

**Cruise Report**  
**FRV „Solea“ cruise 824**  
**27.6. – 12.07.2023**

**The 2023 ICES Coordinated Acoustic Survey in the Skagerrak and Kattegat, the North Sea, West of Scotland and the Malin Shelf area (HERAS)**

Cruise Leader: Dr. Matthias Schaber

**Summary**

The survey was part of an international hydroacoustic survey providing information on stock parameters of small pelagics (Acoustic Survey in the Skagerrak and Kattegat, the North Sea, West of Scotland and the Malin Shelf area, HERAS) coordinated by the ICES Working Group of International Pelagic Surveys (WGIPS). Denmark, Ireland, the Netherlands, Norway and Scotland also participated in the survey. In general, this survey provides the most important fisheries independent contribution to the assessment of herring stocks in the North Sea, Western Baltic Sea, Skagerrak/Kattegat as well as areas west of Scotland and the Irish Sea. The total survey area largely covers ICES Divisions 27.3.a, 27.4.a, 27.4.b and 27.6.a.

The survey design has been standardized across participants and the survey area is partitioned into 23 strata out of which four strata comprising the southern North Sea have been allocated to Germany. Main focus was set on herring (*Clupea harengus*) and sprat (*Sprattus sprattus*), whereas distribution patterns and abundance of anchovy (*Engraulis encrasicolus*) as well as sardine (*Sardina pilchardus*) were another objective of the survey.

Altogether, 1137 nautical miles of hydroacoustic transects were covered, which is for the second consecutive year substantially less than planned. Initial delays and premature termination of the survey led to the loss of a week of survey time. This ultimately led to the repeated non-coverage of stratum 131. Accordingly, the survey area could not be covered as planned.

**Verteiler:**

Schiffsführung FFS „Solea“  
 BA für Landwirtschaft und Ernährung (BLE) Fischereiforschung  
 BM für Ernährung und Landwirtschaft (BMEL), Ref. 614  
 BA für Seeschifffahrt und Hydrographie (BSH), Hamburg  
 Deutscher Angelfischerverband e.V.  
 Deutsche Fischfang-Union, Cuxhaven  
 Deutscher Fischereiverband Hamburg  
 Doggerbank Seefischerei GmbH, Bremerhaven  
 Erzeugergemeinschaft der Deutschen Krabbenfischer GmbH  
 Euro-Baltic Mukran  
 GEOMAR Helmholtz-Zentrum für Ozeanforschung Kiel  
 Kutter- und Küstenfisch Sassnitz

LA für Landwirtschaft, Lebensmittels. und Fischerei (LALLF)  
 LFA für Landwirtschaft und Fischerei MV (LFA)  
 Landesverband der Kutter- u. Küstenfischer MV e.V.  
 Leibniz-Institut für Ostseeforschung Warnemünde  
 Thünen-Institut - Institut für Fischereiökologie  
 Thünen-Institut - Institut für Seefischerei  
 Thünen-Institut - Institut für Ostseefischerei  
 Thünen-Institut - Pressestelle  
 Thünen-Institut - Präsidialbüro  
 Thünen-Institut - Reiseplanung Forschungsschiffe, Dr. Rohlff  
 Fahrtteilnehmer\*innen

The distribution of backscatter values allocated to clupeid fishes in general followed the observations made in previous years, with highest concentrations of schools in the southwestern stratum 51 and notable registrations in the southeastern German Bight (stratum 61). In the northern coastal stratum 71, overall NASC values registered were lower than in the previous year, with again most detections of clupeid aggregations towards the western boundary of that stratum.

To allocate biological information to echorecordings and for the collection of biological samples, 28 fishery hauls were conducted. As in the previous years, sprat contributed the bulk biomass to total catch weight and had -together with mackerel and herring- the most frequent occurrence in the hauls. Herring mostly co-occurred with sprat in mixed schools. Herring catches were -despite the even further reduced coverage- higher than those in the previous year, and herring was widely distributed in the area. Sardines and anchovies were caught only on occasion and in relatively small quantities.

Vertical profiles of ambient hydrographic parameters were measured on 66 stations.

## **1. Cruise objectives**

The following objectives were planned for SB824 HERAS:

- Calibration of hydroacoustic equipment
- Hydroacoustic measurements for the estimation of stock parameters (indices of abundance, SSB etc.) for the assessment of small pelagics (herring, sprat, sardine, anchovy) in the allocated survey area (strata 51, 61, 71 and 131)
- (Targeted) biological sampling including species composition and length-frequency/age distribution of key species in the survey area
- Measurements of hydrographic parameters (e.g. temperature and salinity) in the survey area
- Additional sampling of broadband/FM hydroacoustic data on selected trawl stations and recording of hydroacoustic raw-data using an omnidirectional sonar.

### **1.1 Survey design**

The survey design has been standardized across participants. Where applicable, systematic parallel transect lines with randomized starting points and with transects running perpendicular to lines of bathymetry were followed. Planned survey effort was maintained at a similar level to the previous years. Altogether, 23 strata were covered by all participants in the 2023 HERAS survey, out of which four had been allocated to Germany by the HERAS survey coordinator of the ICES Working Group of International Pelagic Surveys WGIPS (Fig. 1) (ICES, 2023).

## **2. Cruise narrative and preliminary results**

### **2.1 Cruise narrative**

The scientific equipment was loaded in the morning of June 27<sup>th</sup> with the plan to leave Bremerhaven port around noon for the survey. However, due to a lack of crew personnel the survey start had to be postponed by one day. FRV "Solea" left Bremerhaven port on June 28<sup>th</sup> to start survey operations on the easternmost transect in stratum 61. On this day, a calibration of the hydroacoustic equipment was attempted in the evening after the stop of daily survey operations but had to be interrupted due to inclement weather rendering the calibration measurements invalid. After having to cut one survey day shorter than planned for an exchange of crew personnel, stratum 61 was accomplished on June 30<sup>th</sup>. In the following days, stratum 51 was covered. Survey operations had to be interrupted temporarily due to severe weather conditions. After accomplishing stratum 51 on July 7<sup>th</sup>, survey operations commenced in the northeastern stratum 71 from July 8<sup>th</sup>. On this day, a second attempt resulted in the successful calibration of the hydroacoustic equipment. The survey was prematurely terminated in the afternoon of July 12<sup>th</sup> after accomplishing stratum 71 due to logistical problems, and FRV "Solea" returned to Cuxhaven port.

This for the second year in a row rendered stratum 131 completely uncovered, compromising both the survey coverage and the combined survey time series. For the second year in a row, colleagues from the Netherlands (Imares) on board the FRV "Tridens" who within the framework of the HERAS survey covered westerly and

northwesterly adjacent strata agreed to reduce their area coverage in one of their strata to help out and cover stratum 131 as far as possible to avoid compromising the time series.

Altogether, the strata allocated for the 2023 HERAS survey during SB824 were again not fully covered as planned, with stratum 131 remaining completely unsampled. The total transect distance covered was 1137 nautical miles, which is over 600 nautical miles (35 %) short of the planned coverage.

## **2.2 Hydroacoustics**

### **2.2.1 Calibration**

After an unsuccessful first attempt on the first day of the survey (inclement weather), all transducers of the Simrad EK80 scientific echosounder (38, 70, 120 and 200 kHz) were calibrated on July 9<sup>th</sup> in the northern part of stratum 71 (55°37'320" N, 007°15'660" E). Calibration was conducted in CW-mode as well as in FM-mode with good/acceptable results based on calculated RMS-values. Transducer parameters from combined calibration results were applied for data-collection and post-processing of survey data.

### **2.2.2 Echo recording**

Hydroacoustic data were recorded continuously along the transects with a Simrad EK80 scientific echosounder with hull-mounted 38, 70, 120 and 200 kHz transducers at a standard ship speed of 10 kn. Transducer and sample settings applied were in accordance with the specifications provided in the HERAS survey manual (ICES, 2015).

Survey operations were conducted during daytime between 4 am and 6 pm UTC to allocate for the diurnal activity patterns of clupeids schooling at daytime and dispersing and migrating into shallower water layers during nighttime, rendering the fishes indiscernible from other scattering sources and distributed within the transducer nearfield. Post-processing and analysis of data were conducted with Echoview 13 software (Echoview Software Pty Ltd, 2023).

Clupeids in the survey area are discernible on echograms by their typical pillar shaped schools, either sitting on the seafloor or in pelagic layers. The Nautical Area Scattering Coefficient (NASC) values measured and allocated to clupeids through post-processing of the data were not distributed evenly throughout the survey area. As in the previous years, transect sections and regions with particularly high clupeid densities alternated with sections without any detections of clupeid schools. The overall distribution of clupeid NASC measured mostly resembled patterns observed in the previous years, but appeared slightly different in some strata: In S51, dense aggregations of clupeids were again mostly recorded on the western boundary off the British coast and towards the center of the stratum on more northerly transects. Registrations on the eastern stratum boundary off the Dutch coast were comparatively low but included occasional detections of large schools near the inshore end/start points of the transects. In stratum 61, registrations on the easternmost transect in the vicinity of Helgoland were dense as in the previous years. Other than in 2022, NASC values measured on the more westerly transects in that stratum appeared lower and were aggregated less close to the coast but rather towards the northern stratum boundary. Registrations in the northern stratum 71 appeared lower than in the previous year and were mostly recorded in the "offshore" areas along the western boundary of that stratum, with far lower densities measured in northeastern coastal areas. Stratum 131 was not covered. NASC values were generally highest in the southern stratum 51 with fishes concentrating in the warm, mixed layers in the shallow southern and southeastern North Sea (see hydrography). Notable densities were also observed in stratum 71. While echoes from the two "southern" strata -based on corresponding targeted pelagic trawl hauls- largely originated from sprat with some contributions of herring, the contribution of herring was occasionally distinctly higher in stratum 71. However, since no "clean" sprat or herring school was sampled in any of the strata sampled, all of the clupeid schools recorded were allocated the CLU category in post-processing that will be disaggregated into species specific NASC values during the combined survey analysis.

## **2.3 Biological sampling (N. Rohlf)**

Altogether, 28 valid trawl hauls were conducted during the survey. Trawling was carried out using a PSN 388 pelagic trawl ("Krake"). Trawl duration varied between 5 and 40 minutes, but usually was set to 30 minutes.

Hauls were conducted according to echo signals. Additionally, exclusion/validation hauls were shot in areas with echo signals of unclear origin. The positions of all hauls are depicted in Figures 2-4. Catches were sorted according to species, and length- and weight-distributions of individual species were measured. Of all clupeids (herring, sprat, sardine and anchovy), 10 individuals per 0.5 cm length-class were sampled per trawl. Their individual weight, sex and maturity stages were determined and the otoliths were sampled to enable age estimation.

In total, 18 different fish species, two elasmobranch species and three cephalopod species were caught during the survey. A detailed overview on catch compositions (CPUE in kg 30min<sup>-1</sup>) of all 28 valid trawl hauls is given in Tab. 1.

As in the previous years, sprat contributed the bulk of biomass of the total normalized catch weight (14 037 kg, 86%). Sprat, mackerel and herring had the highest occurrence in the trawl hauls with a presence in 26 (93%), 25 (89%) and 24 (86%) of the 28 hauls respectively. The normalized catch weight of herring was at 1 523 kg, representing 93% of the total catch weight. Other clupeids, namely anchovies and sardines had far lower occurrences in the hauls with anchovies caught in 7 (25%) and sardines caught in 5 (18%) of the 28 hauls. Catches alone are not representative for the abundance of small pelagics. Detailed conclusions on abundance cannot be given until echo integration is accomplished and trawl haul and hydroacoustic data are combined.

A detailed overview on numbers, weights and mean lengths of herring, sprat, sardines and anchovies sampled is given in Tab. 2a-d, together with their proportion of the total catch. Figures 5 - 8 show length distributions of these species as derived from total catches. Herring lengths (Figure 5) ranged from 5.25 to 24.75 cm. The lengths showed a bimodal distribution that was dominated by small fish below 11.25 cm total length and a peak at 9.25 cm with a second mode ranging from 11.75 cm to 16.75 cm with a peak at 14.25 cm. The presence of these larger herring was distinctly more pronounced than in the previous year. Sprat lengths (Figure 6) ranged from 4.75 to 14.25 cm. Their length frequency distribution was highly comparable to the preceding year, with highest contributions of fishes ranging from 8.75 to 13.25 cm and a peak at ca. 11cm.

Sardines and anchovies were caught only on occasion and mostly in relatively small quantities, with the exception of haul 23 in which sardines were the only clupeid species contributing with over 7 kg to the total catch weight. The lengths of sardines ranged from 8.75 to 26.75 cm. However, with very few exceptions the sardines caught were large adult specimens at lengths from ca. 24 cm (Figure 7). Anchovy lengths ranged from 9.75 to 17.75 cm (Figure 8) and in total showed a somewhat bimodal distribution with peaks at 11,25 and ca 13 cm.

Individual and combined abundance estimates for herring and sprat (as well as possibly sardines and anchovies) derived from survey data will be available after a final evaluation, combination and analysis of acoustic and trawl data with StoX software (Johnsen et al., 2019). This will be accomplished during a post-cruise meeting scheduled for November 2023 at the Institute of Marine Research IMR, Bergen/Norway. Results will subsequently be presented to ICES WGIPS.

## 2.4 Hydrography

Due to a sensor failure in the CTD regularly deployed, parallel casts were conducted with a SonTek CastAway-CTD. This reduced the total number of CTD stations with reliable measurements to 18 stations, mostly located in the German Bight and the southern North Sea (strata 61 and 51).

Surface temperatures in this area ranged from around 16° C in the western part of stratum 51 to over 18° C in the German Bight. (Fig. 9). As in the previous years in summer, the water column was mixed in the shallow coastal areas south of ca 54° N. Further northward, a thermocline appeared separating the warm surface water from cold deeper layers where temperatures partly dropped to around 9° C in the area covered.

Salinities in the area covered ranged from ca. 31.5 to 34 PSU, with the lower salinities measured along the an coasts in the eastern German bight. No stratification in salinity was evident.

## 3. Survey participants

Dr. Matthias Schaber (cruise leader)	Hydroacoustics/Hydrography	TI-SF
Dr. Sven Gastauer	Hydroacoustics/Hydrography	TI-SF
Jörg Appel	Fish lab/Biology	TI-SF
Gitta Hemken	Fish lab/Biology	TI-SF
Sarah Mayr	Fish lab/Biology	TI-SF
Sylvain Rentel	Fish lab/Biology	TI-SF

#### 4. References

- Echoview Software Pty Ltd (2023). Echoview software, version 13.1. Echoview Software Pty Ltd, Hobart, Australia.
- ICES (2023). Working Group of International Pelagic Surveys (WGIPS). ICES Scientific Reports 5(74). 122 pp. <https://doi.org/10.17895/ices.pub.23607303>
- ICES (2015). Manual for International Pelagic Surveys (IPS). Series of ICES Survey Protocols SISP 9 – IPS. 92 pp.
- Johnsen, E., Totland, A., Skålevik, Å., Holmin, A. J., Dingsør, G. E., Fuglebakk, E., & Handegard, N. O. (2019). StoX: An open source software for marine survey analyses. *Methods in Ecology and Evolution*. 10:1523 –1528. <https://doi.org/10.1111/2041-210X.13250>

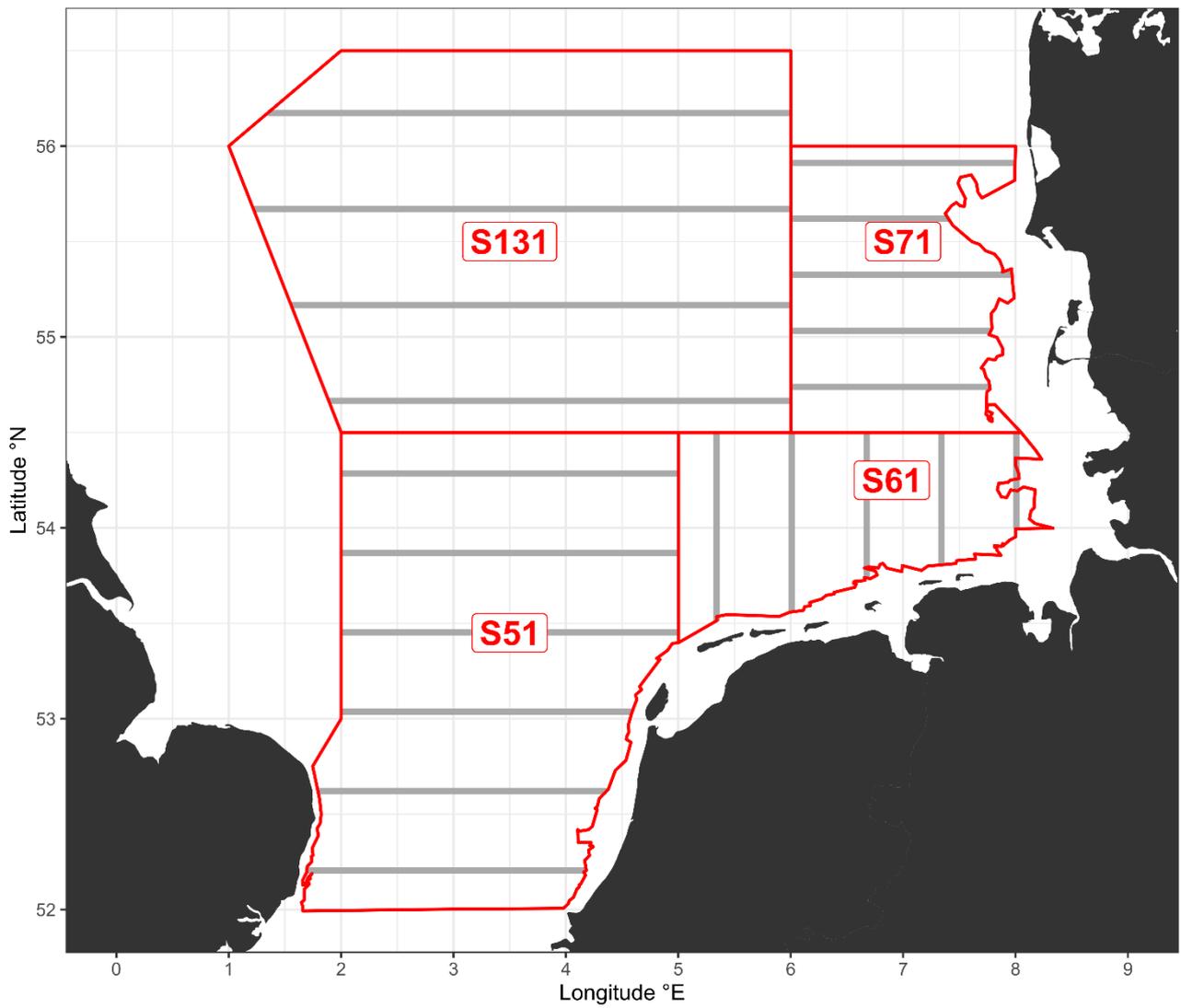
#### 5. Acknowledgements

I hereby thank the crew of FRV “Solea” and Captain W. Stumpp as well as all participants for their outstanding cooperation and commitment that facilitated the accomplishment of this survey during the time available.

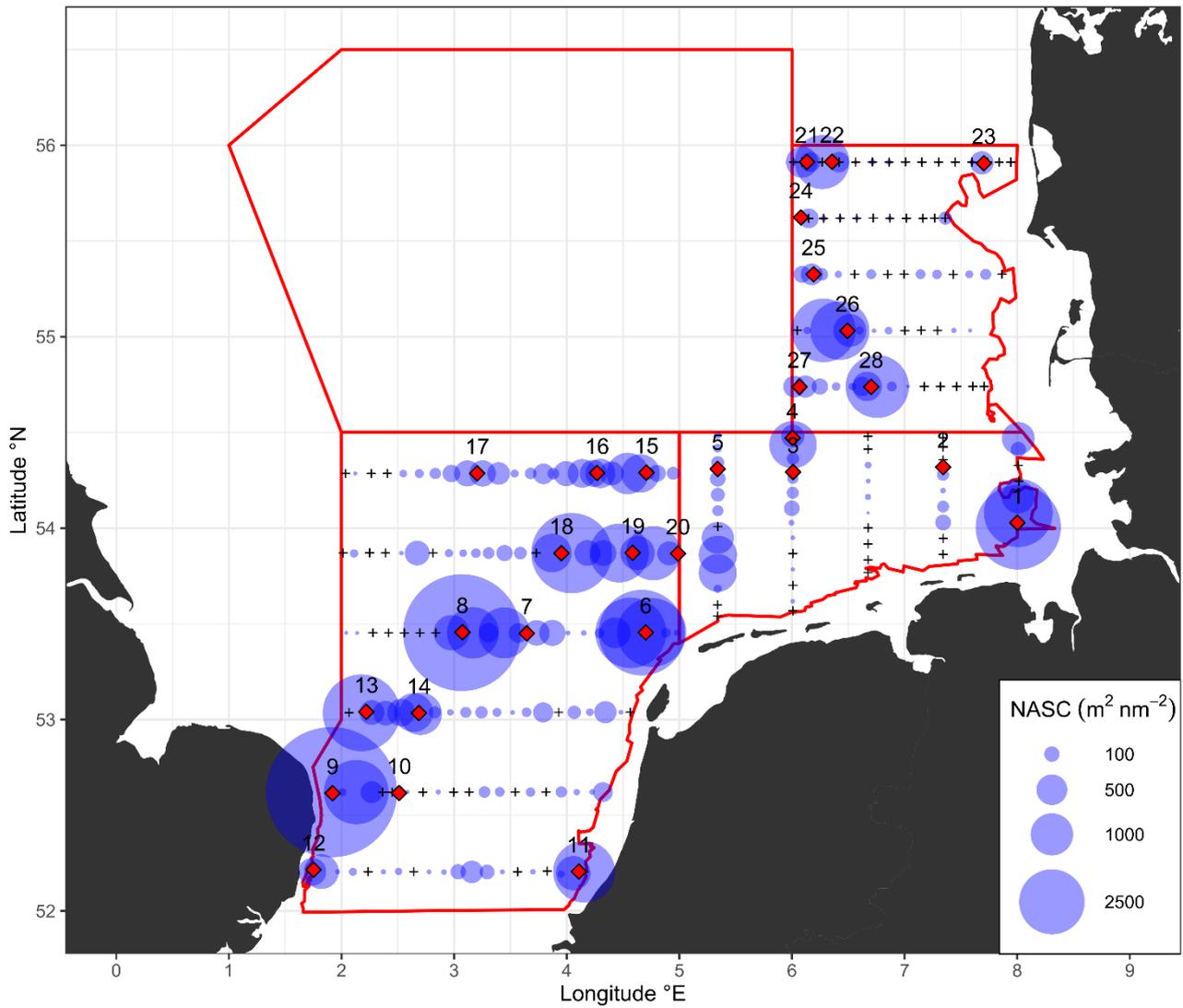


(Dr. M. Schaber, TI-SF / Scientist in charge)

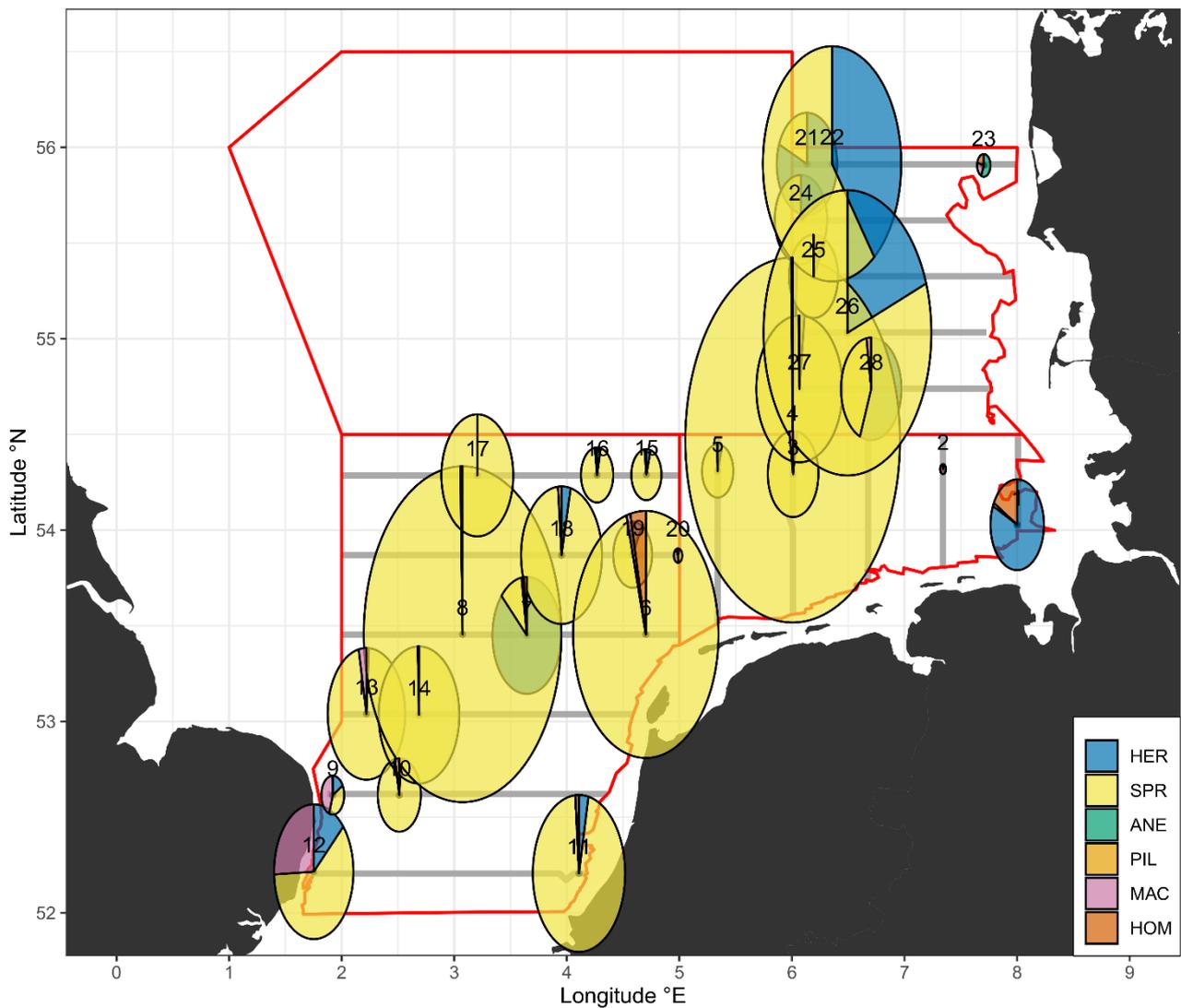
Figures



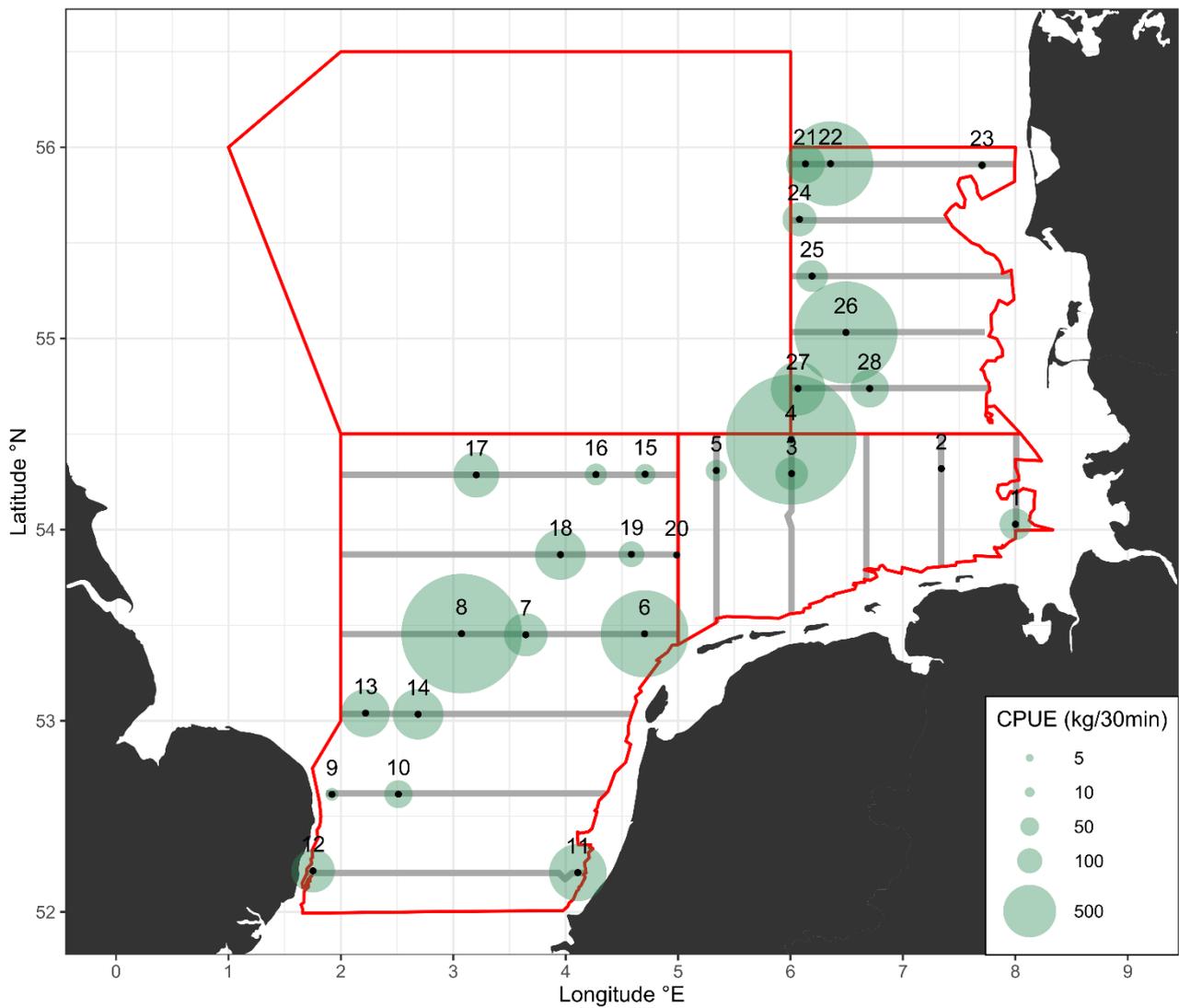
**Figure 1:** FRV "Solea" cruise 824/2023. Survey plan. Total survey area and strata covered (S51, S61, S71, S131) outlined in red. Planned transect lines depicted as grey lines. Refer to Figures 2 and 3 for realized transects/accomplished strata.



**Figure 2:** FRV “Solea” cruise 824/2023. Mean aggregated Nautical Area Scattering Coefficient (NASC in  $m^2nm^{-2}$ ) measured (blue dots, 5 nmi intervals) along the realized transects allocated to clupeids for further disaggregation and to be used in abundance/biomass estimates. Empty intervals indicated by crosses. Red dots indicate (valid) trawl hauls targeting the registered fish aggregations. Total survey area and strata outlined in red.



**Figure 3:** FRV "Solea" cruise 824/2023. Catches ( $\text{kg } 30\text{min}^{-1}$ ) and catch composition of pelagic/schooling fishes (ANE - anchovy *Engraulis encrasicolus*, HER - herring *Clupea harengus*, HOM - horse mackerel *Trachurus trachurus*, MAC - mackerel *Scomber scombrus*, PIL - sardine *Sardina pilchardus*, SPR - sprat *Sprattus sprattus*). Numbers indicate haul/station number. Survey area/strata outlined in red. Accomplished transects depicted as grey lines.



**Figure 4:** FRV "Solea" cruise 824/2023. Combined clupeid (herring *Clupea harengus*, sprat *Sprattus sprattus*, sardine *Sardina pilchardus*, and anchovy *Engraulis encrasicolus*) catches ( $\text{kg } 30\text{min}^{-1}$ ). Numbers indicate haul/station number. Survey area/strata outlined in red. Accomplished transects depicted as grey lines.

### Herring

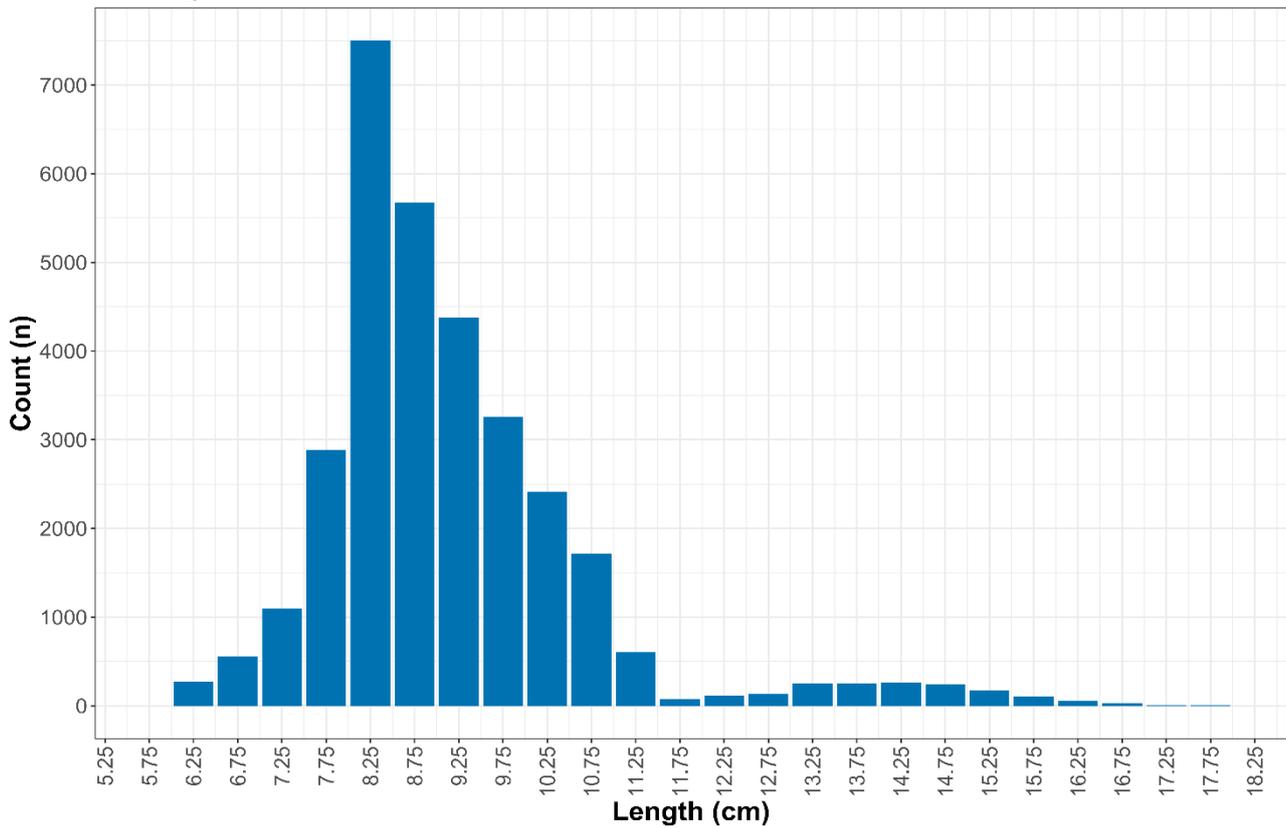


Figure 5: FRV "Solea" cruise 824/2023. Herring (*Clupea harengus*) combined length-frequency distribution.

### Sprat

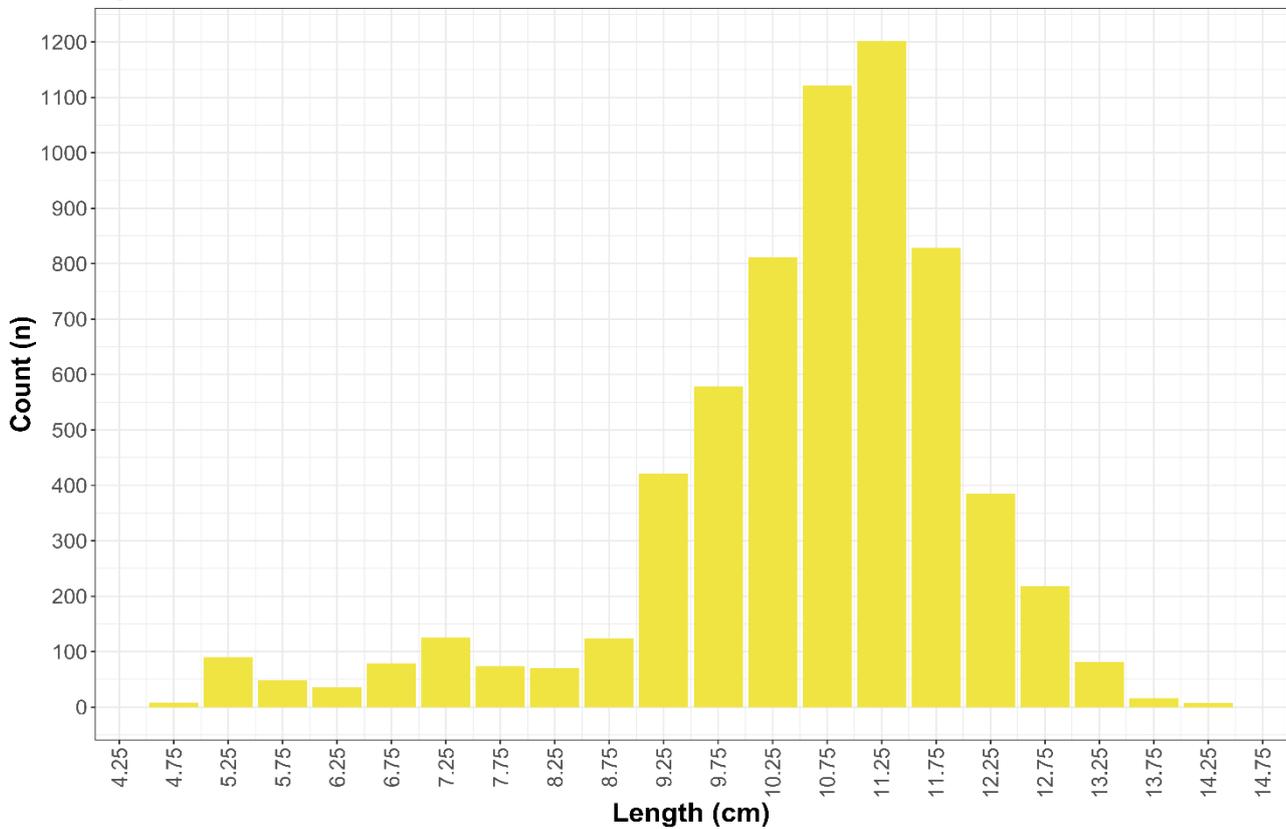
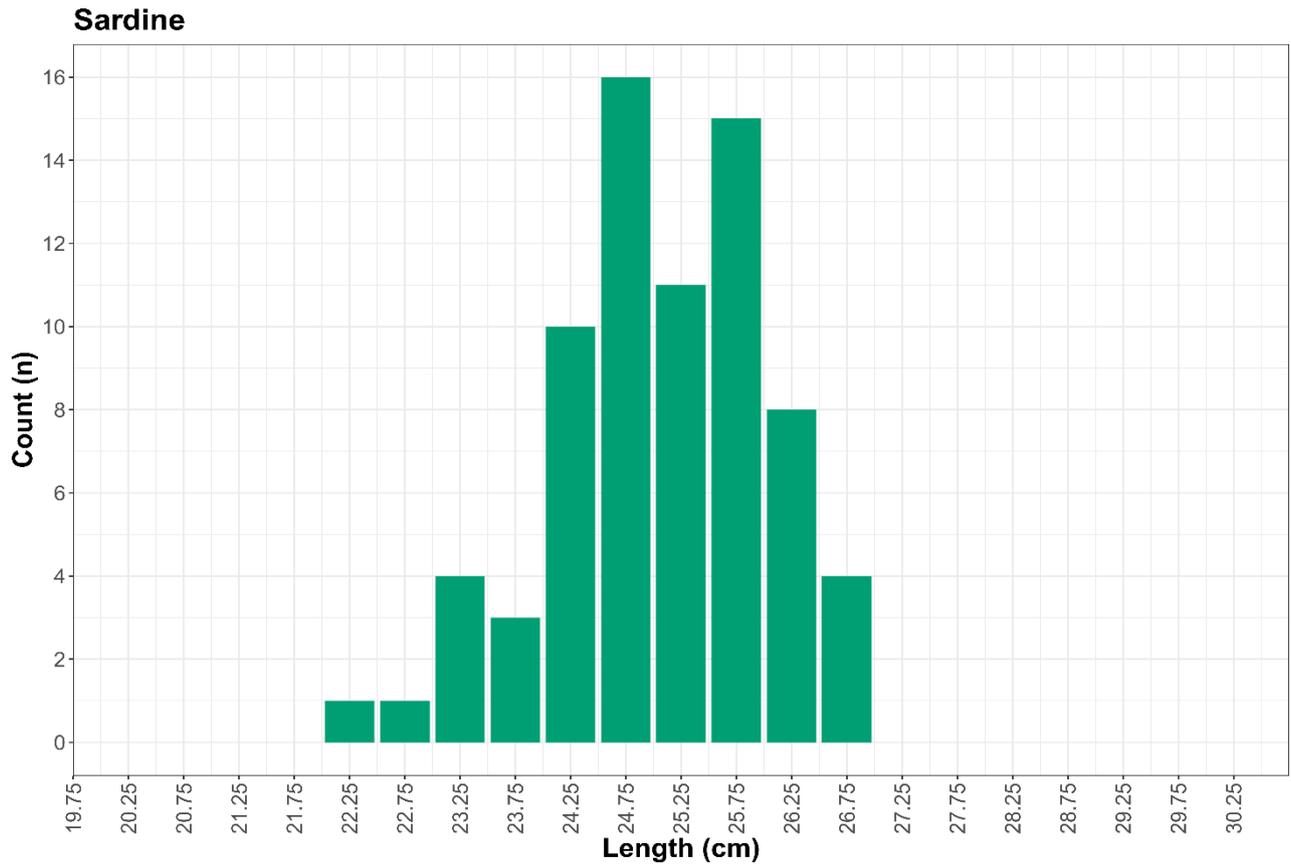
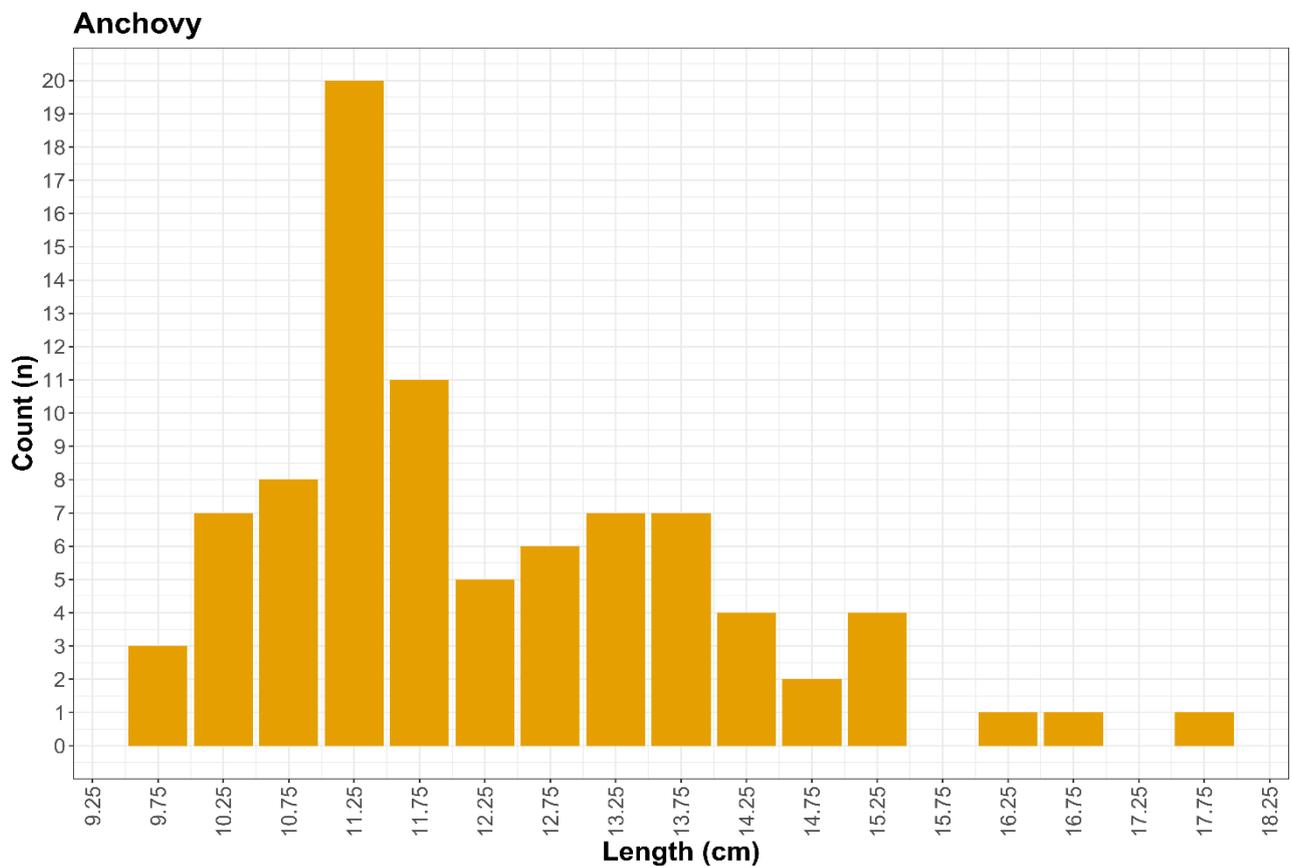


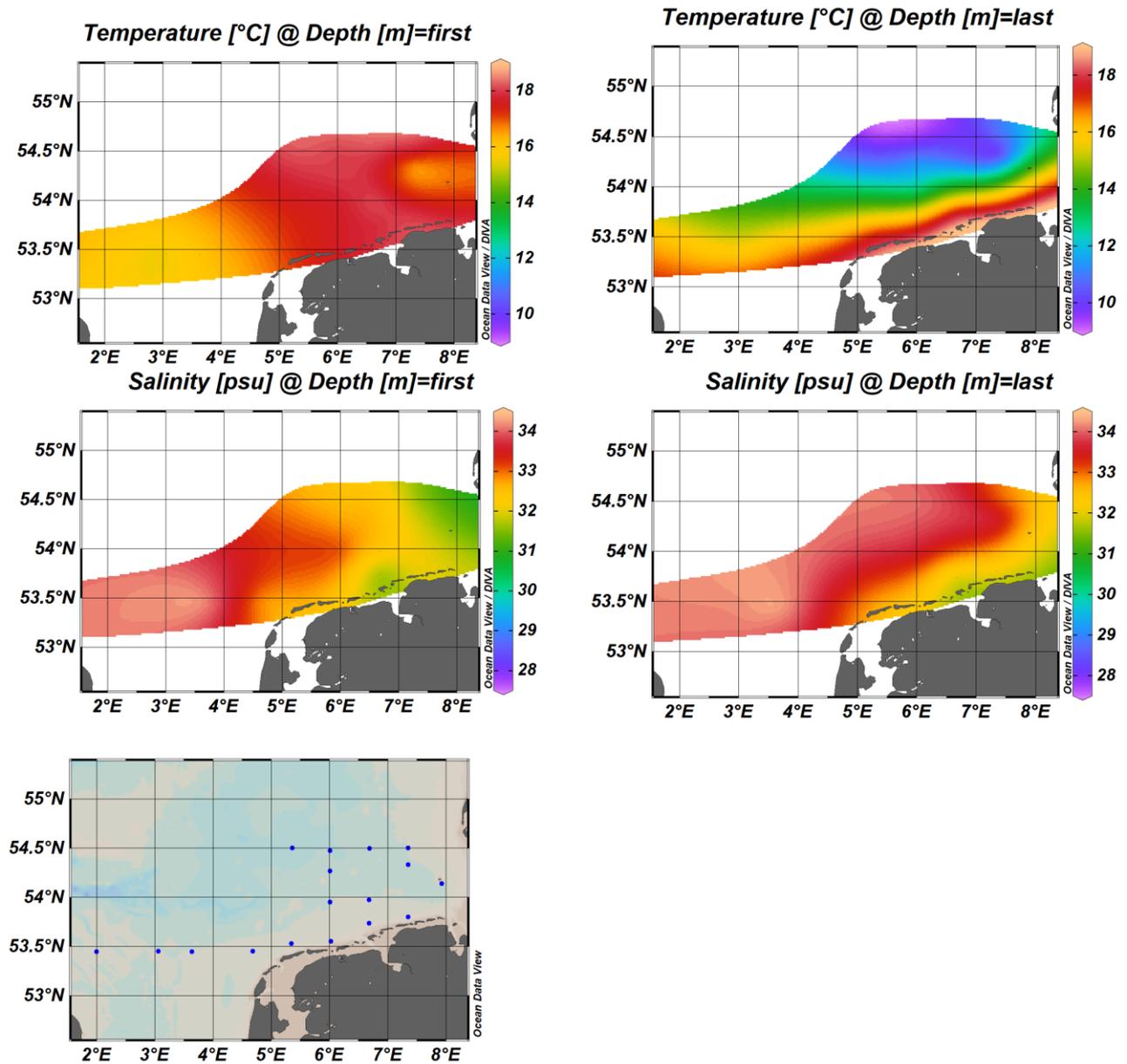
Figure 6: FRV "Solea" cruise 824/2023. Sprat (*Sprattus sprattus*) combined length-frequency distribution.



**Figure 7:** FRV "Solea" cruise 824/2023. Sardine (*Sardina pilchardus*) combined length-frequency distribution. (n=4 < 10cm not shown).



**Figure 8:** FRV "Solea" cruise 824/2023. Anchovy (*Engraulis encrasicolus*) combined length-frequency distribution.



**Figure 9:** FRV "Solea" cruise 824/2023. Hydrography measured with a CastAway-CTD. Stations are depicted as blue dots in the area map (lower panel). Temperature (°C) (upper panels) and Salinity (PSU) (middle panels) near the surface (left) and near the seafloor (right).



**Table 2a:** FRV “Solea” cruise 824/2023. Numbers, weights and mean lengths of **herring** (*Clupea harengus*) and according proportion of total clupeid catch (normalized to 30 minutes tow duration), if clupeid catch >0.

Haul	Stat	Total catch (kg)	Clupeid catch (kg)	Clupeid portion (%)	Herring					Herring (% clups)
					catch (kg)	count (n)	range (cm)			
							min	max	mean	
1	2	33.8	27.9	83%	27.5	10394	6.75	10.75	7.8	99%
3	13	182.6	177.3	97%	4.5	341	6.25	16.25	11.8	3%
4	14	3278.6	3267.0	100%	21.3	1155	11.75	16.25	13.7	1%
5	16	82.2	69.1	84%	3.3	193	7.25	16.75	13.1	5%
6	19	1518.3	1436.3	95%	0.2	24	7.25	11.75	9.7	0%
7	20	54.0	39.8	74%	2.9	1017	5.75	10.25	7.6	7%
9	24	39.3	20.5	52%	6.2	1516	5.75	15.25	8.4	30%
10	25	133.2	127.8	96%	1.7	141	8.25	16.25	11.8	1%
11	28	605.6	597.8	99%	20.0	6264	6.75	11.75	8.0	3%
12	30	465.9	332.1	71%	59.7	33600	5.75	10.75	6.7	18%
13	32	429.0	412.6	96%	4.4	1202	6.25	16.75	7.9	1%
14	33	465.1	460.2	99%	1.1	250	7.25	11.25	8.9	0%
15	37	69.8	63.0	90%	2.9	143	8.75	16.75	14.2	5%
16	38	81.2	72.8	90%	2.7	534	6.25	16.25	8.7	4%
18	44	473.5	458.7	97%	16.9	3568	7.25	16.25	9.2	4%
19	45	107.1	105.5	99%	8.5	2555	5.75	10.25	8.3	8%
20	46	19.0	2.5	13%	0.3	106	5.75	10.75	7.7	12%
21	48	259.5	258.6	100%	210.1	30929	7.75	16.75	10.0	81%
22	49	1361.3	1359.8	100%	537.8	26845	8.75	17.75	14.1	40%
24	54	201.4	195.2	97%	34.5	2398	7.75	16.25	12.4	18%
25	56	206.0	169.7	82%	13.9	2983	6.25	24.75	8.7	8%
26	61	2033.6	1999.4	98%	387.6	54058	7.75	17.25	10.1	19%
27	63	530.4	527.4	99%	9.7	1592	6.75	17.25	9.4	2%
28	65	290.6	252.0	87%	145.0	37702	7.25	18.75	8.9	58%

**Table 2b:** FRV “Solea” cruise 824/2023. Numbers, weights and mean lengths of sprat (*Sprattus sprattus*) and according proportion of total clupeid catch (normalized to 30 minutes tow duration), if clupeid catch >0.

Haul	Stat	Total catch (kg)	Clupeid catch (kg)	Clupeid portion (%)	Sprat					Sprat (% clups)
					catch (kg)	count (n)	range (cm)			
							min	max	mean	
1	2	33.8	27.9	83%	0.4	57	9.25	10.75	9.9	1%
3	13	182.6	177.3	97%	172.7	14264	9.25	14.25	11.6	97%
4	14	3278.6	3267.0	100%	3245.7	355344	9.25	12.75	10.8	99%
5	16	82.2	69.1	84%	65.7	5897	9.75	13.25	11.3	95%
6	19	1518.3	1436.3	95%	1436.1	219576	8.75	13.25	10.4	100%
7	20	54.0	39.8	74%	36.1	4847	6.25	12.75	9.9	91%
8	21	2883.8	2762.8	96%	2761.8	358518	8.25	13.75	10.1	100%
9	24	39.3	20.5	52%	14.3	3962	4.75	13.25	7.4	70%
10	25	133.2	127.8	96%	126.0	16014	9.75	13.25	11.0	99%
11	28	605.6	597.8	99%	577.7	87966	6.25	13.75	8.9	97%
12	30	465.9	332.1	71%	272.4	43275	5.75	12.75	9.4	82%
13	32	429.0	412.6	96%	408.2	36138	6.25	14.25	11.4	99%
14	33	465.1	460.2	99%	459.1	59268	8.25	12.75	10.4	100%
15	37	69.8	63.0	90%	60.1	7559	8.75	12.75	10.5	95%
16	38	81.2	72.8	90%	70.0	6480	10.25	14.25	11.5	96%
17	40	498.1	366.2	74%	366.2	30034	9.75	14.25	11.9	100%
18	44	473.5	458.7	97%	441.8	53543	7.25	13.75	10.4	96%
19	45	107.1	105.5	99%	97.0	14578	6.25	12.25	9.8	92%
20	46	19.0	2.5	13%	2.2	219	4.75	13.25	10.2	87%
21	48	259.5	258.6	100%	48.5	4521	9.75	13.25	11.2	19%
22	49	1361.3	1359.8	100%	822.0	72839	9.25	13.75	11.4	60%
24	54	201.4	195.2	97%	160.7	14926	8.75	12.75	11.2	82%
25	56	206.0	169.7	82%	155.8	17435	8.75	13.25	10.6	92%
26	61	2033.6	1999.4	98%	1611.7	151698	9.25	13.25	11.2	81%
27	63	530.4	527.4	99%	517.6	46401	10.25	12.75	11.5	98%
28	65	290.6	252.0	87%	107.0	10180	9.25	13.25	11.0	42%

**Table 2c:** FRV “Solea” cruise 824/2023. Numbers, weights and mean lengths of **sardine** (*Sardina pilchardus*) and according proportion of total clupeid catch (normalized to 30 minutes tow duration).

Haul	Stat	Total catch (kg)	Clupeid catch (kg)	Clupeid portion (%)	Sardine					Sardine (% clups)
					catch (kg)	count (n)	range (cm)			
							min	max	mean	
3	13	182.6	177.3	97%	0.2	2	23.25	23.25	23.25	0%
5	16	82.2	69.1	84%	0.1	1	20.25	20.25	20.25	0%
11	28	605.6	597.8	99%	0.0	6	8.75	8.75	8.75	0%
23	51	22.7	7.2	32%	7.2	54	22.25	26.75	24.25	100%
27	63	530.4	527.4	99%	0.2	2	24.25	24.25	24.25	0%

**Table 2d:** FRV “Solea” cruise 824/2023. Numbers, weights and mean lengths of **anchovy** (*Engraulis encrasicolus*) and according proportion of total clupeid catch (normalized to 30 minutes tow duration).

Haul	Stat	Total catch (kg)	Clupeid catch (kg)	Clupeid portion (%)	Anchovy					Anchovy (% clups)
					catch (kg)	count (n)	range (cm)			
							min	max	mean	
6	19	1518.3	1436.3	95%	0.05	6	9.75	13.75	11.75	0.0%
7	20	54.0	39.8	74%	0.74	65	10.25	15.25	12.06	1.9%
8	21	2883.8	2762.8	96%	1.00	78	9.75	17.75	12.52	0.0%
10	25	133.2	127.8	96%	0.10	5	13.75	16.75	14.75	0.1%
14	33	465.1	460.2	99%	0.02	2	11.25	11.25	11.25	0.0%
16	38	81.2	72.8	90%	0.01	1	14.25	14.25	14.25	0.0%
20	46	19.0	2.5	13%	0.02	1	15.25	15.25	15.25	0.9%