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MONITORING OF THE MARINE BIOSPHERE AROUND ICELAND IN 2002 - 2003

Eva Yngvadóttir

Skýrsluágrip Rannsóknastofnunar fiskiðnaðarins

Icelandic Fisheries Laboratories Report Summary

Titill / Title	Mengunarvöktun í lífríki sjávar við Ísland 2002 og 2003/ Monitoring of the marine biosphere around Iceland 2002 and 2003		
Höfundar / Authors	*Eva Yngvadóttir*		
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Styrktaraðilar / funding:	*Umhverfisráðuneyti/Ministry for the Environment*		

Ágrip á íslensku:

Í þessari skýrslu eru birtar niðurstöður árlegs vöktunarverkefnis á vegum Umhverfisráðuneytisins fyrir árin 2002 og 2003. 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). Hafrannsóknastofnunin sér um að afla sýna og Rf hefur umsjón með undirbúningi sýna og mælingum á snefilefnum í lífríki hafsins. Sýnin eru mæld á Rf og á Rannsóknastofu í lyfja- og eiturefnafræði.

Mæld voru ýmis ólífræn snefilefni og klórlífræn efni í þorski veiddum í árlegu vorralli Hafró í mars 2003 og í kræklingi sem safnað var á 9 stöðum í kringum landið í ágúst 2002. Vöktun í lífríki sjávar við Ísland hófst 1989.

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 marine biosphere around Iceland in 2002 and 2003. The project, which is overseen by the Enviromental 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. The Icelandic Fisheries Laboratories (IFL) 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 IFL and at the Department of Pharmacology and Toxicology at the University of Iceland.

Metals and organochlorines were analysed in cod *(Gadus morhua)* caught in March 2003 and in blue mussel *(Mytilus edulis)* collected in August 2002. Marine monitoring began in Iceland 1989.

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

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APPENDICES

I. Introduction

This report contains the results of the annual monitoring of heavy metals and organochlorine analyses for blue mussel (*Mytilus edulis*), collected in the waters around Iceland in 2002, as well as for cod (*Gadus morhua*), collected in Icelandic territorial waters in 2003. Annual monitoring of heavy 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 (1-9). To meet the requirements of the OSPAR (Oslo and Paris agreement) and the AMAP (Arctic Monitoring Assessment Program), data has been submitted to the ICES databank (ices.dk), the first data being for the year 1989. The project is supervised by the Environment and Food Agency in Iceland and financed by The Ministry for the Environment. The Icelandic Fisheries Laboratories (IFL) is the coordinator for marine biota monitoring and responsible for methods relating to sampling, preparation and analysis of samples. The samples were analyzed at the IFL and at the Department of Pharmacology and Toxicology at the University of Iceland.

II. Sampling and preparation of samples

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

2.1 Sampling

Using standard sampling guidelines (JMP, ICES and OSPAR), the sampling of cod (30-45 cm length, 4 samples) and dab (20-35 cm length, 2 samples) was carried out in the annual bottom trawl survey in March 2003. Blue mussel, 4-6 cm length, was collected from 9 sites around the country in August 2002. Sampling sites for cod, dab and blue mussel are shown in figure I and coordinates are given in appendix I and II. Icelandic waters have been divided into five main locations (N-NW, NA, SA-A, S, SW).

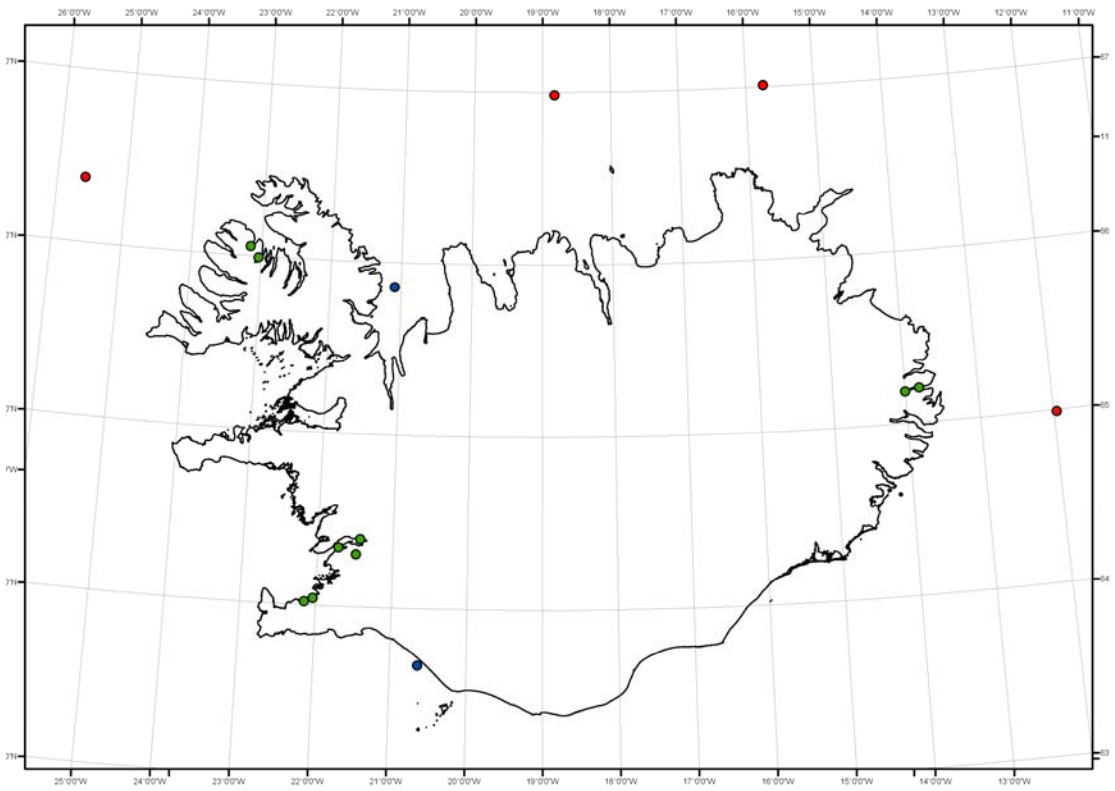

Figure 1. Locations for sampling of cod (*Gadus morhua*) (red dots), dab (*Limanda limanda*) (blue dots) 2003 and blue mussel (*Mytilus edulis*) (green dots) 2002.

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.

30-45cm long cod was selected and dab in the range of 20-35cm, each sample containing 25 ± 5 individuals. No further work was done with the dab samples in this project due to lack of funding and the samples are currently being kept frozen at the IFL. At the time of the sampling, the total weight as well as the gender of each fish was determined, livers were put in preweighed 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 subsamples, 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 the IFL, 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, a-HCH, b-HCH and g-HCH, p,p'-DDT o,p'-DDT, p,p'-DDE and p,p'-DDD, transnonachlor, a-chlordan, g-chlordan, oxychlordan, TOX-26, Tox-50 and Tox-62. Table 1 presents 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 groups	Inorganic contaminants	Organic contaminants	Other
Mussel, 2002 (***Mytilus edulis***)	9	50	Whole soft body		Cd, Cu, Zn, Pb,As, Se, Hg	X*	dry matter and fat
Cod, 2003 (***Gadus morhua***)	4	25	Flesh	4	Hg		dry matter and fat
Labels: Cod-N-NW (1) 03 Cod-N-NW (2) 03 Cod-NA 03 Cod -SA-A 03			Liver	21	Cd, Cu, Zn, Pb, As, Se	X*	dry matter and fat

X* : PCB28, PCB31, PCB52, PCB101, PCB105, PCB118, PCB138, PCB153, PCB156, PCB170, PCB180, a, b, g-HCH, HCB, p,p'-DDT, o,p'-DDT, p,p'-DDE, p,p'-DDD, transnonachlor, a-chlordan, g-chlordan, oxychlordan, TOX-26, Tox-50, Tox-62.

3.2 Methods

The metals were analysed by using cold vapour atomic absorption, FAA/impact bead using D_2-background correction and hydride generation atomic absorption. The

organochlorine compounds were analysed by GC-ECD using HP5890 Series II with an automatic injector (HP7673). A detailed description of the analyses of metals, organic compounds and supporting parameters (dry matter and fat) is given in report (7).

3.3 Quality assurance

The quality of the **metal** analysis was checked in several ways. Certified reference materials are thus routinely treated and analysed in the same manner as the samples. For all the elements measured, standard additions to tissue homogenates prior to decomposition were in place. The additions corresponded to 50, 100 and 150% increase of the expected concentrations. Results for analysis of reference materials, recovery of standard additions 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 IFL has participated in Quasimeme and Quash with satisfactory results. The average fieldblank (C_B), derived from the sample field blanks, and three times its standard deviation ($3xS_B$), 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.

IV. Results

This report contains data from the years 2002 and 2003 which has not been statistically evaluated in connection with previous results. However, there are apparently no obvious changes in contaminant concentrations see (graphical representation in 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)* 1990-2003, (average age, average weight of ungutted fish, average weight of liver, average fat content in liver).

4.2 Heavy metals

Results for metals in blue mussel (2002) and cod (2003) are presented in tables 4 and 5 in appendix IV. New data is presented along with data from previous years (1,4-9) in figures 3a-c 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 12-13 years. It should be noted that results for cod are on a wet weight basis but for mussel on a dry weight basis.

4.2.1 Blue mussel

Figures 3a-c in appendix VII show the average concentration of heavy metals in blue mussel 1991-2002, on a dry weight basis. The horizontal red line shows the ICES90 75% baseline (10). Figures 4a-c in appendix VII show average concentrations (dw), of heavy metals in blue mussel from different sampling sites, 1990-2002. Metal concentrations vary considerably between years and different locations. A sample from Úlfsá, Skutulsfjordur was contaminated during homogenation. Lead was detected below the limits of detection in all cases except for Hvítanes. The results show low values for Hg in blue mussel when compared with ICES90 75% baseline values. Cu and Zn are close to these values but Cd is high in blue mussel from Icelandic coast, 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 shows the average heavy metal concentration in livers of 30-45 cm cod (wet weight), caught in Icelandic waters in March every year between 1990-2003. Figures 7a-f in appendix VIII show average concentrations (ww), of heavy metals in cod from different sampling sites, 1990-2003. Mercury is measured in the flesh. Lead was dedected below the limits of detection in all samples. Variations in concentration between years and locations over the time interval can be

seen. The concentration of heavy metals in cod from Icelandic waters is low compared to cod from other northen 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 costal waters are 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 (2002) and cod (2003) are presented in appendix V, tables 6 and 7. 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 (1,4-9) 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 periode of 12-13 years.

4.3.1 Blue mussel

Figures 5a-b in appendix VII show the concentration on a dry-weight basis of organic compounds in blue mussel from different locations in Iceland 1991-2002. 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, concentration of HCH, HCB and DDE is low, close to the limit of detection.

4.3.2 Cod

Figures 8 in appendix VIII shows the average concentration on a wet-weight basis of organic compounds in livers of 30-45 cm cod, caught in Icelandic waters in March every year between 1991-2003. Figures 9a-e in appendix VIII show average concentrations (ww), of some organic compounds in cod from different sampling sites, 1991-2003. The sum of seven PCBs (PCB-28, PCB-52, PCB-101, PCB-118, PCB-138, PCB-153 and PCB-180) are about 90% of the 11 PCBs measured. The concentration 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 biota for the years 2002 and 2003. It adds to the information gathered every year to determine if the concentration of trace elements is changing (increasing/decreasing), if current situation is a cause for health concerns and if the marine environment is being threatened by pollution. There are no obvious indications that concentration of contaminants are changing in the Icelandic environment. However, a full statistical analysis of all data is needed to confirm that suggestion. In addition, when comparing data of livers it is necessary to keep in mind the factors (i.e fat, age, dw) that may affect the quantity and concentration of trace elements.

Iceland is a volcanic island and 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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IFL: Elín Árnadóttir, Eva Yngvadóttir, Eyrún Þorsteinsdóttir, Helga Halldórsdóttir and Þuríður Ragnarsdóttir.
UIPT: Kristín Ólafsdóttir and Elín V. Magnúsdóttir.

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Appendix I.

Biological measurements of Blue mussel (*Mytilus edulis*) 2002

Species:	**Blue mussel (*Mytilus edulis*)**	Date of sampling:	**12.8.2002**
Length:	4-6 cm	Sampled by:	Marine Inst.
Location:	**Úlfsá, Skutulsfjordur**	Date of preparation:	24.9.2003
Coordinates:	660360-230996	IFL#:	SN-2003-00505

	Length (mm)	Width (mm)	Height (mm)	Total weight (g)	Weight soft body (g)	Weight shell (g)
1	49,60	23,50	22,30	15,60	7,02	7,70
2	43,10	28,00	16,60	7,88	3,65	3,82
3	40,60	19,10	15,50	6,72	2,85	3,67
4	40,00	19,50	16,30	6,90	3,25	3,58
5	56,20	25,30	22,50	17,83	9,37	8,20
6	41,20	19,10	15,90	6,09	2,94	2,98
7	43,70	21,60	18,10	9,20	4,86	4,37
8	42,10	20,80	16,50	8,44	3,90	4,29
9	46,00	21,60	19,10	8,94	3,81	4,82
10	47,30	22,00	18,40	10,77	5,20	5,36
11	44,10	20,90	17,60	9,44	5,02	4,28
12	43,10	20,50	18,40	9,76	4,76	4,63
13	40,00	19,00	15,00	6,58	2,91	3,52
14	40,10	19,30	17,10	7,48	4,30	3,17
15	43,50	22,20	17,30	9,67	4,84	4,45
16	44,10	31,10	17,30	9,79	4,37	5,01
17	40,00	18,70	15,00	6,34	2,90	3,25
18	42,90	20,60	15,80	7,96	3,71	4,09
19	44,70	21,60	18,70	10,78	5,01	5,39
20	42,60	22,60	16,90	7,71	4,22	3,40
21	50,50	27,30	19,80	13,26	7,19	5,52
22	45,00	23,20	18,30	10,40	5,35	4,71
23	40,90	21,20	16,50	7,62	3,37	4,04
24	40,90	20,60	16,90	7,40	3,42	3,49
25	45,30	22,60	17,50	7,62	4,16	3,38
26	53,40	24,90	21,10	15,60	7,89	7,35
27	45,00	20,10	16,40	8,42	4,29	3,99
28	42,10	19,70	15,10	7,40	3,47	3,72
29	46,40	20,10	16,80	9,68	4,76	4,64
30	40,20	19,40	14,90	6,12	3,24	2,63
31	40,00	19,10	15,60	6,18	3,27	2,75
32	40,00	18,20	14,80	6,46	3,00	3,40
33	48,90	23,60	20,20	12,58	6,74	5,50
34	43,10	14,10	17,80	7,78	3,84	3,73
35	44,00	18,20	16,90	6,38	3,10	3,13
36	40,00	39,50	15,00	6,32	3,04	2,99
37	60,00	27,80	22,80	20,95	11,82	8,83
38	43,20	19,60	15,00	7,57	3,66	3,85
39	40,00	17,40	15,50	6,15	3,40	2,28
40	45,00	22,20	17,50	8,53	5,12	3,19
41	45,20	22,50	17,80	9,95	4,71	4,76
42	43,40	21,30	16,10	6,91	3,79	3,02
43	40,10	18,30	14,10	5,63	2,69	2,71
44	43,00	21,50	15,60	7,38	3,94	3,23
45	43,20	21,00	17,7	9,45	4,52	4,68
46	40,20	20,90	14,70	5,78	2,79	2,49
47	47,90	23,30	18,80	11,85	5,65	6,20
48	42,20	20,10	16,60	7,64	3,96	3,68
49	40,20	17,90	15,50	5,91	3,22	2,69
50	40,90	19,00	15,10	6,91	3,37	3,54
	Length	**Width**	**Height**	**Total weight**	**Weight soft body**	**Weight shell**
Average	43,90	21,63	17,13	8,87	4,43	4,20
Stdev	4,25	3,94	2,06	3,19	1,75	1,45
Min	40,00	14,10	14,10	5,63	2,69	2,28
Max	60,00	39,50	22,80	20,95	11,82	8,83

Species:	**Blue mussel (*Mytilus edulis*)**	Date of sampling:	**12.8.2002**
Length:	4-6 cm	Sampled by:	Marine Inst.
Location:	**Dvergasteinn, Álftafjordur**	Date of preparation:	22.10.2003
Coordinates:	655989-230215	IFL#:	SN-2003-00497

	Length (mm)	Width (mm)	Height (mm)	Total weight (g)	Weight soft body (g)	Weight shell (g)
1	43,60	22,80	12,00	7,50	4,20	3,03
2	46,60	22,70	18,00	7,23	3,62	3,48
3	45,10	23,60	18,90	9,22	4,61	4,34
4	42,60	22,10	12,30	7,92	3,99	3,48
5	41,70	20,40	15,80	6,79	3,55	3,05
6	46,50	20,00	20,60	10,05	5,54	4,19
7	41,20	19,20	17,50	7,83	3,49	4,13
8	40,90	18,50	16,60	6,54	3,39	2,98
9	45,40	22,80	18,50	9,40	5,27	3,87
10	55,00	25,10	26,50	24,57	10,60	13,85
11	40,00	20,30	19,80	7,20	3,25	3,82
12	42,30	21,80	18,30	8,83	4,81	3,77
13	48,60	21,60	18,40	11,12	5,34	5,61
14	42,80	21,30	19,50	8,41	5,34	3,00
15	44,90	19,30	21,50	10,26	5,56	4,41
16	47,80	22,80	19,60	11,24	5,95	4,96
17	50,90	23,00	23,80	15,23	7,42	7,45
18	47,60	22,20	21,80	12,90	6,46	6,24
19	56,30	24,80	25,40	18,69	10,05	8,48
20	55,80	26,10	22,70	16,60	9,63	6,78
21	40,00	20,90	15,00	6,07	3,16	2,81
22	41,80	20,90	17,50	6,96	4,06	2,78
23	41,70	19,40	16,90	6,82	3,97	2,70
24	46,00	21,00	20,40	13,18	5,75	7,27
25	45,10	21,70	20,20	9,08	3,81	5,11
26	47,20	21,10	19,10	11,64	5,43	6,08
27	46,90	20,20	21,40	11,40	6,11	5,14
28	50,40	23,30	20,40	12,54	6,67	5,76
29	51,10	24,60	23,10	16,79	8,81	7,90
30	54,70	26,10	23,30	17,95	9,55	8,26
31	41,00	20,20	16,60	6,96	3,95	2,87
32	42,70	20,30	17,10	7,32	4,40	2,82
33	42,90	20,00	19,10	9,32	4,96	4,23
34	48,50	22,90	18,70	12,45	6,02	6,32
35	45,00	23,00	18,50	11,15	5,37	5,49
36	47,10	21,40	22,80	13,36	7,12	6,13
37	46,10	21,00	21,10	12,61	6,20	6,28
38	57,30	27,10	24,70	22,36	11,23	10,80
39	58,20	23,20	25,30	21,86	10,11	11,49
40	60,00	30,10	24,70	23,31	12,47	10,64
41	42,20	21,00	17,70	7,32	4,21	3,04
42	44,30	19,40	17,80	8,51	4,20	4,04
43	44,30	20,30	16,00	7,61	4,16	3,10
44	45,40	20,60	17,70	9,34	4,79	4,46
45	45,30	21,70	17,10	7,22	2,71	4,26
46	47,90	21,80	20,20	9,92	4,18	5,48
47	46,40	21,70	22,50	13,72	6,86	6,74
48	49,70	23,30	22,40	12,99	7,54	5,20
49	51,40	22,30	23,40	14,54	7,62	6,73
50	56,70	23,80	23,60	17,00	9,66	7,10
	Length	**Width**	**Height**	**Total weight**	**Weight soft body**	**Weight shell**
Average	47,06	22,09	19,84	11,58	5,94	5,44
Stdev	5,18	2,22	3,25	4,73	2,39	2,48
Min	40,00	18,50	12,00	6,07	2,71	2,70
Max	60,00	30,10	26,50	24,57	12,47	13,85

Species:	**Blue mussel (*Mytilus edulis*)**	Date of sampling:	**10.8.2002**
Length:	4-6 cm	Sampled by:	Marine Inst.
Location:	**Hvítanes, Hvalfjordur**	Date of preparation:	3.7.2003
Coordinates:	642185-212970	IFL#:	SN-2003-00498

	Length (mm)	Width (mm)	Height (mm)	Total weight (g)	Weight soft body (g)	Weight shell (g)
1	45,50	21,80	19,10	9,99	5,50	4,34
2	42,50	20,60	21,50	8,07	3,91	3,95
3	42,60	20,20	16,70	7,57	4,05	3,36
4	41,70	19,80	18,70	8,03	4,65	3,21
5	44,60	19,90	21,30	11,38	5,26	5,84
6	45,10	19,50	18,30	9,15	4,63	4,19
7	45,20	21,60	16,90	9,05	4,73	4,09
8	45,10	19,00	18,30	9,11	4,65	4,23
9	41,40	19,60	20,00	9,00	4,07	4,83
10	44,90	21,40	19,10	10,14	5,33	4,64
11	43,80	21,20	18,30	7,64	2,66	4,63
12	48,00	23,20	19,80	13,09	7,23	5,70
13	45,70	20,40	20,20	10,56	4,95	5,48
14	54,20	24,10	23,00	16,35	8,95	7,20
15	49,40	22,60	19,30	11,19	6,50	4,54
16	45,10	20,90	18,20	8,80	5,41	3,23
17	50,30	24,60	19,10	12,21	6,56	5,49
18	47,50	22,20	20,40	11,06	5,92	4,97
19	50,10	22,70	22,70	14,02	7,47	6,31
20	52,20	21,60	23,30	13,98	7,56	6,27
21	42,20	20,10	18,30	7,89	4,05	3,59
22	40,80	21,20	20,60	5,57	3,28	2,22
23	43,10	24,10	20,30	8,40	4,51	3,75
24	42,70	20,80	16,70	7,44	4,19	3,09
25	43,30	20,40	16,80	7,43	4,49	2,80
26	46,00	21,90	18,00	9,87	5,34	4,18
27	49,50	21,10	18,90	9,15	5,74	3,21
28	43,70	19,40	19,10	9,10	4,53	4,37
29	49,60	22,50	19,20	9,27	5,20	3,88
30	40,80	18,80	16,40	7,04	4,25	2,69
31	45,50	21,10	16,80	8,48	5,08	3,26
32	45,80	18,60	19,40	9,94	5,21	4,05
33	54,98	26,00	20,50	14,81	8,62	5,90
34	59,80	24,90	27,20	23,81	11,99	11,48
35	41,50	19,80	16,30	6,69	3,50	2,92
36	43,20	17,40	18,30	7,27	4,48	2,66
37	47,10	24,00	22,20	14,83	7,67	7,04
38	49,70	22,90	20,80	14,51	7,27	7,09
39	54,80	24,20	18,80	11,58	5,67	5,76
40	54,70	23,30	23,20	17,68	8,49	9,05
41	46,00	19,30	21,10	8,55	4,10	4,38
42	46,40	21,00	19,40	10,38	5,31	5,00
43	46,30	23,70	18,80	10,22	5,67	4,42
44	48,10	21,80	21,10	12,46	6,63	5,67
45	50,70	22,20	20,30	12,75	7,25	5,39
46	42,10	19,90	15,30	6,14	3,51	2,45
47	42,20	19,70	18,60	8,57	4,91	35,60
48	45,70	20,90	18,80	8,70	5,28	3,31
49	46,10	21,80	19,60	10,54	5,73	4,72
50	48,50	21,80	23,20	14,14	8,34	5,64
	Length	**Width**	**Height**	**Total weight**	**Weight soft body**	**Weight shell**
Average	46,52	21,43	19,56	10,47	5,61	5,32
Stdev	4,23	1,83	2,21	3,34	1,74	4,69
Min	40,80	17,40	15,30	5,57	2,66	2,22
Max	59,80	26,00	27,20	23,81	11,99	35,60

Species:	**Blue mussel (*Mytilus edulis*)**	Date of sampling:	**10.8.2002**
Length:	4-6 cm	Sampled by:	Marine Inst.
Location:	**Eyri, Hvalfjordur**	Date of preparation:	9.7.2003
Coordinates:	642050-214390	IFL#:	SN-2003-00502

	Length (mm)	Width (mm)	Height (mm)	Total weight (g)	Weight soft body (g)	Weight shell (g)
1	40,00	22,30	15,50	6,73	3,85	2,79
2	44,95	20,10	16,10	7,43	4,25	3,04
3	48,40	21,60	18,40	10,01	5,69	4,27
4	53,40	23,65	22,00	16,53	8,80	7,67
5	53,80	24,75	25,50	19,60	11,15	8,24
6	59,40	26,10	26,30	21,88	12,34	9,09
7	40,00	12,65	15,95	5,42	3,49	1,90
8	43,80	19,10	15,40	6,95	4,38	2,54
9	43,70	18,45	16,50	6,70	4,22	2,43
10	42,90	19,85	18,80	8,46	5,08	3,30
11	45,70	22,60	17,20	8,32	4,71	3,61
12	49,65	29,10	27,85	21,56	12,70	8,78
13	54,30	25,80	20,50	12,96	6,57	6,39
14	41,20	13,70	15,15	6,35	3,65	2,65
15	46,30	20,55	17,00	8,56	5,41	3,09
16	45,60	21,50	22,15	11,59	7,20	4,44
17	51,50	25,15	20,10	13,60	8,41	5,14
18	54,75	24,30	21,85	15,80	9,41	6,39
19	58,50	27,00	22,60	19,10	10,72	8,33
20	45,10	21,60	17,20	8,39	5,21	3,14
21	59,55	27,00	23,10	19,41	11,81	7,53
22	59,00	26,00	24,50	20,32	12,34	7,97
23	59,90	28,80	27,30	24,01	13,85	10,15
24	59,80	27,50	24,00	16,64	9,62	6,98
25	58,75	23,10	26,30	22,90	12,29	10,51
26	59,00	25,35	27,40	19,64	10,57	9,03
27	57,00	22,20	26,90	21,36	12,39	8,91
28	59,55	27,50	24,60	19,12	10,57	8,52
29	59,95	24,10	26,85	23,47	13,28	10,13
30	60,00	25,65	24,80	23,25	12,68	10,54
31	59,80	29,75	27,85	26,10	15,83	10,22
32	60,00	29,90	24,90	16,67	7,87	8,75
33	60,00	28,50	24,05	18,67	8,92	9,75
34	60,00	26,60	22,20	19,62	12,34	7,23
35	59,95	28,50	26,40	25,77	14,73	11,02
36	60,00	28,60	28,70	21,59	10,66	10,86
37	59,80	29,90	27,50	26,49	15,99	10,45
38	59,85	30,00	27,30	29,77	17,08	12,66
39	59,95	28,90	26,70	27,09	15,37	11,67
40	60,00	28,20	25,60	27,83	15,59	12,18
41	59,85	26,20	29,70	31,69	17,63	14,01
42	60,00	28,50	24,10	23,84	13,75	10,02
43	59,95	28,40	27,10	27,64	16,55	11,07
44	60,00	27,10	27,70	29,63	17,00	12,58
	Length	**Width**	**Height**	**Total weight**	**Weight soft body**	**Weight shell**
Average	54,42	24,86	23,13	1654,08	10,36	7,73
Stdev	7,03	4,17	4,37	7758,06	4,31	3,37
Min	40,00	12,65	15,15	5,42	3,49	1,90
Max	60,00	30,00	29,70	37811,00	17,63	14,01

Species:	**Blue mussel (*Mytilus edulis*)**	Date of sampling:	**9.8.2002**
Length:	4-6 cm	Sampled by:	Marine Inst.
Location:	**Hvassahraun**	Date of preparation:	3.7.2003
Coordinates:	640125-220900	IFL#:	SN-2003-500

	Length (mm)	Width (mm)	Height (mm)	Total weight (g)	Weight soft body (g)	Weight shell (g)
1	43,00	21,90	19,50	8,30	4,24	3,92
2	42,80	22,40	18,50	9,30	5,33	3,90
3	50,50	24,50	20,90	14,67	7,79	6,53
4	47,50	24,70	21,00	12,50	7,54	4,70
5	50,30	24,90	23,30	16,05	9,32	6,67
6	46,30	22,70	19,00	10,75	6,29	4,27
7	47,60	24,80	19,70	12,81	7,51	5,11
8	42,80	22,90	17,90	8,47	5,20	3,05
9	47,90	22,50	19,30	11,08	6,53	4,32
10	46,90	23,40	19,80	11,56	6,89	4,52
11	49,40	25,90	19,50	13,73	8,05	5,60
12	50,00	25,80	21,30	15,22	9,24	5,79
13	54,10	25,30	23,10	17,86	9,44	8,19
14	49,30	26,00	20,90	13,39	7,74	5,48
15	43,90	25,00	18,30	9,93	5,74	4,05
16	45,80	23,00	21,40	12,62	7,24	5,32
17	49,60	24,10	23,40	17,03	9,12	7,77
18	49,80	25,00	20,90	14,45	8,37	3,02
19	50,50	26,20	21,40	14,72	8,26	6,27
20	52,20	24,30	23,90	17,00	9,65	7,08
21	54,80	26,30	25,20	19,36	11,70	7,52
22	46,10	21,80	19,10	9,86	5,57	4,05
23	44,60	23,70	18,70	9,82	5,61	4,17
24	44,80	22,00	18,30	10,24	5,74	4,39
25	49,00	25,20	22,90	13,70	7,90	5,68
26	48,30	26,20	19,60	12,91	7,21	5,63
27	53,50	27,00	22,90	15,57	9,75	5,70
28	57,60	27,80	24,50	21,00	12,49	8,38
29	40,90	23,10	20,90	10,22	6,31	3,76
30	43,30	24,90	17,50	8,91	4,79	4,08
31	47,80	22,90	20,50	12,35	6,69	5,55
32	48,70	24,40	22,50	14,24	8,09	6,04
33	47,60	24,30	21,40	12,15	7,14	4,84
34	50,30	24,10	20,90	13,73	8,38	5,21
35	50,80	25,50	20,80	14,74	8,80	5,78
36	44,20	22,00	19,60	7,60	3,82	3,65
37	44,10	21,80	19,70	9,67	5,71	3,86
38	44,80	23,30	17,90	9,62	5,70	3,81
39	46,50	23,60	19,30	8,71	5,21	3,40
40	48,30	25,00	19,70	13,04	7,27	5,63
41	52,10	25,80	20,50	15,71	8,64	6,90
42	53,00	26,60	23,70	17,89	10,53	7,20
43	41,80	22,10	17,60	8,63	4,95	3,45
44	43,90	23,40	17,50	9,55	6,06	3,42
45	45,50	23,70	19,30	10,17	5,68	4,35
46	45,40	23,30	21,30	12,48	7,79	4,54
47	44,30	21,90	19,80	10,24	5,99	4,19
48	46,80	21,80	20,70	11,41	6,63	4,71
49	46,10	24,00	18,10	10,94	6,54	4,29
50	49,90	27,30	19,60	12,22	6,29	5,81
	Length	**Width**	**Height**	**Total weight**	**Weight soft body**	**Weight shell**
Average	47,70	24,20	20,46	12,56	7,25	5,11
Stdev	3,62	1,61	1,93	3,10	1,84	1,36
Min	40,90	21,80	17,50	7,60	3,82	3,02
Max	57,60	27,80	25,20	21,00	12,49	8,38

Species:	**Blue mussel (*Mytilus edulis*)**	Date of sampling:	**10.8.2002**
Length:	4-6 cm	Sampled by:	Marine Inst.
Location:	**Hvalstod, Hvalfjordur**	Date of preparation:	4.7.2003
Coordinates:	642375-212670	IFL#:	SN-2003-00499

	Length (mm)	Width (mm)	Height (mm)	Total weight (g)	Weight soft body (g)	Weight shell (g)
1	50,40	22,60	22,80	15,94	8,15	7,63
2	53,40	25,20	21,30	15,83	8,53	6,99
3	60,00	26,80	24,40	24,31	12,11	11,86
4	57,90	26,70	24,50	22,61	11,76	10,65
5	51,00	24,40	24,10	21,40	10,27	10,82
6	60,00	27,40	27,00	25,75	13,53	11,77
7	58,30	26,00	26,60	23,92	12,47	11,17
8	49,80	22,70	20,10	12,42	6,75	5,51
9	48,20	24,20	21,30	12,61	7,19	5,23
10	50,40	20,90	21,80	14,45	7,49	6,76
11	58,10	26,90	23,60	16,23	5,48	10,53
12	53,00	24,20	23,50	16,10	8,60	7,82
13	60,00	25,30	24,40	21,64	11,82	9,35
14	60,00	27,00	24,10	25,46	13,62	11,59
15	54,30	25,50	22,80	18,09	9,97	7,73
16	54,70	24,50	24,70	19,73	10,12	9,42
17	57,70	24,70	28,20	22,37	12,20	9,65
18	57,10	25,00	25,70	22,45	10,79	11,30
19	59,00	25,40	25,60	24,15	12,23	11,64
20	58,10	26,20	23,70	22,50	11,23	10,78
21	60,00	27,30	23,60	22,94	11,72	11,01
22	51,10	23,20	21,40	14,98	7,35	7,37
23	56,30	24,50	25,70	22,18	11,68	10,26
24	58,50	25,90	27,00	23,31	11,51	11,34
25	55,00	23,30	23,50	16,73	8,90	7,61
26	58,70	24,60	23,00	19,91	9,67	9,86
27	56,20	23,10	25,70	20,47	11,38	8,76
28	57,40	25,00	25,20	24,00	9,83	13,96
29	54,50	23,10	25,20	19,77	9,29	10,22
30	54,00	24,30	23,90	16,97	7,75	8,94
31	57,50	24,40	24,40	22,36	11,26	10,93
32	57,00	25,30	24,00	19,54	10,68	8,64
33	57,90	28,70	25,70	24,93	13,69	11,05
34	57,00	24,50	25,40	20,38	11,23	8,86
35	59,10	26,20	23,20	20,88	11,82	8,83
36	49,20	21,60	21,90	12,35	5,31	6,87
37	52,30	25,60	22,80	20,44	10,65	9,47
38	58,20	23,70	25,80	21,84	11,05	10,44
39	52,20	22,00	23,20	16,83	8,28	8,35
40	52,30	25,30	22,60	17,82	9,17	8,46
41	60,00	25,30	25,60	25,35	12,33	12,65
42	57,00	26,60	24,00	22,27	10,72	11,05
43	57,20	22,10	20,90	14,09	7,15	6,60
44	57,40	25,40	24,20	22,50	11,03	11,06
45	59,10	25,30	23,00	22,15	11,08	10,72
46	59,00	24,70	25,30	24,52	12,54	11,62
47	56,60	28,10	24,00	20,14	10,51	9,60
48	60,00	26,70	25,60	25,25	13,06	11,91
49	58,50	26,30	23,30	23,69	10,34	13,08
50	50,50	22,70	22,60	14,78	7,67	6,83
	Length	**Width**	**Height**	**Total weight**	**Weight soft body**	**Weight shell**
Average	56,02	24,93	24,04	20,23	10,26	9,69
Stdev	3,40	1,70	1,70	3,81	2,09	1,99
Min	48,20	20,90	20,10	12,35	5,31	5,23
Max	60,00	28,70	28,20	25,75	13,69	13,96

Species:	**Blue mussel (*Mytilus edulis*)**	Date of sampling:	**9.8.2002**
Length:	4-6 cm	Sampled by:	Marine Inst.
Location:	**Straumur, Straumsvík**	Date of preparation:	2.7.2003
Coordinates:	640260-220250	IFL#:	SN-2003-501

	Length (mm)	Width (mm)	Height (mm)	Total weight (g)	Weight soft body (g)	Weight shell (g)
1	54,80	24,50	22,70	16,36	9,91	6,05
2	60,00	23,20	25,40	20,63	12,51	7,46
3	54,00	24,30	24,40	17,48	9,99	7,30
4	46,90	21,80	20,00	11,38	6,05	5,11
5	52,20	22,60	23,30	14,98	9,09	5,51
6	53,30	25,20	21,50	15,03	9,13	5,54
7	51,60	25,50	24,80	21,74	11,63	9,94
8	42,60	23,00	22,90	10,58	5,97	4,33
9	59,00	21,70	25,20	20,45	13,13	7,12
10	60,00	24,00	20,50	13,78	7,09	5,97
11	42,00	23,50	20,00	8,15	4,10	3,87
12	56,00	26,00	25,90	21,77	12,73	8,78
13	47,20	21,10	18,50	9,48	5,22	4,07
14	51,80	23,40	20,10	13,05	8,18	4,78
15	41,90	21,30	20,60	11,35	6,10	5,11
16	50,00	22,80	19,50	10,81	6,60	4,08
17	50,50	24,30	24,00	10,78	6,79	3,89
18	51,10	23,20	22,00	14,45	7,77	6,48
19	50,20	24,90	22,10	16,24	9,36	6,66
20	54,50	23,10	23,50	16,86	9,33	7,41
21	58,30	23,30	25,60	20,00	11,79	8,03
22	46,80	19,70	17,20	8,08	4,66	3,29
23	43,60	20,40	17,60	8,88	4,78	3,80
24	49,80	22,50	21,50	12,20	7,39	4,63
25	48,80	22,90	19,90	12,26	6,64	5,25
26	51,30	25,40	21,80	15,94	8,76	6,40
27	50,90	25,20	23,30	15,21	8,65	6,21
28	52,00	23,00	22,10	16,00	9,04	6,72
29	49,70	21,90	21,90	12,78	7,03	5,32
30	51,70	23,00	22,50	14,73	8,37	6,1
31	51,10	22,40	19,60	12,33	7,42	4,7
32	48,10	24,30	21,20	12,16	7,36	4,57
33	51,50	23,90	24,40	15,29	9,14	5,89
34	60,00	25,60	27,80	22,36	13,51	8,57
35	59,50	24,40	24,30	19,28	10,35	8,47
36	47,50	22,10	21,50	12,36	7,10	5,11
37	45,60	22,40	17,80	8,61	4,57	3,81
38	44,20	22,20	20,90	12,51	6,59	5,51
39	54,00	22,80	19,40	13,06	7,52	5,30
40	53,90	24,00	23,90	17,72	10,15	7,16
41	56,6	23,30	25,60	17,52	11,20	9,52
42	55,50	27,00	23,60	20,52	12,70	7,42
43	48,00	21,90	19,90	10,41	6,15	4,04
44	46,60	21,20	22,60	10,60	5,03	5,41
45	48,50	22,90	18,70	11,27	6,36	4,78
46	47,70	22,20	20,70	10,50	5,88	4,44
47	50,40	23,10	20,40	12,10	6,46	5,31
48	53,00	21,80	23,20	16,68	9,53	6,99
49	53,80	23,70	22,50	17,47	9,37	7,80
50	58,30	25,20	22,10	16,87	10,38	6,27
	Length	**Width**	**Height**	**Total weight**	**Weight soft body**	**Weight shell**
Average	51,22	23,26	22,01	14,42	8,33	5,93
Stdev	4,77	1,49	2,37	3,86	2,46	1,60
Min	41,90	19,70	17,20	8,08	4,10	3,29
Max	60,00	27,00	27,80	22,36	13,51	9,94

Species:	**Blue mussel (*Mytilus edulis*)**	Date of sampling:	**21.8.2002**
Length:	4-6 cm	Sampled by:	Marine Inst.
Location:	**Mjóifjordur II, Hofsá**	Date of preparation:	10.7.2003
Coordinates:	651220-134850	IFL#:	SN-2003-00503

	Length (mm)	Width (mm)	Height (mm)	Total weight (g)	Weight soft body (g)	Weight shell (g)
1	43,25	21,60	16,80	7,62	4,15	3,42
2	42,15	21,10	16,20	6,29	2,51	3,75
3	50,50	23,40	18,70	9,34	3,81	5,46
4	52,40	25,60	19,10	10,59	4,94	5,55
5	54,20	25,10	18,50	9,86	3,90	5,82
6	56,65	18,60	21,90	14,58	6,81	7,66
7	57,60	28,50	22,80	14,55	7,06	7,34
8	46,40	22,20	18,40	8,10	3,81	4,21
9	46,50	24,30	18,50	9,18	4,27	4,84
10	49,50	24,20	18,00	7,70	2,99	4,62
11	56,20	27,40	22,40	12,30	5,15	7,01
12	56,60	27,80	22,20	16,68	9,40	7,20
13	46,20	23,20	19,00	7,71	3,68	4,02
14	48,70	23,70	20,60	11,30	7,00	4,23
15	47,00	23,10	18,60	8,49	5,09	3,39
16	58,40	26,20	22,50	16,02	7,77	8,20
17	57,10	21,70	22,00	12,33	4,88	7,40
18	45,30	21,80	18,00	7,75	4,01	3,70
19	48,20	24,40	18,00	9,07	4,94	4,08
20	51,10	23,00	18,60	10,00	5,44	4,50
21	52,40	23,60	22,10	11,87	7,30	4,55
22	48,20	25,30	18,30	8,81	4,66	4,08
23	47,50	24,90	19,70	9,41	4,48	4,89
24	46,40	23,20	19,00	8,70	4,39	4,27
25	46,20	21,70	15,10	5,64	2,32	3,19
26	50,60	23,70	19,60	11,51	6,79	4,72
27	53,80	26,30	19,50	11,71	5,87	5,79
28	46,50	22,70	17,50	7,60	3,86	3,71
29	49,00	24,10	18,20	8,22	4,04	4,12
30	48,20	22,00	16,70	6,93	3,08	3,79
31	47,10	22,90	19,00	7,94	3,90	3,98
32	47,50	24,00	17,60	7,93	3,45	4,42
33	46,00	22,20	18,90	7,00	3,40	3,58
34	46,50	22,20	15,60	8,63	4,52	4,07
35	48,10	22,10	19,10	9,32	4,04	5,24
36	51,60	23,30	22,10	11,25	4,84	6,37
37	54,10	25,00	20,30	10,99	5,77	5,17
38	45,40	25,00	19,00	6,64	2,79	3,76
39	49,00	25,10	18,70	10,07	5,49	4,54
40	52,40	23,90	18,10	9,95	4,86	5,06
41	49,40	24,10	12,70	10,05	4,88	5,13
42	54,80	25,60	19,10	11,33	5,62	5,63
43	48,70	23,60	20,00	9,28	4,97	4,35
44	50,90	23,80	19,50	8,96	4,26	4,66
45	51,20	24,10	17,20	8,52	4,26	4,23
46	53,00	24,90	19,70	9,25	3,47	5,75
47	55,20	27,40	20,70	12,48	5,46	7,00
48	49,00	24,60	21,00	10,48	6,03	4,37
49	54,70	22,40	20,50	10,56	4,23	6,31
50	56,80	26,40	22,10	15,20	8,49	6,68
	Length	**Width**	**Height**	**Total weight**	**Weight soft body**	**Weight shell**
Average	50,28	23,94	19,15	9,91	4,86	5,00
Stdev	4,06	1,88	2,06	2,48	1,50	1,27
Min	42,15	18,60	12,70	5,64	2,32	3,19
Max	58,40	28,50	22,80	16,68	9,40	8,20

Species:	**Blue mussel (*Mytilus edulis*)**	Date of sampling:	**21.8.2002**
Length:	4-6 cm	Sampled by:	Marine Inst.
Location:	**Mjóifjordur I, (head**	Date of preparation:	10.7.2003
Coordinates:	651115-140012	IFL#:	SN-2003-00504

	Length (mm)	Width (mm)	Height (mm)	Total weight (g)	Weight soft body (g)	Weight shell (g)
1	47,60	23,60	18,60	7,42	4,16	3,21
2	53,20	21,60	18,80	8,48	3,85	4,51
3	53,20	26,60	18,20	12,68	7,00	5,60
4	59,00	27,60	22,70	11,30	8,22	8,18
5	58,40	26,40	23,90	19,29	10,95	8,25
6	44,90	21,70	15,20	5,64	2,79	2,76
7	45,50	23,00	16,10	6,34	3,12	3,17
8	43,90	23,10	17,70	8,85	4,69	4,03
9	50,00	23,90	17,20	9,21	5,57	3,59
10	50,40	24,20	19,90	9,12	4,33	4,68
11	53,70	24,50	20,90	10,59	5,57	4,78
12	54,40	27,70	21,30	15,60	9,07	6,49
13	56,80	27,80	23,20	16,48	7,66	8,70
14	46,60	22,40	16,40	8,10	5,03	2,99
15	43,80	21,10	16,75	6,29	3,65	2,61
16	46,10	20,90	18,60	6,64	3,02	3,56
17	49,50	23,80	19,50	8,80	4,19	4,54
18	51,40	24,35	18,50	11,98	7,27	4,69
19	48,70	24,35	17,75	8,31	4,33	3,94
20	54,50	25,70	19,40	11,94	6,15	3,75
21	58,60	23,60	24,50	16,00	8,42	7,55
22	40,60	21,60	16,00	4,65	2,52	2,12
23	45,10	21,90	15,60	7,19	3,74	3,38
24	44,25	21,80	15,70	5,60	2,76	2,82
25	50,10	23,15	17,70	10,35	6,34	3,96
26	49,30	22,70	20,10	12,07	6,88	5,14
27	50,60	25,10	19,50	13,00	7,94	5,05
28	54,70	25,10	19,00	9,19	4,28	4,88
29	58,10	22,10	19,75	11,69	6,22	5,45
30	59,20	27,70	22,70	16,99	10,28	6,57
31	45,85	21,40	16,00	5,50	3,08	2,4
32	48,70	22,70	17,25	7,53	3,81	3,71
33	47,40	21,95	16,50	5,85	2,85	2,97
34	50,00	24,90	19,05	12,50	7,17	5,27
35	46,00	23,70	15,65	8,40	5,18	3,19
36	50,15	24,95	19,15	10,40	5,16	5,21
37	51,10	24,00	22,10	12,59	8,27	4,29
38	50,60	24,90	17,60	10,17	6,70	3,40
39	54,05	26,35	19,80	10,06	6,00	4,04
40	59,20	27,45	21,85	14,69	8,91	5,69
41	44,15	21,50	15,10	5,57	2,95	2,58
42	49,40	24,15	17,20	8,08	3,78	4,25
43	50,75	24,15	18,90	12,30	6,92	5,07
44	53,60	21,60	17,90	9,37	4,70	4,62
45	57,50	27,60	20,50	12,65	6,85	5,75
46	60,00	24,00	23,30	15,57	7,85	7,63
47	52,00	26,40	19,75	9,85	5,16	4,67
48	56,60	29,00	22,00	15,03	9,28	5,70
49	59,40	26,30	20,60	15,31	6,77	8,53
50	57,30	24,30	24,10	15,85	7,21	8,55
	Length	**Width**	**Height**	**Total weight**	**Weight soft body**	**Weight shell**
Average	51,32	24,21	19,11	10,54	5,77	4,77
Stdev	5,10	2,14	2,53	3,59	2,16	1,75
Min	40,60	20,90	15,10	4,65	2,52	2,12
Max	60,00	29,00	24,50	19,29	10,95	8,70

Appendix II.

Biological measurements of Cod (*Gadus morhua*) 2003

Species:	**Cod (*Gadus Morhua*)**	**exped./station**			**date**	**n**
Location:	**Northeast off Iceland (NA)**	TBR1-2003-18	670096	154486	7.3.2003	25
Lenght:	30-45cm					
Ship:	Brettingur NS-50					
Expd.leader:	Valur Bogason					
IFL#:	Rf-2004-00932					

Group	exped.-station	Weight jar IFL 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	TBR1-2003-18	106,84	111,86	5,02	190	1	30	157	62,2	3
	TBR1-2003-18	107,20	111,89	4,69	221	1	31	199	61,77	3
	TBR1-2003-18	107,65	112,65	5,00	318	0	34	287	92	3
	TBR1-2003-18	106,85	112,75	5,90	318	0	35	283	89,47	3
			Sum	20,61	1047,0		130,0	926,0	305,4	12,0
			Average	5,15	261,8	0,5	32,5	231,5	76,4	3,0
			STDEV	0,52	66,2		2,4	64,1	16,6	0,0
			Min	4,69	190,0		30,0	157,0	61,8	3,0
			Max	5,90	318,0		35,0	287,0	92,0	3,0
H 2	TBR1-2003-18	107,19	116,14	8,95	413	0	37	361	134,79	3
	TBR1-2003-18	106,99	117,45	10,46	494	1	40	435	149,02	3
	TBR1-2003-18	107,18	117,62	10,44	387	1	36	336	127,03	3
	TBR1-2003-18	107,38	118,66	11,28	400	1	37	345	122,43	3
	TBR1-2003-18	107,27	118,83	11,56	459	1	38	403	141,74	3
	TBR1-2003-18	107,21	119,05	11,84	459	1	36	399	128,57	3
	TBR1-2003-18	107,05	119,82	12,77	360	1	37	301	93,97	4
			Sum	77,30	2972,0		261,0	2580,0	897,6	22,0
			Average	11,04	424,6	0,9	37,3	368,6	128,2	3,1
			STDEV	1,23	47,5		1,4	46,1	17,6	0,4
			Min	8,95	360,0		36,0	301,0	94,0	3,0
			Max	12,77	494,0		40,0	435,0	149,0	4,0
H 3	TBR1-2003-18	106,53	120,89	14,36	378	0	36	324	109,25	3
	TBR1-2003-18	107,19	121,19	14,00	424	0	37	364	126,76	3
	TBR1-2003-18	106,73	121,61	14,88	414	0	38	353	125,1	3
	TBR1-2003-18	107,15	121,98	14,83	443	1	39	398	142,85	3
	TBR1-2003-18	106,91	122,62	15,71	480	1	39	421	160,28	3
	TBR1-2003-18	107,18	123,65	16,47	523	0	41	457	144,09	3
	TBR1-2003-18	107,14	124,89	17,75	386	1	36	329	114	3
	TBR1-2003-18	106,97	126,20	19,23	483	0	39	421	149,43	3
			Sum	127,23	3531,0		305,0	3067,0	1071,8	24,0
			Average	15,90	441,4	0,4	38,1	383,4	134,0	3,0
			STDEV	1,81	50,7		1,7	48,2	17,9	0,0
			Min	14,00	378,0		36,0	324,0	109,3	3,0
			Max	19,23	523,0		41,0	457,0	160,3	3
H 4	TBR1-2003-18	107,26	133,31	26,05	491	1	39	417	144,2	3
	TBR1-2003-18	106,61	135,81	29,20	531	0	42	447	136,55	4
	TBR1-2003-18	107,31	135,93	28,62	598	1	42	522	166,79	5
	TBR1-2003-18	107,09	137,06	29,97	653	1	43	563	162,41	4
			Sum	113,84	2273,0		166,0	1949,0	610,0	16,0
			Average	28,46	568,3	0,8	41,5	487,3	152,5	4,0
			STDEV	1,70	71,7		1,7	67,1	14,4	0,8
			Min	26,05	491,0		39,0	417,0	136,6	3,0
			Max	29,97	653,0		43,0	563,0	166,8	5,0
H 5	TBR1-2003-18	107,28	140,34	33,06	685	0	43	585	196,99	3
	TBR1-2003-18	107,68	141,76	34,08	595	1	42	305	164,74	4
			Sum	67,14	1280,0		85,0	890,0	361,7	7,0
			Average	33,57	640,0	0,5	42,5	445,0	180,9	3,5
			STDEV	0,72	63,6		0,7	198,0	22,8	0,7
			Min	33,06	595,0		42	305	165	3,0
			Max	34,08	685,0		43	585	197	4,0
H1, H2, H3, H4, H5			**Sum**	406,1	11103,0		947,0	9412,0	3246,4	81,0
			Average	16,2	444,1	0,6	37,9	376,5	129,9	3,2
			STDEV	8,9	118,7		3,4	99,5	32,2	0,5
			Min	4,7	190,0		30,0	157,0	61,8	3,0
			Max	34,1	685,0		43,0	585,0	197,0	5,0

Species:	**Cod (*Gadus Morhua*)**	**exped./station**			**date**	**n**
Location:	**Northeast off Iceland (NA)**	TBR1-2003-18	670096	154486	7.3.2003	25
Lenght:	30-45cm					
Ship:	Brettingur NS-50					
Expd.leader:	Valur Bogason					
IFL#:	Rf-2004-00932					

Group	exped.-station	Weight jar IFL 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	TBR1-2003-18	106,84	111,86	5,02	190	1	30	157	62,2	3
	TBR1-2003-18	107,20	111,89	4,69	221	1	31	199	61,77	3
	TBR1-2003-18	107,65	112,65	5,00	318	0	34	287	92	3
	TBR1-2003-18	106,85	112,75	5,90	318	0	35	283	89,47	3
			Sum	20,61	1047,0		130,0	926,0	305,4	12,0
			Average	5,15	261,8	0,5	32,5	231,5	76,4	3,0
			STDEV	0,52	66,2		2,4	64,1	16,6	0,0
			Min	4,69	190,0		30,0	157,0	61,8	3,0
			Max	5,90	318,0		35,0	287,0	92,0	3,0
H 2	TBR1-2003-18	107,19	116,14	8,95	413	0	37	361	134,79	3
	TBR1-2003-18	106,99	117,45	10,46	494	1	40	435	149,02	3
	TBR1-2003-18	107,18	117,62	10,44	387	1	36	336	127,03	3
	TBR1-2003-18	107,38	118,66	11,28	400	1	37	345	122,43	3
	TBR1-2003-18	107,27	118,83	11,56	459	1	38	403	141,74	3
	TBR1-2003-18	107,21	119,05	11,84	459	1	36	399	128,57	3
	TBR1-2003-18	107,05	119,82	12,77	360	1	37	301	93,97	4
			Sum	77,30	2972,0		261,0	2580,0	897,6	22,0
			Average	11,04	424,6	0,9	37,3	368,6	128,2	3,1
			STDEV	1,23	47,5		1,4	46,1	17,6	0,4
			Min	8,95	360,0		36,0	301,0	94,0	3,0
			Max	12,77	494,0		40,0	435,0	149,0	4,0
H 3	TBR1-2003-18	106,53	120,89	14,36	378	0	36	324	109,25	3
	TBR1-2003-18	107,19	121,19	14,00	424	0	37	364	126,76	3
	TBR1-2003-18	106,73	121,61	14,88	414	0	38	353	125,1	3
	TBR1-2003-18	107,15	121,98	14,83	443	1	39	398	142,85	3
	TBR1-2003-18	106,91	122,62	15,71	480	1	39	421	160,28	3
	TBR1-2003-18	107,18	123,65	16,47	523	0	41	457	144,09	3
	TBR1-2003-18	107,14	124,89	17,75	386	1	36	329	114	3
	TBR1-2003-18	106,97	126,20	19,23	483	0	39	421	149,43	3
			Sum	127,23	3531,0		305,0	3067,0	1071,8	24,0
			Average	15,90	441,4	0,4	38,1	383,4	134,0	3,0
			STDEV	1,81	50,7		1,7	48,2	17,9	0,0
			Min	14,00	378,0		36,0	324,0	109,3	3,0
			Max	19,23	523,0		41,0	457,0	160,3	3
H 4	TBR1-2003-18	107,26	133,31	26,05	491	1	39	417	144,2	3
	TBR1-2003-18	106,61	135,81	29,20	531	0	42	447	136,55	4
	TBR1-2003-18	107,31	135,93	28,62	598	1	42	522	166,79	5
	TBR1-2003-18	107,09	137,06	29,97	653	1	43	563	162,41	4
			Sum	113,84	2273,0		166,0	1949,0	610,0	16,0
			Average	28,46	568,3	0,8	41,5	487,3	152,5	4,0
			STDEV	1,70	71,7		1,7	67,1	14,4	0,8
			Min	26,05	491,0		39,0	417,0	136,6	3,0
			Max	29,97	653,0		43,0	563,0	166,8	5,0
H 5	TBR1-2003-18	107,28	140,34	33,06	685	0	43	585	196,99	3
	TBR1-2003-18	107,68	141,76	34,08	595	1	42	305	164,74	4
			Sum	67,14	1280,0		85,0	890,0	361,7	7,0
			Average	33,57	640,0	0,5	42,5	445,0	180,9	3,5
			STDEV	0,72	63,6		0,7	198,0	22,8	0,7
			Min	33,06	595,0		42	305	165	3,0
			Max	34,08	685,0		43	585	197	4,0
H1, H2, H3, H4, H5			**Sum**	406,1	11103,0		947,0	9412,0	3246,4	81,0
			Average	16,2	444,1	0,6	37,9	376,5	129,9	3,2
			STDEV	8,9	118,7		3,4	99,5	32,2	0,5
			Min	4,7	190,0		30,0	157,0	61,8	3,0
			Max	34,1	685,0		43,0	585,0	197,0	5,0

Species:	**Cod (*Gadus Morhua*)**	**exped./station**		**date**		**n**
Location:	**North- Northwest off Iceland(2) (N-NW(2))**	TP-1-2003-79	662266	253615	16.3.2003	25
Lenght:	30-45cm					
Ship:	Árni Friðriksson					
Expd.leader:	Sólmundur Tr. Einarsson					
IFL#:	Rf-2004-00934					

Group	exped.-station	Weight jar IFL 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	TP1-2003-79	106,45	111,15	4,70	760	0	43,0	589	214,7	3
	TP1-2003-79	101,86	107,34	5,48	708	0	43,0	606	174,5	3
	TP1-2003-79	105,55	111,73	6,18	406	0	35,0	325	106,8	3
			Sum	16,36	1874,0		121,0	1520,0	495,9	9,0
			Average	5,45	624,7	0,0	40,3	506,7	165,3	3,0
			STDEV	0,74	191,1		4,6	157,6	54,5	0,0
			Min	4,70	406,0		35,0	325,0	106,8	3
			Max	6,18	760,0		43,0	606,0	214,7	3
H 2	TP1-2003-79	110,75	117,92	7,17	745	0	44,0	635	194,5	3
	TP1-2003-79	106,39	113,68	7,29	386	0	36,0	319	122,3	3
	TP1-2003-79	106,85	114,61	7,76	856	1	45,0	707	254,4	4
	TP1-2003-79	111,90	120,28	8,38	702	0	42,0	589	182,5	3
	TP1-2003-79	106,83	115,29	8,46	820	0	45,0	683	202,5	4
	TP1-2003-79	101,43	110,52	9,09	627	0	40,0	513	178,5	3
	TP1-2003-79	105,70	115,22	9,52	486	0	38,0	405	135,5	3
			Sum	57,67	4622,0		290,0	3851,0	1270,1	23,0
			Average	8,24	660,3	0,1	41,4	550,1	181,4	3,3
			STDEV	0,89	172,9		3,6	145,4	43,9	0,5
			Min	7,17	386,0		36,0	319,0	122,3	3
			Max	9,52	856,0		45,0	707,0	254,4	4
H 3	TP1-2003-79	102,01	112,23	10,22	670	1	42,0	488	159,7	4
	TP1-2003-79	102,04	112,56	10,52	670	1	41,0	535	189,8	4
	TP1-2003-79	101,71	112,50	10,79	852	0	43,0	694	187,2	3
	TP1-2003-79	106,82	117,73	10,91	726	0	43,0	597	201,4	4
	TP1-2003-79	105,92	116,90	10,98	698	1	42,0	555	181,4	3
	TP1-2003-79	106,62	117,85	11,23	745	1	40,0	539	130,1	4
	TP1-2003-79	106,46	117,78	11,32	626	0	40,0	486	152,5	3
	TP1-2003-79	107,49	119,34	11,85	733	0	41,0	580	195,7	3
	TP1-2003-79	102,14	114,10	11,96	750	0	44,0	616	196,7	3
	TP1-2003-79	106,50	118,66	12,16	825	1	45,0	651	228,9	4
	TP1-2003-79	102,23	114,83	12,60	659	0	43,0	537	181,1	3
			Sum	124,54	7954,00		464,0	6278,0	2004,3	38,0
			Average	11,32	723,09	0,5	42,2	570,7	182,2	3,5
			STDEV	0,74	69,36		1,6	64,9	26,7	0,5
			Min	10,22	626,00		40,0	486,0	130,1	3
			Max	12,60	852,00		45,0	694,0	228,9	4
H 4	TP1-2003-79	106,76	121,99	15,23	820	1	45,0	632	225,2	4
	TP1-2003-79	106,00	121,71	15,71	800	0	45,0	632	206,2	3
	TP1-2003-79	105,19	121,43	16,24	810	0	44,0	615	195,7	3
			Sum	47,18	2430,0		134,0	1879,0	627,1	10,0
			Average	15,73	810,0	0,3	44,7	626,3	209,0	3,3
			STDEV	0,51	10,0		0,6	9,8	15,0	0,6
			Min	15,23	800,0		44,0	615,0	195,7	3
			Max	16,24	820,0		45,0	632,0	225,2	4
H 5	TP1-2003-79	106,89	126,86	19,97	814	0	45,0	669	216,6	3
H1, H2, H3, H4, H5			**Sum**	265,72	17694,0		1054,0	14197,0	4613,9	83,0
			Average	10,63	707,8	0,3	42,2	567,9	184,6	3,3
			STDEV	3,55	126,3		2,8	102,6	34,8	0,5
			Min	4,70	386,0		35,0	319,0	106,8	3
			Max	19,97	856,0		45,0	707,0	254,4	4

Species:	**Cod (*Gadus Morhua*)**	**exped./station**			**date**	**n**
Location:	**North-Northwest off Iceland (1) (N-NW(1))**	TB1-2003-27	665903	184979	7.3 2003	25
Lenght:	30-45cm					
Ship:	Bjartur NK-121					
Expd.leader:	Jónbjörn Pálsson					
IFL#:	RF-2004-00933					

Group	exped.-station	Weight jar IFL 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	TB1-2003-27	106,46	118,63	12,17	301	1	33,0	246	87,9	3
	TB1-2003-27	106,18	120,58	14,40	334	0	36,0	279	86,9	3
	TB1-2003-27	105,19	120,70	15,51	348	1	34,0	280	96,9	3
	TB1-2003-27	101,18	117,36	16,18	629	0	43,0	531	193,8	3
	TB1-2003-27	111,37	128,72	17,35	410	0	36,0	344	119,2	3
	TB1-2003-27	105,68	123,3	17,62	322	1	34,0	258	87,4	3
	TB1-2003-27	106,71	126,00	19,29	329	0	34,0	268	96,5	3
	TB1-2003-27	102,19	121,54	19,35	442	1	39,0	371	125,7	3
			Sum	131,87	3115,0		289,0	2577,0	894,3	24,00
			Average	16,48	389,4	0,5	36,1	322,1	111,8	3,00
			STDEV	2,45	107,8		3,4	94,8	36,3	0,00
			Min	12,17	301,0		33,0	246,0	86,9	3,00
			Max	19,35	629,0		43,0	531,0	193,8	3,00
H 2	TB1-2003-27	106,58	128,34	21,76	446	1	37,0	374	133,3	3
	TB1-2003-27	101,92	124,23	22,31	400	1	35,0	314	123,8	3
	TB1-2003-27	107,30	130,09	22,79	625	0	43,0	541	177,2	4
	TB1-2003-27	106,72	129,95	23,23	538	1	40,0	450	134,2	3
	TB1-2003-27	102,38	126,72	24,34	517	0	39,0	428	153,9	3
	TB1-2003-27	106,87	131,47	24,60	403	0	37,0	333	113,0	3
	TB1-2003-27	106,13	131,21	25,08	634	0	43,0	531	190,0	3
	TB1-2003-27	102,32	127,61	25,29	619	1	44,0	543	195,8	5
	TB1-2003-27	102,58	128,28	25,70	474	1	38,0	397	135,1	4
			Sum	215,10	4656,0		356,0	3911,0	1356,3	31,00
			Average	23,90	517,3	0,6	39,6	434,6	150,7	3,44
			STDEV	1,42	93,4		3,2	88,5	30,1	0,73
			Min	21,76	400,0		35,0	314,0	113,0	3,00
			Max	25,70	634,0		44,0	543,0	195,8	5,00
H 3	TB1-2003-27	105,77	132,67	26,90	521	1	40,0	438	154,3	3
	TB1-2003-27	105,62	133,25	27,63	560	1	39,0	432	136,5	3
	TB1-2003-27	102,44	131,21	28,77	495	0	39,0	409	137,9	3
	TB1-2003-27	106,58	136,41	29,83	550	1	39,0	462	152,4	3
			Sum	113,13	2126,0		157,0	1741,0	581,1	12,00
			Average	28,28	531,5	0,8	39,3	435,3	145,3	3,00
			STDEV	1,29	29,4		0,5	21,8	9,3	0,00
			Min	26,90	495,0		39,0	409,0	136,5	3,00
			Max	29,83	560,0		40,0	462,0	154,3	3,00
H 4	TB1-2003-27	105,85	141,89	36,04	603	1	44,0	502	160,1	5
H 5	TB1-2003-27	106,44	147,80	41,36	767	1	45,0	634	214,3	3
	TB1-2003-27	107,00	152,58	45,58	777	0	45,0	628	211,0	3
			Sum	86,94	1544,0		90,0	1262,0	425,3	6,00
			Average	43,47	772,0	0,5	45,0	631,0	212,6	3,00
			STDEV	2,98	7,1		0,0	4,2	2,3	0,00
			Min	41,36	767,0		45,0	628,0	211,0	3,00
			Max	45,58	777,0		45,0	634,0	214,3	3,00
H 6	TB1-2003-27	106,31	174,16	67,85	814	0	45,0	661	219,7	3
H1, H2, H3, H4, H5,H6			**Sum**	614,89	12255,0		937,0	10152,0	3476,7	76,00
			Average	25,62	510,6	0,5	39,0	423,0	144,9	3,17
			STDEV	11,82	147,8		3,8	124,0	42,0	0,48
			Min	12,17	301,0		33,0	246,0	86,9	3,00
			Max	67,85	814,0		45,0	661,0	219,7	5,00

* Samples of the cod flesh were not found in the sampling storage

Appendix III.

Quality assurance of metal analysis

Table 2. Results for trace metals in certified reference materials and recoveries of additions to tissue homogenates of Blue mussel *(Mytilus edulis)* for the year 2002

Analyte	Mussel Tissue BCR278/ 634/413 µg/g	I Z-score*I	TORT-2 NRCC µg/g	I Z-score*I	Recovery,% Blue mussel	MLOD** µg/g
As					98 ± 12	1,8
Measured			22,9 ± 0,5	0,51		
Certified			21,6 ± 1,8			
Cd					103 ± 5	0,16
Measured	0,31 ± 0,03	0,75	26,5 ± 0,2	0,05		
Certified	0,34 ± 0,02		26,7 ± 0,6			
Cu					106 ± 2	0,35
Measured	9,88 ± 0,06	0,23	102 ± 1	0,32		
Certified	9,60 ± 0,16		106 ± 10			
Hg					91 ± 10	0,014
Measured	0,172 ± 0,002	0,67				
Certified	0,188 ± 0,007					
Pb					97 ± 4	0,06
Measured	1,86 ± 0,01	0,23	0,32 ± 0,03	0,79		
Certified	1,91± 0,04		0,35 ± 0,13			
Se					110 ± 6	0,49
Measured			5,80 ± 0,45	0,24		
Certified			5,63 ± 0,67			
Zn					96 ± 9	5,4
Measured	82,9 ± 1,0	0,73	177 ± 2	0,15		
Certified	76 ± 2		180 ± 6			

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

** MLOD is on dry weight basis

Table 3. Results for trace metals in certified reference materials and recoveries of additions to tissue homogenates of Cod *(Gadus morhua)* for the year 2003.

Analyte	DORM-2 NRCC µg/g	IZI*	COD Muscle BCR 422 µg/g	IZI*	DOLT-2 NRCC µg/g		TORT-2 NRCC µg/g	IZI*	Recovery, % Liver	Recovery, % Flesh	MLOD** µg/g Liver	MLOD** µg/g Flesh
As									107 ± 1		1,2	
Measured	17,3 ± 0,3	0,32			13,65 ± 0,11	1,45	21,1 ± 1,8	0,2				
Certified	18,0 ± 1,1				16,60 ± 1,10		21,6 ± 0,5					
Cd									109 ± 4		0,008	
Measured					21,1 ± 0,2	0,11	26,5 ± 0,2	0,05				
Certified					20,8 ± 0,5		26,7 ± 0,6					
Cu									102 ± 5		0,09	
Measured	2,06 ± 0,06	0,96			27,1 ± 0,2	0,41	101 ± 1	0,41				
Certified	2,34 ± 0,16				25,8 ± 1,1		106 ± 10					
Hg										98 ± 5		0,002
Measured	4,47 ± 0,55	0,29	0,489 ± 0,045	1,00								
Certified	4,64 ± 0,26		0,559 ± 0,016									
Pb									98 ± 7		0,06	
Measured					0,24 ± 0,01	0,86	0,32 ± 0,03	0,49				
Certified					0,22 ± 0,02		0,35 ± 0,13					
Se									102 ± 2		0,16	
Measured					6,13 ± 0,49	0,34						
Certified					6,06 ± 0,49							
Zn									100 ± 7		1,09	
Measured	25,0 ± 0,4	0,18			85,8 ± 2,5	0,21	178 ± 2	0,15				
Certified	25,6 ± 2,3				85,8 ± 2,5		180 ± 6					

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

** MLOD is on wet weight basis

Appendix IV.

Results of trace metal analysis for Blue mussel (*Mytilus edulis*) 2002 and Cod (*Gadus Morhua*) 2003

Table 4. Results of trace metals in Blue mussel *(Mytilus edulis)* 2002 (dw)

Samples	Fat %		Dry matter %		Pb, mg/kg dw		Cd, mg/kg dw		Cu, mg/kg dw		Zn, mg/kg dw		As, mg/kg dw		Se, mg/kg dw		Hg, µg/kg dw	
Hvassahraun 02	0,24	± 0,01	6,51	± 0,23	<MLOD		1,88	± 0,05	9,74	± 0,20	122	± 1	19,3	± 0,2	3,09	± 0,10	53,8	± 3,1
Straumur,Straumsvík 02	0,57	± 0,01	10,7	± 0,03	<MLOD		2,17	± 0,01	6,97	± 0,12	89	±2	11,0	± 0,3	4,08	± 0,06	35,0	± 1,3
Eyri, Hvalfjordur 02	0,22	± 0,01	8,75	± 0,04	<MLOD		1,96	± 0,07	8,31	± 0,40	147	± 5	10,0	± 0,6	3,50	± 0,23	42,6	± 1,7
Hvítanes, Hvalfjordur 02	0,45	± 0,03	10,5	± 0,2	0,66	± 0,05	2,74	± 0,09	6,80	± 0,17	115	± 3	10,8	± 0,7	3,25	± 0,24	36,6	± 1,4
Hvalstöð, Hvalfjordur 02	0,28	± 0,03	10,2	± 0,03	<MLOD		1,99	± 0,02	6,47	± 0,18	84	± 1	11,0	± 0,3	3,36	± 0,15	49,6	± 0,3
Dvergasteinn, Álftafjordur 02	0,31	± 0,01	8,31	± 0,013	<MLOD		5,13	± 0,12	5,98	± 0,09	118	± 1	25,6	± 0,3	4,65	± 0,25	54,7	± 2,2
Úlfsá, Skutulsfjordur 02	0,23	± 0,03	6,36	± 0,08	*		*		*		*		*		*		*	
Mjóifjordur I , head 02	0,33	± 0,03	10,3	± 0,01	<MLOD		4,00	± 0,04	10,0	± 0,1	126	± 3	13,6	± 0,3	5,22	± 0,14	54,0	± 4,0
Mjóifjordur II, Hofsá 02	0,62	± 0,01	13,2	± 0,05	<MLOD		3,12	± 0,06	9,55	± 0,12	161	± 3	14,3	± 0,3	5,41	± 0,17	61,3	± 0,2
Limit of detection for samples (MLOD)					0,06		0,16		0,35		5,4		1,8		0,49		13,8	

*** the sample was contaminated during preparation**

Table 5. Results of trace metals in liver and flesh of Cod (*Gadus morhua*) 2003 (ww)

Sample		Fat % Liver	Dry matter % Liver	Pb, µg/g Liver	Cd, µg/g Liver	Cu,µg/g Liver	Zn, µg/g Liver	As, µg/g Liver	Se, µg/g Liver	Dry matter % Flesh*	Fat % Flesh*	Hg, ng/g Flesh*
COD N-NW (1) 03										19,11 ± 0,02	0,05 ± 0,01	22.2 ± 0.1
	Group 1	53,06 ± 0,13	65,14 ± 0,05	<MLOD	0,33 ± 0,01	2,90 ± 0,06	14,2 ± 0,3	5,92 ± 0,18	0,98 ± 0,16			
	Group 2	60,80 ± 0,20	71,29 ± 0,01	<MLOD	0,20 ± 0,01	2,10 ± 0,02	12,5 ± 0,3	5,35 ± 0,35	0,90 ± 0,05			
	Group 3	61,59 ± 0,53	74,12 ± 0,06	<MLOD	0,27 ± 0,01	2,01 ± 0,02	11,8 ± 0,2	5,22 ± 0,35	0,84 ± 0,04			
	Group 4	58,11 ± 0,11	68,38 ± 0,28	<MLOD	0,37 ± 0,01	1,17 ± 0,04	12,9 ± 0,5	4,68 ± 0,14	0,82 ± 0,17			
	Group 5	63,64 ± 0,33	74,06 ± 0,16	<MLOD	0,21 ± 0,01	2,22 ± 0,06	11,5 ± 0,2	4,46 ± 0,12	0,57 ± 0,05			
	Group 6	64,58 ± 0,18	79,34 ± 0,06	<MLOD	0,064 ± 0,004	2,32 ± 0,04	9,09 ± 0,50	4,28 ± 0,20	0,81 ± 0,06			
COD NA 03										19,10 ± 0,05	0,12 ± 0,03	20.7 ± 0.5
	Group 1	32,29 ± 0,21	48,61 ± 0,06	<MLOD	0,29 ± 0,01	3,21 ± 0,11	24,7 ± 0,7	10,6 ± 0,4	1,84 ± 0,08			
	Group 2	42,24 ± 0,10	55,64 ± 0,18	<MLOD	0,21 ± 0,01	3,75 ± 0,06	18,8 ± 0,4	7,14 ± 0,35	1,37 ± 0,09			
	Group 3	55,02 ± 0,64	66,82 ± 0,13	<MLOD	0,18 ± 0,01	3,97 ± 0,06	15,5 ± 0,3	5,64 ± 0,12	1,14 ± 0,20			
	Group 4	60,49 ± 0,18	71,48 ± 0,0,8	<MLOD	0,16 ± 0,01	3,69 ± 0,03	13,7 ± 0,3	4,53 ± 0,32	0,99 ± 0,19			
	Group 5	60,96 ± 0,78	72,28 ± 0,06	<MLOD	0,14 ± 0,01	2,08 ± 0,07	11,5 ± 0,5	5,09 ± 0,16	0,67 ± 0,10			
COD N-NW(2) 03										19,41 ± 0,2	0,1 ± 0,01	31.3 ± 1.7
	Group 1	48,71 ± 0,62	61,47 ± 0,18	<MLOD	0,29 ± 0,01	2,89 ± 0,05	15,1 ± 0,7	5,45 ± 0,05	0,97 ± 0,04			
	Group 2	61,29 ± 0,32	71,68 ± 0,02	<MLOD	0,21 ± 0,01	2,97 ± 0,09	11,9 ± 0,7	5,30 ± 0,08	0,63 ± 0,08			
	Group 3	60,70 ± 0,44	71,56 ± 0,06	<MLOD	0,16 ± 0,01	3,56 ± 0,05	12,7 ± 0,6	6,39 ± 0,40	0,64 ± 0,06			
	Group 4	66,72 ± 0,08	77,34 ± 0,22	<MLOD	0,18 ± 0,01	2,71 ± 0,07	11,7 ± 0,2	6,04 ± 0,24	0,71 ± 0,03			
	Group 5	59,24 ± 0,58	70,20 ± 0,02	<MLOD	0,23 ± 0,01	1,92 ± 0,11	12,2 ± 0,3	6,91 ± 0,37	0,69 ± 0,13			
COD SA-A 03										18,98 ± 0,08	0,11 ± 0,01	15.1 ± 1.2
	Group 1	49,82 ± 0,13	63,32 ± 0,08	<MLOD	0,24 ± 0,01	2,83 ± 0,12	15,1 ± 0,3	2,98 ± 0,11	0,65 ± 0,05			
	Group 2	50,75 ± 0,27	63,99 ± 0,18	<MLOD	0,18 ± 0,01	2,57 ± 0,04	14,7 ± 0,5	5,58 ± 0,53	0,88 ± 0,10			
	Group 3	54,87 ± 1,28	68,74 ± 0,27	<MLOD	0,16 ± 0,01	2,56 ± 0,02	13,4 ± 0,3	3,78 ± 0,19	0,90 ± 0,05			
	Group 4	57,66 ± 0,25	69,82± 0,22	<MLOD	0,12 ± 0,01	2,75 ± 0,02	12,2 ± 0,2	5,22 ± 0,07	0,79 ± 0,05			
	Group 5	61,96 ± 0,79	74,40 ± 0,36	<MLOD	0,068 ± 0,006	1,67 ± 0,02	9,52 ± 0,35	4,29 ± 0,24	0,36 ± 0,01			
Average of all measurements					0,20 ± 0,08	2,66 ± 0,73	13,56 ± 3,33	5,47 ± 1,53	0,86 ± 0,31			22.3 ± 6.7
Limit of detection for samples (MLOD)				0,06	0,008	0,09	1,09	1,2	0,16			1,7

*flesh was pooled into one sample

Appendix V.

Results of organochlorine analysis for Blue mussel (*Mytilus edulis*) 2002 and Cod (*Gadus morhua*) 2003

Table 6. Organochlorines in Blue mussel *(Mytilus edulis)* (dw, ng/g) 2002

	Eyri, Hvalfjordur 02	Hvítanes 02	Hvalstöð 02	Straumur 02	Hvassahraun 02	Dvergasteinn 02	Úlfsá A	Úlfsá B	Úlfsá average** 02	Mjóifj.(II) Hofsá 02	Mjóifj. (I) (head 02
PCB28	<2.6	<2.6	<2.6	<2.6	<2.6	<2.6	<2.6	<2.6	<2.6	<2.6	<2.6
PCB31	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
PCB52	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2
PCB101	0,77	1,22	0,98	1,19	<0.30	0,98	1,98	1,71	1,85	<0.30	<0.30
PCB105	0,21	0,36	0,27	0,33	<0.12	0,37	0,96	0,92	0,94	<0.12	<0.12
PCB118	0,69	1,15	0,95	1,34	0,42	1,01	2,38	1,86	2,12	0,44	0,33
PCB138	1,17	1,89	1,49	2,42	0,51	1,11	1,69	1,50	1,60	0,56	0,35
PCB153	1,59	2,66	1,97	2,96	1,00	1,59	2,48	1,83	2,16	0,89	0,56
PCB156	<0.10	0,12	<0.10	0,12	<0.10	0,12	0,17	0,14	0,16	<0.10	<0.10
PCB170	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07
PCB180	<0.14	0,32	<0.14	0,16	<0.14	<0.14	0,18	0,21	0,20	<0.14	<0.14
Σ3PCB**	3,45	5,70	4,41	6,72	1,93	3,71	6,55	5,19	5,87	1,89	1,24
HCB	0,12	0,13	0,11	0,11	0,04	0,13	0,48	0,51	0,50	0,19	0,16
a-HCH	0,27	0,27	0,24	0,21	0,16	0,22	0,40	0,36	0,38	0,46	0,36
b-HCH	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0,48	0,50	0,49	<0.10	<0.10
g-HCH	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
p,p'-DDE	0,55	0,86	0,90	1,02	0,37	0,58	1,16	0,82	0,99	1,10	0,52
p,p'-DDD	<0.35	0,43	0,35	1.05***	<0.35	<0.35	0,35	0,39	0,37	0,38	<0.35
p,p'-DDT	<0.60	<0.60	<0.60	9.0***	0.85***	<0.60	<0.60	0,72	<0.72	<0.60	<0.60
o,p'-DDT	0,21	<0.20	<0.20	1.6***	<0.20	<0.20	<0.20	<0.20	<0.20	0,30	<0.20
transnonachlor	0,18	0,30	0,31	0,31	0,11	0,48	0,29	0,30	0,30	0,43	0,28
a-chlordan	0,23	0,35	0,25	0,42	0,43	0,31	0,33	0,25	0,29	0,47	0,38
g-chlordan	0,08	0,10	0,09	0,12	0,10	<0.08	0,57	0,34	0,46	0,13	0,12
oxychlordan	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Tox-26	0,38	0,35	0,31	0,35	0,12	0,36	0,21	0,21	0,21	0,52	0,42
Tox-50	0,33	0,50	0,44	0,59	0,18	0,65	0,22	0,23	0,23	0,82	0,64
Tox-62	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10

* Average of two measurements A and B with one week interval

**PCB # 118,138,153.

*** probably too high values due to interference

Table 7. Organochlorines in Cod liver *(Gadus morhua)* (ww,ng/g) 2003

	COD 03 N-NV (2) H1	COD 03 N-NV (2) H2	H3 a	COD 03 N-NV (2) H3 b	H3*	COD 03 N-NV (2) H4	COD 03 N-NV (2) H5	COD 03 NA H1	COD 03 NA H2	COD 03 NA H3	H4 a	COD 03 NA H4 b	H4*
PCB28	3,6	4,0	3,1	3,9	3,5	4,5	4,3	2,8	3,4	3,8	2,6	2,7	2,6
PCB31	2,7	3,0	2,4	3,1	2,7	3,4	3,2	1,9	2,4	2,9	1,9	2,0	2,0
PCB52	6,3	6,6	6,8	6,4	6,6	6,8	8,0	5,3	6,7	7,1	7,4	7,7	7,6
PCB101	7,8	7,3	8,0	7,3	7,6	6,9	7,8	9,5	9,7	9,4	9,5	9,5	9,5
PCB105	4,2	4,0	4,0	4,2	4,1	3,8	4,4	5,0	4,5	4,8	4,0	4,0	4,0
PCB118	13,5	13,2	10,8	11,1	10,9	10,8	12,2	14,6	14,3	15,1	11,3	12,6	11,9
PCB138	21,2	19,4	16,6	17,6	17,1	16,4	19,5	23,7	21,3	24,4	22,3	23,8	23,0
PCB153	28,7	25,1	24,7	24,3	24,5	20,6	23,5	34,2	31,3	35,0	32,4	34,4	33,4
PCB156	1,8	1,8	1,3	1,6	1,4	1,5	1,8	2,2	2,3	2,2	1,2	1,8	1,5
PCB170	2,2	2,1	1,4	1,6	1,5	1,5	1,8	3,2	2,4	2,9	2,6	3,0	2,8
PCB180	6,4	5,6	4,1	4,5	4,3	4,6	4,8	9,4	7,1	7,7	6,7	8,0	7,3
S7PCB**	87,4	81,2	74,1	75,0	74,6	70,6	80,0	99,5	93,8	103	92,1	98,7	95,4
HCB	15,7	18,1	20,2	18,7	19,5	19,3	20,1	11,6	16,0	19,4	19,3	19,6	19,4
a-HCH	4,4	5,2	5,3	5,1	5,2	6,0	5,6	3,4	4,1	4,8	5,9	6,4	6,2
b-HCH	0,82	1,0	1,0	1,1	1,1	1,2	1,1	0,61	0,77	1,0	1,3	1,2	1,2
g-HCH	1,2	1,7	1,9	1,5	1,7	1,9	1,6	0,81	0,91	1,3	1,9	1,5	1,7
p,p'-DDE	71,4	70,2	54,1	53,2	53,6	55,6	66,6	91,6	70,4	95,9	89,1	100	94,7
p,p'-DDD	19,8	22,2	19,0	20,5	19,7	22,2	23,6	19,5	19,6	21,4	18,7	20,3	19,5
p,p'-DDT	19,2	21,4	15,6	16,7	16,2	18,8	22,3	21,0	19,3	21,8	13,9	16,7	15,3
o,p'-DDT	9,2	12,7	11,8	13,1	12,5	12,2	14,1	9,7	13,2	14,6	12,7	15,7	14,2
SDDT	120	127	101	103	102	109	127	142	122	154	134	153	144
transnonachlor	28,8	27,9	23,2	23,3	23,3	24,6	28,3	34,2	30,3	32,9	27,6	31,4	29,5
a-chlordan	19,4	22,0	20,6	19,9	20,3	23,2	25,5	19,6	23,7	24,7	20,1	22,8	21,5
g-chlordan	4,9	6,1	6,2	6,1	6,1	7,0	7,7	5,3	6,8	7,0	5,9	7,2	6,5
oxychlordan	8,2	8,3	5,4	6,1	5,7	7,3	8,2	7,6	7,6	7,1	5,9	9,0	7,4
SCHL	61,3	64,3	55,4	55,4	55,4	62,1	69,7	66,7	68,4	71,6	59,5	70,4	64,9
Tox-26	27,7	29,3	24,2	23,9	24,1	28,4	31,6	25,4	28,2	29,1	22,4	31,1	26,7
Tox-50	46,2	54,2	43,4	48,0	45,7	52,7	54,1	41,4	47,9	53,5	43,3	48,7	46,0
Tox-62	18,4	23,0	16,5	19,9	18,2	21,6	24,5	14,2	18,7	18,5	15,0	19,0	17,0
% extr.lipids	49,7	62,1	61,5	61,3	61,4	68,3	59,8	34,1	43,2	54,4	59,9	62,1	61,0

* Average of two measurements A and B with one week interval

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

Table 7 cont. Organochlorines in Cod liver *(Gadus morhua)* (ww,ng/g) 2003

	COD 03 N-NW (1) H1		COD 03 N-NW (1)		COD 03 N-NW (1) H3	COD 03 N-NW (1) H4	COD 03 N-NW (1) H5	COD 03 N-NW (1) H6	COD 03 SA-A H1	COD 03 SA-A H2	COD 03 SA-A H3		COD 03 SA-A		COD 03 H5
		H2 a	H2 b	H2*								H4-a	H4-b	H4*	
PCB28	3,5	2,7	2,9	2,8	2,5	3,7	2,3	2,9	2,8	2,5	2,7	2,2	5,1	3,7	4,2
PCB31	2,6	2,0	2,1	2,1	2,0	2,6	1,6	2,2	2,1	1,8	2,1	1,8	4,0	2,9	3,4
PCB52	5,4	5,9	6,5	6,2	5,2	9,2	5,7	5,2	5,8	5,6	6,0	5,6	6,7	6,1	6,4
PCB101	7,2	7,4	7,7	7,5	5,8	10,1	7,3	5,2	7,4	6,7	6,4	6,4	6,7	6,5	5,8
PCB105	3,6	3,4	3,7	3,5	2,7	4,4	3,4	2,8	3,2	3,0	2,8	3,0	3,4	3,2	2,8
PCB118	10,6	10,0	10,3	10,1	7,8	12,8	9,9	7,0	9,4	8,2	8,2	7,7	7,9	7,8	7,3
PCB138	14,2	13,5	14,8	14,2	10,4	16,7	14,0	9,8	13,0	11,4	11,0	11,8	13,3	12,5	10,4
PCB153	21,5	19,6	21,6	20,6	15,7	24,2	20,2	13,5	17,3	16,2	14,3	15,5	16,3	15,9	14,4
PCB156	1,3	0,92	1,1	1,0	0,80	1,3	1,0	0,73	1,1	0,95	1,1	0,96	1,2	1,1	0,9
PCB170	1,6	1,4	1,1	1,2	1,1	1,7	1,5	0,86	0,94	0,83	0,70	0,71	1,0	0,88	0,9
PCB180	4,0	3,5	3,6	3,5	2,7	4,4	3,7	2,2	3,1	2,7	2,4	2,6	3,0	2,8	2,3
S7PCB**	66,5	62,6	67,2	64,9	50,1	81,2	63,2	45,8	58,8	53,1	50,8	51,7	58,8	55,3	50,8
HCB	15,1	18,0	18,4	18,2	16,5	23,1	17,0	16,6	17,1	16,6	18,3	18,4	18,1	18,3	19,4
a-HCH	4,3	5,6	6,2	5,9	5,6	5,6	6,2	6,9	5,5	5,2	6,0	6,3	6,4	6,3	7,0
b-HCH	0,88	1,1	1,2	1,2	1,1	1,1	1,2	1,4	1,0	0,94	1,1	1,1	1,1	1,1	1,2
g-HCH	2,2	2,1	1,7	1,9	2,1	2,3	2,2	2,4	1,6	1,6	1,7	1,8	2,0	1,9	2,2
p,p'-DDE	42,7	42,2	46,5	44,3	33,0	61,0	43,3	29,7	43,3	37,2	36,7	35,3	35,9	35,6	31,
p,p'-DDD	14,4	15,7	18,7	17,2	14,4	25,2	15,4	13,3	16,7	14,7	16,0	14,8	15,8	15,3	14,
p,p'-DDT	11,0	10,6		10,6	9,0	18,9	13,2	10,0	14,0	12,6	12,3	11,9	13,5	12,7	11,
o,p'-DDT	7,3	10,1	15,0	12,6	9,4	13,7	11,0	8,3	11,3	10,2	10,6	10,4	11,5	11,0	11,
SDDT	75,4	78,6	80,2	84,7	65,8	119	82,9	61,2	85,3	74,7	75,6	72,4	76,7	74,6	68,4
transnonachlor	19,5	19,8	22,4	21,1	15,8	28,3	19,9	14,4	20,5	17,9	18,6	17,9	17,7	17,8	16,
a-chlordan	13,7	17,4	19,7	18,5	15,4	26,7	16,3	13,4	18,7	16,7	19,2	17,8	17,9	17,8	17,
g-chlordan	4,1	5,3	6,0	5,7	5,0	7,7	4,9	4,5	5,8	5,2	5,9	6,0	5,8	5,9	6,0
oxychlordan	4,3	3,9	4,8	4,4	3,2	6,1	4,2	3,0	3,4	2,8	3,4	3,5	4,0	3,8	3,8
SCHL	41,5	46,5	52,9	49,7	39,4	68,9	45,3	35,2	48,3	42,6	47,1	45,2	45,4	45,3	44,3
Tox-26	15,6	18,0	22,5	20,2	15,3	28,1	18,2	15,3	20,1	17,8	20,0	19,0	19,9	19,5	20,3
Tox-50	26,0	32,9	41,0	36,9	32,0	55,2	36,9	32,0	40,0	35,8	38,3	35,1	37,9	36,5	35,3
Tox-62	4,9	6,7	14,3**	6,7	7,5	10,6	6,8	7,5	11,3	10,2	12,0	10,9	14,9	12,9	12,1
% extr.lipids	53,3	61,6	62,1	61,9	63,0	58,5	63,9	70,0	51,7	52,8	55,8	57,6	56,9	57,2	63,1

Appendix VI.

Graphs of biological variation in Cod (*Gadus morhua*) 1990-2003

Biological variation in 30-45 cm Cod *(Gadus morhua)* from Icelandic waters in March 1990-2003

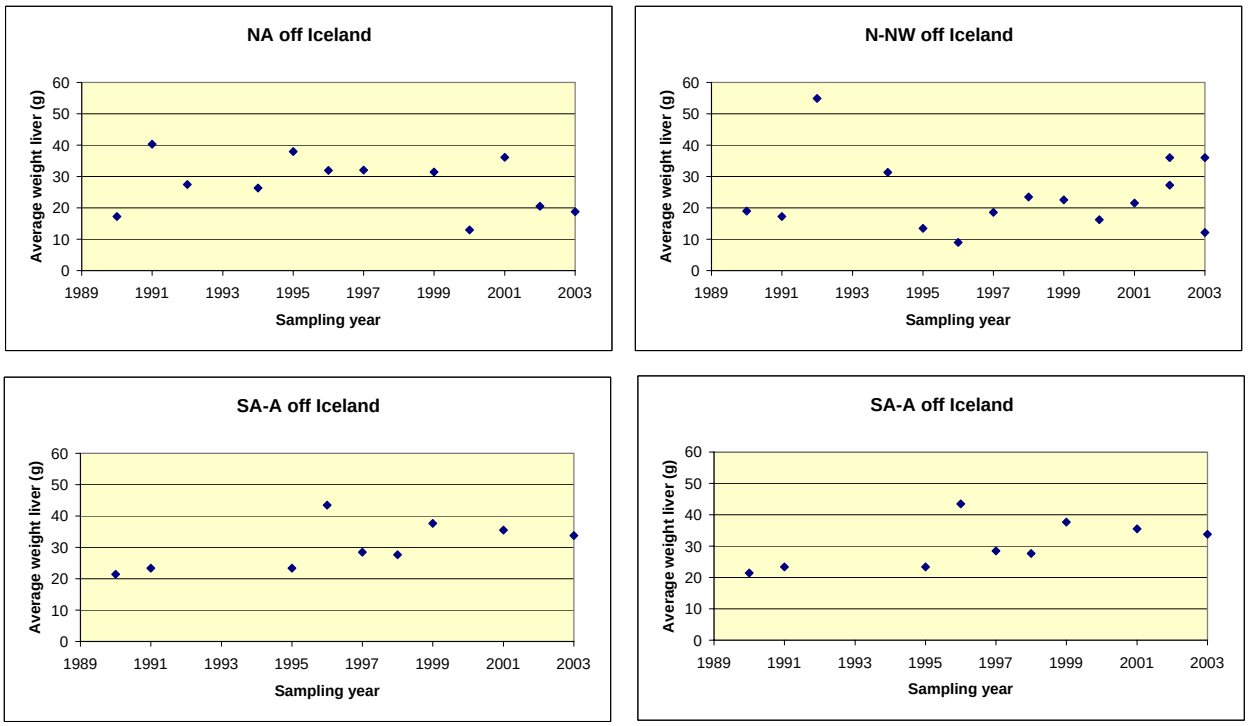


Figure 2c. Average weight liver of Cod *(Gadus morhua)*, 30-45 cm, from Icelandic waters in March 1990-2003.

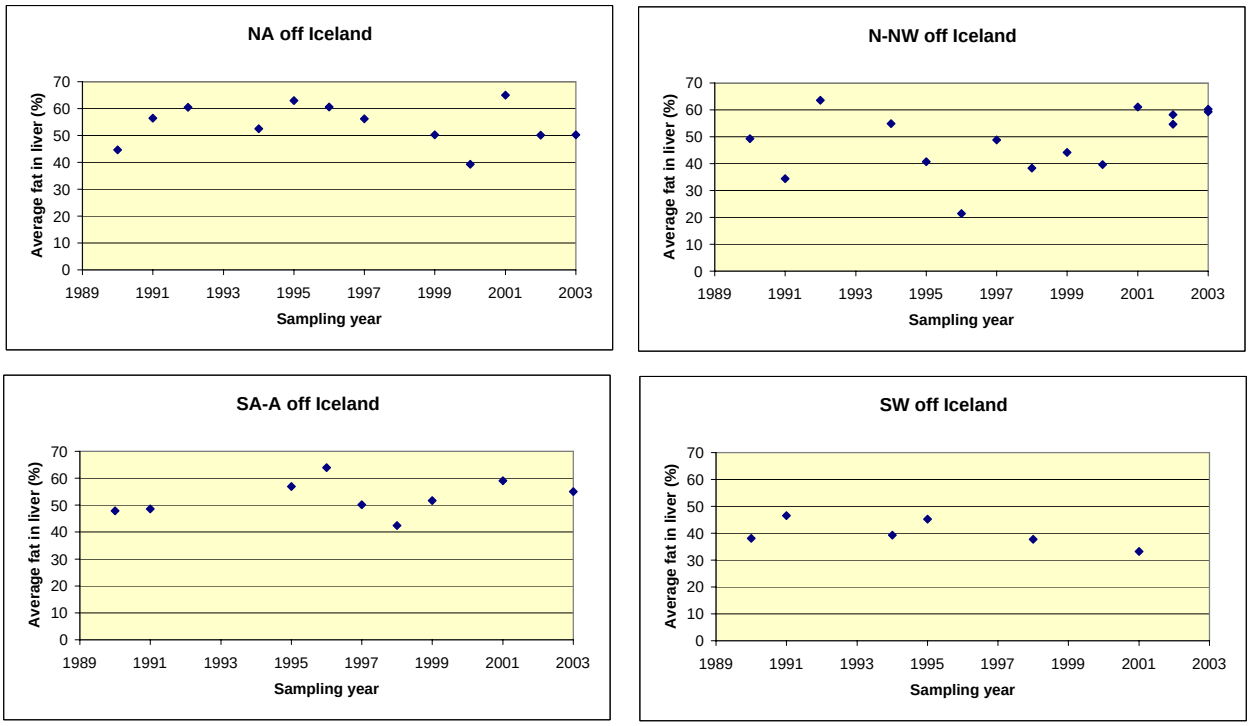


Figure 2d. Average fat (%) in liver of Cod *(Gadus morhua)*, 30-45 cm, from Icelandic waters in March 1990-2003.

Appendix VII.

Graphs of metals and organic compounds in Blue mussel (*Mytilus edulis*) 1990-2002

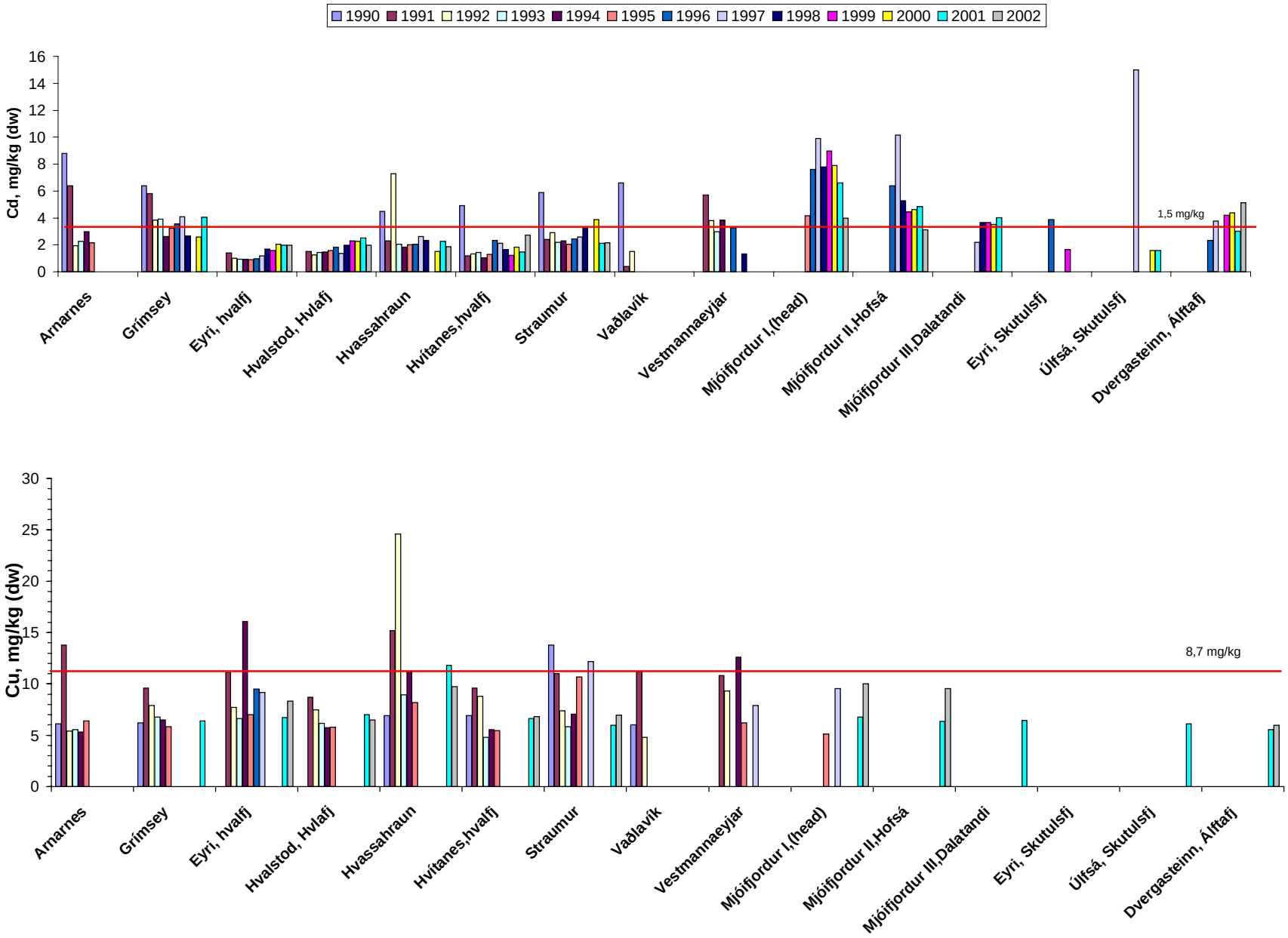


Figure 3a. Cadmium and copper concentration (dw) in Blue mussel (Mytilus edulis) around Iceland 1990-2002. Red line indicates ICES 90 75% baseline (10).

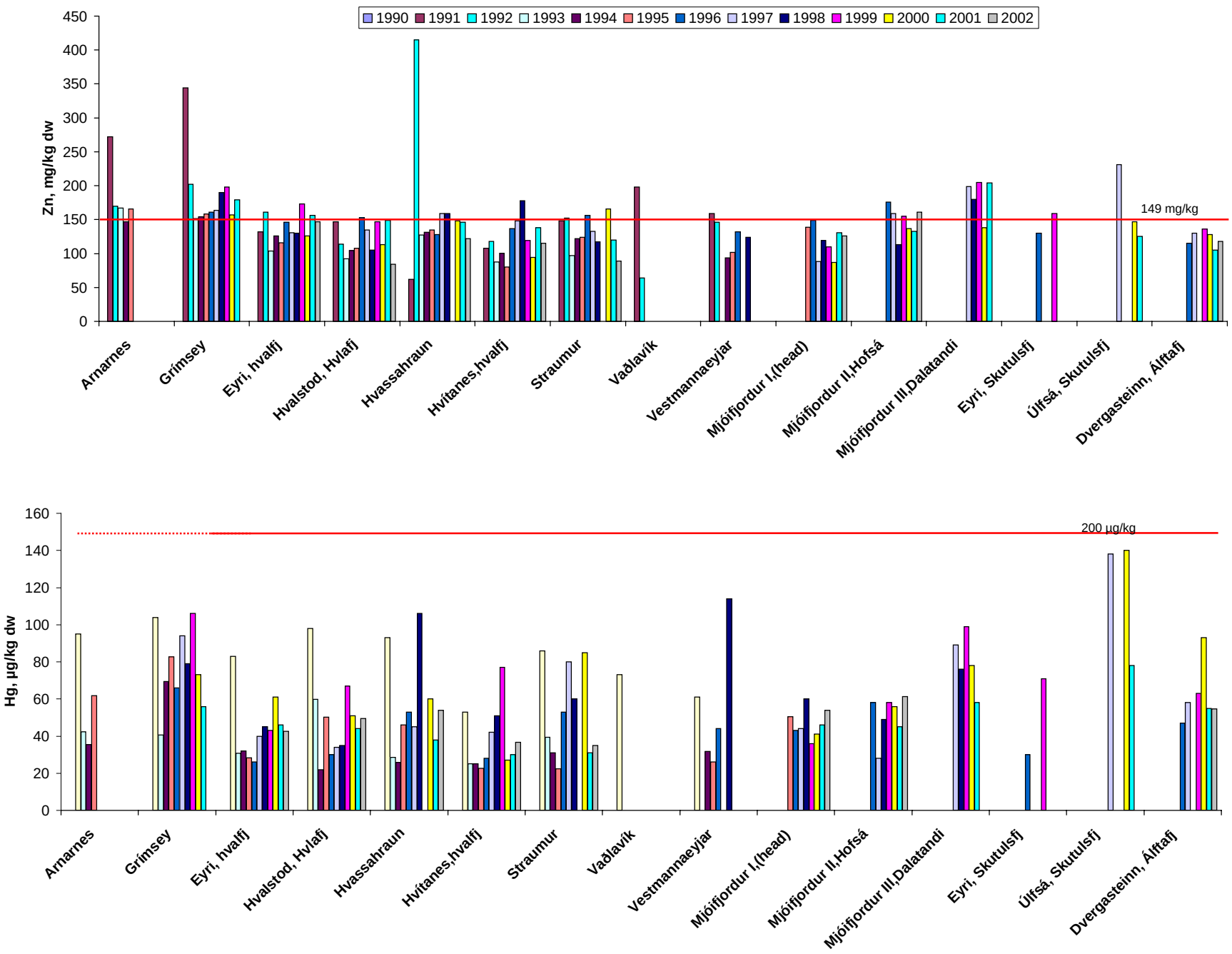


Figure 3b. Zinc and mercury concentration (dw) in Blue mussel (Mytilus edulis) around Iceland 1990-2002. Red line indicates ICES 90 75% baseline (10).

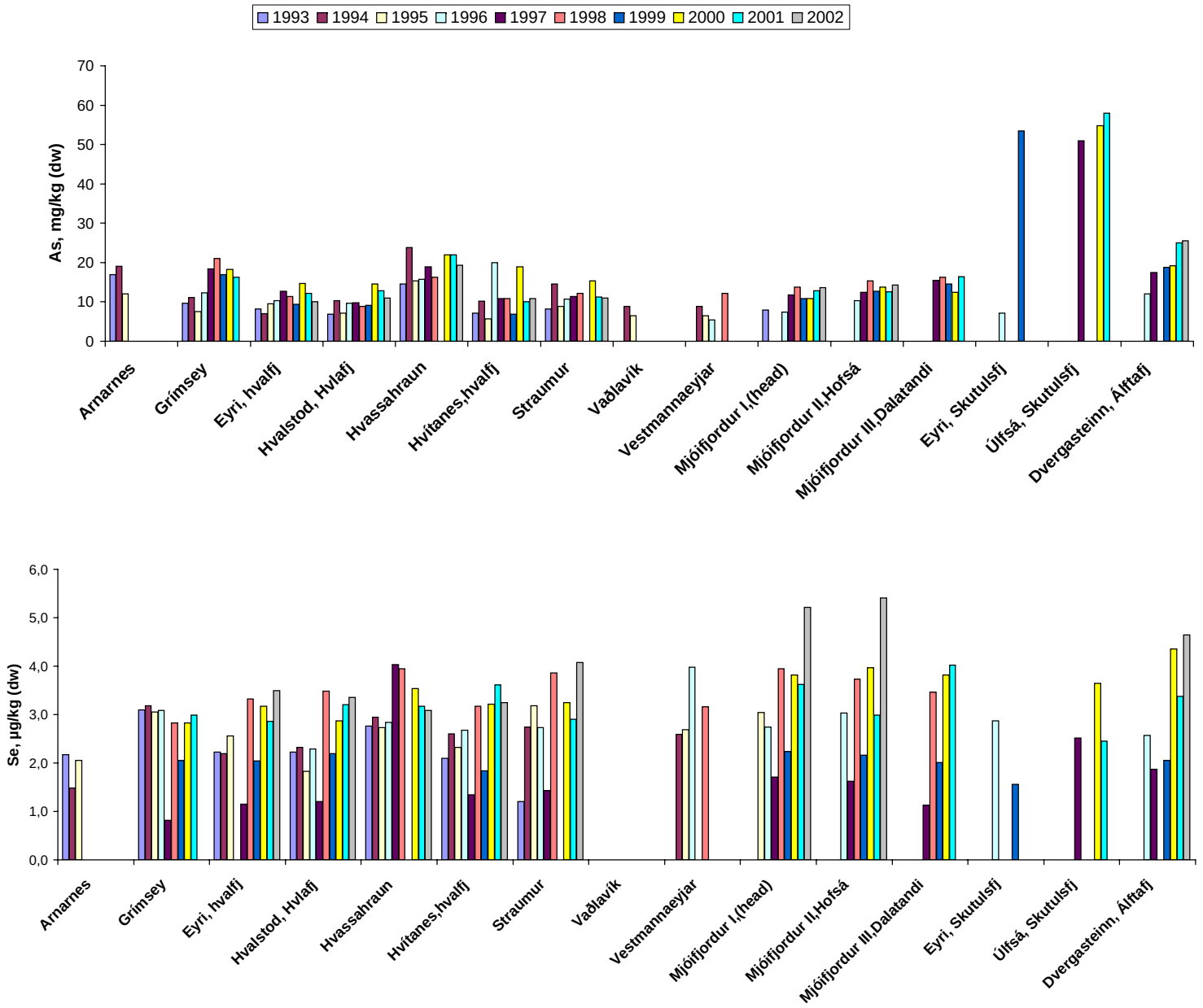


Figure 3c. Arsenic and selenium concentration (dw) in Blue mussel (Mytilus edulis) around Iceland 1993-2002.

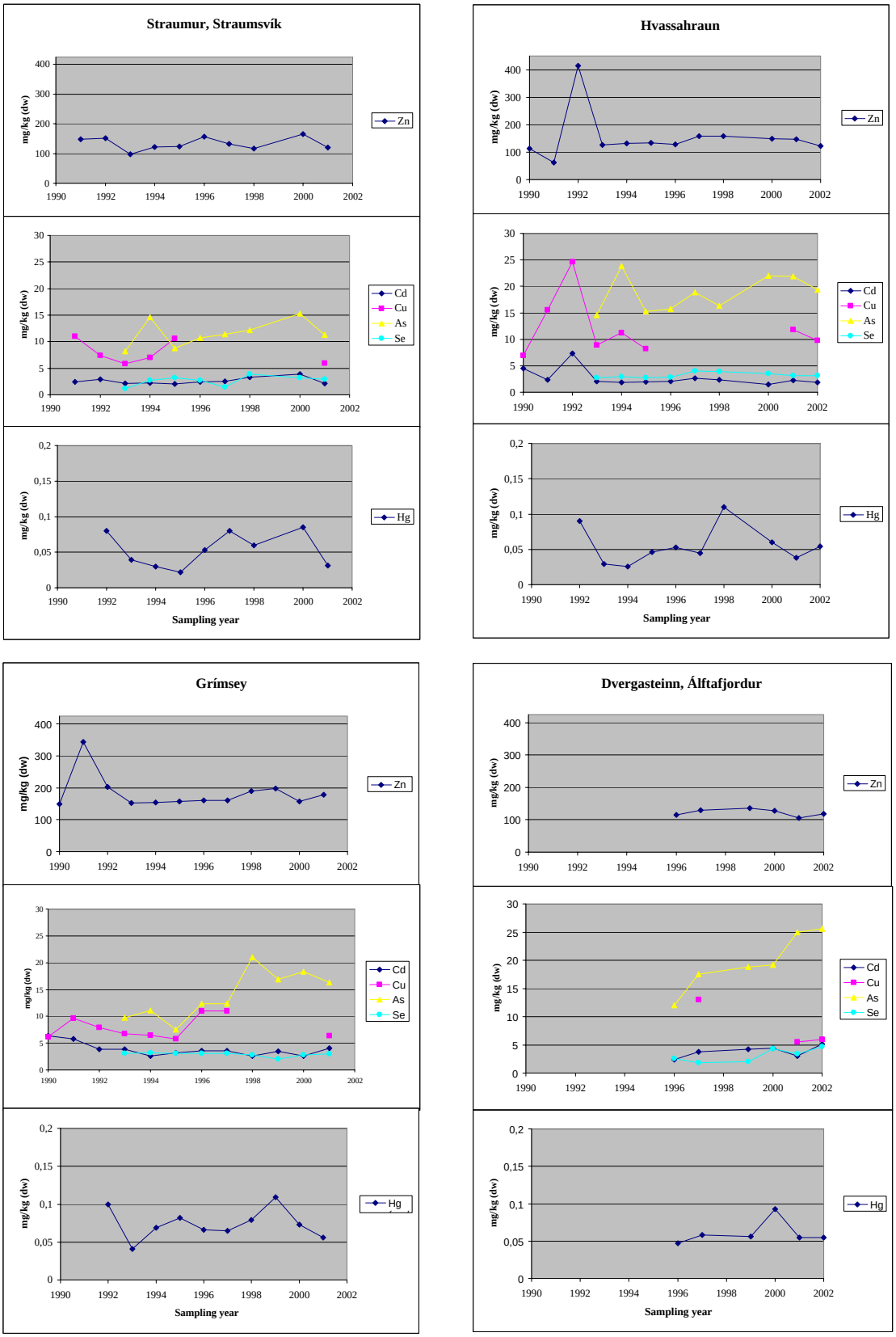


Figure 4a. Concentration of heavy metals (dry weight) in Blue mussel from different sampling sites around Iceland, 1991-2002.

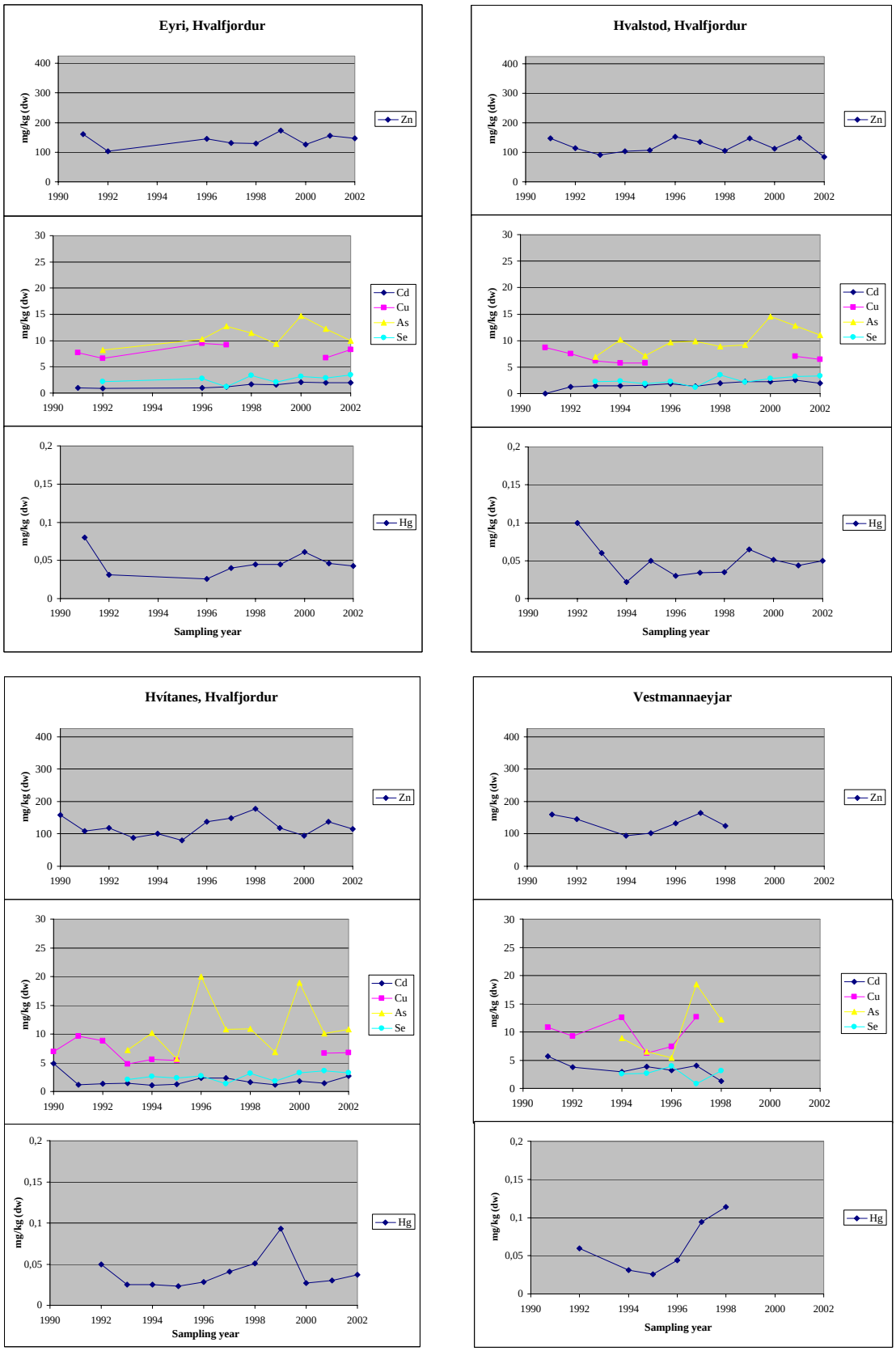


Figure 4b. Concentration of heavy metals (dry weight) in blue mussel from different sampling sites around Iceland, 1991-2002.

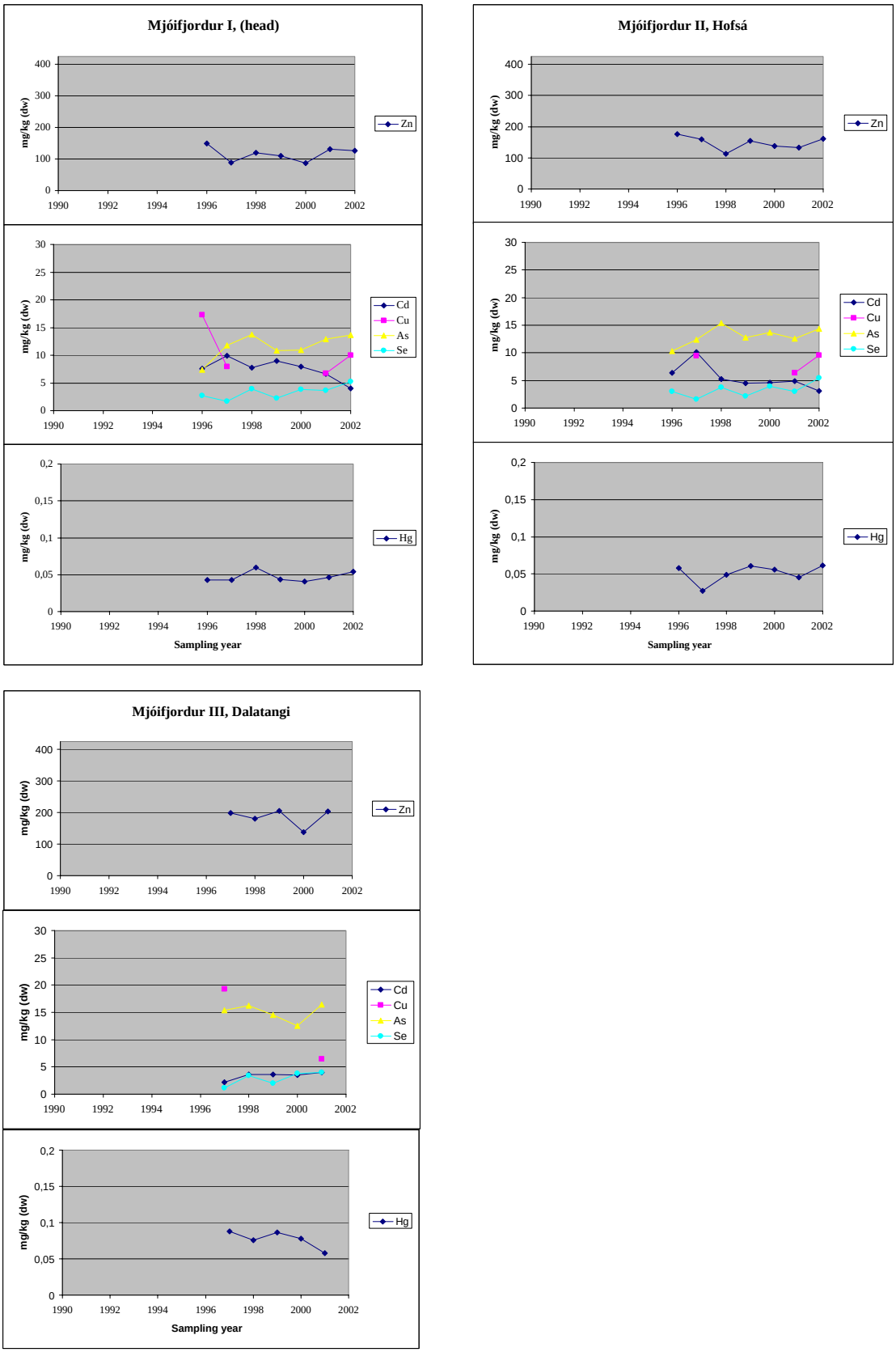


Figure 4c. Concentration of heavy metals (dry weight) in blue mussel from different sampling sites around Iceland, 1991-2002.

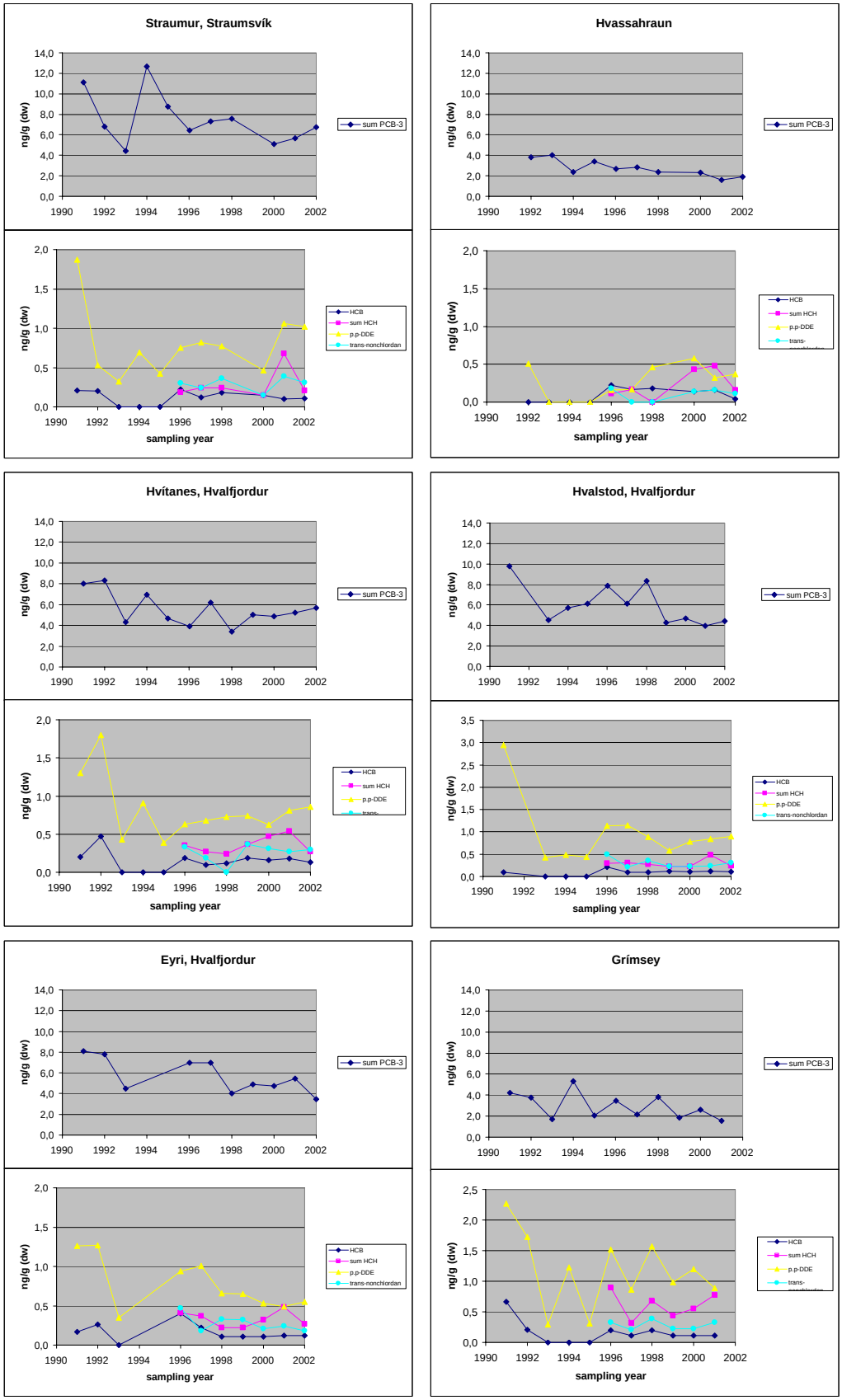


Figure 5a. Concentration of organochlorine compounds (dw) in Blue mussel (Mytilus edulis) at different locations 1991-2002

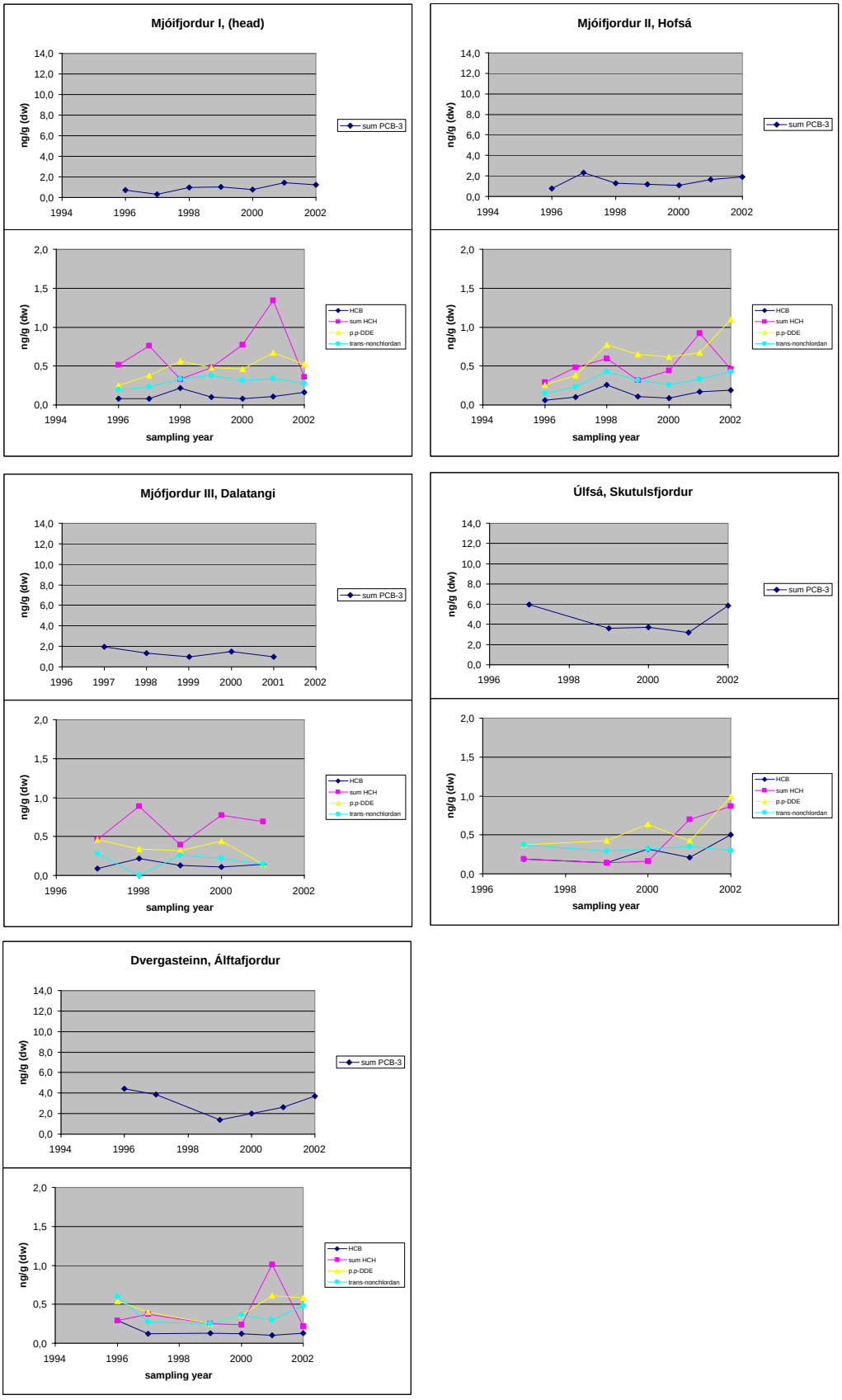
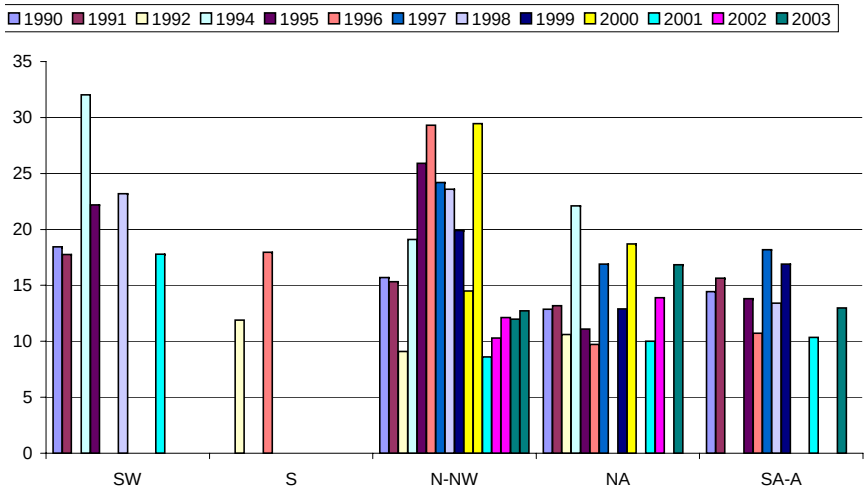
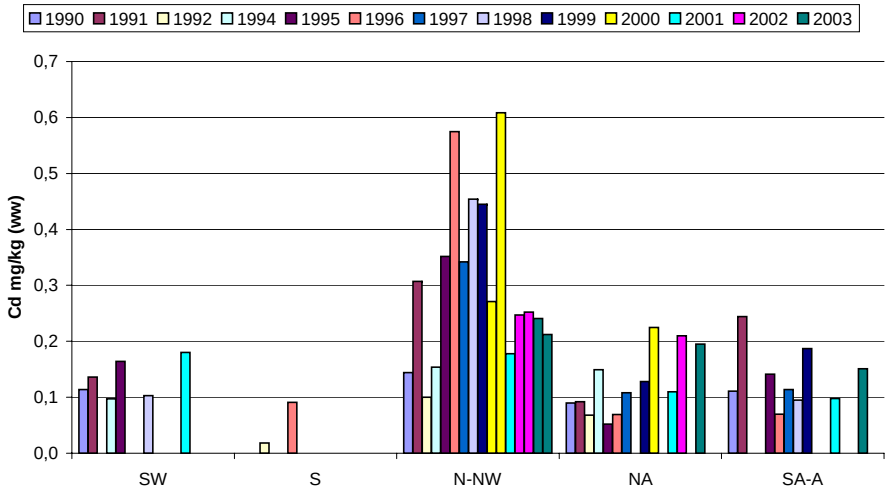


Figure 5b. Concentration of organochlorine compounds (dw) in Blue mussel (Mytilus edulis) at different locations 1991-2002.

Appendix VIII.

Graphs of metals and organic compounds in Cod (*Gadus morhua*) 1990-2003





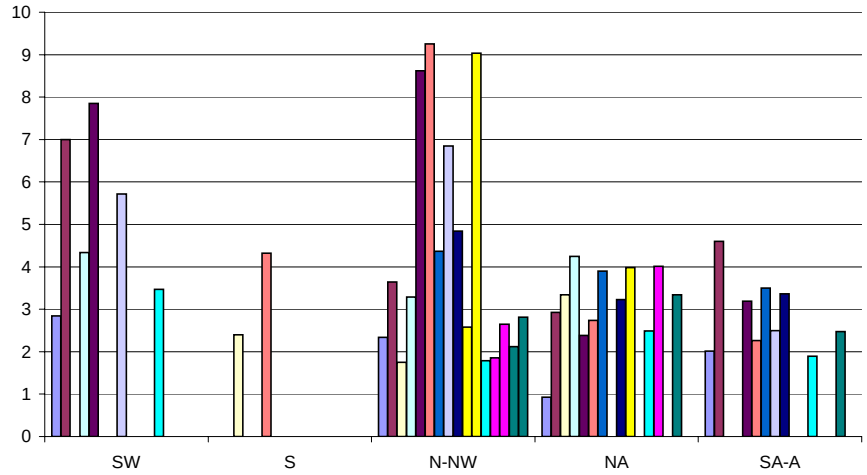
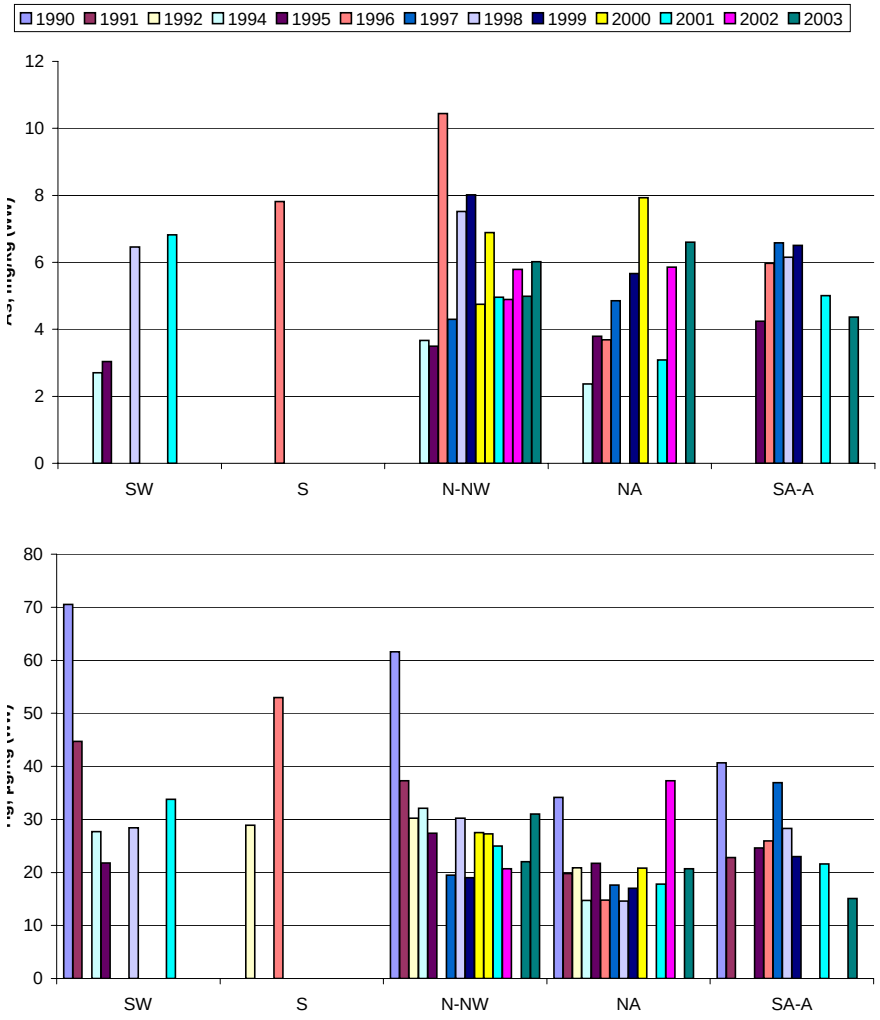


Figure 6a. Heavy metal consentration (ww) in livers of 30-45cm cod (Gadus morhua) from Icelandic waters in March 1990-2003.



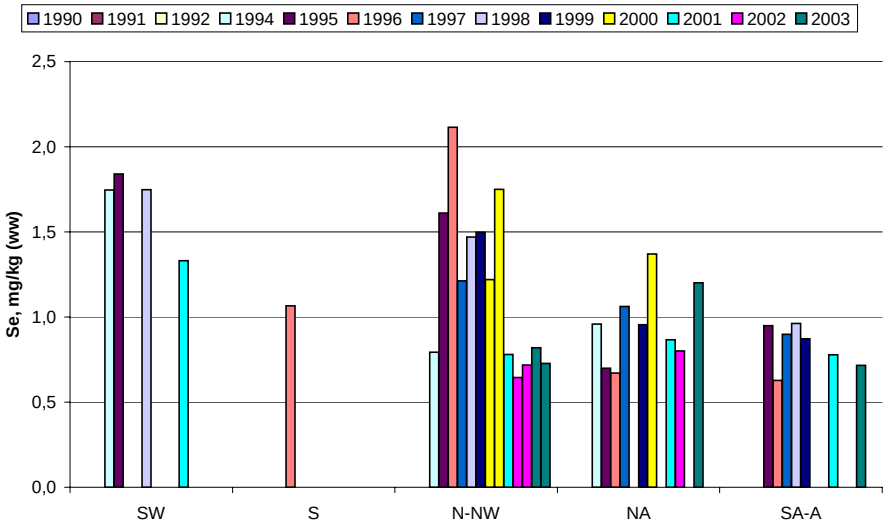


Figure 6b. Heavy metal consentration (ww) in livers of 30-45cm cod (Gadus morhua) from Icelandic waters in March 1990-2003. Mercury (Hg) was analysed in the flesh

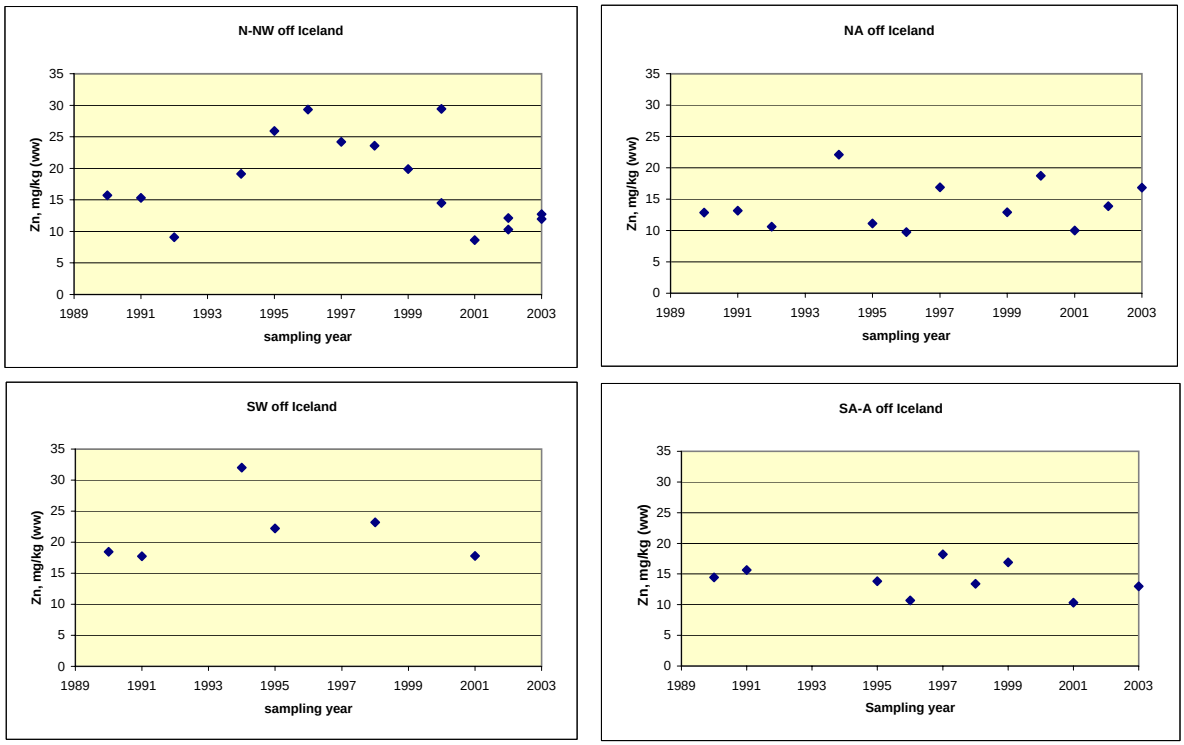


Figure 7a. Average concentration of Zinc (ww) in liver of 30-45 cm Cod (Gadus morhua) from different locations in Icelandic waters in March 1990-2003.

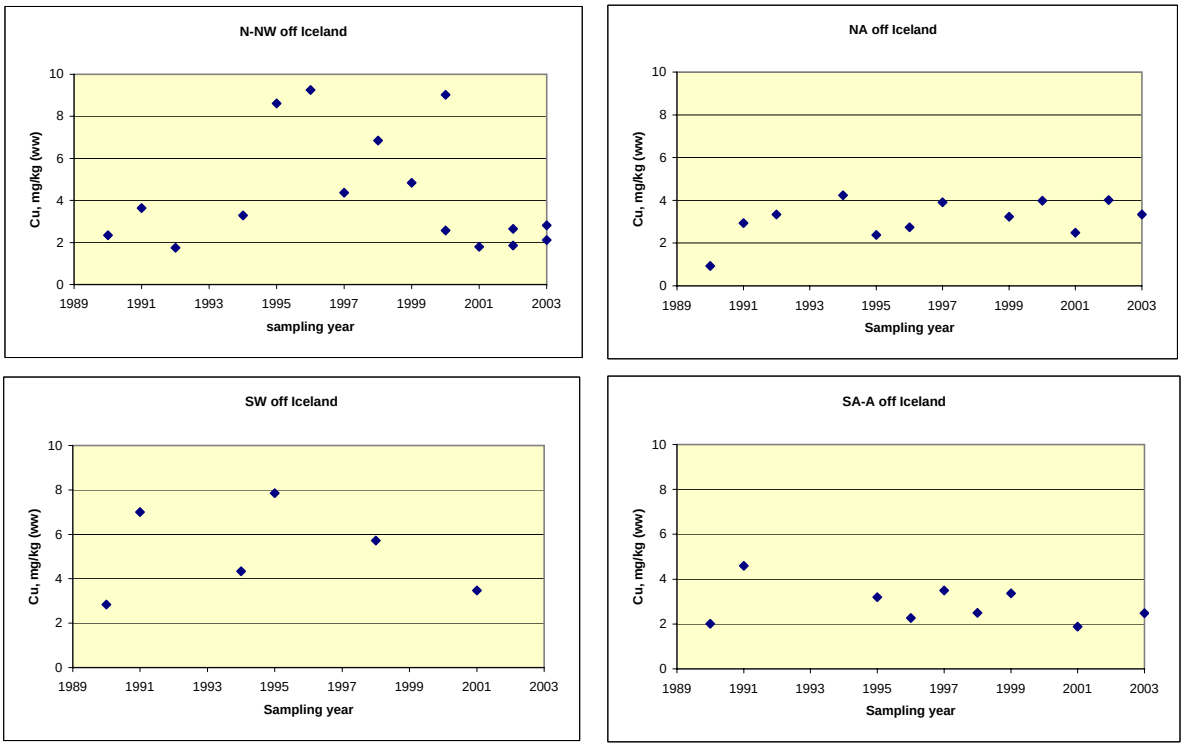


Figure 7b. Average concentration of Copper (ww) in liver of 30-45 cm Cod (Gadus morhua) from different locations in Icelandic waters in March 1990-2003.

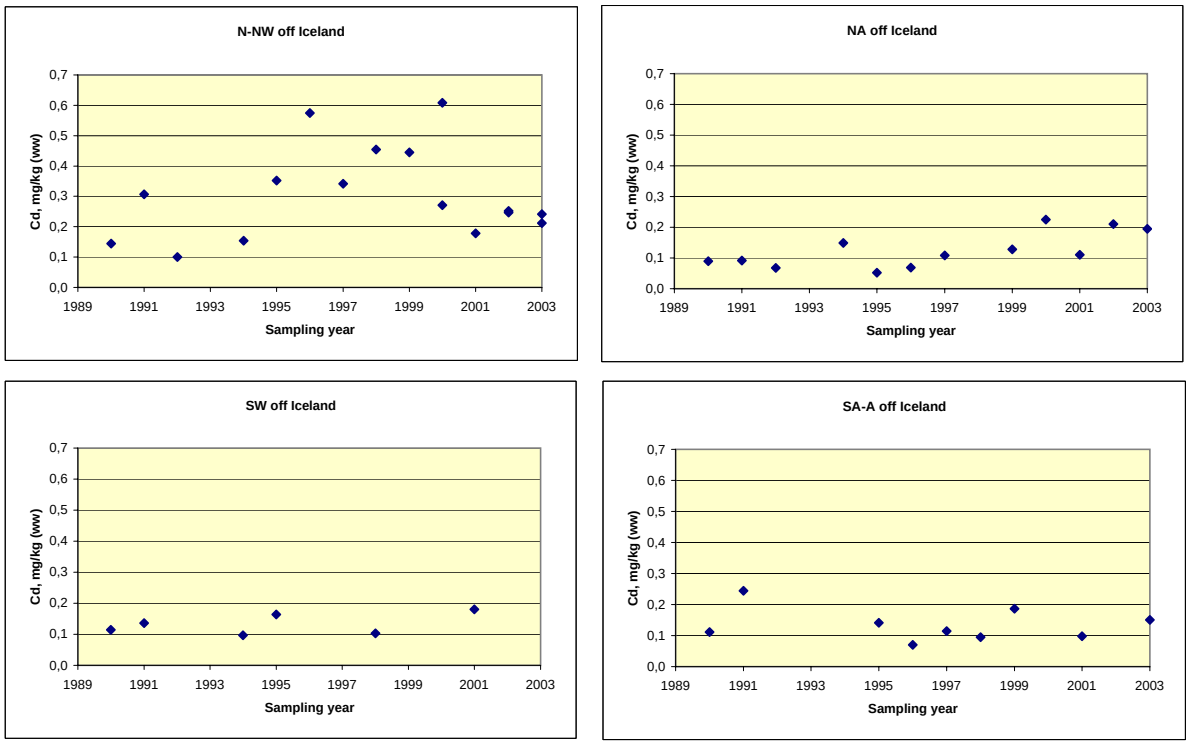


Figure 7c. Average concentration of Cadmium (ww) in liver of 30-45 cm Cod (Gadus morhua) from different locations in Icelandic waters in March 1990-2003.

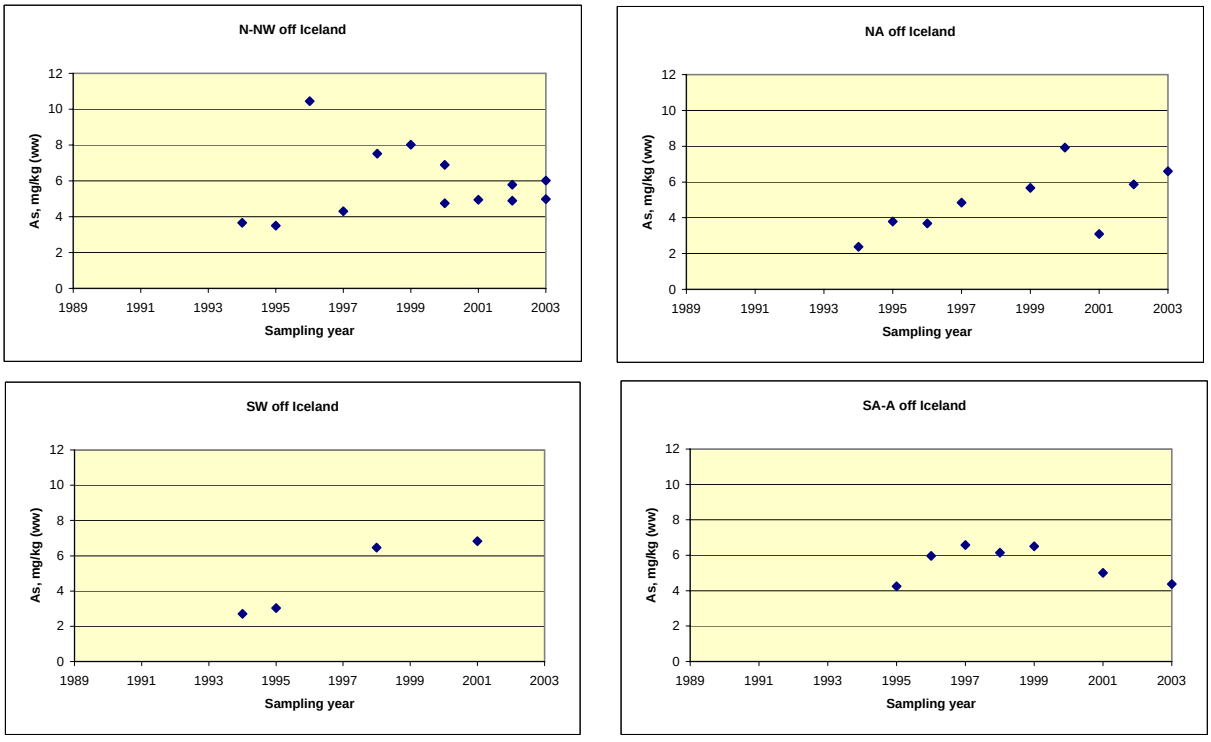


Figure 7d. Average concentration of Arsenic (ww) in liver of 30-45 cm Cod (Gadus morhua) from different locations in Icelandic waters in March 1990-2003.

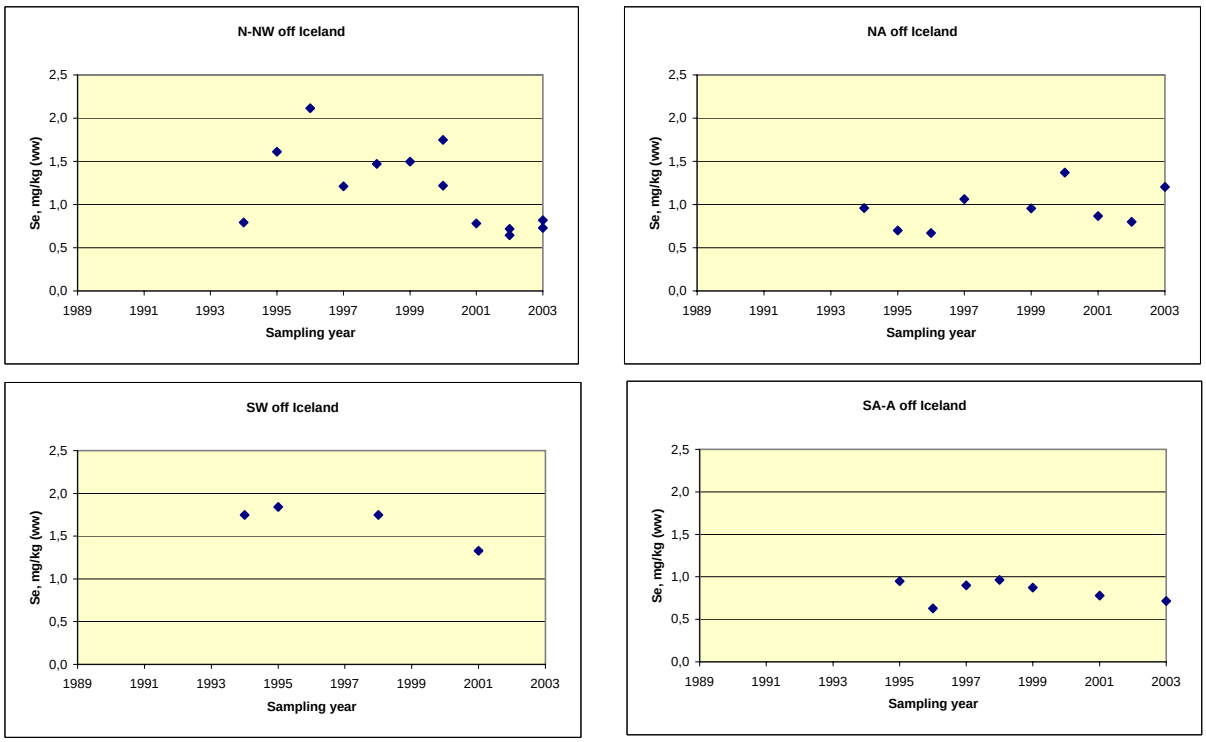


Figure 7e. Average concentration of Selenium (ww) in liver of 30-45 cm Cod (Gadus morhua) from different locations in Icelandic waters in March 1990-2003.

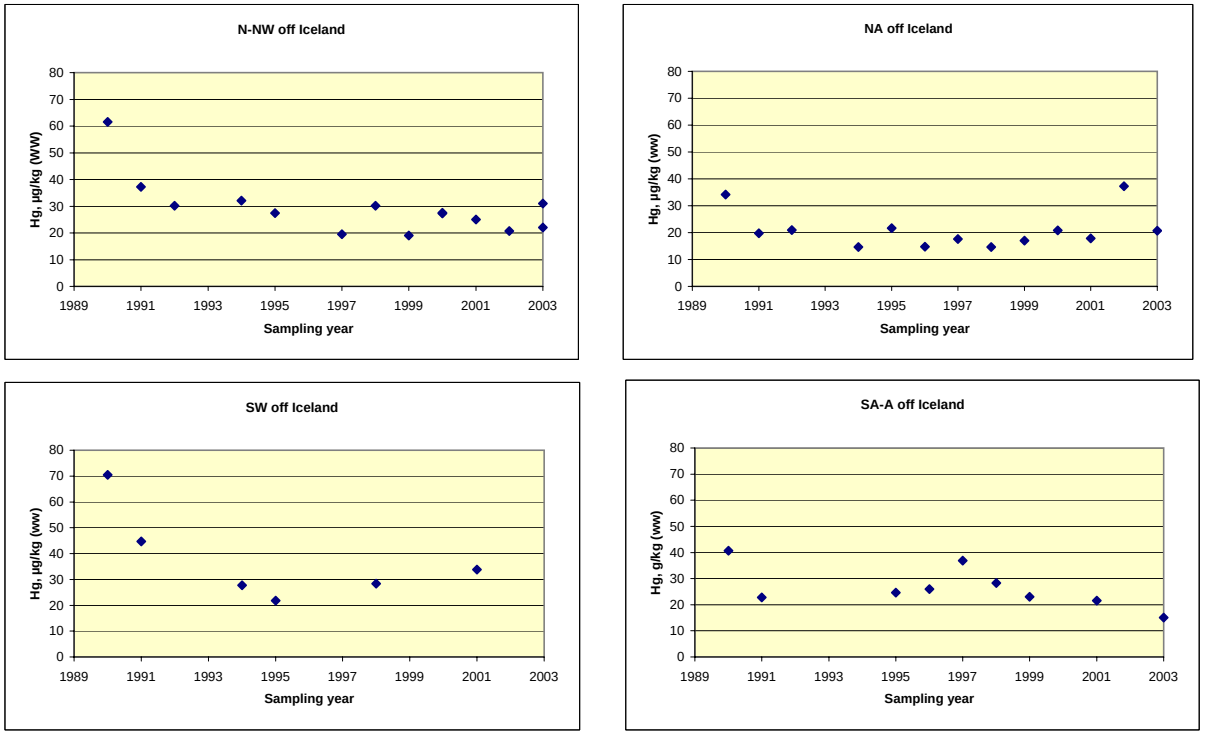
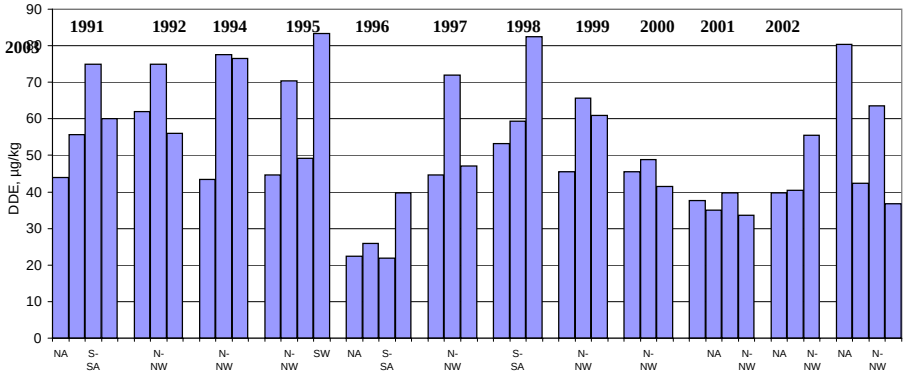
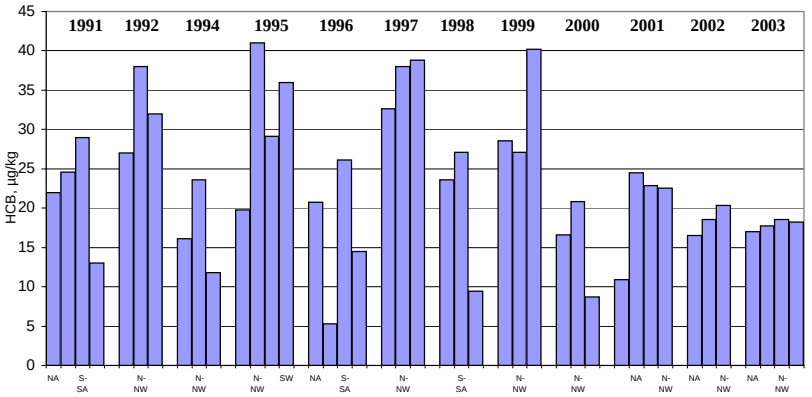
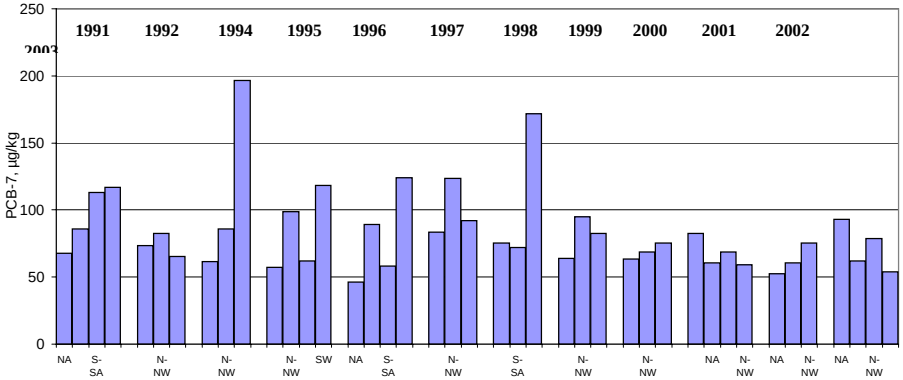
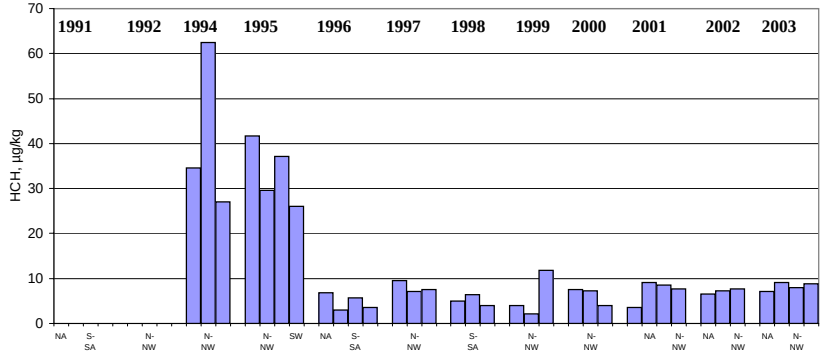


Figure 7f. Average concentration of Mercury (ww) in flesh of 30-45 cm Cod (Gadus morhua) from different locations in Icelandic waters in March 1990-2003.









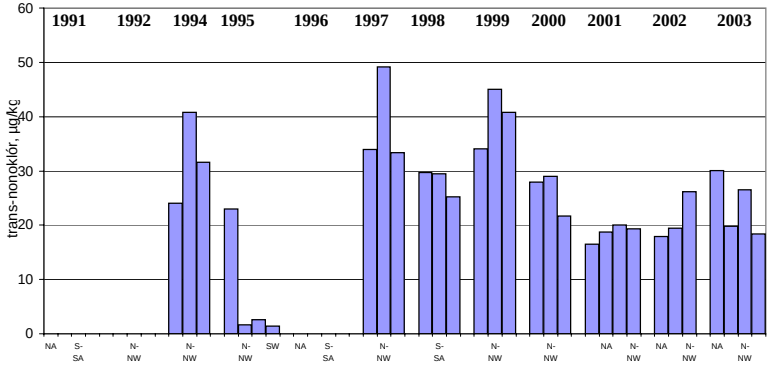


Figure 8. Organochlorine copmounds (ww) in livers of 30-45 cm cod *(Gadus Morhua)* in Icelandic waters in March 1991-2003.

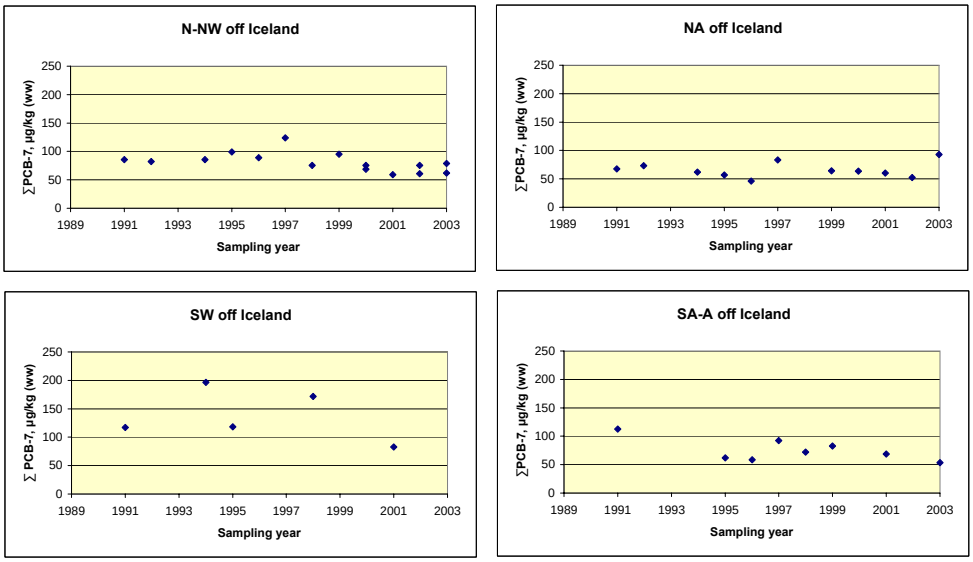


Figure 9a. Average concentration of ∑PCB-7 (ww) in livers of 30-45 cm Cod (Gadus morhua) from different locations in Icelandic waters in March 1991-2003

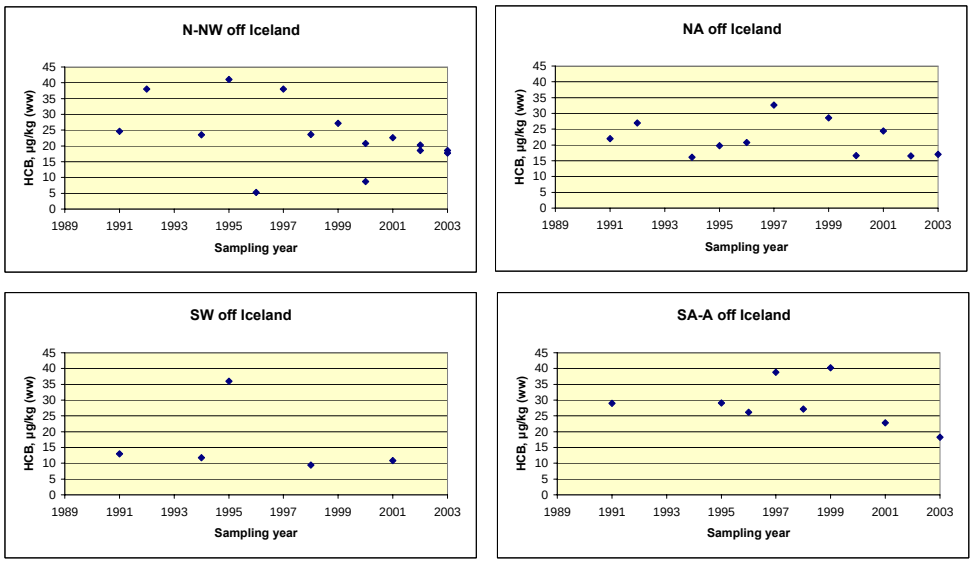


Figure 9b. Average concentration of HCB (ww) in livers of 30-45 cm Cod (Gadus morhua) from different locations in Icelandic waters in March 1991-2003

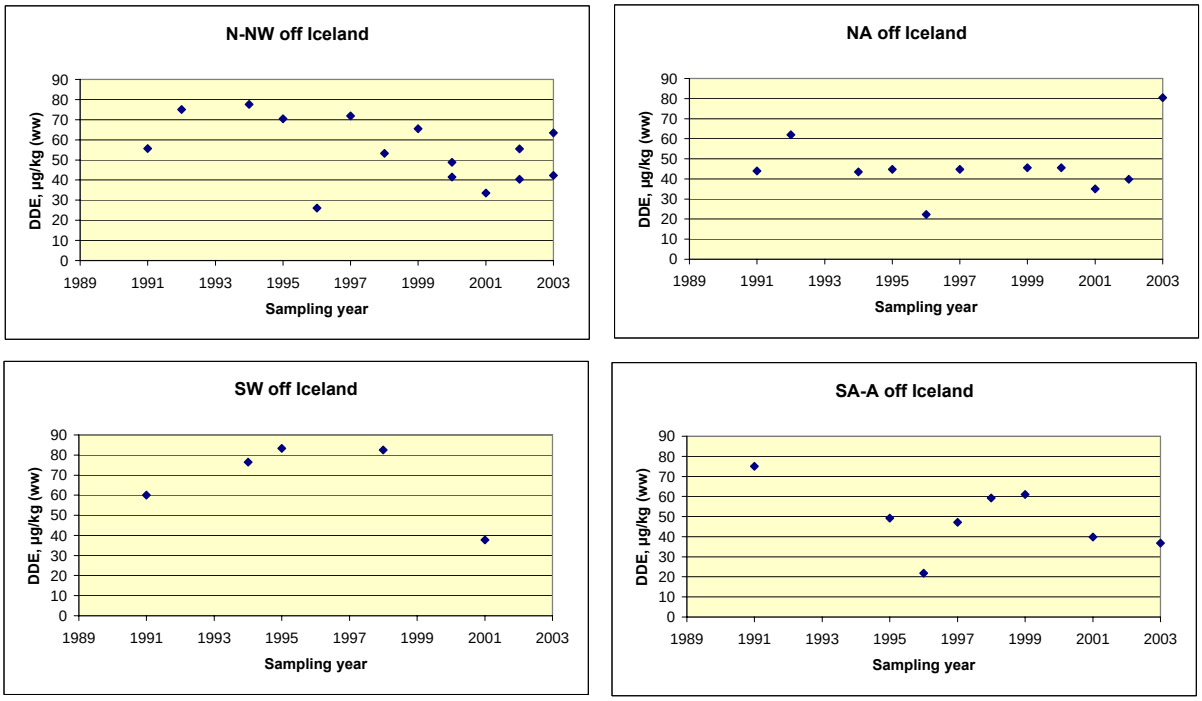


Figure 9c. Average concentration of DDE (ww) in livers of 30-45 cm Cod (Gadus morhua) from different locations in Icelandic waters in March 1991-2003

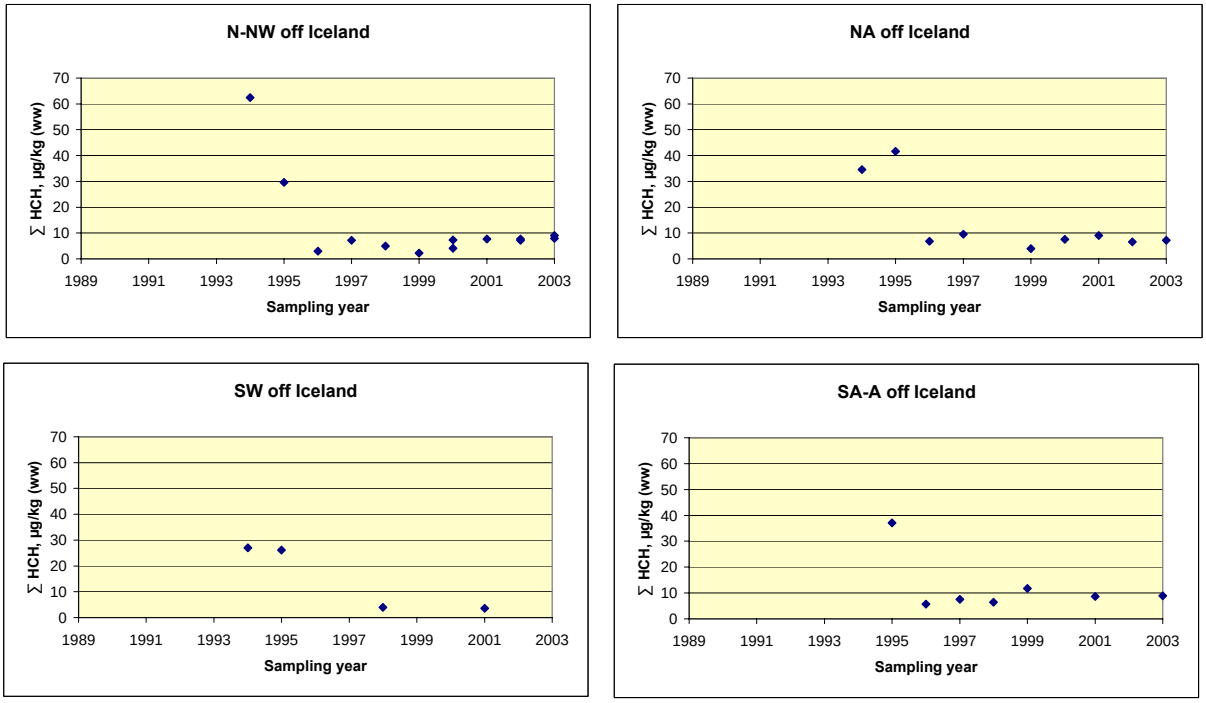


Figure 9d. Average concentration of ∑HCH (ww) in livers of 30-45 cm Cod (Gadus morhua) from different locations in Icelandic waters in March 1991-2003

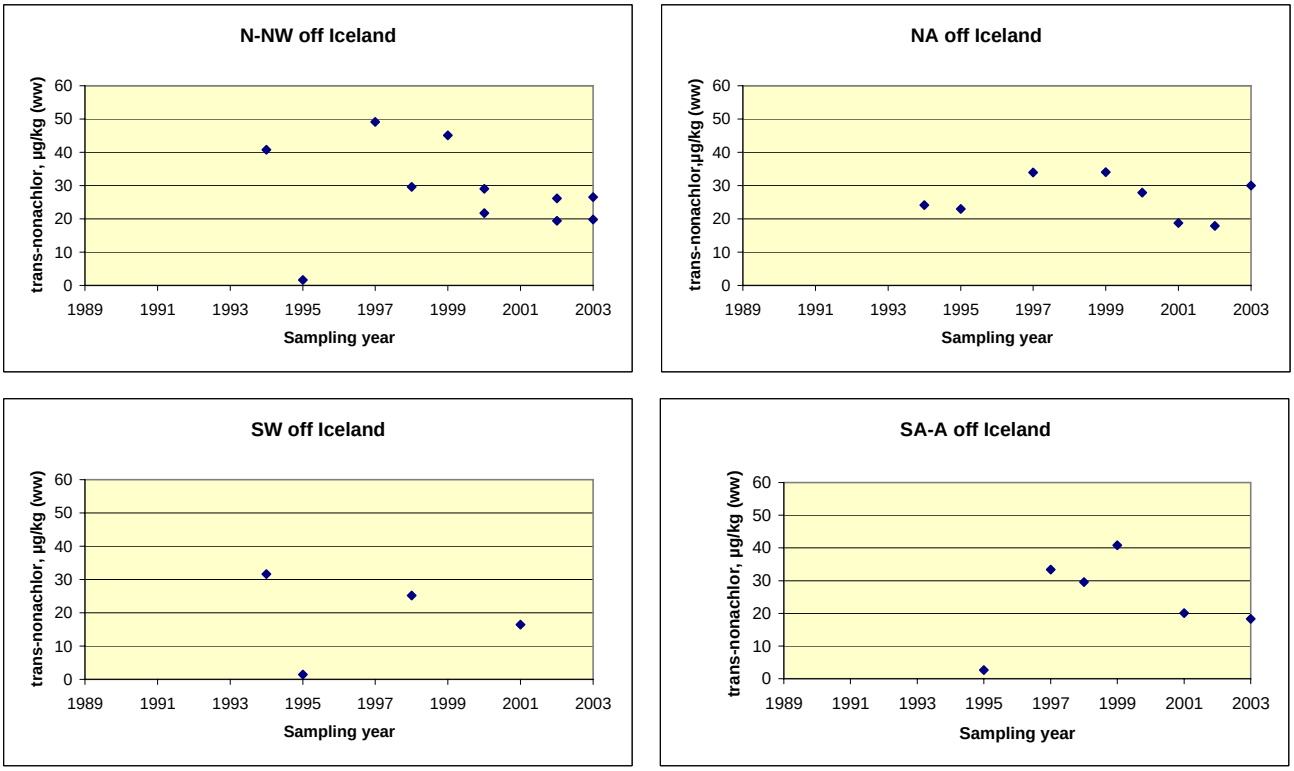


Figure 9e. Average concentration of transnonachlor (ww) in livers of 30-45 cm Cod (Gadus morhua) from different locations in Icelandic waters in March 1991-2003