



**FRV Walther Herwig III
Cruise 380
01.12. – 19.12.2014**

**Studies on Fish Diseases and Biological Effects of Contaminants
in the North Sea and Baltic Sea**

NATO project MODUM

Scientist in Charge: Dr. Thomas Lang

Summary

As part of the fish health monitoring programme of the Thünen Institute of Fisheries Ecology (FI), studies were carried out in five Baltic Sea and three North Sea areas. In addition to the onboard examination of dab (*Limanda limanda*), flounder (*Platichthys flesus*) and cod (*Gadus morhua*) for externally 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 NATO-funded MODUM project (2013-2016), extensive studies were carried out on the health status of cod in dumping areas for chemical munitions and reference areas. Hydrographical measurements were carried out (water temperature, salinity, oxygen content, turbidity). The planned use of an autonomous underwater vehicle (AUV IVER2) and visual observations on drifting marine litter in the North Sea had to be cancelled due to adverse weather conditions. The following preliminary findings were noted:

Dab: Slightly elevated prevalence of lymphocystis, hyperpigmentation and macroscopic liver neoplasms (tumours), epidermal hyperplasia/papilloma and macroscopic liver neoplasms in the North Sea; prevalence of lymphocystis in the Baltic Sea (Kiel Bight) higher than at North Sea sites in the German EEZ.

Baltic cod: Low prevalence of acute/healing skin ulcerations and skeletal deformities; nematodes in the body cavity in all Baltic Sea areas, especially in the eastern sampling areas B13 (Bornholm Basin) and B09 (outside Gdansk Bay); comparatively high prevalences of the gill parasite *Lernaecera branchialis* and the skin parasite *Cryptocotyle lingua* in Kiel Bight; generally high prevalence of the gill parasite *Loma branchialis*.

Participants:

Name	Function	Institution
Dr. Thomas Lang	Scientist in Charge	TI FI Cuxhaven
Jennifer Ipse	Technician	TI FI Cuxhaven
Marc-Oliver Aust	Scientist	TI FI Hamburg
Wolfgang Lindemann	Technician	TI FI Hamburg
Horst Bahl	Scientist	TI FI Hamburg
Finn Werner	Technician	TI FI Hamburg
Dr. Jacek Bełdowski	Guest Scientist	IOPAS, Poland
Jan Majcher	Guest Scientist	IOPAS, Poland
Michael Klein	Guest Scientist	Switzerland
Gabriele Dederer	Guest Scientist	Datadiving, Hamburg
Christoph Rummel	Student	University Rostock
Liliana Lehmann	Student	University Berlin
Luisa Berghoff	Volunteer	University Kiel
Fabian Deister	Volunteer	University Oldenburg

Objectives of the Cruise

1. Studies on the occurrence of fish diseases and parasites in the North Sea and Baltic Sea;
2. Studies on biological effects of contaminants;
3. Studies in the MODUM project (e.g. use of the autonomous underwater vehicle IVER2);
4. Sampling of fish for chemical analysis of contaminants;
5. Hydrographical measurements (salinity, temperature, oxygen, turbidity);
6. Visual detection of drifting marine litter in the North Sea.

Dates of the Cruise

FRV Walther Herwig III left Bremerhaven in the morning of 01.12. The scientific crew already had boarded in the evening of 30.11. After the passage of Kiel Channel on 02.12., the vessel sailed to the first sampling area in the Baltic Sea, where work started in the afternoon of 04.12. in area B09 outside Gdansk Bay. In the morning of 05.12., WHIII arrived in Gdynia, where two scientists (Dr. Jacek Beldowski, Jan Majcher) from the Institute of Oceanology, Polish Academy of Sciences, were taken on board. In the afternoon work was resumed in area B09. During the following days, sampling was conducted in areas BHB, B13 (7./8.12.), B11 and B01 (10./11.12.). In the afternoon of 13.12., Walther Herwig III arrived in Kiel, where an exchange of scientific staff members took place.

On 14.12., WH III again passed Kiel Channel. In the period 15.-17.12., sampling was continued in three North Sea areas (GB1, N01, GB3). Due to bad weather conditions, work had to be finished two days earlier than scheduled. In the evening of 18.12., WHIII arrived in Bremerhaven, where the cruise ended in the morning of 19.12.

The location of the sampling areas and the cruise dates are shown in Fig. 1 and 2 and Tab. 1. In 8 sampling areas (Fig. 1), a total of 32 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).

Preliminary Results

1 Dab (*Limanda limanda*)

In total, 2,455 dab from one Baltic Sea and three North Sea areas were examined for the occurrence of externally visible diseases and parasites (Tab. 4) and 316 dab for the occurrence of liver anomalies (Tab. 5).

The prevalence of some diseases in the North Sea has increased compared to the previous summer cruise (WH cruise 377, 28.08.-17.09.2014). The prevalence of lymphocystis was in range of 3.4 % - 10.5 %, with the lowest value in the inner German Bight (area GB1) and the highest values in area GB3. The prevalence of epidermal hyperplasia/papilloma did not differ between areas (3.2 % - 3.7 %). The prevalence of hyperpigmentation in area N01 has increased compared to previous cruises (43.0 %), the lowest value was again found in area GB1 in the inner German Bight (28.7 %). The strongest regional differences were noted for the parasite *Stephanostomum baccatum* (juvenile digenean trematode under the skin), the prevalence of which ranged from 4.5 % (inner German Bight, area GB1) to 32.3 % (area GB3). Acute/healing skin ulcerations were rare, the prevalence ranged from 0.4 % (area GB3) to 1.4 % (area GB1).

For the majority of diseases, there was a prevalence gradient – as during the previous summer cruise (WH cruise 367, 28.08.-12.09.2013) - in the German EEZ in north-westerly direction, with increasing values from the inner German Bight (area GB1) to the Dogger Bank (area GB4) (see Fig. 3. and Tab. 4). When interpreting this finding, it has to be taken into account that the mean total length of the dab examined increased in north-westerly direction, too, possibly affecting the prevalence, but not exclusively responsible for the gradient recorded.

The prevalence of liver nodules >2 mm (= tumours and pre-stages) was slightly elevated in North Sea dab compared to the summer cruise 2014. For dab of the size range 20-24 cm total length, it was in

the range of 1.9 % (German Bight, area GB1) to 7.7 % (area N01), for dab of the size group ≥ 25 cm the prevalence ranged from 4.5 % (area N01) to 13.3 % (inner German Bight, area GB1).

Baltic Sea dab from Kiel Bight (area B01) displayed differences in disease prevalence to the North Sea dab especially for hyperpigmentation and the parasites *Stephanostomum baccatum*, *Acanthochondria cornuta* (copepode on the gills) and *Lepeophtheirus pectoralis* (copepode on the skin and under the pectoral fins): These diseases/parasites are extremely rare in the Baltic Sea. There was no difference in prevalence of epidermal hyperplasia/papilloma, acute/healing skin ulcerations, fin rot, X-cell gill disease and skeletal deformities between the Baltic Sea and North Sea. However, the prevalence of lymphocystis in Kiel Bight (area B01; 11.4 %) was higher compared to the North Sea sampling areas. The prevalence of liver nodules >2 mm was only slightly lower (20-24 cm: 2.0 %; ≥ 25 cm: 3.8 %) than in the North Sea.

2 Flounder (*Platichthys flesus*)

468 flounder from four Baltic Sea areas were examined for the occurrence of externally visible diseases and parasites (Tab. 6). The prevalence of the most frequent disease lymphocystis was in the range of 17.0 % (Arkona Sea, area B11) to 37.6 % (outside Gdansk Bay, area B09). The prevalence of acute/healing skin ulcerations were generally low; only in area B09 an increase value of 9.9 % was recorded. For *Lepeophtheirus pectoralis*, the marked regional pattern previously known was confirmed: During this cruise, the parasite occurred only in Kiel Bight (area B01), where a prevalence of 74.3 % was recorded.

3 Cod (*Gadus morhua*)

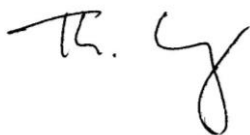
In total, 2,160 cod from five Baltic Sea areas were examined for externally visible diseases and parasites, and 488 specimens for nematodes in the body cavity (Tab. 7). The disease prevalence was low in general; for acute/healing skin ulcerations it ranged from 1.1 % (Arkona Sea, area B11) to 3.7 % (outside Gdansk Bay, area B09). Skeletal deformities were rare, too, the maximum values was 2.2 % (area B09). Larval nematodes in the body cavity were recorded in cod from all sampling areas, with the highest prevalence in the eastern areas B13 (Bornholm Basin) (58.3 %) and B09 (outside Gdansk Bay) (57.3 %). In Kiel Bight, the parasites *Lernaecera branchialis* (copepode in the gills) and *Cryptocotyle lingua* (black trematode cysts in the skin) were comparatively prevalent with prevalences of 7.0 % and 74.6 %, resp. The gill parasite *Loma branchialis* was very prevalent in all areas (69.1 % - 92.5 %).

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, 9 Tables

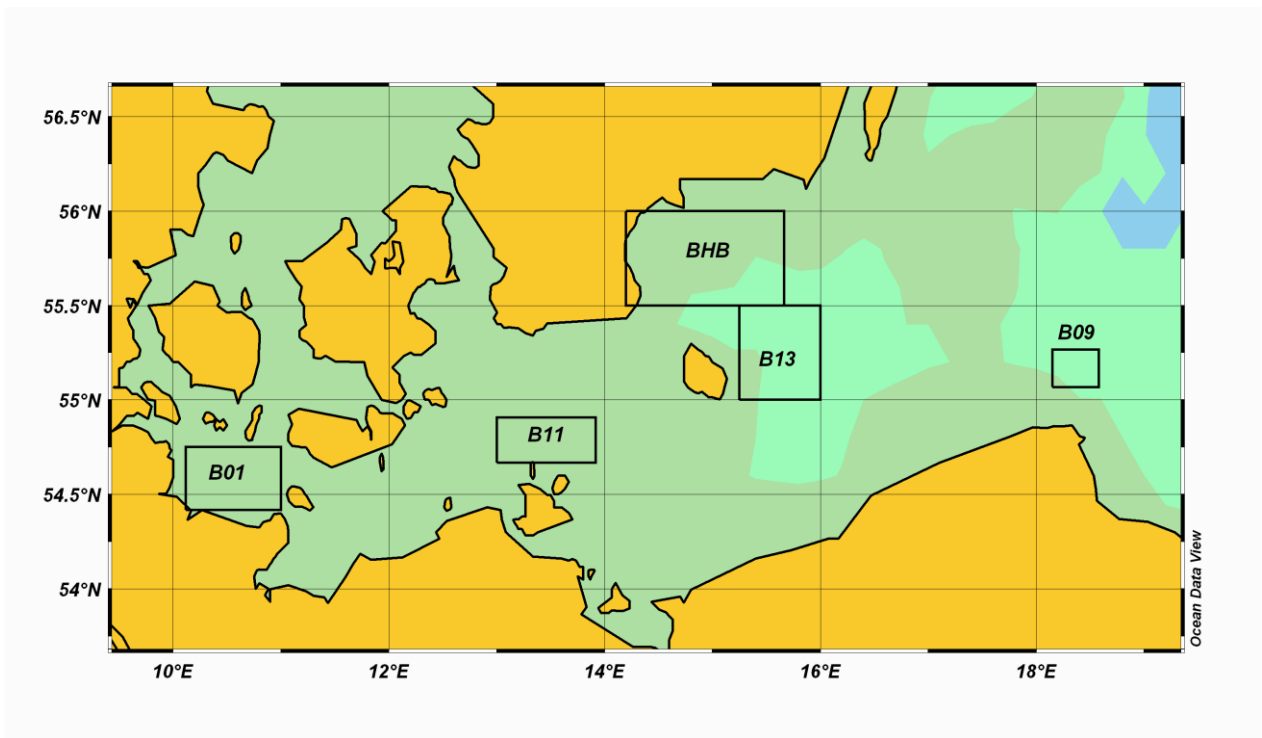


Fig. 1: *Cruise 380 RV 'Walther Herwig III', 01.12. – 19.12.2014:*
Location of sampling sites in the Baltic Sea

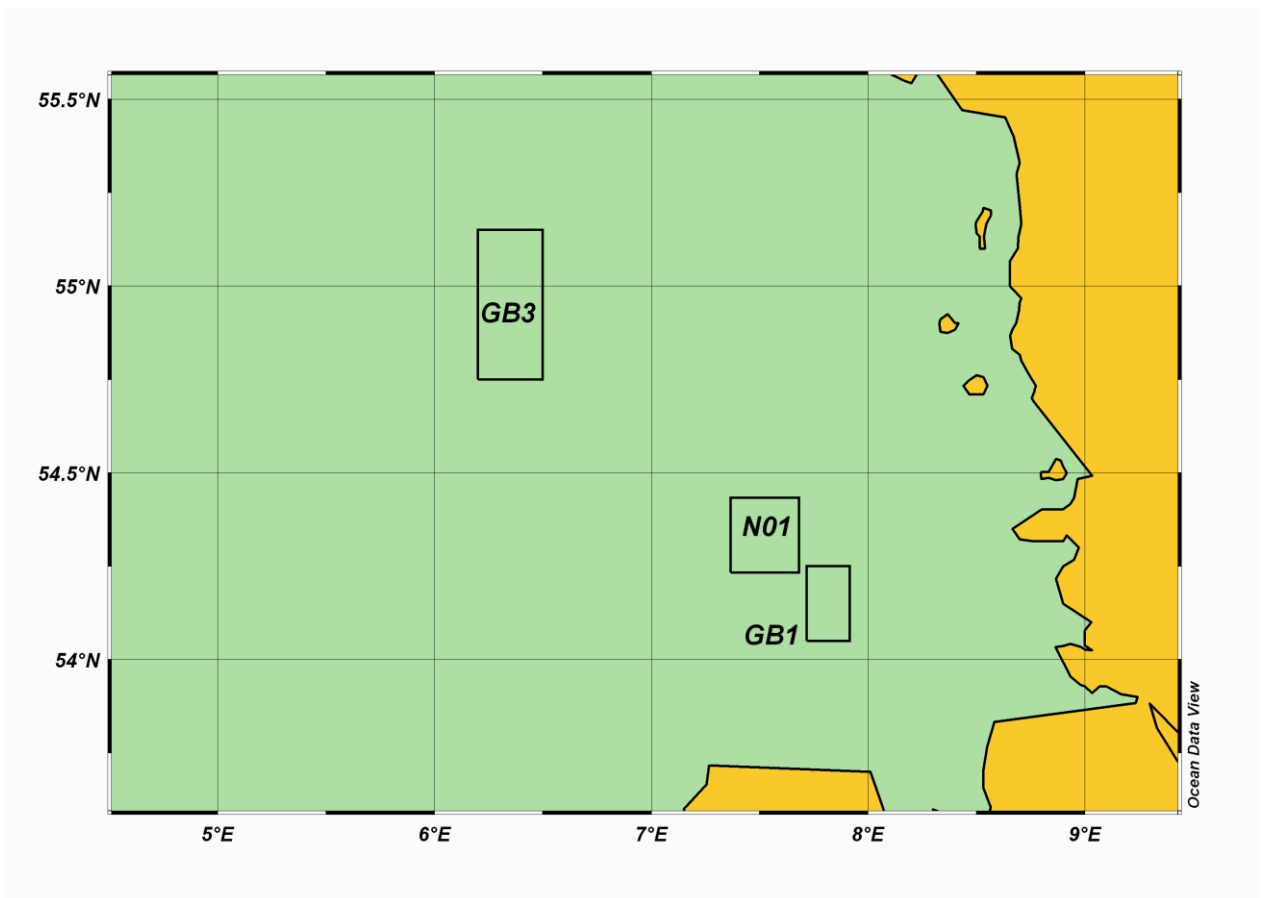


Fig. 2: *Cruise 380 RV 'Walther Herwig III', 01.12. – 19.12.2014:*
Location of sampling sites in the North Sea

Tab. 1: *Cruise 380 RV 'Walther Herwig III', 01.12. – 19.12.2014:*
Geographical coordinates of trawling stations in the Baltic Sea and North Sea

DATE	STATION	Area	ICES-RECTANGLE	Latitude	Longitude
04.12.14	001	B09	39G8	55°10.64N	18°31.46E
05.12.14	002	B09	39G8	55°08.28N	18°11.89E
05.12.14	003	B09	39G8	55°08.07N	18°15.18E
05.12.14	004	B09	39G8	55°08.04N	18°19.01E
05.12.14	005	B09	39G8	55°08.23N	18°12.33E
06.12.14	006	BHB	40G4	55°32.39N	14°50.74E
06.12.14	007	BHB	40G4	55°34.86N	14°56.98E
06.12.14	008	BHB	40G4	55°39.67N	14°56.39E
07.12.14	009	B13	39G5	55°20.18N	15°35.42E
07.12.14	010	B13	39G5	55°20.50N	15°35.08E
07.12.14	011	B13	39G5	55°19.48N	15°35.25E
07.12.14	012	B13	39G5	55°18.00N	15°35.45E
08.12.14	013	B13	39G5	55°19.98N	15°35.19E
08.12.14	014	B13	39G5	55°20.32N	15°34.79E
08.12.14	015	B13	39G5	55°21.85N	15°35.64E
08.12.14	016	B13	39G5	55°22.91N	15°36.78E
08.12.14	017	B13	39G5	55°21.00N	15°43.07E
09.12.14	018	B11	38G3	54°43.90N	13°40.93E
09.12.14	019	B11	38G3	54°46.10N	13°40.26E
09.12.14	020	B11	38G3	54°45.77N	13°31.02E
10.12.14	021	B01	38G0	54°31.87N	10°36.54E
10.12.14	022	B01	38G0	54°31.89N	10°36.59E
11.12.14	023	B01	37G0	54°27.60N	10°33.95E
11.12.14	024	B01	38G0	54°40.37N	10°15.82E
15.12.14	025	GB1	37F7	54°06.28N	07°46.58E
15.12.14	026	GB1	37F7	54°06.77N	07°45.62E
16.12.14	027	N01	37F7	54°15.37N	07°26.44E
16.12.14	028	N01	37F7	54°15.51N	07°25.26E
16.12.14	029	N01	37F7	54°15.54N	07°25.14E
17.12.14	030	GB3	38F6	54°55.76N	06°16.43E
17.12.14	031	GB3	38F6	54°56.22N	06°16.58E
17.12.14	032	GB3	38F6	54°56.10N	06°16.47E

Tab. 1a: *Cruise 380 RV 'Walther Herwig III', 01.12. – 19.12.2014:*
Geographical coordinates of hydrography stations in the Baltic Sea and North Sea

DATE	STATION	FISHING STATION	AREA	ICES-RECTANGLE	LATITUDE	LONGITUDE
04.12.14	001	001	B09	39G8	55°09.98N	18°32.44E
05.12.14	002	002	B09	39G8	55°08.34N	18°10.81E
05.12.14	003	003	B09	39G8	55°07.36N	18°15.98E
05.12.14	004	004	B09	39G8	55°08.22N	18°19.71E
05.12.14	005	005	B09	39G8	55°08.31N	18°10.81E

Tab. 1a: cont.

DATE	STATION	FISHING STATION	AREA	ICES-RECTANGLE	LATITUDE	LONGITUDE
06.12.14	006	006	BHB	40G4	55°31.94N	14°49.87E
06.12.14	007	007	BHB	40G4	55°35.00N	14°57.08E
06.12.14	008	008	BHB	40G4	55°39.42N	14°55.70E
07.12.14	009	009	B13	39G5	55°19.12N	15°34.74E
07.12.14	010	010	B13	39G5	55°19.92N	15°34.43E
07.12.14	011	011	B13	39G5	55°19.29N	15°34.81E
07.12.14	012	012	B13	39G5	55°17.52N	15°35.04E
08.12.14	013	013	B13	39G5	55°19.30N	15°33.72E
08.12.14	014	014	B13	39G5	55°20.37N	15°33.86E
08.12.14	015	015	B13	39G5	55°21.82N	15°35.83E
08.12.14	016	016	B13	39G5	55°23.25N	15°35.64E
08.12.14	017	017	B13	39G5	55°21.05N	15°44.31E
09.12.14	018	018	B11	38G3	54°43.42N	13°42.63E
09.12.14	019	019	B11	38G3	54°45.68N	13°39.29E
09.12.14	020	020	B11	38G3	54°45.82N	13°32.06E
10.12.14	021	021	B01	38G0	54°31.68N	10°36.44E
10.12.14	022	022	B01	38G0	54°31.50N	10°36.07E
11.12.14	023	023	B01	37G0	54°27.80N	10°35.01E
11.12.14	024	024	B01	38G0	54°39.59N	10°15.63E
11.12.14	025		BKB	38G0	54°47.32N	10°08.76E
11.12.14	026		BKB	38G0	54°49.57N	10°08.72E
11.12.14	027		BKB	38G0	54°49.57N	10°14.10E
11.12.14	028		BKB	38G0	54°47.33N	10°14.16E
11.12.14	029		BKB	38G0	54°48.66N	10°11.47E
12.12.14	030			38G0	54°45.56N	10°06.71E
12.12.14	031			38G0	54°46.25N	10°01.64E
12.12.14	032			38F9	54°48.21N	09°57.69E
12.12.14	033			38F9	54°50.34N	09°53.40E
12.12.14	034			38F9	54°49.56N	09°48.14E
12.12.14	035			38F9	54°49.52N	09°42.70E
12.12.14	036			38F9	54°50.73N	09°37.75E
15.12.14	037	025	GB1	37F7	54°06.69N	07°45.86E
15.12.14	038	026	GB1	37F7	54°06.87N	07°44.49E
16.12.14	039	027	N01	37F7	54°15.02N	07°26.53E
16.12.14	040	028	N01	37F7	54°15.22N	07°24.95E
16.12.14	041	029	N01	37F7	54°15.46N	07°23.84E
17.12.14	042	030	GB3	38F6	54°55.82N	06°17.01E
17.12.14	043	031	GB3	38F6	54°55.87N	06°16.54E
17.12.14	044	032	GB3	38F6	54°55,47N	06°15,95E

Tab. 1b: *Cruise 380 RV 'Walther Herwig III', 01.12. – 19.12.2014:*
Geographical coordinates of stations for sediment grabs in the Baltic Sea

DATE	STATION	AREA	ICES-RECTANGLE	LATITUDE	LONGITUDE
12.12.14	001	38G0	54°45.52N	10°06.79E	12.12.14
12.12.14	002	38G0	54°45.50N	10°06.78E	12.12.14
12.12.14	003	38G0	54°46.25N	10°01.57E	12.12.14
12.12.14	004	38G0	54°46.23N	10°01.60E	12.12.14
12.12.14	005	38F9	54°48.16N	09°57.72E	12.12.14
12.12.14	006	38F9	54°48.10N	09°57.75E	12.12.14
12.12.14	007	38F9	54°50.31N	09°53.44E	12.12.14
12.12.14	008	38F9	54°50.29N	09°53.47E	12.12.14
12.12.14	009	38F9	54°49.54N	09°48.16E	12.12.14
12.12.14	010	38F9	54°49.51N	09°48.21E	12.12.14
12.12.14	011	38F9	54°49.50N	09°42.71E	12.12.14
12.12.14	012	38F9	54°49.48N	09°42.72E	12.12.14
12.12.14	013	38F9	54°50.73N	09°37.76E	12.12.14
12.12.14	014	38F9	54°50.73N	09°37.77E	12.12.14

Tab. 2: *Cruise 380 RV 'Walther Herwig III', 01.12. – 19.12.2014:*
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	Haddock	Herring	Sprat	Mackerel	Dab	Plaice	Flounder	
B09	n	178	-	-	38	22	-	-	9	28
	kg	65	-	-	2	< 0,5	-	-	1	7
BHB	n	655	1	-	19	4	-	-	1	3
	kg	186	< 0,5	-	1	< 0,5	-	-	< 0,5	1
B13	n	35	-	-	289	18.748	-	-	1	-
	kg	14	-	-	12	192	-	-	< 0,5	-
B11	n	705	130	-	149	13.123	-	-	7	370
	kg	313	42	-	23	78	-	-	27	81
B01	n	16	79	-	78	160	-	1.900	187	138
	kg	42	6	-	2	1	-	253	65	44
GB1	n	< 1	6.011	-	940	20.796	-	596	4	-
	kg	1	333	-	23	159	-	27	< 0,5	-
N01	n	-	28	-	6.951	1.651	-	558	2	1
	kg	-	1	-	55	15	-	39	< 0,5	< 0,5
GB3	n	-	31	-	1.062	4.017	-	1.510	192	-
	kg	-	2	-	9	17	-	87	32	-

Tab. 3: *Cruise 380 RV 'Walther Herwig III', 01.12. – 19.12.2014:*
 Water depth, temperature (T), salinity (S), O₂ in mg/l and O₂ saturation (%), Baltic Sea and North Sea

DATE	STATION	AREA	DEPTH (m)	S (PSU)	T (°C)	O ₂ (mg/L)	O ₂ -SATURATION (%)
04.12.14	001	B09	4	7,21	6,7	11,45	98,05
			69	9,77	6,1	3,65	31,34
05.12.14	002	B09	3	7,24	6,7	11,35	97,20
			63	10,54	7,7	3,36	30,17
	003	B09	3	7,23	6,8	11,32	97,30
			58	9,57	4,9	1,78	14,82
	004	B09	5	7,22	6,8	11,40	97,91
			72	11,33	9,5	4,10	38,57
005	B09	3	7,45	5,2	10,78	89,18	
		64	11,03	9,2	4,01	37,35	
06.12.14	006	BHB	3	7,73	9,0	10,94	99,44
			71	15,85	7,8	0,58	5,39
	007	BHB	4	7,50	9,1	10,94	99,48
			75	16,10	7,5	0,63	5,79
	008	BHB	4	7,48	8,9	11,01	99,64
			59	15,09	9,8	1,63	15,81
07.12.14	009	B13	3	7,58	9,0	10,96	99,41
			93	17,71	8,7	1,06	10,18
	010	B13	2	7,58	9,0	10,96	99,48
			91	17,34	8,8	1,50	14,46
	011	B13	4	7,58	9,0	10,98	99,72
			91	17,20	8,5	1,24	11,87
012	B13	4	7,61	8,9	10,95	99,26	
		89	16,58	7,6	0,69	6,47	
08.12.14	013	B13	4	7,73	9,1	10,99	100,19
			91	16,92	8,3	0,95	8,99
	014	B13	3	7,60	8,9	11,01	99,76
			91	17,34	8,8	1,46	14,06
	015	B13	3	7,61	8,8	10,95	98,97
			90	16,74	8,2	0,75	7,11
	016	B13	4	7,65	8,7	11,07	99,90
			89	16,91	8,3	1,32	12,53
017	B13	3	7,42	6,5	11,40	97,47	
		90	17,78	8,8	1,94	18,66	
09.12.14	018	B11	3	8,26	7,9	11,39	101,27
			37	9,44	7,6	11,11	98,76
	019	B11	4	8,41	7,6	11,48	101,35
			39	9,26	7,1	11,45	100,64
	020	B11	4	8,57	7,7	11,50	101,81
38			10,33	7,0	11,31	99,64	
10.12.14	021	B01	4	17,57	6,7	11,00	100,94
			11	17,90	7,0	10,85	100,41
	022	B01	3	17,31	6,7	10,93	100,03
			12	18,78	7,3	10,59	99,31

Tab. 3: cont.

DATE	STATION	AREA	DEPTH (m)	S (PSU)	T (°C)	O2 (mg/L)	O2-SATURATION (%)
11.12.14	023	B01	3	17,55	6,5	11,01	100,65
			13	17,56	6,6	11,05	101,09
	024	B01	3	18,33	6,9	10,84	100,51
			15	18,35	6,9	10,86	100,71
	025	BKB	4	18,43	7,2	10,59	98,88
			23	18,48	7,2	10,54	98,50
	026	BKB	4	18,46	6,9	10,69	99,24
			18	18,58	7,3	10,38	97,33
	027	BKB	3	18,07	7,3	10,64	99,38
			27	18,98	7,4	10,34	97,47
	028	BKB	3	18,07	7,3	10,66	99,57
			24	19,22	8,3	9,37	90,28
029	BKB	8	18,36	7,3	9,34	87,41	
		26	18,63	7,3	10,30	96,53	
12.12.14	030	FF	2	18,32	7,2	10,53	98,25
			22	18,67	7,6	9,99	94,29
	031	FF	2	18,27	7,1	10,61	98,78
			25	19,03	8,0	9,65	92,28
	032	FF	2	18,42	6,9	10,70	99,24
			21	18,92	8,0	9,76	93,06
	033	FF	2	18,40	6,3	10,89	99,63
			25	18,49	6,6	10,66	98,11
034	FF	2	18,42	6,4	10,78	98,85	
		20	18,42	6,4	10,81	99,15	
12.12.14	035	FF	2	18,47	6,4	10,69	97,90
			19	18,54	6,5	10,53	96,88
	036	FF	2	18,54	6,6	10,34	95,29
			14	18,59	6,7	10,30	95,11
15.12.14	037	GB1	4	33,71	8,8	9,40	100,55
			39	33,73	8,9	9,38	100,58
	038	GB1	4	33,70	8,9	9,41	100,86
			41	33,71	8,9	9,37	100,56
16.12.14	039	N01	3	33,71	8,8	9,42	100,81
			39	33,87	9,0	9,34	100,68
	040	N01	3	33,75	8,9	9,41	100,83
			39	33,82	9,0	9,35	100,56
	041	N01	4	33,81	8,9	9,42	101,12
			38	33,92	9,1	9,35	100,76
17.12.14	042	GB3	3	34,46	10,0	9,11	100,65
			41	34,47	10,1	9,12	100,92
	043	GB3	4	34,45	10,0	9,12	100,69
			40	34,46	10,1	9,13	100,97
	044	GB3	5	34,49	10,1	9,12	100,88
			39	34,50	10,1	9,10	100,72

Tab. 4: Cruise 380 RV 'Walther Herwig III', 01.12. – 19.12.2014:
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	490	11,4	2,2	0,4	0,4	1,0	0,8	0,2	1,6	0,4	0,2
GB1	506	3,4	3,2	1,4	1,4	0,8	1,2	28,7	4,5	3,4	9,7
N01	700	7,3	3,7	0,6	0,3	0,1	0,7	43,0	9,3	3,3	13,1
GB3	759	10,5	3,2	0,4	0,0	0,3	0,3	30,3	32,3	1,8	7,0
Summe	2.455										

Tab. 5: Cruise 380 RV 'Walther Herwig III', 01.12. – 19.12.2014: Prevalences (%) of liver anomalies in dab (*Limanda limanda*) from the Baltic Sea and North Sea

Area	Lenght (cm)		N unt	Liver nodules (mm)			Green Livers	Nema-todes	Acantho-ceph.
	from	to		≥ 2	≥ 5	≥ 10			
B01	20	24	51	2,0	0,0	0,0	0,0	0,0	0,0
	25	40	53	3,8	1,9	0,0	0,0	0,0	1,9
GB1	20	24	52	1,9	0,0	0,0	0,0	0,0	1,9
	25	40	15	13,3	6,7	6,7	0,0	0,0	0,0
N01	20	24	52	7,7	1,9	1,9	0,0	0,0	1,9
	25	40	22	4,5	0,0	0,0	0,0	0,0	0,0
GB3	20	24	52	3,8	0,0	0,0	1,9	1,9	0,0
	25	40	19	5,3	0,0	0,0	0,0	21,1	0,0
Summe			316						

Tab. 6: Cruise 380 RV 'Walther Herwig III', 01.12. – 19.12.2014:
Prevalences (%) of externally visible diseases and parasites in flounder (*Platichthys flesus*) from the Baltic Sea and North Sea

Area	N unt	Ly	Ulc Ak/Hei	Flo Ak/Hei	Skel Def	Hyp Pig	Cryp	Lepe
B09	141	37,6	9,9	0,7	0,0	63,1	0,0	B09
BHB	7	28,6	0,0	0,0	0,0	100,0	0,0	BHB
B11	153	17,0	2,0	0,7	1,3	58,2	0,0	B11
B01	167	17,4	1,8	0,0	0,0	60,5	74,3	B01
Sum	468							

Tab. 7: Cruise 380 RV 'Walther Herwig III', 01.12. – 19.12.2014: 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
B09	647	3,7	2,2	0,0	0,0	0,0	76,8	110	57,3
BHB	520	2,5	1,7	0,0	0,2	1,5	92,5	116	38,8
B13	358	2,2	1,1	0,0	0,0	0,6	91,1	103	58,3
B11	564	1,1	1,8	0,0	1,4	2,0	69,1	103	27,2
B01	71	1,4	1,4	0,0	7,0	57,7	74,6	56	32,1
Summe	2.160							488	

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>Lernaocera 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>