

FRV Walther Herwig III
Cruise 336
24.08. – 03.09.2010

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

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 five Baltic Sea areas and one North Sea sampling area. In addition to the examination of dab (*Limanda limanda*), flounder (*Platichthys flesus*) and cod (*Gadus morhua*) for externally visible diseases and parasites, Baltic Sea herring (*Clupea harengus*) were examined. In addition, fish samples were frozen for the detection 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: absence of lymphocystis and epidermal hyperplasia/papilloma in Area GB1 in the inner German Bight (North Sea); increased prevalence of liver nodules (tumours and pre-stages) in sampling areas of the Baltic Sea;

Flounder: prevalence of externally visible diseases/parasites in the normal range; slightly increased prevalence of liver nodules (tumours and pre-stages) in some sampling areas of the Baltic Sea;

Baltic cod: increased prevalence of acute/healing skin ulcerations; low prevalence of skeletal deformities;

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);

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
Martin Gschwind	Master Student	Univ. Basel, vTI FOE Cuxhaven
Alexander Schulz	Technician	vTI FOE Hamburg
Jan Peters	Technician	vTI FOE Hamburg
Tina Blancke	Technician	vTI FOE Hamburg
Nico Geveke	Student	University Oldenburg
Hilke Alberts-Hubatsch	Student	University Oldenburg
Dr. Alexandras Rybakovas	Scientist	University Vilnius, Lithuania
Zhanna Tairova	Scientist	NERI, Denmark

4. Hydrographical measurements (salinity, temperature, oxygen, turbidity);

Dates of the Cruise

RV Walther Herwig III left Bremerhaven in the morning of 24.08. 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 25.08. in area B12 and proceeded in areas B10, J2, B11 and B01 on the following days. The 140ft bottom trawl was used for fishing. Due to technical problems with one of the winches, only one of the planned North Sea sites (GB1, inner German Bight) could be visited, where fishing was carried out using the GOV gear. The RV arrived in Bremerhaven in the morning of 31.08.09. for repairing the winch. Since the repair was delayed and took more time than expected, the cruise was officially terminated on 03.09.

The location of the sampling areas and the cruise dates are shown in Fig. 1 and Tab. 1. In 6 sampling areas (Fig. 1), a total of 22 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 22 fishery stations (geographical coordinates in Tab. 1a, results in Tab. 3).

Preliminary Results

1 Dab (*Limanda limanda*)

In total, 1,302 dab from three Baltic Sea (B01, B11, B12) and one North Sea area (German Bight, GB1) were examined for the occurrence of externally visible diseases and parasites (Tab. 4) and 118 dab for the occurrence of liver anomalies (Tab. 5). The prevalences were low in general; the absence of lymphocystis and epidermal hyperplasia/papilloma in area GB1 in the inner German Bight, North Sea, was noted. The prevalence of liver nodules (tumours and pre-stages) in dab from Kiel Bight, Baltic Sea, was elevated compared to previous years. Values were 5.8 % (length group 20-24 cm) and 2.0 % (length group ≥ 25 cm), respectively.

2 Flounder (*Platichthys flesus*)

531 flounder from five Baltic Sea and one North Sea area (GB1) were examined for the occurrence of externally visible diseases and parasites (Tab. 6) and, out of these, 499 specimens for liver anomalies (Tab. 7). The diseases prevalences were in the normal range, only for the liver nodules (tumours and pre-stages) they were increased compared to long-term data, a confirmation of last year's findings.

3 Cod (*Gadus morhua*)

In total, 1.096 cod from four Baltic Sea areas were examined for externally visible diseases and parasites (Tab. 8). The prevalences of acute/healing skin ulcerations were increased in comparison to 2009, with maximum values of > 20 % in areas B10 (Arkona Sea) and B01 (Kiel Bight; $n=7$). The prevalence of skeletal deformities was comparatively low. The infestation with *Loma sp.* in the gills was the most prevalent gross disease condition.

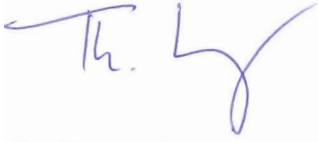
4 Miscellaneous

In some areas of the Baltic Sea, especially the Mecklenburg Bight (area B12), low oxygen levels and partly hypoxia (< 2 mg/l O_2) were recorded close to the bottom.

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 a successful cruise, constructive and hard work and a good atmosphere on board.

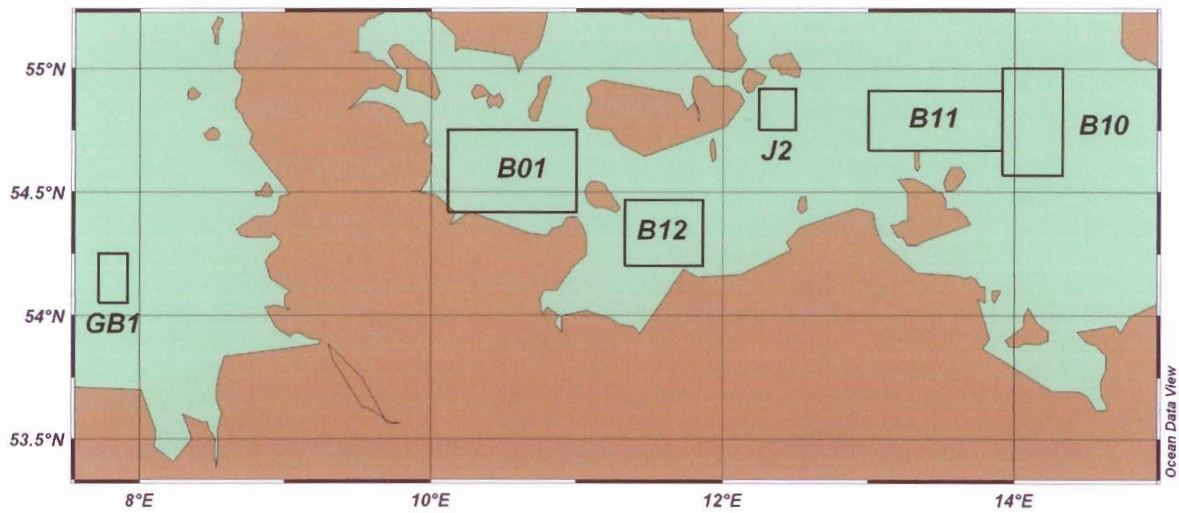


Dr. Thomas Lang
(Scientist in Charge)

Annex

1 Figure, 8 Tables

Fig. 1: *Cruise 336 RV 'Walther Herwig III', 24.08. – 03.09.2010:*
Location of sampling sites in the Baltic Sea



Tab. 1: *Cruise 336 RV 'Walther Herwig III', 24.08. – 03.09.2010:*
Geographical coordinates of trawling sites in the Baltic Sea and North Sea

DATE	STATION	Area	ICES-RECTANGLE	LATITUDE	LONGITUDE
25.08.10	001	B12	37G1	54°26,85N	11°23,29E
25.08.10	002	B12	37G1	54°23,70N	11°24,38E
25.08.10	003	B12	37G1	54°19,67N	11°41,19E
25.08.10	004	B12	37G1	54°14,90N	11°38,94E
25.08.10	005	B12	37G1	54°18,32N	11°27,30E
26.08.10	006	B10	38G3	54°44,64N	13°55,55E
26.08.10	007	B10	38G4	54°50,70N	14°02,35E
26.08.10	008	B10	38G4	54°47,68N	14°00,65E
26.08.10	009	B10	38G4	54°50,02N	14°00,30E
27.08.10	010	J2	38G2	54°47,32N	12°16,46E
27.08.10	011	J2	38G2	54°48,29N	12°18,06E
27.08.10	012	B11	38G3	54°47,41N	13°08,40E
27.08.10	013	B11	38G3	54°46,04N	13°21,92E
27.08.10	014	B11	38G3	54°46,22N	13°40,78E
28.08.10	015	B01	38G0	54°32,87N	10°46,75E
28.08.10	016	B01	38G0	54°32,30N	10°42,49E
28.08.10	017	B01	38G0	54°33,89N	10°30,54E
28.08.10	018	B01	38G0	54°41,07N	10°24,38E
30.08.10	019	GB1	37F7	54°04,60N	07°53,12E
30.08.10	020	GB1	37F7	54°05,83N	07°48,39E
30.08.10	021	GB1	37F7	54°05,51N	07°49,68E
30.08.10	022	GB1	37F7	54°06,35N	07°47,17E

Tab. 1a: *Cruise 336 RV 'Walther Herwig III', 24.08. – 03.09.2010:*
Geographical coordinates of hydrography stations in the Baltic Sea and North Sea

DATE	STATION	FISHING STATION	AREA	ICES-RECTANGLE	LATITUDE	LONGITUDE
25.08.10	1	1	B12	37G1	54°22,47N	11°25,02E
25.08.10	2	2	B12	37G1	54°19,36N	11°26,57E
25.08.10	3	3	B12	37G1	54°18,55N	11°37,88E
25.08.10	4	4	B12	37G1	54°13,55N	11°35,76E
25.08.10	5	5	B12	37G1	54°22,67N	11°25,71E
26.08.10	6	6	B10	38G3	54°48,77N	13°59,16E
26.08.10	7	7	B10	38G3	54°49,78N	13°58,54E
26.08.10	8	8	B10	38G4	54°50,19N	14°01,28E
26.08.10	9	9	B10	38G3	54°48,66N	13°56,90E
27.08.10	10	10	J2	38G2	54°48,36N	12°20,24E
27.08.10	11	11	J2	38G2	54°50,58N	12°25,06E
27.08.10	12	12	B11	38G3	54°46,75N	13°12,41E
27.08.10	13	13	B11	38G3	54°45,91N	13°26,33E
27.08.10	14	14	B11	38G3	54°46,41N	13°44,97E
28.08.10	15	15	B01	38G0	54°32,21N	10°42,73E
28.08.10	16	16	B01	38G0	54°31,79N	10°38,51E
28.08.10	17	17	B01	38G0	54°35,41N	10°27,36E
28.08.10	18	18	B01	38G0	54°41,34N	10°20,29E
30.08.10	19	19	GB1	37F7	54°05,64N	07°48,50E
30.08.10	20	20	GB1	37F7	54°04,44N	07°51,67E
30.08.10	21	21	GB1	37F7	54°06,59N	07°46,13E
30.08.10	22	22	GB1	37F7	54°04,87N	07°50,78E

Tab. 2: *Cruise 336 RV 'Walther Herwig III', 24.08. – 03.09.2010:*
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	17	-	39	653	-	923	1	14
kg	1,0	2,0	-	1,0	9,0	-	103,0	< 0,1	4,0
B10 n	1339	48	-	223	1667	3	2	8	209
kg	679,0	14,0	-	13,0	19,0	2,0	< 0,1	3,0	66,0
J2 n	-	-	-	10	-	-	1	1	3
kg	-	-	-	< 0,1	-	-	< 0,1	< 0,1	1,0
B11 n	1119	407	-	507	1793	1	9	71	82
kg	568,0	77,0	-	15,0	20,0	< 0,1	2,0	17,0	32,0
B01 n	4	120	-	210	184	7	646	6	2
kg	2,0	10,0	-	9,0	3,0	3,0	90,0	2,0	1,0
GB1 n	1	819	-	74	120	2	52	6	27
kg	< 0,1	18,0	-	< 0,1	< 0,1	< 0,1	5,0	< 0,1	9,0

Tab. 3: *Cruise 336 RV 'Walther Herwig III', 24.08. – 03.09.2010:*
 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)	
25.08.10	001	B12	7	17,98	11,50	105,06	6,50	
			18	11,54	22,67	36,75	2,43	
	002		3	17,75	11,59	93,20	5,79	
			18	11,51	21,61	40,51	2,70	
	003		3	17,41	10,94	93,30	5,86	
			21	10,44	25,24	27,92	1,86	
	004		3	18,25	8,81	96,53	6,04	
			21	9,23	26,02	9,57	0,65	
	005		3	17,57	11,59	92,87	5,79	
			17	12,77	16,53	44,56	2,98	
26.08.10	006	B10	3	17,05	7,09	94,05	6,09	
			35	9,89	7,51	70,75	5,34	
	007		3	16,96	7,09	96,00	6,23	
			36	9,56	7,54	68,96	5,24	
	008		3	16,78	7,07	95,22	6,20	
			36	9,83	7,58	67,26	5,08	
	009		3	17,52	7,07	95,64	6,13	
			36	11,19	7,45	80,61	5,91	
	27.08.10	010	J2	3	16,89	8,61	95,47	6,14
				18	10,78	17,37	15,78	1,10
011			3	15,27	8,18	91,85	6,13	
			17	12,33	16,97	32,88	2,21	
27.08.10	012	B11	3	15,07	7,23	94,57	6,37	
			40	9,28	11,26	47,23	3,53	
	013		3	15,50	7,33	94,77	6,33	
			38	9,70	12,20	39,73	2,92	
	014		3	17,41	7,55	95,30	6,11	
			39	11,69	7,73	72,03	5,21	
28.08.10	015	B01	3	17,00	14,20	95,35	5,92	
			18	15,68	18,78	84,44	5,24	
	016		3	17,32	13,08	96,11	5,97	
			14	16,17	16,91	90,91	5,65	
	017		3	17,44	13,97	97,02	5,98	
			14	17,21	14,66	96,70	5,96	
	018		3	17,39	14,01	97,28	6,00	
			23	9,88	23,06	15,55	1,06	
30.08.10	019	GB1	5	17,52	31,44	100,03	5,54	
			38	18,13	32,46	85,42	4,45	
	020		3	17,72	31,80	94,61	5,21	
			37	18,20	32,51	88,14	4,79	
	021		3	17,54	31,40	103,60	5,74	
			38	18,13	32,41	83,72	4,56	
	022		3	17,74	31,74	96,63	5,32	
			39	18,13	32,47	84,91	4,62	

Tab. 4: *Cruise 336 RV 'Walther Herwig III', 24.08. – 03.09.2010:*
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	523	4,8	1,7	2,9	0,4	0,0	0,2	0,0	0,4	0,0	0,2
J2	2	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
B11	14	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
B01	668	5,4	0,6	1,9	0,1	0,0	0,1	0,3	0,3	0,0	0,6
GB1	95	0,0	0,0	1,1	0,0	0,0	2,1	0,0	2,1	0,0	2,1
Total	1,302										

Tab. 5: *Cruise 336 RV 'Walther Herwig III', 24.08. – 03.09.2010:*
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			
B12	20	24	3	0,0	0,0	0,0	0,0	0,0	0,0
	25	40	5	0,0	0,0	0,0	0,0	0,0	0,0
B01	20	24	52	5,8	0,0	0,0	0,0	0,0	0,0
	25	40	51	2,0	0,0	0,0	0,0	0,0	0,0
GB1	20	24	6	16,7	16,7	0,0	0,0	16,7	16,7
	25	40	1	0,0	0,0	0,0	0,0	0,0	100,0
Total			118						

Tab. 6: *Cruise 336 RV 'Walther Herwig III', 24.08. – 03.09.2010:*
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	59	8,5	0,0	0,0	1,7	0,0	4,07	0,0
B10	335	14,9	8,7	1,8	0,9	0,0	80,9	0,0
J2	4	0,0	0,0	0,0	0,0	0,0	100,0	0,0
B11	80	22,5	6,3	0,0	1,2	0,0	82,5	0,0
B01	3	0,0	0,0	33,3	0,0	0,0	66,7	0,0
GB1	50	0,0	0,0	0,0	0,0	4,0	0,0	50,0
Total	1,843							

Tab. 7: *Cruise 336 RV 'Walther Herwig III', 24.08. – 03.09.2010:*
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	100	1,0	0,0	0,0	0,0	2,0	6,0
B10	3	0,0	0,0	0,0	0,0	0,0	33,3
J2	89	9,0	2,2	0,0	0,0	0,0	31,5
B11	4	0,0	0,0	0,0	0,0	0,0	0,0
B01	80	3,7	0,0	0,0	2,5	11,2	27,5
GB1	55	5,5	0,0	0,0	0,0	7,3	9,1
Total	499						

Tab. 8: *Cruise 336 RV 'Walther Herwig III', 24.08. – 03.09.2010:*
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	3	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
B10	584	20,7	2,7	0,3	0,0	0,0	0,0	17,8	43,0
B11	502	17,3	1,8	0,0	0,0	1,0	0,0	31,9	35,1
B01	7	28,6	0,0	0,0	0,0	0,0	0,0	0,0	14,3
Total	1,906								

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	Cryp	: <i>Cryptocotyle sp.</i>
Hyp Pig	: Hyperpigmentation	Loma	: <i>Lomas p.</i>
Skel Def	: Skeletal deformities	LK >2 mm	: Liver nodules > 2 mm in diameter
PBT	: Pseudobranchial pseudotumour		