Federal Research Institute for Rural Areas, Forestry and Fisheries

Thünen-Institute of Sea Fisheries

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Cruise Report
RV Dana
Cruise 09-21
20.09. - 01.10.2021

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 spatial distribution of herring larvae was found to be in common pattern. Most larvae hatched east of the Orkneys. But larvae numbers increased compared to last year, and they were more widely distributed. Only a few stations yielded no herring larvae at all.

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 2022.

Verteiler:
TI - Seefischerei

per E-Mail:
BMEL, Ref. 614
BMEL, Ref. 613
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 4a and 4b should be sampled by double oblique tows with the "Nackthai" (modified GULF III sampler), resulting in herring larval abundance estimates and spatial distribution.

3. Narrative

The survey was undertaken on board RV "Dana" instead of FRV "Walther Herwig III", because the later had some maintenance work still to be done in September. Thus, RV "Dana" stepped in again as replacement vessel, as it had done successfully also in September 2019.

The scientific crew members arrived at Hirtshals in the evening of 09/20/21, and RV Dana left port the same evening. The area under investigation was reached early Wednesday morning, 09/22/21. Wind speed was up to 7 Beaufort, but decreasing to 4.

Wind speed and weather conditions remained harshly for the rest of the cruise, and the cruise track had to be adapted several times. However, all but six plankton tows could be done as scheduled. The field work was finished at Tuesday, 09/28/21. The vessel steamed back to Hirtshals, and the scientists disembarked on Friday 01/10/21.

4. Preliminary results

In total, 105 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.

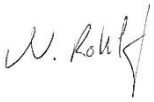
The spatial distribution of herring larvae was found to be in common pattern. Most larvae hatched east of the Orkneys and on shallower banks in the Buchan area. However, larvae numbers increased compared to last year, and they were more widely distributed. Only a few stations yielded no herring larvae. The cruise track and the spatial distribution of herring larvae are given in Figure 1. Figure 2 depicts the distribution of near-bottom water temperature. Abundance estimates and available physical water parameters are listed in Table 1.

5. Participants

Name	Institution	Function
1. Norbert Rohlf	TI-SF	Cruise leader
2. Birgit Suer	TI-SF	Technician
3. Karin Krüger	TI-SF	Technician
4. Andriy Martynenko	TI-SF	Engineer
5. Svea Winning	TI-SF	Technician

6. Acknowledgement

Thanks to Captain Jesper Sandager and RV "Dana" 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 Dana 9-21.

	Haul Nr.	Lat. (° N)	Long.	E/W	Date (UTC)	Time (UTC)	Duration (min)	Water depth (m)	Catch depth (m)	Flow (m^3)	Hela (n/m^2)	Sur-face T (°C)	Bottom T (°C)
1	1	58°34.98	001°09.44	W	22.09.21	06:52	12.40	110	99	58.4	13	13.4	9.9
2	2	58°34.97	001°29.25	W	22.09.21	08:11	16.57	114	107	73.5	28	12.5	10.6
3	3	58°35.00	001°49.40	W	22.09.21	09:29	15.33	100	95	72.1	82	12.6	11.2
4	4	58°34.95	002°09.61	W	22.09.21	10:44	11.09	80	75	53.9	104	12.7	11.8
5	5	58°34.96	002°30.10	W	22.09.21	11:57	10.02	77	71	49.1	63	12.9	12.0
6	6	58°35.01	002°49.91	W	22.09.21	13:01	8.58	70	65	45.0	70	12.8	12.8
7	7	58°25.24	002°50.19	W	22.09.21	14:06	10.08	68	62	52.2	46	12.9	12.9
8	8	58°25.10	002°29.85	W	22.09.21	15:20	10.02	66	62	54.6	87	12.9	12.9
9	9	58°24.98	002°10.60	W	22.09.21	16:26	12.08	84	78	60.0	182	13.0	11.8
10	10	58°25.12	001°50.81	W	22.09.21	17:33	18.17	105	102	91.8	45	12.8	11.4
11	11	58°24.94	001°31.49	W	22.09.21	18:44	18.12	106	101	92.3	24	13.3	10.9
12	12	58°25.02	001°11.43	W	22.09.21	19:51	18.00	105	100	92.9	62	12.9	10.3
13	13	58°15.59	001°09.54	W	22.09.21	21:10	15.32	105	100	69.0	18	13.5	10.1
14	14	58°15.10	001°29.12	W	22.09.21	22:33	21.20	135	120	97.8	37	13.4	10.0
15	15	58°15.03	001°49.06	W	22.09.21	23:55	15.24	101	97	72.2	77	13.0	11.1
16	16	58°15.00	002°09.73	W	23.09.21	01:19	8.20	63	60	38.7	68	12.9	12.0
17	17	58°15.18	002°29.91	W	23.09.21	02:33	7.25	57	52	38.1	141	12.9	12.9
18	18	58°15.24	003°09.71	W	23.09.21	05:14	8.30	62	57	48.1	28	13.0	13.0
19	19	58°05.64	003°28.98	W	23.09.21	06:44	4.04	43	37	20.1	4	13.0	13.0
20	20	58°04.66	003°10.63	W	23.09.21	07:54	4.05	51	46	16.9	0	13.2	13.1
21	21	58°03.48	002°51.36	W	23.09.21	09:11	5.56	57	53	27.9	6	13.2	13.1
22	22	57°35.02	002°50.05	W	23.09.21	10:14	17.15	96	92	91.3	2	13.0	12.4
23	23	57°45.51	002°50.04	W	23.09.21	11:22	3.38	36	31	18.7	0	13.5	13.5
24	24	57°45.10	002°30.06	W	23.09.21	12:36	16.18	112	107	80.2	0	13.6	12.2
25	25	57°54.43	002°29.93	W	23.09.21	13:45	8.27	65	59	42.7	5	13.1	12.8
26	26	58°05.13	002°30.18	W	23.09.21	14:57	9.38	70	67	48.0	60	13.0	13.0
27	27	58°05.25	002°09.95	W	23.09.21	16:09	10.03	69	64	54.0	571	12.8	12.4
28	28	57°55.23	002°10.13	W	23.09.21	17:12	13.01	82	79	68.1	92	13.0	12.7
29	29	57°45.43	002°09.98	W	23.09.21	18:17	20.24	118	113	100.4	228	13.6	12.5
30	30	57°45.20	001°50.61	W	23.09.21	19:44	7.16	61	57	36.8	265	13.5	13.4
31	31	57°54.59	001°49.97	W	23.09.21	20:37	10.44	77	72	53.1	148	12.8	12.2
32	32	58°04.36	001°49.95	W	23.09.21	21:38	14.13	92	86	69.1	85	12.8	12.2
33	33	58°05.02	001°30.81	W	23.09.21	22:52	11.37	83	76	60.8	16	13.0	11.4
34	34	58°05.00	001°10.50	W	24.09.21	00:00	18.27	106	101	95.3	10	13.1	10.2
35	35	57°55.03	001°08.90	W	24.09.21	01:21	18.06	108	102	92.5	11	13.2	9.9
36	36	57°54.98	001°29.92	W	24.09.21	02:43	18.28	101	96	103.9	30	12.7	10.7
37	37	57°45.40	001°29.92	W	24.09.21	03:45	12.03	76	72	63.4	182	12.7	12.8
38	38	57°34.82	001°29.72	W	24.09.21	04:55	13.14	82	77	76.1	957	13.2	12.6
39	39	57°25.59	001°29.82	W	24.09.21	06:02	12.25	94	90	59.3	769	13.1	12.5
40	40	57°15.50	001°49.04	W	24.09.21	07:50	7.33	60	55	36.1	342	13.3	13.3
41	41	57°14.96	001°30.22	W	24.09.21	08:59	10.45	76	70	54.2	435	12.6	12.2
42	42	57°14.88	001°10.22	W	24.09.21	10:05	11.57	78	72	63.8	456	12.8	12.7
43	43	57°24.53	001°09.84	W	24.09.21	11:16	12.40	80	75	67.5	156	13.2	11.8
44	44	57°34.60	001°09.97	W	24.09.21	12:26	15.44	101	95	76.1	7	13.3	11.8
45	45	57°44.57	001°09.96	W	24.09.21	13:44	14.45	95	90	66.6	6	13.1	10.3
46	46	58°44.98	002°44.85	W	24.09.21	21:22	9.08	75	70	43.3	447	12.8	12.3

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)	Botto m T (°C)
47	47	58°44.97	002°30.20	W	24.09.21	22:15	11.31	77	71	59.5	280	12.5	12.3
48	48	58°44.99	002°09.74	W	24.09.21	23:22	12.43	84	79	64.3	491	12.5	12.3
49	49	58°44.92	001°49.96	W	25.09.21	00:28	14.11	93	93	69.3	325	12.4	12.2
50	50	58°44.96	001°30.24	W	25.09.21	01:36	19.48	112	105	99.5	55	12.2	10.9
51	51	58°44.79	001°10.00	W	25.09.21	02:49	19.23	114	108	98.2	70	12.0	10.0
52	52	58°55.05	001°10.29	W	25.09.21	04:06	19.34	119	115	98.8	5	12.9	8.2
53	53	58°54.97	001°29.40	W	25.09.21	05:13	19.41	108	103	99.2	81	12.1	11.6
54	54	58°55.11	001°48.91	W	25.09.21	06:20	16.43	93	88	83.8	68	12.3	12.3
55	55	58°55.05	002°09.13	W	25.09.21	07:27	11.02	80	75	52.0	449	12.5	12.5
56	56	58°54.94	002°29.04	W	25.09.21	08:32	10.03	76	70	46.9	280	12.6	12.5
57	57	59°04.80	002°24.86	W	25.09.21	09:39	9.07	73	67	42.9	9551	12.9	12.9
58	58	59°04.88	002°11.10	W	25.09.21	10:25	11.41	81	76	58.0	830	12.7	12.6
59	59	59°05.24	001°50.97	W	25.09.21	11:30	12.56	83	78	67.1	354	12.6	12.3
60	60	59°05.22	001°31.24	W	25.09.21	12:34	18.05	105	98	87.8	28	12.1	11.3
61	61	59°05.07	001°10.64	W	25.09.21	13:46	23.43	124	119	121.3	13	12.5	8.4
62	62	59°13.97	001°09.52	W	25.09.21	15:09	19.06	117	111	98.8	9	12.0	8.7
63	63	59°15.05	001°29.34	W	25.09.21	16:56	16.31	102	96	80.6	22	12.0	12.0
64	64	59°15.12	001°49.24	W	25.09.21	17:31	12.29	79	73	65.0	2391	12.9	12.7
65	65	59°15.20	002°09.53	W	25.09.21	18:39	13.12	90	83	66.6	1399	13.0	13.0
66	66	59°24.33	002°09.94	W	25.09.21	19:32	11.23	78	73	60.1	165	13.0	13.0
67	67	59°34.60	002°09.92	W	25.09.21	20:33	14.57	94	89	75.3	262	12.6	12.6
68	68	59°44.16	002°09.72	W	25.09.21	21:36	16.12	109	104	76.0	36	12.5	12.3
69	69	59°54.50	002°09.90	W	25.09.21	22:49	17.03	100	95	85.8	23	12.2	12.0
70	70	59°54.77	001°50.48	W	25.09.21	00:03	15.21	103	98	74.0	82	11.8	11.7
71	71	59°55.07	001°29.99	W	26.09.21	01:15	19.25	115	110	93.8	29	11.4	11.3
72	72	59°44.89	001°29.88	W	26.09.21	02:26	11.01	82	77	51.5	49	11.8	11.8
73	73	59°44.94	001°49.64	W	26.09.21	03:50	20.05	109	104	108.0	17	12.3	12.0
74	74	59°34.99	001°49.99	W	26.09.21	05:02	15.58	95	89	82.5	96	12.5	12.5
75	75	59°25.38	001°50.31	W	26.09.21	06:12	15.52	102	97	75.2	110	12.7	12.4
76	76	59°25.02	001°31.41	W	26.09.21	07:23	12.52	91	86	62.9	41	12.2	12.0
77	77	59°24.75	001°11.44	W	26.09.21	08:31	21.56	122	117	108.4	23	11.9	9.2
78	78	59°34.53	001°09.78	W	26.09.21	09:51	19.14	116	109	92.4	58	11.9	9.8
79	79	59°34.82	001°28.20	W	26.09.21	11:04	14.54	97	92	74.0	29	12.2	12.0
80	80	59°44.72	001°09.97	W	26.09.21	12:39	20.05	111	105	107.5	25	11.8	9.6
81	81	59°55.10	001°10.08	W	26.09.21	13:50	16.06	104	98	75.0	121	11.9	11.3
82	82	58°44.94	003°29.57	W	27.09.21	02:06	15.34	90	85	71.8	104	13.2	13.2
83	83	58°38.34	003°49.98	W	27.09.21	03:28	14.24	82	77	76.3	0	13.1	13.3
84	84	58°44.95	003°49.93	W	27.09.21	04:30	13.13	88	83	64.8	0	13.3	13.1
85	85	58°54.94	003°50.29	W	27.09.21	05:35	18.45	99	95	97.8	1	13.0	13.0
86	86	58°55.23	003°31.71	W	27.09.21	06:43	9.55	76	70	45.6	102	13.2	13.1
87	87	59°04.44	003°30.19	W	27.09.21	07:42	9.26	76	71	41.7	0	13.0	13.0
88	88	59°04.80	003°49.28	W	27.09.21	08:48	15.39	108	102	67.0	0	13.0	11.9
89	89	59°14.63	003°49.75	W	27.09.21	09:54	21.41	125	120	96.3	0	12.8	11.0
90	90	59°24.43	003°50.06	W	27.09.21	11:07	22.27	147	120	106.0	0	13.0	10.7
91	91	59°25.17	003°30.02	W	27.09.21	12:34	22.51	145	120	104.5	74	13.0	11.5
92	92	59°15.18	003°29.95	W	27.09.21	13:46	16.34	101	96	96.0	1730	13.1	12.1
93	93	59°15.11	003°10.19	W	27.09.21	15:03	8.22	69	64	37.2	187	13.0	13.1
94	94	59°24.38	003°09.53	W	27.09.21	16:04	11.06	77	72	48.8	483	13.0	13.0
95	95	59°34.78	003°09.93	W	27.09.21	17:27	24.48	153	125	134.7	118	12.9	12.5
96	96	59°44.58	003°11.01	W	27.09.21	19:00	7.53	64	58	37.1	24	12.8	12.5
97	97	59°54.33	003°10.18	W	27.09.21	20:00	12.33	87	83	57.5	3	12.8	11.8

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)	Botto m T (°C)
98	98	59°55.07	002°51.08	W	27.09.21	21:09	10.56	80	74	51.6	5	12.9	12.0
99	99	59°55.20	002°30.95	W	27.09.21	22:16	14.57	94	89	73.5	27	12.6	12.6
100	100	59°45.50	002°29.26	W	27.09.21	23:40	9.58	95	90	42.3	31	12.6	12.6
101	101	59°45.03	002°50.07	W	28.09.21	01:28	12.04	77	72	64.5	0	12.4	12.4
102	102	59°35.11	002°50.00	W	28.09.21	02:45	12.14	77	72	65.3	11	12.5	12.5
103	103	59°35.56	002°30.41	W	28.09.21	03:54	13.53	88	83	72.1	199	12.7	12.5
104	104	59°22.70	002°50.72	W	28.09.21	05:53	5.41	53	47	28.9	303	13.0	13.0
105	105	59°24.97	002°30.85	W	28.09.21	06:59	4.28	48	42	21.7	219	13.0	13.1

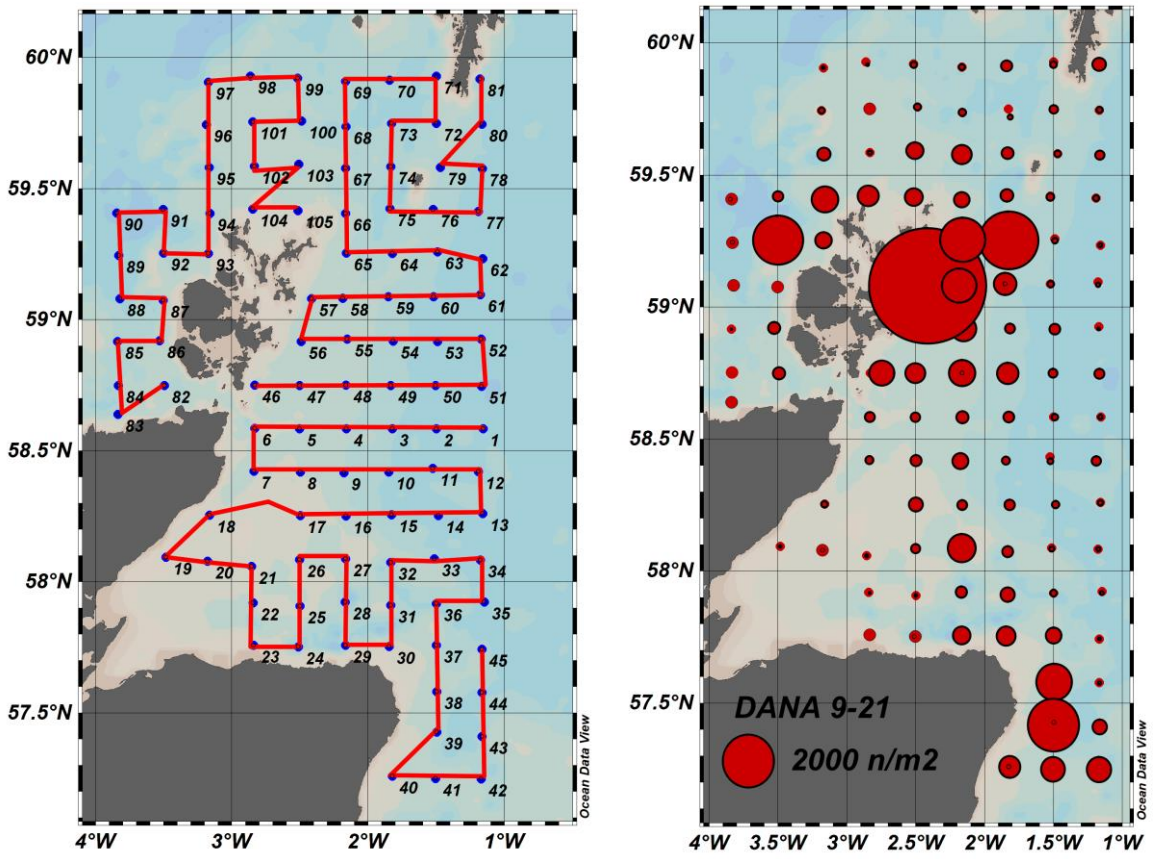


Figure 1: Dana 9-21 cruise track in the Orkney/Shetland (north of 58°N) and Buchan area (by station number, left panel) and corresponding abundance of herring larvae (n/m², right panel). The reference circle in the right panel corresponds to 2000 larvae per square metre.

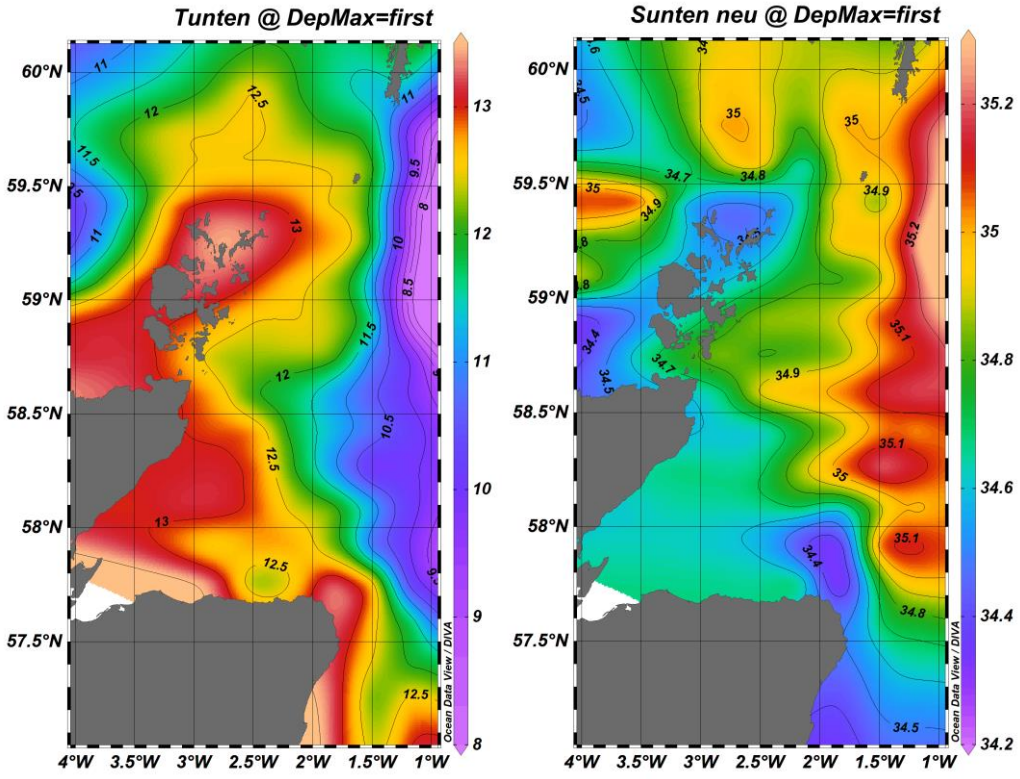


Figure 2: Distribution of near-bottom temperature (°C, left panel) and salinity (psu, right panel) in the area under investigation.