Acoustic Herring Survey report for RV "DANA"

28th June 2011 – 11th July 2011

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Cruise summary

Total days	14
Days of monitoring	11
Number of acoustic samples, ESDU	1535
Number of trawl hauls	35
Number of CTD stations	37
Number of measured fish	23520
Number of aged and race-splitted herring.	2652
Number of aged sprat	419

1. INTRODUCTION

Since 1991 the DTU National Institute of Aquatic Resources (DTU AQUA) has participated in the ICES co-ordinated herring acoustic survey of the North Sea and adjacent waters with the responsibility for the surveying the Skagerrak and Kattegat area.

The actual 2011-survey with R/V DANA, covering the Skagerrak and Kattegat, was conducted in the period June 30 to July 11 2011, while calibration was done during June28 3 to June 30 2011.

2. SURVEY

2.1 Personnel

During calibration 28/6 – 30/6-2011
Bjarne Stage (cruise leader)
Bo Lundgren (assisting cruise leader)
Torben Filt Jensen
Peter Faber
Mads Larsen
Frank V Knudsen
Ronny Sørensen
Eik Ehlert Britsch
An Hoai Pham

During acoustic monitoring 5/7 - 16/7-2009
Bjarne Stage (cruise leader)

Torben Filt Jensen (assisting cruise leader)
An Hoai Pham
Søren Grønby
Susanne Hansen
Helle Andersen
Nina Fuglsang
Frank V Knudsen
George Karatzas

2.2 Narrative

The survey of R/V Dana started on June 28 at 10.00 UTC with departure from Hirtshals heading towards Bornö in Gullmar Fjord, Sweden for calibration of the acoustic equipment. The vessel was anchored at Bornö in the Gullmar Fjord, Sweden early in the evening of June 28. The calibration was initiated in the morning of June 29 and continued until the morning of June 30.

At June 30 noon the scientific crew was exchanged outside the harbour of Skagen. After the short break, R/V Dana steamed northwest towards the border between Skagerrak and the North Sea. The acoustic integration was initiated on July 1 at 00,02 UTC at 57º52'N, 06º53'E.

During the evening of June 30 the wind had increased to above 13 m/s from northwest and continued at this level until the morning of July 2. The heavy wind introduced noise in the upper layer in the water and the towed body with the 38 kHz transducer were lowered to 5-6 m depth. The first trawl haul at 10.00 UTC at July 1 were conducted at 57º08'N, 06º17'E. But the rest of the trawl hauls during July first had to be cancelled due to the weather and fishery had to be stop until the morning July 2.

The North Sea and western Skagerrak area was covered during the period July 1 – 5, eastern Skagerrak during July 5 – 8 and Kattegat during July 9 – 11. The acoustic integration was ended July 11 at 57º45'N, 10º49'E at 07,19 UTC. R/V Dana arrived at Hirthals at 1100 UTC on July 11.

Totally the survey covered about 1900 nautical miles. Data from the 38 kHz echosounder were recorded mainly using a 38 kHz paravane transducer running at depths of 3 – 5 m, the depth depending on the sea state and sailing direction relative to the waves. Simultaneously, data from the 120 kHz and 18 kHz echosounders using hull-mounted transducers were also recorded. The quality of the latter data is strongly dependent on the weather conditions, but this year the weather was calm, so no data had to be excluded due to the weather. During trawling hull-mounted transducers were used for all three frequencies.

2.3 Survey design

The survey was carried out in the Kattegat and Skagerrak area, east of 6° E and north of 56° N (Fig. 1). The area is split into 8 sub-areas.

In principal the survey is designed with parallel survey tracks at right angles to the depth lines with a spacing of 10-15 nm in the area west of 10°E. Due to limitations regarding available time periods and places for fishing (late morning, early afternoon and immediately before and after midnight;

and a limited amount of fishable positions for bottom trawl hauls) this structure cannot not be kept strictly. Along the Swedish coast the transects are planned as east-west transects with a spacing of 10 nm approximately at right angles to the coastline. In Kattegat the survey track was made in a zigzag pattern adapted to the depth curves and the relatively heavy ship traffic.

2.4 Calibration

The echosounders were calibrated at Bornö in the Gullmar Fjord, Sweden during June28 - June 30 2011. The calibration was performed according to the procedures established for EK60 with three frequencies (18, 38 and 120 kHz). This was the second calibration of the year, the previous one just before a cruise to the Norwegian Sea in May. The calibration of the paravane split-beam transducer at 38 kHz was done against a 60 mm copper sphere. The calibration of the three hull-mounted split-beam transducers at 18, 38 and 120 kHz were carried out against 63mm, 60 mm and 23 mm copper spheres, respectively. The results were close to those from the previous calibration earlier in May, and for 38 kHz on the towed body close to results from previous years. The calibration and setup data of the EK60 38 kHz used during the survey are shown in Table 1.

2.5 Acoustic data collection

Acoustic data were collected using mainly the Simrad EK60 38 kHz echosounder with the transducer (Type ES 38 7x7 degrees main lobe) in a towed body. The towed body runs at approx. 3 m depth in good weather and down to about 6 -7 m, as needed, depending on the weather conditions, this year mostly at 4 – 5 m. The speed of the vessel during acoustic sampling was 9 – 11 knots. Also EK60 18 kHz and 120 kHz data were collected. They have not been directly used for the survey estimate, but as an aid during judging when distinguishing between fish and plankton. The acoustic data were recorded as raw data on hard disk 24 hours a day also during fishing operations. During trawl hauls the towed body is taken aboard and the EK60 38 kHz echosounder run on the hull transducer, but data taken during fishing periods are not used for the biomass estimate. The sampling unit (ESDU) was one nautical mile (nm). For the purpose of the later judging process, raw data is pre-integrated into 1 m meter samples for each ping. These samples are stored in separate files one for each ESDU. Integration is conducted from 3 m below the transducer to 1 m above the bottom or to max 300 m depth.

2.6 Biological data - fishing trawls

The trawl hauls were carried out during the survey for species identification. Pelagic hauls were carried out using a FOTÖ trawl (16 mm in the codend), while demersal hauls were carried out using an EXPO trawl (16 mm in the codend). Trawling was carried out in the time intervals 1000 to 1600 and 2030 to 0300 UTC , usually two day hauls (pelagic on larger depth and demersal in shallow waters) and two night hauls (mostly surface or midwater). The strategy was to cover most depth zones within each geographical stratum with trawl hauls. One-hour hauls were used as a standard during the survey.
The total weight of each catch was estimated and the catch sorted into species. Total weight per species and length measurements were made. The clupeid fish were measured to the nearest 0.5 cm total length below, other fish to 1 cm, and the weight to the nearest 0.1g wet weight. From each trawl haul 10 herring (if available) per 0.5 cm length class were collected and frozen for individual determination in land-laboratory of length, weight, age, race (North Sea autumn spawners or Baltic Sea spring spawners) and maturity. Fourier Shape Analyses calibrated to micro-structure formed

in the otoliths during the larval period was used for the discrimination of herring race. Maturity was determined according to an 8-stage scale as also used by Scotland.

2.7 Hydrographic data

CTD profiles with a Seabird 911 were made immediately before or after each trawl haul. Salinity and temperature were measured continuously during the cruise at an intake at about 5 m depth. Data is stored together with position and weather data in the vessel's general information system The distribution of CTD stations is similar to trawl hauls and shown in Fig. 2.

2.8 Data analysis

The raw data is pre-integrated into 1 m samples for each ping and divided into 1 mile datasets and stored on harddisk as files. Scrutiny of the acoustic data is done for a fixed set of layers (3-6 m, 6-10, 10 – 20 and so on) for each mile, using special judging software. The software allows ignoring data from layers and/or intervals with interference from wave- or ship wake-bubbles or rarely with interference from bottom-integration. In areas with heavy abundance of jellyfish or zooplankton, usually krill, manually adjustable thresholds are applied separately to each layer to suppress background echoes.

For each subarea (56E06 – 58E08, C – E in Fig.1) the mean backscattering cross section was estimated for herring, sprat, gadoids and mackerel based on the standardized TS-relationships given in the Manual for Herring Acoustic Surveys in ICES Division III, IV, and IVa (ICES 2000):

$$\text{Herring TS} = 20 \log L - 71.2 \text{ dB}$$
$$\text{Sprat TS} = 20 \log L - 71.2 \text{ dB}$$
$$\text{Gadoids TS} = 20 \log L - 67.5 \text{ dB}$$
$$\text{Mackerel TS} = 20 \log L - 84.9 \text{ dB}$$

where L is the total length in cm. The number of fish per species is assumed to be in proportion to the contribution of the given species in the trawl hauls. Therefore, the relative density of a given species is estimated by subarea using the species composition in the trawl hauls. The nearest trawl hauls are allocated to subareas with uniform depth strata. The length-race and length-age distributions for herring are assumed to be in accordance with combined length-race and length-age distributions in the allocated trawl hauls.

Length-age and length weight relationships by race for the herring were made based on the age and race analysis made on the frozen samples of single fish after the cruise.

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3. RESULTS & DISCUSSION

3.1 Acoustic data

The total number of acoustic sample units of 1 nm (ESDU's) used in the stock size calculation is 1535. The numbers of ESDU's per stratum are given in Table 2. Table 2 also shows the mean Sa and mean TS per stratum used in the abundance estimation. The outline of the strata is shown in Figure 1 and the cruise track for the survey is shown in Figure 2.

Historically, herring and sprat have not been observed in midwater trawl hauls at depths below 150 meters. Therefore, layers below 150 meter have been excluded from the estimation.

The relative herring density in numbers per nm^2 along the cruise track is shown in Figure 3. In 2011 the herring was distributed in more patches in Skagerrak and northern Kattegat with low concentrations along the Norwegian coast and in southern Kattegat. The main concentration of herring is in 2010 primarily distributed in ICES squares 43F8, 44F9, 44G0, 44G1(Fig. 5). This distribution is quite different from 2008 when the main concentration was further west (west of 8˚ E) (see fig 5). The main distribution pattern is more like the pattern in 2009 except that a larger part is found in Skagerrak along the Danish coast and in Kattegat than in 2009 (see Fig. 4).

3.2 Biological data

During the survey in 2011 35 hauls were conducted, 17 surface hauls and 18 bottom hauls. The geographical distribution of hauls is shown in Fig. 2 and details on the hauls and catches are given in Table 3 and 4.

The total catch for the survey was 21,1 tons. Herring was present in 32 hauls with a total catch of 9.7 tons or 46% of the total catch. Length distributions of herring per haul are given in Table 5.

Sprat was only present in the hauls in Kattegat (stratum E). The total sprat catch was 500 kg or 19 % of the total catch in Kattegat.

For the total survey area herring, mackerel and sprat contributed to the total catch by 46%, 23 % and 2 % respectively.

Herring maturity

Based on the frozen single fish herring samples (3678 specimens) from each haul, where race analysis of the otoliths was used to differentiate between North Sea herring and Western Baltic herring, a maturity by age key was made for both races. It is given in the text table below. For North Sea autumn spawners specimens with maturity stage ≥3 and/or age ≥5 are regarded as mature and for Baltic spring spawners specimens with maturity stage ≥2 and/or age ≥5 are regarded as mature.

North Sea autumn spawners:

Skagerrak											
WR	0	1i	1m	2i	2m	3i	3m	4i	4m	5	6
%	100.00	100.00	0.00	61.36	38.64	27.78	72.22	33.33	66.67	100.00	100.00

North Sea			
WR	0	1i	1m
%	100.00	100.00	0.00

Kattegat							
WR	0	1i	1m	2i	2m	3i	3m
%	100.00	100.00	0.00	100.00	0.00	100.00	0.00

Baltic Sea spring spawners:

Skagerrak															
WR	0	1i	1m	2i	2m	3i	3m	4i	4m	5	6	7	8	9	10
%	100.00	95.28	4.72	36.13	63.87	9.09	90.91	0.65	99.35	100.00	100.00	100.00	100.00	100.00	100.00

North Sea			
WR	0	1i	1m
%	100.00	100.00	0.00

Kattegat														
WR	0	1i	1m	2i	2m	3i	3m	4i	4m	5	6	7	8	9
%	100.00	91.72	8.28	39.68	60.32	3.85	96.15	0.00	100.00	100.00	100.00	100.00	100.00	100.00

Sprat maturity

Based on 419 sprat collected over all length classes and hauls including sprat age, weight and maturity keys were established. The maturity key for sprat is shown in the text table below. Sprat with maturity stage ≥3 and/or age ≥3 are regarded as mature

WR	1i	1m	2i	2m	3	4	5	6	7	8
%	28.57	71.43	26.63	73.37	100	100	100	100	100	100

3.3 Biomass estimates

Herring

The total herring biomass estimate for the Danish acoustic survey with R/V Dana in July 2011 is 345,488 tonnes of which 47,9% or 165,589 tonnes is North Sea autumn spawners and 52.1 % or 179,898 tonnes is Baltic Sea spring spawners.

For the total number of herring the survey results give 8,855 mill, of which 58.2 % are North Sea autumn spawners and 41.8 % are Baltic Sea spring spawners.

The estimated total number of herring, mean weight, mean length and biomass per age and maturity stage in each of the surveyed strata are given in Table 6 and 7 for North Sea autumn spawners and Baltic spring spawners respectively.

A comparison for the results of the last 6 years surveys are given in the text table below.

	2006	**2007**	**2008**	**2009**	**2010**	**2011**
Autumn spawners						
Number in mill.	1530	4443	4473	9679	2723	5156
Biomass in tons	98786	315176	80469	157707	148946	165589
Spring spawners						
Number in mill.	6407	8847	7367	1326	1461	3699
Biomass in tons	471850	614048	450505	146590	88597	179898

North Sea autumn spawners

From 2006 to 2007 there was an increase in the abundance of autumn spawners of 190 % and in the biomass of 219 %. The age structure in the abundance for 2006 and 2007 showed the same pattern with 86 % and 91 % of the total abundance as 1 WR for the two years respectively. This increase corresponds to an overall increase of the abundance of autumn spawners in the survey area.

From 2007 to 2008 the abundance of autumn spawners showed an increase of 0.7% whereas the biomass showed a decrease of 74%. As it can be seen from Table 8 this contradictory development between abundance and biomass is the result of a dramatic change in age composition of the abundance from 2007 to 2008. In 2007 1 WR contributed to 91 % of the abundance of autumn spawners, whereas the 0 WR contributes to 88 % of the abundance in 2008. (Table 8).

From 2008 to 2009 the abundance of autumn spawners showed an increase of 116 % and the biomass showed an increase of 96%. As it can be seen from Table 8 the abundance in 2009 is dominated by 0 and 1 WR (81 and 19 % respectively. The abundance of 0 WR are the double of what was seen in 2008 and 1 WR are than 4 times the abundance in 2008.

From 2009 to 2010 the abundance of autumn spawners has decreased by 72 % where as the biomass has decreased with 6%. From Table 8 it can be seen that the abundance is dominated by 1 WR in 2010 where it was dominated by 0 WR in 2008 and 2009. It looks as if the age structure in the abundance is on it way back to the structure seen in 2006 and 2007 (see Table 8)

From 2010 to 2011 the abundance of autumn spawners has increased by 89% whereas the biomass has increased with 7%. From table 8 it can be seen that the abundance of autumn spawners are dominated by 1 WR as in 2010 but the abundance of 0 WR and 2 WR has increased compared to 2010.

Baltic Sea spring spawners

For the spring spawners no large changes in the age structure over the years from 2006 to 2008 have been seen (see Text table).

From 2008 to 2009 there has been a decrease in the abundance of 82 % and in the biomass of 67 %. From Table 9 it can be seen that the major part of the difference in abundance between 2008 and 2009 lies in a decrease in the abundance of 0-3 WR.

From2009 to 2010 the abundance has increased with 9 %, whereas the biomass has decreased with 39.6%. From Table 9 it can be seen that there has been a change in the age structure of the spring spawners from 2009 to 2010. The abundance of 0-3 WR has increased with 39 % and the abundance of 4-13 WR has decreased with 83 %. This shift in the age structure of the abundance is reflected in the biomass.

From 2010 to 2011 the abundance has increased with 153 % and the biomass has increased with 96%. 2009 was the year with the lowest abundance in a period of the last 6 years and 2010 was the year with the lowest biomass. 2009 was exceptional with a very lower percentage of 0-3 WR compared to 4-13 WR. Whereas the age structure from 2010 and 2011 are back to the age structure seen before 2009 with abundance with approx.95 % 0-3WR and approx.5% 4-14 WR (see Table 9)

Sprat

The total abundance estimate of sprat for the Danish acoustic survey with R/V Dana in July 2011 is 1574.20 million corresponding to a biomass at 27464 ton. All sprats were in 2011 found in Kattegat Strata E during the Danish Acoustic survey in Kattegat and Skagerrak June-July 2011.

Abundance, biomass, mean length and mean weight per WR and strata are given in Table 10.

Figure 1. Map showing the survey area for the Danish acoustic survey with R/V Dana in July 2010. The map shows the subareas (strata) used in the abundance estimation.

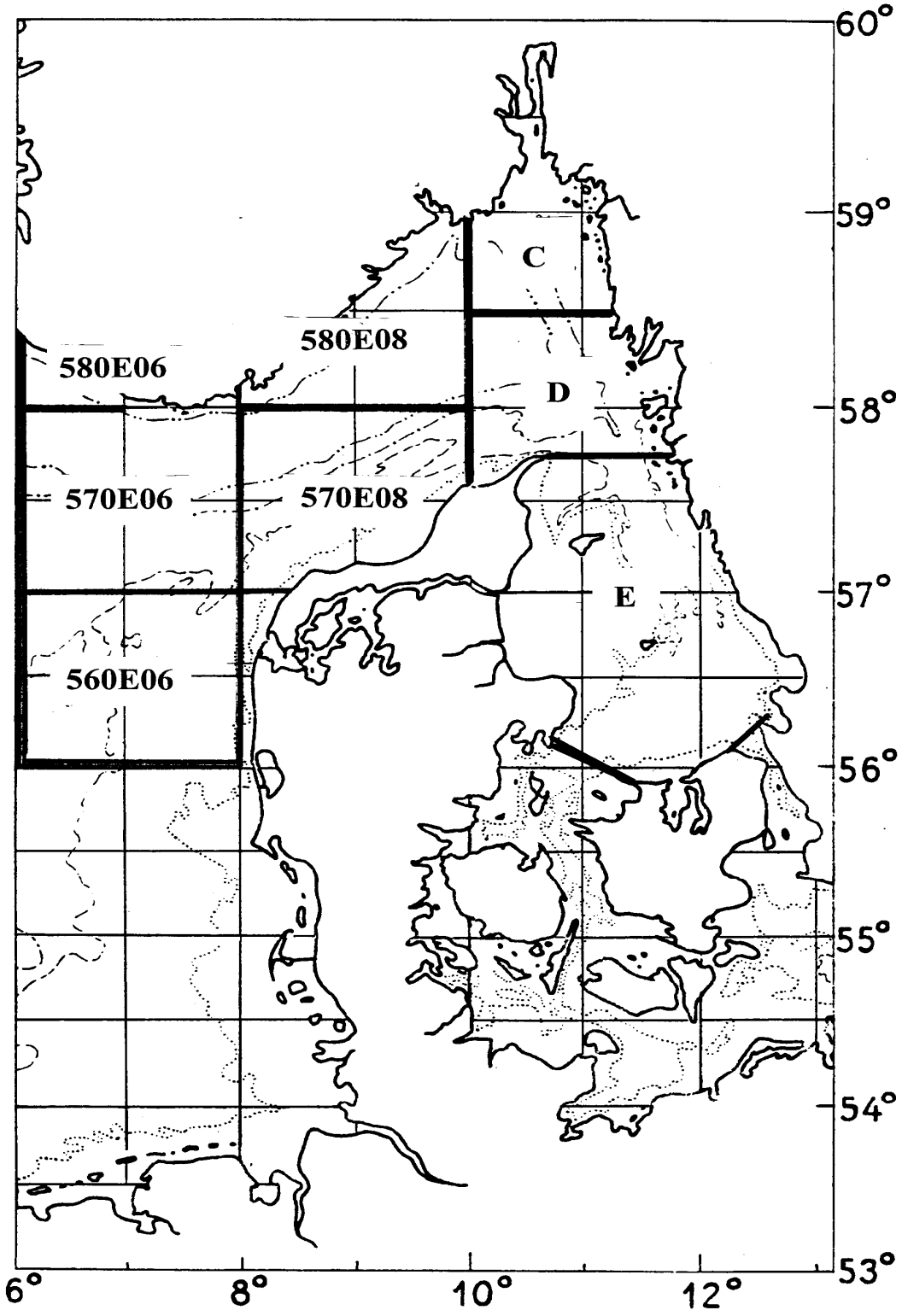

Figure 2. Map showing cruise track and trawl stations during the Danish acoustic survey with R/V Dana in July 2011.

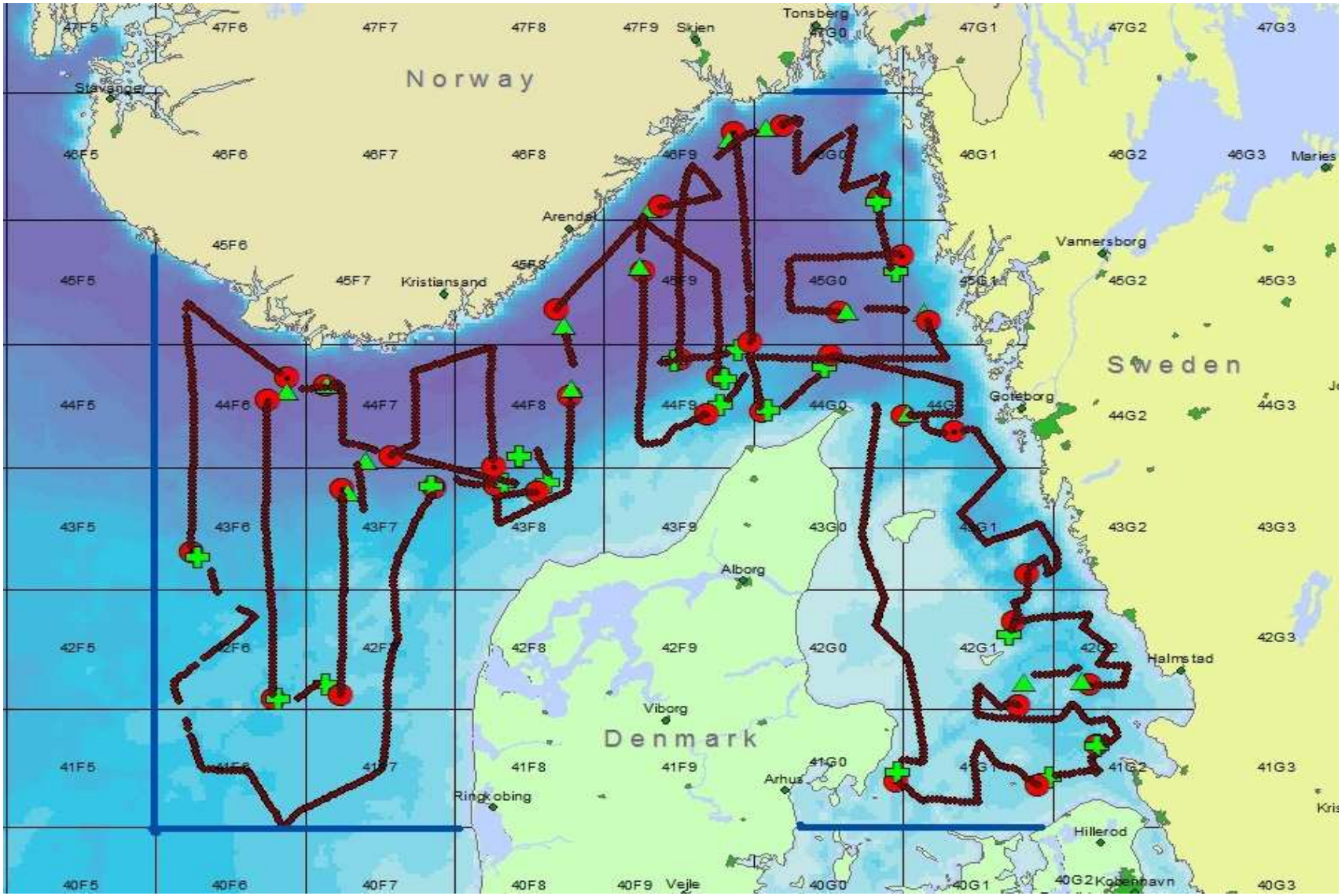

Figure 3. Relative herring density (in numbers per nm²) along the track of the July 2011 Danish acoustic survey in the eastern North Sea, Skagerrak and Kattegat. Red circles indicate relative density of herring per ESDU.

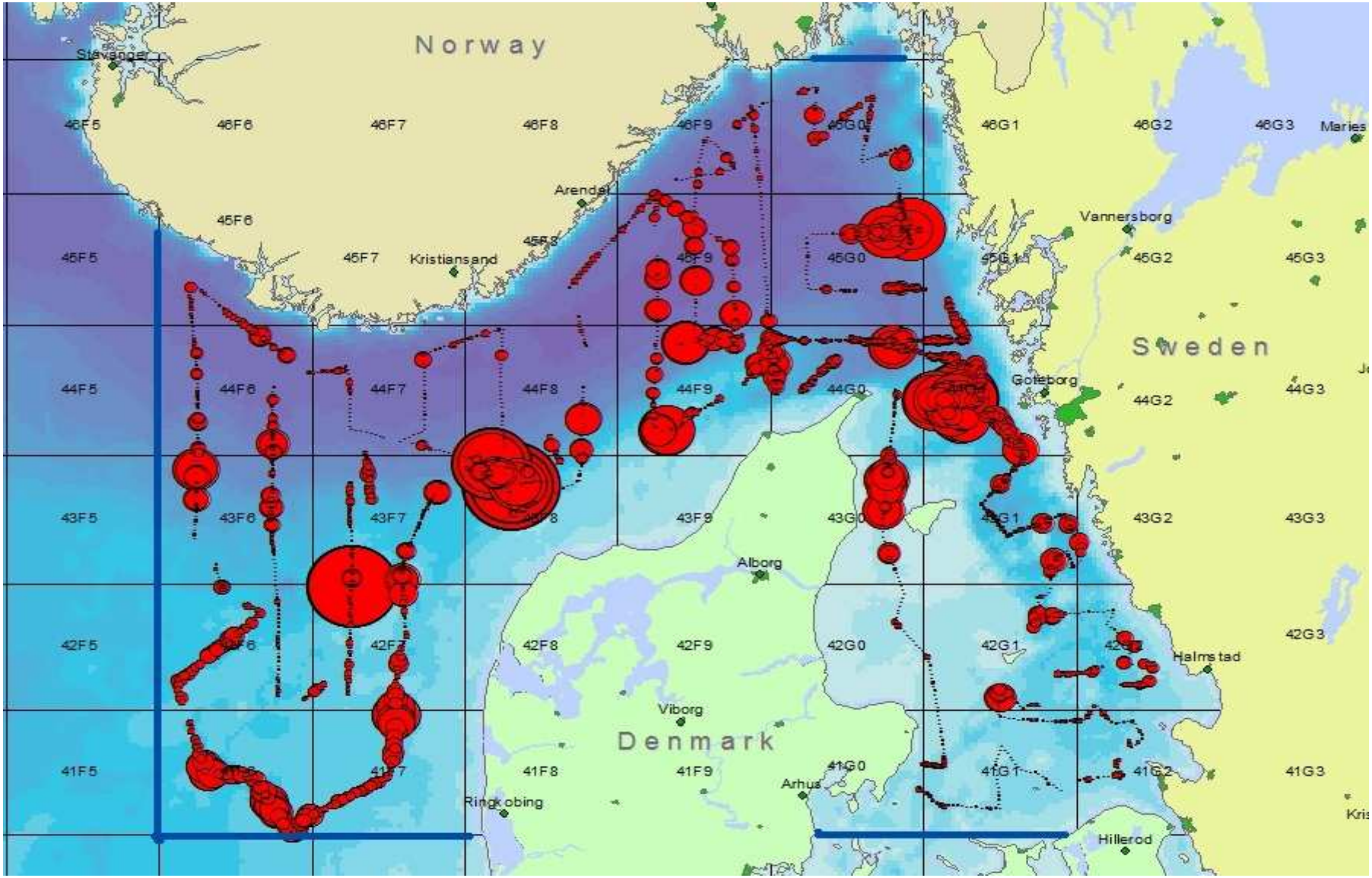

Figure 4. Relative herring density (in numbers per nm²) along the track of the June-July 2009 Danish acoustic survey in the eastern North Sea, Skagerrak and Kattegat. Red circles indicate relative density of herring per ESDU

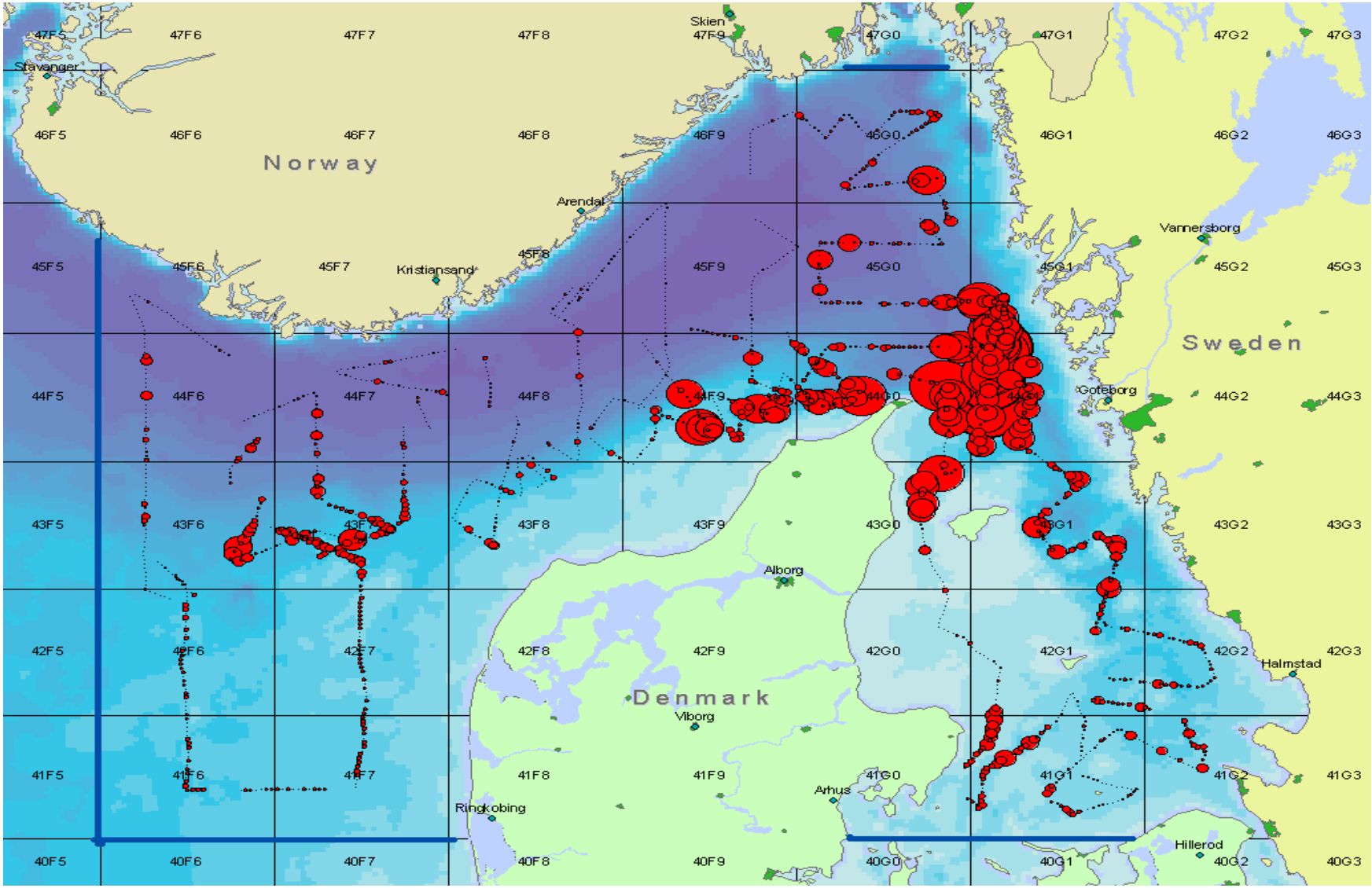

Figure 5. Relative herring density (in numbers per nm²) along the track of the June-July 2008 Danish acoustic survey in the eastern North Sea, Skagerrak and Kattegat. Red circles indicate relative density of herring per ESDU

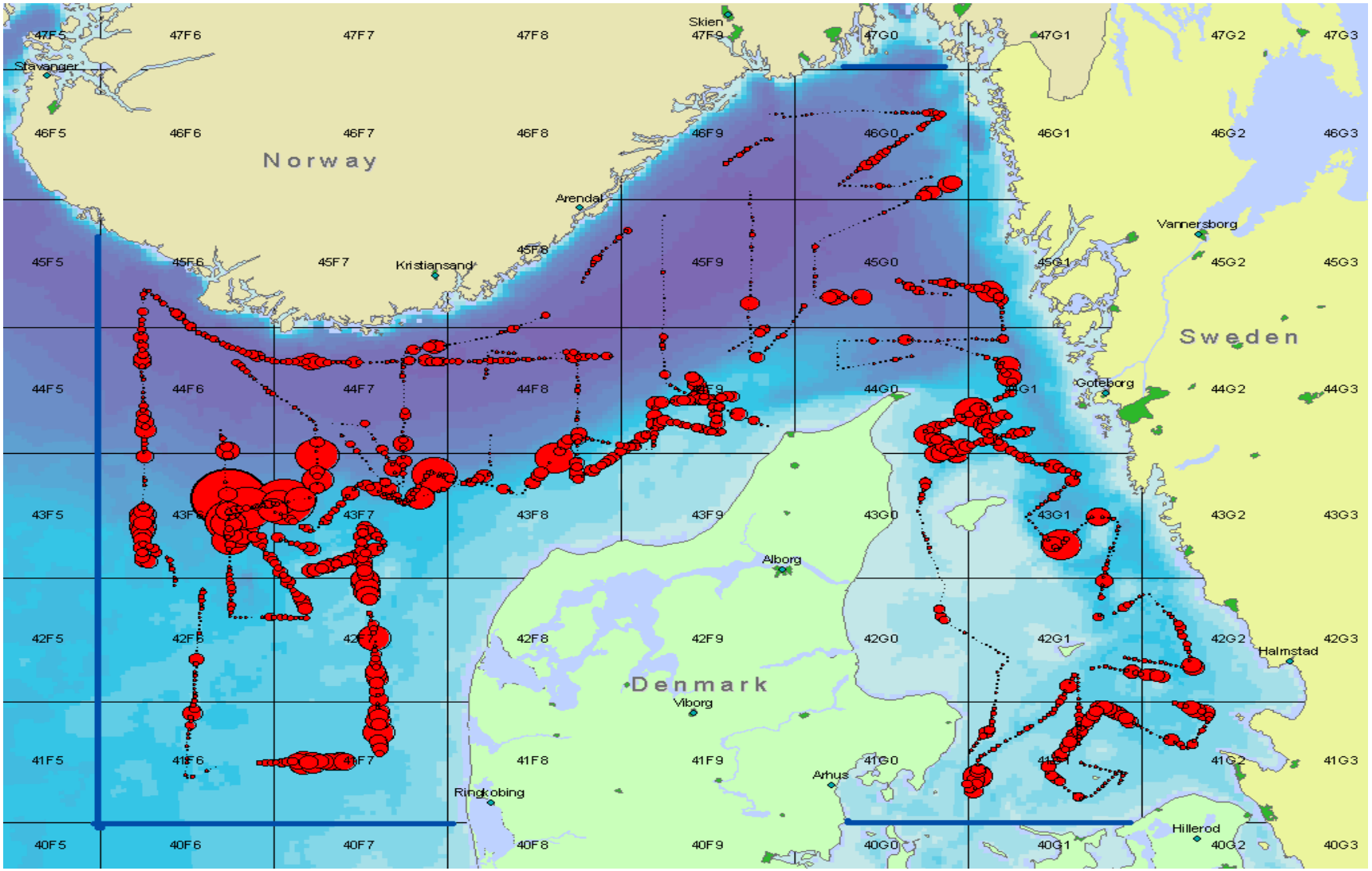

Figure 6. Stations with herring infected with Ichthyophonus (green crosses) and relative herring density (in numbers per nm²) along the track of the July 2010 Danish acoustic survey in the eastern North Sea, Skagerrak and Kattegat. Red circles indicate relative density of herring per ESDU

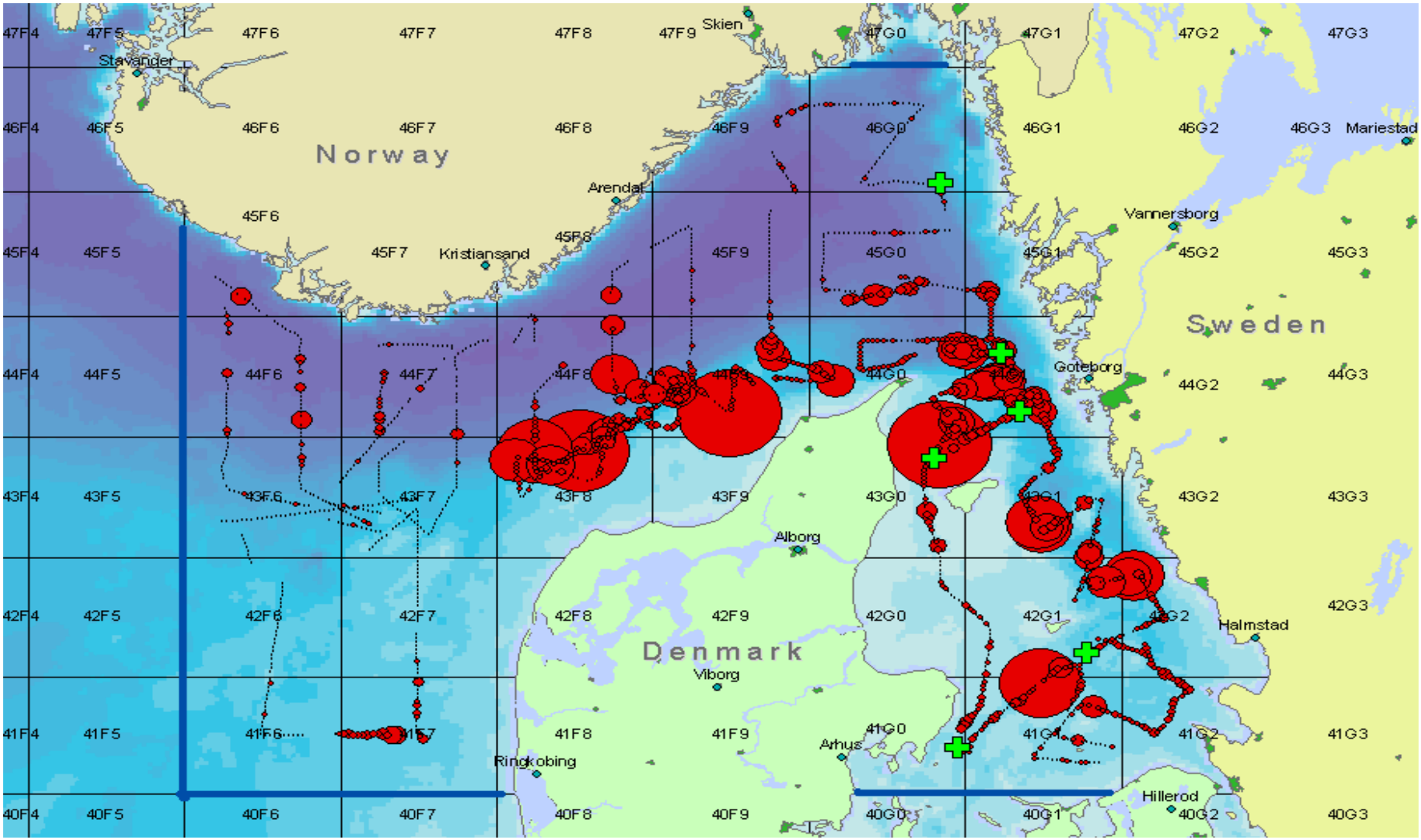

Table 1. . Simrad EK60 and analysis settings used during the Acoustic Herring Survey with R/V Dana Cruise July 2010

Transceiver Menu	
Frequency	38 kHz
Sound speed	1508 $m.s^{-1}$
Max. Power	2000 W
Equivalent two-way beam angle	-20.5 dB
Transducer Sv gain	25.40 dB
3 dB Beamwidth	6.9°
Calibration details	
TS of sphere	-33.6 dB
Range to sphere in calibration	9.56 m
Measured NASC value for calibration	19300 m^2/nmi^2
Calibration factor for NASCs	1.00
Absorption coeff	6.063 dB/km
Log Menu	
Distance	1,0 n.mi. using GPS-speed
Operation Menu	
Ping interval	1 s external trig
Analysis settings	
Bottom margin (backstep)	1.0 m
Integration start (absolute) depth	7 - 9 m
Range of thresholds used	-70 dB

Table 2 Survey statistics for the Danish acoustic survey with R/V Dana in July 2011.

Stratum	Area, Nm*²	ESDU	Hauls	Mean Sa	Mean TS	
560E06	0	3980	208	2	5.09E-06	1.94E-05
570E06	0	3600	251	5	2.03E-06	2.23E-05
570E08	0	3406	203	9	6.77E-06	3.10E-05
580E06	0	209	24	1	1.58E-06	1.85E-05
580E08	0	1822	214	5	2.13E-06	2.41E-05
C	0	988	62	3	3.68E-06	6.98E-06
D	0	1837	172	5	4.08E-06	1.05E-05
E	0	5228	401	7	4.58E-06	1.84E-05

Table 3. Trawl haul details for the Danish acoustic survey with R/V Dana in July 2011.

Trawl hauls Acoustic survey in Kattegat and Skagerrak 04/2011 1 July to 10 July 2011																
Date	Haul	Time	ICES	Position		Trawl Direction	Wire length	Trawl type	Cath depth	Mean depth	Total catch	Main Species	Trawling speed	Trawling duratin	Wind speed	Sea state
dd-mm-yy	no.	UTC	Square	Latitude	Longitude	deg.	m		m	m	kg		Kn	min,	m/s	
01/07/11	282	10;37	43F6	57.08.143 N	006.16.989 E	147	450	Expo	Bottom	62	39	Cod	2	60	15.9	5
02/07/11	478	10:37	43F7	57.25.435 N	007.51.091 E	45	550	Expo	Bottom	140	961	Norway pout, Blue whiting	3	60	7.8	3
02/07/11	493	13:50	43F8	57.26.234 N	008.20.402 E	167	375	Expo	Bottom	60	360	Herring	3	60	7.5	3
02/07/11	529	21:40	44F7	57.50.320 N	007.09.260 E	101	375	Fotö	Surface	458	830	Mackerel, Herring	4	60	5.9	3
03/07/11	542	00:32	44F6	57.48.693 N	006.53.010 E	250	385	Fotö	Surface	349	1235	Mackerel, Herring	4	60	9.4	3
03/07/11	623	10:39	42F6	56.32.693 N	006.49.469 E	101	250	Expo	Bottom	37	99	Herring	3	60	10.8	3
03/07/11	636	13:16	42F7	56.36.203 N	007.08.824 E	125	225	Expo	Bottom	35	240	Herring	3	60	12	3
03/07/11	694	20:59	43F7	57.23.719 N	007.17.852 E	147	360	Fotö	Surface	61	1000	Herring	4	60	10.3	3
04/07/11	710	00:18	44F7	57.31.546 N	007.24.623 E	110	400	Fotö	Surface	255	1040	Herring	4	60	8.6	3
04/07/11	794	10:50	44F8	57.32.860 N	008.25.997 E	65	475	Expo	Bottom	101	1416	Norway pout, Herring	3	60	2	2
04/07/11	807	13:26	43F8	57.26.445 N	008.37.663 E	225	275	Expo	Bottom	36	107	Herring	3	60	1.7	2
04/07/11	868	21:02	44F8	57.49.061 N	008.47.023 E	356	400	Fotö	Surface	515	670	Herring	4	60	2.5	1
05/07/11	882	00:08	45F8	58.04.475 N	008.43.958 E	350	400	Fotö	Surface	434	450	Herring	4	60	3.2	0
05/07/11	964	10:39	44F9	57.51.909 N	009.48.881 E	77	350	Expo	Bottom	59	275	Herring	3	60	4	0
05/07/11	976	13:12	44F9	57.45.361 N	009.47.139 E	234	225	Expo	Bottom	36	2405	Herring	3	60	00:00	0
05/07/11	1045	21:04	45F9	58.18.667 N	009.14.868 E	5	400	Fotö	Surface	423	120	Krill	5	60	2.3	1
06/07/11	1054	00:51	46F9	58.32.482 N	009.18.684 E	63	400	Fotö	Surface	351	275	Large medusa	4	60	2.2	1
06/07/11	1129	10:25	44F9	57.56.328 N	009.28.381 E	242	675	Expo	Bottom	175	170	Norwqay pout, Blue whiting	3	60	4.9	1
06/07/11	1148	13:53	45F9	57.58.820 N	009.53.846 E	53	450	Expo	Bottom	103	1640	Herring, Norway pout	3	50	6	1
06/07/11	1205	21:16	46F9	58.48.954 N	009.50.426 E	229	400	Fotö	Surface	350	215	Mackerel, Herring	4	60	4.8	2
07/07/11	1221	00:27	46G0	58.51.780 N	010.05.473 E	88	400	Fotö	Surface	183	1825	Mackerel	4	60	6	2
07/07/11	1291	10:38	46G0	58.34.360 N	010.50.381 E	177	450	Expo	Bottom	91	153	Invetebrates	3	60	7.5	2
07/07/11	1309	14:00	45G0	58.17.590 N	010.57.686 E	339	470	Expo	Bottom	90	335	Krill	3	60	3.1	2
07/07/11	1362	21:10	45G0	58.08.047 N	010.37.932 E	39	400	Fotö	Surface	218	938	Herring, Mackerel	4	60	1.2	0
08/07/11	1376	00:22	45G1	58.07.491 N	011.08.715 E	184	400	Fotö	Surface	77	983	Mackerel	4	60	2	0
08/07/11	1448	10:37	44G0	57.44.167 N	010.06.069 E	73	425	Expo	Bottom	83	1640	Herring, Norway pout	3	60	4.7	3
08/07/11	1464	13:39	44G0	57.54.476 N	010.29.004 E	45	550	Expo	Bottom	116	277	Invetebrates	3	60	9.1	3
08/07/11	1518	21:05	44G1	57.43.288 N	011.02.486 E	128	400	Fotö	Surface	39	1371	Herring	4	60	4.5	3
09/07/11	1629	12:45	42G1	56.48.667 N	011.43.042 E	25	250	Expo	Bottom	50	700	Sprat, Herring	3	60	8.2	4
09/07/11	1687	21:02	42G2	56.36.844 N	012.11.830 E	348		Fotö	Surface	45	67	Herring, Large medusa	4	60	4.8	4
10/07/11	1702	00:33	42G1	56.36.559 N	011.48.683 E	199	375	Fotö	Surface	32	113	Herring, Large medusa	4	60	7	2
10/07/11	1780	10:43	41G1	56.20.719 N	012.17.974 E	172	200	Expo	Bottom	29	50	Invetebrates	3	48	5.7	2
10/07/11	1799	13:46	41G1	56.12.623 N	011.58.974 E	227	150	Expo	Bottom	24	59	Invetebrates	3	60	5.2	2
10/07/11	1857	21:11	41G0	56.14.093 N	010.57.728 E	348	200	Expo	Surface	19	297	Invetebrates	4	40	2.7	2

Table 4. Catch composition in trawl hauls for the Danish acoustic survey with R/V Dana in June-July 2011.

		Station		282	478	493	529	542	623	636	694	710	794	807	868
		ICES sq.		43F6	43F7	43F8	44F7	44F6	42F6	42F7	43F7	44F7	44F8	43F8	44F8
		Gear		Expo	Expo	Expo	Fotø	Fotø	Expo	Expo	Fotø	Fotø	Expo	Expo	Fotø
		Fishing depth		Bottom	Bottom	Bottom	Surface	Surface	Bottom	Bottom	Surface	Surface	Bottom	Bottom	Surface
		Total depth		62	140	60	458	349	37	35	61	255	101	36	515
		Day/Night		D	D	D	N	N	D	D	N	N	D	D	N
%	Species	Total catch	Total, kg	38	961	360	830	1235	99	240	1000	1040	1416	107	670
46.09	Herring	*Clupea harengus*	9738.014	2.668	0.074	255.664	129.07	574.591	34	132.954	809.564	925.764	286.2	48.1	558.764
22.50	Mackerel	*Scomber scombrus*	4753.462	0.31			682.919	624.677	0.656	0.07	166.047	66.919	0.63		89.104
7.97	Norway pout	*Trisopterus esmarki*	1683.617	0.002	314.999								631.943		
3.62	Invertebrates	*Invertebrata*	764.311		0.565	1.422			0.032	5.64			0.125		
3.45	Large Medusa	*Scyphozoa sp.*	728.117	3.044			10.845	17.344	40	35.665	17.68	35.919		27.6	5.992
2.47	Saithe	*Pollachius virens*	521.712		211.2	16.9							108.9		
2.37	Sprat	*Sprattus sprattus*	500.205												
2.34	Krill	*Euphausidae spp.*	495.235												1.74
1.82	Haddock	*Melanogrammus aeglefinus*	385.081	3.146	78.9	8.93							220.53		
1.41	Cod	*Gadus Morhua*	298.47	16.134	78.75	65.9				19.8			66.7	2.462	
1.36	Blue whiting	*Micromesistius poutassou*	287.635		240.068		0.924	5.286				4.36			2.49
1.23	Whiting	*Merlangius merlangus*	259.775	4.104	14.85	1.638		0.048	0.33	0.224		0.024	83.739	1.39	
0.55	Lumpsucker	*Cyclopterus lumpus*	115.822	5.486	0.746	1.074	1.212	11.765			4.078	2.992		1.718	7.285
0.36	Gurnard	*Trigala spp.*	75.695	3.406		3.956	0.342		20.2	30.4	0.272			7.485	
0.34	Plaice	*Pleuronectes platessa*	72.295			0.956			0.228	2.096				4.306	
0.34	Hake	*Merluccius merluccius*	71.337		9.01	1.98			1.884	6.6			10.38	4.79	
0.31	Long rough dab	*Hippoglosides plattessoides*	64.786		4.576	0.058				0.444			4.716		
0.30	Dab	*Limanda limanda*	62.727	0.338	0.266	0.062			0.886	5.364				8.965	
0.26	Garfish	*Belone belone*	55.987				4.684	0.776			2.246	3.974			3.636
0.15	Pearlside	*Mauorolicus muelleri*	31.976		0.692		0.005	0.058				0.048	0.083		0.029
0.14	Picked Dogfish	*Squalus acanthias*	28.764					0.226							
0.11	Horse mackerel	*Trachurus trachurus*	23.63							0.524	0.112				0.96
0.11	Lemon sole	*Microstomus kitt*	22.426		2.652	0.64				0.22			0.976		
0.09	Northern pink shrimp	*Pandalus borealis*	18.856												
0.07	Common weaver	*Trachinus draco*	15.497					0.228							
0.04	Norway lobster	*Nephrops norvegicus*	7.464		0.266										
0.03	Snake blenny	*Lumpenus lumpretaeformis*	6.864		0.074										
0.03	Gray sole	*Glyptocephalus cynoglossus*	6.824		0.2								0.56		
0.03	Sculpin	*Myoxocephalus scorpius*	6.351												
0.02	Four-bearded rockling	*Enchelyopus cimbrius*	4.49												
0.02	Lesser silver smelt	*Argentina sphyraena*	4.031		2.628								0.312		
0.02	Ling	*Molva molva*	3.5												
0.02	Squids, octopusses	*Cephalopoda sp*	3.33	0.006	0.484	0.77			0.172				0.206		
0.01	Snake blenny	*Lumpenus lampretaeformis*	3.046												
0.01	Tarry ray	*Raja radiata*	1.466												
0.01	Sole	*Solea solea*	1.174												
0.00	Anchovy	*Engraulis encrasicolus*	0.754												
0.00	Turbot	*Psetta maxima*	0.722												
0.00	Greater sandeel	*Hyperoplus lanceolatus*	0.644			0.05			0.488					0.012	
0.00	Spotted snake blenny	*Leptoclinus maculatus*	0.364												
0.00	Hagfish	*Myxine glutinosa*	0.262												
0.00	Flounder	*Platichthys flesus*	0.228												
0.00	Brill	*Scophthalmus rhombe*	0.188												
0.00	Poor-cod	*Trisopterus minutus*	0.142												
0.00	Common dragonet	*Callionymus lyra*	0.112												
0.00	Silvery pout	*Gadiculus argenteus*	0.1												
0.00	Snake blenny	*Lumpenus lumpretaeformis*	0.089												
0.00	Three-spined stickleback	*Gasterosteus aculeatus*	0.067												
0.00	Solenette	*Buglossidium luteum*	0.066												
0.00	Whiting pout	*Trisopterus luscus*	0.056												
0.00	Butter fish	*Phalis gunnellus*	0.054												
0.00	Pogge(armed bullhead)	*Agonus cataphractus*	0.02												
0.00	Sandeel	*Ammodytes marinus*	0.019						0.014					0.001	
0.00	Salmon	*Salmon solar*	0.01												

Table 4. continued.

		Station		882	964	976	1041	1054	1129	1148	1205	1221	1291	1309	1362
		ICES sq.		45F8	44F9	44F9	45F9	46F9	44F9	44F9	46F9	46G0	46G0	45G0	45G0
		Gear		Fotø	Expo	Expo	Fotø	Fotø	Expo	Expo	Fotø	Fotø	Expo	Expo	Fotø
		Fishing depth		Surface	Bottom	Bottom	Surface	Surface	Bottom	Bottom	Surface	Surface	Bottom	Bottom	Surface
		Total depth		434	59	36	423	351	175	103	350	183	91	90	218
		Day/Night		N	D	D	N	N	D	D	N	N	D	D	N
%	Species	Total catch	Total, kg	450	275	2405	120	275	170	1640	215	1825	153	335	938
46.09	Herring	*Clupea harengus*	9738.014	327.602	253.298	2268.669	9.242	16.536	3.682	831.407	34.118	1.132	6.586	0.356	519.974
22.50	Mackerel	*Scomber scombrus*	4753.462	89.538	0.316		15.572	36		0.238	86.312	1822.758			404.154
7.97	Norway pout	*Trisopterus esmarki*	1683.617				0.016	0.006	75.914	621.112					
3.62	Invertebrates	*Invertebrata*	764.311			7.198			0.102				74.139		
3.45	Large Medusa	*Scyphozoa sp.*	728.117	3.56	2.286		13.41	219.086			29.572				1.451
2.47	Saithe	*Pollachius virens*	521.712						17	120.8				32.5	
2.37	Sprat	*Sprattus sprattus*	500.205												
2.34	Krill	*Euphausidae spp.*	495.235	18.316			74.652				63.42			264.276	
1.82	Haddock	*Melanogrammus aeglefinus*	385.081		0.046		0.004	0.002	18.638	21.997			6.652		
1.41	Cod	*Gadus Morhua*	298.47		0.031	0.244			2.86	21.8			7.592		
1.36	Blue whiting	*Micromesistius poutassou*	287.635	1.426					32.631						
1.23	Whiting	*Merlangius merlangus*	259.775	0.042	0.008	92.337	0.018	0.07	0.218	7			12.827		
0.55	Lumpsucker	*Cyclopterus lumpus*	115.822	3.532	13.295		2.8			7.02	0.766			9.205	2.18
0.36	Gurnard	*Trigala spp.*	75.695			6.75	0.196								
0.34	Plaice	*Pleuronectes platessa*	72.295			0.384							0.4	1.076	
0.34	Hake	*Merluccius merluccius*	71.337		5.314	19.3			2.496	6.8				0.05	
0.31	Long rough dab	*Hippoglosides plattessoides*	64.786			0.368			2.746	1.16			38.119	0.548	
0.30	Dab	*Limanda limanda*	62.727			4.878									0.116
0.26	Garfish	*Belone belone*	55.987	5.5			3.992	3			0.346	0.552			10.125
0.15	Pearlside	*Mauorolicus muelleri*	31.976	0.158			0.022	0.068	0.086		0.121		0.308	6.017	
0.14	Picked Dogfish	*Squalus acanthias*	28.764									0.238		19.7	
0.11	Horse mackerel	*Trachurus trachurus*	23.63	0.238	0.354	3.594						0.32			
0.11	Lemon sole	*Microstomus kitt*	22.426			0.24				0.622			0.338	0.254	
0.09	Northern pink shrimp	*Pandalus borealis*	18.856						4.137						
0.07	Common weaver	*Trachinus draco*	15.497					0.232			0.196				
0.04	Norway lobster	*Nephrops norvegicus*	7.464		0.048	0.07			1.138				2.672	2.5	
0.03	Snake blenny	*Lumpenus lumpretaeformis*	6.864						6.79						
0.03	Gray sole	*Glyptocephalus cynoglossus*	6.824							0.044			0.386		
0.03	Sculpin	*Myoxocephalus scorpius*	6.351												
0.02	Four-bearded rockling	*Enchelyopus cimbrius*	4.49						1.119						
0.02	Lesser silver smelt	*Argentina sphyraena*	4.031						0.342				0.238		
0.02	Ling	*Molva molva*	3.5												
0.02	Squids, octopusses	*Cephalopoda sp*	3.33	0.088		0.968	0.076				0.078		0.17		
0.01	Snake blenny	*Lumpenus lampretaeformis*	3.046										2.21		
0.01	Tarry ray	*Raja radiata*	1.466											1.018	
0.01	Sole	*Solea solea*	1.174												
0.00	Anchovy	*Engraulis encrasicolus*	0.754												
0.00	Turbot	*Psetta maxima*	0.722												
0.00	Greater sandeel	*Hyperoplus lanceolatus*	0.644												
0.00	Spotted snake blenny	*Leptoclinus maculatus*	0.364										0.364		
0.00	Hagfish	*Myxine glutinosa*	0.262												
0.00	Flounder	*Platichthys flesus*	0.228												
0.00	Brill	*Scophthalmus rhombe*	0.188												
0.00	Poor-cod	*Trisopterus minutus*	0.142												
0.00	Common dragonet	*Callionymus lyra*	0.112												
0.00	Silvery pout	*Gadiculus argenteus*	0.1						0.1						
0.00	Snake blenny	*Lumpenus lumpretaeformis*	0.089												
0.00	Three-spined stickleback	*Gasterosteus aculeatus*	0.067												
0.00	Solenette	*Buglossidium luteum*	0.066												
0.00	Whiting pout	*Trisopterus luscus*	0.056												
0.00	Butter fish	*Phalis gunnellus*	0.054												
0.00	Pogge(armed bullhead)	*Agonus cataphractus*	0.02												
0.00	Sandeel	*Ammodytes marinus*	0.019		0.004										
0.00	Salmon	*Salmon solar*	0.01												

Table 4. continued.

		Station		1376	1448	1464	1518	1629	1687	1702	1780	1799	1857
		ICES sq.		45G1	44G0	44G0	44G1	42G1	42G2	42G1	41G2	41G1	41G0
		Gear		Fotø	Expo	Expo	Fotø	Expo	Fotø	Fotø	Expo	Expo	Expo
		Fishing depth		Surface	Bottom	Bottom	Surface	Bottom	Surface	Surface	Bottom	Bottom	10m
		Total depth		77	83	116	39	50	45	32	29	24	19
		Day/Night		N	D	D	N	D	N	N	D	D	N
%	Species	Total catch	Total, kg	983	465	277	1371	700	67	113	50	59	297
46.09	Herring	*Clupea harengus*	9738.014	198.284	152.383	8.639	1122.925	196.026	10.368	17.31	0.406		1.658
22.50	Mackerel	*Scomber scombrus*	4753.462	643.49			8.092		1.788	13.872			
7.97	Norway pout	*Trisopterus esmarki*	1683.617		8.631	30.994							
3.62	Invertebrates	*Invertebrata*	764.311		219.087	135.221		51.759			32.8	40.8	195.421
3.45	Large Medusa	*Scyphozoa sp.*	728.117	58.141			102.322		45.1	59.1			
2.47	Saithe	*Pollachius virens*	521.712		0.212	14.2							
2.37	Sprat	*Sprattus sprattus*	500.205				101.463	371.925	0.138	9.465	5.882	0.992	10.34
2.34	Krill	*Euphausidae spp.*	495.235	72.831									
1.82	Haddock	*Melanogrammus aeglefinus*	385.081		23.558	0.436	0.07	0.356	0.026	1.642	0.012	0.136	
1.41	Cod	*Gadus Morhua*	298.47	0.031	6.869	3.1		2.206	2.557	0.034	0.108	0.04	1.252
1.36	Blue whiting	*Micromesistius poutassou*	287.635			0.45							
1.23	Whiting	*Merlangius merlangus*	259.775	0.078	11.624	0.214	0.532	14.222	0.344	0.328	3.934	6.64	2.992
0.55	Lumpsucker	*Cyclopterus lumpus*	115.822			30.7	0.144	2.168	2.99	0.652		1.36	2.654
0.36	Gurnard	*Trigala spp.*	75.695		0.21			0.524	0.538	0.418		0.27	0.728
0.34	Plaice	*Pleuronectes platessa*	72.295		10.85			3.096				1.058	47.845
0.34	Hake	*Merluccius merluccius*	71.337			2.693				0.04			
0.31	Long rough dab	*Hippoglosides plattessoides*	64.786		3.718	5.524		2.721			0.088		
0.30	Dab	*Limanda limanda*	62.727		3.717				0.144	0.356	6.915	3.412	27.308
0.26	Garfish	*Belone belone*	55.987	0.556			16.6						
0.15	Pearlside	*Mauorolicus muelleri*	31.976	0.202	1.903	22.176							
0.14	Picked Dogfish	*Squalus acanthias*	28.764	8.6									
0.11	Horse mackerel	*Trachurus trachurus*	23.63	0.628			16.9						
0.11	Lemon sole	*Microstomus kitt*	22.426		15.872			0.516					0.096
0.09	Northern pink shrimp	*Pandalus borealis*	18.856			14.719							
0.07	Common weaver	*Trachinus draco*	15.497				1.892	0.552	2.232	9.235		0.93	
0.04	Norway lobster	*Nephrops norvegicus*	7.464										0.77
0.03	Snake blenny	*Lumpenus lumpretaeformis*	6.864										
0.03	Gray sole	*Glyptocephalus cynoglossus*	6.824		5.488	0.146							
0.03	Sculpin	*Myoxocephalus scorpius*	6.351									1.964	4.387
0.02	Four-bearded rockling	*Enchelyopus cimbrius*	4.49		0.18	3.147							0.044
0.02	Lesser silver smelt	*Argentina sphyraena*	4.031	0.031	0.443	0.033			0.004				
0.02	Ling	*Molva molva*	3.5			3.5							
0.02	Squids, octopusses	*Cephalopoda sp*	3.33	0.118		0.134	0.06						
0.01	Snake blenny	*Lumpenus lampretaeformis*	3.046			0.836							
0.01	Tarry ray	*Raja radiata*	1.466									0.448	
0.01	Sole	*Solea solea*	1.174					0.036					1.138
0.00	Anchovy	*Engraulis encrasicolus*	0.754						0.72	0.034			
0.00	Turbot	*Psetta maxima*	0.722									0.548	0.174
0.00	Greater sandeel	*Hyperoplus lanceolatus*	0.644							0.026		0.068	
0.00	Spotted snake blenny	*Leptoclinus maculatus*	0.364										
0.00	Hagfish	*Myxine glutinosa*	0.262			0.262							
0.00	Flounder	*Platichthys flesus*	0.228					0.228					
0.00	Brill	*Scophthalmus rhombe*	0.188						0.188				
0.00	Poor-cod	*Trisopterus minutus*	0.142		0.142								
0.00	Common dragonet	*Callionymus lyra*	0.112								0.112		
0.00	Silvery pout	*Gadiculus argenteus*	0.1										
0.00	Snake blenny	*Lumpenus lumpretaeformis*	0.089					0.089					
0.00	Three-spined stickleback	*Gasterosteus aculeatus*	0.067										0.067
0.00	Solenette	*Buglossidium luteum*	0.066					0.044		0.022			
0.00	Whiting pout	*Trisopterus luscus*	0.056		0.056								
0.00	Butter fish	*Phalis qunnellus*	0.054										0.054
0.00	Pogge(armed bullhead)	*Agonus cataphractus*	0.02		0.006								0.014
0.00	Sandeel	*Ammodytes marinus*	0.019										
0.00	Salmon	*Salmon solar*	0.01							0.01			

Table 5. Measured length distribution of herring by haul for the Danish acoustic survey with R/V Dana in June-July 2011.

Station	282	478	493	529	542	623	636	694	710	794	807	868	882	964	976	1041	1054	1129	1148	1205	1221	1291	1309	1362	1376	1448		1464		1518		1629	1687	1702	1780	1857
ICES sq.	43F6	43F7	43F8	44F7	44F6	42F6	42F7	43F7	44F7	44F8	43F8	44F8	45F8	44F9	44F9	45F9	46F9	44F9	44F9	46F9	46G0	46G0	45G0	45G0	45G1	44G0		44G0		44G1		42G1	42G2	42G1	41G2	41G0
Gear	Expo	Expo	Expo	Fotø	Fotø	Expo	Expo	Fotø	Fotø	Expo	Expo	Fotø	Fotø	Expo	Expo	Fotø	Fotø	Expo	Expo	Expo	Fotø	Expo	Expo	Fotø	Fotø	Expo		Expo		Fotø		Expo	Fotø	Fotø	Expo	Expo
Fishing depth	Bottom	Bottom	Bottom	Surface	Surface	Bottom	Bottom	Surface	Surface	Bottom	Bottom	Surface	Surface	Bottom	Bottom	Wsurface	Surface	Bottom	Bottom	Surface	Surface	Bottom	Bottom	Surface	Surface	Bottom		Bottom		Surface		Bottom	Surface	Surface	Bottom	Midwater
Total depth	62	140	60	458	349	37	35	61	255	101	36	515	434	59	36	423	351	175	103	350	183	91	90	218	77	83		116		39		50	45	32	29	24
Day/Night	D	D	D	N	N	D	D	N	N	D	D	N	N	D	D	N	N	D	D	N	N	D	D	N	N	D		D		N		D	N	N	D	N
Total catch,kg	39	961	360	830	1235	99	240	1000	1040	1416	107	670	450	275	2405	120	275	170	1640	215	1825	153	335	938	983	465		277		1371		700	67	113	50	297
Total catch Herring,kg	2.668	0.074	255.664	129.07	574.591	34	132.954	809.564	925.764	286.2	48.1	558.764	327.602	253.298	2268.699	9.242	16.536	3.682	831.407	34.188	1.132	6.586	0.356	519.974	198.284	148.271	4.112	0.311	8.382	255.806	867.119	196.026	10.368	17.31	0.406	1.658
Sample Herring,kg	2.668	0.074	20.414	55.414	48.824	20.068	17.768	23.737	57.514	69.222	21.926	62.136	66.168	19.916	17.992	9.242	16.536	3.682	68.669	34.188	1.132	6.586	0.356	57.858	25.578	1.706	4.112	0.038	8.382	2.618	24.945	26.511	10.368	17.31	0.046	1.658
Length in cm																																				
5.5																																				
6																																				
6.5																																1		1		
7																																1		1		
7.5																																1		1		
8																									1					11		1		1	1	
8.5																									1					39				1	1	
9																									5					90		1				
9.5																									5	32		2		116		2				
10																									4	83		1		95						
10.5																									5	78				49						
11																						1			4	25		2		24	1					
11.5																									1	4				4						
12																															9					
12.5																															19					
13																															39					
13.5							5																								82					
14						7	61																								58					
14.5						36	140															1									23	1				
15				1		131	192	1			9			2	13							5					2				13		1	1		
15.5	3		2			177	129	3	2		57			40	68	1						3					4					2	14	7		5
16	5		23			136	87	20	8		234			126	136	1						9			3		3					19	59	14	6	8
16.5	11		45			63	28	60	19		212			173	100							3			3		19		1			96	81	27	6	18
17	15		65			41	12	98	39		78			83	60	1	1		1			2			12		5					183	42	54	1	6
17.5	17		50			25	5	149	61		23	1		35	32	2	1		2	6		3		2	48		10		2			211	23	53		1
18	11		68	2		20	1	117	89	1	12		1	27	26	9	6		4	8		4		3	56		12		2			101	10	38		
18.5	2		74	3	2	15	1	53	81	1	2	1	2	21	32	16	3		19	13		3		7	88		8		6			30	9	13		
19	3		48	13	4	2		21	59	1	2	4	3	9	23	20	5		14	10		7		20	87		8		3			7	7	24		1
19.5			32	20	13	2		10	34	1		5	4	6	9	24	12		16	19		6	1	28	63		8		10			9	9	39		
20			18	45	22			1	25	3		4	19	2	8	10	11		22	24	1	16		12	53		4		4			4	9	48		1
20.5			15	63	20			7	12	5		7	21	1	3	5	13		37	25		17		18	26		3		14				10	35		
21			9	76	29			3	16	4	1	11	25			12	29		43	26	3	4		20	24		3		16			2	4	16		3
21.5				57	42			1	15	7		13	37		1	8	28		41	37	4	14		22	23				14			1	3	8		1
22			2	64	39				28	16	1	18	45			5	40		50	42	2	6		20	5		2		14			3	1	6		
22.5				51	33				15	45	1	14	37			8	27		48	49		2		20	2				7					3		
23		1		39	40				26	69		31	47		1	1	5		61	40		2		34					3				1	2		
23.5				32	38				25	80	3	21	40			2	11		65	31	1	2	1	47					2					1		
24				29	26				25	87	2	36	43			3	3	3	72	28				57					2					1		
24.5				27	39			1	23	66		57	39			2	5	3	68	7	2	2		44			1		4			1				
25				15	23				19	53		25	28				3	2	30	5				50	1				1							
25.5				16	25			1	18	27		23	40			1			17	3		1		31					1							
26				13	13				12	18		29	23					2	15	4		1		22												
26.5				5	15				18	23		31	6				1	4	10	3				15	1											
27				5	11				12	9		21	20				1		11	1				13												
27.5				4	6			1	7	11		22	22					1		2				6												
28				10	6				6	2		18	14					1	3					6					1							
28.5				4	8				4	6		10	14			1		1						3												
29									10	2		10	8					1	1					1												
29.5				2					7	2		16	6					1	1					3												
30				1	1				5	4		6																								
30.5					6							6						2																		
31																																				
31.5									1																				1							
32												1																								
32.5																							1													
Total no.	67	1	451	597	461	655	661	547	721	543	637	441	544	525	512	132	205	21	651	383	13	114	3	504	514	229	92	5	108	428	244	677	283	395	15	44
Mean Length	17.20	23.00	18.07	22.28	23.30	15.87	14.71	17.64	20.80	24.14	16.43	25.00	23.85	16.70	16.78	20.08	21.50	26.52	22.76	21.85	21.96	19.55	25.17	23.35	18.78	10.20	18.03	10.20	21.22	9.59	13.57	17.30	17.18	18.47	15.23	16.94

Table 6. Abundance, mean weight, mean length and biomass by age group and sub area for North Sea autumn spawning herring in the Danish acoustic survey with R/V Dana in June-July 2011

Number of Autumn Spawners in 2011 in mill.											
WR	0	1i	1m	2i	2m	3i	3m	4i	4m	5	6
580E06	0	4.521002	0	2.549015	1.604935	0.057196	0.148711	0.062667	0.125335	0	0
570E06	0	510.309	0	14.08908	8.870904	0.220791	0.574058	0.358824	0.717648	0.344714	0
580E08	0	29.05113	0	20.74334	13.06062	0.269167	0.699835	0.528052	1.056103	0	0
570E08	0	1095.58	0	53.04497	33.39868	0.898166	2.335231	0.429985	0.859971	0.203687	0
C	4.544574	48.44915	0	8.108257	5.105199	0.555013	1.443033	0.509596	1.019192	0	0
D	513.1933	145.1559	0	15.8316	9.968042	1.006157	2.616008	0.399806	0.799613	0.296868	0.296868
E	767.3813	162.4754	0	0.245201	0	0.051316	0	0	0	0	0
560E06	0	1669.554	0	0	0	0	0	0	0	0	0

Biomass of Autumn Spawners in 2011 in ton.											
WR	0	1i	1m	2i	2m	3i	3m	4i	4m	5	6
580E06	0	336.7027	0	294.197	185.2351	7.149554	18.58884	8.827157	17.65431	0	0
570E06	0	23425.88	0	1646.936	1036.96	31.98004	83.1481	57.04452	114.089	68.14468	0
580E08	0	2063.406	0	2870.776	1807.526	26.19175	68.09855	83.43867	166.8773	0	0
570E08	0	45012.13	0	6629.355	4174.038	145.1436	377.3732	87.51839	175.0368	47.25546	0
C	105.9356	2859.849	0	671.3415	422.6965	46.06604	119.7717	63.10979	126.2196	0	0
D	3304.065	7262.672	0	1916.374	1206.606	181.2643	471.2873	77.87236	155.7447	59.37353	62.34228
E	4479.222	5563.053	0	11.52447	0	3.43819	0	0	0	0	0
560E06	0	45352.78	0	0	0	0	0	0	0	0	0

Mean length of Autumn Spawners in 2011 in cm.											
WR	0	1i	1m	2i	2m	3i	3m	4i	4m	5	6
580E06	0.00	20.76	0.00	23.31	23.31	25.00	25.00	26.79	26.79	0.00	0.00
570E06	0.00	18.13	0.00	23.45	23.45	25.74	25.74	26.88	26.88	28.86	0.00
580E08	0.00	20.50	0.00	24.70	24.70	23.99	23.99	26.69	26.69	0.00	0.00
570E08	0.00	17.40	0.00	23.98	23.98	26.38	26.38	28.16	28.16	30.00	0.00
C	15.31	19.69	0.00	22.57	22.57	22.50	22.50	23.73	23.73	0.00	0.00
D	10.20	19.27	0.00	23.95	23.95	26.72	26.72	27.34	27.34	27.50	29.00
E	9.59	16.77	0.00	19.00	0.00	21.50	0.00	0.00	0.00	0.00	0.00
560E06	0.00	15.35	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Mean weight of Autumn Spawners in 2011 in g.											
WR	0	1i	1m	2i	2m	3i	3m	4i	4m	5	6
580E06	0.00	74.48	0.00	115.42	115.42	125.00	125.00	140.86	140.86	0.00	0.00
570E06	0.00	45.91	0.00	116.89	116.89	144.84	144.84	158.98	158.98	197.68	0.00
580E08	0.00	71.03	0.00	138.40	138.40	97.31	97.31	158.01	158.01	0.00	0.00
570E08	0.00	41.09	0.00	124.98	124.98	161.60	161.60	203.54	203.54	232.00	0.00
C	23.31	59.03	0.00	82.80	82.80	83.00	83.00	123.84	123.84	0.00	0.00
D	6.44	50.03	0.00	121.05	121.05	180.16	180.16	194.78	194.78	200.00	210.00
E	5.84	34.24	0.00	47.00	0.00	67.00	0.00	0.00	0.00	0.00	0.00
560E06	0.00	27.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table 7. Abundance, mean weight, mean length and biomass by age group and sub area for Baltic Sea spring spawning herring in the Danish acoustic survey with R/V Dana in June-July 2011

Number of Spring Spawners in 2011 in mill.

wr	0	1i	1m	2i	2m	3i	3m	4i	4m	5	6	7	8	9	10
580E06	0	0.110893	0.00549	2.791064	4.934924	0.40042	4.004203	0.006469	0.99621	1.631142	0.451206	0.082363	0.279317	0	0
570E06	0	75.90494	3.75767	24.17587	42.74574	3.716207	37.16207	0.129667	19.96878	10.78634	3.522779	3.005127	2.023682	0	0
580E08	0	4.297055	0.212726	27.7779	49.11454	4.322712	43.22712	0.256521	39.50423	14.16487	14.11612	2.04308	0.285421	0.462454	0.513038
570E08	0	461.4317	22.84316	43.78447	77.41602	5.085207	50.85207	0.262887	40.48458	14.80844	9.009867	2.297867	1.287204	0.202791	0.3284
C	0	6.425118	0.318075	21.38774	37.816	1.486841	14.86841	0.044304	6.822865	0.626838	0.313419	0	0	0	0
D	0	53.24547	2.635915	22.97116	40.61568	2.494031	24.94031	0.10385	15.99285	4.597843	2.339847	0.296868	0	0	0
E	0	384.4983	34.71165	7.394702	11.23995	0.112383	2.80957	0	0.561118	0.273358	0.051316	0.107766	0	0.051316	0
560E06	0	1824.434	0	0	0	0	0	0	0	0	0	0	0	0	0

Biomass of Spring Spawners in 2011 in ton.

wr	0	1i	1m	2i	2m	3i	3m	4i	4m	5	6	7	8	9	10
580E06	0	6.875351	0.340364	269.75	476.9493	46.70431	467.0431	0.886124	136.463	233.0868	67.83493	13.86037	48.5654	0	0
570E06	0	2983.97	147.7213	2369.463	4189.485	434.9921	4349.921	18.26495	2812.803	1635.995	601.6893	539.6395	388.8716	0	0
580E08	0	245.0688	12.13212	2793.971	4940.065	543.3356	5433.356	39.39248	6066.442	2464.325	2461.576	400.5048	61.65091	107.0219	131.0054
570E08	0	16067.67	795.4291	4634.678	8194.648	650.6151	6506.151	39.87836	6141.268	2446.698	1663.316	456.7156	284.5218	47.17082	82.25394
C	0	317.8854	15.7369	1977.425	3496.316	128.9999	1289.999	4.486357	690.8989	72.71319	42.9384	0	0	0	0
D	0	2407.182	119.1674	2012.761	3558.794	204.4093	2044.093	10.83598	1668.741	623.665	401.4248	59.37353	0	0	0
E	0	12987.62	1172.494	364.0638	553.3769	6.303346	157.5836	0	33.85238	15.69801	3.078976	6.358168	0	3.078976	0
560E06	0	47494.91	0	0	0	0	0	0	0	0	0	0	0	0	0

Mean length of Spring Spawners in 2011 in cm.

wr	0	1i	1m	2i	2m	3i	3m	4i	4m	5	6	7	8	9	10
580E06	0.00	19.50	19.50	22.53	22.53	24.45	24.45	25.96	25.96	26.54	27.49	28.43	28.38	0.00	0.00
570E06	0.00	17.14	17.14	22.70	22.70	24.54	24.54	25.98	25.98	26.79	28.07	28.71	29.03	0.00	0.00
580E08	0.00	19.28	19.28	22.82	22.82	24.78	24.78	26.43	26.43	27.76	27.68	28.81	30.50	31.65	30.97
570E08	0.00	16.48	16.48	23.00	23.00	24.84	24.84	26.27	26.27	27.01	28.05	28.93	29.68	31.81	30.76
C	0.00	18.53	18.53	22.46	22.46	22.38	22.38	23.69	23.69	26.75	26.50	0.00	0.00	0.00	0.00
D	0.00	18.32	18.32	22.50	22.50	23.97	23.97	24.69	24.69	25.49	27.55	29.50	0.00	0.00	0.00
E	0.00	16.73	16.73	19.16	19.16	21.02	21.02	0.00	21.46	20.57	21.50	21.00	0.00	21.50	0.00
560E06	0.00	15.21	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Mean weight of Spring Spawners in 2011 in g.

wr	0	1i	1m	2i	2m	3i	3m	4i	4m	5	6	7	8	9	10
580E06	0.00	62.00	62.00	96.65	96.65	116.64	116.64	136.98	136.98	142.90	150.34	168.28	173.87	0.00	0.00
570E06	0.00	39.31	39.31	98.01	98.01	117.05	117.05	140.86	140.86	151.67	170.80	179.57	192.16	0.00	0.00
580E08	0.00	57.03	57.03	100.58	100.58	125.69	125.69	153.56	153.56	173.97	174.38	196.03	216.00	231.42	255.35
570E08	0.00	34.82	34.82	105.85	105.85	127.94	127.94	151.69	151.69	165.22	184.61	198.76	221.04	232.61	250.47
C	0.00	49.48	49.48	92.46	92.46	86.76	86.76	101.26	101.26	116.00	137.00	0.00	0.00	0.00	0.00
D	0.00	45.21	45.21	87.62	87.62	81.96	81.96	104.34	104.34	135.64	171.56	200.00	0.00	0.00	0.00
E	0.00	33.78	33.78	49.23	49.23	56.09	56.09	0.00	60.33	57.43	60.00	59.00	0.00	60.00	0.00
560E06	0.00	26.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table 8. Age distribution in estimate of autumn spawners during the Danish acoustic survey with R/V Dana in June-July from 2007 to 2011 given as number per age and strata in mill.and % of total abundance given by age and strata.

Autumn spawners in 2007

Number in millions

	WR								
Strata	0	1	2	3	4	5	6	7	Totalt
580E06	0.00	4.28	0.78	0.00	0.00	0.00	0.00	0.00	5.05
570E06	0.00	121.40	56.69	5.73	0.08	0.00	0.00	0.00	183.90
580E08	0.00	59.15	26.53	0.00	0.00	0.00	0.00	0.00	85.68
570E08	0.00	753.58	118.42	0.00	0.00	0.00	0.00	0.00	872.00
C	0.00	75.63	7.93	0.00	0.00	0.00	0.00	0.00	83.56
D	0.00	1365.50	109.44	5.59	0.00	0.00	0.00	0.00	1480.53
E	0.00	1542.98	46.92	7.76	0.00	0.00	0.00	0.00	1597.67
560E06	0.00	134.85	0.00	0.00	0.00	0.00	0.00	0.00	134.85
All stratas	0.00	4057.35	366.72	19.08	0.08	0.00	0.00	0.00	4443.24

Age distribution in % of total abundance

	WR							
Strata	0	1	2	3	4	5	6	7
580E06	0.00	84.62	15.38	0.00	0.00	0.00	0.00	0.00
570E06	0.00	66.01	30.83	3.12	0.04	0.00	0.00	0.00
580E08	0.00	69.03	30.97	0.00	0.00	0.00	0.00	0.00
570E08	0.00	86.42	13.58	0.00	0.00	0.00	0.00	0.00
C	0.00	90.51	9.49	0.00	0.00	0.00	0.00	0.00
D	0.00	92.23	7.39	0.38	0.00	0.00	0.00	0.00
E	0.00	96.58	2.94	0.49	0.00	0.00	0.00	0.00
560E06	0.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00
All stratas	0.00	91.32	8.25	0.43	0.00	0.00	0.00	0.00

Autumn spawners in 2008

Numbers in millions

	WR								
Strata	0	1	2	3	4	5	6	7	Totalt
580E06	0.00	5.76	5.27	1.14	0.00	0.00	0.00	0.00	12.17
570E06	0.00	233.35	44.02	10.12	1.83	0.97	1.17	0.00	291.45
580E08	0.00	14.77	0.80	0.95	0.00	0.00	0.00	0.00	16.52
570E08	0.00	30.46	35.50	15.28	12.23	0.00	0.00	0.00	93.47
C	0.00	17.00	1.81	0.29	0.00	0.00	0.00	0.00	19.09
D	11.88	61.84	12.28	3.66	1.16	0.71	0.00	0.00	91.51
E	2347.35	13.79	1.01	3.67	0.00	0.00	0.00	0.00	2365.82
560E06	1556.12	26.99	0.00	0.00	0.00	0.00	0.00	0.00	1583.12
All stratas	3915.35	403.95	100.68	35.11	15.21	1.68	1.17	0.00	4473.15

Age distribution in % of total abundance

	WR							
Strata	0	1	2	3	4	5	6	7
580E06	0.00	47.34	43.32	9.35	0.00	0.00	0.00	0.00
570E06	0.00	80.06	15.10	3.47	0.63	0.33	0.40	0.00
580E08	0.00	89.39	4.83	5.77	0.00	0.00	0.00	0.00
570E08	0.00	32.59	37.98	16.35	13.08	0.00	0.00	0.00
C	0.00	89.02	9.46	1.52	0.00	0.00	0.00	0.00
D	12.98	67.58	13.41	3.99	1.27	0.77	0.00	0.00
E	99.22	0.58	0.04	0.16	0.00	0.00	0.00	0.00
560E06	98.29	1.71	0.00	0.00	0.00	0.00	0.00	0.00
All stratas	87.53	9.03	2.25	0.78	0.34	0.04	0.03	0.00

Autumn sawners in 2009

Numbers in millions

	WR								
	0	1	2	3	4	5	6	7	Total
580E06	0.00	0.69	0.09	0.02	0.00	0.00	0.00	0.00	0.81
570E06	31.06	171.89	42.79	7.42	0.00	0.00	0.00	0.00	253.16
580E08	0.00	9.70	4.14	0.27	0.53	0.26	0.05	0.00	14.95
570E08	108.09	747.46	8.76	0.31	0.68	0.27	0.06	0.00	865.63
C	260.15	0.59	0.06	0.00	0.00	0.00	0.00	0.00	260.80
D	3864.97	482.56	3.47	0.16	0.85	0.37	0.00	0.00	4352.38
E	3409.91	277.26	0.30	0.00	0.00	0.00	0.00	0.00	3687.48
560E06	138.33	103.89	1.80	0.00	0.00	0.00	0.00	0.00	244.03
All Strata	7812.52	1794.04	61.42	8.18	2.07	0.91	0.10	0.00	9679.24

Age distribution in % of total abundance

	WR							
	0	1	2	3	4	5	6	7
580E06	0.00	85.88	11.60	2.53	0.00	0.00	0.00	0.00
570E06	12.27	67.90	16.90	2.93	0.00	0.00	0.00	0.00
580E08	0.00	64.85	27.70	1.84	3.55	1.75	0.31	0.00
570E08	12.49	86.35	1.01	0.04	0.08	0.03	0.01	0.00
C	99.75	0.23	0.02	0.00	0.00	0.00	0.00	0.00
D	88.80	11.09	0.08	0.00	0.02	0.01	0.00	0.00
E	92.47	7.52	0.01	0.00	0.00	0.00	0.00	0.00
560E06	56.69	42.57	0.74	0.00	0.00	0.00	0.00	0.00
All Strata	80.71	18.53	0.63	0.08	0.02	0.01	0.00	0.00

Autumn sawners in 2010

Numbers in millions

	WR								
	0	1	2	3	4	5	6	7	Total
580E06	0.00	5.16	0.21	0.10	0.04	0.00	0.00	0.00	5.50
570E06	0.00	19.01	6.15	0.66	0.70	0.14	0.00	0.11	26.76
580E08	0.00	6.73	2.03	0.71	0.66	0.17	0.00	0.00	10.30
570E08	0.00	1222.33	5.96	1.17	0.02	0.04	0.00	0.01	1229.52
C	0.26	3.03	0.51	0.11	0.21	0.00	0.00	0.00	4.12
D	0.06	202.86	7.37	1.70	0.02	0.01	0.00	0.00	212.02
E	49.68	966.47	8.69	2.14	0.00	0.00	0.00	0.00	1026.98
560E06	205.36	2.89	0.00	0.00	0.00	0.00	0.00	0.00	208.25
All Strata	255.37	2428.48	30.91	6.58	1.64	0.36	0.00	0.12	2723.45

Age distribution in % of total abundance

	WR							
	0	1	2	3	4	5	6	7
580E06	0.00	93.80	3.77	1.75	0.67	0.00	0.00	0.00
570E06	0.00	71.02	22.96	2.45	2.60	0.54	0.00	0.43
580E08	0.00	65.40	19.74	6.85	6.39	1.62	0.00	0.00
570E08	0.00	99.42	0.48	0.09	0.00	0.00	0.00	0.00
C	6.34	73.59	12.37	2.70	5.01	0.00	0.00	0.00
D	0.03	95.68	3.48	0.80	0.01	0.00	0.00	0.00
E	4.84	94.11	0.85	0.21	0.00	0.00	0.00	0.00
560E06	98.61	1.39	0.00	0.00	0.00	0.00	0.00	0.00
All Strata	9.38	89.17	1.14	0.24	0.06	0.01	0.00	0.00

Autumn spawners in 2011

Numbers in millions

	WR								
	0	1	2	3	4	5	6	7	Total
580E06	0.00	4.52	4.15	0.21	0.19	0.00	0.00	0.00	9.07
570E06	0.00	510.31	22.96	0.79	1.08	0.34	0.00	0.00	535.48
580E08	0.00	29.05	33.80	0.97	1.58	0.00	0.00	0.00	65.41
570E08	0.00	1095.58	86.44	3.23	1.29	0.20	0.00	0.00	1186.75
C	4.54	48.45	13.21	2.00	1.53	0.00	0.00	0.00	69.73
D	513.19	145.16	25.80	3.62	1.20	0.30	0.30	0.00	689.56
E	767.38	162.48	0.25	0.05	0.00	0.00	0.00	0.00	930.15
560E06	0.00	1669.55	0.00	0.00	0.00	0.00	0.00	0.00	1669.55
All Strata	1285.12	3665.10	186.62	10.87	6.87	0.85	0.30	0.00	5155.72

Age distribution in % of total abundance

	WR							
	0	1	2	3	4	5	6	7
580E06	0.00	49.85	45.80	2.27	2.07	0.00	0.00	0.00
570E06	0.00	95.30	4.29	0.15	0.20	0.06	0.00	0.00
580E08	0.00	44.42	51.68	1.48	2.42	0.00	0.00	0.00
570E08	0.00	92.32	7.28	0.27	0.11	0.02	0.00	0.00
C	6.52	69.48	18.95	2.87	2.19	0.00	0.00	0.00
D	74.42	21.05	3.74	0.53	0.17	0.04	0.04	0.00
E	82.50	17.47	0.03	0.01	0.00	0.00	0.00	0.00
560E06	0.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00
All Strata	24.93	71.09	3.62	0.21	0.13	0.02	0.01	0.00

Table 9. Age distribution in estimate of spring spawners during the Danish acoustic survey with R/V Dana in June-July from 2006 to 2010 given as number per age and strata.

Spring spawners in 2007															
Numbers in millions															
	WR														
Strata	0	1	2	3	4	5	6	7	8	9	10	11	12	13	Total
580E06	0	0.59	10.71	6.52	6.76	1.13	0.91	0.10	0.10	0	0	0	0	0	26.82
570E06	0	38.76	240.73	133.30	63.70	22.19	4.99	3.71	0.88	0	0	0	0	0	508.26
580E08	0	18.16	104.65	52.34	32.00	11.00	2.02	0.26	1.24	0.47	0	0	0	0	222.14
570E08	0	523.57	651.64	295.67	141.30	52.41	12.08	3.48	4.91	2.66	0	0	0	0	1687.73
C	0	500.81	329.72	87.72	27.43	6.10	1.21	0	1.40	0	0	0	0	0	954.39
D	0	531.74	612.87	161.57	51.80	10.31	0	0	1.76	0	0	0	0	0	1370.05
E	0	2138.61	1676.06	193.05	129.39	42.04	11.33	18.17	1.37	0	0	0	0	0	4210.02
560E06	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
All stratas	0	3752.24	3626.38	930.17	452.37	145.18	32.54	25.73	11.66	3.14	0	0	0	0	8979.40
													Total 4-13 WR		670.61
													Total 0-3 WR		8308.79
Spring spawners in 2008															
Numbers in millions															
	WR														
Strata	0	1	2	3	4	5	6	7	8	9	10	11	12	13	total
580E06	0	4.75	22.36	11.44	4.64	1.63	0.23	0	0	0	0	0	0	0	45.06
570E06	0	2263.75	377.97	116.59	51.42	23.77	13.53	5.64	2.24	0.17	0.14	0	0	0	2855.22
580E08	0	49.79	59.90	36.90	7.15	5.02	1.89	1.00	0.48	0.13	0.00	0	0	0	162.26
570E08	0	701.72	228.78	147.20	71.33	46.00	41.03	15.91	6.89	5.64	0.00	0	0	0	1264.51
C	0	108.72	96.90	26.02	7.22	5.07	0.58	0.34	0	0	0.34	0	0	0	245.18
D	1.38	124.71	151.89	59.98	20.05	11.58	3.96	1.21	0	0	0.29	0	0	0	375.05
E	23.86	216.22	125.10	41.38	11.35	6.16	3.85	0.45	0.68	0.36	0	0	0	0	429.43
560E06	81.17	1903.13	5.62	0	0	0	0	0	0	0	0	0	0	0	1989.92
All stratas	106.42	5372.77	1068.54	439.52	173.17	99.23	65.08	24.55	10.28	6.31	0.77	0	0	0	7366.64
													Total 4-13 WR		379.39
													Total 0-3 WR		6987.25
Spring spawners in 2009															
Number in millions															
	WR														
Strata	0	1	2	3	4	5	6	7	8	9	10	11	12	13	total
580E06	0	0.18	0.85	0.44	0.32	0.19	0.02	0	0	0.01	0	0	0	0	2.01
570E06	0	60.72	136.57	138.97	116.99	51.61	44.13	15.51	11.38	1.72	2.16	1.16	0	1.52	582.44
580E08	0	0.00	17.81	9.09	7.78	3.76	2.29	0.71	0.16	0.24	0.05	0	0	0	41.88
570E08	0	87.86	59.76	19.24	13.05	6.39	3.68	1.12	0.21	0.28	0.07	0	0	0	191.66
C	0	0.00	2.61	1.01	0.64	0.09	0.03	0.03	0.03	0	0	0	0	0	4.43
D	0	1.12	66.37	22.03	14.97	5.02	3.51	1.26	0.23	0.39	0.12	0	0	0	115.03
E	0.94	155.35	27.00	5.35	1.99	0.68	0.65	0	0	0	0	0	0	0	191.95
560E06	0	194.39	1.80	0.72	0	0	0	0	0	0	0	0	0	0	196.91
All stratas	0.94	499.62	312.76	196.86	155.73	67.73	54.30	18.63	12.01	2.64	2.40	1.16	0	1.52	1326.32
													Total 4-13 WR		316.13
													Total 0-3 WR		1010.19
Spring spawners in 2010															
Number in millions															
	WR														
Strata	0	1	2	3	4	5	6	7	8	9	10	11	12	13	total
580E06	0	0.64	3.58	2.90	1.33	0.58	0.32	0.04	0	0	0	0	0	0	9.40
570E06	0	2.63	14.71	22.37	8.57	4.51	2.24	0.75	0.39	0.49	0.24	0.01	0.10	0	57.00
580E08	0	0.38	11.76	18.76	6.75	3.59	1.62	1.56	0.70	0.38	0	0	0	0	45.51
570E08	0	111.66	55.59	19.63	0.29	0.10	0.06	0.02	0	0.01	0	0	0	0	187.35
C	0	0.15	4.09	5.31	1.54	1.05	0.45	0.46	0.24	0.15	0	0	0	0	13.43
D	0	45.94	92.39	15.31	1.60	0.38	0.10	0.07	0.03	0.01	0	0	0	0	155.82
E	0.66	611.21	307.14	59.42	7.44	3.49	0.57	0.39	0.12	0.00	0	0	0	0	990.43
560E06	0	1.82	0.01	0	0	0	0	0	0	0	0	0	0	0	1.83
All stratas	0.66	774.43	489.28	143.70	27.52	13.70	5.36	3.28	1.47	1.04	0.25	0.01	0.10	0	1460.78
													Total 4-13 WR		52.72
													Total 0-3 WR		1408.06

Table 10. Abundance, mean weight, mean length and biomass by age group and sub area for sprat in the Danish acoustic survey with R/V Dana in June-July 2011.

Abundance i mill.											
	WR										
Strata	0	1i	1m	2i	2m	3	4	5	6	7	8
580E06	0	0	0	0	0	0	0	0	0	0	0
570E06	0	0	0	0	0	0	0	0	0	0	0
580E08	0	0	0	0	0	0	0	0	0	0	0
570E07	0	0	0	0	0	0	0	0	0	0	0
C	0	0	0	0	0	0	0	0	0	0	0
D	0	0	0	0	0	0	0	0	0	0	0
E	0	12.96414	32.41034	145.6335	401.3013	549.1941	284.6712	103.6618	35.01747	7.333436	2.010795
560E06	0	0	0	0	0	0	0	0	0	0	0

Biomass in ton											
	WR										
Strata	0	1i	1m	2i	2m	3	4	5	6	7	8
580E06	0	0	0	0	0	0	0	0	0	0	0
570E06	0	0	0	0	0	0	0	0	0	0	0
580E08	0	0	0	0	0	0	0	0	0	0	0
570E07	0	0	0	0	0	0	0	0	0	0	0
C	0	0	0	0	0	0	0	0	0	0	0
D	0	0	0	0	0	0	0	0	0	0	0
E	0	147.9552	369.8879	2424.108	6679.764	9586.743	5400.375	1981.424	712.0573	117.4621	44.2375
560E06	0	0	0	0	0	0	0	0	0	0	0

Mean length in cm											
	WR										
Strata	0	1i	1m	2i	2m	3	4	5	6	7	8
580E06	0	0	0	0	0	0	0	0	0	0	0
570E06	0	0	0	0	0	0	0	0	0	0	0
580E08	0	0	0	0	0	0	0	0	0	0	0
570E07	0	0	0	0	0	0	0	0	0	0	0
C	0	0	0	0	0	0	0	0	0	0	0
D	0	0	0	0	0	0	0	0	0	0	0
E	0.0	11.5	11.5	13.1	13.1	13.6	14.0	14.0	14.5	13.5	15.0
560E06	0	0	0	0	0	0	0	0	0	0	0

Mean weight in g											
	WR										
Strata	0	1i	1m	2i	2m	3	4	5	6	7	8
580E06	0	0	0	0	0	0	0	0	0	0	0
570E06	0	0	0	0	0	0	0	0	0	0	0
580E08	0	0	0	0	0	0	0	0	0	0	0
570E07	0	0	0	0	0	0	0	0	0	0	0
C	0	0	0	0	0	0	0	0	0	0	0
D	0	0	0	0	0	0	0	0	0	0	0
E	0.0	11.4	11.4	16.6	16.6	17.5	19.0	19.1	20.3	16.0	22.0
560E06	0	0	0	0	0	0	0	0	0	0	0