

**Cruise Report**  
**FRV Walther Herwig III**  
**Cruise 460**  
**16.09. - 26.09.2022**

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 spatial distribution of herring larvae was strikingly different from proceeding years. While usually most larvae hatched east of the Orkneys, the maximum of newly hatches larvae in this year's survey were found at stations 50 and 51, north-east of the Orkneys and close to the eastern limits of the survey area.

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 2023.

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**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 27.4.a and 27.4.b 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

FRV "Walther Herwig III" was embarked on Friday, 09/16/22, but due to a storm the start of the cruise had to be postponed until Sunday morning 09/18/22, when the vessel left the port of Bremerhaven. Wind speed was still around 7-8 Beaufort.

The area under investigation was reached on Tuesday, 09/20/22, at noon. Wind speed had meanwhile decreased to 4 Beaufort, and the sea was relatively calm. Within the next five days, all plankton tows could be conducted as scheduled, supported by good weather conditions.

The focus of the cruise was on stations around the Orkney/Shetland islands. These stations were completely sampled on Saturday late evening, 09/24/22. Weather forecasts for the next days were poor. Thus, any further sampling in the Buchan area was rejected, and the vessel steamed back to the port of Bremerhaven. The cruise ended on Monday evening, 09/26/22.

## 4. Preliminary results

In total, 92 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 strikingly different from proceeding years. While usually most larvae hatched east of the Orkneys, the maximum of newly hatched larvae in this year's survey were found at stations 50 and 51, north-east of the Orkneys and close to the eastern limits of the survey area (Figure 1). This may be larvae drifted in from the Shetlands. However, also in the common hatching area, plenty of larvae were observed.

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

<b>Name</b>	<b>Institution</b>	<b>Function</b>
1. Norbert Rohlf	TI-SF	Cruise leader
2. Birgit Suer	TI-SF	Technician
3. Karin Krüger	TI-SF	Technician
4. Friederike Beußel	TI-SF	Technician
5. Julia Feldhinkel	TI-SF	Student

## 6. Acknowledgement

Thanks to Captain Werner Stumpp 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 460.

Stat. Nr.	Haul Nr.	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 T (°C)	Bottom T (°C)
524	1	58°34.46	001°08.81	W	20.09.22	09:59	18.10	110	103	90.9	19	13.04	10.58
525	2	58°35.00	001°28.72	W	20.09.22	11:11	18.58	112	109	96.8	12	13.23	11.28
526	3	58°35.00	001°48.54	W	20.09.22	12:21	16.09	98	95	89.0	34	13.21	11.82
527	4	58°35.02	002°08.37	W	20.09.22	13:30	12.49	81	78	68.1	56	13.49	12.79
528	5	58°34.86	002°29.99	W	20.09.22	14:43	10.19	77	72	45.0	103	13.66	13.18
529	6	58°44.89	002°29.45	W	20.09.22	15:45	9.07	76	72	37.4	163	13.45	12.77
530	7	58°45.21	002°44.42	W	20.09.22	16:37	9.59	75	72	40.3	199	13.55	13.32
531	8	58°34.92	002°49.55	W	20.09.22	17:45	10.54	69	65	53.8	80	13.48	13.39
532	9	58°44.94	003°29.02	W	20.09.22	20:24	14.42	89	84	77.0	80	13.70	13.52
533	10	58°37.69	003°49.23	W	20.09.22	21:46	12.05	76	73	61.1	4	13.60	13.67
534	11	58°44.36	003°50.06	W	20.09.22	22:33	12.14	79	76	67.5	4	13.63	13.67
535	12	58°54.45	003°51.13	W	20.09.22	23:37	15.03	89	86	84.2	0	13.72	13.65
536	13	58°54.47	003°30.81	W	21.09.22	00:48	11.57	76	73	62.9	35	13.60	13.53
537	14	59°04.90	003°29.30	W	21.09.22	01:55	12.55	77	72	68.4	1	13.64	13.62
538	15	59°04.86	003°49.59	W	21.09.22	03:03	19.42	104	100	105.9	0	13.64	12.27
539	16	59°14.81	003°51.04	W	21.09.22	04:10	22.52	140	119	124.1	0	13.33	11.96
540	17	59°14.93	003°30.53	W	21.09.22	05:21	17.29	99	96	85.6	28	13.64	11.61
541	18	59°14.56	003°10.90	W	21.09.22	06:27	10.23	67	63	57.0	0	13.57	13.48
542	19	59°24.52	003°09.35	W	21.09.22	07:31	11.26	77	73	57.4	106	13.54	13.35
543	20	59°25.03	003°29.07	W	21.09.22	08:40	22.11	158	121	105.7	3	13.53	11.56
544	21	59°24.60	003°49.17	W	21.09.22	09:56	22.51	146	120	121.0	0	13.15	11.23
545	22	59°34.36	003°51.33	W	21.09.22	11:06	21.10	162	120	114.0	0	13.15	10.95
546	23	59°34.99	003°31.59	W	21.09.22	12:18	21.38	151	120	112.7	17	13.43	12.40
547	24	59°34.44	003°11.48	W	21.09.22	13:33	22.31	121	118	112.6	25	13.43	12.98
548	25	59°44.78	003°09.21	W	21.09.22	14:44	9.57	61	57	50.3	22	13.17	13.10
549	26	59°45.04	003°29.43	W	21.09.22	15:53	16.27	105	100	80.7	0	13.53	12.50
550	27	59°44.81	003°49.49	W	21.09.22	17:13	24.59	140	120	128.2	0	13.20	10.90
551	28	59°54.68	003°50.46	W	21.09.22	18:22	21.55	152	120	109.3	0	13.02	10.82
552	29	59°55.01	003°31.48	W	21.09.22	19:28	20.30	117	113	103.7	0	13.10	10.69
553	30	59°54.99	003°10.67	W	21.09.22	20:34	15.14	86	83	82.4	8	13.38	12.61
554	31	59°55.26	002°50.91	W	21.09.22	21:37	12.26	76	73	62.7	16	13.07	13.02
555	32	59°45.58	002°50.03	W	21.09.22	22:45	11.26	73	70	58.6	15	13.29	12.99
556	33	59°35.55	002°50.02	W	21.09.22	23:53	11.37	76	73	66.1	41	13.45	13.31
557	34	59°25.49	002°50.99	W	22.09.22	01:01	7.27	52	52	38.4	91	13.46	13.47
558	35	59°24.69	002°30.03	W	22.09.22	02:13	7.12	45	41	37.6	65	13.43	13.44
559	36	59°34.61	002°30.04	W	22.09.22	03:11	16.46	89	86	90.1	65	13.30	13.20
560	37	59°44.67	002°29.98	W	22.09.22	04:16	17.21	92	89	89.7	11	12.98	12.54
561	38	59°54.80	002°30.30	W	22.09.22	05:24	19.23	96	93	108.7	19	13.09	12.51
562	39	59°55.03	002°10.90	W	22.09.22	06:28	15.56	95	92	82.4	121	12.54	12.35
563	40	59°55.01	001°50.95	W	22.09.22	07:31	17.23	103	99	87.5	73	12.47	12.33
564	41	59°55.16	001°30.80	W	22.09.22	08:36	17.14	108	104	86.8	366	12.49	12.39

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)
565	42	59°54.85	001°10.94	W	22.09.22	10:18	17.40	100	97	85.3	22	12.77	11.54
566	43	59°45.56	001°09.01	W	22.09.22	11:31	18.38	107	104	89.3	7	12.92	10.12
567	44	59°45.02	001°28.75	W	22.09.22	12:38	12.22	79	76	64.2	22	12.68	12.54
568	45	59°45.01	001°48.51	W	22.09.22	13:42	19.18	103	100	103.8	37	12.59	12.43
569	46	59°45.28	002°09.37	W	22.09.22	14:53	19.09	110	107	94.8	2	12.80	12.54
570	47	59°35.40	002°10.44	W	22.09.22	16:06	17.46	98	94	86.0	748	13.13	12.70
571	48	59°34.95	001°50.60	W	22.09.22	17:14	18.24	98	95	99.2	98	12.95	12.56
572	49	59°34.96	001°30.76	W	22.09.22	18:17	15.51	93	90	85.1	121	12.87	12.54
573	50	59°35.27	001°10.88	W	22.09.22	19:21	17.49	114	110	87.3	1550	13.06	9.35
574	51	59°25.14	001°09.16	W	22.09.22	20:31	21.47	122	118	108.1	1591	13.06	9.34
575	52	59°24.99	001°28.70	W	22.09.22	21:44	15.25	90	87	74.6	194	12.86	12.68
576	53	59°25.02	001°48.68	W	22.09.22	22:55	16.26	102	99	88.0	73	12.88	12.59
577	54	59°25.55	002°09.17	W	23.09.22	00:06	12.36	79	76	68.9	45	13.33	13.34
578	55	59°15.41	002°11.12	W	23.09.22	01:16	11.54	76	73	61.0	247	13.45	13.06
579	56	59°15.13	001°50.61	W	23.09.22	02:25	13.41	78	74	67.6	360	12.81	12.64
580	57	59°14.98	001°30.72	W	23.09.22	03:34	17.24	98	95	86.7	215	12.83	11.92
581	58	59°15.41	001°10.69	W	23.09.22	04:43	21.23	115	105	118.3	122	13.06	9.09
582	59	59°05.55	001°09.32	W	23.09.22	05:53	20.54	121	117	109.5	19	13.26	9.22
583	60	59°04.99	001°29.35	W	23.09.22	07:07	18.16	103	100	88.4	607	13.27	10.37
584	61	59°04.99	001°48.81	W	23.09.22	08:15	13.39	84	81	63.9	225	13.00	12.59
585	62	59°04.98	002°09.15	W	23.09.22	09:24	14.14	79	79	73.9	135	13.44	13.05
586	63	59°05.49	002°24.04	W	23.09.22	10:17	9.53	68	65	52.7	50	13.45	12.89
587	64	58°55.65	002°30.20	W	23.09.22	11:19	11.01	74	71	55.5	67	13.60	12.97
588	65	58°54.70	002°11.62	W	23.09.22	12:22	12.42	81	78	62.1	265	13.53	12.72
589	66	58°54.98	001°51.12	W	23.09.22	13:32	14.30	92	89	67.6	720	13.49	11.97
590	67	58°55.05	001°30.39	W	23.09.22	14:41	24.27	125	119	118.3	154	13.28	10.29
591	68	58°55.31	001°10.35	W	23.09.22	15:53	23.51	122	119	117.6	156	13.35	9.11
592	69	58°45.45	001°09.49	W	23.09.22	17:03	21.29	112	109	108.6	87	13.17	10.93
593	70	58°45.02	001°29.12	W	23.09.22	18:14	19.09	112	108	94.1	51	13.20	10.94
594	71	58°44.97	001°49.05	W	23.09.22	19:23	14.55	92	88	82.3	188	13.37	12.16
595	72	58°45.14	002°09.51	W	23.09.22	20:34	12.13	82	78	42.3	143	13.38	12.74
596	73	58°25.34	002°10.60	W	23.09.22	22:24	13.29	83	80	66.4	179	13.39	12.63
597	74	58°25.00	001°51.23	W	23.09.22	23:27	18.06	103	100	85.7	136	13.36	12.10
598	75	58°25.00	001°31.66	W	24.09.22	00:34	18.29	106	103	96.1	8	13.35	11.14
599	76	58°25.29	001°10.82	W	24.09.22	01:46	20.51	106	102	107.1	8	13.42	11.33
600	77	58°15.54	001°08.99	W	24.09.22	02:56	21.24	108	105	112.5	2	13.43	11.27
601	78	58°15.12	001°27.26	W	24.09.22	04:03	24.43	129	120	124.0	1	13.46	10.93
602	79	58°15.09	001°48.60	W	24.09.22	05:20	17.27	97	94	84.7	41	13.38	11.73
603	80	58°14.98	002°09.51	W	24.09.22	06:33	7.30	57	54	36.0	25	13.29	13.03
604	81	58°14.60	002°29.54	W	24.09.22	07:38	7.28	55	52	36.5	63	13.48	13.43
605	82	58°24.87	002°29.57	W	24.09.22	08:46	9.24	62	59	46.1	69	13.41	13.39
606	83	58°25.23	002°49.40	W	24.09.22	09:52	10.36	68	65	55.3	49	13.54	13.54
607	84	58°15.44	003°09.10	W	24.09.22	11:11	10.13	64	61	55.3	8	13.68	13.68
608	85	58°04.97	003°31.09	W	24.09.22	12:46	4.42	39	36	24.1	0	13.99	13.50
609	86	58°04.53	003°11.20	W	24.09.22	13:46	7.29	51	48	39.2	3	13.88	13.79
610	87	58°04.04	002°50.63	W	24.09.22	14:51	7.34	51	48	37.3	4	13.75	13.52
611	88	58°04.97	002°30.54	W	24.09.22	15:55	12.16	67	64	63.8	30	13.59	13.33
612	89	58°05.08	002°10.52	W	24.09.22	17:02	11.08	67	64	56.8	4	13.58	13.30
613	90	58°04.93	001°50.81	W	24.09.22	18:07	15.00	87	84	77.7	9	13.47	12.37
614	91	58°05.04	001°31.11	W	24.09.22	19:13	12.40	80	77	62.6	3	13.59	11.86
615	92	58°05.89	001°12.71	W	24.09.22	20:22	17.57	104	101	86.9	5	13.25	10.78

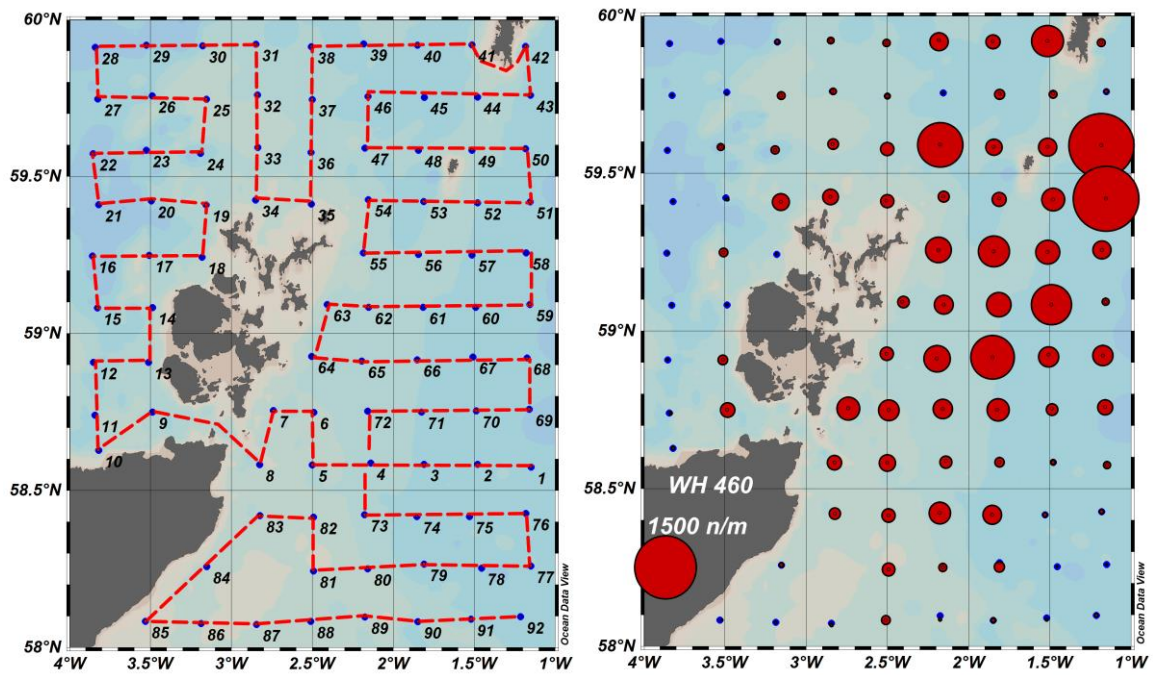


Figure 1: WH 460 cruise track in the Orkney/Shetland area (by station number, left panel) and corresponding abundance of herring larvae ( $n/m^2$ , right panel). The reference circle in the right panel corresponds to 1500 larvae per square metre.

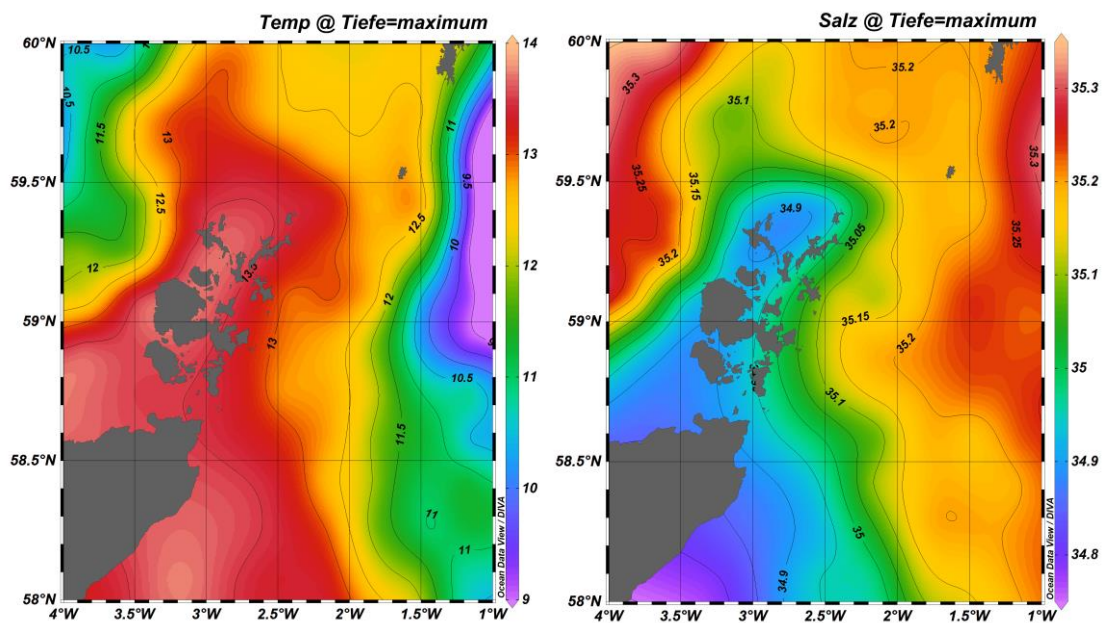


Figure 2: Distribution of near-bottom temperature ( $^{\circ}C$ , left panel) and salinity (psu, right panel) in the area under investigation.