Federal Research Institute for Rural Areas, Forestry and Fisheries

Thünen-Institute of Sea Fisheries

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Cruise Report
FRV "Walther Herwig III"
Cruise 452
05.01.-13.01.2022

Cruise Leader: Dr. Norbert Rohlf

International Herring Larvae Survey in the North Sea

Summary

The cruise is part of the German contribution to the international herring larvae surveys in the North Sea (IHLS). These surveys are conducted during the autumn and winter herring spawning activity. The ICES coordinated studies monitor the spatial distribution and abundance of herring larvae on an annual basis. Survey results gives information about herring spawning stock biomass and the contribution of different spawning components on the overall hatching success. The results provide valuable information for herring stock assessment and the fixation of fishing quotas.

The amount of herring larvae caught (22,000) is in the same order of magnitude compared to preceding years (12,000-26,000 larvae, except 2017). Most herring larvae were found in the inner parts of the English channel, associated with relative high bottom temperatures (> 10°C).

As an additional task, the winter benthos species composition in Box A was examined. Abundance of the brown shrimp *Crangon crangon* was still very low, continuing a trend observed since 2015. Abundances of species such as the dragonet *Callionymus lyra* or the bivalve *Nucula nitidosa* decreased remarkably compared to previous years. Particularly evident this year was the high occurrence of the three-spined stickleback *Gasterosteus aculeatus*.

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2. Research programme

The cruise is a component of the international herring larvae surveys in the North Sea. Parts of ICES area 27.4.c and 27.7.d should be sampled by double oblique tows of the "Nackthai" (modified GULF sampler), resulting in herring larval abundance estimates and spatial distribution as well as bycatch of other Ichthyoplankton, especially plaice eggs.

As an additional task, the winter benthos species composition in Box A should be examined. Epibenthos was sampled applying a 2m-beam trawl. Samples were sieved over 5mm and 2mm mesh. The 5mm fraction was analysed aboard, the 2-mm fraction was preserved in 70% alcohol for analysis in the laboratory ashore. Length-frequency measurements of the solenette *Buglossidium luteum*, the scaldfish *Arnoglossus laterna* and the starfish *Asterias rubens* were also taken in Box A.

3. Narrative

The cruise began one day delayed due to severe wind stress in the German Bight. Thus, FRV "Walther Herwig III" left Bremerhaven on Thursday at noon, 01/06/22. All cruise member's PCR-tests were negative for Covid-19.

Due to unfavourable weather forecast for the English Channel, we started doing one day benthos sampling in Box A.

Having completed that, the vessel steamed into the English Channel to conduct the herring larvae survey. The area under investigation was reached Saturday morning, 01/087/22. Wind speed was at 8-9 Beaufort, but slightly decreasing, and wave height was moderate in the beginning. The first nine hauls were done successful, but then the field work had to be stopped because the sea became higher and higher.

Ichthyoplankton sampling was continued the next morning. Wind speed reduced over the day, and all stations were sampled without any further disturbances.

The IHLS programme was finished on Tuesday evening, 01/11/22. All stations were covered but two, which are meanwhile part of a wind farm construction area and cannot be reached any longer.

Cruise WH 452 ended in Bremerhaven on Thursday at noon, 01/13/22.

4. Preliminary results

In total, 65 plankton tows were done within the IHLS framework. Plankton sampling was achieved according to the manual of the herring larvae surveys. Fish eggs and larvae were sorted from the plankton samples after the end of the cruise. Herring larvae were counted, length measured and their abundance per square metre estimated.

The samples yielded in total 21,927 herring larvae, in the same order of magnitude compared to preceding years (12,000-26,000 larvae, except low estimate in 2017). Fish larvae of other taxa amounted to 621 and 3358 fish eggs were caught, too. Species identification of fish eggs and larvae has not been completed yet, but most fish eggs are already identified to be plaice eggs (*Pleuronectes platessa*).

The majority of herring larvae were found in the inner channel area, between the continental and UK coastlines. In this area, ambient temperature in the water column was relatively high, above 10°C, while waters close to the French, Belgian and Dutch coast line were relatively cold.

The cruise track is given in Figure 1, and the spatial distribution of herring larvae in Figure 2. Figure 3 depicts the length-frequency of herring larvae. Distribution of near-bottom temperature is given in Figure 4. Information on sampling positions and abundance estimates are listed in Table 1.

To investigate the epibenthos composition in Box A, nine beam trawl samples were taken. In general, abundances and biomasses of caught species were very low in 2022. Epifauna

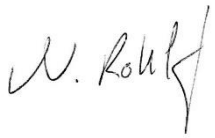
assemblages were dominated by the dab *Limanda limanda*, the solenette *Buglossidium luteum*, the starfish *Asterias rubens* and the brittle star *Ophiura ophiura*. The swimming crab *Liocarcinus holsatus* was also frequently found. Abundance of the brown shrimp *Crangon crangon* was still very low continuing a trend that started in 2015. Additionally, abundances of species such as the dragonet *Callionymus lyra* or the bivalve *Nucula nitidosa* decreased remarkably compared to previous years. Particularly evident this year was the high occurrence of the three-spined stickleback *Gasterosteus aculeatus*. This species is usually very rare in Box A.

5. Participants

Name	Institution	Function
1. Dr. Norbert Rohlf	TI-SF	Cruise leader
2. Birgit Suer	TI-SF	Technician
3. Friederike Beußel	TI-SF	Technician
4. Karin Krüger	TI-SF	Technician
5. Jana Bäger	TI-SF	Technician
6. Svea Winning	TI-SF	Technician
7. Aaron Cordes	TI-SF	Student

6. Acknowledgement

Thanks to Captain Hannes Janßen and FRV "Walther Herwig III" crew members for their excellent support and hospitality and to all participants for their reliable and responsible teamwork.



(Dr. Norbert Rohlf)

7. Tables and Figures

Table 1: Benthos sampling in Box A – haul time and positions.

Station	Sampler	Date	Time	Latitude	Longitude	Depth (m)
1	CTD	07.01.2022	05:57:36	54°17.683N	007°13.38E	41.3
1	2m-beam	07.01.2022	06:06:53	54°17.636N	007°13.34E	40.9
2	2m-beam	07.01.2022	06:47:28	54°19.748N	007°14.05E	42.3
3	2m-beam	07.01.2022	08:01:50	54°22.026N	007°10.01E	40.4
4	2m-beam	07.01.2022	08:36:46	54°21.052N	007°08.06E	40.5
5	2m-beam	07.01.2022	09:13:36	54°22.621N	007°06.50E	39.1
6	2m-beam	07.01.2022	09:47:40	54°22.138N	007°03.70E	39.5
7	2m-beam	07.01.2022	10:23:13	54°23.979N	007°06.04E	39.0
8	2m-beam	07.01.2022	10:55:10	54°26.314N	007°03.17E	71.7
9	2m-beam	07.01.2022	12:02:23	54°26.189N	006°59.92E	38.9
9	CTD	07.01.2022	12:17:12	54°26.234N	006°59.30E	38.3

Table 2: Main data of Ichthyoplankton hauls made during WH 452.

Stat. Nr.	Haul Nr.	Lat	Long.	Date (UTC)	Time (UTC)	Duration (min)	Water depth (m)	Catch depth (m)	Flow (m^3)	Hela (n/m^2)	Surface T (°C)	Bottom T (°C)
10	1	52°24.91N	003°03.24E	08.01.22	06:07	4.01	32	28	23.1	61	9.10	9.12
11	2	52°24.99N	003°10.11E	08.01.22	07:17	6.39	45	42	39.6	148	9.36	9.37
12	3	52°24.99N	002°50.18E	08.01.22	08:26	7.57	43	42	45.9	7	9.55	9.56
13	4	52°14.94N	002°49.80E	08.01.22	09:33	5.03	41	38	31.4	97	9.60	9.61
14	5	52°14.99N	003°10.16E	08.01.22	10:45	4.33	33	30	29.5	549	9.35	9.35
15	6	52°14.84N	003°30.03E	08.01.22	12:02	3.39	27	24	21.4	47	8.88	8.89
16	7	52°12.39N	003°44.28E	08.01.22	13:03	3.23	26	23	19.8	5	8.69	8.69
17	8	52°04.87N	003°50.03E	08.01.22	13:55	2.53	22	19	14.4	2	8.30	8.30
18	9	52°05.23N	003°30.08E	08.01.22	15:07	2.33	23	20	12.8	29	8.76	8.76
19	10	52°04.97N	003°10.14E	09.01.22	07:08	4.08	35	31	21.7	561	9.14	9.16
20	11	52°05.00N	002°49.98E	09.01.22	08:38	4.59	39	36	28.3	322	9.44	9.45
21	12	52°04.91N	002°30.29E	09.01.22	09:56	4.53	39	37	29.0	12	9.78	9.79
22	13	51°54.99N	002°30.29E	09.01.22	11:05	5.07	40	37	28.6	106	9.90	9.91
23	14	51°54.89N	002°50.04E	09.01.22	12:21	5.20	37	34	32.5	413	9.39	9.40
24	15	51°54.27N	003°10.39E	09.01.22	13:40	3.26	30	27	23.0	100	8.77	8.78
25	16	51°57.54N	003°23.93E	09.01.22	14:42	3.51	31	28	24.2	9	8.34	8.36
26	17	51°44.94N	003°10.07E	09.01.22	16:04	2.40	24	20	15.7	9	8.17	8.20
27	18	51°45.78N	002°50.08E	09.01.22	17:26	4.03	32	29	24.8	34	9.24	9.25
28	19	51°44.91N	002°30.20E	09.01.22	18:49	6.31	41	38	37.4	318	9.76	9.77
29	20	51°45.27N	002°10.35E	09.01.22	20:09	7.05	48	45	42.7	287	10.41	10.41
30	21	51°34.97N	002°10.74E	09.01.22	21:12	5.35	42	36	33.0	503	10.48	10.51
31	22	51°35.28N	001°50.56E	09.01.22	22:20	4.51	38	34	28.9	14	9.88	9.96
32	23	51°24.86N	001°49.82E	09.01.22	23:16	6.34	41	38	42.4	194	10.61	10.62
33	24	51°15.04N	001°49.68E	10.01.22	00:09	5.29	40	37	34.5	271	10.55	10.58
34	25	51°04.98N	001°29.95E	10.01.22	01:18	9.02	55	52	54.5	230	10.63	10.65
35	26	50°55.39N	001°10.82E	10.01.22	02:32	5.02	35	32	31.4	1	10.21	10.21
36	27	50°44.96N	001°09.80E	10.01.22	03:40	4.34	33	30	26.3	112	10.67	10.68
37	28	50°45.01N	000°49.94E	10.01.22	04:45	6.22	42	39	38.7	20	10.66	10.66
38	29	50°35.06N	000°50.25E	10.01.22	05:40	7.35	48	45	45.1	1017	10.86	10.89
39	30	50°35.00N	000°30.13E	10.01.22	06:47	8.11	49	47	50.4	52	10.51	10.51
40	31	50°27.65N	000°30.23E	10.01.22	07:31	6.52	45	41	38.6	553	11.01	11.01
41	32	50°25.35N	000°10.52E	10.01.22	08:35	6.56	50	47	42.4	560	11.10	11.14
42	33	50°16.06N	000°10.49E	10.01.22	09:28	6.30	44	40	40.4	860	11.21	11.22

Stat. Nr.	Haul Nr.	Lat.	Long.	Date (UTC)	Time (UTC)	Duration (min)	Water depth (m)	Catch depth (m)	Flow (m^3)	Hela (n/m^2)	Surface T (°C)	Bottom T (°C)
43	34	50°15.19N	000°09.17W	10.01.22	10:32	8.21	51	48	51.5	1001	11.29	11.30
44	35	50°04.98N	000°09.67W	10.01.22	11:29	8.03	48	45	52.4	501	11.36	11.38
45	36	50°04.97N	000°29.37W	10.01.22	12:42	6.34	48	45	39.0	289	11.37	11.38
46	37	49°54.74N	000°30.02W	10.01.22	13:45	7.11	48	45	44.7	402	11.20	11.22
47	38	49°45.02N	000°29.98W	10.01.22	14:49	5.29	43	40	32.0	39	10.77	10.78
48	39	49°35.08N	000°30.10W	10.01.22	15:44	4.04	33	30	23.4	0	10.49	10.52
49	40	49°34.94N	000°10.03W	10.01.22	16:51	4.06	31	28	25.1	1	9.43	9.50
50	41	49°44.84N	000°09.72W	10.01.22	17:42	5.29	39	36	32.5	139	10.31	10.34
51	42	49°54.81N	000°09.61W	10.01.22	18:35	7.52	53	50	45.7	1014	10.70	10.77
52	43	49°45.32N	000°07.78E	10.01.22	20:07	2.53	29	26	16.3	0	9.33	9.71
53	44	49°54.74N	000°09.79E	10.01.22	21:00	4.50	35	32	28.8	393	10.24	10.34
54	45	50°04.70N	000°09.61E	10.01.22	21:58	5.32	44	40	34.6	193	10.86	10.93
55	46	50°15.16N	000°30.33E	10.01.22	23:33	5.42	40	37	33.0	1281	10.90	10.92
56	47	50°05.13N	000°30.31E	11.01.22	00:29	4.17	35	32	24.9	337	10.37	10.40
57	48	49°55.07N	000°30.29E	11.01.22	01:28	3.31	30	27	20.0	419	9.34	9.42
58	49	49°56.44N	000°45.39E	11.01.22	02:22	3.31	29	26	19.8	111	9.14	9.23
59	50	50°04.85N	000°50.11E	11.01.22	03:10	3.54	33	30	23.4	220	9.50	9.73
60	51	50°15.02N	000°50.35E	11.01.22	04:02	5.39	40	37	32.8	1384	10.55	10.57
61	52	50°24.99N	000°50.45E	11.01.22	04:58	4.56	38	36	28.8	2045	10.55	10.57
62	53	50°14.93N	001°09.68E	11.01.22	06:28	3.44	33	30	21.7	662	9.22	9.25
63	54	50°25.04N	001°10.41E	11.01.22	07:21	4.24	37	35	29.1	1667	9.99	10.07
64	55	50°34.06N	001°10.68E	11.01.22	08:19	6.44	49	42	38.6	2951	10.24	10.19
65	656	50°35.37N	001°23.25E	11.01.22	09:44	3.33	30	27	21.8	495	9.58	9.60
66	57	50°45.13N	001°25.48E	11.01.22	10:47	4.16	46	33	26.5	767	9.82	9.84
67	58	50°54.98N	001°29.92E	11.01.22	11:49	8.25	52	49	52.6	983	9.83	10.05
68	59	51°05.70N	001°50.09E	11.01.22	13:28	3.51	30	27	24.2	493	9.46	9.63
69	60	51°15.10N	002°10.05E	11.01.22	14:50	6.06	42	38	39.9	187	9.42	9.55
70	61	51°24.94N	002°10.22E	11.01.22	15:58	4.49	38	35	28.6	311	10.01	10.04
71	62	51°21.70N	002°29.85E	11.01.22	17:18	4.07	32	29	24.6	73	9.01	9.04
72	63	51°24.93N	002°50.70E	11.01.22	18:29	3.06	25	22	17.9	10	8.07	8.31
73	64	51°34.91N	002°50.29E	11.01.22	19:19	3.30	28	26	20.1	174	9.05	9.06
74	65	51°35.08N	002°30.00E	11.01.22	20:32	4.03	32	29	25.4	612	9.78	9.77

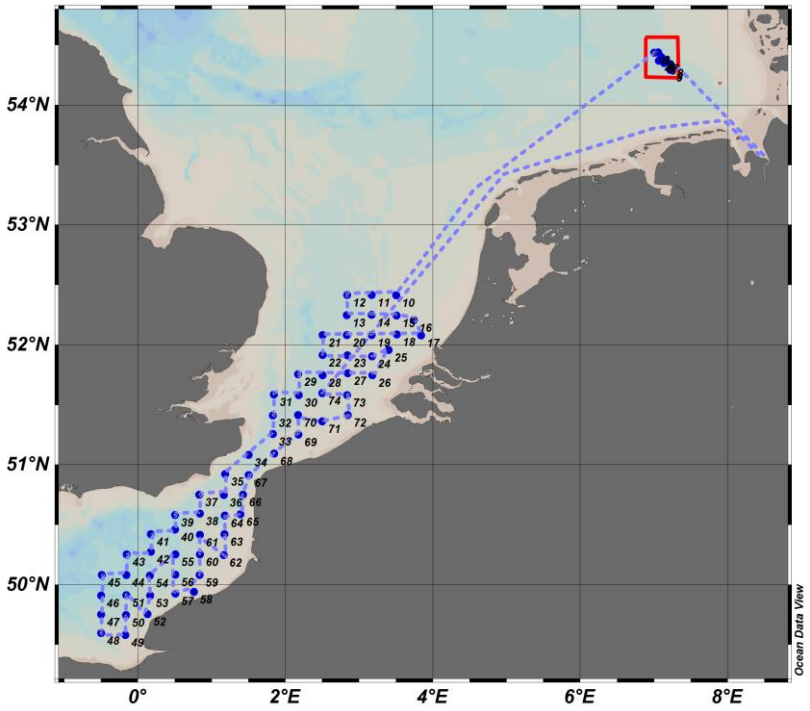


Figure 1: Location of Box A in the German Bight and positions of herring larvae stations in the southern North Sea and the English Channel.

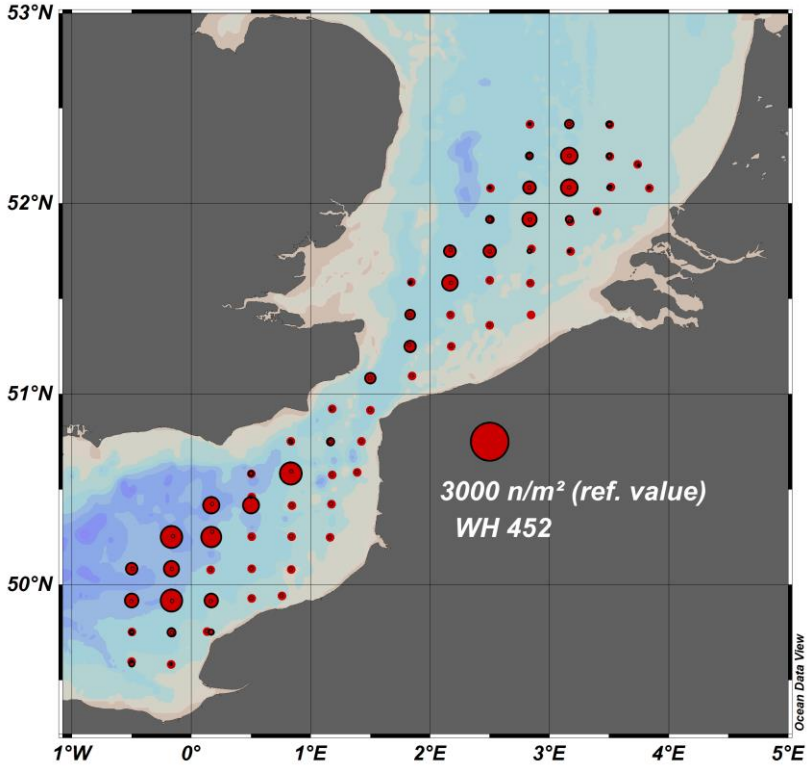


Figure 2: Distribution and abundance of herring larvae (n/m². all length classes) in the southern North Sea and the English Channel. The circle size indicates the equivalent to 3 000 larvae per square metre.

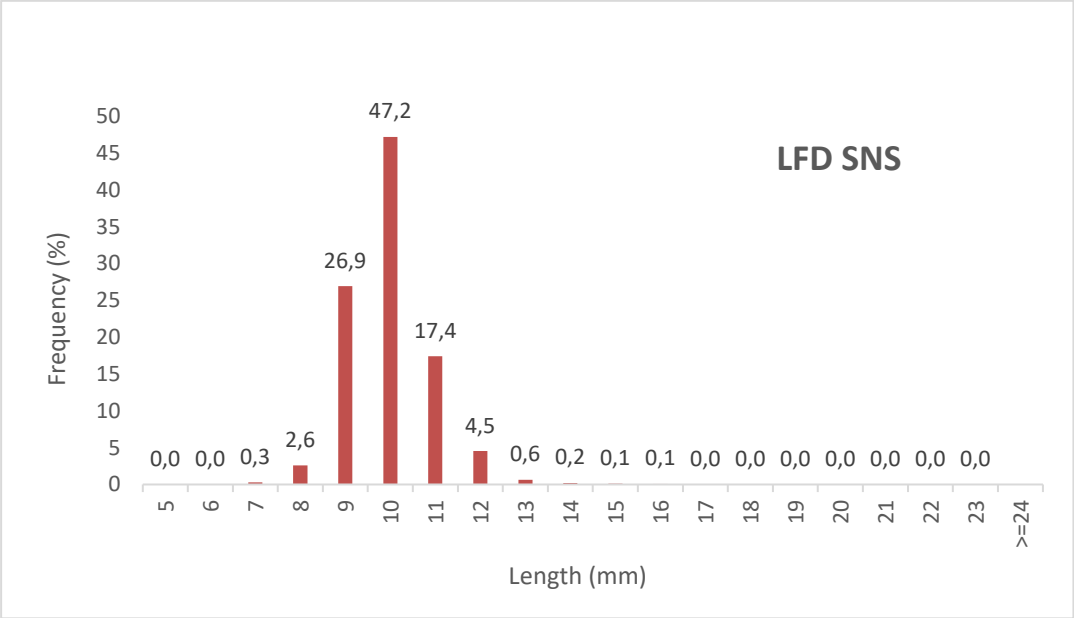


Figure 3: Length-frequency plot of herring larvae obtained during WH 452. The percentage per length class is given on top of each bar (LFD SNS = length frequency distribution southern North Sea).

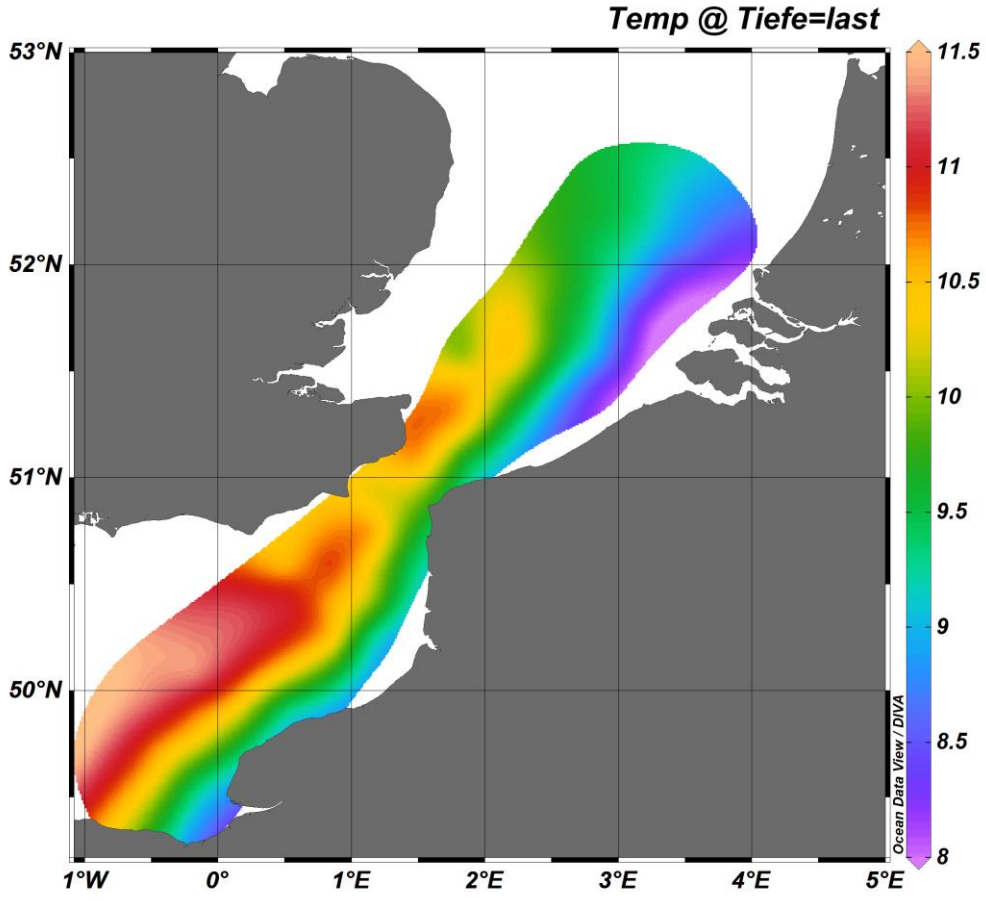


Figure 4: Distribution of near-bottom temperature (°C) in the area under investigation