Annex 5. Copy of Working Group self-evaluation (Ch. 7)

The ICES Working Group on Baltic International Fish Survey (WGBIFS), according to the ICES ASC 2014 recommendation No. 2014/MA2/SSGIEOM:02, met at successive three meetings:

- 23–27 March 2015 in Öregrund (SLU), Sweden;
- 30 March – 3 April 2016 in Rostock (TI-OF), Germany;
- 27-31 March 2017 in Riga (BIOR), Latvia;

Overall, 25 experts (including chair invited experts) from research institutes located on the Baltic Sea coasts and from the ICES Data Centre, taking part in the WGBIFS annual meetings for works on almost constant ToRs and deliverables. Włodzimierz Grygiel, Poland chaired the group for the a.-m. three years. The text of basic report and the set of annexes were prepared from each WGBIFS annual meeting, accordingly to the format proposed by the ICES Secretariat. Any significant changes in the final version of ToRs dedicated to WGBIFS 2015-2017 meetings have not been done.

During the WGBIFS meetings were successfully realised following main ToRs, i.e.:

- combine and analyse acoustic-trawl-biotic results obtained during the fishery-independent, fish stocks assessment relevant surveys, type BIAS, BASS and BITS, accomplished from May 2014 until March 2017; updated the acoustic-hauls-biotic data (sprat, herring, cod, flatfishes) from 2014 - 2016 surveys, were systematically uploaded according to the BASS_DB.mdb and BIAS_DB.mdb Access-database, as well the DATRAS and Tow-Database; the acoustic-trawl data from the BIAS and BASS surveys in 2015 - 2016 are also stored in format of the StoX programme (WGBIFS-2017),
- coordinate the time-schedule of the a.-m. surveys, planning of research vessel/country effort and principal assignments per area and survey, in the period from May 2015 to March 2018, however regarding the next BITS surveys, the re-programming of catch-stations allocation from the Tow-Database was initially implemented (WGBIFS-2017), without violate of the structure of this database,
- finalise the text for IBAS and BITS Manuals, accordingly to SISP standards and suggestions elaborated by reviewers.

Analyse the status of marine litter sampling during the BITS surveys and reporting to the ICES DATRAS sub-database as well as Baltic cod stomachs sampling can be treated than the second order of the WGBIFS ToRs. Cod stomachs sampling and analysing, among-other due to lack of response (interest) from the ICES Working Group on Multispecies Assessment Methods (WGSAM), very limited number of Baltic cod feeding experts, relatively high costs of sampling and not fully developed ICES database for such issue will be continued at local level (depend on possibilities), but not coordinated by WGBIFS. To the same group of ToRs importance more two considered tasks can be added, i.e.: “Analyses related to the improvement of quality of acoustic indices and estimation of the uncertainty. Evaluation of status of the StoX programme” and “The evaluation of possibilities to calculate the Large Fish Indicator (LFI) and Mean Maximum Length (MML) descriptors, based on the BITS surveys results”. The above-mentioned two tasks were only partly realised because it was decided that the WGBIFS should at first move forward and try to evaluate the BIAS and BASS surveys results from the bootstrap method recommended at WKSDO for calculation the surveys sampling variance. Moreover, the limited time of meeting not allowed on the broad exercises with the acoustic-hauls-biotic data (from BIAS and BASS surveys) under the StoX programme, initially implemented into operation for data storage and fish stocks size assessment in the Baltic. Based on the Estonian’s data from the BIAS 2015 survey common procedures used in the StoX programme were deeply considered.

Furthermore, a few additional tasks (see examples below), requested mostly by the Baltic Fisheries Assessment Working Group (WGBFAS), were also accomplished during the running WGBIFS meetings (2015-2017):

- elaboration the set of maps showing geographical distribution (cpue in numbers/h obtained from control-catches with the TV-3 trawl) of cod, flounder, plaice, turbot, dab and brill during the BITS-Q1 and BITS-Q4 surveys in 2015 and 2016,
- actualization of the table reflecting the status of standard research surveys tuning indices (per species, age groups, areas, surveys) ready to use in the Baltic fish stocks assessment process moreover, the overview of various research surveys scope of works, realised by the countries surrounding the Baltic, but presently not used for fish stocks assessment,
- answers on the inquires – "How to explain discrepancy between herring ICES SD 30 and Central Baltic Herring stocks size", and "Comparison of methods applied in different institutes for the Baltic fishes age reading",
- German opinions (2016) regarding "Fish stock indices based on acoustic surveys in the Baltic Sea. Alternative application of results of fishing stations" and "Mixing of the Western Baltic Spring Spawning Herring (WBSSH) and CBH – applicability of the separation function",
- presentation the first results from fish catches calibration experiments between the Danish old and new r/v "Havfisken" and the German r/v "Solea".

In 2015-2017 were also prepared the recommendations to ICES expert groups and the action list addressed mostly to the WGBIFS and in some extent to the ICES Secretariat, and the list of ToRs for the WGBIFS next meetings.

As the deficiencies of the WGBIFS meetings can be mentioned – a lack of any information expected from the ICES/FAO Working Group on Fishing Technology and Fish Behaviour (WGFTFB) about the standardization of the IBAS pelagic trawl (ToR j), and shortage of some input data from the BITS surveys, needed for calculation the LFI and MML ecosystem indicators. The WGBIFS intends prolonging realisation of the both above tasks based on the new information as well as the coordination of marine litter sampling and reporting within the framework of BITS surveys.

The main outcomes and achievements of the WGBIFS meetings are listed in the WGBIS-2017 Final Report:

- the chapter 4 - Summary of achievements of the WG during 3-year (2015-2017) term,
- the chapter 3 - Summary of the Work plan for year 3 (2017),
- the Executive summary (2017).

The materials obtained from routine research surveys (BIAS, BASS, BITS-Q4, BITS-Q1) are the input data independent from commercial fishery preferences and can be used for tuning in the main Baltic fish stocks size assessment, realized annually by the WGBFAS. Fish stocks abundance indices reflect possible precision of the current main fish stocks size and distribution in the Baltic Sea. The evaluation of a bulk of data from recently realized the surveys showed that sampling plans and their accomplishment are nearly similar. However, the BASS-dataset can be used in the assessment of sprat stock in the Baltic Sea with restriction that the year 2016 (when the survey coverage was very poor) is excluded from the dataset.

The WGBIFS have not directly contributed to the ICES "Advisory needs" however, the group is responsible for systematic realisation of the seasonal Baltic research surveys, focused on the monitoring on main species spatial distribution and changes of their abundance, including the YOY. In every year, the WGBIFS prepared the set of input data needed for the Baltic fish stocks size final assessment, made by the WGBFAS.

It is proposed to have the same set of ToRs, as above-mentioned, for 2018-2020 WGBIFS meetings with some modifications, i.e.:

- the intensive review and update of the BITS and IBAS Manuals (ToRs f and g) is not needed however, some current response on the proposed actions (see Annex 4.B) are valuable for further improvement of the a.-m. manuals,

- the present ToR h) should be divided on two separate parts, i.e. “Analyses related to the improvement of quality of acoustic indices and estimation of the uncertainty in the BIAS and BASS surveys” and “Review the progress of the ICES acoustic-trawl surveys database design implemented under the StoX programme”,
- as separate ToRs should be also considered:
  - ¤ “An attempt to make standardization of the pelagic fishing gear used in BIAS and BASS surveys” – close cooperation with the WGFTFB is urgently needed,
  - ¤ “Coordinate the marine litter-sampling programme within the BITS surveys and registering the data in the ICES database” – close cooperation with existing (?) or specialized, newly-created the ICES working group is very needed,
  - ¤ “Define methods for the appropriate processing of the survey data and output products from the BITS survey to fee the Baltic LFI and MML indicators” – close cooperation with specialized the ICES or HELCOM expert group is very needed,
  - ¤ “Compilation of meta-data concerns the Baltic cod stomach sampling during the BITS surveys” – close cooperation with the WGSAM is needed.

Annex: ToR a) Combine and analyse the results of spring (BASS) and autumn (BIAS) 2016 acoustic surveys and report to WGBFAS

5.1.1. Combined results of the Baltic International Acoustic Survey (BIAS)

In September - October 2016, the following acoustic surveys were conducted in the ICES Subdivisions 21-32 (excl. ICES SD 31) however, in some subdivisions only in parts:

Vessel	COUNTRY	ICES SUBDIVISIONS
Aranda	Finland	30, parts of 29 and 32
Atlantniro	Russia	Part of 26
Baltica	Poland	Parts of 24, 25 and 26
Baltica	Latvia/Poland	Parts of 26 and 28
Baltica	Estonia/Poland	Parts of 28, 29 and 32
Dana	Sweden	25, 26, 27, 28, 29,
Darius	Lithuania	Part of 26
Solea	Germany/Denmark	21, 22, 23, 24

5.1.1.1. Area under investigation and overlapping areas

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

Totally, eleven statistical ICES rectangles were inspected by more than one country (Fig. 5.1.1.1.1), precisely the following rectangles:

- 38G4 by GER and POL,
- 38G9 by POL and RUS,
- 39G5 by POL and SWE,
- 39G9 by POL and RUS,
- 40G7 by POL and SWE,
- 40G9 by LIT and RUS,
- 43G9 by LAT and SWE,
- 45H0 by EST and LAT,
- 45H1 by EST and LAT,
- 48H4 by EST and FIN,
- 48H5 by EST and FIN.

The Figure 5.1.1.1.1 illustrates that the coverage of the Baltic Sea during the BIAS-2016 survey, was slightly less as it was planned during the WGBIFS 2016 meeting. The following small areas of the Baltic were omitted from acoustic monitoring:

- the northern part of the ICES SD 21 (German/Danish survey),
- the eastern part of the ICES SD 32 (Russian – GosNIORH survey).

Russia (AtlantNIRO) has realized the BIAS survey in the southeastern part of the ICES SD 26 in 2016, which was not planned during the previous WGBIFS meeting. Since 2012, Russia (GosNIORH) has annually planned to conduct the BIAS surveys in the eastern part of the ICES SD 32, but has failed so far to perform any of them.

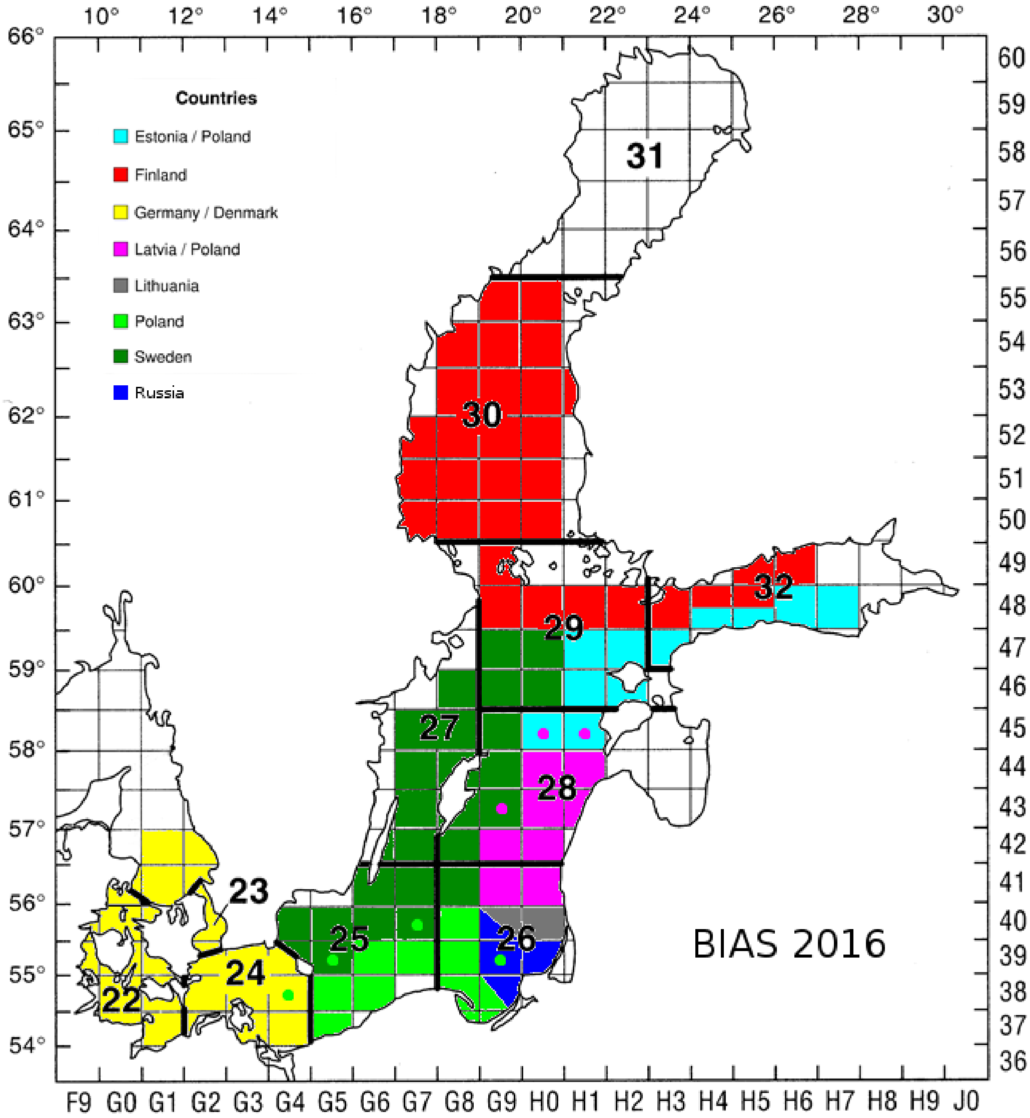


Figure 5.1.1.1.1. Map of the BIAS survey conducted in September-October 2016. Various colours indicate the countries, which covered specific ICES rectangles and delivered data to BIAS-database, thus was responsible for this rectangle. Dot with different colour within a rectangle explain additional data in BIAS-database partly or totally covered by other countries.

Additionally, the Estonian-Latvian acoustic survey in the Gulf of Riga was conducted in July-August 2016, as was planned during WGBIFS 2016 meeting. The survey results from the recent years are accessible at the national level, however, were not uploaded to the WGBIFS database.

5.1.1.2. Total results

Geographical distribution of herring, sprat and cod abundance in the Baltic Sea, accordingly to the ICES rectangles inspected in September-October 2016 is illustrated in Figures 5.1.1.2.1 - 5.1.1.2.5.

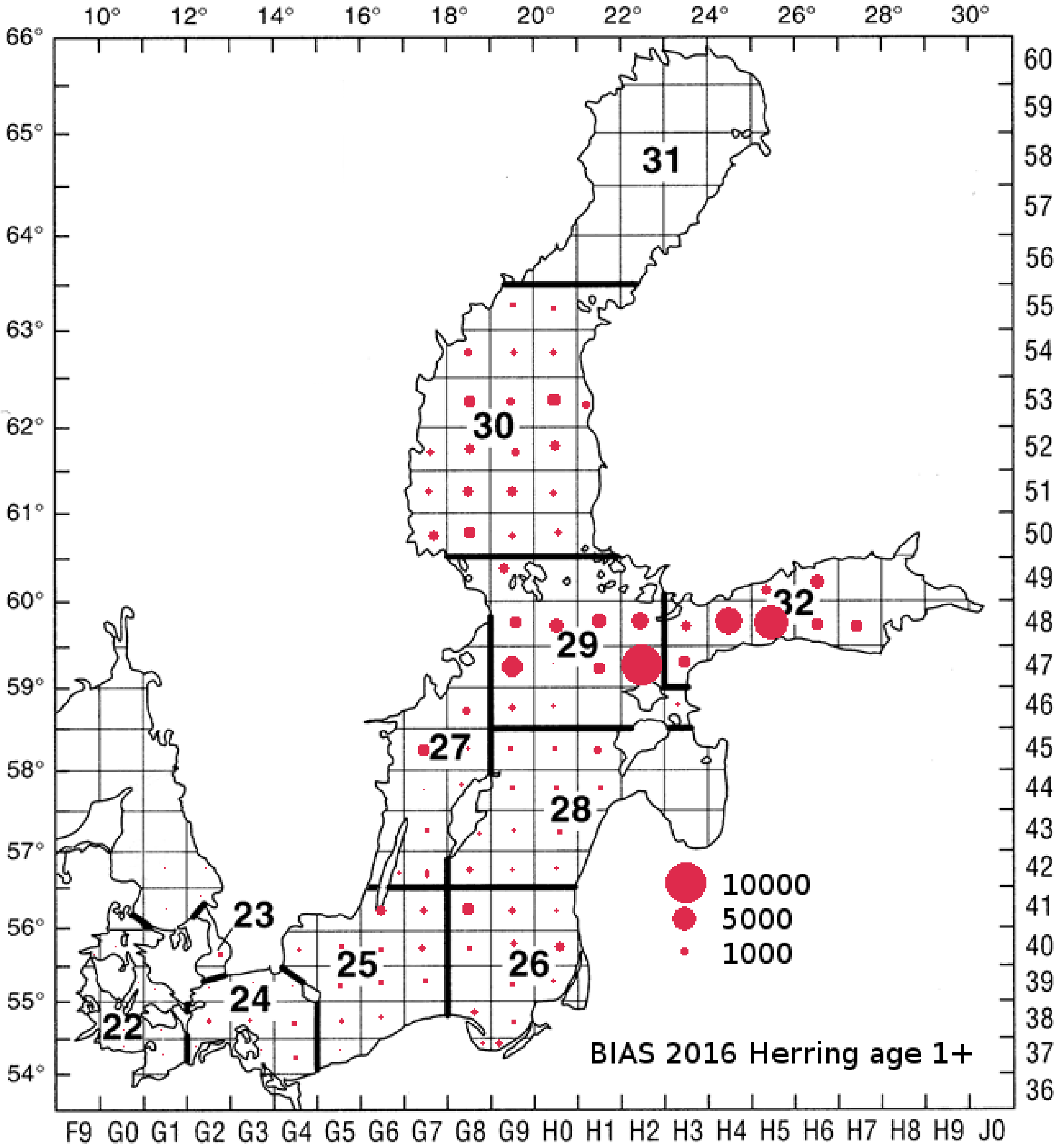


Figure 5.1.1.2.1. The abundance of herring (age 1+) per ICES rectangles monitored in September-October 2016 (the area of circles indicates estimated numbers of specimens x10^6 in given rectangle).

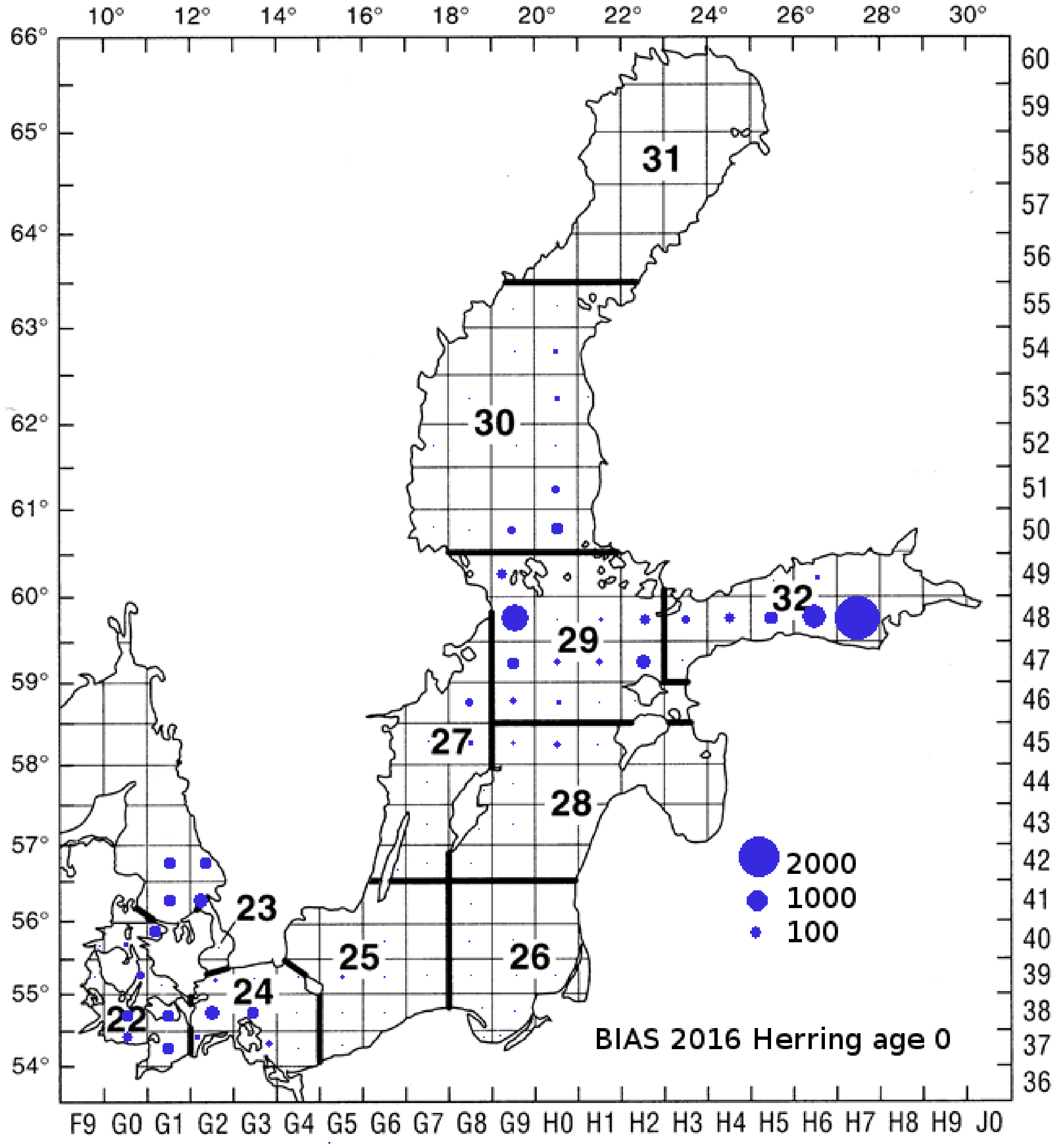


Figure 5.1.1.2.2. The abundance of herring (age 0) per ICES rectangles monitored in September-October 2016 (the area of circles indicates estimated numbers of specimens x10^6 in given rectangle).

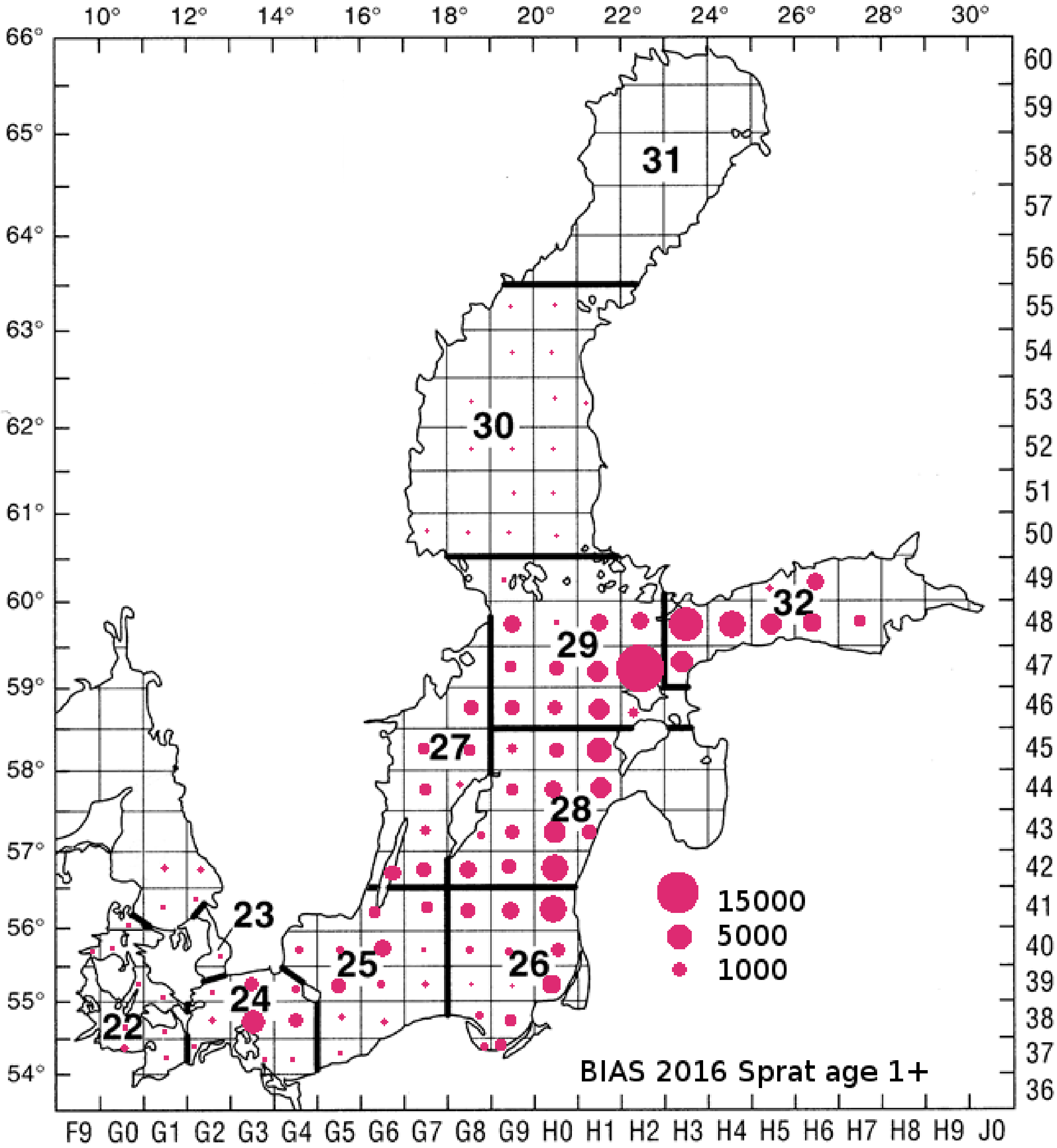


Figure 5.1.1.2.3. The abundance of sprat (age 1+) per ICES rectangles monitored in September-October 2016 (the area of circles indicates estimated numbers of specimens x10^6 in given rectangle).

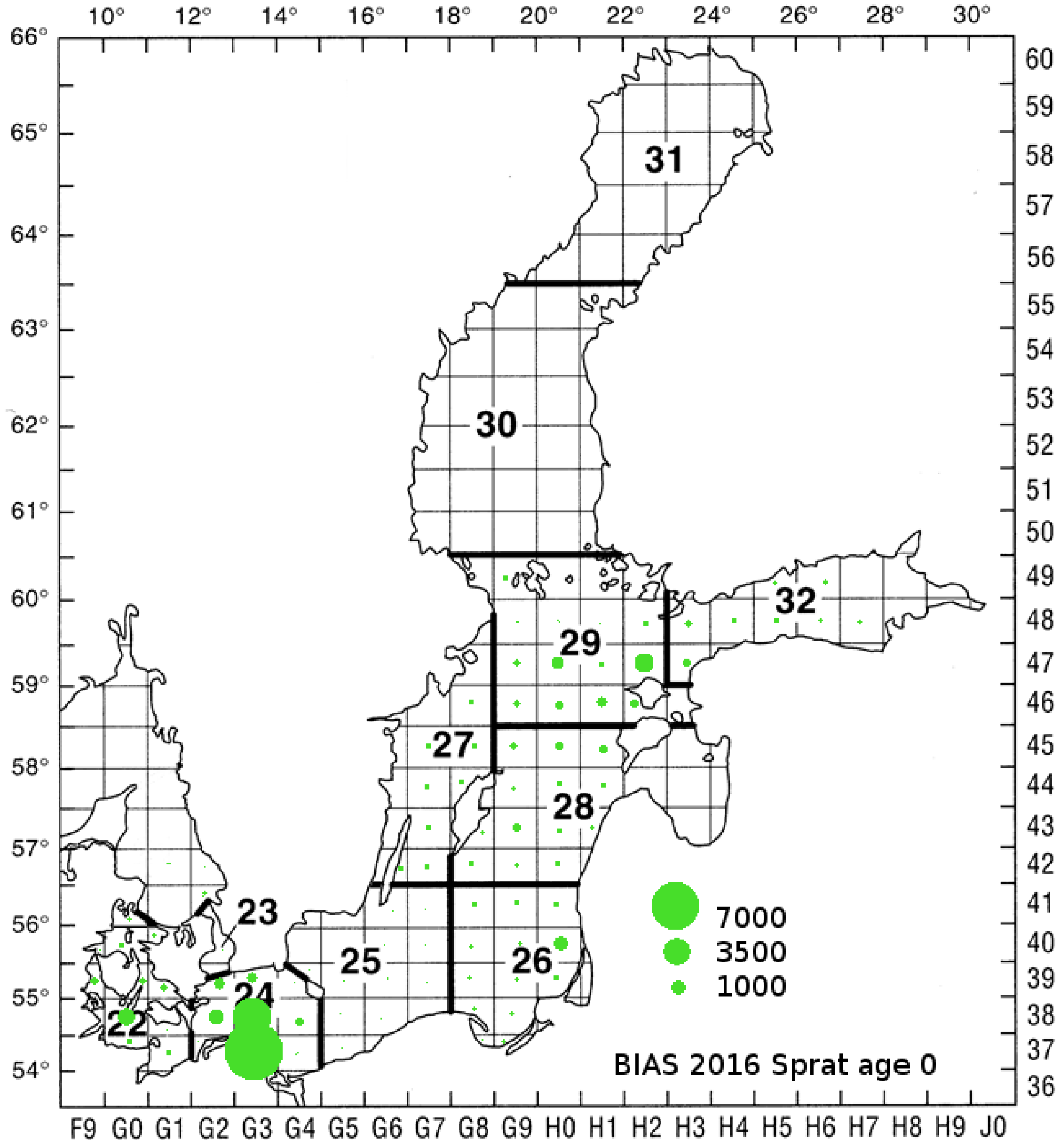


Figure 5.1.1.2.4. The abundance of sprat (age 0) per ICES rectangles monitored in September-October 2016 (the area of circles indicates estimated numbers of specimens x10^6 in given rectangle).

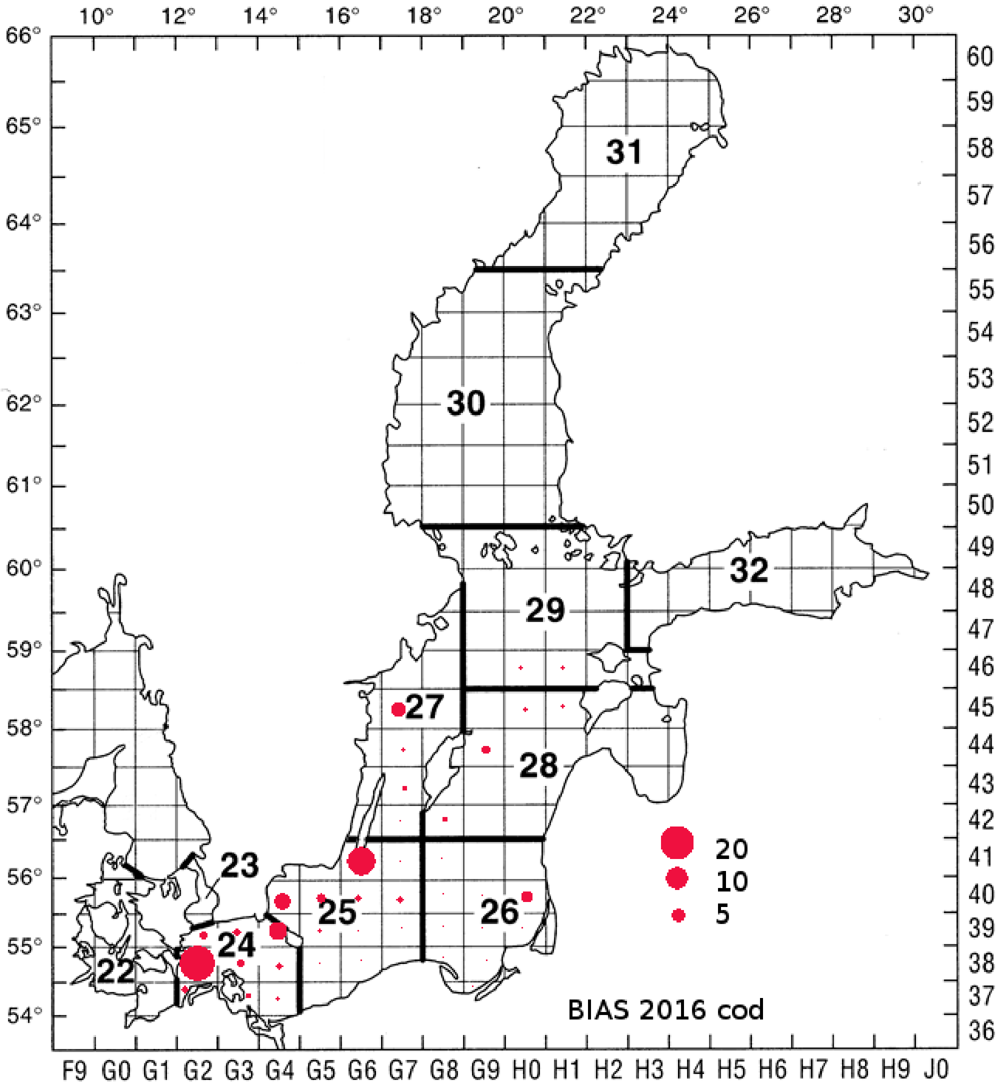


Figure 5.1.1.2.5. The abundance of cod (age 1+) per the ICES rectangles monitored in September-October 2016 (the area of circles indicates estimated numbers of specimens x10^6 in given rectangle).

The fish abundance estimates, which are based on the BIAS surveys in September-October 2016, are presented per the ICES rectangles and age groups and are specified in Tables 5.1.1.2.1, 5.1.1.2.2 and 5.1.1.2.3 for herring, sprat and cod, respectively. In addition, the abundance estimates for herring and sprat aggregated per ICES subdivisions and fish age groups are presented in Tables 5.1.1.2.4 and 5.1.1.2.5.

Table 5.1.1.2.1. Estimated numbers (millions) of herring in September-October 2016, by ICES rectangles, accordingly to age groups.

YEAR	Sub_Div	RECT	total	age 0	age 1	age 2	age 3	age 4	age 5	age 6	age 7	age 8+
2016	21	41G0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2016	21	41G1	125.91	94.95	27.44	2.68	0.57	0.14	0.13	0.00	0.00	0.00
2016	21	41G2	227.35	220.63	5.85	0.77	0.07	0.03	0.00	0.00	0.00	0.00
2016	21	42G1	148.59	132.14	15.52	0.69	0.06	0.08	0.10	0.00	0.00	0.00
2016	21	42G2	156.64	154.58	1.97	0.07	0.00	0.01	0.01	0.00	0.00	0.00
2016	22	37G0	115.36	107.26	3.94	1.50	0.82	0.97	0.52	0.16	0.19	0.00
2016	22	37G1	271.35	234.10	17.42	5.89	1.98	7.39	3.04	0.87	0.66	0.00
2016	22	38G0	254.87	238.58	6.72	4.46	1.09	2.03	0.78	0.38	0.12	0.71
2016	22	38G1	212.36	211.70	0.66	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2016	22	39F9	3.34	3.34	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2016	22	39G0	62.44	61.55	0.64	0.02	0.03	0.15	0.02	0.03	0.00	0.00
2016	22	39G1	9.38	9.26	0.09	0.00	0.00	0.02	0.01	0.00	0.00	0.00
2016	22	40F9	0.88	0.77	0.05	0.02	0.03	0.01	0.00	0.00	0.00	0.00
2016	22	40G0	34.60	30.08	1.91	0.89	1.03	0.55	0.00	0.14	0.00	0.00
2016	22	40G1	273.84	273.84	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2016	22	41G0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2016	23	39G2	20.89	16.12	1.19	0.67	0.91	1.35	0.46	0.07	0.11	0.01
2016	23	40G2	290.08	7.76	189.69	55.82	25.32	8.58	2.15	0.56	0.20	0.00
2016	23	41G2	58.60	58.31	0.29	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2016	24	37G2	49.01	43.11	1.70	1.02	0.68	1.73	0.73	0.02	0.02	0.00
2016	24	37G3	150.31	60.72	15.67	13.37	19.09	24.25	10.56	3.62	2.07	0.96
2016	24	37G4	354.21	5.89	55.73	50.52	81.09	93.23	37.75	17.08	9.95	2.97
2016	24	38G2	545.89	367.32	48.05	30.93	33.09	46.02	15.02	2.74	2.48	0.24
2016	24	38G3	457.78	246.67	42.97	31.87	44.48	57.35	21.97	6.19	4.94	1.34
2016	24	38G4	777.34	23.63	94.91	99.65	207.82	185.26	87.83	45.37	23.83	9.04
2016	24	39G2	85.62	66.04	4.89	2.75	3.74	5.53	1.87	0.29	0.45	0.06
2016	24	39G3	95.05	26.14	14.71	10.06	13.78	18.66	7.48	2.11	1.70	0.41
2016	24	39G4	143.27	10.49	18.94	18.59	32.03	35.97	15.08	6.12	4.10	1.95
2016	25	37G5	118.38	0.68	5.36	31.65	24.00	28.26	12.68	4.93	5.01	5.81
2016	25	38G5	392.56	2.25	17.78	104.96	79.59	93.70	42.05	16.34	16.62	19.27
2016	25	38G6	275.69	1.58	12.49	73.71	55.90	65.80	29.53	11.48	11.67	13.53
2016	25	39G4	17.87	0.42	3.29	3.12	2.93	5.80	0.79	1.10	0.28	0.14
2016	25	39G5	248.77	16.28	22.30	51.62	59.54	48.62	24.29	8.13	9.02	8.98
2016	25	39G6	505.23	2.90	22.88	135.08	102.44	120.59	54.12	21.03	21.39	24.80
2016	25	39G7	453.79	2.60	20.55	121.33	92.01	108.31	48.61	18.89	19.21	22.28
2016	25	40G4	155.81	0.00	8.06	21.57	72.86	31.16	16.62	3.21	0.22	2.11
2016	25	40G5	695.16	0.00	10.26	104.73	141.60	264.29	99.65	28.67	21.30	24.66
2016	25	40G6	575.63	0.95	31.35	128.66	163.13	147.58	70.08	15.98	14.19	3.71
2016	25	40G7	773.64	0.00	14.65	275.32	120.31	163.40	71.56	54.72	45.43	28.26
2016	25	41G6	1,178.50	0.00	41.31	287.53	219.43	324.43	138.26	98.16	58.19	11.18
2016	25	41G7	402.82	0.00	6.45	171.80	87.18	45.34	46.30	25.32	15.58	4.83
2016	26	37G8	84.05	0.42	4.21	19.48	13.94	21.60	9.07	5.01	5.42	4.90
2016	26	37G9	621.68	3.11	31.17	144.11	103.10	159.74	67.08	37.05	40.08	36.24
2016	26	38G8	365.77	1.83	18.34	84.79	60.66	93.99	39.47	21.80	23.58	21.32
2016	26	38G9	293.72	0.66	18.31	46.93	45.40	86.06	40.34	21.39	10.39	24.26
2016	26	39G8	346.17	1.73	17.36	80.24	57.41	88.95	37.35	20.63	22.32	20.18
2016	26	39G9	394.85	0.54	9.19	65.37	51.33	103.07	33.51	42.11	35.03	54.70
2016	26	39H0	20.48	1.05	0.35	3.39	4.12	6.40	1.37	0.95	0.98	1.86
2016	26	40G8	341.64	1.71	17.13	79.19	56.66	87.79	36.86	20.36	22.03	19.91
2016	26	40G9	736.65	0.32	30.87	132.16	152.63	182.17	86.32	74.08	45.21	32.91
2016	26	40H0	1,435.86	0.00	11.54	131.88	285.54	333.70	254.01	200.08	114.80	104.30
2016	26	41G8	2,757.52	3.45	30.83	472.05	379.05	870.83	150.18	543.12	228.80	79.21
2016	26	41G9	272.30	0.00	9.72	61.08	46.40	71.98	30.01	12.50	20.57	20.04
2016	26	41H0	80.64	0.00	6.15	41.78	17.42	10.96	3.38	0.41	0.25	0.29
2016	27	42G6	77.92	1.01	3.37	33.12	10.25	10.19	9.04	6.88	3.04	1.01
2016	27	42G7	571.95	1.17	17.56	369.64	53.72	68.86	44.82	8.39	1.66	6.13
2016	27	43G7	352.53	4.78	1.99	82.27	51.27	121.22	61.60	15.50	11.92	1.99
2016	27	44G7	16.97	10.03	0.00	3.79	0.63	1.89	0.63	0.00	0.00	0.00
2016	27	44G8	234.18	5.71	5.20	84.28	47.09	37.82	20.05	15.99	11.93	6.09
2016	27	45G7	1,502.05	6.11	63.63	751.43	279.72	198.82	85.35	110.47	5.00	1.53
2016	27	45G8	137.12	72.65	2.72	29.06	4.54	17.80	4.18	3.45	1.82	0.91
2016	27	46G8	1,068.04	99.87	290.32	614.13	43.49	15.17	5.06	0.00	0.00	0.00
2016	28_2	42G8	524.93	2.07	17.30	301.38	54.79	95.46	31.97	9.53	9.86	2.57
2016	28_2	42G9	25.44	0.00	0.76	12.42	5.72	3.15	1.79	0.62	0.98	0.00
2016	28_2	42H0	54.88	0.00	1.60	25.06	11.64	10.37	3.01	1.60	1.60	0.00
2016	28_2	43G8	29.31	0.95	2.36	18.44	0.47	1.89	0.95	2.36	1.89	0.00
2016	28_2	43G9	22.19	7.01	0.00	7.13	4.12	3.65	0.09	0.09	0.00	0.09
2016	28_2	43H0	666.49	0.00	0.00	372.63	93.95	94.85	69.18	1.53	5.52	28.83
2016	28_2	43H1	423.71	0.00	0.00	199.35	61.32	73.94	59.94	3.67	6.41	19.10
2016	28_2	44G9	225.81	11.88	0.63	82.84	45.61	40.28	25.09	10.85	7.66	0.96
2016	28_2	44H0	238.34	0.00	14.87	156.15	21.84	17.11	9.04	6.23	8.85	4.25
2016	28_2	44H1	670.50	0.00	40.63	315.01	86.23	127.44	60.57	5.01	21.38	14.24
2016	28_2	45G9	284.76	25.89	4.80	110.28	49.93	73.24	14.14	3.02	1.74	1.74
2016	28_2	45H0	279.54	37.94	2.96	150.54	42.01	24.78	10.97	0.99	3.57	5.79
2016	28_2	45H1	1,146.13	4.39	17.57	536.18	205.51	184.87	119.44	8.78	25.91	43.47
2016	29	46G9	562.77	64.57	36.16	309.49	36.98	84.75	10.36	16.36	1.36	2.73
2016	29	46H0	62.63	23.65	5.74	24.66	6.76	1.69	0.00	0.00	0.13	0.00
2016	29	46H1	4.17	4.17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2016	29	46H2	59.69	1.53	4.84	34.44	8.32	6.32	2.98	0.00	0.31	0.95
2016	29	47G9	5,126.97	122.26	635.71	3,364.36	366.88	332.38	172.86	70.15	55.51	6.87
2016	29	47H0	141.82	77.36	9.28	47.45	2.58	2.58	2.58	0.00	0.00	0.00
2016	29	47H1	2,816.09	85.35	109.94	1,654.30	377.64	263.59	227.45	0.00	38.38	59.46
2016	29	47H2	10,638.36	199.44	892.35	5,787.16	1,199.61	929.17	1,196.68	0.00	139.17	294.79
2016	29	48G9	3,436.37	1,594.00	857.35	892.38	59.01	10.42	3.55	7.31	6.52	5.83
2016	29	48H0	3,000.34	7.62	360.88	1,529.72	406.24	220.50	73.34	150.70	121.17	130.17
2016	29	48H1	3,948.42	52.45	882.87	2,305.42	319.49	128.44	43.47	76.44	66.43	73.41
2016	29	48H2	4,494.57	89.80	1,543.06	2,460.08	190.88	84.20	18.21	40.93	25.51	41.90
2016	29	49G9	1,704.05	136.58	237.48	840.32	194.52	87.03	27.27	58.65	45.99	76.21
2016	30	50G7	963.93	7.40	293.17	449.99	127.23	45.39	20.42	5.24	3.74	11.35
2016	30	50G8	1,456.71	1.39	561.48	595.21	161.47	59.68	29.54	11.83	11.18	24.93
2016	30	50G9	683.49	83.16	205.15	247.59	72.31	29.45	15.96	6.25	6.18	17.44
2016	30	50H0	814.84	230.80	297.14	188.47	45.04	18.01	11.23	4.19	4.79	15.17
2016	30	51G7	504.90	0.00	18.13	224.14	100.61	54.53	29.49	12.77	14.83	50.40
2016	30	51G8	2,010.15	0.00	105.84	878.73	398.55	225.84	132.37	57.77	63.34	147.71
2016	30	51G9	1,398.81	0.00	80.75	680.21	285.69	147.56	74.86	32.39	32.88	64.47
2016	30	51H0	625.20	73.86	156.68	241.42	72.64	30.46	16.87	7.17	6.93	19.17
2016	30	52G7	460.51	1.87	7.74	111.29	68.83	53.23	38.04	22.33	29.97	127.21
2016	30	52G8	1,573.11	0.00	52.68	547.19	307.80	203.89	122.93	59.11	65.34	214.17
2016	30	52G9	368.42	1.55	16.88	129.20	66.80	45.46	29.34	14.75	16.81	47.63
2016	30	52H0	834.81	2.81	37.26	291.22	151.25	103.49	67.02	33.79	38.56	109.41
2016	30	53G8	1,445.38	3.35	64.21	512.44	276.88	183.54	112.80	54.97	61.11	176.08
2016	30	53G9	695.18	0.00	8.62	191.88	129.98	105.59	73.40	38.24	42.40	105.07
2016	30	53H0	1,333.82	20.71	70.59	439.82	231.09	158.09	104.11	52.50	64.36	192.55
2016	30	53H1	228.70	3.11	18.30	82.87	39.82	24.98	15.90	7.67	9.17	26.88
2016	30	54G8	753.00	0.00	4.09	122.57	105.63	101.46	82.67	46.16	60.30	230.12
2016	30	54G9	604.36	7.47	41.73	200.12	97.76	65.76	44.37	23.02	29.15	94.98
2016	30	54H0	1,680.21	36.11	11.71	360.61	278.46	246.89	180.75	96.26	114.75	354.67
2016	30	55G9	451.59	3.34	143.57	191.56	54.22	22.58	12.96	5.55	5.77	12.04
2016	30	55H0	794.85	4.57	100.85	331.95	133.43	73.72	43.10	20.20	22.68	64.36
2016	32	47H3	1,332.92	14.04	52.12	498.93	396.56	118.57	139.29	45.62	42.26	25.51
2016	32	48H3	1,069.44	75.14	199.16	663.65	71.87	20.59	10.30	12.57	4.42	11.74
2016	32	48H4	6,949.50	131.17	581.68	3,495.05	1,961.04	304.90	336.81	49.66	44.01	45.17
2016	32	48H5	9,171.65	182.75	852.43	4,787.55	2,282.72	419.24	389.86	93.30	67.24	96.55
2016	32	48H6	3,262.26	1,237.32	256.28	1,108.28	518.81	54.81	65.55	12.00	9.22	0.00
2016	32	48H7	3889.15	2224.89	141.05	494.62	534.77	192.89	183.95	54.71	46.63	15.64
2016	32	49H5	1265.17	5.73	189.42	789.87	141.87	53.97	23.72	20.92	12.98	26.69
2016	32	49H6	2776.93	42.13	315.71	1576.04	420.35	156.67	72.63	69.4	41.07	82.93

Table 5.1.1.2.2. Estimated numbers (millions) of sprat in September-October 2016, by ICES rectangles, accordingly to age groups.

YEAR	Sub_Div	RECT	total	age 0	age 1	age 2	age 3	age 4	age 5	age 6	age 7	age 8+
2016	21	41G0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2016	21	41G1	34.10	0.00	7.53	22.27	3.81	0.49	0.00	0.00	0.00	0.00
2016	21	41G2	19.59	3.61	11.42	4.31	0.24	0.01	0.00	0.00	0.00	0.00
2016	21	42G1	132.75	0.26	52.84	72.75	6.48	0.42	0.00	0.00	0.00	0.00
2016	21	42G2	173.29	9.21	134.66	28.38	1.02	0.02	0.00	0.00	0.00	0.00
2016	22	37G0	246.03	230.74	4.00	10.46	0.81	0.00	0.02	0.00	0.00	0.00
2016	22	37G1	148.53	145.48	1.14	1.53	0.32	0.00	0.06	0.00	0.00	0.00
2016	22	38G0	1,249.83	1,225.07	3.05	17.80	3.41	0.44	0.06	0.00	0.00	0.00
2016	22	38G1	58.27	58.00	0.27	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2016	22	39F9	595.94	595.94	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2016	22	39G0	225.13	168.95	7.73	40.34	4.59	2.68	0.84	0.00	0.00	0.00
2016	22	39G1	167.58	166.61	0.35	0.62	0.00	0.00	0.00	0.00	0.00	0.00
2016	22	40F9	10.46	3.63	1.32	4.98	0.48	0.04	0.01	0.00	0.00	0.00
2016	22	40G0	413.57	143.51	52.14	196.88	19.12	1.58	0.34	0.00	0.00	0.00
2016	22	40G1	19.56	19.56	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2016	22	41G0	6.78	1.78	1.08	3.45	0.47	0.00	0.00	0.00	0.00	0.00
2016	23	39G2	183.02	166.28	9.03	6.13	0.73	0.33	0.28	0.24	0.00	0.00
2016	23	40G2	1.90	0.75	0.11	0.49	0.10	0.24	0.21	0.00	0.00	0.00
2016	23	41G2	21.56	21.08	0.23	0.16	0.03	0.06	0.00	0.00	0.00	0.00
2016	24	37G2	51.13	38.88	4.26	5.65	1.22	0.41	0.57	0.14	0.00	0.00
2016	24	37G3	7,377.79	7,292.75	70.05	14.99	0.00	0.00	0.00	0.00	0.00	0.00
2016	24	37G4	191.59	35.21	23.69	69.54	31.13	16.47	12.71	2.84	0.00	0.00
2016	24	38G2	1,393.55	1,031.84	173.54	148.43	21.05	6.19	8.80	3.70	0.00	0.00
2016	24	38G3	10,046.07	5,186.01	2,295.86	1,977.42	298.01	110.41	118.30	60.06	0.00	0.00
2016	24	38G4	833.14	104.02	168.00	326.96	115.08	58.13	47.60	13.35	0.00	0.00
2016	24	39G2	749.63	681.08	36.99	25.09	2.99	1.33	1.16	0.99	0.00	0.00
2016	24	39G3	1,643.12	433.93	467.38	544.18	99.31	36.20	41.70	20.42	0.00	0.00
2016	24	39G4	577.35	29.11	160.23	254.76	64.47	30.76	28.74	9.28	0.00	0.00
2016	25	37G5	175.63	0.62	1.63	73.38	56.53	26.45	8.95	5.20	2.64	0.22
2016	25	38G5	578.18	2.05	5.38	241.56	186.11	87.08	29.46	17.11	8.70	0.73
2016	25	38G6	351.78	1.25	3.27	146.97	113.23	52.98	17.92	10.41	5.29	0.44
2016	25	39G4	303.88	0.93	33.93	93.22	97.50	18.83	45.30	4.85	1.12	8.20
2016	25	39G5	1,119.58	6.09	65.91	460.90	207.68	233.58	90.35	44.99	6.50	3.58
2016	25	39G6	567.81	2.02	5.28	237.23	182.77	85.52	28.93	16.81	8.55	0.71
2016	25	39G7	336.97	1.20	3.14	140.78	108.46	50.75	17.17	9.97	5.07	0.42
2016	25	40G4	518.33	0.00	34.56	192.09	66.06	172.27	38.62	0.00	0.00	14.74
2016	25	40G5	397.07	0.00	28.75	38.72	118.45	134.98	31.75	29.82	5.01	9.59
2016	25	40G6	2,268.03	15.17	49.26	423.03	594.91	705.27	140.48	6.79	58.80	274.33
2016	25	40G7	405.60	0.51	5.34	133.86	75.12	73.56	47.81	17.22	24.63	27.54
2016	25	41G6	1,057.79	5.51	0.00	549.01	330.62	112.65	26.16	5.49	2.19	26.16
2016	25	41G7	1,246.20	6.46	89.73	545.08	268.88	170.33	102.58	5.06	30.32	27.77
2016	26	37G8	251.21	2.90	6.94	152.74	51.44	29.63	1.92	4.89	0.74	0.00
2016	26	37G9	1,397.25	16.15	38.63	849.57	286.09	164.83	10.66	27.19	4.14	0.00
2016	26	38G8	603.86	6.98	16.69	367.16	123.64	71.23	4.61	11.75	1.79	0.00
2016	26	38G9	1,000.56	3.59	20.73	506.38	195.53	181.90	59.32	12.99	0.92	19.20
2016	26	39G8	84.95	0.98	2.35	51.65	17.39	10.02	0.65	1.65	0.25	0.00
2016	26	39G9	138.26	0.65	7.95	68.59	20.54	26.89	7.97	1.39	1.21	3.07
2016	26	39H0	4,162.10	145.48	410.62	2,735.36	439.54	370.11	49.18	5.91	2.95	2.95
2016	26	40G8	430.13	4.97	11.89	261.53	88.07	50.74	3.28	8.37	1.28	0.00
2016	26	40G9	541.04	6.81	21.41	182.65	152.22	92.33	39.75	22.30	15.17	8.40
2016	26	40H0	2,481.99	1,379.46	279.92	592.99	100.24	78.10	30.77	0.00	10.26	10.26
2016	26	41G8	1,628.13	18.92	40.30	723.86	498.77	137.78	122.29	46.56	27.65	12.00
2016	26	41G9	2,827.60	164.20	119.60	1,318.20	705.80	212.40	186.20	38.00	39.00	44.20
2016	26	41H0	8,185.60	132.60	768.00	5,810.40	1,055.80	295.80	33.90	71.90	5.30	11.90
2016	27	42G6	2,213.00	32.54	338.46	963.31	742.01	82.99	14.64	30.92	8.14	0.00
2016	27	42G7	3,536.96	84.84	209.95	1,975.33	500.80	307.96	219.25	30.87	207.96	0.00
2016	27	43G7	837.95	36.58	19.69	357.44	283.16	88.84	24.49	0.00	21.18	6.59
2016	27	44G7	1,246.50	214.31	39.81	476.78	285.47	189.90	11.67	28.56	0.00	0.00
2016	27	44G8	227.07	3.21	7.70	65.47	79.27	63.55	2.09	0.00	0.00	5.78
2016	27	45G7	1,131.39	82.81	8.98	505.53	360.14	97.54	28.81	15.97	6.94	24.68
2016	27	45G8	1,306.48	37.95	73.73	536.69	408.75	136.61	32.53	0.00	31.44	48.79
2016	27	46G8	2,727.35	237.39	237.10	1,388.69	745.23	95.25	10.30	1.55	0.00	11.85
2016	28_2	42G8	3,727.98	215.54	61.50	2,265.33	1,102.10	41.75	0.00	21.49	20.26	0.00
2016	28_2	42G9	2,329.20	34.10	125.90	1,087.60	777.50	202.50	48.70	20.10	2.70	30.10
2016	28_2	42H0	6,364.00	172.90	426.90	3,288.80	1,807.80	407.30	141.80	62.10	14.30	42.10
2016	28_2	43G8	502.69	64.34	31.77	238.08	135.53	16.49	8.45	4.02	4.02	0.00
2016	28_2	43G9	3,060.34	610.54	501.80	974.56	495.71	394.29	0.00	45.97	37.47	0.00
2016	28_2	43H0	5,695.30	121.90	640.40	3,889.90	578.40	336.30	126.20	0.00	0.00	2.20
2016	28_2	43H1	1,935.30	47.20	287.80	1,349.20	98.10	112.90	38.90	0.60	0.00	0.60
2016	28_2	44G9	857.16	62.90	100.48	356.11	225.53	91.72	5.66	5.66	9.09	0.00
2016	28_2	44H0	3,208.90	162.80	158.50	1,744.50	773.20	148.40	138.10	12.50	6.90	64.00
2016	28_2	44H1	5,114.60	264.40	425.20	2,979.70	841.80	300.60	233.20	52.60	0.00	17.10
2016	28_2	45G9	1,155.45	460.20	128.00	261.70	187.83	66.22	13.00	9.30	7.23	21.96
2016	28_2	45H0	3,063.23	753.84	243.67	1,390.88	341.36	117.47	88.14	12.47	31.40	83.99
2016	28_2	45H1	5,168.61	655.53	447.87	2,458.32	601.26	290.07	266.53	79.24	154.88	214.91
2016	29	46G9	1,896.31	307.55	66.14	1,247.17	25.98	136.47	59.99	22.48	14.80	15.72
2016	29	46H0	5,426.67	639.51	1,151.11	2,338.77	617.58	434.86	73.09	135.21	18.27	18.27
2016	29	46H1	6,734.25	838.04	806.66	4,130.30	797.63	38.91	53.87	29.93	38.91	0.00
2016	29	46H2	870.55	51.68	161.92	545.45	89.44	5.37	7.35	3.98	5.37	0.00
2016	29	47G9	1,409.46	73.11	97.00	915.24	194.83	83.34	16.16	5.50	24.28	0.00
2016	29	47H0	2,935.47	998.23	145.50	1,341.69	280.43	120.97	40.18	8.46	0.00	0.00
2016	29	47H1	4,941.72	155.00	767.01	3,170.23	618.57	52.53	68.65	51.81	57.91	0.00
2016	29	47H2	20,396.77	2,622.20	5,788.59	10,117.29	1,448.61	79.12	153.87	107.97	79.12	0.00
2016	29	48G9	1,753.10	34.10	176.90	1,309.00	163.90	33.90	14.80	7.70	5.20	7.60
2016	29	48H0	274.30	16.00	35.20	161.00	26.10	15.20	9.20	4.50	2.90	4.20
2016	29	48H1	1,544.60	33.00	130.60	952.30	202.90	98.90	59.90	27.10	15.20	24.70
2016	29	48H2	3,560.20	384.70	405.50	2,055.80	359.90	189.60	92.20	30.80	13.20	28.50
2016	29	49G9	287.00	4.80	35.00	161.10	36.20	22.40	12.90	5.70	2.90	6.00
2016	30	50G7	11.60	0.00	0.10	4.50	3.20	1.60	0.60	0.30	0.60	0.70
2016	30	50G8	17.20	0.00	1.00	10.80	2.90	1.10	0.40	0.20	0.40	0.40
2016	30	50G9	51.20	0.50	0.60	20.20	11.70	5.90	2.90	1.50	3.00	4.90
2016	30	50H0	31.90	0.00	0.30	15.50	8.20	3.40	1.50	0.50	1.30	1.20
2016	30	51G7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2016	30	51G8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2016	30	51G9	3.10	0.00	0.00	0.50	0.40	0.30	0.20	0.20	0.30	1.20
2016	30	51H0	1.00	0.00	0.00	0.10	0.20	0.20	0.10	0.10	0.10	0.20
2016	30	52G7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2016	30	52G8	5.70	0.00	0.00	1.30	1.20	0.90	0.60	0.40	0.40	0.90
2016	30	52G9	0.80	0.00	0.00	0.10	0.10	0.10	0.10	0.10	0.10	0.20
2016	30	52H0	0.70	0.00	0.00	0.00	0.10	0.10	0.10	0.10	0.10	0.20
2016	30	53G8	0.40	0.00	0.00	0.00	0.10	0.10	0.00	0.00	0.10	0.10
2016	30	53G9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2016	30	53H0	10.10	0.00	0.00	0.80	1.20	1.30	0.90	0.80	1.20	3.90
2016	30	53H1	2.80	0.00	0.00	0.10	0.30	0.40	0.20	0.20	0.40	1.20
2016	30	54G8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2016	30	54G9	2.20	0.00	0.00	0.40	0.30	0.30	0.20	0.20	0.20	0.60
2016	30	54H0	0.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.30
2016	30	55G9	31.20	0.00	0.10	6.30	6.40	4.60	2.60	1.80	2.70	6.70
2016	30	55H0	7.60	0.00	0.00	1.80	1.70	1.10	0.70	0.50	0.60	1.20
2016	32	47H3	5,516.49	646.57	1,191.18	3,231.00	206.66	50.13	86.03	55.99	17.72	31.19
2016	32	48H3	13,530.30	252.00	2,828.90	8,533.40	1,260.90	382.20	150.80	65.30	27.20	29.60
2016	32	48H4	8,593.09	68.10	2,101.18	5,213.97	648.07	165.66	190.70	117.64	32.42	55.34
2016	32	48H5	3,981.31	74.90	715.40	2,158.73	412.37	178.61	214.85	129.94	36.66	59.84
2016	32	48H6	3,117.20	3.99	427.51	1,606.85	310.09	143.81	273.55	179.98	50.94	120.48
2016	32	48H7	1135.82	5.38	141.84	591.65	128.32	50.64	90.15	62.36	20.68	44.79
2016	32	49H5	305.50	2.90	53.10	157.00	38.40	24.80	16.30	6.60	3.80	2.60
2016	32	49H6	1573.10	16.80	424.40	987.40	112.40	18.30	6.80	4.30	0.90	1.80

Table 5.1.1.2.3. Estimated numbers (millions) of cod in September-October 2005-2016, by ICES rectangles.

Sub_Div	RECT	Area	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
24	37G2	192.40	2.17	0.00	1.82	0.00	0.00	0.00	0.00	0.00	6.01	0.00	0.00	1.26
24	37G3	167.70	0.00	4.14	0.87	1.18	0.72	4.26	0.00	1.99	1.09	0.91	0.25	2.26
24	37G4	875.10	9.50	0.13	4.27	5.16	1.41	2.60	0.02	0.00	19.73	0.31	3.32	0.88
24	38G2	832.90	10.86	0.00	1.95	0.00	0.00	1.93	1.07	5.97	0.46	0.00	0.00	22.78
24	38G3	865.70	0.28	0.00	1.61	1.07	1.97	3.57	0.40	4.39	0.94	25.85	1.22	2.12
24	38G4	1034.80	3.10	0.27	4.86	6.85	0.48	2.18	0.20	1.03	0.83	0.29	14.08	0.97
24	39G2	406.10	1.49	3.89	1.76	0.41	1.26	3.77	0.05	0.87	0.04	1.69	0.13	2.31
24	39G3	765.00	17.92	3.78	13.93	2.76	0.55	3.80	0.35	2.08	5.09	18.75	2.19	1.12
24	39G4	524.80	2.70	1.82	2.44	1.19	1.58	7.09	0.21	0.38	1.18	4.19	1.07	7.93
25	37G5	642.20	17.83	0.25	1.31	0.00	0.38	0.21	0.00	0.00	0.00	0.03	0.00	0.00
25	38G5	1035.70	57.28	2.06	5.20	0.74	2.92	4.54	18.40	19.88	4.98	3.37	2.95	1.01
25	38G6	940.20	9.54	3.00	17.12	2.52	0.27	0.23	0.00	15.48	0.00	0.00	0.00	0.38
25	38G7	471.70	0.00	0.13	0.04	0.92	0.37	0.85	0.00	0.21	0.00	0.00	0.00	
25	39G4	287.30	2.67	28.46	0.22	4.36	0.35	0.29	0.22	0.57	0.49	2.90	4.21	0.00
25	39G5	979.00	0.75	1.80	0.90	1.57	1.25	3.10	35.67	4.46	2.04	2.88	0.71	2.17
25	39G6	1026.00	0.86	6.50	0.69	4.05	0.48	16.71	3.48	0.04	0.00	0.16	0.12	0.11
25	39G7	1026.00	47.40	0.52	0.44	5.78	0.26	0.18	2.18	0.00	0.00	0.51	0.06	0.04
25	40G4	677.20	1.38	5.54	15.86	0.22	19.19	0.33	25.27	15.24	2.06	31.02	38.33	7.44
25	40G5	1012.90	2.40	7.60	4.89	25.09	1.81	0.81	14.00	5.45	1.24	7.96	31.00	3.14
25	40G6	1013.00	1.13	6.53	0.24	5.94	6.54	7.03	30.84	5.66	0.22	53.62	17.00	1.76
25	40G7	1013.00	2.85	2.89	0.00	3.13	1.75	0.25	9.31	21.37	0.15	3.90	0.00	1.54
25	41G6	764.40	2.69	14.80	0.00	2.53	0.63	0.36	0.00	1.03	0.00	0.84	0.23	18.94
25	41G7	1000.00	0.08	1.90	8.71	0.25	4.40	1.12	61.89	29.81	35.29	0.00	0.53	0.71
26	37G8	86.00	0.46	3.25	0.00	0.23	0.00	0.03	0.00	0.08	0.00	0.54	0.00	0.00
26	37G9	151.60	37.64	0.89	1.59	0.99	0.32	0.21	0.51	0.59	0.00	0.16	0.15	0.10
26	38G8	624.60	37.05	4.97	1.68	3.39	2.01	1.43	1.29	7.19	0.00	1.05	7.11	0.10
26	38G9	918.20	0.00	0.00	0.00	0.00	0.26	0.00	1.31	4.53	49.20	6.52	0.25	0.28
26	39G8	1026.00	32.28	22.10	1.63	0.83	4.33	4.71	19.88	5.18	0.00	0.50	0.42	0.23
26	39G9	1026.00	0.00	0.00	0.00	0.00	0.35	0.00	0.92	0.00	3.12	4.66	7.30	0.17
26	39H0	881.60					0.00	0.00	0.02					0.30
26	40G8	1013.00	17.82	4.57	0.54	0.21	0.55	6.77	3.96	3.18	0.00	0.10	2.75	0.06
26	40G9	1013.00	0.00		0.00	0.00	1.51	0.00	0.21	5.86	9.07	0.79		0.41
26	40H0	1012.10	5.10		0.00	0.71	34.59	51.72	1.12	0.23	0.13	0.14		5.13
26	41G8	1000.00	0.00	2.62		0.04	1.16	1.59	21.93	19.24	0.92	1.30	0.00	1.52
26	41G9	1000.00	10.00	0.07	3.21	0.18	0.00	1.05	0.00	0.00	0.27	195.80	1.59	0.00
26	41H0	953.30	54.47	0.24	3.39	1.92	0.00	0.09	0.00	0.00	0.30	0.00	0.01	0.00
27	42G6	266.00		2.23	0.04	0.00	1.14	0.02	0.00	0.26	0.01	0.00	0.00	0.00
27	42G7	986.90	1.02	1.14	0.49	0.02	0.88	0.00	1.57	0.61	0.69	0.92	0.00	2.68
27	43G6	269.80				0.00								
27	43G7	913.80	0.00	22.02	0.00	0.08	0.00	0.50	0.09	0.00	1.87	2.70	0.00	3.21
27	44G7	960.50	0.00	1.19	1.25	0.42	0.00	0.23	0.00	0.00	0.00	0.07	0.00	0.47
27	44G8	456.60	0.00	0.00	0.00	0.03	0.51	0.23	0.09	0.00	0.19	0.00	0.00	0.00
27	45G7	908.70	0.00	0.00	0.00	1.57	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.93
27	45G8	947.20	0.00	2.22	0.23	0.00	0.00	0.00	0.00	0.00	1.14	0.32	0.00	0.00
27	46G8	884.80	0.00	0.21	0.00	0.00	0.00	0.00	0.07	0.00	0.00	0.37	0.00	0.00
28_2	42G8	945.40	2.35	0.00	3.73	1.65	0.24	1.29	0.00	1.63	4.73	1.79	0.00	0.79
28_2	42G9	986.90	0.00	0.23	0.56	1.33	0.00	0.00	0.00	0.00	4.94	293.83	0.00	0.00
28_2	42H0	968.50	0.00	0.37	10.37	2.89	0.00	0.14	0.00	0.00	0.32	1.23	0.13	0.00
28_2	43G8	296.20	0.32	0.00	0.00	0.19	0.00	0.00	0.00	5.57	0.10	0.40	0.00	0.00
28_2	43G9	973.70	0.00	0.16	12.71	1.04	1.39	0.00	0.00	4.12	5.88	0.00	0.00	0.00
28_2	43H0	973.70	0.00	0.12	3.57	0.00	0.00	0.07	0.00	0.00	0.61	3.59	0.32	0.00
28_2	43H1	412.70	0.00	0.05	0.00	0.00	0.00	0.14	0.00	0.00	0.06	0.00		0.00
28_2	44G9	876.60	0.00	0.00	0.47	0.61	0.00	0.46	2.28	2.60	2.69	2.91	0.00	3.33
28_2	44H0	960.50	0.00	0.47	0.00	0.00	0.00	0.00	0.00	0.00	0.00	238.71	11.70	0.00
28_2	44H1	824.60	0.00	0.00	0.00	0.00	0.00	0.07	0.00	0.00	0.38	0.00	0.00	0.00
28_2	45G9	924.50	0.27	0.00	0.10	0.00	0.36	0.00	0.00	0.63	0.64	0.00	0.00	0.90
28_2	45H0	947.20	0.00	0.00	0.08	0.15	0.00	0.02	0.00	0.00	0.00	0.00	0.04	0.00
28_2	45H1	827.10	0.00	0.00	0.07	0.00	0.00	0.05	0.00	0.00	0.00	0.00	1.67	0.28
29	46G9	933.80	0.03	0.00	0.48	0.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.66
29	46H0	933.80	0.00	0.00	0.00	0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.66
29	46H1	921.50	0.00	0.00	0.00	0.00	0.00	0.42	0.00	0.70	0.09	0.00	0.03	0.00
29	46H2	258.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
29	47G9	876.20	2.82	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.00	0.00	0.00
29	47H0	920.30	0.00	0.00	0.63	0.29	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
29	47H1	920.30	0.00	0.00	0.00	0.00	0.00	0.00	8.77	0.00	0.00	0.00	0.00	0.00
29	47H2	793.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.67	0.05	0.00	0.00
29	48G9	772.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
29	48H0	730.30			0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
29	48H1	544.00			0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
29	48H2	597.00			0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
29	49G9	564.20			0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table 5.1.1.2.4. Estimated numbers (millions) of herring by ICES subdivisions, accordingly to age groups; September-October 2016.

YEAR	Sub_Div	age 0	age 1	age 2	age 3	age 4	age 5	age 6	age 7	age 8+
2016	21	602.30	50.78	4.21	0.70	0.26	0.24	0.00	0.00	0.00
2016	22	1,170.48	31.43	12.78	4.98	11.12	4.37	1.58	0.97	0.71
2016	23	82.19	191.17	56.49	26.23	9.93	2.61	0.63	0.31	0.01
2016	24	850.01	297.57	258.76	435.80	468.00	198.29	83.54	49.54	16.97
2016	25	27.66	216.73	1,511.11	1,220.91	1,447.27	654.53	307.96	238.12	169.56
2016	26	14.83	205.15	1,362.45	1,273.67	2,117.22	788.94	999.48	569.47	420.13
2016	27	201.33	384.80	1,967.72	490.71	471.77	230.73	160.68	35.37	17.65
2016	28_2	90.13	103.48	2,287.41	683.13	751.03	406.18	54.28	95.36	121.04
2016	29	2,458.78	5,575.65	19,249.78	3,168.90	2,151.07	1,778.75	420.54	500.47	692.32
2016	30	481.49	2,296.57	7,018.48	3,205.49	1,999.60	1,258.12	612.16	704.24	2,105.81
2016	32	3,913.17	2,587.85	13,414.00	6,327.99	1,321.65	1,222.10	358.19	267.84	304.24

Table 5.1.1.2.5. Estimated numbers (millions) of sprat by ICES subdivisions, accordingly to age groups; September-October 2016.

YEAR	Sub_Div	age 0	age 1	age 2	age 3	age 4	age 5	age 6	age 7	age 8+
2016	21	13.08	206.45	127.71	11.55	0.94	0.00	0.00	0.00	0.00
2016	22	2,759.27	71.08	276.06	29.20	4.74	1.33	0.00	0.00	0.00
2016	23	188.11	9.37	6.78	0.86	0.63	0.49	0.24	0.00	0.00
2016	24	14,832.83	3,400.00	3,367.02	633.26	259.90	259.58	110.78	0.00	0.00
2016	25	41.83	326.17	3,275.82	2,406.33	1,924.24	625.47	173.73	158.82	394.44
2016	26	1,883.69	1,745.04	13,621.07	3,735.08	1,721.78	550.48	252.89	110.66	111.99
2016	27	729.61	935.42	6,269.23	3,404.82	1,062.62	343.78	107.88	275.66	97.68
2016	28_2	3,626.20	3,579.80	22,284.66	7,966.12	2,526.01	1,108.69	326.06	288.26	476.96
2016	29	6,157.91	9,767.14	28,445.34	4,862.09	1,311.57	662.17	441.14	278.05	105.00
2016	30	0.50	2.10	62.40	38.00	21.40	11.10	6.90	11.60	23.90
2016	32	1,070.65	7,883.51	22,480.01	3,117.21	1,014.16	1,029.19	622.11	190.32	345.64

5.1.1.3. Area corrected data

During WGBIFS meeting in 2006 possible improvement of presenting the results from acoustic surveys was discussed, and correction factor for each ICES subdivision and year was introduced because of the coverage of the investigated area differed in the years. This factor is the proportion between the total area of the ICES subdivision that are presented in the IBAS Manual (see Addendum 2) and the area of the ICES rectangles, which was covered during the survey. Some disagreements appeared about appropriate area of the ICES Subdivision 28. It was agreed that the Gulf of Riga (ICES Subdivision 28.1) must be excluded from the total area. All other the ICES subdivisions kept their areas from the a.-m. Manual.

The area corrected abundance estimates for herring and sprat per the ICES subdivisions and age groups are summarized in Tables 5.1.1.3.1 and 5.1.1.3.2, respectively. Biomass for herring and sprat per the ICES subdivisions and age groups are summarized in Tables 5.1.1.3.3 and 5.1.1.3.4, respectively.

Table 5.1.1.3.1. Area corrected numbers (millions) of herring by ICES subdivisions and age groups (September-October 2016).

YEAR	Sub_Div	AREA_CORR_FACTOR	age 0	age 1	age 2	age 3	age 4	age 5	age 6	age 7	age 8+
2016	21	1.55	931.22	78.51	6.51	1.08	0.40	0.37	0.00	0.00	0.00
2016	22	1.02	1,194.62	32.08	13.04	5.08	11.35	4.46	1.61	0.99	0.72
2016	23	1.00	82.19	191.17	56.49	26.23	9.93	2.61	0.63	0.31	0.01
2016	24	1.00	850.01	297.57	258.76	435.80	468.00	198.29	83.54	49.54	16.97
2016	25	1.07	29.72	232.91	1,623.88	1,312.03	1,555.28	703.38	330.95	255.89	182.22
2016	26	1.01	15.00	207.52	1,378.17	1,288.36	2,141.64	798.05	1,011.01	576.04	424.98
2016	27	1.23	247.78	473.58	2,421.75	603.94	580.63	283.97	197.75	43.53	21.73
2016	28_2	1.01	91.31	104.84	2,317.39	692.09	760.88	411.50	54.99	96.61	122.62
2016	29	1.04	2,556.49	5,797.23	20,014.75	3,294.83	2,236.55	1,849.44	437.25	520.36	719.83
2016	30	1.07	516.11	2,461.71	7,523.15	3,435.98	2,143.38	1,348.59	656.18	754.88	2,257.24
2016	32	1.42	5,561.57	3,677.96	19,064.55	8,993.61	1,878.39	1,736.90	509.07	380.67	432.40

Table 5.1.1.3.2. Area corrected numbers (millions) of sprat by ICES subdivisions and age groups (September-October 2016).

YEAR	Sub_Div	AREA_CORR_FACTOR	age 0	age 1	age 2	age 3	age 4	age 5	age 6	age 7	age 8+
2016	21	1.55	20.22	319.19	197.45	17.86	1.45	0.00	0.00	0.00	0.00
2016	22	1.02	2,816.17	72.55	281.75	29.80	4.84	1.36	0.00	0.00	0.00
2016	23	1.00	188.11	9.37	6.78	0.86	0.63	0.49	0.24	0.00	0.00
2016	24	1.00	14,832.83	3,400.00	3,367.02	633.26	259.90	259.58	110.78	0.00	0.00
2016	25	1.07	44.95	350.52	3,520.29	2,585.91	2,067.84	672.14	186.69	170.68	423.88
2016	26	1.01	1,905.42	1,765.17	13,778.21	3,778.16	1,741.65	556.83	255.81	111.94	113.28
2016	27	1.23	897.96	1,151.26	7,715.78	4,190.44	1,307.81	423.11	132.77	339.26	120.22
2016	28_2	1.01	3,673.72	3,626.72	22,576.75	8,070.54	2,559.12	1,123.22	330.33	292.04	483.21
2016	29	1.04	6,402.62	10,155.28	29,575.74	5,055.31	1,363.69	688.48	458.67	289.10	109.17
2016	30	1.07	0.54	2.25	66.89	40.73	22.94	11.90	7.40	12.43	25.62
2016	32	1.42	1,521.66	11,204.39	31,949.56	4,430.31	1,441.36	1,462.72	884.17	270.49	491.24

Table 5.1.1.3.3. Estimated biomass (in tons) of herring in September-October 2016.

YEAR	Sub_Div	AREA_CORR_FACTOR	age 0	age 1	age 2	age 3	age 4	age 5	age 6	age 7	age 8+
2016	21	1.55	11,744.00	3,128.46	348.65	58.27	12.80	17.00			
2016	22	1.02	9,035.01	1,071.02	667.85	219.98	460.25	193.75	69.42	45.54	43.48
2016	23	1.00	747.74	8,133.90	3,933.56	2,369.94	734.76	266.21	63.61	32.86	0.46
2016	24	1.00	8,045.93	9,774.86	11,842.75	27,353.06	22,284.89	11,329.91	6,397.28	3,100.37	1,173.60
2016	25	1.07	361.06	5,766.01	39,980.00	57,865.68	63,115.77	34,929.14	17,686.07	13,856.57	10,893.36
2016	26	1.01	99.73	4,994.28	34,205.16	39,585.82	77,485.78	35,798.89	46,923.20	31,065.76	25,930.54
2016	27	1.23	1,055.07	6,276.28	42,073.16	13,914.44	16,801.30	9,191.69	6,313.58	1,668.57	873.29
2016	28_2	1.01	242.52	1,510.49	40,203.45	14,658.72	19,850.73	11,949.26	1,806.20	2,820.91	3,825.25
2016	29	1.04	9,612.68	67,084.70	299,230.07	61,013.24	50,269.98	42,668.92	10,581.69	12,796.63	18,191.54
2016	30	1.07	2,430.35	39,717.14	168,661.27	87,569.23	61,905.64	42,943.69	22,624.56	28,482.93	100,058.19
2016	32	1.42	26,422.99	40,417.30	273,258.27	167,161.62	42,428.68	39,820.60	11,942.98	9,548.00	12,224.22

Table 5.1.1.3.4. Estimated biomass (in tons) of sprat in September-October 2016.

YEAR	Sub_Div	AREA_CORR_FACTOR	age 0	age 1	age 2	age 3	age 4	age 5	age 6	age 7	age 8+
2016	21	1.55	68.58	3,465.02	2,909.64	310.25	27.10				
2016	22	1.02	9,728.34	843.17	3,681.06	405.73	86.42	23.83			
2016	23	1.00	924.32	116.00	95.06	13.36	10.88	10.34	3.40		
2016	24	1.00	61,488.51	44,048.02	48,996.24	10,292.02	4,323.68	4,278.05	1,642.72	0.00	
2016	25	1.07	172.96	3,623.21	40,060.95	33,069.14	31,033.27	10,608.63	3,126.80	2,587.22	6,240.77
2016	26	1.01	6,625.99	15,517.66	135,539.17	41,983.55	21,042.91	7,260.88	3,426.32	1,467.48	1,581.29
2016	27	1.23	3,173.19	7,879.68	66,047.72	43,867.47	16,078.38	5,548.27	1,711.51	4,313.99	1,488.53
2016	28_2	1.01	13,185.65	27,164.69	191,901.19	78,668.17	27,792.22	12,325.62	3,903.15	3,412.45	5,137.34
2016	29	1.04	18,989.06	62,694.15	221,518.37	45,024.26	14,519.87	7,334.95	4,976.05	3,103.66	1,309.50
2016	30	1.07	2.01	17.07	703.79	480.16	293.41	159.19	106.94	173.87	400.09
2016	32	1.42	4,254.49	71,811.42	220,263.09	35,145.62	13,144.34	14,863.27	9,278.96	2,847.12	5,693.75

5.1.1.4. Tuning fleets for WGBFAS

5.1.1.4.1. Herring in the ICES Subdivisions 25–29

The tuning fleet for assessment of the Central Baltic herring (CBH) abundance in the ICES Subdivisions 25-29 per age groups and years 1991-2016 (BIAS) is presented in Figure 5.1.1.4.1.1, with inclusion of the data from the ICES SD 29N. The area corrected combined results (for age 1+ CBH) of the above-mentioned ICES subdivisions are presented in Table 1. The recruitment index for herring (age 0) in the ICES Subdivisions 25-29 is presented in Table 2.

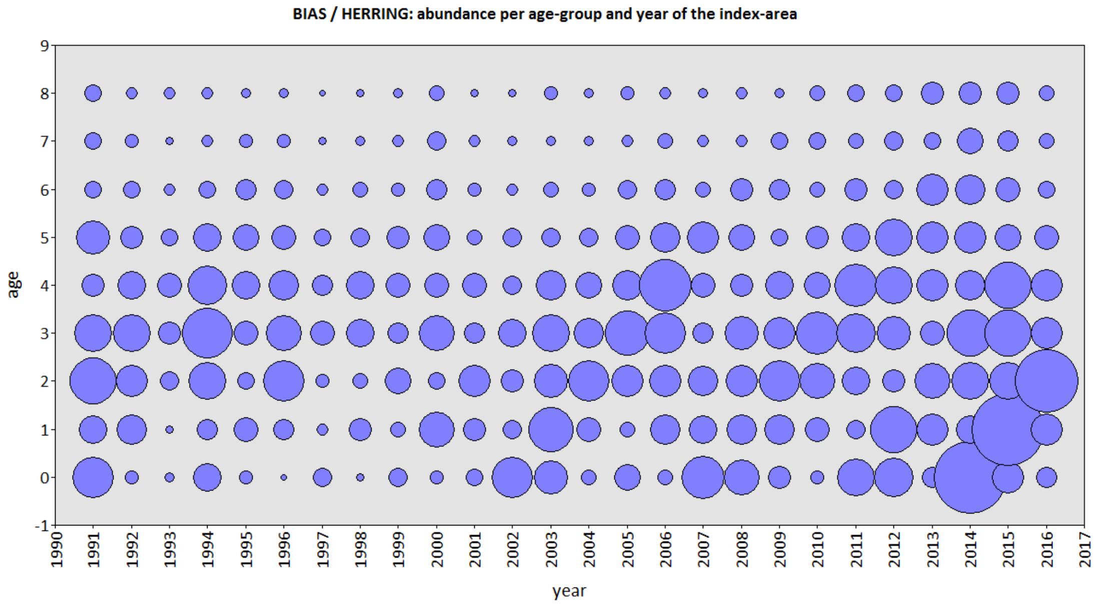


Figure 5.1.1.4.1.1. Autumn (BIAS) tuning fleet index (abundance per age groups and years 1991-2016) for herring in the ICES Subdivisions 25-29.

Table 1. *Whole time-series of tuning indices*. Autumn acoustic (BIAS) tuning fleet index (numbers in millions) for the Central Baltic herring (the ICES Subdivisions 25–27, 28.2 and 29, including the existing data of the ICES SD 29 North).

YEAR	HER_TOTAL_age1_8	HER_AGE1	HER_AGE2	HER_AGE3	HER_AGE4	HER_AGE5	HER_AGE6	HER_AGE	HER_AGE8+
1991	59,944.22	6,942.71	20,002.43	11,963.95	4,148.43	9,642.76	2,511.21	2280.03	2452.71
1992	45,994.83	7,416.92	9,155.99	13,177.55	7,156.18	4,107.91	2,273.74	1539.52	1167.03
1993	28,396.39	709.95	4,539.70	6,809.39	7,830.70	3,619.01	2,054.43	1089.66	1743.56
1994	57,157.97	3,924.41	11,881.25	20,303.84	11,526.53	5,653.24	2,098.90	940.75	829.04
1995	28,048.83	4,663.87	2,235.90	4,464.12	5,908.26	5,286.76	3,156.91	1503.95	829.06
1996	43,944.57	3,985.13	13,761.96	9,989.35	7,360.96	4,532.76	2,358.59	1178.87	776.94
1997	15,438.37	1,447.81	1,544.65	5,182.71	3,237.17	2,156.86	1,091.15	466.71	311.32
1998	24,922.96	4,285.08	2,170.72	6,617.17	6,520.67	2,584.07	1,523.58	791.27	430.41
1999	20,511.86	1,754.15	4,741.92	3,193.65	4,251.46	3,679.73	1,427.81	833.2	629.96
2000	40,924.36	10,151.18	2,560.04	9,873.66	4,837.59	5,200.35	3,234.04	3006.83	2060.67
2001	24,300.57	4,028.51	8,194.34	3,286.15	4,660.79	1,567.36	1,238.05	861.26	464.12
2002	20,672.28	2,686.92	4,242.02	6,508.41	2,842.26	2,326.29	869.78	741.28	455.3
2003	49,161.77	16,704.18	9,115.70	10,643.33	6,689.95	2,319.57	1,777.96	755.07	1156
2004	34,519.87	4,913.56	13,229.49	6,788.89	4,672.24	2,500.08	1,132.10	603.52	679.98
2005	41,760.33	1,920.24	8,250.78	15,344.88	7,123.19	4,355.80	2,540.70	1095.95	1128.8
2006	62,514.29	7,316.60	8,059.84	12,700.27	21,120.77	7,336.31	3,068.12	1700.65	1211.72
2007	29,634.05	5,400.70	6,587.26	2,974.88	4,191.03	7,092.91	1,696.87	882.93	807.46
2008	35,039.19	6,841.54	6,822.40	7,588.80	3,612.67	4,926.52	3,563.14	877.07	807.05
2009	38,653.24	6,408.78	12,141.39	6,820.28	5,551.44	2,058.64	2,969.48	2089.22	614
2010	37,891.76	3,829.47	8,278.75	12,047.60	5,006.24	3,542.80	1,684.71	1901.9	1600.3
2011	44,141.66	2,338.71	5,667.81	10,992.95	12,668.94	5,525.30	3,257.40	1448.43	2242.12
2012	51,695.69	14,947.97	3,630.05	7,544.67	9,345.39	9,199.52	2,684.65	2261.89	2081.55
2013	46,887.63	6,895.68	9,160.08	3,855.08	6,934.01	7,127.08	7,272.45	2154.28	3488.96
2014	59,146.09	5,086.33	10,113.93	15,408.71	5,916.49	7,369.87	6,664.24	4933.46	3653.07
2015	95,183.53	36,179.38	9,812.43	15,272.96	15,548.98	5,486.39	4,873.36	3648.14	4361.89
2016	58,080.31	6,816.07	27,755.94	7,191.25	7,274.97	4,046.34	2,031.95	1,492.42	1,471.37

Note: The coverage of the ICES Subdivision 29N was very inconsistent until 2007. In the years, 1993, 1995 and 1997 the total coverage was very poor. It is recommended that these data should not be used.

Table 2. Autumn acoustic (BIAS) recruitment index (age 0; numbers in millions) for the Central Baltic herring (the ICES Subdivisions 25-27, 28.2 and 29, including the existing data of the ICES SD 29 North).

YEAR	HER_AGE0
1991	13,732.73
1992	1,607.67
1993	1,297.73
1994	6,122.03
1995	1,356.71
1996	336.39
1997	4,050.41
1998	507.52
1999	2,591.05
2000	1,318.96
2001	2,122.76
2002	16,046.38
2003	9,066.54
2004	1,586.72
2005	5,567.63
2006	1,990.13
2007	12,197.22
2008	8,673.16
2009	3,365.99
2010	1,177.97
2011	10,098.28
2012	11,140.63
2013	3,068.44
2014	35,060.67
2015	7,661.72
2016	2,940.31

Note: The coverage of the ICES Subdivision 29N has been very inconsistent until 2007. In the years, 1993, 1995 and 1997 the total coverage was very poor. It is recommended that these data should not be used.

5.1.1.4.2. Sprat in the ICES Subdivisions 22–29

The tuning fleet for assessment of sprat abundance in the ICES Subdivisions 22-29 per age groups and years 1991-2016 (BIAS) is presented in Figure 5.1.1.4.2.1. The area corrected combined results (for age 1+ sprat) of the above-mentioned ICES subdivisions are presented in Table 3. The recruitment index for sprat (age 0) in the ICES Subdivisions 22-29 is presented in Table 4.

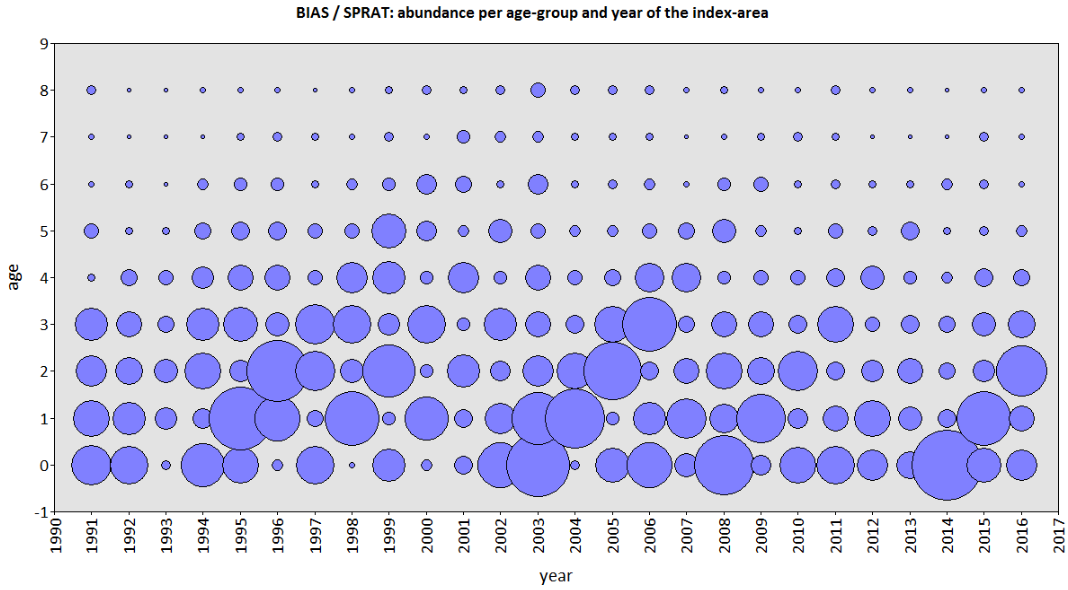


Figure 5.1.1.4.2.1. Autumn (BIAS) tuning fleet index (abundance per age groups and years 1991-2016) for sprat in the ICES Subdivisions 22-29.

Table 3. *Whole time-series of tuning indices*. Autumn acoustic (BIAS) tuning fleet index (numbers in millions) for Baltic sprat (the ICES Subdivisions 22–29).

YEAR	SPR_TOTAL_age 1_8	SPR_AGE1	SPR_AGE2	SPR_AGE3	SPR_AGE4	SPR_AGE5	SPR_AGE6	SPR_AGE7	SPR_AGE8
1991	149,058.78	46,487.55	40,298.51	43,681.07	2,743.40	8,923.78	1,850.70	1,956.55	3117.22
1992	102,482.10	36,519.48	26,991.22	24,050.54	9,289.37	1,920.67	2,436.59	714.03	560.2
1993	98,533.51	30,598.67	30,890.12	16,143.51	12,681.94	4,602.94	989.26	1,451.80	1175.27
1994	137,290.10	12,531.57	44,587.69	43,274.48	17,271.54	11,924.82	5,111.65	1,028.95	1559.41
1995	231,515.93	133,193.30	16,471.15	39,297.74	22,146.93	11,336.09	5,565.78	2,104.11	1400.83
1996	268,983.16	69,994.44	130,760.26	20,797.14	23,240.90	12,777.76	6,405.11	3,696.69	1310.87
1997	143,508.24	9,279.48	57,189.82	56,067.88	8,711.23	7,627.08	2,577.01	1,638.94	416.8
1998	229,727.74	100,615.48	21,975.06	55,422.01	36,291.46	8,055.62	4,734.54	1,623.02	1010.56
1999	195,727.24	4,892.39	90,049.98	15,989.26	35,716.70	38,820.46	5,230.64	3,289.62	1738.19
2000	153,298.39	58,702.70	5,284.94	49,634.73	5,676.06	13,932.76	15,834.60	1,554.39	2678.2
2001	107,308.72	12,047.44	35,686.65	6,927.47	30,236.94	4,028.43	9,605.64	6,369.57	2406.58
2002	118,874.55	31,208.71	14,414.86	36,762.80	5,733.13	18,735.12	2,638.09	5,036.99	4344.84
2003	213,176.57	99,128.90	32,269.59	24,035.40	23,198.49	8,015.62	13,163.37	4,830.62	8534.58
2004	199,357.55	119,497.31	47,026.76	11,638.43	7,928.99	4,875.78	2,449.65	2,388.71	3551.91
2005	204,805.07	7,082.11	125,148.06	48,723.56	10,035.20	5,115.68	3,010.70	2,364.40	3325.36
2006	201,584.17	36,531.26	11,773.53	103,289.44	32,411.85	7,937.24	4,582.91	2,110.57	2947.37
2007	120,744.73	51,888.04	21,665.20	8,174.54	26,102.00	9,800.35	1,066.69	470.39	1577.52
2008	127,064.04	28,804.63	45,117.75	20,134.34	5,350.44	18,819.87	5,678.43	1,241.37	1917.21
2009	145,140.98	77,342.78	25,333.42	20,839.86	6,546.99	4,667.38	7,023.48	2,011.35	1375.72
2010	88,295.36	12,048.42	51,771.79	10,275.01	6,594.51	1,880.19	1,951.11	2,591.36	1182.97
2011	99,587.07	20,620.08	11,656.53	43,356.67	9,989.74	6,746.61	2,614.83	1,794.67	2807.94
2012	90,590.08	40,515.77	16,525.13	7,935.32	18,412.56	3,494.33	1,732.67	606.20	1368.12
2013	71,926.85	19,407.84	20,363.57	11,448.00	5,683.54	11,219.11	1,771.30	759.48	1274.02
2014	40,768.24	10,447.80	8,623.21	9,735.00	4,695.08	2,033.89	3,778.55	681.04	773.67
2015	158,980.65	99,618.14	17,315.45	19,727.94	11,041.13	3,426.39	3,552.12	2,771.69	1527.78
2016	142,656.19	20,530.86	80,822.32	24,344.28	9,305.47	3,725.21	1,475.29	1,203.01	1,249.75

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

Table 4. Autumn acoustic (BIAS) recruitment index (age 0; numbers in millions) for sprat (the ICES Subdivisions 22-29).

YEAR	SPR_AGE0
1991	59,472.84
1992	48,035.33
1993	5,173.57
1994	64,092.10
1995	44,364.82
1996	3,841.55
1997	45,947.64
1998	1,279.14
1999	33,320.45
2000	4,601.26
2001	12,000.66
2002	79,550.86
2003	146,334.99
2004	3,562.32
2005	41,862.94
2006	66,125.22
2007	17,821.04
2008	115,698.22
2009	12,798.16
2010	41,158.22
2011	45,186.05
2012	33,653.39
2013	24,694.37
2014	162,714.99
2015	36,900.25
2016	30,761.79

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

5.1.1.4.3. Herring in the ICES Subdivision 30

The results from 2012 survey are not consistent with the results from other years due to lower area coverage than normally. In 2012, Sweden could not support the funding for the BIAS survey in the Bothnian Sea and therefore the coverage of the ICES SD 30 was based on the Finnish data only, which resulted in half of the normal effort. In 2013, Finland installed fishing equipment and the Simrad EK-60 echosounder into the R/V “Aranda” and used the vessel in order to cover all required ICES rectangles in the Bothnian Sea. In 2014, the distance of the acoustic transects and the numbers of realized fish control-hauls were done almost as planned. Not all of the 2014 herring age samples were available at the deadline-time of data delivery for the 2015 WGBIFS meeting and therefore there could be higher uncertainty in the 2014 age composition of the fish hauls. According to the procedure, delayed data cannot be taken into account for evaluation of the tuning data in the current year.

Tuning fleet data from the October 1991, 2000, 2007-2016 BIAS surveys are accessible for the assessment of the Gulf of Bothnian herring stock (the ICES Subdivisions 30-31), the area corrected combined results are presented in Table 5.1.1.4.3.1 and Figure 5.1.1.4.3.1.

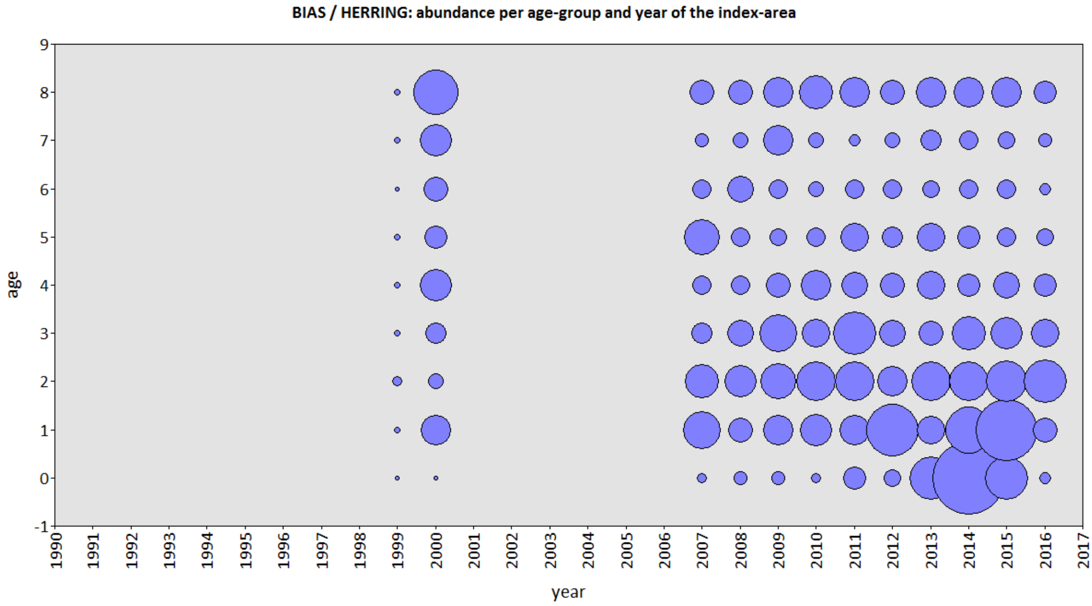


Figure 5.1.1.4.3.1. Autumn (BIAS) tuning fleet index (abundance per age groups and years 1999-2000 and 2007-2016) for herring in the ICES Subdivision 30.

Table 5.1.1.4.3.1. Correction factor and area corrected numbers (millions) of herring per age groups in the ICES Subdivision 30 (1999, 2000, 2007-2016).

YEAR	AREA_CORR_FACTOR	age 0	age 1	age 2	age 3	age 4	age 5	age 6	age 7	age 8+
1999	1.28	100.45	187.68	561.32	252.25	228.34	252.55	140.65	156.24	188.65
2000	1.06	104.19	3 846.00	928.57	1 794.16	4 429.95	2 048.50	2 704.11	4 361.30	8 552.91
2007	1.06	442.53	5 670.78	4 916.19	1 845.69	1 507.59	5 254.43	1 441.11	826.08	2 347.95
2008	1.2	859.15	2 669.79	4 846.31	3 386.30	1 649.49	1 825.30	3 344.39	1 265.96	3 049.00
2009	1.06	679.46	3 573.39	5 089.63	5 558.51	2 438.03	1 282.91	1 518.46	3 615.98	3 757.41
2010	1.06	452.73	3 989.84	6 534.82	3 500.95	3 535.59	1 576.84	982.35	891.26	4 479.00
2011	1.06	2 041.68	3 699.81	6 100.51	7 384.00	3 086.23	3 133.75	1 442.21	641.73	3 870.69
2012	1.08	1 402.04	11 647.55	3 841.53	3 108.94	2 733.63	1 868.14	1 693.16	987.30	2 494.57
2013	1.11	8 358.81	3 306.48	6 645.52	2 843.18	3 486.22	3 386.11	1 434.66	1 771.46	3 946.95
2014	1.08	22 393.65	9 007.65	6 686.09	4 905.35	2 234.93	2 126.82	1 691.66	1 550.85	3 642.34
2015	1.21	8 949.47	17 996.57	8 079.44	4 637.48	3 507.45	1 844.19	1 681.52	1 331.19	4 362.95
2016	1.07	516.11	2461.71	7523.15	3435.98	2143.38	1348.59	656.18	754.88	2257.24

5.1.2. Combined results of the Baltic Acoustic Spring Survey (BASS)

In May–June 2016, the following acoustic surveys were conducted:

Vessel	Country	ICES Sub-divisions
BALTICA	Latvia-Poland	Parts of 26, 28,
BALTICA	Estonia-Poland	Parts of 28, 29, 32
DARIUS	Lithuania	Part of 26

5.1.2.1. Area under investigation and overlapping areas

The BASS-2016 surveys were realised by the above-mentioned countries in the ICES Subdivisions 26 (northern part), 28, 29 (south-east part only) and 32 (in one ICES rectangle) (Fig. 5.1.2.1.1). The area coverage of the Baltic Sea with the BASS/2016 survey was very poor. Due to the engine problems of the R/V "Walther Herwig III", Germany was unable to conduct the BASS survey. ICES Subdivisions 24, 25 and western parts of SD 26 and 28 remained thus uncovered. One statistical the ICES rectangle 45H0 was inspected by both, Estonia and Latvia however they covered different parts of that rectangle, therefore the data from both countries was used in the calculation of the indices.

During late spring, sprat is concentrated for spawning in the Baltic deeper basins. Herring stays at this time primarily in shallow water areas close to coasts however, small fraction of herring started to migrate to deeper waters for feeding after spawning. The portion of herring is much smaller than 10% in most monitored areas. These numbers should not be used for a real investigation of herring stock abundance.

Because of relatively small portion of herring (<10%) in comparison with sprat (>90%) in most of areas monitored during the BASS surveys only the distribution of sprat is further examined.

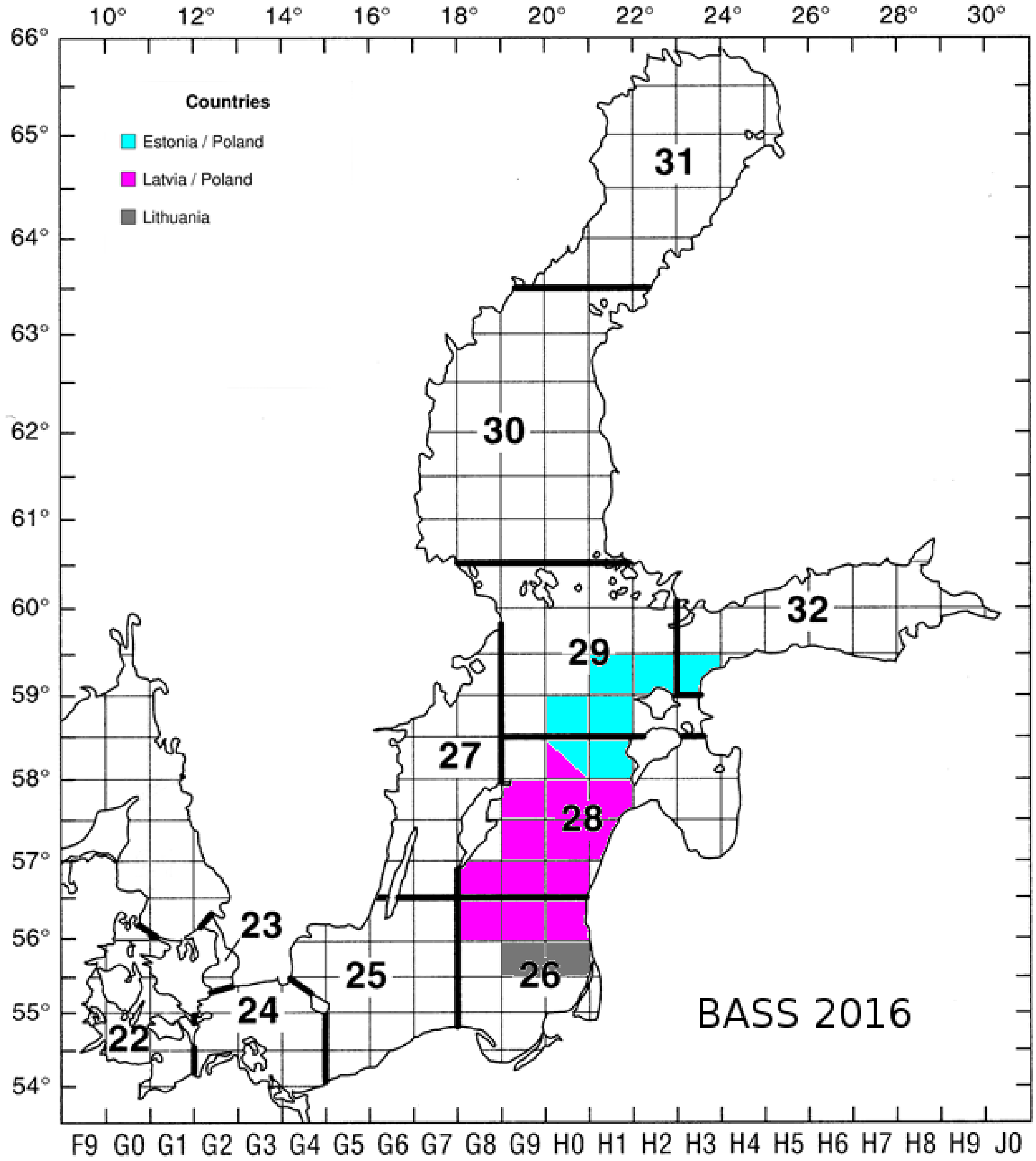


Figure 5.1.2.1.1. Map of the BASS survey conducted in May 2016. Various colours indicate the countries, which covered specific ICES rectangles and delivered data to the BASS-database, thus was responsible for this rectangle. Dot with different colour within a rectangle explain additional data in the BASS-database partly or totally covered by other countries.

5.1.2.2. Combined results and area corrected data

The geographical distribution of the sprat abundance per ICES rectangles monitored in May 2016 is demonstrated in Figure 5.1.2.2.1. The Baltic sprat stock abundance estimates per ICES rectangles and ICES subdivisions according to age groups are presented in Tables 5.1.2.2.1 and 5.1.2.2.2. During the WGBIFS 2006 meeting possible improvement of the results from acoustic surveys was discussed, and a correction factor for each ICES subdivision and year was introduced because of the coverage of the investigated areas differed in the years. This factor is the proportion to the total area of ICES subdivision (see the IBAS Manual) and the area of rectangles covered during the survey. The correction factors, calculated by ICES subdivisions for 2016 are included.

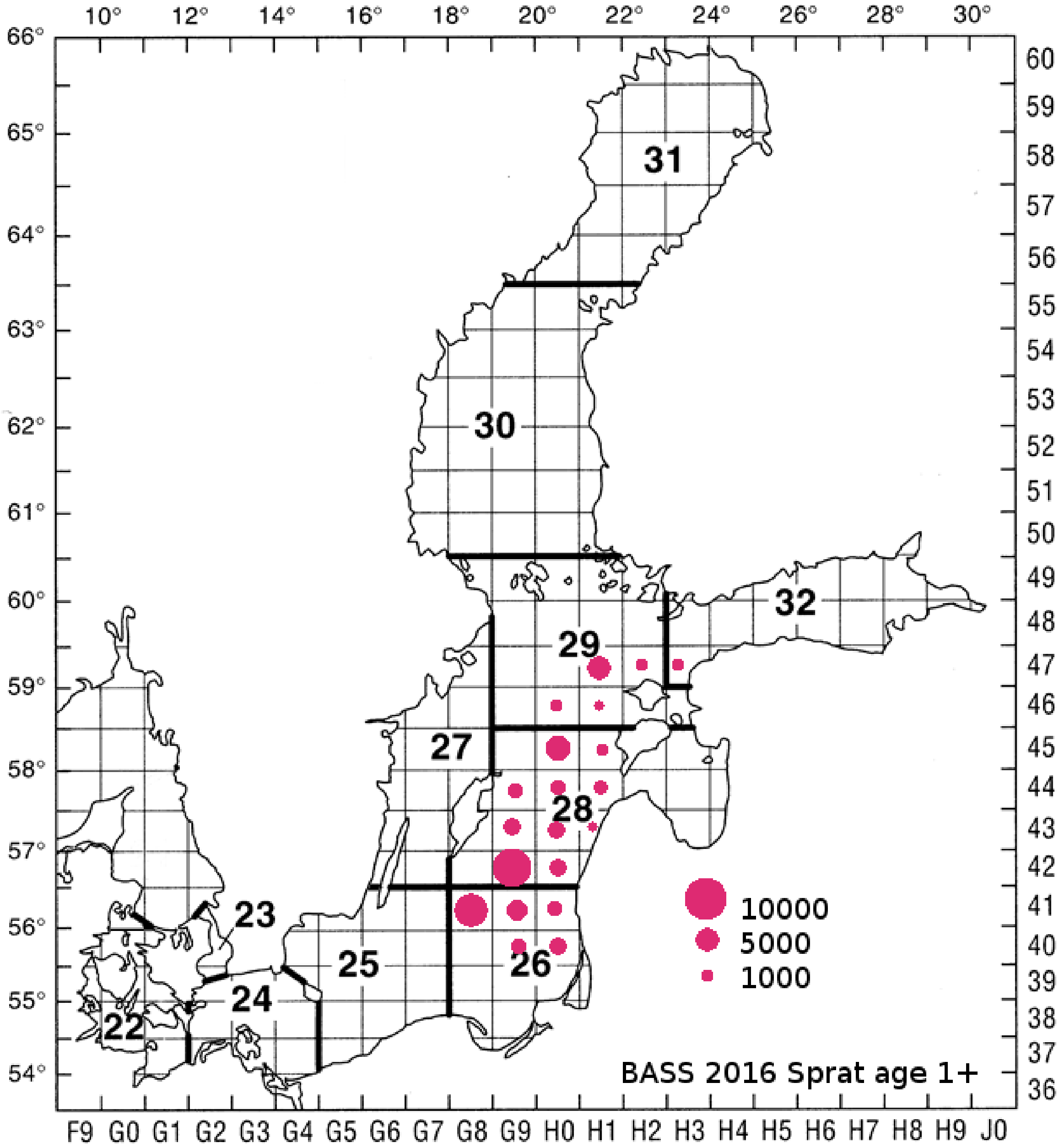


Figure 5.1.2.2.1. The abundance of sprat per ICES rectangles monitored in May 2016 (the area of circles indicates estimated numbers of specimens x10^6 in given rectangle).

Table 5.1.2.2.1. Estimated abundance (millions) of sprat in May 2016 per age groups and the ICES rectangles in given ICES subdivisions.

YEAR	Sub_Div	RECT	total	age 1	age 2	age 3	age 4	age 5	age 6	age 7	age 8+
2016	26	40G9	3,183.18	190.48	1,828.40	744.70	220.77	76.12	76.06	20.71	25.95
2016	26	40H0	4,281.74	1,035.24	1,603.79	1,047.48	323.91	134.78	62.11	60.47	13.97
2016	26	41G8	8,737.50	648.95	6,893.56	666.21	245.17	129.92		89.65	64.05
2016	26	41G9	4,794.57	539.32	3,778.31	222.36	151.19	71.70	8.02	16.69	6.98
2016	26	41H0	3,607.94	471.79	2,584.43	279.31	131.88	77.06	4.93	9.87	48.67
2016	28_2	42G9	9,197.97	1,529.58	6,536.54	484.90	309.00	174.18	91.98	34.55	37.23
2016	28_2	42H0	4,376.15	947.07	3,087.61	180.55	74.27	34.05	27.84		24.77
2016	28_2	43G9	4,379.09	322.73	3,345.43	288.45	250.68	98.13	55.70		17.96
2016	28_2	43H0	4,188.60	570.52	3,100.46	256.27	143.27	43.56	41.51	7.35	25.65
2016	28_2	43H1	1,219.58	222.31	818.94	93.48	48.31	18.85	11.78	5.89	
2016	28_2	44G9	3,619.96	423.92	2,868.45	149.34	65.04	65.72	17.89		29.59
2016	28_2	44H0	3,395.97	362.07	2,587.08	215.54	102.95	44.90	24.51		58.93
2016	28_2	44H1	2,967.59	426.28	2,073.78	204.37	135.23	67.15	33.30	10.15	17.34
2016	28_2	45H0	6,410.44	1,626.34	4,368.41	157.55	118.41	60.57	27.27	3.23	48.66
2016	28_2	45H1	3,660.99	909.87	2,485.44	92.29	62.89	49.29	34.06	5.59	21.56
2016	29	46H0	3,387.87	182.57	2,467.08	150.06	245.81	134.56	36.50	60.28	111.01
2016	29	46H1	2,344.49	289.93	1,679.86	67.55	126.81	81.26	19.50	23.95	55.63
2016	29	47H1	6,252.20	510.12	4,948.13	108.83	246.48	185.40	59.45	56.85	136.93
2016	29	47H2	2,340.62	18.08	1,851.88	59.68	156.94	100.59	34.37	35.56	83.52
2016	32	47H3	2,308.64	174.73	1,889.23	34.68	64.15	57.21		13.87	74.78

Table 5.1.2.2.2. Estimated numbers of sprat (millions) by ICES subdivisions, according to age groups (May 2016).

YEAR	Sub_Div	age 1	age 2	age 3	age 4	age 5	age 6	age 7	age 8+
2016	26	2,885.78	16,688.48	2,960.06	1,072.92	489.59	151.12	197.38	159.61
2016	28_2	7,340.69	31,272.15	2,122.73	1,310.06	656.40	365.84	66.76	281.69
2016	29	1,000.69	10,946.94	386.13	776.04	501.81	149.83	176.64	387.09
2016	32	174.73	1,889.23	34.68	64.15	57.21		13.87	74.78

5.1.2.2.1. Sprat in the ICES Subdivisions 24 – 28

Tuning Fleets for WGBFAS

The area corrected abundance estimates for sprat per ICES subdivision are summarized in Table 5.1.2.2.1.1. The corresponding biomass estimates of sprat are given in the Table 5.1.2.2.1.2. The complete time-series (2001 - 2016) of the area-corrected sprat abundance in the ICES Subdivisions 24-28 (without the Gulf of Riga) is given in the Table 5.

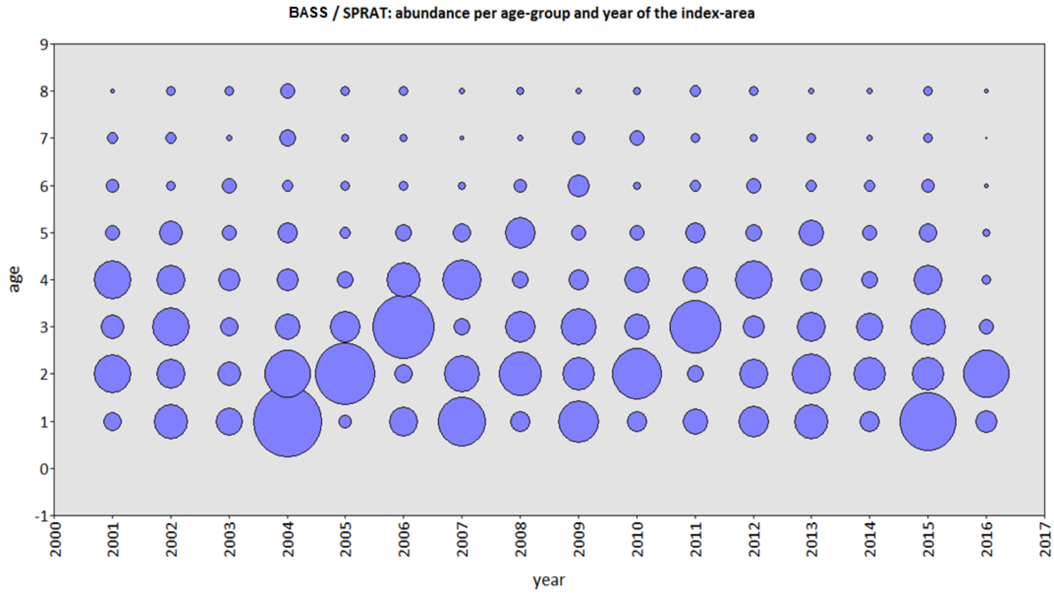


Figure 5.1.2.2.1.1. Spring (BASS) tuning fleet index (abundance per age groups and years 2001-2016) for sprat in the ICES Subdivisions 24-28.

Table 5.1.2.2.1.1. Area corrected numbers (millions) of sprat by ICES subdivisions and age groups (May 2016).

YEAR	Sub_Div	AREA_CORR_FACTOR	age 1	age 2	age 3	age 4	age 5	age 6	age 7	age 8+
2016	26	2.175176766	6,277.07	36,300.40	6,438.65	2,333.78	1,064.95	328.71	429.34	347.18
2016	28_2	1.263863342	9,277.64	39,523.72	2,682.84	1,655.74	829.60	462.37	84.38	356.02
2016	29	2.844712138	2,846.68	31,140.91	1,098.42	2,207.62	1,427.50	426.23	502.49	1,101.15
2016	32	13.98209584	2,443.13	26,415.34	484.86	896.90	799.92		193.95	1,045.54

Table 5.1.2.2.1.2. Corrected sprat biomass (in tonnes) according to ICES subdivisions and age groups (May 2016).

YEAR	Sub_Div	AREA_CORR_FACTOR	age 1	age 2	age 3	age 4	age 5	age 6	age 7	age 8+
2016	26	2.175176766	23,714.35	245,484.34	51,426.47	22,386.11	11,149.03	3,670.64	4,683.31	3,931.22
2016	28_2	1.263863342	31,716.83	241,880.15	22,789.05	16,729.13	8,231.45	4,703.59	900.33	3,759.11
2016	29	2.844712138	8,704.07	165,886.05	7,383.83	17,778.55	12,038.64	4,056.52	4,808.76	10,051.15
2016	32	13.98209584	5,744.33	124,050.32	3,702.75	7,477.98	6,688.73		2,146.29	9,431.21

Table 5. *Whole time-series of tuning indices*. Spring acoustic (BASS) tuning fleet index (numbers in millions) for Baltic sprat (the ICES Subdivisions 24-28 without GoR).

YEAR	SPR_TOTAL	SPR_AGE1	SPR_AGE2	SPR_AGE3	SPR_AGE4	SPR_AGE5	SPR_AGE6	SPR_AGE7	SPR_AGE8
2001	109 404.16	8 225.02	35 734.86	12 970.86	37 327.77	5 384.44	4 635.49	4 526.01	599.71
2002	125 782.95	27 412.12	18 982.00	36 813.57	19 044.89	14 758.59	2 517.12	3 669.81	2 584.85
2003	84 986.61	26 468.98	16 471.45	8 422.95	15 532.70	5 653.45	7 169.73	1 660.01	3 607.34
2004	258 606.73	136 162.06	65 565.92	15 783.74	11 042.29	12 655.24	3 270.65	7 805.79	6 321.05
2005	134 373.52	4 358.61	88 829.99	23 556.64	7 258.25	3 516.63	2 780.51	1 829.96	2 242.94
2006	130 287.13	13 416.63	7 980.49	76 703.20	21 045.81	5 701.71	1 970.41	1 525.76	1 943.11
2007	132 637.19	51 568.74	28 713.21	6 377.16	36 006.21	7 480.56	1 261.14	532.65	697.52
2008	102 722.51	9 029.20	40 269.65	20 164.14	5 627.08	21 187.94	4 209.97	757.16	1 477.38
2009	139 641.22	39 412.17	26 701.03	36 255.42	10 548.51	6 312.12	14 106.27	5 341.22	964.48
2010	112 784.60	9 387.20	58 680.01	15 199.18	15 963.48	5 061.93	1 653.59	5 566.35	1 272.87
2011	128 153.97	18 091.69	6 790.99	66 159.99	16 689.00	10 564.65	4 076.69	2 399.13	3 381.83
2012	107 660.52	22 699.62	22 079.78	11 274.09	35 541.24	7 515.42	5 024.69	1 367.20	2 158.48
2013	111 418.65	24 876.63	35 333.30	18 392.57	11 357.94	14 959.37	3 385.50	2 163.71	949.62
2014	76 549.35	10 144.65	26 906.62	19 857.10	7 457.71	6 098.20	3 810.12	1 217.38	1 057.57
2015	160 548.72	70 752.42	24 659.60	29 744.21	18 934.79	8 080.81	4 074.30	2 581.47	1 721.12
2016	108 392.40	15 554.71	75 824.12	9 121.48	3 989.53	1 894.54	791.08	513.72	703.20

Note: In year 2016, the inspected area coverage was very poor. It is recommended that these data should not be used.

Annex: ToR b) Update the BIAS and BASS acoustic databases

5.2. ToR b) Update the BIAS and BASS acoustic databases

After validation, the international data from the Baltic International Acoustic Survey (BIAS) and the Baltic Acoustic Spring Survey (BASS) curried out in 2016 were added to the BIAS_DB.mdb and the BASS_DB.mdb Access-databases, respectively. These databases also include queries with the used algorithms for creation of report tables and calculation of the different tuning fleets. The updated versions of the databases are located in the folder "Data" of the ICES WGBIFS-2017 SharePoint. A data transmission error was found shortly after WGBIFS-2016 meeting and corrected at checking the database (BIAS 2011, the ICES rectangles 37G8 and 40G7, missing herring datasets in the Tables 6 and 7). The correction caused changes <0.25% of the herring tuning fleets in 2011.

The results of the next international acoustic surveys (BIAS, BASS) should be summarized in table format according the IBAS Manual and latest one month before the next year meeting uploaded to the ICES WGBIFS-SharePoint. Simultaneously the acoustic-trawl data from both types of surveys should be also uploaded to the newly created database, linked with the StoX programme.

O. Kaljuste and N. Larson from Sweden were assigned as the above-mentioned (old-type) acoustic-trawl data coordinators, responsible to control that the acoustic survey results are uploaded in the right format to the ICES WGBIFS-SharePoint. Moreover, G. Kruk from Poland was assigned as the manager of the BIAS and BASS databases for aggregated data (old-type). G. Kruk in cooperation with particular national submitters will check the integrated data for errors and preliminary analysis will be performed in order to present the data to the WGBIFS meeting for further evaluations and discussion. If the countries do not submit the data to database manager in the agreed time, this work cannot be done during the WGBIFS annual meeting with the required quality. Furthermore, O. Kaljuste (Sweden) and J. Lilja (Finland) were assigned as the new-type acoustic-trawl data coordinators; the data from BIAS and BASS surveys should be uploaded before the next WGBIFS meeting to the ICES Data Center database, using the StoX programme software.

Annex: ToR c) Plan and decide on acoustic surveys to be conducted in autumn 2017 and spring 2017-2018

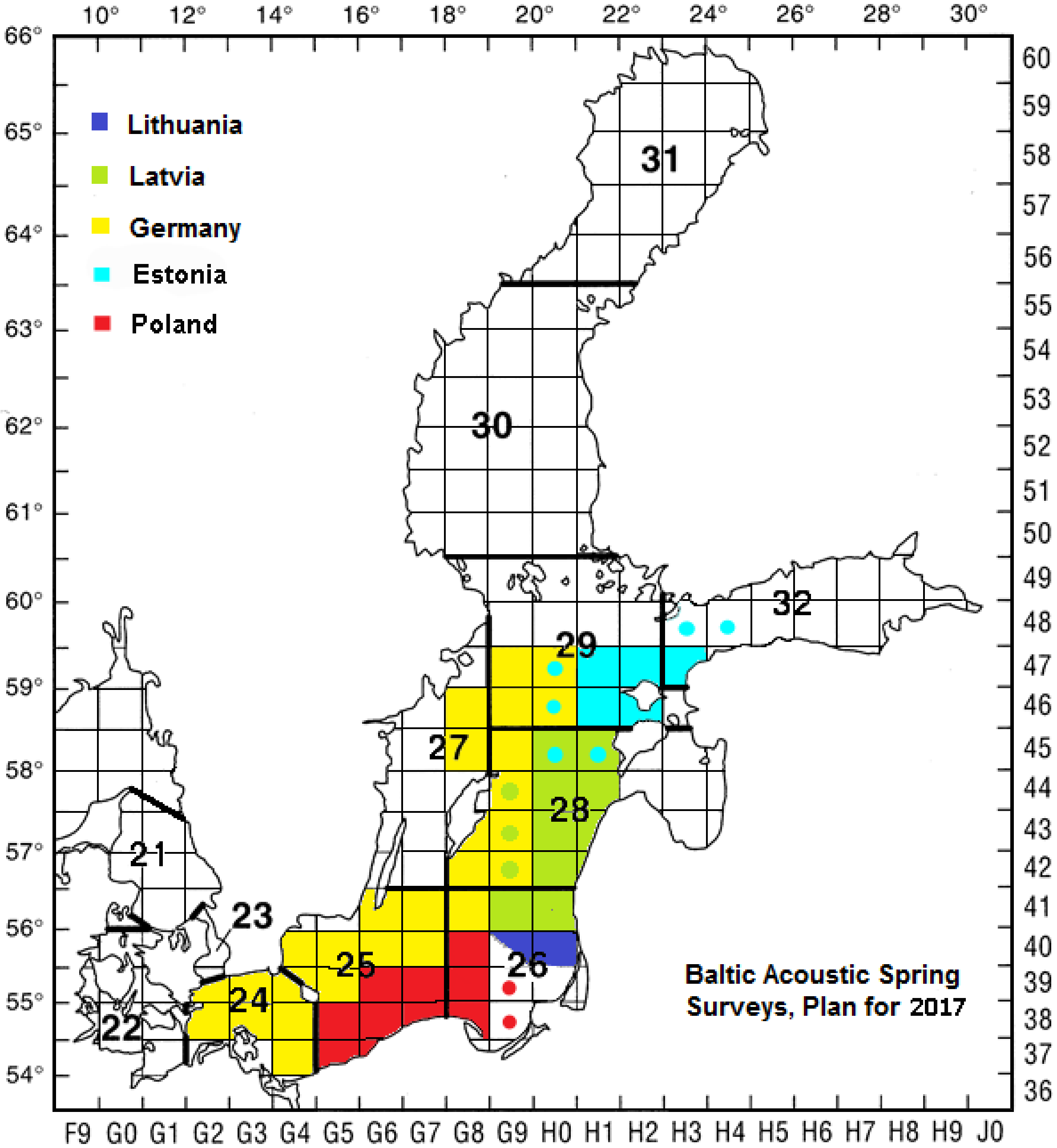
5.3.1. Planned acoustic survey activities

All the Baltic Sea countries (with the exception of Russia – St. Petersburg) intend to take part in the autumn BIAS acoustic surveys and experiments in 2017. There is also an intention to conduct the traditional Latvian/Estonian herring acoustic survey in the Gulf of Riga on July/August 2017 and 2018. Germany, Lithuania, and the joint Latvian-Polish and Estonian-Polish BASS surveys will be continued in May 2017-2018 too. In May 2017 is planned for the first time (after long-time break) the Polish BASS survey in the Polish EEZ. The list of participating research vessels and initially planned periods of particular surveys are given in tables below and the Figures 5.3.1.1-5.3.1.3 reflects areas, which will be covered with acoustic-trawl investigations during planned BASS and BIAS surveys (2017-2018).

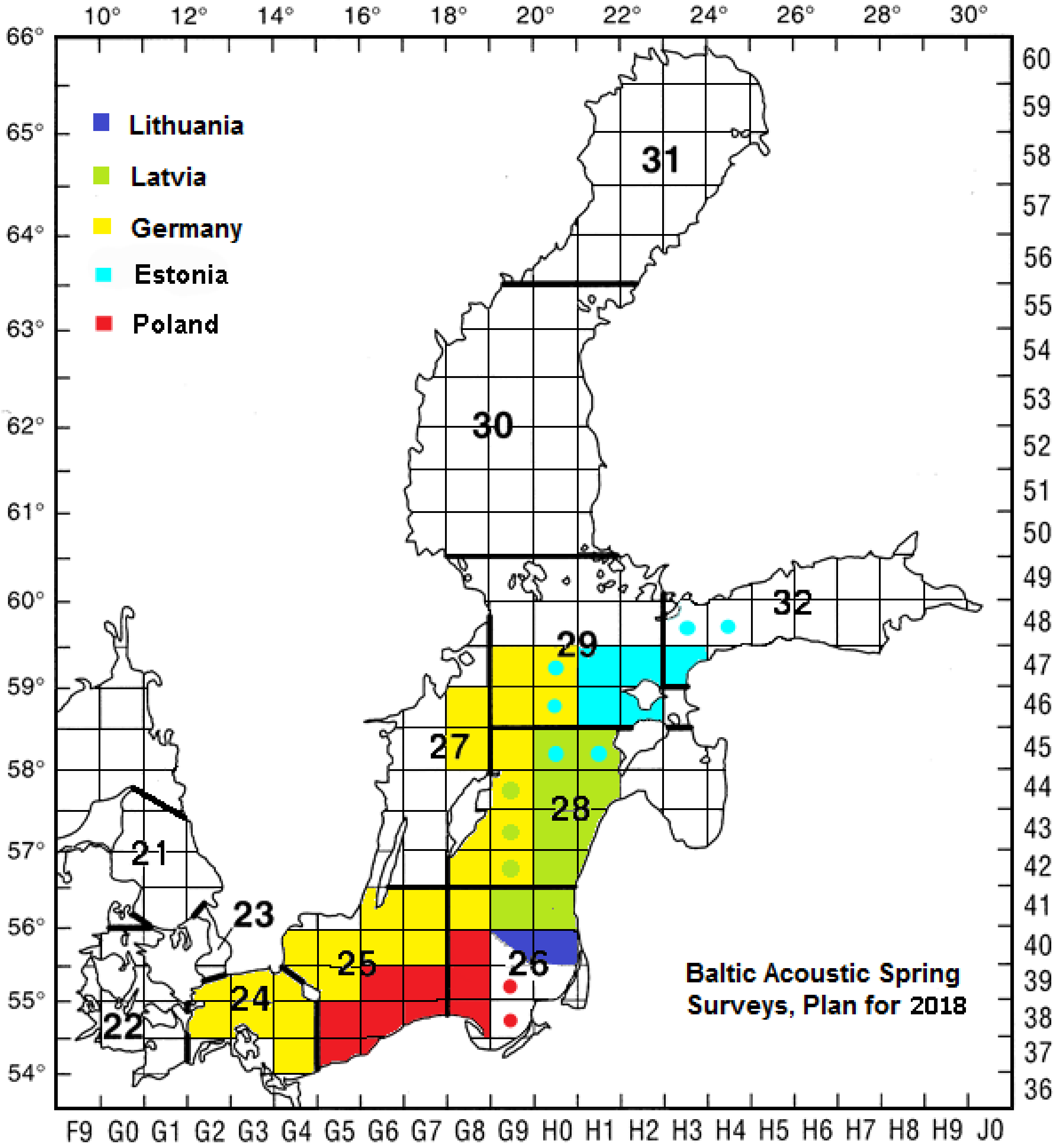
Vessel	Country	Area of investigations (ICES subdivisions)	(Preliminary) Period of investigations (**BASS-2017**)	Duration (days)
Walther Hervig III	Germany	24, 25, 26 (part), 28 (part)	03-24.05.2017	21
Baltica	Latvia-Poland	26, 28	18-25.05.2017	8
Baltica	Estonia-Poland	28(part), 29E, 32	26-31.05.2017	5
Darius	Lithuania	26 (the Lithuanian EEZ)	beginning of May 2017	2
Baltica	Poland	24 (part), 25 (part), 26 (part)	02-13.05.2017	12

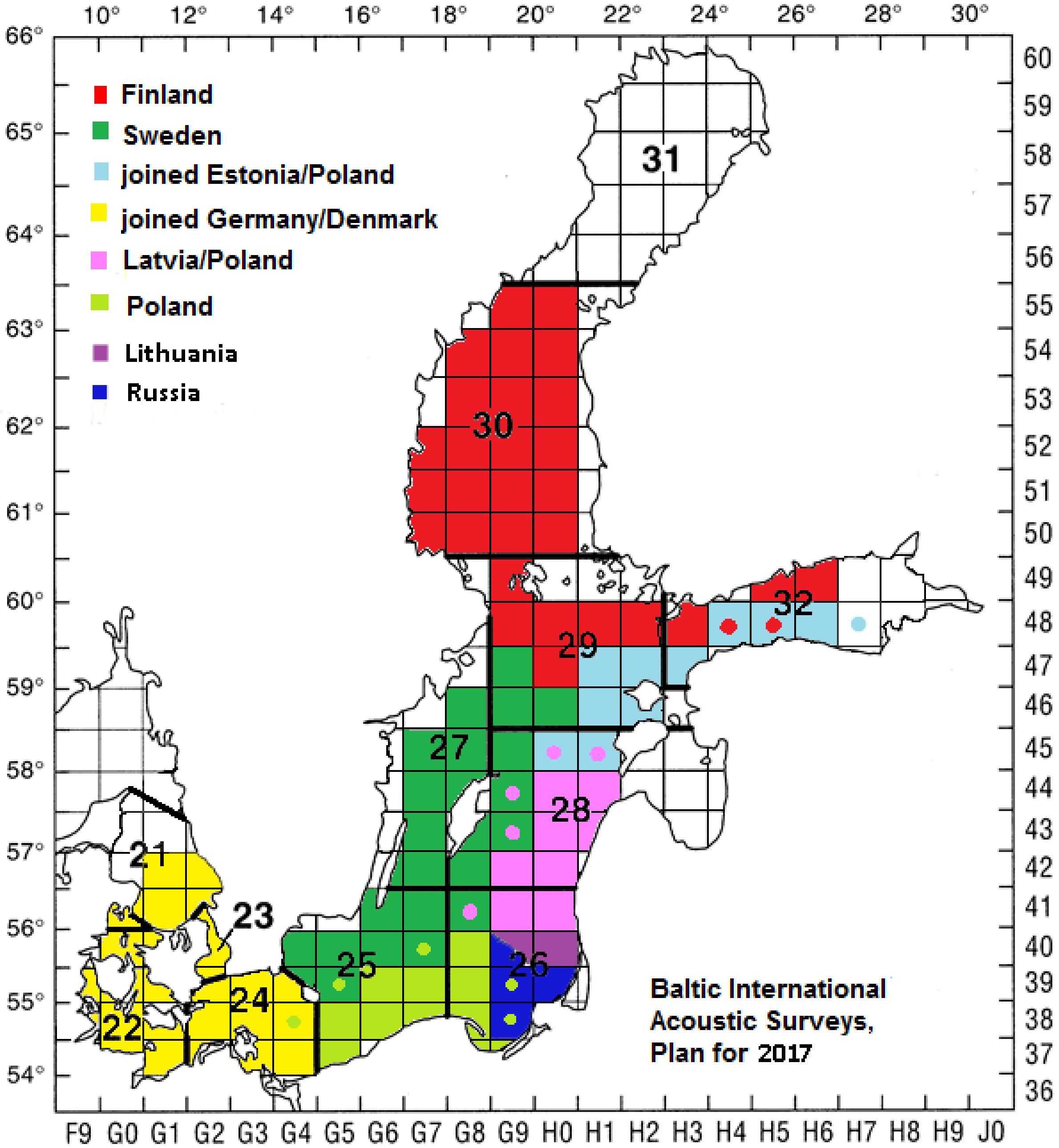
Vessel	Country	Area of investigation (ICES subdivisions)	(Preliminary) Period of investigations (**BIAS-2017**)	Duration (days)
Solea	Germany	21, 22, 23, 24	04-24.10.2017	21
Darius	Lithuania	26(part)	October 2017	2
Baltica	Latvia-Poland	26, 28	11-20.10.2017	10
Baltica	Poland	24(part), 25, 26	18-30.09.2017	18
Dana	Sweden	27, 25, 26, 28, 29	05-20.10.2017	16
Baltica	Estonia-Poland	28, 29, 32	21-31.10.2017	11
Dana	Finland	29N, 32N, 30	21.10-01.11.2017	12
Atlantniro	Russia	26	October 2017	10

Vessel	Country	Area of investigation (ICES subdivisions)	(Preliminary) Period of investigations (**BASS-2018**)	Duration (Days)
Walther Hervig III	Germany	24, 25N, 26SW, 28W, 29 (part)	May 2018	20
Baltica	Poland	24 (part), 25 (part), 26 (part)	May 2018	10
Baltica	Estonia-Poland	28 (part), 29 (part), 32 (part)	May 2018	5
Baltica	Latvia-Poland	26 (part), 28 (part)	11-19.05.2018	8
Darius	Lithuania	26 (the Lithuanian EEZ)	May 2018	2



Lithuania
Latvia
Germany
Estonia
Poland
Baltic Acoustic Spring Surveys, Plan for 2017


Lithuania
Latvia
Germany
Estonia
Poland
Baltic Acoustic Spring Surveys, Plan for 2018
10° 12° 14° 16° 18° 20° 22° 24° 26° 28° 30°
66° 65° 64° 63° 62° 61° 60° 59° 58° 57° 56° 55° 54°
60 59 58 57 56 55 54 53 52 51 50 49 48 47 46 45 44 43 42 41 40 39 38 37 36
F9 G0 G1 G2 G3 G4 G5 G6 G7 G8 G9 H0 H1 H2 H3 H4 H5 H6 H7 H8 H9 J0
21 22 23 24 25 26 27 28 29 30 31 32



Figures 5.3.1.1–5.3.1.3. The planned coverage of the Baltic Sea and the assignment of the national/joint acoustic surveys to the ICES rectangles during the May 2017 and 2018, and September/October 2017 surveys (from top to bottom). Base colours of rectangles indicate the country or joint survey, which is responsible for this ICES rectangle. Coloured dots indicate overlapping coverage by other countries (sometimes only parts of rectangle are covered).

Annex ToR d) Discuss the results from BITS surveys performed in autumn 2016 and spring 2017

5.4.1. BITS 4th quarter 2016

During the BITS-Q4/2016 surveys the level of realized valid hauls was relatively high (94%) vs. planned and Denmark, Germany, Estonia, Poland, Sweden, Russia, Lithuania and Latvia participated in cruises in the ICES Subdivisions 20-29 (Table 5.4.1.1, Figure 5.4.1.1). Sweden was able to substitute most of the allocated catch-stations, which the Swedish military prohibited to inspect.

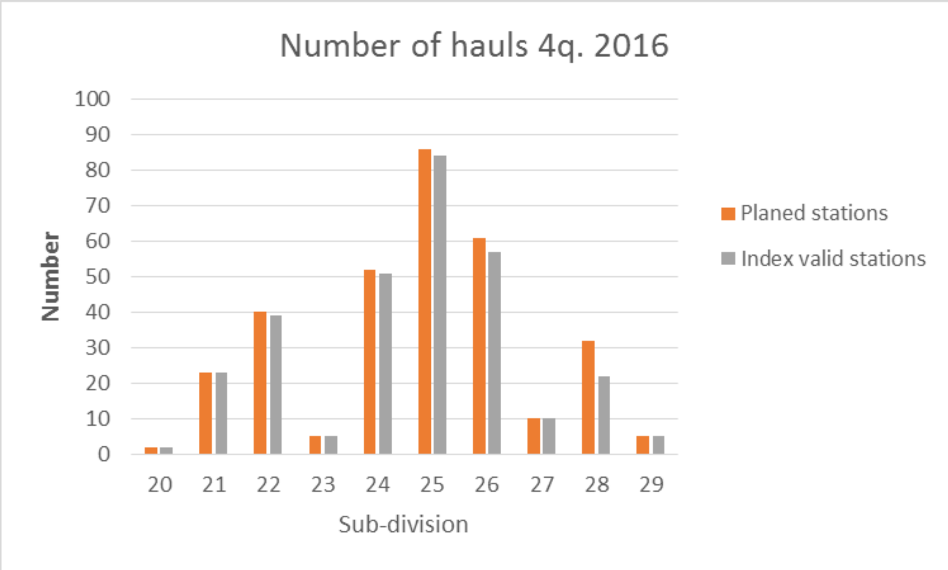


Figure 5.4.1.1. Comparison of the planned (BITS-Q4 2016) and the index-valid catch-stations by ICES subdivisions and depth layers.

Table 5.4.1.1. Comparison of the planned fishing-stations and realized during the BITS-Q4 2016 by ICES subdivisions and depth layers.

ICES subdivi-sions	Gear (TVL,TVS)	Depth strata (1–6)	Number of hauls planed	Number of valid hauls realized using "standard" ground trawl	Number of valid hauls realized using rock-hoppers	Number of assumed zero-catch hauls	Number of replacement hauls	Number of invalid hauls	% stations fished
21	TVS	1	5	5	0	0	0	0	100
21	TVS	2	13	13	0	0	0	0	100
21	TVS	3	1	1	0	0	0	0	100
21	TVS	4	3	3	0	0	0	0	100
21	TVS	5	1	1	0	0	0	0	100
21	TVS	ALL	23	23	0	0	0	0	100
22	TVS	1	30	28	0	0	1	2	97
22	TVS	2	10	10	0	0	0	0	100
22	TVS	ALL	40	38	0	0	1	2	98
23	TVS	1	4	4	0	0	0	0	100
23	TVS	2	1	1	0	0	0	0	100
23	TVS	ALL	5	5	0	0	0	0	100
24	TVS	1	18	17	0	0	1	0	100
24	TVL/TVS	2	30	28	0	0	0	0	93
24	TVL	3	4	5	0	0	0	0	125
24	TVL/TVS	ALL	52	50	0	0	1	0	98
25	TVL	2	14	13	0	0	0	1	93
25	TVL	3	30	28	0	0	2	0	100
25	TVL	4	29	27	0	1	0	0	97
25	TVL	5	13	12	0	0	0	0	92
25	TVL	6	0	1	0	0	0	0	NA
25	TVL	ALL	86	81	0	1	2	1	98
26	TVL/TVS	2	8	7	0	0	0	0	88
26	TVL/TVS	3	11	10	1	0	0	0	100
26	TVL/TVS	4	15	10	1	2	0	0	87
26	TVL/TVS	5	19	15	1	2	1	0	100
26	TVL	6	8	5	1	1	0	0	88
26	TVL/TVS	ALL	61	47	4	5	1	0	93

27	TVL	3	2	0	0	0	0	0	0
27	TVL	4	4	4	0	1	1	0	150
27	TVL	5	1	0	0	1	0	0	100
27	TVL	6	3	0	0	2	1	0	100
27	TVL	ALL	10	4	0	4	2	0	100
28	TVL	2	7	0	2	0	0	1	29
28	TVL/TVS	3	9	5	3	0	1	0	100
28	TVL/TVS	4	11	3	5	1	0	0	82
28	TVL	5	5	0	0	2	0	0	40
28	TVL/TVS	ALL	32	8	10	3	1	1	69
29	TVS	2	2	2	0	0	0	0	100
29	TVS	3	2	2	0	0	0	0	100
29	TVS	4	1	1	0	0	0	0	100
29	TVS	ALL	5	5	0	0	0	0	100
ALL SD		ALL	314	261	14	13	8	4	94.3

5.4.2. BITS 1st quarter 2017

During the BITS-Q1/2017 surveys the level of realized valid hauls was very high (99%) vs. planned. The above-mentioned surveys were realised by Denmark, Germany, Poland, Sweden, Lithuania and Latvia in the ICES Subdivisions 22-28 (Table 5.4.2.1, Figure 5.4.2.1).

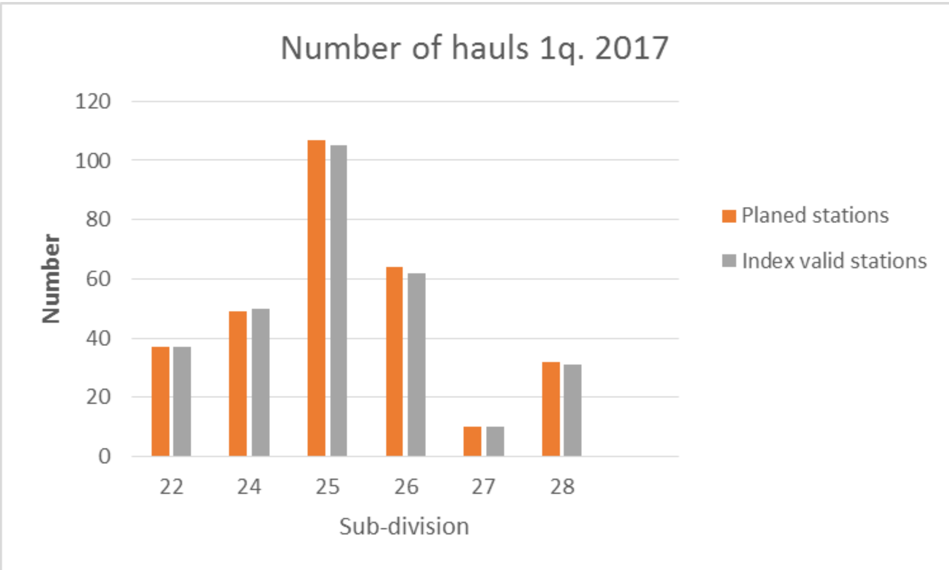


Figure 5.4.2.1. Comparison of the planned and the index-valid fishing-stations by ICES subdivisions and depth layers (the BITS-Q1/2017).

Table 5.4.2.1. Comparison of the planned and realized control-catches by ICES subdivisions and depth layers (the BITS-Q1/2017).

ICES subdivi-sions	Gear (TVL, TVS)	Depth strata (1–6)	Number of hauls planed	Number of valid hauls realized using "standard" ground trawl	Number of valid hauls realized using rock-hoppers	Number of assumed zero-catch hauls	Number of replacement hauls	Number of invalid hauls	% stations fished
22	TVS	1	29	28	0	0	1	0	100
22	TVS	2	8	8	0	0	0	0	100
22	TVS	ALL	37	36	0	0	1	0	100
24	TVS	1	20	20	0	0	1	0	105
24	TVL/TVS	2	26	24	0	0	2	1	100
24	TVL	3	3	3	0	0	0	0	100
24	TVL/TVS	ALL	49	47	0	0	3	1	102
25	TVL	2	18	17	0	0	0	0	94
25	TVL	3	39	35	0	0	2	1	95
25	TVL	4	38	35	0	0	0	0	92
25	TVL	5	12	15	0	0	0	0	125
25	TVL	6	0	1	0	0	0	0	NA
25	TVL	ALL	107	103	0	0	2	1	98
26	TVL/TVS	2	9	8	0	0	0	0	89
26	TVL/TVS	3	14	13	1	0	0	0	100
26	TVL/TVS	4	17	16	1	0	0	0	100
26	TVL/TVS	5	21	18	1	1	0	0	95
26	TVL	6	3	1	1	1	0	0	100
26	TVL/TVS	ALL	64	56	4	2	0	0	97
27	TVL	3	2	2	0	0	0	0	100
27	TVL	4	4	1	0	3	0	0	100
27	TVL	5	1	0	0	1	0	0	100
27	TVL	6	3	0	0	3	0	0	100
27	TVL	ALL	10	3	0	7	0	0	100
28	TVL	2	7	1	4	0	1	0	86
28	TVL	3	9	3	5	0	1	0	100
28	TVL	4	10	1	9	0	0	0	100
28	TVL	5	6	0	4	1	0	0	83
28	TVL	6	0	0	1	0	0	0	NA
28	TVL	ALL	32	5	23	1	2	0	97
ALL SD		ALL	299	250	27	10	8	2	99

5.4.3. Update and the re-programming of BITS catch-stations allocation from the Tow-Database

To speed up the process of preparation the final version of the Tow-Database it is necessary that all countries submit the feedback immediately after the BITS survey accomplishment (see ToR d). Some catch-stations were deleted or were corrected in the Tow-Database dependent on the information of the different countries. More than 90% of the catch-stations, which are stored in the Tow-Database, were already successfully used at least one time. It should be underlined that the standard groundrope of the TV-3 trawl must be used when the catch-station was successfully carried out during earlier surveys with this gear.

The feedbacks from BITS surveys inserted into the Tow-Database should contain information about:

- ICES subdivision,
- start and end position (latitude, longitude) of trawling of particular haul,
- ship course during fishing,
- mean seabed depth,
- bottom depth range,
- codes of the running hauls,

¤ evaluation the process of realised catch-stations and e.g. explanation of reason for deleting the given haul from the T-D.

Full set of codes for characterizing the different type of realization of hauls was defined and is presented in WGBIFS-2016 Report, Annex ToR e, Ch. 5.5.2.1. Moreover, the current used structure of the Tow-Database was described in the WGBIFS 2005 Report and in the BITS Manual.

The re-programming of BITS catch-stations allocation from the Tow-Database

Discussed and initially agreed during the WGBIFS-2017 meeting a new re-programming of BITS catch-stations allocation from the Tow-Database is summarized in the ToR d and widely described in the working paper "Allocation of BITS hauls from TD" (Annex 8). The program is made in *R*, provides the list of hauls from the Tow-Database to be fished by each participating countries, and replaces the existing procedure consisting of a combination of various software. The program follows the same method as already agreed by the WGBIFS and used in the past, but includes an additional module, which makes it possible to request extra hauls during the ongoing survey. This module allows drawing additional hauls to the regular allocated hauls if excess survey time is available. The additionally catch-stations cannot be made in other countries EEZ without permission and therefore the hauls must be situated in the own EEZ or international zone.

5.4.3.1. Reworking of the Database of Trawl Surveys (DATRAS)

During the WGBIFS-2017, meeting any essential changes in the Database of Trawl Surveys (DATRAS) wasn't made. Hitherto existing changes were described in the WGBIFS-2016 Report (incl. annexes) and some minor incorrectness is listed in Annex 10 to this year report.

Annex ToR e) Plan and decide on demersal trawl surveys and experiments to be conducted in autumn 2017 and spring 2018

The procedure used for allocating ground trawl catch-stations to ICES subdivisions and depth layers was described in Annex ToR e of the WGBIFS-2015 Report (see also Annex 3 "Method used for planning the BITS" of the WGBIFS-2004 Report). The method for allocating catch-stations to the ICES SDs was slightly adapted in 2015, according to the new definition of the stock structure of cod in the Baltic Sea, created during WKBALTCOD in March 2015. The most of institutes intend to participate in the BITS-Q4/2017 and BITS-Q1/2018 surveys have nearly the same plans regarding the numbers of control-hauls as in the previous seasons, but location of the catch-stations per country was significantly revised during the WGBIFS-2016 meeting.

The planning of catch-stations in the ICES SDs 24, 25 and 26 in the framework of the BITS-Q4/2017 and the BITS-Q1/2018 was partly influenced by the rule introduced in February 2016 by the Polish government, concerning the work of international research vessels in the Polish EEZ. Accordingly, to this new rule an administrative observer of the government must be on board of the international research vessels if they work in the Polish EEZ. The position of Denmark and Germany is still that they will not realize fishing stations in the Polish zone (as was previously) during the next BITS surveys among-others due to applied the above-mentioned rule.

The total number of catch-stations committed by the countries and ICES subdivisions in the framework of the BITS-Q4/2017 and the BITS-Q1/2018 is listed in Table 5.5.1. Allocated ground trawl hauls by ICES subdivisions and the depth layers for autumn survey in 2017 are presented in Table 5.5.2 and the corresponding allocation for spring 2018 in Table 5.5.3. According to the recommendations of the WGBIFS-2011 meeting, all countries involved in realization of the BITS catch-stations should upload to DATRAS information related to all fished species.

Table 5.5.1. Total numbers of catch-stations planned by particular countries during the BITS surveys in autumn 2017 and spring 2018.

COUNTRY	VESSEL	NUMBER OF PLANNED STATIONS IN AUTUMN 2017	NUMBER OF PLANNED STATIONS IN SPRING 2018
Germany	Solea	57	60
Denmark	Havfisken	27	27
Poland	Baltica	3	7
	Total 22 + 24	87	94
Denmark	Dana	50	50
Estonia	commercial vessel	5	0
Finland	Aranda	0	0
Latvia	Baltica	25	25
Lithuania	Darius	6	6
Poland	Baltica	57	74
Russia	Atlantniro/Atlantida	0	0
Sweden	Dana	30	50
	Total 25 - 28	173	205
	Total 22, 24 - 28	**260**	**299**

Table 5.5.2. Allocation of planned fishing-stations by ICES subdivisions and depth layers in autumn 2017 (BITS-Q4).

	ICES SUBDIVISION						
DEPTH LAYER [M]	22	24	25	26	27	28	TOTAL
10 – 39	29	24	22	8	0	7	90
40 – 59	5	13	24	9	2	7	60
60 – 79	0	16	24	12	4	9	65
80 – 100	0	0	14	14	4	5	37
100 – 120	0	0	0	8	0	0	8
Total	**34**	**53**	**84**	**51**	**10**	**28**	**260**

Table 5.5.3. Allocation of planned catch-stations by ICES subdivisions and depth layers in spring 2018 (BITS-Q1).

	ICES SUBDIVISION						
DEPTH LAYER [M]	22	24	25	26	27	28	TOTAL
10 – 39	33	25	26	9	0	8	101
40 – 59	5	14	31	10	2	8	70
60 – 79	0	17	29	16	4	11	77
80 – 100	0	0	16	16	4	6	42
100 – 120	0	0	0	9	0	0	9
Total	**38**	**56**	**102**	**60**	**10**	**33**	**299**

Annex ToR h) Analyses related to the improvement of quality of acoustic indices and estimation of the uncertainty. Review the progress of the ICES acoustic-trawl survey database design and the development of the StoX software

5.8.2. Review the progress of the ICES acoustic-trawl survey database design and the development of the StoX software

Acoustic surveys provide important fishery-independent estimates for Baltic herring and sprat stocks resource and because of this all analyses related to the improvement of quality of acoustic indices and estimation of the uncertainty are very needed.

The important phase in an improvement of the IBAS surveys acoustic and biotic data storage and utilization is implementation of the StoX software (programme), elaborated under the "AtlantOS" project and managed by the ICES Data-Center. The ICES acoustic data portal is accessible at *http://ices.dk/marine-data/data-portals/Pages/acoustic.aspx*.

One day of the WGBIFS-2017 meeting was devoted special deliberation, connected with exercises, which can be named "Review the progress of the ICES acoustic-trawl survey database design and the development of the StoX software to enable usage of IBAS methodology for the calculation of acoustic estimates based on the WGBIFS data". The evaluation of status of the StoX programme development, was the additional, however essential task of the WGBIFS-2017 meeting. Because of this fact, a small group of experts invited by WGBIFS chair and the sub-group of the WGBIFS members deliberated on this matter. By this opportunity were prepared: acoustic data portal validation rules and the list of various acoustic surveys uploaded to the system (until Feb. 2017) and validated. The files named "Acoustic validation of existing upload Feb2017.xlsx" and "Acoustic Data Portal Validation rules.xlsx" are located in the folder "07. Software" of the ICES WGBIFS-2017 Meeting docs - SharePoint. In the first file are listed various acoustic surveys with evaluated errors in acoustic or biotic data and proposed action to eliminate all incorrectness; some comments are also added. The need of resubmission or information that resubmission is most likely not needed is indicated too. In the second, in turn a file can be found the list with description of validation rules and quality checks in an acoustic database.

At the WGBIFS meeting in March 2017, a review on the progress of the ICES acoustic-trawl survey database design and the development of the StoX software was presented by O. Kaljuste, Sweden with some comments made by H. Parner, from the ICES Data Centre (Annex 9). In the presentation "Review the progress of the ICES acoustic-trawl survey database design elaborated under the AtlantOS project…" can be found information among-others about expected the next stages in development of the ICES acoustic data portal and fully implementation of the StoX programme to the IBAS surveys.

A number of quality control checks have been applied in the acoustic-trawl survey database, which will prevent obviously wrong data from getting into the acoustic database and from there into the indices estimates using StoX. Consequently, some data already within the database needs to be resubmitted. The WGBIFS members having submitted not fully correct data into the acoustic database will be contacted by an acoustic data manager on what's wrong and how to resubmit the data in question. Additionally, ICES Data Centre recreated GIS layer of ICES Subdivisions/Statistical Rectangles/>10 meter depth covered by IBAS and sent the layer of polygons to the StoX developers at the IMR-Bergen.

Comparison of fish stocks abundance at the length calculations for each ICES rectangle between the StoX software and the standard IBAS method was done using the test dataset. It resulted by 1-3% difference in fish abundance. The reason behind this difference is the use slightly different approach to split NASC by species. Tests showed that both methods gave the same NASC by species. However, the calculation operation from NASC to fish number by length group by species differs between those two methods. After the production of NASC values by species, the StoX software estimates a relative length distribution by station for each species and makes a total length distribution for each species for the ICES rectangle. According to the IBAS method, the length distribution used is the same as used for the split NASC operation which means that the total length distribution of one species in a rectangle is affected by the catch of other species (through the weighting of the various stations).

After the WGBIFS 2017 meeting have StoX developers decided not to add this different IBAS calculation method into the software features. Accordingly, to the StoX team very recent opinion (May 2017), other acoustic surveys (outside the Baltic) have used the same method as the IBAS calculation method, and the final decision whether the original method should be used in the future, as a part of the StoX, should be taken after consultancies, before the BIAS-2017 survey begins. Despite the minor difference in the final result, the StoX team recommend to use the method already implemented in the StoX as this gives users the opportunity to combine different acoustic categories and also retrieve estimated NASC by species by log-distance (nice for mapping).

It should be underlined that the above-mentioned additional task, realised at the WGBIFS-2017 meeting, was preceded by the WKBIFS-ACOU workshop organized at the beginning of December 2016 at the ICES headquarters.

The ToRs for the WKBIFS-ACOU workshop were to:
a) evaluate the existing national computational tools used for the acoustic abundance estimations of sprat, herring and cod in the Baltic Sea,
b) test run StoX estimation software using existing data reported into ICES new acoustic database before the workshop,
c) establish baseline parameters within StoX for use during future BIAS/BASS surveys,
d) provide feedback to the ICES Data Centre on the new acoustic trawl data format/database,
e) provide feedback to StoX developers to address outstanding issues.

Hjalte Parner from the ICES Data Centre gave an overview about the status of the ICES Acoustic data portal and new database for acoustic-trawl surveys.

Before the workshop, most of the countries participating in BIAS and BASS surveys have uploaded the acoustic and biotic data from 2015 through the acoustic data portal into this new database for testing out StoX as assessment tool.

Olavi Kaljuste from WGBIFS gave an insight into the existing national computational tools used for the acoustic abundance estimations of sprat, herring and cod in the Baltic Sea. The current national computerization methods follow a very robust abundance estimation protocol, which in addition allows diverse implementation nationally by combining the national survey estimates by the ICES statistical rectangles within the ICES subdivisions into the final annual tuning indices. However, the current computerization method is not transparent and difficult to reproduce centrally even having a central acoustic database.

Espen Johnsen and Atle Totland from IMR-Bergen, presented the StoX software, including the data requirements from the ICES Data Centre. Abundance estimations done using the StoX framework are transparent and reproducible. In addition, StoX is very flexible as new methods can be developed at any time and as a tool, StoX makes it apparent how the national calculations are done and as such facilitate discussions to improve and share methods.

For the period of the WKBIFS-ACOU workshop, Elor Sepp from WGBIFS produced one working input dataset uploaded to the ICES acoustic data portal and downloadable in StoX format for testing purposes. He also provided StoX developers with a list of all log distances, trawl hauls and values for fish target strength-length relationship constants for all species used for the calculation of fish abundances in specific ICES rectangle in order to test StoX split NASC function. During the WKBIFS-ACOU workshop, the ICES Acoustic data format was adjusted in order to cope with the sampling methodology used during BIAS and BASS surveys and the possibilities in using StoX was introduced.

A task force group with Olavi Kaljuste (Sweden) and Juha Lilja (Finland) as contact persons from the Baltic International Fish Survey Working Group (WGBIFS) group was created to carry out the next steps in an implementation of the StoX software to the IBAS surveys. The task force group is the link between WGBIFS, the ICES Data Centre and the StoX team and will assure by testing that the ICES Acoustic data format and the StoX survey estimation software perform as expected in order for WGBIFS to use StoX for calculating their annual tuning indices going forward.

Annex ToR i) Coordinate the marine litter sampling programme in the Baltic International Trawl Survey (BITS) and registering the data in the ICES database. The status of Baltic cod stomachs sampling in BITS surveys

Marine litter sampling and reporting

Based on EC's Marine Strategy Framework Directive, WKMAL requested WGBIFS to discuss at the meeting in 2012, the suggested collection and storage of information about the marine litter (anthropogenic origin) appearances in bottom fish catches during the BITS surveys. Systematically monitoring of the spatial and temporal distribution of marine litter in the Baltic Sea as one parameter of the Marine Strategy Framework Directive – can be source of the Baltic environment status evaluation in time and space (MSFD descriptor; Report of the joint MEDPOL/Black Sea/JRC/ICES Workshop on Marine Litters; WKMAL/2011).

The WGBIFS at the meeting in 2015 agreed that since autumn 2015, the marine litter data will be collected during the BITS-Q1 and BITS-Q4 surveys as regular procedure obeyed by all participated countries. The standard protocol, which was developed for the IBTSWG was adapted for WGBIFS purposes and is used for the exchange of marine litter data sampled in the Baltic Sea. The report from marine litter findings should be prepared in a standard database format. Marine litter data submitters will transfer data using the new DATRAS Trawl litter standard format, implementing ICES vocabulary and classification coding, described in the suitable manual, or via the Litter Reporting Format (ERF3.2; *vide* Annex 12), downloadable here: http://www.ices.dk/marine-data/data-portals/Pages/DATRAS-Docs.aspx. Standard form is accessible also from the WGBIFS-2017 SharePoint. The sheet and description of the marine litter categories that need to be collected at each fish catch-station are attached to the BITS Manual (2017). Each type of marine litter that is collected will be submitted in the format mentioned on the Table 5.2.2.1 and then uploaded to DATRAS. Once collected, these data can be sending by delegate to the WGBIFS or by the marine litter sampling co-coordinator. All data should be uploaded by haul, number, weight and size (Tables 5.2.2.2 and 5.2.2.3 in the BITS Manual 2017).
The about 300 fishing-stations, which are realised during BITS-Q1 and BITS-Q4 surveys can be used to improve the sample intensity related to the marine litter distribution.

Submission of the marine litter data from the current BITS surveys into DATRAS Litter database is in a good progress; there are many new facilities provided from DATRAS to improve and faster submission process, i.e.:

- improved data screening procedures and defined new checks base on position, and new references,
- cross check against submitted Trawl HH record,
- exchange data available on promptly soon after upload,
- HH and LT records are in the same file.

The status of submission of marine litter data from BITS-Q1 and BITS-Q4 per country and years 2012-2016 is accessible in Annex ToR i, the WGBIFS-2016 Report.

Baltic cod stomachs sampling

The Working Group on Multispecies Assessment Methods (WGSAM) in 2010 proposed the realization of stomach sampling of the main predator fish in the North Sea and the Baltic Sea to improve the basic knowledge concerning the species interactions in relation to the multispecies approach. On this basis, the EU project MARE/2012/02 "Study on stomach contents of fish to support the assessment of good environmental status of marine food webs and the prediction of MSY after stock restoration" was funded and realized from December 1, 2012 and lasted for 24 months. The WGBIFS at the meeting in 2014 decided that Baltic cod stomachs sampling procedure (Annex ToR i and the BITS Manual-2017), widely described within the EU project MARE/2012/02 manual, would be adopted for realization during the

BITS-1q and BITS-4q surveys. According to the Manual 10 cod stomachs per 1-cm length class from each the ICES Subdivisions (22-26, 28) in the 1st and the 4th quarter should be collected in the BITS surveys. The set of 10 stomachs may include also empty stomachs; however, stomachs that are obviously regurgitated are discarded. Within each ICES SD, a wide geographical coverage of samples should be obtained whenever possible. Detailed description of cod stomachs sampling procedures was inserted to the WGBIFS-2015 Report and annexes as well to the BITS Manual-2017. The list of Baltic cod and flounder stomachs collected in November 2016 and February-March 2017 for feeding analyses is mentioned below:

	BITS-Q4/2016	BITS-Q1/2017	BITS-Q4/2016	BITS-Q1/2017
Sweden	416	577	357	417
Denmark	-	835	-	-
Finland	-	-	-	-
Germany		-	-	-
Poland	511	662	-	-
Latvia	48	439	-	-
Estonia	-	-	-	-
Lithuania	-	-	-	-
Russia	884		-	-
Total	1859	1678	357	417

Annex ToR j) Discuss the possibilities to make further standardizations of IBAS. An attempt to standardize the pelagic fishing gear used in BIAS and BASS surveys

The WGBIFS in 2005 realized the first phase of the standardization various types of fishing gears applied in the BIAS and BASS surveys, i.e. then was recommended that for fishing in areas westward and eastward from the meridian 18°00'E adequately, 10- and 6-mm mesh bar length in the codend will be used in the pelagic trawl. However, the specification of technical construction of applied fishing gear and a set of rigging to this one was not discussed and not unified.

During the WGBIFS-2015 meeting K. Stanuch (chair invited expert from Poland) presented an own overview of the existing constructions of both commercial and research pelagic trawls used in the Baltic Sea and with expected steps for the standardization (see Annex 10 of the WGBIFS 2015 report). The group admitted that with this initiative only the first step has been done and the practical ways of should be further discussed.

At the WGBIFS/2016 meeting, the technical-schemes of national pelagic trawl gears used in the BIAS and BASS surveys were presented by Poland, Germany, Russia and Finland (available at the WGBIFS/2016 SharePoint; in the folder Background documents - Pelagic gear in BIAS_BASS surveys). It appeared that the construction, shape and size, inlet area as well as the rigging of those trawls is different. Even the trawl doors were very different and some of them in use were actually designed for demersal hauls. Because of the fish unique behaviour, the reaction on these gears can be different. The unlike inlet area and other parameters of trawls, e.g. differences in netting size of the front part of these trawls, different meshes, leads to different catchability properties of the fishing gears and determined various cpue of fish. The trawls from Poland, Germany and Finland have similar size; this is only concerns the circumference, which gives only information about inlet area. If we assume the same mesh-opening factor (0.3) the theoretical inlet area of smallest trawl is app. 150 m^2 and biggest one is 2000 m^2. The Swedish and Finnish delegates informed the WGBIFS that, they have already ordered and use relatively new pelagic fishing gears and do not like to implement for BIAS surveys any new standard gear however, they suggested performing an experiment focused on observations how the fish behaves in the front part of trawl and about the trawl catchability. For this experiment, the underwater cameras will be mounted to the headrope and footrope of trawl. It should be underlined that in 2016, similarly like at the previous meeting, only the Polish expert on fishing gear constructions was attended in a part time the WGBIFS meeting. No fishing gear experts from other countries were present at the meeting and therefore a constructive and critical discussion on this topic was not possible.

Because of lack of the fishing gear specific competence among the WGBIFS members, the group was not able to come up with any proposal regarding the specification of the new standard pelagic trawl gear. WGBIFS asked the ICES – FAO Working Group on Fishing Technology and Fish Behaviour (WGFTFB) for advice (ICES EG Recommendations 2016 – ID 51 and Annex 4 of the WGBIFS 2016 report), which type of pelagic trawl, incl. rigging (e.g. type of trawl doors), would be the best for BIAS and BASS surveys in the Baltic Sea conditions. WGFTFB has not replied to our request. Despite this temporal problems the WGBIFS/2017 agreeing on the need for standardization of trawl for acoustic surveys in the next years.