Institut für Seefischerei (TI-SF)

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Cruise Report
FRV „Solea" cruise 837
27.6. – 17.07.2024

The 2024 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 five strata (some in part) 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, 1307 nautical miles of hydroacoustic transects were covered, which is less than planned (1595 nmi). Several phases of inclement weather prevented full coverage of the allocated strata/transects.

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.
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Thünen-Institut - Institut für Seefischerei
Thünen-Institut - Institut für Ostseefischerei
Thünen-Institut - Pressestelle
Thünen-Institut - Präsidialbüro
Thünen-Institut - Reiseplanung Forschungsschiffe, Dr. Rohlf
Fahrtteilnehmer*innen

The distribution of backscatter values allocated to clupeid fishes largely followed the observations made in previous years, with highest concentrations of schools in the southwestern stratum 51 and notable registrations in the southern German Bight (stratum 61). In the northern coastal stratum 71, overall NASC values registered were again lower than in the previous year, with 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, 31 fishery hauls were conducted. As in the previous years, sprat contributed the bulk biomass to total catch weight and had -together herring- the most frequent occurrence in the hauls. Herring mostly co-occurred with sprat in mixed schools. Herring catches were -with only a slightly increase in survey coverage- distinctly 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 67 stations.

1. Cruise objectives

The following objectives were planned for SB837 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, 81 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 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 2024 HERAS survey, out of which five had been allocated to Germany by the HERAS survey coordinator of the ICES Working Group of International Pelagic Surveys WGIPS (Fig. 1) (ICES, 2024). Transects in strata 81 and 131 were partitioned between Germany and the Netherlands, with FRV “Solea” scheduled to cover the southern parts of the corresponding strata.

2. Cruise narrative and preliminary results

2.1 Cruise narrative

The scientific equipment was loaded in the morning of June 27$^{th.}$ FRV “Solea” left Cuxhaven port for calibration of the scientific echosounders on noon that day. Calibration was accomplished near Helgoland island. Survey operations commenced on 28th of June on the northernmost transect of stratum 71. Stratum 71 was accomplished after 3.5 days in the afternoon of July 1st, after which survey operations continued in stratum 61. In the evening of that day the survey was interrupted and FRV “Solea” steamed to Helgoland to seek shelter from inclement weather and for an unplanned disembarkation of a member of the scientific crew. On July 2nd and 3rd, further transects in stratum 61 were covered in increasingly severe weather which ultimately required another interruption of the survey and seeking shelter in the Ems river estuary for three full days. Stratum 61 was then accomplished on July 8th in the afternoon, after which it was decided to steam to the southernmost transect of stratum 51 to continue survey operations the next morning. Stratum 51 was accomplished without further delays on July 14th. With three days of remaining survey time and further transects to cover in stratum 81 south and stratum 131 south, it was decided and arranged with FRV “Tridens” (NL) that “Solea” covers one of the two long transects allocated in S131, with the zigzag transect in S81 south to be omitted. “Tridens” offered to cover the missing transect in S131. On July 15th-16th the S131 transect

was accomplished and “Solea” ended survey operations in the afternoon of July 16th to head back to port. The 2024 HERAS survey ended on July 17th.

Altogether, the strata allocated for the 2024 HERAS survey during SB837 were not fully covered as planned due to repeated and partly prolonged severe weather situations, with the southern part of stratum 81 remaining completely unsampled and one of the two transects in stratum 131 omitted but accomplished by another vessel. The total transect distance covered was 1307 nautical miles, which is ca. 290 nautical miles (18 %) short of the planned coverage.

2.2 Hydroacoustics

2.2.1 Calibration

All transducers of the Simrad EK80 scientific echosounder (38, 70, 120 and 200 kHz) were calibrated on June 27th in stratum 61 south of Helgoland (55°07’050’’ N, 007°57’370’’ 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 14 software (Echoview Software Pty Ltd, 2024).

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. In S51, dense aggregations of clupeids were again mostly recorded on the western boundary off the British coast and towards the center and eastern boundaries of the stratum on more northerly transects. In stratum 61, registrations on the easternmost transect south of Helgoland in the inner German Bight were dense as in the previous years. Westward in the central stratum, comparatively low densities were measured, whereas on the western stratum boundary and in the southwestern coastal areas of that stratum high to large NASC measurements were registered. In the northern stratum 71 measured acoustic backscatter values appeared lower than in the previous year and were mostly recorded in the “offshore” areas along the western boundary of that stratum, with virtually no registrations in northeastern and eastern coastal areas. On the transect covered in stratum 131, almost no registrations were recorded in the western half, and somewhat patchy aggregations were registered in the eastern section and on the border with stratum 71. 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 the southwestern part of stratum 61 and the inner German Bight. Based on corresponding targeted pelagic trawl hauls, the measured backscatter largely originated from sprat with varying contributions of herring across all strata. Since with one exception 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 (with one exception) that will be disaggregated into species specific NASC values during the combined survey analysis.

2.3 Biological sampling (N. Rohlf)

Thirty-one trawl hauls were conducted during the 2024 survey. Trawling was carried out using a PSN 388 pelagic trawl ("Krake"). Trawl duration varied between 5 and 30 minutes. All catches were standardized by 30 minutes trawl duration. Hauls were conducted according to echo registrations. Additionally, exclusion/validation hauls were shot in areas with echo signals of unclear origin. The positions of all hauls are depicted in Fig. 2. Catches were sorted according to species, and length- and weight-distributions of all 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 stage was determined and the otoliths were sampled to enable age estimation. Fin clips were collected for the assignment of genetic stock origin.

In total, 15 different fish species and three cephalopod species were caught during the survey. A detailed overview on catch compositions (CPUE in kg $30min^{-1}$) of all 31 hauls is given in Tab. 1.

As in the previous years, sprat contributed the bulk of biomass of catch weight (8.336 tonnes, i.e., 75%) and also had the highest frequency of occurrence in all hauls (28 hauls, resp. 90%). The total catch of herring was 2.561 t, representing 23% of the total catch weight. Herring was also widely distributed in the area occurring in 81% of the hauls. Mackerel were present in 35% of the hauls, amounting to 110 kg in total weight. Catches alone are not representative for abundance estimates of small pelagic fishes. 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 3 - 6 show length distributions of these species as derived from total catches. Herring lengths ranged from 3.75 to 26.25 cm. The length distribution was dominated by small fish below 12.25 cm total length, showing one peak around 10.25 cm. Larger herring were present in the area, but only in small numbers. Sprat lengths ranged from 3.75 to 14.75 cm. There were at least two peaks in the length distribution, one at 5.75 cm and the second at 10.25 cm. Sardines and anchovies were caught only on occasion and in small quantities. Total catch of anchovy was 78 fish ranging from 10.75 to 17.25 cm. Of sardine, 147 individuals were caught in the length range 19.75 to 25.75, all exclusively in haul 18.

Individual and combined abundance estimates for herring and sprat derived from survey data will be available after a final evaluation, combination and analysis of acoustic and trawl data with StoX software (Stox, 2015). This will be accomplished during a post-cruise meeting scheduled for November 2024 at the Institute of Marine Research IMR, Bergen/Norway. Results will subsequently be presented to ICES WGIPS.

2.4 Hydrography

Vertical profiles of temperature, salinity and oxygen concentration were measured on 67 stations using a SeaBird CTD. Measurements presented here are preliminary – a quality check/calibration check is required before hydrographic data will be uploaded to oceanographic databases.

Surface temperatures in the survey area ranged from around 14° C in the western part of the central stratum 131 to 18° C in the coastal regions of the German Bight (Fig. 9). The water column was well 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 central, deep parts of the survey area.

Salinities ranged from ca. 30 to 35 PSU, with the lower salinities measured along the coasts in the southeastern North Sea/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
Dr. Norbert Rohlf	Fish lab/Biology	TI-SF
Jörg Appel	Fish lab/Biology	TI-SF
Marsha Dechant	Fish lab/Biology	TI-SF
Marleen Schlüter (until July 2nd)	Fish lab/Biology	TI-SF

4. References

Echoview Software Pty Ltd (2024). Echoview software, version 14. Echoview Software Pty Ltd, Hobart, Australia.

ICES. 2024. Working Group on International Pelagic Surveys (WGIPS). ICES Scientific Reports. 6:60. 124 pp. https://doi.org/10.17895/ices.pub.25965769

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.

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

Figures

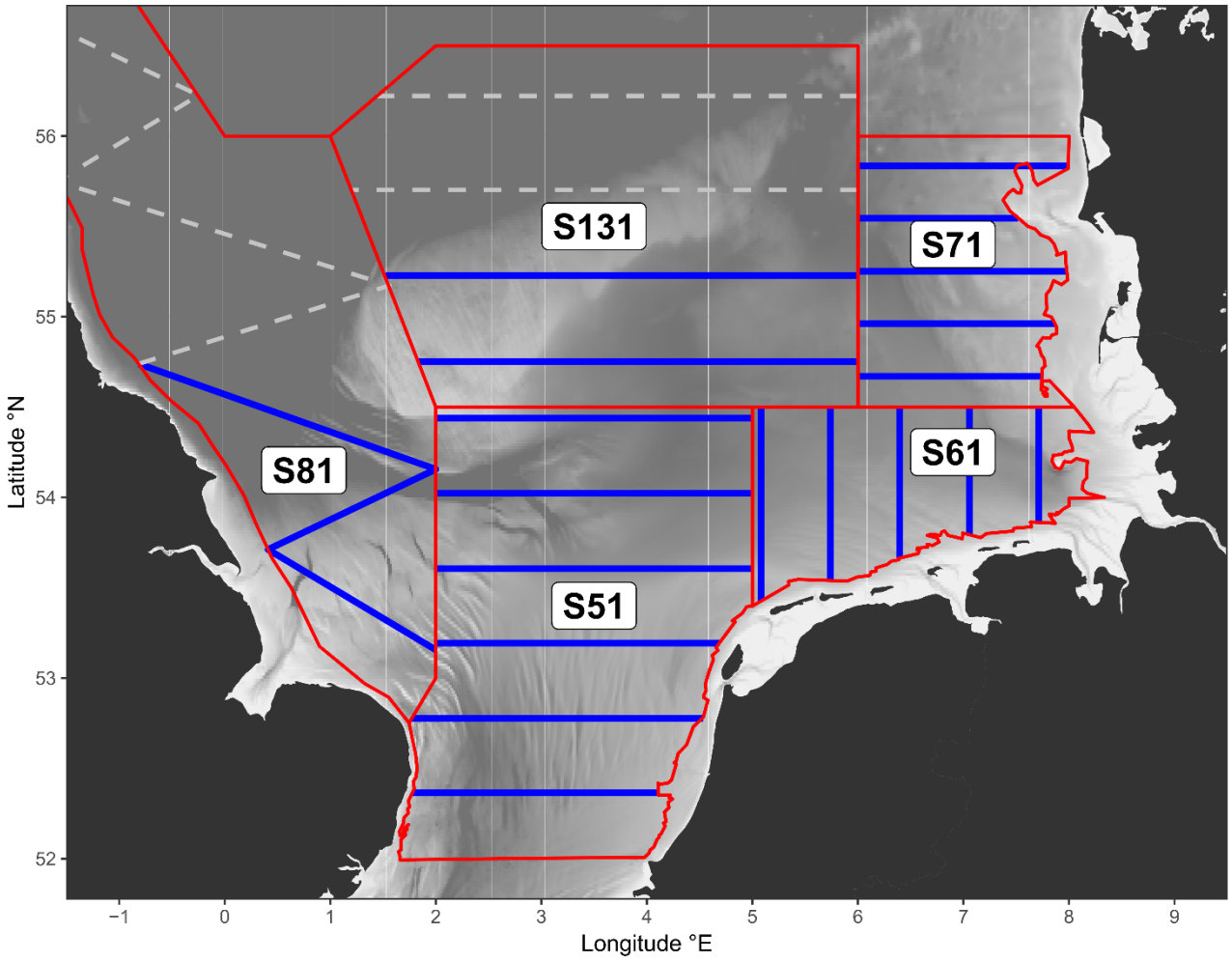

Figure 1: FRV "Solea" cruise 837/2024. Survey plan. Total survey area and strata covered (S51, S61, S71, S81, S131) outlined in red. Planned transect lines depicted as blue lines. Grey dashed lines represent further transects in the corresponding strata allocated to other vessels participating in the survey. Refer to Figures 2 and 3 for realized transects/accomplished strata.

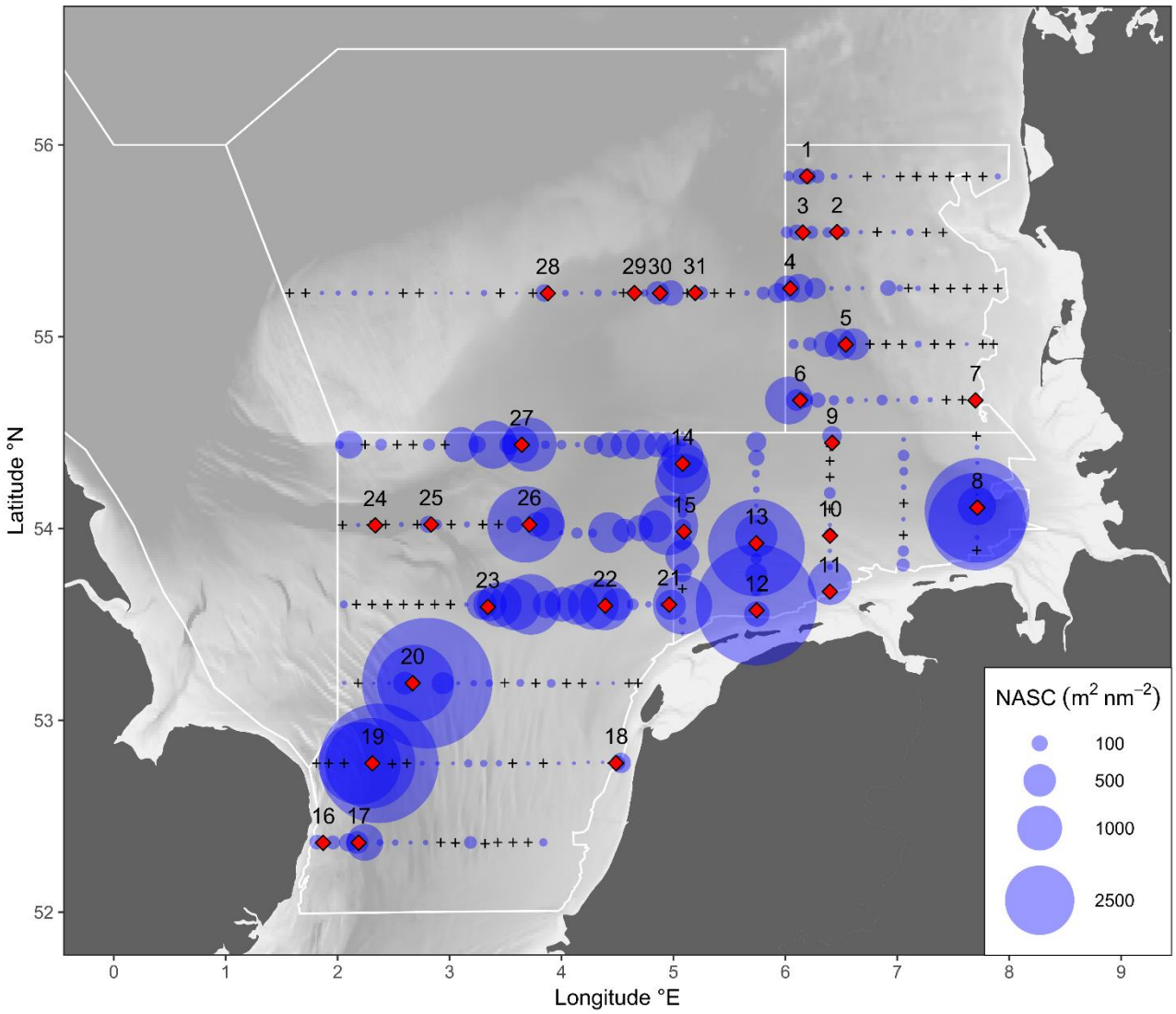

Figure 2: FRV "Solea" cruise 837/2024. Mean aggregated Nautical Area Scattering Coefficient (NASC in m^2nm^{-2}) measured (blue dots, 5 nmi intervals) along the realized transects allocated to clupeids for further dis-aggregation and to be used in abundance/biomass estimates. Empty intervals indicated by crosses. Red dots indicate (valid) trawl hauls targeting the registered fish aggregations. Total survey area and strata outlined in white.

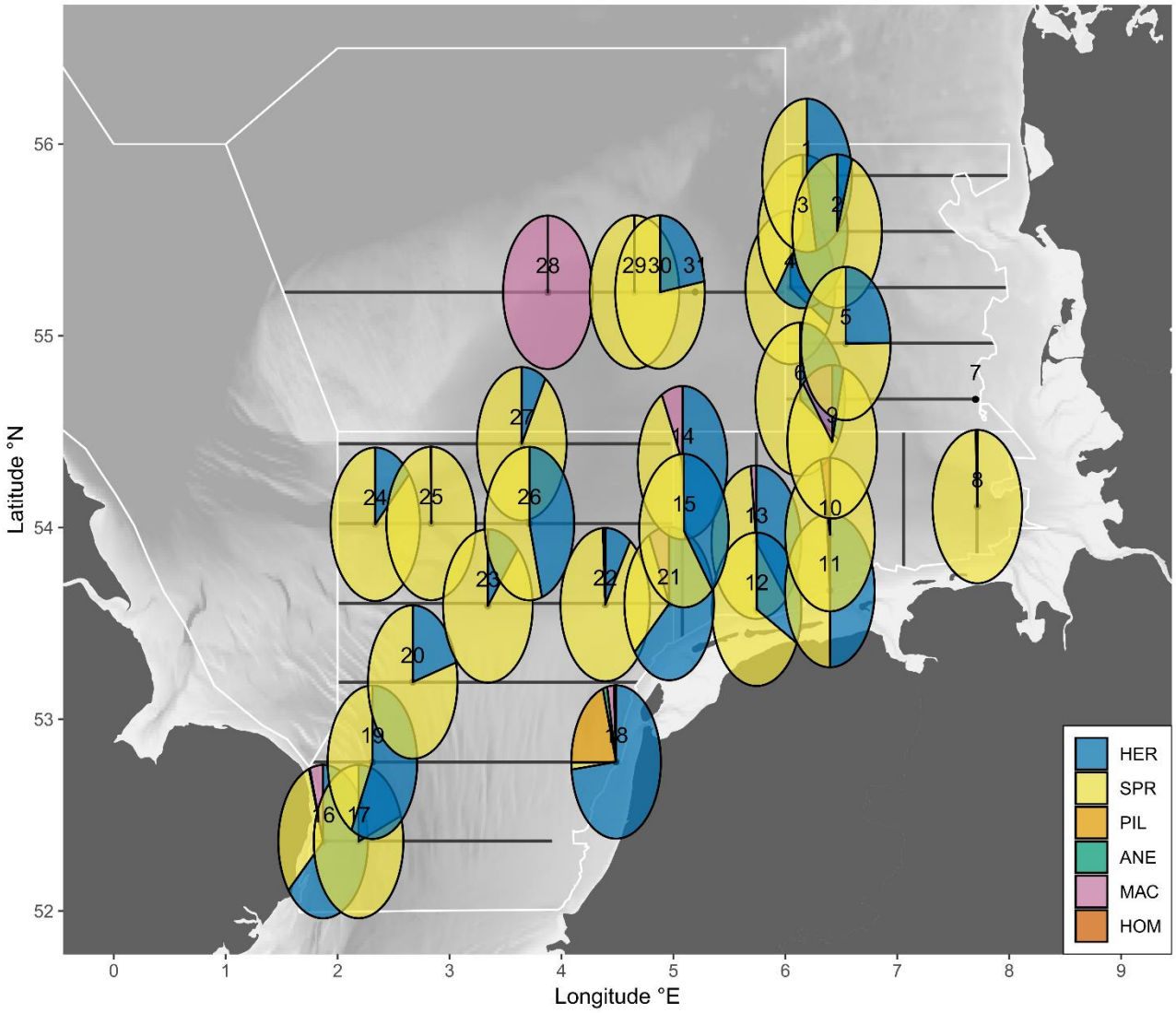

Figure 3: FRV "Solea" cruise 837/2024. Catch composition of pelagic/schooling fishes (ANE - anchovy *Engraulis encrasicolus*, HER - herring *Clupea harengus*, HOM - horse mackerel *Trachurus trachurus*, MAC - mackerel *Scomber scombrus*, PIL - sardine *Sardina pilchardus*, SPR - sprat *Sprattus sprattus*. Numbers indicate haul/station number. Survey area/strata outlined in white. Accomplished transects depicted as black lines.

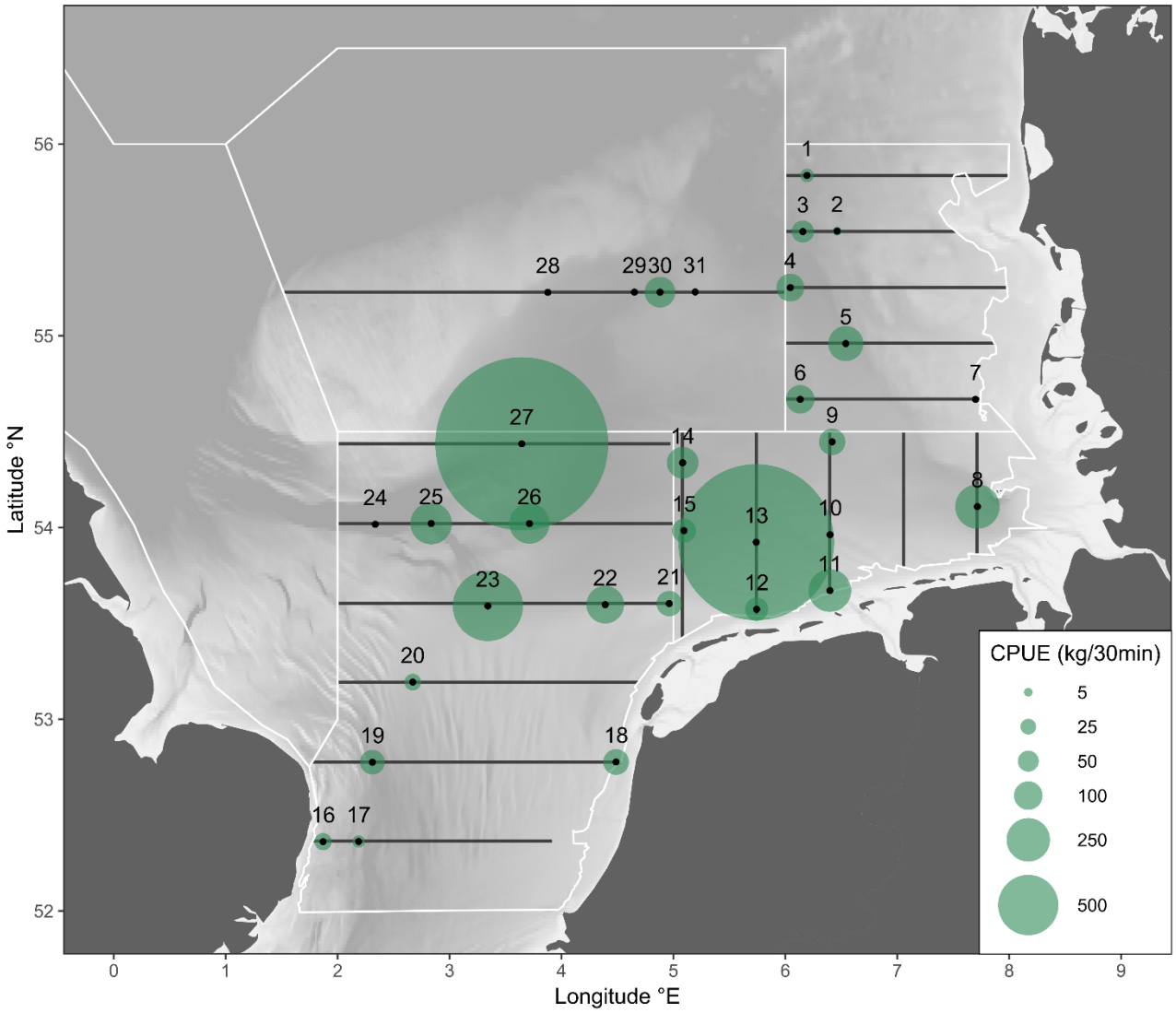

Figure 4: FRV "Solea" cruise 837/2024. Combined standardized clupeid (herring *Clupea harengus*, sprat *Sprattus sprattus*, sardine *Sardina pilchardus*, and anchovy *Engraulis encrasicolus*) catches (kg 30min^{-1}). Numbers indicate haul/station number. Survey area/strata outlined in white. Accomplished transects depicted as black lines.

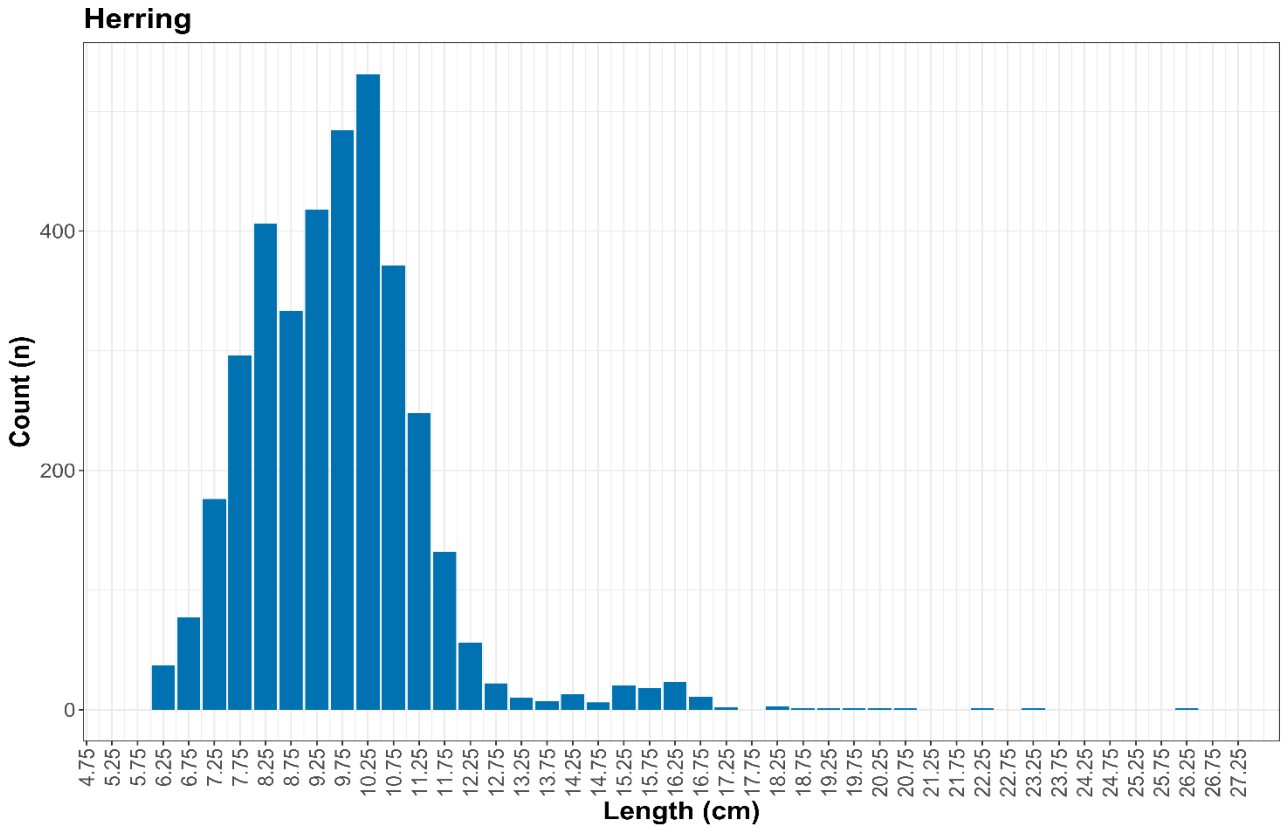

Figure 5: FRV "Solea" cruise 837/2024. Herring (*Clupea harengus*) combined length-frequency distribution.

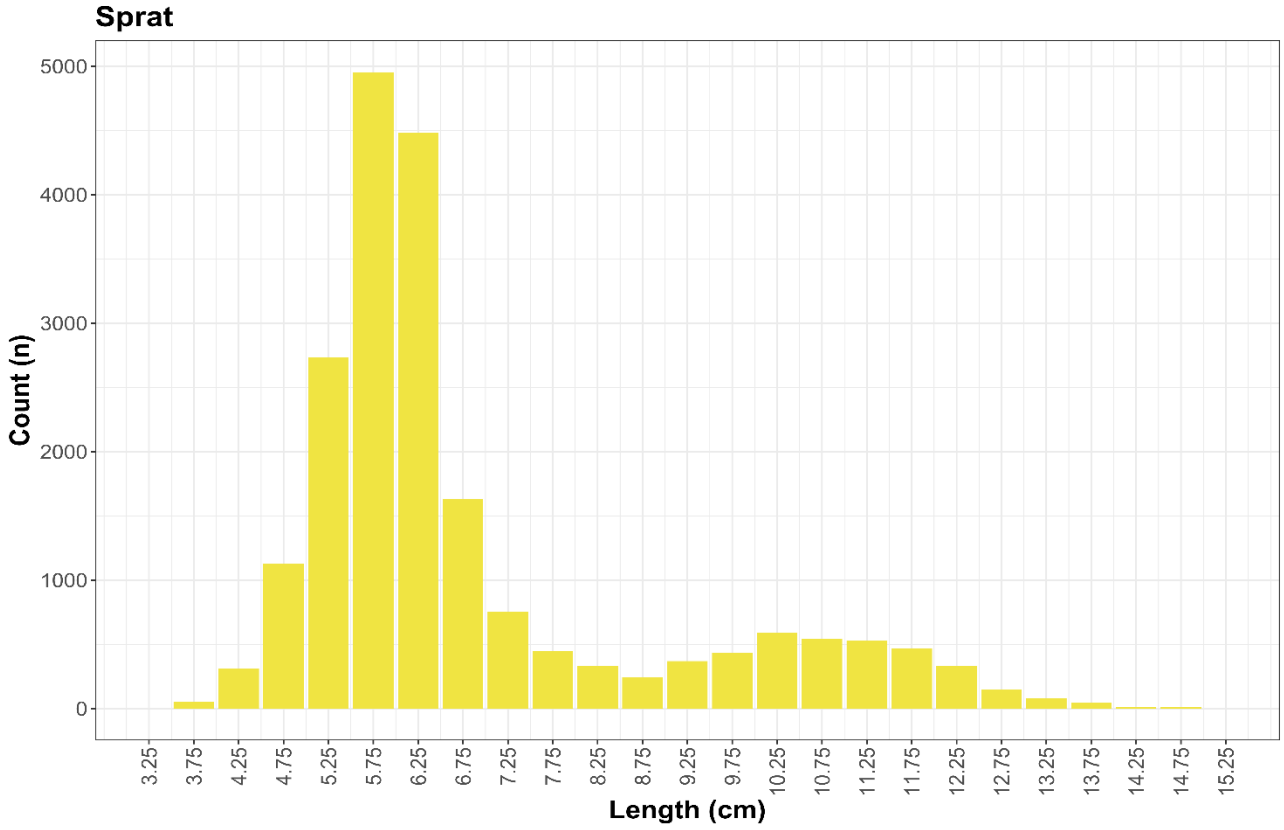

Figure 6: FRV "Solea" cruise 837/2024. Sprat (*Sprattus sprattus*) combined length-frequency distribution.

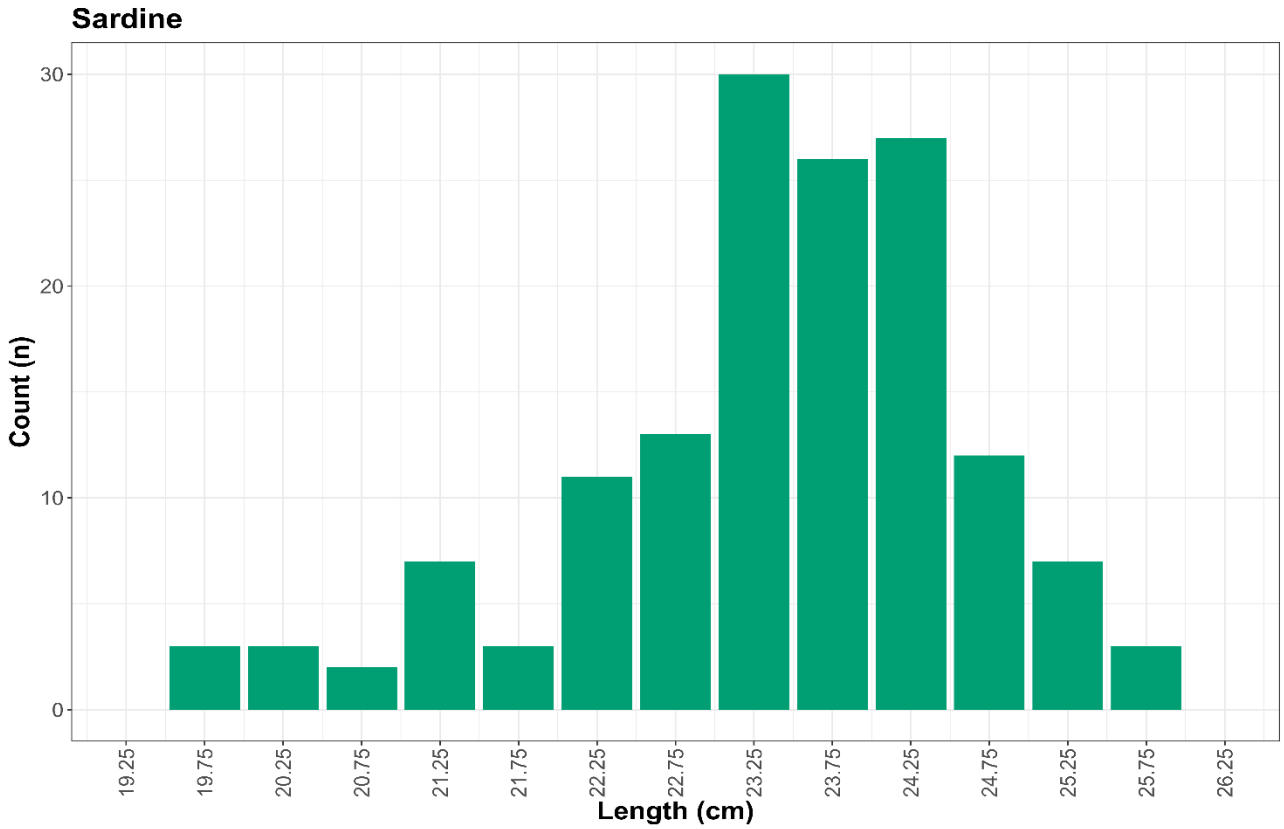

Figure 7: FRV "Solea" cruise 837/2024. Sardine (*Sardina pilchardus*) combined length-frequency distribution. (n=4 < 10cm not shown).

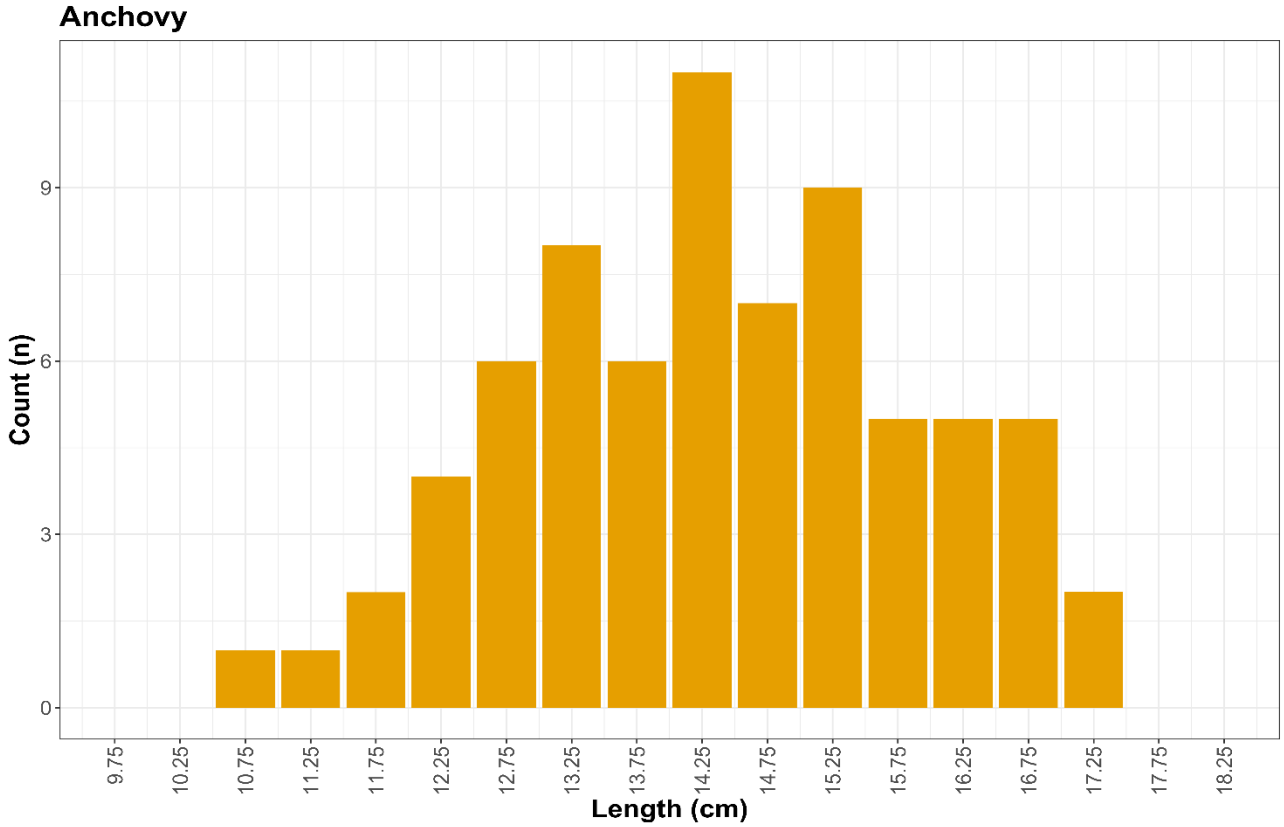

Figure 8: FRV "Solea" cruise 837/2024. Anchovy (*Engraulis encrasicolus*) combined length-frequency distribution.

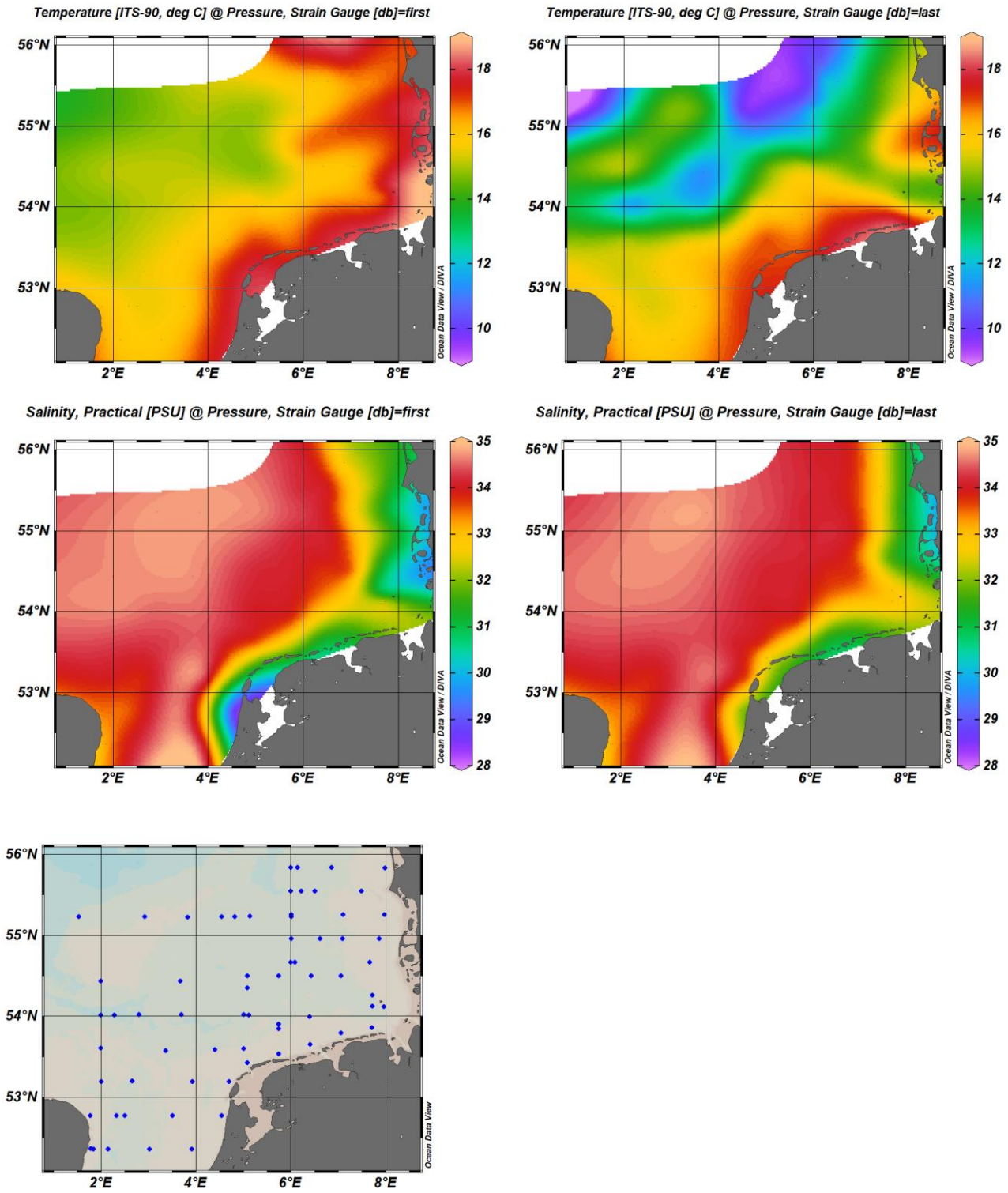

Figure 9: FRV “Solea” cruise 837/2024. Hydrography. Stations are depicted as blue dots in the area map (lower panel). Temperature (°C) (upper panels) and Salinity (PSU) (middle panels) near the surface (left) and near the seafloor (right). Data are preliminary and require quality check before upload to oceanographic database.

Tables

Table 1: FRV "Solea" cruise 837/2024. Catch composition (CPUE in kg) standardized to 30 minutes tow duration (valid hauls).

HAUL	STATION	TOTAL (kg/30 min)	*ALLOTEUTHIS SUBULATA*	*CALLIONYMUS LYRA*	*CLUPEA HARENGUS*	*ECHIICHTHYS VIPERA*	*ENGRAULIS ENCRASICOLUS*	*EUTRIGLA GURNARDUS*	*GADUS MORHUA*	*HYPEROPLUS LANCEOLATUS*	*ILLEX COINDETI*	*LIMANDA LIMANDA*	*LOLIGO spec.*	*MELANOGRAMMUS AEGLEFINUS*	*MERLANGIUS MERLANGUS*	*PLEURONECTES PLATESSA*	*SARDINA PILCHARDUS*	*SCOMBER SCOMBRUS*	*SPRATTUS SPRATTUS*	*TRACHURUS TRACHURUS*	NUMBER OF SPECIES
1	3	18.5			8.1			1.1							0.0				9.3		4
2	7	8.2			0.3			2.5							0.1				5.4		4
3	8	58.6			34.0			2.0	0.0					0.3	0.0				22.3		6
4	10	94.9			31.2			0.3						0.3					63.1		4
5	15	157.4			39.1			0.5											117.8		3
6	18	99.2			33.5														65.8		2
7	19	0.3	0.0									0.2			0.1						3
8	21	262.5			0.4										0.2			1.6	260.4		4
9	25	95.2	0.0	0.0	4.0			0.2		0.1					0.0			10.7	80.2		8
10	26	0.1	0.0																0.1	0.0	3
11	27	242.1	0.0		120.7					0.1					0.0			2.6	118.7	0.0	7
12	28	62.3	0.0		20.1		0.1			0.0									42.1		5
13	30	3614.7	0.0		1384.5										0.1			70.0	2160.1		5
14	33	135.9			66.5			0.1			0.2							10.4	58.7		5
15	34	67.4	0.2		26.2			0.1							0.1				40.8		5
16	37	35.6	0.3		21.0	2.2	0.1						0.1			0.1		1.6	10.1		8
17	38	16.6			2.7	2.7													11.2		3
18	41	85.2	0.1		60.2		1.3					0.0			3.0	0.1	16.7	2.0	1.2	0.7	10
19	44	81.7	5.7		41.5	0.3									3.9				30.4		5
20	47	30.1	0.1		6.1	0.8													23.1		4
21	50	83.8	0.6		53.3	0.0		0.1		0.0								6.1	23.7	0.0	8
22	51	186.4	0.5		17.5		0.0	0.6							0.0			1.5	166.1		7
23	52	700.6	0.8		79.9							0.3			15.0				604.6		5
24	55	19.3	0.0		0.1			1.8						1.7	14.8				0.9		6
25	56	228.0	0.0					0.7							0.5			0.3	226.5		5
26	57	211.0			95.7			0.5							0.1				114.7		4
27	59	4376.3			387.5			0.5											3988.3		3
28	63	53.8	0.0					4.4				0.4		2.5	43.8			2.8			6
29	64	1.3						1.3											0.0		2
30	65	123.9			26.7			6.6											90.6		3
31	66	29.0						27.7						1.4							2
total (kg)		**11180.3**	8.5	0.0	2560.7	6.0	1.5	50.9	0.0	0.2	0.2	0.9	0.1	6.1	81.7	0.2	16.7	109.6	8336.2	0.7	
proportion (%)			0.1	0.0	22.9	0.1	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.1	0.7	0.0	0.1	1.0	74.6	0.0	
number of catches			17	1	25	5	4	18	1	4	1	4	1	5	17	2	1	11	28	4	
presence (%)			55	3	81	16	13	58	3	13	3	13	3	16	55	6	3	35	90	13	

Table 2a: FRV "Solea" cruise 837/2024. 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.

		Total	clupeid	clupeid	herring					herring
		Catch	Catch	portion	catch	count	range (cm)			(% clups)
Haul	Stat	(kg)	(kg)	(%)	(kg)	(n)	min	max	mean	
1	3	18.5	17.4	94%	8.1	1684	6.25	15.25	9.3	47%
2	7	8.2	5.7	69%	0.3	39	7.25	11.75	10.4	0%
3	8	58.6	56.3	96%	34.0	4869	8.25	15.25	10.2	60%
4	10	94.9	94.3	99%	31.2	6037	5.75	13.75	9.2	33%
5	15	157.4	156.9	100%	39.1	5529	7.25	19.25	9.2	25%
6	18	99.2	99.2	100%	33.5	4824	6.75	19.75	9.8	34%
8	21	262.5	260.8	99%	0.4	63	7.25	14.75	9.8	0%
9	25	95.2	84.2	88%	4.0	543	8.25	13.25	10.2	5%
11	27	242.1	239.4	99%	120.7	33126	7.25	10.75	8.4	50%
12	28	62.3	62.2	100%	20.1	5766	5.75	11.75	8.1	32%
13	30	3614.7	3544.5	98%	1384.5	188084	9.25	12.75	10.7	39%
14	33	135.9	125.2	92%	66.5	10848	4.75	10.25	7.4	53%
15	34	67.4	67.0	99%	26.2	5371	3.75	9.25	6.2	39%
16	37	35.6	31.2	88%	21.0	4776	9.25	14.25	11.2	67%
17	38	16.6	13.9	84%	2.7	1079	7.25	13.75	8.9	20%
18	41	85.2	79.4	93%	60.2	7747	6.75	9.75	7.5	76%
19	44	81.7	71.9	88%	41.5	14745	8.75	12.25	10.3	58%
20	47	30.1	29.2	97%	6.1	4063	6.25	11.75	9.5	21%
21	50	83.8	76.9	92%	53.3	5086	7.25	11.75	9.2	69%
22	51	186.4	183.7	99%	17.5	3738	7.25	10.75	9.0	10%
23	52	700.6	684.5	98%	79.9	10713	8.25	18.25	10.1	12%
24	55	19.3	1.1	6%	0.1	1	26.25	26.25	26.3	14%
26	57	211.0	210.4	100%	95.7	11070	9.25	15.25	11.0	45%
27	59	4376.3	4375.8	100%	387.5	33582	9.25	18.75	11.6	9%
30	65	123.9	117.3	95%	26.7	1227	9.25	23.25	13.9	23%

Table 2b: FRV "Solea" cruise 837/2024. 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.

		Total	clupeid	clupeid	sprat					sprat
		Catch	catch	portion	catch	count	range (cm)			(% clups)
Haul	Stat	(kg)	(kg)	(%)	(kg)	(n)	min	max	mean	
1	3	18.5	17.4	94%	9.3	1149	8.75	12.25	10.5	53%
2	7	8.2	5.7	69%	5.4	650	8.75	12.25	10.4	0%
3	8	58.6	56.3	96%	22.3	2498	9.25	14.25	10.5	40%
4	10	94.9	94.3	99%	63.1	8885	8.75	12.25	9.9	67%
5	15	157.4	156.9	100%	117.8	9275	9.75	14.25	11.7	75%
6	18	99.2	99.2	100%	65.8	6704	6.25	13.75	10.4	66%
8	21	262.5	260.8	99%	260.4	29523	9.25	11.75	10.5	100%
9	25	95.2	84.2	88%	80.2	5995	9.75	14.75	11.7	95%
10	26	0.1	0.1	91%	0.1	7	11.75	13.75	12.8	100%
11	27	242.1	239.4	99%	118.7	19617	7.25	12.25	9.0	50%
12	28	62.3	62.2	100%	42.1	16314	5.25	12.75	7.3	68%
13	30	3614.7	3544.5	98%	2160.1	217170	5.25	10.25	6.9	61%
14	33	135.9	125.2	92%	58.7	19218	8.25	13.25	11.8	47%
15	34	67.4	67.0	99%	40.8	4906	3.75	14.75	6.1	61%
16	37	35.6	31.2	88%	10.1	3446	4.25	13.25	5.9	32%
17	38	16.6	13.9	84%	11.2	5534	8.25	13.75	9.0	80%
18	41	85.2	79.4	93%	1.2	81	6.75	13.75	10.1	2%
19	44	81.7	71.9	88%	30.4	19977	5.25	10.25	7.5	42%
20	47	30.1	29.2	97%	23.1	19127	8.25	13.75	11.5	79%
21	50	83.8	76.9	92%	23.7	4502	5.25	10.75	7.4	31%
22	51	186.4	183.7	99%	166.1	56226	6.25	9.25	7.7	90%
23	52	700.6	684.5	98%	604.6	67369	7.25	13.75	10.4	88%
24	55	19.3	1.1	6%	0.9	69	10.75	13.75	12.0	86%
25	56	228.0	226.5	99%	226.5	15551	9.25	14.75	12.2	100%
26	57	211.0	210.4	100%	114.7	11262	9.25	14.25	11.0	55%
27	59	4376.3	4375.8	100%	3988.3	282942	9.75	14.75	12.2	91%
29	64	1.3	0.03	2%	0.03	3	11.25	12.25	11.6	100%
30	65	123.9	117.3	95%	90.6	8630	8.75	14.25	11.9	77%

Table 2c: FRV "Solea" cruise 837/2024. Numbers, weights and mean lengths of **sardine** (*Sardina pilchardus*) and according proportion of total clupeid catch (normalized to 30 minutes tow duration).

					pilchard					
		total catch	clupeid catch	clupeid portion	catch	count	range (cm)			pilchard (% clups)
Haul	Stat	(kg)	(kg)	(%)	(kg)	(n)	min	max	mean	
18	41	85.2	79.4	93%	16.7	147	19.75	25.75	23.4	21%

Table 2d: FRV "Solea" cruise 837/2024. Numbers, weights and mean lengths of **anchovy** (*Engraulis encrasicolus*) and according proportion of total clupeid catch (normalized to 30 minutes tow duration).

					Anchovy					
		total catch	clupeid catch	clupeid portion	catch	count	range (cm)			anchovy (% clups)
Haul	Stat	(kg)	(kg)	(%)	(kg)	(n)	min	max	mean	
12	28	62.3	62.2	100%	0.1	2	17.25	17.25	17.25	0.1%
16	37	35.6	31.2	88%	0.1	10	12.25	17.25	14.67	0.4%
18	41	85.2	79.4	93%	1.3	60	10.75	14.25	12.55	1.6%
22	51	186.4	183.7	99%	0.05	6	12.25	12.25	12.25	0.0%