# APPENDIX IIB: Denmark

# Acoustic Herring Survey report for RV "DANA"

29th June2004 – 12th July 2004

Bo Lundgren[1], Torben Filt Jensen[2], Teunis Jansen[3]
Danish Institute for Fisheries Research,
[1]Dept for Marine Fisheries, Hirtshals, Denmark
[2]Dept. of IT and Technical Support, Hirtshals, Denmark
[3]Dept. of IT and Technical Support, Charlottenlund, Denmark

## 1. INTRODUCTION

Since 1991 the Danish institute for Fisheries Research (DIFRES) 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 2004-survey with R/V DANA, covering the Skagerrak and Kattegat, was conducted in the period July 1 to July 12 2004, while calibration was done during June 29 – July 1.

## 2. SURVEY

### 2.1 Personnel

| | |
|---|---|
| **During calibration 29/6 – 1/7-2004** | |
| Bo Lundgren (cruise leader) | HFI |
| Torben Filt Jensen(assisting cruise leader) | ITT |
| Teunis Jansen | HFI |
| Tommy Nielsen | ITT |
| Bo Tegen Nielsen | ITT |
| Claus Halle | ADM |
| **During acoustic monitoring 1/7-12/7-2004** | |
| Bo Lundgren (cruise leader) | HFI |
| Torben Filt Jensen (assisting cruise leader) | ITT |
| Teunis Jansen | ITT |
| Lise Sindahl | HFI |
| Helle Rasmussen | HFI |
| Tommy Kristensen | HFI |
| Rasmus F. Jensen | HFI |
| Bo Tegen Nielsen | ITT |

HFI = Dept for Marine Fisheries, DIFRES, Denmark
ITT = Dept. of IT and Technical Support, DIFRES, Denmark
ADM = Administration Dept, DIFRES, Denmark

### 2.2 Narrative

R/V Dana left Hirtshals on June 29th 2003 at 12.00 for the calibration site in the Gullmar Fjord in Sweden. Some tests of the echosounder equipment and some preparations for the calibration next day were carried underway.

R/V Dana went to harbour in Frederikshavn on July 1 2004 at 13.00 for exchange of scientific personnel and left again at 18.00 (Danish local time, 16.00 UTC) with a southerly course to start the survey. The survey work (acoustic integration) started at 16.36 UTC on the position 57º 23.20´ N 10º 37.60´ E in the north-western part of the Kattegat. The Kattegat area was covered during July 2 – 3, eastern Skagerrak during July 4 – 6, western Skagerrak during July 7 – 9 and morning of July 12 and the overlap area during July 10 – 11. Short stops just outside Hirtshals on July 5 and just outside Hanstholm on July 7 was done to change personel. Totally the survey covered about 1700 nautical miles mainly using the 38 kHz paravane transducer running at depths of 4 – 6 m depending on the sea state and sailing direction relative to the waves. Simultaneously data from the 120 kHz and 18 kHz echosounders using the hull-mounted transducers were also recorded, but unfortunately the quality of these data were strongly dependent on the weather conditions. During trawling hull-mounted transducers were used for all three frequencies. The acoustic integration ended near the Danish coast in mid-Skagerrak at 06.27 UTC on the position 57º 39.40´ N 09º 44.40´ E. The survey ended in Hirtshals on 10 July 2003 at 11.00 hour.

## **2.3** Survey design

The survey was carried out in the Kattegat and in the Skagerrak, east of 6° E and north of 56° N (Fig. IIB.1). The area is split into 7 sub-areas surveyed by Dana and one overlap area to be surveyed also by the Norwegian and German survey partners. This year the survey was started in the eastern Kattegat and ended in the western Skagerrak in order to reach the overlap area on June 10$^{th}$ at the same time as the other partners. 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 limited time periods and places for fishing (late morning, early afternoon and immediately before and after midnight; 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 way adapted to the depth curves and the relatively heavy ship traffic.

## **2.4** Calibration

The echo sounders were calibrated at the Bornö Island site in the Gullmar Fjord, Sweden 29 June – 1 July 2004. This year the calibration procedures were different from earlier years because the echosounder equipment had been upgraded to EK60 with three frequencies (18, 38 and 120 kHz) earlier in the year. The modified procedures were introduced during a previous cruise to the North Atlantic with guidance from collegues at IMR in Bergen, Norway. Calibration of the paravane split-beam transducer at 38 kHz was done with a 60 mm copper sphere. Calibration of the three hull-mounted split-beam transducers at 18, 38 and 120 kHz were carried out with 63mm, 60 mm and 23 mm copper spheres, respectively. As a backup in case of failures in the new system calibration was also carried out with the 60 mm Cu-sphere on the paravane mounted 38 kHz transducer with the previously used EY500 echo sounder. The results were similar to the previous calibration earlier in the year, and for 38 kHz close to results from previous years. The calibration setup of the EK60 38 kHz used to produce the survey data is shown in Table **IIB.**1.

## **2.5** Acoustic data collection

Acoustic data were collected using mainly the Simrad EK60 38kHz echosounder with the transducer (Type ES 38 7x7 degrees main lobe) in a towed body. The towed body runs running at approx. 3 m depth in good weather and down to about 6 -7 m as needed depending on the weather conditions. The speed of the vessel during acoustic sampling was 8 – 10 knots. Also EK60 18 kHz and 120 kHz data were collected, but has not been used for the survey estimate since the data quality is very weather dependent due to the position of the transducers on the hull. Acoustic data were recorded as raw data on harddisk all 24 hours also during fishing operations, but data taken during fishing periods (usually two daytime hauls and two nighttime hauls (the latter immediately before and after local midnight)) are not used for the biomass estimate. The sampling unit (ESDU) was one nautical mile (nm). For the survey purpose raw data is pre-integrated into 1 m meter samples for each ping and stored as files on harddisk for each 1 nm interval. Integration is conducted from 3 m below the transducer to 1 m above the bottom or usually max 300 m depth. During trawl hauls the towed body is taken aboard and the EK60 38 kHz echosounder run on the hull transducer.

## **2.6** Biological data - fishing trawls

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 (Fig. IIB.2) were carried out using an EXPO trawl (16 mm in the codend). Trawling was carried out in the time intervals 1000 to 1800h and 2200 to 0300h UTC (Table **IIB.**2). The trawling strategy was made in a way that most depth zones were covered with in each geographical stratum (see Fig. **IIB**.2). In the deeper areas mid water hauls were made to identify until which depth herring will be found. 1 hour hauls were used as a standard during the survey, but sometimes shortened if the catch indicators indicated very large catches.

The fish caught were sorted into species groups and length groups within each species. Numbers and weight for each length group for each species was recorded with emphasis on pelagic species. The clupeid fish were measured to the nearest 0.5 cm total length below other fish to 1 cm and the weight to nearest 0.1g wet weight. In each trawl haul 10 (if available) herring per 0.5 cm length class were sampled for determination of age, race (North Sea autumn spawners or Baltic Sea spring spawmers) and maturity. Micro-structure formed during the larval period were used for the discrimination of herring race. Maturity was determined according to an 8-stage scale as also used by Scotland (see Survey Manual App IV).

## **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 shown in Fig. IIB.4.

## **2.8** Data analysis

The raw data is preintegrated into 1m samples for each ping and 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. It allows deleting layers and/or intervals with interference from wave- or ship wake-bubbles or rarely with bottom-

integration. In areas with heavy abundance of jellyfish or zooplankton, usually krill, manually adjustable thresholds is applied separately to each layer to suppress background echoes

For each sub area the mean back scattering cross section was estimated for herring, sprat, gadoids and mackerel based on the 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 the length-race and length-age distributions in the allocated trawl hauls.

Length-weight relationships by race for the herring were made based on the single fish sampled in each haul and frozen for later for micro-structure analysis of the otolith after the cruise.

## 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 about 1300. Herring and sprat was not observed in mid-water trawl hauls at depths below 150 meters. Therefore, layers below 150 meter were excluded from the estimation.

### 3.2 Biological data

35 hauls were conducted (18 surface hauls, 3 mid water hauls and 14 bottom hauls, two of which were unsuccessful (Figure IIB.2 and Tables IIB2 and IIB.3.). The total catch was 14 tons of which about on third was jellyfish and one third clupeids. Herring was present in 30 of the hauls and was the dominant catch in the fishery with a total catch at 4602 kg. No herring was present in hauls below 150 m depths. Blue whiting, mackerel, invertebrates (krill, shrimp, Norway lobster) and saithe, were the most common among the remaining species with a total catch of 1,515 kg, 428 kg, 679 kg and 241 kg respectively. They were mainly taken in the bottom and pelagic hauls, while mackerel and garfish were taken in surface hauls. Jellyfish were sometimes present in high quantities in the catches totally almost 5 tonnes. In the southern Kattegat totally 127 kg of sprat was taken. For herring the total catch was 4.6 tons which is somewhat higher than last year.

Based on maturity analysis of frozen single fish samples from each haul, where micro-structure analysis of the otoliths was used to differentiate between North Sea herring and Western Baltic herring, the maturity by age key was made for both races is given in the text table below. In accordance with the survey manual both North Sea autumn spawners and Baltic spring-spawners at

maturity state 3 and up have been considered as mature. The following constants have been used to split the catch.

North Sea autumn spawners:

| WR | 0im | 1im | 1ma | 2im | 2ma | 3im | 3ma | 4 | 5 |
|---|---|---|---|---|---|---|---|---|---|
| % | 100 | 99 | 1 | 58 | 42 | 61 | 39 | 100 | 100 |

Western Baltic spring spawners:

| WR | 0im | 1im | 1ma | 2im | 2ma | 3im | 3ma | 4 | 5 | 6 | 7 | 8 | 9+ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| % | 100 | 100 | 0 | 96 | 4 | 90 | 10 | 100 | 100 | 100 | 100 | 100 | 100 |

Figure **IIB.4.a** shows the length-weight relations for various age groups an the average for the two races based on the single fish data. The trendline estimates are based on the points of the average relations. Figure **IIB.4.b** shows the length-weight relations for sprat.

Table **IIB.4.a** shows the size distribution and total number of herring in each trawl haul based on the total catch for small catches or on subsamples raised to total catch for large samples. Table **IIB.4.b** shows the corresponding total catches.

## 3.3 Biomass estimates

The total herring biomass estimate for the survey is 274,000 tonnes of which 28 % or 78,000 tonnes is North Sea autumn spawning herring and 72 % or 196,000 tonnes is Western Baltic spring spawning herring.

The estimated total number of herring, mean weight and mean length per age and maturity group in each of the surveyed strata for the two herring stock components in the are given in Table **IIB.5.a**, **b, and c.** Stratum 560E06 is the overlap area and the others together is the standard Danish survey area.

Figures **IIB.5.a and b** shows plots of the estimated number of herring per stratum and and the total with and without the overlap area.

**Stratum overview Acoustic Herring Survey R/V Dana Cruise 07/04 July 2004**

| Stratum Nr | Stratum ID | Area Nm^2 | Number of logs | Hauls in stratum | Hauls from neighbour strata | Total hauls used | Mean Sa | Mean TS |
|---|---|---|---|---|---|---|---|---|
| 3 | 570E08 | 3406 | 266 | 7 | 4 | 11 | 272.5319 | -42.40 |
| 4 | 570E06 | 3600 | 319 | 7 | 4 | 11 | 155.0617 | -44.16 |
| 5 | 580E08 | 1822 | 142 | 2 | 5 | 7 | 57.68696 | -42.28 |
| 6 | 580E06 | 209 | 11 | 1 | 2 | 3 | 201.8364 | -42.62 |
| 7 | C | 988 | 97 | 2 | 3 | 5 | 198.3685 | -44.36 |
| 8 | D | 1837 | 178 | 2 | 8 | 10 | 469.1892 | -42.66 |
| 9 | E | 5228 | 385 | 9 | -1 | 8 | 152.638 | -46.86 |
| Overlap | 560E06 | 3980 | 270 | 4 | 4 | 8 | 86.06304 | -44.49 |

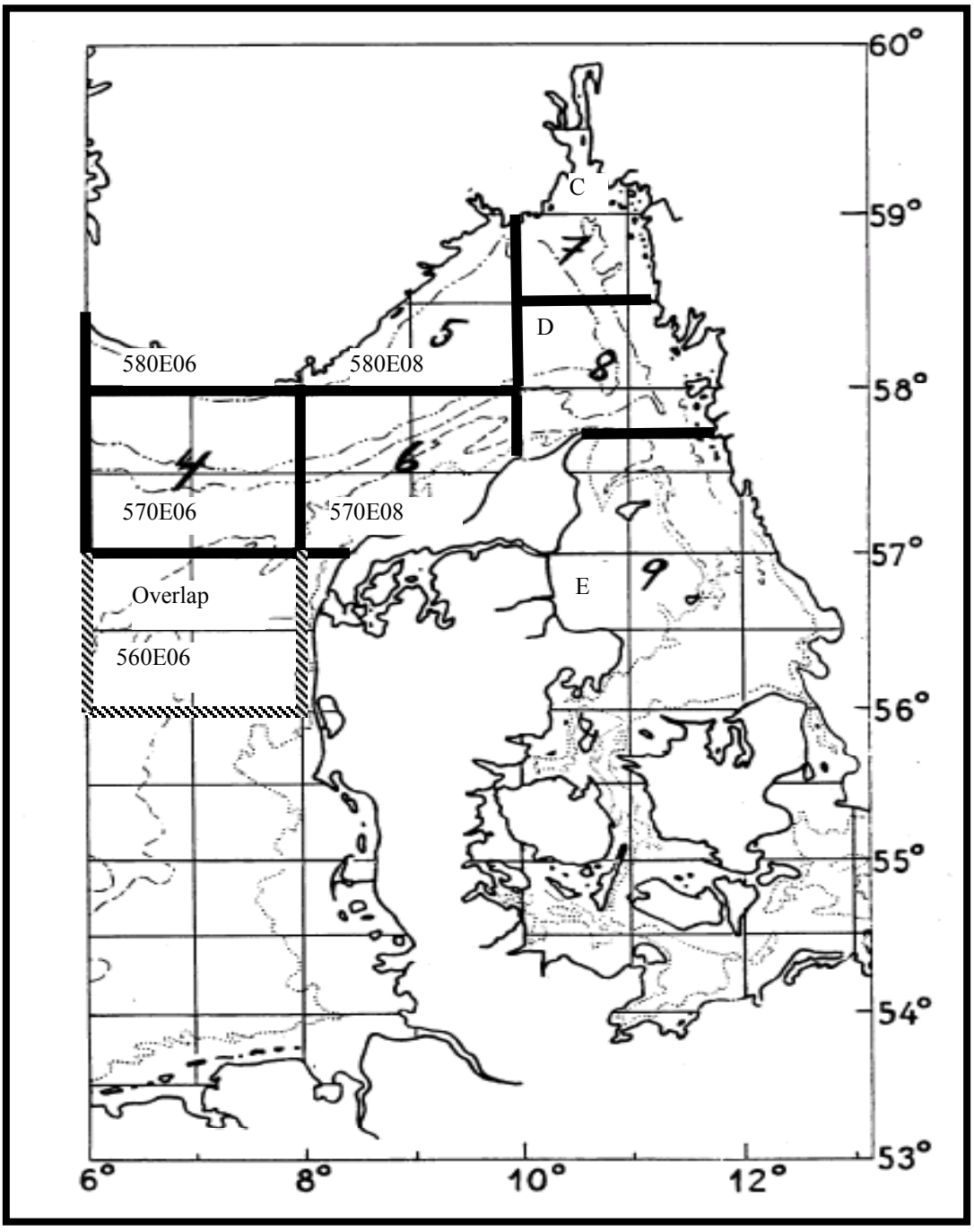



**Figure IIB.1.** Map of the eastern North Sea, Skagerrak and Kattegat showing the sub areas used in the estimation during the July Danish acoustic survey of R/V Dana 2004.

Cruise track and stations during the Acoustic Herring Survey R/V Dana Cruise 07/04 July 2004

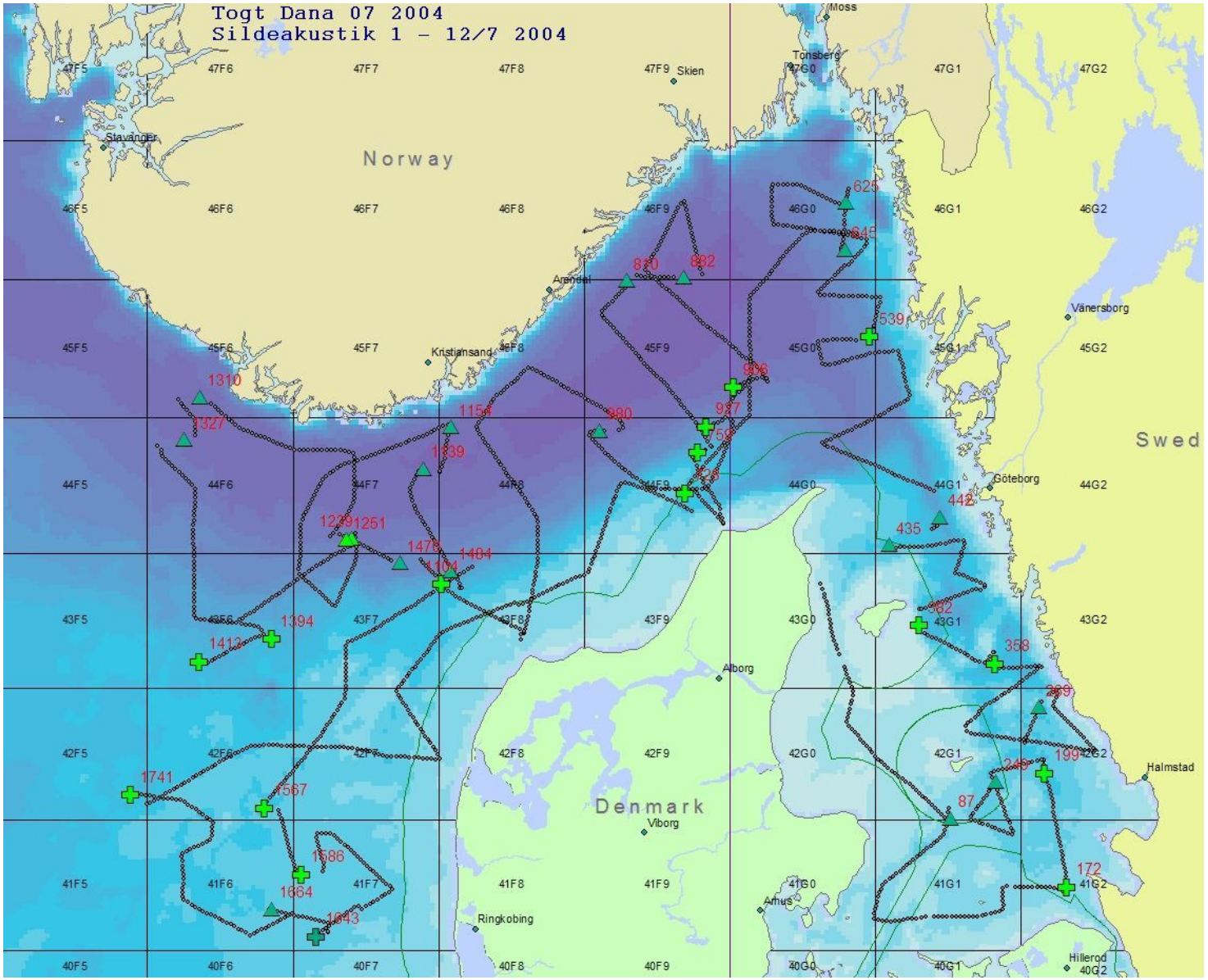



**Figure IIB.2.** Map of the eastern North Sea, Skagerrak and Kattegat showing cruise track, the location of stations (trawl hauls and CTD stations) during the July 2004 Danish acoustic survey (Fotö hauls ▲ are pelagic and Expo hauls ╬ are demersal, Red numbers are haul IDs cumulative sailed distance along the track in nm).

Bathymetry from:
The MAST project DYNOCS MAST II contract No MAS2-CT94-0088

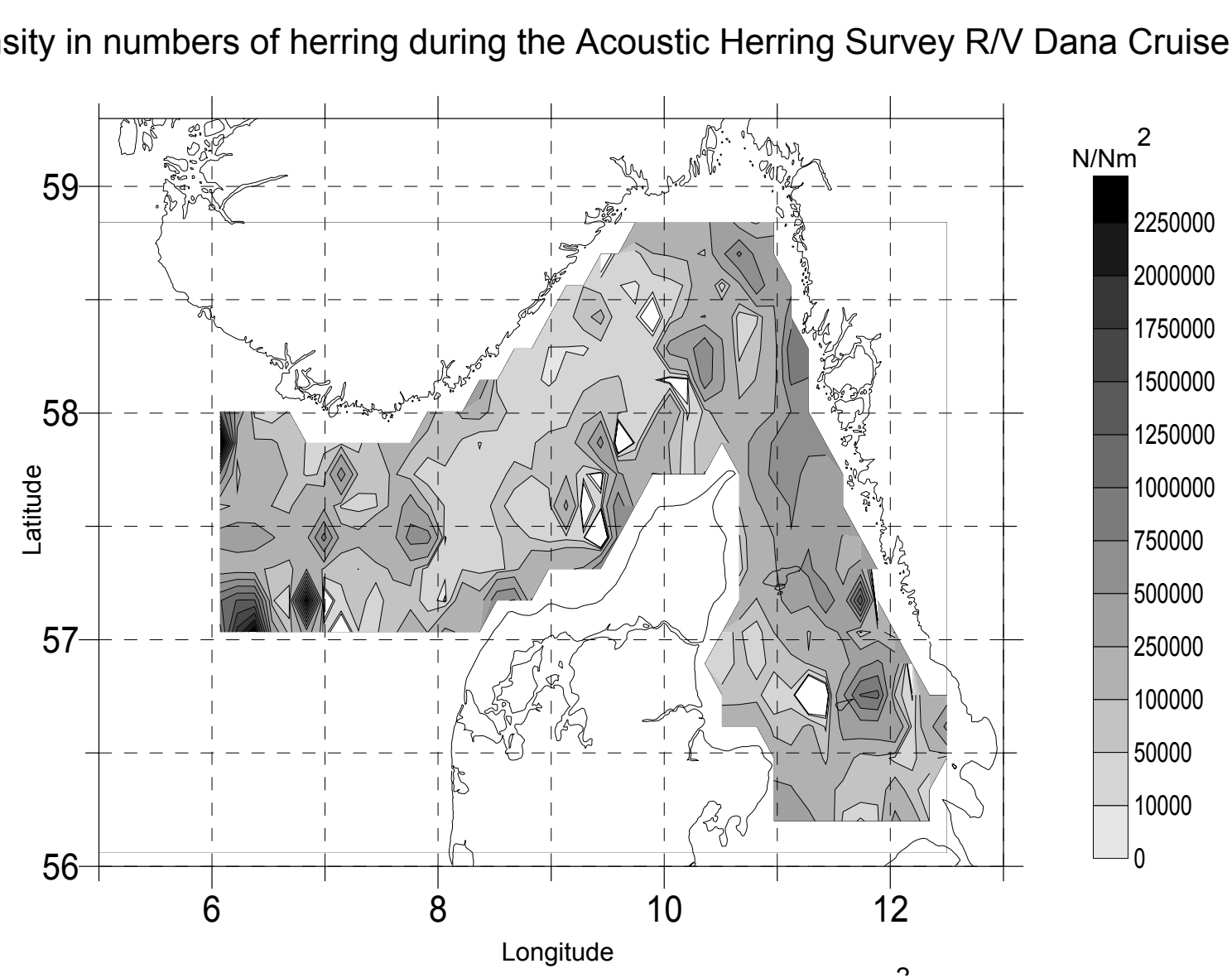



**Figure IIB.3.a** Contoured density (N/nm²) of herring from the July 2004 Danish acoustic survey in the eastern North Sea, Skagerrak and Kattegat.

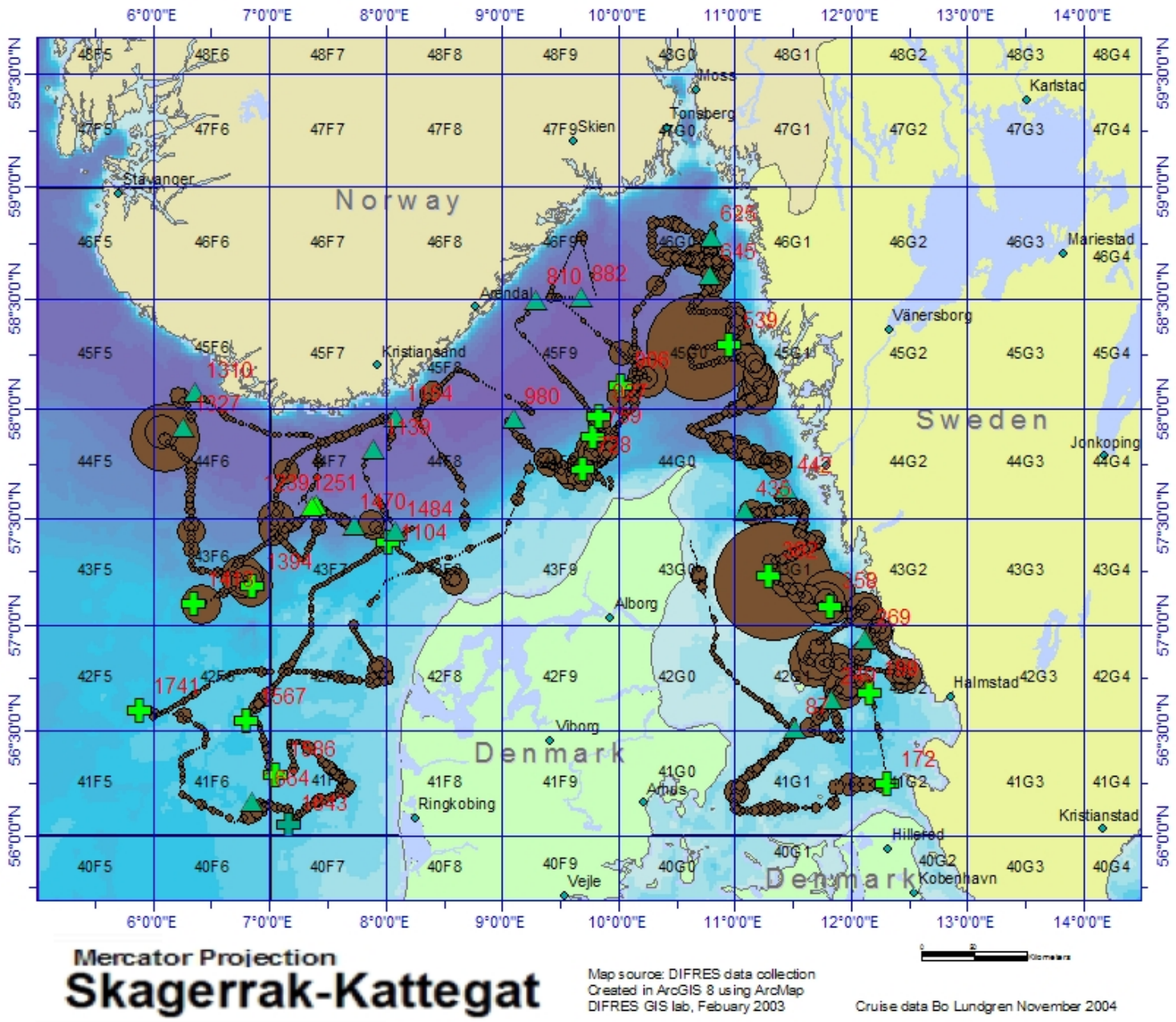
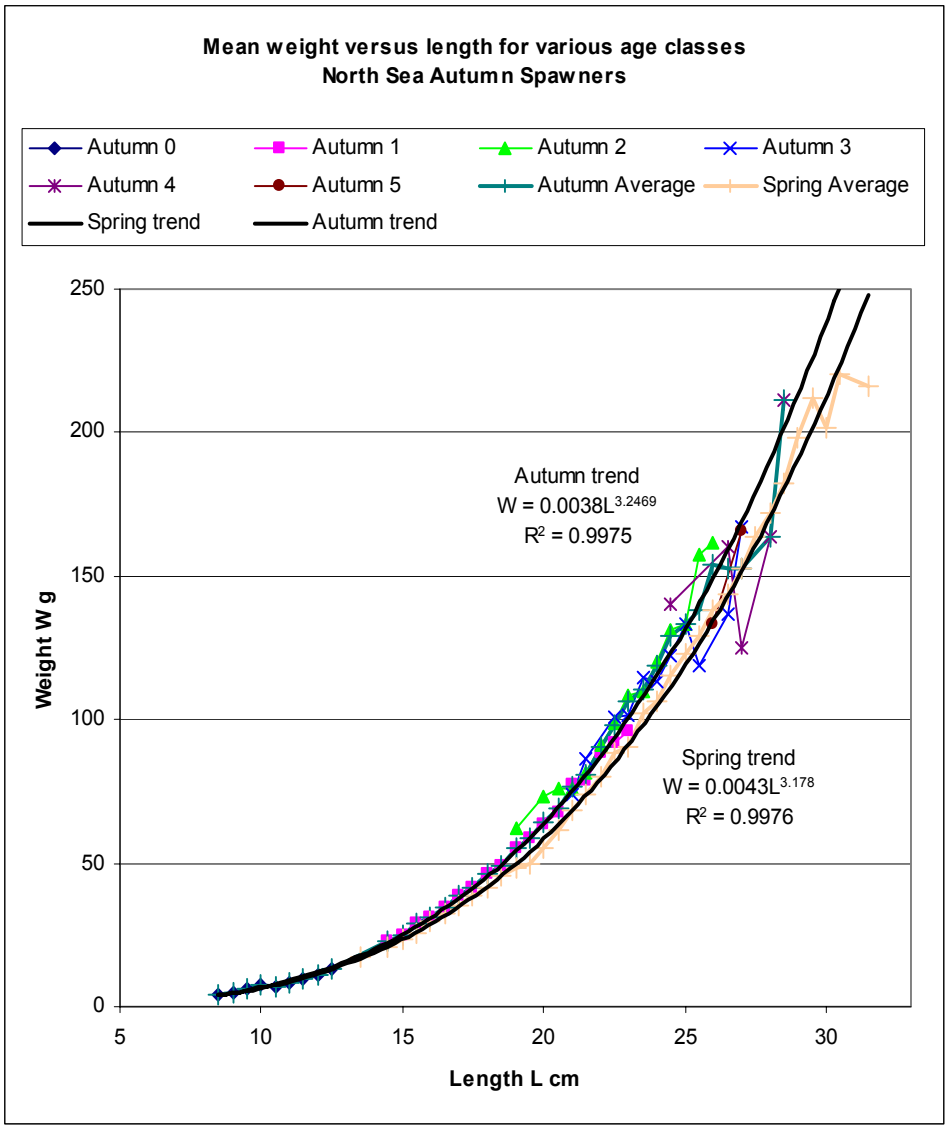



**Figure IIB.3.b** Relative herring density (in numbers per nm²) along the track of the July 2004 Danish acoustic survey in the eastern North Sea, Skagerrak and Kattegat. Brown circles indicate relative density of herring per ESDU (1 nm).



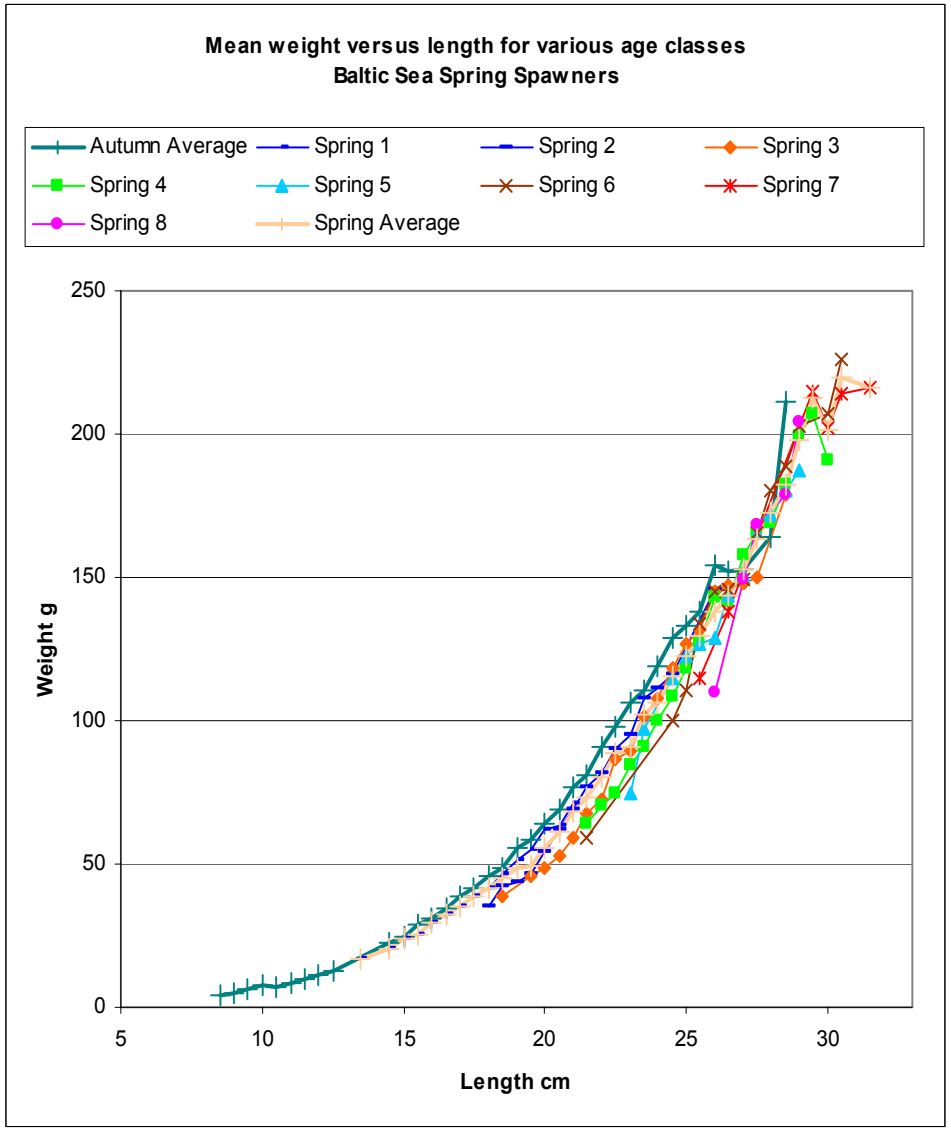




**Figure IIB.4.a** Length weight relationship by winter ring numbers for herring from the July 2004 Danish acoustic survey.

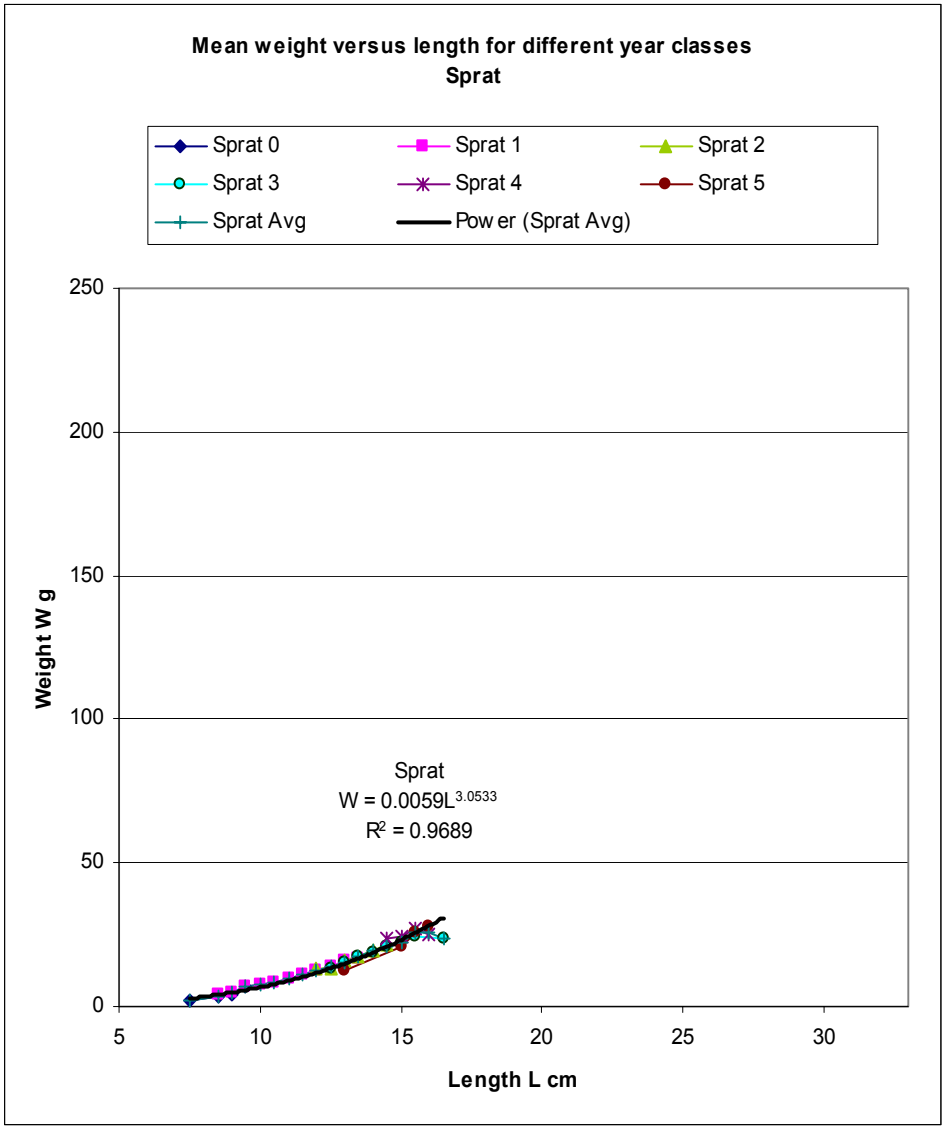



**Figure IIB.4.b** Length weight relationship by winter ring numbers for sprat from the July 2004 Danish acoustic survey.

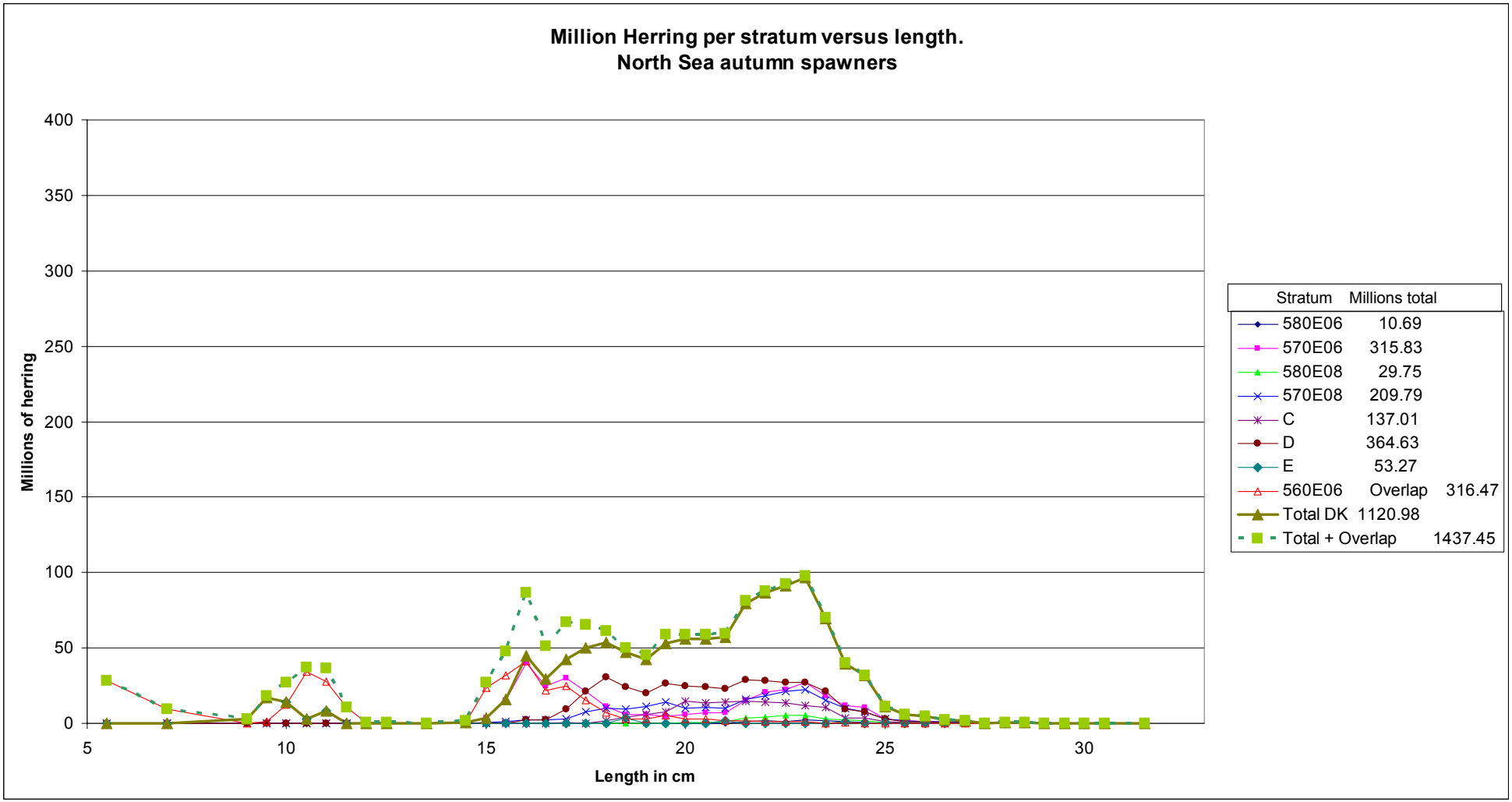



**Figure IIB.5.a** Estimed number of herring per length group in various strata from the July 2004 Danish acoustic survey.

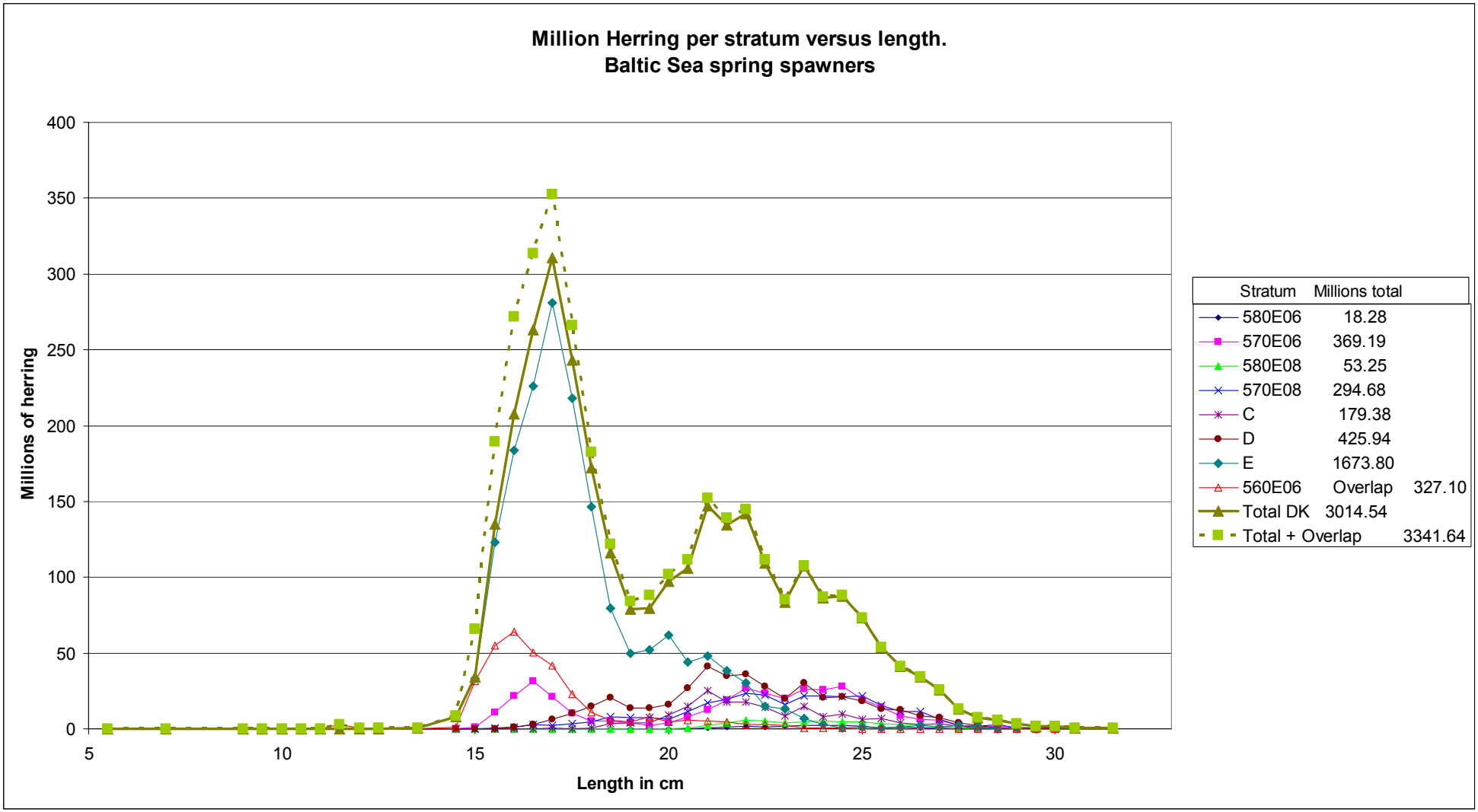



**Figure IIB.5.b** Estimed number of herring per length group in various strata from the July 2004 Danish acoustic survey.

**Table IIB.1.** Simrad EK60 and analysis settings used during the the Acoustic Herring Survey R/V Dana Cruise July 2004

| | |
|---|---|
| **Transceiver Menu** | |
| Frequency | 38 kHz |
| Sound speed | 1491 $m.s^{-1}$ |
| Max. Power | 2000 W |
| Equivalent two-way beam angle | -20.5 dB |
| Default Transducer Sv gain | 24.59 dB |
| 3 dB Beamwidth | 6.9° |
| **Calibration details** | |
| TS of sphere | -33.6 dB |
| Range to sphere in calibration | 9.17 m |
| Measured NASC value for calibration | 23100 $m^2/nmi^2$ |
| Calibration factor for NASCs | 1.00 |
| **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 IIB.2.** Trawl hauls during the Acoustic Herring Survey R/V Dana Cruise July 2004

| Haul ID | Date Time UTC | Sun time | ICES square | Lat N | Long E | Trawl | Catch Depth | Mean BDepth | Wire length | Door span m | Trawling duration | Catch kg | Main Species | Speed kn | Course deg | Wind m/s | Wind deg | Sea Beaf |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 87 | 02-07-04 01:30 | 02:16 | 42G1 | 56.30.400 | 011.31.555 | fotø | surface | 27.3 | 300 | 70 | 48 | 2000 | Jellyfish, Sprat, Herring, Mackerel, Common Weaver | 4.1 | 345 | 9 | 251 | 2 |
| 172 | 02-07-04 10:33 | 11:22 | 41G2 | 56.14.778 | 012.19.143 | expo | bottom | 26 | 250 | 68 | 30 | 650 | Jellyfish, Whiting, Sprat, Herring, Anchovy | 3 | 346 | 8 | 247 | 3 |
| 199 | 02-07-04 14:05 | 14:53 | 42G2 | 56.40.754 | 012.10.034 | expo | bottom | 42.8 | 300 | 72 | 60 | 208 | Jellyfish, Herring, Cod, Whiting, Plaice, Sprat | 2.9 | 319 | 8 | 242 | 3 |
| 249 | 02-07-04 21:28 | 22:15 | 42G1 | 56.38.824 | 011.50.098 | fotø | surface | 36 | 300 | 70 | 30 | 220 | Jellyfish, Herring, Sprat, Common Weaver | 3.7 | 220 | 7 | 220 | 2 |
| 269 | 03-07-04 00:12 | 01:00 | 42G2 | 56.55.647 | 012.07.740 | fotø | surface | 49 | 300 | 75 | 30 | 1400 | Jellyfish, Herring, Sprat, Garfish, Mackerel | 4 | 26 | 4 | 227 | 2 |
| 358 | 03-07-04 10:30 | 11:17 | 43G1 | 57.05.432 | 011.49.516 | expo | X | 58.4 | 350 | 77 | 59 | | Trawl torn | 3 | | 5 | 146 | 2 |
| 382 | 03-07-04 14:17 | 15:02 | 43G1 | 57.14.090 | 011.18.180 | expo | bottom | 30.2 | 270 | 63 | 60 | 296 | Common Weaver, Sprat, Jellyfish, Dab, Whiting, Herring | 3.2 | 221 | 5 | 209 | 1 |
| 435 | 03-07-04 21:19 | 22:03 | 44G1 | 57.31.860 | 011.05.959 | fotø | surface | 40.7 | 330 | 70 | 60 | 380 | Jellyfish, Herring, Mackerel, Garfish | 3.7 | 55 | 5 | 286 | 2 |
| 442 | 04-07-04 00:22 | 01:07 | 44G1 | 57.38.072 | 011.27.034 | fotø | surface | 86.1 | 330 | 74 | 60 | 903 | Jellyfish, Herring, Mackerel, Horse Mackerel | 3.9 | 349 | 4 | 243 | 2 |
| 539 | 04-07-04 11:57 | 12:40 | 45G0 | 58.17.661 | 010.57.882 | expo | bottom | 111.8 | 500 | 82 | 22 | 425 | Krill, Saithe, Cod, Dogfish, Whiting, Blue Whiting, Norway Pout, Herring(, Common Weaver), Pearlside | 2.9 | 43 | 5 | 237 | 2 |
| 625 | 04-07-04 21:20 | 22:03 | 46G0 | 58.46.571 | 010.48.308 | fotø | surface | 79.2 | 375 | 82 | 60 | 450 | Jellyfish, Herring, Mackerel, Garfish | 3.7 | 92 | 9 | 219 | 3 |
| 645 | 05-07-04 00:44 | 01:27 | 46G0 | 58.36.453 | 010.47.710 | fotø | surface | 84.6 | 375 | 70 | 60 | 465 | Jellyfish, Herring, Mackerel, Lumpsucker | 4.2 | 47 | 7 | 229 | 3 |
| 728 | 05-07-04 10:15 | 10:53 | 44F9 | 57.43.485 | 009.41.900 | expo | bottom | 35.9 | 300 | 72 | 30 | 75 | Dab, Whiting, Jellyfish, Herring, Cod, Gurnards, Horse Mackerel | 3.5 | 54 | 11 | 256 | 4 |
| 759 | 05-07-04 14:33 | 15:12 | 44F9 | 57.52.366 | 009.47.218 | expo | bottom | 60 | 400 | 77 | 45 | 990 | Herring, Haddock, Saithe, Cod, Flatfish | 3.4 | 75 | 9 | 263 | 4 |
| 810 | 05-07-04 21:37 | 22:14 | 46F9 | 58.29.788 | 009.17.814 | fotø | surface | 452.1 | 390 | 80 | 60 | 312 | Herring, Jellyfish, Mackerel, Garfish | 2.4 | 60 | 5 | 262 | 2 |
| 882 | 06-07-04 00:23 | 01:01 | 46F9 | 58.30.504 | 009.41.260 | fotø | surface | 592.9 | 425 | 80 | 60 | 200 | Herring, Jellyfish and Krill, Garfish, Lumpsucker, Saithe, Mackerel | 3.7 | 92 | 7 | 297 | 3 |
| 906 | 06-07-04 10:44 | 11:24 | 45G0 | 58.06.719 | 010.01.744 | expo | bottom | 201 | 860 | 89 | 60 | 1407 | Blue Whiting, Shrimps, Saithe, Vahls Eelpout, Lumpsucker, Cod, Haddock | 2.7 | 69 | 7 | 268 | 4 |
| 927 | 06-07-04 14:32 | 15:11 | 44F9 | 57.58.040 | 009.50.590 | expo | bottom | 100.8 | 640 | 78 | 60 | 322 | Jellyfish, Herring, Saithe, Norway Pout, Haddock, Lumpsucker, Hake | 3.3 | 69 | 12 | 261 | 5 |
| 980 | 06-07-04 23:34 | 00:10 | 44F9 | 57.57.151 | 009.06.796 | fotø | surface | 459.8 | 420 | 86 | 61 | 290 | Blue Whiting, Herring, Jellyfish, Lumpsucker, Saithe, Mackerel | 3.7 | 88 | 12 | 283 | 5 |
| 1104 | 07-07-04 14:52 | 15:24 | 43F8 | 57.23.220 | 008.01.259 | expo | X | 71.4 | 500 | 91 | 60 | | Trawl torn | 3 | | 11 | 301 | 5 |
| 1139 | 07-07-04 21:25 | 21:56 | 44F7 | 57.48.736 | 007.53.955 | fotø | surface | 513.2 | 350 | 89 | 61 | 680 | Herring, Mackerel, Jellyfish, Saithe, Lumpsucker, Blue Whiting, Garfish | 3 | 104 | 6 | 301 | 4 |
| 1154 | 08-07-04 00:23 | 00:55 | 44F8 | 57.57.902 | 008.05.575 | fotø | surface | 520.7 | 400 | 78 | 66 | 265 | Herring, Mackerel, Jellyfish, Garfish, Lumpsucker | 1.7 | 101 | 2 | 295 | 3 |
| 1239 | 08-07-04 10:37 | 11:06 | 44F7 | 57.33.442 | 007.24.534 | fotø | 230-250 | 263.4 | 1140 | 112 | 60 | 75 | Jellyfish, Saithe, Blue Whiting, Shrimp, Lumpsucker, Krill, Pearlside | 3.6 | 285 | 8 | 76 | 2 |
| 1251 | 08-07-04 13:09 | 13:38 | 44F7 | 57.33.112 | 007.22.143 | fotø | 138-158 | 259 | 915 | 109 | 60 | 115 | Saithe, Pearlside, Krill, Lumpsucker | 3.5 | 281 | 10 | 57 | 3 |
| 1310 | 08-07-04 21:28 | 21:53 | 45F6 | 58.04.506 | 006.22.160 | fotø | surface | 343 | 470 | 80 | 60 | 430 | Herring, Krill and Jellyfish, Blue Whiting, Lumpsucker, Mackerel, Dogfish | 4.2 | 276 | 9 | 52 | 4 |
| 1327 | 09-07-04 00:29 | 00:54 | 44F6 | 57.55.109 | 006.15.591 | fotø | surface | 309.1 | 415 | 83 | 60 | 480 | Herring, Krill and Jellyfish,Blue Whiting, Garfish, Mackerel | 4.5 | 259 | 13 | 85 | 4 |
| 1394 | 09-07-04 10:24 | 10:51 | 43F6 | 57.11.008 | 006.51.306 | expo | bottom | 66.1 | 400 | 80 | 30 | 260 | Herring, Haddock, Jellyfish, Whiting | 3.1 | 313 | 4 | 76 | 3 |
| 1413 | 09-07-04 13:47 | 14:12 | 43F6 | 57.05.987 | 006.21.396 | expo | bottom | 61.2 | 400 | 86 | 61 | 295 | Herring, Dab, Haddock, Cod, Jellyfish, Gurnard, Flatfish | 3.1 | 311 | 2 | 130 | 2 |
| 1470 | 09-07-04 21:39 | 22:09 | 43F7 | 57.27.995 | 007.44.353 | fotø | surface | 157 | 375 | 72 | 62 | 380 | Herring, Blue Whiting, Krill and Jellyfish, Mackerel, Lumpsucker, Garfish | 3.8 | 81 | 1 | 351 | 2 |
| 1484 | 10-07-04 00:23 | 00:55 | 43F8 | 57.26.143 | 008.05.567 | fotø | surface | 91.5 | 375 | 72 | 60 | 240 | Herring, Jellyfish, Mackerel, Garfish, Lumpsucker | 4.6 | 78 | 4 | 59 | 2 |
| 1567 | 10-07-04 10:38 | 11:05 | 42F6 | 56.32.859 | 006.48.374 | expo | bottom | 41.8 | 360 | 77 | 50 | 73 | Gurnards, Jellyfish, Whiting, Dab, Hake, Horse Mackerel, Cod | 3.6 | 84 | 8 | 293 | 4 |
| 1586 | 10-07-04 13:56 | 14:24 | 41F7 | 56.17.625 | 007.03.584 | expo | pelagic | 34 | 290 | 67 | 60 | 10 | Jellyfish, Gurnards, Herring, Sprat (small catch) | 4.2 | 79 | 11 | 290 | 4 |
| 1643 | 10-07-04 21:38 | 22:06 | 41F7 | 56.03.347 | 007.09.925 | expo | surface | 29.1 | 300 | 68 | 31 | 8 | Jellyfish, Mackerel, Garfish, Herring (very small catch) | 4.1 | 64 | 12 | 268 | 5 |
| 1664 | 11-07-04 00:34 | 01:01 | 41F6 | 56.09.636 | 006.51.611 | fotø | surface | 37.4 | 320 | 72 | 60 | 83 | Mackerel, Horse mackerel, Garfish,Jellyfish, Herring, Gurnards, | 4.2 | 111 | 9 | 271 | 5 |
| 1741 | 11-07-04 10:34 | 10:57 | 42F5 | 56.35.829 | 005.53.206 | expo | bottom | 51.1 | 400 | 83 | 60 | 230 | Herring, Dab, Jellyfish, Flatfish, Whiting, Gurnards | 3.3 | 118 | 10 | 316 | 5 |

**Table IIB.3.** Trawl haul species composition in kg during the Acoustic Herring Survey R/V Dana Cruise July 2004

| Weight Total Kg | Station | 87 | 172 | 199 | 249 | 269 | 382 | 435 | 442 | 539 | 625 | 645 | 728 | 759 | 810 | 882 | 906 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Fishing depth | surface | bottom | bottom | surface | surface | bottom | surface | surface | bottom | surface | surface | Bottom | bottom | surface | surface | bottom |
| | Gear Type | Fotø | Expo | Expo | Fotø | Fotø | Expo | Fotø | Fotø | Expo | Fotø | Fotø | Expo | Expo | Fotø | Fotø | Expo |
| | Area | E | E | E | E | E | E | E | E | D | C | C | 570E08 | 570E08 | 580E08 | 580E08 | D |
| Species | ICES Sq | 42G1 | 41G2 | 42G2 | 42G1 | 42G2 | 43G1 | 44G1 | 44G1 | 45G0 | 46G0 | 46G0 | 44F9 | 44F9 | 46F9 | 46F9 | 45G0 |
| Scyphozoa | | 1962.400 | 547.976 | 153.556 | 153.154 | 1308.232 | 21.708 | 257.502 | 537.206 | | 320.660 | 217.610 | | | | | |
| Clupea harengus | | 16.352 | 18.280 | 27.694 | 49.694 | 84.223 | 12.938 | 112.803 | 320.135 | 5.530 | 106.692 | 211.202 | 3.160 | 945.685 | 263.558 | 141.691 | |
| Micromesistius poutassou | | | | | | | | | | 7.035 | | | | | | | 1196.952 |
| Scomber scombrus | | 2.787 | | | 0.254 | 0.999 | | 4.574 | 42.207 | 0.158 | 16.900 | 30.500 | | | 20.223 | 1.140 | |
| Invertebrata | | | | | | | | | | | | | 5.626 | | 22.229 | 34.330 | |
| Euphausiidae | | | | | | | | | | 299.393 | | | | | | | |
| Pollachius virens | | | | | | | | | | 49.500 | | | | 9.700 | | 6.480 | 36.600 |
| Trachinus draco | | 1.481 | 5.296 | 0.068 | 2.052 | 0.704 | 154.844 | | | 4.400 | | 0.202 | 0.664 | | | | |
| Limanda limanda | | | 4.342 | 0.630 | 0.050 | | 20.859 | | | | | | 33.298 | 4.050 | | | |
| Sprattus sprattus | | 16.356 | 29.567 | 0.856 | 14.030 | 4.714 | 61.262 | 0.162 | 0.304 | | | | | | | | |
| Cyclopterus lumpus | | | 1.022 | | 0.160 | | | | | 0.804 | | 4.800 | | | | 7.940 | 12.600 |
| Merlangius merlangus | | 0.050 | 32.631 | 5.096 | 0.210 | 0.091 | 17.656 | 0.476 | 0.428 | 10.900 | 0.406 | 0.132 | 23.250 | | 0.096 | | |
| Pandalus borealis | | | | | | | | | | | | | | | | | 101.628 |
| Gadus morhua | | | 1.094 | 17.800 | | | 0.318 | | | 23.900 | | | 3.152 | 7.100 | | | 11.100 |
| Belone belone | | | | | 0.178 | 1.101 | | 4.244 | | 0.052 | 3.774 | 0.570 | | | 5.850 | 8.410 | |
| Melanogrammus aeglefinus | | | | 0.154 | 0.010 | | | 0.010 | | 0.968 | | | 0.690 | 18.295 | 0.012 | | 6.907 |
| Maurolicus muelleri | | | | | | | | | | 3.505 | | | | | 0.018 | | 0.113 |
| Trachurus trachurus | | | | | | | 0.859 | 0.190 | 2.052 | | | | 1.532 | | | | |
| Lycodes vahlii | | | | | | | | | | | | | | | | | 36.097 |
| Eutrigla gurnardus | | 0.057 | | 0.034 | | | 0.492 | | | | | | 1.646 | | | | |
| Trisopterus esmarkii | | | | 0.220 | | | | | | 5.860 | | | | | | | 0.301 |
| Squalus acanthias | | | | | | | | | | 11.900 | | | | | | | |
| Hippoglossoides platesso | | | | 0.200 | | | | | | | | | 0.246 | 3.042 | | | 0.151 |
| Engraulis encrasicolus | | 0.039 | 9.808 | | 0.200 | | 0.087 | 0.042 | 0.113 | | | | 0.028 | | | | |
| Pleuronectes platessa | | | 0.124 | 1.414 | | | 3.193 | | | | | | 0.482 | 1.172 | | | |
| Merluccius merluccius | | | | | | | | | | 0.032 | | | 0.478 | 0.200 | | | |
| Pasiphaea sp. | | | | | | | | | | | | | | | | | |
| Hyperoplus lanceolatus | | 0.061 | | | | | | | | | | | | | | | |
| Microstomus kitt | | | | 0.272 | | | | | | 0.184 | | | 0.664 | 0.794 | | | |
| Sardina pilchardus | | | | | | | | | | | | | | | | | |
| Myxine glutinosa | | | | | | | | | | | | | | | | | 1.769 |
| Salmo trutta | | | | | | | | | | | 1.560 | | | | | | |
| Cephalopoda | | | | | | | | | | | | | | | | | 0.412 |
| Scophthalmus rhombus | | | | | | | 1.224 | | | | | | | | | | |
| Glyptocephalus cynogloss | | | | | | | | | | | | | | | | | 0.910 |
| Enchelyopus cimbrius | | | | | | | | | | | | | | | | | 0.866 |
| Raja radiata | | | | | | | | | | 0.794 | | | | | | | |
| Trigla lucerna | | | | | | | | | 0.552 | | | | | | | | |
| Solea vulgaris | | | | | | | 0.531 | | | | | | | | | | |
| Nephrops norvegicus | | | | | | | | | | 0.066 | | | | | | | 0.404 |
| Notoscopelus kroeyeri | | | | | | | | | | | | | | | | | |
| Zeugopterus punctatus | | | | | | | | | | | | | | | | | 0.169 |
| Buglossidium luteum | | | | | | | | | | | | | | | | | |
| Ammodytidae | | | | | | | | | | | | | | | | | |
| Grand Total | | 1999.582 | 650.141 | 207.994 | 219.992 | 1400.064 | 295.972 | 380.003 | 902.998 | 424.981 | 449.992 | 465.016 | 74.916 | 990.038 | 311.986 | 199.991 | 1406.978 |

**Table IIB.3.** Trawl haul species composition in kg during the Acoustic Herring Survey R/V Dana Cruise July 2004 (continued)

| Weight Total Kg | Station | 927 | 980 | 1139 | 1154 | 1239 | 1251 | 1310 | 1327 | 1394 | 1413 | 1470 | 1484 | 1567 | 1586 | 1643 | 1664 | 1741 | Total | Max |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Fishing depth | bottom | surface | surface | surface | 230-250 | 138-158 | surface | surface | bottom | bottom | surface | surface | bottom | Pelagic | surface | surface | bottom | Survey | Survey |
| | Gear Type | Expo | Fotø | Fotø | Fotø | Fotø | Fotø | Fotø | Fotø | Expo | Expo | Fotø | Fotø | Expo | Expo | Expo | Fotø | Expo | | |
| | Area | 570E08 | 570E08 | 570E06 | 570E08 | 570E06 | 570E06 | 580E06 | 570E06 | 570E06 | 570E06 | 570E06 | 570E08 | 560E06 | 560E06 | 560E06 | 560E06 | 560E04 | | |
| Species | ICES Sq | 44F9 | 44F9 | 44F7 | 44F8 | 44F7 | 44F7 | 45F6 | 44F6 | 43F6 | 43F6 | 43F7 | 43F8 | 42F6 | 41F7 | 41F7 | 41F6 | 42F5 | | |
| Scyphozoa | | 176.576 | | 22.048 | 73.044 | 33.354 | | | | | | | 88.015 | | 5.084 | 4.840 | 3.802 | | 5886.768 | 1962.400 |
| Clupea harengus | | 66.294 | 93.974 | 546.369 | 92.400 | | | 274.072 | 329.340 | 241.447 | 211.312 | 127.614 | 126.294 | 0.318 | 2.118 | 0.102 | 0.522 | 170.849 | 4602.662 | 945.685 |
| Micromesistius poutassou | | | 115.623 | 5.631 | 0.428 | 10.816 | | 52.391 | 34.331 | | | 91.947 | | | | | | | 1515.154 | 1196.952 |
| Scomber scombrus | | | 2.662 | 88.847 | 84.200 | | | 2.430 | 6.520 | | | 64.403 | 18.428 | 0.668 | | 1.664 | 38.480 | | 428.043 | 88.847 |
| Invertebrata | | | 15.397 | | | | | 96.584 | 97.065 | 3.747 | 5.671 | 70.448 | | 18.424 | | | | 7.854 | 377.375 | 97.065 |
| Euphausiidae | | | | | | 3.916 | 16.879 | | | | | | | | | | | | 320.187 | 299.393 |
| Pollachius virens | | 36.730 | 28.600 | 7.600 | | 12.200 | 54.500 | | | | | | | | | | | | 241.910 | 54.500 |
| Trachinus draco | | | | | | | | | | | | | | | | | | | 169.711 | 154.844 |
| Limanda limanda | | | | | | | | | | 0.304 | 33.348 | | | 5.460 | | | | 38.226 | 140.567 | 38.226 |
| Sprattus sprattus | | | | | | | | | | | | | | | 0.097 | | | | 127.349 | 61.262 |
| Cyclopterus lumpus | | 6.500 | 33.700 | 6.500 | 1.020 | 5.300 | 5.154 | 3.214 | | | | 22.500 | 1.924 | | | | | | 113.138 | 33.700 |
| Merlangius merlangus | | 1.710 | 0.061 | 0.141 | 0.308 | 0.014 | | 0.285 | 0.224 | 1.706 | 1.600 | 0.356 | 0.656 | 10.098 | 0.026 | | 0.006 | 3.404 | 112.018 | 32.631 |
| Pandalus borealis | | | | | | | | | | | | | | | | | | | 101.628 | 101.628 |
| Gadus morhua | | 0.462 | | | | | | | | 0.144 | 17.700 | | | 3.788 | | | | 0.072 | 86.630 | 23.900 |
| Belone belone | | | | 2.854 | 13.600 | | | 0.214 | 11.840 | | | 2.756 | 2.824 | 0.468 | | 0.998 | 6.555 | | 66.288 | 13.600 |
| Melanogrammus aeglefinus | | 11.910 | | | | 0.006 | | | 0.032 | 12.486 | 11.778 | | 0.036 | 0.184 | | | | 0.322 | 63.800 | 18.295 |
| Maurolicus muelleri | | 0.008 | 0.009 | | | 0.298 | 38.467 | | | | | | | | | | | | 42.418 | 38.467 |
| Trachurus trachurus | | | | | | | | | | | | | | 3.850 | | 0.434 | 33.431 | | 42.348 | 33.431 |
| Lycodes vahlii | | | | | | | | | | | | | | | | | | | 36.097 | 36.097 |
| Eutrigla gurnardus | | | | | | | | | | | 2.474 | | | 19.510 | 2.960 | | 0.296 | 2.371 | 29.840 | 19.510 |
| Trisopterus esmarkii | | 18.102 | | | | 0.076 | | | | | 0.279 | | | | | | | | 24.838 | 18.102 |
| Squalus acanthias | | | | | | | | 0.644 | | | | | | | | | | | 12.544 | 11.900 |
| Hippoglossoides platesso | | | | | | | | | | | 0.512 | | | 0.120 | | | | 6.516 | 10.786 | 6.516 |
| Engraulis encrasicolus | | | | | | | | | | | | | | | | | | | 10.316 | 9.808 |
| Pleuronectes platessa | | | | | | | | | | | 2.242 | | | 1.362 | | | | | 9.989 | 3.193 |
| Merluccius merluccius | | 2.958 | | | | | | | | | | | | 4.900 | | | | 0.372 | 8.940 | 4.900 |
| Pasiphaea sp. | | | | | | 8.777 | | | | | | | | | | | | | 8.777 | 8.777 |
| Hyperoplus lanceolatus | | | | | | | | | | 0.090 | 6.137 | | | 1.260 | | | | | 7.548 | 6.137 |
| Microstomus kitt | | 0.462 | | | | | | | | 0.080 | 1.928 | | | | | | | | 4.384 | 1.928 |
| Sardina pilchardus | | | | | | | | | | | | | 1.828 | | | | 0.152 | | 1.980 | 1.828 |
| Myxine glutinosa | | | | | | | | | | | | | | | | | | | 1.769 | 1.769 |
| Salmo trutta | | | | | | | | | | | | | | | | | | | 1.560 | 1.560 |
| Cephalopoda | | 0.184 | | | | | | 0.162 | 0.721 | | | | | | | | | | 1.479 | 0.721 |
| Scophthalmus rhombus | | | | | | | | | | | | | | | | | | | 1.224 | 1.224 |
| Glyptocephalus cynogloss | | | | | | | | | | | | | | | | | | | 0.910 | 0.910 |
| Enchelyopus cimbrius | | | | | | | | | | | | | | | | | | | 0.866 | 0.866 |
| Raja radiata | | | | | | | | | | | | | | | | | | | 0.794 | 0.794 |
| Trigla lucerna | | | | | | | | | | | | | | | | | | | 0.552 | 0.552 |
| Solea vulgaris | | | | | | | | | | | | | | | | | | | 0.531 | 0.531 |
| Nephrops norvegicus | | | | | | | | | | | | | | | | | | | 0.470 | 0.404 |
| Notoscopelus kroeyeri | | | | | | 0.230 | | | | | | | | | | | | | 0.230 | 0.230 |
| Zeugopterus punctatus | | | | | | | | | | | | | | | | | | | 0.169 | 0.169 |
| Buglossidium luteum | | | | | | | | | | | | | | | | 0.006 | | | 0.006 | 0.006 |
| Ammodytidae | | | | | | | | | | | | | | | | | 0.004 | | 0.004 | 0.004 |
| Grand Total | | 321.896 | 290.025 | 679.989 | 265.000 | 74.988 | 115.000 | 429.996 | 480.074 | 260.004 | 294.982 | 380.024 | 240.006 | 70.410 | 10.285 | 8.044 | 83.248 | 229.986 | 14614.600 | 1999.582 |

**Table IIB.4.a** Raised length frequency composition by stratum and trawl station for the Acoustic Herring Survey R/V Dana Cruise July 2004

| | 560E04 | 560E06 | | | | 570E06 | | | | | 570E08 | | | | | | 580E06 | 580E08 | | C | | D | E | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 42F5 | 41F6 | 41F7 | | 42F6 | 43F6 | | 43F7 | 44F6 | 44F7 | 43F8 | 44F8 | 44F9 | | | | 45F6 | 46F9 | | 46G0 | | 45G0 | 41G2 | 42G1 | | 42G2 | | 43G1 | 44G1 | | |
| | 1741 | 1664 | 1586 | 1643 | 1567 | 1394 | 1413 | 1470 | 1327 | 1139 | 1484 | 1154 | 728 | 759 | 927 | 980 | 1310 | 810 | 882 | 625 | 645 | 539 | 172 | 87 | 249 | 199 | 269 | 382 | 435 | 442 | |
| Length | EXPO | FOTØ | EXPO | EXPO | EXPO | EXPO | EXPO | FOTØ | FOTØ | FOTØ | FOTØ | FOTØ | EXPO | EXPO | EXPO | FOTØ | FOTØ | FOTØ | FOTØ | FOTØ | FOTØ | EXPO | EXPO | FOTØ | FOTØ | EXPO | FOTØ | EXPO | FOTØ | FOTØ | Total |
| 5.5 | | | | 3 | | | | | | | | | | | | | | | | | | | | | | | | | | 3 |
| 7 | | | | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | 1 |
| 9 | | | | | | | | | | | | | | | | | | | | | | | | | | | 5 | | | 5 |
| 9.5 | | | 5 | | | | | | | | | | | | | | | | | | | | | | | | 29 | | | 34 |
| 10 | | | 62 | | | | | | | | | | | | | | | | | | | | | | | | 24 | | | 86 |
| 10.5 | | | 126 | | 2 | | | | | | | | | | | | | | | | | | | | | | 5 | | | 133 |
| 11 | | | 70 | 1 | 1 | | | | | | | | | | | | | | | | | | | | | | 14 | | | 86 |
| 11.5 | | | 6 | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | 7 |
| 12 | | | 3 | | | | | | | | | | | | | | | | | | | | | | | | | | | 3 |
| 12.5 | | | 2 | | | | | | | | | | | | | | | | | | | | | | | | | | | 2 |
| 13.5 | | | | | | | | | | | | | | | | | | | | | | | | 2 | | | | | | 2 |
| 14.5 | 44 | | 2 | | | | | | | | | | | | | | | | | | | | 4 | 5 | 4 | 2 | | 5 | | | 66 |
| 15 | 148 | 10 | | | | 5 | 96 | | | | 8 | | | | | | | | | | | | 32 | 37 | 26 | 2 | | | | | 365 |
| 15.5 | 1022 | 8 | | | 3 | 57 | 439 | | | | 23 | | | | | | | | | | | | 105 | 91 | 218 | 9 | 11 | 10 | | | 1995 |
| 16 | 1940 | 2 | | | 3 | 277 | 1002 | | | | 39 | | 1 | | | | | | | | | | 84 | 102 | 473 | 75 | 24 | 10 | 51 | 14 | 4095 |
| 16.5 | 1333 | | | | 2 | 288 | 1167 | 4 | | | 42 | | 2 | | | | | | | 4 | | | 77 | 77 | 417 | 158 | 73 | 48 | 42 | 14 | 3747 |
| 17 | 622 | | | | 1 | 307 | 1359 | 4 | | | 52 | | 1 | | | | | | | 8 | 21 | | 61 | 55 | 332 | 194 | 184 | 63 | 295 | 139 | 3700 |
| 17.5 | 178 | | | | | 155 | 906 | 17 | | | 73 | | 4 | 41 | | 4 | | | | 8 | | | 28 | 46 | 59 | 94 | 211 | 39 | 464 | 474 | 2800 |
| 18 | 15 | | | | | 60 | 439 | 37 | | | 52 | | 8 | 81 | | | | | | 33 | 64 | | 16 | 14 | 22 | 21 | 91 | 34 | 489 | 752 | 2230 |
| 18.5 | 30 | | | | | 33 | 233 | 54 | | | 26 | | 11 | 122 | | | | | | 62 | 213 | 1 | 6 | 4 | 7 | 15 | 24 | 29 | 270 | 571 | 1709 |
| 19 | | | | | | 22 | 55 | 50 | | | 47 | 1 | 10 | 284 | | | | | 5 | 123 | 245 | | 20 | 18 | 4 | 4 | 15 | 5 | 110 | 348 | 1364 |
| 19.5 | | | | | 1 | | 41 | 25 | 9 | 16 | 52 | | 12 | 609 | | | | | | 123 | 351 | | 19 | 20 | 11 | 9 | 15 | 10 | 118 | 251 | 1690 |
| 20 | | | | | | 8 | 14 | 33 | | 63 | 60 | 2 | 4 | 731 | | 4 | 4 | | 30 | 287 | 532 | 1 | 18 | 9 | 4 | 15 | 29 | 14 | 110 | 432 | 2403 |
| 20.5 | | | | | | 5 | | 50 | 28 | 47 | 83 | 7 | 4 | 1055 | 2 | 4 | 4 | 53 | 61 | 238 | 543 | 4 | 19 | 2 | 4 | 9 | 13 | 5 | 127 | 334 | 2700 |
| 21 | | | | | | | | 33 | 75 | 173 | 81 | 12 | | 2070 | 6 | 29 | 25 | 80 | 142 | 332 | 585 | 6 | 12 | 4 | 18 | 17 | 11 | 10 | 101 | 418 | 4240 |
| 21.5 | | | | | | 5 | | 50 | 224 | 425 | 62 | 27 | 1 | 1827 | 15 | 46 | 68 | 320 | 188 | 189 | 351 | 2 | 12 | 7 | 4 | 2 | 2 | 5 | 93 | 418 | 4342 |
| 22 | | | | | | | | 66 | 373 | 709 | 42 | 34 | | 1908 | 13 | 67 | 121 | 386 | 274 | 82 | 202 | 3 | 2 | 4 | 4 | 11 | 7 | 5 | 34 | 376 | 4723 |
| 22.5 | | | | | | | | 91 | 233 | 756 | 42 | 36 | | 1543 | 28 | 67 | 107 | 440 | 228 | 74 | 106 | 2 | 4 | | | 11 | 4 | | 8 | 195 | 3974 |
| 23 | | | | | | | | 91 | 457 | 583 | 34 | 22 | | 812 | 63 | 83 | 153 | 280 | 208 | 21 | 11 | 3 | 4 | 2 | 4 | 6 | | | 8 | 181 | 3025 |
| 23.5 | | | | | | | | 137 | 467 | 410 | 5 | 23 | | 487 | 72 | 92 | 143 | 173 | 117 | 8 | 21 | 13 | 2 | 2 | | 4 | 4 | | | 70 | 2249 |
| 24 | | | | | | | | 95 | 280 | 504 | 16 | 18 | | 41 | 80 | 63 | 135 | 160 | 91 | 8 | | 3 | | 2 | | 2 | 2 | | 17 | 14 | 1530 |
| 24.5 | | | | | | | | 141 | 336 | 441 | 8 | 18 | | | 63 | 46 | 110 | 213 | 46 | | | 5 | | | | 2 | | | | | 1429 |
| 25 | | | | | | | | 70 | 168 | 142 | 3 | 19 | 1 | 41 | 57 | 79 | 75 | 120 | 41 | 4 | | 2 | | 2 | | 2 | | | | 14 | 839 |
| 25.5 | | | | | | | | 70 | 112 | 189 | | 13 | | | 25 | 58 | 25 | 40 | 41 | | | 4 | | 2 | | | | | | | 579 |
| 26 | | | | | | | | 17 | 121 | 189 | | 1 | | | 49 | 46 | 29 | 93 | 10 | 4 | | 1 | | | | 2 | | | | 14 | 576 |
| 26.5 | | | | | | | | 21 | 28 | 95 | | 7 | | | 27 | 63 | 18 | 40 | 15 | 4 | | 1 | | | | | | | | 56 | 373 |
| 27 | | | | | | | | 8 | 47 | 110 | | 6 | | | 15 | 17 | 14 | 27 | 15 | | | 2 | | | | 2 | 2 | | | 14 | 279 |
| 27.5 | | | | | | | | 4 | 9 | 63 | | 1 | | | 4 | 8 | 4 | 13 | 10 | | | 1 | | | | 4 | | | | 28 | 150 |
| 28 | | | | | | | | 8 | 9 | 16 | | | | | 8 | 8 | | 13 | | | | | | | | | | | | 42 | 104 |
| 28.5 | | | | | | | | 12 | 19 | 32 | | 1 | | | 6 | 13 | | | | | | | | | | | | | | | 82 |
| 29 | | | | | | | | 4 | 9 | 16 | | | | | | 4 | 4 | 13 | | | | | | | | | | | | 14 | 64 |
| 29.5 | | | | | | | | 4 | | 16 | | | | | 2 | | | | | | | | | | | | | | | | 22 |
| 30 | | | | | | | | 4 | 9 | | | | | | 2 | | 4 | | | | | | | | | | | | | | 19 |
| 30.5 | | | | | | | | 4 | 9 | | | | | | | | | | | | | | | | | | | | | | 13 |
| 31.5 | | | | | | | | | | | | | | | | 4 | | | | | | | | | | | | | | | 4 |
| Total | 5332 | 20 | 276 | 6 | 13 | 1224 | 5751 | 1206 | 3024 | 4994 | 849 | 248 | 59 | 11651 | 536 | 805 | 1041 | 2464 | 1520 | 1612 | 3245 | 54 | 523 | 505 | 1610 | 671 | 720 | 367 | 2337 | 5184 | 57843 |

**Table IIB.4.b** Raised catch weights of herring by trawl station for the Acoustic Herring Survey R/V Dana Cruise July 2004

| | 560E04 | 560E06 | | | | 570E06 | | | | | 570E08 | | | | | | 580E06 | 580E08 | | C | | D | E | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 42F5 | 41F6 | 41F7 | | 42F6 | 43F6 | | 43F7 | 44F6 | 44F7 | 43F8 | 44F8 | 44F9 | | | | 45F6 | 46F9 | | 46G0 | | 45G0 | 41G2 | 42G1 | | 42G2 | | 43G1 | 44G1 | | |
| | 1741 | 1664 | 1586 | 1643 | 1567 | 1394 | 1413 | 1470 | 1327 | 1139 | 1484 | 1154 | 728 | 759 | 927 | 980 | 1310 | 810 | 882 | 625 | 645 | 539 | 172 | 87 | 249 | 199 | 269 | 382 | 435 | 442 | |
| Total | EXPO | FOTØ | EXPO | EXPO | EXPO | EXPO | EXPO | FOTØ | FOTØ | FOTØ | FOTØ | FOTØ | EXPO | EXPO | EXPO | FOTØ | FOTØ | FOTØ | FOTØ | FOTØ | FOTØ | EXPO | EXPO | FOTØ | FOTØ | EXPO | FOTØ | EXPO | FOTØ | FOTØ | Total |
| Catch | 170.8 | 0.52 | 2.11 | 0.10 | 0.32 | 241 | 211 | 127 | 329 | 546 | 126 | 92.4 | 3.16 | 945 | 66.3 | 94.0 | 274 | 264 | 142 | 107 | 211 | 5.53 | 18.3 | 16.4 | 49.7 | 27.7 | 84.2 | 12.9 | 113 | 320 | 3 |

**Table IIB.5a** Numbers of herring by age, maturity, stock and sub area for the Acoustic Herring Survey R/V Dana Cruise July 2004

| Stratum | North Sea Autumn spawners. Abundance (Millions)..... 0 | 1i | 1m | 2i | 2m | 3i | 3m | 4 | 5 | 6 | 7 | 8 | 9+ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 580E06 | 0.00 | 1.33 | 0.01 | 4.55 | 3.32 | 0.83 | 0.53 | 0.10 | 0.02 | 0.00 | 0.00 | 0.00 | 0.00 |
| 570E06 | 0.00 | 192.25 | 1.54 | 59.37 | 43.36 | 10.63 | 6.88 | 1.56 | 0.23 | 0.00 | 0.00 | 0.00 | 0.00 |
| 580E08 | 0.00 | 5.13 | 0.04 | 11.88 | 8.68 | 2.14 | 1.38 | 0.41 | 0.08 | 0.00 | 0.00 | 0.00 | 0.00 |
| 570E08 | 0.00 | 98.06 | 0.79 | 53.70 | 39.22 | 9.60 | 6.21 | 1.88 | 0.32 | 0.00 | 0.00 | 0.00 | 0.00 |
| C | 0.00 | 63.69 | 0.51 | 36.51 | 26.66 | 5.46 | 3.53 | 0.55 | 0.10 | 0.00 | 0.00 | 0.00 | 0.00 |
| D | 0.00 | 213.01 | 1.71 | 74.51 | 54.42 | 11.55 | 7.47 | 1.61 | 0.35 | 0.00 | 0.00 | 0.00 | 0.00 |
| E | 45.45 | 3.28 | 0.03 | 2.26 | 1.65 | 0.00 | 0.00 | 0.00 | 0.60 | 0.00 | 0.00 | 0.00 | 0.00 |
| 560E06 | 113.37 | 194.78 | 1.56 | 3.48 | 2.54 | 0.43 | 0.28 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

| Stratum | Baltic Sea Spring spawners Abundance (Millions)..... 0 | 1i | 1m | 2i | 2m | 3i | 3m | 4 | 5 | 6 | 7 | 8 | 9+ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 580E06 | 0.00 | 0.06 | 0.00 | 6.28 | 0.23 | 5.77 | 0.64 | 3.34 | 1.26 | 0.54 | 0.10 | 0.06 | 0.00 |
| 570E06 | 0.00 | 116.82 | 0.00 | 100.62 | 3.69 | 71.74 | 7.97 | 41.59 | 17.02 | 7.27 | 1.70 | 0.76 | 0.00 |
| 580E08 | 0.00 | 0.38 | 0.00 | 19.57 | 0.72 | 14.58 | 1.62 | 9.29 | 4.63 | 1.88 | 0.38 | 0.20 | 0.00 |
| 570E08 | 0.00 | 42.71 | 0.00 | 102.59 | 3.76 | 65.40 | 7.27 | 41.22 | 20.23 | 8.55 | 2.08 | 0.89 | 0.00 |
| C | 0.00 | 18.94 | 0.00 | 93.87 | 3.44 | 30.81 | 3.42 | 17.74 | 7.76 | 2.71 | 0.43 | 0.26 | 0.00 |
| D | 0.00 | 93.74 | 0.00 | 176.18 | 6.46 | 69.57 | 7.73 | 42.55 | 20.26 | 7.49 | 1.20 | 0.76 | 0.00 |
| E | 0.00 | 1286.61 | 0.00 | 287.64 | 10.55 | 53.62 | 5.96 | 16.55 | 6.30 | 5.71 | 0.00 | 0.88 | 0.00 |
| 560E06 | 0.00 | 300.05 | 0.00 | 22.02 | 0.81 | 2.77 | 0.31 | 1.06 | 0.07 | 0.02 | 0.00 | 0.00 | 0.00 |

**Table IIB.5b** Mean weight of herring by age, maturity, stock and subarea for the Acoustic Herring Survey R/V Dana Cruise July 2004

| North Sea Autumn spawners. Mean weights (g) | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Stratum** | **0** | **1i** | **1m** | **2i** | **2m** | **3i** | **3m** | **4** | **5** | **6** | **7** | **8** | **9+** |
| **580E06** | 0.000 | 81.883 | 81.883 | 97.068 | 97.068 | 104.867 | 104.867 | 135.916 | 140.606 | 0.000 | 0.000 | 0.000 | 0.000 |
| **570E06** | 0.000 | 42.965 | 42.965 | 94.993 | 94.993 | 104.003 | 104.003 | 141.627 | 140.606 | 0.000 | 0.000 | 0.000 | 0.000 |
| **580E08** | 0.000 | 78.362 | 78.362 | 94.923 | 94.923 | 104.168 | 104.168 | 148.818 | 140.606 | 0.000 | 0.000 | 0.000 | 0.000 |
| **570E08** | 0.000 | 57.386 | 57.386 | 93.939 | 93.939 | 104.017 | 104.017 | 149.878 | 140.606 | 0.000 | 0.000 | 0.000 | 0.000 |
| **C** | 0.000 | 64.931 | 64.931 | 89.720 | 89.720 | 98.623 | 98.623 | 137.925 | 140.606 | 0.000 | 0.000 | 0.000 | 0.000 |
| **D** | 0.000 | 56.261 | 56.261 | 90.889 | 90.889 | 100.196 | 100.196 | 146.575 | 140.606 | 0.000 | 0.000 | 0.000 | 0.000 |
| **E** | 7.183 | 48.708 | 48.708 | 94.457 | 94.457 | 0.000 | 0.000 | 0.000 | 158.147 | 0.000 | 0.000 | 0.000 | 0.000 |
| **560E06** | 6.226 | 33.755 | 33.755 | 83.988 | 83.988 | 90.073 | 90.073 | 116.846 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |

| Baltic Sea Spring spawners Mean weights (g) | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Stratum** | **0** | **1i** | **1m** | **2i** | **2m** | **3i** | **3m** | **4** | **5** | **6** | **7** | **8** | **9+** |
| **580E06** | | 66.463 | | 89.474 | 89.474 | 111.410 | 111.410 | 119.495 | 137.942 | 153.338 | 177.725 | 165.294 | 0.000 |
| **570E06** | | 37.116 | | 85.435 | 85.435 | 111.946 | 111.946 | 121.162 | 141.237 | 151.587 | 173.053 | 168.508 | 0.000 |
| **580E08** | | 64.369 | | 86.395 | 86.395 | 113.224 | 113.224 | 124.426 | 144.974 | 147.363 | 173.750 | 163.838 | 0.000 |
| **570E08** | | 48.917 | | 83.160 | 83.160 | 113.545 | 113.545 | 124.464 | 144.811 | 149.352 | 179.591 | 166.021 | 0.000 |
| **C** | | 56.566 | | 79.004 | 79.004 | 109.610 | 109.610 | 119.740 | 141.388 | 144.334 | 135.303 | 159.797 | 0.000 |
| **D** | | 49.592 | | 79.970 | 79.970 | 110.801 | 110.801 | 121.920 | 143.888 | 147.097 | 154.441 | 159.531 | 0.000 |
| **E** | 0.000 | 36.872 | | 64.776 | 64.776 | 76.972 | 76.972 | 94.693 | 137.347 | 133.478 | 0.000 | 0.166 | 0.000 |
| **560E06** | 0.000 | 0.034 | | 0.075 | 0.075 | 0.096 | 0.096 | 0.098 | 0.114 | 0.120 | 0.000 | 0.000 | 0.000 |

**Table IIB.5c** Mean length of herring by age, maturity, stock and subarea for the Acoustic Herring Survey R/V Dana Cruise July 2004

| Stratum | North Sea Autumn spawners. Mean lengths (cm) 0 | 1i | 1m | 2i | 2m | 3i | 3m | 4 | 5 | 6 | 7 | 8 | 9+ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 580E06 | 0.00 | 21.82 | 21.82 | 23.04 | 23.04 | 23.61 | 23.61 | 25.63 | 26.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 570E06 | 0.00 | 17.54 | 17.54 | 22.88 | 22.88 | 23.54 | 23.54 | 25.97 | 26.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 580E08 | 0.00 | 21.51 | 21.51 | 22.87 | 22.87 | 23.55 | 23.55 | 26.40 | 26.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 570E08 | 0.00 | 19.35 | 19.35 | 22.78 | 22.78 | 23.53 | 23.53 | 26.45 | 26.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| C | 0.00 | 20.22 | 20.22 | 22.45 | 22.45 | 23.12 | 23.12 | 25.78 | 26.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| D | 0.00 | 19.26 | 19.26 | 22.54 | 22.54 | 23.24 | 23.24 | 26.27 | 26.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| E | 9.97 | 18.50 | 18.50 | 22.75 | 22.75 | 0.00 | 0.00 | 0.00 | 27.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 560E06 | 9.03 | 16.25 | 16.25 | 21.98 | 21.98 | 22.48 | 22.48 | 24.50 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

| Stratum | Baltic Sea Spring spawners Mean lengths (cm) 0 | 1i | 1m | 2i | 2m | 3i | 3m | 4 | 5 | 6 | 7 | 8 | 9+ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 580E06 | | 20.42 | | 22.44 | 22.44 | 24.09 | 24.09 | 24.60 | 25.77 | 26.60 | 27.83 | 27.32 | 0.00 |
| 570E06 | | 16.88 | | 22.10 | 22.10 | 24.11 | 24.11 | 24.70 | 25.96 | 26.53 | 27.61 | 27.50 | 0.00 |
| 580E08 | | 20.19 | | 22.19 | 22.19 | 24.19 | 24.19 | 24.91 | 26.19 | 26.34 | 27.60 | 27.25 | 0.00 |
| 570E08 | | 18.44 | | 21.91 | 21.91 | 24.22 | 24.22 | 24.91 | 26.18 | 26.44 | 27.91 | 27.37 | 0.00 |
| C | | 19.37 | | 21.56 | 21.56 | 23.94 | 23.94 | 24.60 | 25.98 | 26.17 | 25.68 | 27.04 | 0.00 |
| D | | 18.54 | | 21.64 | 21.64 | 24.02 | 24.02 | 24.74 | 26.13 | 26.32 | 26.68 | 27.02 | 0.00 |
| E | 0.00 | 16.86 | | 20.19 | 20.19 | 21.35 | 21.35 | 22.77 | 25.68 | 25.22 | 0.00 | 27.44 | 0.00 |
| 560E06 | 0.00 | 16.38 | | 21.17 | 21.17 | 23.00 | 23.00 | 23.13 | 24.30 | 24.68 | 0.00 | 0.00 | 0.00 |