

**Cruise report**  
**FRV „Solea“ Cruise 726**  
**30.09. - 20.10.2016**

Scientists in charge: Dr. Matthias Schaber (TI-SF) & Dr. Tomas Gröhsler (TI-OF)

**Hydroacoustic survey for the assessment of small pelagics in the Baltic Sea**

**1. In a nutshell**

The cruise was part of an international hydroacoustic survey providing information on stock parameters of small pelagics in the Baltic Sea, coordinated by the ICES Working Group of International Pelagic Surveys (WGIPS) and the ICES Baltic International Fish Survey Group (WGBIFS). FRV “Solea” participated for the 29<sup>th</sup> time. The survey area covered the western Baltic Sea including Kattegat, Belt Sea, Sound and Arkona Sea (ICES Subdivisions SD 21, 22, 23 and 24). Altogether, 1179 nm (plus 178 nm daytime transects for comparison) of hydroacoustic transects were covered.

In the majority of sampled rectangles, mean NASC values per nautical mile were significantly higher than the low values measured in 2015 and also often higher than those measured in 2014 as well as the long-time mean values. Only in three rectangles in ICES SD 22 (a rectangle with generally low registrations) and in SD 23 (and the transition area to SD 21 respectively), mean NASC values were lower than in the previous year. In SD23, unlike in previous years, comparatively low NASC values (lower than the previous three years and than the long-time mean) were measured, indicating absence of the dense aggregations of herring usually observed in that area at this time of the year.

For species allocation and identification, altogether 55 fishery hauls were conducted.

**Distributionlist:**

TI - Seefischerei  
Saßnitzer Seefischerei e. G.

**via E-Mail:**

BMEL, Ref. 614  
BMEL, Ref. 613  
Bundesanstalt für Landwirtschaft und Ernährung,  
Hamburg  
Schiffsführung FFS “  
Präsidialbüro (Michael Welling)  
Personalreferat Braunschweig  
TI - Fischereiökologie  
TI - Ostseefischerei Rostock  
TI - FIZ-Fischerei  
TI - PR  
MRI - BFEL HH, FB Fischqualität

Dr. Rohlf/SF - Reiseplanung Forschungsschiffe  
Fahrtteilnehmer  
Bundesamt für Seeschifffahrt und Hydrographie, Hamburg  
Mecklenburger Hochseefischerei GmbH, Rostock  
Doggerbank Seefischerei GmbH, Bremerhaven  
Deutscher Fischerei - Verband e. V., Hamburg  
Leibniz-Institut für Meereswissenschaften IFM-GEOMAR  
H. Cammann-Oehne, BSH  
Deutscher Hochseefischerei-Verband e.V.  
DFFU

## 2. Cruise objectives

The following objectives were planned for SB726:

- Hydroacoustic measurements for the assessment of small pelagics in Kattegat and western Baltic Sea including Belt Sea, Sound and Arkona Sea (ICES SD 21, 22, 23, 24)
- (Pelagic) trawling according to hydroacoustic measurements
- Hydrographic measurements on hydroacoustic transects and after each fishery haul
- Identification and recording of species- and length-composition of trawl catches
- Collection of biological samples of herring, sprat and additionally European anchovy and cod for further analyses

## 3. Cruise narrative and preliminary results

### 3.1 Cruise narrative (Matthias Schaber)

FRV "Solea" was equipped with all hydroacoustic equipment and biological sampling gear on September 30<sup>th</sup> in Kiel harbor. On the same afternoon, „Solea" left port for the calibration of scientific echosounders. The calibration site off Strande was chosen according to prevailing weather conditions providing acceptable conditions for calibration. Both the 38 and 120 kHz transducer were calibrated with calibration values regarded as good. After calibration FRV "Solea" continued to Warnemünde port the same evening for disembarkation of calibration crew and embarkation of the rest of the scientific crew. Leaving of port and start of survey was scheduled for October 1<sup>st</sup>. Hydroacoustic survey operations commenced October 1<sup>st</sup> at 06:45 PM in SD 24.

Generally, survey operations were conducted during nighttime to account for the more pelagic distribution of clupeids during that time. Due to adverse weather conditions during covering SD24, survey operations had to be relocated into SD22 after covering most of the southernmost transects in SD24. After accomplishing transects in SD22 and an interruption of survey work for one night in Warnemünde port on October 8<sup>th</sup> due to bad weather and for an exchange of parts of the scientific staff, the remaining section of the southernmost transect in SD24 was finished prior to shifting survey operations into the Sound (SD23) due to prevailing bad and deteriorating weather conditions. Afterwards, SD21 was covered but the planned transect had to be shortened with the two northernmost rectangles (43G1 and 43G2) omitted due to adverse weather conditions. Stormy weather required another cruise break in Copenhagen for 2 days afterwards. Then, in improving weather, the two remaining transects in SD24 were covered on October 16<sup>th</sup> and 17<sup>th</sup> prior to another sampling and measurement of SD23 on October 18<sup>th</sup>. The scientific program was finished on October 19<sup>th</sup>, 02:20 AM, and FRV "Solea" left the survey area to steam to Copenhagen port (disembarking of one member of the scientific crew) and onward to Marienehe port, where the ship arrived on October 19<sup>th</sup>, 16:50 PM. All hydroacoustic equipment and biological sampling gear was disarmed on October 20<sup>th</sup>.

Altogether, the following survey schedule was accomplished:

- Arkona Sea (SD 24) 01. - 03.10.
- Belt Sea (SD 22) 03. - 07.10.
- Arkona Sea (SD 24) 09. -10.10.
- Sound (SD 23) 10. -11.10.
- Kattegat (SD 21) 11. - 13.10.
- Arkona Sea (SD 24) 16. - 17.10.
- Sound (SD 23) 18. - 19.10.

Total survey time	15 nights
Fishery hauls	55
CTD-casts	81
Hydroacoustic transects	1179 nmi (+ 178 nmi daytime transects for comparison)

Overall hydroacoustic transect length was 1179 nmi (2015: 1230 nmi).

## 3.2 Hydroacoustics

### 3.2.1 Calibration

Both transducers (38 kHz and 120 kHz) were calibrated prior to the beginning of the survey in initially inclement but increasingly improving weather conditions from a drifting vessel in Strande Bay/Kiel Bight. Overall calibration results were considered good based on calculated RMS values. Resulting transducer parameters were applied for consecutive data-collection and post-processing of hydroacoustic survey data.

### 3.2.2 Echo recording

Hydroacoustic data were recorded with a Simrad EK80 scientific echosounder with hull-mounted 38 kHz and 120 kHz transducers. Post-processing and analysis were accomplished with EchoView 7 software. The transducer settings applied were in accordance with the specifications provided in ICES (2014).

During the survey, hydroacoustic data were recorded at a standard ship speed of 10 kn leading to daily transect lengths of roughly 90 to 100 nmi. Figure 1 depicts the spatial distribution of mean NASC values (5 nmi intervals) measured on the hydroacoustic transects covered in 2016. In almost all rectangles surveyed, mean NASC values were significantly higher than those recorded in 2015, often also higher than those recorded in 2014, and –in SD24- also above the long-time survey average. On ICES subdivision scale, mean NASC values were higher than in the previous year in SD 21, 22 and 24 while in SD 23 mean NASC values were significantly lower than in preceding years.

In SD 21, overall NASC values measured were comparatively low, but mean NASC per 1 nmi EDSU was – occasionally significantly- higher in almost all rectangles observed than in the previous year, but mostly lower than the long-time survey average in all rectangles surveyed. Rectangles with increased aggregations of clupeids (43G1 and 43G2) in the northern part could not be covered due to adverse weather conditions. Increased aggregations were instead measured in the southwestern part of SD 21.

In SD 22, mean NASC values recorded were higher than the previous year in all but one rectangles surveyed. In comparison to the long-term survey mean of rectangles in SD 24, the NASC measured was lower in the majority of rectangles. No clear aggregations of clupeids were measured, but overall NASC values were increased compared to previous years almost along the whole survey transect covered. However, in the short transect section covering rectangle 40G1, NASC values were many times higher than the values observed in the years before and also than the long-term survey mean.

The large aggregations of big herring that can be observed annually in SD 23 in the Öre Sound were not present in autumn 2016. NASC values in rectangle 40G2 covering the aggregation hotspot in this area were significantly lower than the high levels measured in 2015 (only 13% of the measured values in 2015) and also only ca. 40% of the long-time survey average. Measurements were made in inclement weather conditions with strong currents in the Sound. A replicate measurement of the transect in SD 23 in good weather conditions a few days later corroborated these findings.

In SD 24, mean NASC values were significantly and partially six fold higher than the values measured in 2015 in all rectangles. Apart from increased aggregations in the eastern parts of SD 24, highest values were measured north and east/southeast of Rügen Island (38G3 and 37G3 respectively).

The final analysis of hydroacoustic data will be accomplished in the first quarter of 2017, when results will be reported to the ICES Working Group of International Pelagic Surveys (WGIPS).

### 3.3 Biological sampling (Tomas Gröhsler)

To validate and allocate echorecordings, altogether 55 fishery hauls were conducted (Figure 2). Trawling time was 30 minutes. On all stations a pelagic trawl net „Krake” (PSN 388) was employed.

Fishery hauls according to ICES Subdivision:

Subdivision	Hauls (n)
21	12
22	17
23	6
24	20

The following samples were collected and frozen for further processing at TI-OF to identify additional biological parameters of stock structure (e. g. sex, maturity, age):

- 1,501 herring (*Clupea harengus*), 749 sprat (*Sprattus sprattus*), 535 European anchovies (*Engraulis encrasicolus*) and 42 sardines (*Sardina pilchardus*).

Further, frozen samples of different fishes (e.g. herring, anchovy etc.) for genetic investigations, stock discrimination and evaluation of distribution patterns in Danish waters were further collected for DTU aqua, Charlottenlund, DK.

Altogether, the following species were sampled and processed:

Species	Length measurements	Number of hauls
BELONE BELONE	4	3
CLUPEA HARENGUS	8,912	52
CRYSTALLOGOBIUS LINEARIS	210	17
CTENOLABRUS RUPESTRIS	8	8
CYCLOPTERUS LUMPUS	8	8
ENGRAULIS ENCRASICOLUS	1,323	41
EUTRIGLA GURNARDUS	33	11
GADUS MORHUA	269	40
GASTEROSTEUS ACULEATUS	846	42
GOBIUS NIGER	11	7
LIMANDA LIMANDA	308	29
MELANOGRAMMUS AEGLEFINUS	4	3
MERLANGIUS MERLANGUS	755	46
MULLUS SURMULETUS	6	4
PLATICHTHYS FLESUS	37	18
PLEURONECTES PLATESSA	31	15
POMATOSCHISTUS MINUTUS	153	25
SARDINA PILCHARDUS	69	13
SCOMBER SCOMBRUS	10	6
SPRATTUS SPRATTUS	10,033	51
SYNGNATHUS ROSTELLATUS	4	3
SYNGNATHUS TYPHLE	17	12
TRACHINUS DRACO	212	19
TRACHURUS TRACHURUS	117	29
TRISOPTERUS ESMARKI	8	4
Others	397	51

The overall catch composition ( $\text{kg } 0.5 \text{ h}^{-1}$ ) per trawl haul according to ICES Subdivision 21, 22, 23 and 24 is given in Tables 1-4. Altogether, 49 different species were recorded. Herring were caught in 52, sprat in 51 hauls. SD 23, which is typically characterized by the highest mean catch rates per station ( $\text{kg } 0.5 \text{ h}^{-1}$ ), showed this year the lowest values ever recorded. In contrast to the last year where sardines (*Sardina pilchardus*) were not caught at all, this species did appear in 2015 catches in SDs 22-24. As in last year's anchovy (*Engraulis encrasicolus*) was present in most catches. Anchovies were caught throughout the survey area in 41 out of 55 hauls, including the majority of hauls in SD 21 and SD 22.

Figures 3 and 4 show relative length-frequency distributions of herring and sprat in ICES subdivisions 21, 22, 23 and 24 for the years 2015 and 2016. Compared to results from the previous survey in 2015, the following conclusions for herring can be drawn (Fig. 3):

- As in 2015, catches in SD 21 showed a bimodal distribution characterized by the presence of the incoming year class ( $\leq 15 \text{ cm}$ ) and older herring ( $>15 \text{ cm}$ ). In contrast to 2015, the fraction of the incoming year class was higher in 2016.
- SD 22 showed the incoming year class with a mode at 9.75 cm while in 2015 this mode had been observed at 10.75 cm. A rather low fraction of older fishes showed in both years another comparable mode (17.25 cm in 2016 and at 16.75 cm in 2015).
- In SD 23, smaller herring ( $< 20 \text{ cm}$ ) dominated catches. This was in contrast to the dominant contribution of larger herring ( $>20 \text{ cm}$ ) in previous years.
- In SD 24, the herring length-frequency distribution was characterized by a similar contribution of the incoming year class ( $\leq 15.00 \text{ cm}$ ) and older herring ( $>15 \text{ cm}$ ) in both years.
- Altogether, the present contribution of the incoming year class (ca.  $<15 \text{ cm}$ ) seemed to be quite similar in the last two years.

Relative length-frequency distributions of sprat in the years 2016 and 2015 (Fig. 4) can be characterized as follows:

- In SD 21 catch numbers of the incoming year class ( $\leq 10 \text{ cm}$ ) were virtually absent in both years. The catches were dominated by the contribution of larger sprat (ca.  $>10 \text{ cm}$ ).
- In SD 22 and 23 catch numbers of the incoming year class ( $\leq 10 \text{ cm}$ ) dominated in 2016, whereas they were almost virtually absent in 2015. The dominant high contribution of larger sprat (ca.  $>10 \text{ cm}$ ) in 2015 disappeared in 2016.
- In SD 24, the sprat length-frequency distribution was rather similar compared to 2015 with a bimodal distribution of both incoming year class ( $< 10 \text{ cm}$ ) and older sprat.
- Altogether, the present contribution of the incoming year class (ca.  $<10 \text{ cm}$ ) increased compared to last year's very low value.

### 3.4 Hydrography (Matthias Schaber)

Vertical profiles of temperature and salinity were measured with a SeaBird SBE CTD-probe on a station grid covering the whole survey area. Hydrography measurements were either conducted directly after a trawl haul or, in case of no fishing activity, in regular intervals along the cruise track. Altogether, 81 CTD casts were conducted during this survey.

Surface temperatures ranged from ca.  $12^\circ\text{C}$  in the Kattegat, Sound and northern Arkona Sea to almost  $18^\circ\text{C}$  in the southern Arkona Sea and the Kiel Bight (Fig. 5). Bottom temperatures were also comparatively and similarly high in the southern part of the survey area but decreased to less than  $8^\circ\text{C}$  in the deep parts of the southeastern Arkona Sea/western Bornholm Basin.

Surface salinities showed a large gradient from ca. 7 PSU in the eastern Arkona Sea to ca. 16 PSU in the Kiel Bight and over 20 PSU in the Kattegat. Salinity near the seafloor ranged from 8 PSU in the Arkona

Sea to ca. 33 PSU in the Kattegat. Especially in the Sound, a very strong stratification with steep salinity gradients was observed.

Surface waters were well oxygenated throughout the survey area, while especially in the northern parts of the Sound as well as in the inner, southeastern Mecklenburg Bight and the northern Kiel Bight as well as in eastern parts of the Kattegat low levels, as well as in comparatively large areas anoxic conditions were observed.

## 5. Survey participants

Name	Function	Institute
<b>30.09.-01.10.2016/Calibration of hydroacoustic equipment</b>		
Dr. M. Schaber	Hydroacoustics, Cruise leader	TI-SF
M. Drenckow	Hydroacoustics	TI-SF
S.-E. Levinsky	Fishery biology	DTU Aqua, Charlottenlund, (DK)
B. Stefanowitsch	Student assistant	TI-SF
S. Wieser	Student assistant	TI-SF
<b>01.-20.10.2016/Survey</b>		
Dr. M. Schaber	Hydroacoustics, Cruise leader	TI-SF
Dr. T. Gröhsler	Hydroacoustics, Cruise leader	TI-OF (01.-08.10.)
A. Bühler	Fishery biology, Student assistant	TI-OF (09.-20.10.)
M. Koth	Fishery biology	TI-OF (01.-09.10.)
S.-E. Levinsky	Fishery biology	DTU Aqua, Charlottenlund, (DK)
B. Stefanowitsch	Student assistant	TI-SF
S. Wieser	Student assistant	TI-SF

## 6. References

Echoview Software Pty Ltd (2016). Echoview software, version 7. Echoview Software Pty Ltd, Hobart, Australia

ICES (2014). SISP Manual of International Baltic Acoustic Surveys (IBAS). Report of the Baltic International Fish Survey Working Group (WGBIFS). ICES CM 2014/SSGESST:13

## 7. Acknowledgements

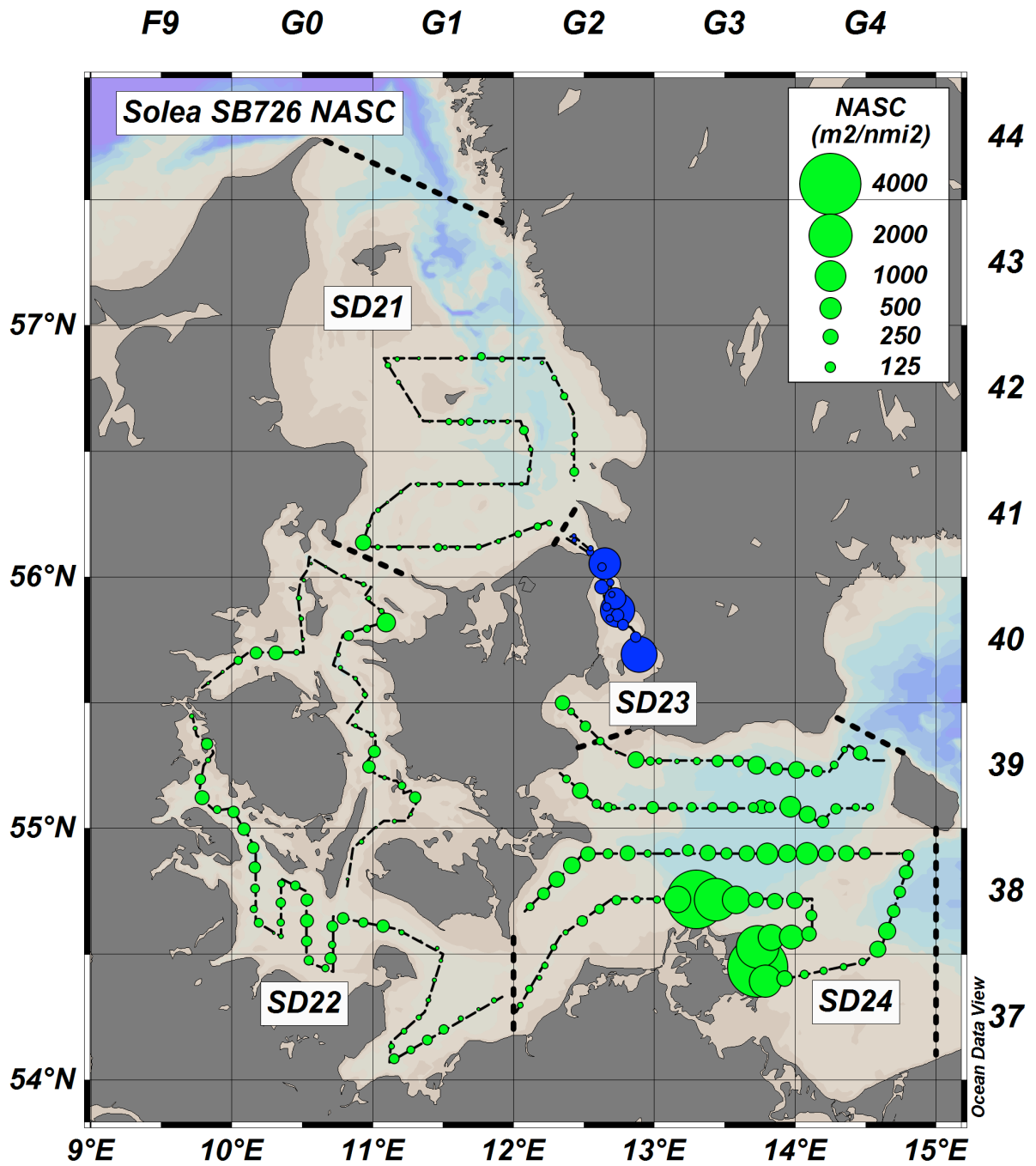
We hereby thank the crew of FRV "Solea" and Captain V. Koops as well as all participants for their outstanding cooperation and commitment that facilitated the successful accomplishment of this survey.



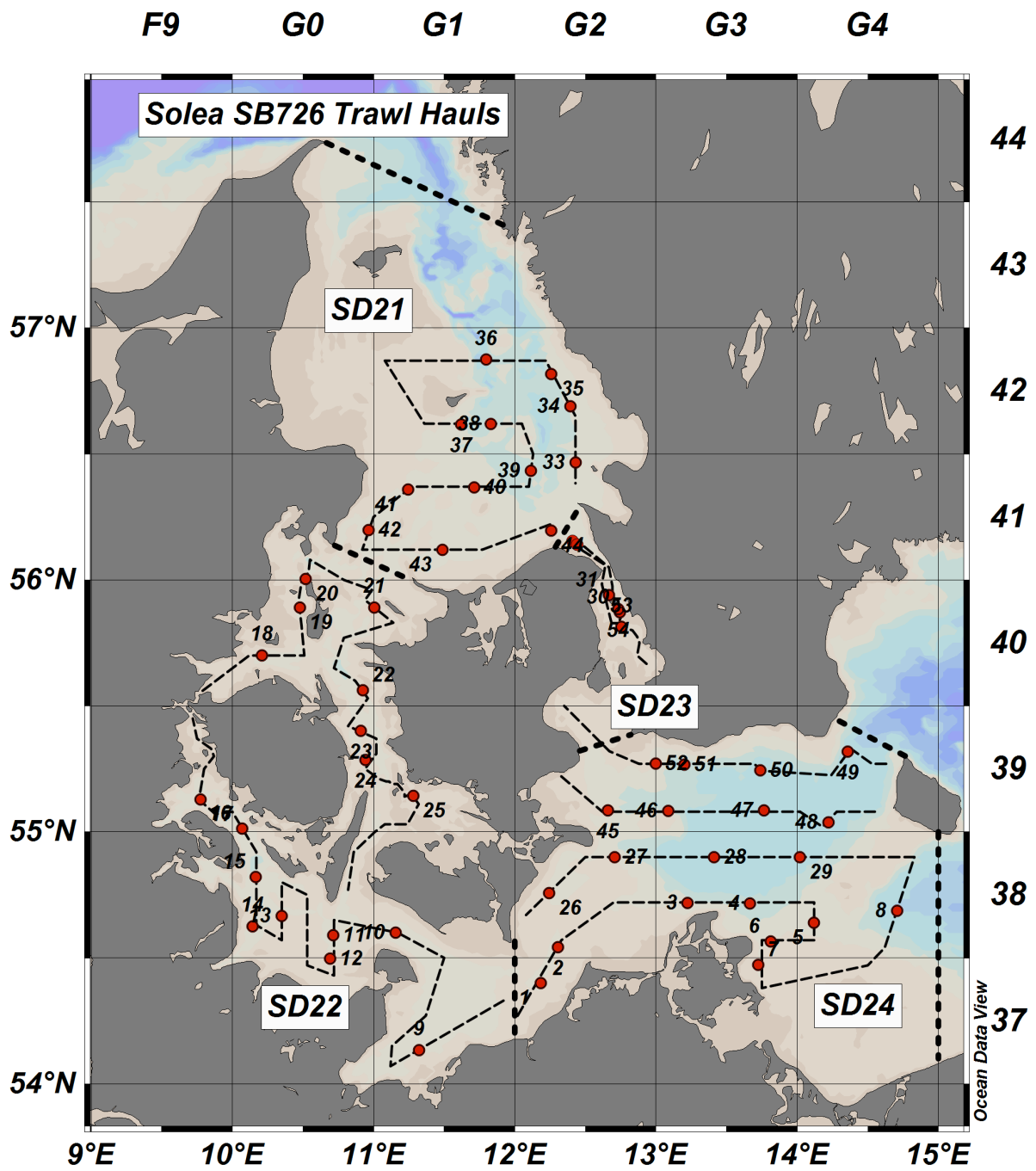
(Dr. M. Schaber, TI-SF / Scientist in charge)



(Dr. T. Gröhsler, TI-OF / Scientist in charge)

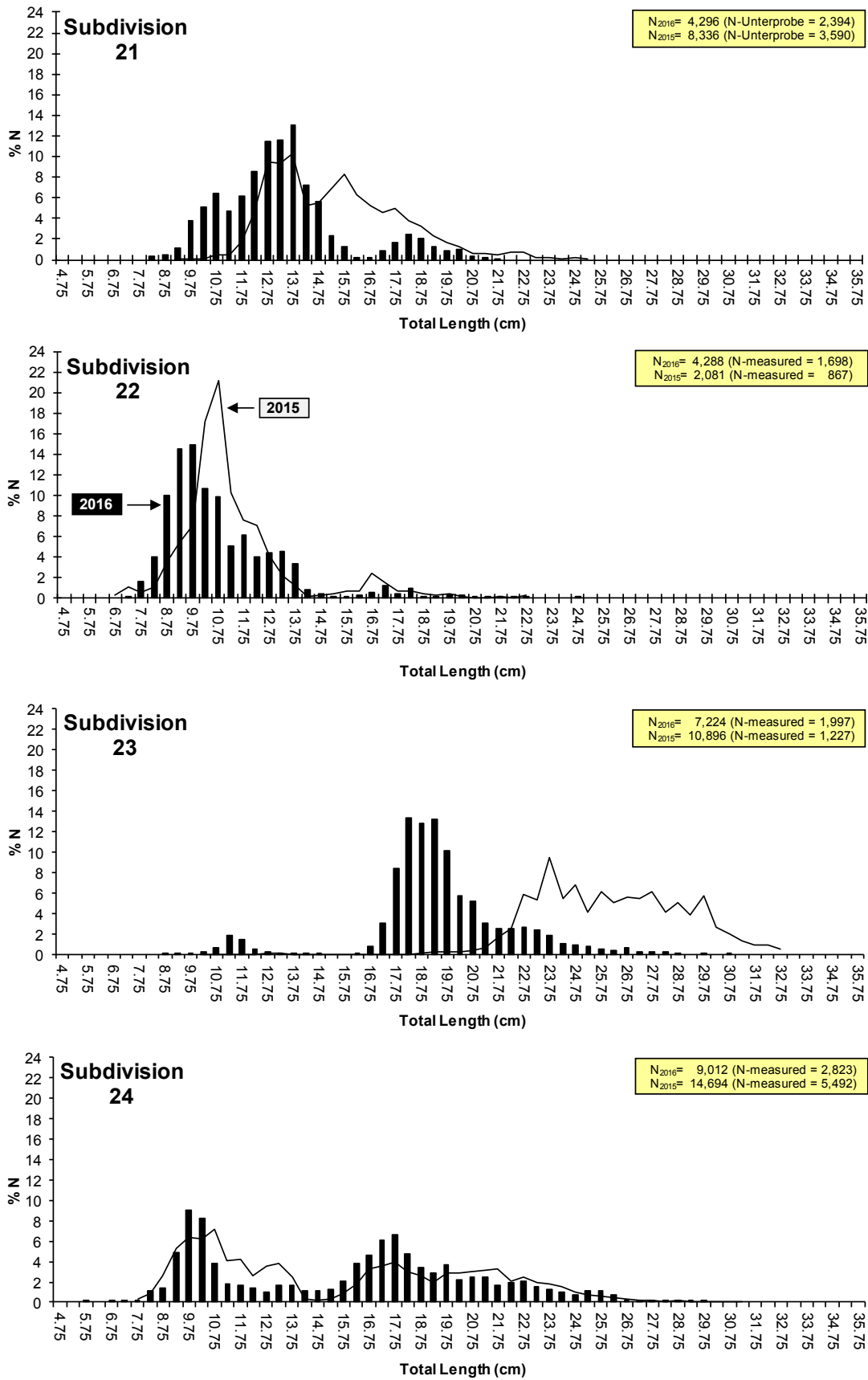


**Figure 1:** FRV "Solea" cruise 726/2016. Cruisetrack (thin dashed lines) and mean NASC (5 nmi intervals, dots). ICES statistical rectangles are indicated in the top and right axis. Thick dashed lines separate ICES subdivisions (SD). Blue NASC values in Subdivision 23 (Sound) represent mean of two recordings.

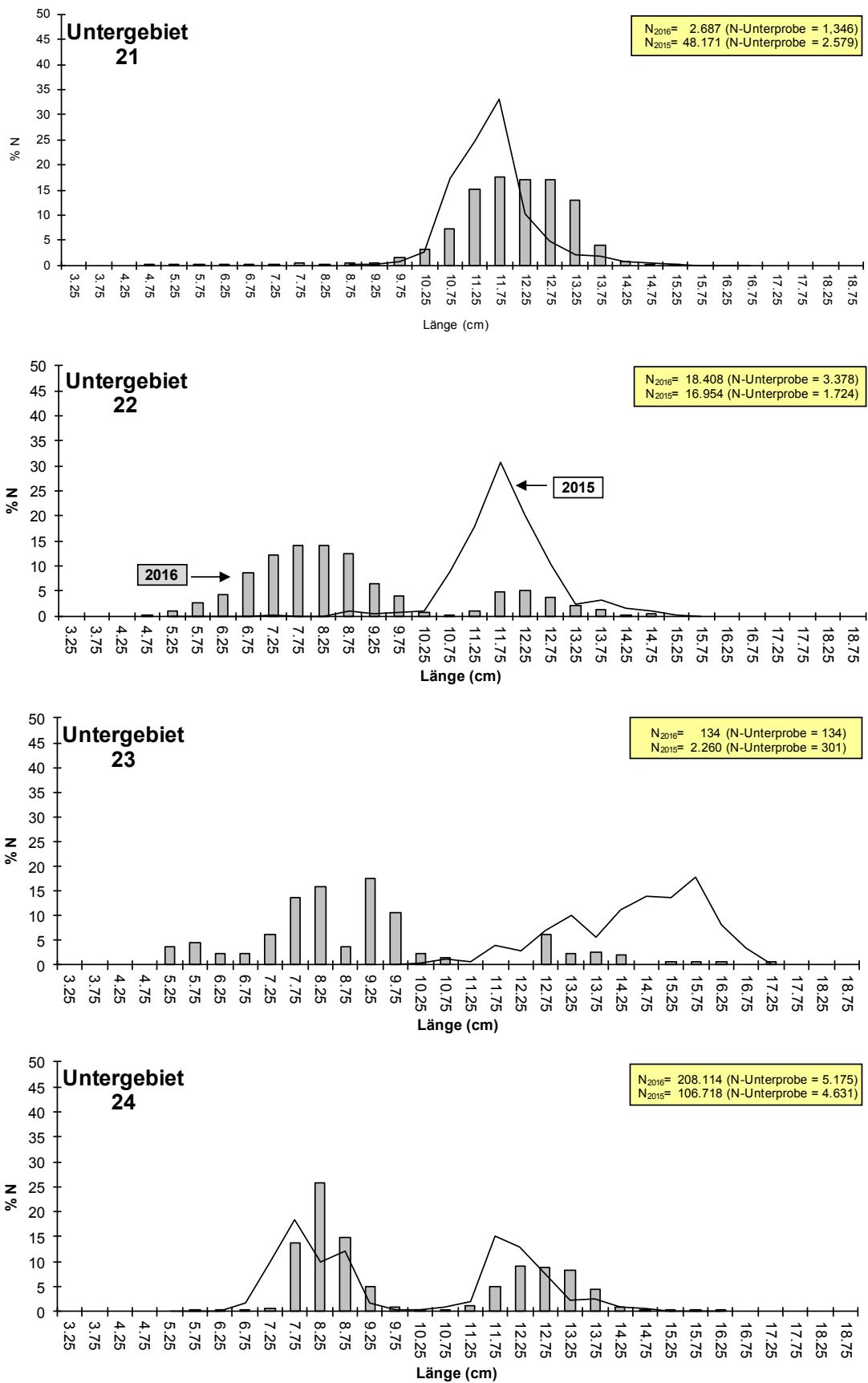


**Figure 2:** FRV "Solea" cruise 726/2016. Cruisetrack (thin dashed lines) and fishery hauls (red dots). ICES statistical rectangles are indicated in the top and right axis. Thick dashed lines separate ICES subdivisions (SD).

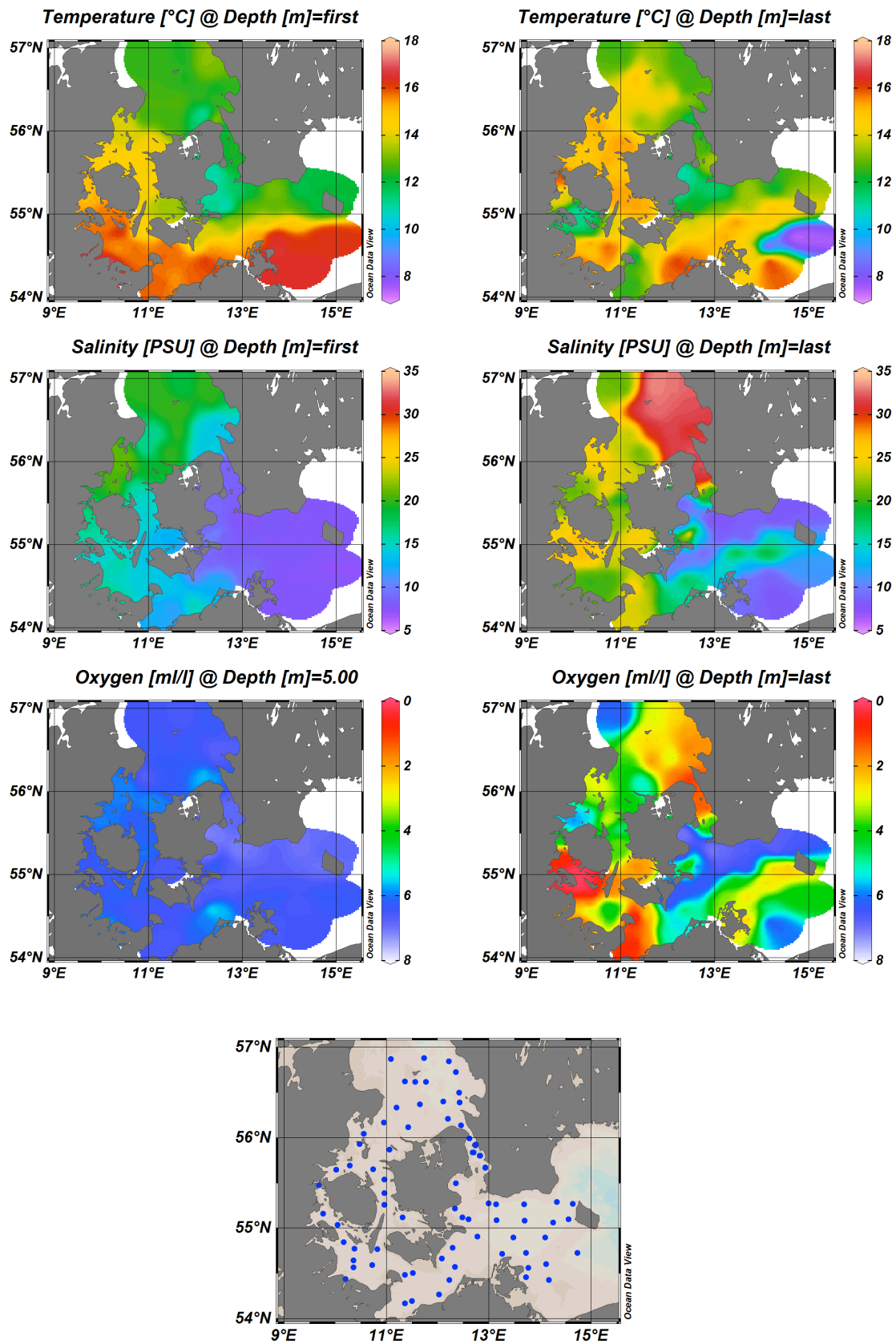




**Figure 3:** FRV “Solea” cruise 726/2016: Herring (*Clupea harengus*) length-frequency distribution compared to previous year (cruise 710/2015).



**Figure 4:** FRV "Solea" cruise 726/2016: Sprat (*Sprattus sprattus*) length-frequency distribution compared to previous year (cruise 710/2015).



**Figure 5:** FRV "Solea" cruise 726/2016: Hydrography. CTD stations are depicted as blue dots in the area map (lower panel). Temperature (°C, top panels), salinity (PSU, middle panels and oxygen concentration (ml/l, lower panels) at the surface (left) and near the seafloor (right). Surface oxygen concentration levels are displayed at 5 m depth.

## Tables

**Table 1:** FRV "Solea" cruise 726/2016: Catch composition (kg 0.5 h<sup>-1</sup>) by haul in SD 21.

Haul No.	33	34	35	36	37	38	39	40	41	42	43	44	Total
Species/ICES Rectangle	41G2	42G2	42G2	42G1	42G1	42G1	41G2	41G1	41G1	41G0	41G1	41G2	
BELONE BELONE											0.02		0.02
CLUPEA HARENGUS	1.67	3.53	3.19	2.66	2.26	10.86	1.46	1.84	1.08		20.29	19.23	68.07
CRANGON CRANGON				+									+
CRYSTALLOGOBIUS LINEARIS	+	0.01		+			+		+			+	0.01
CTENOLABRUS RUPESTRIS													+
CYCLOPTERUS LUMPUS											0.160		0.16
ENGRAULIS ENCRASICOLUS	0.01	0.01	0.09	0.11	0.10	0.92	2.19	1.05	2.42	0.43	0.110	0.060	7.50
EUTRIGLA GURNARDUS	+	0.02	0.01	0.04	0.05				1.06	0.15		+	1.33
GADUS MORHUA		6.84	2.12				5.36	2.94	2.67			0.010	19.94
GASTEROSTEUS ACULEATUS	+						+	0.01	+	+	0.08	0.01	0.10
HIPPOGLOSSOIDES PLATESSOIDES					+								+
LEANDER				+									+
LIMANDA LIMANDA		0.81	0.09	0.11	0.07			0.1	1.05	0.2		0.01	2.44
LOLIGO FORBESI	0.01	0.01	0.06	0.12	0.05	0.73	0.05	+	0.02			0.37	1.42
MELANOGRAMMUS AEGLEFINUS	0.99												0.99
MERLANGIUS MERLANGUS	0.01	1.03	0.53	0.05	0.1	0.09	0.06	0.03	0.03	0.02	0.06	0.05	2.06
MERLUCCIIUS MERLUCCIIUS		0.18	0.27										0.45
MYSIDACEA				0.01									0.01
PLEURONECTES PLATESSA		0.95	0.41	0.49									1.85
POMATOSCHISTUS MINUTUS		+	+	+									+
SARDINA PILCHARDUS	0.01				0.06	0.01		0.03		0.06	0.25		0.42
SCOMBER SCOMBRUS					0.68	0.43	0.43						1.54
SEPIOLA				0.03		0.01							0.05
SPRATTUS SPRATTUS	0.13	4.8	3.66		11.93	8.05	0.34	0.12	0.16		4.82	0.29	34.30
SQUALUS ACANTHIAS		0.96											0.96
SYNGNATHUS ROSTELLATUS				+									+
TRACHINUS DRACO		0.23	0.21	0.19	2.28	3.39	0.39	0.67	0.38	0.14	0.34	0.22	8.44
TRACHURUS TRACHURUS	0.01	0.02	+				0.03	0.03	0.02	0.01	0.03	0.03	0.18
TRISOPTERUS ESMARKI			0.01	0.02									0.03
<b>Total</b>	<b>2.84</b>	<b>19.40</b>	<b>10.66</b>	<b>3.83</b>	<b>17.58</b>	<b>24.49</b>	<b>10.31</b>	<b>6.82</b>	<b>8.89</b>	<b>1.01</b>	<b>26.16</b>	<b>20.28</b>	<b>152.27</b>
<b>Medusae</b>	<b>4.16</b>	<b>0.02</b>	<b>1.86</b>	<b>1.95</b>	<b>0.27</b>	<b>0.23</b>	<b>1.77</b>	<b>15.18</b>	<b>11.05</b>	<b>4.12</b>	<b>13.67</b>	<b>1.99</b>	<b>56.26</b>

+ = < 0.01 kg

**Table 2:** FRV "Solea" cruise 726/2016: Catch composition (kg 0.5 h<sup>-1</sup>) by haul in SD 22.

Haul No.	9	10	11	12	13	14	15	16	17	18	19	20	21
Species/ICES Rectangle	37G1	38G1	38G0	37G0	38G0	38G0	38G0	39G0	39F9	40G0	40G0	41G0	40G1
AGONUS CATAPHRACTUS							+						
ANGUILLA ANGUILLA									0.05				
CALLIONYMUS LYRA			0.03										
CLUPEA HARENGUS	1.54	2.08	2.72	4.20	3.48	0.17	0.37	0.28	0.08	0.26	0.04		0.13
CRANGON CRANGON												+	+
CRYSTALLOGOBIUS LINEARIS			+								+		+
CTENOLABRUS RUPESTRIS			+						+	0.01			0.01
CYCLOPTERUS LUMPUS						0.16	1.05						
ENGRAULIS ENCRASICOLUS	0.09	0.01	0.02	0.08	0.46	0.69	1.70	0.18	0.04	0.05	3.32	0.84	0.06
EUTRIGLA GURNARDUS													
GADUS MORHUA	0.19	0.01	5.01	9.44	0.04		0.02	0.01	0.02			0.08	0.01
GASTEROSTEUS ACULEATUS	0.01	0.01	0.01		0.09		0.15	0.19	0.51	0.01	+	0.02	0.02
GOBIUS			0.01										
GOBIUS NIGER			+						0.01		+		
LIMANDA LIMANDA	0.05	0.04	20.74	3.69	1.91		0.08		0.22		0.12	0.09	0.12
LOLIGO FORBESI											0.01	+	
LUMPENUS LAMPRETAEFORMIS			0.02										
MERLANGIUS MERLANGUS	0.24	0.01	0.93	0.22	0.06	0.01	0.04	0.10	0.04		0.06	0.06	0.03
MULLUS SURMULETUS			0.03								0.02	0.08	0.03
PHOLIS GUNNELLUS													
PLATICHTHYS FLEUS			2.43	0.22	0.50								
PLEURONECTES PLATESSA			2.90					0.15	0.10				
POMATOSCHISTUS MINUTUS	+		+	+									+
PSETTA MAXIMA									1.78				
SARDINA PILCHARDUS											0.01	0.01	0.02
SCOMBER SCOMBRUS						0.02						0.23	
SPINACHIA SPINACHIA				+									
SPRATTUS SPRATTUS	0.39	0.31	4.56	6.03	11.11	0.33	3.74	4.62	7.17	2.55		0.19	+
SYNGNATHUS ROSTELLATUS	+		+										
SYNGNATHUS TYPHLE		+					+			+	+	+	+
TRACHINUS DRACO	0.10		0.21	0.06							0.02	0.19	0.22
TRACHURUS TRACHURUS				0.04	0.03	0.03		+			0.01	0.12	0.05
TRISOPTERUS ESMARKI												+	+
TRISOPTERUS MINUTUS													+
<b>Total</b>	<b>2.61</b>	<b>2.47</b>	<b>39.62</b>	<b>23.98</b>	<b>17.68</b>	<b>1.41</b>	<b>7.15</b>	<b>5.53</b>	<b>10.02</b>	<b>2.88</b>	<b>3.61</b>	<b>1.91</b>	<b>0.70</b>
<b>Medusae</b>	<b>37.76</b>	<b>6.99</b>	<b>4.71</b>	<b>4.53</b>	<b>33.10</b>	<b>53.80</b>	<b>48.38</b>	<b>47.70</b>	<b>7.37</b>	<b>11.59</b>	<b>32.86</b>	<b>9.08</b>	<b>6.37</b>

Haul No.	22	23	24	25	Total
Species/ICES Rectangle	40G0	39G0	39G0	39G1	
AGONUS CATAPHRACTUS			0.01		0.01
ANGUILLA ANGUILLA					0.05
CALLIONYMUS LYRA					0.03
CLUPEA HARENGUS	0.12	0.96	20.93	0.74	38.10
CRANGON CRANGON				+	+
CRYSTALLOGOBIUS LINEARIS	0.02	0.01		0.01	0.04
CTENOLABRUS RUPESTRIS	+		+		0.02
CYCLOPTERUS LUMPUS			0.21		1.42
ENGRAULIS ENCRASICOLUS	+	0.02	0.03		7.59
EUTRIGLA GURNARDUS			+		+
GADUS MORHUA			8.48	0.05	23.36
GASTEROSTEUS ACULEATUS	+	0.06	0.01	5.50	6.59
GOBIUS					0.01
GOBIUS NIGER				+	0.01
LIMANDA LIMANDA	0.03		0.21	0.01	27.31
LOLIGO FORBESI			0.01		0.02
LUMPENUS LAMPRETAEFORMIS					0.02
MERLANGIUS MERLANGUS	0.01	0.19	0.14	0.10	2.24
MULLUS SURMULETUS					0.16
PHOLIS GUNNELLUS				0.02	0.02
PLATICHTHYS FLEUS	0.18				3.33
PLEURONECTES PLATESSA			0.07		3.22
POMATOSCHISTUS MINUTUS	+	+		0.01	0.01
PSETTA MAXIMA					1.78
SARDINA PILCHARDUS				0.02	0.06
SCOMBER SCOMBRUS			0.05		0.30
SPINACHIA SPINACHIA					+
SPRATTUS SPRATTUS	0.31	1.19	50.12	5.55	98.17
SYNGNATHUS ROSTELLATUS					+
SYNGNATHUS TYPHLE	+	+		+	+
TRACHINUS DRACO		0.02			0.82
TRACHURUS TRACHURUS	+	0.11	0.16		0.55
TRISOPTERUS ESMARKI				+	+
TRISOPTERUS MINUTUS					+
<b>Total</b>	<b>0.67</b>	<b>2.56</b>	<b>80.43</b>	<b>12.01</b>	<b>215.24</b>
<b>Medusae</b>	<b>8.31</b>	<b>23.15</b>	<b>8.46</b>	<b>2.78</b>	<b>346.94</b>

+ = < 0.01 kg

**Table 3:** FRV "Solea" cruise 726/2016: Catch composition (kg 0.5 h<sup>-1</sup>) by haul in SD 23.

Haul No.	30	31	32	53	54	55	Total
Species/ICES Rectangle	40G2	40G2	41G2	40G2	40G2	41G2	
CARCINUS	0.03						0.03
CLUPEA HARENGUS	97.33	153.30		0.91	122.72	1.77	376.03
CRYSTALLOGOBIUS LINEARIS						+	+
ENGRAULIS ENCRASICOLUS			0.01	0.03		0.03	0.07
EUTRIGLA GURNARDUS	+		0.01				0.01
GADUS MORHUA	90.86	25.38	2.67	13.22	11.03		143.16
GASTEROSTEUS ACULEATUS	+	+	0.01	+	+	0.01	0.02
LIMANDA LIMANDA			0.36	0.25	0.06		0.67
LOLIGO FORBESI			0.01		+	0.05	0.06
MELANOGRAMMUS AEGLEFINUS				1.09	1.23		2.32
MERLANGIUS MERLANGUS	0.03		0.01		0.05	+	0.09
PLATICHTHYS FLESUS						0.35	0.35
PLEURONECTES PLATESSA	0.18				0.44		0.62
POLLACHIUS VIRENS	3.33			3.17			6.50
SARDINA PILCHARDUS					+		+
SPRATTUS SPRATTUS	0.13		0.01	0.07	0.32	0.28	0.81
SYNGNATHUS TYPHLE	+						+
TRACHINUS DRACO						0.02	0.02
TRACHURUS TRACHURUS			+			+	+
<b>Total</b>	<b>191.89</b>	<b>178.68</b>	<b>3.09</b>	<b>18.74</b>	<b>135.85</b>	<b>2.51</b>	<b>530.76</b>
Medusae	2.93	2.56	3.96	4.17	1.00	3.33	17.96

+ = < 0.01 kg

**Table 4:** FRV "Solea" cruise 726/2016: Catch composition (kg 0.5 h<sup>-1</sup>) by haul in SD 24.

Haul No.	1	2	3	4	5	6	7	8	26	27	28	29	45
Species/ICES Rectangle	37G2	38G2	38G3	38G3	38G4	38G3	37G3	38G4	38G2	38G2	38G3	38G4	39G2
AMMODYTES TOBIANUS													0.04
BELONE BELONE			0.10							0.39			
CLUPEA HARENGUS	1.47	3.23	11.57	13.75	12.20	9.56	53.66	53.96	25.05	2.41	5.29	92.66	3.11
CRANGON CRANGON											+	+	+
CRYSTALLOGOBIUS LINEARIS	+	+								+			0.01
CTENOLABRUS RUPESTRIS	+												
CYCLOPTERUS LUMPUS		0.16	0.24										0.11
ENGRAULIS ENCRASICOLUS	0.45	0.12							0.08	0.01	0.01		0.09
GADUS MORHUA	0.02	0.10		0.02		0.81	3.84	0.54	0.01	+	1.27	0.84	0.06
GASTEROSTEUS ACULEATUS	0.01	+		0.12			0.01		0.01	0.08	0.02	+	3.44
GOBIUS NIGER				0.01						0.01			+
LEANDER													+
LIMANDA LIMANDA	+	1.99	1.02							0.03			+
MERLANGIUS MERLANGUS	0.34	1.13	0.03	0.98			0.07	0.20	0.02	0.04	4.03	2.56	
MYOXOCEPHALUS SCORPIUS		0.03											
OSMERUS EPERLANUS							0.08						
PLATICHTHYS FLESUS		1.48	0.50	0.44	0.44	1.68	0.31		0.20	0.68	0.23		
PLEURONECTES PLATESSA		0.17	0.22							0.52	0.21	0.16	
POLLACHIUS POLLACHIUS													
POMATOSCHISTUS MINUTUS	+	+	+	0.01		0.01	0.01			0.04	+	+	+
SARDINA PILCHARDUS										0.01			+
SPRATTUS SPRATTUS	0.87	1.08	753.9	24.84	2.48	59.74	324.25	6.99	22.89	12.12	61.78	81.97	9.85
STIZOSTEDION LUCIOPERCA							0.26						
SYNGNATHUS TYPHLE	+												+
TRACHURUS TRACHURUS			0.01								+	0.02	
<b>Total</b>	<b>3.16</b>	<b>9.49</b>	<b>767.37</b>	<b>40.39</b>	<b>15.12</b>	<b>71.80</b>	<b>382.53</b>	<b>61.69</b>	<b>48.26</b>	<b>16.34</b>	<b>72.84</b>	<b>178.32</b>	<b>16.56</b>
Medusae	2.39	13.20	0.84	5.99	42.20	18.60	4.12	9.70	11.40	3.01	3.20	7.62	1.64

Haul No.	46	47	48	49	50	51	52	Total
Species/ICES Rectangle	39G3	39G3	39G4	39G4	39G3	39G3	39G2	
AMMODYTES TOBIANUS								0.04
BELONE BELONE								0.49
CLUPEA HARENGUS	0.93	1.80	4.16	2.67	5.24	1.26	0.95	304.93
CRANGON CRANGON								+
CRYSTALLOGOBIUS LINEARIS								0.01
CTENOLABRUS RUPESTRIS								+
CYCLOPTERUS LUMPUS						0.18		0.69
ENGRAULIS ENCRASICOLUS	0.01	0.19	0.04			0.02		1.02
GADUS MORHUA	0.01	0.36	3.78	1.35	2.45		0.36	15.82
GASTEROSTEUS ACULEATUS	0.24	0.01		+	+	+		3.94
GOBIUS NIGER								0.02
LEANDER								+
LIMANDA LIMANDA								3.04
MERLANGIUS MERLANGUS	+	0.25	3.61		2.20			15.46
MYOXOCEPHALUS SCORPIUS								0.03
OSMERUS EPERLANUS								0.08
PLATICHTHYS FLESUS	0.20		0.19	0.37	0.32			7.04
PLEURONECTES PLATESSA				0.23				1.51
POLLACHIUS POLLACHIUS					1.60			1.60
POMATOSCHISTUS MINUTUS	+	+	+		+			0.07
SARDINA PILCHARDUS								0.01
SPRATTUS SPRATTUS	2.25	126.52	12.71	2.22	85.84	4.72	1.22	1598.24
STIZOSTEDION LUCIOPERCA								0.26
SYNGNATHUS TYPHLE								+
TRACHURUS TRACHURUS	0.04	0.04	0.05		0.11	+		0.27
<b>Total</b>	<b>3.68</b>	<b>129.17</b>	<b>24.54</b>	<b>6.84</b>	<b>97.76</b>	<b>6.00</b>	<b>2.71</b>	<b>1954.57</b>
Medusae	5.54	1.50	5.25	5.20	3.24	23.29	15.96	183.89

+ = < 0.01 kg