

RV Walther Herwig III Cruise 349

02.12. – 21.12.2011

Fish diseases and biological effects of contaminants in the Baltic Sea and North Sea, CHEMSEA-project

Scientist in Charge: Nicolai Fricke

Summary

As part of the long-term monitoring programme of the vTI Institute of Fisheries Ecology on diseases and parasites of marine fish species and in the framework of the CHEMSEA project, studies were conducted in 7 Baltic Sea areas and 2 North Sea areas, the latter in the German EEZ of the wider German Bight.

In addition to the examination of dab (*Limanda limanda*), Baltic cod (*Gadus morhua*) and Baltic flounder (*Platichthys flesus*) for macroscopically visible external and internal diseases and parasites, extensive samples for the CHEMSEA project were taken for measurements on dumped chemical weapons and their biological effects. In particular, cod samples were taken for the CHEMSEA project in areas B09, B13 and B15. In addition, fish samples were frozen for the detection of contaminants (incl. radioactive substances) in the framework of national legislation (BLMP) and international monitoring programmes (HELCOM). Hydrographical measurements were carried out (water temperature, salinity, oxygen content, turbidity). The following preliminary findings were noted:

Dab: In contrast to the development of the last years, increased prevalences of lymphocystis, epidermal hyperplasia/papilloma and hyper-pigmentation were recorded in the German Bight; moderately increased prevalences of liver nodules ≥ 2 mm were noted in all sampling areas;

Flounder: Prevalences in the normal range

Baltic cod: Comparably high prevalences of skin ulcers in the Baltic Sea sampling areas B13 and B15.

Participants

Name	Function	Institution
Nicolai Fricke	Scientist in Charge	FOE, Cuxhaven
Thomas Tepperies	Technician	FOE, Cuxhaven
Jennifer Ipse	Technician	FOE, Cuxhaven
Wolfgang Lindemann	Technician	FOE, Hamburg
Alexander Betz	Technician	FOE, Hamburg
Dr. Aleksandras Rybakovas	Guest Scientist	University Vilnius, Lithuania
Emilia Katarzyna Jankowska	Guest Scientist	University Sopot, Poland
Marta Szubska	Guest Scientist	University Sopot, Poland
Nico Geveke	Assistant	
Flemming Dahlke	Student	University Hamburg
Julia Heiler	Volunteer	
Carolin Knörr	Student	University Hamburg
Bastian Rosin	Volunteer	
Andrea Franke	Volunteer	

Objectives of the Cruise

1. Studies on biological effects of contaminants and diseases and parasites in fish;
2. Sampling of fish for the analysis of radioactive substances;
3. Sampling of livers and other organs of fish for subsequent histological and biochemical studies;
4. Studies and sampling for the project CHEMSEA (CHEMical Munitions SEArch and Assess)
5. Sampling of benthos for studies on biological effects of contaminants in invertebrates;
6. Hydrographical measurements (salinity, temperature, oxygen, turbidity);

Dates of the Cruise

RV Walther Herwig III left Bremerhaven on schedule in the early morning of 02.12. After the passage of the Kiel Channel the ship entered Kiel harbour where the two Polish guest scientists boarded. Due to heavy weather conditions, departure of Kiel was delayed for one and a half day. In the morning of 04.12.2012 the work was started in the first sampling area B12 in Mecklenburg Bight. In the following days in the areas of B10, B13, B15, B09, B11 and B01 sampling was conducted. To obtain the samples, both pelagic trawls (PSN 205) and bottom trawls (140 ft. bottom trawl) were applied. During the Baltic Sea sampling, work had to be interrupted several times because of bad weather conditions. On 15.12., RV WHIII arrived in Kiel again. In the early morning of 16.12. the two Polish guest-scientists disembarked and A. Franke boarded to support the scientific crew in the North Sea. After passing the Kiel-Channel later that day, fishing was impossible again, due to bad weather conditions. Fishing in the German Bight was resumed on 19.12. in area N01 and finalized on 20.12. In the morning of 21.12., WH III arrived in Bremerhaven at the scheduled time.

The location of the sampling areas and the cruise dates are shown in Figure 1 and 2 and Tables 1. In 9 sampling areas (Fig. 1 and 2), a total of 33 fishing hauls was performed (towing time 30-90 min each) (see Table 1). In the Baltic Sea, a 140 ft bottom trawl and pelagic PSN 205 net were used, in the North Sea a GOV (see Table 1); all with standard configuration. In the areas of B13, B15 and B09 in the framework of the CHEMSEA-project 19 bottom samplings were performed with van Veen Grab (Table 1c). Hydrographical CTD measurements were made at stations related to bottom and fish samplings (see Table 1b).

Preliminary Results

1 Dab (*Limanda limanda*)

In total, 1,926 dab were examined for the occurrence of externally visible diseases and parasites in two North Sea areas (N01 and GB1) and two Baltic Sea areas (B01 and B12), 297 for liver anomalies (results are provided in Tab. 4 and 5). The prevalences of diseases were generally low. In contrast to the development of the last years, increased prevalences of lymphocystis (between 3.8 % in GB1 und 9.6 % in N01), epidermal hyperplasia/papillomas (between 3.8 % in GB1 und 8.8 % in N01) and hyperpigmentation (between 13.5 % in GB1 und 21.7 % in N01) could be observed in the German Bight. The prevalence of lymphocystis in the North Sea is similar to the one in the Baltic Sea (11.6 % in B12 and 9.1 % in B01). The prevalence of liver nodules ≥ 5 mm (liver tumours) in the North Sea areas was again low. In case of liver nodules > 2 mm (liver tumours and pre-stages) prevalences (± 5 %) were slightly increased in both length classes and all areas, but still in the range of the natural variance.

2 Flounder (*Platichthys flesus*)

614 flounder inspected for externally visible diseases in six Baltic Sea areas (results see Tab. 6) and 203 flounder for liver anomalies (results see Tab. 7). All prevalences were within normal range.

3 Cod (*Gadus morhua*)

1.492 Baltic cod from 7 sampling areas were examined for the occurrence of externally visible diseases and parasites (results see Table 8). The prevalence of acute/healing skin ulcers was again comparatively high with maximum values of 14.3 % and 25.0 % in areas B15 and B13, resp.

Miscellaneous

An extended sampling of cod was carried out for CHEMSEA project (CHEmical Munitions SEArch and Assess) in areas B13 (Bornholm Basin), B15 (Gulf of Gdansk) and B09 (polish coast). Samples for contaminant and biological effects of chemical warfare agents, resp., were taken from the following organs: musculature, liver, spleen, bile, head kidney, kidney and blood, and were distributed to project partners for subsequent analyses (see Tab. 9).

First results are expected for the end 2012. Additionally bottom sampling was performed to analyse possible effects of chemical warfare agents on benthos organisms.

Oxygen levels in the bottom layers were with the exception of the eastern Bornholm areas non-critical. In the areas of B13, B15 and B09 oxygen levels in the bottom layers (depth < 60 m) were below 2 mg O₂/l. This situation is typical for the Baltic Sea due to a halocline in the depths of 60 m that prevents the exchange between upper and lower water layers.

The mean catch data of the most frequent fish species are provided in Tab. 2; Tab. 3 gives results of the hydrographical CTD 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. The enormous efforts of the crew to fix technical problems are gratefully acknowledged.



Nicolai Fricke
(Scientist in Charge)

Annex: 8 Tables, 2 Figures

Fig. 1: *Cruise 349 RV „Walther Herwig III“, 02.12. – 21.12.2011:*
Location of sampling sites in the Baltic Sea

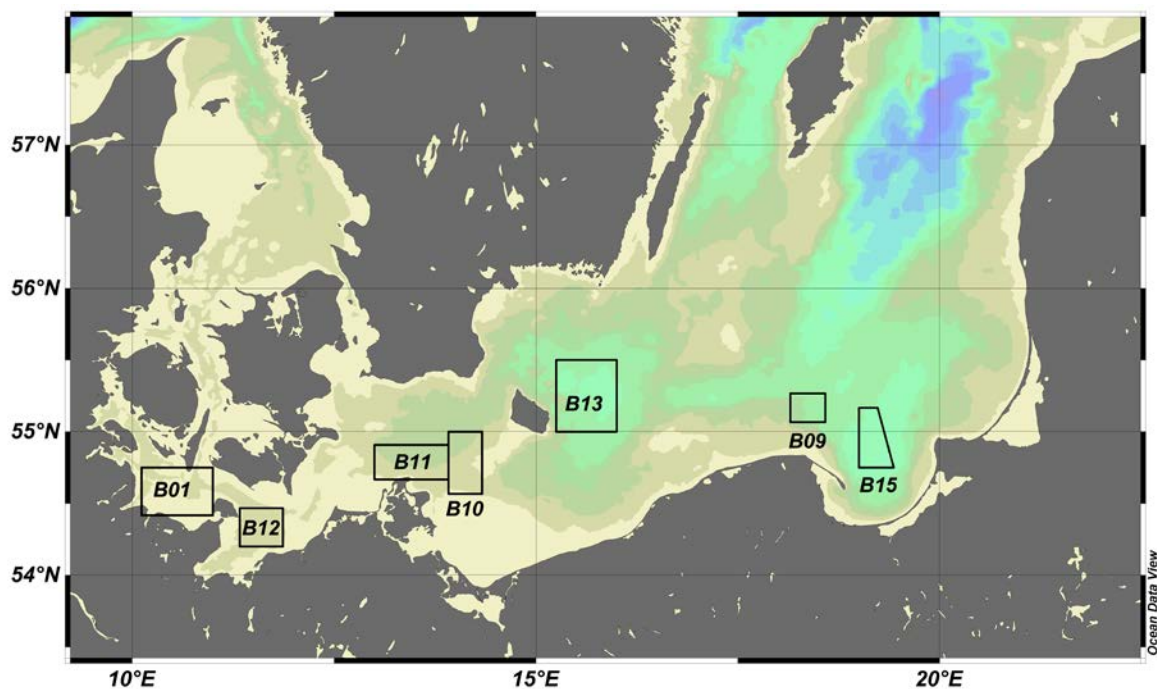
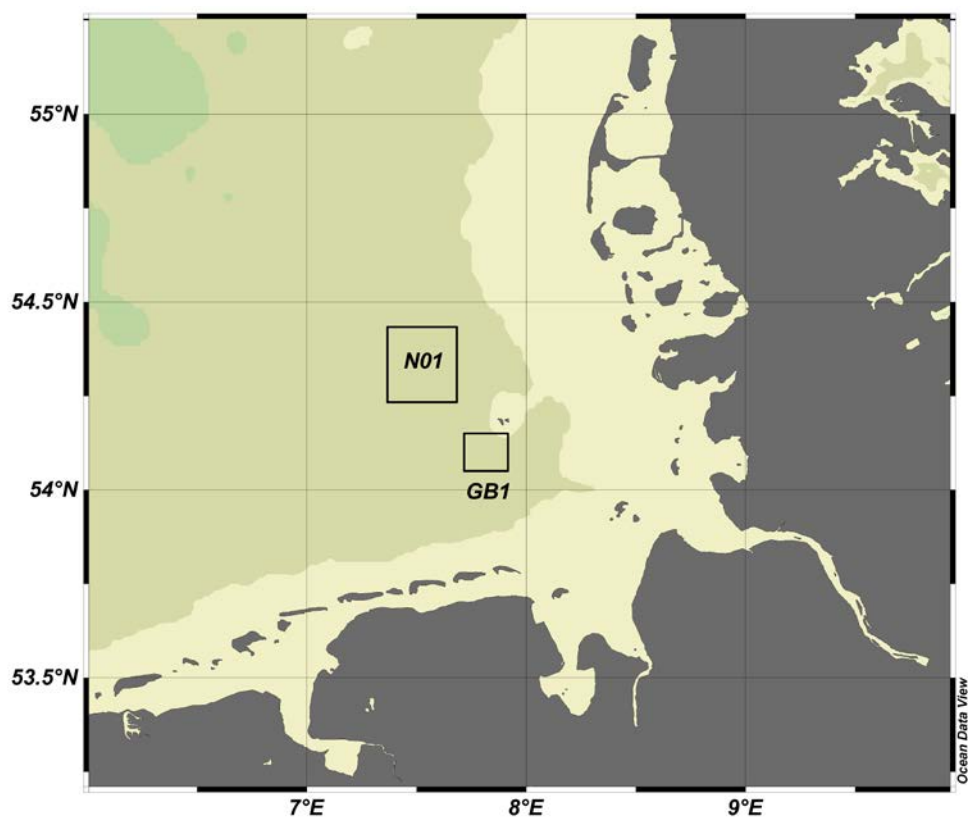


Fig. 2: *Cruise 349 RV „Walther Herwig III“, 02.12. – 21.12.2011:*
Location of sampling sites in the North Sea



Tab. 1a: *Cruise 349 RV „Walther Herwig III“, 02.12. – 21.12.2011:*
Geographical coordinates of trawling sites, Baltic Sea and North Sea

DATE	FISHING-STATION	Area	ICES-RECTANGLE	LATITUDE	LONGITUDE	B: Bottom trawl P: Pelagic trawl
04.12.11	001	B12	37G1	54°26,24N	11°23,42E	B
04.12.11	002	B12	37G1	54°21,49N	11°25,79E	B
04.12.11	003	B12	37G1	54°13,46N	11°35,66E	B
05.12.11	004	B10	38G4	54°39,13N	14°02,96E	B
05.12.11	005	B10	38G3	54°44,59N	13°55,62E	B
06.12.11	006	B13	39G5	55°17,32N	15°29,15E	P
07.12.11	007	B13	39G5	55°20,34N	15°35,57E	P
07.12.11	008	B13	39G5	55°18,45N	15°35,77E	P
07.12.11	009	B13	39G5	55°19,55N	15°32,23E	P
08.12.11	010	B13	39G5	55°08,37N	15°50,11E	P
08.12.11	011	B13	39G5	55°16,58N	15°44,33E	P
08.12.11	012	B13	39G5	55°17,86N	15°43,30E	P
12.12.11	013	B15	38G9	54°56,76N	19°08,68E	P
12.12.11	014	B15	38G9	54°50,06N	19°07,06E	P
12.12.11	015	B15	38G9	54°45,98N	19°10,84E	P
12.12.11	016	B15	38G9	54°49,75N	19°11,31E	P
13.12.11	017	B09	39G8	55°08,26N	18°19,38E	B
13.12.11	018	B09	39G8	55°09,23N	18°14,14E	B
13.12.11	019	B09	39G8	55°12,74N	18°11,06E	B
13.12.11	020	B09	39G8	55°09,06N	18°14,27E	B
14.12.11	021	B11	38G3	54°44,53N	13°42,42E	B
14.12.11	022	B11	38G3	54°46,98N	13°50,63E	B
14.12.11	023	B11	38G3	54°48,12N	13°50,87E	B
14.12.11	024	B11	38G3	54°45,97N	13°27,14E	B
15.12.11	025	B01	38G0	54°33,16N	10°48,03E	B
15.12.11	026	B01	38G0	54°32,17N	10°39,61E	B
19.12.11	027	N01	37F7	54°15,60N	07°26,93E	B
19.12.11	028	N01	37F7	54°15,39N	07°30,13E	B
19.12.11	029	N01	37F7	54°18,85N	07°26,20E	B
19.12.11	030	N01	37F7	54°15,68N	07°30,33E	B
20.12.11	031	GB1	37F7	54°07,28N	07°45,32E	B
20.12.11	032	GB1	37F7	54°04,25N	07°52,73E	B
20.12.11	033	GB1	37F7	54°06,89N	07°45,55E	B

Tab. 1b: *Cruise 349 RV „Walther Herwig III“, 02.12. – 21.12.2011:*
Geographical coordinates of hydrography CTD stations

DATE	HYDRO-STATION	Related to FISHING (F) /Grab (G)-STATION	Area	ICES-RECTANGLE	LATITUDE	LONGITUDE
04.12.11	001	F001	B12	37G1	54°26,96N	11°23,03E
04.12.11	002	F002	B12	37G1	54°22,05N	11°26,11E
04.12.11	003	F003	B12	37G1	54°13,46N	11°34,71E
05.12.11	004	F004	B10	38G4	54°38,38N	14°03,04E
05.12.11	005	F005	B10	38G3	54°44,03N	13°55,86E
06.12.11	006	-	B13	39G5	55°20,32N	15°35,53E
06.12.11	007	G001	B13	39G5	55°08,93N	15°15,53E
06.12.11	008	G002	B13	39G5	55°16,41N	15°28,38E
06.12.11	009	G003	B13	39G5	55°18,24N	15°30,98E
07.12.11	010	F007	B13	39G5	55°21,01N	15°37,10E
07.12.11	011	G004	B13	39G5	55°23,65N	15°41,13E
07.12.11	012	F008	B13	39G5	55°17,42N	15°34,03E
07.12.11	013	G005	B13	39G5	55°22,86N	15°42,71E
07.12.11	014	F009	B13	39G5	55°18,93N	15°31,48E
07.12.11	015	G006	B13	39G5	55°24,04N	15°39,44E
07.12.11	016	G007	B13	39G5	55°24,32N	15°36,28E
07.12.11	017	G008	B13	39G5	55°18,03N	15°39,43E
08.12.11	018	G009/F010	B13	39G5	55°07,27N	15°50,91E
08.12.11	019	G010/F011	B13	39G5	55°16,03N	15°44,33E
08.12.11	020	G011/F012	B13	39G5	55°25,10N	15°48,09E
12.12.11	021	F013	B15	38G9	54°56,81N	19°08,98E
12.12.11	022	G012/F014	B15	38G9	54°50,86N	19°06,86E
12.12.11	023	G013/G014/ G015	B15	38G9	54°44,96N	19°09,45E
12.12.11	024	G016/F015	B15	38G9	54°50,62N	19°11,16E
12.12.11	025	F016	B15	38G9	54°46,58N	19°11,25E
13.12.11	026	F017	B09	39G8	55°08,30N	18°20,16E
13.12.11	027	F018	B09	39G8	55°08,75N	18°14,49E
13.12.11	028	G017/F019	B09	39G8	55°13,57N	18°10,85E
13.12.11	029	G018/G019/ F020	B09	39G8	55°08,92N	18°21,53E
14.12.11	030	F021	B11	38G3	54°44,41N	13°42,45E
14.12.11	031	F022	B11	38G3	54°46,55N	13°50,01E
14.12.11	032	F023	B11	38G3	54°48,29N	13°51,29E
14.12.11	033	F024	B11	38G3	54°46,14N	13°27,34E
15.12.11	034	F025	B01	38G0	54°33,25N	10°49,32E
15.12.11	035	F026	B01	38G0	54°31,90N	10°40,89E
19.12.11	036	F027	N01	37F7	54°15,58N	07°26,39E
19.12.11	037	F028	N01	37F7	54°15,10N	07°29,58E
19.12.11	038	F029	N01	37F7	54°18,89N	07°26,08E
19.12.11	039	F030	N01	37F7	54°15,34N	07°30,88E
20.12.11	040	F031	GB1	37F7	54°07,71N	07°45,59E
20.12.11	041	F032	GB1	37F7	54°03,66N	07°53,09E
20.12.11	042	F033	GB1	37F7	54°04,92N	07°51,49E

Tab. 1c: *Cruise 349 RV „Walther Herwig III“, 02.12. – 21.12.2011:*
Geographical coordinates of dredge stations in the Baltic Sea

DATE	GRAB-STATION	RELATED TO FISHING-STATION	AREA	ICES-RECTANGLE	LATITUDE	LONGITUDE
06.12.11	001	-	B13	39G5	55°08,83N	15°15,37E
06.12.11	002	F006	B13	39G5	55°16,21N	15°28,69E
06.12.11	003	-	B13	39G5	55°18,21N	15°31,15E
07.12.11	004	F007	B13	39G5	55°23,55N	15°41,30E
07.12.11	005	-	B13	39G5	55°22,77N	15°42,93E
07.12.11	006	-	B13	39G5	55°24,06N	15°39,65E
07.12.11	007	-	B13	39G5	55°24,37N	15°36,53E
07.12.11	008	-	B13	39G5	55°18,09N	15°39,64E
08.12.11	009	F010	B13	39G5	55°07,29N	15°50,49E
08.12.11	010	F011	B13	39G5	55°16,02N	15°44,25E
08.12.11	011	F012	B13	39G5	55°25,02N	15°48,11E
12.12.11	012	F013	B15	38G9	54°50,88N	19°06,79E
12.12.11	013	F014	B15	38G9	54°45,04N	19°09,14E
12.12.11	014	-	B15	38G9	54°45,20N	19°09,91E
12.12.11	015	F015	B15	38G9	54°45,14N	19°10,69E
12.12.11	016	F016	B15	38G9	54°50,65N	19°11,13E
13.12.11	017	F019	B09	39G8	55°13,50N	18°10,91E
13.12.11	018	F019	B09	39G8	55°08,92N	18°14,92E
13.12.11	019	-	B09	39G8	55°08,91N	18°21,62E

Tab. 2: *Cruise 349 RV „Walther Herwig III“, 02.12. – 21.12.2011:*
Mean catches of selected abundant fish species
(n = number, kg = weight per 1 h trawling)

Area	Cod	Whiting	Haddock	Herring	Sprat	Mackerel	Dab	Plaice	Flounder
B12 n	3	47	-	67	28	-	289	16	24
kg	8,0	3,0	-	1,0	< 0,1	-	38,0	4,0	9,0
B10 n	268	49	-	39	1,293	3	-	64	85
kg	171,0	26,0	-	4,0	21,0	3,0	-	15,0	30,0
B13 n	14	-	-	124	944	-	-	1	-
kg	8,0	-	-	6,0	11,0	-	-	< 0,1	-
B15 n	36	-	-	352	10,857	-	-	-	-
kg	20,0	-	-	18,0	92,0	-	-	-	-
B09 n	46	-	-	13	2	-	-	-	-
kg	34,0	-	-	1,0	< 0,1	-	-	-	-
B11 n	267	362	1	22	23	-	7	26	170
kg	298,0	186,0	< 0,1	3,0	< 0,1	-	2,0	5,0	74,0
B01 n	6	14	-	79	78	-	1,214	168	28
kg	9,0	1,0	-	2,0	1,0	-	115,0	50,0	14,0
N01 n	2	6	7	4,098	16,214	-	597	4	2
kg	3,0	< 0,1	< 0,1	58,0	123,0	-	35,0	1,0	1,0
GB1 n	1	11	-	595	2,170	-	275	4	11
kg	< 0,1	1,0	-	5,0	14,0	-	17,0	1,0	2,0

Tab. 3: *Cruise 349 RV „Walther Herwig III“, 02.12. – 21.12.2011:*
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)
04.12.11	001	B12	4	7,69	18,50	92,75	9,81
			18	7,79	18,76	92,61	9,76
	002		3	8,04	17,95	91,22	9,60
			20	8,70	19,07	91,74	9,44
	003		3	7,78	16,77	90,76	9,69
			22	7,77	16,80	92,77	9,90
05.11.11	004	B10	2	7,43	7,35	84,37	9,66
	20		7,43	7,35	91,51	10,47	
	005		3	7,41	8,04	90,34	10,30
			33	9,79	16,43	67,63	6,91
06.12.11	006	B13	4	7,33	7,55	91,08	10,44
			92	6,32	14,79	1,90	0,21
	007		3	7,40	7,52	89,29	10,22
			58	7,21	12,07	28,21	3,15
	008		5	7,16	7,62	90,76	10,44
			88	6,20	14,64	2,24	0,25
	009		3	7,02	7,62	90,24	10,42
			91	6,30	14,82	2,23	0,25
	07.12.11		010	B13	3	6,97	7,63
91		6,32			14,78	2,47	0,28
011		3	6,94		7,66	90,89	10,51
		88	6,23		14,74	2,27	0,25
012		3	6,96		7,59	91,01	10,52
		92	6,31		14,81	2,13	0,24
013		3	7,09		7,61	84,35	9,72
		90	6,24		14,77	1,92	0,22
014		4	6,37		7,62	90,32	10,59
		91	6,23		14,81	2,18	0,25
015		2	6,93		7,64	88,90	10,28
		89	6,23		14,74	2,14	0,24
016		3	6,88		7,62	89,65	10,38
		88	6,22		14,71	2,63	0,30
017		3	7,17		7,58	90,64	10,43
	93	6,47	14,84	2,24	0,25		
08.12.11	018	B13	4	7,11	7,44	91,03	10,50
	85		6,61	14,72	3,53	0,39	
	019		4	7,09	7,45	84,43	9,74
			93	6,43	14,78	1,73	0,19
	020		3	6,99	7,60	88,69	10,25
			87	6,24	14,73	2,14	0,24

Tab. 3: (cont.)

DATE	STATION	AREA	DEPTH(m)	T (°C)	S (PSU)	O ₂ -Saturation (%)	O ₂ (mg/l)
12.12.11	021	B15	4	7,63	7,15	91,84	10,48
			101	5,06	10,89	2,54	0,30
	022		4	7,54	7,15	89,92	10,28
			101	5,01	10,93	2,31	0,27
	023		4	7,46	7,13	91,18	10,44
			98	4,99	10,94	3,03	0,36
	024		3	7,78	7,14	91,85	10,44
			103	5,15	10,96	2,35	0,28
025	3	7,58	7,14	83,67	9,56		
	99	5,02	10,92	2,51	0,30		
13.12.11	026	B09	3	6,67	7,27	90,57	10,57
			77	5,05	10,73	2,86	0,34
	027		2	6,34	7,28	87,72	10,32
			67	5,16	10,38	11,20	1,33
	028		5	6,61	7,29	91,64	10,71
			59	5,62	9,33	52,24	6,17
	029		3	6,84	7,26	92,33	10,73
			79	5,26	10,76	5,14	0,61
14.12.11	030	B11	3	6,22	7,69	90,42	10,64
			40	7,61	21,66	83,50	8,67
	031		4	7,61	21,66	83,50	8,67
			41	7,86	21,09	81,97	8,49
	032		6	6,19	8,88	93,11	10,88
			41	9,07	20,12	74,55	7,56
	033		4	6,19	7,83	84,51	9,94
			40	8,02	21,25	82,71	8,53
15.12.11	034	B01	4	6,14	20,66	92,63	10,02
			20	6,87	23,06	93,14	9,75
	035		4	5,91	19,57	90,61	9,93
			21	6,71	22,75	91,19	9,60
19.12.11	036	N01	3	7,61	33,51	91,02	8,75
			41	7,78	33,71	92,49	8,84
	037		5	7,10	33,20	91,36	8,90
			40	7,75	33,64	92,53	8,85
	038		3	7,42	33,52	86,41	8,34
			39	7,54	33,58	92,62	8,91
	039		3	6,83	32,97	78,22	7,68
			39	7,82	33,67	92,15	8,80
20.12.11	040	GB1	3	7,42	33,45	89,26	8,62
			38	7,42	33,45	92,76	8,95
	041		5	7,08	33,15	92,04	8,97
			39	7,36	33,32	92,02	8,90
	042	N01	3	7,19	33,23	90,79	8,82
			41	7,34	33,30	91,54	8,86

Tab. 4: Cruise 349 RV „Walther Herwig III“, 02.12. – 21.12.2011:
Prevalences (%) of externally visible diseases and parasites of dab
(*Limanda limanda*) in 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	277	11,6	1,1	0,4	0,4	0,0	0,7	0,4	0,0	0,0	2,2	0,7
B01	548	9,1	0,9	0,0	0,0	0,2	0,2	0,0	2,0	0,0	1,1	2,2
N01	605	9,6	8,8	2,8	1,3	0,0	0,3	21,7	7,6	4,6	8,1	17,0
GB1	532	3,8	5,8	2,6	0,8	0,0	0,6	13,5	10,0	3,0	6,2	18,4
Sum	1,962											

Tab. 5: Cruise 349 RV „Walther Herwig III“, 02.12. – 21.12.2011: 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.
	von	bis		≥ 2	≥ 5	≥ 10			
B01	20	24	50	6,0	0,0	0,0	4,0	0,0	0,0
	25	40	52	3,8	0,0	0,0	0,0	1,9	0,0
N01	20	24	61	6,6	4,9	0,0	0,0	0,0	0,0
	25	40	51	5,9	2,0	0,0	0,0	0,0	7,8
GB1	20	24	51	5,9	0,0	0,0	0,0	0,0	3,9
	25	40	32	9,4	0,0	0,0	0,0	3,1	3,1
Sum			297						

Tab. 6: Cruise 349 RV „Walther Herwig III“, 02.12. – 21.12.2011:
Prevalences (%) of diseases and parasites of flounder (*Platichthys flesus*)
from the Baltic Sea

Area	N unt	Ly	Ulc Ak/Hei	Flo Ak/Hei	Skel Def	Hyp Pig	Cryp	Lepe
B12	71	31,0	2,8	0,0	0,0	0,0	66,2	19,7
B10	169	27,8	3,0	0,6	0,6	0,0	69,2	0,0
B13	1	100,0	0,0	0,0	0,0	0,0	100,0	0,0
B09	1	100,0	0,0	0,0	0,0	100,0	0,0	0,0
B11	315	29,8	4,8	1,0	3,2	0,0	52,4	0,0
B01	57	33,3	3,5	0,0	1,8	0,0	68,4	10,5
Sum	614							

Tab. 7: Cruise 349 RV „Walther Herwig III“, 02.12. – 21.12.2011:
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	71	1,4	0,0	0,0	0,0	8,5	8,5
B10	50	0,0	0,0	0,0	0,0	4,0	6,0
B13	1	0,0	0,0	0,0	0,0	0,0	0,0
B09	1	0,0	0,0	0,0	0,0	0,0	0,0
B11	50	6,0	0,0	0,0	2,0	2,0	20,0
B01	30	3,3	0,0	0,0	0,0	0,0	13,3
Sum	203						

Tab. 8: Cruise 349 RV „Walther Herwig III“, 02.12. – 21.12.2011:
Prevalences (%) of diseases and parasites of cod (*Gadus morhua*) in the
Baltic Sea

Area	N unt	Ulc Ak / Hei	Skel Def	PBT	Locera	Clav	Cryp	Loma
B12	7	14,3	0,0	0,0	0,0	0,0	42,9	28,6
B10	327	10,4	4,0	0,0	0,0	0,0	5,2	16,5
B13	140	25,0	3,6	0,0	0,0	0,0	1,4	88,6
B15	133	14,3	1,5	0,0	0,0	0,0	0,8	35,3
B09	235	11,9	3,0	0,0	0,0	0,0	0,4	35,7
B11	637	7,8	6,1	0,5	0,0	0,0	7,4	10,4
B01	13	0,0	0,0	0,0	0,0	0,0	46,2	0,0
Sum	1,492							

Tab. 9: Cruise 349 RV „Walther Herwig III“, 02.12. – 21.12.2011:
Cod tissue samples collected and distributed to CHEMSEA project partners

Sampling area	Number of fish	Project Partner	Cod tissue	Analysis
B13	88	IOPAS (PP1)	Muscle, liver, kidney	Organochlorines, PAH, metals
B15	50			
B09	50			
B13	83	FOI (PP4)	Bile	Acute/chronic toxicity tests with cell lines
B15	46			
B09	50			
B13	88	VERIFIN (PP6)	Muscle, liver, kidney, urine	Chemical warfare agents and metabolites
B15	50			
B09	50			
B13	88	SYKE (PP7)	Muscle, liver	Oxidative stress enzymes, neurotoxicity biomarkers
B15	50			
B09	50			
B13	88	vTI (PP8)	Blood smears, liver, spleen	Differential blood cell counts, histopathology
B15	50			
B09	50			
B13	88	AWI (PP9)	Liver, kidney, head kidney, blood smears	Histopathology, lysosomal membrane stability, blood cell counts
B15	50			
B09	50			
B13	86	LEPA (PP10), Sub-contractor NRC-IEVU	Blood smears	Micronucleus assay, genotoxicity biomarkers
B15	42			
B09	45			

Abbreviations:

N unt : Number examined
Ly : Lymphocystis
Ep Hyp/Pap : Epidermal hyperplasia/papilloma
Ulc Ak/Hei : Skin ulceration/en, acute/healing
Flo Ak/Hei : Fin rot/erosion, acute/healing
KieHy : Gill hyperplasia, x-cell disease
Hyp Pig : Hyperpigmentation
Skel Def : Skeletal deformities
PBT : Pseudobranchial pseudotumour

Acanthoceph. : Acanthocephaleans, liver
Steph : *Stephanostomum baccatum*
Acanth : *Acanthochondria cornuta*
Lepe : *Lepeophtheirus pectoralis*
Locera : *Lernaeocera branchialis*
Cryp : *Cryptocotyle sp.*
Loma : *Loma sp.*
Diplo : *Diplostomum sp.*