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Mengunarvöktun í lífríki sjávar við Ísland 2007 og 2008

Monitoring of the marine biosphere around Iceland 2007 and 2008

Hrönn Ólína Jörundsdóttir
Sasan Rabieh
Hulda Soffía Jónasdóttir
Þuríður Ragnarsdóttir
Helga Gunnlaugsdóttir

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Höfundar / Authors	*Hrönn Ólína Jörundsdóttir, Sasan Rabieh, Hulda Soffía Jónasdóttir, Þuríður Ragnarsdóttir and Helga Gunnlaugsdóttir*		
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Ágrip á íslensku:

Í þessari skýrslu eru birtar niðurstöður árlegs vöktunarverkefnis á vegum Umhverfisráðuneytisins fyrir árin 2007 og 2008. Markmið með þessari vöktun er að uppfylla skuldbindingar Íslands varðandi Oslóar- og Parísarsamninginn (OSPAR), auk AMAP (Artic Monitoring Assessment Program). Gögnin hafa verið send í gagnabanka Alþjóðahafrannsóknarráðsins (ICES). Hafrannsóknastofnun sér um að afla sýna og Matís hefur umsjón með undirbúningi sýna og mælingum á snefilefnum í lífríki hafsins. Sýnin eru mæld á Matís og á Rannsóknastofu í lyfja- og eiturefnafræði.

Mæld voru ýmis ólífræn snefilefni og klórlífræn efni í þorski veiddum í árlegu vorralli Hafró í mars 2008 og í kræklingi sem safnað var á 11 stöðum í kringum landið í ágúst/sept 2007. Vöktun í lífríki sjávar við Ísland hófst 1989 og er gögnum safnað saman í gagnagrunn, í skýrslunni eru birtar yfirlitsmyndir fyrir sum efnanna sem fylgst er með.

Lykilorð á íslensku: *OSPAR, AMAP, vöktun á lífríki sjávar, ólífræn snefilefni, klórlífræn efni, þorskur, kræklingur.*

Summary in English:

This report contains results of the annual monitoring of the biosphere around Iceland in 2007 and 2008. The project, overseen by the Environmental and Food Agency of Iceland, is to fulfil the OSPAR (Oslo and Paris agreement) and AMAP (Arctic Monitoring Assessment Program) agreements. The data has been submitted to the ICES databank (ices.dk), collection of data began 1989. Matís ohf is the coordinator for marine biota monitoring and is responsible for methods relating to sampling, preparation and analysis of samples. The samples were analyzed at the Matís and at the Department of Pharmacology and Toxicology at the University of Iceland.

Trace metals and organochlorines were analysed in cod *(Gadus morhua)* caught in March 2008 and in blue mussel *(Mytilus edulis)* collected in August/Sept 2007. Marine monitoring began in Iceland 1989.

English keywords: *OSPAR, AMAP, monitoring, trace metals, organochlorine compounds, cod (Gadus Morhua), blue mussel (Mytilus edulis).*

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I. Introduction

This report contains the results of the annual monitoring of heavy metals and organochlorine analyses for blue mussel (*Mytilus edulis*), collected along the coast around Iceland in 2007, as well as for cod (*Gadus morhua*), collected in Icelandic territorial waters in 2008. Annual monitoring of trace metals in the marine biota around Iceland began in 1989 and the monitoring of organochlorine compounds a few years later, in 1991. Several reports have already been published on this matter (1-14). To meet the requirements of the OSPAR (Oslo and Paris agreement) and the AMAP (Arctic Monitoring and Assessment Program), data has been submitted to the ICES databank (www.ices.dk), the first data from 1989. The project is supervised by the Environment and Food Agency in Iceland and financed by The Ministry for the Environment as well as the Ministry of Fisheries and Matís ohf. Matís is the coordinator for the marine biota monitoring and responsible for methods relating to sampling, sample preparation, analysis of samples and writing of this report. The samples were analyzed at Matís and the Department of Pharmacology and Toxicology at the University of Iceland.

II. Sampling and preparation of samples

The Marine Research Institute handles all sampling, while Matís is responsible for the storage of samples, sample preparation and chemical analysis.

2.1 Sampling

Using standard sampling guidelines (JMP, ICES and OSPAR), the sampling of cod (30-45 cm length, 3 samples (N-NW(1), N-NW(2) and NE) was carried out in the annual bottom trawl survey in March 2008. Blue mussel, 4-6 cm length, were collected from 11 sites along the coast of the country in August/September 2007. Sampling sites for cod and blue mussel are shown in Figure 1 and coordinates are presented in appendix I and II. Icelandic waters have been divided into five main locations (N-NW, NE, SE-E, S, and SW) (6).

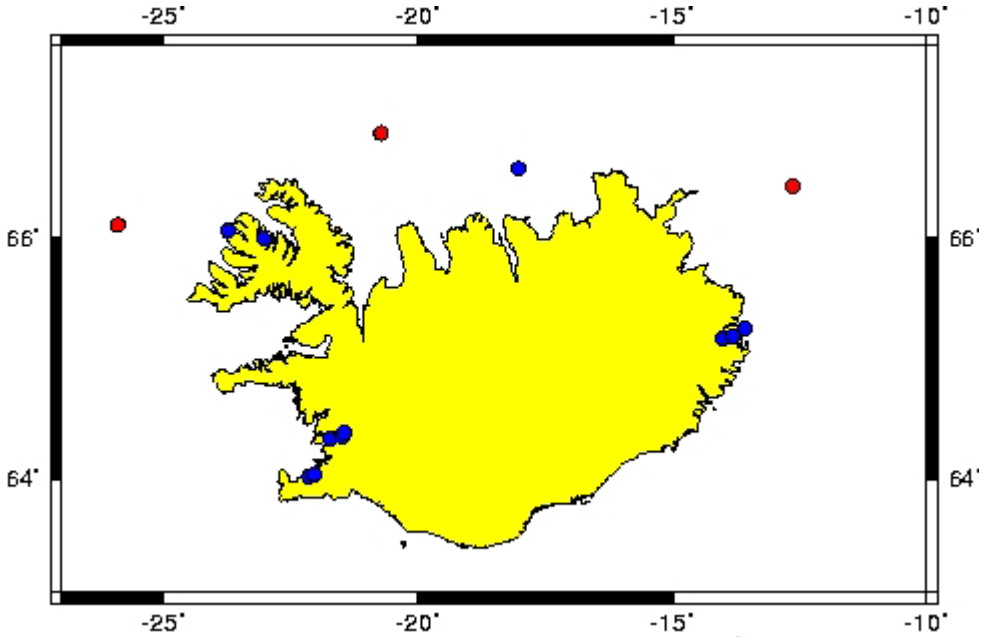

Figure 1. Locations for sampling of cod (Gadus morhua) (red dots) 2008 and blue mussel (Mytilus edulis) (blue dots) 2007.

2.2 Preparation of samples prior to analysing

Each sample of mussel contained 50 ± 5 individuals. Each mussel was weighed and its length (4-6 cm), height and width measured. The flesh and the shell were then weighed separately (Appendix I). After each sample (50 individuals) had been homogenized it was kept frozen until the analysis took place.

30-45 cm long cod was selected, each sample containing 25 ± 5 individuals. At the time of the sampling, the total weight as well as the gender of each fish was determined, livers were put in pre-weighed and pre-cleaned glass jars and, finally, the fish was gutted. All samples were kept frozen until further preparation for analysis took place. Later, the otoliths were removed for age determination, the fish was filleted, skinned, and the flesh weighed (Appendix II). Finally, each sample of flesh (25 ± 5 individuals) was homogenized. The livers of each cod sample were divided into sub samples, according to the weight of the livers. All liver samples were homogenized and kept frozen until analysis took place.

III. Analysis

3.1 Metals and organic contaminants in biota

The trace metal analysis of lead, cadmium, copper, zinc, mercury, arsenic and selenium was carried out at Matís, as well as analysis of the supporting parameters, dry matter and fat. The following organic compounds were analysed at the Department of Pharmacology and Toxicology at the University of Iceland: 11 PCBs, HCB, α-HCH, β-HCH and γ-HCH, p,p'-DDT o,p'-DDT, p,p'-DDE and p,p'-DDD,

transnonachlor, α-chlordan, γ-chlordan, oxychlordan, Tox-26, Tox-50, Tox-62, PBDE-47, PBDE-99, and PBDE-100. Table 1 presents the samples and all the parameters measured in each sample.

Table 1. Parameters measured in different samples.

Species	Number of samples	Number of individuals	Type of sample	Number of group	Inorganic contaminants	Organic contaminants	Other
Mussel, 2007 (*Mytilus edulis*)	11	50			Cu, Zn, As, Se, Cd, Hg, Pb	*	Dry matter and fat
Cod, 2007 (*Gadus morhua*)	3	25	Flesh	3	Hg		Dry matter and fat
			Liver	16	Cu, Zn, As, Se, Cd, Pb	*	Dry matter and fat
Labels: Cod-N-NW(1) 07 Cod-N-NW(2) 07 Cod-NE 07							

* PCB # 28, 31, 52, 101, 105, 118, 138, 153, 156, 170, 180, α-, β-, γ-HCH, HCB, p,p'-DDT, o,p'-DDT, p,p'-DDE, p,p'-DDD, *trans*-nonachlor, α-, γ-Chlordan, Oxychlordan, Toxaphene-26, -50, -62, BDE # 47, 99 and 100.

3.2 Methods

Inorganic contaminants (Cd, Cu, Zn, As, Se, Hg, Pb) in the samples were determined by ICP-MS after mineralization of the samples with closed vessel acid digestion. Portions (up to 200 mg weighed to 0.1 mg) of freeze dried samples (cod liver was used wet) together with 3 ml HNO_3 and 1.5 ml H_2O_2 were transferred to 50 ml digestion bombs. Samples were digested in a Mars5 microwave oven (CEM, North Carolina, USA). The digested sample solutions were quantitatively transferred to 50 ml polypropylene tubes and diluted to 30 ml with Milli-Q water. The concentration of the different elements (Cd, Cu, Zn, As, Se, Hg, Pb) in these digests was determined by ICP-MS (Agilent 7500ce, Waldbronn, Germany). ^{45}Sc, ^{72}Ge, ^{115}In and ^{205}Tl were used as internal standards. The organochlorine compounds were analysed by GC-ECD using HP5890 Series II with an automatic injector (HP7673). A detailed description of the analyses of organic compounds and supporting parameters (dry matter and fat) has been given in a previous report (7).

3.3 Quality assurance

The quality of the metal analysis was checked in several ways. Certified reference materials are routinely treated and analysed in the same manner as the samples. Results for analysis of reference materials and limits of detection are shown in Table 2 and 3 in appendix III. Also shown are Z scores for the reference materials. The trace analytical lab at the Matís has participated in QUASIMEME annually with satisfactory results. Also, Matís participated in SLV test with satisfactory results. The

average field blank (C_B), derived from the sample field blanks, and three times its standard deviation ($3xS_B$), and were used to evaluate the limit of detection (LOD).

For **organic contaminants,** a solvent blank and sample of certified reference material was extracted with each batch of samples. A certified standard solution was also run with the samples to check own standards. The limit of detection was estimated to be 3 x STDEV of the blanks. The Department of Pharmacology and Toxicology at the University of Iceland has participated in QUASIMEME annually with satisfactory results. Results for analysis in certificate mussel and cod liver samples are presented in appendix III, Tables 4 and 5 along with relevant detection limits in Table 6.

IV. Results

This report contains data from the years 2007 and 2008, due to budget constrains these results have not been statistically evaluated in connection with our previous data from the annual monitoring of the biosphere around Iceland in order to evaluate time trend or spatial difference. However, there are apparently no obvious changes in the contaminant concentrations patterns seen over the time period (for graphical illustrations please refer to appendices VII and VIII). To be able to monitor long term trends and to indicate large scale spatial difference in the marine biota around Iceland, data from many years needs to be assessed with statistical models.

4.1 Biological variations

Figures 2a-d in appendix VI shows the biological variation in cod *(Gadus morhua)* 1990-2007, (average age, average weight of ungutted fish, average weight of liver, and average fat content in liver).

4.2 Heavy metals

Results for metals in blue mussel (2007) and cod (2008) are presented in Tables 7 and 8 in appendix IV. New data is presented along with data from previous years (1, 4-14) in figures 3a-f and 4a-c (Appendix VII) for blue mussel and in figures 6a-b and 7a-f (Appendix VIII) for cod, giving an overview of a period of 17-18 years. It should be noted that results for cod are presented on wet weight basis, while the result for mussel are presented on dry weight basis.

4.2.1 Blue mussel

Figures 3a-f in appendix VII show the average concentration of heavy metals in blue mussel 1990-2007, on dry weight basis. The horizontal red line shows the ICES90 75% baseline (11). Figures 4a-c in appendix VII show average concentrations (dw), of heavy metals in blue mussel from different sampling sites, 1990-2007. Metal concentrations vary considerably between years and different locations. This year the concentration of cadmium is higher in Grímsey and Dvergasteinn compared to other locations. According to the existing monitoring data (1999-2007) the concentration of arsenic is noticeably higher at Úlfsá, Skutulsfjörður than at any of the other sample locations for blue mussel. The results show low values for mercury in blue mussel

when compared with ICES90 75% baseline values. The copper concentrations are generally low in blue mussel, while the zink concentrations are close to the ICES90 75% value. The cadmium levels are high in blue mussels from Icelandic coasts, compared to other areas. This cadmium is considered to be of natural origin since no anthropogenic source is known.

4.2.2 Cod

Figures 6a-b in appendix VIII show the average heavy metal concentration in livers of 30-45 cm cod (wet weight), caught in Icelandic waters in March every year between 1990-2008. Figures 7a-f in appendix VIII show average concentrations (ww), of heavy metals in cod from different sampling sites, 1990-2008. Mercury is measured in the flesh as well. Lead concentration was below the limits of detection in all samples. Variations in concentration between years and locations over the time interval is shown in Figures 6a-b and 7a-f in Appendix VIII. The concentration of heavy metals in cod from Icelandic waters is low compared to cod from other northern locations (6). As for the blue mussel the only exception is cadmium which is probably of natural origin reflecting the natural background values. However, the amount of cadmium in cod and other species in Icelandic coastal waters is far below the TWI (Tolerable Weekly Intake) standard of WHO, even with heavy consumption (6).

4.3 Organic compounds

Results for organic compounds in blue mussel (2007) and cod (2008) are presented in appendix V, Tables 9 and 10. The results for cod are presented on a wet-weight basis but results for blue mussel are on a dry-weight basis. New data is shown along with data from previous years (1, 4-10) in figures 5a-b (Appendix VII) for blue mussel and in figures 8 and 9a-e (Appendix VIII) for cod, giving an overview of a 16-18 year period.

4.3.1 Blue mussel

Figures 5a-b in appendix VII show the concentration on dry-weight basis of organic compounds in blue mussel from different locations in Iceland 1991-2007. The PCB congeners included in the Σ3PCBs are CB-118, CB-138 and CB-153 where the sum ranges from 50-80% of the sum of 11 PCB analysed. The most common organochlorines found in blue mussel are PCBs. The concentration of PCBs in blue mussel found in Iceland are comparable with values found in mussels from remote areas of the west coast of United States and also similar to the lowest values found in mussels on the coast of the United Kingdom and Ireland (6). In general, concentrations of HCH, HCB and DDE are low, close to the limit of detection.

4.3.2 Cod

Figure 8 in appendix VIII shows the average concentration on wet-weight basis of organic compounds in livers of 30-45 cm cod, caught in Icelandic waters in March every year between 1991 and 2008. Figures 9a-e in appendix VIII show the average

concentrations (w.w.) of some organic compounds in cod from different sampling sites, 1991-2007. The sum of seven PCBs (CB-28, CB-52, CB-101, CB-118, CB-138, CB-153 and CB-180) is about 90% of the 11 PCBs measured. The concentrations of the organic substances that are measured in cod from Icelandic waters correspond to the lowest values observed elsewhere (6).

V. Conclusion

This report contains the results of an evaluation of trace elements in Icelandic marine biota for the years 2007 and 2008. It adds to the information gathered every year to determine: if the concentration of trace elements is increasing, decreasing or not changing; if current situation is a cause for health concerns; and if the marine environment is being threatened by pollution**.**

This data has not been statistically evaluated in connection with previous results in order to evaluate time trend or spatial difference. However, there are apparently no obvious changes in contaminant concentrations pattern seen in previous years. **A full statistical analysis of all data is needed to confirm changes if any.** This was done in 1998 (6) but additional data collected over the last 10 years calls for a new methodical statistical evaluation of the existing Icelandic monitoring data. In addition, when comparing data of livers it is necessary to keep in mind the factors (i.e. fat, age, d.w.) that may affect the quantity and concentration of trace elements.

Iceland is unique in terms of geology, oceanography and meteorology. High levels of heavy metals, particularly cadmium, occur naturally in the environment in Iceland. Therefore, natural background values need to be kept in mind when comparing contamination levels with other countries.

VI. Acknowledgement

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Appendix I.

Biological measurements of Blue mussel (*Mytilus edulis*)

2007

Species:	**Blue mussel (*Mytilus edulis*)**	Date of sampling:	**15.08.07**
Length:	4-6 cm	Sampled by:	Marine Inst.
Location:	**Úlfsá/Sigurðarbúð, Skutulsfjordur**	Date of preparation:	25.07.08
Coordinates:	660355-231000	IFL#:	M-2008-02702

	Length (mm)	Width (mm)	Height (mm)	Total weight (g)	Weight soft body (g)	Weight shell (g)
1	46,9	21,9	20,7	13,01	6,59	6,25
2	49,2	22,2	20,4	12,92	6,10	6,61
3	49,3	23,4	23,1	16,45	7,91	8,32
4	47,8	22,2	20,8	11,67	5,07	6,31
5	45,8	22,3	18,4	9,02	4,58	4,21
6	52,9	22,5	25,5	18,58	9,64	8,69
7	60,1	26,6	24,7	18,06	8,35	9,43
8	53,6	25,8	22,9	17,44	8,96	8,25
9	55,2	24,9	26,4	20,16	8,84	11,1
10	54,5	25,0	25,8	22,53	11,36	10,68
11	45,7	22,1	19,9	12,81	5,97	6,70
12	52,3	24,6	20,9	15,25	7,94	7,20
13	49,2	22,6	20,7	14,53	7,36	7,08
14	51,3	22,4	24,4	17,44	8,67	8,67
15	51,5	23,3	21,7	14,59	8,53	5,94
16	53,4	24,7	23,9	19,48	10,23	9,12
17	55,9	25,1	24,1	21,78	9,62	12,02
18	57,2	27,6	23,9	21,98	11,79	10,04
19	54,2	26,1	23,2	20,57	10,35	10,14
20	55,4	27,0	23,8	18,54	10,46	7,82
21	44,4	21,5	19,4	10,60	5,71	4,74
22	45,9	21,4	20,0	11,42	5,80	5,54
23	50,7	23,7	22,0	15,50	8,01	7,38
24	51,8	24,7	21,2	15,30	8,36	6,73
25	55,4	23,9	23,5	9,73	9,36	10,25
26	49,4	21,2	27,7	18,45	8,76	9,64
27	55,2	24,3	26,3	21,41	10,66	10,62
28	52,1	24,1	23,0	17,08	8,80	8,13
29	53,6	25,2	23,1	18,57	9,51	8,89
30	48,3	21,9	19,5	12,85	6,55	6,17
31	47,9	22,4	20,8	12,18	6,71	5,36
32	53,4	23,4	21,8	14,50	7,33	6,98
33	49,5	23,7	21,2	13,10	7,61	5,44
34	50,8	24,6	20,6	14,35	7,36	6,93
35	43,9	19,1	20,6	11,71	5,96	5,68
36	45,1	23,6	19,2	10,74	5,47	5,21
37	49,7	23,7	21,3	14,74	5,96	8,59
38	54,0	25,5	22,4	17,64	8,61	8,88
39	50,5	24,1	22,2	15,11	8,17	6,83
40	42,6	21,4	19,0	10,08	5,14	4,80
41	47,8	21,5	20,6	11,46	5,11	6,20
42	46,5	22,5	23,0	13,50	7,17	6,16
43	55,5	23,9	23,7	19,52	8,94	10,44
44	56,2	28,1	22,2	20,05	10,14	9,82
45	46,1	21,7	20,0	11,00	5,76	5,08
46	46,5	21,9	20,0	10,99	5,67	5,03
47	44,0	22,2	17,8	9,01	4,68	4,09
48	51,4	24,5	23,5	17,30	7,03	4,86
49	51,5	25,8	24,6	17,45	8,91	8,30
50	51,1	23,8	21,2	15,46	7,70	7,64

	Length	Width	Height	Total weight	Weight soft body	Weight shell
Average	50,6	23,6	22,1	15,35	7,79	7,50
Stdev	4,0	1,8	2,2	3,72	1,84	2,03
Min	42,6	19,1	17,8	9,01	4,58	4,09
Max	60,1	28,1	27,7	22,53	11,79	12,02

Species:	**Blue mussel (*Mytilus edulis*)**	Date of sampling:	**29,08,07**
Length:	4-6 cm	Sampled by:	Marine. Inst. Í
Location:	**Eyri, Hvalfjordur**	Date of preparation:	18,09,08
Coordinates:	642005-214403	IFL#:	M-2008-03345

	Length (mm)	Width (mm)	Height (mm)	Total weight (g)	Weight soft body (g)	Weight shell (g)
1	54,0	25,0	22,0	16,06	8,78	7,09
2	51,0	23,0	22,0	8,35	5,87	6,20
3	40,0	21,0	16,0	6,80	3,67	2,45
4	43,0	21,0	16,0	7,02	4,02	2,88
5	40,0	20,0	16,0	6,35	3,63	2,60
6	40,0	17,0	15,0	5,03	2,89	2,08
7	40,0	20,0	17,0	6,38	3,41	2,83
8	45,0	20,0	20,0	10,26	5,65	4,44
9	46,0	23,0	18,0	10,23	5,52	4,67
10	58,0	24,0	25,0	26,08	11,97	13,87
11	66,0	27,0	30,0	30,59	16,91	13,65
12	55,0	24,0	24,0	17,63	8,38	8,53
13	56,0	24,0	24,0	18,14	9,08	8,78
14	42,0	22,0	21,0	9,30	4,66	4,40
15	44,0	23,0	17,0	8,21	3,93	3,70
16	40,0	20,0	15,0	5,55	2,76	2,56
17	43,0	22,0	16,0	6,92	3,35	3,29
18	40,0	20,0	14,0	5,71	2,82	2,74
19	40,0	20,0	16,0	8,01	4,26	3,55
20	40,0	20,0	17,0	5,95	3,41	2,39
21	40,0	20,0	14,0	5,39	2,34	2,39
22	40,0	20,0	14,0	6,85	4,11	2,66
23	43,0	21,0	16,0	7,68	4,19	3,32
24	40,0	17,0	16,0	5,30	2,88	2,29
25	41,0	20,0	15,0	6,58	3,85	2,64
26	34,0	20,0	15,0	8,78	2,03	1,69
27	35,0	20,0	13,0	4,45	2,68	1,69
28	35,0	16,0	14,0	3,77	2,14	1,58
29	38,0	18,0	13,0	5,77	3,41	2,24
30	35,0	18,0	16,0	3,88	2,13	1,69
31	36,0	17,0	13,0	7,00	3,82	3,14
32	38,0	18,0	20,0	4,60	2,71	1,79
33	33,0	19,0	14,0	4,89	2,80	1,30
34	37,0	18,0	14,0	4,36	2,75	1,65
35	36,0	17,0	14,0	4,25	2,46	1,71
36	36,0	17,0	13,0	4,00	2,24	1,74
37	36,0	17,0	14,0	4,34	2,30	1,73
38	37,0	17,0	13,0	4,56	2,58	1,76
39	38,0	19,0	14,0	4,84	2,78	2,03
40	34,0	18,0	14,0	3,75	2,21	1,48
41	36,0	16,0	12,0	4,40	2,45	1,95
42	36,0	16,0	13,0	4,45	2,71	1,61
43	36,0	20,0	14,0	4,35	2,99	1,94
44	36,0	17,0	14,0	4,29	2,39	1,69
45	36,0	17,0	14,0	5,40	3,02	2,34
46	35,0	16,0	15,0	4,30	2,19	2,09
47	37,0	16,0	14,0	4,18	2,48	2,68
48	35,0	16,0	13,0	4,16	2,25	1,82
49	36,0	17,0	13,0	4,07	2,20	1,84
50	35,0	15,0	13,0	3,99	2,02	1,77
	Length	**Width**	**Height**	**Total weight**	**Weight soft body**	**Weight shell**
Average	40,7	19,4	16,1	7,34	3,92	3,26
Stdev	7,0	2,8	3,8	5,43	2,76	2,73
Min	33,0	15,0	12,0	3,75	2,02	1,30
Max	66,0	27,0	30,0	30,59	16,91	13,87

Species:	**Blue mussel (*Mytilus edulis*)**	Date of sampling:	**28,08,2007**		
Length:	4-6 cm	Sampled by:	Marine Inst.		Í
Location:	**Hvítanes, Hvalfjörður**	Date of preparation:	17,09,2008		
Coordinates:	642185-212982	IFL#:	M-2008-03344		

	Length (mm)	Width (mm)	Height (mm)	Total weight (g)	Weight soft body (g)	Weight shell (g)
1	50,0	24,0	22,0	13,13	8,00	5,00
2	43,0	23,0	17,0	8,51	4,17	4,21
3	44,0	20,0	18,0	8,65	4,70	3,88
4	41,0	19,0	16,0	6,16	3,41	2,69
5	46,0	23,0	18,0	10,64	4,69	5,54
6	42,0	22,0	17,0	8,38	4,00	4,24
7	40,0	19,0	17,0	7,15	3,96	2,73
8	53,0	26,0	22,0	15,18	8,27	6,77
9	46,0	22,0	19,0	10,99	6,03	4,87
10	48,0	21,0	18,0	10,41	5,88	4,39
11	52,0	25,0	20,0	13,11	6,95	5,96
12	50,0	23,0	21,0	12,28	6,84	5,32
13	42,0	20,0	17,0	8,45	4,34	3,94
14	45,0	21,0	21,0	10,48	5,61	4,79
15	40,0	20,0	17,0	7,34	4,15	3,06
16	41,0	20,0	15,0	6,49	3,95	3,84
17	40,0	19,0	15,0	6,58	3,42	3,06
18	42,0	19,0	16,0	8,11	4,05	2,41
19	40,0	22,0	17,0	6,77	3,42	3,06
20	41,0	20,0	20,0	8,82	4,77	3,80
21	52,0	26,0	21,0	13,93	7,56	6,13
22	51,0	24,0	20,0	12,57	5,86	6,55
23	42,0	20,0	17,0	7,31	4,00	3,27
24	47,6	24,2	20,0	11,13	6,21	4,73
25	46,1	23,8	18,2	10,21	5,27	4,58
26	48,2	23,1	19,7	9,59	4,31	4,64
27	41,5	20,7	18,4	7,90	3,95	3,76
28	42,8	23,5	18,6	8,65	4,43	4,00
29	42,7	21,9	17,0	8,69	4,04	4,34
30	42,8	21,3	17,1	7,71	4,18	3,33
31	50,1	24,8	22,0	14,03	7,10	6,35
32	50,9	25,0	24,8	11,56	6,30	4,99
33	42,7	20,8	16,2	6,77	3,03	3,06
34	38,5	21,4	16,6	6,09	2,59	3,22
35	41,7	21,6	17,4	6,82	2,97	3,54
36	42,7	21,6	19,0	7,13	3,49	3,39
37	41,1	22,7	15,5	6,73	3,01	3,35
38	42,2	20,9	17,2	7,12	2,59	4,18
39	48,6	25,3	22,3	12,99	6,80	5,69
40	39,8	19,0	17,0	4,96	1,91	2,76
41	47,3	22,0	18,1	8,27	2,55	5,28
42	40,7	20,2	16,3	5,46	2,13	2,28
43	41,7	22,3	16,6	6,64	3,22	3,18
44	53,6	16,0	20,0	14,32	8,37	5,75
45	46,9	24,0	16,5	9,27	4,06	4,93
46	41,5	20,5	19,2	8,63	4,37	4,07
47	49,2	25,5	21,0	12,58	7,06	5,42
48	40,1	20,3	17,4	7,04	3,42	3,33
49	52,2	26,7	21,1	14,24	7,41	6,69
50	40,5	20,9	16,0	6,04	2,70	2,82
	Length	**Width**	**Height**	**Total weight**	**Weight soft body**	**Weight shell**
Average	44,7	22,0	18,4	9,24	4,71	4,26
Stdev	4,3	2,3	2,2	2,74	1,72	1,20
Min	38,5	16,0	15,0	4,96	1,91	2,28
Max	53,6	26,7	24,8	15,18	8,37	6,77

Species:	**Blue mussel (*Mytilus edulis*)**	Date of sampling:	**27.08.07**
Length:	4-6 cm	Sampled by:	Marine Inst. Í
Location:	**Hvassahraun**	Date of preparation:	11.09.08
Coordinates:	640121-220953	IFL#:	M-08-3282

	Length (mm)	**Width (mm)**	**Height (mm)**	**Total weight (g)**	**Weight soft body (g)**	**Weight shell (g)**
1	46,6	23,6	19,2	12,63	5,73	6,27
2	44,8	23,1	16,9	10,30	3,73	6,03
3	47,3	26,2	18,4	12,62	5,72	6,59
4	55,5	27,3	22,2	19,13	10,05	8,97
5	59,6	29,3	23,1	21,76	11,72	9,73
6	52,0	26,7	20,4	14,81	6,12	8,23
7	52,4	27,4	21,9	16,58	8,82	7,31
8	52,1	26,4	23,9	17,44	9,84	7,23
9	49,2	24,2	19,9	13,33	7,34	5,59
10	56,4	28,2	24,6	20,46	10,46	9,66
11	47,9	21,3	19,7	10,59	6,31	4,18
12	49,1	24,0	19,5	12,47	7,05	5,34
13	53,2	25,3	20,1	17,39	8,40	8,82
14	48,3	25,7	19,6	13,22	7,47	5,60
15	54,5	25,5	21,5	16,69	9,23	7,25
16	55,6	29,1	24,4	23,19	12,18	10,56
17	57,9	27,4	23,4	20,81	11,84	8,79
18	55,8	271,0	23,4	19,84	11,47	8,19
19	56,2	28,6	22,3	20,28	10,68	9,44
20	54,0	26,1	22,2	19,32	10,86	8,26
21	44,8	23,0	13,5	9,73	5,04	4,49
22	44,2	25,5	19,6	10,74	5,40	5,10
23	49,7	25,0	24,6	14,83	8,24	6,51
24	50,9	28,7	21,9	17,50	9,62	7,49
25	52,7	27,1	22,4	17,56	9,60	7,84
26	54,0	25,2	21,0	16,33	8,50	7,70
27	55,2	28,9	22,7	19,80	10,84	8,85
28	57,3	29,8	20,4	18,56	10,76	7,68
29	60,4	28,4	29,2	30,20	10,12	13,94
30	56,6	28,7	23,4	20,01	10,88	10,92
31	47,2	25,7	19,8	13,10	7,58	5,4
32	50,5	27,2	22,1	15,84	9,02	6,73
33	49,7	25,7	17,4	12,80	6,52	6,17
34	54,3	27,6	23,8	20,73	10,68	9,68
35	48,2	25,8	20,7	12,61	7,12	5,44
36	51,3	25,5	20,1	14,65	7,44	6,73
37	59,0	31,3	25,1	26,72	13,78	12,77
38	54,0	26,5	23,3	18,57	11,06	7,30
39	51,0	25,2	22,5	15,59	8,68	6,74
40	57,3	28,9	23,9	20,95	10,80	9,35
41	44,8	24,2	18,5	10,32	5,76	4,48
42	49,8	26,9	23,1	15,87	8,77	6,99
43	46,7	24,4	21,3	13,26	7,27	5,86
44	53,0	23,7	18,8	14,57	8,33	6,11
45	56,2	27,9	22,6	20,10	9,96	8,91
46	52,3	26,1	20,8	15,43	9,07	6,26
47	59,4	29,0	23,2	21,54	12,90	8,38
48	51,4	26,0	20,5	14,51	8,30	6,04
49	56,0	27,2	23,8	20,01	10,41	9,18
50	54,0	27,7	25,6	19,55	11,01	8,42
	Length	**Width**	**Height**	**Total weight**	**Weight soft body**	**Weight shell**
Average	52,4	31,4	21,6	16,90	8,97	7,59
Stdev	4,3	34,6	2,6	4,27	2,22	2,02
Min	44,2	21,3	13,5	9,73	3,73	4,18
Max	60,4	271,0	29,2	30,20	13,78	13,94

Species:	**Blue mussel (*Mytilus edulis*)**	Date of sampling:	**27.08.07**	
Length:	4-6 cm	Sampled by:	Marine Inst.	A
Location:	**Straumur, Straumsvík**	Date of preparation:	12.09.08	
Coordinates:	640254-220270	IFL#:	M-08-03295	

	Length (mm)	Width (mm)	Height (mm)	Total weight (g)	Weight soft body (g)	Weight shell (g)
1	43,1	20,3	17,5	8,55	4,56	3,80
2	45,0	22,3	18,5	8,70	4,93	3,74
3	47,6	23,1	20,2	11,90	6,53	5,14
4	45,6	23,6	18,2	10,03	5,52	4,14
5	52,5	24,4	22,2	15,78	9,44	6,20
6	48,2	24,3	21,4	11,91	7,00	4,70
7	55,7	24,9	22,1	18,65	9,54	9,02
8	53,5	24,2	24,6	17,65	10,14	7,42
9	55,8	24,5	20,6	17,79	9,39	8,16
10	55,4	24,3	29,2	22,43	12,61	9,59
11	45,7	22,2	18,6	10,39	5,68	4,57
12	44,5	23,0	17,8	9,41	5,14	4,16
13	44,5	21,3	18,0	8,88	4,81	3,79
14	50,3	24,9	19,5	12,71	7,14	5,41
15	56,0	25,2	22,7	18,69	10,29	8,35
16	56,1	22,6	24,0	18,11	10,05	7,87
17	55,5	25,6	23,4	19,92	10,40	9,35
18	56,9	25,4	26,6	20,07	12,48	9,53
19	59,1	25,6	22,4	19,38	11,09	8,15
20	44,7	21,7	21,3	16,13	7,93	8,80
21	46,8	22,0	18,8	10,93	6,05	4,78
22	44,2	20,8	19,2	9,37	5,20	4,02
23	43,9	24,6	18,2	9,67	5,65	3,92
24	43,0	21,8	19,2	9,58	5,63	3,82
25	49,9	23,7	17,9	11,58	6,51	4,90
26	45,6	23,4	17,9	9,16	5,41	3,60
27	43,7	22,2	18,3	8,09	4,68	3,32
28	49,8	19,3	20,7	11,07	6,49	4,46
29	55,7	24,9	23,2	18,40	10,33	7,92
30	52,8	24,8	20,1	14,59	8,45	6,07
31	44,5	20,9	19,3	10,17	5,97	4,04
32	48,6	22,6	20,6	11,86	6,65	5,01
33	49,9	26,9	20,7	16,49	7,93	5,49
34	53,6	22,1	22,9	16,69	8,53	7,99
35	56,7	22,1	24,3	19,01	10,34	8,57
36	60,2	25,1	22,0	19,80	10,47	9,26
37	58,4	23,1	24,0	18,67	9,70	8,73
38	59,3	29,3	24,6	21,05	12,39	8,08
39	56,5	22,8	25,7	19,21	10,78	8,23
40	55,4	24,9	23,9	17,86	10,17	7,46
41	44,5	20,4	19,9	10,69	5,46	4,93
42	45,0	22,9	18,5	10,08	5,63	4,40
43	55,9	25,9	22,1	17,53	9,45	7,29
44	55,8	25,6	21,7	18,50	9,41	8,89
45	60,1	25,7	23,1	19,78	10,78	8,28
46	60,0	27,6	26,9	18,56	11,72	6,71
47	60,5	25,3	23,0	19,33	11,11	8,04
48	58,4	26,6	27,6	27,08	12,76	14,12
49	58,1	25,7	24,5	20,73	12,23	8,27
50	60,6	25,1	26,5	24,13	13,79	10,21

	Length	Width	Height	Total weight	Weight soft body	Weight shell
Average	51,9	23,8	21,7	15,33	8,49	6,65
Stdev	5,9	2,0	2,9	4,85	2,65	2,35
Min	43,0	19,3	17,5	8,09	4,56	3,32
Max	60,6	29,3	29,2	27,08	13,79	14,12

Species:	**Blue mussel (*Mytilus edulis*)**	Date of sampling:	**30.08.07**
Length:	4-6 cm	Sampled by:	Marine Inst. A
Location:	**Mjoifjordur I (head)**	Date of preparation:	19.09.08
Coordinates:	651128-140048	IFL#:	M-2008-3358

	Length (mm)	Width (mm)	Height (mm)	Total weight (g)	Weight soft body (g)	Weight shell (g)
1	47,0	24,0	22,0	12,60	7,00	5,44
2	45,0	25,0	20,0	10,76	5,59	5,00
3	59,0	28,0	25,0	19,84	11,93	7,55
4	53,0	28,0	22,0	16,35	8,85	7,31
5	50,0	24,0	23,0	14,07	7,89	5,95
6	51,0	28,0	23,0	20,32	10,67	9,41
7	41,0	24,0	20,0	11,15	5,99	5,54
8	52,0	26,0	22,0	15,33	8,13	7,03
9	60,0	28,0	27,0	23,57	13,16	10,08
10	50,0	25,0	23,0	15,48	8,38	6,95
11	57,0	28,0	25,0	19,23	9,99	8,91
12	48,0	24,0	21,0	13,24	6,38	6,28
13	49,0	25,0	22,0	14,95	8,23	5,86
14	60,0	26,0	24,0	21,08	13,59	7,13
15	54,0	26,0	21,0	16,05	8,25	7,44
16	56,0	26,0	23,0	17,44	9,23	8,06
17	48,0	23,0	19,0	9,83	5,31	3,91
18	45,0	23,0	20,0	11,50	5,81	5,40
19	50,0	26,0	21,0	14,40	7,54	6,34
20	55,0	27,0	24,0	16,88	9,99	6,34
21	46,0	22,0	20,0	10,55	5,45	4,95
22	55,0	21,0	24,0	16,05	9,91	5,86
23	51,0	24,0	20,0	14,86	7,19	7,40
24	51,0	25,0	20,0	13,53	7,99	5,48
25	51,0	25,0	24,0	15,61	8,61	6,84
26	57,0	28,0	23,0	18,87	10,59	8,12
27	42,0	21,0	19,0	8,37	4,35	3,70
28	51,0	27,0	25,0	25,82	13,21	12,52
29	38,0	25,0	20,0	10,97	6,35	4,55
30	45,0	22,0	20,0	9,69	5,54	3,94
31	50,0	24,0	20,0	11,95	7,86	3,98
32	50,0	26,0	22,0	15,26	8,44	6,63
33	56,0	25,0	20,0	16,01	8,63	7,33
34	49,0	24,0	20,0	14,31	6,89	7,26
35	48,0	23,0	21,0	12,99	6,92	5,80
36	43,0	21,0	19,0	9,28	3,98	5,16
37	53,0	25,0	24,0	16,44	9,41	7,00
38	55,0	26,0	23,0	19,25	9,80	9,24
39	47,0	23,0	20,0	12,72	6,52	5,97
40	51,0	23,0	21,0	12,90	7,39	5,43
41	42,0	20,0	19,0	8,61	4,10	4,36
42	50,0	24,0	20,0	13,24	7,34	5,84
43	48,0	23,0	21,0	13,09	6,31	6,31
44	50,0	28,0	20,0	15,31	8,27	6,87
45	51,0	23,0	23,0	14,21	7,82	6,15
46	50,0	23,0	23,0	15,00	8,82	6,07
47	44,0	22,0	17,0	9,09	4,77	4,28
48	57,0	25,0	24,0	16,83	9,87	6,89
49	53,0	25,0	20,0	13,96	9,06	4,86
50	54,0	27,0	24,0	18,21	9,83	8,24
	Length		**Height**	**Total weight**	**Weight soft body**	**Weight shell**
Average	50,36	24,7	21,7	14,74	8,06	6,46
Stdev	5,0	2,1	2,1	3,75	2,25	1,71
Min	38,0	20,0	17,0	8,37	3,98	3,70
Max	60,0	28,0	27,0	25,82	13,59	12,52

Species:	**Blue mussel (*Mytilus edulis*)**	Date of sampling:	**30.08.07**		
Length:	4-6 cm	Sampled by:	Marine Inst.		A
Location:	**Mjoifjordur II, Hofsa, bryggja**	Date of preparation:	18.09.08		
Coordinates:	651216-134773	IFL#:	M-2008-3356		

	Length (mm)	Width (mm)	Height (mm)	Total weight (g)	Weight soft body (g)	Weight shell (g)
1	48,0	25,0	20,0	12,71	7,42	5,14
2	50,0	22,0	18,0	11,03	6,31	4,54
3	47,0	24,0	17,0	10,98	5,96	4,85
4	46,0	23,0	17,0	9,88	5,44	4,27
5	47,0	23,0	21,0	13,75	7,96	5,75
6	49,0	27,0	26,0	19,70	9,96	9,67
7	52,0	25,0	21,0	17,01	8,05	8,82
8	42,0	22,0	17,0	9,12	4,61	4,36
9	44,0	22,0	18,0	10,50	5,00	5,33
10	44,0	22,0	19,0	9,52	4,44	4,63
11	52,0	26,0	22,0	18,88	9,65	9,10
12	42,0	19,0	15,0	7,28	3,76	3,44
13	41,0	20,0	17,0	8,23	4,50	3,66
14	44,0	20,0	17,0	9,66	4,53	5,08
15	50,0	25,0	20,0	13,49	7,40	5,91
16	48,0	23,0	19,0	11,16	6,01	5,07
17	42,0	21,0	13,0	9,53	4,79	4,62
18	44,0	22,0	15,0	8,92	4,01	4,80
19	44,0	22,0	16,0	9,07	4,90	4,05
20	42,0	20,0	16,0	7,18	3,98	3,20
21	52,0	25,0	21,0	15,16	7,98	7,14
22	52,0	29,0	21,0	18,11	8,91	9,17
23	47,0	24,0	19,0	10,65	5,22	5,14
24	45,0	23,0	19,0	10,84	5,12	5,45
25	56,0	27,0	22,0	18,82	9,75	8,62
26	45,0	21,0	18,0	8,35	3,28	4,62
27	45,0	23,0	19,0	9,76	4,05	4,82
28	58,0	26,0	21,0	15,77	7,89	7,56
29	48,0	25,0	28,0	10,16	4,66	5,17
30	44,0	23,0	18,0	9,03	3,04	5,50
31	45,0	22,0	19,0	10,98	4,16	6,20
32	43,0	20,0	18,0	8,62	2,84	5,26
33	45,0	23,0	20,0	9,64	3,85	5,39
34	41,0	19,0	15,0	4,92	2,00	2,69
35	45,0	22,0	19,0	8,96	3,48	5,04
36	41,0	20,0	17,0	7,40	3,88	3,43
37	47,0	23,0	18,0	11,43	5,44	5,85
38	44,0	22,0	18,0	10,42	4,70	5,57
39	45,0	23,0	17,0	9,53	5,10	4,34
40	49,0	23,0	18,0	11,66	6,03	5,56
41	49,0	25,0	18,0	10,45	6,17	4,24
42	48,0	23,0	20,0	12,33	6,75	5,64
43	48,0	24,0	20,0	11,74	6,82	4,78
44	40,0	20,0	16,0	7,87	3,77	3,87
45	43,0	22,0	17,0	9,03	5,11	3,87
46	55,0	25,0	20,0	15,77	8,33	7,47
47	50,0	23,0	20,0	12,98	6,79	6,16
48	42,0	21,0	17,0	8,62	4,39	4,13
49	43,0	22,0	15,0	7,23	3,71	3,39
50						
	Length	**Width**	**Height**		**Weight soft body**	**Weight shell**
Average	46,39	22,88	18,61	11,10	5,55	5,35
Stdev	4,12	2,17	2,66	3,35	1,93	1,62
Min	40,00	19,00	13,00	4,92	2,00	2,69
Max	58,00	29,00	28,00	19,70	9,96	9,67

Species:	**Blue mussel (*Mytilus edulis*)**	Date of sampling:	**30,08,2007**
Length:	4-6 cm	Sampled by:	Marine Inst.
Location:	**Mjoifjordur III, Daltangi**	Date of preparation:	19,09,2008
Coordinates:	651610-133456	IFL#:	M-2008-3373

	Length (mm)	Width (mm)	Height (mm)	Total weight (g)	Weight soft body (g)	Weight shell (g)
1	50,0	23,0	22,0	14,83	5,80	8,43
2	54,0	24,0	24,0	14,33	6,92	7,30
3	47,0	23,0	20,0	10,12	4,06	5,67
4	50,0	25,0	22,0	14,31	5,59	7,61
5	52,0	23,0	21,0	10,98	4,83	6,05
6	48,0	23,0	19,0	9,93	4,60	5,21
7	48,0	23,0	20,0	12,82	7,11	5,61
8	46,0	22,0	20,0	9,37	3,92	5,37
9	47,0	22,0	19,0	10,30	5,08	5,09
10	44,0	20,0	18,0	8,63	4,64	3,76
11	43,0	23,0	16,0	8,81	4,67	4,04
12	44,0	20,0	18,0	9,51	4,87	4,39
13	43,0	18,0	19,0	6,29	2,39	3,63
14	42,0	21,0	20,0	7,86	3,89	3,59
15	40,0	20,0	16,0	7 ,68	3,35	3,98
16	50,0	25,0	22,0	13,63	5,35	8,04
17	50,0	22,0	20,0	14,11	7,36	6,60
18	50,0	25,0	22,0	16,24	7,61	8,41
19	47,0	25,0	20,0	12,57	7,68	4,77
20	48,0	22,0	20,0	10,83	5,70	4,85
21	47,0	21,0	20,0	11,75	6,03	6,54
22	45,0	23,0	20,0	12,30	5,45	6,54
23	44,0	21,0	20,0	4,89	5,25	4,41
24	44,0	23,0	17,0	8,36	3,40	4,60
25	45,0	20,0	17,0	8,80	3,92	4,20
26	43,0	22,0	18,0	7,07	2,72	3,87
27	43,0	22,0	17,0	7,06	2,90	3,76
28	41,0	20,0	19,0	8,42	3,43	3,90
29	45,0	21,0	18,0	7,27	2,03	4,43
30	40,0	19,0	15,0	5,12	2,06	2,74
31	44,0	20,0	20,0	10,39	5,47	4,71
32	42,0	21,0	20,0	8,71	3,82	4,73
33	40,0	20,0	18,0	7,05	4,30	2,6
34	40,0	20,0	18,0	5,80	2,92	2,8
35	44,0	23,0	18,0	8,96	3,65	5,1
36	44,0	21,0	18,0	10,24	4,80	5,20
37	43,0	23,0	20,0	12,19	4,95	6,93
38	47,0	21,0	20,0	15,18	5,60	9,25
39	48,0	22,0	27,0	19,78	6,99	12,25
40	52,0	25,0	22,0	18,06	7,27	10,22
41	52,0	25,0	20,0	17,25	7,86	9,04
42	52,0	24,0	22,0	15,90	8,20	7,55
43	50,0	24,0	22,0	16,29	7,81	8,37
44	46,0	24,0	23,0	15,28	7,64	7,30
45	46,0	20,0	21,0	11,87	6,74	4,98
46	48,0	23,0	20,0	12,57	6,13	6,31
47	45,0	21,0	20,0	10,69	5,60	4,95
48	44,0	23,0	19,0	10,54	5,32	5,08
49	42,0	20,0	19,0	9,44	4,59	4,40
50	46,0	22,0	17,0	8,80	4,40	
	Length	**Width**	**Height**	**Total weight**	**Weight soft body**	**Weight shell**
Average	45,9	22,1	19,7	11,05	5,13	5,70
Stdev	3,6	1,8	2,2	3,51	1,65	2,06
Min	40,0	18,0	15,0	4,89	2,03	2,60
Max	54,0	25,0	27,0	19,78	8,20	12,25

Species:	**Blue mussel (*Mytilus edulis*)**	Date of sampling:	**28.08.07**
Length:	4-6 cm	Sampled by:	Marine Inst. A
Location:	**Hvalstod, Hvalfjordur**	Date of preparation:	11.09.08
Coordinates:	642383-212721	IFL#:	M-2008-03281

	Length (mm)	Width (mm)	Height (mm)	Total weight (g)	Weight soft body (g)	Weight shell (g)
1	45,1	21,7	16,2	8,97	4,63	4,04
2	47,9	23,2	18,9	11,55	5,72	5,53
3	51,1	22,8	21,8	13,55	7,56	5,72
4	52,5	25,5	20,3	14,76	8,21	6,20
5	49,3	24,7	18,4	11,25	5,72	5,24
6	57,5	26,4	21,6	17,96	8,97	5,59
7	52,1	24,7	21,0	15,58	7,89	7,25
8	60,0	26,4	21,5	21,95	9,80	11,62
9	52,6	25,6	21,0	15,27	8,03	6,95
10	57,3	27,6	24,2	21,43	10,22	10,79
11	46,4	23,6	16,8	9,58	4,77	4,60
12	45,5	22,2	16,1	9,08	4,40	4,55
13	46,7	23,0	18,9	10,77	5,39	5,25
14	50,3	24,1	21,1	13,78	7,59	6,02
15	45,0	23,4	18,9	11,31	6,11	5,05
16	49,8	24,7	21,1	13,35	6,84	6,30
17	52,4	23,7	20,2	13,59	6,86	6,56
18	53,3	25,8	20,5	15,90	8,80	6,91
19	56,8	25,0	21,2	17,82	10,20	7,24
20	60,0	27,7	21,8	20,84	10,67	9,84
21	46,8	23,7	18,3	11,64	5,66	5,85
22	49,7	24,0	19,1	12,79	6,33	6,09
23	50,6	24,0	20,5	14,66	7,64	6,95
24	57,0	27,9	20,7	17,63	9,39	7,87
25	57,2	29,9	22,4	20,29	10,91	9,08
26	52,3	23,8	20,0	13,16	7,32	5,51
27	54,0	25,5	21,7	15,55	8,39	7,03
28	47,3	23,5	19,3	11,49	5,85	5,46
29	51,2	24,9	20,4	13,22	7,33	5,72
30	53,2	26,9	22,9	17,33	9,24	7,96
31	50,0	21,2	19,3	13,82	7,20	6,51
32	47,2	23,8	18,6	11,53	5,92	5,43
33	53,3	25,2	20,9	16,56	7,04	7,76
34	53,4	26,2	22,6	16,13	8,46	7,37
35	50,1	24,5	20,4	13,11	7,09	5,72
36	50,9	27,6	22,1	15,81	8,85	6,75
37	53,4	25,4	26,3	20,86	9,98	10,73
38	54,5	24,6	21,8	16,08	8,31	7,61
39	59,4	29,5	24,6	22,24	11,98	10,05
40	56,3	27,5	21,0	17,71	8,71	8,60
41	43,8	23,0	18,1	9,49	4,65	4,24
42	49,5	23,2	18,6	11,27	5,97	5,23
43	51,3	25,0	21,9	13,88	7,33	6,36
44	50,9	24,3	20,3	13,22	7,20	5,80
45	47,0	24,3	18,5	11,12	6,05	4,98
46	49,5	23,7	18,8	11,49	5,70	5,53
47	53,7	23,9	20,9	14,30	6,83	7,10
48	56,5	28,5	21,3	18,42	10,23	8,09
49	54,3	26,3	21,8	17,74	8,37	9,17
50	57,9	28,9	21,3	16,70	7,83	8,61
	Length	**Width**	**Height**	**Total weight**	**Weight soft body**	**Weight shell**
Average	51,9	25,1	20,5	14,75	7,60	6,81
Stdev	4,1	2,0	2,0	3,49	1,80	1,77
Min	43,8	21,2	16,1	8,97	4,40	4,04
Max	60,0	29,9	26,3	22,24	11,98	11,62

Species:	**Blue mussel (*Mytilus edulis*)**	Date of sampling:	**16.08.07**
Length:	4-6 cm	Sampled by:	Marine Inst. A
Location:	**Dvergasteinn, Álftafjörður**	Date of preparation:	24.07.08
Coordinates:	655909-230210	IFL#:	M-2008-2685

	Length (mm)	Width (mm)	Height (mm)	Total weight (g)	Weight soft body (g)	Weight shell (g)
1	43,7	21,8	17,2	7,69	3,98	3,40
2	43,1	22,7	19,9	8,47	4,55	3,64
3	46,2	22,9	18,9	8,29	4,72	3,34
4	40,3	19,6	17,4	4,42	1,88	2,37
5	40,0	19,0	15,2	4,57	2,32	2,01
6	45,4	22,4	19,7	6,43	2,63	3,63
7	43,9	21,2	17,0	5,21	2,70	2,34
8	43,0	21,9	19,8	5,74	2,55	2,97
9	43,6	19,7	18,4	5,58	2,73	2,68
10	43,8	22,0	20,2	7,53	2,81	4,47
11	40,4	20,7	18,5	8,00	4,40	3,41
12	44,4	20,9	17,8	7,26	4,50	2,63
13	45,2	22,4	19,4	9,61	5,65	3,78
14	41,0	20,3	18,4	6,91	4,47	2,37
15	46,1	23,4	22,0	10,97	6,66	4,19
16	44,9	23,2	18,2	6,92	3,20	3,48
17	47,1	22,2	17,1	8,45	4,98	3,19
18	44,9	21,6	18,3	7,55	4,45	2,95
19	43,6	22,7	17,8	8,00	4,30	3,54
20	50,6	26,3	20,4	11,20	6,34	4,72
21	40,0	19,3	16,6	5,61	3,11	2,30
22	40,0	21,8	16,0	5,44	2,81	2,49
23	42,3	21,1	17,3	7,53	4,29	3,09
24	43,6	22,3	17,2	7,53	4,80	2,63
25	43,0	21,2	18,3	7,67	4,58	2,98
26	40,6	19,5	15,6	4,63	2,03	2,34
27	45,5	24,1	19,2	10,15	5,95	4,02
28	45,5	24,2	16,2	7,86	4,58	3,15
29	47,5	23,5	19,9	9,11	4,34	4,62
30	55,3	26,1	24,0	14,59	8,11	6,34
31	45,4	20,7	20,1	9,31	4,12	5,04
32	41,3	22,4	16,6	6,25	3,37	2,70
33	40,1	22,6	15,9	5,51	2,45	2,82
34	41,2	23,1	18,4	9,31	5,19	4,00
35	41,3	17,9	16,6	5,68	2,61	2,80
36	42,5	22,3	17,9	7,63	4,04	3,37
37	45,5	21,3	19,9	8,50	4,78	3,56
38	41,3	22,0	17,7	6,09	2,97	2,89
39	42,4	19,4	18,2	6,38	3,13	3,00
40	46,4	22,7	19,7	8,41	3,29	4,89
41	41,6	21,0	17,7	4,94	1,83	2,68
42	40,7	20,2	18,0	6,95	4,34	2,39
43	40,4	19,4	17,3	5,64	3,18	2,30
44	44,0	20,3	16,8	6,16	3,44	2,48
45	41,4	21,1	16,4	5,90	3,12	2,48
46	41,9	19,3	17,8	7,90	3,42	4,31
47	44,7	23,1	17,1	7,86	4,65	3,06
48	43,1	16,9	20,8	8,38	4,68	3,53
49	45,0	21,1	16,3	5,63	2,85	2,54
50	40,5	20,2	15,9	5,39	3,05	2,18
	Length	**Width**	**Height**	**Total weight**	**Weight soft body**	**Weight shell**
Average	43,5	21,5	18,1	7,33	3,90	3,26
Stdev	2,9	1,8	1,7	1,94	1,29	0,88
Min	40,0	16,9	15,2	4,42	1,83	2,01
Max	55,3	26,3	24,0	14,59	8,11	6,34

Species:	**Blue mussel (*Mytilus edulis*)**	Date of sampling:	**31,08,07**		
Length:	4-6 cm	Sampled by:	Marine Inst.		A
Location:	**Grímsey**	Date of preparation:			
Coordinates:	663313-180141	IFL#:	M-2008-2672		

	Length (mm)	Width (mm)	Height (mm)	Total weight (g)	Weight soft body (g)	Weight shell (g)
1	46,1	23,2	19,6	11,58	5,31	6,02
2	50,5	23,2	22,4	17,32	8,30	8,91
3	54,8	25,3	24,6	22,61	10,04	12,45
4	47,4	23,8	20,2	13,11	6,64	6,19
5	52,6	24,5	22,9	18,73	9,59	8,78
6	56,3	26,0	23,9	20,47	9,33	10,75
7	50,5	25,3	22,3	17,16	8,06	8,65
8	48,6	24,8	19,4	11,38	5,30	5,70
9	44,6	22,2	18,9	10,96	5,08	5,44
10	47,6	23,1	20,2	14,99	6,07	8,48
11	43,6	22,4	18,3	10,71	4,63	6
12	45,7	22,3	17,7	9,64	4,05	5,42
13	43,4	22,7	21,2	13,04	5,55	7,19
14	43,2	20,9	19,1	10,92	3,89	6,89
15	51,8	23,9	21,1	16,32	7,28	8,93
16	51,6	26,1	21,3	12,29	4,75	7,35
17	55,9	26,0	22,2	17,54	9,16	8,24
18	58,8	28,9	23,7	21,86	11,52	10,15
19	55,6	28,0	26,8	22,07	11,22	10,67
20	44,7	20,7	18,4	11,23	4,59	6,43
21	51,8	24,5	20,4	14,91	7,20	7,48
22	49,6	21,7	19,6	12,81	6,50	6,17
23	51,5	25,8	20,9	16,90	8,57	8,14
24	51,0	23,4	20,7	13,63	6,49	6,88
25	51,9	26,2	21,5	16,50	8,23	8,04
26	51,6	25,9	21,8	16,11	7,38	8,29
27	51,3	24,3	20,6	14,41	7,82	6,38
28	52,7	26,9	23,5	18,79	9,88	8,54
29	55,5	24,6	21,7	19,86	9,37	10,28
30	59,1	30,4	24,4	25,45	13,21	11,9
31	47,2	21,2	20,7	9,71	4,68	4,88
32	48,8	22,4	20,3	13,39	6,45	6,66
33	44,0	21,2	15,7	8,61	3,80	4,64
34	48,9	23,5	19,4	12,95	6,15	6,4
35	46,1	21,1	18,7	10,31	4,58	5,37
36	50,7	25,1	19,0	13,36	6,43	6,56
37	51,4	24,6	19,6	15,43	6,93	8,05
38	60,0	27,7	26,3	23,49	13,51	9,75
39	51,1	22,8	21,6	15,44	7,45	7,77
40	48,7	23,5	21,9	14,82	7,12	7,46
41	44,7	22,3	16,7	10,30	5,16	7,85
42	45,5	22,2	20,9	10,22	4,16	5,7
43	50,3	23,2	23,4	16,09	8,13	7,81
44	57,3	24,2	24,0	20,94	9,72	11,01
45	52,2	23,2	22,5	16,86	8,43	8,29
46	49,9	22,7	22,6	15,82	7,87	7,75
47	53,8	22,0	22,2	16,51	7,85	8,49
48	59,7	29,3	22,4	21,49	10,08	11,09
49	59,5	25,9	26,4	23,98	10,47	13,24
50	59,1	26,2	26,5	21,17	9,78	11,22

	Length	Width	Height	Total weight	Weight soft body	Weight shell
Average	51,1	24,3	21,4	15,64	7,47	7,98
Stdev	4,7	2,3	2,5	4,31	2,39	2,04
Min	43,2	20,7	15,7	8,61	3,80	4,64
Max	60,0	30,4	26,8	25,45	13,51	13,24

Appendix II.

Biological measurements of Cod (*Gadus morhua*) 2008

Species:	**Cod (*Gadus Morhua*)**	**exped./station**		**date**	**n**
Location:	**North-Northwest of Iceland (1)**	B3-2008-177	**664952 -204362**	4.3.2008	25
Lenght:	30-45cm				
Ship:	Bjarni Sæmundsson				
Expd.leader:	Björn Ævar Steinsson				

Group	exped.-station	Weight jar MATIS g	Weight jar and liver g	Weight liver g	Weight ungutted fish, g	Sex 0=female 1=male	Lenght cm	Weight gutted fish, g	Weight fillets g	Age
H 1	77	98,57	105,88	7,31	329	0	33	271	87	3
	77	98,48	106,46	7,98	209	0	29	175	48	2
	77	98,31	108,79	10,48	373	1	35	311	89	3
	77	98,88	110,94	12,06	345	1	35	300	79	3
			Sum	37,83	1256,0		132,0	1057,0	303,0	11,0
			Average	9,46	314,0		33,0	264,3	75,8	2,8
			STDEV	2,21	72,3		2,8	61,8	19,0	0,5
			Min	7,31	209,0		29,0	175,0	48,0	2
			Max	12,06	373,0		35,0	311,0	89,0	3
H 2	77	98,98	112,80	13,82	368	1	35	312	95	3
	77	98,50	113,33	14,83	346	0	35	293	75	3
	77	98,38	113,63	15,25	364	1	35	306	90	3
	77	98,11	113,80	15,69	327	1	33	281	91	3
	77	98,28	114,41	16,13	231	1	30	186	45	2
	77	98,09	114,88	16,79	400	0	37	341	90	3
	77	98,49	116,31	17,82	298	0	33	253	69	3
			Sum	110,33	2334,0		238,0	1972,0	555,0	20,0
			Average	15,76	333,4		34,0	281,7	79,3	2,9
			STDEV	1,31	55,5		2,2	50,2	17,9	0,4
			Min	13,82	231,0		30,0	186,0	45,0	2
			Max	17,82	400,0		37,0	341,0	95,0	3
H 3	77	98,77	118,53	19,76	292	1	33	240	64	3
	77	98,90	121,30	22,40	379	1	36	304	77	3
	77	98,34	121,30	22,96	434	0	36	347	119	3
	77	98,42	121,48	23,06	336	1	32	272	88	3
	77	98,34	122,24	23,90	392	0	35	324	114	3
			Sum	112,08	1833,0		172,0	1487,0	462,0	15,0
			Average	22,42	366,6		34,4	297,4	92,4	3,0
			STDEV	1,58	54,4		1,8	42,3	23,6	0,0
			Min	19,76	292,0		32,0	240,0	64,0	3
			Max	23,90	434,0		36,0	347,0	119,0	3
H 4	77	98,91	127,31	28,40	397	0	36	331	90	3
	77	98,51	127,38	28,87	475	1	38	383	113	3
	77	98,51	133,21	34,70	436	1	37	369	106	3
	77	98,75	133,61	34,86	452	1	36	360	135	3
			Sum	126,83	1760,0		147,0	1443,0	444,0	12,0
			Average	31,71	440,0		36,8	360,8	111,0	3,0
			STDEV	3,55	32,8		1,0	22,0	18,7	0,0
			Min	28,40	397,0		36,0	331,0	90,0	3
			Max	34,86	475,0		38,0	383,0	135,0	3
H 5	77	97,93	135,63	37,70	544	1	40	472	127	3
	77	98,57	136,95	38,38	563	1	40	470	130	3
	77	98,23	139,71	41,48	489	1	38	404	130	3
			Sum	117,56	1596,0		118,0	1346,0	387,0	9,0
			Average	39,19	532,0		39,3	448,7	129,0	3,0
			STDEV	2,01	38,4		1,2	38,7	1,7	0,0
			Min	37,70	489,0		38,0	404,0	127,0	3,0
			Max	41,48	563,0		40,0	472,0	130,0	3,0
H 6	77	98,11	146,25	48,14	733	1	41	574	192	3
	77	98,53	148,25	49,72	556	0	38	449	139	3
			Sum	97,86	1289,0		79,0	1023,0	331,0	6,0
			Average	48,93	644,5		39,5	511,5	165,5	3,0
			STDEV	1,12	125,2		2,1	88,4	37,5	0,0
			Min	48,14	556,0		38,0	449,0	139,0	3,0
			Max	49,72	733,0		41,0	574,0	192,0	3,0
H1, H2, H3, H4, H5,H6			**Sum**	602,49	10068,00		886,00	8328,00	2482,00	73,00
			Average	24,10	402,72		35,44	333,12	99,28	2,92
			STDEV	12,23	114,04		2,93	90,51	32,22	0,28
			Min	7,31	209,00		29,00	175,00	45,00	2,00
			Max	49,72	733,00		41,00	574,00	192,00	3,00

Species:	**Cod (*Gadus Morhua*)**	**exped./station**			**date**	**n**
Location:	**North- Northwest of Iceland (2)**	TP1-2008-100	660683	-260548	13.3.2008	2
Lenght:	30-45cm	TP1-2008-101	661120	-255420	13.3.2008	3
Ship:	Páll Pálsson ÍS-102	TP1-2008-102	661675	-255104	14.3.2008	20
Expd.leader:	Hjalti Karlsson					
			661675	**-255104**		25

Group	exped.-station	Weight jar MATIS g	Weight jar and liver g	Weight liver g	Weight ungutted fish, g	Sex 0=female 1=male	Lenght cm	Weight gutted fish, g	Weight fillets g	Age
H 1	102	98,32	110,20	11,88	247	1	31,0	213,0	43	3
	101	98,20	112,22	14,02	600	1	41,0	537,0	161	4
	102	98,73	115,67	16,94	308	1	34,0	269,0	59	3
	102	98,78	118,39	19,61	510	0	40,0	445,0	154	3
	102	98,32	118,32	20,00	265	0	31,0	222,0	84	3
	102	98,42	118,95	20,53	481	0	38,0	414,0	166	3
			Sum	102,98	2411,0		215,0	2100,0	667,0	19,0
			Average	17,16	401,8		35,8	350,0	111,2	3,2
			STDEV	3,56	147,5		4,4	134,0	55,6	0,4
			Min	11,88	247,0		31,0	213,0	43,0	3
			Max	20,53	600,0		41,0	537,0	166,0	4
H 2	102	98,35	120,67	22,32	621	1	41,0	557,0	133	3
	102	98,85	122,14	23,29	533	1	40,0	461,0	171	3
	101	98,67	122,34	23,67	414	1	37,0	351,0	104	3
	102	98,44	122,99	24,55	423	0	37,0	369,0	109	3
	102	98,44	123,00	24,56	333	0	34,0	278,0	96	3
	102	98,46	125,58	27,12	456	0	39,0	393,0	31	3
	102	98,11	125,84	27,73	375	0	34,0	316,0	64	3
			Sum	173,24	3155,0		262,0	2725,0	708,0	21,0
			Average	24,75	450,7		37,4	389,3	101,1	3,0
			STDEV	1,99	97,9		2,8	93,9	45,3	0,0
			Min	22,32	333,0		34,0	278,0	31,0	3
			Max	27,73	621,0		41,0	557,0	171,0	3
H 3	102	98,37	129,60	31,23	563	1	39,0	484,0	141	3
	102	98,20	130,95	32,75	625	1	41,0	542,0	179	5
	101	98,65	132,12	33,47	430	1	36,0	361,0	123	3
	102	98,83	132,31	33,48	675	0	43,0	584,0	202	5
	100	98,56	133,77	35,21	466	0	34,0	383,0	127	3
	102	98,99	135,86	36,87	571	0	39,0	491,0	185	3
			Sum	203,01	3330,00		232,0	2845,0	957,0	22,0
			Average	33,84	555,00		38,7	474,2	159,5	3,7
			STDEV	1,97	92,92		3,3	87,4	33,4	1,0
			Min	31,23	430,00		34,0	361,0	123,0	3
			Max	36,87	675,00		43,0	584,0	202,0	5
H 4	102	98,69	146,84	48,15	720,0	1	42,0	612,0	190,0	4
	102	98,69	148,56	49,87	680,0	0	42,0	582,0	190,0	3
			Sum	98,02	1400,0		84,0	1194,0	380,0	7,0
			Average	49,01	700,0		42,0	597,0	190,0	3,5
			STDEV	1,22	28,3		0,0	21,2	0,0	0,7
			Min	48,15	680,0		42,0	582,0	190,0	3
			Max	49,87	720,0		42,0	612,0	190,0	4
H 5	102	98,53	155,15	56,62	819,0	1	43,0	696,0	227,0	4
	102	98,23	156,46	58,23	755,0	0	44,0	637,0	205,0	3
	102	99,20	157,56	58,36	762,0	1	45,0	644,0	217,0	4
	100	98,47	158,83	60,36	694,0	1	41,0	577,0	172,0	4
			Sum	233,57	3030,0		173,0	2554,0	821,0	15,0
			Average	58,39	757,5		43,3	638,5	205,3	3,8
			STDEV	1,53	51,1		1,7	48,7	23,9	0,5
			Min	56,62	694,0		41,0	577,0	172,0	3,0
			Max	60,36	819,0		45,0	696,0	227,0	4,0
H1, H2, H3, H4, H5			**Sum**	810,82	13326,00		966,0	11418,00	3533,00	84,00
			Average	32,43	533,04		38,64	456,72	141,32	3,36
			STDEV	14,70	161,9		3,9	138,7	55,8	0,6
			Min	11,88	247,0		31,0	213,0	31,0	3,0
			Max	60,36	819,00		45,00	696,00	227,00	5,00

Species:	**Cod (*Gadus Morhua*)**	**exped./station**			**date**	**n**
Location:	**Northeast of Iceland**	TB1-2008-151	662460	-123818	11.3.2008	25
Lenght:	30-45cm					
Ship:	Bjartur NK					
Expd.leader:	Jónbjörn Pálsson					

Group	exped.-station	Weight jar MATIS g	Weight jar and liver g	Weight liver g	Weight ungutted fish, g	Sex 0=female 1=male	Lenght cm	Weight gutted fish, g	Weight fillets g	Age
H 1	151	97,93	103,61	5,68	272	0	33,0	244,0	71	3
	151	98,53	104,87	6,34	201	0	30,0	176,0	106	3
	151	97,84	106,20	8,36	244	0	32,0	214,0	63	3
	151	98,38	108,15	9,77	247	0	32,0	214,0	45	3
	151	98,22	108,68	10,46	290	0	33,0	259,0	73	3
	151	98,64	109,15	10,51	243	0	32,0	211,0	58	3
	151	98,92	109,50	10,58	256	0	32,0	216,0	62	3
	151	98,55	109,25	10,70	246	1	32,0	208,0	67	3
			Sum	72,40	1999,0		256,0	1742,0	545,0	24,0
			Average	9,05	249,9		32,0	217,8	68,1	3,0
			STDEV	2,03	25,7		0,9	24,8	17,6	0,0
			Min	5,68	201,0		30,0	176,0	45,0	3
			Max	10,70	290,0		33,0	259,0	106,0	3
H 2	151	98,46	109,70	11,24	377	0	37,0	342,0	87	3
	151	98,23	111,05	12,82	291	0	33,0	236,0	70	3
	151	98,72	111,55	12,83	347	1	35,0	306,0	109	3
	151	97,90	111,09	13,19	584	0	43,0	525,0	153	4
	151	98,59	112,92	14,33	333	1	35,0	291,0	91	3
	151	98,23	112,80	14,57	306	1	33,0	254,0	105	3
	151	97,92	112,72	14,80	281	0	33,0	242,0	70	3
			Sum	93,78	2519,0		249,0	2196,0	685,0	22,0
			Average	13,40	359,9		35,6	313,7	97,9	3,1
			STDEV	1,26	104,3		3,6	100,6	28,7	0,4
			Min	11,24	281,0		33,0	236,0	70,0	3
			Max	14,80	584,0		43,0	525,0	153,0	4
H 3	151	99,06	114,07	15,01	325	1	35,0	284,0	80	5
	151	98,31	117,01	18,70	451	1	38,0	394,0	125	4
	151	98,54	120,71	22,17	430	1	39,0	376,0	104	3
	151	98,63	122,17	23,54	398	0	35,0	341,0	105	3
			Sum	79,42	1604,00		147,0	1395,0	414,0	15,0
			Average	19,86	401,00		36,8	348,8	103,5	3,8
			STDEV	3,82	55,15		2,1	48,5	18,4	1,0
			Min	15,01	325,00		35,0	284,0	80,0	3
			Max	23,54	451,00		39,0	394,0	125,0	5
H 4	151	98,49	123,35	24,86	702,0	0	45,0	634,0	172,0	4
	151	98,52	128,23	29,71	593,0	0	42,0	490,0	95,0	3
	151	98,82	130,45	31,63	687,0	0	44,0	504,0	147,0	4
	151	98,61	131,48	32,87	587,0	1	41,0	492,0	141,0	4
			Sum	119,07	2569,0		172,0	2120,0	555,0	15,0
			Average	29,77	642,3		43,0	530,0	138,8	3,8
			STDEV	3,52	60,7		1,8	69,6	32,1	0,5
			Min	24,86	587,0		41,0	490,0	95,0	3
			Max	32,87	702,0		45,0	634,0	172,0	4
H 5	151	98,53	136,23	37,70	682,0	1	43,0	586,0	187,0	4
	151	98,80	139,46	40,66	803,0	1	45,0	689,0	205,0	4
			Sum	78,36	1485,0		88,0	1275,0	392,0	8,0
			Average	39,18	742,5		44,0	637,5	196,0	4,0
			STDEV	2,09	85,6		1,4	72,8	12,7	0,0
			Min	37,70	682,0		43,0	586,0	187,0	4,0
			Max	40,66	803,0		45,0	689,0	205,0	4,0
H1, H2, H3, H4, H5			**Sum**	443,03	10176,00		912,00	8728,00	2591,00	84,00
			Average	17,72	407,04		36,48	349,12	103,64	3,36
			STDEV	9,9	177,6		4,8	149,4	42,7	0,6
			Min	5,7	201,0		30,0	176,0	45,0	3,0
			Max	40,66	803,00		45,00	689,00	205,00	5,00

Appendix III.

Quality assurance in metal analysis and persistent organochlorines analysis

Table 2. Results for trace metals in certified reference materials (mussel tissue 278 and Quasimeme R54) for the year 2007.

Analyte		QTM080BT Quasimeme R54 µg/g	I Z-scoreI	Mussel Tissue ERM-CE278 mg/kg	I Z-score*I	MLOD** mg/kg
As						0,3
	Measured	1,990		5,32 ± 0,48		
	Certified	2,456	-1,50	6,07 ± 0,13	-0,98	
Cd						0,03
	Measured	143,0		0,270 ± 0,007		
	Certified	161,4	-0,60	0,348 ±0,007	-1,7	
Cu						0,6
	Measured	719,0		6,90 ± 0,14		
	Certified	1132	-2,20	9,45 ± 0,13	-2,2	
Hg						0,03
	Measured	NA	-	0,200 ± 0,025		
	Certified			0,196 ± 0,009	-1,8	
Pb						0,03
	Measured	124,0		1,51 ± 0,02		
	Certified	140,9	-0,80	2.00 ± 0.04	-1,9	
Se						0,3
	Measured	479,0		2,13 ± 0,14		
	Certified	485,3	-0,10	1.84 ± 0.10	1,3	
Zn						1,5
	Measured	33,30		66,3 ± 1,5		
	Certified	37,10	-0,70	83.1 ± 1.7	1,6	

* Z-score ((mesarured value-certified value)/(certified value*0,125))
** MLOD is on dry weight basis
NA: not analyzed

Table 3. Results for trace metals in certified reference materials (DORM-2 and Quasimeme R56) for the year 2009.

Analyte		QTM081BT Quasimeme R56 µg/g	I Z-scoreI	DORM-2 NRC-CNRC mg/kg	I Z-score*I	MLOD** mg/kg
As						0,3
	Measured	1,550		17,2 ± 0,4		
	Certified	1,677	-0,60	18,0 ± 1,1	-0,36	
Cr						0,03
	Measured	55,00		26,3 ± 3,3		
	Certified	55,75	0,00	34,7 ± 2,5	-1,92	
Cu						0,6
	Measured	413,0		1,67 ± 0,08		
	Certified	729,6	-2,20	2,34 ± 0,16	-2,30	
Hg						0,03
	Measured	481,0		4,23 ± 0,03		
	Certified	585,8	-1,30	4,64 ± 0,26	0,71	
Se						0,3
	Measured	1470		1,60 ± 0,07		
	Certified	1568	-0,50	1,40 ± 0,09	1,15	
Zn						1,5
	Measured	4,17		21,5 ± 0,8		
	Certified	5,75	-0,90	25,6 ± 2,3	-1,27	

* Z-score ((mesarured value-certified value)/(certified value*0,125))

** MLOD is on dry weight basis

NA: not analyzed

Table 4. Qualitative assurance. Persistent organochlorines (ng/g ww) in a certified mussel sample from QUASIMEME, that were analysed with the mussel samples from 2007.

Blue mussel control								assign			
chemical	**CRM**	**weight basis**	anal. 1	anal. 2	anal. 3	**mean**	**SD**	value	**time**	I Z I	**det. Lim.**
CB28	**QOR091BT**	**wet weight**	0,18			**0,18**		0,14	**2 weeks**	1,34	0,01
CB31	**QOR091BT**	**wet weight**	0,12			**0,12**		0,10	**2 weeks**	0,78	0,01
CB52	**QOR091BT**	**wet weight**	0,27			**0,27**		0,27	**2 weeks**	0,00	0,01
CB101	**QOR091BT**	**wet weight**	1,15			**1,15**		1,09	**2 weeks**	0,40	0,01
CB105	**QOR091BT**	**wet weight**	0,19			**0,19**		0,17	**2 weeks**	0,60	0,01
CB118	**QOR091BT**	**wet weight**	0,97			**0,97**		0,92	**2 weeks**	0,39	0,01
CB138	**QOR091BT**	**wet weight**	2,37			**2,37**		2,32	**2 weeks**	0,17	0,01
CB153	**QOR091BT**	**wet weight**	3,76			**3,76**		3,61	**2 weeks**	0,32	0,01
CB156	**QOR091BT**	**wet weight**	0,08			**0,08**		0,08	**2 weeks**	0,00	0,01
CB180	**QOR091BT**	**wet weight**	**					0,18	**2 weeks**		0,02
HCB	**QOR091BT**	**wet weight**	0,04			**0,04**		0,04	**2 weeks**	0,00	0,01
a-HCH	**QOR091BT**	**wet weight**	<0,02					0,02	**2 weeks**	-1,60	0,02
b-HCH	**QOR091BT**	**wet weight**	0,04			**0,04**			**2 weeks**		0,02
g-HCH	**QOR091BT**	**wet weight**	0,04			**0,04**		0,05	**2 weeks**	-0,55	0,02
pp'-DDE	**QOR091BT**	**wet weight**	0,68			**0,68**		0,65	**2 weeks**	0,32	0,01
pp'-DDD	**QOR091BT**	**wet weight**	0,26			**0,26**		0,20	**2 weeks**	1,61	0,01
pp'-DDT	**QOR091BT**	**wet weight**	0,04			**0,04**		*0,07*	**2 weeks**	*	0,02
op'-DDT	**QOR091BT**	**wet weight**	<0,1					*0,07*	**2 weeks**	*	0,02
transn-chlor	**QOR091BT**	**wet weight**	0,06			**0,06**		0,05	**2 weeks**	0,53	0,01
* "assigned value" only "indicative". Quasimeme does not assign %error and thus Z-score can not be calculated.											
**interferences in sample											
a- and g-chlordane, oxychlordane and toxaphenes are not certified in this sample by quasimeme											

Table 5. Qualitative assurance. Persistent organochlorines (ng/g ww) in a certified cod liver sample from QUASIMEME, that were analysed with the cod liver samples from 2008.

Cod liver control								assign			
chemical	**CRM**	**weight basis**	anal. 1	anal. 2	anal. 3	**mean**	**SD**	value	**time**	I Z I	**det. Lim.**
CB28	**QOR086BT**	**wet weight**	10,6	10,3	10,1	**10,3**	**0,23**	9,64	**2 weeks**	0,56	0,20
CB31	**QOR086BT**	**wet weight**	4,01	4,06	4,01	**4,03**	**0,03**	3,86	**2 weeks**	0,34	0,20
CB52	**QOR086BT**	**wet weight**	26,4	24,3	25,6	**25,4**	**1,02**	23,8	**2 weeks**	0,55	0,10
CB101	**QOR086BT**	**wet weight**	68,4	65,4	65,7	**66,5**	**1,67**	65,3	**2 weeks**	0,14	0,20
CB105	**QOR086BT**	**wet weight**	18,4	18,4	18,7	**18,5**	**0,17**	17,1	**2 weeks**	0,65	0,05
CB118	**QOR086BT**	**wet weight**	71,8	69,0	74,6	**71,8**	**2,80**	73,1	**2 weeks**	-0,15	0,05
CB138	**QOR086BT**	**wet weight**	138	134	140	**137**	**3,2**	136	**2 weeks**	0,09	0,05
CB153	**QOR086BT**	**wet weight**	212	203	214	**210**	**5,7**	220	**2 weeks**	-0,37	0,05
CB156	**QOR086BT**	**wet weight**	8,48	7,91	6,45	**7,61**	**1,05**	8,59	**2 weeks**	-0,90	0,05
CB180	**QOR086BT**	**wet weight**	47,1	45,9	47,1	**46,7**	**0,69**	45,5	**2 weeks**	0,21	0,05
HCB	**QOR086BT**	**wet weight**	14,2	13,6	14,3	**14,0**	**0,35**	13,5	**2 weeks**	0,31	0,05
a-HCH	**QOR086BT**	**wet weight**	1,76	1,56	1,60	**1,64**	**0,11**	1,54	**2 weeks**	0,49	0,05
b-HCH	**QOR086BT**	**wet weight**	1,89	1,80	1,82	**1,84**	**0,05**	1,83	**2 weeks**	0,03	0,05
g-HCH	**QOR086BT**	**wet weight**	1,06	0,90	1,16	**1,04**	**0,13**	1,03	**2 weeks**	0,07	0,05
pp'-DDE	**QOR086BT**	**wet weight**	91,9	86,2	88,2	**88,8**	**2,88**	83,3	**2 weeks**	0,52	0,10
pp'-DDD	**QOR086BT**	**wet weight**	28,2	26,7	27,0	**27,3**	**0,81**	26,0	**2 weeks**	0,40	0,10
pp'-DDT	**QOR086BT**	**wet weight**	0,84	0,62	0,64	**0,70**	**0,12**	*0.61*	**2 weeks**	*	0,20
op'-DDT	**QOR086BT**	**wet weight**	2,26	1,90	2,17	**2,11**	**0,19**	*0.18*	**2 weeks**	*	0,20
transn-chlor	**QOR086BT**	**wet weight**	7,89	7,98	8,20	**8,02**	**0,16**	7,80	**2 weeks**	0,23	0,05
* "assigned value" only "indicative". Quasimeme does not assign %error and thus Z-score can not be calculated.											
a- and g-chlordane, oxychlordane and toxaphenes are not certified in this sample by quasimeme											

Table 6. Detection limits* (ng/g)

	Detection limits	
chemical	**mussel ng/g sample dw**	**Cod liver ng/g sample ww**
a-HCH	0,05	0,05
HCB	0,01	0,05
b-HCH	0,10	0,05
g-HCH	0,10	0,16
PCB-31	0,10	0,20
PCB-28	0,10	0,20
PCB-52	0,10	0,10
oxychlordane	0,05	0,20
gamma-Chl.	0,10	0,05
PCB-101	0,10	0,20
alfa-Chl.	0,05	0,05
transnonachlor	0,05	0,05
4,4'-DDE	0,10	0,10
tox 26	0,05	0,10
PCB-118	0,05	0,05
4,4'-DDD	0,10	0,12
2,4'-DDT	0,1-0,2	0,20
PCB-153	0,05	0,05
PCB-105	0,05	0,05
4,4'-DDT	0,10	0,20
PCB-138	0,05	0,05
tox 50	0,10	0,10
PCB-156	0,05	0,05
PCB-180	0,20	0,12
tox 62	0,10	0,20
PCB-170	0,05	0,05
PBDE-47	0,10	0,20
PBDE-100	n.a.	0,20
PBDE-99	0,10	0,20

*detection limits are 3 x std of blanks, or 3 x noise level or higher when other peaks interfer.

Appendix IV.

Results of trace metal analysis for Blue mussel (*Mytilus edulis*) 2007 and Cod(*Gadus Morhua*) 2008

Table 7. Results of trace metals in Blue mussel *(Mytilus edulis)* 2007 (dw)

Samples	Fat		Dry matter		Pb, mg/kg		Cd, mg/kg		Cu, mg/kg		Zn, mg/kg		As, mg/kg		Se, mg/kg		Hg, mg/kg	
	%	±	%	±	dw	±	dw	±	dw	±	dw	±	dw	±	dw	±	dw	±
Grímsey 07	0,20	0,40	7,4	0,4	0,227	0,010	4,10	0,24	3,08	0,16	154	8	9,71	0,27	1,97	0,05	0,161	0,012
Hvassahraun 07	0,30	0,40	9,90	0,40	0,514	0,022	0,791	0,055	5,68	0,19	130	10	16,2	1,0	2,18	0,05	0,052	0,004
Hvítanes, Hvalfjörður 07	0,70	0,40	12,10	0,40	0,122	0,007	1,15	0,04	3,89	0,16	77,2	2,2	6,75	0,08	2,36	0,02	0,030	0,001
Eyri, Hvalfjördur 07	0,40	0,40	10,10	0,40	0,049	0,003	1,19	0,05	5,62	0,38	101	5	7,03	0,16	2,59	0,03	0,069	0,007
Hvalstöd, Hvalfjörður 07	0,10	0,40	7,0	0,4	0,056	0,001	1,14	0,04	4,13	0,13	101	3	7,18	0,16	2,23	0,02	0,050	0,002
Mjóifjörður, Hofsá (Brekka) 07	0,30	0,40	7,80	0,40	0,206	0,015	1,95	0,12	6,80	0,58	158	11	9,14	0,18	2,97	0,09	0,101	0,009
Mjóifjörður, Dalatangi 07	0,20	0,40	8,50	0,40	0,093	0,003	1,33	0,03	3,36	0,09	107	1	10,7	0,1	1,88	0,002	0,095	0,007
Mjóifjörður, head (Botn) 07	0,30	0,40	7,80	0,40	0,086	0,005	1,34	0,09	3,60	0,26	79,5	4,4	7,93	0,28	2,13	0,09	0,055	0,001
Úlfsá, Skutulsfjördur 07	0,20	0,40	6,30	0,40	0,640	0,031	0,893	0,015	4,26	0,29	99,0	4,3	60,9	0,4	2,16	0,04	0,101	0,019
Dvergasteinn, Álftafjördur 07	0,40	0,40	9,40	0,40	0,180	0,009	3,12	0,07	5,23	0,10	96,8	1,6	8,27	0,10	3,19	0,05	0,052	0,002
Straumur, Straumsvík 07	0,50	0,40	9,80	0,40	0,071	0,005	1,65	0,10	2,96	0,16	88,2	5,4	8,00	0,35	2,65	0,04	0,040	0,002
Limit of detection for samples (MLOD)					0,03		0,03		0,60		1,5		0,3		0,30		0,03	

Table 8. Results of trace metals in liver and flesh of Cod (*Gadus morhua*) 2008 (ww)

Sample		Fat %		Dry matter %		Pb, mg/kg	Cd, mg/kg		Cu,mg/kg		Zn, mg/kg		As, mg/kg		Se, mg/kg		Dry matter %		Fat %		Hg, mg/kg	
		Liver	±	Liver	±	Liver	Liver	±	Liver	±	Liver	±	Liver	±	Liver	±	Flesh*	±	Flesh*	±	Flesh*	±
Cod N-NW (1) 08																						
	Group 1	37,4	2,8	51,3	2,3	< 0,02	0,265	0,003	2,21	0,02	11,1	0,2	5,98	0,06	1,15	0,01						
	Group 2	52,6	2,8	63,8	2,3	< 0,02	0,236	0,009	2,48	0,13	8,35	0,47	5,96	0,26	0,788	0,017						
	Group 3	51,9	2,8	63,2	2,3	< 0,02	0,149	0,004	2,06	0,05	7,65	0,81	5,50	0,19	0,749	0,036						
	Group 4	59,7	2,8	69,6	2,3	< 0,02	0,150	0,005	2,29	0,08	7,06	0,25	5,16	0,22	0,657	0,040						
	Group 5	56,8	2,8	67,1	2,3	< 0,02	0,187	0,004	1,99	0,03	8,35	0,32	5,07	0,24	0,789	0,016						
	Group 6	58,6	2,8	69,7	2,3	< 0,02	0,090	0,001	2,42	0,20	8,63	1,28	5,25	0,07	0,712	0,016						
	Average						**0,179**		**2,24**		**8,52**		**5,49**		**0,808**		**19,2**	1,2	**0,20**	0,06	**0,024**	0,001
Cod N-NW (2) 08																						
	Group 1	60,2	2,8	69,4	2,3	< 0,02	0,317	0,002	2,66	0,03	9,74	0,12	4,94	0,33	0,801	0,031						
	Group 2	60,9	2,8	70,1	2,3	< 0,02	0,298	0,006	2,82	0,07	9,55	0,27	5,18	0,19	0,724	0,033						
	Group 3	65,7	2,8	74,5	2,3	< 0,02	0,226	0,004	2,66	0,06	8,99	0,15	5,29	0,20	0,656	0,040						
	Group 4	67,9	2,8	75,3	2,3	< 0,02	0,148	0,009	2,09	0,18	8,11	0,81	3,13	0,13	0,534	0,022						
	Group 5	70,0	2,8	77,5	2,3	< 0,02	0,218	0,004	3,11	0,04	8,82	0,42	4,58	0,16	0,609	0,045						
	Average						**0,242**		**2,67**		**9,05**		**4,62**		**0,665**		**19,5**	1,2	**0,13**	0,06	**0,041**	0,001
Cod NA 08																						
	Group 1	42,1	2,8	56,5	2,3	< 0,02	0,205	0,009	2,76	0,20	13,9	0,8	8,91	0,28	1,24	0,04						
	Group 2	42,1	2,8	56,0	2,3	< 0,02	0,167	0,001	2,97	0,01	12,5	0,2	7,80	0,03	1,09	0,01						
	Group 3	53,5	2,8	64,9	2,3	< 0,02	0,182	0,003	2,39	0,02	10,7	0,3	6,60	0,25	0,985	0,045						
	Group 4	51,3	2,8	62,6	2,3	< 0,02	0,131	0,004	3,19	0,16	11,8	0,6	6,66	0,12	1,00	0,06						
	Group 5	52,5	2,8	64,0	2,3	< 0,02	0,136	0,001	3,13	0,05	9,58	0,52	5,54	0,12	0,911	0,035						
	Average						**0,164**		**2,89**		**11,7**		**7,10**		**1,048**		**19,3**	1,2	**0,26**	0,06	**0,023**	0,001
Average of all measurements							0,194		2,58		9,68		5,72		0,838						0,029	
Limit of detection for samples (MLOD)						0,02	0,020		0,20		0,20		0,02		0,06						0,02	

*Flesh was pooled into one sample

Appendix V.

Results of organochlorine analysis for Blue mussel (*Mytilus edulis*) 2007 and Cod (*Gadus morhua*) 2008

Table 9. Persistent organochlorines in Blue mussel (*Mytulis edulis* , ng/g dw) 2007

	Grímsey 07	Úlfsá 07	Dvergasteinn 07	Dalatangi 07	Brekka 07			Botn 07
					A	B	mean*	
PCB28	**0,18**	**<0,1**	**<0,1**	**0,11**	0,13	0,12	**0,13**	**0,15**
PCB31	**<0,1**	**<0,1**	**<0,1**	**<0,1**	0,11	0,09	**0,10**	**0,11**
PCB52	**<0,1**	**0,17**	**0,41**	**0,35**	0,34	0,32	**0,33**	**0,33**
PCB101	**<0,1**	**0,77**	**1,27**	**0,43**	0,64	0,66	**0,65**	**0,21**
PCB105	**<0,05**	**0,14**	**0,35**	**0,14**	<0,05	<0,05	**<0,05**	**0,05**
PCB118	**0,13**	**0,50**	**1,15**	**0,36**	0,46	0,47	**0,47**	**0,17**
PCB138	**0,13**	**1,05**	**0,98**	**0,33**	2,08	2,06	**2,07**	**0,18**
PCB153	**0,50**	**1,58**	**1,20**	**0,58**	2,33	2,33	**2,33**	**0,46**
PCB156	**<0,1**	**<0,1**	**0,12**	**<0,1**	0,12	0,11	**0,12**	**<0,1**
PCB170	**<0,1**	**<0,1**	**<0,1**	**<0,1**	<0,1	<0,1	**<0,1**	**<0,1**
PCB180	**<0,2**	**0,32**	**<0,2**	**<0,2**	0,24	0,20	**0,22**	**<0,2**
Σ3PCB**	**0,76**	**3,1**	**3,3**	**1,3**	4,9	4,9	**4,9**	**0,81**
HCB	**0,08**	**0,23**	**0,09**	**0,09**	0,14	0,13	**0,14**	**0,13**
a-HCH	**0,15**	**0,09**	**0,13**	**0,18**	0,22	0,22	**0,22**	**0,26**
b-HCH	**<0,1**	**<0,1**	**<0,1**	**<0,1**	<0,1	<0,1	**<0,1**	**<0,1**
g-HCH	**<0,1**	**<0,1**	**<0,1**	**<0,1**	0,15	0,12	**0,14**	**0,16**
p,p'-DDE	**0,36**	**0,38**	**0,26**	**0,20**	0,69	0,67	**0,68**	**0,33**
p,p'-DDD	**<0,1**	**0,12**	**<0,1**	**<0,1**	0,15	0,11	**0,13**	**<0,1**
*p,p'-DDT***	*(0,21)*	*(0,21)*	*(0,34)*	*(0,22)*	*(0,49)*	*(0,50)*	*(0,50)*	*(0,47)*
o,p'-DDT***	<0,2	<0,2	<0,2	<0,2	<0,2	<0,2	<0,2	<0,2
PCB153/DDE	**1,4**	**4,2**	**4,6**	**2,9**	3,4	3,5	**3,4**	**1,4**
transnonachlor	**0,12**	**0,20**	**0,17**	**0,11**	0,36	0,38	**0,37**	**0,20**
a-chlordan	**0,12**	**0,08**	**0,12**	**0,08**	0,18	0,18	**0,18**	**0,15**
g-chlordan	**<0,1**	**<0,1**	**<0,1**	**<0,05**	0,09	0,10	**0,10**	**0,07**
oxychlordan	**<0,05**	**<0,05**	**<0,05**	**<0,05**	<0,05	<0,05	**<0,05**	**<0,05**
Tox-26	**0,08**	**0,15**	**0,22**	**0,18**	0,33	0,34	**0,34**	**0,29**
Tox-50	**0,46**	**0,34**	**0,58**	**0,35**	0,84	0,76	**0,80**	**0,83**
Tox-62	**<0,1**	**<0,1**	**<0,1**	**<0,1**	0,19	0,19	**0,19**	**0,11**
PBDE-47	**<0,1**	**0,56**	**<0,1**	**<0,1**	0,12	0,12	**0,12**	**<0,1**
PBDE-99	**<0,1**	**0,23**	**<0,1**	**<0,1**	<0,1	<0,1	**<0,1**	**<0,1**
% extracted fat	**0,32**	**0,27**	**0,54**	**0,29**	0,35	0,40	**0,38**	**0,40**
% fat (IFL)	***0,2***	***0,2***	***0,4***	***0,2***			***0,3***	**0,3**
% dw (IFL)	***7,4***	***6,3***	***9,4***	***8,5***			***7,8***	**7,8**

*Mean of two analysis A and B performed one week apart

** PCB # 118, 138 and 153

*** Values are highly suspect and these are not certified in QUASIMEME blue mussel

Table 9. Persistent organochlorines in Blue mussel (*Mytulis edulis* , ng/g dw) 2007

	Hvalstöð 07	Hvítanes 07	Hvassahraun 07	Eyri 07	Straumur 07
PCB28	**0,36**	**0,26**	**<0,1**	**0,13**	**<0,1**
PCB31	**0,23**	**0,22**	**<0,1**	**<0,1**	**<0,1**
PCB52	**0,44**	**0,41**	**<0,1**	**0,24**	**0,17**
PCB101	**0,87**	**0,87**	**0,23**	**0,74**	**0,97**
PCB105	**0,18**	**0,17**	**<0,05**	**0,14**	**0,22**
PCB118	**0,84**	**0,65**	**0,23**	**0,63**	**0,81**
PCB138	**1,47**	**1,15**	**0,33**	**1,02**	**1,71**
PCB153	**2,43**	**1,75**	**0,61**	**1,51**	**2,43**
PCB156	**<0,1**	**<0,1**	**<0,1**	**0,14**	**<0,1**
PCB170	**<0,1**	**<0,1**	**<0,1**	**<0,1**	**<0,1**
PCB180	**<0,2**	**<0,2**	**<0,2**	**<0,2**	**<0,2**
Σ3PCB**	**4,7**	**3,6**	**1,2**	**3,2**	**5,0**
HCB	**0,12**	**0,10**	**0,06**	**0,13**	**0,15**
a-HCH	**0,20**	**0,21**	**<0,05**	**0,17**	**0,14**
b-HCH	**<0,1**	**<0,1**	**<0,1**	**<0,1**	**<0,1**
g-HCH	**0,13**	**0,18**	**<0,1**	**0,10**	**<0,1**
p,p'-DDE	**0,98**	**0,52**	**0,17**	**0,49**	**0,91**
p,p'-DDD	**0,24**	**0,15**	**<0,1**	**0,17**	**0,49**
*p,p'-DDT****	*(0,47)*	*(0,37)*	*(0,12)*	*(0,47)*	*(1,08)*
o,p'-DDT***	<0,1	<0,2	<0,1	<0,2	*(0,28)*
PCB153/DDE	**2,5**	**3,4**	**3,6**	**3,1**	**2,7**
transnonachlor	**0,36**	**0,21**	**0,08**	**0,24**	**0,29**
a-chlordan	**0,21**	**0,18**	**<0,05**	**0,17**	**0,20**
g-chlordan	**<0,1**	**0,14**	**<0,05**	**0,06**	**0,05**
oxychlordan	**<0,05**	**<0,05**	**<0,05**	**<0,05**	**<0,05**
Tox-26	**0,34**	**0,27**	**0,07**	**0,27**	**0,35**
Tox-50	**0,80**	**0,82**	**0,16**	**0,67**	**0,83**
Tox-62	**<0,1**	**<0,1**	**<0,1**	**<0,1**	**<0,1**
PBDE-47	**0,42**	**0,30**	**<0,1**	**0,44**	**0,55**
PBDE-99	**<0,1**	**<0,1**	**<0,1**	**<0,1**	**<0,1**
% extracted fat	**0,43**	**0,79**	**0,28**	**0,57**	**0,61**
% fat (IFL)	***0,1***	***0,7***	***0,3***	***0,4***	***0,5***
% dw (IFL)	***7,0***	***12,1***	***9,9***	***10,1***	***9,8***

** PCB # 118, 138 and 153

*** Values are highly suspect and these are not certified in QUASIMEME blue mussel

Table 10 a. Persistent organochlorines in cod liver 2008 (ng/g ww)

	COD N-NW(1)	COD N-NW(1)	COD N-NW(1)	COD N-NW(1)	COD N-NW(1)		COD N-NW(1)	COD N-NW(1)
	H1	H2	H3	H4	H5 A	H5 B	H5*	H6
PCB28	1,2	1,7	1,6	1,7	1,9	1,9	1,9	1,5
PCB31	0,71	1,1	0,96	1,2	1,3	1,3	1,3	1,0
PCB52	3,2	4,4	4,3	4,8	4,8	5,2	5,0	3,5
PCB101	5,3	5,6	5,3	5,1	***	5,2	5,2	3,1
PCB105	2,5	2,7	2,5	2,5	2,8	3,1	3,0	1,5
PCB118	7,3	7,0	6,6	6,6	7,4	7,6	7,5	3,9
PCB138	10,1	9,6	8,4	9,2	***	10,0	10,0	5,0
PCB153	16,3	15,5	14,2	14,1	***	19,8	19,8	7,9
PCB156	0,82	0,91	0,82	0,79	***	1,20	1,2	0,46
PCB170	1,2	1,1	1,0	0,99	***	1,8	1,8	0,48
PCB180	3,8	3,4	2,9	2,7	***	6,4	6,4	1,2
Σ7PCB**	47,2	47,2	43,3	44,2		56,1	55,8	26,1
HCB	8,5	12,8	12,2	14,2	13,9	14,6	14,3	11,4
a-HCH	2,1	3,3	3,5	3,7	3,5	3,4	3,5	3,5
b-HCH	0,49	0,82	0,85	0,94	0,92	0,96	0,94	0,93
g-HCH	0,57	0,91	0,98	1,1	0,98	1,0	0,99	0,97
p,p'-DDE	31,2	30,5	29,1	30,9	31,5	31,8	31,7	17,8
p,p'-DDD	9,0	11,3	11,3	12,2	12,0	12,1	12,1	8,8
p,p'-DDT****	3,7	4,0	4,0	4,3	4,7	***	4,7	2,7
o,p'-DDT****	1,3	2,7	2,9	2,7	2,8	2,9	2,9	1,3
ΣDDT	45,2	48,5	47,3	50,1	51,0		51,3	30,6
PCB153/DDE	0,52	0,51	0,49	0,46		0,62	0,62	0,44
transnonachlor	14,6	16,9	15,7	17,2	15,4	16,6	16,0	10,5
a-chlordan	8,8	13,2	12,1	13,4	12,9	14,2	13,6	11,3
g-chlordan	2,5	3,9	3,7	4,1	3,8	4,5	4,2	3,4
oxychlordan	3,0	3,7	3,8	4,1	4,5	4,8	4,7	2,3
ΣCHL	28,9	37,7	35,3	38,8	36,6	40,1	38,4	27,5
Tox-26	11,7	15,8	15,7	16,6	16,6	17,8	17,2	12,8
Tox-50	19,9	27,0	26,5	28,9	28,6	32,2	30,4	25,2
Tox-62	3,8	6,3	5,5	6,5	6,3	8,1	7,2	5,4
PBDE-47	1,9	2,0	2,0	2,1	1,7	2,0	1,9	1,3
PBDE-99	<0,2	0,21	<0,2	<0,2	<0,2	<0,2	<0,2	<0,2
PBDE-100	<0,2	<0,2	<0,2	<0,2	<0,2	<0,2	<0,2	<0,2
% extracted fat	36,8	53,0	54,0	58,8	57,5	56,9	57,2	58,6

* Mean of two different analysis performed two week apart

** PCB # 28, 52, 101, 118, 138, 153 and 180

*** Contamination prevents accurate quantification

**** Not certified values (indicative) in QUASIMEME cod liver

Table 10 b. Persistent organochlorines in cod liver 2008 (ng/g ww)

	COD N-NW(2)	COD N-NW(2)	COD N-NW(2)	COD N-NW(2)	COD N-NW(2)
	H1	H2	H3	H4	H5
PCB28	2,3	2,1	2,5	2,1	2,2
PCB31	1,4	1,3	1,7	1,5	1,5
PCB52	6,8	7,0	6,7	5,6	6,4
PCB101	8,9	8,6	8,3	6,9	9,1
PCB105	4,2	4,2	3,7	3,2	3,9
PCB118	10,2	10,2	8,4	6,4	8,9
PCB138	15,6	14,8	11,9	9,7	14,9
PCB153	24,6	23,5	19,0	15,3	24,0
PCB156	1,6	1,5	1,2	0,91	1,4
PCB170	1,8	2,0	1,2	0,83	1,7
PCB180	6,3	5,8	4,1	2,9	5,1
Σ7PCB**	74,7	72,0	60,9	48,9	70,6
HCB	19,3	19,3	18,9	16,7	21,0
a-HCH	2,6	2,9	3,1	3,4	3,5
b-HCH	0,81	0,84	0,92	1,1	1,1
g-HCH	0,62	0,73	0,75	0,85	0,92
p,p'-DDE	64,6	54,3	47,0	32,0	62,3
p,p'-DDD	17,0	18,2	17,8	13,6	17,9
p,p'-DDT****	11,3	8,0	7,8	5,6	9,5
o,p'-DDT****	1,9	2,6	4,5	4,4	2,8
ΣDDT	94,8	83,1	77,1	55,6	92,5
PCB153/DDE	0,38	0,43	0,40	0,48	0,39
transnonachlor	27,5	27,5	24,4	20,6	24,7
a-chlordan	20,8	20,9	21,5	19,2	21,9
g-chlordan	6,7	6,7	6,9	6,4	7,3
oxychlordan	5,3	5,5	4,7	4,0	4,6
ΣCHL	60,3	60,6	57,5	50,2	58,5
Tox-26	24,8	26,0	23,1	20,7	23,7
Tox-50	42,5	42,8	42,4	39,2	43,6
Tox-62	14,6	12,4	12,6	12,8	14,7
PBDE-47	3,3	3,6	3,1	2,3	2,9
PBDE-99	<0,2	<0,2	<0,2	<0,2	0,20
PBDE-100	0,31	0,42	0,30	0,26	0,44
% extracted fat	58,0	56,6	63,2	68,0	71,0

** PCB # 28, 52, 101, 118, 138, 153 and 180

*** Contamination prevents accurate quantification

**** Not certified values (indicative) in QUASIMEME cod liver

Table 10 c. Persistent organochlorines in cod liver 2008 (ng/g ww)

	COD NA	COD NA	COD NA		COD NA	COD NA	COD NA		COD NA
PCB28	H1	H2	H3 A	H3 B	H3*	H4	H5 A	H5 B	H5*
PCB31									
PCB52	1,5	1,8	2,1	2,2	2,2	2,1	2,0	2,2	2,1
PCB101	0,82	0,92	1,2	1,2	1,2	1,3	1,0	1,1	1,1
PCB105	4,9	5,6	6,6	7,0	6,8	6,7	6,4	6,8	6,6
PCB118	7,1	8,1	8,2	9,3	8,8	8,5	8,5	9,3	8,9
PCB138	3,1	3,4	3,6	3,6	3,6	3,6	3,5	3,7	3,6
PCB153	7,5	8,3	8,6	9,2	8,9	8,5	8,3	8,6	8,5
PCB156	10,7	11,6	12,6	15,0	13,8	12,0	11,7	12,0	11,9
PCB170	16,6	18,1	19,0	21,8	20,4	18,0	17,1	18,6	17,9
PCB180	0,99	1,1	1,2	1,4	1,3	1,1	1,1	1,2	1,2
	1,2	1,3	1,2	***	1,2	1,1	1,2	1,2	1,2
Σ7PCB**	3,9	4,2	4,0	***	4,0	3,6	3,8	3,9	3,9
HCB	52,2	57,7	61,1	64,5	64,8	59,4	57,8	61,4	59,6
a-HCH	11,7	13,2	16,5	17,5	17,0	16,3	15,5	16,3	15,9
b-HCH									
g-HCH	2,2	2,6	3,2	3,2	3,2	3,1	3,0	3,1	3,1
	0,54	0,64	0,77	0,73	0,75	0,74	0,77	0,81	0,79
p,p'-DDE	0,55	0,74	0,86	0,97	0,92	0,88	0,77	0,94	0,86
p,p'-DDD									
p,p'-DDT****	36,5	40,4	44,5	46,2	45,4	41,7	39,3	43,5	41,4
o,p'-DDT****	12,9	14,2	16,7	17,0	16,9	16,1	16,7	17,4	17,1
	5,8	6,4	6,9	7,6	7,3	6,7	7,3	7,5	7,4
ΣDDT	3,9	4,7	5,3	5,6	5,5	5,0	5,1	5,4	5,3
PCB153/DDE	59,1	65,7	73,4	76,4	74,9	69,5	68,4	73,8	71,1
transnonachlor	0,45	0,45	0,43	0,47	0,45	0,43	0,44	0,43	0,43
a-chlordan									
g-chlordan	18,9	20,9	22,9	24,3	23,6	22,5	22,1	23,5	22,8
oxychlordan	15,6	18,0	20,6	21,7	21,2	20,2	20,6	22,0	21,3
	5,3	5,7	6,6	7,2	6,9	6,8	6,8	7,2	7,0
ΣCHL	3,1	3,6	3,8	4,2	4,0	4,4	3,7	4,1	3,9
Tox-26	42,9	48,2	53,9	57,4	55,7	53,9	53,2	56,8	55,0
Tox-50									
Tox-62	16,8	19,5	22,0	23,4	22,7	22,2	21,7	22,9	22,3
	29,7	34,4	39,9	42,6	41,2	39,6	40,4	41,7	41,1
PBDE-47	7,0	8,4	10,8	11,2	11,0	10,8	10,1	11,1	10,6
PBDE-99									
PBDE-100	2,6	2,8	3,0	3,2	3,1	3,0	3,0	3,0	3,0
	<0,2	<0,2	<0,2	<0,2	<0,2	<0,2	<0,2	<0,2	<0,2
% extracted fat	0,37	0,41	0,42	0,41	0,42	0,27	0,39	0,37	0,38
	39,6	42,1	52,7	53,7	53,2	51,8	52,9	52,4	52,7

* Mean of two different analysis performed two week apart

** PCB # 28, 52, 101, 118, 138, 153 and 180

*** Contamination prevents accurate quantification

**** Not certified values (indicative) in QUASIMEME cod liver

Appendix VI.

Graphs of biological variation in Cod (*Gadus morhua*) 1990-2008

Biological variation in 30-45 cm Cod (Gadus morhua) from Icelandic waters in March 1990-2007

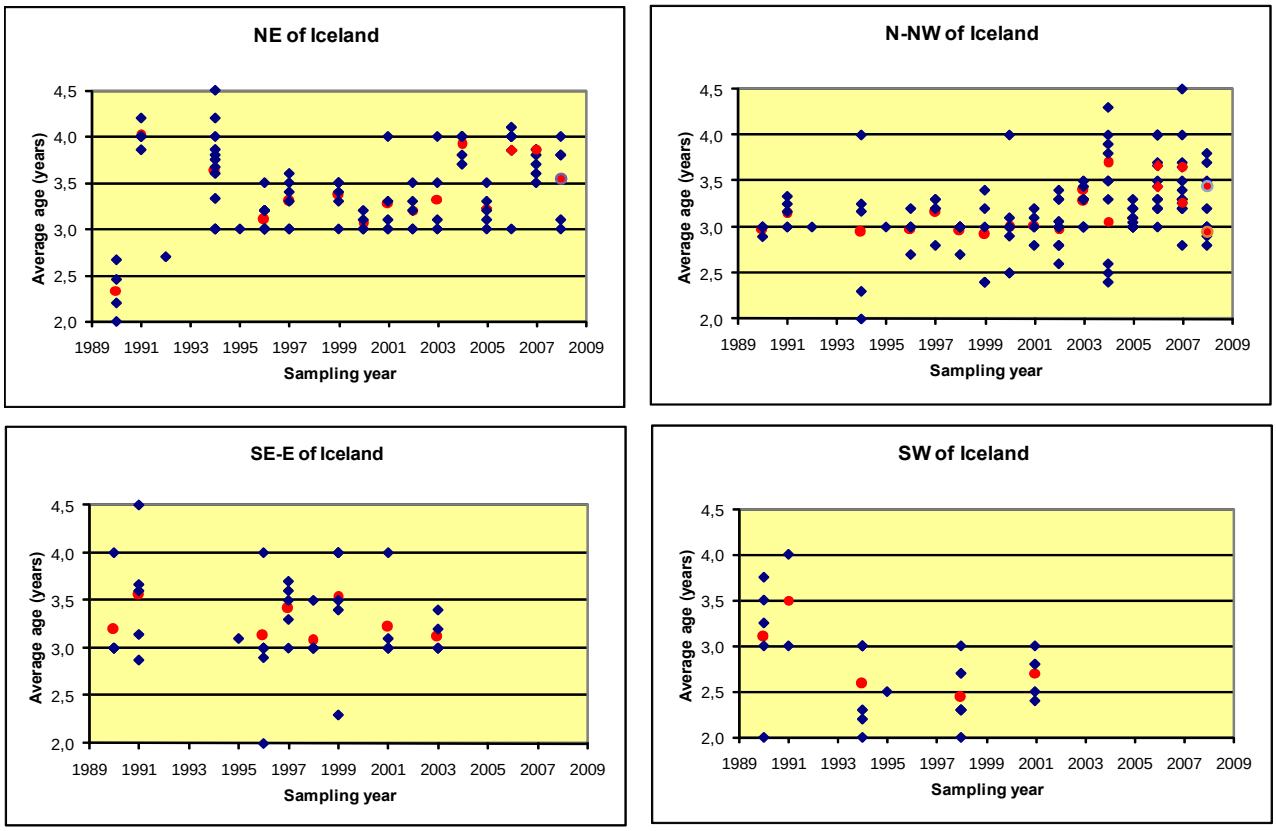


Figure 2a. Average age in 30-45 cm Cod (Gadus morhua) from Icelandic waters in March 1990-2008.The red dots represent the average values.

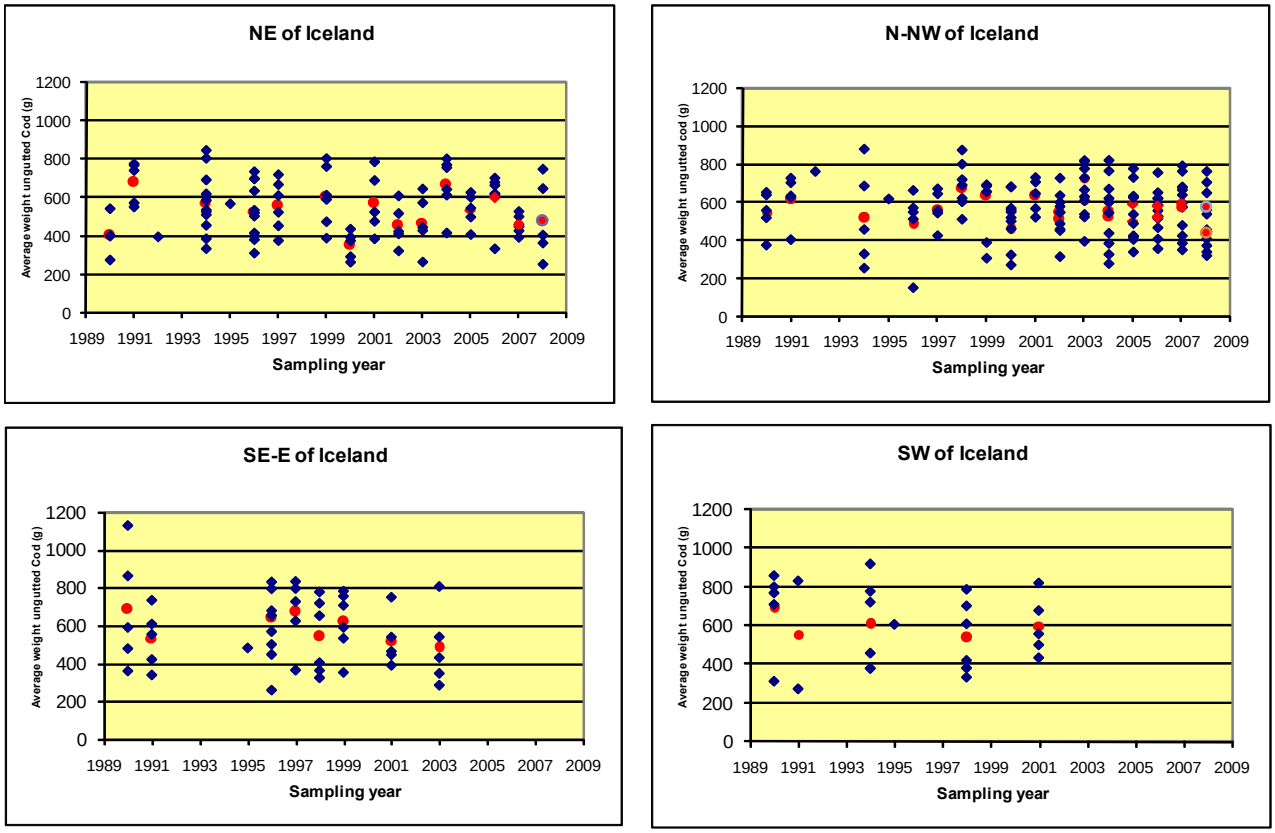


Figure 2b. Average weight ungutted Cod (Gadus morhua), 30-45 cm, from Icelandic waters in March 1990-2008.The red dots represent the average values.

Biological variation in 30-45 cm Cod (Gadus morhua) from Icelandic waters in March 1990-2007

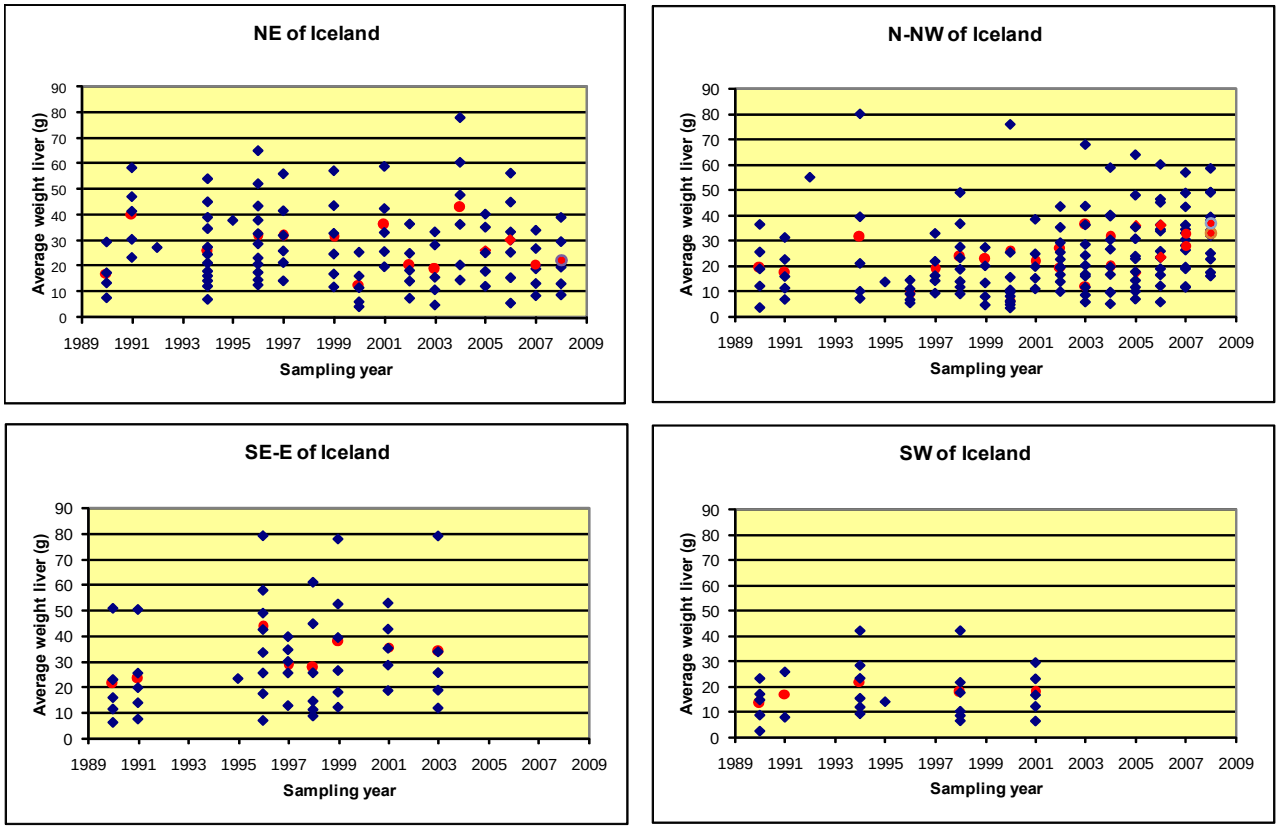


Figure 2c. Average weight liver of Cod (Gadus morhua), 30-45 cm, from Icelandic waters in March 1990-2008.The red dots represent the average values.

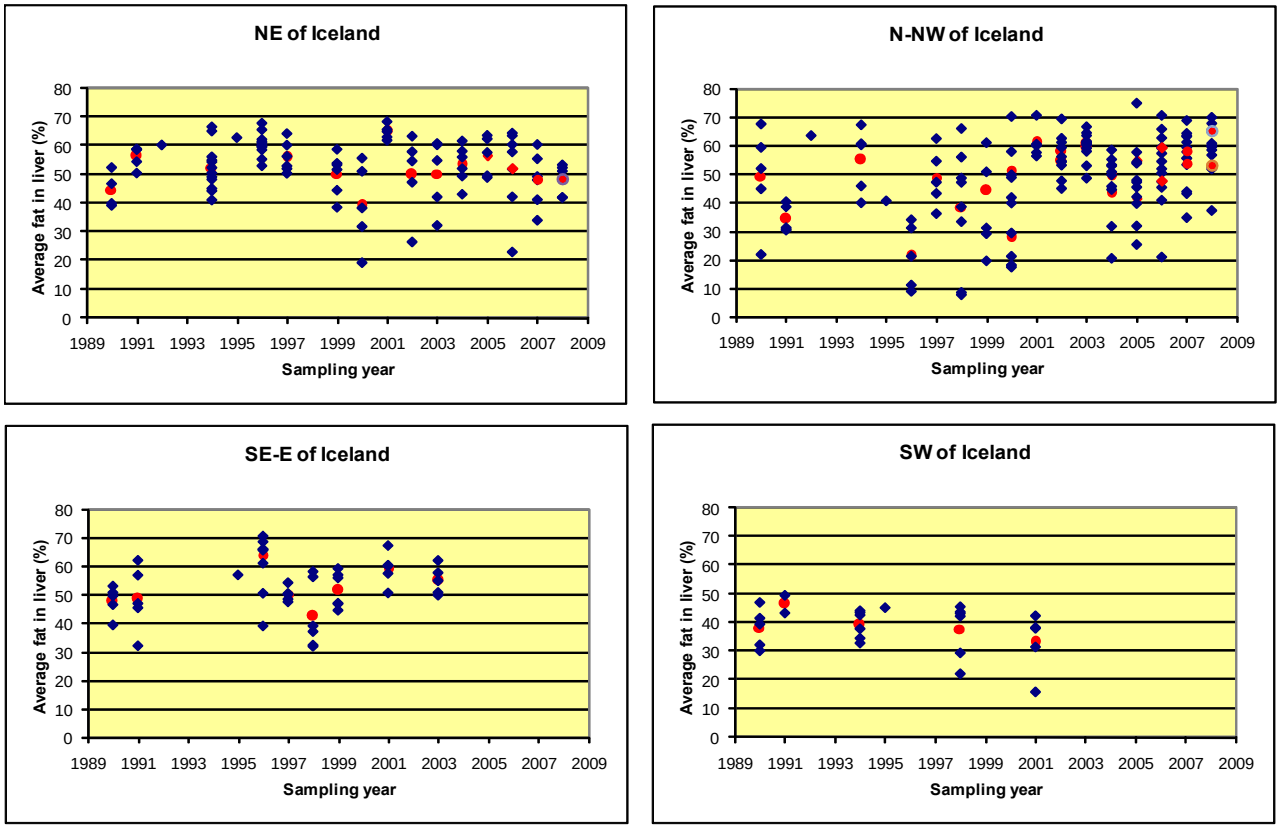


Figure 2d. Average fat (%) in liver of Cod (Gadus morhua), 30-45 cm, from Icelandic waters in March 1990-2008.The red dots represent the average values.

Appendix VII.

Graphs of metals and organic compounds in Blue mussel (*Mytilus edulis*) 1990-2007

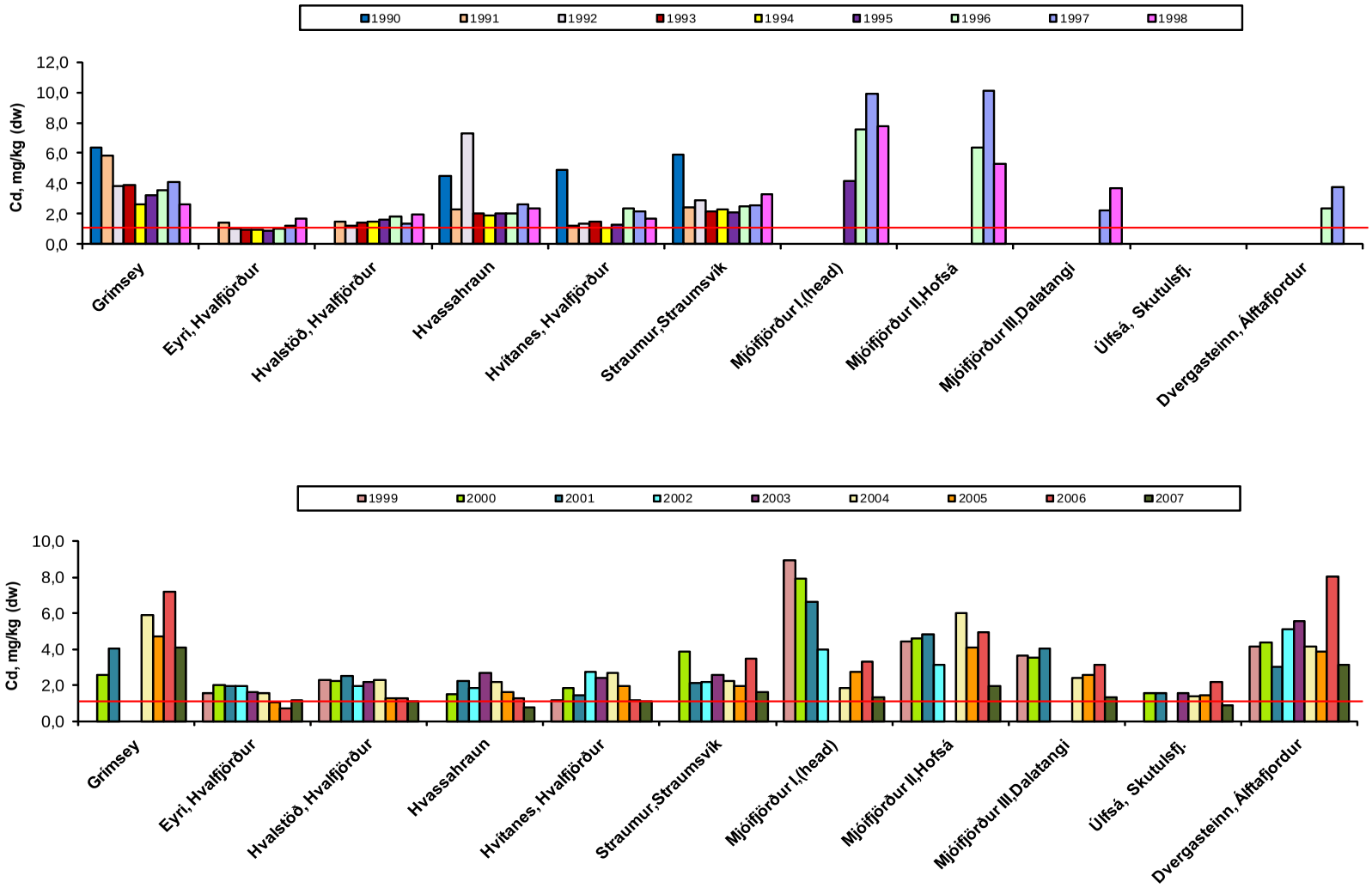


Figure 3a. Cadmium concentration (dw) in Blue mussel (Mytilus edulis) around Iceland 1991-2007. Red line indicates ICES 90 75% baseline (11).

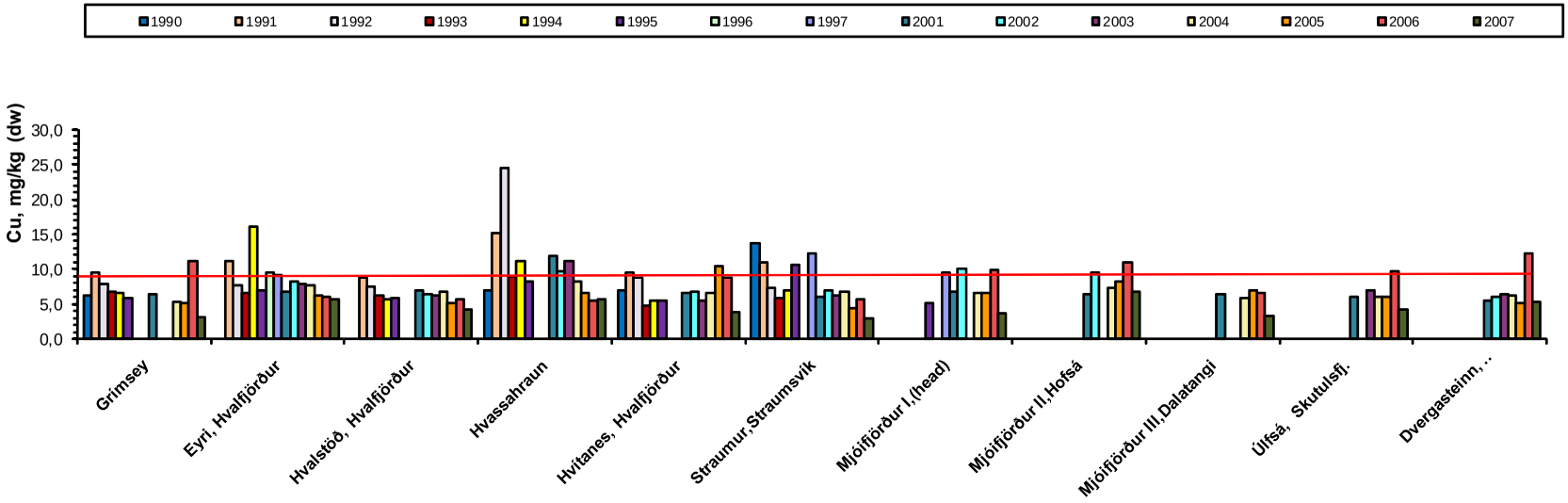


Figure 3b. Copper concentration (dw) in Blue mussel (Mytilus edulis) around Iceland 1990-2007. Red line indicates ICES 90 75% baseline (11).

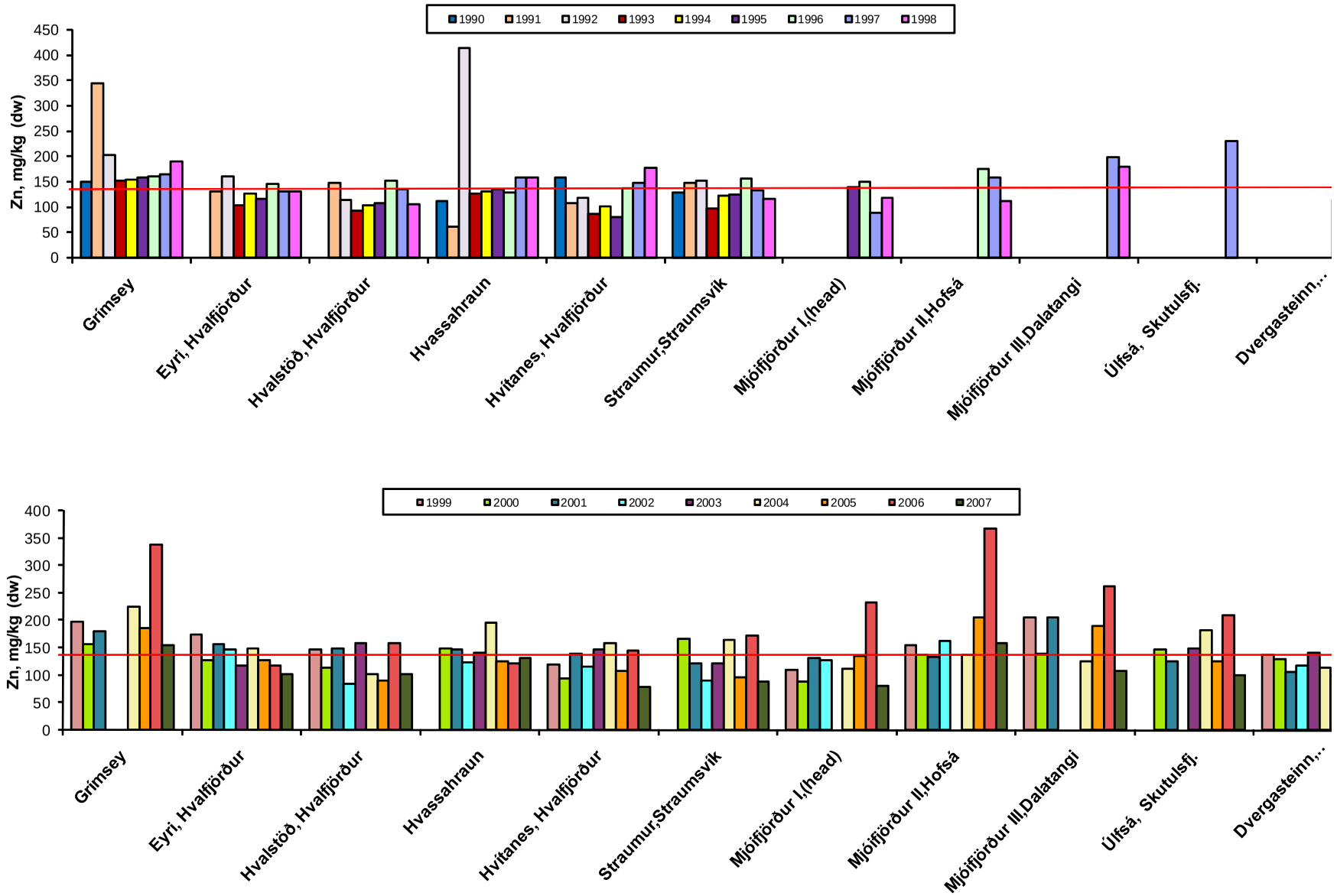


Figure 3c. Zinc concentration (dw) in Blue mussel (Mytilus edulis) around Iceland 1990-2007. Red line indicates ICES 90 75% baseline (11).

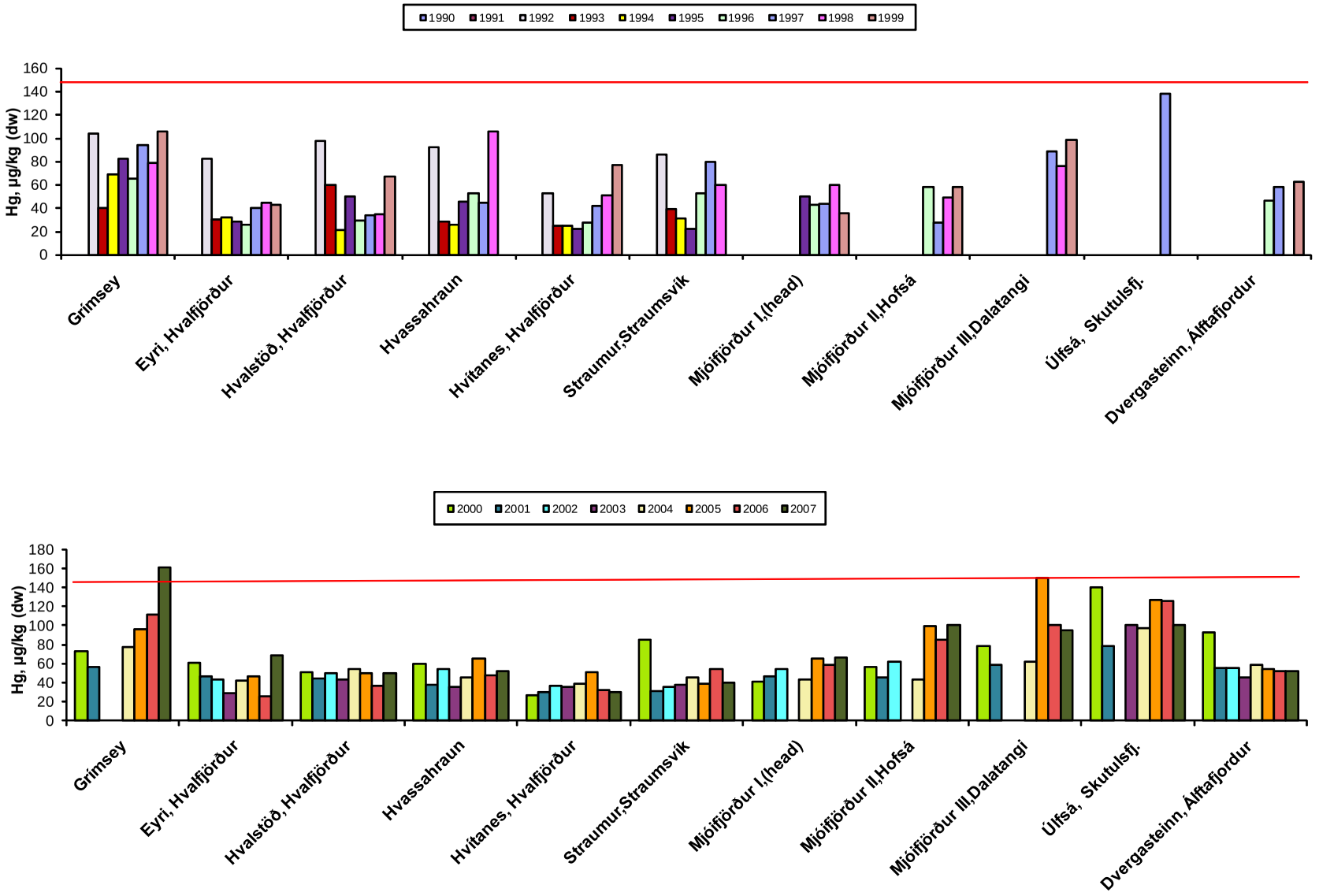


Figure 3d. Mercury concentration (dw) in Blue mussel (Mytilus edulis) around Iceland 1990-2007. Red line indicates ICES 90 75% baseline (11).

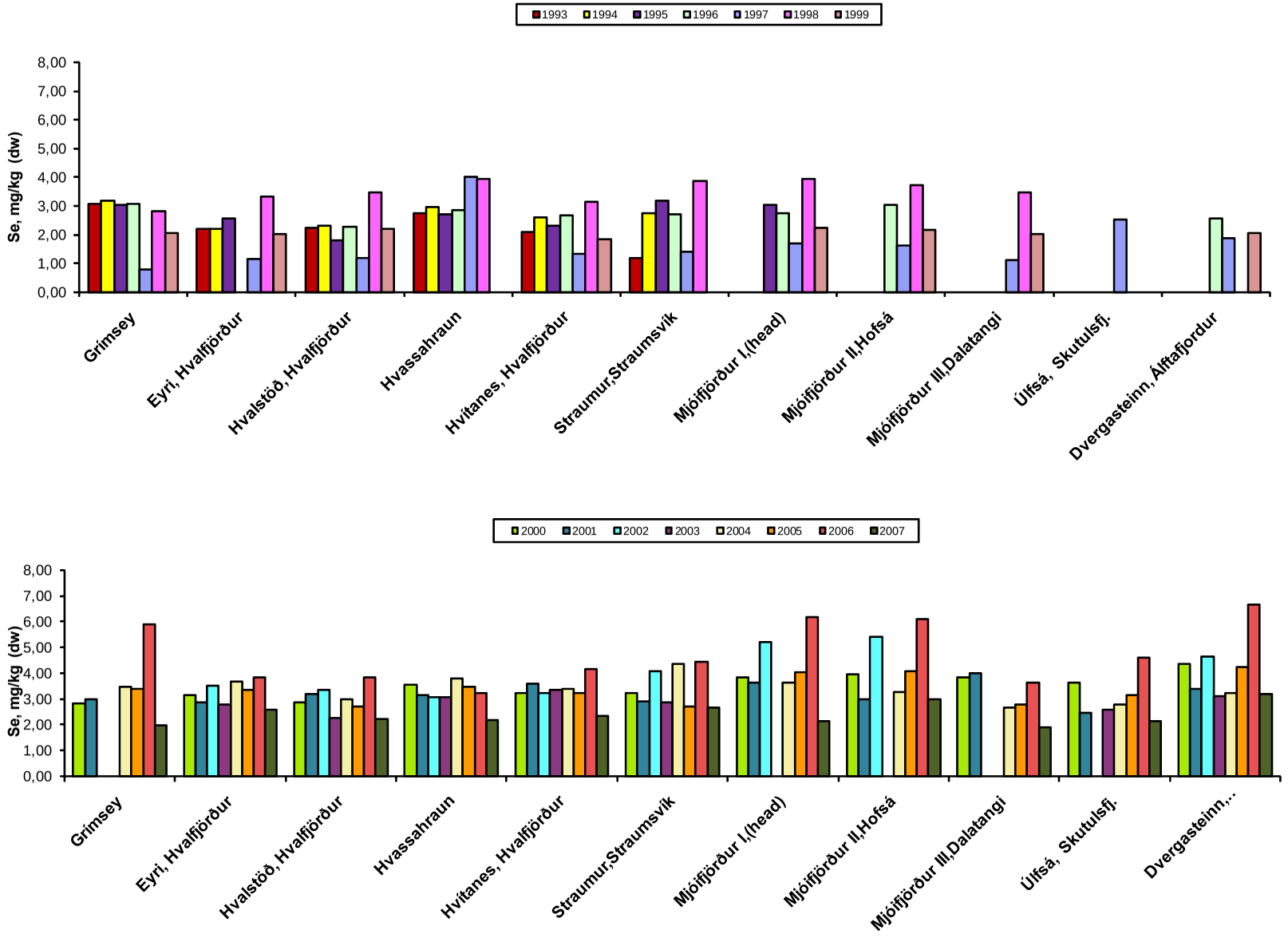


Figure 3e. Selenium concentration (dw) in Blue mussel (Mytilus edulis) around Iceland 1993-2007.

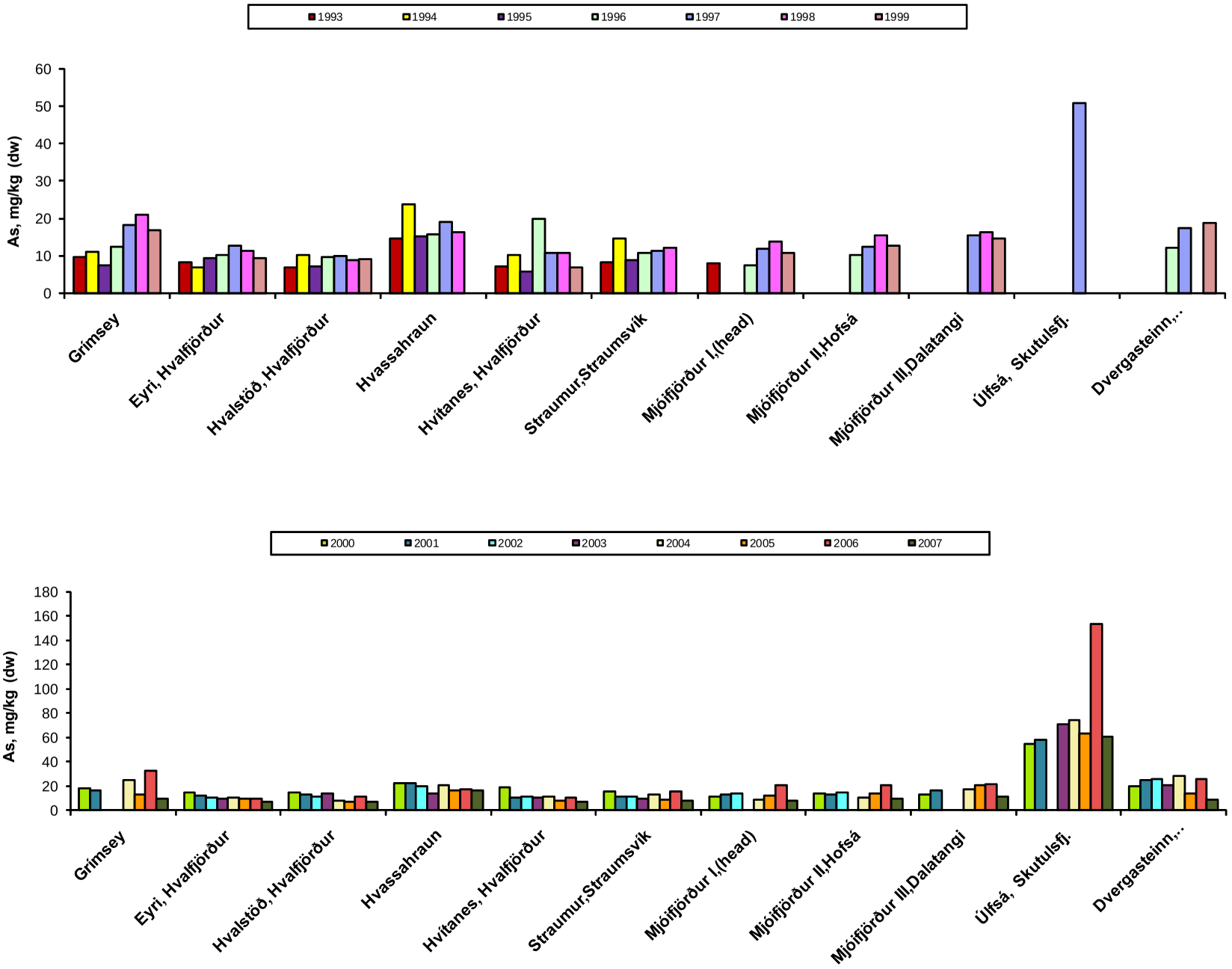


Figure 3f. Arsenic concentration (dw) in Blue mussel (Mytilus edulis) around Iceland 1993-2007.

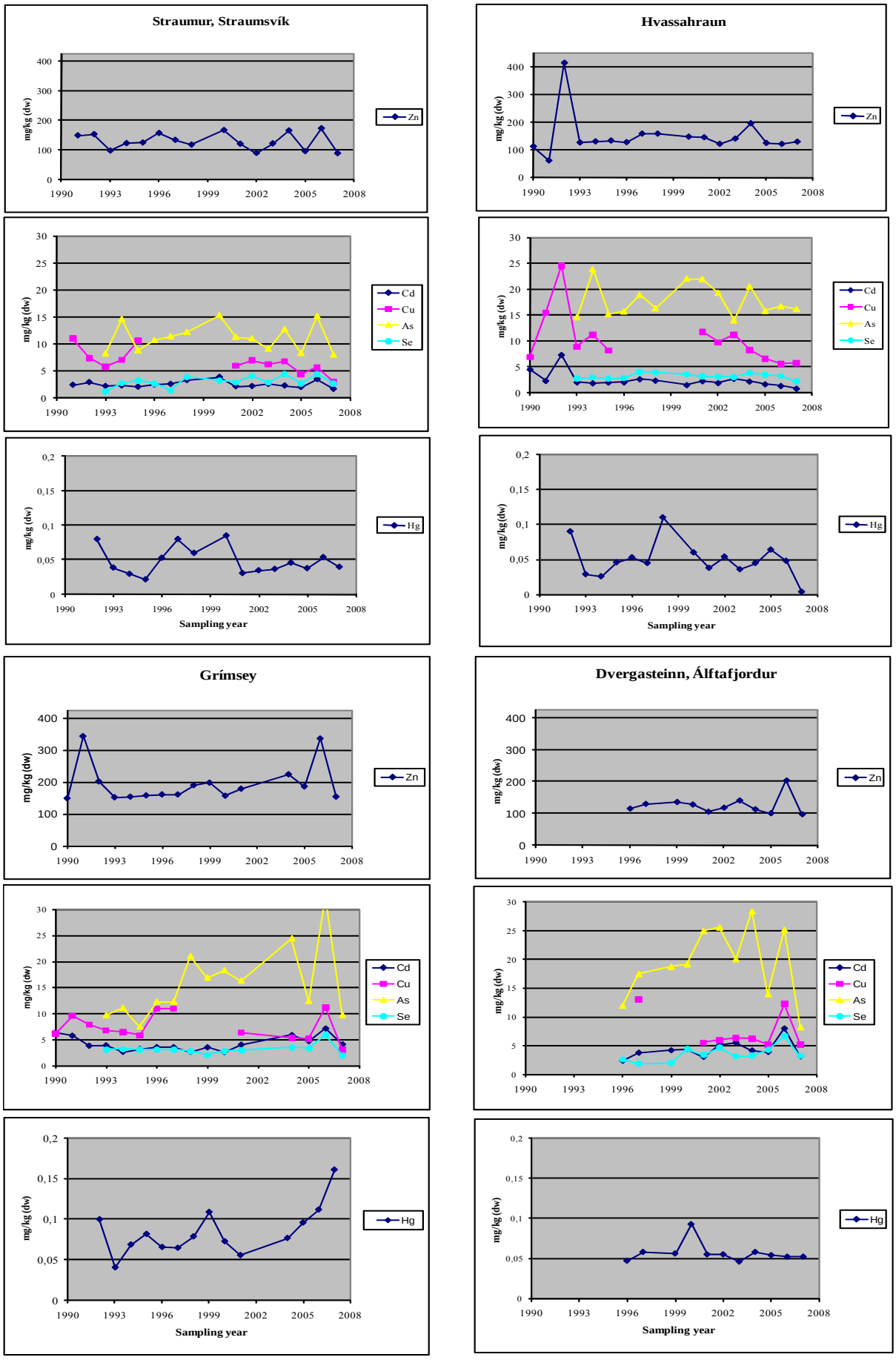


Figure 4a. Concentration of heavy metals (dry weight) in Blue mussel from different sampling sites around Iceland, 1990-2007.

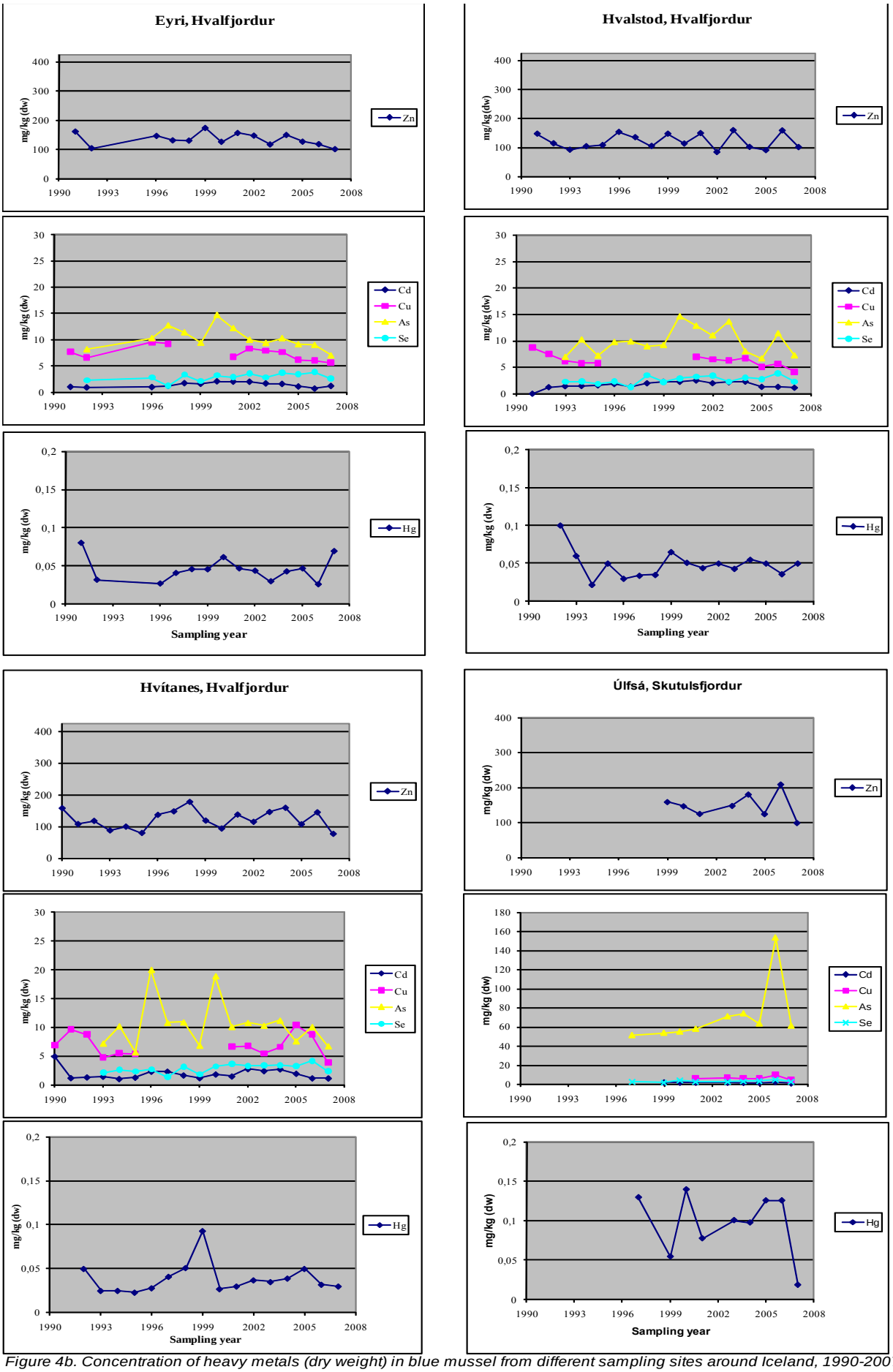


Figure 4b. Concentration of heavy metals (dry weight) in blue mussel from different sampling sites around Iceland, 1990-2007.

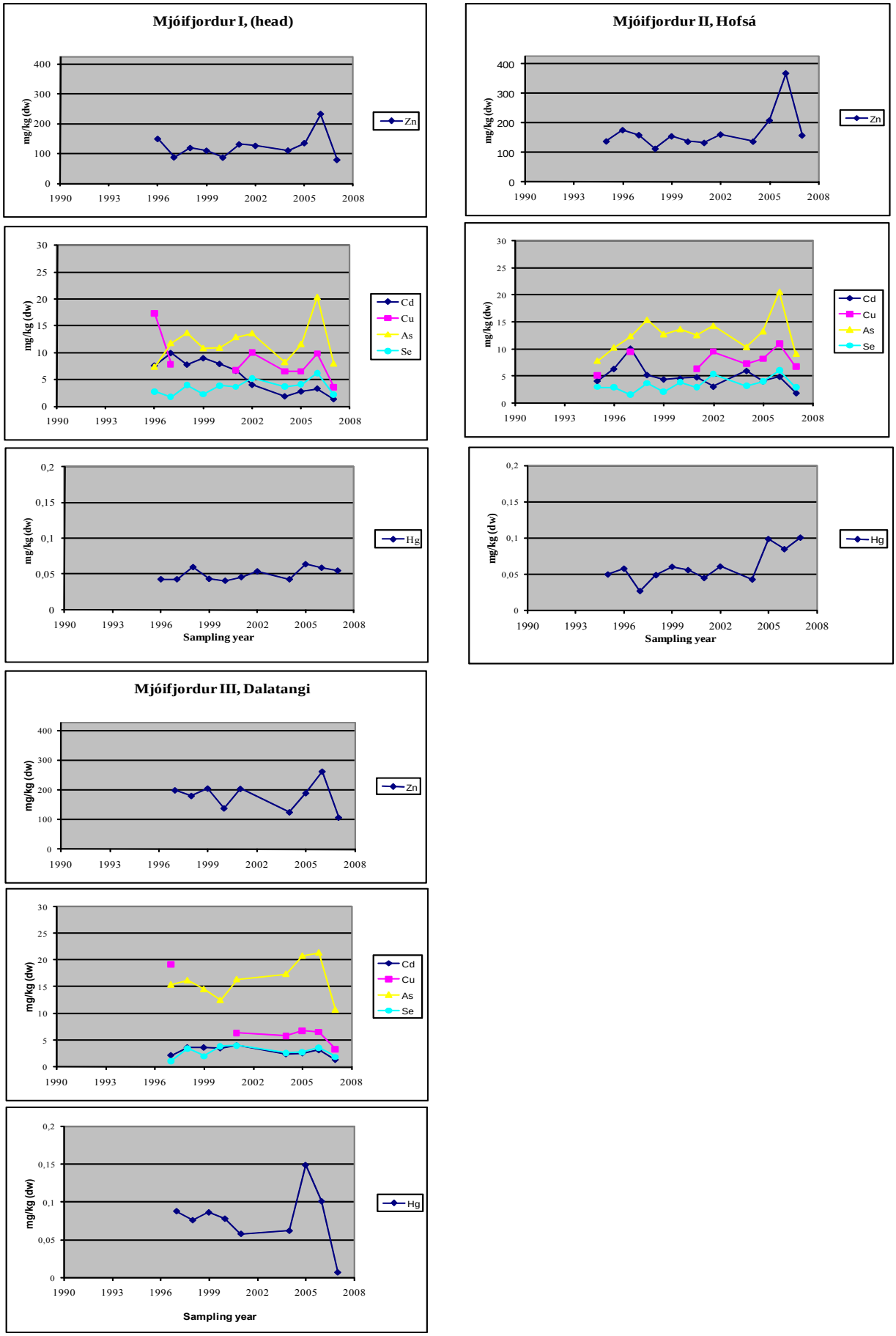


Figure 4c. Concentration of heavy metals (dry weight) in blue mussel from different sampling sites around Iceland, 1990-2007.

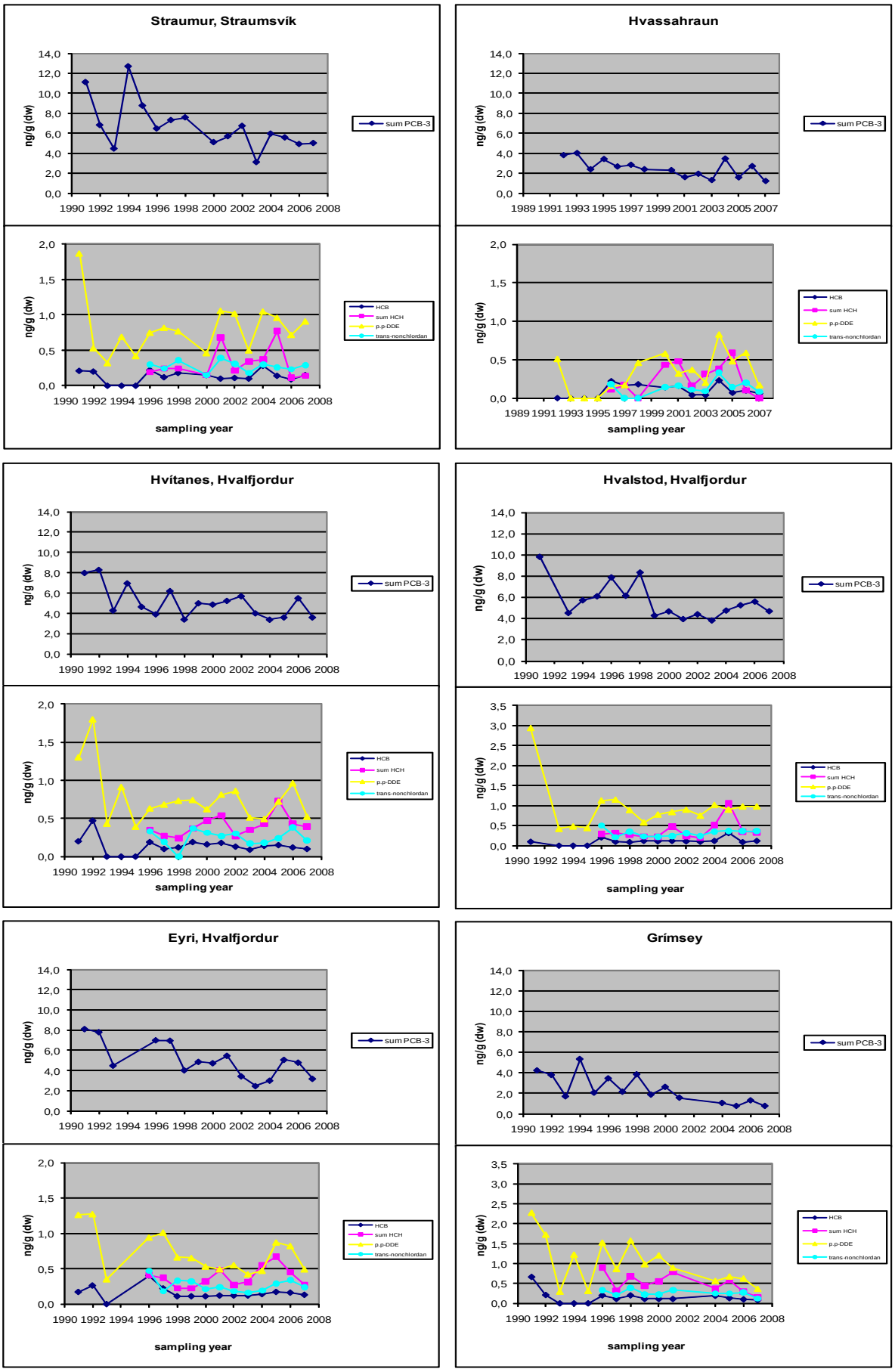


Figure 5a. Concentration of organochlorine compounds (dw) in Blue mussel (Mytilus edulis) at different locations 1991-2007.

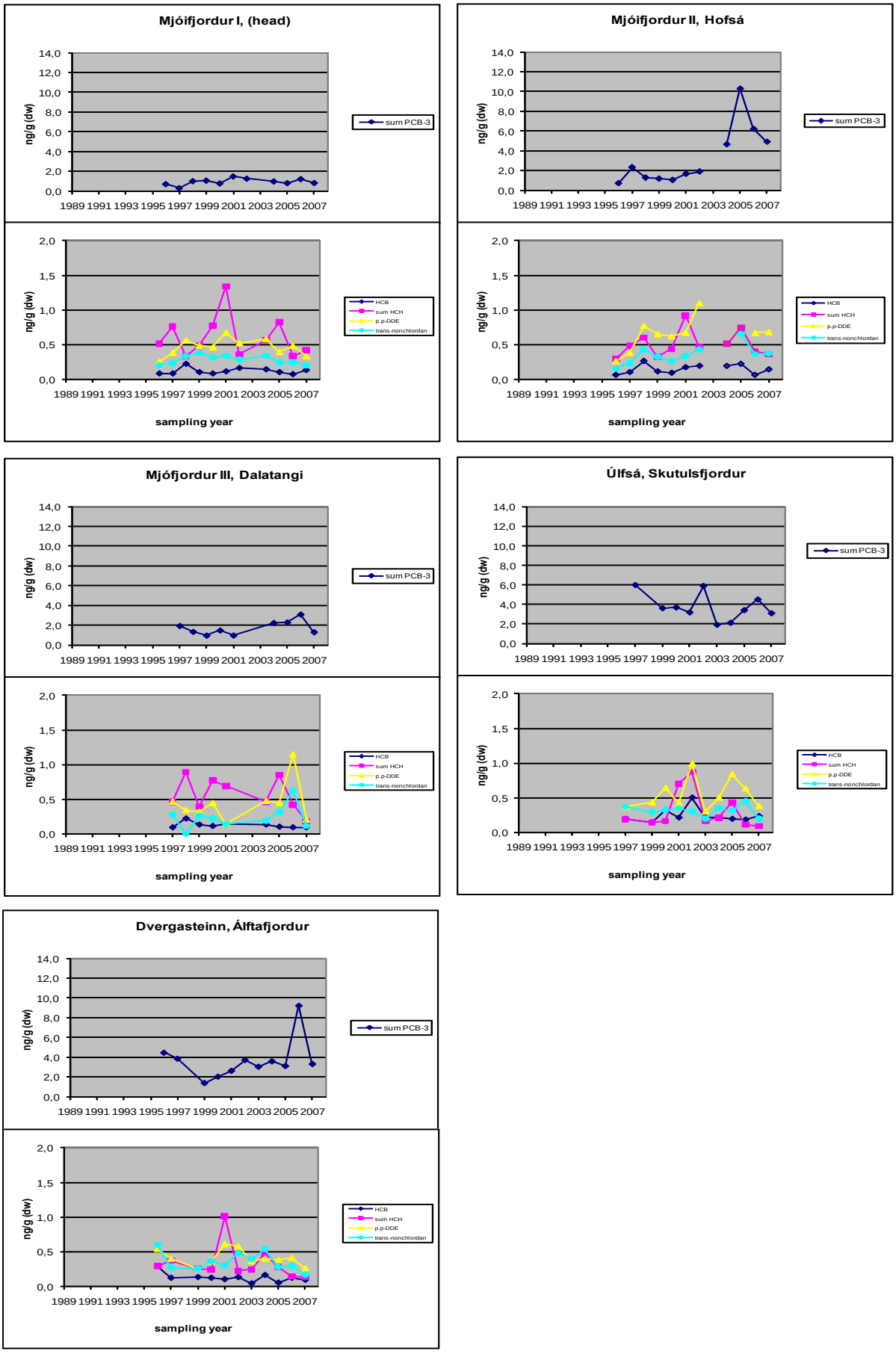


Figure 5b. Concentration of organochlorine compounds (dw) in Blue mussel (Mytilus edulis) at different locations 1991-2007.

Appendix VIII.

Graphs of metals and organic compounds in Cod (*Gadus morhua*) 1990-2008

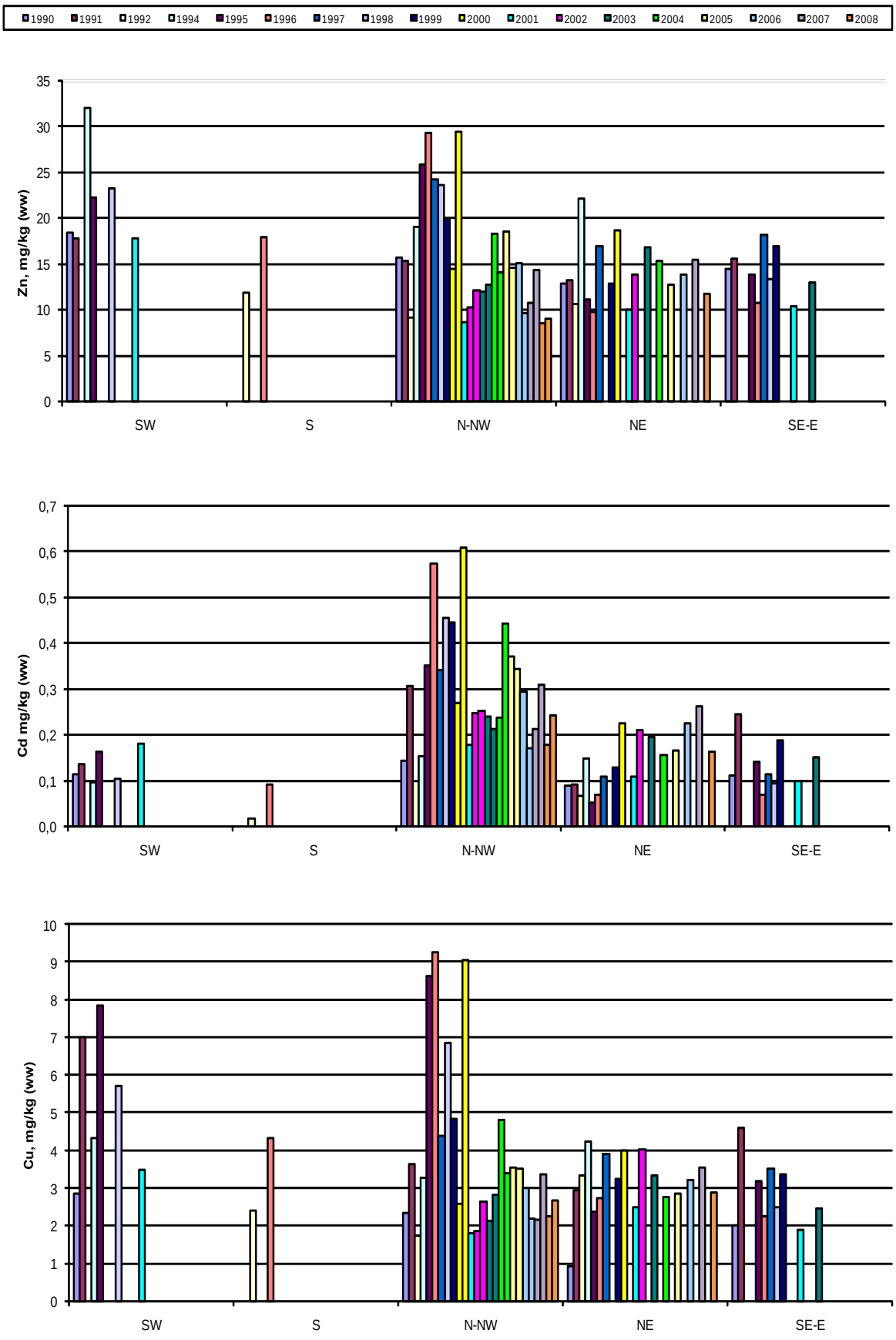


Figure 6a. Heavy metal concentration (ww) in livers of 30-45cm cod (Gadus morhua) from Icelandic waters in March 1990-2008.

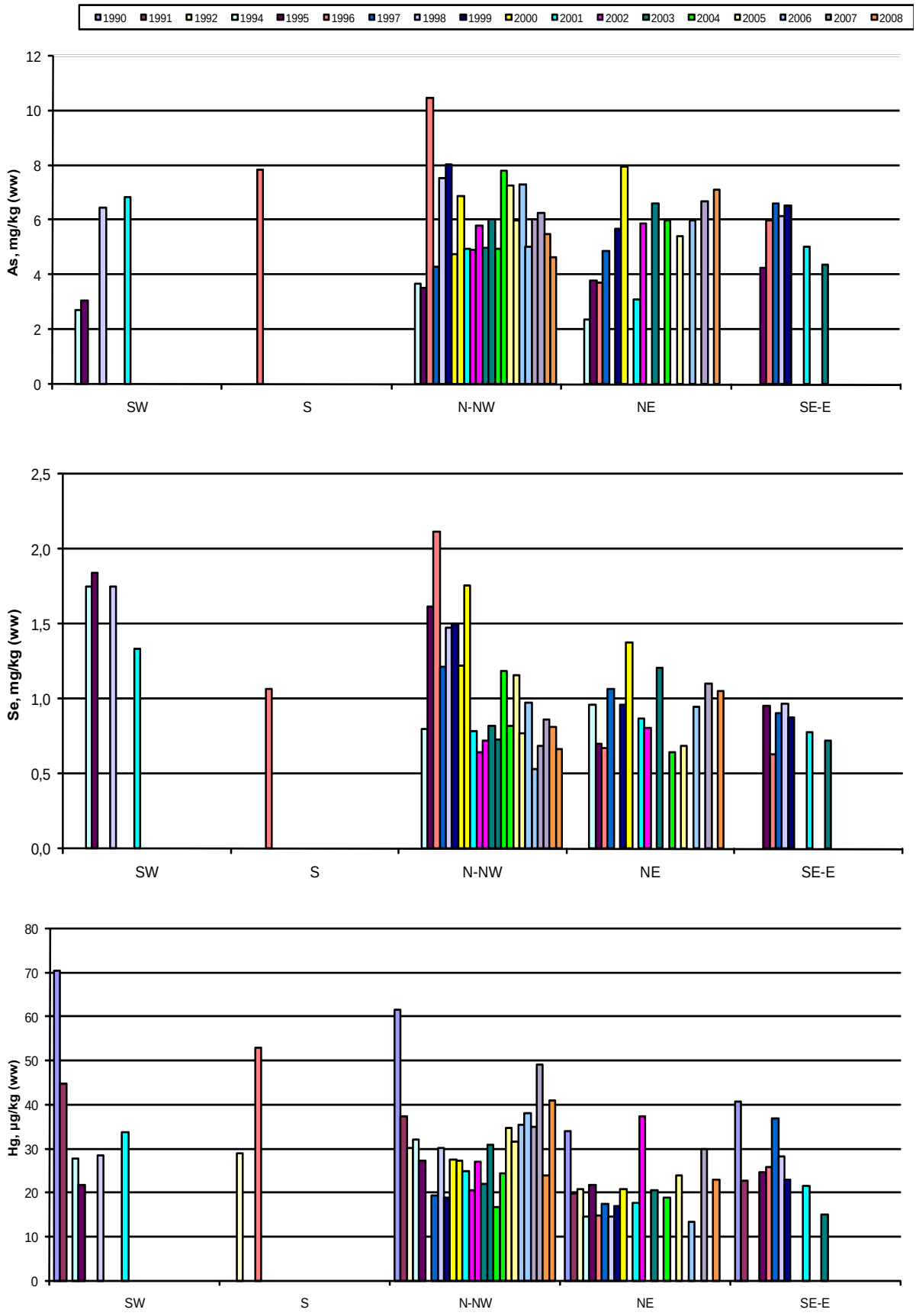


Figure 6b. Heavy metal concentration (ww) in livers of 30-45cm cod (Gadus morhua) from Icelandic waters in March 1990-2008. Mercury (Hg) was analysed in the flesh

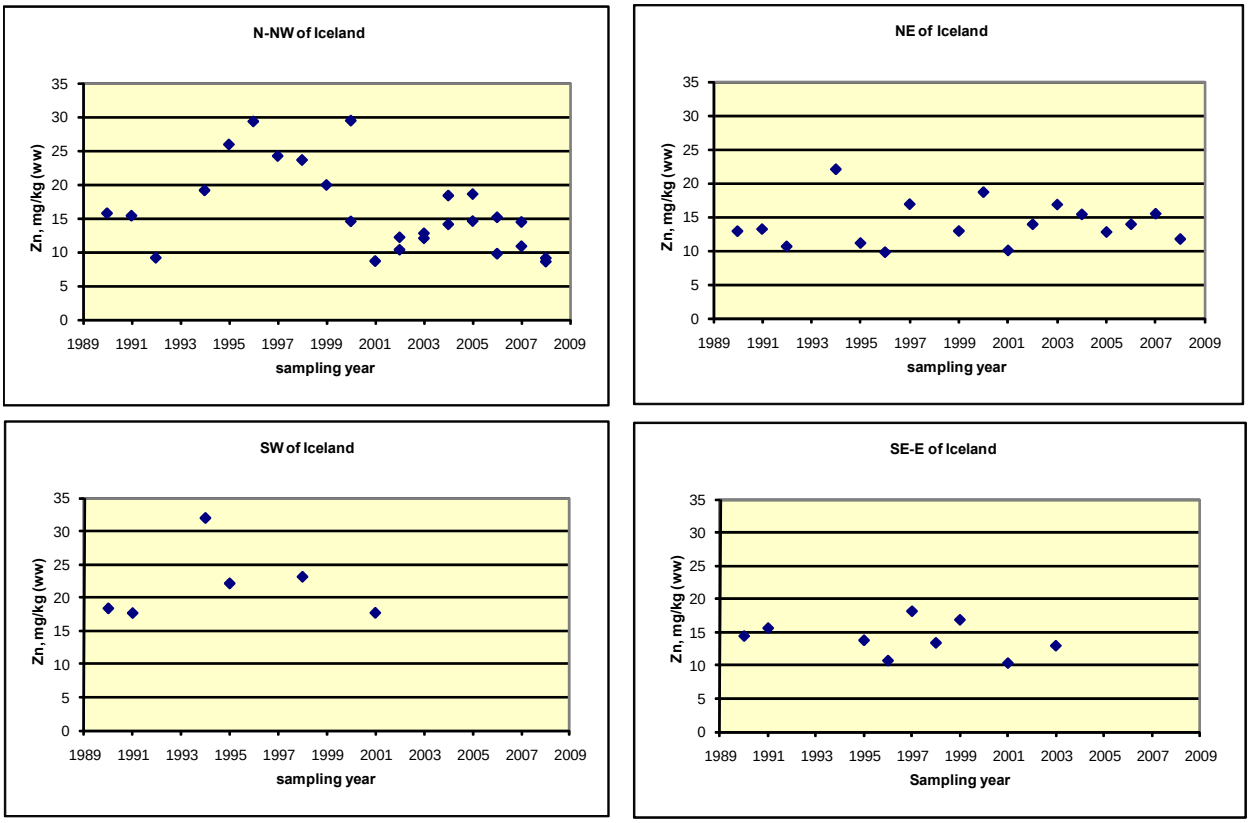


Figure 7a. Average concentration of Zinc (ww) in livers of 30-45 cm Cod (Gadus morhua) from different locations in Icelandic waters in March 1990-2008.

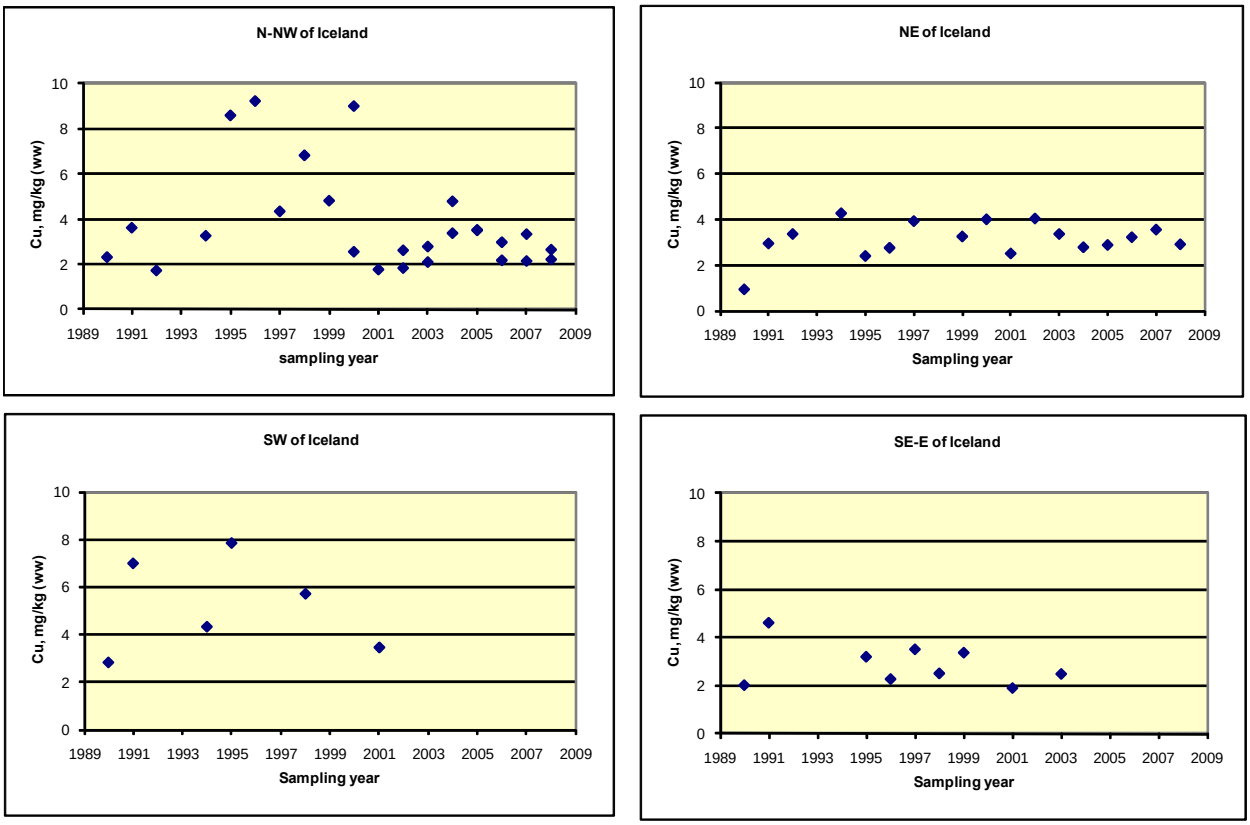


Figure 7b. Average concentration of Copper (ww) in livers of 30-45 cm Cod (Gadus morhua) from different locations in Icelandic waters in March 1990-2008.

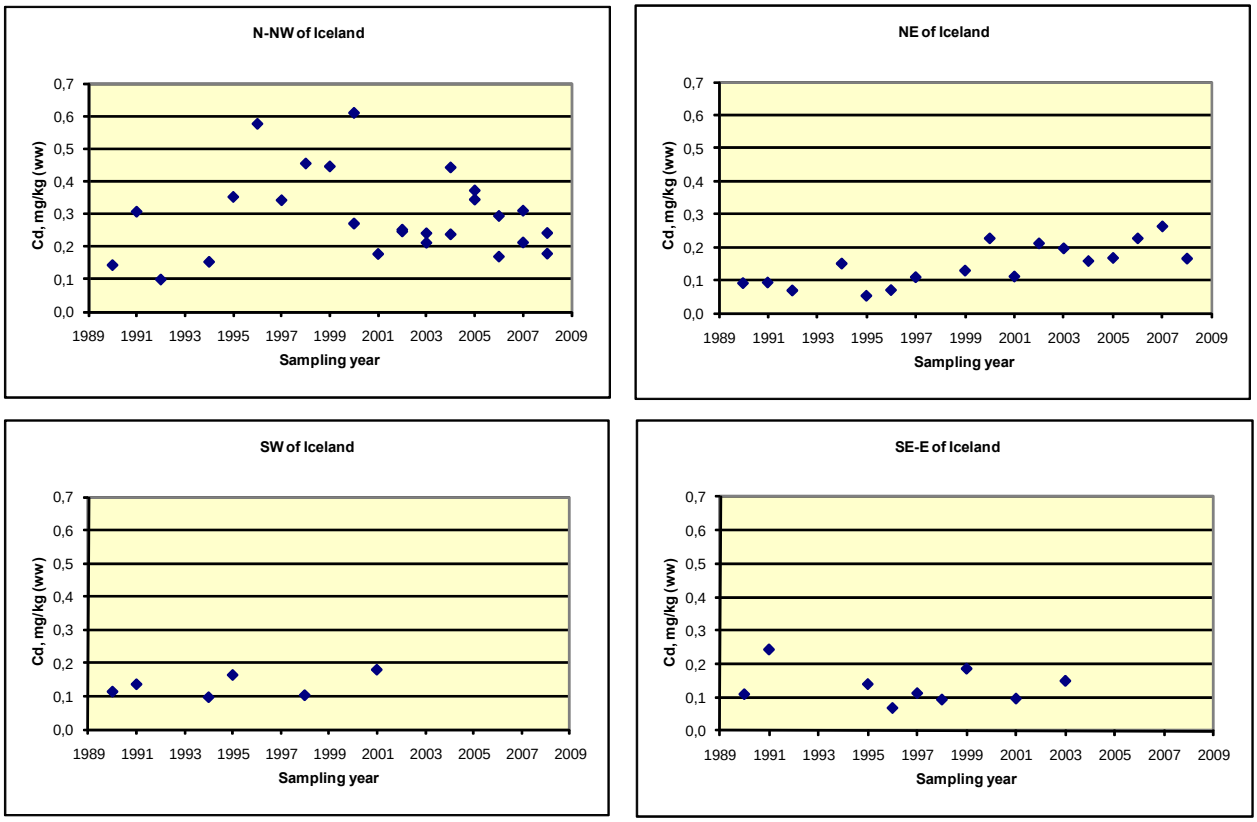


Figure 7c. Average concentration of Cadmium (ww) in livers of 30-45 cm Cod (Gadus morhua) from different locations in Icelandic waters in March 1990-2008.

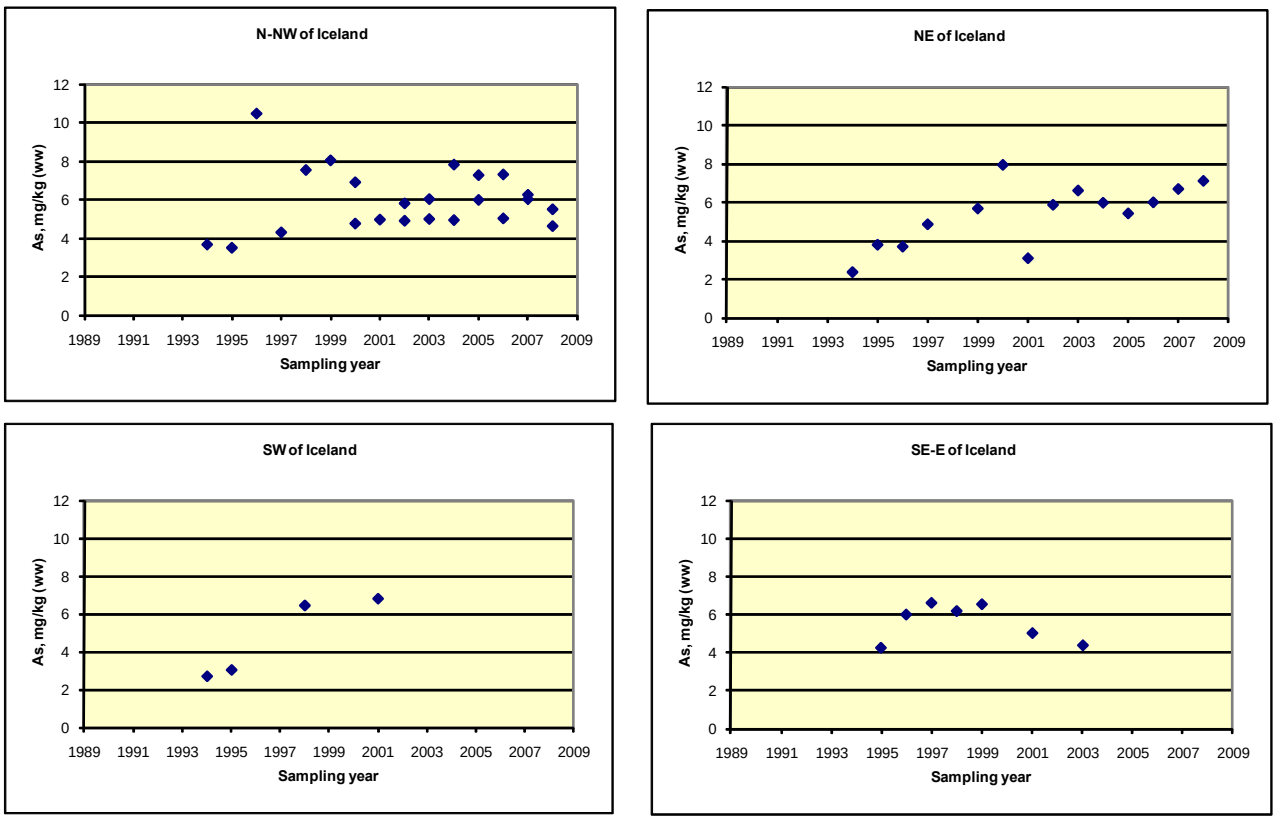


Figure 7d. Average concentration of Arsenic (ww) in livers of 30-45 cm Cod (Gadus morhua) from different locations in Icelandic waters in March 1990-2008.

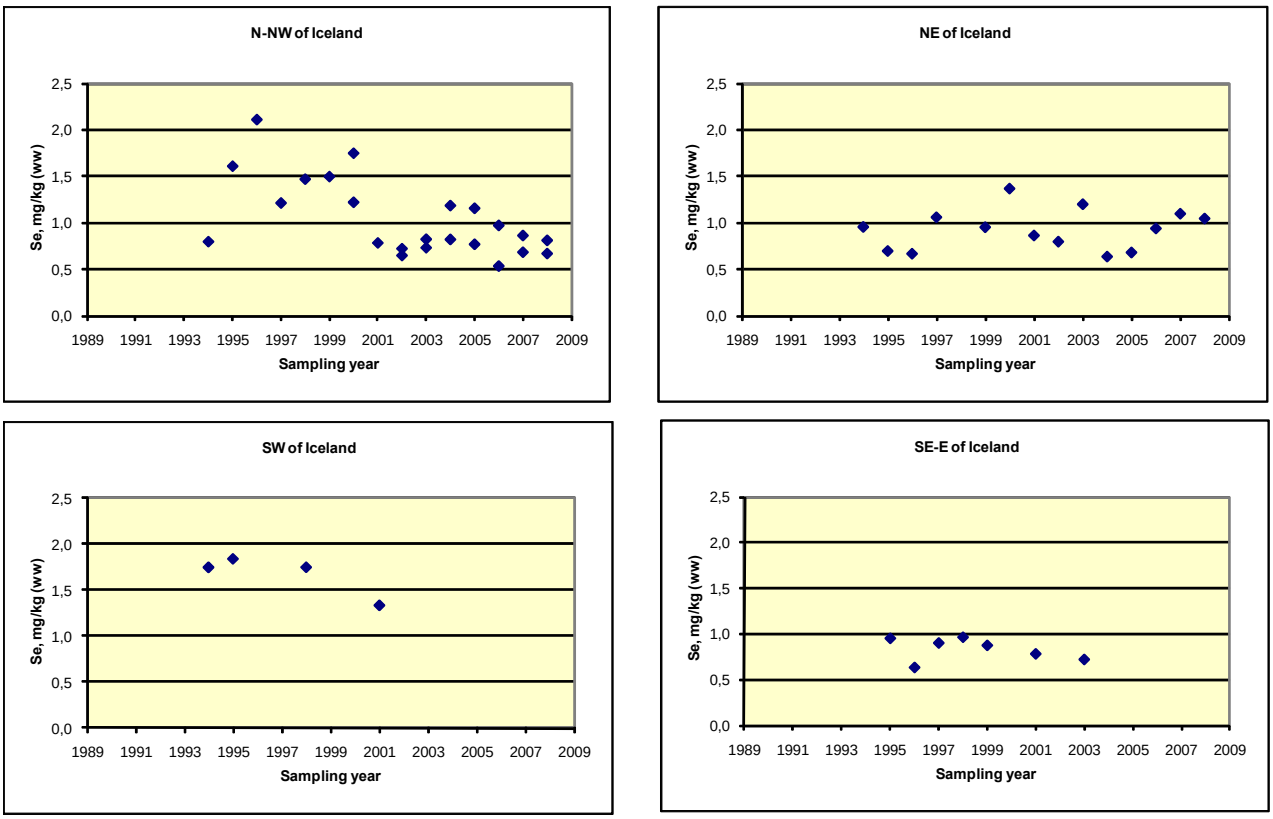


Figure 7e. Average concentration of Selenium (ww) in livers of 30-45 cm Cod (Gadus morhua) from different locations in Icelandic waters in March 1990-2008.

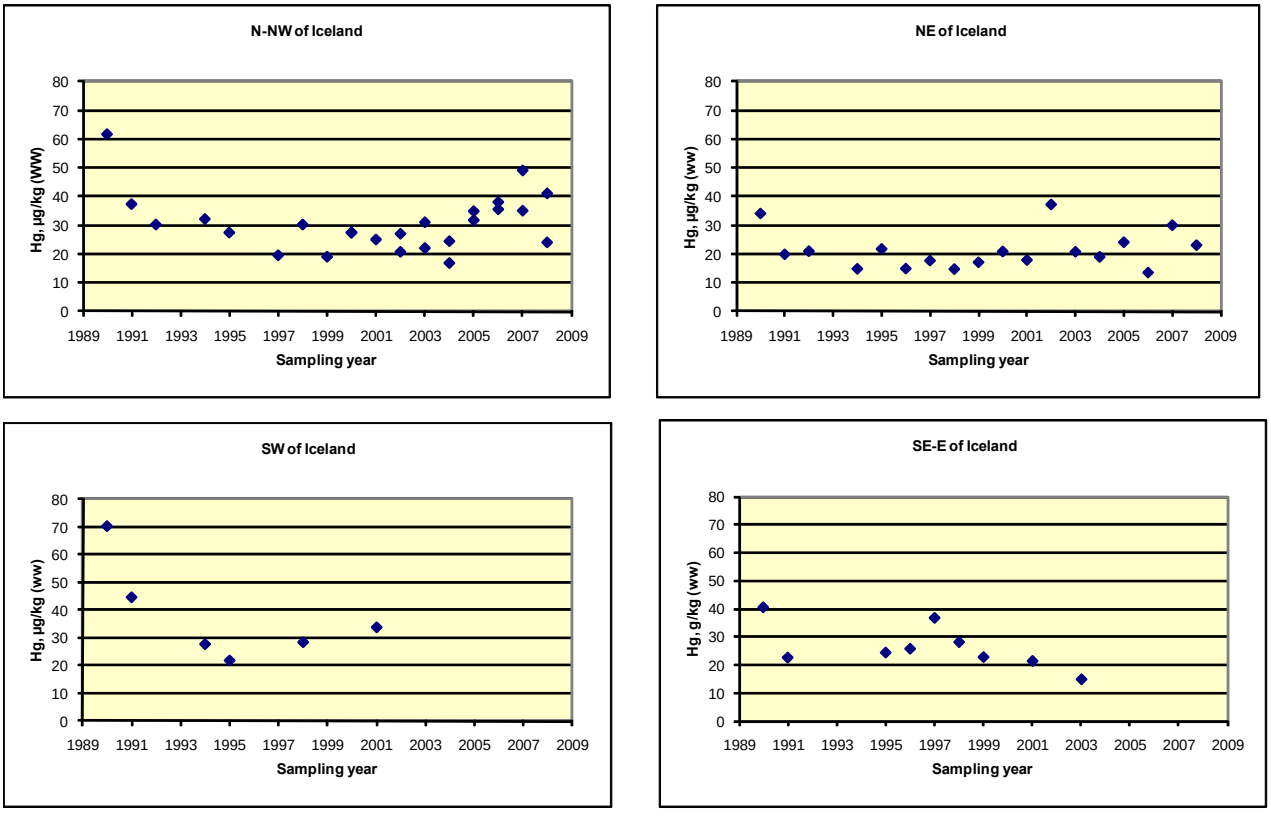
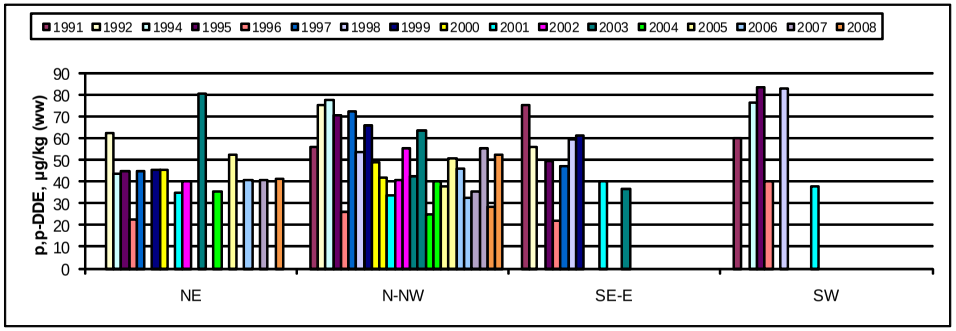
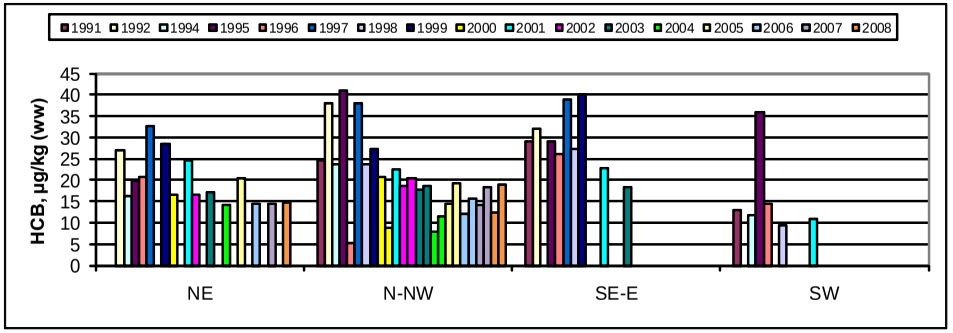
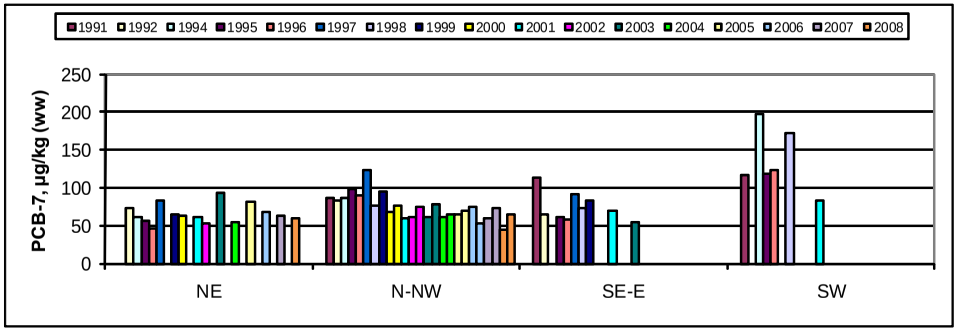
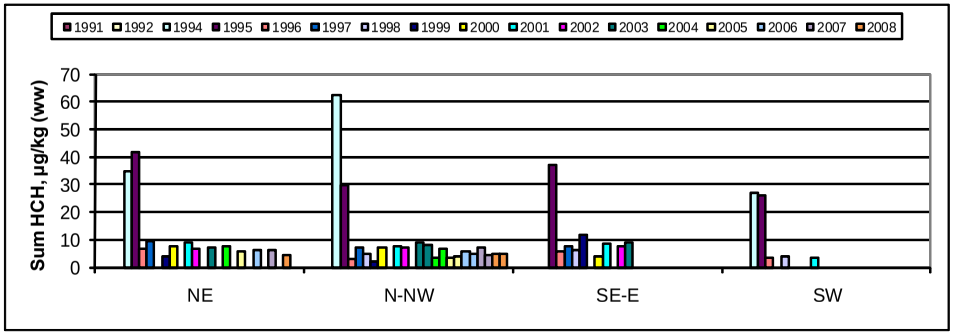


Figure 7f. Average concentration of Mercury (ww) in flesh of 30-45 cm Cod (Gadus morhua) from different locations in Icelandic waters in March 1990-2008.









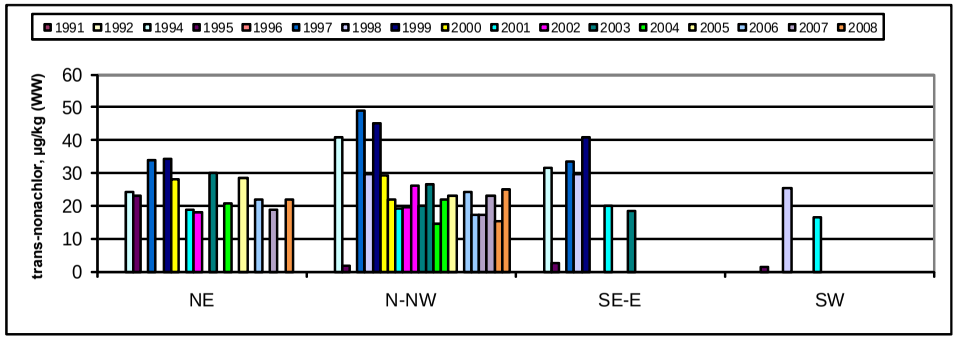


Figure 8. Average concentration of organochlorine compounds (ww) in livers of 30-45 cm Cod (Gadus morhua) from different locations in Icelandic waters in March 1991-2008.

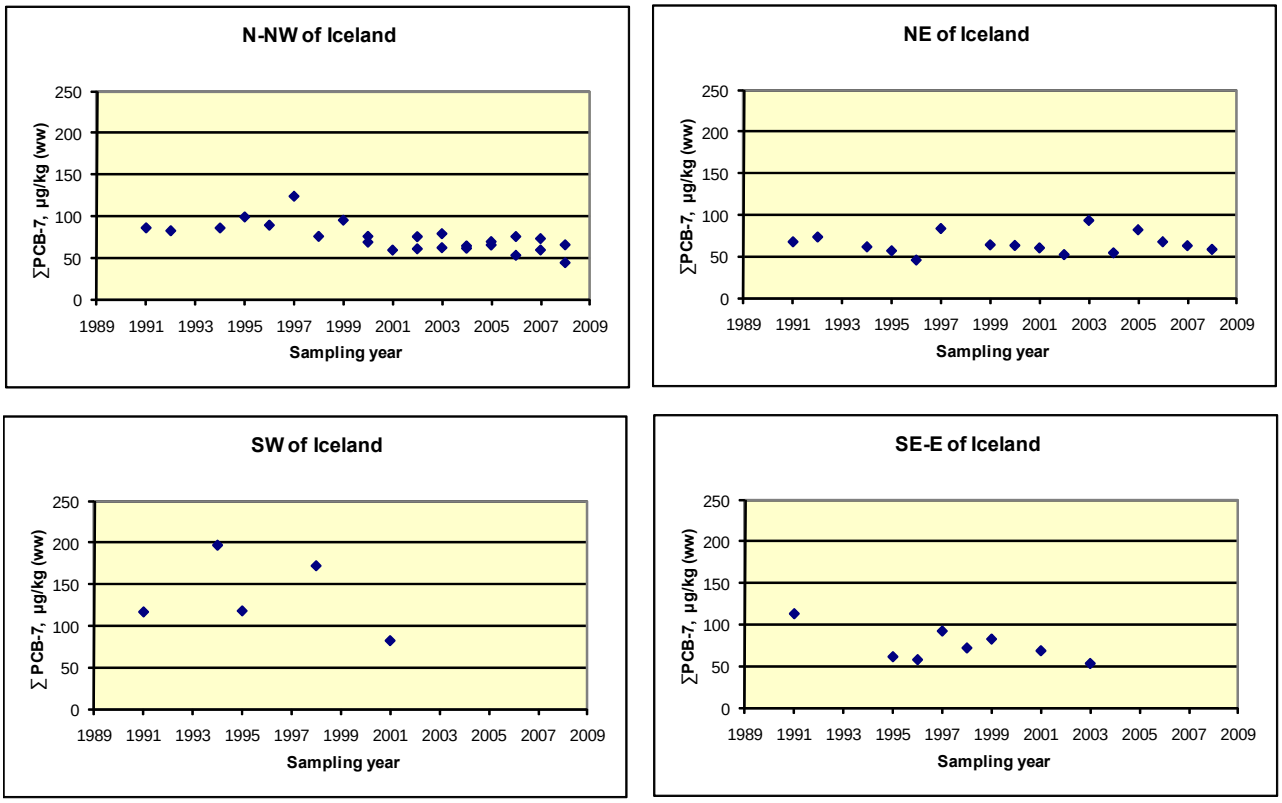


Figure 9a. Average concentration of ∑PCB-7 (ww) in livers of 30-45 cm Cod (Gadus morhua) from different locations in Icelandic waters in March 1991-2008.

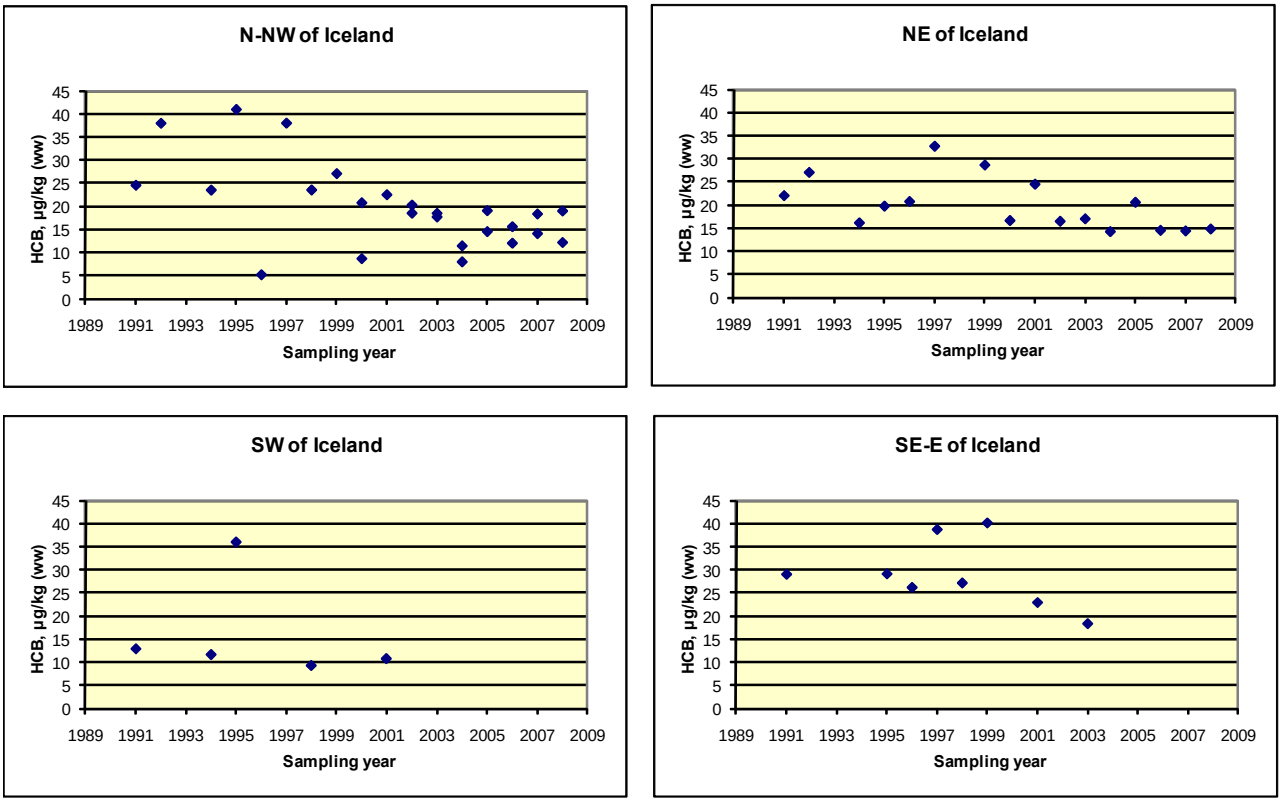


Figure 9b. Average concentration of HCB (ww) in livers of 30-45 cm Cod (Gadus morhua) from different locations in Icelandic waters in March 1991-2008.

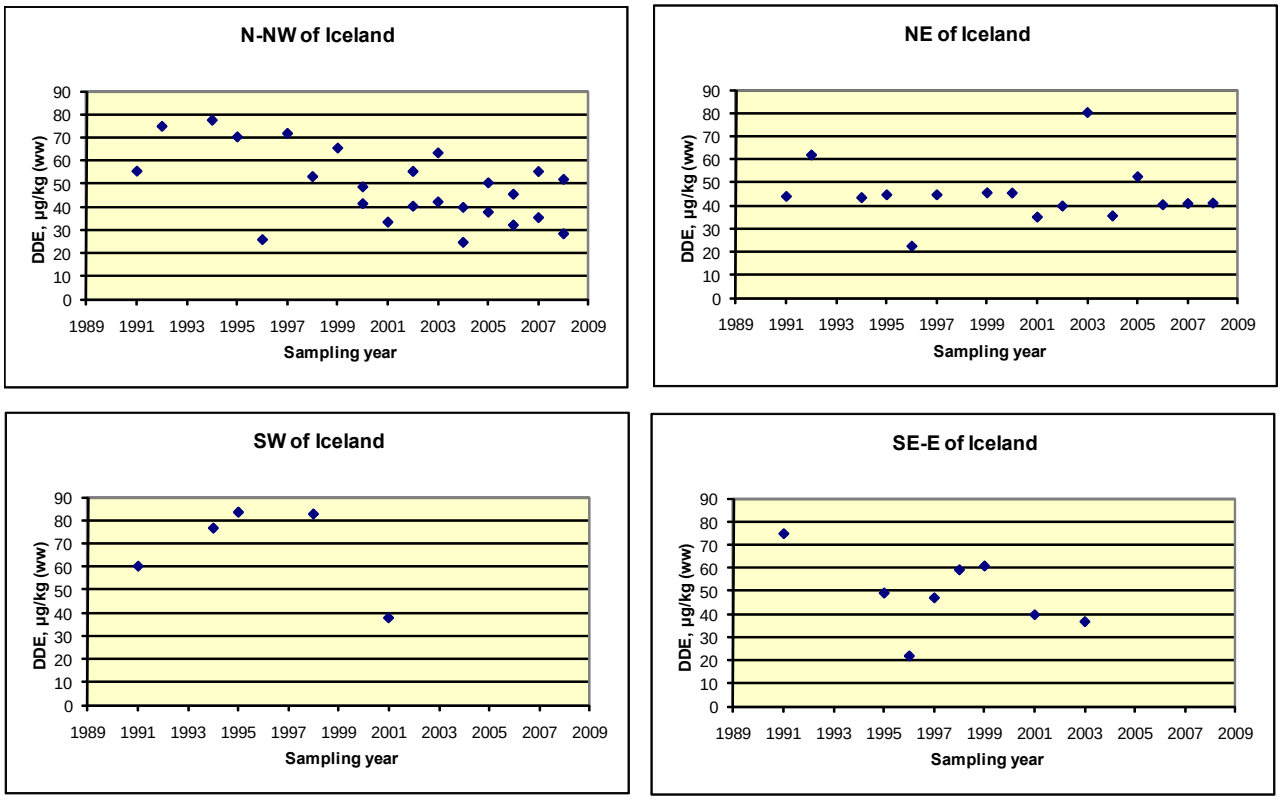


Figure 9c. Average concentration of DDE (ww) in livers of 30-45 cm Cod (Gadus morhua) from different locations in Icelandic waters in March 1991-2008.

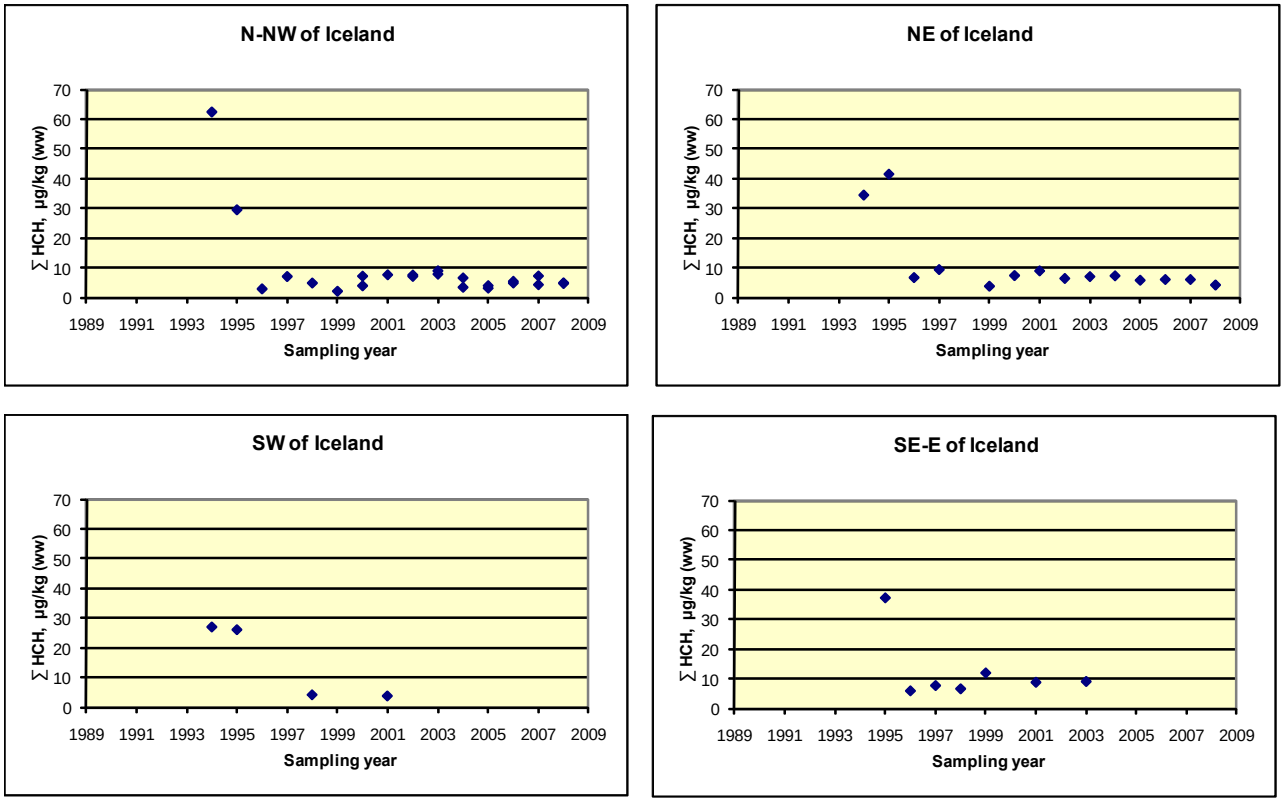


Figure 9d. Average concentration of ∑HCH (ww) in livers of 30-45 cm Cod (Gadus morhua) from different locations in Icelandic waters in March 1991-2008.

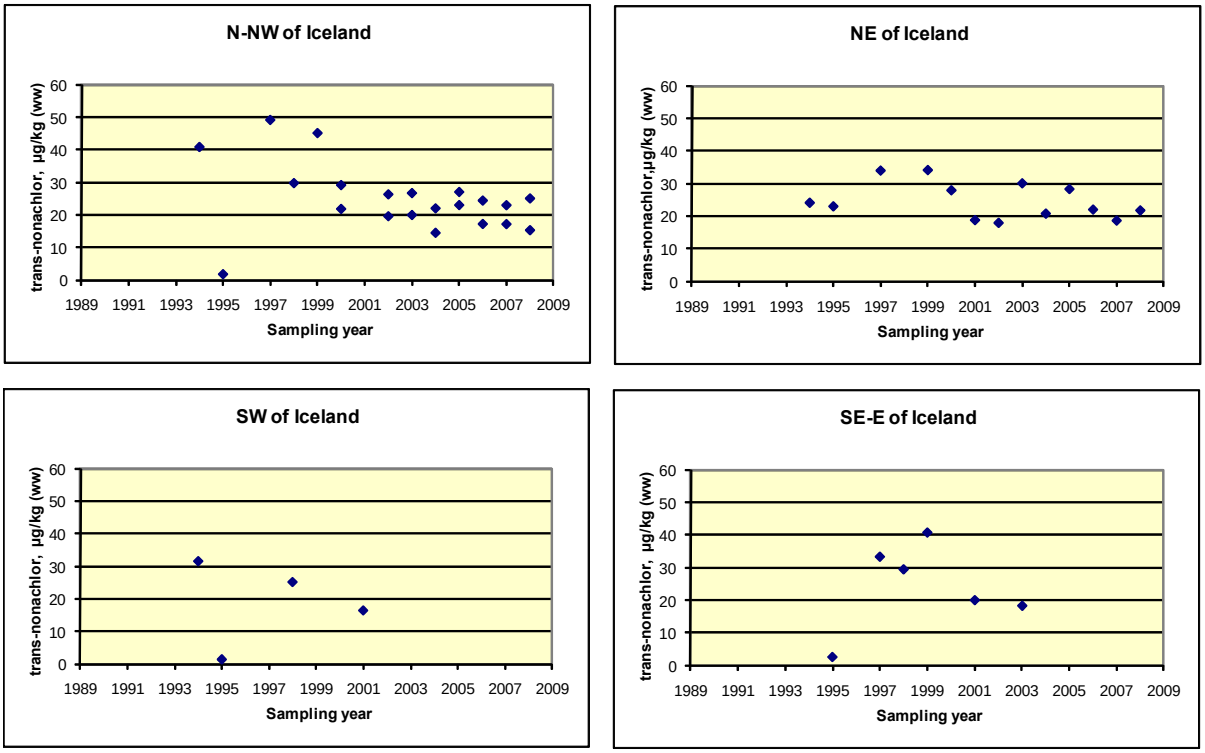


Figure 9e. Average concentration of transnonachlor (ww) in livers of 30-45 cm Cod (Gadus morhua) from different locations in Icelandic waters in March 1991-2008.