Federal Research Institute for Rural Areas, Forestry and Fisheries

Thünen-Institute of Sea Fisheries

THÜNEN

Herwigstraße 31, 27572 Bremerhaven Telephone +49471 94460-331 Telefax +49471 94460-199 24.02.2020 Az.: Dr.Ro/Grie/4375

Cruise Report
FRV "Walther Herwig III"
Cruise 433
06.01.-13.01.2020

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 (12,000) is in line with 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. However, conclusions for North Sea herring spawning stock dynamics 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 2020.

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

per E-Mail:
BMEL, Ref. 614
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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. Parts of ICES area 4c and 7d should be sampled by double oblique tows with the "Nackthai" (modified GULF sampler), resulting in herring larval abundance estimates and spatial distribution.

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 Monday morning, 01/06/20. The area under investigation was reached the next morning, 01/07/20. Wind speed was 5 to 6 Beaufort, increasing with time. During the evening, wind speed reached 8 Beaufort, thus plankton sampling was stopped during this night. We re-started the next morning and finished the IHLS programme without any further disturbances on Friday afternoon, 01/10/20. All scheduled stations were covered, excepting two, which became part of a wind farm 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, 01/12/20.

Cruise WH 433 ended in Bremerhaven on Monday afternoon, 01/13/20.

4. Preliminary results

In total, 65 plankton tows were done within the IHLS framework. Physical measurements, e.g. temperature, salinity and conductivity, were conducted via a CTD mounted directly onto the gulf sampler.

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 and their abundance per square metre estimated. Length measurements are still in progress and thus length-frequency plots cannot be shown yet.

The samples yielded in total 11,998 herring larvae, which is in line with preceding years (12,000-20,000 larvae, expect 2017). Fish larvae of other taxa amounted to 546 and 3793 fish eggs were caught, too. Species identification of fish eggs and larvae is pending.

Most herring larvae were found in the south-western part of the survey area, in front of the French coastline, but larger quantities of larvae occurred also in Belgian waters. If the later were newly hatched larvae or larger larvae drifting out of the English Channel can only be judged when larvae length measurements are finalized.

The cruise track is given in Figure 1, and the spatial distribution of herring larvae in Figure 2. Figure 3 depicts the distribution of near-bottom water temperature. Abundance estimates and available physical water parameters are listed in Table 1.

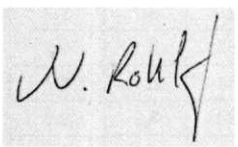
To investigate the benthos composition in Box A, nine beam trawl samples were taken. In general, abundances and biomasses of caught species were very low in 2020. Epifauna assemblages were dominated by the dab *Limanda limanda*, the solenette *Buglossidium luteum* and the starfish *Asterias rubens*. Particularly evident this year were the 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. Species such as *Crangon crangon*, *Ophiura ophiura* and *Astropecten irregularis* have had a period of high abundances that end up in the middle of the 2010s. Since then abundances of these species were steadily decreasing, resulting in the very low abundances observed in 2020.

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
7. Ana Vaz	University of Coimbra	Scientist

6. Acknowledgement

Thanks to Captain Hannes Janßen and FRV "Walterh 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 433.

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)	Sur- face T (°C)	Bottom T (°C)
1	1	52°25.00	003°29.77	E	07.01.20	06:59	2.43	26	23	15.0	12	9.0	9.0
2	2	52°24.98	003°10.02	E	07.01.20	08:04	5.23	40	37	30.4	34	9.4	9.4
3	3	52°24.98	002°49.97	E	07.01.20	09:15	4.15	38	34	24.7	31	10.0	9.9
4	4	52°15.00	002°49.98	E	07.01.20	10:15	3.41	35	32	24.9	7	10.0	10.0
5	5	52°15.03	003°10.20	E	07.01.20	11:19	3.35	28	25	18.8	9	9.5	9.5
6	6	52°14.96	003°29.98	E	07.01.20	12:20	3.05	25	22	17.6	7	8.9	8.9
7	7	52°12.38	003°44.12	E	07.01.20	13:09	2.14	22	19	12.4	2	8.7	8.7
8	8	52°05.05	003°50.01	E	07.01.20	14:04	2.18	18	15	14.8	0	8.4	8.4
9	9	52°04.99	003°29.70	E	07.01.20	15:14	2.44	21	18	14.0	3	8.6	8.7
10	10	52°04.94	003°09.86	E	07.01.20	16:20	4.18	35	31	24.4	1	9.2	9.2
11	11	52°05.04	002°49.14	E	07.01.20	17:33	5.11	40	37	29.0	8	9.7	9.7
12	12	52°05.14	002°30.80	E	07.01.20	18:40	7.02	47	42	41.0	0	10.2	10.2
13	13	51°55.03	002°30.14	E	08.01.20	03:19	5.37	43	40	36.0	1	10.2	10.2
14	14	51°54.95	002°50.13	E	08.01.20	04:29	4.56	37	35	31.0	26	9.7	9.7
15	15	51°54.98	003°11.01	E	08.01.20	06:06	3.29	33	30	21.7	55	9.1	9.2
16	16	51°56.53	003°23.95	E	08.01.20	06:50	3.54	28	25	20.6	11	8.7	8.7
17	17	51°45.03	003°10.02	E	08.01.20	08:27	2.12	22	19	12.6	24	8.9	8.9
18	18	51°45.91	002°50.19	E	08.01.20	09:54	4.35	35	32	25.6	36	9.6	9.6
19	19	51°45.00	002°30.08	E	08.01.20	11:26	5.59	41	38	32.8	4	10.2	10.1
20	20	51°45.01	002°10.08	E	08.01.20	12:47	7.28	51	48	39.1	8	10.5	10.5
21	21	51°35.04	002°09.99	E	08.01.20	13:50	5.30	39	36	30.0	21	10.4	10.4
22	22	51°34.93	001°49.96	E	08.01.20	15:03	4.49	39	36	30.7	0	9.8	9.8
23	23	51°24.92	001°49.98	E	08.01.20	15:57	5.47	41	39	33.6	7	9.5	9.6
24	24	51°14.96	001°49.85	E	08.01.20	16:48	5.25	40	38	32.3	181	10.0	10.0
25	25	51°05.09	001°03.11	E	08.01.20	17:58	8.01	55	52	47.5	101	10.3	10.3
26	26	50°55.24	001°10.34	E	08.01.20	19:13	4.49	35	32	29.6	38	10.2	10.2
27	27	50°45.14	001°10.13	E	08.01.20	20:11	3.20	31	28	19.2	76	10.6	10.6
28	28	50°45.17	000°50.28	E	08.01.20	21:21	5.13	39	36	31.5	36	10.5	10.6
29	29	50°35.32	000°50.06	E	08.01.20	22:26	5.37	47	44	32.0	300	10.8	10.8
30	30	50°35.00	000°30.00	E	08.01.20	23:38	8.00	49	46	43.1	193	10.9	10.9
31	31	50°27.34	000°29.99	E	09.01.20	00:25	7.04	43	40	39.1	403	11.0	11.0
32	32	50°24.97	000°10.05	E	09.01.20	01:31	7.01	49	46	39.8	383	11.1	11.1
33	33	50°16.04	000°10.24	E	09.01.20	02:40	6.18	42	39	38.0	789	11.0	11.1
34	34	50°15.19	000°09.74	W	09.01.20	03:47	7.55	51	48	45.5	859	11.1	11.1
35	35	50°05.05	000°09.98	W	09.01.20	04:52	6.55	48	43	41.5	695	11.1	11.2
36	36	50°05.08	000°29.88	W	09.01.20	06:19	7.10	49	46	41.8	207	11.2	11.2
37	37	49°55.07	000°30.06	W	09.01.20	07:24	6.27	49	46	35.8	594	11.1	11.1
38	38	49°45.06	000°30.18	W	09.01.20	08:24	5.30	44	41	30.8	21	10.5	10.5
39	39	49°35.05	000°30.06	W	09.01.20	09:23	3.51	39	31	23.5	5	10.3	10.3
40	40	49°34.98	000°09.97	W	09.01.20	10:32	3.52	40	28	21.7	0	9.7	10.1
41	41	49°45.12	000°10.03	W	09.01.20	11:27	5.29	39	36	30.5	302	10.4	10.4
42	42	49°54.96	000°10.11	W	09.01.20	12:20	7.18	51	48	41.6	1452	10.9	11.0
43	43	49°45.48	000°08.51	E	09.01.20	13:56	2.54	26	23	14.4	137	9.7	9.8
44	44	49°55.10	000°09.91	E	09.01.20	14:51	4.04	34	30	25.2	391	10.1	10.4
45	45	50°04.97	000°09.97	E	09.01.20	15:45	4.53	40	37	28.7	715	10.8	10.8
46	46	50°15.13	000°29.94	E	09.01.20	17:14	5.18	40	37	27.8	1132	10.8	10.8

Stat. Nr.	Haul Nr.	Lat. (° N)	Long.	E/ W	Date (UTC)	Time (UTC)	Dura tion (min)	Water depth (m)	Catch depth (m)	Flow (m³)	Hela (n/m²)	Sur- face T (°C)	Bottom T (°C)
47	47	50°05.08	000°30.06	E	09.01.20	18:12	4.15	36	33	21.6	503	10.1	10.4
48	48	49°55.01	000°30.05	E	09.01.20	19:17	3.45	31	28	22.4	250	9.7	9.7
49	49	49°56.38	000°45.07	E	09.01.20	20:01	3.26	30	27	19.1	55	9.5	9.5
50	50	50°05.05	000°49.92	E	09.01.20	20:48	4.15	34	31	22.6	1170	10.1	10.1
51	51	50°15.02	000°49.88	E	09.01.20	21:41	5.34	42	39	30.7	605	10.3	10.3
52	52	50°25.16	000°50.03	E	09.01.20	22:37	4.46	39	36	25.6	594	10.8	10.8
53	53	50°15.64	001°10.01	E	10.01.20	00:08	4.14	31	28	23.2	333	9.4	9.4
54	54	50°24.91	001°10.04	E	10.01.20	01:00	4.13	32	29	24.5	294	9.8	9.9
55	55	50°34.87	001°10.74	E	10.01.20	01:53	9.02	57	54	50.0	156	10.1	10.1
56	56	50°34.98	001°22.97	E	10.01.20	03:13	3.26	30	27	19.2	97	9.5	9.6
57	57	50°45.00	001°25.00	E	10.01.20	04:17	6.36	45	42	36.0	143	9.8	9.9
58	58	50°55.06	001°30.09	E	10.01.20	05:34	6.49	49	46	36.7	208	10.0	10.0
59	59	51°05.67	001°49.80	E	10.01.20	07:35	4.02	30	27	20.3	95	9.6	9.6
60	60	51°14.97	002°09.86	E	10.01.20	09:16	5.56	40	37	31.4	852	9.8	9.8
61	61	51°24.92	002°09.82	E	10.01.20	10:26	5.24	40	37	30.0	284	10.1	10.1
62	62	51°21.76	002°30.26	E	10.01.20	11:42	4.16	33	30	25.2	305	8.7	8.7
63	63	51°28.09	002°49.85	E	10.01.20	13:00	4.06	29	26	20.8	132	8.7	8.7
64	64	51°34.56	002°49.86	E	10.01.20	13:37	3.39	29	26	20.0	190	9.2	9.2
65	65	51°35.10	002°29.96	E	10.01.20	14:53	4.30	34	31	23.3	171	9.9	9.9

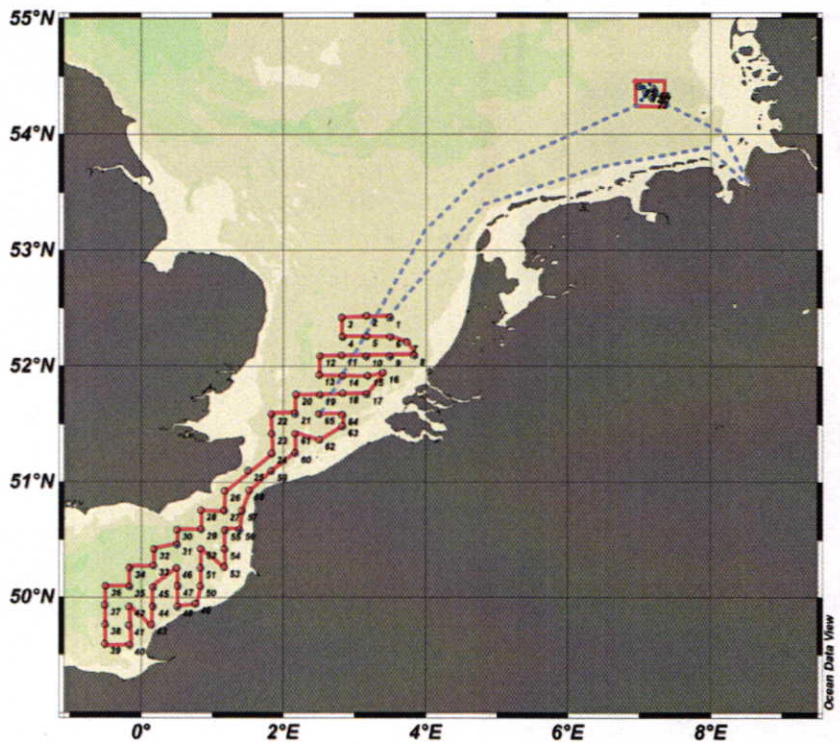


Figure 1: Location of Box A in the German Bight and positions of herring larvae stations in the southern North Sea and the English Channel.

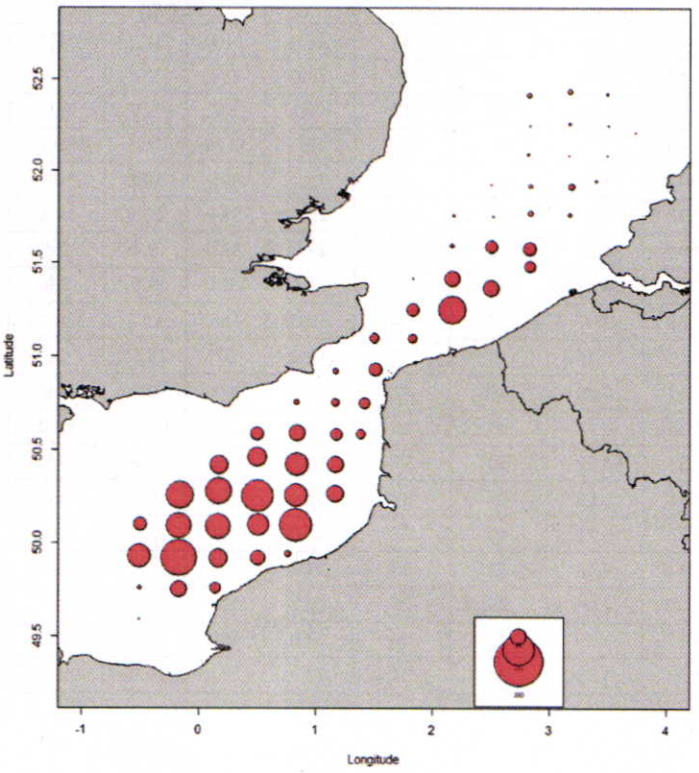


Figure 2: Distribution and abundance of herring larvae (n/m², all length classes) in the southern North Sea and the English Channel. The circle size equivalent to 250 larvae per square metre is indicated.

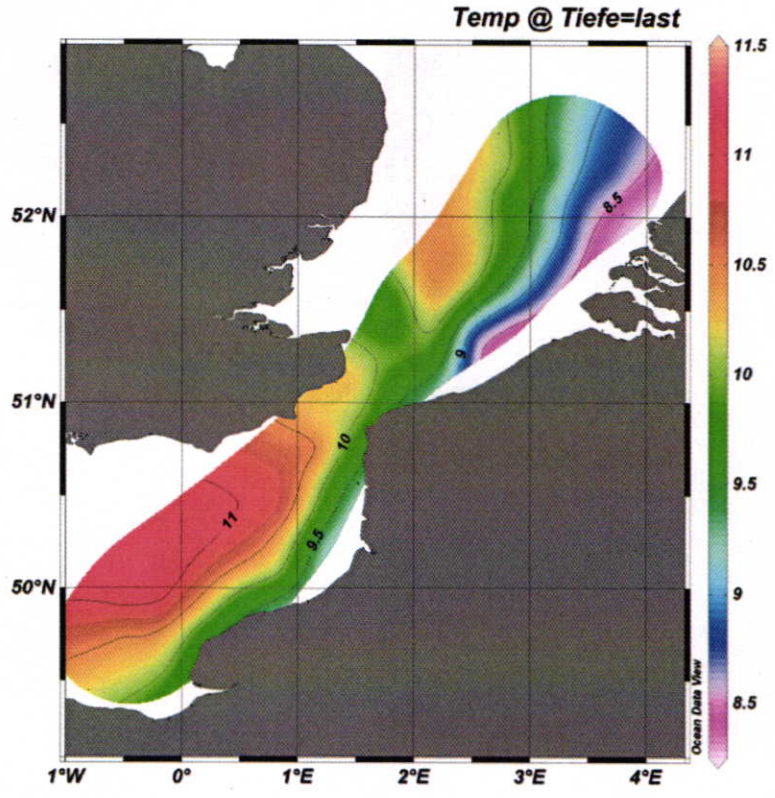


Figure 3: Distribution of near-bottom temperature (°C) in the area under investigation