

**FRV Walther Herwig III
Cruise 408
24.08. - 13.09.2017**

**Integrated Monitoring of Contaminants and their
Biological Effects (INMON)**

DAIMON project

Scientist in Charge: Dr. Thomas Lang

Summary

As part of the integrated monitoring programme of the Thünen Institute of Fisheries Ecology (FI) on contaminants and biological effects (incl. fish diseases) in fish from the North Sea and Baltic Sea, studies were carried out in five Baltic Sea and five North Sea areas. In addition to the onboard examination of dab (*Limanda limanda*), flounder (*Platichthys flesus*) and cod (*Gadus morhua*) for macroscopical externally and internally visible diseases and parasites, a large range of fish samples were taken for a subsequent analysis of contaminants (incl. radioactive substances) and their biological effects. As part of the DAIMON project, extensive studies were carried out on the health status of cod in a dumping area for chemical munitions in Bornholm Basin and in a reference area outside the Gulf of Gdansk. In a dumpsite of conventional munitions located in Kiel Bight (Kolberger Heide, Baltic Sea), cages with dab deployed in early August during cruise 314 RC Clupea were retrieved by research divers. Furthermore, sediment samples were taken and hydrographical measurements were carried out (water temperature, salinity, oxygen content, turbidity). The following preliminary findings were noted:

Dab: generally decreasing prevalence of lymphocystis in the North Sea; increased prevalence of hyperpigmentation in the North Sea; increasing prevalence of liver nodules in Kiel Bight, Baltic Sea.

Baltic cod: Very low prevalence of acute/healing skin ulcerations and skeletal deformities; strong infestation with nematodes in the body cavity in all Baltic Sea areas, now also in Kiel Bight; once more generally high prevalence of the gill parasite *Loma branchialis* (= *morhua*).

Participants:

Name	Function	Institution
Dr. Thomas Lang	Scientist in Charge	TI FI Cuxhaven
Katharina Straumer	Scientist	TI FI Cuxhaven
Jennifer Ipse	Technician	TI FI Cuxhaven
Maike Siegmund	Technician	TI FI Cuxhaven
Wolfgang Lindemann	Technician	TI FI Hamburg
Dr. Pedro Nogueira	Scientist	TI FI Hamburg
Ulrike Machulik	Technician	TI FI Hamburg
Daniel Koske	Scientist	TI FI Hamburg
Dr. Henrik Kusche	Scientist	TI FI Hamburg
Dr. Matthias Brenner	Guest Scientist	AWI Bremerhaven
Marta Szubska	Guest Scientist	IOPAS, Sopot
Lena Soumpasis	Student	University Kiel
Nicole Stollberg	Student	University Rostock
Nicole Smialek	Student	University Hamburg
Jan Römer	Student	University Hamburg

Objectives of the Cruise

1. Studies on biological effects of contaminants;
2. Studies on the occurrence of fish diseases and parasites;
3. Sampling of fish for chemical analysis of contaminants;
4. Tissue sampling of livers and other organs for subsequent histological and biochemical analyses;
5. Studies and sampling for the DAIMON project;
6. Retrieval of fish cages with dab exposed in situ to conventional munitions;
7. Hydrographical measurements (salinity, temperature, oxygen, turbidity);
8. Sediment sampling;
9. Sea surface trawling for plastic particles using a Neuston net;
10. Hydroacoustic measurements.

Dates of the Cruise

FRV Walther Herwig III left Bremerhaven in the morning of 24.08 heading for the Baltic Sea via the Skagerrak. Work started on 26.08. in the dumpsite for chemical munitions/warfare agents in Bornholm Basin (area B13) and was continued in the same area during the next day. An extensive sampling for the DAIMON project was carried out that was also done on 28.08-29.08. in the reference area outside the Bay of Gdansk (area B09). On 30.08., RV Walther Herwig III berthed in Kiel, where an exchange of scientists took place.

On 31.08 and 01.09. research divers came onboard and helped to retrieve cages with dab that were deployed in early August during cruise 314 with RV Clupea in a dumpsite of conventional munitions in Kiel Bight (Kolberger Heide, Baltic Sea).

On 02.09. areas B10 and B11 located in the Arkona Sea were visited, on 03.09. the sampling area B01 in Kiel Bight. On 04.09., RV Walther Herwig III left the Baltic Sea and passed Kiel Channel heading for the North Sea study sites, where work started on 05.09. in area GB4 in the outer German EEZ. During the following days, study areas P02, GB3, N01 and GB1 were visited.

Because of bad weather, the cruise ended in the evening of 11.09., one day ahead of schedule, in Bremerhaven.

The location of the sampling areas and the cruise dates are shown in Fig. 1 and 2 and Tab. 1. In 10 sampling areas (Fig. 1), a total of 42 fishing hauls was performed (towing time 30–60 min. each) (geographical coordinates in Tab. 1, catch composition in Tab. 2). In the Baltic Sea, a 140 ft bottom trawl and a pelagic PSN 205 net were used, in the North Sea a GOV net, all with standard configuration. Hydrographical measurements were made at all fishery stations (geographical coordinates in Tab. 1a, results in Tab. 3), in the Baltic Sea sediment samples were taken using a van Veen grab (Tab 1b).

Preliminary Results

1 Dab (*Limanda limanda*)

In total, 2,905 dab from one Baltic Sea area (B01) and five North Sea areas (GB1, N01, GB3, GB4, P02) were examined for the occurrence of externally visible diseases and parasites (Tab. 4) and 483 dab (≥ 20 cm) for the occurrence of liver anomalies (Tab. 5).

The prevalence of the diseases recorded largely corresponded to finding from previous surveys. The generally decreasing trend in lymphocystis prevalence of North Sea dab apparently continues (current values 1.0–11.1 %). Currently, Baltic Sea dab from Kiel Bight display a higher prevalence (5.6 %) compared to some of the North Sea study areas. In contrast, the prevalence of grossly visible parasites is lower in the Baltic Sea, and the phenomenon of hyperpigmentation is almost lacking completely (see Tab. 4).

In the four areas of the German North Sea EEZ, the marked spatial patterns in disease prevalence already identified during previous cruises were confirmed. The prevalence of lymphocystis, x-cell gill disease and in particular of the parasite *Stephanostomum baccatum* (white cysts under the skin) increases in northwesterly direction, while the prevalence of the parasites *Acanthochondria cornuta* and *Lepeophtheirus pectoralis* (both copepods, crustaceans) decrease.

There is indication that the prevalence of hyperpigmentation in North Sea dab is again increasing and approaches the maximum values recorded during the 1990s. The highest prevalence was recorded in area GB4 (60.9 %). The causes of this phenomenon are still unknown.

There were no major new findings regarding the prevalence of liver tumours, but the prevalence of macroscopic liver nodules >2 mm in large dab (≥ 25 cm) from Kiel Bight (area B01) was markedly increase (13.2 %) compared to previous cruises (Tab. 5).

2 Cod (*Gadus morhua*)

In total, 1038 cod from five Baltic Sea areas were examined for externally visible diseases and parasites, out of which 357 specimens were inspected for nematodes in the body cavity (Tab. 6). The prevalence of externally visible diseases largely corresponded to previous cruises. The prevalence of acute/healing skin ulcerations was low and ranged from 0.4 % to 3.5 %. Skeletal deformities were rare, too, with values in the range of 0.0 % to 1.5 %.

Larval nematodes in the body cavity were recorded in cod from all sampling areas, this time also in area B01 (Kiel Bight). A comparison to data from the 1980s/1990s reveals that the prevalence has clearly increased since then. The highest prevalence (88.7 %) occurred in cod from the dumpsite of chemical munitions/warfare agents in Bornholm Basin (area B13). The majority of nematodes belong to the species *Contracaecum osculatatum*, which mostly infests the livers of cod. The final hosts of this parasite are seals.

In Kiel Bight (area B01), the parasite *Cryptocotyle lingua* (black trematode cysts in the skin) was again prevalent with a value of 23.8 %. The gill parasite *Loma branchialis* (= morhua) was again very prevalent in all areas, the highest prevalence of 94.8 % was recorded in cod from area B13 in Bornholm Basin.

3 Flounder (*Platichthys flesus*)

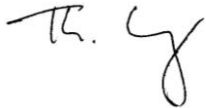
In total, 300 flounder from three Baltic Sea areas and one North Sea area (area GB1) were examined for the presence of externally visible diseases and parasites. In the Baltic Sea, lymphocystis is the predominating disease (maximum prevalence 32.8 % in the Arkona Sea, area B11, in the inner German Bight (North Sea, area GB1) the disease is rare in general. In contrast, flounder from this area are characterised by a strong infestation with the skin parasite *Lepeophtheirus pectoralis*, which is rare in Baltic flounder from the Arkona Sea near the island of Rügen.

4 Miscellaneous

The mean catch data of the most frequent fish species are provided in Tab. 2; Tab. 3 gives results of the hydrographical measurements.

Acknowledgements

Thanks are due to Captain Vandrei and his crew and to the scientific staff for constructive and hard work and a very good atmosphere on board.



Dr. Thomas Lang

(Scientist in Charge)

Annex

2 Figures, 7 Tables

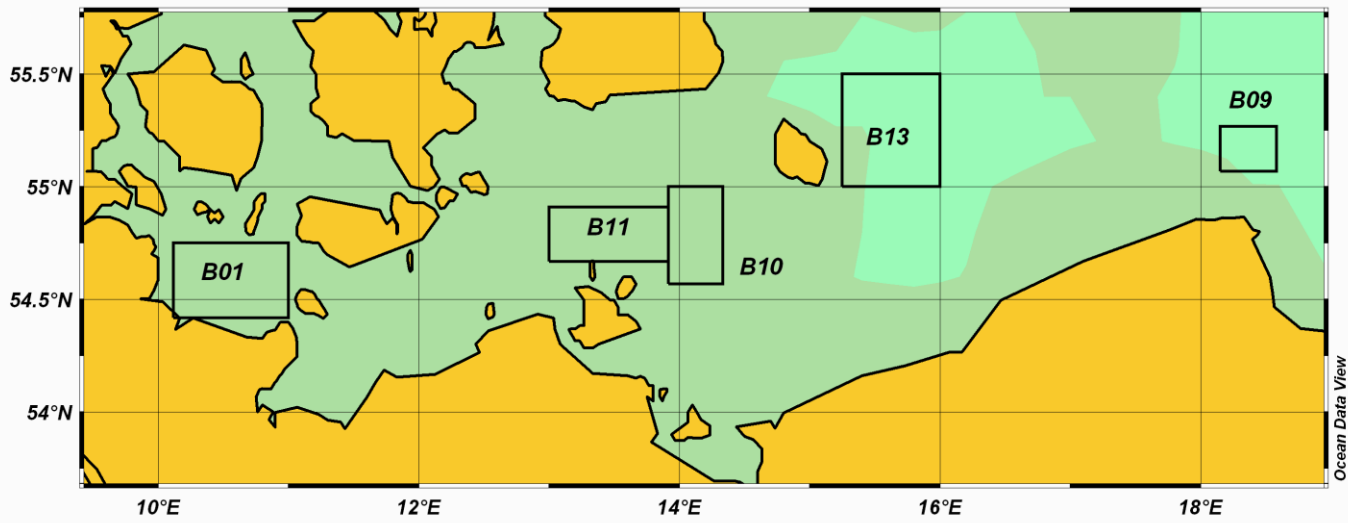


Fig. 1: Cruise 408 RV 'Walther Herwig III', 24.08. – 13.09.2017:
Location of sampling sites in the Baltic Sea

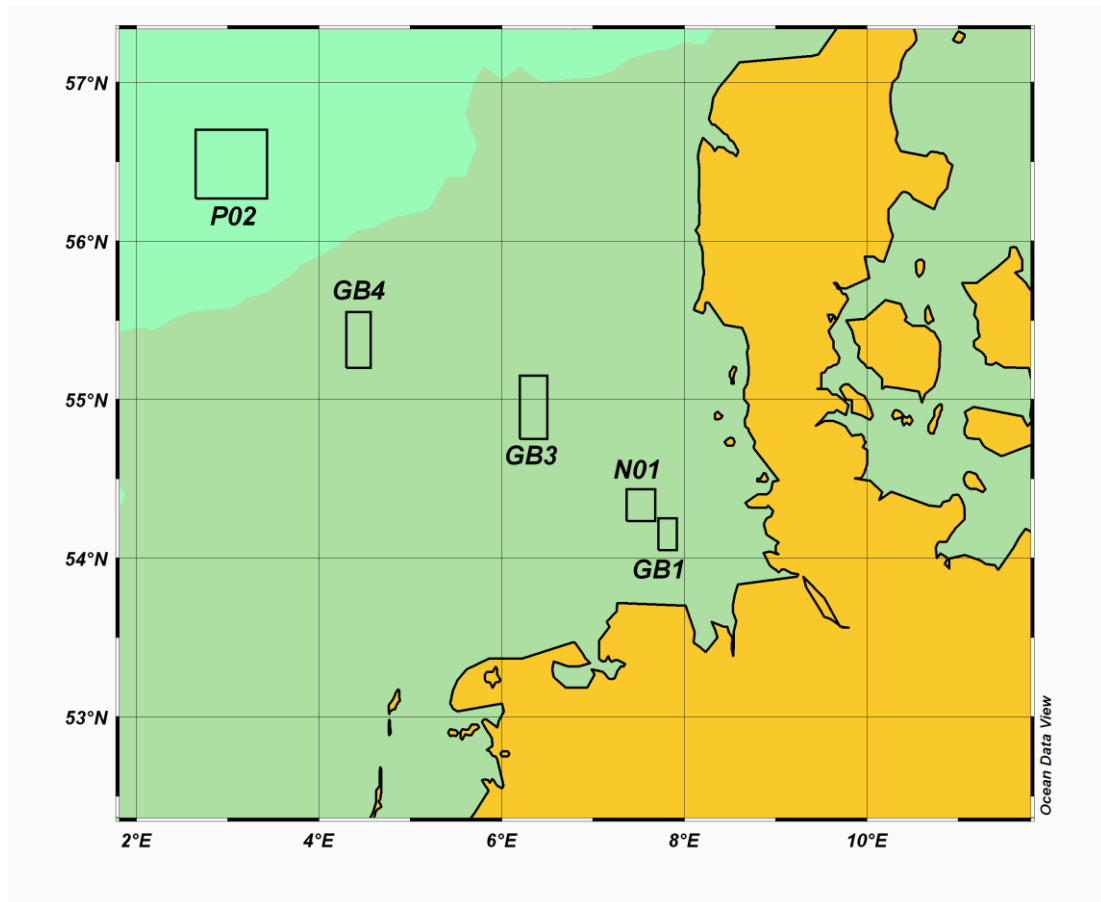


Fig. 2: Cruise 408 RV 'Walther Herwig III', 24.08. – 13.09.2017:
Location of sampling sites in the North Sea

Tab. 1: Cruise 408 RV 'Walther Herwig III', 24.08. – 13.09.2017:
Geographical coordinates of trawling stations in the Baltic Sea and North Sea

Date	Station	LOG-Station	Area	ICES-Rectangle	Latitude	Longitude
26.08.17	001	622	B13	39G5	55°21,51N	15°32,96E
26.08.17	002	627	B13	39G5	55°18,82N	15°38,75E
27.08.17	003	636	B13	39G5	55°22,71N	15°39,81E
27.08.17	004	638	B13	39G5	55°20,25N	15°40,96E
27.08.17	005	639	B13	39G5	55°22,98N	15°37,16E
27.08.17	006	640	B13	39G5	55°19,41N	15°38,51E
28.08.17	007	642	B09	39G8	55°14,64N	18°09,98E
28.08.17	008	646	B09	39G8	55°14,44N	18°10,22E
28.08.17	009	646	B09	39G8	55°11,21N	18°12,25E
28.08.17	010	647	B09	39G8	55°08,16N	18°12,90E
28.08.17	011	648	B09	39G8	55°08,18N	18°18,06E
29.08.17	012	649	B09	39G8	55°13,06N	18°16,32E
29.08.17	013	650	B09	39G8	55°14,48N	18°10,22E
29.08.17	015	653	B09	39G8	55°11,33N	18°11,55E
29.08.17	016	654	B09	39G8	55°07,53N	18°10,91E
02.09.17	022	655	B10	38G4	54°51,18N	14°00,40E
02.09.17	023	657	B10	38G3	54°44,79N	13°56,36E
02.09.17	024	660	B11	38G3	54°41,61N	13°47,25E
03.09.17	025	663	B01	38G0	54°33,04N	10°47,31E
03.09.17	026	665	B01	38G0	54°31,99N	10°37,64E
05.09.17	027	670	GB4	39F4	55°23,02N	04°33,05E
05.09.17	028	671	GB4	39F4	55°23,63N	04°26,14E
05.09.17	029	673	GB4	39F4	55°23,04N	04°31,30E
06.09.17	030	674	P02	42F3	56°41,28N	03°12,69E
06.09.17	031	675	P02	42F3	56°34,11N	03°03,89E
06.09.17	032	676	P02	41F3	56°28,21N	03°09,04E
07.09.17	033	677	GB3	38F6	54°55,70N	06°16,15E
07.09.17	034	679	GB3	38F6	54°56,10N	06°16,74E
07.09.17	035	680	GB3	38F6	54°58,50N	06°22,51E
09.09.17	036	681	N01	37F7	54°15,63N	07°26,99E
09.09.17	037	684	N01	37F7	54°15,55N	07°30,28E
09.09.17	038	685	N01	37F7	54°18,30N	07°30,37E
09.09.17	039	686	N01	37F7	54°15,84N	07°29,95E
10.09.17	040	687	GB1	37F7	54°04,67N	07°53,47E
10.09.17	041	688	GB1	37F7	54°06,43N	07°46,14E
10.09.17	042	689	GB1	37F7	54°04,41N	07°53,72E

Tab. 1a: Cruise 408 RV 'Walther Herwig III', 24.08. – 13.09.2017: Geographical coordinates of hydrography stations in the Baltic Sea and North Sea

Date	Station	LOG-Station	Area	ICES-Rectangle	Latitude	Longitude
26.08.17	001	622	B13	39G5	55°21,23N	15°40,58E
26.08.17	002	627	B13	39G5	55°18,15N	15°39,76E
26.08.17	003	629	B13	39G5	55°06,39N	15°36,90E
26.08.17	004	630	B13	39G5	55°14,45N	15°36,67E
26.08.17	005	631	B13	39G5	55°20,82N	15°36,48E
26.08.17	006	632	B13	39G5	55°26,73N	15°36,77E
26.08.17	007	633	B13	39G5	55°21,06N	15°26,14E
27.08.17	008	634	B13	39G5	55°20,72N	15°44,98E
27.08.17	009	635	B13	39G5	55°20,56N	15°55,18E
27.08.17	010	639	B13	39G5	55°24,04N	15°37,10E
27.08.17	011	640	B13	39G5	55°21,94N	15°32,11E
28.08.17	012	642	B09	39G8	55°14,80N	18°10,61E
28.08.17	013	645	B09	39G8	55°15,16N	18°10,16E
28.08.17	014	646	B09	39G8	55°11,10N	18°11,66E
28.08.17	015	647	B09	39G8	55°08,18N	18°11,40E
28.08.17	016	648	B09	39G8	55°08,20N	18°19,30E
29.08.17	017	649	B09	39G8	55°12,73N	18°17,87E
29.08.17	018	650	B09	39G8	55°15,14N	18°09,61E
29.08.17	019	652	B09	39G8	55°12,77N	18°17,87E
29.08.17	020	653	B09	39G8	55°11,78N	18°11,60E
29.08.17	021	654	B09	39G8	55°10,10N	18°11,31E
02.09.17	022	655	B10	38G4	54°52,05N	14°00,79E
02.09.17	023	657	B10	38G3	54°45,49N	13°56,16E
02.09.17	024	659	B11	38G3	54°41,08N	13°47,26E
03.09.17	025	663	B01	38G0	54°33,12N	10°48,22E
03.09.17	026	665	B01	38G0	54°31,92N	10°36,54E
05.09.17	027	670	GB4	39F4	55°23,79N	04°33,44E
05.09.17	028	671	GB4	39F4	55°24,15N	04°25,16E
05.09.17	029	673	GB4	39F4	55°23,11N	04°32,48E
06.09.17	030	674	P02	42F3	56°41,77N	03°11,85E
06.09.17	031	675	P02	42F3	56°34,78N	03°04,62E
06.09.17	032	676	P02	41F3	56°29,11N	03°09,21E
07.09.17	033	677	GB3	38F6	54°55,54N	06°15,90E
07.09.17	034	679	GB3	38F6	54°55,91N	06°15,78E
07.09.17	035	680	GB3	38F6	54°58,77N	06°23,72E
09.09.17	036	681	N01	37F7	54°15,77N	07°27,82E
09.09.17	037	684	N01	37F7	54°19,47N	07°30,51E
09.09.17	038	686	N01	37F7	54°15,30N	07°30,30E
10.09.17	039	687	GB1	37F7	54°04,52N	07°54,28E
10.09.17	040	688	GB1	37F7	54°06,82N	07°45,47E
10.09.17	041	689	GB1	37F7	54°04,35N	07°54,64E

Tab. 1b: Cruise 408 RV 'Walther Herwig III', 24.08. – 13.09.2017:
Geographical coordinates of sediment sampling stations in the Baltic Sea

Date	LOG-Station	Sampling Station	GEBIET	RECTANGLE	GEOBREITE	GEOLAENGE
26.08.17	622	001	B13	39G5	55°21,23N	15°40,58E
26.08.17	623	002	B13	39G5	55°22,78N	15°42,98E
26.08.17	624	003	B13	39G5	55°23,54N	15°41,34E
26.08.17	625	004	B13	39G5	55°24,38N	15°36,45E
26.08.17	626	005	B13	39G5	55°18,17N	15°39,76E
26.08.17	628	006	B13	39G5	55°16,21N	15°28,72E
27.08.17	637	007	B13	39G5	55°15,92N	15°48,18E
27.08.17	641	008	B13	39G5	55°17,08N	15°33,76E
28.08.17	643	009	B09	39G8	55°10,16N	18°22,37E
28.08.17	644	010	B09	39G8	55°15,69N	18°14,29E
29.08.17	651	011	B09	39G8	55°04,85N	18°11,37E
02.09.17	656	012	B10	38G3	54°46,64N	13°57,42E
02.09.17	657	013	B10	38G3	54°39,31N	13°56,76E
02.09.17	660	014	B11	38G3	54°46,08N	13°46,82E
03.09.17	664	015	B01	38G0	54°31,75N	10°35,80E
03.09.17	666	016	B01	38G0	54°32,80N	10°46,32E

Tab. 1c: Cruise 408 RV 'Walther Herwig III', 24.08. – 13.09.2017:
Geographical coordinates of Neuston trawl sampling stations in the Baltic Sea and North Sea

DATUM	LOG-Station	Neuston-Station	GEBIET	RECTANGLE	GEOBREITE	GEOLAENGE	DAUER
02.09.17	661	001	B11	38G3	54°46,90N	13°45,44E	33
02.09.17	662	002	B11	38G3	54°47,70N	13°39,31E	9
03.09.17	668	003	B01	38G0	54°32,10N	10°50,25E	30
03.09.17	669	004	B01	38G0	54°31,42N	10°44,87E	25
05.09.17	672	005	GB4	39F4	55°22,95N	04°32,65E	30
07.09.17	678	006	GB3	38F6	54°56,60N	06°21,78E	24
09.09.17	682	007	N01	37F7	54°17,40N	07°30,87E	30
09.09.17	683	008	N01	37F7	54°14,88N	07°30,27E	16

Tab. 2: Cruise 408 RV 'Walther Herwig III', 24.08. – 13.09.2017: Mean catches of selected abundant fish species in the Baltic Sea and North Sea (n = number, kg = weight per 1 h trawling)

Area	Cod	Whiting	Herring	Sprat	Mackerel	Dab	Plaice	Flounder
B13	n kg	144 41		782 35	9132 143	9 2		
B09	n kg	82 39		112 5	8 < 0,5		2 < 0,5	6 1
B10	n kg	136 43	306 102	2155 132	27958 387	1 1	7 16	140 29
B11	n kg	104 37	2923 472	865 29	38377 449			213 43
B01	n kg	82 104	276 10	454 13	2110 33	13 2	1942 242	68 23
GB4	n kg		728 8	38275 1431	32014 498	5 1	654 48	7 1
P02	n kg	< 1 < 0,5	123 11		1699 279	1800 136	6 2	
GB3	n kg	< 1 < 0,5	9134 215	2549 17	18255 99	197 48	703 36	57 16
N011	n kg		1938 56	1655 8	4415 19	96 14	1040 62	6 1
GB1	n kg		25930 793	83 < 0,5	1062 3		731 34	32 1
								14 3

Tab. 3: Cruise 408 RV 'Walther Herwig III', 24.08. – 13.09.2017: Water depth, temperature (T), salinity (S), O₂ in mg/l and O₂ saturation (%) in Baltic Sea and North Sea

DATE	STATION	AREA	DEPTH (m)	T (°C)	S (PSU)	O ₂ (mg/L)	O ₂ -SATURATION (%)
26.08.2017	001	B13	3 90	18,04 6,97	7,369 18,011	6.33 0.86	99.94 11.41
26.08.2017	002	B13	3 93	18,27 6,96	7,355 18,080	6.35 0.90	100.71 11.86
26.08.2017	003	B13	2 74	18,57 6,73	7,530 17,017	6.33 1.36	101.04 17.80
26.08.2017	004	B13	3 91	18,21 6,95	7,410 17,911	6.26 0.95	99.14 12.52
26.08.2017	005	B13	3 89	18,03 6,96	7,360 18,066	6.40 0.88	101.00 11.64
26.08.2017	006	B13	3 80	18,27 6,92	7,359 17,485	6.40 1.03	101.53 13.60
26.08.2017	007	B13	3 87	18,09 6,98	7,371 17,910	6.20 0.89	97.95 11.75
27.08.2017	008	B13	3 88	18,10 6,96	7,369 17,970	6.29 0.89	99.51 11.73
27.08.2017	009	B13	3 88	17,95 6,97	7,338 17,976	6.25 0.87	98.54 11.45

Tab. 3: cont.

DATE	STATION	AREA	DEPTH (m)	T (°C)	S (PSU)	O2 (mg/L)	O2-SATURATION (%)
27.08.2017	010	B13	3	18,02	7,364	6.30	99.46
			86	6,92	17,550	0.97	12.79
27.08.2017	011	B13	3	18,23	7,385	6.33	100.40
			87	6,97	17,892	0.89	11.84
28.08.2017	012	B09	3	18,24	7,364	6.04	95.69
			58	5,24	8,533	4.79	57.09
28.08.2017	013	B09	2	18,25	7,361	6.09	96.57
			61	5,54	9,849	3.15	38.21
28.08.2017	014	B09	3	18,30	7,375	6.08	96.51
			54	5,18	8,340	4.92	58.46
28.08.2017	015	B09	4	18,41	7,356	6.20	98.53
			65	5,39	9,778	3.25	39.19
28.08.2017	016	B09	2	18,47	7,361	6.27	99.87
			71	5,48	10,781	3.10	37.78
29.08.2017	017	B09	3	18,23	7,352	6.06	96.12
			62	5,44	9,759	3.10	37.46
29.08.2017	018	B09	2	18,26	7,370	6.08	96.45
			63	5,81	10,460	4.64	56.80
29.08.2017	019	B09	3	18,26	7,363	6.12	97.00
			65	5,50	9,979	3.31	40.11
29.08.2017	020	B09	3	18,47	7,345	6.24	99.31
			52	5,25	9,147	3.70	44.34
29.08.2017	021	B09	2	18,54	7,345	6.26	99.79
			61	5,50	10,006	3.13	37.87
02.09.2017	022	B10	3	17,95	7,732	6.17	97.49
			39	13,94	12,273	3.64	54.42
02.09.2017	023	B10	3	18,08	7,716	6.16	97.50
			37	13,10	10,135	4.01	58.11
02.09.2017	024	B11	4	18,25	7,879	6.19	98.53
			31	13,65	9,931	3.82	55.82
03.09.2017	025	B01	2	17,69	12,863	5.99	97.04
			21	14,29	23,184	2.57	41.44
03.09.2017	026	B01	3	18,11	15,108	6.19	102.49
			15	17,45	16,241	4.77	78.47
05.09.2017	027	GB4	3	16,95	34,725	5.48	99.86
			42	10,29	34,523	4.84	76.92
05.09.2017	028	GB4	3	16,87	34,694	5.45	99.03
			36	10,67	34,544	5.03	80.57
05.09.2017	029	GB4	4	17,02	34,742	5.47	99.86
			41	10,25	34,512	4.83	76.73
06.09.2017	030	P02	3	16,04	34,875	5.57	99.85
			64	7,41	35,011	4.64	69.33
06.09.2017	031	P02	2	16,03	34,889	5.53	99.04
			67	7,48	34,999	4.96	74.30

Tab. 3: cont.

DATE	STATION	AREA	DEPTH (m)	T (°C)	S (PSU)	O2 (mg/L)	O2-SATURATION (%)
06.09.2017	032	P02	3	16,13	34,886	5.55	99.53
			65	7,49	35,007	4.71	70.61
07.09.2017	033	GB3	2	17,82	34,430	5.22	96.45
			37	17,84	34,431	5.21	96.45
07.09.2017	034	GB3	3	17,81	34,432	5.18	95.85
			37	17,82	34,433	5.14	95.10
07.09.2017	035	GB3	3	17,88	34,363	5.33	98.56
			41	17,73	34,439	4.90	90.54
09.09.2017	036	N01	3	17,84	33,357	5.04	92.60
			38	17,85	33,359	4.98	91.49
09.09.2017	037	N01	3	17,74	33,278	5.09	93.35
			37	17,81	33,329	4.97	91.28
09.09.2017	038	N01	2	17,84	33,358	5.06	93.04
			37	17,83	33,359	5.02	92.24
10.09.2017	039	GB1	3	18,02	33,091	5.04	92.83
			37	18,04	33,089	5.04	92.91
10.09.2017	040	GB1	4	18,04	33,041	4.96	91.43
			35	18,06	33,058	4.93	90.73
10.09.2017	041	GB1	3	18,05	33,013	5.23	96.32
			36	18,05	33,095	5.03	92.60

Tab. 4: Cruise 408 RV 'Walther Herwig III', 24.08. – 13.09.2017: Prevalences (%) of externally visible diseases and parasites in dab (*Limanda limanda*) from the Baltic Sea and North Sea

Area	N unt	Ly	Ep Hyp/Pap	Ulc Ak/Hei	Flo Ak/Hei	KieHy	Skel Def	Hyp Pig	Steph	Acanth	Lepe
B01	466	5,6	1,1	2,1	0,4	0,4	0,0	0,2	0,0	0,4	0,0
GB1	503	1,8	4,8	0,6	1,6	0,0	1,0	33,4	1,6	4,2	17,7
N01	508	2,2	3,5	2,4	1,0	0,2	0,6	48,0	2,4	3,1	20,9
GB3	502	1,0	1,4	0,6	1,6	0,0	0,0	39,8	10,8	1,8	16,3
GB4	425	11,1	1,2	1,9	2,1	0,5	0,5	60,9	90,6	5,2	9,9
P02	501	11,2	2,8	0,4	0,6	0,0	0,2	36,3	99,8	2,8	2,2
Sum	2905										

Tab. 5: Cruise 408 RV 'Walther Herwig III', 24.08. – 13.09.2017: Prevalences (%) of liver anomalies in dab (*Limanda limanda*) from the Baltic Sea and North Sea

GEBIET	Length (cm)		N unt	Liver nodules (mm)			Green Lebern	Nematodes	Acanthoceph.
	von	bis		≥ 2	≥ 5	≥ 10			
B01	20	24	53	0,0	0,0	0,0	1,9	0,0	0,0
	25	40	53	13,2	5,7	1,9	1,9	0,0	0,0
GB1	10	19	1	0,0	0,0	0,0	0,0	0,0	0,0
	20	24	64	0,0	3,1	1,6	0,0	0,0	0,0
	25	40	5	0,0	0,0	0,0	0,0	0,0	0,0
GB3	20	24	50	0,0	0,0	0,0	0,0	2,0	0,0
	25	40	15	6,7	0,0	0,0	0,0	0,0	0,0
GB4	20	24	67	7,5	3,0	1,5	1,5	6,0	0,0
	25	40	13	0,0	0,0	0,0	0,0	7,7	0,0
N01	20	24	51	2,0	0,0	0,0	0,0	0,0	0,0
	25	40	39	12,8	5,1	2,6	0,0	0,0	0,0
P02	20	24	51	3,9	0,0	2,0	94,1	23,5	5,9
	25	40	21	9,5	0,0	4,8	66,7	33,3	0,0
Summe			483						

Tab. 6: Cruise 408 RV 'Walther Herwig III', 24.08. – 13.09.2017: Prevalences (%) of externally visible diseases and parasites in cod (*Gadus morhua*) from the Baltic Sea

Area	N unt	Ulc Ak/Hei	Skel Def	PBT	Locera	Cryp	Loma	N	Anis
B01	25	0,0	0,0	0,0	4,0	0,0	4,0	2	50,0
B09	403	3,5	1,5	0,5	0,0	0,2	85,1	133	58,6
B10	272	1,5	0,7	0,4	0,0	20,6	43,8	98	7,1
B11	105	1,9	0,0	0,0	0,0	23,8	29,5		
B13	233	0,4	0,9	0,0	0,0	0,9	94,8	124	88,7
Sum	1038							357	

Tab. 7: Cruise 408 RV 'Walther Herwig III', 24.08. – 13.09.2017:
Prevalences (%) of externally visible diseases and parasites in flounder
(*Platichthys flesus*) from the Baltic Sea

GEBIET	N unt	Ly	Ulc Ak/Hei	Flo Ak/Hei	Skel Def	Cryp	Lepe
B01	7	85,7	0,0	0,0	0,0	85,7	42,9
B10	132	31,1	1,5	0,0	0,8	59,8	0,0
B11	131	32,8	1,5	0,0	0,0	57,3	0,0
GB1	30	0,0	0,0	0,0	0,0	23,3	100,0
<i>Summe</i>	300						

Abbreviations:

N unt	: Number examined	Acanthoceph.	: Acanthocephaleans, liver
Ly	: Lymphocystis	Steph	: <i>Stephanostomum baccatum</i>
Ep Hyp/Pap	: Epidermal hyperplasia/papilloma	Acanth	: <i>Acanthochondria cornuta</i>
Ulc Ak/Hei	: Skin ulcerationen, acute/healing	Lepe	: <i>Lepeophtheirus pectoralis</i>
Flo Ak/Hei	: Fin rot/erosion, acute/healing	Locera	: <i>Lernaecocera branchialis</i>
KieHy	: Gill hyperplasia, x-cell disease	Clav	: <i>Clavella adunca</i>
Hyp Pig	: Hyperpigmentation	Cryp	: <i>Cryptocotyle spp.</i>
Skel Def	: Skeletal deformities	Loma	: <i>Loma sp.</i>
PBT	: Pseudobranchial pseudotumour	Nemato	: Nematodes in the body cavity
LK >2 mm	: Liver nodules > 2 mm in diameter	Cryp	: <i>Cryptocotyle spp.</i>