length	47	66.938577	1.424225	1.02	0.4376

country=Sweden

The GLM Procedure

Class Level Information

Class	Levels	Values
pairno2	34	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34
sequence	2	First Second
gear	3	Fot? GOV TV3-930
length	48	8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55

Number of observations 3264

country=Sweden

The GLM Procedure

Dependent Variable: lncpue

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	224	11131.24894	49.69308	17.47	<.0001
Error	3039	8646.54210	2.84519		
Corrected Total	3263	19777.79104			

R-Square	Coeff Var	Root MSE	lncpue Mean
0.562816	198.2620	1.686770	0.850778

Source	DF	Type I SS	Mean Square	F Value	Pr > F
pairno2	33	5271.711535	159.748834	56.15	<.0001
sequence	1	0.001817	0.001817	0.00	0.9798
gear	2	5.279015	2.639508	0.93	0.3956
length	47	5446.018936	115.872743	40.73	<.0001
gear*length	94	339.386830	3.610498	1.27	0.0431
sequence*length	47	68.850803	1.464911	0.51	0.9975

Source	DF	Type III SS	Mean Square	F Value	Pr > F
pairno2	33	5214.994239	158.030128	55.54	<.0001
sequence	1	0.685769	0.685769	0.24	0.6235
gear	2	5.279015	2.639508	0.93	0.3956
length	47	1959.559993	41.692766	14.65	<.0001
gear*length	94	317.373387	3.376313	1.19	0.1088
sequence*length	47	68.850803	1.464911	0.51	0.9975

```
country=D gear=HG20/25

The UNIVARIATE Procedure
Variable:  res1

                            Moments

N                        1536    Sum Weights              1536
Mean                        0    Sum Observations            0
Std Deviation      1.62686452    Variance           2.64668816
Skewness           -0.5264977    Kurtosis           0.34785337
Uncorrected SS     4062.66633    Corrected SS       4062.66633
Coeff Variation             .    Std Error Mean     0.04151029


              Basic Statistical Measures

    Location                    Variability

Mean     0.000000     Std Deviation            1.62686
Median   0.176043     Variance                 2.64669
Mode      .           Range                    9.93807
                      Interquartile Range      2.06220


           Tests for Location: Mu0=0

Test           -Statistic-    -----p Value------

Student's t    t         0    Pr > |t|    1.0000
Sign           M        60    Pr >= |M|   0.0024
Signed Rank    S     35107    Pr >= |S|   0.0434


                   Tests for Normality

Test                  --Statistic---    -----p Value------

Shapiro-Wilk          W     0.982047    Pr < W      <0.0001
Kolmogorov-Smirnov    D     0.048443    Pr > D      <0.0100
Cramer-von Mises      W-Sq  1.096091    Pr > W-Sq   <0.0050
Anderson-Darling      A-Sq   7.03841    Pr > A-Sq   <0.0050
```



```
country=D gear=HG20/25

The UNIVARIATE Procedure
Variable:  res1

           Extreme Observations

------Lowest-----        -----Highest-----

   Value      Obs           Value      Obs

-5.78295      839         3.73317     1481
-5.17081      880         3.76929     1479
-5.16046      844         3.93664     1294
-4.98957      555         4.08420     1144
-4.97672      554         4.15512     1390
```

```
                    Histogram                          #  Boxplot
 4.25+*                                                2     |
     .**                                               6     |
 3.25+****                                            17     |
     .**********                                      46     |
 2.25+***************                                 74     |
     .**********************                         110     |
 1.25+**********************************             167  +-----+
     .****************************************       197  |     |
 0.25+******************************************     209  *--+--*
     .***************************************        195  |     |
-0.75+*****************************                  143  +-----+
     .************************                       117     |
-1.75+*****************                               82     |
     .*********                                       44     |
-2.75+*********                                       43     |
     .*******                                         31     |
-3.75+*****                                           22     |
     .****                                            17     0
-4.75+***                                             11     0
     .*                                                2     0
-5.75+*                                                1     0
      ----+----+----+----+----+----+----+----+--
      * may represent up to 5 counts
```

```
                  Normal Probability Plot
 4.25+                                                  *
     |                                               +++*
 3.25+                                            ++*****
     |                                         +*****
 2.25+                                      *****
     |                                   ****
 1.25+                               *****
     |                           *****
 0.25+                        ****+
     |                     ****
-0.75+                  ****
     |               ****
-1.75+             ***
     |          +***
-2.75+       ++***
     |    +++***
-3.75+ +++ ***
     |+ ***
-4.75+**
     |*
-5.75+*
      +----+----+----+----+----+----+----+----+----+----+
          -2        -1         0        +1        +2
```

```
Model_2: GLM Interaction effects model, vers. 1             08:29 Thursday, February 8, 2001  15

country=D gear=TV3-520

The UNIVARIATE Procedure
Variable:  res1

                            Moments

N                       1536    Sum Weights               1536
Mean                       0    Sum Observations             0
Std Deviation      1.5497064    Variance            2.40158992
Skewness          -0.5982953    Kurtosis            0.62515295
Uncorrected SS    3686.44053    Corrected SS        3686.44053
Coeff Variation            .    Std Error Mean      0.03954156

              Basic Statistical Measures

    Location                    Variability

Mean     0.000000     Std Deviation            1.54971
Median   0.130709     Variance                 2.40159
Mode      .           Range                    9.72227
                      Interquartile Range      1.90279

           Tests for Location: Mu0=0

Test           -Statistic-    -----p Value------

Student's t    t         0    Pr > |t|    1.0000
Sign           M        51    Pr >= |M|   0.0099
Signed Rank    S     38555    Pr >= |S|   0.0265



                   Tests for Normality

Test                  --Statistic---    -----p Value------

Shapiro-Wilk          W     0.977924    Pr < W      <0.0001
Kolmogorov-Smirnov    D     0.048514    Pr > D      <0.0100
Cramer-von Mises      W-Sq  1.245844    Pr > W-Sq   <0.0050
Anderson-Darling      A-Sq  8.372251    Pr > A-Sq   <0.0050
```

```
Model_2: GLM Interaction effects model, vers. 1                             08:29 Thursday, February 8, 2001  16

country=D gear=TV3-520

The UNIVARIATE Procedure
Variable:  res1

           Extreme Observations

------Lowest-----        -----Highest-----

   Value      Obs           Value      Obs

-5.58329      303         3.64615      385
-5.23305      873         3.77463      721
-5.18689      871         3.78532      958
-5.15511      870         3.87036      913
-5.13921     1131         4.13898      720
```

```
                       Histogram                               #  Boxplot                   Normal Probability Plot
   4.25+*                                                      1     0        4.25+                                                  *
       .*                                                      5     |            |                                                ++*
   3.25+****                                                  16     |        3.25+                                             ++****
       .*******                                               33     |            |                                         +*****
   2.25+*************                                         61     |        2.25+                                     +*****
       .************************                             118     |            |                                  *****
   1.25+**********************************                   167  +-----+     1.25+                               *****
       .**********************************************       228  |     |         |                           *****
   0.25+**************************************               190  *--+--*     0.25+                        ****+
       .*******************************************          211  |     |         |                     ****
  -0.75+*********************************                    165  +-----+    -0.75+                 *****
       .*************************                            122     |            |              ****+
  -1.75+**************                                        66     |       -1.75+            ***+
       .********                                              38     |            |         ++**
  -2.75+*********                                             41     |       -2.75+      ++****
       .******                                                28     |            |   +++***
  -3.75+****                                                  20     0       -3.75++++ ***
       .***                                                   13     0            | ****
  -4.75+*                                                      4     0       -4.75+**
       .**                                                     8     0            |*
  -5.75+*                                                      1     0       -5.75+*
        ----+----+----+----+----+----+----+----+----+-                         +----+----+----+----+----+----+----+----+----+----+
        * may represent up to 5 counts                                                 -2        -1         0        +1        +2
```

country=Denmark gear=Granton

The UNIVARIATE Procedure
Variable: res1

Moments

N	2640	Sum Weights	2640
Mean	0	Sum Observations	0
Std Deviation	1.60664881	Variance	2.58132039
Skewness	0.06984477	Kurtosis	-0.6789099
Uncorrected SS	6812.10451	Corrected SS	6812.10451
Coeff Variation	.	Std Error Mean	0.03126936

Basic Statistical Measures

Location		Variability	
Mean	0.000000	Std Deviation	1.60665
Median	0.017322	Variance	2.58132
Mode	.	Range	8.94822
		Interquartile Range	2.48003

Tests for Location: Mu0=0

Test	-Statistic-		-----p Value------	
Student's t	t	0	Pr > |t|	1.0000
Sign	M	8	Pr >= |M|	0.7703
Signed Rank	S	-11905	Pr >= |S|	0.7612

Tests for Normality

Test	--Statistic---		-----p Value------	
Kolmogorov-Smirnov	D	0.040857	Pr > D	<0.0100
Cramer-von Mises	W-Sq	1.038756	Pr > W-Sq	<0.0050
Anderson-Darling	A-Sq	6.988251	Pr > A-Sq	<0.0050

Quantiles (Definition 5)

Quantile	Estimate
100% Max	4.7334019

Model_2: GLM Interaction effects model, vers. 1   08:29 Thursday, February 8, 2001 18

country=Denmark gear=Granton

The UNIVARIATE Procedure
Variable: res1

Extreme Observations

------Lowest-----		-----Highest-----	
Value	Obs	Value	Obs
-4.21482	64	4.02473	1971
-3.91389	1559	4.03870	2277
-3.91025	130	4.35753	1254
-3.86042	63	4.42509	1255
-3.81412	308	4.73340	1253

```
                    Histogram                        #  Boxplot                  Normal Probability Plot
   4.75+*                                            1     |        4.75+                                                       *
       .*                                            5     |            |                                                       *
       .****                                        22     |            |                                                    +***
       .********                                    46     |            |                                                 *****
       .***************                             90     |            |                                             *****
       .**********************                     131     |            |                                          ****
       .**********************************         201     |            |                                       ****
       .*********************************************  269  +-----+      |                                    ****
       .************************************************ 286 |     |     |                                 ****
   0.25+*********************************************** 277 *--+--*  0.25+                             ****
       .*********************************************  270  |     |     |                          ****
       .******************************************     249  |     |     |                       +***
       .***************************************        232  +-----+     |                    +****
       .***************************************        231     |        |                 +****
       .*********************************              193     |        |             *****
       .*****************                               99     |        |      *******
       .*****                                           25     |        |****+++
       .**                                              12     |        |*+++
  -4.25+*                                                1     |     -4.25+*
        ----+----+----+----+----+----+----+----+---                     +----+----+----+----+----+----+----+----+----+----+
        * may represent up to 6 counts                                       -2        -1         0        +1        +2
```

```
Model_2: GLM Interaction effects model, vers. 1                      08:29 Thursday, February 8, 2001  19

country=Denmark gear=TV3-930

The UNIVARIATE Procedure
Variable:  res1

                            Moments

N                         2640    Sum Weights               2640
Mean                         0    Sum Observations             0
Std Deviation       1.65256903    Variance             2.7309844
Skewness            -0.3878818    Kurtosis            -0.2582437
Uncorrected SS      7207.06784    Corrected SS        7207.06784
Coeff Variation              .    Std Error Mean      0.03216308


              Basic Statistical Measures

    Location                    Variability

Mean     0.000000     Std Deviation            1.65257
Median   0.251225     Variance                 2.73098
Mode      .           Range                    9.90800
                      Interquartile Range      2.24345


           Tests for Location: Mu0=0

Test           -Statistic-    -----p Value------

Student's t    t         0    Pr > |t|    1.0000
Sign           M       188    Pr >= |M|   <.0001
Signed Rank    S     95706    Pr >= |S|   0.0145




                   Tests for Normality

Test                  --Statistic---    -----p Value------

Kolmogorov-Smirnov    D     0.072589    Pr > D     <0.0100
Cramer-von Mises      W-Sq   3.54716    Pr > W-Sq  <0.0050
Anderson-Darling      A-Sq  20.00436    Pr > A-Sq  <0.0050


Quantiles (Definition 5)

Quantile       Estimate

100% Max       5.102908


Model_2: GLM Interaction effects model, vers. 1                                   08:29 Thursday, February 8, 2001  20

country=Denmark gear=TV3-930

The UNIVARIATE Procedure
Variable:  res1

           Extreme Observations

------Lowest-----        -----Highest-----

   Value      Obs           Value      Obs

-4.80509       61         4.40333     2546
-4.61537     1452         4.47604      772
-4.48238     1698         4.54669     1345
-4.31879     2429         4.80342      770
-4.23962      449         5.10291      769




                   Histogram                              #  Boxplot                  Normal Probability Plot
   5.25+*                                                1     0        5.25+                                                  *
       .*                                                2     0            |                                                  *
   4.25+*                                                8     |        4.25+                                                  *
       .**                                              10     |            |                                               ++**
   3.25+****                                            28     |        3.25+                                            ++****
       .******                                          53     |            |                                         ++****
   2.25+***************                                132     |        2.25+                                      +*****
       .***************************                    240     |            |                                  *****
   1.25+*********************************              294  +-----+     1.25+                               ****
       .***************************************        346  |     |         |                           *****
   0.25+********************************************   394  *--+--*     0.25+                       *****+
       .******************************                 270  |     |         |                     ***+
  -0.75+********************                           177  |     |    -0.75+                   **+
       .******************                             159  +-----+         |                +***
  -1.75+*****************                              146     |       -1.75+             +****
       .**************                                 118     |            |          ++***
  -2.75+**************                                 122     |       -2.75+       ++****
       .********                                        69     |            |    ++****
  -3.75+******                                          54     |       -3.75+*******
       .**                                              15     0            |*
  -4.75+*                                                2     0       -4.75+*
        ----+----+----+----+----+----+----+----+----                         +----+----+----+----+----+----+----+----+----+----+
        * may represent up to 9 counts                                           -2        -1         0        +1        +2
```

country=Latvia gear=LBT

The UNIVARIATE Procedure
Variable: res1

Moments

N	1776	Sum Weights	1776
Mean	0	Sum Observations	0
Std Deviation	1.31771136	Variance	1.73636322
Skewness	0.56229963	Kurtosis	1.01139828
Uncorrected SS	3082.04471	Corrected SS	3082.04471
Coeff Variation	.	Std Error Mean	0.03126791

Basic Statistical Measures

Location		Variability	
Mean	0.00000	Std Deviation	1.31771
Median	-0.21649	Variance	1.73636
Mode	-0.87360	Range	8.28945
		Interquartile Range	1.14850

NOTE: The mode displayed is the smallest of 59 modes with a count of 2.

Tests for Location: Mu0=0

Test	-Statistic-		-----p Value------	
Student's t	t	0	Pr > |t|	1.0000
Sign	M	-159	Pr >= |M|	<.0001
Signed Rank	S	-111548	Pr >= |S|	<.0001

Tests for Normality

Test	--Statistic---		-----p Value------	
Shapiro-Wilk	W	0.937067	Pr < W	<0.0001
Kolmogorov-Smirnov	D	0.127085	Pr > D	<0.0100
Cramer-von Mises	W-Sq	8.668197	Pr > W-Sq	<0.0050
Anderson-Darling	A-Sq	48.02975	Pr > A-Sq	<0.0050

Quantiles (Definition 5)

country=Latvia gear=LBT

The UNIVARIATE Procedure
Variable: res1

Quantiles (Definition 5)

Quantile	Estimate
0% Min	-4.067248

Extreme Observations

------Lowest-----		-----Highest-----	
Value	Obs	Value	Obs
-4.06725	375	3.86429	896
-3.94609	379	3.94282	1568
-3.74036	1553	4.03658	1569
-3.63204	396	4.09248	1298
-3.59603	377	4.22220	1297

```
                     Histogram                            #  Boxplot                Normal Probability Plot
   4.25+*                                                 3     *       4.25+                                                  *
       .**                                               16     0           |                                                ***
       .****                                             38     0           |                                            *****++
       .*******                                          70     0           |                                        ****++++
       .*******                                          66     0           |                                     ****+++
       .*******                                          61     |           |                                    **+++
       .***                                              25     |           |                                 ++**
       .*************                                   124     |           |                             +++****
       .*********************************               326  +--+--+        |                         ++******
       .*********************************************   441  *-----*        |                     *******
       .**********************************              340  +-----+        |               *******
       .**************                                  138     |           |          ******++
       .*****                                            46     |           |        ***+++
       .***                                              27     0           |      ***+
       .***                                              23     0           |   +***
       .***                                              24     0           |*****
       .*                                                 7     0           |*
  -4.25+*                                                 1     0      -4.25+*
        ----+----+----+----+----+----+----+----+----+                       +----+----+----+----+----+----+----+----+----+----+
        * may represent up to 10 counts                                         -2        -1         0        +1        +2
```

Model_2: GLM Interaction effects model, vers. 1   08:29 Thursday, February 8, 2001 23

country=Latvia gear=TV3-520

The UNIVARIATE Procedure
Variable: res1

Moments

N	1776	Sum Weights	1776
Mean	0	Sum Observations	0
Std Deviation	1.32848592	Variance	1.76487483
Skewness	0.25469922	Kurtosis	0.5712789
Uncorrected SS	3132.65282	Corrected SS	3132.65282
Coeff Variation	.	Std Error Mean	0.03152358

Basic Statistical Measures

Location		Variability	
Mean	0.00000	Std Deviation	1.32849
Median	-0.14393	Variance	1.76487
Mode	-1.01817	Range	7.97106
		Interquartile Range	1.17489

NOTE: The mode displayed is the smallest of 65 modes with a count of 2.

Tests for Location: Mu0=0

Test	-Statistic-		-----p Value------	
Student's t	t	0	Pr > |t|	1.0000
Sign	M	-87	Pr >= |M|	<.0001
Signed Rank	S	-77569	Pr >= |S|	0.0003

Tests for Normality

Test	--Statistic---		-----p Value------	
Shapiro-Wilk	W	0.95676	Pr < W	<0.0001
Kolmogorov-Smirnov	D	0.113826	Pr > D	<0.0100
Cramer-von Mises	W-Sq	6.110258	Pr > W-Sq	<0.0050
Anderson-Darling	A-Sq	34.09206	Pr > A-Sq	<0.0050

Model_2: GLM Interaction effects model, vers. 1   08:29 Thursday, February 8, 2001 24

country=Latvia gear=TV3-520

The UNIVARIATE Procedure
Variable: res1

Quantiles (Definition 5)

Quantile	Estimate
0% Min	-4.031451

Extreme Observations

------Lowest-----		-----Highest-----	
Value	Obs	Value	Obs
-4.03145	1092	3.43537	145
-3.86659	1095	3.59320	1568
-3.76575	1117	3.60409	1155
-3.68638	1093	3.74933	774
-3.68595	1097	3.93961	147

```
                          Histogram                         #  Boxplot                        Normal Probability Plot
   3.75+*                                                   4     0        3.75+                                                  *
       .****                                               29     0            |                                              *****
       .********                                           63     0            |                                         ******+
       .***************                                   113     0            |                                     *****++
       .*********                                          65     |            |                                   ***+++
       .******                                             47     |            |                                 +**+
       .**************                                    109     |            |                             +++***
       .***********************************************   371  +--+--+         |                         +*******
  -0.25+*********************************************     355  *-----*    -0.25+                     ******
       .********************************************      350  +-----+         |               *******
       .****************                                  121     |            |           *****++
       .*******                                            49     |            |         ***++
       .****                                               25     0            |       +**
       .*****                                              38     0            |   ++****
       .****                                               28     0            |******
       .*                                                   8     0            |*
  -4.25+*                                                   1     0       -4.25+*
        ----+----+----+----+----+----+----+----+----+--                         +----+----+----+----+----+----+----+----+----+----+
        * may represent up to 8 counts                                              -2        -1         0        +1        +2
```

country=Poland gear=P20/25

The UNIVARIATE Procedure
Variable: res1

Moments

N	1296	Sum Weights	1296
Mean	0	Sum Observations	0
Std Deviation	1.70496055	Variance	2.90689048
Skewness	-0.0505036	Kurtosis	-0.3768604
Uncorrected SS	3764.42317	Corrected SS	3764.42317
Coeff Variation	.	Std Error Mean	0.04736002

Basic Statistical Measures

Location		Variability	
Mean	0.00000	Std Deviation	1.70496
Median	0.01174	Variance	2.90689
Mode	-4.10275	Range	8.46965
		Interquartile Range	2.36271

NOTE: The mode displayed is the smallest of 29 modes with a count of 2.

Tests for Location: Mu0=0

Test	-Statistic-		-----p Value------	
Student's t	t	0	Pr > |t|	1.0000
Sign	M	3	Pr >= |M|	0.8895
Signed Rank	S	2640	Pr >= |S|	0.8448

Tests for Normality

Test	--Statistic---		-----p Value------	
Shapiro-Wilk	W	0.995019	Pr < W	0.0003
Kolmogorov-Smirnov	D	0.032067	Pr > D	<0.0100
Cramer-von Mises	W-Sq	0.2498	Pr > W-Sq	<0.0050
Anderson-Darling	A-Sq	1.317047	Pr > A-Sq	<0.0050

country=Poland gear=P20/25

The UNIVARIATE Procedure
Variable: res1

Quantiles (Definition 5)

Quantile	Estimate
0% Min	-4.3296640

Extreme Observations

------Lowest-----		-----Highest-----	
Value	Obs	Value	Obs
-4.32966	1213	4.06984	1143
-4.32966	685	4.13615	1289
-4.30471	137	4.13615	761
-4.30471	521	4.13998	437
-4.20135	1215	4.13998	53

```
                Histogram                       #  Boxplot            Normal Probability Plot
   4.25+**                                      8     |       4.25+                                                  +*
       .****                                   14     |           |                                             *****
       .**********                             37     |           |                                         *****
       .*********                              36     |           |                                       ***
       .************                           46     |           |                                    ***
       .****************************          112     |           |                                 ****
       .***********************************   139  +-----+        |                             *****
       .***********************************   138  |     |        |                          ****
       .*******************************       121  *--+--*        |                        ***
       .*****************************         114  |     |        |                      ***
       .****************************************160  |     |      |                  *****
       .*******************************       124  +-----+        |               ****
       .************************               94     |           |            ****
       .**************                         56     |           |          ***
       .*********                              34     |           |       ****
       .********                               32     |           |    ****
       .******                                 21     |           | *****
  -4.25+***                                    10     |      -4.25+**
        ----+----+----+----+----+----+----+----+                   +----+----+----+----+----+----+----+----+----+----+
        * may represent up to 4 counts                                 -2        -1         0        +1        +2
```

Model_2: GLM Interaction effects model, vers. 1 08:29 Thursday, February 8, 2001 27

country=Poland gear=TV3-930

The UNIVARIATE Procedure
Variable: res1

Moments

N	1296	Sum Weights	1296
Mean	0	Sum Observations	0
Std Deviation	1.80456414	Variance	3.25645173
Skewness	-0.1348195	Kurtosis	-0.710174
Uncorrected SS	4217.105	Corrected SS	4217.105
Coeff Variation	.	Std Error Mean	0.05012678

Basic Statistical Measures

Location		Variability	
Mean	0.00000	Std Deviation	1.80456
Median	0.20056	Variance	3.25645
Mode	-4.26169	Range	8.89728
		Interquartile Range	2.84293

NOTE: The mode displayed is the smallest of 27 modes with a count of 2.

Tests for Location: Mu0=0

Test	-Statistic-		-----p Value------	
Student's t	t	0	Pr > |t|	1.0000
Sign	M	49	Pr >= |M|	0.0070
Signed Rank	S	2420	Pr >= |S|	0.8576

Tests for Normality

Test	--Statistic---		-----p Value------	
Shapiro-Wilk	W	0.985308	Pr < W	<0.0001
Kolmogorov-Smirnov	D	0.057211	Pr > D	<0.0100
Cramer-von Mises	W-Sq	1.325174	Pr > W-Sq	<0.0050
Anderson-Darling	A-Sq	7.123978	Pr > A-Sq	<0.0050

Quantiles (Definition 5)

Model_2: GLM Interaction effects model, vers. 1 08:29 Thursday, February 8, 2001 28
country=Poland gear=TV3-930

The UNIVARIATE Procedure
Variable: res1

Quantiles (Definition 5)

Quantile	Estimate
0% Min	-4.791458

Extreme Observations

------Lowest-----		-----Highest-----	
Value	Obs	Value	Obs
-4.79146	687	3.99560	88
-4.79146	159	4.03920	86
-4.77313	684	4.03920	614
-4.77313	156	4.10582	621
-4.48576	681	4.10582	93

```
                     Histogram                      #  Boxplot                        Normal Probability Plot
   4.25+*                                           4     |          4.25+                                                ++*
       .****                                       16     |              |                                             ++****
       .*******                                    26     |              |                                          +****
       .**************                             53     |              |                                       *****
       .****************                           64     |              |                                    ****
       .*********************************         132     |              |                                *****
       .**************************************    149  +-----+           |                             ****+
       .******************************            118  |     |           |                           ***+
       .**********************************        135  *--+--*           |                        ****
  -0.25+***********************                    90  |     |      -0.25+                      ***
       .*******************                        74  |     |           |                    +**
       .******************************            117  +-----+           |                 +****
       .***************************               106     |              |              +****
       .***************************               105     |              |           *****
       .**************                             54     |              |        ****
       .*******                                    28     |              |    *****
       .***                                        12     |              |  ***+
       .***                                         9     |              |***
  -4.75+*                                           4     |         -4.75+*
        ----+----+----+----+----+----+----+---                         +----+----+----+----+----+----+----+----+----+----+
        * may represent up to 4 counts                                     -2        -1         0        +1        +2
```

Model_2: GLM Interaction effects model, vers. 1   8:29 Thursday, February 8, 2001 29

Country=Russia gear=HAKE-4M

The UNIVARIATE Procedure
Variable: res1

Moments

N	480	Sum Weights	480
Mean	0	Sum Observations	0
Std Deviation	1.07479035	Variance	1.15517431
Skewness	-0.3605107	Kurtosis	0.63145542
Uncorrected SS	553.328492	Corrected SS	553.328492
Coeff Variation	.	Std Error Mean	0.04905724

Basic Statistical Measures

Location		Variability	
Mean	0.000000	Std Deviation	1.07479
Median	0.121156	Variance	1.15517
Mode	0.868879	Range	6.37784
		Interquartile Range	1.22131

Tests for Location: Mu0=0

Test	-Statistic-		-----p Value------	
Student's t	t	0	Pr > |t|	1.0000
Sign	M	19	Pr >= |M|	0.0912
Signed Rank	S	2609	Pr >= |S|	0.3914

Tests for Normality

Test	--Statistic---		-----p Value------	
Shapiro-Wilk	W	0.983716	Pr < W	<0.0001
Kolmogorov-Smirnov	D	0.058104	Pr > D	<0.0100
Cramer-von Mises	W-Sq	0.406278	Pr > W-Sq	<0.0050
Anderson-Darling	A-Sq	2.478363	Pr > A-Sq	<0.0050

Quantiles (Definition 5)

Quantile   Estimate

Model_2: GLM Interaction effects model, vers. 1   08:29 Thursday, February 8, 2001 30

country=Russia gear=HAKE-4M

The UNIVARIATE Procedure
Variable: res1

Extreme Observations

------Lowest-----		-----Highest-----	
Value	Obs	Value	Obs
-3.49070	263	2.62064	341
-3.24284	266	2.68173	69
-3.06944	87	2.72802	72
-3.00760	370	2.81668	71
-2.95460	261	2.88714	68

```
                       Histogram                      #  Boxplot                        Normal Probability Plot
   2.75+***                                           8     0        2.75+                                              *****
       .**                                            6     |            |                                            ***++
       .******                                       16     |            |                                       +*****
       .**************                               41     |            |                                   ******
       .***********************                      67  +-----+         |                              +*****
       .*****************************************   121  *--+--*         |                        ********
  -0.25+********************************             94  |     |    -0.25+                   ******
       .*******************                          57  +-----+         |               *****+
       .**********                                   30     |            |           ****+
       .*****                                        15     |            |       ++***
       .****                                         11     0            |  ++++****
       .****                                         10     0            |++*****
  -3.25+**                                            4     0       -3.25+**
        ----+----+----+----+----+----+----+----+-                         +----+----+----+----+----+----+----+----+----+----+
        * may represent up to 3 counts                                        -2        -1         0        +1        +2
```

country=Russia gear=TV3-930

The UNIVARIATE Procedure
Variable: res1

Moments

N	480	Sum Weights	480
Mean	0	Sum Observations	0
Std Deviation	1.0940656	Variance	1.19697953
Skewness	-0.3350401	Kurtosis	0.39297138
Uncorrected SS	573.353195	Corrected SS	573.353195
Coeff Variation	.	Std Error Mean	0.04993703

Basic Statistical Measures

Location		Variability	
Mean	0.00000	Std Deviation	1.09407
Median	0.02293	Variance	1.19698
Mode	-0.90195	Range	6.64802
		Interquartile Range	1.35707

NOTE: The mode displayed is the smallest of 6 modes with a count of 2.

Tests for Location: Mu0=0

Test	-Statistic-		-----p Value------	
Student's t	t	0	Pr > |t|	1.0000
Sign	M	4	Pr >= |M|	0.7494
Signed Rank	S	1556	Pr >= |S|	0.6093

Tests for Normality

Test	--Statistic---		-----p Value------	
Shapiro-Wilk	W	0.989878	Pr < W	0.0022
Kolmogorov-Smirnov	D	0.039444	Pr > D	0.0695
Cramer-von Mises	W-Sq	0.106107	Pr > W-Sq	0.0950
Anderson-Darling	A-Sq	0.963754	Pr > A-Sq	0.0165

Quantiles (Definition 5)

Model_2: GLM Interaction effects model, vers. 1 08:29 Thursday, February 8, 2001 32

country=Russia gear=TV3-930

The UNIVARIATE Procedure
Variable: res1

Quantiles (Definition 5)

Quantile	Estimate
0% Min	-3.7560045

Extreme Observations

------Lowest-----		-----Highest-----	
Value	Obs	Value	Obs
-3.75600	115	2.42081	153
-3.31350	369	2.42081	150
-3.11747	366	2.54071	148
-2.96235	375	2.62064	149
-2.95804	307	2.89201	93

```
                         Histogram                        #  Boxplot                        Normal Probability Plot
   2.75+**                                                3     0        2.75+                                                ++*
       .*****                                             9     |            |                                            +*****
       .*************                                    26     |            |                                       ******
       .************************                         47     |            |                                  ******
       .***********************************              69  +-----+         |                              *****
       .*********************************************    90  *--+--*         |                         ******
       .********************************************     87  |     |         |                    ******
       .**************************************           76  +-----+         |               ******
       .*****************                                34     |            |           *****
       .********                                         16     |            |       +****
       .******                                           11     |            |   +++***
       .*****                                             9     0            |+*****
       .*                                                 2     0            |*
  -3.75+*                                                 1     0       -3.75+*
        ----+----+----+----+----+----+----+----+----+                        +----+----+----+----+----+----+----+----+----+----+
        * may represent up to 2 counts                                           -2        -1         0        +1        +2
```

Model_2: GLM Interaction effects model, vers. 1 08:29 Thursday, February 8, 2001 33

country=Sweden gear=Fot?

The UNIVARIATE Procedure
Variable: res1

Moments

N	96	Sum Weights	96
Mean	0	Sum Observations	0
Std Deviation	1.40146136	Variance	1.96409395
Skewness	0	Kurtosis	-0.1746068
Uncorrected SS	186.588925	Corrected SS	186.588925
Coeff Variation	.	Std Error Mean	0.14303605

Basic Statistical Measures

Location		Variability	
Mean	0.000000	Std Deviation	1.40146
Median	0.000000	Variance	1.96409
Mode	0.407287	Range	5.72357
		Interquartile Range	1.28423

Tests for Location: Mu0=0

Test	-Statistic-		-----p Value------	
Student's t	t	0	Pr > |t|	1.0000
Sign	M	0	Pr >= |M|	1.0000
Signed Rank	S	-18	Pr >= |S|	0.9480

Tests for Normality

Test	--Statistic---		-----p Value------	
Shapiro-Wilk	W	0.965656	Pr < W	0.0128
Kolmogorov-Smirnov	D	0.093588	Pr > D	0.0379
Cramer-von Mises	W-Sq	0.191916	Pr > W-Sq	0.0068
Anderson-Darling	A-Sq	1.126587	Pr > A-Sq	0.0059

Quantiles (Definition 5)

Quantile Estimate

Model_2: GLM Interaction effects model, vers. 1 08:29 Thursday, February 8, 2001 34

country=Sweden gear=Fot?

The UNIVARIATE Procedure
Variable: res1

Extreme Observations

------Lowest-----		-----Highest-----	
Value	Obs	Value	Obs
-2.86178	39	2.57707	85
-2.83959	38	2.73009	88
-2.83959	35	2.83959	86
-2.73009	40	2.83959	83
-2.57707	37	2.86178	87

```
   Stem Leaf                     #  Boxplot                   Normal Probability Plot
      2 67889                    5     0        2.75+                                          ***+*   *
      2 012334                   6     |            |                                     *****+
      1 6799                     4     |            |                                   ***++
      1 00112                    5     |            |                                 +**
      0 55567779                 8  +-----+         |                             ++***
      0 02223333344444444444    20  *--+--*         |                         *******
     -0 44444444444333332220    20  |     |         |                   *******
     -0 97776555                 8  +-----+         |                 ***++
     -1 21100                    5     |            |               **+
     -1 9976                     4     |            |           ++***
     -2 433210                   6     |            |        +*****
     -2 98876                    5     0       -2.75+*   *++**
         ----+----+----+----+                        +----+----+----+----+----+----+----+----+----+----+
                                                         -2        -1         0        +1        +2
```

```
country=Sweden gear=GOV

The UNIVARIATE Procedure
Variable:  res1

                            Moments

N                         1536    Sum Weights             1536
Mean                         0    Sum Observations           0
Std Deviation       1.60601781    Variance          2.57929321
Skewness            -0.3427292    Kurtosis          -0.2674711
Uncorrected SS      3959.21507    Corrected SS      3959.21507
Coeff Variation              .    Std Error Mean    0.04097838


              Basic Statistical Measures

    Location                    Variability

Mean     0.000000     Std Deviation            1.60602
Median   0.228884     Variance                 2.57929
Mode      .           Range                    9.34952
                      Interquartile Range      2.11523


           Tests for Location: Mu0=0

Test           -Statistic-    -----p Value------

Student's t    t         0    Pr > |t|    1.0000
Sign           M        87    Pr >= |M|   <.0001
Signed Rank    S     31766    Pr >= |S|   0.0677


                   Tests for Normality

Test                  --Statistic---    -----p Value------

Shapiro-Wilk          W     0.982443    Pr < W     <0.0001
Kolmogorov-Smirnov    D      0.07494    Pr > D     <0.0100
Cramer-von Mises      W-Sq  2.120083    Pr > W-Sq  <0.0050
Anderson-Darling      A-Sq  11.38802    Pr > A-Sq  <0.0050

Quantiles  (Definition 5)

Quantile     Estimate
```



```
country=Sweden gear=GOV

The UNIVARIATE Procedure
Variable:  res1

           Extreme Observations

------Lowest-----        -----Highest-----

   Value      Obs           Value      Obs

-4.86220       62         4.00690      183
-4.57799       64         4.09121      725
-4.47888      394         4.10642      187
-4.44595      604         4.13364      723
-4.40867      129         4.48732      722
```

```
                        Histogram                         #  Boxplot
   4.25+*                                                 5     0
       .*                                                 4     |
       .*****                                            22     |
       .*******                                          31     |
       .****************                                 78     |
       .**********************                          107     |
       .************************************            179  +-----+
       .*******************************************     213  |     |
       .********************************************    216  *--+--*
  -0.25+***************************************         194  |     |
       .********************                             96  |     |
       .****************                                 76  +-----+
       .*******************                              95     |
       .*****************                                84     |
       .***************                                  72     |
       .********                                         39     |
       .****                                             18     |
       .*                                                 5     0
  -4.75+*                                                 2     0
        ----+----+----+----+----+----+----+----+----
        * may represent up to 5 counts
```

```
                     Normal Probability Plot
  4.25+                                                  *
      |                                               +++*
      |                                            ++*****
      |                                         +****
      |                                      *****
      |                                   ****
      |                               *****
      |                           *****
      |                        ****+
 -0.25+                    *****
      |                  ***+
      |                +**
      |             +****
      |          ++***
      |       +****
      |    *****
      |*****
      |*
 -4.75+*
       +----+----+----+----+----+----+----+----+----+----+
            -2       -1         0        +1        +2
```

```
Model_2: GLM Interaction effects model, vers. 1                       08:29 Thursday, February 8, 2001  37

country=Sweden gear=TV3-930

The UNIVARIATE Procedure
Variable:  res1

                            Moments

N                        1632    Sum Weights               1632
Mean                        0    Sum Observations             0
Std Deviation       1.6611731    Variance            2.75949608
Skewness           -0.3394103    Kurtosis            -0.1617893
Uncorrected SS      4500.7381    Corrected SS         4500.7381
Coeff Variation             .    Std Error Mean      0.04112016


              Basic Statistical Measures

    Location                    Variability

Mean     0.000000     Std Deviation            1.66117
Median   0.213801     Variance                 2.75950
Mode      .           Range                   10.21482
                      Interquartile Range      2.15454


           Tests for Location: Mu0=0

Test           -Statistic-    -----p Value------

Student's t    t         0    Pr > |t|    1.0000
Sign           M        91    Pr >= |M|   <.0001
Signed Rank    S     34665    Pr >= |S|   0.0687



                   Tests for Normality

Test                  --Statistic---    -----p Value------

Shapiro-Wilk          W     0.984645    Pr < W     <0.0001
Kolmogorov-Smirnov    D     0.061858    Pr > D     <0.0100
Cramer-von Mises      W-Sq  1.743467    Pr > W-Sq  <0.0050
Anderson-Darling      A-Sq  9.907904    Pr > A-Sq  <0.0050


Quantiles (Definition 5)

Quantile       Estimate


Model_2: GLM Interaction effects model, vers. 1                                 08:29 Thursday, February 8, 2001  38

country=Sweden gear=TV3-930

The UNIVARIATE Procedure
Variable:  res1

           Extreme Observations

------Lowest-----        -----Highest-----

  Value      Obs           Value      Obs

-5.01669     1081        4.27449      136
-4.61535      653        4.28187      141
-4.53594     1022        4.43303      194
-4.45517     1211        4.68213      193
-4.40935     1021        5.19813      384


                         Histogram                         #  Boxplot                        Normal Probability Plot
   5.25+*                                                  1     0        5.25+                                                  *
       .*                                                  1     0            |                                                  *
       .*                                                  5     0            |                                                  *
       .***                                               12     |            |                                               +***
       .***                                               14     |            |                                             ++***
       .********                                          37     |            |                                         +****
       .*****************                                 84     |            |                                      *****
   1.75+****************************                     136     |        1.75+                                  *****
       .**********************************               169  +-----+         |                               ****
       .*********************************************    222  |     |         |                           *****
       .**********************************************   226  *--+--*         |                        ****+
       .***************************************          192  |     |         |                     ****
       .*************************                        124  |     |         |                  ***+
       .*******************                               92  +-----+         |                ***
  -1.75+*****************                                 84     |       -1.75+             +***
       .***************                                   74     |            |          ++***
       .**************                                    69     |            |       ++****
       .**********                                        49     |            |    +*****
       .******                                            29     |            | *****
       .**                                                 9     0            |*
       .*                                                  2     0            |*
  -5.25+*                                                  1     0       -5.25+*
        ----+----+----+----+----+----+----+----+----+-                         +----+----+----+----+----+----+----+----+----+----+
        * may represent up to 5 counts                                             -2        -1         0        +1        +2
```

Annex 5 (Method 2): Plots of model residuals versus fish length (cod)

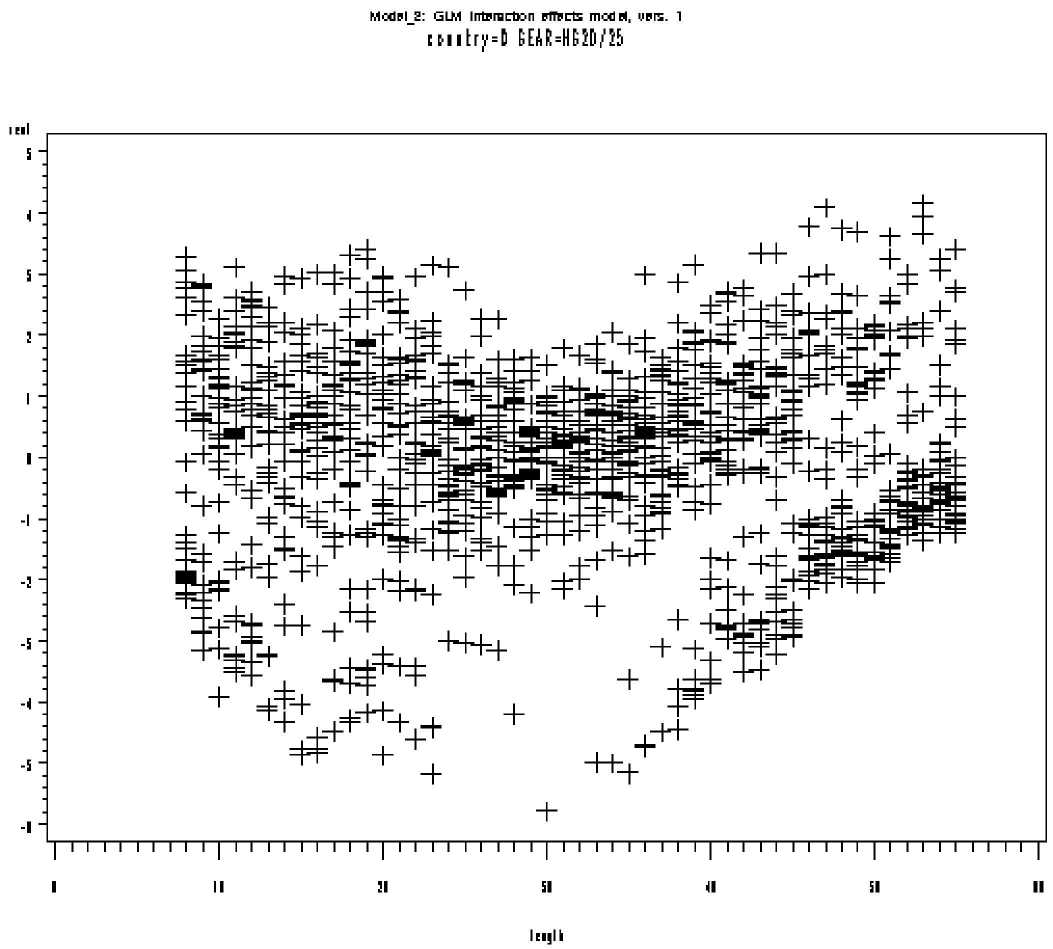


Figure 8.1. Model Resiudals vs Length and Model Predictions by coutnry and gear.

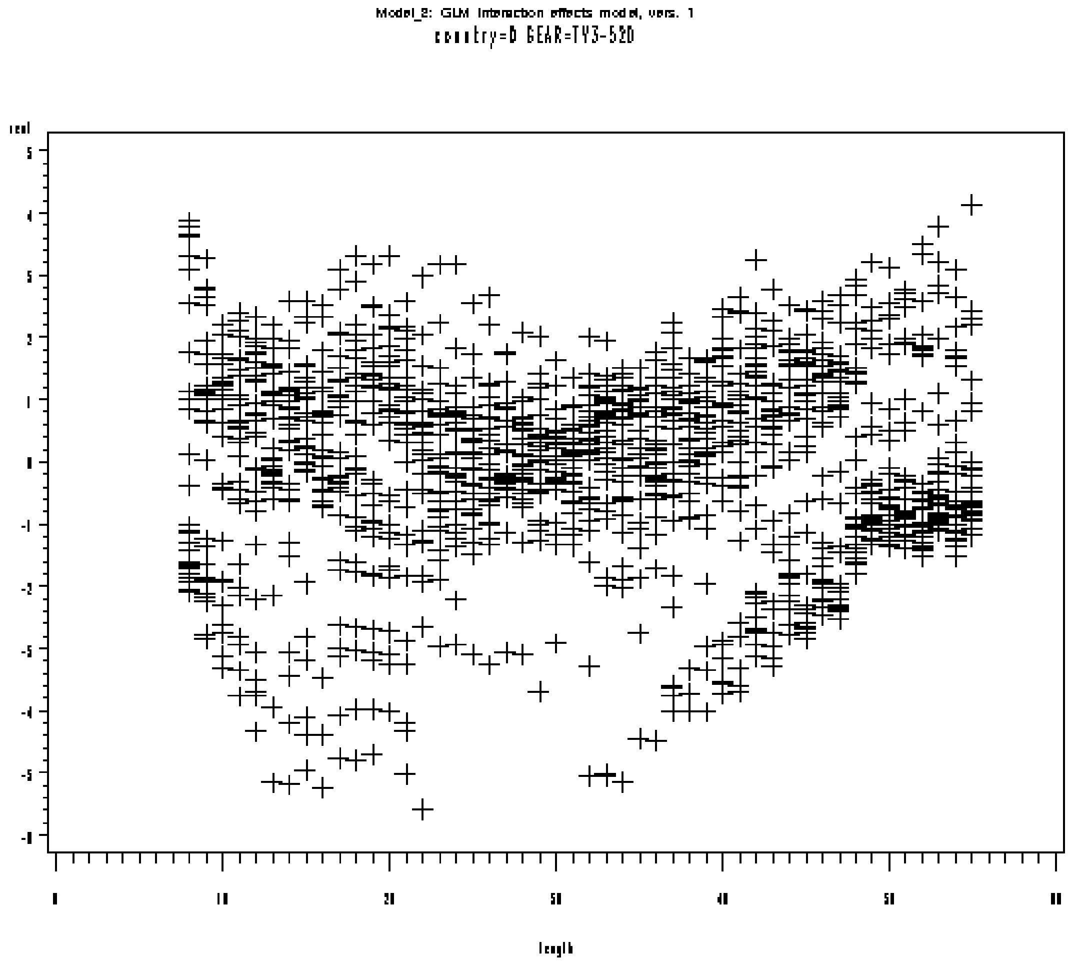


Figure 8.2. Model Residuals vs Length and Model Predictions by country and gear.

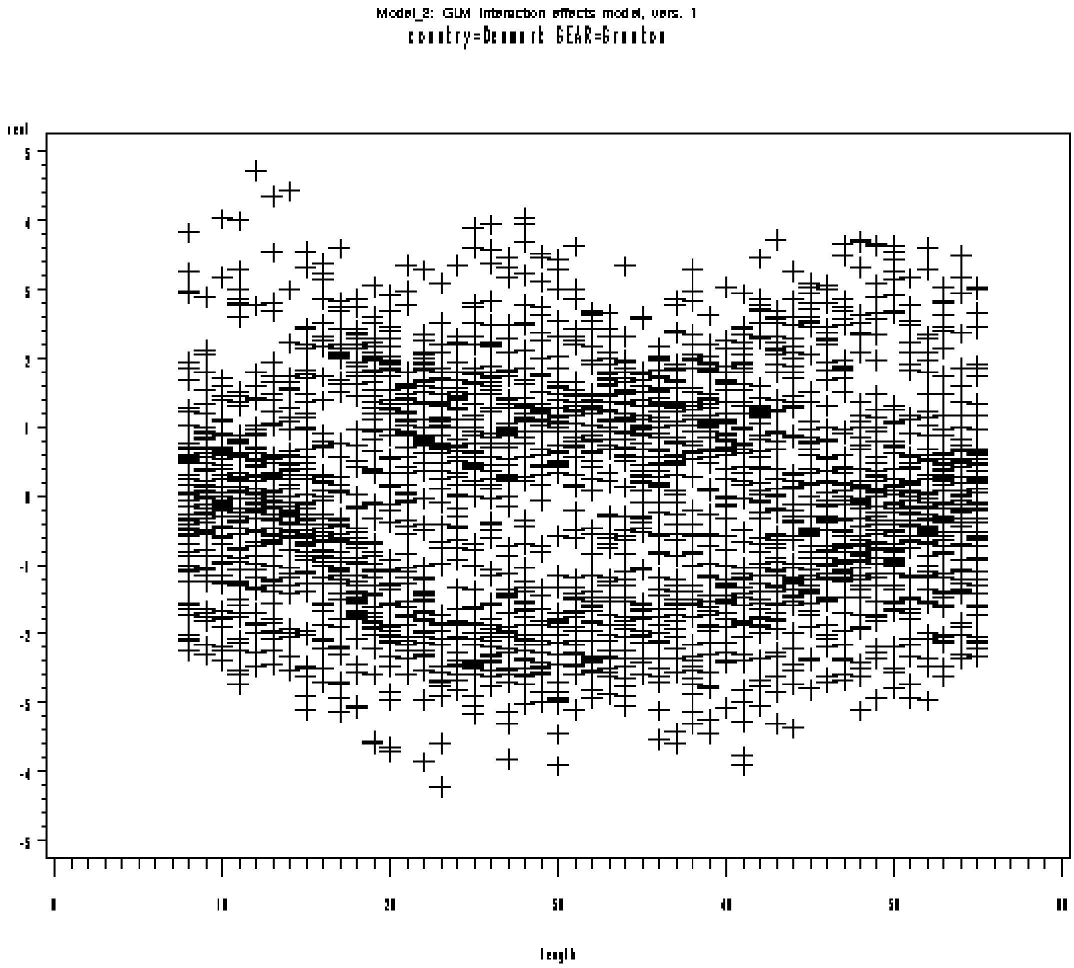


Figure 8.3. Model Residuals vs Length and Model Predictions by country and gear.

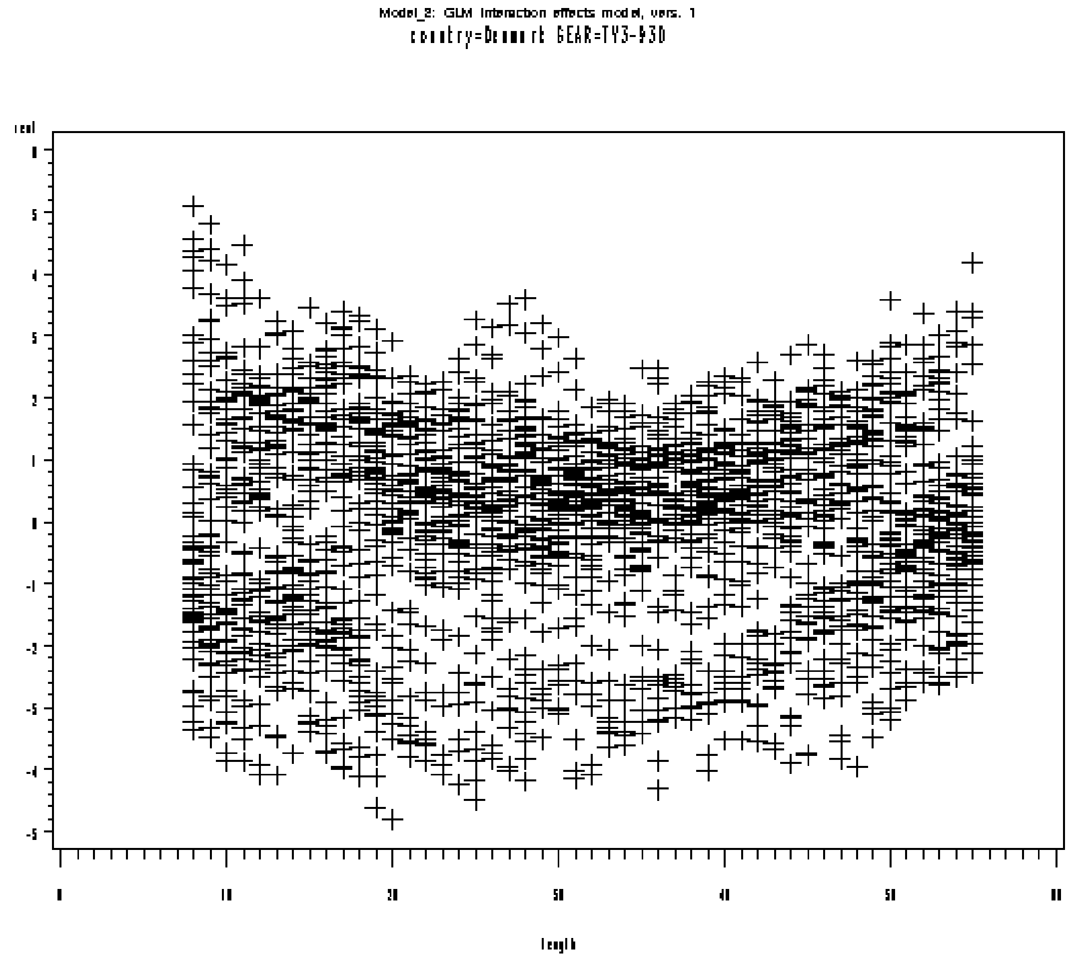


Figure 8.4. Model Residuals vs Length and Model Predictions by country and gear.

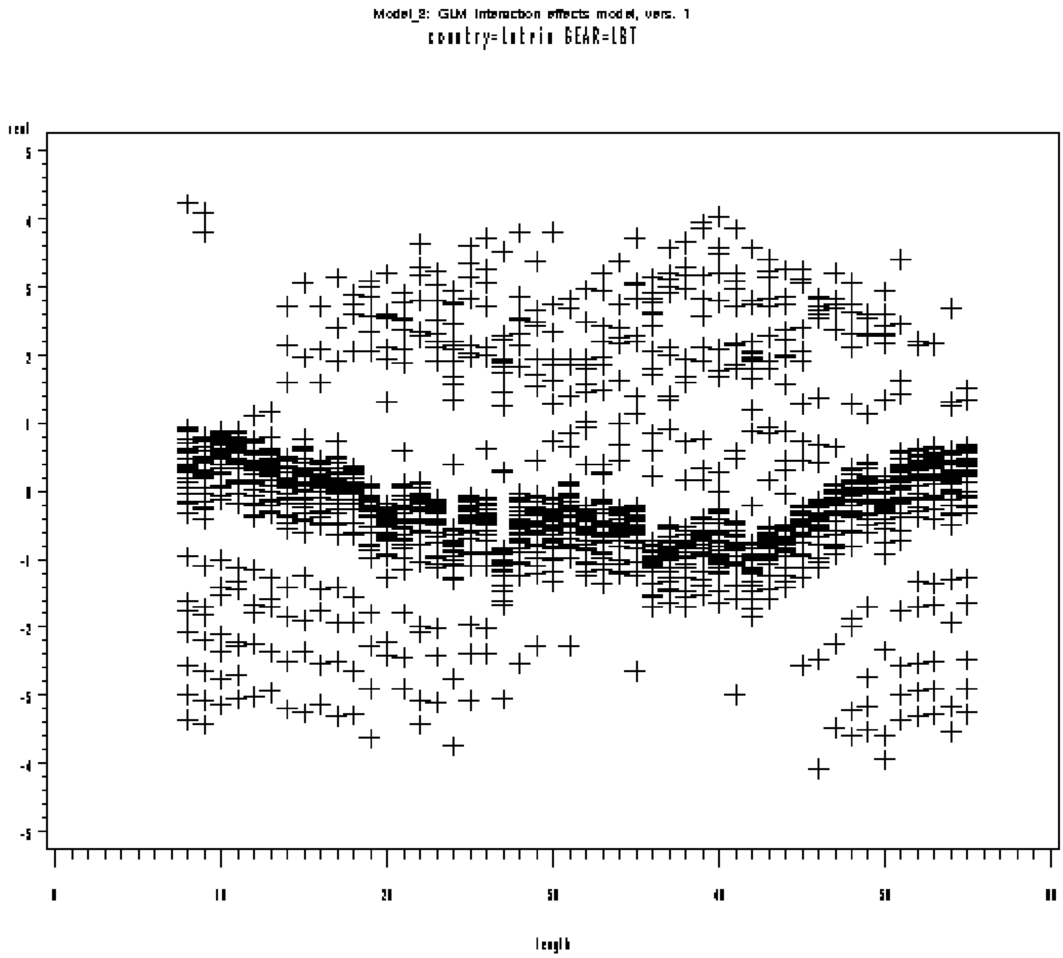


Figure 8.5 Model Residuals vs Length and Model Predictions by country and gear.

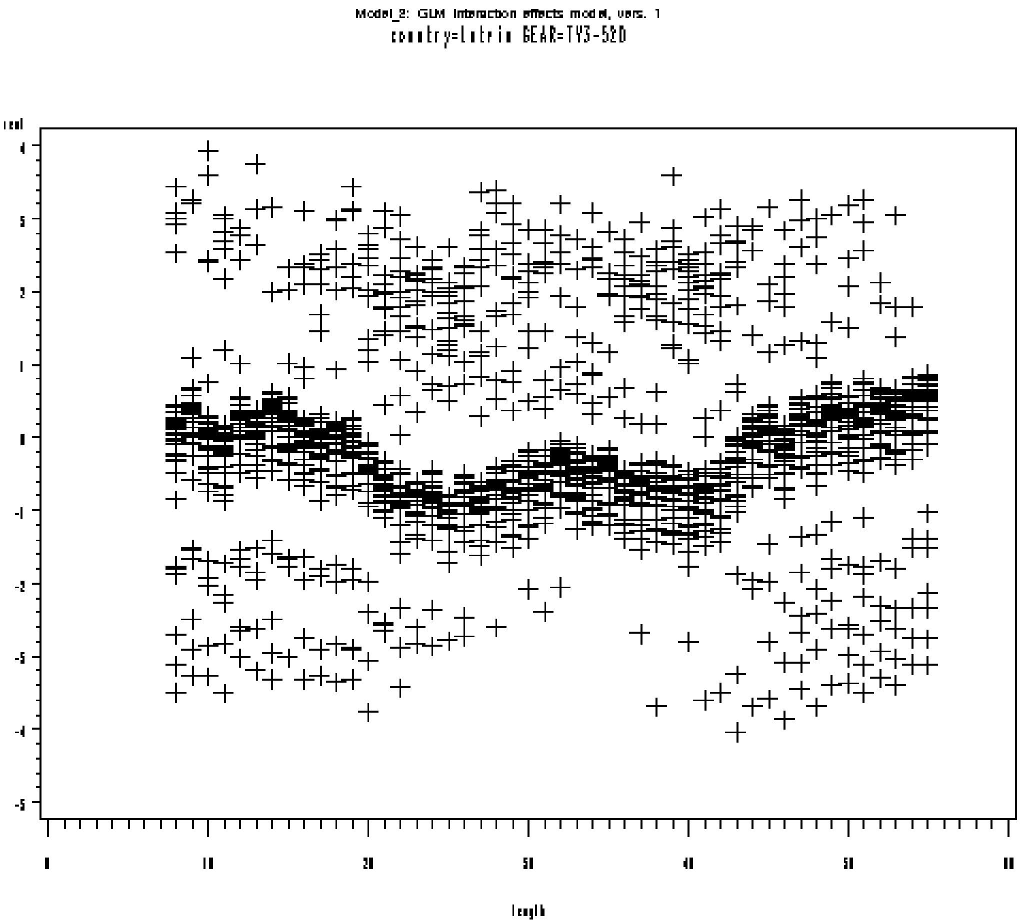


Figure 8.6. Model Residuals vs Length and Model Predictions by country and gear.

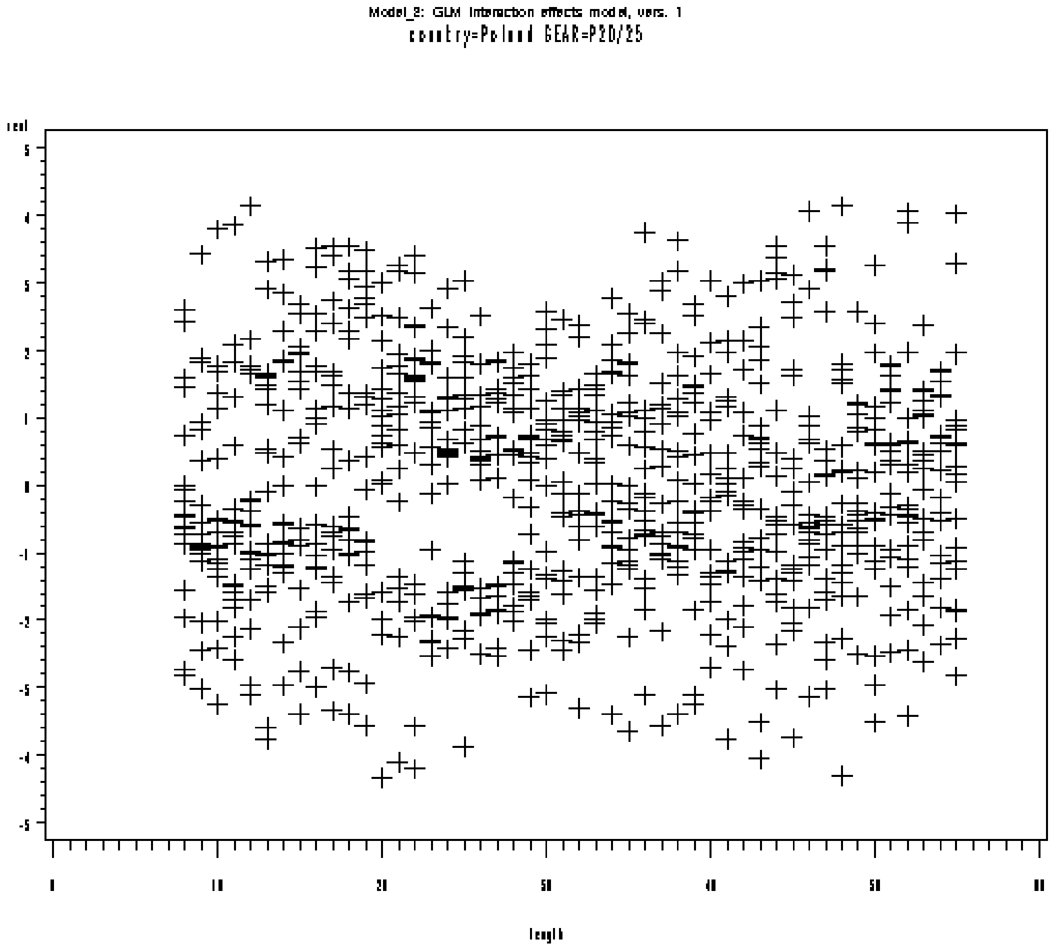


Figure 8.7. Model Residuals vs Length and Model Predictions by country and gear.

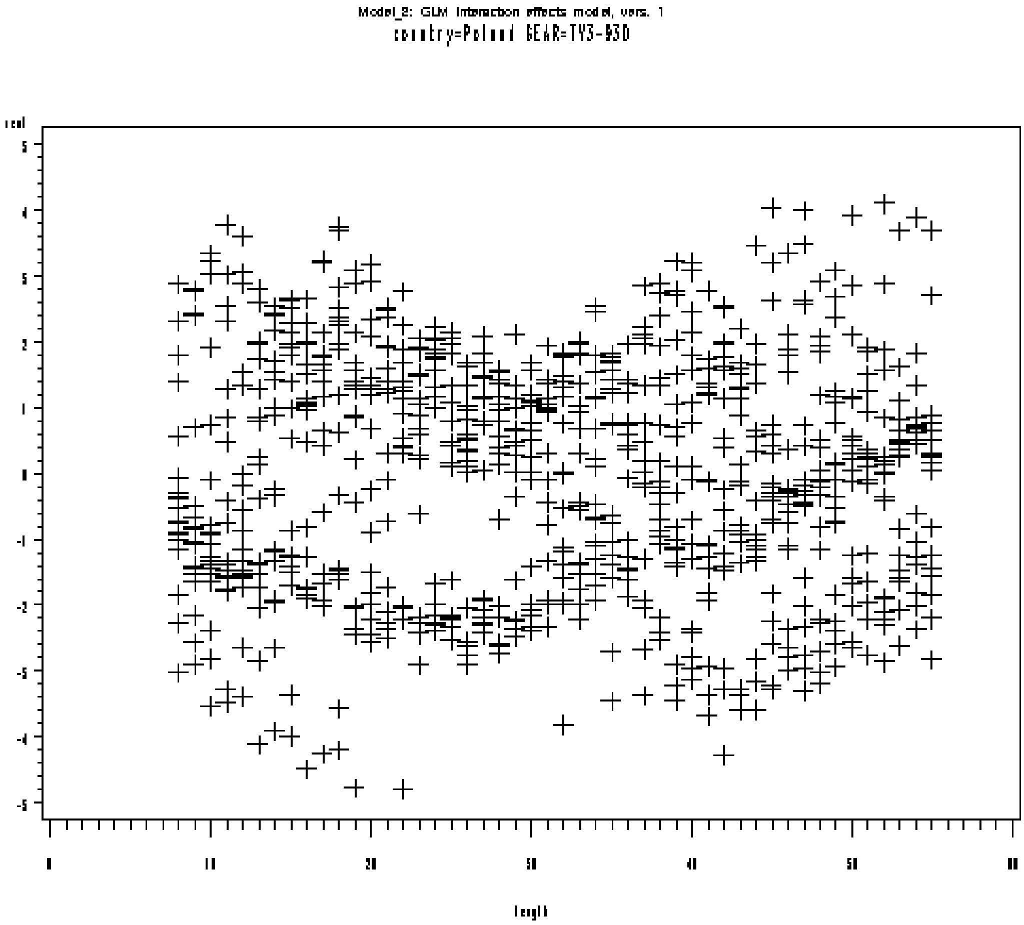


Figure 8.8. Model Residuals vs Length and Model Predictions by country and gear.

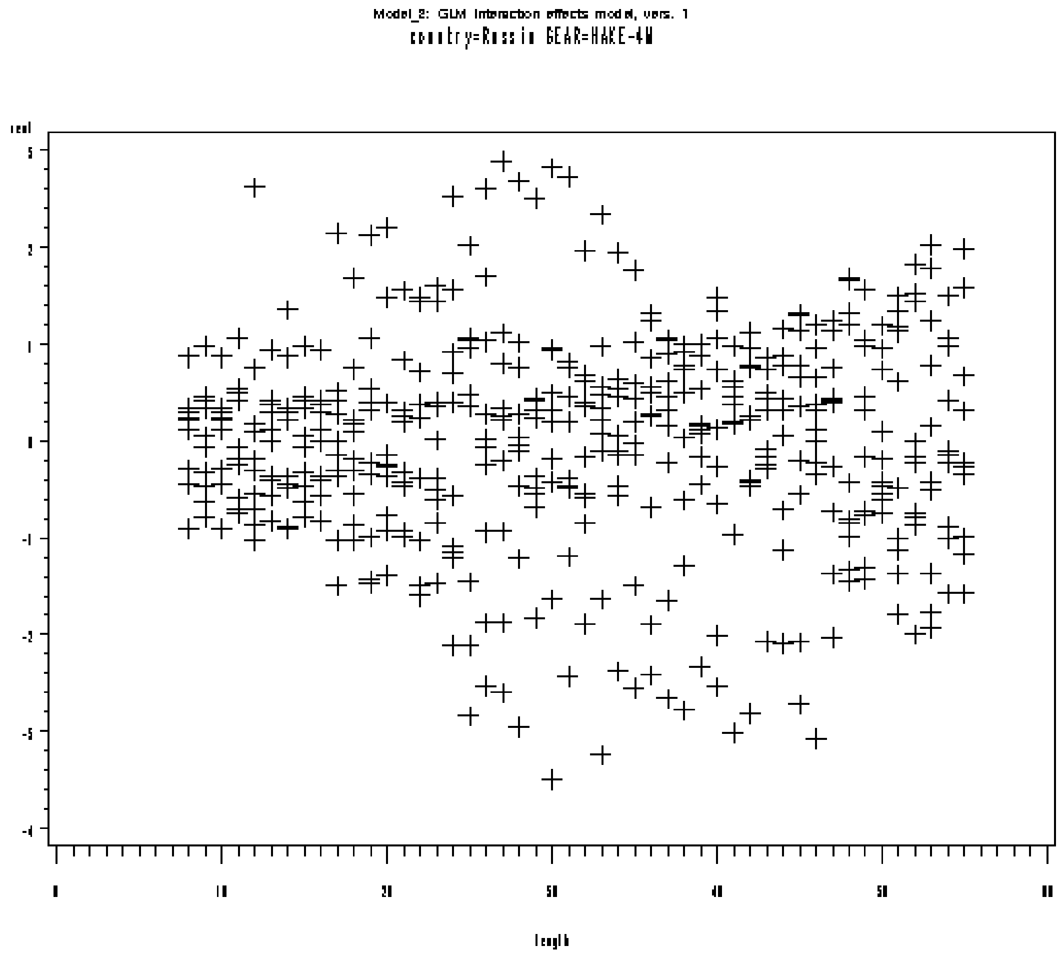


Figure 8.9. Model Residuals vs Length and Model Predictions by country and gear.

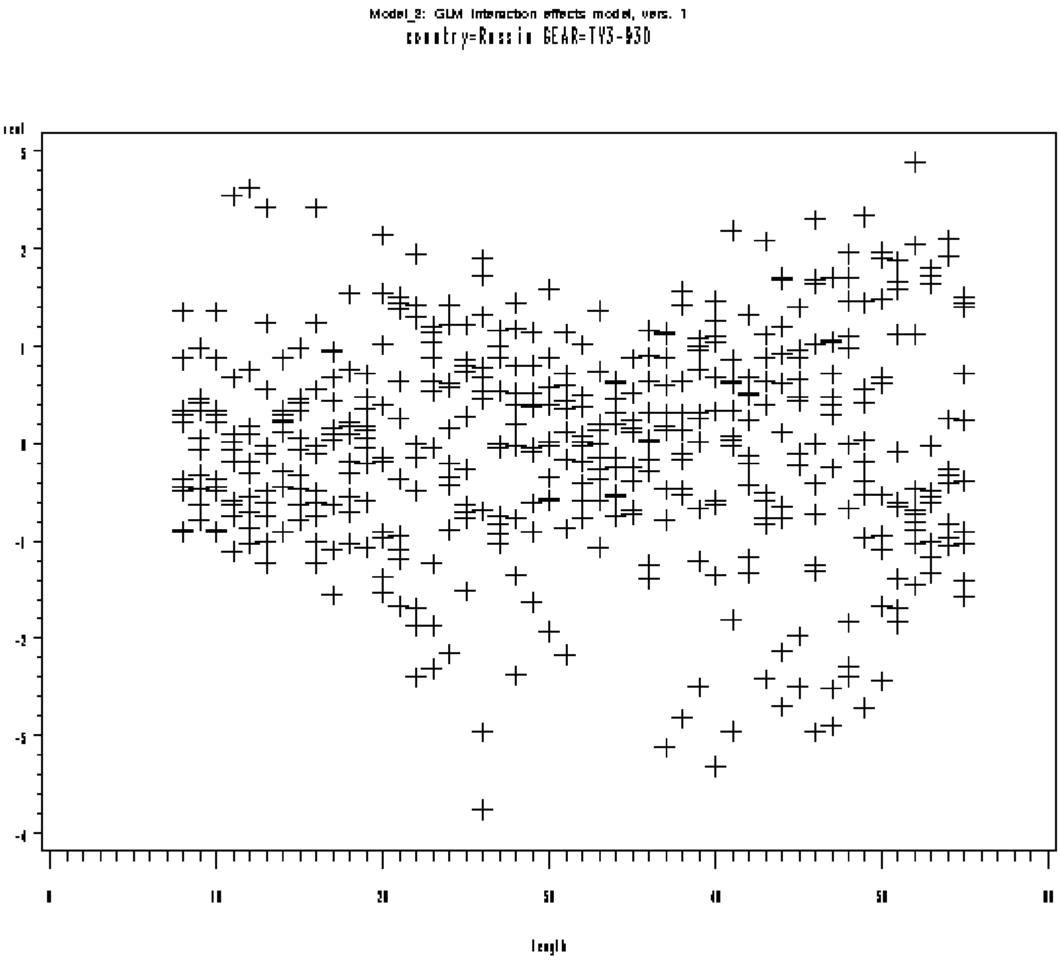


Figure 8.10 Model Residuals vs Length and Model Predictions by country and gear.

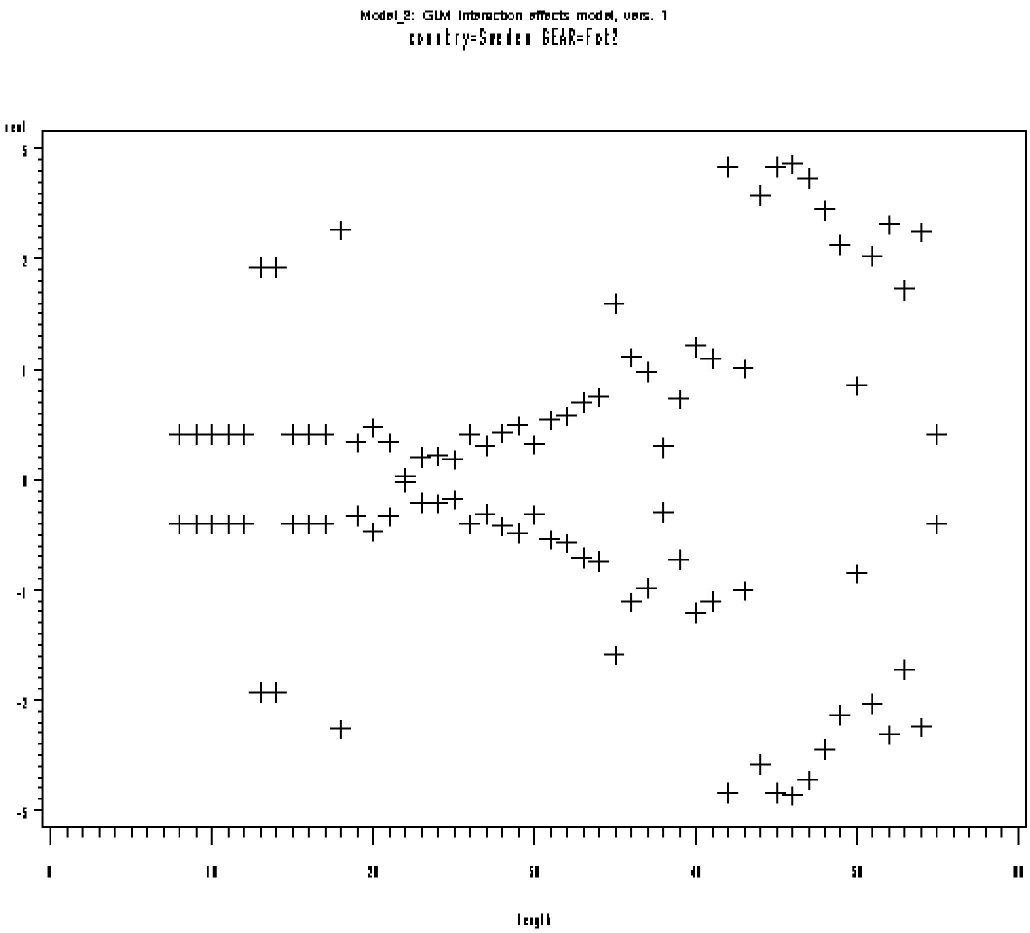


Figure 8.11. Model Residuals vs Length and Model Predictions by country and gear.

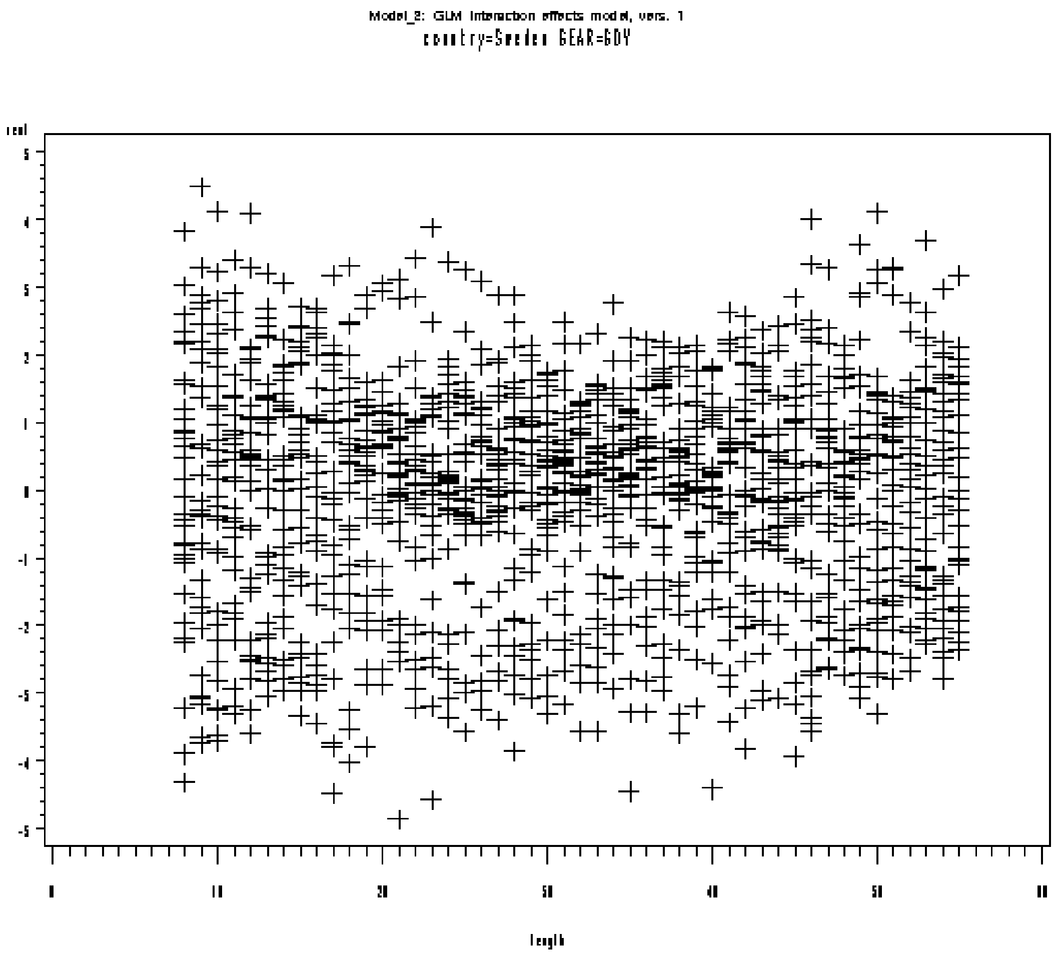


Figure 8.12. Model Residuals vs Length and Model Predictions by country and gear.

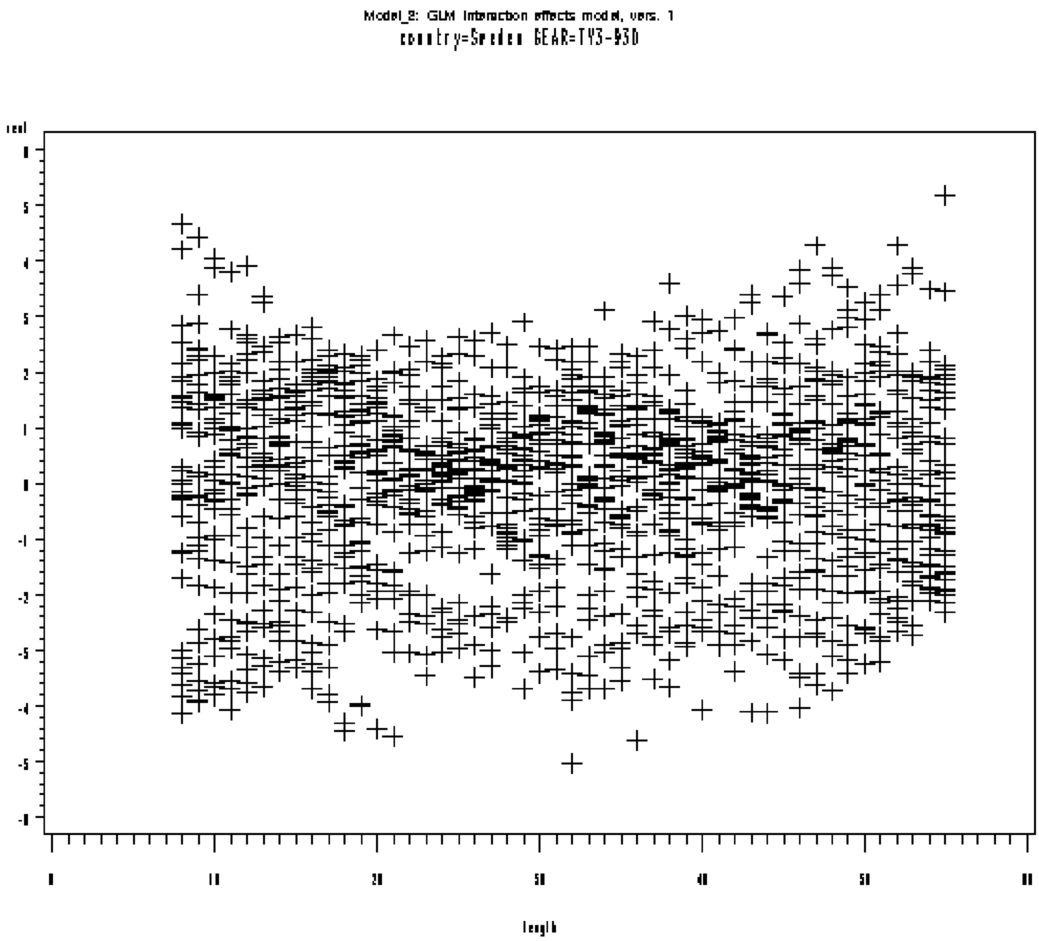


Figure 8.13. Model Residuals vs Length and Model Predictions by country and gear.

Method 3

Output from SAS Generalized Linear Model (GENMOD) analysis of log-transformed inter-calibration data

New TV3-trawls versus traditional national trawls

Cod

```
08:45 Thursday, February 8, 2001   1

country=D

The GENMOD Procedure

         Model Information

Data Set                   WORK.TWO
Distribution                  Gamma
Link Function                   Log
Dependent Variable             cpue
Observations Used              2305
Invalid Response Values        3967


                         Class Level Information

Class         Levels    Values

pairno2           32    1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
                        21 22 23 24 25 26 27 28 29 30 31 32
sequence           2    First Second
gear               2    HG20/25 TV3-520
length            98    2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
                        21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37
                        38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54
                        55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71
                        72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88
                        ...


           Criteria For Assessing Goodness Of Fit

Criterion                 DF           Value        Value/DF

Deviance                2087       1384.2492          0.6633
Scaled Deviance         2087       2188.7794          1.0488
Pearson Chi-Square      2087       1319.8809          0.6324
Scaled Pearson X2       2087       2087.0000          1.0000
Log Likelihood                    -8312.1826


Algorithm converged.


Scale                                0      1.5812      0.0000      1.5812      1.5812

NOTE: The Gamma scale parameter was estimated by DOF/Pearson's Chi-Square

    Lagrange Multiplier Statistics

Parameter     Chi-Square    Pr > ChiSq

Scale            22.3004        <.0001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country=D

The GENMOD Procedure

                        LR Statistics For Type 3 Analysis

                                                                Chi-
Source             Num DF     Den DF    F Value    Pr > F     Square    Pr > ChiSq

pairno2                31       2087      34.64    <.0001    1073.76        <.0001
sequence                1       2087       0.02    0.8963       0.02        0.8963
gear                    1       2087       0.24    0.6255       0.24        0.6255
length                 72       2087      21.78    <.0001    1568.30        <.0001
gear*length            49       2087       0.44    0.9997      21.63        0.9998
sequence*length        54       2087       0.51    0.9988      27.60        0.9989
```

country=Denmark

The GENMOD Procedure

Model Information

Data Set	WORK.TWO
Distribution	Gamma
Link Function	Log
Dependent Variable	cpue
Observations Used	3026
Invalid Response Values	7754

Class Level Information

Class	Levels	Values
pairno2	55	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55
sequence	2	First Second
gear	2	Granton TV3-930
length	98	2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 ...

Criteria For Assessing Goodness Of Fit

Criterion	DF	Value	Value/DF
Deviance	2764	1828.0475	0.6614
Scaled Deviance	2764	2800.2086	1.0131
Pearson Chi-Square	2764	1804.4096	0.6528
Scaled Pearson X2	2764	2764.0000	1.0000
Log Likelihood		-9279.4327	

Algorithm converged.

Scale	0	1.5318	0.0000	1.5318	1.5318

NOTE: The Gamma scale parameter was estimated by DOF/Pearson's Chi-Square

Lagrange Multiplier Statistics

Parameter	Chi-Square	Pr > ChiSq
Scale	40.5146	<.0001

LR Statistics For Type 3 Analysis

Source	Num DF	Den DF	F Value	Pr > F	Chi-Square	Pr > ChiSq
pairno2	54	2764	54.95	<.0001	2967.18	<.0001
sequence	1	2764	10.57	0.0012	10.57	0.0011
gear	1	2764	75.59	<.0001	75.59	<.0001
length	82	2764	8.60	<.0001	704.87	<.0001
gear*length	61	2764	2.14	<.0001	130.67	<.0001
sequence*length	61	2764	0.63	0.9884	38.59	0.9889

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country=Latvia

The GENMOD Procedure

Model Information

Data Set	WORK.TWO
Distribution	Gamma
Link Function	Log
Dependent Variable	cpue
Observations Used	756
Invalid Response Values	6496

Class Level Information

Class	Levels	Values
pairno2	37	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37
sequence	2	First Second
gear	2	LBT TV3-520
length	98	2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 ...

Criteria For Assessing Goodness Of Fit

Criterion	DF	Value	Value/DF
Deviance	548	315.8946	0.5764
Scaled Deviance	548	606.1961	1.1062
Pearson Chi-Square	548	285.5680	0.5211
Scaled Pearson X2	548	548.0000	1.0000
Log Likelihood		-2120.7135	

Algorithm converged.

Scale	0	1.9190	0.0000	1.9190	1.9190

NOTE: The Gamma scale parameter was estimated by DOF/Pearson's Chi-Square

Lagrange Multiplier Statistics

Parameter	Chi-Square	Pr > ChiSq
Scale	25.9515	<.0001

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country=Latvia

The GENMOD Procedure

LR Statistics For Type 3 Analysis

Source	Num DF	Den DF	F Value	Pr > F	Chi-Square	Pr > ChiSq
pairno2	34	548	43.65	<.0001	1484.02	<.0001
sequence	1	548	0.40	0.5261	0.40	0.5258
gear	1	548	14.69	0.0001	14.69	0.0001
length	69	548	3.37	<.0001	232.34	<.0001
gear*length	46	548	1.07	0.3523	49.26	0.3441
sequence*length	56	548	1.15	0.2194	64.44	0.2052

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country=Poland

The GENMOD Procedure

Model Information

Data Set	WORK.TWO
Distribution	Gamma
Link Function	Log
Dependent Variable	cpue
Observations Used	1414
Invalid Response Values	3873

Class Level Information

Class	Levels	Values
pairno2	27	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27
sequence	2	First Second
gear	2	P20/25 TV3-930
length	98	2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 ...

Criteria For Assessing Goodness Of Fit

Criterion	DF	Value	Value/DF
Deviance	1216	817.3920	0.6722
Scaled Deviance	1216	1372.9641	1.1291
Pearson Chi-Square	1216	723.9437	0.5953
Scaled Pearson X2	1216	1216.0000	1.0000
Log Likelihood		-4529.9875	

Algorithm converged.

Scale	0	1.6797	0.0000	1.6797	1.6797

NOTE: The Gamma scale parameter was estimated by DOF/Pearson's Chi-Square

Lagrange Multiplier Statistics

Parameter	Chi-Square	Pr > ChiSq
Scale	9.3342	0.0022

LR Statistics For Type 3 Analysis

Source	Num DF	Den DF	F Value	Pr > F	Chi-Square	Pr > ChiSq
pairno2	26	1216	36.97	<.0001	961.22	<.0001
sequence	1	1216	1.74	0.1875	1.74	0.1873
gear	1	1216	35.15	<.0001	35.15	<.0001
length	68	1216	9.47	<.0001	644.04	<.0001

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country=Poland

The GENMOD Procedure

LR Statistics For Type 3 Analysis

Source	Num DF	Den DF	F Value	Pr > F	Chi-Square	Pr > ChiSq
gear*length	49	1216	1.02	0.4379	49.95	0.4356
sequence*length	51	1216	1.44	0.0245	73.43	0.0215

country=Russia

The GENMOD Procedure

Model Information

Data Set	WORK.TWO
Distribution	Gamma
Link Function	Log
Dependent Variable	cpue
Observations Used	611
Invalid Response Values	1349

Class Level Information

Class	Levels	Values
pairno2	10	1 2 3 4 5 6 7 8 9 10
sequence	2	first second
gear	2	HAKE-4M TV3-930
length	98	2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 ...

Criteria For Assessing Goodness Of Fit

Criterion	DF	Value	Value/DF
Deviance	444	270.1835	0.6085
Scaled Deviance	444	502.6770	1.1322
Pearson Chi-Square	444	238.6453	0.5375
Scaled Pearson X2	444	444.0000	1.0000
Log Likelihood		-1502.7088	

Algorithm converged.

Scale	0	1.8605	0.0000	1.8605	1.8605

NOTE: The Gamma scale parameter was estimated by DOF/Pearson's Chi-Square

Lagrange Multiplier Statistics

Parameter	Chi-Square	Pr > ChiSq
Scale	18.2700	<.0001

LR Statistics For Type 3 Analysis

Source	Num DF	Den DF	F Value	Pr > F	Chi-Square	Pr > ChiSq
pairno2	9	444	37.54	<.0001	337.89	<.0001
sequence	1	444	11.69	0.0007	11.69	0.0006
gear	1	444	0.26	0.6116	0.26	0.6113
length	65	444	12.68	<.0001	823.91	<.0001
gear*length	41	444	0.59	0.9799	24.23	0.9827
sequence*length	45	444	0.83	0.7818	37.19	0.7897

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country=Sweden

The GENMOD Procedure

Model Information

Data Set	WORK.TWO
Distribution	Gamma
Link Function	Log
Dependent Variable	cpue
Observations Used	2409
Invalid Response Values	4255

Class Level Information

Class	Levels	Values
pairno2	34	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34
sequence	2	First Second
gear	3	Fot? GOV TV3-930
length	98	2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 ...

Criteria For Assessing Goodness Of Fit

Criterion	DF	Value	Value/DF
Deviance	2110	1469.2972	0.6963
Scaled Deviance	2110	2179.2653	1.0328
Pearson Chi-Square	2110	1422.5974	0.6742
Scaled Pearson X2	2110	2110.0000	1.0000
Log Likelihood		-8494.5286	

Algorithm converged.

Scale	0	1.4832	0.0000	1.4832	1.4832

NOTE: The Gamma scale parameter was estimated by DOF/Pearson's Chi-Square

Lagrange Multiplier Statistics

Parameter	Chi-Square	Pr > ChiSq
Scale	41.2367	<.0001

LR Statistics For Type 3 Analysis

Source	Num DF	Den DF	F Value	Pr > F	Chi-Square	Pr > ChiSq
pairno2	33	2110	28.54	<.0001	941.88	<.0001
sequence	1	2110	0.12	0.7262	0.12	0.7262
gear	2	2110	0.21	0.8104	0.42	0.8104
length	85	2110	8.34	<.0001	708.97	<.0001

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country=Sweden

The GENMOD Procedure

LR Statistics For Type 3 Analysis

Source	Num DF	Den DF	F Value	Pr > F	Chi-Square	Pr > ChiSq
gear*length	109	2110	1.14	0.1567	124.34	0.1495
sequence*length	65	2110	0.81	0.8555	52.93	0.8583

ANNEX 6

USERS MANUAL FOR THE CLEAR TOW INFORMATION DATABASE

When opening the database the first appearance is a “front page”. On this sheet one can click any of five buttons for a short presentation of each of the five sheets (including the “front page”) in the database. There are also four buttons for access to the other four sheets.

The first data sheet presents all data available for the tows, with the number of the tow as basic unit (in the first column). In the second column a depth range is given (1, 2 or 3). This depth range is interactive with the overview sheet, where there is an option to select strata of interest (see below). The next information is ICES rectangle. This is now given according to the international numerical system, to which the ICES alphanumeric codes are translated. As there exist two different numeric systems it must be decided if the alphanumeric or one of the numeric systems will be used. Also ICES Sub-division number is included in the database. Next in the table are positions of the tow. There are columns for ten latitude and ten longitude points (start and end point of the tow and up to eight way-points), given in the form 00 (degrees) 00.00, with degrees and minutes each in its own column, to facilitate the further processing. Information on depth is given as the mean of available depth values and separate depth figures; maximum 10 (for the positions given for the tow). Most of the included tows are given with two or three track points (mostly straight tracks; other tracks have more waypoints) and because the usual length of a sampling tow rarely exceeding 2 nautical miles, the average depth calculation is based on the three first track points. In case of a longer tow (6–8 way points) an intermediate exceptional deep-water sequence could have significantly affected the mean depth of the tow causing bias in the depth stratification. The remaining information regards the source of the data for the tow (e.g. name of commercial vessel, German research data, and so on).

On the data sheet there are also two separate tables on holds and wrecks respectively. They are numbered (not relating to the tow numbering) and one position (same format as for tows) and source of data given.

The first output feature of the database is an overview map of all tows (“Overview”). The tows are distributed on three depth ranges, defined by the user by setting an upper limit for the first range and a lower limit for the third range. The second range is then defined as between the chosen values. The three depth ranges can be independently plotted on the map. Any changes of depth ranges are interactively done also in the data sheet and shown on the map. The tow positions are shown on the map with different symbols and colours related to the depth ranges. An optional ICES rectangle selected from a “dropdown list” can be shown on the map. A close-up view from the selected ICES rectangle is available. Observe that if the chosen ICES rectangular is equal to that default on “Chart”-page meaning that the selected individual tow on page “Chart” is within or in the vicinity of the rectangular it will be high-lighted on the close-up map. From close-up map you can compile a list of all available tows and by filtering the list you can have a look at other similar tows in the given area. From the list of tows it is possible to return to the close-up screen.

The second output page (“Chart”) gives information for one selected tow. The number of the tow should be entered in a frame, and then information on ICES rectangle and ICES Sub-division, depth (max., min. and mean), position (start and end of tow), tow length (in nautical miles), number of way-points and source of tow data is given in separate frames. In another frame the desired length (e.g. 2 nautical miles) can be written, where-after the tow is “shortened” to that length, provided that the initial distance between two way-points is longer than that. If not “No data” will appear in the field. Also the start and end positions of a second section of the tow is given, again if length permits. The position of the tow is given on a map, where also the ICES rectangle (and quarters of it), where the tow is situated, is inserted. To obtain more detailed information one can “zoom in” (click a button) to a smaller scale map displayed on a separate page. The scale of this close-up map depends on the length of the chosen tow. On the map start and end positions and way-points are plotted in different colours, together with endpoints of selected haul length. The ICES rectangular and quarters are plotted. Also wrecks and holds are plotted on this map, with reference to the data sheet. In a table on the same page the positions of the start and end points and way-points and the distance between them as well as the possible haul distance selected are given. A diagram is included, showing depth at each position and the distance between them. A possibility to choose directly page “Overview” is provided and vice verse.

The third output page is called “Reports”. There one can choose between three summary tables. The first one gives all available tows, distributed on ICES rectangles and on the three depth ranges defined by the user in “Overview” (also given on this page). The second table lists all available tows distributed on ICES Sub-division and six depth ranges, >20, 20–40, 40–60, 60–80, 80–100 and 100–150 m. An eventual appearance of code “9999” in any of the tables indicates of non-existing data. The third table gives a list of randomly selected tows for two optional cruises, based on a user defined total number of hauls and distribution on Sub-divisions and depth strata.

The 3-stage “tow stratification” program can be launched by pressing the “Randomise”-button on the “Reports” page. In stage 1 user is asked to check the requested number of tows given in the two provided criteria tables (numbers printed with red colour). The first table (geographical distribution=criteria 1) and the second table (bottom depth= criteria 2) defines the way how the given number of tows is planned to be distributed in the randomising process. By inserting either number zero (0) or one (1) in the last two columns (“Cruise 1” and “Cruise 2”) of the first table, user can influence whether or not the particular Sub-division is included in the stratification regarding the given cruise. There are some automatic input data checks enabling that invalid values are not accepted. The input field in column “Requested” will accept only a number between 0 and 999 whereas the two last “Cruise” columns in the first table will accept only numbers zero (0) or one (1). After finalising the two tables (1 and 2), the stage 2 will be run by pressing the button “Randomise cruise 1” or alternatively “Randomise cruise 2”. Tows will be now selected from the database according the defined criteria-tables following a certain principal described in the next chapter. After the program has accomplished the randomising process, the obtained result is shown in the two tables in numbers of found tows (printed with bold black colour). The total number of requested and found tows are summarised and compared in a specific output field below the first table. Observe that stratification (stage 2) can be run only for one cruise at the time. The last “default” cruise is indicated on the criteria table screen. If the “default” cruise stratification is accepted a list of selected tows (stage 3) can be compiled by pressing buttons “Pick randomised tows for cruise 1” or “Pick randomised tows for cruise 2”. The default list is then printed on a separate excel-worksheet and can be either saved as an Excel-file or printed out as a hard copy using Excel-printout-option.

The randomising program is using the following principal in the stratification. In the beginning all existing numbers in columns “Found” tows in the first and the second table are replaced with a zero. Stratification will be started from an ICES Sub-division with the lowest code number. In this case it is 22. If the number of requested tows in the first table for that sub-area is larger than zero, a tow carrying the same ICES Sub-division code (criteria 1) is picked randomly from the database. If the depth reading of the chosen tow matches the defined depth stratification (criteria 2), the tow is accepted and the numbers in columns “Found” tows in tables 1 (ICES Sub-division) and 2 (depth strata) are added by one accordingly. Simultaneously the numbers of “Requested” tows in the first and second table are subtracted by one. If the criteria 2 for the selected tow is not met, a new tow is randomly selected from the data base. This procedure is repeated until a tow meeting the criteria 2 is found. If no tows are found, the case is sealed as “completed” and program moves to next ICES Sub-division. All selected and accepted tows are marked as “used” and cannot be reselected during the ongoing run of the program. The described loop for one Sub-division is then repeated one after the another for all included Sub-divisions until all the numbers in the first table column “Requested” are zero or alternatively marked as “completed” meaning that no tows could be found.

Both cruises are treated independently one at the time and randomising can be started from either of the two provided cruises. There is room only for one stratification result at the time. Observe that if the obtained result is accepted or wish to be preserved for some reason, the list of selected tows has to be compiled and saved or/and printed out before repeating the randomising process.