

**FRV Walther Herwig III  
Cruise 370  
30.11. – 20.12.2013**

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

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 seven Baltic Sea and six North Sea areas. The cruise also constituted the final sampling campaign of the EU-funded CHEMSEA project (2011-2014) and the first campaign within the NATO-funded MODUM project (2013-2016), both addressing ecological effects of dumped chemical munitions in the Baltic Sea. 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. Hydrographical measurements were carried out (water temperature, salinity, oxygen content, turbidity). The following preliminary findings were noted:

*Dab*: Elevated prevalence of lymphocystis, epidermal hyperplasia/papilloma and macroscopic liver neoplasms in the North Sea; increasing prevalence of some diseases on a north-westerly transect in the German North Sea EEZ from the inner German Bight to the Dogger Bank.

*Flounder*: Elevated prevalence of lymphocystis in the Baltic Sea;

*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 (off Gdansk Bay).

**Participants:**

<b>Name</b>	<b>Function</b>	<b>Institution</b>
Dr. Thomas Lang	Scientist in Charge	TI-FI Cuxhaven
Nicolai Fricke	Scientist	TI-FI Cuxhaven
Jennifer Ipse	Technician	TI-FI Cuxhaven
Wolfgang Lindemann	Technician	TI-FI Hamburg
Horst Bahl	Scientist	TI-FI Hamburg
Marc Faber	Student	University Berlin
Lina Weirup	Student	University Hamburg
Christoph Rummel	Volunteer	University Mainz
Kolja Franssen	Volunteer	University Hamburg
Liliana Lehmann	Volunteer	University Berlin
Jessica Macken	Volunteer	University Göttingen
Shauna Grassmann	Volunteer	University Göttingen

## Objectives of the Cruise

1. Studies on fish diseases and parasites in the North Sea and Baltic Sea;
2. Studies on biological effects of contaminants;
3. Final studies for the CHEMSEA project and first studies in the MODUM project;
4. Sampling of fish for chemical analysis of contaminants;
5. Hydrographical measurements (salinity, temperature, oxygen, turbidity).

## Dates of the Cruise

FRV Walther Herwig III left Bremerhaven in the early morning of 30.11. The scientific crew already had boarded in the evening of 29.11. After the passage of Kiel Channel, the vessel sailed to the first sampling areas in the Baltic Sea, where work started in the morning of 01.12. in area B01 (Kiel Bight). In the following days, sampling was conducted in areas B10, B09 und SFI4. Due to a heavy storm (Xaver) fishing was not possible for three days. Work was resumed on 08.12. in area B13 east of Bornholm (dumpsite for chemical munitions after World War II) and continued in B11 and B12. In the evening of 10.12., after the end of the Baltic Sea programme, Walther Herwig III arrived in Kiel.

On 11.12., WHIII again passed Kiel Channel. In the period 12.-18.12., sampling was continued in four North Sea areas (P02, GB3, GB1, GB4, N01). The cruise ended according to schedule in the morning of 20.12. in Bremerhaven.

The location of the sampling areas and the cruise dates are shown in Fig. 1 and 2 and Tab. 1. In 9 sampling areas (Fig. 1), a total of 41 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, 5,040 dab from one Baltic Sea and six North Sea areas were examined for the occurrence of externally visible diseases and parasites (Tab. 4) and 641 dab for the occurrence of liver anomalies (Tab. 5).

The prevalence of some diseases in the North Sea was increased compared to the previous summer cruise 2013 (WH cruise 367, 28.08.-12.09.2013). The prevalence of lymphocystis was in range of 4.4 % - 13.5 %, with the lowest value in the inner German Bight (area GB1) and the highest values in the north-westerly edge of the German EEZ on the Dogger Bank (area GB4). The prevalence of epidermal hyperplasia/papilloma was in the range of 1.7 % (Ekofisk, area P02) to 6.8% (Horns Reef, area N11). Marked regional variation was recorded for hyperpigmentation, with values between 19.9 % (inner German Bight, area GB1) and 40.7 % (Dogger Bank, area GB4). The strongest regional differences were noted for the parasite *Stephanostomum baccatum* (juvenile digenean trematode under the skin), the prevalence of which ranged from 6.3 % (inner German Bight, area GB1) to 99.9 % (Ekofisk, area P02).

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 elevated North Sea dab compared to previous cruises. For dab of the size range 20-24 cm total length was in the range of 1.9 % (German Bight, areas N01 and GB1) to 22.2 % (Dogger Bank, area GB4), for dab of the size

group  $\geq 25$  cm the prevalence ranged from 10.4 % (Horns Reef, area N11) to 23.7 % (Dogger Bank, area GB4).

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.

## **2 Flounder (*Platichthys flesus*)**

1,079 flounder from six Baltic Sea areas and one of the North Sea areas (inner German Bight, area GB1) were examined for the occurrence of externally visible diseases and parasites (Tab. 6). The prevalence of lymphocystis in the Arkona Sea was high compared to the summer cruise 2013 (WH 367) (area B10: 28.5 %; area B11: 18.6 %). For *Lepeophtheirus pectoralis*, the marked regional pattern previously known was confirmed. A high prevalence occurred in the inner German Bight (area GB1, North Sea) and Kiel Bight (area B01, Baltic Sea), lower prevalence in flounder from Mecklenburg Bight (area B12) and zero prevalence in the eastern Baltic Sea sampling areas.

## **3 Cod (*Gadus morhua*)**

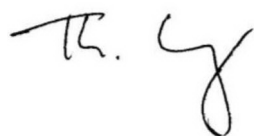
In total, 2,012 cod from seven Baltic Sea areas and five North Sea areas (in the latter only single specimens, so results cannot be regarded as representative) were examined for externally visible diseases and parasites and for nematodes in the body cavity (Tab. 7). The disease prevalence was low in general, and for acute/healing stages the maximum values were below 9.0 %. Skeletal deformities were rare, too, with maximum values of 1.3 % (in areas B01, B09, B11). Larval nematodes in the body cavity were recorded in all Baltic Sea areas and were most prevalent in the eastern areas B13 east of Bornholm (83.3 % of six cod examined) and B09 off Gdansk Bay (27.3 % of 150 cod examined).

## **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**

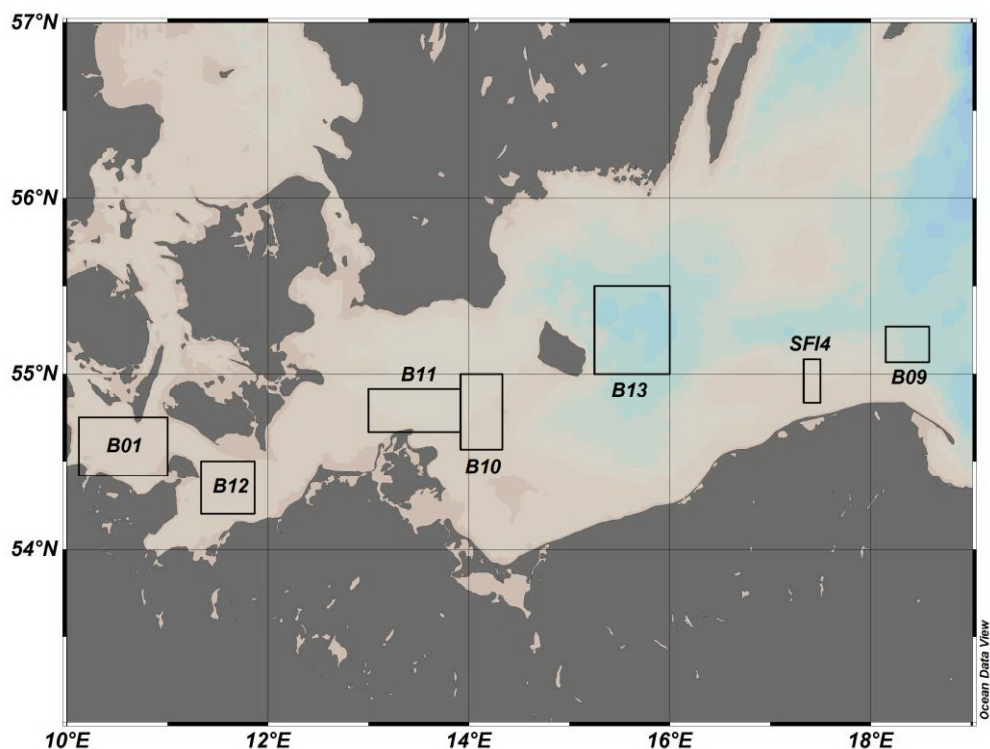
Thanks are due to Captain Karow and his crew and to the scientific staff for constructive and hard work and a very good atmosphere on board.



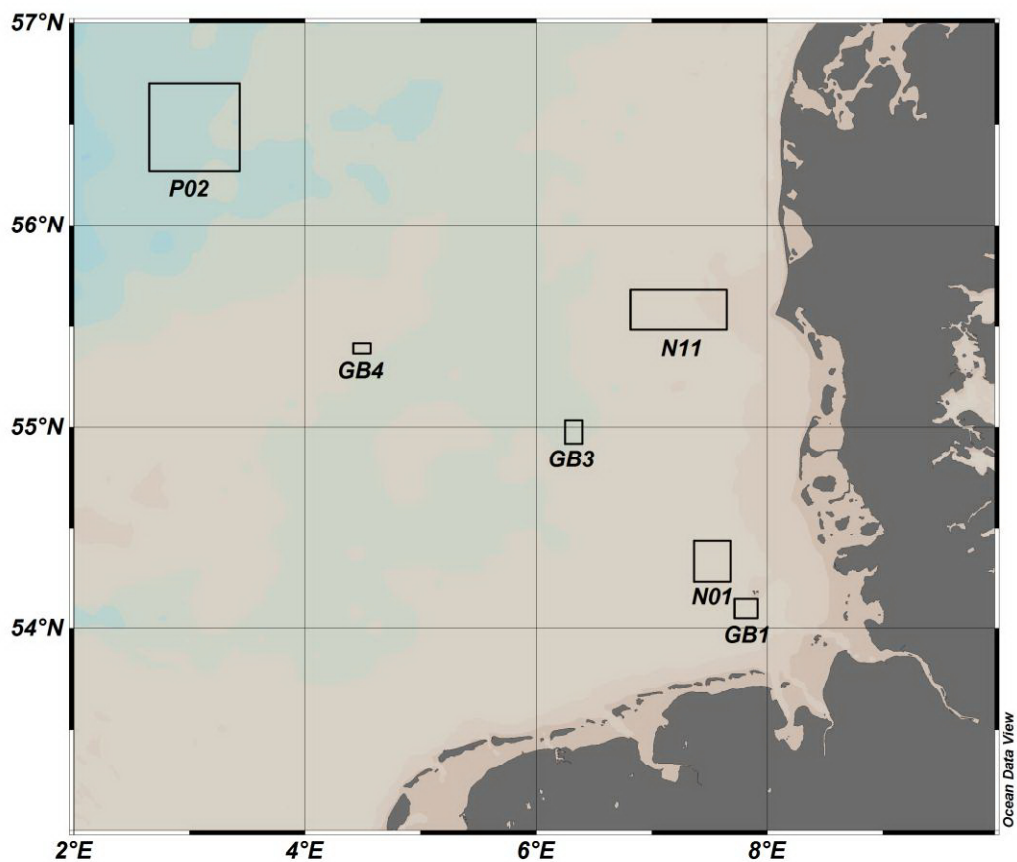
Dr. Thomas Lang  
(Scientist in Charge)

## **Annex**

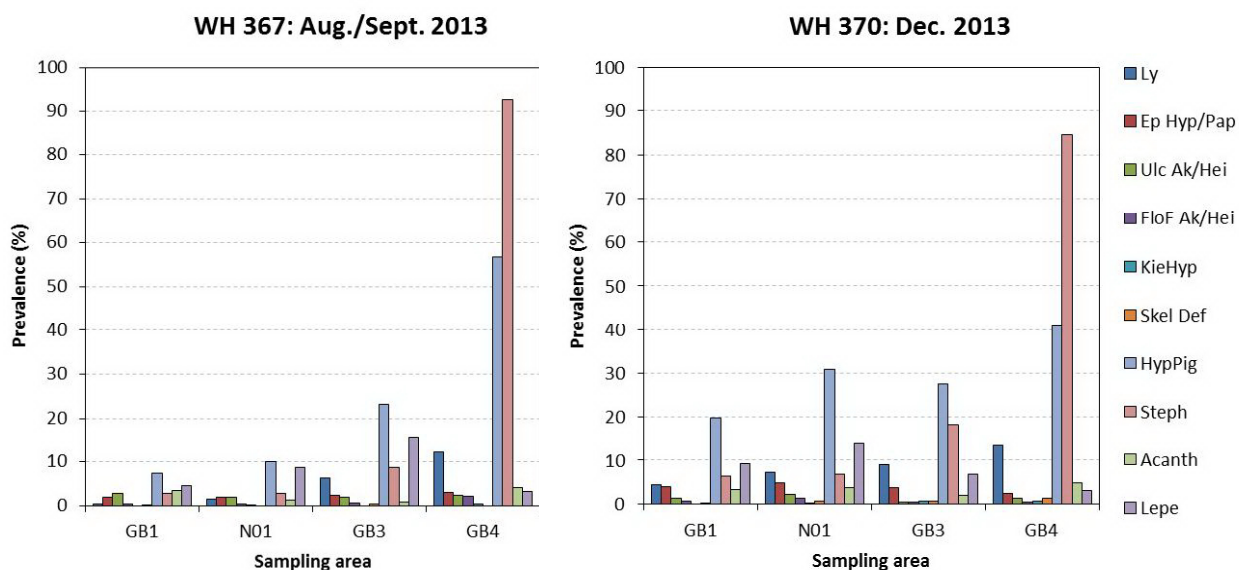
3 Figures, 7 Tables



**Fig. 1:** *Cruise 370 RV 'Walther Herwig III', 30.11. – 20.12.2013:*  
Location of sampling sites in the Baltic Sea



**Fig. 2:** *Cruise 370 RV 'Walther Herwig III', 30.11. – 20.12.2013:*  
Location of sampling sites in the North Sea



**Fig. 3:** Cruises 367 (23.08. – 12.09.2013) and 370 (30.11.-20.12.2013) RV 'Walther Herwig III': Prevalence (%) of dab diseases on a NW transect in the German EEZ in the North Sea (WH 370: location of areas Fig. 2, prevalence Tab. 5; abbreviations in the legend at the end of the report)

**Tab. 1:** Cruise 370 RV 'Walther Herwig III', 30.11. – 20.12.2013: Geographical coordinates of trawling stations in the Baltic Sea and North Sea

DATE	STATION	Area	ICES-RECTANGLE	Latitude	Longitude
01.12.13	001	B01	38G0	54°44,19N	10°13,28E
01.12.13	002	B01	38G0	54°36,45N	10°24,45E
01.12.13	003	B01	38G0	54°31,81N	10°35,93E
02.12.13	004	B10	38G3	54°49,53N	13°56,30E
02.12.13	005	B10	38G4	54°52,24N	14°01,97E
02.12.13	006	B10	38G3	54°46,94N	13°57,57E
03.12.13	007	B09	39G8	55°09,08N	18°14,32E
03.12.13	008	B09	39G8	55°11,53N	18°29,45E
03.12.13	009	B09	39G8	55°11,76N	18°29,76E
04.12.13	010	SFI	39G7	55°00,79N	17°29,11E
08.12.13	011	B13	39G5	55°22,96N	15°34,07E
08.12.13	012	B13	39G5	55°18,59N	15°39,98E
08.12.13	013	B13	39G5	55°23,18N	15°38,64E
08.12.13	014	B13	39G5	55°18,87N	15°41,67E
09.12.13	015	B11	38G3	54°47,46N	13°51,75E
09.12.13	016	B11	38G3	54°47,21N	13°48,73E
09.12.13	017	B11	38G3	54°45,78N	13°28,98E
10.12.13	018	B12	37G1	54°20,08N	11°42,53E
10.12.13	019	B12	37G1	54°19,64N	11°26,33E
12.12.13	020	N11	40F7	55°31,26N	07°07,90E

**Tab.1: cont.**

DATE	STATION	Area	ICES-RECTANGLE	Latitude	Longitude
12.12.13	021	N11	40F7	55°36,73N	07°05,10E
12.12.13	022	N11	40F7	55°33,56N	07°10,64E
12.12.13	023	N11	40F7	55°36,49N	07°04,21E
13.12.13	024	P02	41F3	56°28,08N	03°24,19E
13.12.13	025	P02	42F3	56°36,64N	03°12,82E
13.12.13	026	P02	42F3	56°34,56N	03°04,45E
14.12.13	027	GB3	38F6	54°55,93N	06°16,72E
14.12.13	028	GB3	38F6	54°58,67N	06°22,93E
14.12.13	029	GB3	38F6	54°56,33N	06°16,27E
15.12.13	030	GB1	37F7	54°04,52N	07°53,40E
15.12.13	031	GB1	37F7	54°06,54N	07°46,00E
16.12.13	032	GB1	37F7	54°04,62N	07°53,29E
16.12.13	033	GB1	37F7	54°06,35N	07°46,99E
17.12.13	034	GB4	39F4	55°23,78N	04°25,19E
17.12.13	035	GB4	39F4	55°22,98N	04°32,79E
17.12.13	036	GB4	39F4	55°22,91N	04°26,60E
17.12.13	037	GB4	39F4	55°23,11N	04°32,51E
18.12.13	038	N01	37F7	54°19,58N	07°30,34E
18.12.13	039	N01	37F7	54°16,19N	07°31,29E
18.12.13	040	N01	37F7	54°19,47N	07°27,58E
18.12.13	041	N01	37F7	54°15,66N	07°26,99E

**Tab. 1a:** *Cruise 370 RV 'Walther Herwig III', 30.11. – 20.12.2013:*  
Geographical coordinates of hydrography stations in the Baltic Sea and North Sea

DATE	STATION	FISHING STATION	AREA	ICES-RECTANGLE	LATITUDE	LONGITUDE
01.12.13	001	001	B01	38G0	54°44,60N	10°13,19E
01.12.13	002	002	B01	38G0	54°36,67N	10°23,93E
01.12.13	003	003	B01	38G0	54°31,80N	10°34,50E
02.12.13	004	004	B10	38G3	54°49,31N	13°55,47E
02.12.13	005	005	B10	38G4	54°52,78N	14°02,46E
02.12.13	006	006	B10	38G3	54°46,33N	13°56,90E
03.12.13	007	007	B09	39G8	55°08,42N	18°14,73E
03.12.13	008	008	B09	39G8	55°11,34N	18°30,75E
03.12.13	009	009	B09	39G8	55°12,28N	18°30,60E
04.12.13	010	010	SFI	39G7	55°00,78N	17°29,00E
08.12.13	011	011	B13	39G5	55°23,25N	15°33,58E
08.12.13	012	012	B13	39G5	55°17,78N	15°40,30E
08.12.13	013	013	B13	39G5	55°23,76N	15°37,73E

**Tab. 1a: cont.**

<b>DATE</b>	<b>STATION</b>	<b>FISHING STATION</b>	<b>AREA</b>	<b>ICES-RECTANGLE</b>	<b>LATITUDE</b>	<b>LONGITUDE</b>
08.12.13	014	014	B13	39G5	55°18,16N	15°42,39E
09.12.13	015	015	B11	38G3	54°48,49N	13°53,00E
09.12.13	016	016	B11	38G3	54°47,37N	13°49,47E
09.12.13	017	017	B11	38G3	54°45,62N	13°30,58E
10.12.13	018	018	B12	37G1	54°20,35N	11°43,42E
10.12.13	019	019	B12	37G1	54°19,26N	11°26,45E
12.12.13	020	020	N11	40F7	55°30,59N	07°08,05E
12.12.13	021	021	N11	40F7	55°37,23N	07°04,02E
12.12.13	022	022	N11	40F7	55°33,49N	07°11,97E
12.12.13	023	023	N11	40F7	55°37,08N	07°03,54E
13.12.13	024	024	P02	41F3	56°27,61N	03°25,61E
13.12.13	025	025	P02	42F3	56°36,10N	03°12,99E
13.12.13	026	026	P02	42F3	56°35,41N	03°04,93E
14.12.13	027	027	GB3	38F6	54°55,92N	06°17,42E
14.12.13	028	028	GB3	38F6	54°59,11N	06°23,76E
14.12.13	029	029	GB3	38F6	54°55,97N	06°14,81E
15.12.13	030	030	GB1	37F7	54°04,24N	07°54,47E
15.12.13	031	031	GB1	37F7	54°06,86N	07°45,13E
16.12.13	032	032	GB1	37F7	54°04,07N	07°54,33E
16.12.13	033	033	GB1	37F7	54°06,95N	07°45,26E
17.12.13	034	034	GB4	39F4	55°23,72N	04°25,49E
17.12.13	035	035	GB4	39F4	55°23,12N	04°33,82E
17.12.13	036	036	GB4	39F4	55°22,70N	04°25,32E
17.12.13	037	037	GB4	39F4	55°23,17N	04°33,87E
18.12.13	038	038	N01	37F7	54°20,43N	07°30,08E
18.12.13	039	039	N01	37F7	54°15,90N	07°32,62E
18.12.13	040	040	N01	37F7	54°20,13N	07°27,34E
18.12.13	041	041	N01	37F7	54°15,21N	07°26,24E

**Tab. 2:** *Cruise 370 RV 'Walther Herwig III', 30.11. – 20.12.2013:*  
Mean catches of selected abundant fish species in the Baltic Sea and North Sea  
(n = number, kg = weight per 1 h trawling)

<b>Area</b>	<b>Cod</b>	<b>Whiting</b>	<b>Haddock</b>	<b>Herring</b>	<b>Sprat</b>	<b>Mackerel</b>	<b>Dab</b>	<b>Plaice</b>	<b>Flounder</b>
B01 n	24	112	-	1514	299	2	1741	183	8
kg	25	7	-	21	4	< 0,5	253	41	3
B10 n	403	106	-	2585	11554	-	-	7	178
kg	163	33	-	128	38	-	-	3	45
B09 n	223	-	-	12	6	-	-	1	6
kg	83	-	-	1	< 0,5	-	-	< 0,5	2
SFI4 n	267	-	-	5	-	-	-	-	29
kg	105	-	-	1	-	-	-	-	9
B13 n	2	-	-	2257	7329	2	-	-	-
kg	1	-	-	127	104	1	-	-	-
B11 n	315	45	-	26	22	-	4	14	727
kg	138	6	-	3	< 0,5	-	< 0,5	4	237
B12 n	14	180	-	361	354	-	375	34	82
kg	7	11	-	14	3	-	62	12	25
N11 n	8	10	-	1741	40	-	403	3	-
kg	1	< 0,5	-	30	< 0,5	-	27	< 0,5	-
P02 n	1	5	4	3	-	-	1261	4	-
kg	2	1	2	< 0,5	-	-	79	2	-
GB3 n	3	22	-	2029	643	-	3396	10	-
kg	5	1	-	33	2	-	186	2	-
GB1 n	1	5	-	1054	1040	-	352	4	7
kg	1	1	-	10	6	-	20	1	2
GB4 n	4	10	-	6070	4362	-	1737	11	-
kg	< 0,5	< 0,5	-	78	21	-	137	1	-
N01 n	2	24	-	5167	2303	-	400	2	-
kg	1	1	-	56	11	-	30	< 0,5	-



**Tab. 3:** *Cruise 370 RV 'Walther Herwig III', 30.11. – 20.12.2013:*  
 Water depth, temperature (T), salinity (S), O<sub>2</sub> in mg/l and O<sub>2</sub> saturation (%), Baltic Sea and North Sea

DATE	STATION	AREA	DEPTH (m)	S (PSU)	T (°C)	O <sub>2</sub> (mg/L)	O <sub>2</sub> -SATURATION (%)
01.12.2013	001	B01	3	20,902	7,81	10,11	97,31
			21	24,888	10,89	6,07	64,30
	002		2	19,671	7,61	10,36	98,48
			14	19,708	7,63	10,31	98,08
	003		2	19,191	7,40	10,53	99,30
			12	19,313	7,48	10,50	99,26
02.12.2013	004	B10	2	8,379	7,74	11,00	97,44
			39	14,344	10,01	8,40	81,56
	005		2	8,063	7,80	10,98	97,23
			38	14,705	9,99	8,61	83,80
	006		2	8,242	7,49	11,12	97,82
			34	8,842	8,07	10,81	96,79
03.12.2013	007	B09	3	7,213	7,97	10,95	96,81
			65	9,802	4,30	3,96	32,55
	008		4	7,116	7,96	10,96	96,84
			81	11,845	6,28	3,73	32,65
	009		2	7,128	8,02	10,92	96,64
			78	11,795	6,61	4,17	36,78
04.12.2013	010	SF14	3	7,384	7,35	11,23	97,90
			31	7,385	7,36	11,22	97,86
08.12.2013	011	B13	2	7,724	6,82	10,76	92,87
			90	16,423	9,88	5,18	50,88
	012		2	7,882	6,68	10,76	92,63
			92	17,279	10,10	4,11	40,72
	013		1	7,729	6,78	10,80	93,07
			87	16,797	9,43	3,29	31,99
	014		1	7,885	6,70	10,77	92,71
			92	17,233	10,08	4,53	44,90
09.12.2013	015	B11	2	8,855	6,93	11,10	96,71
			39	12,058	6,19	10,96	95,79
	016		2	8,909	6,86	11,11	96,65
			39	12,474	6,17	10,95	95,91
	017		1	9,420	6,35	11,35	97,86
			37	12,757	5,90	11,11	96,86
10.12.2013	018	B12	2	19,138	6,49	10,50	96,87
			21	20,021	6,49	10,43	96,80
	019		2	18,642	6,36	10,60	97,15
			19	19,386	6,16	10,59	97,09
12.12.2013	020	N11	2	34,004	8,63	9,14	97,62
			27	34,010	8,64	9,15	97,77
	021		3	34,175	8,80	9,11	97,78
			28	34,206	8,84	9,10	97,83

**Tab. 3: cont.**

DATE	STATION	AREA	DEPTH (m)	S (PSU)	T (°C)	O <sub>2</sub> (mg/L)	O <sub>2</sub> -SATURATION (%)
12.12.2013	022		3	33,791	8,43	9,15	97,18
			27	33,956	8,57	9,10	97,08
	023		2	34,134	8,78	9,11	97,76
			30	34,134	8,78	9,10	97,67
13.12.2013	024	P02	3	34,866	7,19	9,22	95,94
			65	34,873	7,15	9,23	95,92
	025		2	34,883	7,19	9,23	95,99
			66	34,893	7,17	9,23	95,98
	026		2	34,928	7,43	9,21	96,32
			67	34,939	7,40	9,17	95,83
14.12.2013	027	GB3	2	34,087	9,38	8,96	97,44
			40	34,328	9,42	8,93	97,24
	028		4	33,502	9,12	9,00	96,84
			41	34,351	9,40	8,96	97,55
	029		3	34,221	9,37	8,99	97,75
			39	34,463	9,41	8,95	97,60
15.12.2013	030	GB1	2	31,372	7,76	9,44	97,17
			38	31,702	8,08	9,28	96,51
	031		2	31,090	7,57	9,53	97,56
			37	32,007	8,30	9,19	96,18
16.12.2013	032	GB1	2	31,546	7,92	9,29	96,19
			36	31,702	8,08	9,24	96,09
	033		3	31,403	7,83	9,36	96,60
			37	31,931	8,19	9,27	96,75
17.12.2013	034	GB4	3	34,831	8,56	9,08	97,37
			43	34,871	8,42	9,17	98,04
	035		1	34,817	8,64	9,05	97,21
			43	34,848	8,47	9,11	97,49
	036		2	34,821	8,63	9,08	97,50
			42	34,911	8,20	9,18	97,73
	037		1	34,813	8,68	9,04	97,18
			42	34,847	8,47	9,13	97,68
18.12.2013	038	N01	2	32,048	8,03	9,29	96,67
			23	32,462	8,43	9,21	97,03
	039		2	32,892	8,64	9,15	97,04
			37	32,899	8,66	9,17	97,38
	040		2	32,655	8,41	9,15	96,43
			27	32,656	8,41	9,26	97,58
	041		2	32,821	8,79	9,09	96,74
			36	32,838	8,79	9,14	97,23

**Tab. 4:** Cruise 370 RV 'Walther Herwig III', 30.11. – 20.12.2013:  
Prevalences (%) of externally visible diseases and parasites in dab  
(*Limanda limanda*) from the Baltic Sea and North Sea

GEBIET	N unt	Ly	Ep Hyp/Pap	Ulc Ak/Hei	Flo Ak/Hei	KieHy	Skel Def	Hyp Pig	Steph	Acanth	Lepe
B01	507	12,0	1,6	1,2	0,4	0,4	0,6	0,2	0,2	0,0	0,2
N11	749	8,0	6,8	2,4	1,1	0,3	0,9	32,6	19,4	2,0	13,4
P02	761	11,7	1,7	1,2	0,7	0,0	1,1	20,6	99,9	1,4	0,0
GB3	752	8,9	3,6	0,3	0,3	0,7	0,7	27,4	18,4	2,0	6,8
GB1	752	4,4	3,9	1,3	0,5	0,0	0,1	19,9	6,3	3,3	9,3
GB4	762	13,5	2,4	1,3	0,3	0,5	1,2	40,7	84,6	4,9	3,1
N01	757	6,9	3,8	2,2	1,3	0,3	0,5	29,6	6,9	3,8	12,0
Summe	<b>5040</b>										

**Tab. 5:** Cruise 370 RV 'Walther Herwig III', 30.11. – 20.12.2013:  
Prevalences (%) of liver anomalies in dab (*Limanda limanda*) from the Baltic Sea  
and North Sea

GEBIET	Länge (cm)		N unt	Leberknoten (mm)			Grüne Lebern	Nema- toden	Kratzer
	von	bis		≥ 2	≥ 5	≥ 10			
B01	20	24	26	7,7	0	0	3,8	0	0
	25	40	22	4,5	0	0	9,1	0	4,5
N11	20	24	53	5,7	1,9	0	0	0	0
	25	40	48	10,4	4,2	4,2	2,1	0	0
P02	20	24	54	22,2	7,4	1,9	94,4	38,9	5,6
	25	40	5	20,0	20,0	0	60,0	20,0	0
GB3	20	24	56	3,6	0	0	3,6	1,8	1,8
	25	40	51	9,8	2,0	2,0	2,0	5,9	2,0
GB1	20	24	53	1,9	0	0	0	1,9	0
	25	40	51	11,8	5,9	3,9	2,0	3,9	2,0
GB4	20	24	55	5,5	1,8	0	0	5,5	3,6
	25	40	59	23,7	11,9	6,8	3,4	5,1	3,4
N01	20	24	53	1,9	0	0	0	0	0
	25	40	55	14,5	9,1	3,6	1,8	3,6	0
Summe			<b>641</b>						

**Tab. 6:** Cruise 370 RV 'Walther Herwig III', 30.11. – 20.12.2013:  
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
B01	24	33,3	0,0	0,0	0,0	62,5	70,8	B01
B10	267	28,5	0,0	0,7	0,7	71,2	0,0	B10
B09	56	26,8	5,4	0,0	1,8	64,3	0,0	B09
SF4	29	55,2	10,3	3,4	0,0	69,0	0,0	SF4
B11	512	18,6	1,6	0,4	0,8	70,1	0,0	B11
B12	163	14,1	1,2	0,0	0,0	74,2	25,8	B12
GB1	28	7,1	3,6	0,0	0,0	7,1	92,9	GB1
Sum	<b>1,079</b>							

**Tab. 7:** Cruise 370 RV 'Walther Herwig III', 30.11. – 20.12.2013:  
Prevalences (%) of externally visible diseases and parasites in cod (*Gadus morhua*)  
from the Baltic Sea

GEBIET	N unt	Ulc Ak/Hei	Skel Def	PBT	Locera	Cryp	Loma	N	Nemato
B01	79	0,0	1,3	0,0	6,3	44,3	12,7	55	12,7
B10	555	2,2	0,4	0,0	0,7	0,2	36,9	159	2,5
B09	552	8,9	1,3	0,0	0,0	0,0	74,1	150	27,3
SF4	258	5,0	0,8	0,0	0,0	0,0	70,9	141	24,8
B13	6	0,0	0,0	0,0	0,0	0,0	83,3	6	83,3
B11	519	2,3	1,3	0,0	1,3	5,0	21,8	145	6,2
B12	27	0,0	0,0	0,0	3,7	51,9	33,3	10	20,0
N11	2	0,0	0,0	0,0	0,0	0,0	0,0	2	50,0
P02	4	0,0	0,0	0,0	25,0	0,0	0,0	4	75,0
GB3	8	25,0	0,0	0,0	0,0	0,0	12,5	8	50,0
GB1	1	0,0	0,0	0,0	0,0	0,0	0,0	1	0,0
N01	1	0,0	0,0	0,0	0,0	0,0	100,0	1	100,0
<i>Summe</i>	<b>2,012</b>							<b>628</b>	

**Abbreviations:**

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