Acoustic Herring Survey report for RV "DANA"

25th June – 8th July 2013

Karl Johan Stæhr
DTU-Aqua, National Institute of Aquatic Resources

Cruise summary

Total days	14
Days of monitoring	11
Number of acoustic samples, ESDU monitored	1864
Number of trawl hauls	37
Number of CTD stations	37
Number of WP2 stations	20
Fish catch in kg	19959
Fish catch in number	373228
Number of measured fish of fish	28129
Number of measured herring	16474
Number of measured mackerel	4315
Number of measured sprat	1098
Number of aged and race-split herring.	2278
Number of aged sprat	242

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 2013-survey with R/V DANA, covering the Skagerrak and Kattegat, was conducted in the period June 27 June to July 8 2013, while calibration was done during June 25 to June 27 2013.

2. SURVEY

2.1 Personnel

During calibration 25/6– 27/6 2013
Karl-Johan Stæhr (cruise leader)
Torben Filt Jensen (assisting cruise leader)
Ronny Sørensen
Eik Ehlert Britsch
Christian Petersen
Thomas Thomsen
Claus Halle
Maria Jarum

During acoustic monitoring 27/6 - 8/7-2013
Karl-Johan Stæhr (cruise leader)
Helle Andersen (assisting cruise leader)
Torben Filt Jensen
Eva Maria Fenger Pedersen
Nina Fuglsang
Tommy Henriksen
René Erlandsen
Ronny Sørensen
Bue Poulsen (guest)

2.2 Narrative

The survey of R/V Dana started on June 25th at 06.00 UTC with departure from Hirtshals heading towards Bornö in Gullmar Fjord, Sweden for calibration of the acoustic equipment. Due to heavy traffic the pilot was delayed 1.5 hour and the vessel was anchored at Bornö in the Gullmar Fjord, Sweden June 25th at 15.30 UTC. The calibration was initiated in the evening of June 25th and continued until the morning of June 27th.

At June 27th 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 June 27th at 19.28 UTC at 57º50.0'N, 008º15.3'E with a CTD-station followed by integration for the north-western corner of the survey area.

The North Sea and western Skagerrak area was covered during the period June 27 – July 1, eastern Skagerrak during July 1-5 and Kattegat during July 5-8.

At the June 29th two bottom hauls around 57N 10, 007E 20 had to be cancelled due to heavy wind, 17-20 m/s. The integration was therefore continued for reduced speed heading North West. At 22.00 UTC the wind has reduced so much that a surface haul could be made at 58º06.8'N, 006º13.5'E. After the haul integration was continued at a southern transect at normal speed.

The acoustic integration was ended July 8 at 57º 26'N, 10º 44'E at 06.02 UTC as the termination of the towed body brook. The towed body was recovered.

R/V Dana arrived at Hirthals at 1130 UTC on July 8.

Totally the survey covered about 1864 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 June 25 - June 27 2013. 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.

The impedance measurement on the 120 kHz transducer showed changes compared to last calibration, this has to be investigated further. If problems with the transducer it has to be changed during next doking.

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 500 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 6 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 Table 8 and Figure 3.

2.8 Plankton data

During the survey WP2 samples has been taken 2 times a day late evening and noon. Sampling has been conducted from 150 m or 5 m above bottom to surface with a 180 µm netting. The samples have been fractionised in size groups by filters of 2000 µm, 1000 µm and 180 µm. The samples have been dried for 24 hours and frozen for dry weight measurements at shore.
20 WP2 stations have been taken; see Table 9 and Figure 3.

2.9 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):

Herring TS = 20 log L – 71.2 dB
Sprat TS = 20 log L – 71.2 dB
Gadoids TS = 20 log L – 67.5 dB
Mackerel TS = 20 log L – 84.9 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) collected for the stock size calculation is 1864. 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.

3.2 Biological data

During the survey in 2013 37 hauls were conducted, 19 surface hauls and 18 bottom hauls. The geographical distribution of hauls and details on the hauls are given in Figure 2 and Table 3. Catches in species is given in Table 4.

Length distributions of herring, mackerel and sprat by haul are given in table 5 to 7.

The total catch for the survey was 20.0 tons. Herring was present in 34 hauls with a total catch of 9,9 tons or 49 % of the total catch. Totally 16,474 herring have been measured. Length distributions of herring per haul are given in Table 5.

Sprat was present in 10 hauls in 2013. The total sprat catch was 408 kg or 2.1 % of the total catch. Totally 1,098 sprat have been measured. Length distributions of sprat per haul are given in table 6.

Mackerel were present in 16 hauls with a total catch of 3.9 ton or 19.4 % of the total catch. Totally 4,315 mackerel have been measured. Length distributions of Mackerel per haul are given in table 7.

For the total survey area herring, mackerel and sprat contributed to the total catch by 49%, 19 % and 2 % respectively.

For other species 6242 individuals has been measured all together.

Herring maturity

Based on the frozen single fish herring samples (2278 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
%	100.00	100.00	0.00	75.48	24.52	0.00	100.00

North Sea					
WR	0	1i	1m	2i	2m
%	100.00	100.00	0.00	28.57	71.43

Kattegat					
wr	0	1i	1m	2i	2m
%	100.00	98.97	1.03	39.29	60.71

Baltic Sea spring spawners:

Skagerrak																	
wr	0	1i	1m	2i	2m	3i	3m	4i	4m	5	6	7	8	9	10	11	12
%	100.00	87.50	12.50	33.43	66.57	7.67	92.33	5.33	94.67	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

North Sea									
WR	0	1i	1m	2i	2m	3i	3m	4i	4m
%	100.00	85.71	14.29	77.78	22.22	20.00	80.00	0.00	100.00

Kattegat										
wr	0	1i	1m	2i	2m	3i	3m	4i	4m	5
%	100.00	95.00	5.00	51.94	48.06	17.72	82.28	16.67	83.33	100.00

Sprat maturity

Based on 595 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

Skagerrak		
wr	2i	2m
%	0.00	100.00

North Sea						
wr	2i	2m	3	4	5	6
%	81.82	1.82	100.00	100.00	100.00	100.00

Kattegat									
wr	0	1i	1m	2i	2m	3	4	5	6
%	100.00	94.74	5.26	78.79	21.21	100.00	100.00	100.00	100.00

3.3 Biomass estimates

Herring

The total herring biomass estimate for the Danish acoustic survey with R/V Dana in July 2013 is 145,727 tonnes of which 42.6% or 62,126 tonnes is North Sea autumn spawners and 57.4 % or 83,601 tonnes is Baltic Sea spring spawners.
For the total number of herring the survey results give 2,083 mill, of which 51.4 % are North Sea autumn spawners and 48.6 % 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 10 and 11 for North Sea autumn spawners and Baltic spring spawners respectively.

A comparison for the results of the last 8 years surveys are given in the text table below.

	2006	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**
Autumn spawners								
Number in mill.	1530	4443	4473	9679	2723	5156	4805	1070
Biomass in tons	98786	315176	80469	157707	148946	165589	259947	62126
Spring spawners								
Number in mill.	6407	8847	7367	1326	1461	3699	1955	1013
Biomass in tons	471850	614048	450505	146590	88597	179898	122901	83601

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 (see Table 12).

This increase in both abundance and biomass from 2006 to 207 therefore 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 12 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.

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 12 the abundance in 2009 is dominated by 0 and 1 WR (81 and 19 % respectively), as in 2008. 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. This can be explained by a general increase of the abundance of 0 and 1 WR in the survey area since 2008

From 2009 to 2010 the abundance of autumn spawners has decreased by 72 % whereas the biomass has decreased with 6%. From Table 12 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 its way back to the structure seen in 2006 and 2007 (see Table 12)

From 2010 to 2011 the abundance of autumn spawners has increased by 89% whereas the biomass has increased with 7%. From table 12 it can be seen that the abundance of autumn spawners are dominated by 1 WR as in 2011 but the abundance of 0 WR and 2 WR has increased compared to 2010. The shift to a larger fraction of 0 WR compared with 2010 results in the larger in increase on abundance compared with biomass.

From 2011 to 2012 the abundance of autumn spawners has decreased by 7% whereas the biomass has increased with 11%. Table 12 shows that the fraction of 0 WR has decreased drastically from 2011 to 2012 whereas the fractions of 1WR and older have increased.

From 2012 to 2013 the abundance of autumn spawners has decreased by 78 % whereas the biomass has decreased with 76%. Table 12 shows that in 2013 no fish of 4 WR or older have been seen. For 0 and 1 WR the age structure in 2013 and 2012. The decrease in both abundance and biomass can therefore be seen as the result of both the lack of individuals of 4 WR or older and a general decrease of 0 and 1WR.

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 13 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 (86%), whereas the abundance of 4 WR or older are at the same level.

From2009 to 2010 the abundance has increased with 9 %, whereas the biomass has decreased with 39.6%. From Table 13 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 13)

From 2011 to 2012 the abundance has decrease with 47% and the biomass has decreased with 32% compared with 2011. The abundance of 0-3 WR has decreased with 46% and the abundance of 4-13 WR has decreased with 67%, thereby the spring spawning herring are back to an age distribution like the one seen in 2010 (Table 13), but with a general lower abundance for both 0-3 WR and 4-13 WR.

From 2012 to 2013 the abundance of spring spawners has decreased with 47% and the biomass has decreased with 32 % compared with 2012. Table 13 shows that the abundance of 4-13 WR in 2013 is of the same size as in 2012. But for 0-3 WR there have been a decrease of 50% in the abundance, dominated by the 1WR.

Sprat

The total abundance estimate of sprat for the Danish acoustic survey with R/V Dana in July 2013 is 543.57 million corresponding to a biomass at 11074 ton. Sprats were in 2012 found in Kattegat Strata E with 98.1 %, Skagerrak (ICES 43F6 and 44F9) with 0.7 % and in the North Sea Strata 560E06 with 1.2 % during the Danish Acoustic survey in Kattegat and Skagerrak June-July 2013.

Abundance, biomass, mean length and mean weight per WR and strata are given in Table 14.

Figure 1. Map showing the survey area for the Danish acoustic survey with R/V Dana in July 2012. The map shows the subareas (strata) used in the abundance estimation.

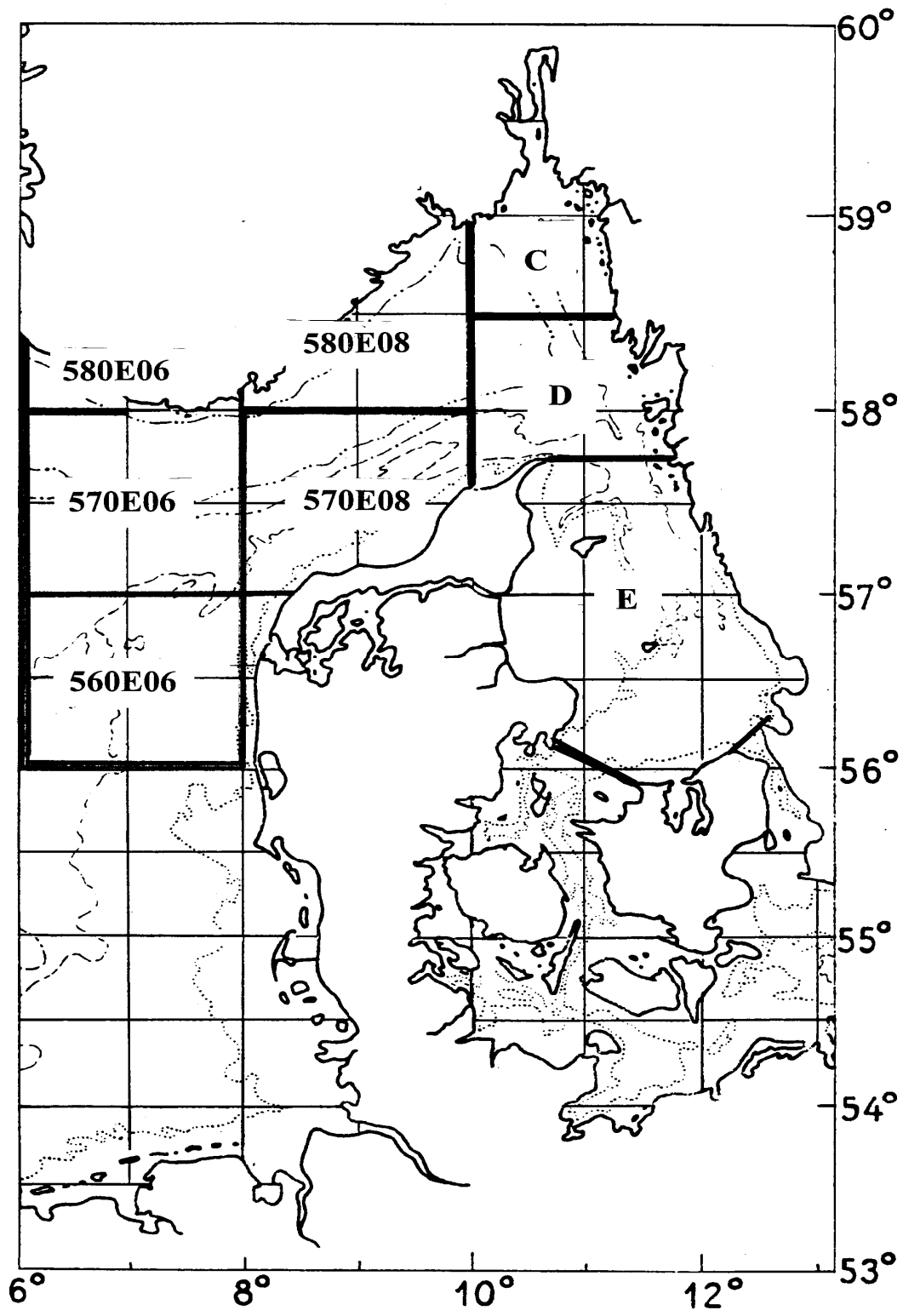

Figure 2. Map showing cruise track and trawl stations during the Danish acoustic survey with R/V Dana in June-July 2013.Gren is pelagic hauls and blue is demersal hauls.

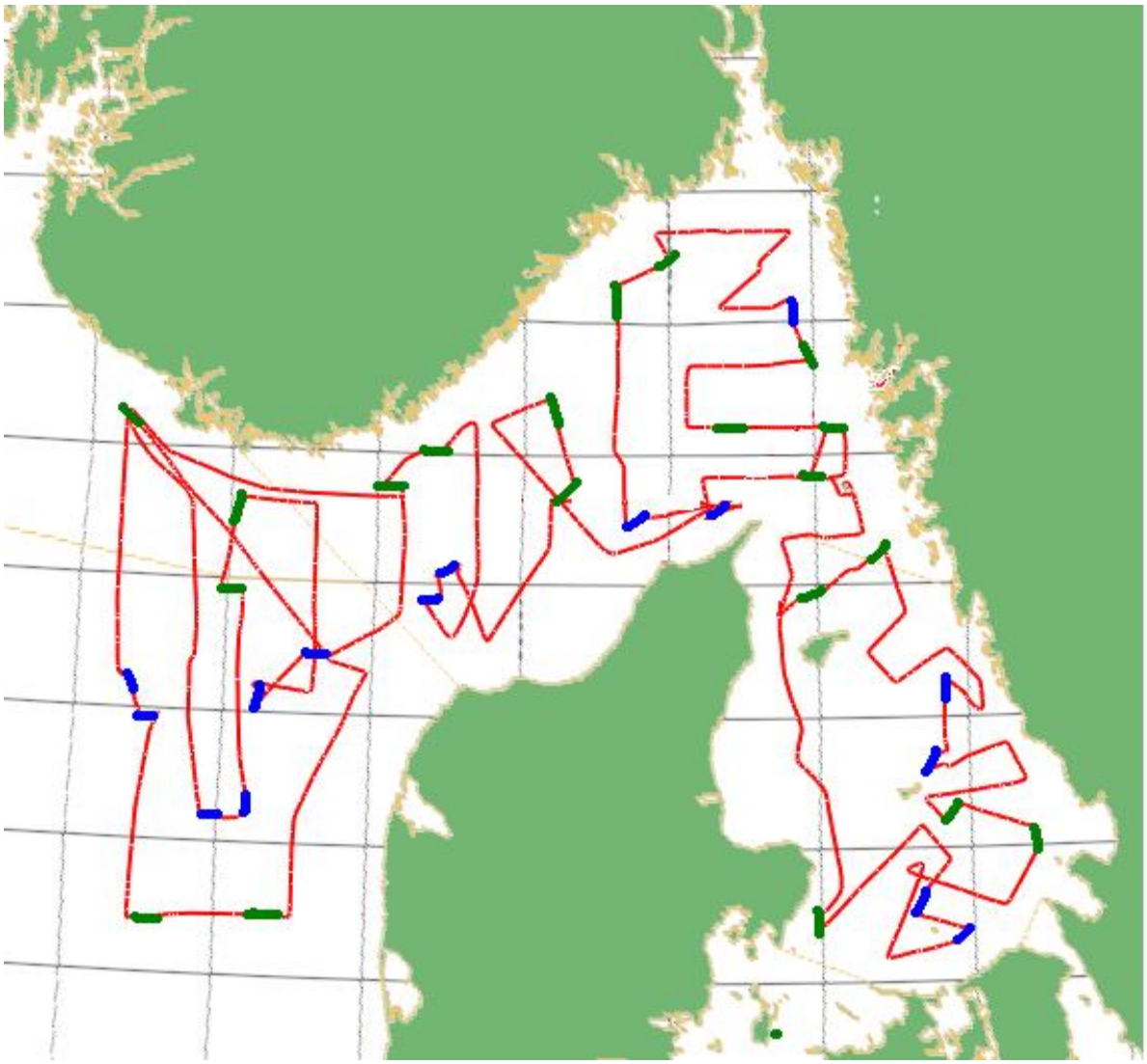

Figure 3. Map showing CTD and WP2 stations during the Danish acoustic survey with R/V Dana in June-July 2013. X are CTD stations and squares are combined CTD and WP2 stations.

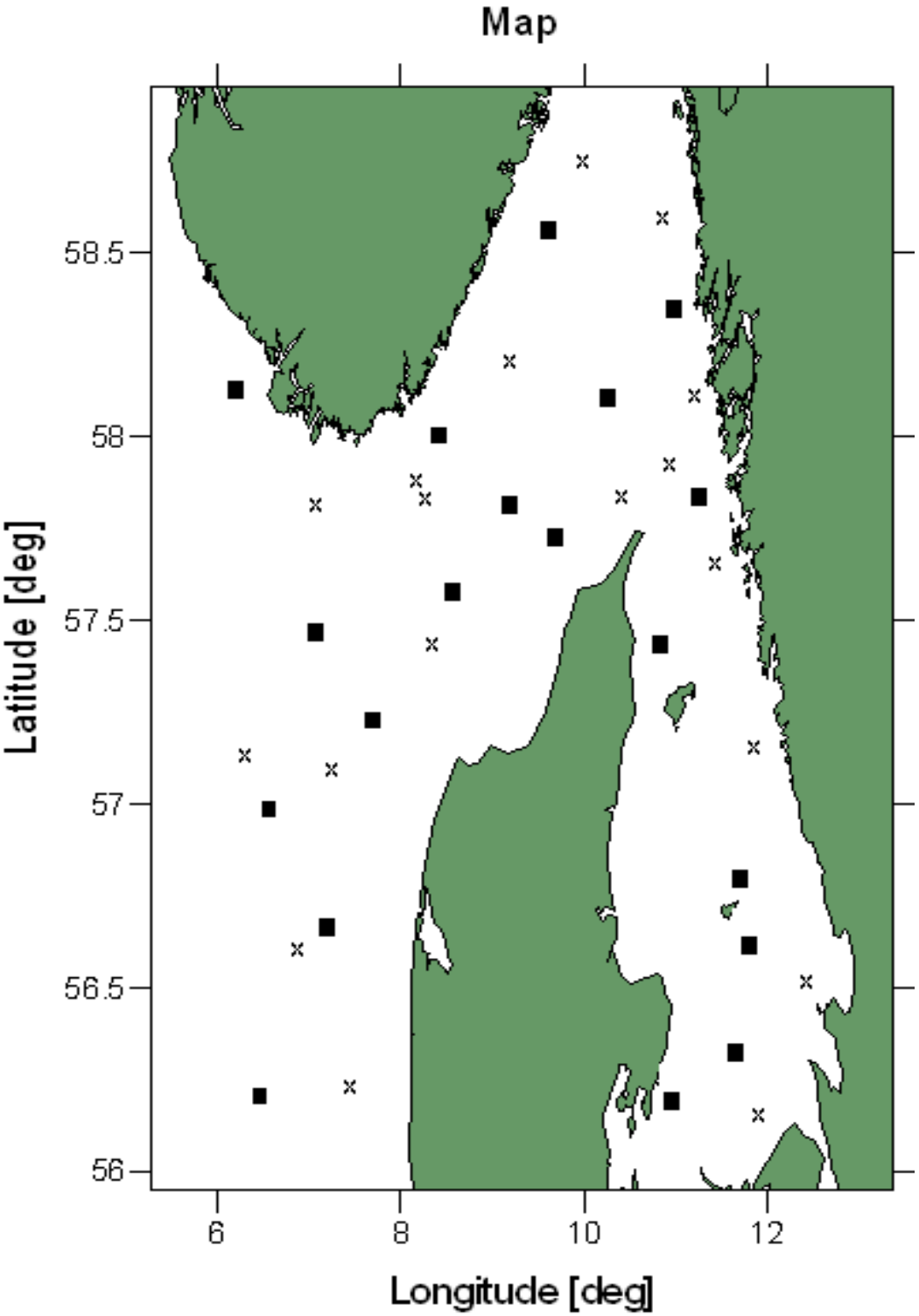

Table 1. . Simrad EK60 and analysis settings used during the Acoustic Herring Survey with R/V Dana Cruise June-July 2013

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 2013

Stratum	Area, NM*2	ESDU	Hauls	Mean Sa	Mean TS
560E06	3980	167	5	6.92E-07	3.85E-05
570E06	3600	397	8	2.12E-06	4.92E-05
570E08	3406	238	6	1.18E-06	3.72E-05
580E06	209	33	1	2.63E-06	3.10E-05
580E08	1822	98	4	1.56E-06	2.24E-05
C	988	66	3	6.95E-07	1.68E-05
D	1837	175	7	1.85E-06	2.04E-05
E	5228	431	9	3.20E-06	2.23E-05

Table 3. Trawl hauls details for the Danish acoustic survey with R/V Dana in June-July 2013.

Trawl hauls Acoustic survey in Kattegat and Skagerrak 06/2013 27 JUne to 8 July 2013																
						Trawl	Wire	Trawl	Cath	Mean	Total		Trawling	Trawling	Wind	
Date	Haul	Time	ICES	Position		Direction	length	type	depth	depth	catch	Main Species	speed	duratin	speed	Sea state
dd-mm-yy	no.	UTC	Square	Latitude	Longitude	deg.	m		m	m	kg		Kn	min,	m/s	
28-06-13	139	10:34	43F6	57.07.271 N	006.18.696 E	133	350	Expo	Bottom	60	5	Gurnard. Large medusa	3.4	59	9.3	4
28-06-13	151	13:09	42F6	56.57.658 N	006.28.054 E	40	325	Expo	Bottom	55	8	Large medusa	3.3	60	9.5	5
28-06-13	206	20:42	41F6	56.12.625 N	006.29.696 E	83	300	Fotö	Surface	42	100	Mackerel, Herring, Large medusa	4.2	60	5.3	2
29-06-13	230	05:02	41F7	56.14.108 N	007.16.423 E	92	300	Fotö	Surface	31	390	Mackerel, Herring	3.8	60	8.5	2
29-06-13	397	02:24	45F6	58.06.752 N	006.13.544 E	139	300	Fotö	Surface	338	1140	Herring, Mackerel	4.6	60	10	5
30-06-13	495	10:28	42F6	56.36.114 N	006.54.006 E	87	270	Expo	Bottom	38	45	Gurnard	3.2	60	4.6	3
30-06-13	504	12:33	42F7	56.36.474 E	007.08.833 E	358	285	Expo	Bottom	36	183	Saithe	3.1	60	4.7	3
30-06-13	558	20:50	43F6	57.28.050 N	007.03.743 E	268	300	Fotö	Surface	138	4460	Herring, Mackerel	4.1	60	5.3	3
01-07-13	578	00:17	44F7	57.44.823 N	007.02.090 E	14	300	Fotö	Surface	386	1340	Herring, Mackerel	3.9	60	4.9	2
01-07-13	658	10:25	43F7	57.04.904 N	007.14.125E	205	300	Expo	Bottom	35	47	Dab, Gurnard, Cod	2.9	60	10.5	4
01-07-13	678	13:36	43F7	57.13.741 N	007.33.749 E	88	340	Expo	Bottom	54	54	Herring	3	60	8.9	4
01-07-13	733	21:02	44F7	57.52.261 N	008.07.651 E	265	300	Fotö	Surface	457	830	Herring, Mackerel	4	60	12.6	4
02-07-13	751	00:16	45F8	58.00.439 N	008.19.171 E	84	300	Fotö	Surface	492	1210	Herring	4.1	60	11.4	4
02-07-13	828	10:35	43F8	57.26.227 N	008.19.517 E	84	380	Expo	Bottom	66	277	Cod	3.3	48	8.9	5
02-07-13	839	12:42	44F8	57.32.871 N	008.31.409 E	63	450	Expo	Bottom	104	2450	Norway pout	2.7	60	9.5	5
02-07-13	899	21:11	44F9	57.49.768 N	009.13.790 E	40	300	Fotö	Surface	143	660	Mackerel, Herring	4.1	60	6.3	3
03-07-13	918	00:17	45F9	58.07.577 N	009.12.026 E	350	300	Fotö	Surface	649	400	Herring	3.7	60	7	3
03-07-13	1008	10:49	44G0	57.49.595 N	010.23.261 E	234	410	Expo	Bottom	81	27	Norway pout, Saith	3.8	60	10.8	3
03-07-13	1028	13:54	44F9	57.45.435 N	009.47.628 E	124	290	Expo	Surface	38	191	Whiting, Herring	3	60	7	3
03-07-13	1085	21:31	46F9	58.34.658 N	009.37.316 E	347	300	Fotö	Surface	344	200	Herring, Krill	4	60	4.2	3
04-07-13	1098	00:17	46F9	58.42.822 N	009.53.952 E	55	300	Fotö	Surface	286	250	Mackerel, Herring	4.3	60	3	3
04-07-13	1180	10:42	46G0	58.34.567 N	010.50,673 E	185		Expo	Bottom	83	Failed		3.3	14	7.3	3
04-07-13	1182	11:33	46G0	58.32.744 N	010.50.648 E	187		Expo	Bottom	92	660	Herring, Picked dogfish	2.8	44	7.9	3
04-07-13	1192	13:51	45G0	58.23.437 N	010.55.588 E	128	300	Fotö	Surface	104	17	Large medusa	4.2	60	6.1	3
04-07-13	1243	20:54	45G0	58.06.249 N	010.18.220 E	88	300	Fotö	Surface	143	950	Herring, Mackerel	4.1	60	6.6	3
05-07-13	1266	00:16	45G1	58.06.380 N	011.04.148 E	110	300	Fotö	Surface	98	550	Herring, Mackerel	4.1	60	5.3	3
05-07-13	1349	10:42	44G1	57.35.371 N	010.57.937 E	110	300	Fotö	Surface	92	67	Large medusa, Herring	4.4	60	11.5	3
05-07-13	1362	13:33	44G1	57.50.806 N	011.14.851 E	320	375	Expo	Bottom	62	730	Herring, Invetebretes	2.9	64	13.2	5
05-07-13	1421	21:12	43G0	57.27.168 N	010.51.726 E	73	300	Fotö	Surface	41	340	Herring	4.5	60	8.9	3
06-07-13	1440	00:22	44G1	57.36.139 N	011.21.667 E	23	300	Fotö	Surface	66	973	Mackerel, Herring	4.5	60	8.7	3
06-07-13	1525	10:34	43G1	57.08.107 N	011.50.455 E	183	300	Expo	Bottom	56	55	Large medusa	3.6	40	4.2	3
06-07-13	1545	13:38	42G1	56.50.996 N	011.44.338 E	198	300	Expo	Bottom	41	450	Sprat	3	55	3.9	3
06-07-13	1606	20:59	42G1	56.37.574 N	011.48.824 E	38	300	Fotö	Surface	36	124	Mackerel, Large medusa	4.4	60	2.1	3
07-07-13	1627	00:18	42G2	56.34.640 N	012.23.107 E	207	300	Fotö	Surface	31	106	Mackerel, Large medusa	4	60	3.9	2
07-07-13	1715	10:40	41G1	56.09.511 N	011.53.206 E	51	240	Expo	Bottom	25	91	Large medusa	3.4	60	4.6	2
07-07-13	1731	13:29	41G1	56.16.412 N	011.36.796 E	17	300	Expo	Bottom	30	207	Invetebrates, Large Medusa	2.9	60	4.7	2
07-07-13	1790	21:10	41G0	56.12.320 N	010.57.292 E	2	300	Expo	Surface	21	270	Herring, Sprat	3	60	6.6	2

Table 4. Catch composition in trawl hauls for the Danish acoustic survey with R/V Dana in June - July 2013.

Acoustic survey in Skagerrak and Kattegat June-July 2013																									
		Station		139	151	206	230	397	495	504	558	578	658	678	733
		ICES sq.		43F6	42F6	41F6	41F7	45F6	42F6	42F7	43F7	44F7	43F7	43F7	44F8
		Gear		Expo	Expo	Fotö	Fotö	Fotö	Expo	Expo	Fotö	Fotö	Expo	Expo	Fotö
		Fishing depth		Bottom	Bottom	Surface	Surface	Surface	Bottom	Bottom	Surface	Surface	Bottom	Bottom	Surface
		Total depth		60	55	42	31	338	38	36	138	386	35	70	457
		Day/Night		D	D	N	N	N	D	D	N	N	D	D	N
%		Total catch	Total	5	8	100	390	1140	45	183	4460	1340	47	54	830
0.00	Anchovy	Engraulis encrasicolus	0.134												
0.03	Blue whiting	Micromesistius poutassou	6.982					5.058				1.924			
2.05	Sprat	Sprattus sprattus	408.471		0.018		2.021		0.012						
0.09	Common weaver	Trachinus draco	17.549									0.106			0.064
0.00		Anarhichas lupus	0.002												
0.01	Horse mackerel	Trachurus trachurus	0.998								0.526				
0.12	Garfish	Belone belone	24.196			0.506	0.348	0.792			0.606	3.348			
0.14	Long rough dab	Hippoglosides plattessoides	27.189		0.010								0.220	0.042	
1.52	Whiting	Merlangius merlangus	303.033	0.452	0.136	0.001	0.210		0.356	7.635		0.130	0.044	1.194	0.137
2.01	Invertebrates	Invertebrater	400.583	0.028	0.072	0.016	0.233							4.724	
0.32	Dab	Limanda limanda	64.346	0.698	0.984		0.224		1.144	2.514			15.200	1.592	
0.05	Hake	Merluccius merluccius	10.645												
0.80	Gurnard	Trigala spp.	159.781	1.438		15.900	48.961		33.500	40.800			11.900	0.540	
0.56	Haddock	Melanogrammus aeglefinus	112.655	0.518	0.916									0.926	0.046
19.37	Mackerel	Scomber scombrus	3866.487			31.973	180.884	371.977	0.192	0.466	951.322	265.152	1.206	0.310	208.670
0.91	Saithe	Pollachius virens	182.072		0.096		0.088			106.900				0.478	
0.12	Plaice	Pleuronectes platessa	23.528		0.444		0.732		0.970	0.280			5.816	4.226	
0.01	Lemon sole	Microstomus kitt	2.722											0.196	
49.39	Herring	Clupea harengus	9857.050	0.475	0.190	24.466	151.456	683.594	2.904	0.936	3505.676	957.085		34.700	370.418
0.00	Gray sole	Glyptocephalus cynoglossus	0.690												
10.48	Norway pout	Trisopterus esmarki	2091.965												
0.69	Lumpsucker	Cyclopterus lumpus	137.018					0.208			1.870				1.550
7.81	Large Medusa	Scyphozoa sp.	1558.346	1.206	3.594	24.500	4.515	78.370	3.942	13.400		108.105	2.600	7.045	249.107
0.00	Greater sandeel	Hyperoplus lanceolatus	Tobiskonge	0.639			0.242	0.229							
1.54	Cod	Gadus Morhua	Torsk	308.054			0.008			2.258				9.700	13.100	
0.05	Pearlside	Mauorolicus muelleri	Laksesild	10.428								0.029			0.008
0.00	Ling	Molva molva	Lange	0.770											
0.41	Krill	Euphausidae spp.	Lyskrebs	81.541											
1.37	Picked Dogfish	Squalus acanthias	Pighaj	273.648	1.048										
0.01	Tarry ray	Raja radiata	Tærbe	2.032											
0.01	Anglerfish	Lophiuspiscatorius	Havtaske	1.790											
0.01	Norway lobster	Nephrops norvegicus	Jomfruhummer	1.060											
0.00	Flounder	Platichthys flesus	Skrubbe	0.446											
0.01	Squids, octopusses	Cephalopoda sp	Blæksprutter	2.436											
0.05	Sandeel	Ammodytes marinus	Havtobis	10.720	0.001		0.014			0.042	9.610			0.036	1.016
0.02	Salmon	Salmon solar	Laks	4.204								4.122			
0.00	Northern pink shrimp	Pandalus borealis	Dybhavsreje	0.630											
0.02	Sculpin	Myoxocephalus scorpius	Ulk	4.378											
0.00	Scaldfish	Arnoglossus laterna	Tungehvarre	0.008			0.008								
100			Total	19959.226	4.816	7.508	97.626	389.909	1139.999	45.320	182.541	4460.000	1340.001	46.722	70.089	830.000

Table 4. continued.

Acoustic survey in Skagerrak and Kattegat June-July 2013																
			Station		751	828	839	899	918	1008	1028	1085	1098	1182	1192	1243
			ICES sq.		45F8	43F8	44F8	44F9	45F9	44G0	44F9	46F9	46F9	46G0	45G0	45G0
			Gear		Fotö	Expo	Expo	Fotö	Fotö	Expo	Expo	Fotö	Fotö	Expo	Fotö	Fotö
			Fishing depth		Surface	Bottom	Bottom	Surface	Surface	Bottom	Bottom	Surface	Surface	Bottom	Surface	Surface
			Total depth		492	66	104	143	649	81	38	344	286	92	104	143
			Day/Night		N	D	D	N	N	D	D	N	N	D	D	N
%			Total catch	Total	1210	277	2450	660	400	27	191	200	250	660	17	950
0.00	Anchovy	Engraulis encrasicolus	Ansjos	0.134												
0.03	Blue whiting	Micromesistius poutassou	Blåhvilling	6.982												
2.05	Sprat	Sprattus sprattus	Brisling	408.471							0.014					
0.09	Common weaver	Trachinus draco	Fjæsing	17.549	0.236											
0.00		Anarhichas lupus	Havkat	0.002			0.002									
0.01	Horse mackerel	Trachurus trachurus	Hestemakrel	0.998				0.386								
0.12	Garfish	Belone belone	Hornfisk	24.196	2.542				1.524			0.366	0.448			2.290
0.14	Long rough dab	Hippoglosides plattessoides	Håising	27.189			7.025	0.048								
1.52	Whiting	Merlangius merlangus	Hvilling	303.033	0.145	6.865	20.010	0.029	0.007		106.918	0.276	0.207	1.443	0.064	0.144
2.01	Invertebrates	Invertebrata	Invertebrater	400.583		0.742	15.386			0.234	2.300			4.324		
0.32	Dab	Limanda limanda	Ising	64.346		1.650	0.954				13.630					
0.05	Hake	Merluccius merluccius	Kulmule	10.645			3.008			0.166	4.390					
0.80	Gurnard	Trigala spp.	Knurhane	159.781	0.388	1.146	0.346	0.170			3.638		0.256			
0.56	Haddock	Melanogrammus aeglefinus	Kuller	112.655	0.026	16.636	90.334	0.033	0.020		0.408			0.511		0.041
19.37	Mackerel	Scomber scombrus	Makrel	3866.487	178.793			313.781	59.244		1.390	1.680	110.600		0.142	287.814
0.91	Saithe	Pollachius virens	Sej,gråsej mørksej	182.072		13.140	18.310	4.700		8.210	0.236	9.800	12.600			4.680
0.12	Plaice	Pleuronectes platessa	Rødspætte	23.528		2.116					4.888					
0.01	Lemon sole	Microstomus kitt	Rødtunge	2.722		0.896	0.422				0.440			0.018		
49.39	Herring	Clupea harengus	Sild	9857.050	831.742	17.996	264.600	258.029	293.752	2.160	41.032	111.800	40.704	366.542	0.119	488.975
0.00	Gray sole	Glyptocephalus cynoglossus	Skærising	0.690			0.328									
10.48	Norway pout	Trisopterus esmarki	Sperling	2091.965		9.302	2047.845			10.995				23.615		
0.69	Lumpsucker	Cyclopterus lumpus	Stenbider	137.018				8.965	26.900	2.376		8.800	15.500	7.965		54.300
7.81	Large Medusa	Scyphozoa sp.	Store gobler	1558.346	196.129	2.096		73.859	18.486	2.440	7.100	8.200	43.800	5.420	16.800	111.756
0.00	Greater sandeel	Hyperoplus lanceolatus	Tobiskonge	0.639												
1.54	Cod	Gadus Morhua	Torsk	308.054		204.600	68.492			0.086	4.236			0.314		
0.05	Pearlside	Mauorolicus muelleri	Laksesild	10.428					0.067	0.555		7.908	1.831			
0.00	Ling	Molva molva	Lange	0.770			0.748									
0.41	Krill	Euphausidae spp.	Lyskrebs	81.541								50.460	23.605			
1.37	Picked Dogfish	Squalus acanthias	Pighaj	273.648										247.400		
0.01	Tarry ray	Raja radiata	Tærbe	2.032												
0.01	Anglerfish	Lophiuspiscatorius	Havtaske	1.790										1.790		
0.01	Norway lobster	Nephrops norvegicus	Jomfruhummer	1.060										0.094		
0.00	Flounder	Platichthys flesus	Skrubbe	0.446												
0.01	Squids, octopusses	Cephalopoda sp	Blæksprutter	2.436			2.052				0.060			0.178		
0.05	Sandeel	Ammodytes marinus	Havtobis	10.720												
0.02	Salmon	Salmon solar	Laks	4.204								0.082				
0.00	Northern pink shrimp	Pandalus borealis	Dybhavsreje	0.630							0.002	0.628				
0.02	Sculpin	Myoxocephalus scorpius	Ulk	4.378												
0.00	Scaldfish	Arnoglossus laterna	Tungehvarre	0.008												
100			Total	19959.226	1210.001	277.185	2539.862	660.000	400.000	27.222	190.682	200.000	249.551	659.614	17.125	950.000

Table 4. continued.

Acoustic survey in Skagerrak and Kattegat June-July 2013																	
			Station		1266	1349	1362	1421	1440	1525	1545	1606	1627	1715	1731	1790
			ICES sq.		45G1	44G1	44G1	43G0	44G1	43G1	42G1	42G1	42G2	41G1	41G1	41G0
			Gear		Fotö	Fotö	Expo	Fotö	Fotö	Expo	Expo	Fotö	Fotö	Expo	Expo	Expo
			Fishing depth		Surface	Surface	Bottom	Surface	Surface	Bottom	Bottom	Surface	Surface	Bottom	Bottom	Surface
			Total depth		98	92	62	41	66	56	41	36	31	25	30	21
			Day/Night		N	D	D	N	N	D	D	N	N	D	D	N
%			Total catch	Total	550	67	730	340	973	55	450	124	106	91	208	270
0.00	Anchovy	Engraulis encrasicolus	Ansjos	0.134				0.134								
0.03	Blue whiting	Micromesistius poutassou	Blåhvilling	6.982												
2.05	Sprat	Sprattus sprattus	Brisling	408.471					0.096		343.171		0.042	0.644	0.168	62.285
0.09	Common weaver	Trachinus draco	Fjæsing	17.549	0.169			5.450	0.134		0.510	4.308	3.532	2.040	0.900	0.100
0.00		Anarhichas lupus	Havkat	0.002												
0.01	Horse mackerel	Trachurus trachurus	Hestemakrel	0.998					0.086							
0.12	Garfish	Belone belone	Hornfisk	24.196	0.608	1.982		3.570	4.140			0.752				0.374
0.14	Long rough dab	Hippoglosides plattessoides	Håising	27.189			18.500			0.040	1.258				0.046	
1.52	Whiting	Merlangius merlangus	Hvilling	303.033	0.018	0.050	140.550	0.113	0.087	5.256	4.660	0.032	0.092	1.726	3.894	0.152
2.01	Invertebrates	Invertebrata	Invertebrater	400.583			160.346			1.016	47.705			10.385	151.300	1.772
0.32	Dab	Limanda limanda	Ising	64.346			0.474			0.646	13.700			2.036	8.900	
0.05	Hake	Merluccius merluccius	Kulmule	10.645			2.622			0.042	0.191			0.226		
0.80	Gurnard	Trigala spp.	Knurhane	159.781			0.248				0.158	0.036		0.172	0.184	
0.56	Haddock	Melanogrammus aeglefinus	Kuller	112.655		0.004	0.354			0.250	1.116				0.516	
19.37	Mackerel	Scomber scombrus	Makrel	3866.487	191.387	0.904	3.314	25.274	546.419		2.814	73.185	54.000	0.806	0.532	2.256
0.91	Saithe	Pollachius virens	Sej,gråsej mørksej	182.072			1.898	0.462			0.310			0.164		
0.12	Plaice	Pleuronectes platessa	Rødspætte	23.528			1.020				1.118			1.042	0.876	
0.01	Lemon sole	Microstomus kitt	Rødtunge	2.722			0.518								0.232	
49.39	Herring	Clupea harengus	Sild	9857.050	283.246	13.100	395.298	238.387	320.976	4.098	4.824	1.306	11.272	0.564	1.918	132.710
0.00	Gray sole	Glyptocephalus cynoglossus	Skærising	0.690			0.152				0.210					
10.48	Norway pout	Trisopterus esmarki	Sperling	2091.965						0.186					0.022	
0.69	Lumpsucker	Cyclopterus lumpus	Stenbider	137.018		2.508	0.228		0.826	1.290			1.690		1.492	0.550
7.81	Large Medusa	Scyphozoa sp.	Store gobler	1558.346	41.866	48.800		66.610	100.237	40.700	27.361	44.100	35.200	67.700	33.500	69.802
0.00	Greater sandeel	Hyperoplus lanceolatus	Tobiskonge	0.639							0.168					
1.54	Cod	Gadus Morhua	Torsk	308.054			3.710			1.220	0.156			0.142	0.032	
0.05	Pearlside	Mauorolicus muelleri	Laksesild	10.428	0.030											
0.00	Ling	Molva molva	Lange	0.770											0.022	
0.41	Krill	Euphausidae spp.	Lyskrebs	81.541	7.476											
1.37	Picked Dogfish	Squalus acanthias	Pighaj	273.648	25.200											
0.01	Tarry ray	Raja radiata	Tærbe	2.032										0.806	1.226	
0.01	Anglerfish	Lophiuspiscatorius	Havtaske	1.790												
0.01	Norway lobster	Nephrops norvegicus	Jomfruhummer	1.060			0.458			0.054	0.454					
0.00	Flounder	Platichthys flesus	Skrubbe	0.446								0.354			0.092	
0.01	Squids, octopusses	Cephalopoda sp	Blæksprutter	2.436			0.110				0.016			0.014	0.006	
0.05	Sandeel	Ammodytes marinus	Havtobis	10.720						0.001						
0.02	Salmon	Salmon solar	Laks	4.204												
0.00	Northern pink shrimp	Pandalus borealis	Dybhavsreje	0.630												
0.02	Sculpin	Myoxocephalus scorpius	Ulk	4.378			0.200				0.088			2.232	1.858	
0.00	Scaldfish	Arnoglossus laterna	Tungehvarre	0.008												
100			Total	19959.226	550.000	67.348	730.000	340.000	973.001	54.799	449.988	124.073	105.828	90.699	207.716	270.001

Table 5. Measured length distribution of herring by haul for the Danish acoustic survey with R/V Dana in June-July 2013.

Station	139	151	206	230	397	495	504	558	578	678	733	751	828	839	899	918	1008	1028	1085	1098	1182	1243	1266	1349	1362	1421	1440	1525	1545	1606	1627	1715	1731	1790
ICES sq.	48F6	42F6	41F6	41F7	45F6	42F6	42F7	43F7	44F7	43F7	44F8	45F8	43F8	44F8	44F9	45F9	44G0	44F9	46F9	46F9	46G0	45G0	45G1	44G1	44G1	43G0	44G1	43G1	42G1	42G1	42G2	41G1	41G1	41G0
Gear	Expo	Expo	Fot6	Fot6	Fot6	Expo	Expo	Fot6	Fot6	Expo	Fot6	Fot6	Expo	Expo	Fot6	Fot6	Expo	Expo	Fot6	Fot6	Expo	Fot6	Fot6	Fot6	Expo	Fot6	Fot6	Expo	Expo	Fot6	Fot6	Expo	Expo	Expo
Fishing depth	Bottom	Bottom	Surface	Surface	Surface	Bottom	Bottom	Surface	Surface	Bottom	Surface	Surface	Bottom	Surface	Surface	Surface	Bottom	Bottom	Surface	Surface	Bottom	Surface	Surface	Surface	Bottom	Surface	Surface	Bottom	Bottom	Surface	Surface	Bottom	Bottom	Surface
Total depth	60	55	42	31	338	38	36	138	386	70	457	492	66	104	81	649	143	38	344	286	92	143	98	92	62	41	66	56	41	36	31	25	30	21
Day/Night	D	D	N	N	N	D	D	N	N	D	N	N	D	D	N	N	N	D	N	N	D	N	N	D	D	N	N	D	D	N	N	D	D	N
Total catch,kg	5	8	100	390	1140	45	183	4460	1340	54	830	1210	277	2450	660	400	27	191	200	250	660	950	550	67	730	340	973	55	450	124	106	91	208	270
Total catch Herring,kg	0.475	0.190	26.466	151.546	683.594	2.904	0.936	3505.676	957.085	34.700	370.418	831.742	17.996	264.600	258.029	293.752	2.160	41.032	111.800	40.704	0.314	366.228	488.975	0.054	13.100	0.039	355.259	0.470	237.917	320.976	4.098	4.824	1.306	11.272	0.564	1.918	132.710
Sample Herring,kg	0.475	0.190	26.466	32.823	70.057	2.904	0.936	54.427	66.559	26.284	56.063	67.684	17.996	53.989	51.582	49.492	2.160	41.032	70.969	40.704	0.162	46.364	70.231	0.018	57.386	13.100	0.008	45.911	0.470	53.263	52.736	4.098	4.824	1.306	11.272	0.564	1.918	49.432
Length in cm																																						
5,5																										4									
6																										12									
6,5																							1			14									
7																							2			35									
7,5																							1			46									
8																							1		1	38									
8,5																										11									
9																								1		5									
9,5																					1														
10																							1												
10,5																																			
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12,5																																			
13																																			
13,5																																			
14																																			
14,5				7						13							3				3						1						1		
15	1			93			1			42																							7	1
15,5			1	161				2		59										3													9	
16			2	258						72			17				1		8		1					5	1	1					9	
16,5			3	154					1	33			39						16							8		1	3				16	2
17	1	1	6	134		1				36			82				2		13		3					1		1				1	5	14
17,5	3	1	29	80		2		6	1	24			103				1		35		8												8	70
18	3		54	50		4		7		16			86				1		53	2	5		1		6	43	2	1	6		2		5	131
18,5	3		85	17		3	2	5		29			43	2					74		18		31		18	139	4	1	6		6		1	218
19	1		113	4		12	1	12		67			21	3					93	3	64	1	128		87	7	54	233	26	2	14		16		3	163
19,5			104	4	5	21	1	18	1	93	1	3	14	14	6	1	135	5	3	128		192	13	77	248	60	2	21	1	29	1		98
20			47	1	8	8		14	4	56	5	8	1	51	15	16	4	205	50	15	213	18	175	40	183	144	98	10	18	1	33	1		114
20,5			26		21	3	1	41	15	24	14	31	2	154	109	33	6	144	65	48	142	44	134	61	137	75	96	14	4	3	30	1		85
21			5		33	1	1	37	34	9	45	62	4	162	143	52	10	38	116	55	53	111	62	42	80	44	33	9	7	4	34	2		55
21,5			2		58			38	48	7	74	82	5	130	111	52	3	8	128	79	20	130	35	16	45	42	99	10	3	4	21			30
22			3		90			38	66	6	99	104	2	77	81	50	2	5	104	80	20	115	44	9	43	15	95	7	4	2	14	1	1	11
22,5				1	109		2	34	86		93	98	2	41	48	52			91	57	18	96	50	6	29	5	74	6	1	2	8	1		4
23				1	114		1	46	68		58	89	2	27	25	58	3	4	80	51	9	76	28	1	17	2	43	1	1	1	4	1		2
23,5			1		89		1	67	64	1	57	79		20	32	50		1	60	33	8	55	30	2	16	2	34	1	1					
24		1			85		1	42	84		45	56	2	14	21	49			38	15	11	44	19		8		12							
24,5			2		65		1	36	63		46	52		10	14	42			31	13		28	12	3	1		12	1		1	1			
25			1		28			43	40		24	34		1	12	13	1		25	11	2	14	10	2	4		6							
25,5					9			18	35		14	14			2	20			5	2	1	8			2									
26					5			19	14		9	5			5	12		1	11	3	1	14	3											
26,5					2			10	9		4	3			3	5			1	4	1	4		1							2			
27						2		7	4		4	2			1	4			1	2		3					2							
27,5						1		1	3		1	1								2		2												
28						1		4	1											2		3									1			
28,5						1		1	2		1				1	2						1												
29						1		2	1						1				2	3		3					1							
29,5								2	2		2					1																		
30															2				1				2											
30,5									3		1																							
31								1	1														1											
31,5												1																						
32																																		
32,5																																		
Total no.	12	3	485	963	725	55	13	551	650	587	598	723	425	706	626	517	35	833	819	475	8	725	772	6	913	203	2	721	165	1007	698	68	92	19	202	9	65	998
Mean Length	17.75	19.50	19.04	16.33	22.94	19.26	26.27	22.81	23.36	17.85	22.87	22.73	17.80	21.32	21.83	22.79	20.59	19.47	22.16	22.19	14.44	20.24	22.42	7.67	20.60	20.77	8.50	20.58	7.88	19.50	21.34	20.79	19.64	21.45	20.54	20.72	16.61	19.15

Table 6. Measured length distribution of mackerel by haul for the Danish acoustic survey with R/V Dana in June-July 2013.

Makrel																										
Stratum																										
Station	206	230	397	495	504	558	578	658	678	733	751	899	918	1028	1085	1098	1243	1266	1349	1362	1421	1440	1545	1606	1627	1790
ICES sq.	41F6	41F7	45F6	42F6	42F7	43F7	44F7	43F7	43F7	44F8	45F8	44F9	45F9	44F9	46F9	46F9	45G0	45G1	44G1	44G1	43G0	44G1	42G1	42G1	42G2	41G0
Gear	Fotö	Fotö	Fotö	Expo	Expo	Fotö	Fotö	Expo	Expo	Fotö	Fotö	Fotö	Fotö	Expo	Fotö	Fotö	Fotö	Fotö	Fotö	Expo	Fotö	Fotö	Expo	Fotö	Fotö	Expo
Fishing depth	Surface	Surface	Surface	Bottom	Bottom	Surface	Surface	Bottom	Bottom	Surface	Surface	Surface	Surface	Bottom	Surface	Surface	Surface	Surface	Surface	Bottom	Surface	Surface	Bottom	Surface	Surface	Surface
Total depth	42	31	338	38	36	138	386	35	70	457	492	143	649	38	344	286	143	98	92	62	41	66	41	36	31	21
Day/Night	N	N	N	D	D	N	N	D	D	N	N	N	N	D	N	N	N	N	D	D	N	N	D	N	N	N
Total catch,kg	100	390	1140	45	183	4460	1340	47	54	830	1210	660	400	191	200	250	950	550	67	730	340	973	450	124	106	270
Total catch Mackerel,l	31.973	180.884	371.977	0.192	0.466	951.322	265.152	1.206	0.310	208.670	178.793	313.781	59.244	1.390	1.620	110.600	287.814	191.387	0.904	3	25	546	3	73	54	2.256
Sample Mackerel,kg	31.973	60.662	42.658	0.192	0.466	59.089	36.791	1.206	0.310	54.700	42.025	52.486	17.748	1.390	1.620	29.743	52.741	31.193	0.904	3	14.798	31	2.814	73	54	2.256
Length in cm																										
15																										
16																										
17																		1								
18																										
19	1	1	1																							
20	3		1		1						1							1			11			2	14	
21	2		7							6	2				1	5		7	1		18			10	55	1
22	1		4							10	3	1	1			2	2	14	2		27	4		54	123	5
23	16	1	6							12	3	1			1	8	3	16			37	8		67	92	5
24	47	19	24			6	1			25	18	14	6	1	1	18	5	37	1		22	18		23	29	
25	89	43	83		1	29	27			122	79	86	27		2	64	72	90	3		10	56	1	4	4	1
26	59	38	82			93	87			124	116	158	31	2	1	77	124	53			6	58		4	6	
27	20	19	72			121	74			46	54	71	16	1	2	21	72	10	1		5	33		9		3
28	1	3	13			28	21			15	4	25	4			5	20	1			4	7		5	3	
29		5		1		18	5			3		2	2	2		2	6					7		7		
30		12	1			3	1	1		3		2	2			1		2						5		
31	1	7				3				1	1	1	1					1						2		
32		16				3	3	1									1			1				18		
33		27				4			1	3	2		3			1	3			1	1			19		
34	1	24	4			8	3			2	2		1		1		6	1		2		5		19		2
35		15			1	5	3	1		1	1		4		1		3			1		1	1	18		
36		11				5	3	1		2	1		6	1			3			1			1	20	1	
37		11				4				1							3							7		
38		6				2				1										2				9		
39		1				2	1						1									1	3	3		
40		1															1	1					1	6		
41						1											1							4		
42																				1				3		
43																								3		
44																								3		
45																										
46																								1		
47																										
48																										
49																										
50																										
51																										
52																										
53																										
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58																										
59																										
60																										
61																										
Total no.	241	260	298	1	3	335	229	4	1	377	287	361	105	7	10	204	325	235	8	9	141	198	7	325	327	17
Mean length	25.0249	29.74615	25.7349	29	26.66667	27.58507	26.95197	33.25	33	25.76923	25.87456	26.05263	27.31429	28.14286	26.7	25.46569	26.69231	24.84681	23.875	35.77778	23.09929	25.9899	36.14286	28.57538	22.41284	24.70588

Table 7. Measured length distribution of sprat by haul for the Danish acoustic survey with R/V Dana in June-July 2013.

Station	151	230	495	1440	1545	1627	1715	1731	1790
ICES sq.	42F6	41F7	42F6	44G1	42G1	42G2	41G1	41G1	41G0
Gear	Expo	Fotö	Expo	Fotö	Expo	Fotö	Expo	Expo	Expo
Fishing depth	Bottom	Surface	Bottom	Surface	Bottom	Surface	Bottom	Bottom	Surface
Total depth	55	31	38	66	41	31	25	30	21
Day/Night	D	N	D	N	D	N	D	D	N
Total catch.kg	8	390	45	973	450	106	91	208	270
Total catch Sprat,kg	0.018	2.021	0.012	0.096	343.171	0.042	0.644	0.168	62.285
Sample Sprat,kg	0.018	1.040	0.012	0.096	14.268	0.042	0.644	0.168	6.704
Length in cm									
5.5									
6									
6.5									
7			1						
7.5									
8									
8.5									
9					2				
9.5									
10									
10.5					5				
11		3			7			1	
11.5		6			10			1	
12		14			8				
12.5		16		1	16		3		2
13	1	12			50		3	1	9
13.5		8		1	130		12	3	35
14		5			155		6	1	90
14.5		2		2	142	2	6	2	93
15				1	97		5	1	47
15.5					49				17
16					10				2
16.5					2				
17									
17.5									
18									
18.5									
19									
19.5									
20									
20.5									
21									
21.5									
22									
22.5									
23									
23.5									
24									
24.5									
25									
25.5									
26									
26.5									
27									
27.5									
28									
28.5									
29									
29.5									
30									
30.5									

Table 8. CTD Station details for the Danish acoustic survey with R/V Dana in July 2013.

						Bottom	Wind	
Date	Haul	Time	ICES	Position		depth	speed	Sea state
dd-mm-yy	no.	UTC	Square	Latitude	Longitude	m	m/s	
27-06-13	3	19:28	44F8	57.50.034 N	008.15.309 E	520	4.3	3
28-06-13	138	10:00	43F6	57.07.957 N	006.17.608 E	56	8.2	4
28-06-13	156	14:31	42F6	56.59.095 N	006.34.091 E	56	10.5	5
28-06-13	205	19:59	41F6	56.12.372 N	006.27.257 E	43	4.8	2
29-06-13	236	01:47	41F7	56.13.847 N	007.26.152 E	30	7.4	2
29-06-13	396	22:02	45F6	58.07.652 N	006.12.517 E	337	15.5	6
30-06-13	495	10:03	42F6	56.36.250 N	006.52.734 E	45	4.7	3
30-06-13	508	13:55	42F7	56.39.882 N	007.11.042E	33	5.7	3
30-06-13	557	19:59	43F7	57.28.077 N	007.04.698 E	138	4.6	3
01-07-13	583	01:44	44F7	57.48.827 N	007.03.653 E	416	5.9	2
01-07-13	657	10:01	43F7	57.05.522 N	007.14.271 E	33	6.9	2
01-07-13	683	14:54	43F7	57.13.526 N	007.40.935 E	51	8.4	4
01-07-13	732	20:11	44F8	57.52.790 N	008.09.567 E	500	8.4	4
02-07-13	755	01:43	45F8	58.00.169 N	008.25.033 E	513	11.7	5
02-07-13	826	09:59	43F8	57.26.183 N	008.20.174E	68	7.3	5
02-07-13	843	14:21	44F8	57.34.635 N	008.33.291 E	100	9.2	5
02-07-13	898	00:00	44F9	57.48.791 N	009.10.744 E	131	7	3
03-07-13	924	01:43	45F9	58.12.321 N	009.10.629 E	648	6.4	3
03-07-13	1008	10:16	44G0	57.50.069 N	010.25.127 E	89	9.6	3
03-07-13	1033	15:17	44F9	57.43.689 N	009.41.345 E	36	6.6	3
03-07-13	1084	20:38	46F9	58.33.761 N	009.37,251 E	497	4.5	3
04-07-13	1102	01:41	46F9	58.44.858 N	009.59.576 E	256	3.5	3
04-07-13	1179	10:02	46G0	58.35.574 N	010.50.557 E	82	5.4	3
04-07-13	1196	15:11	45G0	58.21.026 N	010.58.507 E	89	5.6	3
04-07-13	1242	20:03	45G0	58.06.388 N	010.15.670 E	142	6.9	3
05-07-13	1272	10:19	45G1	58.06.681 N	011.11.542 E	72	7.4	3
05-07-13	1348	10:03	44G0	57.55.407 N	010.55.852 E	123	9.1	3
05-07-13	1362	12:57	44G1	57.50.221 N	011.15.367 E	68	12.3	5
05-07-13	1421	20:32	43G0	57.26.234 N	010.49.192 E	45	10	2
06-07-13	1445	01:31	44G1	57.39.401 N	011.26.182 E	88	6.9	3
06-07-13	1524	10:04	43G1	57.09.164 N	011.50.318 E	54	5.6	3
06-07-13	1549	14:56	42G1	56.47.956 N	011.42.207 E	33	4.2	3
06-07-13	1605	20:27	42G1	56.37.051 N	011.47.773 E	37	1.6	3
07-07-13	1632	01:46	42G2	56.30.940 N	012.25.815 E	32	4.8	2
07-07-13	1714	10:13	41G1	56.09.429 N	011.53.585 E	26	3.7	2
07-07-13	1736	14:52	41G1	56.19.661 N	011.39.015 E	31	6	2
07-07-13	1789	20:32	41G0	56.11.490 N	010.57.667 E	23	5.7	2

Table 9. WP2 Station details for the Danish acoustic survey with R/V Dana in July 2013.

Date	Station	Time	ICES	Position		Mean depth	WP2 depth	Wind speed	Sea state
dd-mm-yy	no.	UTC	Square	Latitude	Longitude	m	m	m/s	
28-06-13	156	14:45	42F6	56.59.122 N	006.34.055 E	57	50.0	9.2	5
28-06-13	205	20:07	41F6	56.12.439 N	006.27.342 E	43	36.4	4.3	2
29-06-13	396	22:31	45F6	58.07.873 N	006.12.051 E	335	149.6	15.6	6
30-06-13	508	14:03	42F7	56.39.873 N	007.11.144 E	34	27.8	6	3
30-06-13	557	20:16	43F7	57.28.102 N	007.05.092 E	138	130.8	5.3	3
01-07-13	683	15:06	43F7	57.13.533 N	007.41.054 E	51	45.8	9.2	4
02-07-13	755	02:02	45F8	58.00.093 N	008.25.061 E	515	149.6	12.8	5
02-07-13	843	14:37	44F8	57.34.796 N	008.33.687 E	100	92.5	8.8	5
02-07-13	898	20:34	44F9	57.48.839 N	009.11.188 E	130	123.4	6.3	3
03-07-13	1033	15:24	44F9	57.43.694 N	009.41.286 E	36	31.2	7.2	3
03-07-13	1084	21:00	46F9	58.33.749 N	009.37.182 E	503	147.3	4.1	3
04-07-13	1196	15:22	45G0	58.21.251 N	010.58.634 E	87	78.4	5.5	3
04-07-13	1242	20:20	45G0	58.06.525 N	010.15.847 E	144	141.5	6.4	3
05-07-13	1362	13:08	44G1	57.50.269 N	011.15.577 E	71	60.2	10.3	5
05-07-13	1421	20:41	43G0	57.26.321 N	010.49.274 E	44	38.0	9.8	2
06-07-13	1549	15:05	42G1	56.47.975 N	011.42.286 E	33	28.2	4.3	3
06-07-13	1605	20:33	42G1	56.36.958 N	011.47.741 E	37	30.9	1.9	3
07-07-13	1736	15:00	41G1	56.19.633 N	011.39.064 E	31	24.6	5.1	2
07-07-13	1789	20:46	41G0	56.11.452 N	010.57.413 E	22	16.4		

Table 10. 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 2013

Number of Autumn Spawners in 2013 in mill.							
WR	0	1i	1m	2i	2m	3i	3m
580E06	0	3.273015	0	0.69054	0.22428	0	0
570E06	0	73.05099	0	27.1059	8.80363	0	0
580E08	0	44.03971	0	17.5696	5.70635	0	0.37658
570E08	0	63.39655	0	18.5943	6.03917	0	0
C	0.07602	36.00901	0	1.39513	0.45312	0	0.02367
D	0.44404	155.399	0	15.9134	5.16845	0	0
E	22.3959	405.5113	4.22408	14.4436	22.3219	0	0
560E06	14.5064	102.8274	0	0.05099	0.12748	0	0
Total	37.4224	883.5069	4.22408	95.7634	48.8443	0	0.40025

Biomass of Autumn Spawners in 2013 in ton.							
WR	0	1i	1m	2i	2m	3i	3m
580E06	0.00	238.83	0.00	61.46	19.96	0.00	0.00
570E06	0.00	4949.61	0.00	2800.39	909.53	0.00	0.00
580E08	0.00	3345.15	0.00	1698.86	551.77	0.00	39.16
570E08	0.00	4832.46	0.00	1826.48	593.22	0.00	0.00
C	1.23	2184.94	0.00	126.22	40.99	0.00	2.46
D	3.25	9246.73	0.00	1190.29	386.59	0.00	0.00
E	441.30	19761.30	205.85	1064.59	1645.27	0.00	0.00
560E06	311.94	3625.34	0.00	5.85	14.62	0.00	0.00
Total	757.73	48184.36	205.85	8774.13	4161.95	0.00	41.63

Mean length of Autumn Spawners in 2013 in cm.							
WR	0	1i	1m	2i	2m	3i	3m
580E06	0.00	20.63	20.63	22.00	22.00	0.00	0.00
570E06	0.00	20.35	20.35	23.18	23.18	0.00	0.00
580E08	0.00	21.07	21.07	23.14	23.14	25.00	25.00
570E08	0.00	20.78	20.78	22.80	22.80	0.00	0.00
C	13.70	19.85	19.85	23.48	23.48	25.00	25.00
D	9.83	19.99	19.99	22.29	22.29	0.00	0.00
E	12.70	19.14	19.14	22.12	22.12	0.00	0.00
560E06	15.07	16.80	16.80	23.43	23.43	0.00	0.00

Mean weight of Autumn Spawners in 2013 in g.							
WR	0	1i	1m	2i	2m	3i	3m
580E06	0.00	72.97	72.97	89.00	89.00	0.00	0.00
570E06	0.00	67.76	67.76	103.31	103.31	0.00	0.00
580E08	0.00	75.96	75.96	96.69	96.69	104.00	104.00
570E08	0.00	76.23	76.23	98.23	98.23	0.00	0.00
C	16.20	60.68	60.68	90.47	90.47	104.00	104.00
D	7.33	59.50	59.50	74.80	74.80	0.00	0.00
E	19.70	48.73	48.73	73.71	73.71	0.00	0.00
560E06	21.50	35.26	35.26	114.71	114.71	0.00	0.00

Table 11. 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 2013

Number of Spring Spawners in 2013 in mill.																	
wr	0	1i	1m	2i	2m	3i	3m	4i	4m	5	6	7	8	9	10	11	12
580E06	0	0	0	4.44467	8.85069	1.64873	19.8597	0.09216	1.63583	2.26671	0.15247	1.07745	0	0	0	0	0
570E06	0	0	0	26.628	53.0244	7.84932	94.5486	0.76906	13.6507	7.68111	3.51523	3.75468	0.75894	0.19995	0.23433	0	0
580E08	0	0	0	25.5835	50.9445	5.18757	62.4867	0.4188	7.43368	2.79971	2.76953	0.37646	0.19525	0	0.05979	0	0.01698
570E08	0	0.89039	0.1272	13.899	27.6772	2.10256	25.3262	0.15106	2.68135	1.00127	1.03099	0.15203	0.12033	0.10388	0.05194	0	0
C	0	0.83095	0.11871	3.41004	6.79044	0.22494	2.70951	0.01351	0.23985	0.13749	0.11024	0.00576	0.00576	0	0.00576	0	0.00576
D	0	2.46966	0.35281	20.048	39.9217	1.48221	17.8539	0.09808	1.74086	0.48462	0.46689	0.07677	0	0.15355	0.35677	0	0
E	0	22.791	1.19952	143.156	132.473	18.1398	84.2205	1.60775	8.03877	5.01437	0	0	0	0	0	0	0
560E06	0	7.23207	1.20534	1.10384	0.31538	0.0255	0.10198	0	0.0255	0	0	0	0	0	0	0	0

Biomass of Spring Spawners in 2013 in ton.																	
wr	0	1i	1m	2i	2m	3i	3m	4i	4m	5	6	7	8	9	10	11	12
580E06	0	0	0	400.357	797.232	162.657	1959.27	9.47561	168.192	228.603	20.1868	109.453	0	0	0	0	0
570E06	0	0	0	2491.6	4961.54	862.645	10391	90.5036	1606.44	999.468	532.299	497.325	124.095	32.5158	43.6743	0	0
580E08	0	0	0	2267.22	4514.72	512.188	6169.54	46.5303	825.913	372.575	309.56	59.8353	25.3822	0	10.2846	0	2.51298
570E08	0	54.8399	7.83427	1403.5	2794.8	226.344	2726.42	19.0638	338.382	143.788	124.688	21.2525	18.5054	19.2706	10.181	0	0
C	0	57.1277	8.1611	257.848	513.455	18.5345	223.257	1.46787	26.0547	18.9746	11.1643	1.2843	0.80055	0	0.99055	0	0.85236
D	0	169.071	24.153	1528.42	3043.56	115.481	1391.02	13.0274	231.237	79.2726	44.7293	14.8172	0	30.5557	27.8282	0	0
E	0	1032.2	54.3261	8524.46	7888.31	1272.14	5906.36	125.69	628.452	438.085	0	0	0	0	0	0	0
560E06	0	228.572	38.0953	64.6758	18.4788	2.33028	9.32113	0	2.57505	0	0	0	0	0	0	0	0

Mean length of Spring Spawners in 2013 in cm.																	
wr	0	1i	1m	2i	2m	3i	3m	4i	4m	5	6	7	8	9	10	11	12
580E06	0.00	0.00	0.00	22.31	22.31	23.50	23.50	23.30	23.30	23.78	26.50	24.52	0.00	0.00	0.00	0.00	0.00
570E06	0.00	0.00	0.00	22.39	22.39	24.12	24.12	24.81	24.81	25.54	27.12	26.52	28.40	29.89	29.81	0.00	0.00
580E08	0.00	0.00	0.00	22.31	22.31	23.52	23.52	24.59	24.59	25.72	24.95	27.16	27.00	0.00	30.00	0.00	29.00
570E08	0.00	20.24	20.24	22.44	22.44	23.64	23.64	24.54	24.54	26.09	25.68	26.22	27.79	30.50	30.50	0.00	0.00
C	0.00	21.00	21.00	21.38	21.38	22.60	22.60	24.68	24.68	25.96	24.34	29.00	27.00	0.00	30.00	0.00	29.00
D	0.00	20.96	20.96	21.94	21.94	22.41	22.41	25.84	25.84	27.42	24.71	28.50	0.00	30.50	23.00	0.00	0.00
E	0.00	18.60	18.60	20.67	20.67	22.17	22.17	23.38	23.38	22.94	0.00	0.00	0.00	0.00	0.00	0.00	0.00
560E06	0.00	16.60	16.60	19.95	19.95	23.60	23.60	24.00	24.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Mean weight of Spring Spawners in 2013 in g.																	
wr	0	1i	1m	2i	2m	3i	3m	4i	4m	5	6	7	8	9	10	11	12
580E06	0.00	0.00	0.00	90.08	90.08	98.66	98.66	102.82	102.82	100.85	132.40	101.58	0.00	0.00	0.00	0.00	0.00
570E06	0.00	0.00	0.00	93.57	93.57	109.90	109.90	117.68	117.68	130.12	151.43	132.45	163.51	162.62	186.38	0.00	0.00
580E08	0.00	0.00	0.00	88.62	88.62	98.73	98.73	111.10	111.10	133.08	111.77	158.94	130.00	0.00	172.00	0.00	148.00
570E08	0.00	61.59	61.59	100.98	100.98	107.65	107.65	126.20	126.20	143.60	120.94	139.80	153.79	185.50	196.00	0.00	0.00
C	0.00	68.75	68.75	75.61	75.61	82.40	82.40	108.63	108.63	138.00	101.27	223.00	139.00	0.00	172.00	0.00	148.00
D	0.00	68.46	68.46	76.24	76.24	77.91	77.91	132.83	132.83	163.58	95.80	193.00	0.00	199.00	78.00	0.00	0.00
E	0.00	45.29	45.29	59.55	59.55	70.13	70.13	78.18	78.18	87.37	0.00	0.00	0.00	0.00	0.00	0.00	0.00
560E06	0.00	31.61	31.61	58.59	58.59	91.40	91.40	101.00	101.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table 12. Age distribution in estimate of autumn spawners during the Danish acoustic survey with R/V Dana in June-July from 2007 to 2013 given as number per age and strata in mill.and % of total abundance given by age and strata.

Autumn spawners in 2006

Number in millions

	WR								
Strata	0	1	2	3	4	5	6	7	Totalt
580E06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
570E06	0.00	313.22	77.82	1.31	0.00	0.00	0.00	0.00	392.36
580E08	0.00	72.47	5.61	0.00	0.00	0.28	0.00	0.00	78.36
570E08	30.99	425.10	40.41	2.00	0.00	0.00	0.00	0.00	498.50
C	0.00	125.25	21.23	0.00	0.00	0.32	0.00	0.00	146.79
D	0.00	265.61	13.04	1.53	0.00	0.00	0.00	0.00	280.17
E	6.57	107.84	17.39	1.23	0.00	0.00	1.09	0.00	134.12
560E06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
All stratas	37.56	1309.49	175.49	6.07	0.00	0.60	1.09	0.00	1530.29

Age distribution in % of total abundance

	WR							
Strata	0	1	2	3	4	5	6	7
580E06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
570E06	0.00	79.83	19.83	0.33	0.00	0.00	0.00	0.00
580E08	0.00	92.48	7.16	0.00	0.00	0.36	0.00	0.00
570E08	6.22	85.28	8.11	0.40	0.00	0.00	0.00	0.00
C	0.00	85.32	14.46	0.00	0.00	0.22	0.00	0.00
D	0.00	94.80	4.65	0.55	0.00	0.00	0.00	0.00
E	4.90	80.41	12.97	0.92	0.00	0.00	0.81	0.00
560E06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
All stratas	2.45	85.57	11.47	0.40	0.00	0.04	0.07	0.00

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

Table 12 continued….

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

Autumn spawners in 2012

Numbers in millions

	WR								
	0	1	2	3	4	5	6	7	Total
580E06	0.00	11.54	7.21	0.30	0.08	0.00	0.07	0.07	19.26
570E06	0.00	539.59	129.74	7.71	3.47	0.69	0.20	0.58	681.98
580E08	0.10	208.42	49.54	1.71	0.75	0.38	0.41	0.00	261.30
570E08	0.00	1247.08	114.79	3.07	3.47	0.26	0.00	0.19	1368.86
C	132.42	62.45	10.42	0.00	0.22	0.00	0.00	0.00	205.51
D	0.00	992.33	29.05	0.26	0.76	0.00	0.00	0.00	1022.40
E	54.99	722.62	7.38	1.33	1.20	0.44	0.00	0.00	787.96
560E06	0.00	457.36	0.21	0.00	0.00	0.00	0.00	0.00	457.57
All Strata	187.51	4241.38	348.34	14.38	9.96	1.77	0.68	0.83	4804.84

Age distribution in % of total abundance

	WR							
	0	1	2	3	4	5	6	7
580E06	0.00	59.91	37.45	1.57	0.40	0.00	0.34	0.34
570E06	0.00	79.12	19.02	1.13	0.51	0.10	0.03	0.08
580E08	0.04	79.76	18.96	0.65	0.29	0.15	0.16	0.00
570E08	0.00	91.10	8.39	0.22	0.25	0.02	0.00	0.01
C	64.44	30.39	5.07	0.00	0.11	0.00	0.00	0.00
D	0.00	97.06	2.84	0.03	0.07	0.00	0.00	0.00
E	6.98	91.71	0.94	0.17	0.15	0.06	0.00	0.00
560E06	0.00	99.95	0.05	0.00	0.00	0.00	0.00	0.00
All Strata	3.90	88.27	7.25	0.30	0.21	0.04	0.01	0.02

Autumn spawners in 2013

Numbers in millions

	WR								
	0	1	2	3	4	5	6	7	Total
580E06	0.00	3.27	0.91	0.00	0.00	0.00	0.00	0.00	4.19
570E06	0.00	73.05	35.91	0.00	0.00	0.00	0.00	0.00	108.96
580E08	0.00	44.04	23.28	0.38	0.00	0.00	0.00	0.00	67.69
570E08	0.00	63.40	24.63	0.00	0.00	0.00	0.00	0.00	88.03
C	0.08	36.01	1.85	0.02	0.00	0.00	0.00	0.00	37.96
D	0.44	155.40	21.08	0.00	0.00	0.00	0.00	0.00	176.92
E	22.40	409.74	36.77	0.00	0.00	0.00	0.00	0.00	468.90
560E06	14.51	102.83	0.18	0.00	0.00	0.00	0.00	0.00	117.51
All Strata	37.42	887.73	144.61	0.40	0.00	0.00	0.00	0.00	1070.16

Age distribution in % of total abundance

	WR							
	0	1	2	3	4	5	6	7
580E06	0.00	78.16	21.84	0.00	0.00	0.00	0.00	0.00
570E06	0.00	67.04	32.96	0.00	0.00	0.00	0.00	0.00
580E08	0.00	65.06	34.38	0.56	0.00	0.00	0.00	0.00
570E08	0.00	72.02	27.98	0.00	0.00	0.00	0.00	0.00
C	0.20	94.87	4.87	0.06	0.00	0.00	0.00	0.00
D	0.25	87.83	11.92	0.00	0.00	0.00	0.00	0.00
E	4.78	87.38	7.84	0.00	0.00	0.00	0.00	0.00
560E06	12.34	87.50	0.15	0.00	0.00	0.00	0.00	0.00
All Strata	3.50	82.95	13.51	0.04	0.00	0.00	0.00	0.00

Table 13. Age distribution in estimate of spring spawners during the Danish acoustic survey with R/V Dana in June-July from 2007 to 2013 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 13 Continued..

Spring spawners in 2011															
Number in millions															
	WR														
Strata	0	1	2	3	4	5	6	7	8	9	10	11	12	13	total
580E06	0	0.12	7.73	4.40	1.00	1.63	0.45	0.08	0	0	0	0	0	0	15.69
570E06	0	79.66	66.92	40.88	20.10	10.79	3.52	3.01	2.02	0.00	0.00	0	0	0	226.90
580E08	0	4.51	76.89	47.55	39.76	14.16	14.12	2.04	0.29	0.46	1	0	0	0	200.30
570E08	0	484.27	121.20	55.94	40.75	14.81	9.01	2.30	1	0.20	0	0	0	0	730.09
C	0	6.74	59.20	16.36	6.87	0.63	0.31	0.00	0.00	0.00	0	0	0	0	90.11
D	0	55.88	63.59	27.43	16.10	4.60	2.34	0.30	0.00	0.00	0	0	0	0	170.23
E	0.00	419.21	18.63	2.92	0.56	0.27	0.05	0.11	0.00	0.05	0	0	0	0	441.81
560E06	0	1824.43	0.00	0	0	0	0	0	0	0	0	0	0	0	1824.43
All stratas	0.00	2874.83	414.17	195.48	125.13	46.89	29.80	7.83	3.88	0.72	0.84	0	0	0	3699.57
													Total 4-13 WR		215.09
													Total 0-3 WR		3484.48
Spring spawners in 2012															
Number in millions															
	WR														
Strata	0	1	2	3	4	5	6	7	8	9	10	11	12	13	total
580E06	0	0.09	12.74	4.11	1.82	0.83	0.45	0.41	0	0	0	0	0		20.79
570E06	0	0.80	53.18	18.53	7.18	5.64	2.64	1.49	1.14	0.25	0.00	0	0		91.00
580E08	0	6.38	127.18	31.48	11.14	2.07	2.28	0.00	0.00	0.00	0	0	0		180.53
570E08	0	37.49	185.06	18.31	4.00	8.21	4.20	1.39	1	1.05	0	0	0		260.68
C	0	2.80	70.51	11.69	3.71	0.56	0.43	0.00	0.00	0.00	0	0	0		89.70
D	0	122.36	149.95	10.99	1.72	1.38	0.20	0.00	0.00	0.00	0	0	0		286.60
E	0.97	687.18	244.61	18.12	2.48	2.87	0.68	0.12	0.00	0.00	0	0	0		957.03
560E06	0	67.84	0.70	0	0	0	0	0	0	0	0	0	0		68.54
All stratas	0.97	924.95	843.92	113.21	32.05	21.56	10.88	3.43	2.30	1.31	0.00	0.00	0.30	0	1954.88
													Total 4-13 WR		71.83
													Total 0-3 WR		1883.04
Spring spawners in 2013															
Number in millions															
	WR														
Strata	0	1	2	3	4	5	6	7	8	9	10	11	12	13	total
580E06	0	0.00	13.30	21.51	1.73	2.27	0.15	1.08	0	0	0	0	0		40.03
570E06	0	0.00	79.65	102.40	14.42	7.68	3.52	3.75	0.76	0.20	0.23	0	0		212.61
580E08	0	0.00	76.53	67.67	7.85	2.80	2.77	0.38	0.20	0.00	0	0	0		158.27
570E08	0	1.02	41.58	27.43	2.83	1.00	1.03	0.15	0	0.10	0	0	0		75.32
C	0	0.95	10.20	2.93	0.25	0.14	0.11	0.01	0.01	0.00	0	0	0		14.61
D	0	2.82	59.97	19.34	1.84	0.48	0.47	0.08	0.00	0.15	0	0	0		85.51
E	0.00	23.99	275.63	102.36	9.65	5.01	0.00	0.00	0.00	0.00	0	0	0		416.64
560E06	0	8.44	1.42	0	0	0	0	0	0	0	0	0	0		10.01
All stratas	0.00	37.22	558.27	343.77	38.60	19.39	8.05	5.44	1.08	0.46	0.71	0.00	0.02	0	1013.00
													Total 4-13 WR		73.74
													Total 0-3 WR		939.26

Table 14. 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 2013.

Number of Sprat in 2013 in mill									
WR	0	1i	1m	2i	2m	3	4	5	6
580E06	0	0	0	0	0	0	0	0	0
570E06	0	0	0	0	3.92011	0	0	0	0
580E08	0	0	0	0	0	0	0	0	0
570E08	0	0	0	0	0.02053	0	0	0	0
C	0	0	0	0	0	0	0	0	0
D	0	0	0	0	0	0	0	0	0
E	1.35094	13.6956	0.76087	54.2055	14.5938	255.771	158.733	33.2454	0.90415
560E06	0	0	0	1.43988	0.032	3.28215	0.95127	0.28526	0.09509
Biomass of Sprat in 2013 in tonn									
WR	0	1i	1m	2i	2m	3	4	5	6
580E06	0	0	0	0	0	0	0	0	0
570E06	0	0	0	0	64.7995	0	0	0	0
580E08	0	0	0	0	0	0	0	0	0
570E08	0	0	0	0	0.28579	0	0	0	0
C	0	0	0	0	0	0	0	0	0
D	0	0	0	0	0	0	0	0	0
E	8.72707	149.025	8.27919	915.931	246.597	5205.9	3547.76	803.598	24.5114
560E06	0	0	0	19.4132	0.4314	49.5346	16.999	5.84975	2.06719
Mean length of Sprat in 2013 in cm									
WR	0	1i	1m	2i	2m	3	4	5	6
580E06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
570E06	0.00	0.00	0.00	0.00	13.00	0.00	0.00	0.00	0.00
580E08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
570E08	0.00	0.00	0.00	0.00	12.50	0.00	0.00	0.00	0.00
C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
D	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
E	9.75	11.18	11.18	13.12	13.12	14.08	14.56	15.30	16.00
560E06	0.00	0.00	0.00	12.09	12.09	12.46	13.47	14.17	14.50
Mean weight of Sprat in 2013 in g									
WR	0	1i	1m	2i	2m	3	4	5	6
580E06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
570E06	0.00	0.00	0.00	0.00	16.53	0.00	0.00	0.00	0.00
580E08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
570E08	0.00	0.00	0.00	0.00	13.92	0.00	0.00	0.00	0.00
C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
D	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
E	6.46	10.88	10.88	16.90	16.90	20.35	22.35	24.17	27.11
560E06	0.00	0.00	0.00	13.48	13.48	15.09	17.87	20.51	21.74