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Cruise Report
FRV „Solea“ cruise 812
05.10. - 24.10.2022

Hydroacoustic survey for the assessment of small pelagics in the Baltic Sea (GERAS/BIAS)

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

1. Summary

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 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 35th 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 2021.

Altogether, 1208 nautical miles of hydroacoustic transects (plus 175 nmi daytime/repeat transects for comparison) 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 49 fishery hauls were conducted. Vertical hydrography profiles were measured on 74 stations.

In all subdivisions covered, mean NASC values per nautical mile per ICES statistical rectangle were mostly either distinctly lower or distinctly higher than the values measured in 2021. Compared to the long-time survey mean since 1991, mean NASC values were lower in 21 out of 28 rectangles covered. On ICES subdivision scale, mean NASC values were overall distinctly higher than in the previous year in subdivisions 21 and 22, while in SD 23 and 24 lower mean NASC values were recorded.

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 SB812:

- 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 1208 nautical miles (2021: 1124 nmi) (Figure 1).

3. Cruise narrative and preliminary results

3.1 Cruise narrative

The 812th cruise of FRV "Solea" represents the 35th subsequent GERAS survey. Generally, survey operations during the GERAS/BIAS are conducted during nighttime to account for a more pelagic distribution of clupeids at that time. Equipment of the vessel took place on October 5th in Kiel port, when also a calibration of the echosounders had been planned but had to be postponed. On October 6th, survey operations commenced in SD 22 (Belt Sea). After covering some sections of the southwestern area of SD 22 and the northeastern transects in this subdivision, survey operations commenced in SD 24 (Arkona Sea) on October 9th, with that SD fully covered on October 13th. On October 14th and 15th, the remaining transect sections in the southwestern part of SD 22 were accomplished before FRV "Solea" entered Kiel port for a short cruise break (exchange of scientific crew members) on October 16th. Later that day, the calibration of the echosounders used during the survey took place in Strande Bay. Afterwards, FRV "Solea" continued to SD 23 (the Sound), which was sampled several times during regular night transects (17. & 22.10.) as well as for comparison during daytime (18. & 23.10.). Subdivision 21 (Kattegat) was covered from Oct 18th-21st. Survey operations in SD 21 had to be interrupted for 0.5 nights due to inclement weather, which did not restrict full coverage of the transects in that SD. After accomplishing all planned transects in all SDs, another daytime comparison was conducted in SD 23. FRV "Solea" returned to Rostock harbor, where the survey ended after unloading of the scientific equipment and samples on October 25th.

Altogether, the following survey schedule was accomplished:

Belt Sea	(SD 22)	6.- 8.10. & 14.-15.10.
Arkona Sea	(SD 24)	9.-13.10.
Sound	(SD 23)	17. & 22.10. (23.10.)
Kattegat	(SD 21)	18. - 21.10.

Total survey time	16 nights (incl. 0.5 days loss due to bad weather)
Fishery hauls	49
CTD-casts	74
Hydroacoustic transects	1208 nmi (+ 175 nmi daytime/ repeated transects for comparison)

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 in Strande Bay (54°26.30 N, 10°11.85 E) on October 16th. 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 13 software (Echoview Software Pty Ltd, 2022). 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 used and recorded from an omnidirectional Simrad CS90 sonar 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 2022. In general, the majority of these NASC measurements can be allocated to clupeids. Altogether, 28 ICES statistical rectangles were covered in the survey 2022 (25 in 2020). In the rectangles covered in both years, the mean NASC in 2022 was higher than in 2020 (partly significantly) in 14 rectangles. In three rectangles the mean NASC was in the range of 2021. In the 8 other rectangles, mean NASC values were partly well below the already low values measured in 2021. Compared with the long-term survey mean (1991-2021), the mean NASC measured in 2022 was again lower in 21 out of 28 rectangles. On ICES subdivision scale, mean NASC values were overall distinctly higher than in the previous year in subdivisions 21 (Kattegat) and 22 (Belt Sea), while in SD 23 (the Sound) and 24 (Arkona Sea) lower mean NASC values were recorded.

In the rectangles of SD 21 covered both in 2022 and 2021, overall NASC values measured were higher than those measured in the previous year along the Swedish coast of the Kattegat (41G2, 42G2) and in the central Kattegat (42G1). In the southern Kattegat, the mean NASC per 1 nmi EDSU measured was slightly higher (41G0) or distinctly lower (41G1) than the values measured in the previous year. The three rectangles in the northern Kattegat not covered in 2021 showed lower NASC values than the long-term survey average. In general, aggregations of clupeids were mostly observed in the central and northern parts of the SD 21 survey area and along the Swedish coast.

In SD 22, the mean overall NASC values recorded were higher than in the previous years in 10 out of 11 rectangles surveyed. Highest increases were recorded in Kiel Bight (38G0), the western parts of that subdivision (39F9), in areas north of the Belt Sea adjacent to the Kattegat (40G0) as well as in the Belts (39G0, 39G1).

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 2022 to the extent observed prior to 2016. NASC values in rectangles 39G2 and 40G2 were again below the survey mean, but in the range of (40G2) or distinctly

higher (39G2) than in 2021. Once again, a massive aggregation of herring was detected in rectangle 41G2 located at the narrow isthmus in the northern Sound in an otherwise rather "empty" rectangle.

In SD 24, mean NASC values were comparable (1) or distinctly lower (7) than the levels measured in 2021 in 8 out of 9 rectangles. Only in 37G3 (east of Rügen Island), the mean NASC values per rectangle were higher than the values measured in 2021. Mean NASC values were lower than the long-term survey average (1991-2021) in all rectangles covered in SD 24. Notable aggregations were detected around Rügen Island, the southeastern Arkona Sea bordering the Bornholm Basin (38G4) and in Faxe Bugt (39G2).

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

Fishery hauls according to ICES Subdivision (Figure 1):

SD	Hauls (n)
21	12
22	16
23	5
24	16

Altogether, 1 399 individual herring, 781 sprat, 352 European anchovies and 60 sardines were frozen for further investigations (e.g. determining sex, maturity, age). Results of catch compositions by Subdivision are presented in Tables 1-4. Altogether, 27 different fish species were recorded. Out of 49 hauls in total, herring were caught in 47, sprat in 42, anchovies in 39 and sardines in 5. Again, SD 23 showed amongst the highest mean herring catch rate per station (kg 0.5 h^{-1}) in the data series, which however was only caused by one exceptionally large haul in the northern part of the Sound (Haul 33). Similar to previous years, anchovies (*Engraulis encrasicolus*) were present in most parts of the survey area except from the Sound (SD 23). Sardines (*Sardina pilchardus*) were only present in catches from SD 21, albeit in low numbers. Figure 3 depicts a representation of the standardized clupeid catch per haul.

Altogether, the following fish species were sampled and processed:

Species	Length measurements (n)	Prevalence (n of hauls)
Aphia minuta	591	27
Belone belone	12	9
Clupea harengus	8 578	47
Engraulis encrasicolus	2 771	39
Gadus morhua	95	24
Gasterosteus aculeatus	899	30
Limanda limanda	24	13
Merlangius merlangus	448	33
Platichthys flesus	26	11
Pleuronectes platessa	12	7
Pomatoschistus minutus	396	28
Sardina pilchardus	83	5
Scomber scombrus	5 081	25
Sprattus sprattus	6 308	42
Squalus acanthias	53	2
Trachinus draco	228	13
Trachurus trachurus	169	28
Others	124	-

Figure 4 shows the relative length-frequency distributions of herring and sprat in ICES subdivisions 21, 22, 23 and 24 for the years 2021 and 2022. Compared to results from the previous survey in 2021, the following conclusions for **herring** can be drawn:

- In 2022 catches in SD 21 were dominated by the incoming year class at 12-17 cm length with a mode at 15 cm and only low contributions of larger herring. This is in contrast to 2021, when catches in SD 21 were dominated by herring >15 cm with a mode at 18.75 cm and minor contributions of the incoming year class (ca. ≤15 cm).
- As in the previous year, catches in SD 22 were dominated by the incoming year class (ca. ≤15 cm), but with somewhat higher contributions of small herring <10 cm.
- In SD 23 a significant contribution of herring >20 cm was again recorded. Catches showed a mode at ca. 26.75 cm (2021: 26.25 cm). Other than in the previous year, minor contributions of very small herring (mode at ca. 7 cm) and the incoming year class (mode at ca. 15 cm) were registered.
- In 2022, catches in SD 24 showed a bimodal distribution with modes at ca. 13 cm and 18 cm, whereas catches in the previous year were characterized by a trimodal distribution with modes at 9.25 cm, 13.25-14.25 cm and 17.25 cm, with also lower contributions of fishes <15 cm than in 2022. Both in 2022 as well as in the previous survey, herring larger than ca. 25 cm were almost absent.

Relative length-frequency distributions of **sprat** in the years 2021 and 2022 (Figure 4) can be characterized as follows:

- In SD 21 the incoming year class (ca. ≤10 cm) had virtually been absent from catches in 2021. In contrast, some contribution of this year class was observed in in 2022. However, both in 2021 and in 2022 catches in SD 21 were dominated by larger sprat (mode at ca. 13 cm in 2022).
- In 2021, catches in SD 22 had shown a tri-modal distribution with contributions of the incoming year class (ca. ≤10 cm, mode at 9.75 cm) as well as of larger sprat (>10 cm, modes at 11.25 cm and at 13.25 cm, respectively) and a general length range of ca. 7.5-15 cm with only minor contributions of smaller fish. This is contrast to the results of 2022, when catches showed a unimodal distribution indicating an exclusive contribution of the incoming year class (ca. ≤10 cm) with a mode at ca. 8.5 cm and virtually no sprat measured >10.5 cm.
- In SD 23, catches of sprat resembled the observations made in 2021 with catches dominated by larger fish (>10 cm) at a mode of ca. 14.25 cm. Other than in 2021, a low but distinct contribution of the incoming year class was observed in 2022.
- In SD 24, catches of sprat also highly resembled the observations made in 2021 and showed a bimodal distribution with a distinct contribution of the incoming year class (ca. ≤10 cm, mode at 8.75 cm) and also a notable contribution of larger, older sprat (>10 cm, mode at ca. 12.75 cm).
- Altogether, the contribution of the incoming year class (ca. ≤10 cm) seemed to be higher than in 2021 and 2020.

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, 74 CTD casts were conducted during this survey (Figure 6).

Surface temperatures were higher than in the previous year in some areas, ranging from > 12°C in the central Kattegat area (SD 21) to 14°C, and partly higher in the southwestern parts of the survey area (SD 22) and the Arkona Sea (SD 24). In general, surface temperatures were highest in the southern part of the survey area. 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 (~ 8°C). The deeper parts of the Sound and the Kattegat were comparatively warm with temperatures around 12°C. Temperatures near the seafloor were generally higher in the shallow areas of SD 21-24, but in the central and eastern parts of

the Arkona Sea (SD 24), bottom temperatures were relatively high at ~ 14 °C and exceeded surface temperatures.

As usual, due to the hydrographic nature of the western Baltic Sea, surface salinities showed a large gradient (from ca. 7.5 PSU in the southeastern Arkona Sea to > 25 PSU in the Kattegat). Surface salinities in the western parts of the survey area were comparable to the values recorded in the previous year and exceeded 15 PSU south of the Belt Sea. Salinity near the seafloor ranged from 8 PSU in the Arkona Sea to ca. 34 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 measured in the inner Mecklenburg Bight (SD 22) and the western SD 22 area of the southern Little Belt as well as in the deep parts of the southeastern Arkona Sea (Bornholm Basin area). In 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 (16.-24.10.)	Cruise Leader (Hydroacoustics, Hydrography)	TI-SF
L. Hartkens (5.-16.10.)	Cruise Leader (Hydroacoustics, Hydrography)	TI-SF
Dr. S. Gastauer (16.-24.10.)	Hydroacoustics, Hydrography	TI-SF
A. Georgi	Fishery biology	TI-OF
M. Koth	Fishery biology	TI-OF
N. Lyse (5.-16.10.)	Fishery biology	DTU-Aqua (DK)
S. Niemann (16.-24.10.)	Fishery biology	TI-OF
K. Paetz (5.-16.10.)	Fishery biology	TI-SF
J. Plewka (16.-24.10.)	Fishery biology	TI-SF
J. Stounberg (16.-24.10.)	Fishery biology	DTU-Aqua (DK)

5. References

Echoview Software Pty Ltd (2022) Echoview software, version 13 (13.0.396). 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 S. Meier 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

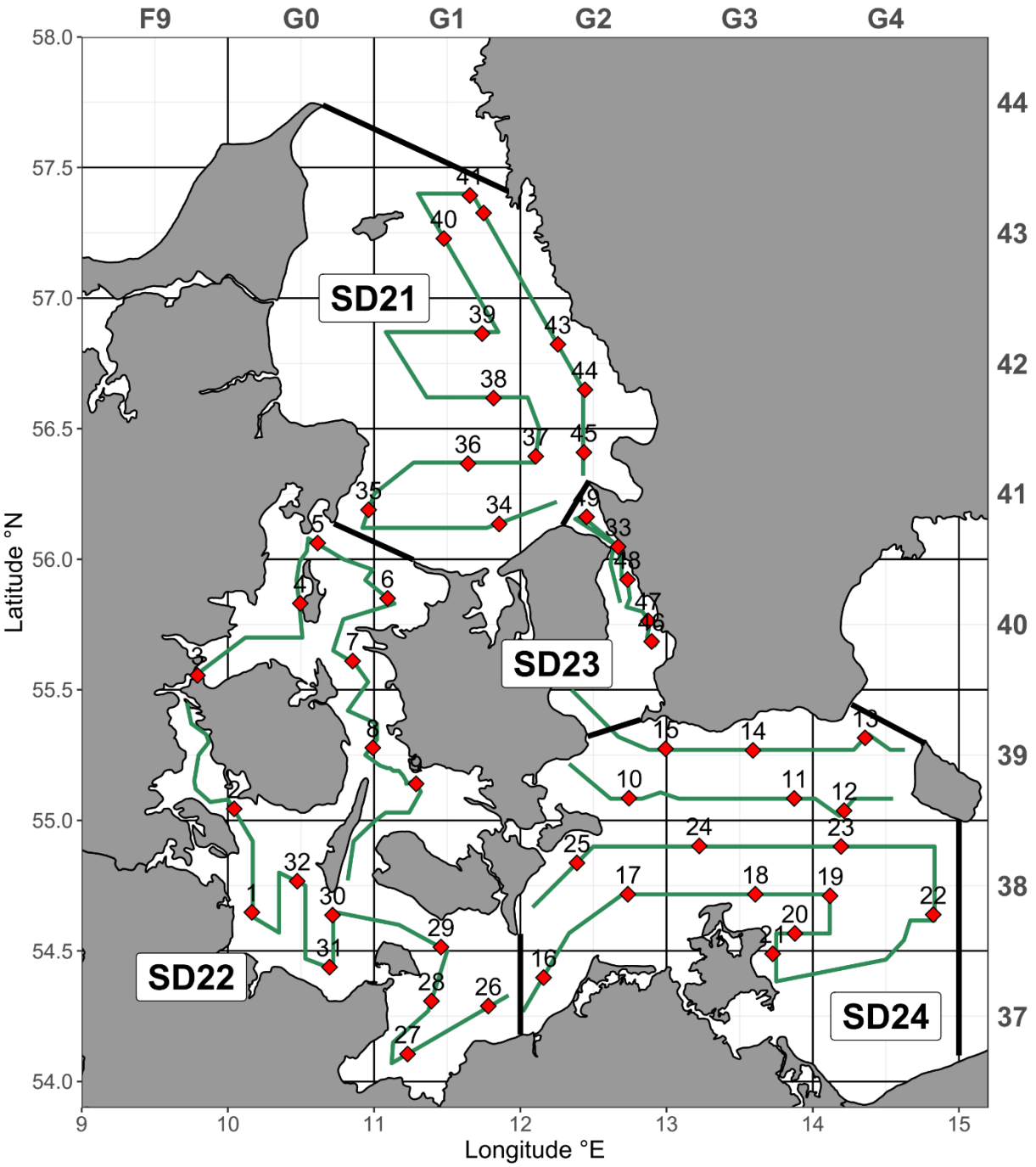

Figure 1: FRV "Solea" cruise 812/2022. Cruise track (dark green lines) and fishery hauls (red diamonds). ICES statistical rectangles are indicated in the top and right axis. Thick black lines separate ICES subdivisions (SD).

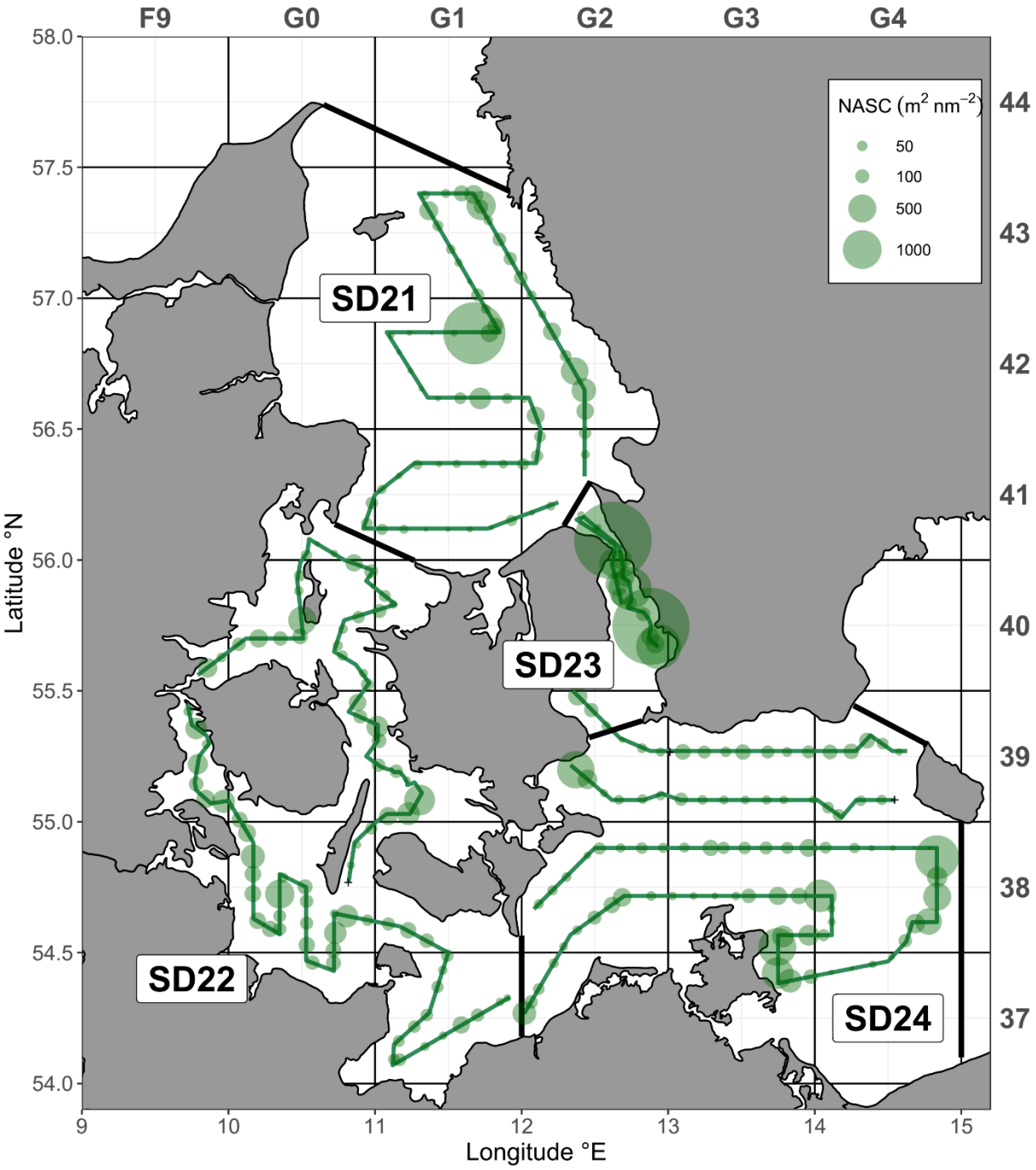

Figure 2: FRV "Solea" cruise 812/2022. Cruise track (thin grey lines) and mean NASC (5 nmi intervals, dots). ICES statistical rectangles are indicated in the top and right axis. Thick black lines separate ICES subdivisions.

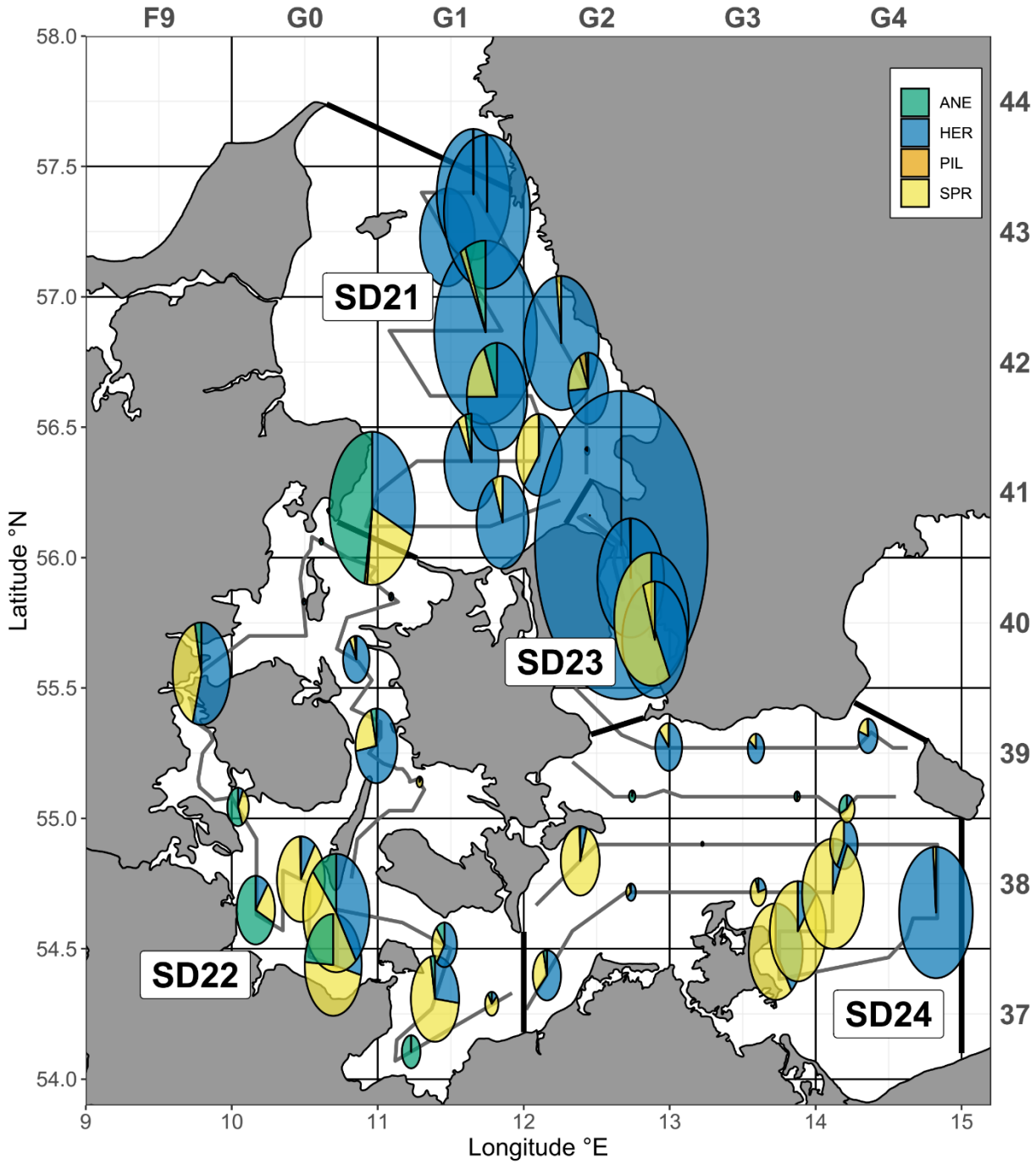

Figure 3: FRV "Solea" cruise 812/2022. Clupeid catch per haul (kg 30min^{-1}). ANE = European anchovy (*Engraulis encrasicolus*), HER = Herring (*Clupea harengus*), PIL = Sardine (*Sardina pilchardus*), SPR = Sprat (*Sprattus sprattus*). ICES statistical rectangles are indicated in the top and right axis. Thick black lines separate ICES subdivisions. Thin grey lines indicate cruise track.

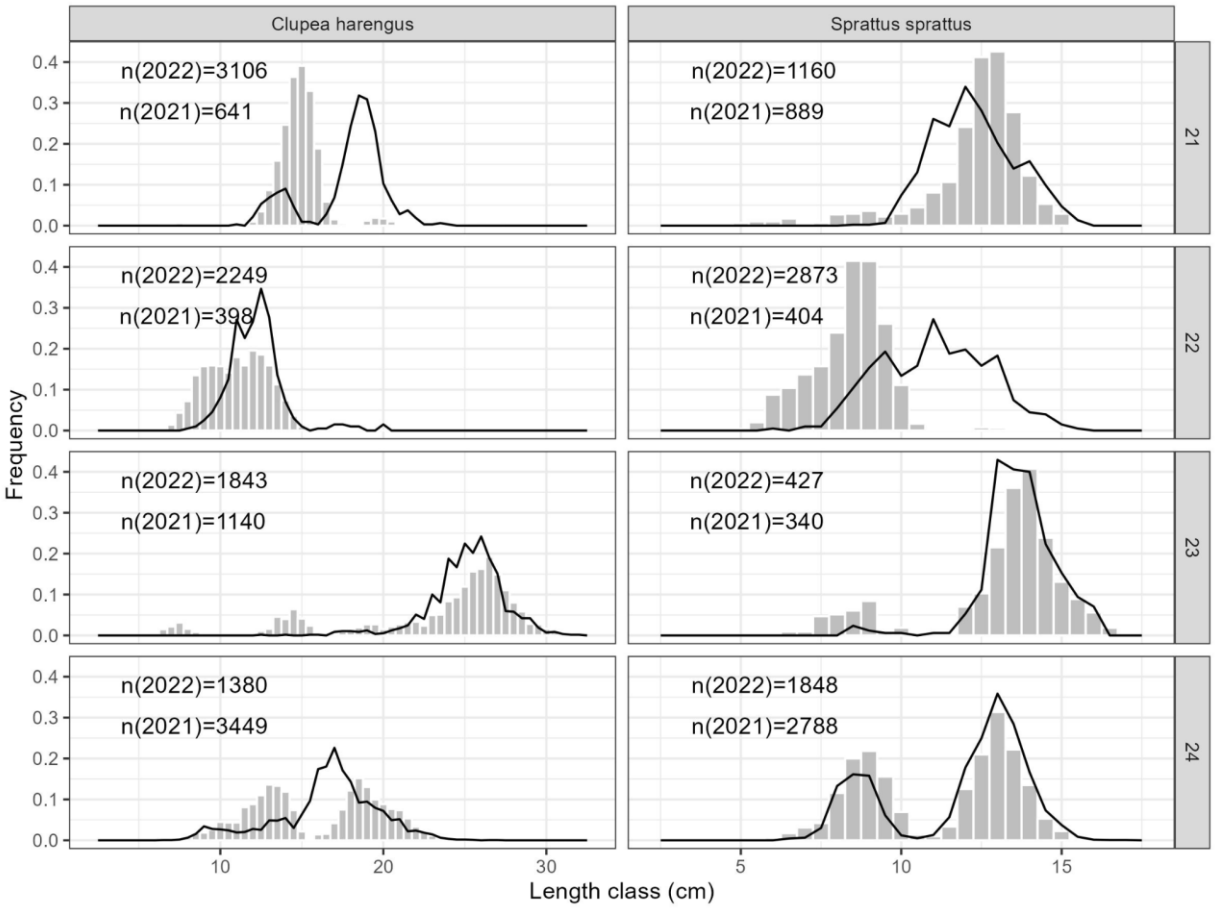

Figure 4: FRV "Solea" cruise 812/2022. Herring (*Clupea harengus*, left) and sprat (*Sprattus sprattus*, right) length-frequency distribution (bars) compared to the previous year (cruise 798/2021, lines).

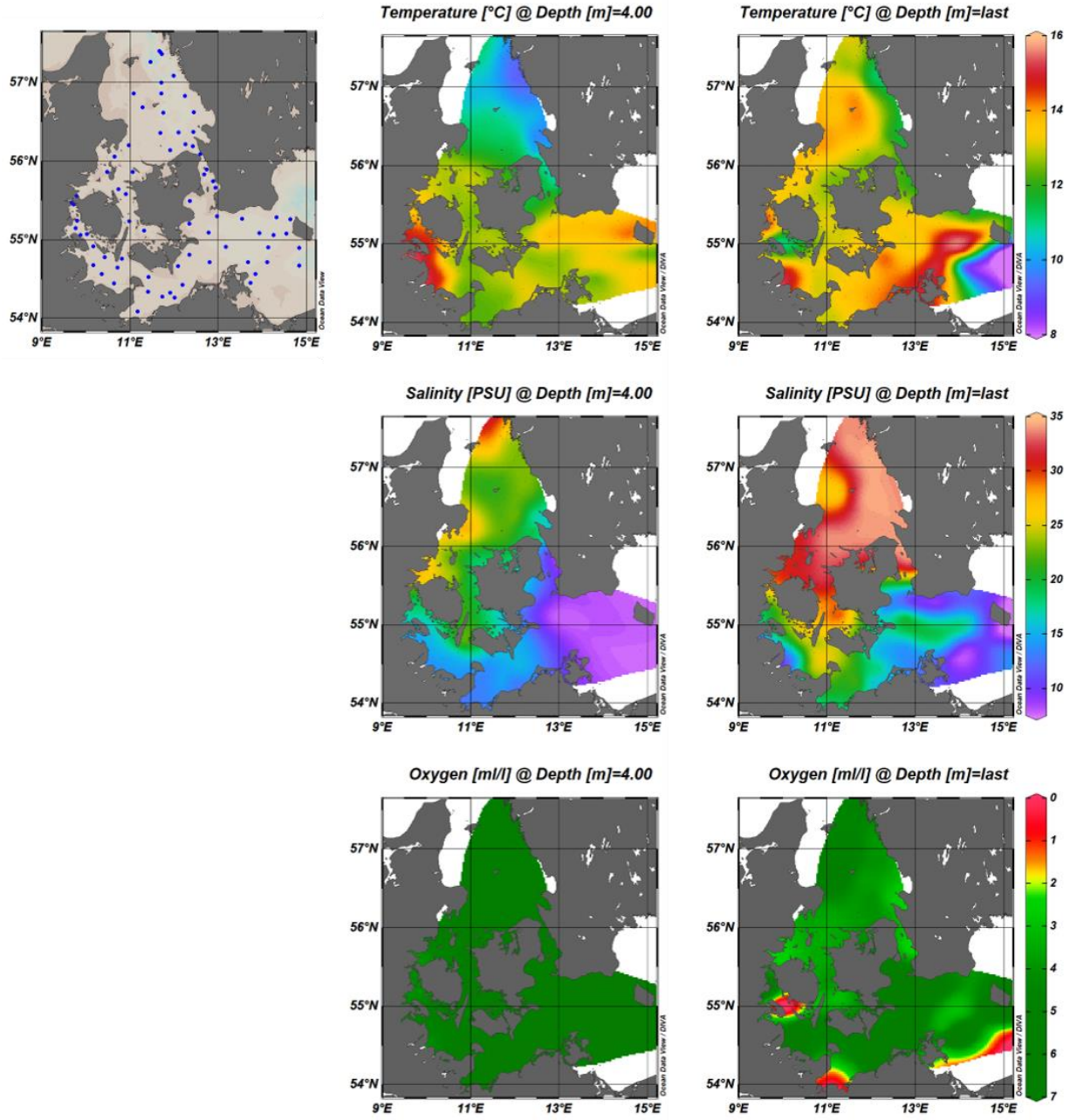

Figure 6: FRV “Solea” cruise 812/2022: Hydrography. CTD stations are depicted as blue dots in the area map (top left). Temperature (°C, top panels), salinity (PSU, middle panels) and oxygen concentration (ml/l, lower panels) at the surface (left) and near the seafloor (right).

Tables

Table 1: FRV "Solea" cruise 812/2022: Catch composition (kg 0.5 h^{-1}) by haul in SD 21 (+ = <0.01 kg).

Haul No.	34	35	36	37	38	39	40	41	42	43	44	45
Species/ICES Rectangle	**41G1**	**41G0**	**41G1**	**41G2**	**42G1**	**42G1**	**43G1**	**43G1**	**43G1**	**42G2**	**42G2**	**41G2**
APHIA MINUTA		0.01	+	0.49	0.02					0.48	0.28	+
CLUPEA HARENGUS	19.38	48.96	21.83	8.59	25.72	399.60	24.49	74.88	243.81	81.80	7.09	0.24
ENGRAULIS ENCRASICOLUS	0.01	74.34	0.86	0.03	2.39	28.09		0.02	0.37	+	0.21	0.02
EUTRIGLA GURNARDUS		0.003		+	+		0.05	+				+
GADUS MORHUA		0.06			0.02							
GASTEROSTEUS ACULEATUS	+	0.01			0.01							
LIMANDA LIMANDA		0.20	0.05					0.09			0.30	
MELANOGRAMMUS AEGLEFINUS							0.03	0.21				
MERLANGIUS MERLANGUS	0.30	0.43	0.20	0.03	1.35	0.63	0.25	0.82	0.95	0.38	1.08	0.06
MERLUCCIUS MERLUCCIUS							0.23		0.16	0.11		
PLEURONECTES PLATESSA		0.95										
POMATOSCHISTUS MINUTUS	+	+			0.01	+	+			+	+	+
SARDINA PILCHARDUS		1.54			0.06					0.02	0.50	0.01
SCOMBER SCOMBRUS	0.20	2.42	7.90	8.65	0.64	10.02	0.04	0.93	0.38	2.93	0.60	0.04
SPRATTUS SPRATTUS	1.03	33.21	1.18	5.35	6.14	7.29		0.00	0.04	1.74	1.79	0.03
SQUALUS ACANTHIAS							1.11		764.24			
TRACHINUS DRACO	25.20		3.40		2.63	0.54	0.04	0.16	0.18	0.34	0.07	0.12
TRACHURUS TRACHURUS	0.07	0.08	0.03		0.04	0.03	0.01	0.02	0.083	0.01	0.06	0.03
TRISOPTERUS ESMARKI							0.04	0.60	0.04			
Total	**46.20**	**162.22**	**35.45**	**23.13**	**39.03**	**446.20**	**26.28**	**77.73**	**1010.25**	**87.81**	**11.98**	**0.53**

Table 2: FRV "Solea" cruise 812/2022: Catch composition (kg 0.5 h^{-1}) by haul in SD 22 (+ = <0.01 kg).

Haul No.	1	2	3	4	5	6	7	8	9	26	27	28	29	30	31	32
Species/ICES Rectangle	**38G0**	**39G0**	**40F9**	**40G0**	**41G0**	**40G1**	**40G0**	**39G0**	**39G1**	**37G1**	**37G1**	**37G1**	**38G1**	**38G0**	**37G0**	**38G0**
AGONUS CATAPHRACTUS													0.02			
APHIA MINUTA				+		+	0.47	+	+	+	+	0.02	+		0.02	0.01
BELONE BELONE							0.06				0.06	0.04			0.03	
CLUPEA HARENGUS	0.96	0.19	15.84	0.16	0.07	0.17	3.41	7.89	0.05	0.17		4.30	2.05	19.69	7.94	1.60
CTENOLABRUS RUPESTRIS		+		0.01					0.03							
CYCLOPTERUS LUMPUS							0.35								0.49	
ENGRAULIS ENCRASICOLUS	5.99	1.45	1.06	0.05	0.18	0.10	0.08	0.47	+	0.12	1.99	0.50	0.38	6.20	6.77	0.10
GADUS MORHUA	6.47	+		+		+		0.01	+			0.26			7.07	0.02
GASTEROSTEUS ACULEATUS	0.07	0.10			+	0.01		+	+		0.03	0.48	0.17		0.12	0.01
GOBIUS NIGER				+												
LIMANDA LIMANDA	0.39	0.11						0.04	0.06		0.25	0.03	0.07			
MERLANGIUS MERLANGUS	0.02			0.02	0.12	0.05		0.04	0.03	0.04		0.09	0.02		0.08	
PLATICHTHYS FLESUS	0.25															
PLEURONECTES PLATESSA		0.05											0.12			
POMATOSCHISTUS MINUTUS	0.01					+		+	0.01			0.01	0.03	+	+	0.01
SCOMBER SCOMBRUS			6.49				0.14				0.06	0.11		0.06	1.38	
SPRATTUS SPRATTUS	1.73	0.91	11.92	0.02		0.03	0.25	2.49	0.37	0.92		11.39	0.96	23.49	13.41	14.27
SYNGNATHUS TYPHLE											+					+
TRACHINUS DRACO					0.09	0.03	0.06									
TRACHURUS TRACHURUS	0.01			+		0.07	0.04	0.04		0.01	0.06	0.06	0.01	0.09	0.09	
Total	**15.90**	**2.82**	**35.31**	**0.26**	**0.46**	**0.47**	**4.85**	**10.99**	**0.57**	**1.26**	**2.45**	**17.29**	**3.83**	**49.52**	**37.40**	**16.03**

Table 3: FRV "Solea" cruise 812/2022: Catch composition (kg 0.5 h^{-1}) by haul in SD 23 (+ = <0.01 kg).

Haul No.	33	46	47	48	49
Species/ICES Rectangle	**41G2**	**40G2**	**40G2**	**40G2**	**41G2**
APHIA MINUTA			0.21	+	+
BELONE BELONE		0.03	0.06		
CLUPEA HARENGUS	27294.00	43.69	33.92	50.44	
CTENOLABRUS RUPESTRIS			0.02		
ENGRAULIS ENCRASICOLUS		0.00			0.00
EUTRIGLA GURNARDUS					0.00
GADUS MORHUA		1.10	2.96		
GASTEROSTEUS ACULEATUS			0.00		0.00
MERLANGIUS MERLANGUS			2.54	0.13	0.01
PLEURONECTES PLATESSA				0.18	
SCOMBER SCOMBRUS	6.42	0.46	1.08		
SPRATTUS SPRATTUS		2.71	47.14	0.16	
TRACHURUS TRACHURUS					0.02
TRISOPTERUS ESMARKI				0.01	
Total	**27300.42**	**47.98**	**87.94**	**50.92**	**0.03**

Table 4: FRV "Solea" cruise 812/2022: Catch composition (kg 0.5 h^{-1}) by haul in SD 24 (+ = <0.01 kg).

Haul No.	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Species/ICES Rectangle	**39G2**	**39G3**	**39G4**	**39G4**	**39G3**	**39G2**	**37G2**	**38G2**	**38G3**	**38G4**	**38G3**	**37G3**	**38G4**	**38G4**	**38G3**	**38G2**
APHIA MINUTA			+				+	0.01	+						+	+
BELONE BELONE	0.07										0.06			0.06		
CLUPEA HARENGUS	0.02	0.10	0.19	1.69	1.40	3.38	2.72	0.50	0.33	2.91	3.06	9.40	75.26	2.40	0.09	0.50
CYCLOPTERUS LUMPUS				0.19	0.16					0.65	0.35			0.28		
ENGRAULIS ENCRASICOLUS	0.43	0.19	0.46	0.01			0.18	0.05	0.09		0.02				0.06	0.04
GADUS MORHUA	+	0.01	+	0.22	0.01		0.04	0.01	0.01			1.71	3.38			0.02
GASTEROSTEUS ACULEATUS	1.17	0.13	2.11		0.02	0.03	0.05		0.12	0.27	0.15	0.06	0.17	0.01	0.17	0.05
GOBIUS NIGER	+		+													
LIMANDA LIMANDA				0.09												0.09
MERLANGIUS MERLANGUS		+	0.01				0.05	0.01	0.01			0.13	0.09			0.05
PLATICHTHYS FLESUS		0.17	0.36	1.00	0.26				0.45	0.72	0.23		0.51		1.10	0.35
PLEURONECTES PLATESSA			0.10						0.21				0.51			
POMATOSCHISTUS MINUTUS	0.01	0.06	0.03	0.01		+		+	0.01		+		+		0.02	0.01
RHINONEMUS CIMBRIUS			0.09													
SCOMBER SCOMBRUS							0.04		0.05			0.19				0.05
SPRATTUS SPRATTUS		0.09	0.83	0.42	0.26	0.48	1.36	0.22	1.11	34.58	23.52	14.06	0.96	1.71		8.42
TRACHURUS TRACHURUS							0.22	0.02	0.01						+	0.01
Total	**1.71**	**0.76**	**4.18**	**3.63**	**2.11**	**3.90**	**4.66**	**0.81**	**2.40**	**39.14**	**27.39**	**25.55**	**80.88**	**4.46**	**1.45**	**9.58**