

## Institute of Sea Fisheries

Palmaille 9, 22767 Hamburg Telephone +4940 38905-166 Telefax +4940 38905-263 03.04.2014 Az.: Dr Ro/v.S./3338

### Cruise report FRV "Walther Herwig III" Cruise 371 02.01. – 13.01.2014

#### International Herring Larvae Survey in the North Sea and German Small-scale Bottom Trawl Survey

Scientist in charge: Dr. Norbert Rohlf

#### Summary

The cruise had two main objectives. The first part was the German contribution to the international herring larvae surveys in the North Sea (IHLS). These surveys are conducted annually during the autumn and winter herring spawning activity and monitor the spatial distribution and abundance of herring larvae. The resulting survey index is used as an important estimator of herring spawning stock biomass and provides valuable information for herring stock assessment and the fixation of fishing quotas. Large quantities of newly hatched larvae were found in the survey area in the English Channel. However, conclusions for North Sea herring stock spawning biomass can only be drawn when information of larvae abundance from all spawning areas become available prior to the herring assessment working group meeting in March 2014.

With regards to time constrains, only one day was achievable for the work in Box A. None of the planned GOV hauls were conducted, but instead a complete set of 9 stations dedicated to benthos sampling could be done. The epifauna in Box A was dominated by high numbers of the goby *Pomatoschistus minutus*, the brittle star *Ophiura ophiura* and the shrimp *Crangon allmanni*. Compared to preceding years, high abundances of juvenile starfishes (*Asterias rubens*) and solenettes (*Buglossidium luteum*) disappeared. Additionally, the shrimp *Crangon crangon* was less abundant this year.

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#### Verteiler:

TI - Institut für Seefischerei  
Saßnitzer Seefischerei e. G.  
DFFU

Doggerbank Seefischerei GmbH, Bremerhaven  
Deutscher Fischerei - Verband e. V., Hamburg  
Leibniz-Institut für Meereswissenschaften IFM-GEOMAR  
H. Cammann-Oehne, BSH  
Deutscher Hochseefischerei-Verband e.V.

#### per e-mail:

Bundesanstalt für Landwirtschaft und Ernährung, Hamburg  
Schiffsführung FFS "Walther Herwig"  
BMEL, Ref. 614  
BMEL, Ref. 613  
TI - Präsidialbüro (Michael Welling)  
TI - Verwaltung Hamburg  
TI - Institut für Fischereiökologie  
TI - Institut für Ostseefischerei Rostock  
TI - FIZ-Fischerei  
TI - PR  
MRI - BFEL HH, FB Fischqualität  
Dr. Rohlf, SF - Reiseplanung Forschungsschiffe  
Fahrtteilnehmer  
Bundesamt für Seeschifffahrt und Hydrographie, Hamburg  
Mecklenburger Hochseefischerei GmbH, Rostock

## **2. Research programme**

### **2.1 Herring larvae survey**

The cruise was a component of the international herring larvae surveys. Parts of ICES area IVc and VIIId should be sampled by double oblique tows with the "Nackthai" (modified GULF III sampler), resulting in herring larval abundance estimates and spatial distribution.

The whole survey area could be sampled as scheduled, 66 plankton tows in total. Physical measurements, e.g. temperature, salinity and conductivity, were conducted via a CTD mounted directly onto the gulf sampler. Sampling was achieved according to the manual of the herring larvae surveys.

### **2.2 Monitoring (TI-SF)**

With regards to time constraints, only one day was achievable for the work planned in Box A. None of the planned GOV hauls was conducted, but instead the full set of 9 stations dedicated to benthos sampling could be done as scheduled.

### **2.3 Measurement of relevant environmental parameters (TI-SF, University of Hamburg)**

Three temperature and salinity profiles were taken with a Seabird CTD and water samples for nutrient analyses were obtained by a rosette sampler. The analyses will be done at the University of Hamburg.

### **2.4 Epibenthos (Senckenberg Research Institute, Wilhelmshaven)**

The 2-m beam trawl for the sampling of epibenthos had a mesh size of 20 x 20 mm in the main net and 4 x 4 mm in the cod end and was applied with 5-min towing duration at 1.5 knots. Samples were sieved over 5 and 2 mm, before the > 5-mm fraction was sorted on board, and the 2-5 mm fraction preserved in alcohol for later analyses in the laboratory.

Investigations of epibenthos were accompanied by sampling of sediments using a 0.1 m<sup>2</sup> Van Veen grab for the analysis of sediment composition and total organic carbon (TOC).

## **3. Narrative**

FRV "Walther Herwig III" was ready to leave the port of Bremerhaven on Thursday, 01/02/14. Due to strong wind speeds and unfavourable weather conditions and forecasts, sailing had to be postponed until Tuesday afternoon, 01/07/14, resulting in the loss of five days ship-time.

Thus, priority was given to fulfil the obligations in the herring larvae sampling programme in the southern North Sea. With regard to time constraints, fishing activities in the German Bight had to be cancelled, but it was possible to complete the benthos sampling in Box A within one day.

The area of investigation was reached on Wednesday, 01/08/14. Weather conditions had meanwhile improved, and the scientific programme started in the morning. Plankton sampling could be conducted as scheduled, with the loss of only one station due to wind stress. The herring larvae programme was finished four days later, on 01/11/14, having done 66 plankton hauls.

The vessel steamed into the German Bight for benthos sampling in Box A. Nine stations could be done within one day to obtain the needed number of van Veen grab and 2m-beam trawl samples.

FRV "Walther Herwig III" was back in Bremerhaven late Monday morning (01/13/14).

## 4. Preliminary results

### 4.1 Ichthyoplankton (TI-SF)

Fish eggs and larvae were sorted from the plankton samples after the end of the cruise. Herring larvae were counted and length measured to millimetre below and their abundance per square metre estimated.

The samples yielded in total 27,072 herring larvae. Fish larvae of other taxa amounted to 655 and 3929 fish eggs were caught, too. Species identification of the remaining fish eggs and larvae is not finished yet.

The cruise track by haul number is given in Figure 1 and the spatial distribution of herring larvae in Figure 2. Abundance estimates and available physical parameters are listed in Table 1. Herring larvae length-frequencies are plotted in Figure 3. Figure 4 depicts the distribution of near-bottom water temperature and salinity.

### 4.2 Epibenthos (Senckenberg, Wilhelmshaven)

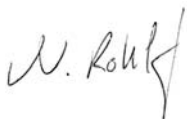
Nine beam trawl hauls and nine van Veen grab samples were taken in Box A. The sediment consisted of muddy fine sand. The epifauna in Box A was dominated by high numbers of the goby *Pomatoschistus minutus*, the brittle star *Ophiura ophiura* and the shrimp *Crangon allmanni*. Compared to preceding years, high abundances of juvenile starfishes (*Asterias rubens*) and solenettes (*Buglossidium luteum*) disappeared. Additionally, the shrimp *Crangon crangon* was less abundant this year. Following a period of rather cold winter temperatures in the German Bight, the abundance of the brittle star *Ophiura ophiura* is remarkably high in Box A since the summer survey 2011.

## 5. Participants

Name	Institution	Function
1. Norbert Rohlf	TI-SF	Cruise leader
2. Birgit Suer	TI-SF	Technician
3. Christine Petersen-Frey	TI-SF	Technician
4. Michael Sasse	TI-SF	Technician
5. Svenja Zakrzewski	TI-SF	Student
6. Inken Rottgardt	TI-SF	Student
7. Dr. Hermann Neumann	Senckenberg	Scientist
8. Robin Hinz	Senckenberg	Technician

## 6. Acknowledgement

Thanks to Captain Hans-Otto Janßen and FRV "Walther Herwig III" crew members for their great support and hospitality and to all participants for their reliable and responsible teamwork.



(Dr. Norbert Rohlf)

## 7. Tables and Figures

Table 1: Main data of Ichthyoplankton hauls made during WH 371

Stat. No.	Haul No.	Lat. (° N)	Long.	E/ W	Date (UTC)	Time (UTC)	Duration (min)	Water depth (m)	Catch depth (m)	Flow (m <sup>3</sup> )	Hela (n/m <sup>2</sup> )	Surface		Bottom	
												T (°C)	Sal (psu)	T (°C)	Sal (psu)
1	1	52°25.21	003°31.10	E	08.01.14	09:23	4.25	30	29	22.3	359	9.2	34.59	9.2	34.58
2	2	52°25.08	003°10.07	E	08.01.14	10:37	5.59	44	40	35.4	1135	9.6	34.94	9.6	34.94
3	3	52°25.41	002°50.14	E	08.01.14	11:48	5.32	39	36	27.4	982	10.2	35.18	10.2	35.21
4	4	52°15.13	002°30.46	E	08.01.14	13:11	6.22	44	41	33.7	379	10.3	35.21	10.3	35.20
5	5	52°14.82	002°48.87	E	08.01.14	14:18	6.41	41	38	41.8	1409	10.1	35.15	10.1	35.18
6	6	52°14.92	003°09.51	E	08.01.14	15:26	4.30	36	32	25.7	853	9.5	34.81	9.5	34.82
7	7	52°14.85	003°29.50	E	08.01.14	16:29	3.15	29	26	18.6	185	9.2	34.52	9.2	34.59
8	8	52°15.00	003°47.27	E	08.01.14	17:24	2.59	25	23	17.4	4	8.4	34.13	8.4	34.14
9	9	52°05.02	003°50.16	E	08.01.14	18:23	3.10	24	21	19.9	6	8.5	34.26	8.5	34.26
10	10	52°04.70	003°30.08	E	08.01.14	19:33	4.31	31	28	26.0	248	9.0	34.42	9.0	34.44
11	11	52°05.12	003°10.68	E	08.01.14	20:37	4.20	30	27	25.7	473	9.5	34.96	9.5	34.96
12	12	52°05.03	002°50.34	E	08.01.14	21:41	4.40	37	32	28.8	1877	10.2	35.15	10.2	35.15
13	13	52°05.04	002°30.28	E	08.01.14	22:44	5.46	43	39	28.9	482	10.4	35.22	10.4	35.22
14	14	51°55.39	002°30.01	E	09.01.14	23:38	5.38	39	36	33.6	311	10.5	35.11	10.5	35.11
15	15	51°45.33	002°10.16	E	09.01.14	00:58	7.10	48	45	39.1	29	10.8	35.17	10.8	35.17
16	16	51°34.36	002°12.36	E	09.01.14	01:56	6.33	46	43	36.6	403	10.7	35.04	10.7	35.04
17	17	51°35.15	001°50.39	E	09.01.14	03:17	6.21	39	36	37.8	0	10.9	35.29	10.9	35.27
18	18	51°25.30	001°50.48	E	09.01.14	04:23	7.20	44	41	39.0	14	11.0	35.32	11.0	35.31
19	19	51°15.37	001°50.26	E	09.01.14	05:29	4.15	42	39	21.2	22	10.9	35.22	10.9	35.20
20	20	50°55.32	001°11.36	E	09.01.14	10:07	3.55	30	27	21.3	0	10.4	35.18	10.4	35.18
21	21	50°45.33	001°10.04	E	09.01.14	11:11	5.03	35	32	27.3	5	11.1	35.33	11.1	35.34
22	22	50°45.06	000°50.15	E	09.01.14	12:42	5.34	37	34	34.5	2	10.6	35.16	10.6	35.18
23	23	50°35.16	000°50.32	E	09.01.14	13:42	8.51	44	41	53.5	296	11.1	35.35	11.1	35.33
24	24	50°34.87	000°30.28	E	09.01.14	15:24	8.39	51	48	52.3	9	10.9	35.25	11.0	35.26
25	25	50°27.53	000°30.32	E	09.01.14	16:12	6.43	43	40	38.0	1590	11.1	35.38	11.1	35.38
26	26	50°25.14	000°10.32	E	09.01.14	17:44	7.51	50	47	45.9	430	11.1	35.37	11.1	35.36
27	27	50°16.45	000°10.76	E	09.01.14	18:36	7.47	45	42	46.9	168	11.1	35.39	11.1	35.38
28	28	50°15.12	000°08.98	W	09.01.14	19:43	9.39	53	50	54.5	17	11.1	35.34	11.1	35.33
29	29	50°05.59	000°09.78	W	09.01.14	20:39	7.02	49	46	38.5	382	11.1	35.36	11.1	35.35
30	30	50°04.88	000°28.60	W	09.01.14	21:40	7.12	46	43	39.4	550	11.2	35.39	11.2	35.39
31	31	49°55.44	000°30.08	W	09.01.14	22:34	6.48	45	42	38.1	5	11.0	35.30	11.0	35.31
32	32	49°45.07	000°29.91	W	09.01.14	23:29	5.35	40	37	31.5	4	10.8	35.19	10.8	35.19
33	33	49°35.67	000°29.90	W	10.01.14	00:29	4.03	30	27	23.2	4	10.6	35.01	10.7	35.02
34	34	49°34.85	000°10.35	W	10.01.14	01:22	3.48	29	26	21.8	0	10.0	34.38	10.1	34.41
35	35	49°44.65	000°09.70	W	10.01.14	02:20	5.44	38	35	31.7	1	10.5	34.90	10.5	34.95
36	36	49°54.96	000°10.17	W	10.01.14	03:16	8.41	51	49	54.3	0	10.8	35.18	10.8	35.22
37	37	49°45.65	000°08.57	E	10.01.14	04:37	4.07	29	26	24.9	1	9.6	32.77	10.0	33.95
38	38	49°54.93	000°09.95	E	10.01.14	05:25	5.35	38	35	30.7	0	10.1	34.26	10.2	34.42
39	39	50°04.92	000°09.51	E	10.01.14	06:18	8.41	46	43	49.7	2	10.8	35.18	10.8	35.21
40	40	50°14.77	000°29.36	E	10.01.14	07:44	8.47	44	41	51.5	173	10.8	35.25	10.8	35.24
41	41	50°05.54	000°29.89	E	10.01.14	08:41	6.40	38	34	37.9	1	10.3	34.62	10.3	34.61
42	42	49°55.01	000°29.73	E	10.01.14	09:38	4.00	29	26	22.0	12	9.5	33.05	9.5	33.14
43	43	49°56.37	000°44.70	E	10.01.14	10:33	3.51	27	24	24.0	1	9.3	32.65	9.3	32.89
44	44	50°04.68	000°49.89	E	10.01.14	11:21	3.52	29	26	20.6	0	9.7	34.02	9.8	34.08
45	45	50°14.52	000°50.07	E	10.01.14	12:12	4.55	36	33	26.8	19	10.5	34.93	10.5	34.94
46	46	50°24.11	000°49.87	E	10.01.14	13:03	6.31	36	33	37.7	4216	10.8	35.22	10.8	35.23
47	47	50°15.06	001°09.63	E	10.01.14	14:27	4.28	29	25	25.5	40	9.6	34.04	9.7	34.20
48	48	50°25.14	001°10.03	E	10.01.14	15:21	5.18	34	31	31.8	2835	10.4	35.01	10.5	35.03

Table 1 continued

Stat. No.	Haul No.	Lat. (° N)	Long.	E/W	Date (UTC)	Time (UTC)	Duration (min)	Water depth (m)	Catch depth (m)	Flow (m <sup>3</sup> )	Hela (n/m <sup>2</sup> )	T (°C)	Sal (psu)	T (°C)	Sal (psu)
49	49	50°33.71	001°09.99	E	10.01.14	16:05	7.37	48	45	45.5	3150	10.7	35.03	10.9	35.24
50	50	50°34.90	001°22.75	E	10.01.14	17:03	4.26	32	29	26.1	1745	10.5	35.01	10.5	35.07
51	51	50°44.99	001°25.14	E	10.01.14	17:51	7.42	49	46	44.0	1157	10.5	35.06	10.8	35.22
52	52	50°54.88	001°30.27	E	10.01.14	18:38	7.20	48	45	46.7	747	9.6	34.03	10.7	35.12
53	53	51°05.52	001°49.66	E	10.01.14	19:45	3.57	32	29	22.2	255	10.0	34.56	10.1	34.60
54	54	51°14.55	002°09.14	E	10.01.14	20:50	6.07	38	35	36.8	177	10.1	34.71	10.1	34.73
55	55	51°24.33	002°10.41	E	10.01.14	21:39	4.19	28	25	21.3	436	10.5	35.13	10.5	35.13
56	56	51°23.01	002°22.41	E	10.01.14	22:23	4.34	26	23	26.7	50	10.2	34.77	10.2	34.82
57	57	51°24.65	002°49.41	E	10.01.14	23:57	2.29	22	19	13.1	52	9.2	33.92	9.2	34.00
58	58	51°34.49	002°49.84	E	11.01.14	00:46	5.08	27	24	28.0	291	9.7	34.55	9.7	34.55
59	59	51°35.07	002°30.57	E	11.01.14	01:50	5.15	36	33	29.9	365	10.2	34.85	10.2	34.86
60	60	51°44.04	002°30.52	E	11.01.14	02:40	4.26	35	32	25.1	572	10.3	35.07	10.3	35.07
61	61	51°55.23	002°49.76	E	11.01.14	04:07	5.05	32	29	28.8	487	9.8	34.82	9.8	34.82
62	62	51°45.98	002°49.92	E	11.01.14	05:13	4.38	30	30	27.7	128	9.7	34.63	9.7	34.62
63	63	51°45.15	003°09.70	E	11.01.14	06:17	3.06	25	22	19.3	154	8.9	34.37	8.9	34.38
64	64	51°54.58	003°09.13	E	11.01.14	07:08	4.27	28	25	28.5	387	9.4	34.68	9.4	34.68
65	65	51°54.92	003°29.13	E	11.01.14	08:07	4.46	29	26	27.7	209	8.6	34.23	8.6	34.24
66	66	52°14.86	004°09.54	E	11.01.14	10:34	2.41	21	18	15.4	0	7.8	31.40	7.8	31.42

Tab 2: Boundaries of Box A in the German EEZ

LAT		LON		Center	
From	to	From	to		
54°17.00´ N	54°27.00´ N	006°58.00´ E	007°15.00´ E	54°22.00´ N	007°06.50´ E

Tab.3: Type and amount of samples obtained in Box A

Stat. No.	Set No.	Sampler type	Lat. (° N)	Long.	E/W	Date (UTC)	Time (UTC)	Water depth (m)	T (°C) SURFACE
67	1	CTD	54°17.95	007°01.93	E	12.01.14	06:57	40	7.2
67	1	Grabber	54°17.88	007°02.00	E	12.01.14	07:04	39	7.2
67	1	Dredge	54°17.88	007°01.89	E	12.01.14	07:07	41	7.2
68	2	Dredge	54°20.93	007°05.34	E	12.01.14	07:46	0	7.2
68	2	Grabber	54°21.14	007°04.75	E	12.01.14	08:01	40	7.2
69	3	Grabber	54°24.02	006°59.74	E	12.01.14	08:35	39	7.3
69	3	Dredge	54°23.79	007°00.10	E	12.01.14	08:44	40	7.3
70	4	Dredge	54°23.73	007°05.56	E	12.01.14	09:19	41	7.3
70	4	Grabber	54°23.98	007°04.81	E	12.01.14	09:35	39	7.3
71	2	CTD	54°26.04	007°09.86	E	12.01.14	10:00	41	7.3
71	5	Grabber	54°26.05	007°09.80	E	12.01.14	10:07	41	7.3
71	5	Dredge	54°26.08	007°09.68	E	12.01.14	10:09	39	7.3
72	6	Dredge	54°21.69	007°12.57	E	12.01.14	11:30	44	7.2
72	6	Grabber	54°21.85	007°11.78	E	12.01.14	11:43	41	7.2
73	7	Grabber	54°22.98	007°06.68	E	12.01.14	12:10	41	7.2
73	7	Dredge	54°22.98	007°06.48	E	12.01.14	12:14	40	7.2
74	8	Dredge	54°23.83	007°13.87	E	12.01.14	12:57	42	7.3
74	8	Grabber	54°23.99	007°13.16	E	12.01.14	13:11	41	7.3
75	3	CTD	54°19.01	007°11.73	E	12.01.14	13:54	42	7.2
75	9	Grabber	54°18.97	007°11.65	E	12.01.14	14:00	41	7.2
75	9	Dredge	54°18.97	007°11.57	E	12.01.14	14:01	42	7.2

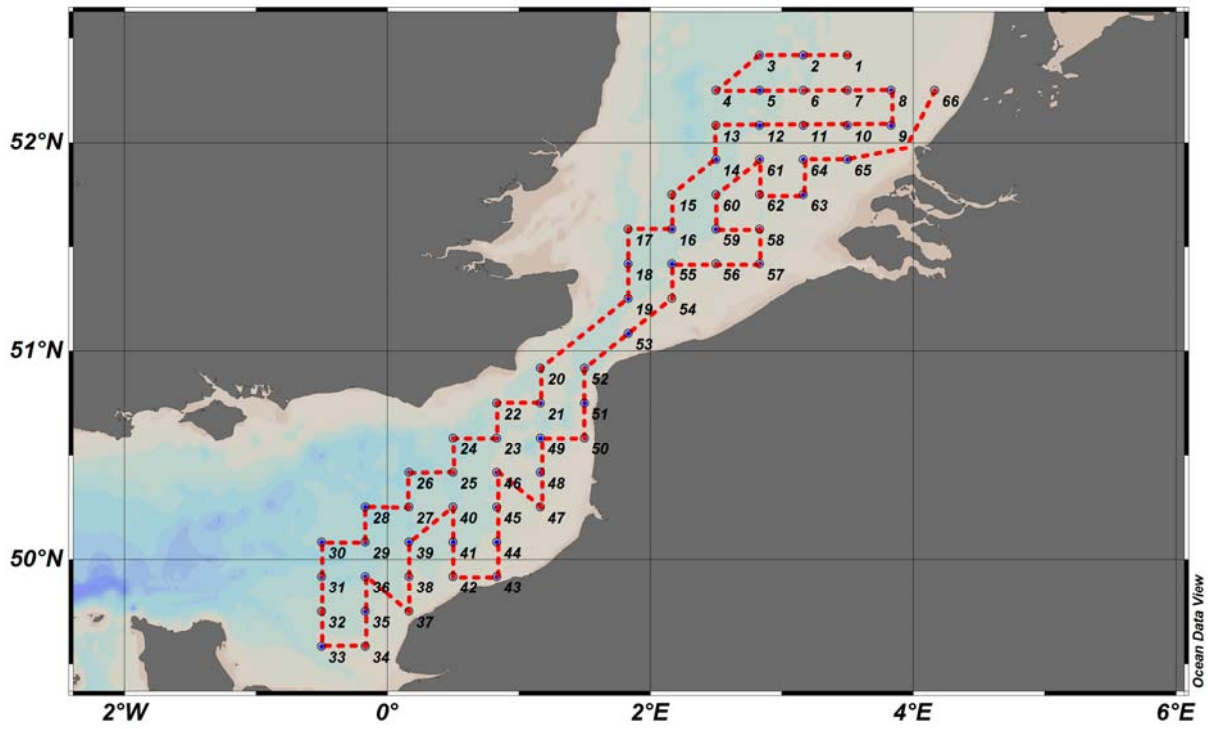


Figure 1: Cruise track in the southern North Sea and the English Channel.

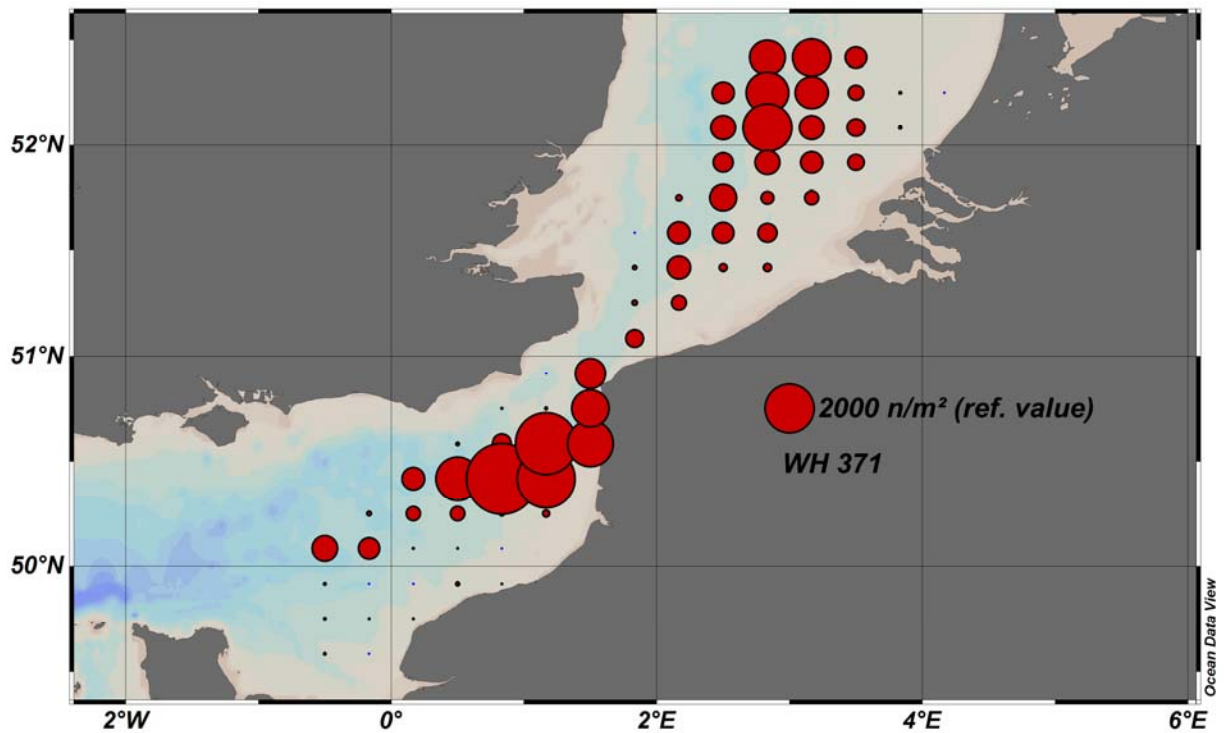


Figure 2: Corresponding abundance of herring larvae (n/m<sup>2</sup>). The circle size equivalent to 2000 larvae per square metre is indicated.

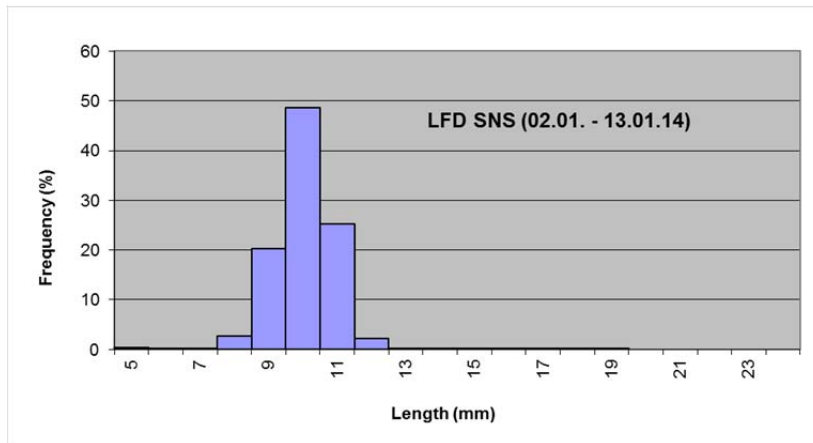


Figure 3: Length-frequency plot of herring larvae (mm) caught in the southern North Sea.

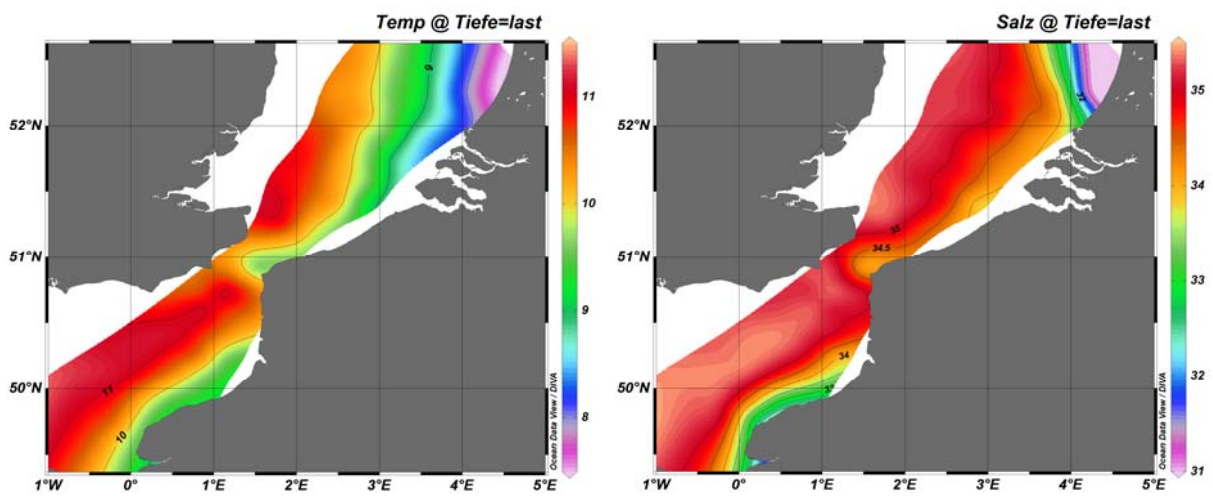


Figure 4: Distribution of near-bottom temperature ( $^{\circ}\text{C}$ , left panel) and salinity (psu, right panel) in the southern North Sea.

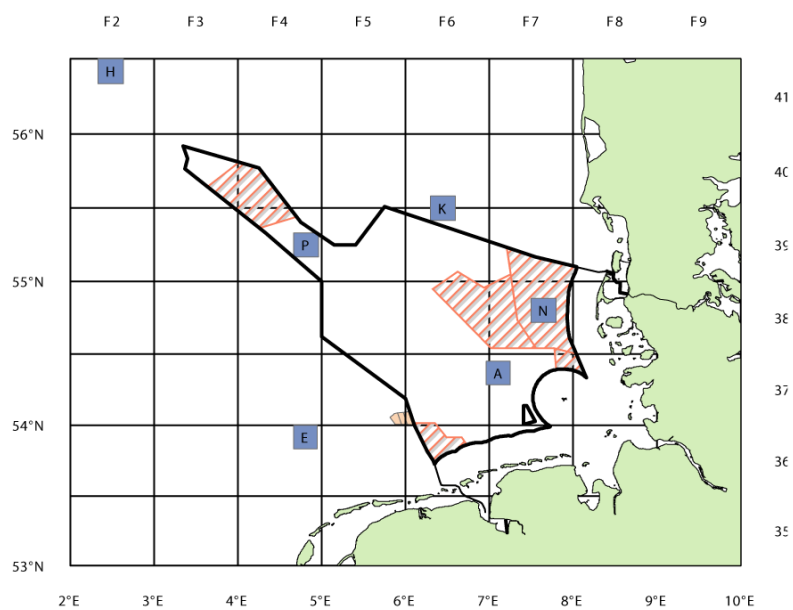


Figure 5: Location of Box A in the German EEZ