

**FRV Walther Herwig III
Cruise 346
31.08. – 15.09.2011**

**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 vTI Institute of Fisheries Ecology (vTI FOE) on contaminants and biological effects (incl. fish diseases) in marine fish species, studies were conducted in four Baltic Sea and five North Sea sampling area. 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 the 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: compared to long-term data, continuation of the trend for low prevalences of lymphocystis and epidermal hyperplasia/papilloma in the North Sea (in particular in areas N01 and GB1 in the German Bight);

Flounder: disease prevalences in the normal range;

Baltic cod: comparatively high prevalence of acute/healing skin ulcerations in the Arkona Sea.

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);

Participants:

Name	Function	Institution
Dr. Thomas Lang	Scientist in Charge	vTI FOE Cuxhaven
Nicolai Fricke	Scientist	vTI FOE Cuxhaven
Thomas Tepperies	Technician	vTI FOE Cuxhaven
Jennifer Ipse	Technician	vTI FOE Cuxhaven
Wolfgang Lindemann	Technician	vTI FOE Hamburg
Alexander Schulz	Technician	vTI FOE Hamburg
Jan Neukirchen	Technician	vTI FOE Hamburg
Paul Kotterba	Technician	vTI OSF Rostock
Julia Heiler	Student	University Rostock
Carolin Knörr	Student	University Hamburg
Flemming Dahlke	Student	University Hamburg
Dr. Alexandras Rybakovas	Scientist	University Vilnius, Lithuania

Dates of the Cruise

RV Walther Herwig III left Bremerhaven in the early morning of 01.09. 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 02.09. in area B12 and proceeded in areas B10, B11 and B01 on the following days. The 140ft bottom trawl was used for fishing.

After the end of the Baltic Sea programme, WH III sailed back to the North Sea through Kiel Channel. Due to stormy weather, work was delayed and continued on 08.09. in area N01 in the German Bight. Until 12.09., sampling was carried out in areas GB4, GB3, N11 and GB1. Due to bad weather, fishing was not possible on 13.09. and 14.09. The cruise ended according to schedule in the morning of 15.09. in Bremerhaven.

The location of the sampling areas and the cruise dates are shown in Fig. 1, Fig. 2 and Tab. 1. In 9 sampling areas (Fig. 1), a total of 34 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 34 fishery stations (geographical coordinates in Tab. 1a, results in Tab. 3).

Preliminary Results

1 Dab (*Limanda limanda*)

In total, 1,495 dab from two Baltic Sea (B01, B12) and five North Sea areas were examined for the occurrence of externally visible diseases and parasites (Tab. 4) and 501 dab for the occurrence of liver anomalies (Tab. 5). The prevalences were low in general. The prevalences of lymphocystis and epidermal hyperplasia/papilloma were particularly low in the German Bight/German EEZ (Lymphocystis: in the range 0.2 % in area GB1 and 1.2 % in area GB3; epidermal hyperplasia/papilloma: in the range 0.9 % in area N01 and 2.1 % in area GB3). For lymphocystis, there seems to be a gradient within the German EEZ with increasing values from the more coastal to the more offshore areas. In the Baltic Sea, the prevalence of lymphocystis was higher compared to the North Sea (exception GB4), which is opposite to earlier findings (in the period 1980-2000). The prevalence of liver nodules >2 mm (= tumours) was in the normal range. An exception were fish of the length group ≥ 25 cm in area GB4 with 7 fish showing liver nodules >2 mm and 4 fish with liver nodules >5 mm out of 17 fish inspected. Dab from this area also showed an elevated prevalence of other liver anomalies (see Tab. 5).

2 Flounder (*Platichthys flesus*)

301 flounder from four Baltic Sea and two North Sea areas (German Bight: GB1, N01) were examined for the occurrence of externally visible diseases and parasites (Tab. 6) and, out of these, 273 specimens for liver anomalies (Tab. 7). The diseases prevalences were in the normal range; in particular fish from the areas around the island of Rügen (B10, B11) had a high prevalence of lymphocystis. Liver nodules >2 mm were only recorded in flounder from areas B10 and B11.

3 Cod (*Gadus morhua*)

In total, 1,290 cod from four Baltic Sea and two North Sea areas were examined for externally visible diseases and parasites (Tab. 8). The prevalences of acute/healing skin ulcerations again were comparatively high, with maximum values in areas B10 and B11 (Arkona Sea) (11.6 % and 9.9 %, resp.).

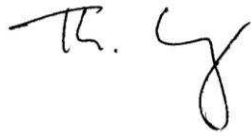
4 Miscellaneous

Oxygen levels in bottom water lower compared to winter 2010, but were higher than the critical value of 2.0 mg/l O₂) in all sampling areas.

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

2 Figures, 8 Tables

Fig. 1: *Cruise 346 RV 'Walther Herwig III', 31.08. – 15.09.2011:*
Location of sampling sites in the Baltic Sea

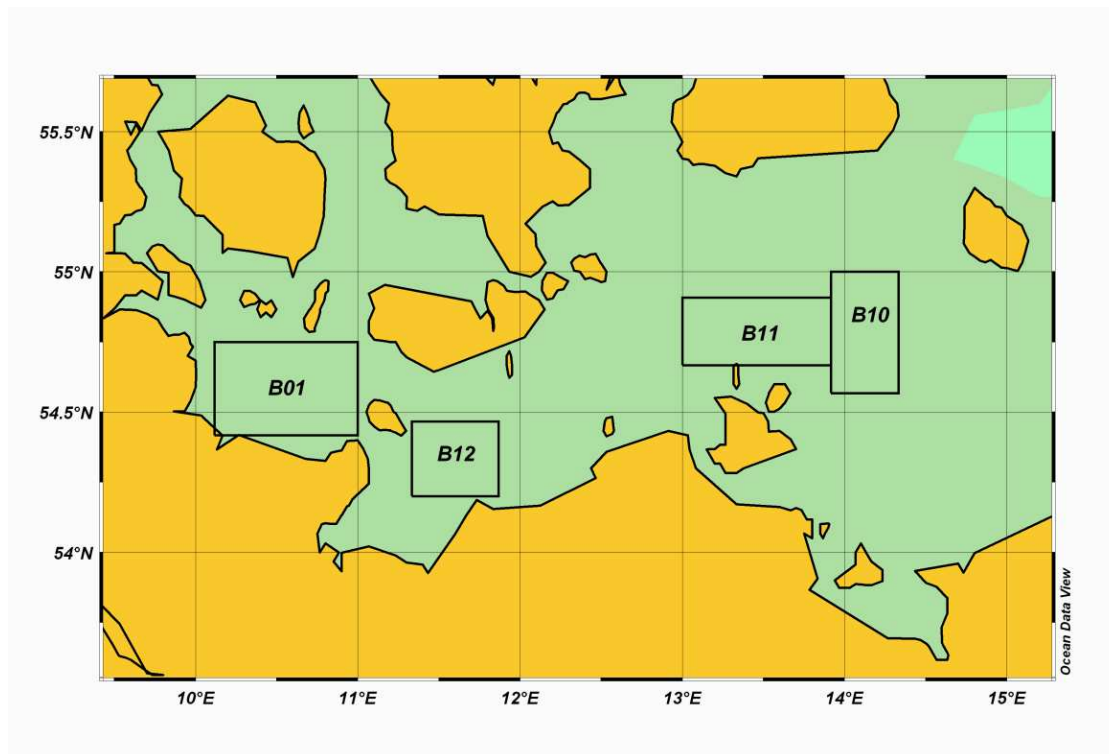
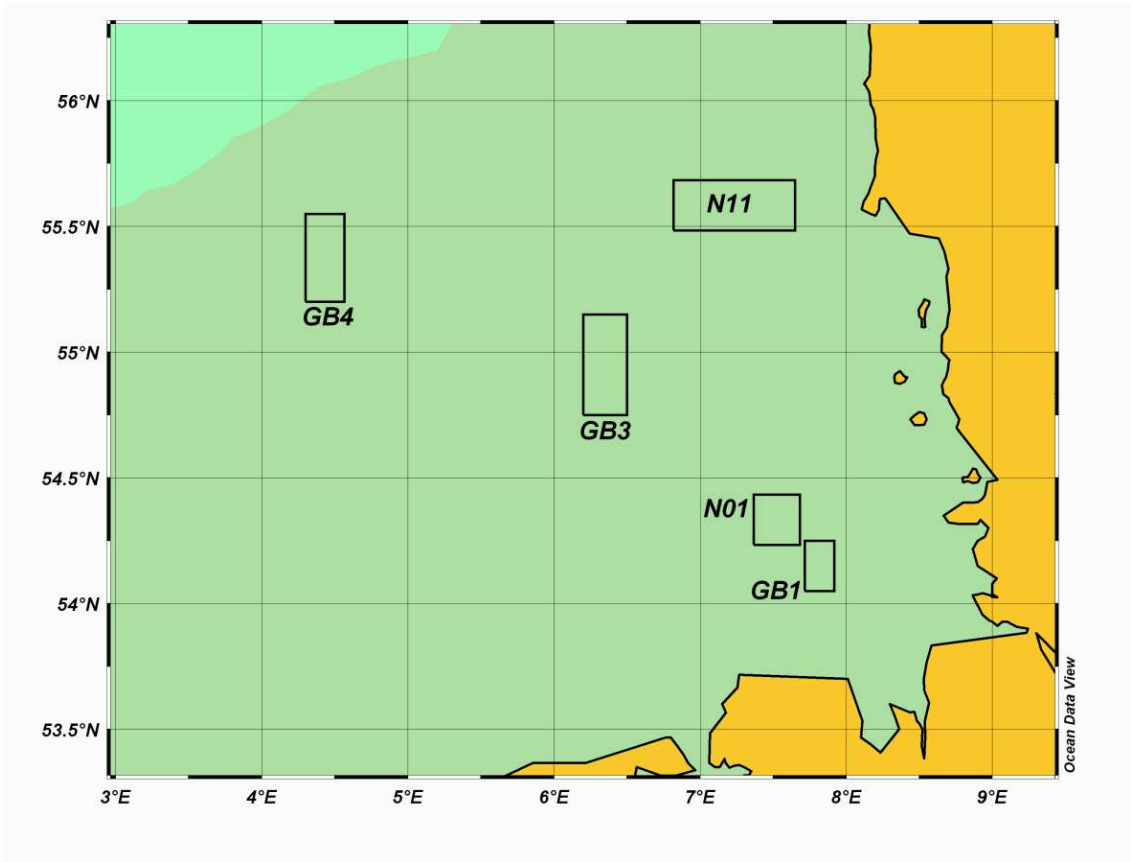


Fig. 2:

Cruise 346 RV 'Walther Herwig III', 31.08. – 15.09.2011:
Location of sampling sites in the North Sea



Tab. 1:

Cruise 346 RV 'Walther Herwig III', 31.08. – 15.09.2011:
 Geographical coordinates of trawling sites in the Baltic Sea and North Sea

DATE	STATION	Area	ICES-RECTANGLE	LATITUDE	LONGITUDE
02.09.11	001	B12	37G1	54°27,13N	11°22,44E
02.09.11	002	B12	37G1	54°25,97N	11°25,86E
02.09.11	003	B12	37G1	54°13,20N	11°33,46E
02.09.11	004	B12	37G1	54°18,32N	11°27,10E
03.09.11	005	B10	38G3	54°44,91N	13°55,74E
03.09.11	006	B10	38G4	54°50,85N	14°02,75E
03.09.11	007	B10	38G3	54°43,97N	13°56,43E
03.09.11	008	B10	38G3	54°50,18N	13°59,95E
04.09.11	009	B11	38G3	54°46,25N	13°38,84E
04.09.11	010	B11	38G3	54°44,75N	13°54,40E
04.09.11	011	B11	38G3	54°45,04N	13°47,42E
04.09.11	012	B11	38G3	54°45,68N	13°29,17E
05.09.11	013	B01	38G0	54°33,22N	10°48,02E
05.09.11	014	B01	38G0	54°31,94N	10°37,29E
05.09.11	015	B01	38G0	54°33,63N	10°30,89E
08.09.11	016	N01	37F7	54°15,67N	07°27,51E
08.09.11	017	N01	37F7	54°18,76N	07°26,49E
08.09.11	018	N01	37F7	54°15,49N	07°29,91E
08.09.11	019	N01	37F7	54°15,55N	07°30,36E
09.09.11	020	GB4	39F4	55°22,96N	04°26,86E
09.09.11	021	GB4	39F4	55°23,04N	04°32,56E
09.09.11	022	GB4	39F4	55°23,60N	04°26,62E
09.09.11	023	GB4	39F4	55°23,23N	04°30,55E
10.09.11	024	GB3	38F6	54°55,60N	06°15,95E
10.09.11	025	GB3	38F6	54°58,18N	06°21,97E
10.09.11	026	GB3	38F6	54°58,90N	06°23,35E
10.09.11	027	GB3	38F6	54°57,53N	06°19,51E
11.09.11	028	N11	40F7	55°30,52N	07°07,49E
11.09.11	029	N11	40F7	55°35,59N	07°05,82E
11.09.11	030	N11	40F7	55°34,78N	07°08,41E
12.09.11	031	GB1	37F7	54°04,38N	07°54,20E
12.09.11	032	GB1	37F7	54°06,54N	07°46,60E
12.09.11	033	GB1	37F7	54°04,47N	07°54,53E
12.09.11	034	GB1	37F7	54°04,70N	07°52,16E

Tab. 1a: *Cruise 346 RV 'Walther Herwig III', 31.08. – 15.09.2011:*
 Geographical coordinates of hydrography stations in the Baltic Sea and North Sea

DATE	STATION	FISHING STATION	AREA	ICES-RECTANGLE	LATITUDE	LONGITUDE
02.09.11	001	001	B12	37G1	54°22,71N	11°25,01E
02.09.11	002	002	B12	37G1	54°21,46N	11°26,18E
02.09.11	003	003	B12	37G1	54°12,62N	11°40,72E
02.09.11	004	004	B12	37G1	54°22,66N	11°25,82E
03.09.11	005	005	B10	38G3	54°48,91N	13°59,12E
03.09.11	006	006	B10	38G3	54°49,08N	13°55,55E
03.09.11	007	007	B10	38G3	54°48,57N	13°56,30E
03.09.11	008	008	B10	38G3	54°46,13N	13°56,96E
04.09.11	009	009	B11	38G3	54°46,53N	13°46,20E
04.09.11	010	010	B11	38G3	54°41,66N	13°48,46E
04.09.11	011	011	B11	38G3	54°40,61N	13°47,02E
04.09.11	012	012	B11	38G3	54°45,90N	13°20,83E
05.09.11	013	013	B01	38G0	54°31,96N	10°40,76E
05.09.11	014	014	B01	38G0	54°32,79N	10°45,38E
05.09.11	015	015	B01	38G0	54°36,46N	10°25,02E
08.09.11	016	016	N01	37F7	54°18,28N	07°34,00E
08.09.11	017	017	N01	37F7	54°15,87N	07°32,00E
08.09.11	018	018	N01	37F7	54°19,90N	07°27,35E
08.09.11	019	019	N01	37F7	54°19,76N	07°30,45E
09.09.11	020	020	GB4	39F4	55°23,25N	04°32,94E
09.09.11	021	021	GB4	39F4	55°23,78N	04°25,23E
09.09.11	022	022	GB4	39F4	55°23,13N	04°30,73E
09.09.11	023	023	GB4	39F4	55°23,42N	04°26,06E
10.09.11	024	024	GB3	38F6	54°58,19N	06°22,65E
10.09.11	025	025	GB3	38F6	54°56,40N	06°15,85E
10.09.11	026	026	GB3	38F6	54°57,85N	06°19,49E
10.09.11	027	027	GB3	38F6	54°58,86N	06°22,92E
11.09.11	028	028	N11	40F7	55°35,01N	07°08,47E
11.09.11	029	029	N11	40F7	55°33,48N	07°08,22E
11.09.11	030	030	N11	40F7	55°32,53N	07°08,39E
12.09.11	031	031	GB1	37F7	54°06,60N	07°48,03E
12.09.11	032	032	GB1	37F7	54°04,37N	07°54,97E
12.09.11	033	033	GB1	37F7	54°06,37N	07°48,64E
12.09.11	034	034	GB1	37F7	54°06,92N	07°45,59E

Tab. 2: *Cruise 346 RV 'Walther Herwig III', 31.08. – 15.09.2011:*
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	2	18	-	35	1,902	2	742	4	6
kg	< 0,1	2,0	-	1,0	21,0	< 0,1	85,0	1,0	1,0
B10 n	187	98	-	720	271	-	-	54	81
kg	88,0	44,0	-	46,0	4,0	-	-	10,0	29,0
B11 n	238	102	-	604	690	1	-	24	7
kg	102,0	39,0	-	37,0	9,0	1,0	-	4,0	3,0
B01 n	1	17	-	106	281	1	1,107	52	2
kg	1	1,0	-	3,0	3,0	< 0,1	104,0	12,0	1,0
N01 n	1	1,061	-	1,254	1,718	6	708	8	5
kg	< 0,1	33,0	-	10,0	9,0	1,0	18,0	1,0	2,0
GB4 n	-	60	-	17,093	31,612	392	949	37	-
kg	-	3,0	-	533,0	507,0	45,0	64,0	16,0	-
GB3 n	-	4.654	-	1,998	640	-	5,095	292	-
kg	-	81,0	-	19,0	6,0	-	289,0	38,0	-
N11 n	7	174	-	22,115	33,439	1,830	3,701	135	-
kg	3,0	10,0	-	395,0	460,0	230,0	290,0	25,0	-
GB1 n	-	1,629	-	81	224	1	156	4	26
kg	-	54,0	-	1,0	1,0	< 0,1	5,0	1,0	8,0

Tab. 3: *Cruise 346 RV 'Walther Herwig III', 31.08. – 15.09.2011:*
 Water depth, temperature (T), salinity (S), O₂ saturation and O₂ in mg/l, Baltic Sea
 and North Sea

DATE	STATION	AREA	DEPTH (m)	T (°C)	S (PSU)	O ₂ - SATURATION (%)	O ₂ (mg/l)
02.09.11	001	B12	3	16,36	13,27	95,67	8,65
			18	14,31	19,74	70,12	6,36
	002		4	16,42	11,92	100,04	9,10
			23	14,25	19,95	69,74	6,32
	003		2	16,65	11,73	101,3	9,19
			22	10,40	22,81	21,96	2,12
004	2	16,71	12,90	100,91	9,08		
	21	11,98	23,52	57,84	5,38		
03.09.11	005	B10	2	15,76	7,54	98,33	9,32
			21	11,66	10,18	69,85	7,11
	006		2	15,47	7,31	97,61	9,32
			24	12,73	11,27	58,54	5,77
	007		3	15,71	7,35	100,15	9,51
			16	11,69	10,52	46,17	4,69
008	3	16,02	7,49	100,98	9,52		
	15	14,74	8,27	83,67	8,06		
04.09.11	009	B11	3	15,60	7,25	99,11	9,44
			19	11,28	11,21	53,68	5,48
	010		3	15,95	7,50	99,46	9,39
			22	13,02	13,66	38,69	3,74
	011		3	16,19	7,56	100,17	9,41
			21	11,93	10,38	66,02	6,68
012	4	16,06	7,55	99,97	9,41		
	20	12,43	14,68	46,21	4,50		
05.09.11	013	B01	3	17,08	15,67	106,02	9,31
			18	13,22	23,53	55,30	5,01
	014		3	17,10	15,84	107,29	9,41
			36	13,24	23,29	59,44	5,39
	015		2	17,06	15,64	105,27	9,23
37		13,51	20,37	85,26	7,83		
08.09.11	016	N01	3	16,94	33,50	94,56	7,47
			39	17,01	33,55	93,18	7,35
	017		2	17,01	33,29	91,76	7,25
			23	17,08	33,39	91,25	7,20
	018		3	16,99	33,53	93,49	7,38
			22	17,01	33,53	93,01	7,34
019	3	16,95	33,41	93,36	7,38		
	27	16,91	33,45	92,38	7,31		

Tab. 3: (cont.)

09.09.11	020	GB4	3	14,06	34,80	93,82	7,79
			52	10,04	34,86	68,11	6,15
	021		3	13,99	34,76	94,33	7,84
			52	9,99	34,83	66,3	5,99
	022		3	14,14	34,78	95,17	7,89
			52	9,85	34,83	66,62	6,04
023	3	14,10	34,77	94,88	7,87		
	53	9,99	34,83	66,36	6,00		
10.09.11	024	GB3	3	16,49	34,35	94,72	7,51
			53	16,49	34,35	94,5	7,50
	025		3	16,46	34,42	94,97	7,53
			66	16,45	34,42	94,72	7,52
	026		3	16,59	34,37	96,36	7,63
			66	16,51	34,36	94,56	7,50
027	3	16,62	34,35	96,84	7,66		
	67	16,50	34,34	94,76	7,51		
11.09.11	028	N11	3	16,58	33,88	93,74	7,44
			34	16,57	33,90	93,58	7,43
	029		4	16,55	33,92	94,29	7,49
			37	16,54	33,92	93,85	7,45
	030		4	16,62	33,90	93,85	7,44
35		16,53	33,92	92,1	7,33		
12.09.11	031	GB1	3	17,09	32,37	95,46	7,57
			33	17,10	33,23	87,95	6,94
	032		3	17,15	32,48	96,82	7,67
			39	17,09	32,99	87,45	6,91
	033		4	17,07	32,52	93,5	7,41
			39	17,12	33,20	86,95	6,86
034	3	17,08	33,00	88,71	7,01		
	41	17,13	33,13	86,58	6,83		

Tab. 4: *Cruise 346 RV 'Walther Herwig III', 31.08. – 15.09.2011:*
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	Myxo
B12	530	11,5	0,8	2,8	0,2	0,0	0,4	0,0	0,0	0,0	0,0	0,2
B01	658	7,4	0,9	1,8	0,6	0,0	0,0	0,0	0,0	0,0	0,3	0,3
N01	677	0,6	0,9	1,5	0,3	0,0	0,4	3,4	1,9	2,1	6,2	17,7
GB4	666	14,1	2,0	3,8	1,8	0,5	0,0	42,2	93,8	2,4	6,9	13,2
GB3	679	1,2	2,1	1,2	0,9	0,1	0,6	13,1	19,1	3,1	13,8	13,8
N11	545	1,3	2,8	8,1	1,5	0,0	0,0	22,6	15,8	7,3	20,7	11,7
GB1	440	0,2	1,4	2,0	0,9	0,0	0,2	3,6	5,2	4,8	6,8	22,0
Sum	4,195											

Tab. 5: *Cruise 346 RV 'Walther Herwig III', 31.08. – 15.09.2011:*
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	Acantho-ceph.
	von	bis		≥ 2	≥ 5	≥ 10			
B01	20	24	54	5,6	0,0	0,0	5,6	0,0	0,0
	25	40	50	4,0	0,0	0,0	4,0	0,0	0,0
N01	20	24	55	0,0	0,0	0,0	0,0	0,0	0,0
	25	40	2	0,0	0,0	0,0	0,0	0,0	0,0
GB4	20	24	54	1,9	1,9	1,9	1,9	5,6	0,0
	25	40	17	41,2	23,5	5,9	17,6	5,9	5,9
GB3	20	24	57	0,0	0,0	0,0	0,0	3,5	1,8
	25	40	56	3,6	1,8	1,8	0,0	0,0	0,0
N11	20	24	57	3,5	1,8	0,0	0,0	0,0	0,0
	25	40	55	7,3	1,8	0,0	0,0	1,8	0,0
GB1	20	24	42	0,0	0,0	0,0	0,0	0,0	0,0
	25	40	2	0,0	0,0	0,0	0,0	0,0	0,0
Sum			501						

Tab. 6: *Cruise 346 RV 'Walther Herwig III', 31.08. – 15.09.2011:*
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	23	13,0	0,0	0,0	0,0	0,0	69,6	13,0
B10	128	25,8	9,4	0,0	2,3	2,3	60,2	0,0
B11	28	25,0	7,1	0,0	0,0	0,0	60,7	0,0
B01	7	14,3	14,3	0,0	0,0	0,0	57,1	14,3
N01	20	20,0	0,0	0,0	0,0	0,0	0,0	95,0
GB1	95	8,4	1,1	1,1	0,0	1,1	0,0	95,8
Sum	301							

Tab. 7: *Cruise 346 RV 'Walther Herwig III', 31.08. – 15.09.2011:*
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	23	0,0	0,0	0,0	0,0	8,7	4,3
B10	100	2,0	0,0	0,0	0,0	2,0	9,0
B11	28	10,7	0,0	0,0	0,0	0,0	7,1
B01	7	0,0	0,0	0,0	0,0	0,0	0,0
N01	20	0,0	0,0	0,0	0,0	0,0	0,0
GB1	95	0,0	0,0	0,0	0,0	0,0	4,2
<i>Sum</i>	273						

Tab. 8: *Cruise 346 RV 'Walther Herwig III', 31.08. – 15.09.2011:*
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
B12	2	50,0	0,0	0,0	0,0	0,0	0,0	50,0	0,0
B10	740	11,6	3,8	0,0	0,0	0,5	0,0	15,1	31,8
B11	534	9,9	4,5	0,0	0,0	0,2	0,0	21,3	48,5
B01	3	0,0	0,0	0,0	0,0	0,0	0,0	33,3	100,0
N11	10	0,0	10,0	0,0	0,0	0,0	20,0	10,0	0,0
GB1	1	0,0	0,0	0,0	0,0	0,0	0,0	100,0	0,0
<i>Sum</i>	1.290								

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 ulceration/en, acute/healing	Lepe	: <i>Lepeophtheirus pectoralis</i>
Flo Ak/Hei	: Fin rot/erosion, acute/healing	Locera	: <i>Lernaecera branchialis</i>
KieHy	: Gill hyperplasia, x-cell disease	Cryp	: <i>Cryptocotyle sp.</i>
Hyp Pig	: Hyperpigmentation	Loma	: <i>Loma sp.</i>
Skel Def	: Skeletal deformities	LK >2 mm	: Liver nodules > 2 mm in diameter
PBT	: Pseudobranchial pseudotumour		