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Cruise Report
FRV „Solea“ cruise 840
01.10. - 19.10.2024

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

(GERAS – German Acoustic Autumn Survey /BIAS – Baltic International Acoustic Survey)

Cruise Leader: Dr. Matthias Schaber/Lea Hartkens (TI-SF)

1. Summary

The cruise was part of an international hydroacoustic survey providing information on stock parameters of small pelagic fishes in the Baltic Sea, coordinated by the ICES Working Group of International Pelagic Surveys (WGIPS) and the ICES Baltic International Fish Survey Working Group (WGBIFS). Further WGBIFS contributors to the Baltic survey are national fisheries research institutes of Sweden, Poland, Finland, Latvia, Estonia and Lithuania. FRV “Solea” participated for the 37th 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). The survey effort was comparable to 2022.

Altogether, 1207 nautical miles of hydroacoustic transects were covered. For species allocation and identification as well as to collect biological data for an age stratified abundance estimation of the target species herring and sprat, altogether 47 fishery hauls were conducted. Vertical hydrography profiles were measured on 88 stations.

Mean NASC values per nautical mile per ICES statistical rectangle were higher in 2 (and lower) in 5 out of 7 rectangles covered in SD 21. In SD 22, the values recorded were higher in 10 out of 11 rectangles. In SD 23, 2 out of 3 rectangles yielded higher mean NASC values than in 2023. In SD 24, the measurements were higher than the previous year in 5 out of 9 rectangles. However, compared to the long-time survey mean since 1991, mean NASC values were lower in 22 out of 28 rectangles covered. On ICES subdivision scale, mean NASC values in comparison with the previous year were overall distinctly higher in subdivision 22, slightly higher in SD 24, similar in SD 23 and slightly lower in SD 21.

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-Baltik 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 Seefischerei
Thünen-Institut – Pressestelle, Dr. Welling
Thünen-Institut – Präsidialbüro
Thünen-Institut – Reiseplanung Forschungsschiffe, Dr. Rohlf
Fahrtteilnehmer*innen

2. Cruise objectives and Survey design

The survey has the main objective to annually assess the clupeoid resources of herring and sprat in the Baltic Sea in autumn. The reported acoustic survey is conducted every year to supply the ICES Herring Assessment Working Group for the Area South of 62°N (HAWG) and Baltic Fisheries Assessment Working Group (WGBFAS) with an index value for the stock size of herring and sprat in the Western Baltic area (Kattegat/Subdivisions 21 and Subdivisions 22, 23 and 24).

The following objectives were planned for SB840:

- Hydroacoustic measurements for the assessment of small pelagics in the Kattegat and western Baltic Sea including Belt Sea, Sound and Arkona Sea (ICES Subdivisions 21, 22, 23 and 24)
- (Pelagic) trawling according to hydroacoustic registrations
- 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 sardine, European anchovy and cod for further analyses
- Comparison of day and night-time transects with FRV "Clupea" in ICES Subdivision 23

ICES statistical rectangles were used as strata for all Subdivisions (ICES, 2017). The area was limited by the 10 m depth line. The survey area in the Western Baltic Sea is characterized by a number of islands and sounds. Consequently, parallel transects would lead to an unsuitable coverage of the survey area. Therefore, a zig-zag track was adopted to cover all depth strata regularly and sufficiently. Overall, the covered regular cruise track length was 1207 nautical miles (2023: 1168 nmi) (Figure 1).

3. Cruise narrative and preliminary results

3.1 Cruise narrative

This cruise represented the 37th subsequent GERAS survey. In general, survey operations are conducted during nighttime to account for a more pelagic distribution of clupeids at that time. Loading of scientific equipment and embarkation of scientific crew took place on October 1st in Kiel port. FRV "Solea" left port in the late afternoon of that day for a calibration of the echosounders, which was planned to take place in Strande Bight that evening but had to be postponed to the next morning off Langeland due to strong easterly winds preventing calibration in the Kiel Bight area. Survey operations started in the evening of October 2nd in SD 22 and continued in SD 24 (Arkona Sea) from October 3rd. All planned transects in SD 24 were covered by October 7th. Based on the weather forecast predicting inclement weather in the overall survey area for the following days, it was decided to continue survey operations in the northern part of SD 21 (Kattegat) for 2 nights before steaming south through the Sound to interrupt survey operations for one night in Køge Bugt. With improving weather conditions, SD 23 (the Sound) was accomplished on October 11th including transect sections of daytime recording (for comparison), and the remaining transect sections in the southern part of SD 21 on October 12th and 13th. A crew change took place on October 14th in Copenhagen, before survey operations continued in SD 22 (Belt Sea, Western Baltic), which was accomplished in the early morning of October 19th. Later that day, FRV "Solea" returned to Kiel port, where the survey ended.

Altogether, the following survey schedule was accomplished:

Belt Sea	(SD 22)	1.10. & 15.-18.10.
Arkona Sea	(SD 24)	2.-7.10.
Sound	(SD 23)	11.10.
Kattegat	(SD 21)	8.-9.10. & 12.-13.10.

Total survey time	17 nights (incl. 2 days/nights loss due to bad weather etc.)
Fishery hauls	47
CTD-casts	88
Hydroacoustic transects	1207 nmi

3.2 Hydroacoustics

3.2.1 Calibration

All transducers (38, 70, 120 and 200 kHz) were calibrated in CW and FM mode from a drifting vessel west of Bagenkop/Langeland on October 2nd. Overall calibration results were considered very good based on calculated RMS values. Resulting transducer parameters were applied for the post-processing of hydroacoustic survey data.

3.2.2 Echo recording

All acoustic investigations were performed during night time to account for the more pelagic distribution of clupeids during that time. Hydroacoustic data were recorded with a Simrad EK80 scientific echosounder with hull-mounted 38, 70, 120 and 200 kHz transducers at a standard ship speed of 10 kn. Post-processing and analysis of hydroacoustic data were conducted with Echoview 15 software (Echoview Software Pty Ltd, 2024). Mean volume backscattering values (S_v) were integrated over 1 nmi intervals from 10 m below the surface to ca. 0.5 m over the seafloor (NASC - Nautical Area Scattering Coefficient). Interferences from surface turbulence, bottom structures and scattering layers were removed from the echogram. In post-processing, no species-specific NASC values were allocated to echo registrations, but a MIX category was used for the combined acoustic backscatter per EDSU. The transducer settings applied were in accordance with the specifications provided in ICES (2015, 2017). During fishing operations, additional data on distribution of fishes in the water column were occasionally recorded from an omnidirectional Simrad CS90 sonar and used to adjust –where applicable- the trawl net position.

Figure 2 depicts the spatial distribution of mean NASC values (5 nmi intervals) measured on the hydroacoustic transects covered in 2024. In general, the majority of these NASC measurements can be allocated to clupeids, but in some areas/rectangles, significant contributions of other organisms (e.g. three-spined stickleback, *Gasterosteus aculeatus*) to the measurements were recorded, which will be accounted for in the further analyses. Altogether, 28 ICES statistical rectangles were covered in the 2024 survey (with some of these rectangles comprising areas that are allocated to different subdivisions, which accordingly leads to the total of >28 rectangles in the following comparison). The mean NASC per rectangle in 2024 was higher than in 2023 (partly significantly) in 19 rectangles. In two rectangles the mean NASC was in the range of 2023. In the 8 remaining rectangles, mean NASC values were partly well below the values measured in 2023. Compared with the long-term survey mean (1991-2023), the mean NASC measured in 2024 was below average in 22 out of 28 rectangles. On ICES subdivision scale, mean NASC values were overall higher than in the previous year in subdivisions 22 (Belt Sea) and 24 (Arkona Sea), about the same (as in 2023) in SD 23 (the Sound), and slightly lower in SD 21 (Kattegat).

In the rectangles covered in SD 21, mean NASC values measured were distinctly higher than those measured in the previous year in the northern Kattegat (43G1, 43G2), while in all the remaining rectangles along the Swedish coast of the Kattegat and in the southern Kattegat the mean NASC per 1 nmi EDSU measured was lower than the values measured in the previous year. In general, patchy aggregations of clupeids were observed along the transect in the southern and western parts of SD 21 covered, while along the Swedish coast and especially in the northern rectangles, aggregations seemed more clustered.

In SD 22, the mean overall NASC values recorded were higher than in the previous years in all but one out of 11 rectangles surveyed. Only along the rather short transect section in rectangle 40G1, mean NASC per 1 nmi EDSU was lower.

As in the previous years, the large aggregations of big herring that usually could be observed in the inner Sound area of SD 23 were not present in autumn 2024 to the extent observed prior to 2016. However, NASC values in rectangles 39G2 and 40G2 were higher than in 2023. As in 2023, a notable aggregation of herring was detected in rectangle 41G2 located at the narrow isthmus in the northern Sound that significantly contributed to the high average NASC in an otherwise rather "empty" rectangle.

In SD 24, mean NASC values were again (partly distinctly) higher than the levels measured in 2023 in 5 out of 9 rectangles (similar to 2023 in one rectangle). Lower values were recorded in 37G3 (east of Sassnitz, Rügen Island), 38G4 (Arkona Sea, Bornholm Basin area) and 39G3 (northern Arkona Sea along Swedish coast).

On a rectangle basis, mean NASC values measured were below the long-term survey average (1991-2023) in all but 5 rectangles.

3.3 Biological sampling (S. Haase, TI-OF)

For species allocation and identification as well as to collect biological data for an age stratified abundance estimation of the target species herring and sprat, altogether 47 fishery hauls were conducted. Fishery hauls according to ICES Subdivision (Figure 1):

SD	Hauls (n)
21	12
22	14
23	4
24	17

Altogether, 1413 individual herring, 670 sprat, 435 European anchovies and 179 sardines were frozen for further investigations (e.g. determining sex, maturity, age). Results of catch compositions by Subdivision are presented in Tables 2-5. In total, 34 different fish species were recorded. Out of 47 hauls in total, herring were caught in 45, sprat in 41 and anchovies in 28. As in the previous years except for 2023, SD 23 again showed the highest mean herring catch rates per station (kg 0.5 h^{-1}) in 2024 due to the dominance of large, old herring. Still, catch rates in SD 21 were again considerably above average due to the strong contribution of small length classes. Anchovies (*Engraulis encrasicolus*) were present in all parts (Subdivisions) of the survey area, albeit numbers were partly much lower than previously recorded. Sardines (*Sardina pilchardus*) were caught in low numbers in 9 hauls from Subdivisions 21, 22 and 23, with the highest prevalence (5 hauls) in SD 21 (Kattegat). Figure 3 depicts a representation of the standardized clupeid catch per haul.

Altogether, the following species were sampled and processed:

Species	Length measurements (n)	Prevalence (n of hauls)
Agonus cataphractus	2	2
Anguilla anguilla	1	1
Aphia minuta	205	14
Belone belone	15	9
Clupea harengus	8 736	45
Ctenolabrus rupestris	2	1
Cyclopterus lumpus	6	6
Engraulis encrasicolus	435	28
Eutrigla gurnardus	10	4
Gadus morhua	197	23
Gasterosteus aculeatus	1 702	43
Gobius niger	9	2
Hyperoplus lanceolatus	1	1
Limanda limanda	58	17

Lumpenus lampretaeformis	1	1
Melanogrammus aeglefinus	9	5
Merlangius merlangus	1 028	39
Merluccius merluccius	12	4
Mullus surmuletus	1	1
Neogobius melanostomus	1	1
Pholis gunnellus	2	2
Platichthys flesus	42	14
Pleuronectes platessa	39	13
Pomatoschistus minutus	84	20
Pungitius pungitius	1	1
Sardina pilchardus	176	9
Scomber scombrus	630	17
Solea vulgaris	2	1
Sprattus sprattus	4 367	41
Squalus acanthias	1	1
Syngnathus typhle	1	1
Trachinus draco	124	11
Trachurus trachurus	50	14

Figure 4 shows the relative length-frequency distributions of herring and sprat in ICES subdivisions 21, 22, 23 and 24 for the years 2023 and 2024. Compared to results from the previous survey in 2023, the following conclusions for **herring** can be drawn:

- In 2024, catches showed a bi-modal length distribution with modes at ca. 13 and 19 cm with a higher contribution of smaller herring. Similarly, in 2023, catches in SD 21 showed abi-modal distribution with individuals ranging between 13 and 21 cm.
- As in the previous year, catches in SD 22 were dominated by the incoming year class (≤15 cm), but with a lower contribution of herring <10 cm than in 2023.
- In SD 23, catches were dominated by the incoming year class (≤15 cm). Still, a significant contribution of herring >22 cm was again recorded, although in a lower proportion than in the previous year.
- Catches in SD 24 showed almost the same length distributions in 2024 as in 2023 and were clearly dominated by the incoming year class (≤15 cm), with lower contributions of herring in the range of 18-23 cm. Similar to the previous years, herring larger than ca. 25 cm were absent.

Relative length-frequency distributions of **sprat** in the years 2024 and 2023 (Figure 4) can be characterized as follows:

- Contrary to previous year, the incoming year class (≤10 cm) was slightly more pronounced in catches in SD 21. Similar to previous years, catches were dominated by larger sprat, with a mode at 12 cm (ca. 11.5 cm in 2023).
- In 2024, catches in SD 22 showed a bimodal length distribution with largest proportions of the incoming year class at a length range 7-10 cm (mode 9 cm) and lesser contributions of sprat 10-13 cm. The length distribution was similar to 2023 with less individuals of the length classes 7 – 8 cm.
- While in 2023 catches in SD 23 had been dominated by larger sprat (>10 cm) with a mode at ca. 10.5 cm, a wider range of length classes between 5 – 11.5 cm was caught in 2024 with sprat at around 6 cm clearly dominating.
- In SD 24, catches of sprat showed a bimodal distribution with a distinct contribution of the incoming year class (≤10 cm, mode at ca. 8.5 cm) and also a notable contribution of larger, older sprat (>10 cm, mode at ca. 14cm).

- As in 2023, the contribution of the incoming year class (≤10 cm) seemed to be comparatively high in SDs 23 and 24.

3.4 Hydrography

Vertical profiles of temperature, salinity and oxygen concentration 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, 88 CTD casts were conducted during this survey (Figure 5).

Surface temperatures showed a lesser gradient and range than in the previous year and were lowest in the western part of the survey area (SD22: Western Kiel Bight, Belt Sea; SD 21: Southwestern Kattegat) at around 12°C and highest in the central and eastern Arkona Sea (SD 24) at partly >15°C. Bottom temperatures showed a higher variability due to thermohaline layering and were lowest in the deep parts of the Bornholm Basin area in SD 24 (~ 7°C) and the deep northern parts of the Kattegat (SD 21, ~7°C) . Bottom layers in the western Belt Sea, the southern and western/central Arkona Sea as well as in the Kattegat were again rather warm with temperatures partly exceeding 15°C. There, bottom temperatures often exceeded surface temperatures.

As usual, due to the hydrographic nature of the western Baltic Sea, surface salinities showed a large gradient (from ca. 7 PSU in the southeastern Arkona Sea to > 30 PSU in the Kattegat). Other than in the previous year, surface salinities in the southwestern parts of the survey did not exceed 20 PSU but were around 14 PUS in the Kiel Bight. Salinity near the seafloor ranged from ca. 8 PSU in the Arkona Sea to almost 35 PSU in the deep parts of the Kattegat. Especially in the Sound (SD 23), a very strong stratification with steep salinity gradients was again observed.

Surface waters were well oxygenated throughout the survey area. In contrast, pronounced oxygen depletion was again measured in the Mecklenburg Bight (SD 22), around Fehmarn and the coastal areas of the Kiel Bight south of the Little Belt (SD 22). Low oxygen levels were also measured in the deeper parts of the central Arkona Sea as well as in the Bornholm Basin area (SD 24) and in deeper parts of the Sound (SD 23). In some of those regions, lowest oxygen concentrations measured near the seafloor were below 0.5 ml/l and occasionally in in the anoxic range.

4. Survey participants

Name	Function	Institute
Dr. M. Schaber (1.-14.10.)	Cruise Leader (Hydroacoustics, Hydrography)	TI-SF
L. Hartkens (14.-19.10.)	Cruise Leader (Hydroacoustics, Hydrography)	TI-SF
M. Bächtiger	Fishery biology	TI-SF
M. Hicken	Fishery biology	TI-OF
S. Kjelstrup (15.-19.10.)	Fishery biology	DTU-Aqua (DK)
M. Koth	Fishery biology	TI-OF
S.E. Levinsky (1.-15.10.)	Fishery biology	DTU-Aqua (DK)
T. Peters	Fishery biology, Hydroacoustics	TI-SF

5. References

Echoview Software Pty Ltd (2024) Echoview software, version 15. Echoview Software Pty Ltd, Hobart, Australia.

ICES (2017). SISP Manual of International Baltic Acoustic Surveys (IBAS). Series of ICES Survey Protocols SISP 8 – IBAS. 47pp. http://doi.org/10.17895/ices.pub.3368

ICES (2015). Report of the Workshop on scrutinisation procedures for pelagic ecosystem surveys (WKSCRUT). ICES CM 2015 / SSGIEOM: 18

6. 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 enabled the safe and successful accomplishment of this survey.

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

Figures

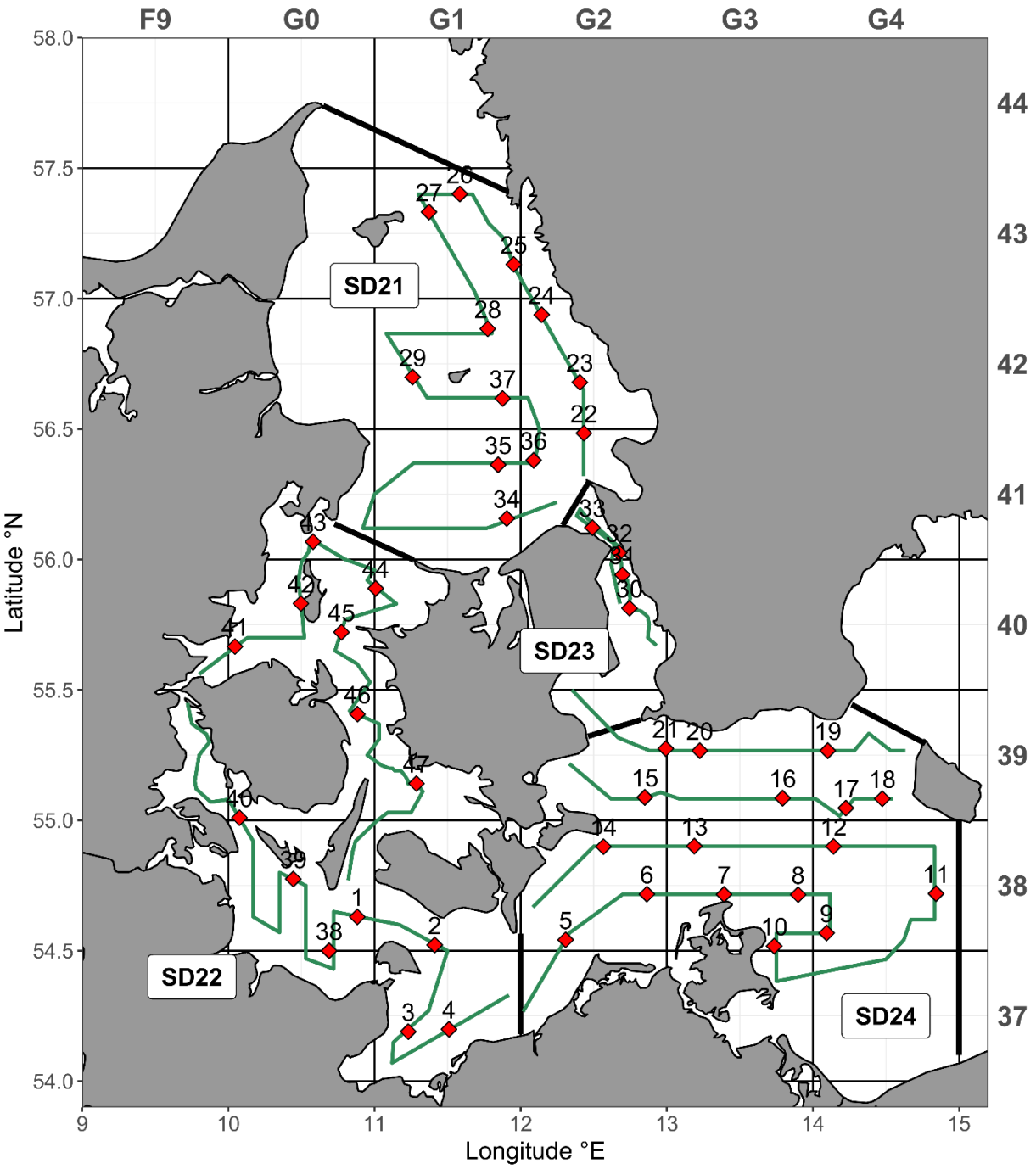

Figure 1: FRV "Solea" cruise 840/2024. Cruise track (dark green lines) and fishery hauls (red diamonds). ICES statistical rectangles are indicated in the top and right axis. Thick black lines separate ICES subdivisions (SD).

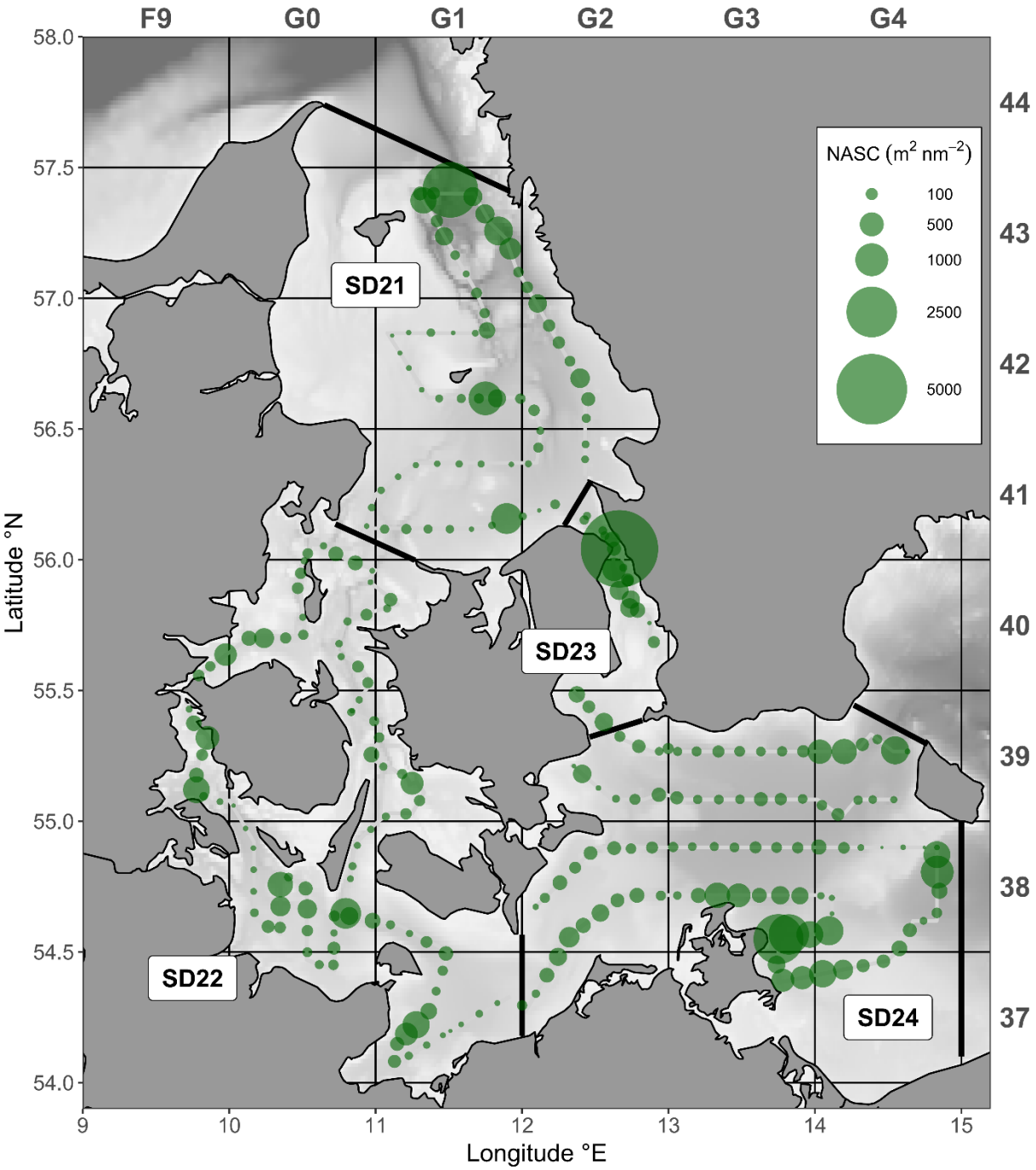

Figure 2: FRV "Solea" cruise 840/2024. Cruise track (light grey lines) and mean NASC (5 nmi intervals, dots). ICES statistical rectangles are indicated in the top and right axis. Thick black lines separate ICES subdivisions.

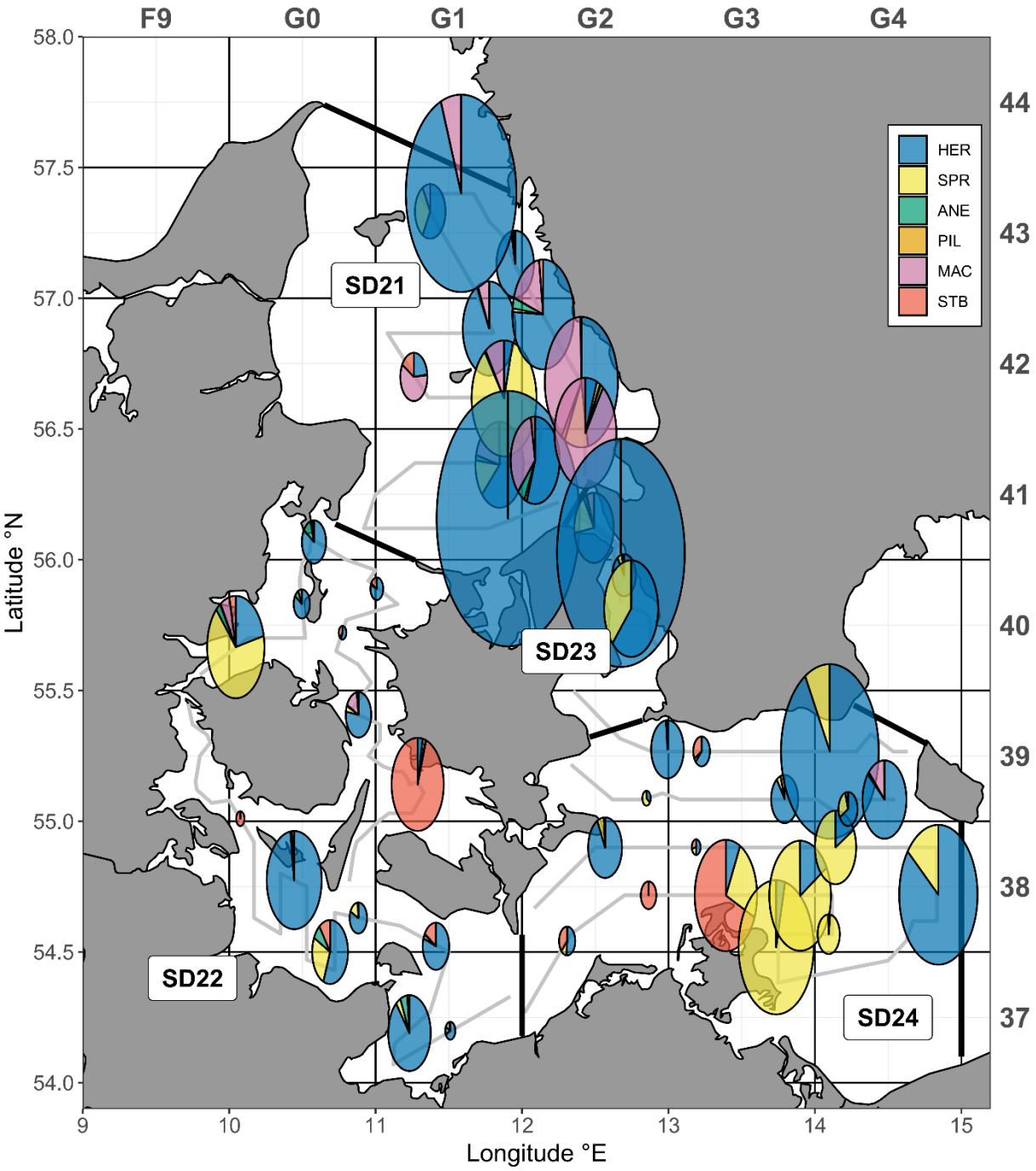

Figure 3: FRV "Solea" cruise 840/2024. Catch per haul, pelagic species (pie size = log scale of CPUE kg 30min^{-1}). ANE = European anchovy (*Engraulis encrasicolus*), HER = Herring (*Clupea harengus*), MAC = Mackerel (*Scomber scombrus*), PIL = Sardine (*Sardina pilchardus*), SPR = Sprat (*Sprattus sprattus*), STB = Three-spined stickleback (*Gasterosteus aculeatus*). ICES statistical rectangles are indicated in the top and right axis. Thick black lines separate ICES subdivisions. Thin grey lines indicate cruise track.

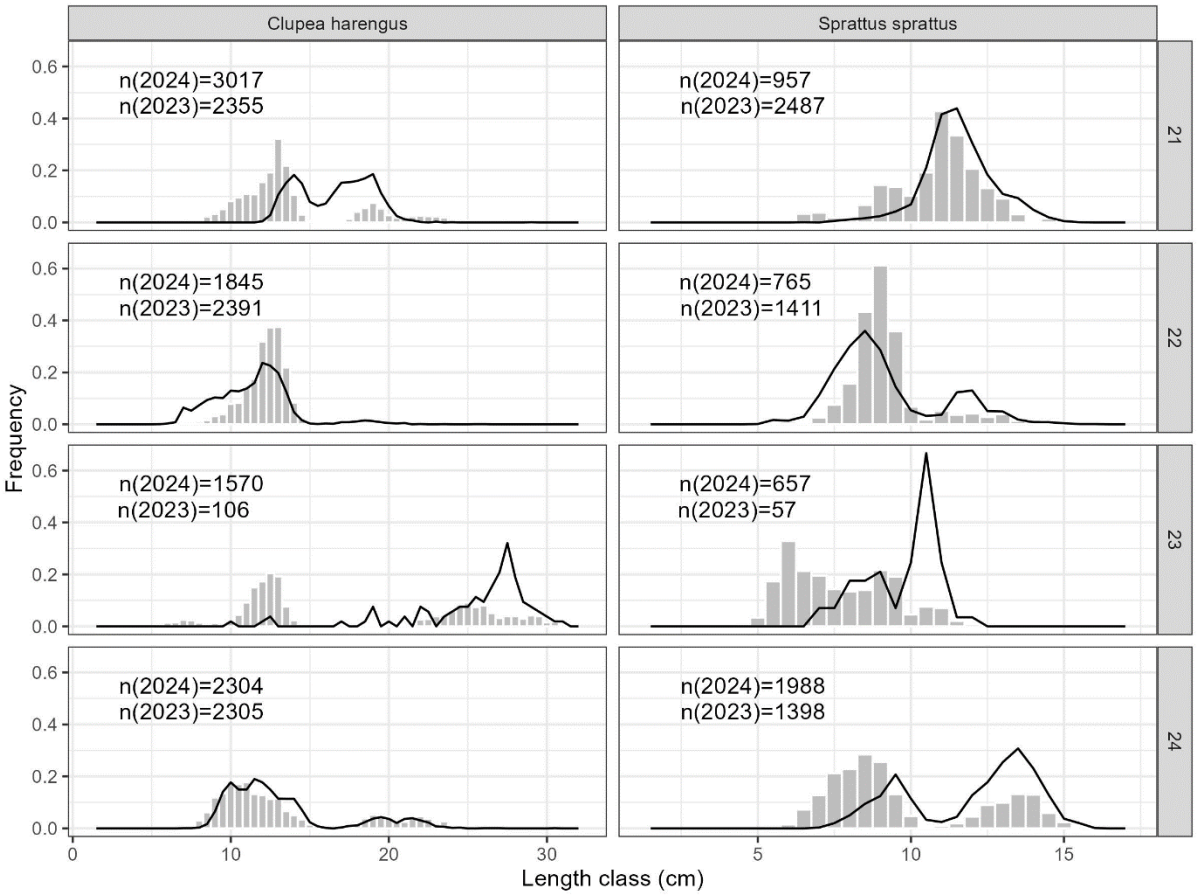

Figure 4: FRV "Solea" cruise 840/2024. Herring (*Clupea harengus*, left) and sprat (*Sprattus sprattus*, right) length-frequency distribution (bars) compared to the previous year (cruise 827/2023, lines).

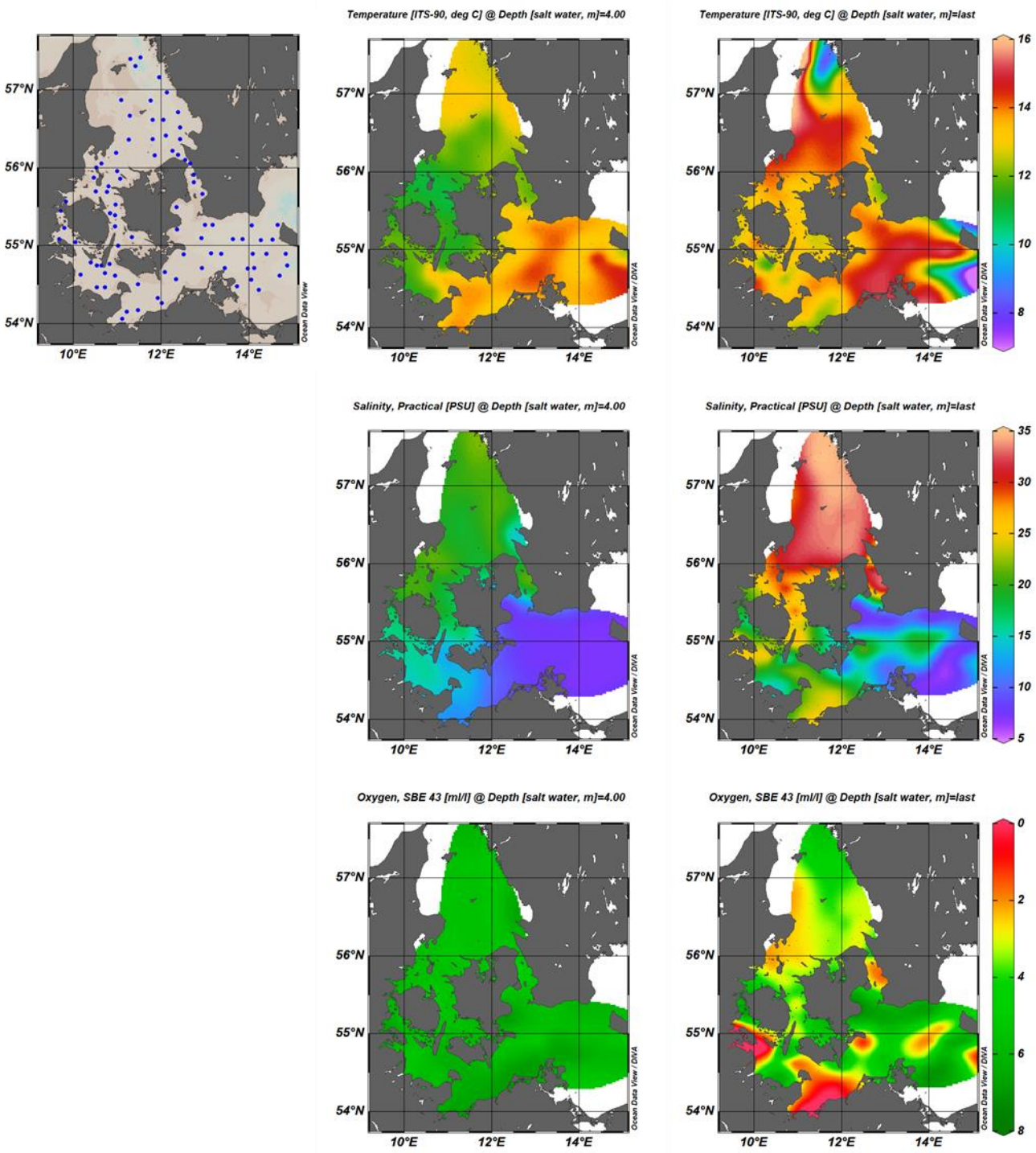

Figure 5: FRV "Solea" cruise 840/2024: Hydrography. CTD stations (n=88) are depicted as blue dots in the area map (top left). Temperature (°C, top panels), salinity (PSU, middle panels) and oxygen concentration (ml/l, lower panels) at the surface (left) and near the seafloor (right).

Tables

Table 1: FRV "Solea" cruise 840/2024: Catch composition (kg 0.5 h^{-1}) by haul in SD 21 (+ = <0.01 kg).

Haul No.	22	23	24	25	26	27	28	29	34	35	36	37
Species/ICES Rectangle	41G2	42G2	42G2	43G1	43G1	43G1	42G1	42G1	41G1	41G1	41G2	42G1
APHIA MINUTA	+	0.02	0.02	0.01		+	+					
BELONE BELONE					0.07	0.25						
CLUPEA HARENGUS	1.37	19.22	16.26	5.56	266.46	2.20	17.81	0.70	1493.36	6.74	6.21	1.12
CYCLOPTERUS LUMPUS								0.20				
ENGRAULIS ENCRASICOLUS	0.02	0.03	0.66	0.05	0.06		0.10		0.03	0.21	0.56	0.15
EUTRIGLA GURNARDUS		0.01					0.01					
GADUS MORHUA		+										
GASTEROSTEUS ACULEATUS	0.01	0.15	0.47	0.11	0.14		0.04	0.49	0.16	0.06	0.32	0.02
LIMANDA LIMANDA							0.07	0.06				
MELANOGRAMMUS AEGLEFINUS												0.04
MERLANGIUS MERLANGUS	0.82	1.88	0.51	0.62	6.44	0.08	0.62	0.05	1.38	0.32	0.05	0.14
MERLUCCIUS MERLUCCIUS		+	0.02	0.01			0.01					
POMATOSCHISTUS MINUTUS	+			+			+					+
SARDINA PILCHARDUS	0.34	0.65	0.03						0.06		0.02	
SCOMBER SCOMBRUS	20.48	16.52	3.83		16.80	0.32	1.36	1.78	0.10	2.23	3.89	2.46
SPRATTUS SPRATTUS	0.40	4.29	0.23	0.04	0.10	1.25	0.02	0.01	1.23	1.47	0.18	21.98
SQUALUS ACANTHIAS				1.43								
TRACHINUS DRACO	0.07		0.06	0.14		0.07	0.97	1.69	0.22		0.34	1.51
TRACHURUS TRACHURUS	0.01	0.05	0.12	0.01	0.02	0.04		+	0.06		0.04	0.05
Total	**23.51**	**42.80**	**22.19**	**7.97**	**290.09**	**4.20**	**21.00**	**4.99**	**1496.60**	**11.03**	**11.60**	**27.45**

Table 2: FRV "Solea" cruise 840/2024: Catch composition (kg 0.5 h^{-1}) by haul in SD 22 (+ = <0.01 kg).

Haul No.	1	2	3	4	38	39	40	41	42	43	44	45	46	47
Species/ICES Rectangle	38G0	38G1	37G1	37G1	37G0	38G0	39G0	40G0	40G0	41G0	40G1	40G0	39G0	39G1
AGONUS CATAPHRACTUS			+					0.01						
APHIA MINUTA								+	+		+	+	+	+
BELONE BELONE	0.03		0.06	0.04										
CLUPEA HARENGUS	1.17	2.30	6.93	0.33	2.94	15.25		3.81	1.09	2.06	0.73	0.27	1.89	0.43
CYCLOPTERUS LUMPUS			0.31											
ENGRAULIS ENCRASICOLUS		0.02	0.43	0.07	0.39	0.04		0.48	0.11	0.27	0.01	0.02	0.02	0.01
GADUS MORHUA	0.01		0.03		3.07			0.08	0.15		0.01	0.01		0.04
GASTEROSTEUS ACULEATUS	0.02	0.46	0.13	0.01	0.54	0.20	0.53	0.64	0.10	0.06	0.16	0.18	0.05	12.64
GOBIUS NIGER														0.00
LIMANDA LIMANDA	0.80	0.04	1.06	0.10	0.16			0.10	0.01		0.09			
LUMPENUS LAMPRETAEFORMIS			+											
MELANOGRAMMUS AEGLEFINUS			0.02											
MERLANGIUS MERLANGUS	0.02	0.01	0.50	0.03	0.11	0.01	0.02	0.59	+	0.01	0.01	0.05	0.03	
MULLUS SURMULETUS								0.02						
PHOLIS GUNNELLUS														0.01
PLATICHTHYS FLESUS			0.22		0.16									
PLEURONECTES PLATESSA	0.17		0.70	0.12	0.17									
PUNGITIUS PUNGITIUS		+												
SARDINA PILCHARDUS								0.06		0.05		0.01		
SCOMBER SCOMBRUS				0.08				0.94					0.38	
SPRATTUS SPRATTUS	0.24	0.08	0.29	+	1.37	0.12		11.80			0.01		0.10	0.22
SYNGNATHUS TYPHLE										+				
TRACHINUS DRACO											0.04			
TRACHURUS TRACHURUS								0.03		0.05				
Total	**2.45**	**2.90**	**10.67**	**0.77**	**8.90**	**15.62**	**0.54**	**18.55**	**1.46**	**2.50**	**1.06**	**0.53**	**2.48**	**13.34**

Table 3: FRV "Solea" cruise 840/2024: Catch composition (kg 0.5 h^{-1}) by haul in SD 23 (+ = <0.01 kg).

Haul No.	30	31	32	33
Species/ICES Rectangle	40G2	40G2	41G2	41G2
APHIA MINUTA	+	+		
BELONE BELONE	0.03			
CLUPEA HARENGUS	9.25	2.11	679.27	4.69
CTENOLABRUS RUPESTRIS		0.01		
ENGRAULIS ENCRASICOLUS			0.06	0.15
EUTRIGLA GURNARDUS		0.27	0.13	
GADUS MORHUA			+	
GASTEROSTEUS ACULEATUS		0.03	0.10	0.39
GOBIUS NIGER		0.06		
LIMANDA LIMANDA		0.11	0.02	0.26
MELANOGRAMMUS AEGLEFINUS		1.01		0.65
MERLANGIUS MERLANGUS	1.35	0.33	0.41	0.60
NEOGOBIUS MELANOSTOMUS	0.01			
PLATICHTHYS FLESUS	0.41	0.14		0.16
PLEURONECTES PLATESSA		0.35	0.05	0.05
POMATOSCHISTUS MINUTUS		0.02		
SARDINA PILCHARDUS				0.05
SCOMBER SCOMBRUS		0.05	0.49	
SOLEA VULGARIS		0.07		
SPRATTUS SPRATTUS	5.62	0.15	0.07	1.19
TRACHINUS DRACO	0.04			
TRACHURUS TRACHURUS			0.01	0.01
Total	**16.80**	**4.75**	**680.61**	**8.23**

Table 4: FRV "Solea" cruise 840/2024: Catch composition (kg 0.5 h^{-1}) by haul in SD 24 (+ = <0.01 kg).

Haul No.	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
Species/ICES Rectangle	38G2	38G2	38G3	38G3	38G4	38G3	38G4	38G4	38G3	38G2	39G2	39G3	39G4	39G4	39G4	39G3	39G2
ANGUILLA ANGUILLA													0.52				
BELONE BELONE	0.03	0.08														0.03	
CLUPEA HARENGUS	0.66		1.76	3.68	0.05	1.74	45.84	1.23	0.29	4.30	0.19	2.68	1.10	7.24	128.00	0.84	4.22
CYCLOPTERUS LUMPUS							0.20	0.10				0.23			0.30		
ENGRAULIS ENCRASICOLUS		0.01								0.01					0.01		0.04
GADUS MORHUA		0.01	+	0.01		1.16	1.07	1.15		0.02		0.01	0.54	+	0.34	0.01	0.01
GASTEROSTEUS ACULEATUS	0.48	1.21	15.94	0.01	0.02		+		0.16	0.05	0.01	0.15	0.01	+	0.05	0.45	0.02
HYPEROPLUS LANCEOLATUS																0.02	
LIMANDA LIMANDA	0.29		0.14							0.12					0.21		
MELANOGRAMMUS AEGLEFINUS								0.31									
MERLANGIUS MERLANGUS	0.02		0.01	0.04		0.10		4.44	0.02	0.08		0.14	0.83	0.01			
PHOLIS GUNNELLUS																0.03	
PLATICHTHYS FLESUS			1.17	0.72		0.67		0.30		1.67	0.12	1.37			0.22	0.76	
PLEURONECTES PLATESSA	0.09					0.11			0.42	0.83					0.18	0.17	
POMATOSCHISTUS MINUTUS	+	+	0.01	0.01	+	+		+	+	+	+		+	+	+	+	+
SCOMBER SCOMBRUS														1.04			
SPRATTUS SPRATTUS	0.14		5.55	18.62	2.05	43.79	7.71	5.99	0.12	0.30	0.34	0.15	0.47	0.10	11.74	0.06	
Total	**1.71**	**1.30**	**24.57**	**23.09**	**2.12**	**47.57**	**54.82**	**13.52**	**1.00**	**7.36**	**0.65**	**4.73**	**3.45**	**8.39**	**141.05**	**2.37**	**4.29**