

**FRV Walther Herwig III**  
**Cruise 357**  
**23.08. – 07.09.2012**

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

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 marine fish species, studies were conducted in three Baltic Sea and four North Sea sampling areas. Because of technical problems not all sampling areas planned could be visited. 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 in the framework of national legislation (BLMP) and international monitoring programmes (OSPAR, HELCOM). Hydrographical measurements were carried out (water temperature, salinity, oxygen content, turbidity). The following preliminary findings were noted:

*Dab*: low prevalences of lymphocystis and epidermal hyperplasia/papilloma in the German Bight, North Sea (areas N01 northwest of Helgoland and GB1 in the inner German Bight); 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*: disease prevalences in the Baltic Sea and North Sea in the normal range;

*Baltic cod*: prevalence of acute/healing skin ulcerations in the Arkona Sea in the normal range; low prevalence of skin parasites (*Cryptocotyle* sp.) and gill parasites (*Loma* sp.).

**Participants:**

<b>Name</b>	<b>Function</b>	<b>Institution</b>
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Thomas Tepperies	Technician	vTI FOE Cuxhaven
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Virmantas Stunzenas	Scientist	University Vilnius, Lithuania

## Objectives of the Cruise

1. Studies on biological effects of contaminants;
2. Studies on the prevalence and spatial distribution of fish diseases and parasites;
3. Sampling of fish for chemical analysis of radioactive substances, trace metals and organic contaminants (in the framework of national and OSPAR/HELCOM monitoring and research projects);
4. Hydrographical measurements (salinity, temperature, oxygen, turbidity).

## Dates of the Cruise

FRV Walther Herwig III left Bremerhaven in the early morning of 23.08. The scientific crew already boarded the evening before. 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 24.08. in area B12. On 25.08., fishing in area B10 had to be stopped due to technical problems and WHIII went to Warnemünde for repair. After successful repair, sampling proceeded on 30.08. in area B10 and, the following day, in area B01. A 140ft bottom trawl was used for fishing in the Baltic Sea.

After the end of the Baltic Sea programme, WH III sailed back to the North Sea on 01.09. through Kiel Channel. In the period 02.-05.09., the four North Sea sampling areas (GB4, GB3, GB1, N01) were visited. Fishing was carried out using a GOV trawl.

The cruise ended according to schedule in the morning of 07.09. in Bremerhaven.

The location of the sampling areas and the cruise dates are shown in Fig. 1, Fig. 2 and Tab. 1. In 7 sampling areas (Fig. 1), a total of 31 fishing hauls was performed (towing time 30–60 min. each) (geographical coordinates in Tab. 1, catch composition in Tab. 2). Hydrographical measurements were made at all 31 fishery stations (geographical coordinates in Tab. 1a, results in Tab. 3).

## Preliminary Results

### 1 Dab (*Limanda limanda*)

In total, 3,098 dab from two Baltic Sea (B01, B12) and four North Sea areas were examined for the occurrence of externally visible diseases and parasites (Tab. 4) and 364 dab for the occurrence of liver anomalies (Tab. 5).

The disease prevalences in the North Sea were low in general. The prevalences of lymphocystis and epidermal hyperplasia/papilloma were particularly low in areas GB1 (lymphocystis: 0.2 %, epidermal hyperplasia/papilloma: 0.4 %) and N01 (lymphocystis: 1.1 %, epidermal hyperplasia/papilloma: 1.4 %) in the German Bight. For a range of diseases (lymphocystis, fin rot, hyperpigmentation, *Stephanostomum baccatum* (Trematoda)) there was a prevalence gradient 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.

Lymphocystis was more prevalent in the two Baltic Sea areas B01 and B12 compared to three of the four North Sea areas (Tab. 4); in previous years this was opposite.

The prevalence of liver nodules >2 mm (= tumours and pre-stages) in North Sea dab was low and in the normal range of previous years. The highest prevalence (5.8 %) was recorded in dab of the length group  $\geq 25$  cm in Kiel Bight (Baltic Sea, area B01) (Tab. 5).

### 2 Flounder (*Platichthys flesus*)

684 flounder from three Baltic Sea areas and one of the North Sea areas (German Bight, GB1) were examined for the occurrence of externally visible diseases and parasites (Tab. 6) and, out of these, 476 specimens for liver anomalies (Tab. 7). The disease prevalences were in the normal

range; in each of the three Baltic Sea areas, the prevalence of lymphocystis exceeded 20 %, while the prevalence in the North Sea area GB1 was markedly lower (4.2 %). The skin parasite *Lepeophtheirus pectoralis* (Copepoda) was prevalent especially in Kiel Bight (Baltic Sea, B01) and German Bight (North Sea, N01), both areas with a comparatively high salinity. Liver nodules >2 mm were only recorded in flounder from the Baltic Sea areas B10 and B12.

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

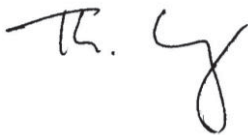
Cod (n=820) were only sampled and examined for externally visible diseases and parasites in area B10 northeast of the island of Rügen (Tab. 8). The prevalences of acute/healing skin ulcerations (8.7 %) and most of the other diseases were comparable to those of previous years. However, the prevalence of the parasites *Cryptocotyle* sp. and *Loma* sp. was markedly lower than in summer 2011.

### **4 Miscellaneous**

The mean catch data of the most frequent fish species are provided in Tab. 2; Tab. 3a, b give 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.



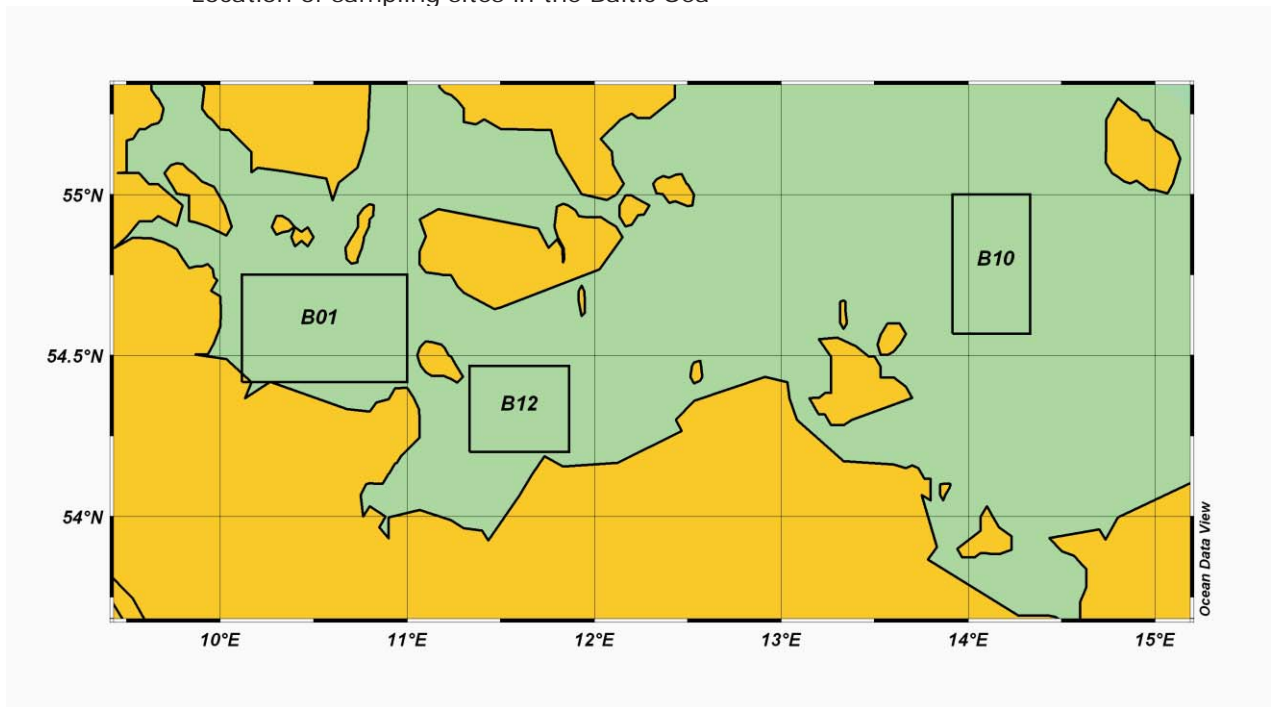
Dr. Thomas Lang

(Scientist in Charge)

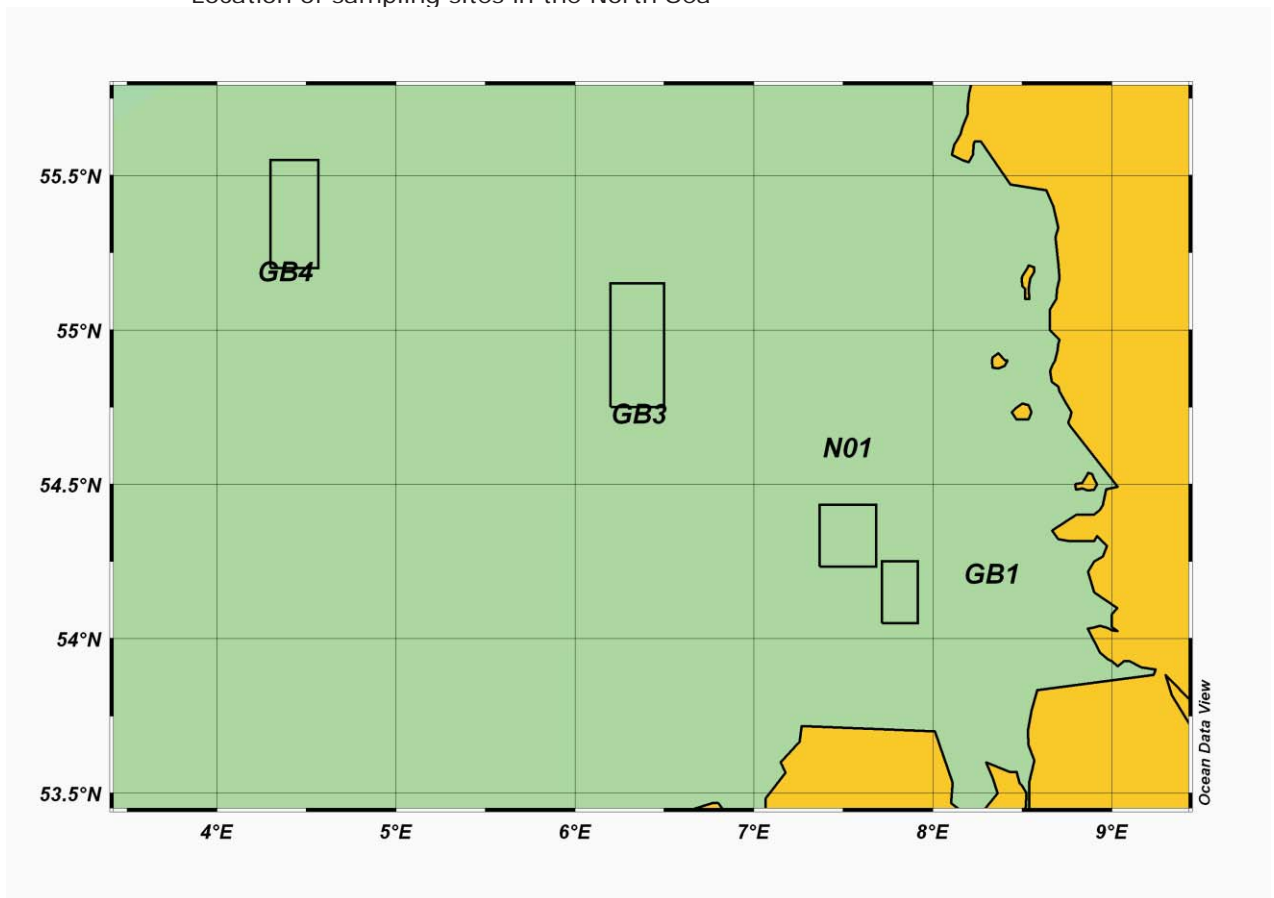
### **Annex**

3 Figures, 8 Tables

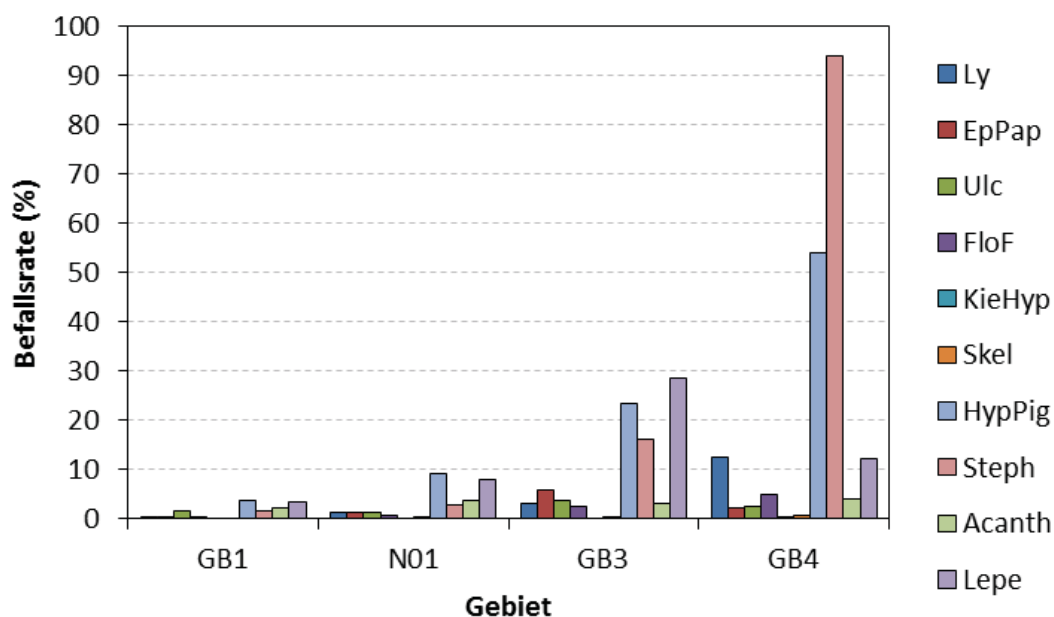
**Fig. 1:** *Cruise 357 RV 'Walther Herwig III', 23.08. – 07.09.2012:*  
Location of sampling sites in the Baltic Sea



**Fig. 2:** *Cruise 357 RV 'Walther Herwig III', 23.08. – 07.09.2012:*  
Location of sampling sites in the North Sea



**Fig. 3:** *Cruise 357 RV 'Walther Herwig III', 23.08. – 07.09.2012:*  
Prevalence (%) of dab diseases on a NW transect in the German EEZ in the North Sea (location of areas Abb. 2, prevalence Tab. 5)



**Tab. 1:** *Cruise 357 RV 'Walther Herwig III', 23.08. – 07.09.2012:*  
Geographical coordinates of trawling sites in the Baltic Sea and North Sea

DATE	STATION	Acti vity	Area	ICES- RECTANGLE	Latitude	Longitude
24.08.12	001	F	B12	37G1	54°27,22N	11°22,86E
24.08.12	002	F	B12	37G1	54°19,87N	11°42,12E
24.08.12	003	F	B12	37G1	54°15,07N	11°39,38E
24.08.12	004	F	B12	37G1	54°12,15N	11°49,60E
24.08.12	005	F	B12	37G1	54°12,44N	11°41,88E
24.08.12	006	F	B12	37G1	54°13,17N	11°35,29E
25.08.12	007	F	B10	38G4	54°53,03N	14°04,30E
30.08.12	008	F	B10	38G4	54°53,31N	14°04,74E
30.08.12	009	F	B10	38G4	54°52,69N	14°01,80E
30.08.12	010	F	B10	38G3	54°49,98N	13°59,85E
30.08.12	011	F	B10	38G3	54°47,61N	13°59,15E
31.08.12	012	F	B01	38G0	54°33,14N	10°47,76E
31.08.12	013	F	B01	38G0	54°32,12N	10°38,28E
31.08.12	014	F	B01	38G0	54°34,02N	10°30,27E
31.08.12	015	F	B01	38G0	54°32,23N	10°39,65E
02.09.12	016	F	GB4	39F4	55°23,19N	04°33,98E
02.09.12	017	F	GB4	39F4	55°23,54N	04°25,91E
02.09.12	018	F	GB4	39F4	55°21,43N	04°23,49E
02.09.12	019	F	GB4	39F4	55°22,77N	04°18,07E

**Tab.1: cont.**

DATE	STATION	Acti vity	Area	ICES- RECTANGLE	Latitude	Longitude
03.09.12	020	F	GB3	38F6	54°56,23N	06°16,04E
03.09.12	021	F	GB3	38F6	54°58,29N	06°22,12E
03.09.12	022	F	GB3	38F6	54°58,21N	06°22,30E
03.09.12	023	F	GB3	38F6	54°56,80N	06°17,13E
04.09.12	024	F	GB1	37F7	54°04,45N	07°53,33E
04.09.12	025	F	GB1	37F7	54°06,61N	07°46,17E
04.09.12	026	F	GB1	37F7	54°04,53N	07°54,26E
04.09.12	027	F	GB1	37F7	54°06,62N	07°46,33E
05.09.12	028	F	N01	37F7	54°15,09N	07°30,59E
05.09.12	029	F	N01	37F7	54°16,10N	07°31,91E
05.09.12	030	F	N01	37F7	54°22,45N	07°33,62E
05.09.12	031	F	N01	37F7	54°18,66N	07°26,79E

**Tab. 1a:** *Cruise 357 RV 'Walther Herwig III', 23.08. – 07.09.2012:*  
Geographical coordinates of hydrography stations in the Baltic Sea and North Sea

DATE	STATION	FISHING STATION	AREA	ICES- RECTANGLE	LATITUD E	LONGITUD E
24.08.12	001	001	B12	37G1	54°22,93N	11°24,83E
24.08.12	002	002	B12	37G1	54°17,63N	11°35,34E
24.08.12	003	003	B12	37G1	54°13,91N	11°46,85E
24.08.12	004	004	B12	37G1	54°13,15N	11°42,36E
24.08.12	005	005	B12	37G1	54°12,95N	11°34,43E
24.08.12	006	006	B12	37G1	54°13,58N	11°42,74E
30.08.12	008	008	B10	38G3	54°49,94N	13°59,81E
30.08.12	009	009	B10	38G4	54°48,06N	14°00,88E
30.08.12	010	010	B10	38G3	54°46,05N	13°56,71E
30.08.12	011	011	B10	38G4	54°50,88N	14°03,10E
31.08.12	012	012	B01	38G0	54°32,15N	10°40,30E
31.08.12	013	013	B01	38G0	54°32,17N	10°42,67E
31.08.12	014	014	B01	38G0	54°35,29N	10°27,09E
31.08.12	015	015	B01	38G0	54°32,54N	10°43,82E
02.09.12	017	017	GB4	39F4	55°23,34N	04°34,51E
02.09.12	018	018	GB4	39F4	55°22,90N	04°18,53E
02.09.12	019	019	GB4	39F4	55°21,64N	04°21,71E
03.09.12	020	020	GB3	38F6	54°58,49N	06°22,41E
03.09.12	021	021	GB3	38F6	54°56,82N	06°19,06E
03.09.12	022	022	GB3	38F6	54°56,76N	06°19,09E
03.09.12	023	023	GB3	38F6	54°57,77N	06°20,93E

**Tab. 1a: cont.**

DATE	STATION	FISHING STATION	AREA	ICES-RECTANGLE	LATITUDE	LONGITUDE
04.09.12	024	024	GB1	37F7	54°06,76N	07°45,97E
04.09.12	025	025	GB1	37F7	54°04,61N	07°53,85E
04.09.12	026	026	GB1	37F7	54°06,12N	07°48,40E
04.09.12	027	027	GB1	37F7	54°04,58N	07°53,06E
05.09.12	028	028	N01	37F7	54°19,55N	07°30,18E
05.09.12	029	029	N01	37F7	54°18,75N	07°26,48E
05.09.12	030	030	N01	37F7	54°21,12N	07°31,05E
05.09.12	031	031	N01	37F7	54°15,76N	07°31,63E

**Tab. 2:** *Cruise 357 RV 'Walther Herwig III', 23.08. – 07.09.2012:*  
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
B12 n	1	2	-	9	391	-	95	1	2
kg	< 0,5	< 0,5	-	< 0,5	6,0	-	11,0	< 0,5	1,0
B10 n	473	71	-	1.084	9.770	1	-	34	146
kg	153,0	32,0	-	89,0	125,0	< 0,5	-	8,0	40,0
B01 n	2	58	-	140	360	7	2.950	225	22
kg	< 0,5	1,0	-	3,0	5,0	1,0	407,0	58,0	9,0
GB4 n	3	8	-	14.813	52.318	3	779	17	-
kg	1,0	1,0	-	352,0	818,0	< 0,5	59,0	5,0	-
GB3 n	1	1.692	-	6.244	110.138	22	2.653	67	-
kg	2,0	21,0	-	83,0	999,0	6,0	152,0	13,0	-
GB1 n	2	306	-	59	9.772	4	262	3	36
kg	< 0,5	8,0	-	< 0,5	71	1,0	7,0	1,0	9,0
N01 n	-	161	-	24.985	16.533	76	652	24	14
kg	-	6,0	-	231,0	162,0	15,0	24,0	4,0	5,0

**Tab. 3:** *Cruise 357 RV 'Walther Herwig III', 23.08. – 07.09.2012:*  
 Water depth, temperature (T), salinity (S), O<sub>2</sub> saturation and O<sub>2</sub> in mg/l, Baltic Sea and North Sea

DATE	STATION	AREA	DEPTH (m)	T (°C)	S (PSU)	O <sub>2</sub> (mg/L)	O <sub>2</sub> -SATURATION (%)	
24.08.2012	001	B12	1	17,74	10,63	9,04	101,23	
			18	15,67	15,10	7,53	83,09	
		002		1	17,76	10,21	9,03	100,86
				19	13,29	20,58	4,26	46,21
		003		1	17,84	10,43	9,06	101,55
				19	12,64	22,42	3,81	41,32
		004		1	17,83	10,42	9,04	101,29
				20	12,09	23,44	3,27	35,22
		005		1	17,87	10,57	9,03	101,30
				20	13,06	21,02	3,74	40,54
		006		1	17,74	10,36	9,13	102,03
				19	12,14	22,86	2,84	30,55
30.08.2012	008	B10	2	18,02	7,88	9,06	100,32	
			26	8,89	8,20	8,53	77,58	
		009		1	17,99	7,88	8,95	99,14
				21	14,10	7,91	8,33	85,01
		010		1	18,01	7,85	9,04	100,07
				33	8,14	8,79	8,20	73,53
		011		1	18,07	7,86	9,05	100,37
				36	10,97	11,24	4,07	39,79
31.08.2012	012	B01	1	17,68	14,13	8,99	102,66	
			16	14,66	21,83	6,26	70,43	
		013		1	17,70	14,11	9,01	102,92
				17	13,76	23,81	4,08	45,59
		014		2	18,35	13,97	9,31	107,62
				14	16,59	16,58	6,18	70,10
	015		2	18,40	14,58	9,07	105,40	
			18	13,49	23,84	4,96	55,22	
02.09.2012	017	GB4	1	16,65	34,92	7,63	96,84	
			42	10,54	34,73	6,14	68,75	
		018		2	16,47	34,92	7,64	96,64
				38	10,41	34,76	6,07	67,73
		019		2	16,65	34,92	7,69	97,53
			42	10,32	34,72	6,10	67,93	



**Tab. 3: cont.**

DATE	STATION	AREA	DEPTH (m)	T (°C)	S (PSU)	O <sub>2</sub> (mg/L)	O <sub>2</sub> -SATURATION (%)
03.09.2012	020	GB3	2	17,01	34,48	7,29	92,93
			39	17,01	34,48	7,24	92,31
	021		1	17,01	34,48	7,46	95,10
			39	16,63	34,48	6,57	83,17
	022		1	17,22	34,49	7,60	97,26
			39	16,60	34,48	6,54	82,71
	023		1	17,16	34,49	7,59	97,01
			40	16,66	34,48	6,67	84,38
04.09.2012	024	GB1	1	17,98	32,94	7,13	91,75
			36	18,04	33,03	6,83	88,05
	025		2	18,18	31,74	7,14	91,49
			36	17,91	32,55	6,69	85,69
	026		2	18,08	32,84	7,48	96,29
			39	18,00	33,03	6,87	88,40
	027		3	18,20	32,93	7,05	91,06
			37	18,08	32,91	6,91	89,01
05.09.2012	028	N01	1	17,82	32,84	7,47	95,74
			28	17,90	33,14	7,01	90,14
	029		2	17,75	32,89	7,70	98,61
			37	17,88	33,17	7,04	90,45
	030		1	17,80	32,78	7,51	96,15
			24	17,80	32,82	7,22	92,47
	031		2	17,85	33,10	7,60	97,59
38			17,96	33,26	7,05	90,89	

**Tab. 4:** *Cruise 357 RV 'Walther Herwig III', 23.08. – 07.09.2012:*  
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
B12	152	16,4	0,7	3,9	5,3	0,0	0,7	0,0	0,0	0,0	0,0
B01	661	9,7	1,1	1,7	0,9	0,0	0,6	0,0	0,0	0,0	0,6
GB4	567	12,5	2,1	2,5	4,9	0,2	0,5	53,8	93,8	4,1	12,0
GB3	623	3,0	5,8	3,7	2,6	0,0	0,3	23,4	16,2	3,0	18,5
GB1	464	0,2	0,4	1,7	0,4	0,0	0,0	3,7	1,7	2,2	3,4
N01	631	1,1	1,4	1,4	0,5	0,0	0,2	9,2	2,9	3,6	7,9
<i>Sum</i>	<b>3,098</b>										

**Tab. 5:** *Cruise 357 RV 'Walther Herwig III', 23.08. – 07.09.2012:*  
Prevalences (%) of liver anomalies in dab (*Limanda limanda*) from the Baltic Sea and North Sea

AREA	Length(cm)		N unt	Liver Nodules (mm)			Green Livers	Nema- todes	Acanthoceph.
	von	bis		≥ 2	≥ 5	≥ 10			
B01	20	24	52	1,9	0,0	0,0	5,8	0,0	0,0
	25	40	52	5,8	1,9	0,0	5,8	1,9	0,0
GB4	20	24	53	0,0	3,8	1,9	5,7	9,4	5,7
	25	40	4	0,0	0,0	25,0	0,0	0,0	0,0
GB3	20	24	54	1,9	0,0	0,0	0,0	0,0	0,0
	25	40	52	1,9	0,0	3,8	0,0	1,9	0,0
GB1	20	24	22	0,0	0,0	0,0	0,0	0,0	0,0
	20	24	0	0,0	0,0	0,0	0,0	0,0	0,0
N01	20	24	66	3,0	0,0	1,5	0,0	0,0	0,0
	25	40	9	0,0	0,0	0,0	0,0	0,0	0,0
<i>Sum</i>			<b>364</b>						

**Tab. 6:** *Cruise 357 RV 'Walther Herwig III', 23.08. – 07.09.2012:*  
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
B12	15	20,0	0,0	0,0	0,0	0,0	40,0	33,3
B10	467	22,9	9,9	1,3	0,4	0,4	60,8	0,0
B01	59	22,0	0,0	0,0	0,0	0,0	62,7	16,9
GB1	143	4,2	0,0	0,7	0,0	0,0	4,2	95,8
<i>Sum</i>	<b>684</b>							

**Tab. 7:** *Cruise 357 RV 'Walther Herwig III', 23.08. – 07.09.2012:* Prevalences (%) of liver anomalies in flounder (*Platichthys flesus*) from the Baltic Sea and North Sea

Area	N unt	Liver Nodules (mm)			Green Livers	Nema- todes	Acantho- ceph.
		≥ 2	≥ 5	≥ 10			
B12	15	6,7	0,0	0,0	0,0	0,0	13,3
B10	314	0,0	0,3	0,0	0,0	1,0	4,1
B01	59	0,0	0,0	0,0	0,0	0,0	6,8
GB1	88	0,0	0,0	0,0	0,0	2,3	1,1
<i>Sum</i>	<b>476</b>						

**Tab. 8:** *Cruise 357 RV 'Walther Herwig III', 23.08. – 07.09.2012:*  
Prevalences (%) of externally visible diseases and parasites in cod (*Gadus morhua*) from the Baltic Sea

Area	N unt	Ulc Ak/Hei	Skel Def	PBT	NetzAb	Locera	Clav	Cryp	Loma
B10	820	8,7	2,2	0,0	0,0	0,5	0,0	2,9	0,1
<i>Sum</i>	<b>820</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>Cryp</b>	: <i>Cryptocotyle sp.</i>
<b>Hyp Pig</b>	: Hyperpigmentation	<b>Loma</b>	: <i>Loma sp.</i>
<b>Skel Def</b>	: Skeletal deformities	<b>LK &gt;2 mm</b>	: Liver nodules > 2 mm in diameter
<b>PBT</b>	: Pseudobranchial pseudotumour		