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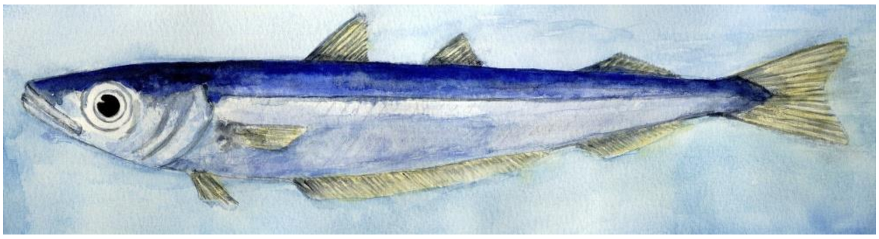

INTERNATIONAL BLUE WHITING SPAWNING STOCK SURVEY (IBWSS) SPRING 2025

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Material and methods

Survey planning and Coordination

Coordination of the survey was initiated at the meeting of the Working Group on International Pelagic Surveys (WGIPS) in January 2025 and continued by correspondence until the start of the survey. Spain did not participate in the 2025 survey due to lack of availability of a vessel. During the survey, effort was refined and adjusted by the survey coordinator (Norway) using real time observations. Participating vessels together with their effective survey periods are listed below:

Vessel	Institute	Effective survey period
Celtic Explorer	Marine Institute, Ireland	23/3 – 06/04
Jákup Sverri	Faroe Marine Research Institute, Faroe Islands	29/3 – 08/04
Tridens	Wageningen Marine Research, the Netherlands	15/3 – 31/03
Vendla	Institute of Marine Research, Norway	23/3 – 02/04

Survey design was based on methods described in ICES Manual for International Pelagic Surveys (ICES, 2015). Weather conditions during the first week were very good. However, from 22 March onwards weather conditions deteriorated, and during the period 27 to 30, all participating vessels ceased surveying due to storm conditions. All participating vessels experienced downtime of two or more days. As a result, it was decided to exclude stratum 5 (Rockall Plateau/Hatton Bank area) and refocus effort to ensure coverage within the core area (stratum 3). Stratum 7 (Porcupine Seabight) was covered in the northern sector by pre-planned effort from the Dutch vessel, but not in the south due to no Spanish participation. Area coverage for core strata was maintained through reallocation of sampling effort between vessels. The entire survey was completed in 23 days, exceeding the agreed 21-day target threshold (Figure 3).

Vessel cruise tracks, trawl positions and survey stratification are shown in Figure 1. CTD and plankton stations are in shown in Figure 2. Communication between vessels occurred daily via email to the coordinator (Norway) exchanging up to date information on blue whiting distribution, echograms, fleet activity and biological information. Tridens keeps a weblog during the survey with echograms, catches and additional information.

Sampling equipment

All vessels employed a single midwater trawl for biological sampling, the properties of which are provided in Table 1. Acoustic equipment for data collection and processing are presented in Table 2. Survey abundance estimates are based on acoustic data collected from calibrated scientific echo sounders using an operating frequency of 38 kHz. All transducers were calibrated using a standardised sphere calibration (Demer et al. 2015) prior, during or directly after the survey. Acoustic settings by vessel are summarised in Table 2.

Biological sampling

All components of the trawl haul catch were sorted and weighed; fish and other taxa were identified to species level where possible. A summary of biological sampling by vessel is provided in Table 3.

Hydrographic sampling

Hydrographic sampling (vertical CTD casts) was carried out by each vessel at predetermined locations (Figure 2 and Table 3). Depth was capped at a maximum depth of 1000 m in open water.

Plankton sampling

Plankton sampling, by way of vertical WP2 casts, was carried out by the RV *Jákup Sverri* (FO) to a depth of 200 m (Table 3). WP2 casts were also carried out by FV *Vendla* (NO), with a focus on sampling blue whiting eggs to a depth of 400 m.

Acoustic data processing

Echogram scrutinisation for blue whiting was carried out by experienced personnel, with the aid of trawl composition information. Post-processing software and procedures are described by vessel below;

On RV *Celtic Explorer*, acoustic data were backed up every 24 hrs and scrutinised using Echoview (V 14.0) post-processing software for the previous day's work. Data was partitioned into the following categories: blue whiting and mesopelagic fish species. For mesopelagic fish, categorisation was based on criteria agreed at WGIPS 2021 (ICES 2021, Annex 22).

On RV *Jákup Sverri*, acoustic data were scrutinised every 24 hrs on board using LSSS (3.0.0) post processing software. Data was partitioned into the following categories: plankton, mesopelagics/krill and blue whiting. Partitioning of data into the above categories was based on trawl samples and acoustic characteristics on the echograms.

On RV *Tridens*, acoustic data were backed up continuously and scrutinised every 24 hrs using the Large Scale Survey System LSSS (3.0.0) post-processing software. Blue whiting was identified and separated from other recordings based on trawl catch information and characteristics of the recordings. Recordings have been assigned to blue whiting and mesopelagic fish species, based on the criteria at WGIPS 2021 (ICES 2021, Annex 22).

On FV *Vendla*, the acoustic recordings were scrutinized using LSSS (2.17.0) once or twice per day. Data was partitioned into the following categories: plankton (<120 m depth layer), mesopelagic species and blue whiting.

Acoustic data analysis

Acoustic data were analysed using the StoX software package (V4.1.3) and R-StoX packages software package (RStoX Framework 4.0.0, RStoX Base 2.0.0 and RStoX Data 2.0.0). A description of StoX software package is provided by Johnsen et. al. (2019). Estimation of abundance from acoustic surveys using StoX is carried out according to the stratified transect design model developed by Jolly and Hampton (1990). Baseline survey strata, established in 2017, were adjusted based on survey effort and observations in 2025 (Figure 1). Area stratification and transect design are shown in Figure 1 and 4. Within StoX, length and weight data from trawl samples were equally weighted and applied across all transects within a given stratum (Figure 4).

Following the decisions made at the Workshop on implementing a new TS relationship for blue whiting abundance estimates (WKTSBLUES, ICES 2012), the following target strength (TS)-to-fish length (L) relationship (Pedersen et al. 2011) is used:

$$TS = 20 \log10 (L) - 65.2$$

In StoX an impute super-individual table is produced where abundance is linked to population parameters including age, length, weight, sex, maturity etc. This table is used to split the total abundance estimate by any combination of population parameters. The StoX project folder for 2025 is available on request.

Estimate of relative sampling error

For the baseline run, StoX estimates the number of individuals by length group which are further grouped into population characteristics such as numbers at age and sex.

A total length distribution is calculated, by transect, using all the trawl stations assigned to the individual transects. Conversion from NASC (by transect) to mean density by length group by stratum uses the calculated length distribution and a standard target strength equation with user defined parameters. Thereafter, the mean density by stratum is estimated by using a standard weighted mean function, where each transect density is weighted by transect distance. The number of individuals by stratum is given as the product of stratum area and area density.

The bootstrap procedure to estimate the coefficient of variance randomly replaces transects and trawl stations within a stratum on each successive run. The output of all runs are stored in a RData-file, which is used to calculate the relative sampling error.

Results

Stock size

The estimated total stock biomass (TSB) of blue whiting for the 2025 international survey was 2.3 million tonnes, representing an abundance of 24.2×10^9 individuals (Table 4). This is a 29% decrease in total stock biomass and a 34% decrease in total stock numbers (TSN) from observations in 2024 (Table 4). The spawning stock biomass (SSB) was estimated at 2.2 million tonnes representing 23.3×10^9 individuals (Table 5). This is a 28% decrease in the observed spawning stock biomass and a 33% decrease in the spawning stock numbers (SSN) compared to last year. The age structure of the stock remains comparable to 2024, in that it is still dominated by the 2020- and 2021-year classes (74% combined).

Distribution of blue whiting

In total, 5,533 nmi (nautical miles) of survey transects (EDSU) were completed across six strata, relating to an overall geographical coverage of 100,490 nmi² (Figure 1, Tables 3 & 7), Area coverage saw a decrease (21%) as compared to 2024, this can be accounted for by the omission of stratum 5 (Rockall Bank) and the partial coverage of stratum 7 (Porcupine Seabight) as Spain did not participate this year. Poor weather conditions resulted in the reallocation of survey effort to ensure coverage in core stratum areas. The northern sector of stratum 6 (Faroes/Shetland Channel) saw incomplete coverage as compared to 2024, with two transects omitted due to poor weather conditions earlier in the survey and available time.

The distribution of blue whiting in 2025 saw a constriction of distribution along the continental shelf edge as compared to 2024, where blue whiting aggregations had previously extended further westward into the Rockall Trough. The centre of gravity, containing the highest density of aggregations, were observed close to the shelf edge from 55°N to 59°N within the core stratum 3 (Figures 6 & 7). The northern centre of gravity of blue whiting may indicate that spawning had occurred earlier as compared to 2024.

Of the six survey strata, all saw a decrease in abundance and biomass as compared to 2024 (Table 4), with the exception of stratum 6 (TSB 2%, TSN -6%). The reduction in biomass and abundance reported at stratum level is in agreement with the overall reduction in the TSB and TSN estimates for 2025. All survey strata were surveyed by at least two vessels, and the largest area (stratum 3) was covered by four vessels. Temporal progression was considered good.

The Porcupine Bank (stratum 1), saw a decrease of 63% in TSB and 65% in TSN, as compared to 2024. The North Porcupine Bank (stratum 2), historically a high abundance area, saw a reduction of 40% in TSB and 50% in TSN. Observation would indicate that the bulk of the stock had already migrated north at the time of the survey. The core area (stratum 3), where the bulk of the stock was located, saw a reduction of 19% in TSB and 25% in TSN. Stratum 4 (South Faroes) saw a reduction of 16% in TSB and 13% in TSN. Stratum 5 (Rockall Bank), was not surveyed. Stratum 7 (Porcupine Seabight), was partially covered (northern area) and saw a reduction of 75% in TSB and 74% in TSN.

Echograms

Each survey participant provided an echogram of their highest density registration (NASC) per 1 nmi EDSU (Figure 7a-d).

Stock composition

Otolith aged fish from the survey showed ages from 1 to 12 years (10+ group), Table 5 and Figure 11.

The spawning stock biomass was dominated by the age groups 4 and 5, respectively. Combined, these age cohorts represent 74% of TSB and 69% of TSN. In terms of abundance, 4-year-olds (2021 year-class) were most abundant (50%), followed by the 5-year-olds (2020 year-class) at 20%.

The largest fish were found in stratum 7, with a mean length of 26.3 cm and a mean weight of 102.3 g (Figures 8 & 9).

Immature fish represented 2% of TSB and 3% of TSN. Over 96% of the 2-year-old fish were mature contributing to the SSB of the stock (Table 5).

The CV of the total estimate of abundance was 0.17, which is higher than 2024 (2024= 0.13, 2023= 0.16 and 2022= 0.19).

The survey time series (2004-2025) of TSN and TSB are presented in Figures 13 and 14 respectively and Table 6.

Hydrography

A total of 98 CTD casts were undertaken over the course of the survey (Table 1). Horizontal plots of temperature and salinity at depths of 50 m, 100 m, 200 m and 500 m as derived from vertical CTD casts are displayed in Figures 15-18, respectively. A decrease in salinity observed in 2017 persisted through 2018 and 2019, but seems to have reversed again in 2020 with an increasing trend (K.M. Larsen, pers. comm., Faroe Marine Research Institute). Pre-2020, this is thought to have limited the western extent of the blue whiting spawning distribution on the Rockall and Hatton Bank areas. Observations since 2022 are in agreement with a reversing trend (in salinity mainly), with a more western extension of fish into the Rockall Trough than observed in recent years. Last year (2024) blue whiting were found on the eastern slopes of the Rockall Plateau. However, in 2025 almost no blue whiting was observed towards the western part of the transects in the Rockall Trough (stratum 3), indicating an eastward contraction of the fish in 2025.

Mesopelagic fish

Echogram scrutinisation for mesopelagic fish species was conducted by participants during the survey and will be uploaded to the ICES database after further analysis.

Concluding remarks

Main results

- Weather conditions were poor for a portion of the survey, with all vessels experiencing multiple days of weather downtime.
- The International Blue Whiting Spawning Stock Survey 2025 shows an 29% decrease in TSB and a corresponding 34% decrease in TSN as compared to the 2024 estimate.
- In terms of abundance, 4-year-olds (2021 year-class) were most abundant (50%), followed by the 5-year-olds (2020 year-class) at 20%.
- Immature fish represented 2% of TSB and 3% of TSN. Over 96% of the 2-year-old fish were mature contributing to the SSB of the stock.
- Estimated uncertainty around the total stock abundance was CV=0.17 (CV=0.13 in 2024).
- The reduction in area coverage (21%), although significant, occurred in peripheral boundary areas. Effort was reallocated to ensure core strata were covered comprehensively. One transect was conducted in stratum 5 (Rockall Bank) in the south, with no blue whiting observed (Figure 1). Observations in stratum 3 saw the distribution closer to the shelf edge in 2025 than in the previous year. This information, along with fleet activity (focused in the east) informed the decision making process. The group considered that the stock was sufficiently contained within the survey area given the above information.
- Incomplete coverage in the northern sector of stratum 6 (Faroes/Shetland Channel) and the omission of stratum 5 (Rockall Bank) and stratum 7 (south) may in part have contributed to the reduced estimate of biomass and abundance in 2025. However, the contribution of these historically low abundance areas are considered to be minor when compared to the total survey area.
- In terms of biological sampling effort, the number of trawl stations increased by 10% compared to 2024. The stock was considered representatively sampled in number, and across the distribution area.
- The survey was carried out over 23 days, outside the 21-day target window. Temporal progression was considered well aligned, in spite of the poor weather conditions encountered and an improvement on 2024. The group considers this as acceptable. Core areas were representatively sampled by multiple vessels.

Interpretation of the results

- The group considers the 2025 estimate of abundance as robust. Good stock containment was achieved for in core strata.
- The westward expansion of blue whiting into the Rockall Trough was not as widespread as during the period 2020-2024 and could be influenced by a change in hydrographic conditions as well as a consequence of reduced stock size.
- The bulk of SSB was distributed north off the Porcupine Bank and northwards in the Rockall Trough from 55°N to 59°N. A notable decrease was observed in the Porcupine and north Porcupine strata as compared to 2024 and this most likely the result of northward post-spawning migration.

Recommendations

- The group recommends that coverage in the western Rockall/Hatton Bank (stratum 5) should be carried out based on real time observations, including input from national fisheries to monitor westward expansion an eastward contraction phase.
- To facilitate the process of calculating global biomass the group requires that all data be made available as soon as possible, and no later than 72 hours, before the post cruise meeting.
- Hydrographic and Plankton data along with Log book files formats should still be submitted in the PGNAPES format.
- It is recommended that the effective timing of the survey starting point is maintained to begin around the 20th March in 2026.

Achievements

- All survey data were uploaded to the ICES trawl-acoustic database in advance of the post cruise meeting.
- Improved temporal progression between vessels.
- Improved biological sampling and harmonisation of age reading across participants.

References

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Table 1. Country and vessel specific details, IBWSS March-April 2025.

	Celtic Explorer	Jákup Sverri	Tridens	Vendla
Trawl dimensions				
Circumference (m)	768	832	860	832
Vertical opening (m)	50	36	30-70	45
Mesh size in codend (mm)	20	45	40	40
Typical towing speed (kts)	3.5	3.3	3.5-4.0	3.5-4.0
Plankton sampling				
Sampling net	-	WP2 plankton net	-	WP2 plankton net
Standard sampling depth (m)	-	200	-	400
Hydrographic sampling				
CTD Unit	SBE911	SBE911	SBE911	SBE25
Standard sampling depth (m)	1000	1000	900*	1000

Table 2. Acoustic instruments and settings for the primary acoustic sampling frequency, IBWSS March-April 2025. Tridens was not able to carry out CTD downcast because of a shortened to a CTD cable after a reparation.

	Celtic Explorer	Jákup Sverri	Tridens	Vendla
Echo sounder	Simrad EK 60	Simrad EK80	Simrad EK 80	Simrad EK 80
Frequency (kHz)	**38**, 18, 120, 200	18, **38**, 70, 120, 200, 333	18, **38**, 70, 120, 200	18, **38**, 70
Primary transducer	ES 38B	ES 38-7	ES 38B	ES 38B
Transducer installation	Drop keel	Drop keel	Drop keel	Drop keel
Transducer depth (m)	8.8	6-9	8	8.5
Upper integration limit (m)	20	15	15	15
Absorption coeff. (dB/km)	9.4	10.2	9.5	10.0
Pulse length (ms)	1.024	1.024	1.024	1.024
Band width (kHz)	2.43	3.06	2.43	2.43
Transmitter power (W)	2000	2000	2000	2000
Angle sensitivity (dB)	21.9	21.9	21.9	21.9
2-way beam angle (dB)	-20.6	-20.4	-20.6	-20.7
Ts Transducer gain (dB)	26.68	26.84	26.53	26.9
s_A correction (dB)	-0.61	-0.07	-0.2	-0.62
3 dB beam width (dg)				
alongship:	6.59	6.49	6.87	6.95
athw. ship:	6.53	6.53	6.87	6.95
Maximum range (m)	1000	750	750	750
Post processing software	Echoview	LSSS	LSSS	LSSS

Table 3. Survey effort by vessel, IBWSS March-April 2025.

Vessel	Effective survey period	Sum of EDSU (nmi)	Trawl stations	CTD stations	Plankton samples	Mesopelagic samples	Aged fish	Length-measured fish
C Explorer	23/03-06/04	1,771	17	26	-	3	650	7,538
Jákup Sverri	29/03-08/04	1,310	8	23	22	-	450	1,343
Vendla	23/03- 02/04	1,216	10	20	20	-	299	955
Tridens	15/03-1/04	1,595	11	29	-	-	600	2,092
Total	15/03-08/04	5,533	46	98	42	3	2,199	11,928

Table 4. Abundance and biomass estimate of blue whiting by stratum. IBWSS March-April 2025.

		2025				2024				Diff 2025-2024	
Stratum	Name	TSB (10^3 t)	TSN (10^9)	% TSB	% TSN	TSB (10^3 t)	TSN (10^9)	% TSB	% TSN	TSB	TSN
1	Porcupine Bk	111	1,201	4.9	5.0	304	3,403	9.6	9.3	-63%	-65%
2	N Porcupine Bk	132	1,390	5.8	5.7	219	2,766	6.9	7.5	-40%	-50%
3	Rockall Trough	1,810	19,323	80.0	79.9	2,226	25,918	70.1	70.7	-19%	-25%
4	South Faroes	83	896	3.6	3.7	98	1,030	3.1	2.8	-16%	-13%
5	Rockall Bank	0	0	0.0	0.0	168	1,783	5.3	4.9	-100%	-100%
6	Faroe/Shet Ch.	115	1,249	5.1	5.2	114	1,324	3.6	3.6	1%	-6%
7	Porc. Seabight	12	117	0.5	0.5	47	451	1.5	1.2	-75%	-74%
	Total	2,262	24,176	100	100	3,176	36,676	100	100	-29%	-34%

Table 5. Survey stock estimate of blue whiting (determined from StoX baseline output), IBWSS March-April 2025.

Length (cm)	Age in years (year class) 1 2024	2 2023	3 2022	4 2021	5 2020	6 2019	7 2018	8 2017	9 2016	10+	Number (10^6)	Biomass (10^6 kg)	Mean weight (g)	Prop Mature
14-15											0	0	0.0	0
15-16											0	0	0.0	0
16-17											0	0	23.1	0
17-18	12										12	0	30.9	0
18-19	62	3									65	2	34.0	9
19-20	158	15									173	7	38.5	32
20-21	191	30	8								229	10	45.5	24
21-22	149	31									180	9	50.9	29
22-23	58	165	18								241	13	55.7	79
23-24	20	771	86	15	4						896	55	61.3	94
24-25		798	647	494	22						1,962	136	69.2	98
25-26		205	1,160	2,114	138	4					3,620	279	77.0	99
26-27		209	1,005	3,041	646	46					4,948	418	84.4	98
27-28		3	500	2,440	1,188	54	7				4,192	395	94.2	99
28-29		7	166	1,980	1,028	88	4				3,274	342	104.5	99
29-30			5	1,067	683	99	40			2	1,896	225	118.7	99
30-31			2	479	449	79	31	30	17	4	1,092	144	131.4	100
31-32				305	211	58	29			8	611	89	145.9	99
32-33				54	250	22	31	5	12	8	381	63	165.5	99
33-34				42	85	52	38	23	4	13	257	45	175.4	100
34-35				2	19	37	3	20	4	3	89	16	184.0	100
35-36					7	3	7	3		2	22	5	204.2	100
36-37					8	4	8	3			23	5	226.8	100
37-38					2	1	2				5	1	263.3	100
38-39							2	3			5	1	275.7	100
39-40							1				1	0	276.0	100
40-41					1						1	0	374.0	100
41-42								1			1	0	321.0	100
42-43														
43-44														
44-45														
TSN(mill)	650	2,236	3,598	12,034	4,741	546	203	88	37	41	24,175			
TSB(1000 t)	29.5	146.7	285.9	1,136.1	532.0	72.4	31.7	14.8	5.8	7.2	2,262.1			
Mean length(cm)	20.0	23.7	25.5	26.9	28.2	29.6	31.4	32.5	31.4					
Mean weight(g)	45	66	79	94	112	133	156	168	153					
% Mature	26	96	99	98	99	100	98	100	100	100				
SSB (1000kg)	7.8	140.5	282.7	1,116.2	528.0	72.4	30.9	14.8	5.8	7.2	2,206.1			
SSN (mill)	171	2,141	3,557	11,822	4,705	546	199	88	37	41	23,308.0			

Table 6. Time series of StoX abundance estimates of blue whiting (millions) by age in the IBWSS, 2025. Total biomass in last column (1000 t).

	Age										
Year	1	2	3	4	5	6	7	8	9	10+	TSB (1000 t)
2004	1,097	5,538	13,062	15,134	5,119	1,086	994	593	164		3,505
2005	2,129	1,413	5,601	7,780	8,500	2,925	632	280	129	23	2,513
2006	2,512	2,222	10,858	11,677	4,713	2,717	923	352	198	31	3,512
2007	468	706	5,241	11,244	8,437	3,155	1,110	456	123	58	3,274
2008	337	523	1,451	6,642	6,722	3,869	1,715	1,028	269	284	2,639
2009	275	329	360	1,292	3,739	3,457	1,636	587	250	162	1,599
2010*											
2011	312	1,361	1,135	930	1,043	1,712	2,170	2,422	1,298	250	1,826
2012	1,141	1,818	6,464	1,022	596	1,420	2,231	1,785	1,256	1,022	2,355
2013	586	1,346	6,183	7,197	2,933	1,280	1,306	1,396	927	1,670	3,107
2014	4,183	1,491	5,239	8,420	10,202	2,754	772	577	899	1,585	3,337
2015	3,255	4,565	1,888	3,630	1,792	465	173	108	206	247	1,403
2016	2,745	7,893	10,164	6,274	4,687	1,539	413	133	235	256	2,873
2017	275	2,180	15,939	10,196	3,621	1,711	900	75	66	144	3,135
2018	836	628	6,615	21,490	7,692	2,187	755	188	72	144	4,035
2019	1,129	1,169	3,468	9,590	16,979	3,434	484	513	99	144	4,198
2020#											
2021	1,948	2,095	2,545	2,275	3,914	3,197	3,379	463	189	114	2,357
2022	4,461	9,313	4,830	5,460	2,587	1,880	898	1,764	71	178	2,707
2023	873	8,135	14,771	2,744	1,352	711	520	202	508	67	2,501
2024	729	2,885	18,767	10,787	1,843	577	518	487	42	41	3,176
2025	650	2,236	3,598	12,034	4,741	546	203	88	37	41	2,262

* Survey discarded. [#] No survey due to pandemic

Table 7. IBWSS survey effort time series.

Survey effort	Survey area (nmi²)	Transect n. miles (nmi)	Trawls	CTDs	Plankton	Bio sampling (WHB) Measured	Aged
2004	149,000		76	196			
2005	172,000	12,385	111	248	-	29,935	4,623
2006	170,000	10,393	95	201	-	7,211	2,731
2007	135,000	6,455	52	92		5,367	2,037
2008	127,000	9,173	68	161	-	10,045	3,636
2009	133,900	9,798	78	160	-	11,460	3,265
2010	109,320	9,015	62	174	-	8,057	2,617
2011	68,851	6,470	52	140	16	3,810	1,794
2012	88,746	8,629	69	150	47	8,597	3,194
2013	87,895	7,456	44	130	21	7,044	3,004
2014	125,319	8,231	52	167	59	7,728	3,292
2015	123,840	7,436	48	139	39	8,037	2,423
2016*	134,429	6,257	45	110	47	5,390	2,441
2017	135,085	6,105	46	100	33	5,269	2,477
2018	128,030	7,296	49	101	45	5,315	2,619
2019	121,397	7,610	38	118	17	6,228	1,938
2021	118,169	7,794	45	102	8	12,019	2,089
2022	126,235	5,812	47	99	57	6,499	2,372
2023	133,186	8,586	42	89	54	7,798	2,365
2024^	127,183	6,411	42	106	38	7,915	2,366
2025	100,490	5,533	46	98	42	11,928	2,199
Diff	-21%	-14%	10%	-8%	11%	51%	-7%

* End of Russian participation, ^ change from sum transect miles to sum of EDSU's (1 nmi) sampled

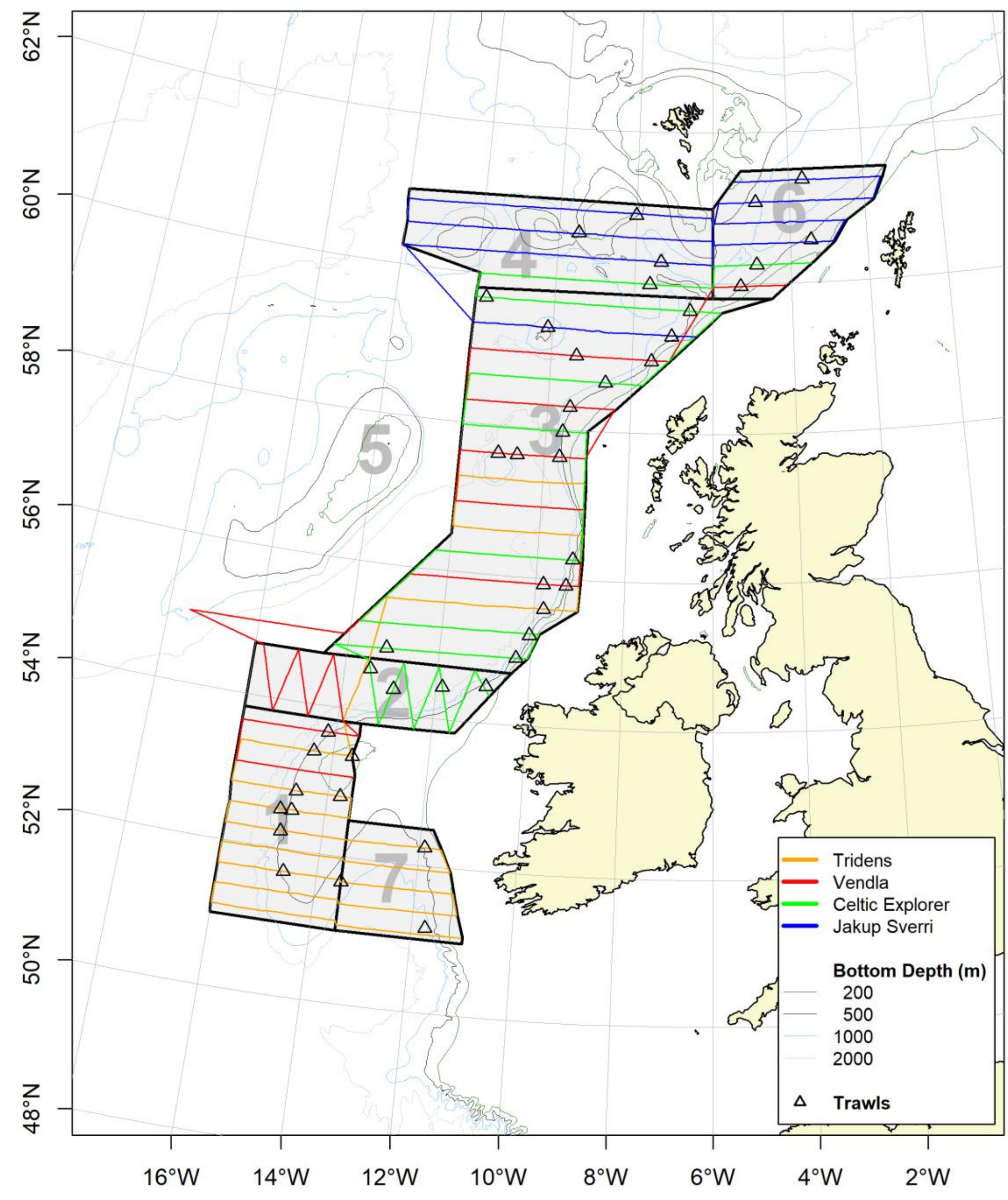


Figure 1. Strata, cruise tracks and trawl hauls for the individual vessels (country) during the International Blue Whiting Spawning Stock Survey (IBWSS) from March-April 2025. Faroe Islands (RV *Jákup Sverri*); Ireland (RV *Celtic Explorer*); Netherlands (RV *Tridens)*; Norway (FV *Vendla*).

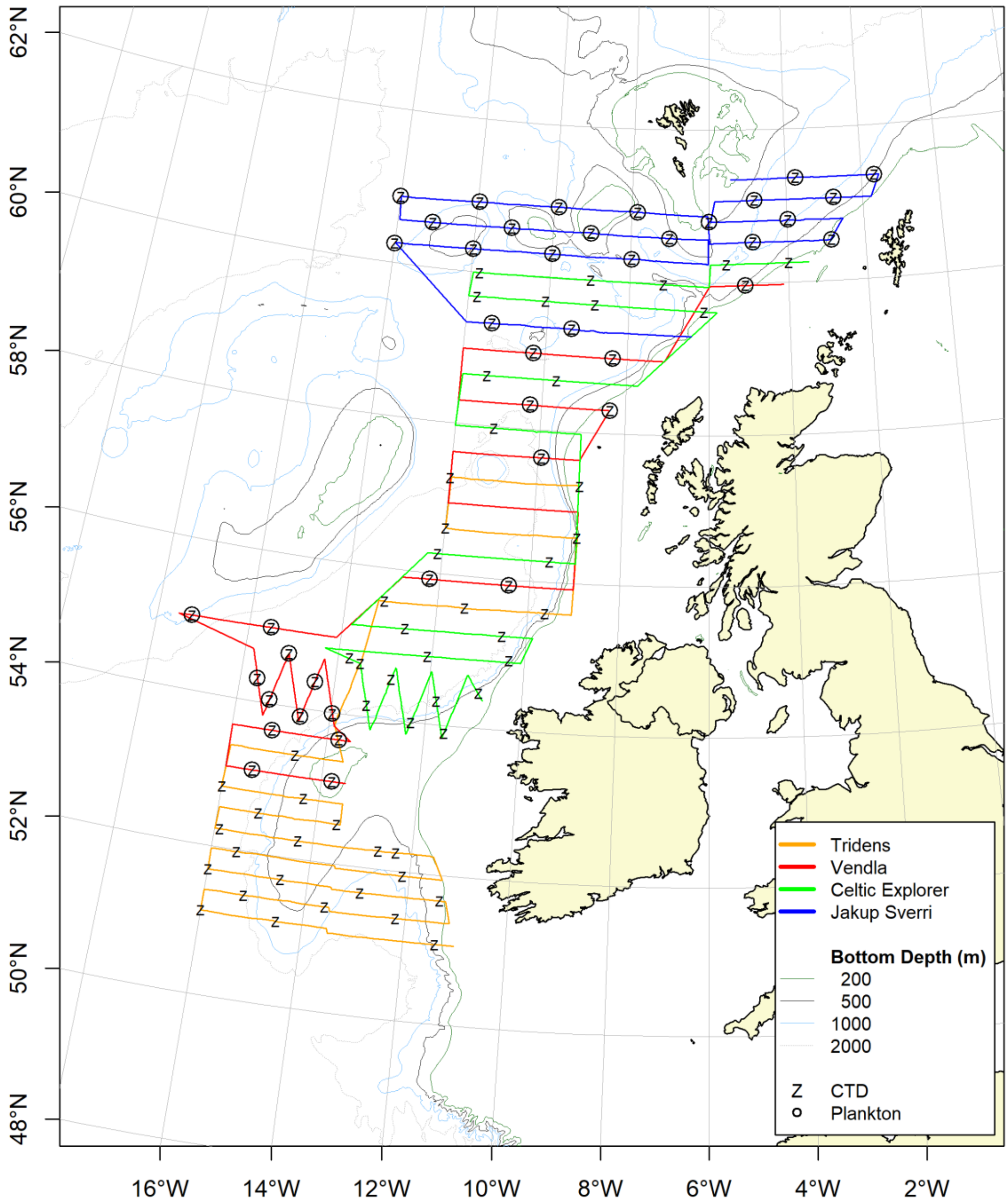


Figure 2. Vessel cruise tracks with hydrographic CTD stations (z) and WP2 plankton net samples (circles) during the International Blue Whiting Spawning Stock Survey (IBWSS) from March-April 2025.

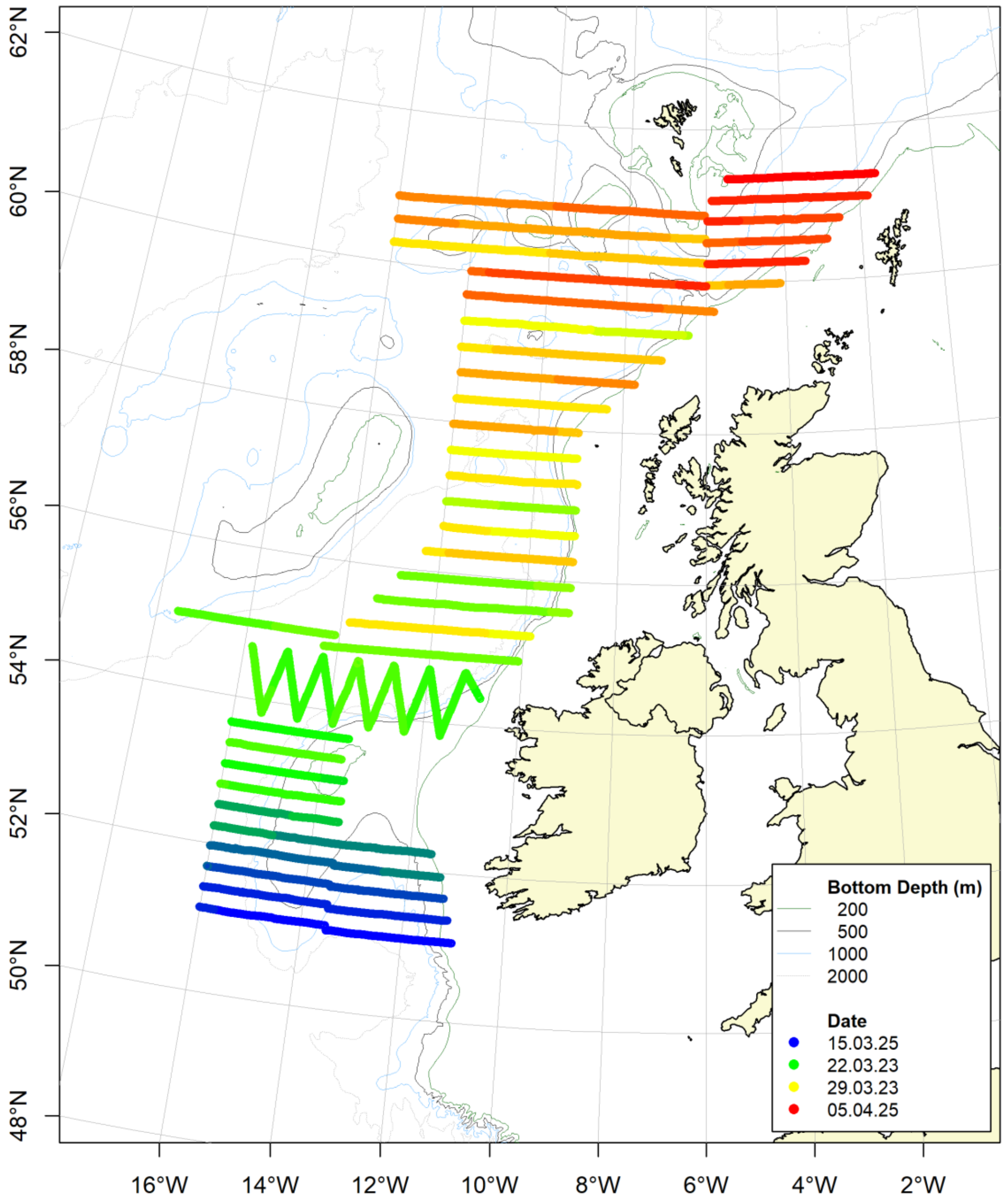


Figure 3. Temporal progression for the International Blue Whiting Spawning Stock Survey (IBWSS) from March-April 2025.

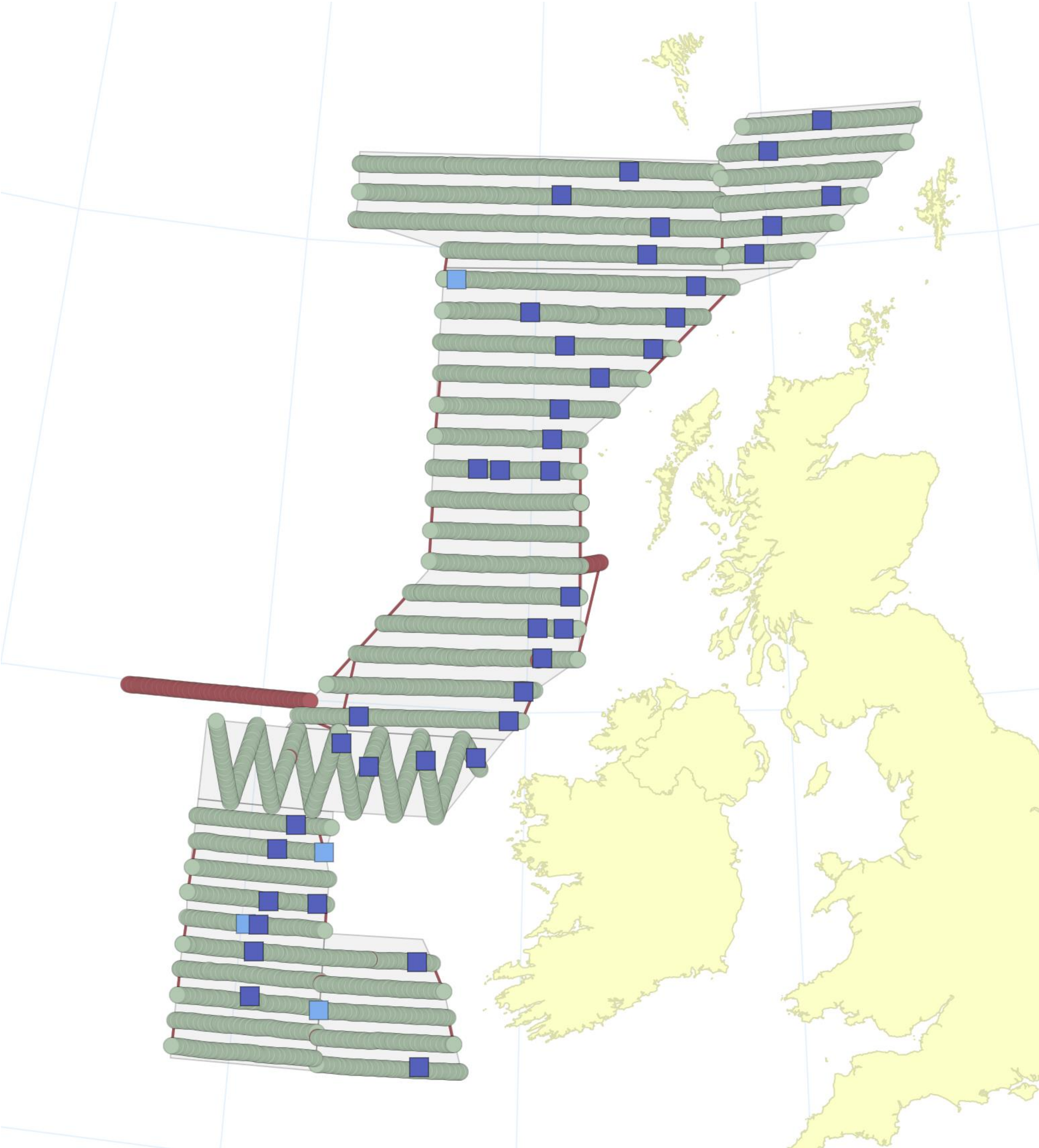


Figure 4. Tagged acoustic transects (green circles) with associated trawl stations containing blue whiting (dark blue squares) used in the StoX abundance estimation. IBWSS March-April 2025.

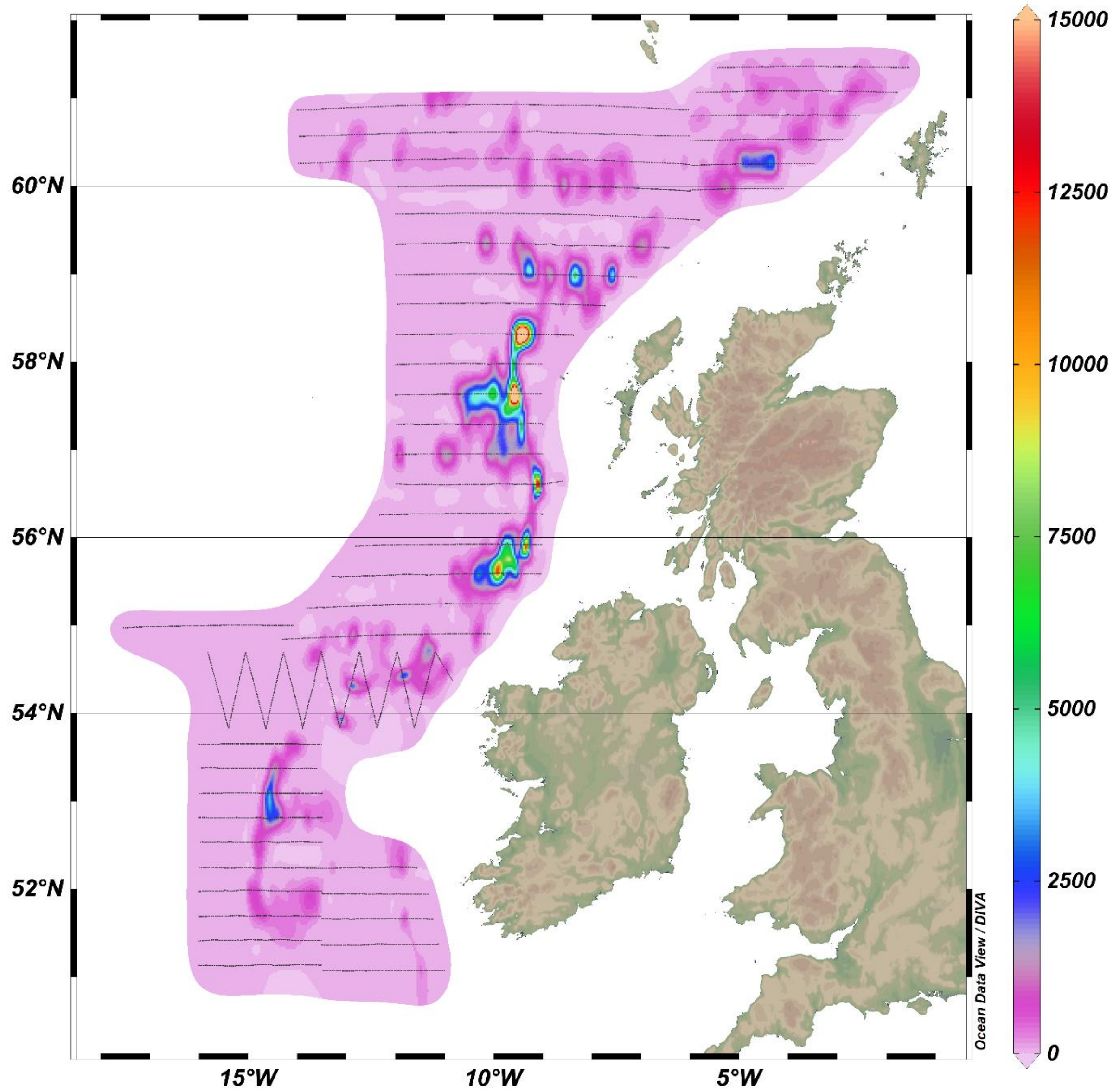


Figure 5. Acoustic density heat map (s_A m^2/nmi^2) of blue whiting during the International Blue Whiting Spawning Stock Survey (IBWSS) from March-April 2025.

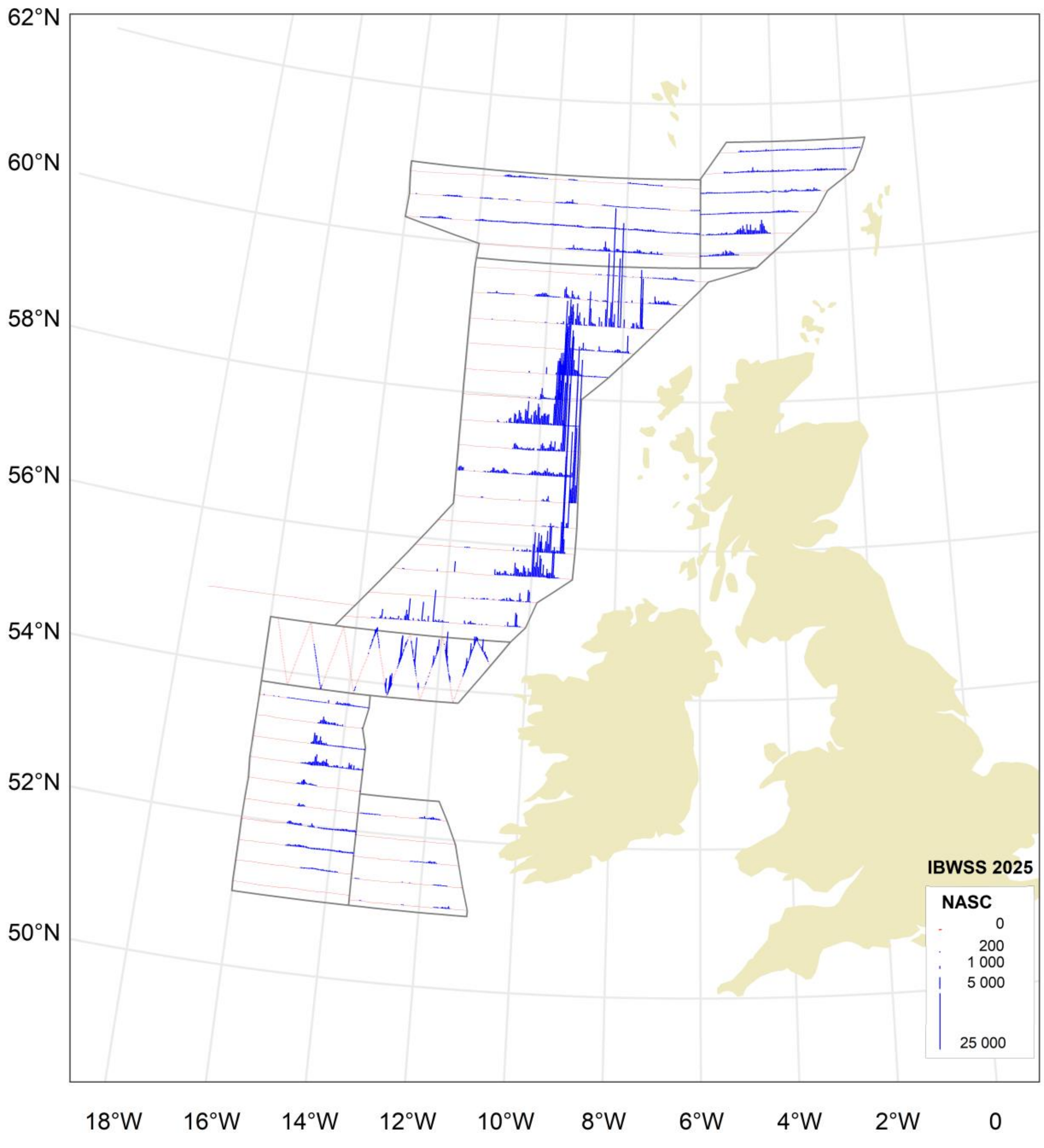
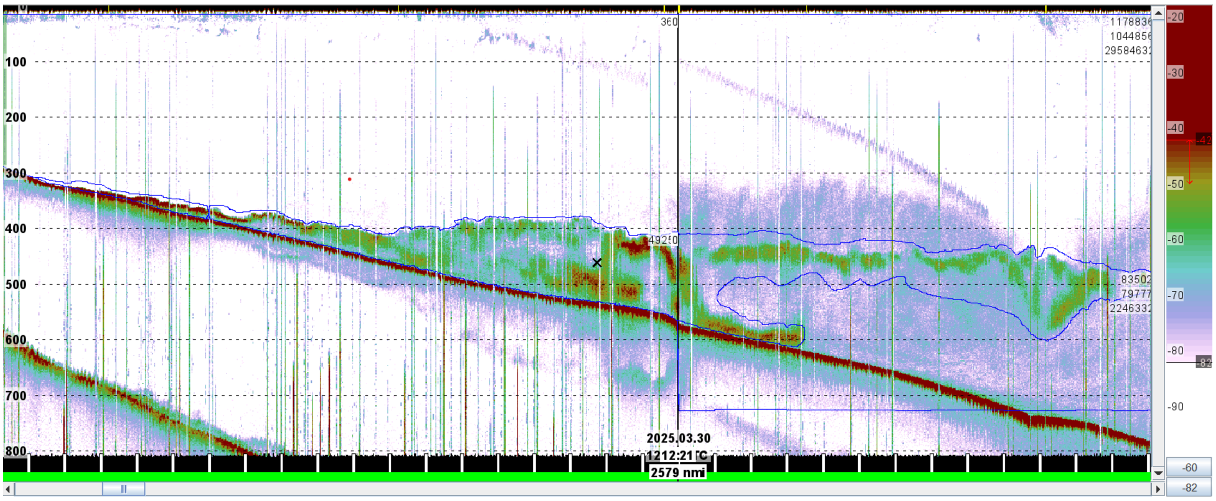
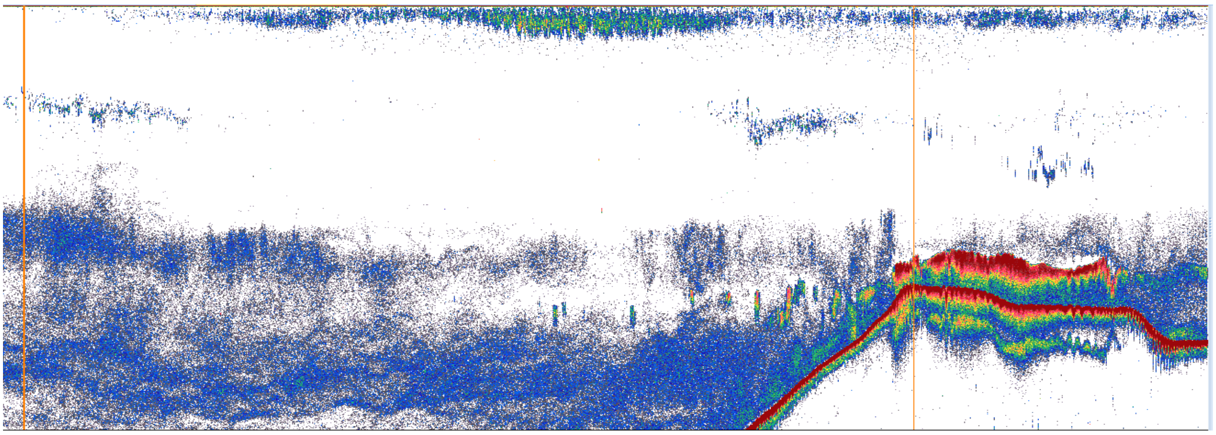


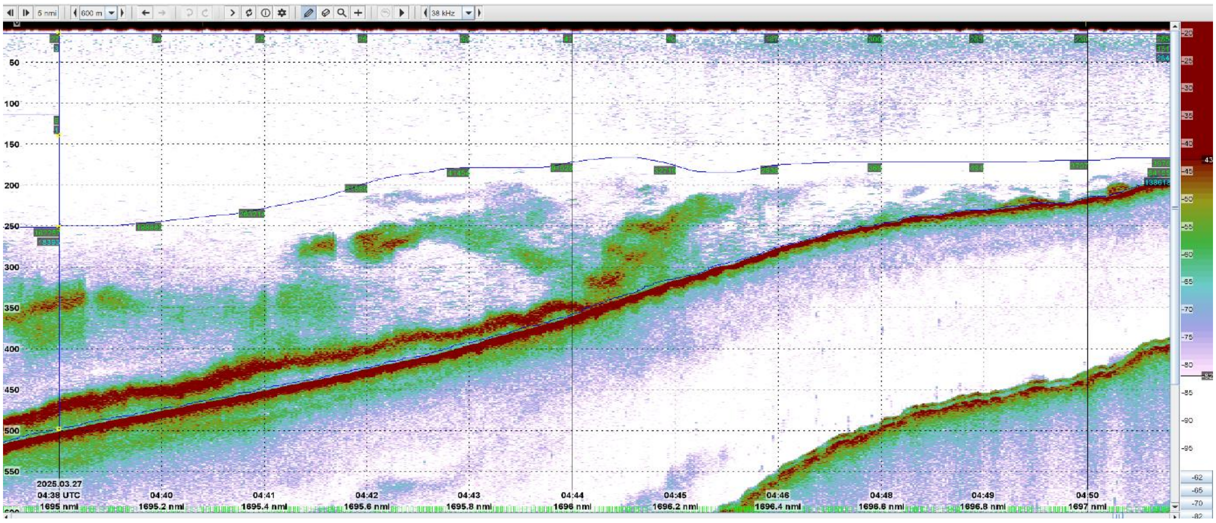
Figure 6. Map of proportional acoustic density (s_A m^2/nmi^2) of blue whiting by 1 nmi sampling unit. IBWSS March-April 2025.



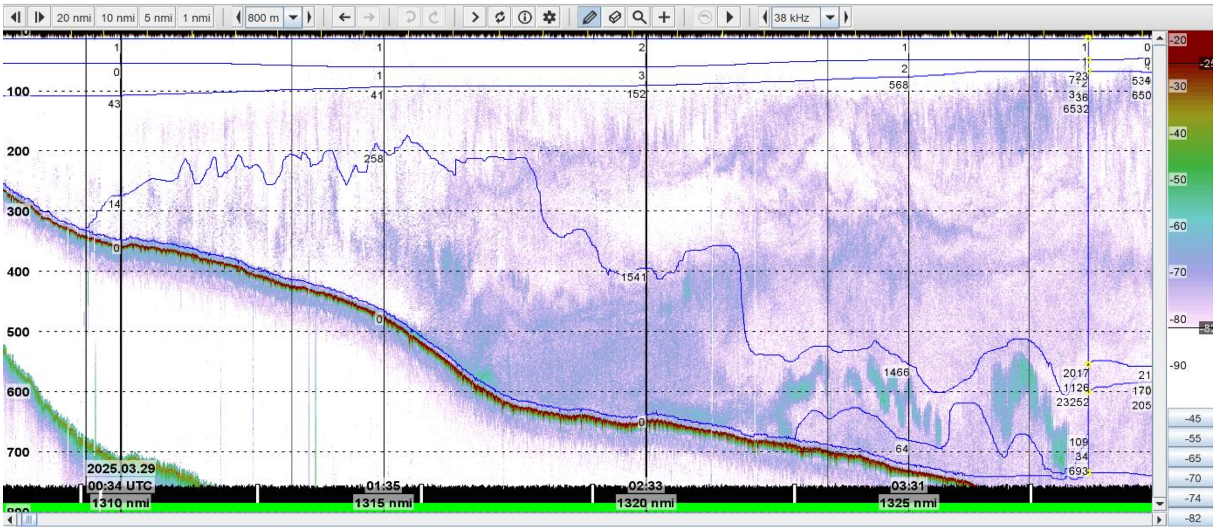
a) Single highest density blue whiting per 1nmi log interval (s_A value 59,948 m²/nmi²) recorded in during the IBWSS survey in the Rockall Trough area (Stratum 3) FRV *Tridens*, Netherlands.



b) Single highest density blue whiting layer (s_A value 55,747 m²/nmi²) by 1nmi recorded by the RV *Celtic Explorer* at the shelf edge in the Rockall Trough (Stratum 3).



c) Single highest density blue whiting layer (s_A value 130,059 m²/nmi²) by 1nmi recorded by the RV *Vendla* at the shelf edge in the Rockall Trough (Stratum 3).



d) Acoustic registrations (38 kHz) of blue whiting with the Faroese Jákup Sverri on 29 March, 2025 on the shelf break northwest of the Hebrides.

Figure 7. Echograms of interest encountered during the IBWSS, March-April 2025. Vertical banding represents 1 nmi acoustic sampling intervals (EDSU). All echograms presented at 38 kHz.

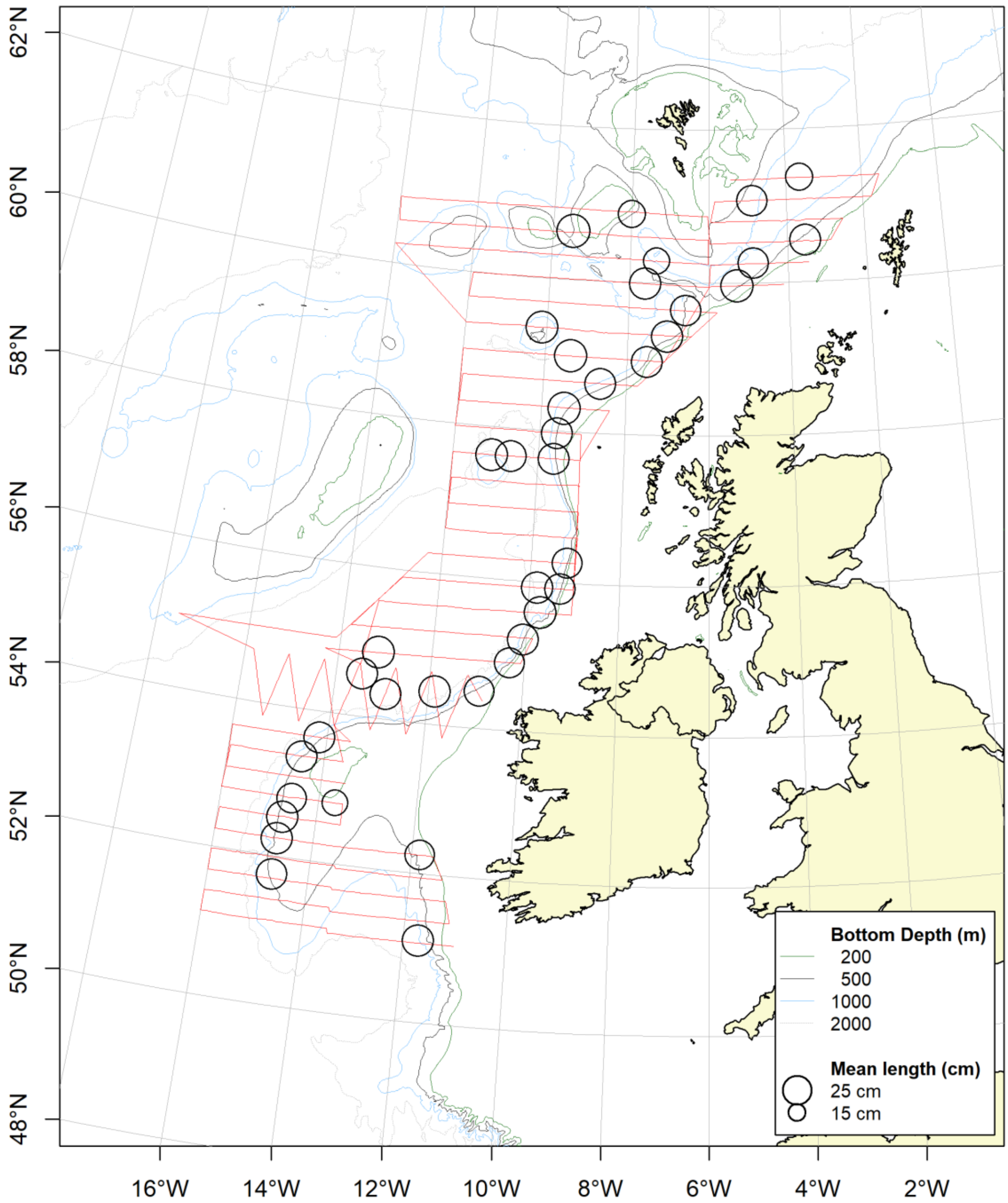


Figure 8. Combined mean length of blue whiting from trawl catches by vessel, IBWSS in March-April 2025.

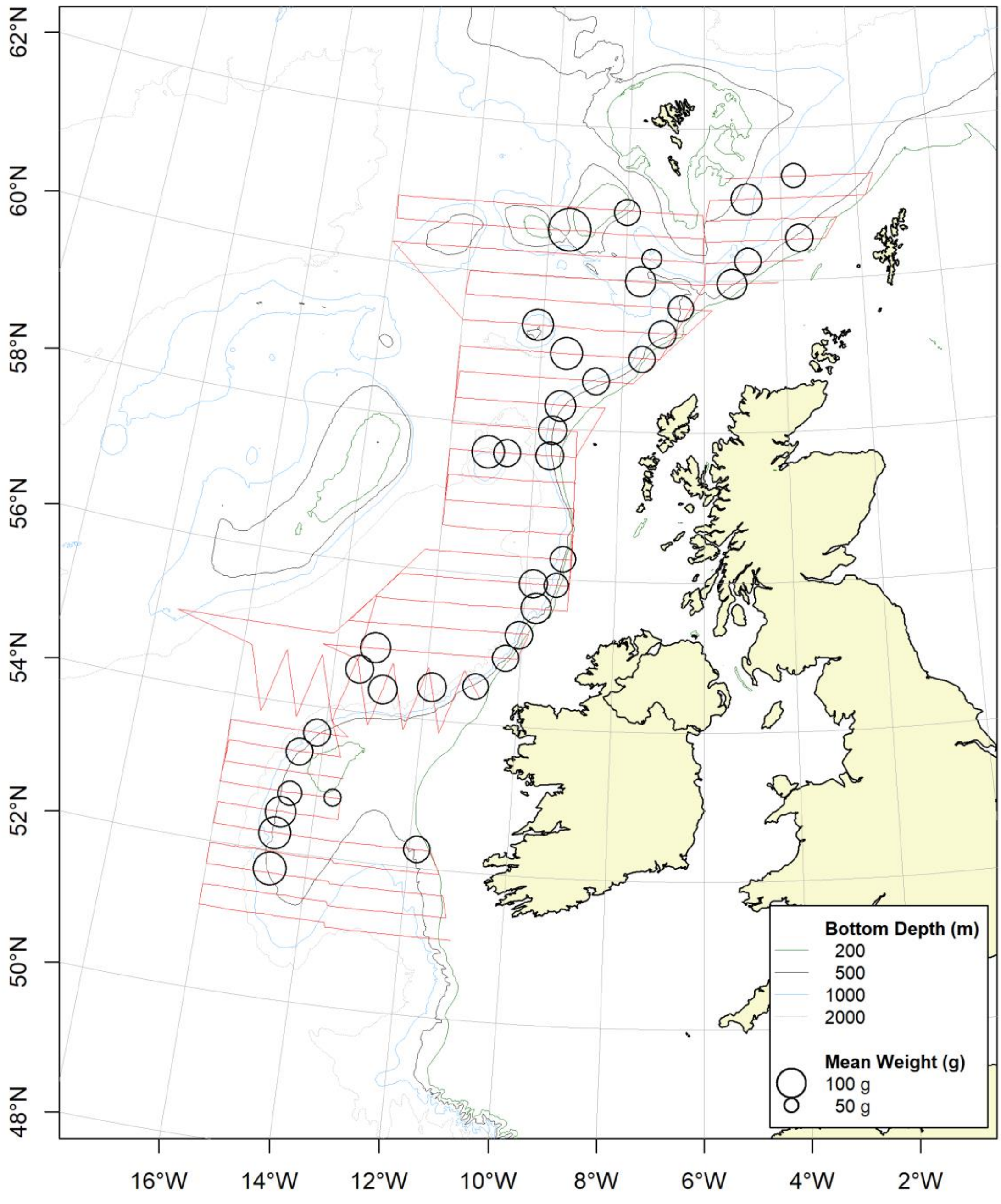


Figure 9. Combined mean weight of blue whiting from trawl catches, IBWSS March-April 2025.

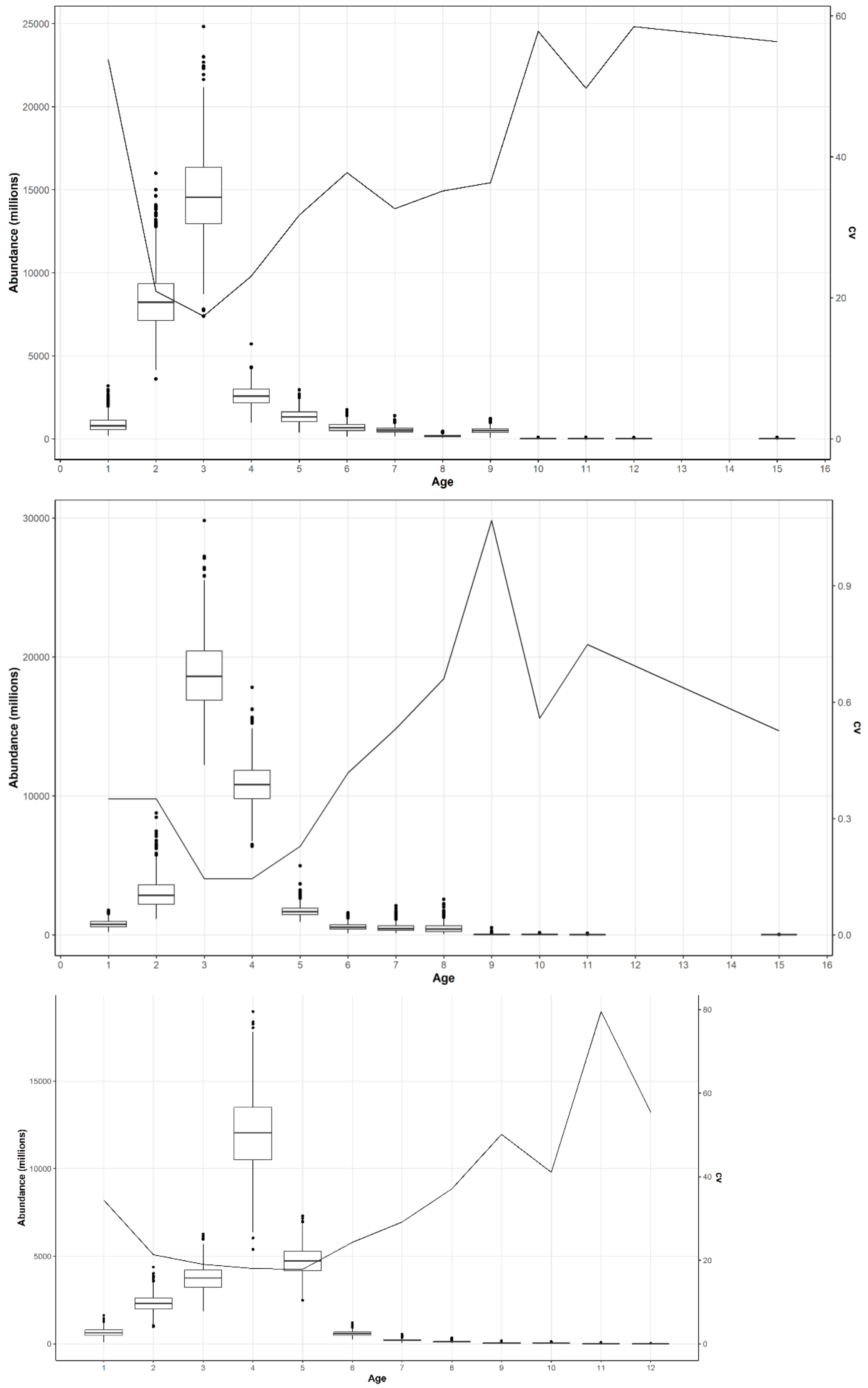


Figure 10. Blue whiting bootstrap abundance (millions) by age (left axis) and associated CVs (right axis) in 2023 (top panel), 2024 (middle panel) and 2025 (lower panel). From StoX.

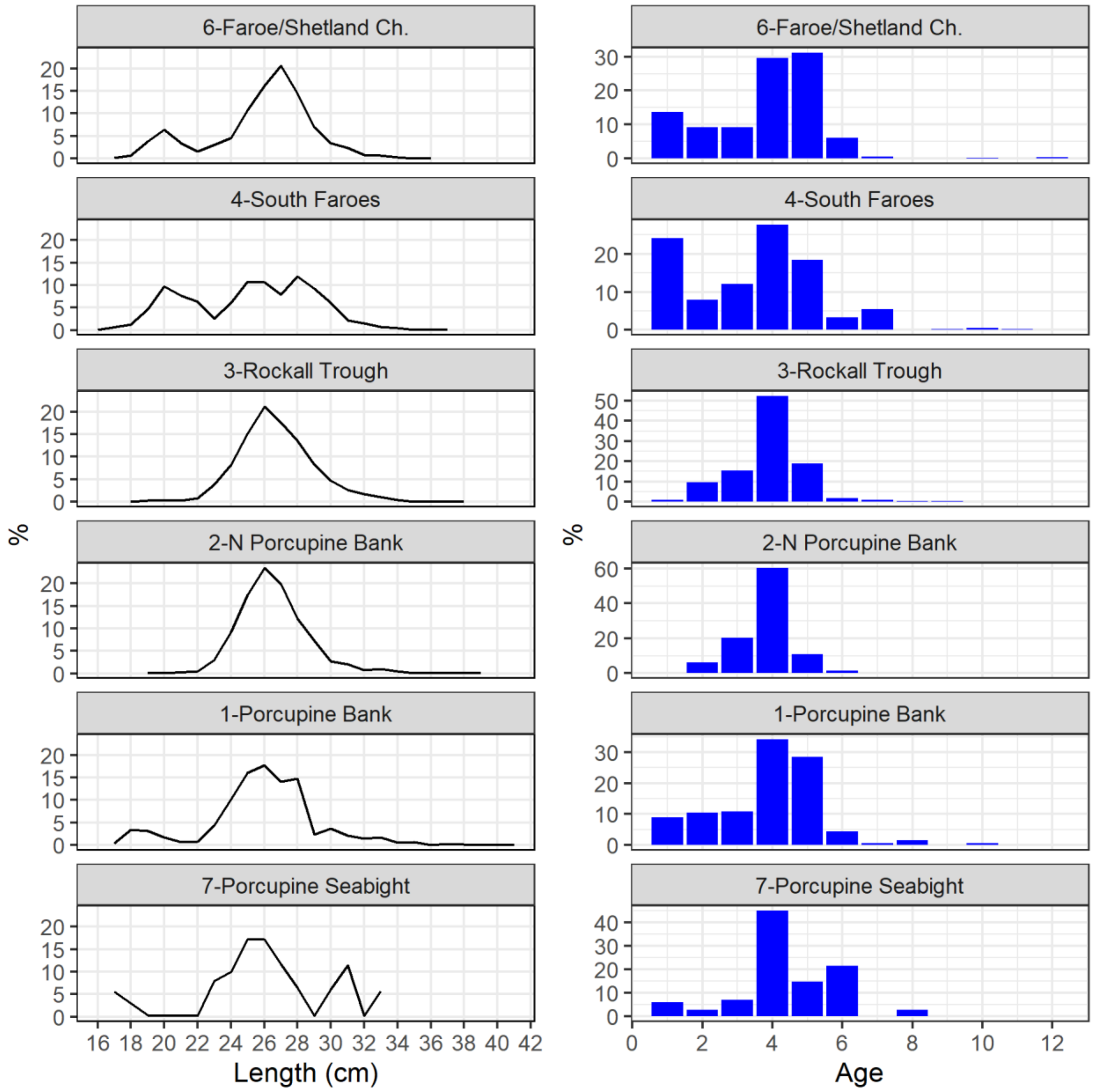


Figure 11. Length and age distribution (numbers) of blue whiting by survey strata. March-April 2025.

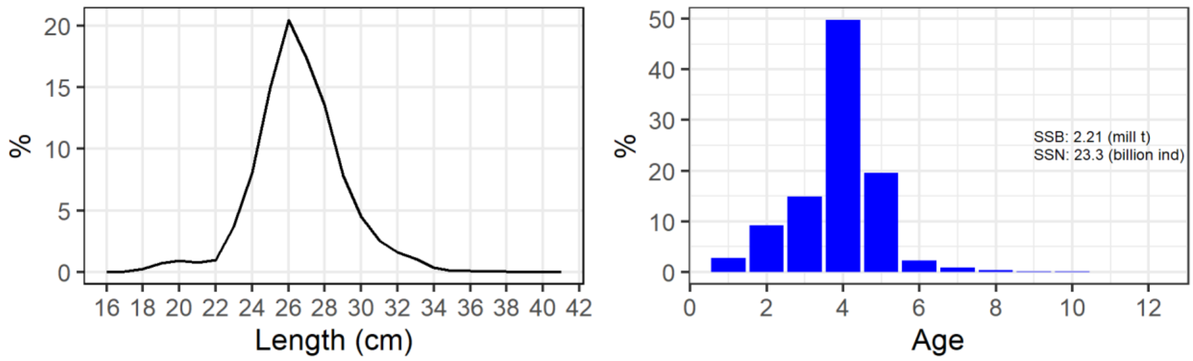


Figure 12. Length and age distribution (numbers) of total stock of blue whiting. March-April 2025.

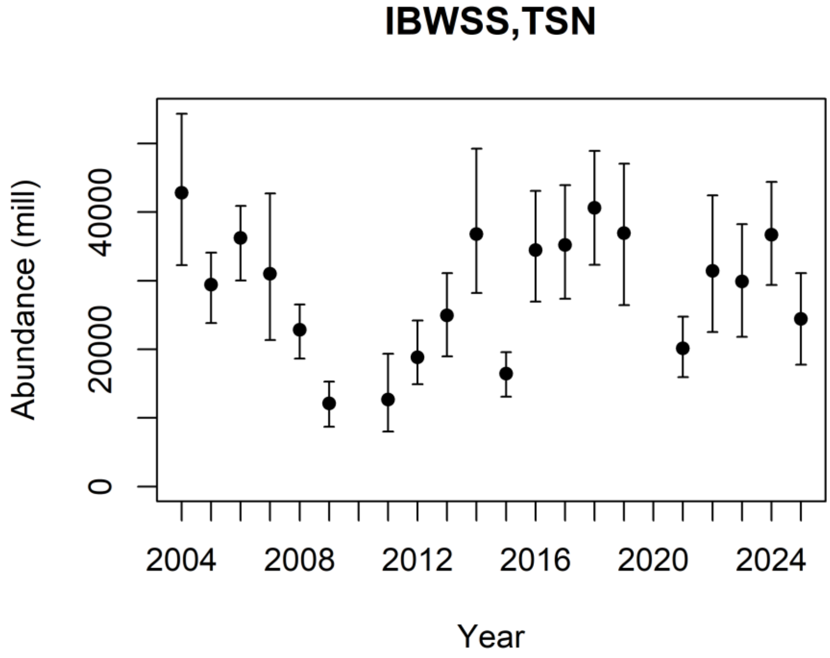


Figure 13. Time series of StoX survey indices of blue whiting abundance, 2004-2025, excluding 2010 and 2020.

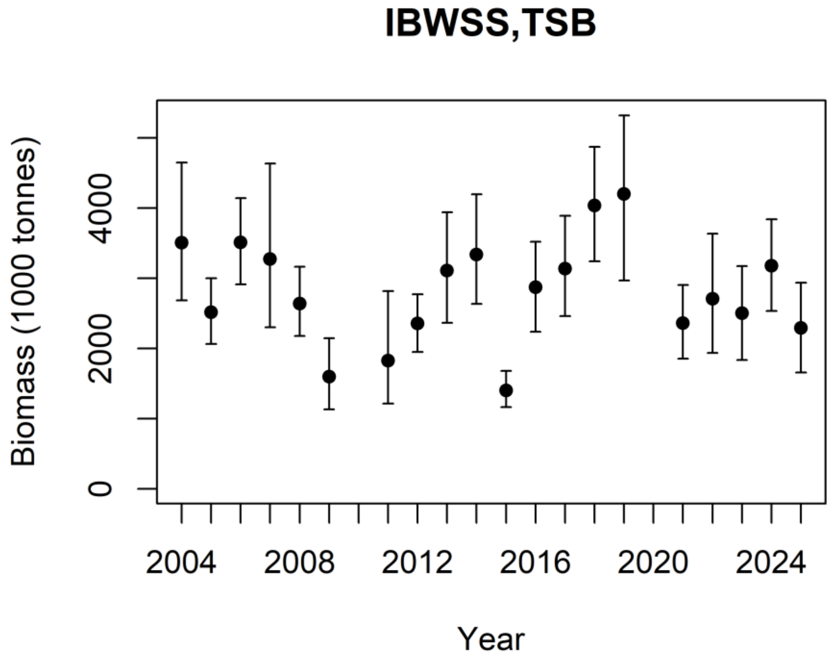


Figure 14. Time series of StoX survey indices of blue whiting biomass, 2004-2025, excluding 2010 and 2020.

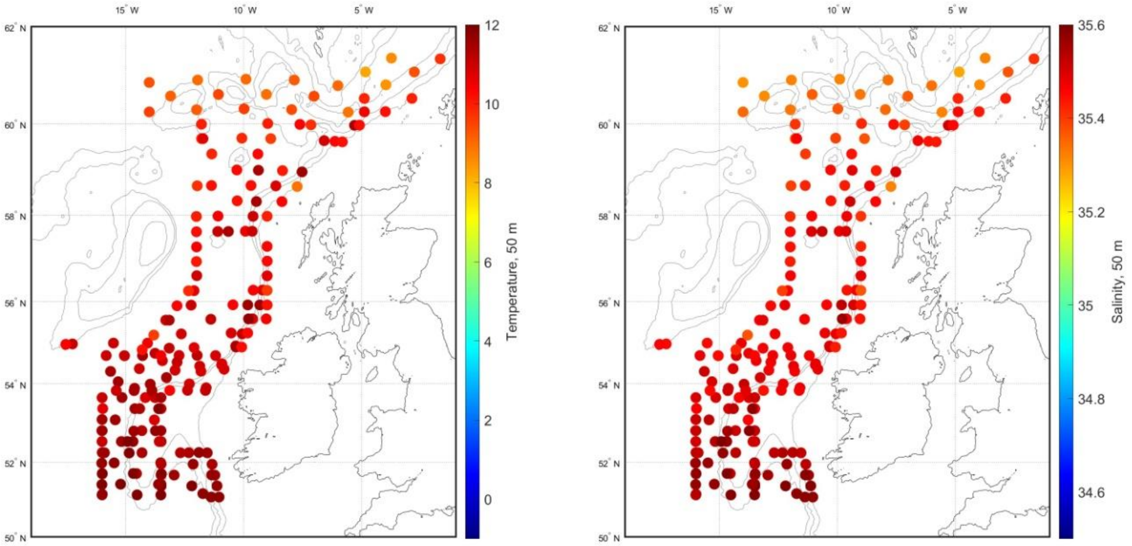


Figure 15. Horizontal temperature (left panel) and salinity (right panel) at 50 m subsurface as derived from vertical CTD casts. IBWSS March-April 2025.

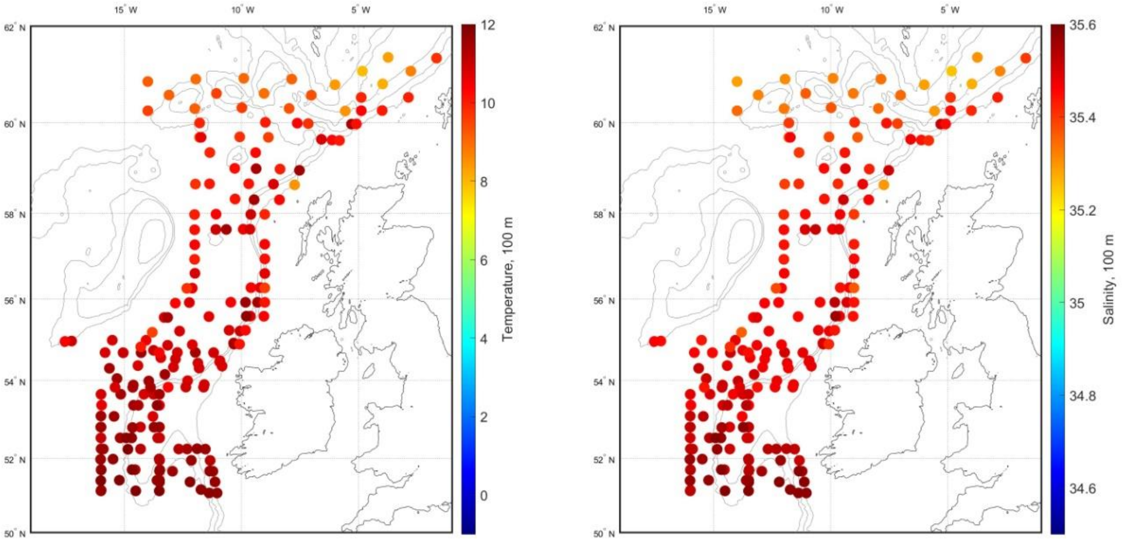


Figure 16. Horizontal temperature (left panel) and salinity (right panel) at 100 m subsurface as derived from vertical CTD casts. IBWSS March-April 2025.

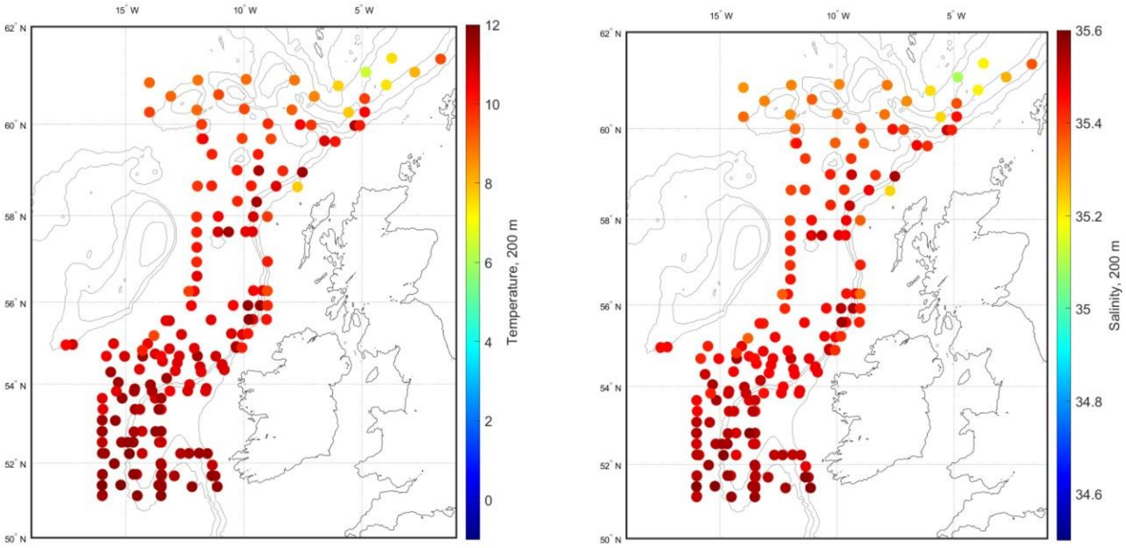


Figure 17. Horizontal temperature (left panel) and salinity (right panel) at 200 m subsurface as derived from vertical CTD casts. IBWSS March-April 2025.

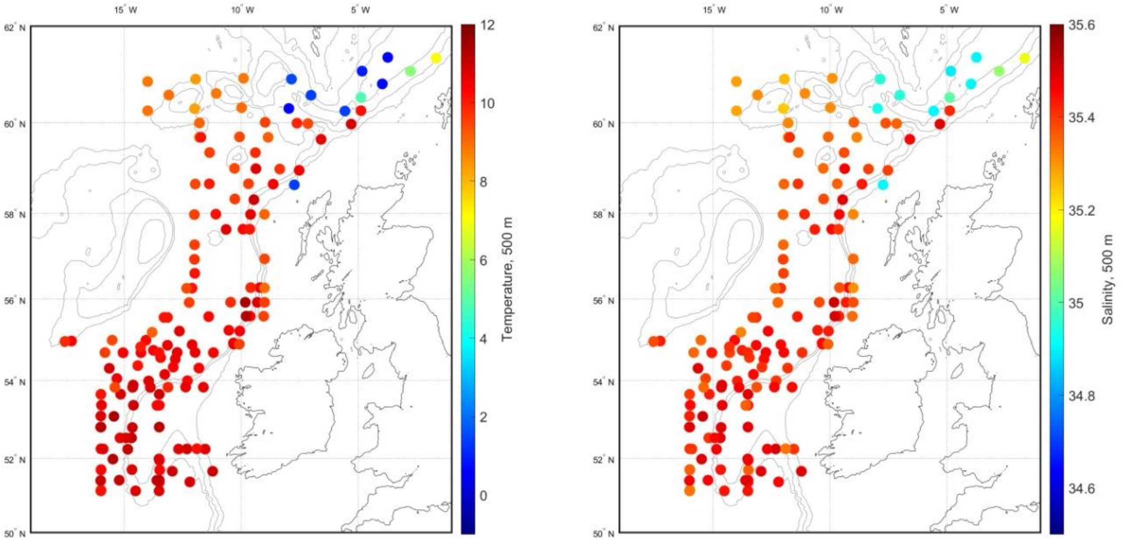


Figure 18. Horizontal temperature (left panel) and salinity (right panel) at 500 m subsurface as derived from vertical CTD casts. IBWSS March-April 2025.