

Cruise Report
FRV "Walther Herwig III"
Cruise 442
05.01.-11.01.2021

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 (26,000) is higher compared to preceding years (12,000-20,000 larvae, except 2017). Most herring larvae were found in the south-western part of the survey area, in front of the French coastline, and higher quantities of larvae occurred also in Belgian waters.

As an additional task, the winter benthos species composition in Box A was examined. Benthos samples revealed extreme low abundances of the shrimp *Crangon crangon* and the brittle star *Ophiura ophiura*, as well as the complete absence of the bivalve *Nucula nitidosa*. The latter was frequently found in Box A since 1998, but is absent since 2018.

Verteiler:

TI - Seefischerei

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Bundesanstalt für Landwirtschaft und Ernährung, Hamburg

Schiffsführung RV „Dana“

Schiffsführung FFS "Walther Herwig III"

Präsidialbüro (Michael Welling)

Personalreferat Braunschweig

TI - Fischereiökologie

TI - Ostseefischerei Rostock

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

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.

DFFU

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

FRV "Walther Herwig III" left Bremerhaven on Tuesday afternoon, 01/05/21. All cruise members were PCR-tested for Covid-19 the day before. The area under investigation was reached the next morning, 01/06/21. Wind speed was at 6 Beaufort, slightly increasing.

However, due to unforeseen technical failure of the CTD used for depth recording and measurements of water temperature during the hauls, station work couldn't start immediately. Several trials revealed a loose connection somewhere in the electronic system, most likely in the CTD itself. Thus, as a kind of first aid, the CTD was exchanged by a Scanmar depth sensor to get the field work started. As a consequence, no digital data profiles on water depth, salinity or temperature are available for the hauls done by the Scanmar system.

While continuing the Ichthyoplankton sampling, the CTD connectors were checked and the system opened. One cable was bad; replaced and the connector repaired by the electrician. Clue and synthetic resin had to harden 24 hours, so it took until station 42 before the CTD was in use. After CTD repairment, all equipment operated properly.

The IHLS programme was finished without any further disturbances on Saturday at noon, 01/09/21. All stations were covered but two, which are meanwhile part of a wind farm construction area and cannot be reached any longer.

Having completed the IHLS programme, the vessel steamed into the German Bight to conduct one day of benthos sampling in Box A. This was done on Sunday, 01/10/21.

Cruise WH 442 ended in Bremerhaven on Monday afternoon, 01/11/21.

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 26,422 herring larvae, somewhat higher compared to preceding years (12,000-20,000 larvae, except low estimate in 2017). Fish larvae of other taxa amounted to 597 and 3121 fish eggs were caught, too. Species identification of fish eggs and larvae is not complete yet, but most fish eggs are identified as plaice *Pleuronectes platessa* (1505).

The majority of herring larvae were found in the south-western part of the survey area, in front of the French coastline. Larger larvae (above 15 mm standard length) drifted eastwards through the English Channel, mostly observed in Belgian and Dutch waters (not shown here).

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. 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. Epifauna assemblages were dominated by the brittle star *Ophiura ophiura* and the starfishes *Asterias rubens* and *Astropecten irregularis*. Fishes such as the dab *Limanda limanda* and the solenette *Buglossidium luteum* have dominated the assemblages in previous years, but revealed very low abundances in 2021. In particular, abundances of the solenette were lower than in the 20 years before. In contrast, the bivalve *Nucula nitidosa* reappeared in Box A after a complete absence since 2018, but still with unusually low abundances. Particularly evident this year were the extreme low abundances of the brown shrimp *Crangon crangon*. The brown shrimp has been a dominant part of the epibenthic community in Box A since the beginning of the survey in 1998. Since 2015 abundances of that species were steadily decreasing, resulting this year in the lowest ever observed in the study period.

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. Dr. Hermann Neumann	TI-SF	Scientist

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: Main data of Ichthyoplankton hauls made during WH 442.

Stat. Nr.	Haul Nr.	Lat (° N)	Long.	E/ W	Date (UTC)	Time (UTC)	Dura tion (min)	Water depth (m)	Catch depth (m)	Flow (m ³)	Hela (n/m ²)	Surface T (°C)	Bottom T (°C)
1	1	52°25.33	003°30.42	E	06.01.21	12:22	4.28	30	26	23.9	295	na	na
2	2	52°24.96	003°09.96	E	06.01.21	13:30	6.46	44	40	36.0	29	na	na
3	3	52°25.03	002°50.60	E	06.01.21	14:49	4.12	37	32	23.0	40	na	na
4	4	52°14.96	002°49.95	E	06.01.21	15:49	6.27	38	34	34.9	22	na	na
5	5	52°15.00	003°10.00	E	06.01.21	16:56	4.10	34	30	22.9	82	na	na
6	6	52°15.03	003°30.14	E	06.01.21	18:01	3.16	29	24	17.7	514	na	na
7	7	52°12.46	003°44.18	E	06.01.21	18:48	3.00	24	20	16.8	106	na	na
8	8	52°05.47	003°50.51	E	06.01.21	19:37	2.47	24	21	13.8	7	na	na
9	9	52°05.00	003°30.47	E	06.01.21	20:54	3.24	30	27	18.1	48	na	na
10	10	52°04.99	003°10.68	E	06.01.21	22:01	4.16	31	27	23.2	247	na	na
11	11	52°04.94	002°50.78	E	06.01.21	23:08	4.52	38	33	25.2	23	na	na
12	12	52°05.09	002°30.24	E	07.01.21	00:16	5.33	41	38	29.7	54	na	na
13	13	51°55.27	002°29.78	E	07.01.21	01:07	5.39	36	33	30.0	20	na	na
14	14	51°55.00	002°49.32	E	07.01.21	02:21	4.40	32	29	24.5	162	na	na
15	15	51°54.95	003°09.81	E	07.01.21	03:35	3.59	29	25	20.0	197	na	na
16	16	51°57.40	003°23.88	E	07.01.21	04:30	4.37	31	26	24.4	43	na	na
17	17	51°44.97	003°10.12	E	07.01.21	06:01	2.10	21	18	11.8	93	na	na
18	18	51°46.40	002°50.39	E	07.01.21	07:27	4.36	34	30	24.3	352	na	na
19	19	51°45.52	002°30.07	E	07.01.21	08:48	5.13	37	35	28.6	48	na	na
20	20	51°45.21	002°10.97	E	07.01.21	10:02	6.20	47	44	34.5	8	na	na
21	21	51°35.38	002°10.00	E	07.01.21	11:03	5.04	37	34	28.1	5	na	na
22	22	51°35.11	001°50.91	E	07.01.21	12:10	4.52	37	34	25.2	9	na	na
23	23	51°25.30	001°50.16	E	07.01.21	13:04	6.41	42	39	35.7	9	na	na
24	24	51°15.35	001°49.94	E	07.01.21	13:53	6.07	41	38	33.8	7	na	na
25	25	51°05.11	001°30.00	E	07.01.21	15:10	8.43	56	51	46.9	5	na	na
26	26	50°55.00	001°10.02	E	07.01.21	16:38	5.07	38	34	28.3	1	na	na
27	27	50°45.10	001°10.18	E	07.01.21	17:37	3.36	29	24	18.8	147	na	na
28	28	50°44.90	000°50.08	E	07.01.21	18:49	5.29	41	37	29.5	17	na	na
29	29	50°35.35	000°49.84	E	07.01.21	19:41	6.06	48	44	33.7	371	na	na
30	30	50°35.12	000°30.61	E	07.01.21	20:55	8.14	52	48	45.3	91	na	na
31	31	50°27.68	000°29.96	E	07.01.21	21:42	5.29	43	40	29.5	235	na	na
32	32	50°25.00	000°10.40	E	07.01.21	22:53	7.29	48	45	40.6	956	na	na
33	33	50°16.28	000°10.30	E	07.01.21	23:43	6.13	41	38	34.1	492	na	na
34	34	50°15.02	000°09.36	W	08.01.21	00:52	8.18	51	48	45.5	348	na	na
35	35	50°05.26	000°09.91	W	08.01.21	01:53	7.01	48	45	39.0	2993	na	na
36	36	50°04.97	000°29.93	W	08.01.21	03:15	7.47	49	44	41.6	2213	na	na
37	37	49°55.02	000°30.03	W	08.01.21	04:11	6.38	48	44	35.5	3170	na	na
38	38	49°44.95	000°30.02	W	08.01.21	05:07	6.20	42	38	34.5	15	na	na
39	39	49°35.05	000°30.10	W	08.01.21	06:01	3.15	33	30	17.6	9	na	na
40	40	49°35.19	000°10.70	W	08.01.21	07:09	3.58	31	26	20.0	0	na	na
41	41	49°44.60	000°09.76	W	08.01.21	08:03	5.06	38	36	28.2	44	na	na
42	42	49°54.54	000°10.05	W	08.01.21	08:58	8.05	47	44	45.6	6069	10.5	10.6
43	43	49°45.77	000°07.83	E	08.01.21	10:31	3.29	27	24	18.2	450	9.1	9.1
44	44	49°54.83	000°09.84	E	08.01.21	11:27	4.52	34	30	24.3	1924	9.7	9.8
45	45	50°04.50	000°09.90	E	08.01.21	12:20	5.58	40	37	33.9	3242	10.4	10.5
46	46	50°14.97	000°29.37	E	08.01.21	13:47	6.05	41	38	31.7	1236	10.4	10.5
47	47	50°05.42	000°30.08	E	08.01.21	14:44	5.15	37	34	25.8	766	10.0	10.0

Stat. Nr.	Haul Nr.	Lat. (° N)	Long.	E/ W	Date (UTC)	Time (UTC)	Duration (min)	Water depth (m)	Catch depth (m)	Flow (m³)	Hela (n/m²)	Surface T (°C)	Bottom T (°C)
48	48	49°55.03	000°29.00	E	08.01.21	15:46	4.02	31	81	21.6	1579	9.0	9.1
49	49	49°56.40	000°45.09	E	08.01.21	16:32	3.52	30	74	21.0	6	8.7	8.7
50	50	50°04.66	000°49.82	E	08.01.21	17:16	4.38	33	88	24.3	231	9.6	9.6
51	51	50°14.90	000°49.97	E	08.01.21	18:09	5.18	41	108	27.4	1101	10.1	10.1
52	52	50°24.46	000°49.49	E	08.01.21	19:00	5.38	40	110	30.2	299	10.4	10.4
53	53	50°15.33	001°09.49	E	08.01.21	20:28	3.52	30	76	20.9	123	9.0	9.0
54	54	50°24.66	001°09.96	E	08.01.21	21:22	5.23	35	97	29.2	204	9.6	9.6
55	55	50°34.47	001°10.08	E	08.01.21	22:16	10.04	57	202	56.4	465	10.2	10.2
56	56	50°35.31	001°22.75	E	08.01.21	23:41	3.42	29	65	20.3	334	9.1	9.1
57	57	50°44.55	001°24.83	E	09.01.21	00:41	5.20	39	96	28.6	164	10.0	10.0
58	58	50°54.58	001°29.73	E	09.01.21	01:49	7.45	51	146	41.7	48	9.5	9.6
59	59	51°05.67	001°49.99	E	09.01.21	03:46	3.20	30	67	17.8	288	9.3	9.3
60	60	51°14.95	002°09.95	E	09.01.21	05:23	5.44	39	115	31.5	158	9.6	9.7
61	61	51°24.97	002°09.97	E	09.01.21	06:21	4.15	40	86	23.8	71	10.0	10.0
62	62	51°21.64	002°29.53	E	09.01.21	07:32	4.08	33	80	21.1	92	8.3	8.3
63	63	51°27.67	002°49.28	E	09.01.21	08:47	3.33	28	69	19.2	123	7.9	8.4
64	64	51°34.56	002°50.55	E	09.01.21	09:24	3.56	29	77	20.7	69	9.1	9.1
65	65	51°35.00	002°30.66	E	09.01.21	10:36	5.07	37	100	27.0	264	9.6	9.6

Table 2: Benthos sampling in Box A – haul time and positions.

Station	Sampler	Date	Time	Latitude	Longitude	Depth (m)
66	CTD	10.01.21	08:00:38	54°18.536N	007°00.528E	39.9
66	2m-beam	10.01.21	08:13:29	54°18.699N	007°00.572E	40.0
67	2m-beam	10.01.21	08:52:05	54°22.267N	007°04.815E	40.9
68	2m-beam	10.01.21	09:19:55	54°24.246N	007°02.674E	39.4
69	2m-beam	10.01.21	09:48:29	54°26.882N	007°02.562E	39.0
70	2m-beam	10.01.21	10:30:46	54°24.356N	007°09.550E	40.7
71	2m-beam	10.01.21	11:03:45	54°24.368N	007°14.296E	38.0
72	2m-beam	10.01.21	12:17:23	54°21.466N	007°08.575E	40.6
73	2m-beam	10.01.21	12:45:47	54°18.859N	007°09.804E	40.7
74	2m-beam	10.01.21	13:06:14	54°18.015N	007°07.035E	39.5
74	CTD	10.01.21	13:20:45	54°17.861N	007°06.169E	39.4

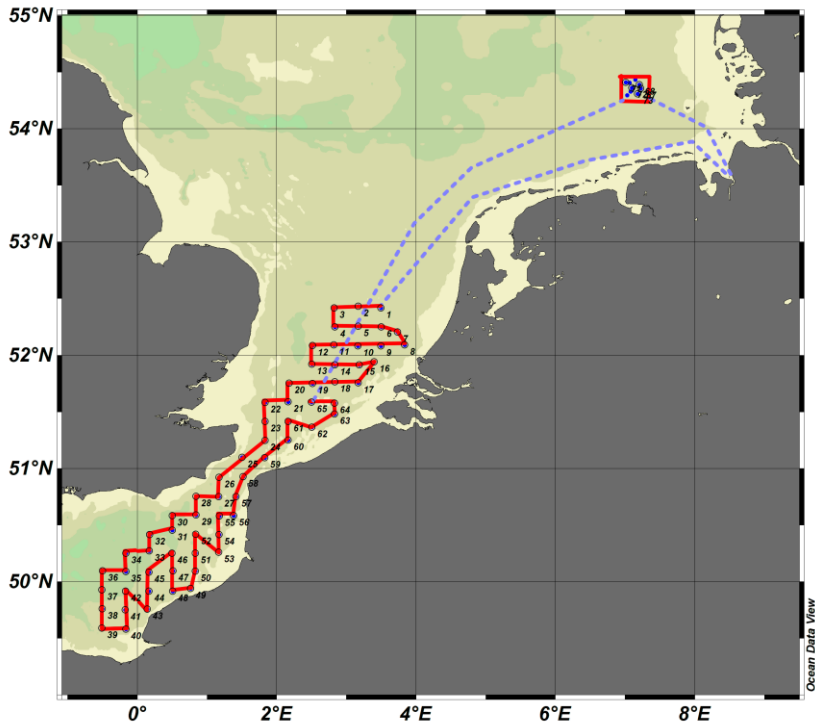


Figure 1: Location of Box A in the German Bight and positions of herring larvae stations in the southern North Sea and the English Channel.

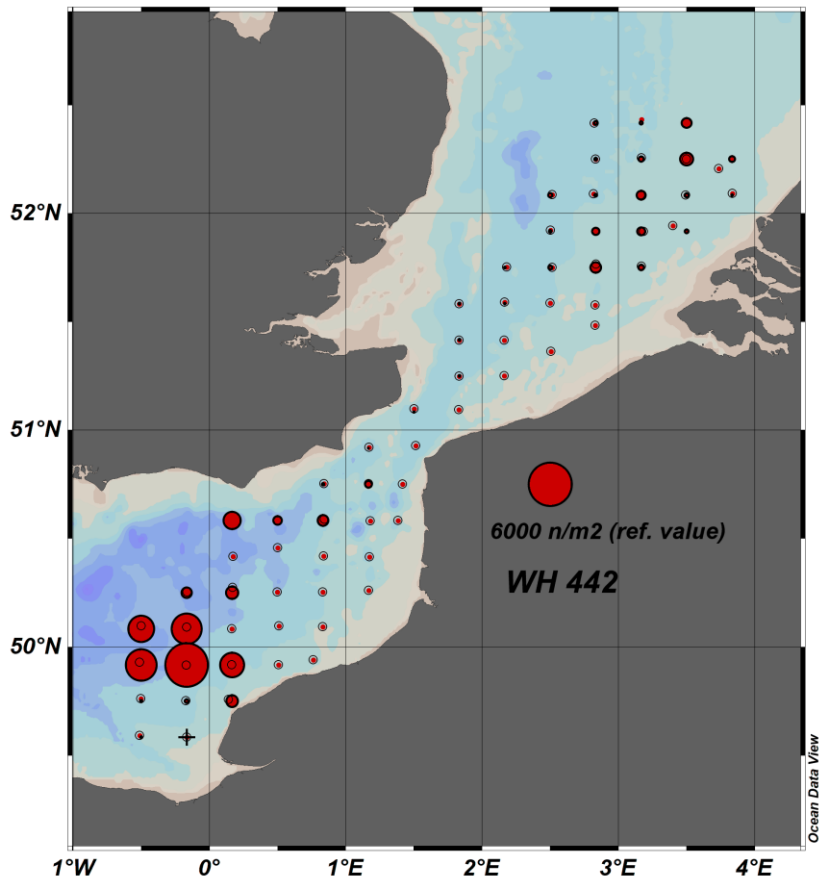


Figure 2: Distribution and abundance of herring larvae (n/m^2 , all length classes) in the southern North Sea and the English Channel. The circle size equivalent to 6 000 larvae per square metre is indicated.

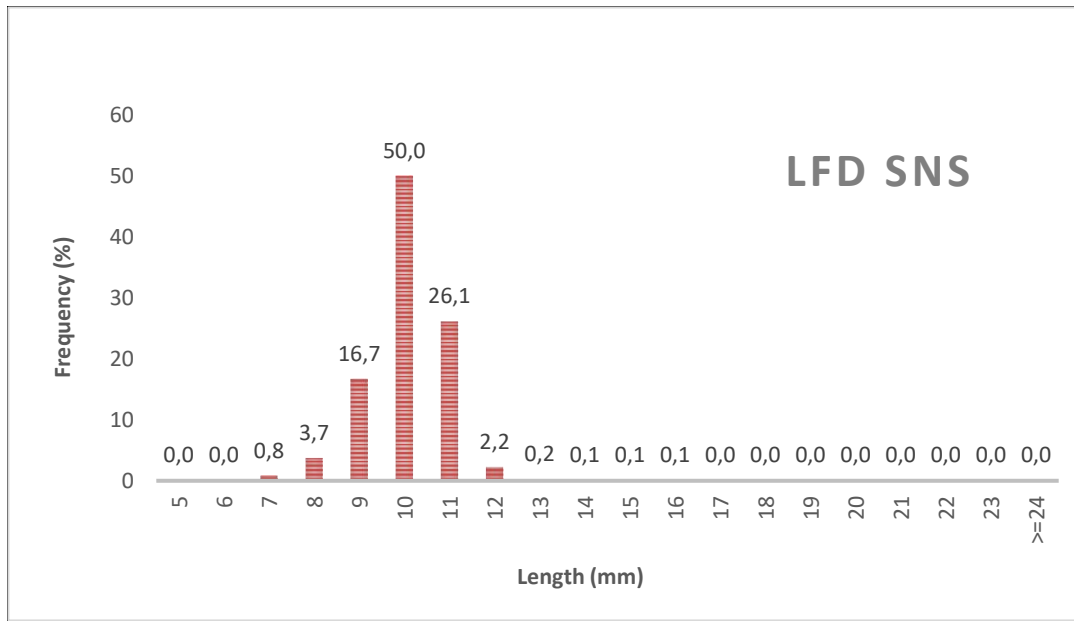


Figure 3: Length-frequency plot of herring larvae obtained during WH 442. The percentage per length class is given on top of each bar (LFD SNS = length frequency distribution southern North Sea).