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Monitoring of the marine biosphere around Iceland 2011 and 2012

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Ágrip á íslensku:	<p>Í þessari skýrslu eru birtar niðurstöður árlegs vöktunarverkefnis sem styrkt var af Umhverfis- og auðlindaráðuneytinu ásamt Atvinnuvega- og Nýsköpunarráðuneytinu. Markmið með þessari vöktun er að uppfylla skuldbindingar Íslands varðandi Oslóar- og Parísarsamninginn (OSPAR), auk AMAP (Arctic Monitoring Assessment Program). Gögnin eru hluti af framlagi Íslands í gagnabanka Alþjóðahafrannsóknaráðsins (ICES). Hafrannsóknastofnunin 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 Háskóla Íslands í lyfja- og eiturefnafræði.</p> <p>Mæld voru ýmis ólífræn snefilefni og klórlífræn efni í þorski veiddum í árlegu vorralli Hafró í mars 2012 og í kræklingi sem safnað var á 11 stöðum í kringum landið í ágúst/sept 2011. Vöktun í lífríki sjávar við Ísland hófst 1989 og er sýnasöfnun eins frá ári til árs og unnið eftir alþjóðlegum sýnatökuleiðbeiningum. Gögnunum er safnað saman í gagnagrunn, í skýrslunni eru birtar yfirlitsmyndir fyrir sum efnanna sem fylgst er með. Kadmín er svæðisbundið hærra í íslenskum kræklingi samanborið við krækling frá öðrum löndum. Niðurstöður sýna breytingar í mynstri styrks klórlífrænna efna í kræklingi sem safnað var nálægt Hvalstöðinni í Hvalfirði í september 2011. Styrkur klórlífrænna efna jókst árin 2009 og 2010 en lækkaði í sýnum frá 2011 og er orðinn sambærilegur við þann styrk sem mældist fyrir 2009. Styrkur DDEs er þó hærri en hann var fyrir 2009. Ekki voru sýnilegar breytingar í styrk þessara efna á söfnunarstað kræklinga við Hvammsvík í Hvalfirði né á neinum öðrum söfnunarstað í kringum landið sem rannsakaður var 2011. Mikilvægt er að fylgjast með þessum breytingum í mynstri styrks klórlífrænna efna í kræklingi í vöktunarverkefninu á næstu árum til að sjá hvernig þær breytast. Ítarleg tölfræðigreining á gögnunum er í gangi þ.a. hægt sé að meta með vísindalegum aðferðum aukningu eða minnkun mengandi efna í lífríki sjávar hér við land.</p>		
Lykilorð á íslensku:	<i>OSPAR, AMAP, vöktun á lífríki sjávar, ólífræn snefilefni, klórlífræn efni, þorskur, kræklingur.</i>		

Report summary

<p><i>Summary in English:</i></p>	<p>This report contains results of the annual monitoring of the biosphere around Iceland in 2011 and 2012. The project, overseen by the Environment Agency of Iceland, is to fulfil the OSPAR (Oslo and Paris agreement) and AMAP (Arctic Monitoring Assessment Program) agreements. The project was funded by Ministry for the Environment and Natural Resources as well as the Ministry of Industries and Innovation. The data obtained is a part of Iceland's contribution to the ICES databank (ices.dk). The collection of data started 1989. Matís 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 Matís and the Department of Pharmacology and Toxicology at the University of Iceland.</p> <p>Trace metals and organochlorines were analysed in cod (<i>Gadus morhua</i>) caught in March 2011 and in blue mussel (<i>Mytilus edulis</i>) collected from 11 sites in August/Sept 2011. Marine monitoring began in Iceland 1989 and the sampling is carried out according to standardized sampling guidelines. Changes were observed in the organochlorine concentration patterns in blue mussels collected year 2011 at the sampling site Hvalstod in Hvalfjordur. The concentration of organochlorines increased the years 2009 and 2010 but decreased in the samples from 2011 and is in line with the concentration of organohalogenes in mussels before 2009. No noteworthy increase in organochlorine concentrations was however observed in blue mussels obtained at Hvammsvík in Hvalfjordur nor any of the other sample sites studied year 2011. These results need to be followed up in the annual monitoring of the biosphere around Iceland next year to see if this change in contaminant concentration pattern continues. A thorough statistical evaluation is on-going on all the available data from this monitoring program to analyse spatial and temporal trends of pollutants in the Icelandic marine biosphere.</p>
<p><i>English keywords:</i></p>	<p><i>OSPAR, AMAP, monitoring, trace metals, organochlorine compounds, cod (Gadus Morhua), blue mussel (Mytilus edulis).</i></p>

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- VIII. Graphs of metals and organic compounds in Cod (*Gadus morhua*) 1990-2012.

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 2011, as well as for cod (*Gadus morhua*), which is collected in Icelandic territorial waters in 2012. 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 (1-17, 19). 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 Icelandic Environment Agency and financed by The Ministry for the Environment and Natural Resources as well as the Ministry of Industries and Innovation and Matís. 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, 2 samples (N-NW and NE)) was carried out in the annual bottom trawl survey in March 2012. Blue mussel samples, 4-6 cm length, were collected from 11 sites along the coast of the country in August/September 2011. Sampling locations for the blue mussel samples changed slightly this year i.e. the sampling location at Hvítanes and Eyri, both in Hvalfjörður, were moved due to limited availability of mussels at the original site. Sampling sites, i.e. coordinates, for all cod and blue mussel measured are shown in Figure 1. Icelandic waters have been divided into five main locations (N-NW, NE, SE-E, S, and SW) (6).

	Sample	Location	Site specifications ^a	Type of industry
Blue mussel	Grimsey	66°33,134-18°01,407	B	
	Hvalstöð, Hvalfjörður	64°23,826-21°27,210	I	Landing and processing of whale catch
	Hvammsvík, Hvalfjörður	64°21,64-21°33,53	B	
	Hvítanes, Hvalfjörður	64°01,205-22°09,526	B	
	Hvasshraun	64°02,541-22°02,700	B	
	Straumur, Straumsvík	65°11,28-14°00,48	I	Aluminium factory
	Mjóifjörður I, (head)	65°12,156-13°47,733	B	
	Mjóifjörður II, (Hofsá)	65°16,101-13°34,564	B	
	Mjóifjörður III, Dalatangi	66°03,36-23°10,02	B	
	Úlfhá, Skutulsfjörður	65°58,29-23°04,50	I	Waste incineration
Dvergasteinn, Álftafjörður	64°20,20-21°41,09	B		
Cod	Cod N-NW	66°16,83-25°51,03	B	
	Cod NE	65°17,87-12°25,93	B	

a: B = Baseline, I = Impact

Figure 1. Locations for sampling of blue mussel (*Mytilus edulis*) 2011 and cod (*Gadus morhua*) 2012.

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 this each sample (50 individuals) was homogenized and frozen until analysis was performed.

30-45 cm long cod was selected, each sample consisted of 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 and frozen until analyses were performed. 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 Persistent Organic Pollutants (POP) 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, BDE-47, BDE-99, and BDE-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, 2011 (<i>Mytilus edulis</i>)	11	50			Cu, Zn, As, Se, Cd, Hg, Pb	*	Dry matter and fat
Cod, 2012 (<i>Gadus morhua</i>)	2	25	Flesh	1	Hg		Dry matter and fat
			Liver	6	Cu, Zn, As, Se, Cd, Pb	*	Dry matter and fat
Labels:							
Cod-N-NW(2)							
Cod-NE							

* 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.

Only three liver groups from each cod sample were analyzed to optimize the project resources compared to 5-6 liver groups in the previous years.

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 not freeze dried and weighted wet) together with 3 ml HNO₃ and 1.5 ml H₂O₂ were transferred to 50 ml digestion bombs. Samples were digested in a Mars5 microwave oven (CEM, North Carolina, USA), according to method SV-25-02-SN in Matis Quality manual. 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). ¹¹⁵In was used as internal standard. 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) and for the inorganic contaminants the analytical method used is presented in details in method SV-22-02-SN-1 in Matis Quality manual.

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 FAPAS test with satisfactory results. The limit of

detection (LOD) was calculated as follows: 20 digested blank samples were run and standard deviation (S.D.) calculated. LOD represents 3 x S.D. in blank samples.

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 2011 and 2012. Statistical evaluation of the available time series is part of a currently on-going Ph.D. project and the statistical evaluation of contaminants in mussels sampled around the Icelandic coastline has recently been published (20). Increase in POP concentration was observed in mussels from the site Hvalstod year 2009 (17) and 2010 (19). This increase seems to have reversed year 2011 and is in the same range as before the increase appeared with the exception of DDE which is higher compared to the years prior to the increase. The higher DDE concentration is reflected in the CB-153/DDE ratio that is 1,2 in the 2011 samples compared to 0,4 in the 2009 and 2010 samples. The ratio 2007 and 2008 was 2,5 and 2,8, respectively. For details see Table 9a in Appendix V and Figure 5a in Appendix VII. The site Hvalstod, Hvalfjordur, is located 400m south-west of a processing plant for fin whales (*Balaenoptera physalus*) and these whales were hunted and processed in the years 2009 and 2010 after a 20 year long break in the processing plants operation. No fin whale were caught and processed in the year 2011. It is therefore likely that the increase observed 2009 and 2010 is related to whale offal entering the fjord from the process plant. No noteworthy increase in POP concentrations was observed year 2009 in blue mussels obtained from the other annual sampling sites in Hvalfjordur i.e. Hvítanes /Hvammsvík nor any of the other sample locations studied (Figures 5a and 5b). Future plans of continued whale hunting and processing emphasise a reason to continuously monitor the environmental conditions in Hvalfjordur.

4.1 Biological variations

Figures 2a-d in appendix VI shows the biological variation in cod (*Gadus morhua*) 1990-2011, (average age, average weight of ungutted fish, average weight of liver, and average fat content in liver). No large trends are observed in the charts.

4.2 Heavy metals

Results for metals in blue mussel (2011) and cod (2012) are presented in Tables 7 and 8 in appendix IV. New data is presented along with data from previous years (1, 4-17, 19) 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 ca. 20 years. It should be noted that results for cod are presented on wet weight basis (w.w.), while the result for mussel are presented on dry weight basis (d.w.).

4.2.1 Blue mussel

The annual sampling site for the blue mussel sample taken at Hvítanes in Hvalfjordur (64°21,85-21°29,8) has been moved slightly from previous location. The name of this sampling station has though not been changed in the figures in appendix VII that illustrate the results obtained for trace metals and organic compounds in blue mussels at the various sample sites around Iceland over the past 21 years.

Figures 3a-f in appendix VII, show the average concentration of inorganic trace elements in blue mussel from the years 1990-2010, 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, 1990-2011 where no indication of temporal trend can be distinguished. The concentration of inorganic trace elements is very similar in mussels from all sites whereas some site variation in concentration is seen for Cd where the concentration of is higher in Mjóifjordur, Grímsey and Dvergasteinn compared to other locations. 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. As is approximately five times higher in mussels from Úlfsá, Skutulsfjordur compared to the average As concentration in mussels from other sites but the reason for this is unknown. Some indications for increased Zn concentration in mussels from Grímsey can be seen but it is still too early to draw any conclusions, where further monitoring is needed. 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. A detailed statistical evaluation of the contaminants monitored as part of this project in mussels sampled around the Icelandic coastline has recently been published (20).

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 1990-2012. Figures 7a-f in appendix VIII show average concentrations (w.w.) of heavy metals in cod livers from different sampling sites, between the years 1990-2012. Mercury is measured in the flesh instead of in the liver. Lead concentration

was below the limits of detection in all samples. Variations in concentration between years and locations over the time interval are 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). A detailed statistical evaluation of contaminants in cod samples from Icelandic waters is presently on going and will be published in the near future.

4.3 Organic compounds

Results for organic compounds in blue mussel (2011) and cod (2012) 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, 4-17, 19) in Figures 5a-b (Appendix VII) for blue mussel and in figures 8 and 9a-e (Appendix VIII) for cod, giving an overview of approximately 20 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 1991-2011. The PCB congeners included in the Σ 3PCBs 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 and DDE. As mentioned in results (i.e. section IV Results above) changes were observed in the organochlorine concentration patterns in blue mussels collected in 2009 and 2010 at the sampling site Hvalstod in Hvalfjordur. This change in concentration has reversed, for details see Figure 5a in Appendix VII and discussions in section IV Results. The concentration of PCBs in blue mussel found in Iceland are at the same levels as concentration 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 other DDTs except for 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 2012. Figures 9a-e in appendix VIII show the average concentrations (w.w.) of some organic compounds in cod from different sampling sites, 1991-2012. 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 2011 and 2012. It adds to the information gathered every year to determine whether 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.

There are apparently no large scale changes in contaminant concentrations pattern seen in previous years. 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.

The last statistical evaluation was performed in 1998 (6) but additional data collected over the last 12 years called for a new methodical statistical evaluation of the existing Icelandic monitoring data, this work has is now on-going and has already resulted in one publication (20)

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*)

2012

Species:	Blue mussel (<i>Mytilus edulis</i>)		Date of sampling:	27.08.2011		
Length:	4-6 cm		Sampled by:	Marine Inst.		
Location:	Úlfsá		Date of preparation	30.10.2012		
Coordinates:	660335 231005		MATIS#:	R12-2579-9		
	Length (mm)	Width (mm)	Height (mm)	Total weight (g)	Weight soft body (g)	Weight shell (g)
1	40,0	22,1	16,7	7,02	3,68	3,24
2	48,6	25,5	20,9	15,23	7,24	7,88
3	44,7	20,8	18,4	9,49	4,53	4,89
4	50,8	22,6	22,7	15,64	7,58	7,96
5	55,6	25,7	24,3	20,55	10,24	10,13
6	52,2	23,7	21,0	14,96	7,28	7,22
7	54,9	24,7	25,3	20,50	10,14	10,10
8	47,5	24,5	18,9	11,53	6,64	4,77
9	55,6	23,3	22,5	18,34	9,66	8,39
10	54,1	24,9	23,7	20,65	9,25	11,12
11	43,4	21,9	16,8	7,94	4,32	3,40
12	46,7	22,7	21,0	13,82	6,31	6,86
13	53,3	26,4	21,2	14,49	7,96	6,20
14	47,2	22,9	18,8	10,73	5,31	4,82
15	50,7	21,5	20,4	13,84	6,49	7,09
16	47,8	22,8	19,6	12,21	6,19	5,88
17	51,1	23,6	21,5	15,36	7,48	7,54
18	50,2	23,3	21,7	15,85	7,11	8,41
19	51,8	22,9	21,4	16,27	7,56	8,18
20	56,4	25,2	26,3	20,65	11,16	9,24
21	53,3	26,1	20,6	15,35	7,32	7,80
22	45,6	23,3	17,2	10,60	4,79	5,63
23	46,2	24,0	20,0	14,10	5,99	7,92
24	47,2	24,5	19,9	11,86	5,92	5,57
25	48,9	20,1	18,9	11,42	5,68	5,66
26	45,6	22,8	18,9	11,28	5,83	5,35
27	49,4	25,1	19,5	13,09	6,84	5,90
28	47,8	22,3	18,3	12,42	5,55	6,75
29	42,3	24,5	22,2	17,12	8,77	8,24
30	56,1	26,1	20,6	18,52	9,66	8,76
31	42,8	20,1	16,1	7,96	4,35	3,45
32	42,3	21,1	15,0	7,47	4,13	3,22
33	45,6	23,3	17,5	9,58	4,95	4,32
34	45,0	23,3	17,3	11,36	5,68	5,63
35	46,7	21,1	20,0	12,42	6,94	6,27
36	50,1	23,3	21,2	14,64	7,02	7,47
37	52,2	26,1	18,8	14,83	7,41	7,16
38	50,0	24,5	23,3	18,63	9,02	9,39
39	53,4	23,9	22,3	17,09	8,80	8,01
40	57,2	26,7	21,7	19,63	10,31	9,24
41	44,5	20,6	17,2	10,05	5,08	4,94
42	42,8	21,7	21,1	13,26	6,45	6,75
43	48,4	23,3	21,1	14,43	6,44	7,88
44	50,6	22,8	20,1	15,16	7,64	7,33
45	52,8	21,7	21,1	19,63	8,99	10,59
46	50,0	23,9	22,8	15,82	8,09	7,65
47	48,3	23,3	18,3	11,97	6,16	5,62
48	52,3	24,4	19,4	14,06	7,34	6,66
49	50,1	23,3	19,9	14,74	6,36	8,20
50	53,8	22,2	23,3	18,05	8,37	9,47
	Length	Width	Height	Total weight	Weight soft body	Weight shell
Average	49,28	23,41	20,33	14,23	7,08	7,00
Stdev	4,21	1,65	2,37	3,62	1,78	1,94
Min	40,00	20,10	15,00	7,02	3,68	3,22
Max	57,20	26,70	26,30	20,65	11,16	11,12

Species:	Blue mussel (<i>Mytilus edulis</i>)		Date of sampling:	28.8.2011		
Length:	4-6 cm		Sampled by:	Marine Inst.		
Location:	Hvassahraun		Date of preparation	23.10.2012		
Coordinates:	640125 220900		MATIS#:	R12-2579-4		
	Length (mm)	Width (mm)	Height (mm)	Total weight (g)	Weight soft body (g)	Weight shell (g)
1	45,8	23,8	20,3	12,39	6,06	6,09
2	42,6	22,2	21,6	11,84	6,27	5,37
3	50,0	24,6	23,1	16,33	8,85	7,34
4	49,6	25,5	23,5	15,67	7,62	7,70
5	50,4	28,1	20,8	15,07	7,69	6,50
6	50,1	25,7	21,6	16,76	8,72	7,79
7	53,6	28,4	24,1	20,52	11,13	9,01
8	60,3	26,6	25,7	22,46	13,02	9,27
9	41,2	22,4	16,6	8,17	4,00	3,84
10	45,7	24,2	19,8	12,21	6,77	5,19
11	42,0	22,3	20,0	10,90	5,83	4,93
12	46,3	23,4	19,2	11,44	5,92	5,25
13	45,8	23,7	16,8	9,78	5,30	4,32
14	48,3	24,5	20,6	13,54	7,68	5,78
15	48,7	23,9	22,7	15,96	8,68	7,14
16	47,4	26,8	20,3	13,60	7,97	5,47
17	52,7	27,3	22,8	18,00	9,95	7,87
18	59,4	28,3	25,4	24,25	13,05	11,03
19	40,9	22,1	18,8	9,50	4,86	4,53
20	47,5	25,1	21,2	13,83	7,27	6,37
21	46,0	26,0	20,4	13,31	7,25	5,91
22	44,8	22,8	20,4	12,15	6,02	5,77
23	50,0	24,8	22,4	15,42	7,64	7,57
24	47,2	25,0	19,1	13,52	6,87	6,41
25	53,4	25,6	22,0	16,89	9,13	7,52
26	49,5	26,8	21,2	15,06	7,86	7,09
27	48,8	25,4	22,5	16,80	8,83	7,62
28	54,4	24,4	26,0	19,76	11,28	8,05
29	46,5	24,1	19,7	11,71	6,24	5,28
30	46,7	24,4	21,4	13,71	7,04	6,44
31	47,0	24,2	19,7	12,70	6,87	5,71
32	48,7	24,0	20,7	13,70	6,97	6,29
33	52,2	24,2	23,8	17,93	9,28	8,48
34	49,2	23,2	20,8	14,97	7,84	6,47
35	50,7	26,8	22,0	16,81	7,60	8,71
36	54,5	27,2	23,2	19,72	10,96	8,53
37	53,3	26,9	23,4	18,82	10,98	7,57
38	63,4	27,3	28,0	27,98	14,07	13,54
39	48,2	24,1	18,8	11,16	6,58	4,51
40	46,0	23,5	19,7	12,35	6,99	5,22
41	46,4	26,3	18,8	12,00	6,33	5,53
42	48,9	24,1	21,2	14,33	7,86	6,34
43	47,9	23,7	20,1	12,88	7,42	5,32
44	49,0	25,9	22,3	15,14	8,49	6,51
45	53,9	28,0	24,3	20,01	11,17	8,66
46	53,0	27,8	23,2	19,26	10,61	8,55
47	57,2	29,0	24,3	23,69	12,67	10,83
48	59,5	27,1	26,8	25,34	13,40	11,81
49	42,2	23,5	18,1	10,00	5,27	4,54
50	44,3	23,0	19,4	11,06	5,88	5,05
	Length	Width	Height	Total weight	Weight soft body	Weight shell
Average	49,4	25,2	21,6	15,41	8,24	6,93
Stdev	4,9	1,8	2,4	4,34	2,40	2,01
Min	40,9	22,1	16,6	8,17	4,00	3,84
Max	63,4	29,0	28,0	27,98	14,07	13,54

Species:	Blue mussel (<i>Mytilus edulis</i>)			Date of sampling:	28.8.2011		
Length:	4-6 cm			Sampled by:	Marine Inst.		
Location:	Straumur, Straumsvík			Date of preparation	24.10.2012		
Coordinates:	640260 220250			MATIS#:	R12-2579-5		
	Length (mm)	Width (mm)	Height (mm)	Total weight (g)	Weight soft body (g)	Weight shell (g)	
1	50,5	25,2	19,8	12,62	6,85	5,47	
2	48,7	20,1	21,9	12,96	6,98	5,77	
3	46,7	24,3	17,4	10,09	5,37	4,44	
4	51,3	23,7	20,0	12,11	6,03	5,96	
5	49,4	23,9	19,6	11,77	6,65	4,91	
6	51,8	21,8	22,2	11,78	5,74	5,81	
7	52,5	24,1	23,9	18,28	9,88	8,21	
8	54,8	23,6	27,0	19,25	9,81	9,20	
9	55,2	25,4	24,1	19,16	9,58	9,41	
10	60,3	28,8	24,2	23,03	13,05	9,72	
11	47,1	21,9	20,3	11,39	6,58	4,64	
12	45,1	24,2	18,1	10,94	5,69	5,10	
13	46,5	21,9	20,2	13,20	7,00	6,05	
14	47,9	24,3	18,9	11,89	6,88	4,91	
15	53,5	22,0	21,4	15,56	8,81	6,61	
16	53,0	26,5	24,3	19,05	10,10	8,83	
17	51,7	22,8	22,9	15,49	7,86	7,41	
18	58,4	26,7	22,5	18,09	10,79	7,22	
19	61,2	29,5	24,8	22,88	13,98	8,78	
20	61,7	29,4	28,7	31,07	15,08	15,61	
21	45,9	24,8	17,5	10,45	5,63	4,67	
22	47,8	24,5	19,4	12,19	6,29	5,73	
23	48,0	23,4	18,0	10,33	5,55	4,64	
24	52,2	22,1	22,0	15,58	8,89	6,49	
25	57,7	26,7	21,6	17,03	9,52	7,09	
26	54,2	26,4	23,3	16,99	5,75	9,09	
27	55,6	24,5	21,5	17,52	9,35	7,87	
28	57,7	28,5	24,2	19,40	11,44	7,70	
29	56,9	24,0	27,6	24,03	12,57	11,21	
30	64,5	29,3	30,0	30,85	17,99	12,64	
31	49,4	24,6	18,9	10,84	6,56	4,18	
32	50,4	25,0	22,2	14,60	7,79	6,61	
33	51,3	21,7	20,0	14,12	8,61	5,35	
34	52,8	22,3	21,5	16,03	9,17	6,74	
35	56,5	22,4	26,1	20,52	10,47	9,90	
36	62,0	24,3	26,7	25,28	13,49	11,41	
37	64,2	28,0	29,1	28,19	15,96	11,94	
38	63,7	31,4	25,3	26,53	15,05	11,20	
39	65,9	26,9	26,1	25,51	14,06	11,28	
40	65,9	28,7	29,6	29,51	16,46	12,92	
41	48,7	23,8	19,4	11,21	6,45	4,57	
42	47,1	23,1	19,2	10,52	6,49	3,98	
43	50,1	24,1	20,2	11,68	6,14	5,43	
44	50,2	23,8	21,7	13,65	8,30	5,24	
45	52,7	25,8	22,7	15,77	8,59	7,02	
46	53,9	24,7	22,3	16,08	9,32	6,68	
47	52,2	23,6	25,7	17,87	9,78	7,97	
48	53,8	22,2	24,8	16,45	8,83	7,46	
49	57,1	25,3	26,6	20,56	11,02	9,15	
50	60,7	27,5	24,7	22,57	11,84	10,52	
	Length	Width	Height	Total weight	Weight soft body	Weight shell	
Average	53,9	24,9	22,8	17,25	9,42	7,61	
Stdev	5,7	2,5	3,3	5,82	3,29	2,69	
Min	45,1	20,1	17,4	10,09	5,37	3,98	
Max	65,9	31,4	30,0	31,07	17,99	15,61	

Species: Blue mussel (<i>Mytilus edulis</i>)		Date of sampling: 31.8.2011				
Length: 4-6 cm		Sampled by: Marine Inst.				
Location: Mjóifjörður botn		Date of preparation 25.10.2012				
Coordinates: 651128 140048		MATIS#: R12-2579-6				
	Length (mm)	Width (mm)	Height (mm)	Total weight (g)	Weight soft body (g)	Weight shell (g)
1	45,1	20,8	18,6	10,51	4,84	5,21
2	51,4	26,1	19,6	13,96	7,51	6,14
3	48,3	21,8	18,9	12,08	5,84	5,70
4	51,0	22,1	20,1	12,37	6,87	5,06
5	51,9	22,1	22,7	14,65	8,42	6,11
6	53,1	24,0	21,8	15,39	8,72	6,20
7	57,2	26,5	24,1	22,31	12,02	9,76
8	57,7	26,9	23,1	19,03	10,17	8,43
9	58,9	27,3	25,0	22,28	13,11	8,84
10	59,2	25,9	20,9	16,84	10,13	6,20
11	44,5	20,0	19,1	8,72	5,13	3,50
12	45,3	23,2	18,9	9,99	5,17	4,45
13	45,0	22,8	18,7	10,47	5,79	4,33
14	52,4	24,8	20,5	14,54	8,50	5,83
15	56,3	24,5	20,4	16,59	8,92	7,43
16	58,2	26,7	23,7	20,25	11,10	8,85
17	54,1	25,0	19,9	15,17	8,34	6,35
18	59,3	25,8	22,5	19,19	10,14	8,45
19	56,1	25,9	22,8	19,05	10,63	8,21
20	60,8	28,0	24,5	23,40	11,61	11,60
21	49,0	20,5	17,6	9,48	5,71	3,43
22	51,7	23,0	19,6	13,25	7,20	5,93
23	52,6	24,8	20,9	14,53	7,93	6,16
24	52,7	24,1	21,0	15,32	8,30	6,87
25	53,0	24,7	23,0	16,96	9,19	7,60
26	55,1	24,0	21,9	16,11	9,02	6,85
27	58,3	26,8	22,7	17,55	10,57	6,55
28	58,9	27,0	23,1	20,72	10,66	9,76
29	60,3	27,2	24,8	21,69	12,56	8,52
30	60,5	26,8	24,1	22,50	12,55	9,29
31	45,4	21,7	17,7	8,73	4,82	3,79
32	46,7	22,7	19,2	10,66	6,02	4,38
33	46,8	20,8	18,1	8,73	5,17	3,49
34	46,7	21,4	19,1	11,10	6,08	4,51
35	58,6	27,4	21,5	19,07	11,14	7,65
36	55,4	25,3	25,2	21,51	10,75	10,44
37	58,4	26,2	23,1	18,57	10,14	8,14
38	58,8	25,9	22,3	19,06	11,10	7,65
39	58,4	27,9	25,3	22,53	12,06	10,33
40	61,2	25,7	25,4	21,43	13,04	8,19
41	50,6	22,5	21,1	14,07	7,66	6,24
42	51,4	24,7	20,6	15,00	8,16	6,51
43	56,7	25,2	21,4	17,84	10,34	7,09
44	56,5	23,5	24,1	17,27	10,16	6,94
45	59,3	25,5	22,2	19,88	11,11	8,62
46	55,4	26,2	22,9	17,53	10,97	6,35
47	59,6	24,5	24,2	17,31	10,66	6,54
48	57,0	24,9	24,6	19,57	10,99	8,38
49	59,7	25,2	23,3	18,93	11,43	7,27
50	60,3	28,5	26,1	23,65	13,87	9,41
	Length	Width	Height	Total weight	Weight soft body	Weight shell
Average	54,42	24,7	21,8	16,55	9,25	6,99
Stdev	5,1	2,2	2,3	4,29	2,48	1,94
Min	44,5	20,0	17,6	8,72	4,82	3,43
Max	61,2	28,5	26,1	23,65	13,87	11,60

Species:	Blue mussel (<i>Mytilus edulis</i>)		Date of sampling:	31.08.2011		
Length:	4-6 cm		Sampled by:	Marine Inst.		
Location:	Mjóifjörður Hofsa/Brekka		Date of preparation	29.10.2012		
Coordinates:	651215 134773		MATIS#:	R12-2579-7		
	Length (mm)	Width (mm)	Height (mm)	Total weight (g)	Weight soft body (g)	Weight shell (g)
1	43,2	19,9	16,7	7,62	3,85	3,69
2	45,9	19,6	17,5	8,82	4,53	4,13
3	46,9	22,4	20,1	11,68	6,20	5,37
4	46,7	21,1	20,4	11,64	5,77	5,71
5	46,2	21,5	19,2	12,37	4,62	7,52
6	48,1	22,6	17,8	10,55	5,38	5,02
7	45,6	21,6	18,3	10,31	5,16	4,92
8	43,3	20,7	17,1	9,12	4,42	4,16
9	49,2	22,4	17,8	11,00	5,37	5,33
10	49,1	23,1	19,7	12,83	6,09	6,58
11	41,5	20,9	18,2	9,23	4,89	4,28
12	46,8	21,2	17,5	10,33	5,15	4,99
13	42,7	20,2	13,5	7,68	4,13	3,47
14	42,3	22,5	16,2	8,37	4,47	3,73
15	42,7	18,9	17,3	8,78	4,13	4,50
16	41,7	20,8	19,8	8,67	4,98	3,64
17	43,1	19,6	19,5	9,65	4,48	5,08
18	41,9	19,5	15,7	6,69	3,84	2,80
19	41,9	20,8	18,7	9,61	4,79	4,71
20	50,8	23,1	18,9	11,92	6,62	5,28
21	40,0	19,5	16,7	7,41	3,48	3,81
22	40,1	18,9	15,0	7,03	3,68	3,31
23	40,1	20,0	16,1	7,51	4,04	3,42
24	43,9	20,0	16,1	8,70	4,33	4,13
25	41,7	18,9	16,2	7,45	3,54	3,69
26	41,2	18,3	15,0	6,85	3,52	3,36
27	40,0	18,9	16,1	7,91	3,60	4,22
28	47,8	21,1	17,2	10,54	5,76	4,60
29	48,9	22,2	21,1	13,40	7,55	5,75
30	44,4	19,5	16,7	9,07	4,41	4,60
31	44,4	21,7	18,9	12,18	4,57	7,57
32	40,1	20,0	15,6	8,18	3,43	4,70
33	42,2	19,9	16,7	11,17	4,00	7,16
34	40,6	20,0	16,1	7,90	3,87	3,90
35	49,5	22,2	19,5	12,68	6,72	5,80
36	46,6	21,7	18,9	12,73	4,91	7,70
37	46,1	22,3	16,1	10,09	5,07	4,90
38	42,2	19,5	17,2	8,63	4,27	4,35
39	46,7	23,3	18,9	12,94	6,18	6,70
40	44,5	22,2	19,5	11,11	5,57	5,47
41	42,5	19,9	18,7	9,76	4,84	4,67
42	45,6	20,7	17,7	8,77	5,08	3,61
43	45,1	21,2	17,6	10,75	5,12	5,52
44	50,7	21,6	18,4	10,52	5,92	4,57
45	48,4	21,7	20,4	13,37	6,18	7,08
46	44,3	20,4	16,1	7,79	4,11	3,51
47	44,5	20,3	18,4	9,04	4,52	4,36
48	50,4	25,5	19,2	14,40	6,82	7,42
49	51,3	21,8	21,0	14,55	7,63	6,69
50	54,2	25,6	22,9	18,61	9,29	8,96
	Length	Width	Height	Total weight	Weight soft body	Weight shell
Average	44,95	21,02	17,88	10,16	5,02	5,01
Stdev	3,50	1,57	1,84	2,41	1,22	1,40
Min	40,00	18,30	13,50	6,69	3,43	2,80
Max	54,20	25,60	22,90	18,61	9,29	8,96

Species:	Blue mussel (<i>Mytilus edulis</i>)			Date of sampling:	31.08.2011	
Length:	4-6 cm			Sampled by:	Marine Inst.	
Location:	Dalatangi			Date of preparation	29.10.2012	
Coordinates:	651610 133456			MATIS#:	R12-2579-8	
	Length (mm)	Width (mm)	Height (mm)	Total weight (g)	Weight soft body (g)	Weight shell (g)
1	40,6	18,3	16,1	8,96	3,77	5,13
2	41,6	19,5	17,3	8,58	3,72	4,66
3	42,8	19,5	20,0	10,96	5,53	5,32
4	44,0	20,6	17,3	10,03	5,38	4,54
5	46,7	20,5	15,6	9,60	5,15	4,44
6	47,2	22,3	19,9	11,11	5,00	6,08
7	47,2	22,3	20,6	13,42	6,17	6,97
8	47,2	22,2	18,9	11,78	6,53	5,06
9	46,7	23,3	20,1	14,93	6,67	8,11
10	50,0	22,2	20,0	13,46	6,70	6,80
11	42,8	20,0	15,6	8,19	3,57	4,33
12	43,9	21,1	15,2	9,27	4,89	4,20
13	45,1	20,6	17,2	8,00	3,40	4,52
14	44,0	22,3	17,3	10,58	5,37	5,12
15	44,9	22,2	20,0	11,11	6,10	4,99
16	44,7	21,7	21,6	13,28	5,52	7,68
17	47,3	22,3	19,5	12,90	6,33	6,56
18	48,9	22,8	18,9	12,23	6,60	5,58
19	50,0	19,5	17,3	13,37	7,14	6,11
20	51,1	18,3	21,7	14,05	7,77	6,18
21	40,0	17,8	15,1	6,63	3,33	3,23
22	41,7	20,1	15,0	6,88	2,15	4,53
23	43,9	20,0	16,7	9,16	4,41	4,74
24	44,0	20,5	16,2	8,95	4,27	4,53
25	44,5	19,5	17,8	9,43	4,62	4,66
26	45,6	18,9	16,1	8,85	4,52	4,40
27	50,0	22,8	21,1	14,10	6,90	7,12
28	56,0	23,8	17,8	12,98	6,10	6,73
29	52,2	24,5	21,7	16,89	9,35	7,42
30	58,3	26,7	22,3	21,65	10,70	10,85
31	45,5	22,9	17,5	10,23	5,41	4,71
32	47,1	23,0	18,7	11,71	5,58	5,95
33	48,2	21,6	19,4	12,18	5,89	5,89
34	47,5	22,8	19,4	11,01	6,05	4,82
35	46,5	24,9	20,3	12,16	6,71	5,12
36	50,9	23,6	20,2	13,87	7,58	6,09
37	45,3	24,5	21,1	13,94	7,26	6,44
38	50,3	23,4	20,7	13,48	7,58	5,72
39	52,0	23,1	24,1	17,06	9,37	7,34
40	52,7	25,3	27,5	22,98	10,17	12,45
41	42,1	21,0	15,9	7,94	4,10	3,63
42	43,1	19,9	17,1	8,77	4,79	3,82
43	41,7	20,4	15,4	6,94	3,74	3,10
44	43,7	21,0	17,1	7,30	3,21	4,04
45	43,0	22,4	18,6	10,94	5,56	5,30
46	44,7	20,3	17,5	9,07	4,90	3,95
47	42,9	21,8	15,7	8,00	4,43	3,41
48	47,0	21,6	17,3	10,16	5,30	4,74
49	46,8	23,1	19,7	12,00	6,28	5,54
50	45,7	24,0	22,1	14,26	5,78	8,24
	Length	Width	Height	Total weight	Weight soft body	Weight shell
Average	46,39	21,73	18,70	11,51	5,75	5,62
Stdev	3,84	1,93	2,57	3,39	1,78	1,77
Min	40,00	17,80	15,00	6,63	2,15	3,10
Max	58,30	26,70	27,50	22,98	10,70	12,45

Species:	Blue mussel (<i>Mytilus edulis</i>)		Date of sampling:	2.9.2011		
Length:	4-6 cm		Sampled by:	Marine Inst.		
Location:	Hvalstöð, Hvalfjörður		Date of preparation	28.9.2012		
Coordinates:	642375 212670		MATIS#:	R12-2579-2		
	Length (mm)	Width (mm)	Height (mm)	Total weight (g)	Weight soft body (g)	Weight shell (g)
1	42,2	20,9	16,1	7,19	2,72	4,01
2	43,0	19,8	20,7	10,31	4,62	5,19
3	48,7	24,3	17,7	10,87	5,18	5,25
4	50,0	24,8	19,7	12,57	6,34	5,79
5	48,7	24,0	18,9	9,82	5,58	3,87
6	50,5	24,7	22,4	14,38	5,62	7,97
7	49,7	24,9	19,7	12,27	6,56	5,11
8	57,6	29,5	22,7	21,86	10,08	11,23
9	59,5	28,1	25,9	24,29	11,37	12,15
10	56,1	27,7	24,3	18,83	9,05	9,20
11	42,2	22,1	17,4	8,85	4,19	4,45
12	50,5	23,5	20,8	12,42	6,50	5,60
13	49,0	25,2	19,2	11,49	6,47	4,49
14	54,1	25,9	23,3	17,32	9,56	7,59
15	51,6	27,2	20,8	15,36	7,51	7,65
16	58,4	29,2	20,7	17,42	9,77	7,33
17	50,0	23,9	23,1	14,88	7,95	6,79
18	51,2	27,4	20,3	14,27	7,79	6,42
19	53,5	29,1	23,2	19,57	10,36	8,79
20	60,7	33,1	23,6	23,85	12,91	10,74
21	48,8	24,5	19,1	9,40	4,17	4,94
22	46,0	23,4	18,3	10,94	4,83	5,39
23	49,3	24,2	21,3	11,98	5,49	6,16
24	59,2	31,0	22,2	21,46	9,58	11,04
25	59,4	28,8	23,5	20,27	10,42	9,05
26	58,3	29,7	23,2	22,33	10,90	10,55
27	59,8	27,0	24,2	19,40	8,80	10,03
28	61,8	32,5	23,2	23,64	11,47	11,25
29	59,2	28,2	25,1	28,71	10,09	13,38
30	59,0	30,0	24,2	24,02	9,87	13,14
31	42,0	20,9	18,3	8,45	3,71	4,50
32	48,9	24,2	18,6	12,15	5,94	5,96
33	51,2	24,8	22,4	16,20	8,16	7,65
34	58,9	24,8	24,9	15,76	7,44	8,18
35	54,2	26,6	20,4	16,71	8,96	7,58
36	53,8	26,9	22,2	15,40	7,44	7,57
37	58,0	27,9	22,7	19,88	11,88	7,91
38	59,6	30,3	23,9	24,37	12,79	11,49
39	55,0	28,5	24,2	19,30	10,54	8,49
40	65,3	34,5	28,4	33,63	18,73	14,35
41	47,9	23,7	20,7	13,20	7,11	5,95
42	52,4	27,6	21,0	16,22	9,01	7,07
43	50,5	26,0	20,1	13,93	7,86	5,58
44	51,9	25,2	23,7	16,73	8,63	7,76
45	56,9	28,4	22,7	18,64	10,51	7,82
46	54,7	25,4	24,3	19,31	10,12	9,00
47	57,7	28,2	23,4	21,46	12,30	8,91
48	55,3	28,1	24,2	20,36	10,81	9,24
49	58,6	26,9	23,0	21,11	9,85	10,74
50	45,5	23,2	21,9	12,67	5,78	6,70
	Length	Width	Height	Total weight	Weight soft body	Weight shell
Average	53,33	26,53	21,92	16,91	8,47	7,94
Stdev	5,62	3,10	2,46	5,54	2,94	2,61
Min	42,00	19,80	16,10	7,19	2,72	3,87
Max	65,30	34,50	28,40	33,63	18,73	14,35

Species:	Blue mussel (<i>Mytilus edulis</i>)		Date of sampling:	26.08.2011		
Length:	4-6 cm		Sampled by:	Marine Inst.		
Location:	Seljaland, Álftafirði		Date of preparation	26.08.2012		
Coordinates:	655807 230449		MATIS#:	R12-2579-10		
	Length (mm)	Width (mm)	Height (mm)	Total weight (g)	Weight soft body (g)	Weight shell (g)
1	47,5	23,3	21,0	11,30	7,09	4,09
2	40,0	20,7	15,5	6,23	3,75	2,19
3	41,7	20,0	16,0	7,18	4,09	2,82
4	43,1	20,6	18,5	9,43	4,90	4,13
5	45,7	20,2	18,8	9,40	5,10	4,00
6	47,2	22,6	17,7	9,56	5,74	3,67
7	45,0	19,8	18,4	9,39	4,48	4,82
8	48,7	23,5	17,9	10,80	6,11	4,44
9	52,9	26,4	21,0	13,89	8,06	5,62
10	53,0	25,2	24,4	18,45	10,39	7,86
11	41,5	20,0	16,8	6,78	4,14	2,54
12	42,0	20,1	17,9	7,84	4,36	3,37
13	42,5	19,9	18,0	8,37	4,66	3,63
14	46,4	21,1	19,6	10,92	6,11	4,68
15	42,2	21,8	19,0	8,55	5,03	3,46
16	43,4	20,5	18,8	7,70	4,56	3,07
17	46,3	20,5	18,8	9,48	5,33	4,05
18	46,9	22,6	18,2	9,20	6,02	3,15
19	51,1	24,0	19,4	12,46	6,28	6,06
20	56,1	26,8	25,9	22,08	12,13	9,87
21	40,0	18,7	15,4	5,53	2,95	2,35
22	43,7	21,8	18,0	8,04	4,87	3,02
23	41,1	18,1	17,2	7,09	3,98	2,65
24	42,8	20,4	18,8	8,52	4,74	3,69
25	43,1	22,3	18,8	9,22	5,07	4,10
26	49,4	24,3	19,2	10,97	6,67	4,24
27	49,0	22,9	22,7	14,84	8,02	6,69
28	48,8	22,8	20,3	12,65	6,75	5,81
29	52,6	24,5	22,3	13,06	8,20	4,73
30	54,4	24,2	25,0	16,75	9,50	7,10
31	42,2	20,1	17,3	8,02	4,70	3,10
32	43,3	22,2	19,9	9,16	5,36	3,68
33	46,2	20,6	17,8	10,83	5,02	5,63
34	51,6	23,3	21,7	14,63	7,92	6,43
35	50,0	22,8	21,1	14,02	7,55	6,43
36	45,0	20,1	17,8	8,98	4,87	4,02
37	42,2	20,6	15,1	7,30	4,18	3,06
38	41,2	19,9	18,4	9,01	4,75	4,19
39	45,6	20,1	18,4	9,50	4,83	4,58
40	50,0	22,2	18,3	11,64	5,79	5,57
41	40,1	18,3	16,1	7,78	4,33	3,38
42	41,1	20,0	15,5	7,02	3,55	3,40
43	41,2	18,9	14,4	7,61	4,09	3,48
44	41,2	20,0	14,4	6,41	3,49	2,89
45	42,2	20,6	16,2	7,25	4,28	2,90
46	45,6	22,2	20,0	11,72	6,22	5,37
47	46,1	21,2	20,0	11,72	6,37	5,29
48	48,9	21,7	19,9	10,56	6,56	3,92
49	54,4	24,4	23,3	16,52	10,10	6,33
50	52,8	24,4	20,6	14,87	7,94	6,89
	Length	Width	Height	Total weight	Weight soft body	Weight shell
Average	45,98	21,66	18,91	10,40	5,82	4,45
Stdev	4,44	2,03	2,58	3,42	1,94	1,58
Min	40,00	18,10	14,40	5,53	2,95	2,19
Max	56,10	26,80	25,90	22,08	12,13	9,87

Species:	Blue mussel (<i>Mytilus edulis</i>)		Date of sampling:	29.8.2011		
Length:	4-6 cm		Sampled by:	Marine Inst. 46 mussels		
Location:	Grimsey		Date of preparation	3.10.2012		
Coordinates:	663280 1801372		MATIS#:	R12-2579-1		
	Length (mm)	Width (mm)	Height (mm)	Total weight (g)	Weight soft body (g)	Weight shell (g)
1						
2	37,0	18,2	15,2	5,03	1,97	2,88
3	34,2	17,2	17,8	7,02	2,99	3,90
4	37,8	19,7	15,9	6,12	3,58	2,46
5	37,1	17,8	16,4	5,99	3,18	2,76
6	35,2	18,2	15,2	5,76	2,40	3,13
7	37,8	18,3	15,2	6,14	3,02	2,94
8	38,6	18,6	18,7	9,15	3,81	5,18
9						
10	38,8	18,8	15,7	6,94	3,05	3,52
11	34,7	16,5	12,9	3,95	1,78	1,94
12	33,1	15,0	13,6	3,70	1,84	1,71
13	33,0	18,3	14,5	4,57	2,49	1,94
14	36,8	19,7	13,9	5,18	2,69	2,39
15	39,6	19,0	19,3	9,26	4,21	4,90
16	39,1	18,6	14,5	5,63	2,65	2,67
17	41,5	25,0	16,7	8,58	4,72	3,32
18	45,2	23,1	19,9	12,47	6,48	5,83
19	44,1	22,4	18,7	10,92	5,53	5,29
20	54,4	23,4	19,8	12,35	5,70	6,35
21	40,3	18,5	16,3	7,51	3,11	4,19
22	41,4	20,5	17,1	8,09	4,24	3,65
23	45,0	22,0	19,2	10,82	5,64	4,99
24	42,9	21,5	17,8	9,60	4,58	4,88
25	51,8	24,1	23,1	12,55	4,98	7,41
26	50,9	25,1	21,4	17,36	8,06	8,81
27						
28	54,2	25,0	21,2	15,90	8,15	7,31
29	56,4	26,5	22,3	19,88	10,05	9,62
30	53,2	26,8	22,0	19,12	8,81	9,95
31	40,9	20,3	15,8	4,76	1,72	2,92
32	45,8	22,8	18,7	10,88	5,62	5,13
33	43,1	21,2	18,0	8,71	4,04	4,39
34	50,9	24,4	20,5	13,52	7,33	6,05
35	52,7	25,9	22,0	16,94	8,85	7,81
36	51,3	25,0	24,1	19,31	8,51	10,61
37	55,1	26,9	22,1	19,04	9,44	9,47
38	56,3	25,2	21,4	18,09	8,92	8,99
39	59,3	27,2	23,8	22,31	11,66	10,37
40	59,6	28,9	25,7	24,85	14,69	9,99
41	38,1	18,4	17,2	5,92	3,02	2,75
42	43,5	20,8	16,5	7,54	3,78	3,58
43	40,1	20,7	18,2	9,39	4,18	4,94
44	40,7	21,1	17,7	8,06	4,30	3,58
45	46,3	20,1	17,3	8,67	4,88	3,70
46	49,8	25,0	20,3	13,49	6,70	6,58
47	49,0	23,4	21,2	14,34	7,02	7,12
48	45,7	21,9	19,8	10,76	5,94	4,70
49	52,7	24,0	21,7	12,67	5,37	7,18
50						
	Length	Width	Height	Total weight	Weight soft body	Weight shell
Average	44,67	21,76	18,62	10,84	5,34	5,30
Stdev	7,51	3,33	3,08	5,35	2,86	2,59
Min	33,00	15,00	12,90	3,70	1,72	1,71
Max	59,60	28,90	25,70	24,85	14,69	10,61

Species: Blue mussel (<i>Mytilus edulis</i>)		Date of sampling: 2.9.2011				
Length: 4-6 cm		Sampled by: Marine Inst.				
Location: Hvammsvik		Date of preparation 9.10.2012				
Coordinates: 642141 213243		MATIS#: R12-2579-3				
	Length (mm)	Width (mm)	Height (mm)	Total weight (g)	Weight soft body (g)	Weight shell (g)
1	42,5	24,3	22,5	9,93	5,57	4,20
2	45,2	24,3	19,5	10,09	5,26	4,52
3	43,2	22,5	20,1	10,55	5,67	4,62
4	46,4	24,2	21,4	9,93	5,51	4,25
5	44,1	22,8	19,2	11,82	6,55	5,05
6	45,1	22,0	19,6	11,37	5,71	5,35
7	42,2	23,3	21,5	12,42	6,21	6,07
8	47,2	22,6	20,1	10,85	6,71	4,04
9	49,2	25,9	25,8	15,64	8,64	6,71
10	57,7	26,5	25,4	19,47	11,62	7,65
11	40,5	19,2	15,2	6,63	3,85	2,73
12	41,1	19,9	17,1	7,10	4,16	2,85
13	41,7	22,4	17,7	8,21	4,99	3,03
14	41,9	21,7	21,6	12,04	5,39	6,53
15	44,0	24,7	20,5	11,72	6,46	5,19
16	40,8	19,5	18,6	8,47	4,71	3,66
17	43,4	21,4	19,3	10,63	5,60	4,96
18	48,2	24,5	17,7	11,02	6,22	4,68
19	50,3	23,2	22,6	15,59	8,30	7,15
20	51,1	22,6	23,8	17,15	9,58	7,44
21	41,5	21,1	20,2	9,66	5,33	4,20
22	42,2	22,7	18,0	9,19	4,92	4,00
23	45,3	21,8	18,6	9,43	5,36	3,91
24	44,4	21,9	18,7	9,57	5,25	4,10
25	46,5	22,5	20,2	12,73	6,34	6,24
26	50,3	25,1	24,8	16,43	9,99	6,31
27	51,0	25,8	23,5	19,16	10,55	8,41
28	51,5	25,6	21,8	16,41	9,07	7,17
29	52,6	24,0	26,1	19,84	10,90	8,51
30	55,7	26,8	24,9	20,98	13,16	7,82
31	46,6	21,6	21,5	13,47	7,13	6,17
32	41,1	22,1	20,0	10,41	5,97	4,27
33	45,9	24,0	18,9	11,02	6,42	4,35
34	43,8	23,2	19,9	10,92	6,25	4,38
35	51,4	25,2	23,7	18,10	9,25	8,50
36	48,2	22,5	20,9	12,90	6,63	6,17
37	43,8	22,7	21,1	12,85	6,83	5,86
38	46,5	23,7	18,2	10,51	6,53	4,08
39	50,2	25,1	22,5	15,36	8,51	6,68
40	51,4	26,9	24,6	18,55	10,48	7,85
41	44,1	23,0	20,6	9,80	5,75	3,80
42	43,8	23,3	17,0	9,21	4,91	4,09
43	46,7	20,6	18,0	9,74	5,88	3,63
44	45,3	22,2	20,6	11,04	6,38	4,40
45	47,8	23,2	21,2	14,01	7,75	5,95
46	49,6	25,5	22,3	15,54	9,29	6,05
47	54,0	23,7	22,6	16,19	9,31	6,76
48	51,5	28,8	22,2	15,22	9,51	5,63
49	54,3	19,0	23,6	19,78	11,01	8,56
50	43,7	20,8	17,6	9,03	4,83	3,95
	Length	Width	Height	Total weight	Weight soft body	Weight shell
Average	46,73	23,24	20,86	12,75	7,12	5,45
Stdev	4,28	2,06	2,53	3,70	2,19	1,62
Min	40,50	19,00	15,20	6,63	3,85	2,73
Max	57,70	28,80	26,10	20,98	13,16	8,56

Species:	Blue mussel (<i>Mytilus edulis</i>)		Date of sampling:	2.11.2011		
Length:	4-6 cm		Sampled by:	Marine Inst.		
Location:	Hvalfjörður - Bolaklettur		Date of preparation	15.11.2012		
Coordinates:	642031 214117		MATIS#:	R12-2579-11		
	Length (mm)	Width (mm)	Height (mm)	Total weight (g)	Weight soft body (g)	Weight shell (g)
1	41,7	21,7	16,1	8,25	4,71	3,36
2	40,0	20,0	16,1	7,20	4,18	2,97
3	41,6	21,7	17,2	7,72	4,50	3,09
4	41,6	21,7	16,2	9,29	4,41	4,71
5	44,0	21,3	16,6	10,44	5,28	5,08
6	42,3	21,2	15,6	8,36	4,44	3,94
7	43,9	23,3	17,8	9,85	5,85	3,93
8	45,1	22,2	16,2	9,90	5,69	4,18
9	46,7	22,2	17,8	10,48	5,81	4,57
10	48,4	23,9	20,5	14,00	7,01	6,87
11	40,0	20,0	13,9	6,32	3,57	2,65
12	40,0	20,0	13,9	6,22	3,57	2,46
13	40,0	20,0	16,6	7,23	4,22	2,93
14	41,2	20,0	18,3	9,18	5,17	4,00
15	44,4	22,2	20,0	10,18	5,67	4,38
16	40,6	21,7	15,6	7,97	4,10	3,89
17	41,7	20,0	15,1	7,41	4,01	3,09
18	45,6	23,3	20,0	11,15	5,93	5,13
19	45,5	22,3	17,8	9,78	5,16	4,56
20	45,5	23,9	17,8	11,01	6,08	4,83
21	46,7	23,3	17,8	11,99	5,74	6,12
22	41,7	20,0	16,7	8,24	4,04	4,11
23	40,0	22,2	16,1	7,47	3,97	3,36
24	41,1	21,2	15,6	7,57	4,45	3,03
25	45,0	24,4	17,8	10,45	5,62	4,73
26	40,0	19,5	13,9	6,44	3,74	2,54
27	40,6	20,6	16,7	8,35	4,24	4,02
28	42,7	21,2	15,6	7,80	4,37	3,37
29	45,6	24,5	18,4	12,03	5,85	6,10
30	46,2	23,9	19,4	11,98	6,37	5,57
31	40,0	20,2	16,2	7,14	3,63	3,45
32	43,8	22,8	15,9	8,14	4,39	3,66
33	42,7	22,6	18,7	8,58	5,16	3,38
34	41,8	24,1	18,5	9,47	5,20	4,19
35	43,1	23,7	17,0	8,28	4,56	3,71
36	42,2	22,8	20,7	10,56	5,22	5,30
37	47,1	21,7	20,4	12,13	6,44	5,56
38	42,0	21,5	17,8	9,35	4,99	4,19
39	48,4	23,3	20,2	13,11	6,77	6,25
40	49,0	23,2	21,5	13,09	6,38	6,58
41	40,4	19,9	17,0	6,01	3,69	2,22
42	40,0	19,4	16,4	6,21	3,54	2,62
43	40,2	20,6	15,7	5,75	3,10	2,44
44	39,9	20,1	13,8	5,23	3,00	2,07
45	41,1	20,2	17,4	8,04	4,09	3,85
46	41,5	23,0	18,1	8,45	4,81	3,53
47	45,9	23,1	19,4	11,17	6,57	4,52
48	42,9	22,6	17,9	8,93	5,07	3,85
49	44,2	24,9	18,2	10,60	5,57	4,93
50	47,2	24,2	20,4	13,42	7,37	5,92
	Length	Width	Height	Total weight	Weight soft body	Weight shell
Average	43,06	21,95	17,37	9,16	4,95	4,12
Stdev	2,67	1,55	1,91	2,17	1,06	1,19
Min	39,90	19,40	13,80	5,23	3,00	2,07
Max	49,00	24,90	21,50	14,00	7,37	6,87

Appendix II.

Biological measurements of Cod (*Gadus morhua*) 2012

Species:	Cod (<i>Gadus Morhua</i>)	exped./station			date	n
Location:	North- Northwest of Iceland (2)	TJ1-2011			7.3.2012	25
Lenght:	30-45cm	n	station	°N	°W	
Ship:	Jón Vídalín	5	64	662867	251828	
Expd.leader:	HjalTI Karlsson	5	66	662257	253428	
		4	67	662210	254155	
		9	69	661683	255103	
		2	70	661694	255373	

R13-711-2

Group	exped.-station	Weight jar IFL g	Weight jar and liver g	Weight liver g	Weight ungutted fish, g	Sex 2=female 1=male	Lenght cm	Weight fillets g	Age
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H 1	exped.-station	Weight jar IFL g	Weight jar and liver g	Weight liver g	Weight ungutted fish, g	Sex 2=female 1=male	Lenght cm	Weight fillets g	Age
	67	101,73	113,17	11,44	432	2	36	99	3
67	101,69	119,98	18,29	349	1	35	65	3	
69	101,91	125,46	23,55	745	2	43	197	3	
70	101,67	127,91	26,24	595	1	40	131	3	
64	101,40	128,53	27,13	746	2	44	177	3	
67	105,39	133,43	28,04	466	1	37	116	4	
		Sum	134,69	3333,0		235,0	785,0		
		Average	22,45	555,5		39,2	130,8	3,2	
		STDEV	6,44	167,1		3,8	49,1	0,4	
		Min	11,44	349,0		35,0	65,0	3,0	
		Max	28,04	746,0		44,0	197,0	4,0	

H 2	exped.-station	Weight jar IFL g	Weight jar and liver g	Weight liver g	Weight ungutted fish, g	Sex 2=female 1=male	Lenght cm	Weight fillets g	Age
	66	101,20	132,59	31,39	485	1	37	81	3
69	101,83	133,76	31,93	761	1	43	217	4	
66	101,33	134,98	33,65	601	1	42	122	4	
69	101,57	135,32	33,75	597	1	41	138	3	
64	101,85	136,45	34,60	458	2	42	190	4	
69	101,59	140,94	39,35	636	1	41	132	4	
		Sum	204,67	3538,0		246,0	880,0		
		Average	34,11	589,7		41,0	146,7	3,7	
		STDEV	2,84	109,5		2,1	49,1	0,5	
		Min	31,39	458,0		37,0	81,0	3,0	
		Max	39,35	761,0		43,0	217,0	4,0	

H 3	exped.-station	Weight jar IFL g	Weight jar and liver g	Weight liver g	Weight ungutted fish, g	Sex 2=female 1=male	Lenght cm	Weight fillets g	Age
	66	101,86	142,07	40,21	689	1	41	140	3
66	101,68	144,07	42,39	723	1	44	176	3	
66	101,74	144,14	42,40	673	1	42	171	5	
69	101,90	145,20	43,30	682	2	41	148	3	
69	101,85	145,75	43,90	761	1	43	173	3	
		Sum	212,20	3528,0		211,0	808,0		
		Average	42,44	705,6		42,2	161,6	3,4	
		STDEV	1,40	36,3		1,3	16,4	0,9	
		Min	40,21	673,0		41,0	140,0	3,0	
		Max	43,90	761,0		44,0	176,0	5,0	

H 4	exped.-station	Weight jar IFL g	Weight jar and liver g	Weight liver g	Weight ungutted fish, g	Sex 2=female 1=male	Lenght cm	Weight fillets g	Age
	69	101,98	148,45	46,47	846	2	44	182	4
69	101,63	149,66	48,03	720	1	42	200	4	
69	101,70	150,78	49,08	584	1	39	110	4	
67	101,71	151,09	49,38	716	1	42	164	4	
		Sum	192,96	2866,0		167,0	656,0		
		Average	48,24	716,5		41,8	164,0	4,0	
		STDEV	1,31	107,0		2,1	38,9	0,0	
		Min	46,47	584,0		39,0	110,0	4,0	
		Max	49,38	846,0		44,0	200,0	4,0	

H5	exped.-station	Weight jar IFL g	Weight jar and liver g	Weight liver g	Weight ungutted fish, g	Sex 2=female 1=male	Lenght cm	Weight fillets g	Age
	64	105,49	158,36	52,87	840	1	44	178	4
64	101,24	164,36	63,12	717	2	43	170	4	
70	102,04	167,08	65,04	730	1	44	210	3	
64	101,81	170,09	68,28	823	1	43	195	4	
		Sum	249,31	3110,0		174,0	753,0		
		Average	62,33	777,5		43,5	188,3	3,8	
		STDEV	6,65	63,0		0,6	17,9	0,5	
		Min	52,87	717,0		43,0	170,0	3,0	
		Max	68,28	840,0		44,0	210,0	4,0	

H1, H2, H3, H4, H5, H6		Sum	993,83	16375,00		1033,0	3882,0	
		Average	39,75	655,00		41,3	155,3	3,6
		STDEV	14,06	132,93		2,6	40,6	0,6
		Min	11,44	349,00		35,0	65,0	3,0
		Max	68,28	846,00		44,0	217,0	5,0

Species:	Cod (<i>Gadus Morhua</i>)	exped./station				date	n
Location:	Northeast of Iceland	n	station	°N	°W	9.3.2012	25
Lenght:	30-45cm	25	78	651787	122593		
Ship:	Bjartur NK						
Expd.leader:	Valur Bogason						R13-711-1

Group	exped.-station	Weight jar IFL g	Weight jar and liver g	Weight liver g	Weight ungutted fish, g	Sex 2=female 1=male	Lenght cm	Weight fillets g	Age
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H 1	78	105,31	109,67	4,36	207	1	30,0	45	3	
	78	105,30	110,92	5,62	228	1	31,0	47	3	
	78	105,32	111,24	5,92	303	2	35,0	88	3	
	78	105,47	111,73	6,26	226	1	31,0	63	3	
	78	101,95	108,25	6,30	215	2	30,0	67	3	
	78	105,10	111,50	6,40	279	1	33,0	67	3	
	78	104,61	111,86	7,25	249	1	32,0	118	3	
	78	105,29	112,84	7,55	221	1	30,0	55	3	
				Sum	49,66	1928,0		252,0	550,0	
				Average	6,21	241,0		31,5	68,8	3,0
				STDEV	0,98	33,8		1,8	24,1	0,0
				Min	4,36	207,0		30,0	45,0	3,0
				Max	7,55	303,0		35,0	118,0	3,0

H 2	78	105,30	113,62	8,32	395	2	36,0	86	3	
	78	105,78	115,06	9,28	417	2	37,0	125	4	
	78	104,68	115,17	10,49	263	1	33,0	61	3	
	78	104,85	116,14	11,29	326	1	34,0	87	3	
	78	105,16	116,73	11,57	400	1	38,0	91	4	
	78	104,92	116,72	11,80	285	1	33,0	59	4	
					Sum	62,75	2086,0		211,0	509,0
				Average	10,46	347,7		35,2	84,8	3,5
				STDEV	1,39	65,3		2,1	24,1	0,5
				Min	8,32	263,0		33,0	59,0	3,0
				Max	11,80	417,0		38,0	125,0	4,0

H 3	78	98,34	112,21	13,87	403	2	37,0	109	3	
	78	105,00	120,58	15,58	270	2	32,0	71	3	
	78	105,30	122,37	17,07	383	2	36,0	87	3	
	78	105,04	122,55	17,51	698	2	44,0	198	4	
	78	105,05	124,53	19,48	393	1	37,0	118	4	
					Sum	83,51	2147,0		186,0	583,0
				Average	16,70	429,4		37,2	116,6	3,4
				STDEV	2,11	159,5		4,3	49,1	0,5
				Min	13,87	270,0		32,0	71,0	3,0
				Max	19,48	698,0		44,0	198,0	4,0

H 4	78	105,52	129,86	24,34	441	1	38,0	102	4	
	78	105,21	131,33	26,12	595	2	42,0	166	4	
	78	105,19	134,41	29,22	634	1	43,0	149	4	
					Sum	79,68	1670,0		123,0	417,0
				Average	26,56	556,7		41,0	139,0	4,0
				STDEV	2,47	102,1		2,6	33,2	0,0
				Min	24,34	441,0		38,0	102,0	4,0
				Max	29,22	634,0		43,0	166,0	4,0

H 5	78	105,38	135,59	30,21	578	2	42,0	167	4	
	78	105,32	136,96	31,64	533	2	40,0	135	5	
	78	105,03	149,87	44,84	690	1	43,0	173	4	
				Sum	106,69	1801,0		125,0	475,0	
				Average	35,56	600,3		41,7	158,3	4,3
				STDEV	8,07	80,8		1,5	20,4	0,6
				Min	30,21	533,0		40,0	135,0	4,0
				Max	44,84	690,0		43,0	173,0	5,0

H1, H2, H3, H4, H5				Sum	382,29	9632,0		897,0	2534,0	
				Average	15,29	385,3		35,9	101,4	3,5
				STDEV	10,41	155,0		4,5	43,3	0,6
				Min	4,36	207,0		30,0	45,0	3,0
				Max	44,84	698,0		44,0	198,0	5,0

Appendix III.

Quality assurance in metal analysis and persistent organochlorines analysis

Table 2. Results for trace metals in certified reference materials (DOLT-3 and Quasimeme R72) for the year 2012.

Analyte	QTM097BT Quasimeme R72 µg/g	I Z-score ^I	DOLT-3 NRC-CNRC mg/kg	I Z-score ^{II}	MLOD ^{**} mg/kg
As	<i>Measured</i>		8,54		
	<i>Certified</i>	0,1	10,2	-1,54	0,002
Cd	<i>Measured</i>		16,94		
	<i>Certified</i>	-0,3	19,4	-1,24	0,03
Cu	<i>Measured</i>		26,23		
	<i>Certified</i>	-1,2	31,2	-1,67	0,002
Hg	<i>Measured</i>		3,53		
	<i>Certified</i>	0,4	3,37	0,35	0,06
Pb	<i>Measured</i>		0,21		
	<i>Certified</i>	-1,2	0,32	-1,76	0,04
Se	<i>Measured</i>		6,48		
	<i>Certified</i>	-0,4	7,06	-0,69	
Zn	<i>Measured</i>		80,86		
	<i>Certified</i>	-0,6	86,6	-0,81	0,002

* Z-score (calculated according to method SV-22-02 SN-1 in Matis quality manual)

** MLOD is on dry weight basis

NA: not analyzed

Table 3. Results for trace metals in certified reference materials (DORM-3 and Quasimene R72) for the year 2012.

Analyte	QTM098BT Quasimene R72 µg/g	I Z-score ¹	DORM-3 NRC-CNRC mg/kg	I Z-score* ¹	MLOD** mg/kg
As	<i>Measured</i>		7,53		
	<i>Certified</i>	-0,2	6,88	0,79	0,002
Cd	<i>Measured</i>		0,290		
	<i>Certified</i>		0,29	0,04	0,03
Cu	<i>Measured</i>		12,37		
	<i>Certified</i>	0,3	15,5	-1,91	0,002
Hg	<i>Measured</i>		0,41		
	<i>Certified</i>	-0,2	0,382	0,35	0,06
Pb	<i>Measured</i>		0,35		
	<i>Certified</i>	1,5	0,395	-0,69	0,04

* Z-score (calculated according to method SV-22-02 SN-1 in Matis quality manual)

** 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 was analysed with the mussel samples from 2011

Blue mussel control				assign		ww
chemical	CRM	weight basis	result	value	Z **	det. Lim.
CB28	QOR096BT	wet weight	0,15	0,15	0,00	0,02
CB31	QOR096BT	wet weight	0,10	0,10	0,00	0,02
CB52	QOR096BT	wet weight	0,24	0,26	-0,44	0,01
CB101	QOR096BT	wet weight	1,13	1,10	0,20	0,01
CB105	QOR096BT	wet weight	0,22	0,21	0,26	0,01
CB118	QOR096BT	wet weight	0,96	0,92	0,31	0,01
CB138	QOR096BT	wet weight	2,32	2,28	0,13	0,01
CB153	QOR096BT	wet weight	3,74	3,52	0,49	0,01
CB156	QOR096BT	wet weight	0,07	0,08	-0,48	0,01
CB180	QOR096BT	wet weight	0,16	0,16	0,03	0,01
HCB	QOR096BT	wet weight	0,06	0,06	-0,20	0,002
a-HCH	QOR096BT	wet weight	0,03	0,03	-0,21	0,005
b-HCH	QOR096BT	wet weight	0,03	0,02	0,47	0,01
g-HCH	QOR096BT	wet weight	0,04	0,03	0,38	0,01
pp'-DDE	QOR096BT	wet weight	0,70	0,66	0,42	0,005
pp'-DDD	QOR096BT	wet weight	0,24	0,22	0,49	0,005
pp'-DDT	QOR096BT	wet weight	0,50	*		0,02
op'-DDT	QOR096BT	wet weight	0,11	*		0,01
transn-chlor	QOR096BT	wet weight	0,06	0,06	0,00	0,005
lipid extractable	QOR096BT	wet weight	2,57	2,48	0,08	

a- and g-chlordane, oxychlordane and toxaphenes are not certified in this sample by quasimeme

* no assigned value by quasimeme

**Z score is calculated by quasimeme method: (value-assigned value)/total error

Table 5. Qualitative assurance. Persistent organochlorines (ng/g ww) in a certified cod liver sample from QUASIMEME, that was analysed with the cod liver samples from 2012

Cod liver control				assign		
chemical	CRM	weight basis	result	value	det. Lim.	Z-score**
CB28	QOR0108BT	wet weight	10,9	10,6	0,20	0,26
CB31	QOR0108BT	wet weight	3,56	3,78	0,20	-0,45
CB52	QOR0108BT	wet weight	24,0	23,7	0,10	0,11
CB101	QOR0108BT	wet weight	62,1	63,7	0,10	-0,20
CB105	QOR0108BT	wet weight	17,1	16,3	0,10	0,38
CB118	QOR0108BT	wet weight	71,0	69,9	0,10	0,13
CB138	QOR0108BT	wet weight	151	148	0,10	0,16
CB153	QOR0108BT	wet weight	223	219	0,10	0,14
CB156	QOR0108BT	wet weight	7,73	8,41	0,10	-0,64
CB180	QOR0108BT	wet weight	43,2	45,5	0,20	-0,41
HCB	QOR0108BT	wet weight	14,3	14,0	0,10	0,19
a-HCH	QOR0108BT	wet weight	1,44	1,37	0,10	0,39
b-HCH	QOR0108BT	wet weight	1,24	1,40	0,30	-0,86
g-HCH	QOR0108BT	wet weight	0,56	0.60*	0,10	
pp'-DDE	QOR0108BT	wet weight	81,4	83,1	0,10	-0,16
pp'-DDD	QOR0108BT	wet weight	27,2	26,7	0,16	0,14
pp'-DDT	QOR0108BT	wet weight	1,06	0.83*	0,40	
op'-DDT	QOR0108BT	wet weight	<2	0.48*	2,0	
transn-chlor	QOR0108BT	wet weight	7,63	7,43	0,10	0,21
%extracted fat			55,2	57,01		-0,26

a- and g-chlordane, oxychlordane, toxaphenes and PBDEs are not certified in this sample by quasimeme

* "assigned value" only "indicative". Quasimeme does not assign %error

**Z score is calculated by quasimeme method: (value-assigned value)/total error

Table 6. Detection limits* (ng/g)

chemical	Detection limits	
	mussel ng/g sample dw	Cod liver ng/g sample ww
a-HCH	0,05	0,10
HCB	0,02	0,10
b-HCH	0,10	0,30
g-HCH	0,10	0,10
PCB-31	0,20	0,20
PCB-28	0,25	0,20
PCB-52	0,10	0,10
oxychlorane	0,10	0,10
gamma-Chl.	0,2-0,9	0,25
PCB-101	0,05	0,10
alfa-Chl.	0,05	0,25
transnonachlor	0,05	0,10
4,4'-DDE	0,05	0,10
tox 26	0,05	0,10
PCB-118	0,05	0,10
4,4'-DDD	0,05	0,16
2,4'-DDT	0,10	2,00
PCB-153	0,05	0,10
PCB-105	0,10	0,10
4,4'-DDT	0,20	0,40
PCB-138	0,05	0,10
tox 50	0,10	0,10
PCB-156	0,10	0,10
PCB-180	0,10	0,20
tox 62	0,10	0,20
PCB-170	0,05	0,10
PBDE-47	0,05	0,10
PBDE-100	0,10	0,20
PBDE-99	0,10	0,20

*** detection limits are 3 x SD of blanks, or 3 x S/N or higher when other peaks interfer.**

Appendix IV.

**Results of trace metal analysis for
Blue mussel (*Mytilus edulis*) 2011 and
Cod (*Gadus morhua*) 2012**

Table 7. Results of trace metals in Blue mussel (*Mytilus edulis*) 2011 (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, mg/kg dw
	%	±								
Grimsey	0,19	0,02	7,10	1,0	2,8	8,4	429	13	1,5	0,09
Hvalstöð, Hvalfjörður	0,88	0,07	13,3	0,03	1,2	4,1	167	9,1	2,1	0,07
Hvammsvík, Hvalfjörður	0,95	0,08	15,6	0,03	1,0	4,0	110	8,0	2,2	0,05
Hvassahraun	0,19	0,02	6,80	0,42	1,2	7,0	167	22	2,2	0,07
Straumur, Straumsvík	0,44	0,04	9,10	0,08	1,7	2,9	82	7,3	2,9	0,06
Mjóifjörður I, head-Fjörður	0,38	0,03	9,70	0,10	2,3	2,7	93	6,5	2,7	0,05
Mjóifjörður II, Hofsa-brekka	0,38	0,03	7,70	0,22	3,5	5,0	151	7,5	2,9	0,07
Mjóifjörður III, Dalatangi	0,21	0,02	6,10	0,12	2,0	3,1	168	11	2,0	0,07
Úlfsa, Skutulsfj.	0,26	0,02	7,20	0,41	0,78	3,7	130	48	1,8	0,08
Seljaland, Álftafjörður	0,28	0,02	6,80	0,27	3,6	5,4	77	10	2,6	0,07
Bolaklettur, Hvalfjörður	0,89	0,07	13,0	0,52	0,80	3,7	104	8,0	2,4	0,06
Limit of detection for samples (MLOD)				0,04	0,03	0,002	0,002	0,002	0,07	0,06

Table 8. Results of trace metals in liver and flesh of Cod (*Gadus morhua*) 2012 (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(2) 12																								
Group 1	46,4	4	58,6	2	<0,04	0,04	0,22	0,04	2,0	0,4	13,8	3	6,6	1	1,0	0,2								
Group 2	52,4	4	68,9	3	<0,04	0,03	0,14	0,03	3,0	0,6	11,4	2	5,8	1	0,8	0,2								
Group 4	70,7	6	78,4	3	<0,04	0,03	0,13	0,03	2,9	0,6	8,2	2	6,4	1	0,6	0,1								
Average	56,5		68,6				0,16		2,6		11,1		6,3		0,8				19,5	0,8	0,01	0,001	0,028	0,052
Cod NA 12																								
Group 3	51,3	4	62,2	2	<0,04	0,03	0,16	0,03	2,9	0,6	13,3	3	8,0	2	0,9	0,2								
Group 4	46,5	4	41,1	2	<0,04	0,07	0,34	0,07	2,7	0,5	17,4	3	5,6	1	0,9	0,2								
Group 5	60,0	5	69,9	3	<0,04	0,06	0,29	0,06	2,7	0,5	16,6	3	5,1	1	0,7	0,1								
Average	52,6		57,7				0,26		2,8		15,8		6,2		0,8				19,2	0,8	0,07	0,006	0,032	0,034
Average of all measurements					<0,04		0,21		2,7		13,4		6,2		0,8								0,02	
Limit of detection for samples (MLOD)					0,04		0,03		0,002		0,002		0,002		0,07								0,06	

*Flesh was pooled into one sample

Appendix V.

**Results of organochlorine analysis for
Blue mussel (*Mytilus edulis*) 2011 and
Cod (*Gadus morhua*) 2012**

Table 9a. Persistent organochlorines in Blue mussel (*Mytilus edulis*, ng/g dw) 2011

	Grimsey 2011	Hvammsvík 2011	Hvalstöð 2011	Úlf Sá 2011	Dalatangi 2011	Hvassahraun 2011
PCB28	<0,25	<0,25	<0,25	<0,25	<0,25	<0,25
PCB31	<0,20	<0,20	<0,20	<0,20	<0,20	<0,20
PCB52	0,10	<0,1	0,11	<0,1	0,18	<0,1
PCB101	0,33	0,28	0,51	0,47	0,43	0,16
PCB105	0,14	0,16	0,23	0,16	0,21	0,11
PCB118	0,15	0,31	0,58	0,47	0,39	0,18
PCB138	0,36	0,70	1,4	1,0	0,62	0,43
PCB153	0,38	0,96	1,9	1,3	0,57	0,47
PCB156	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1
PCB170	<0,05	<0,05	<0,05	<0,05	<0,05	<0,05
PCB180	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1
Σ3PCB*	0,89	2,0	3,9	2,8	1,6	1,1
HCB	0,33	0,27	0,24	0,17	0,12	0,16
a-HCH	0,09	0,05	<0,05	0,06	0,13	0,05
b-HCH	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1
g-HCH	0,13	<0,1	<0,1	0,10	0,15	<0,1
p,p'-DDE	0,47	0,43	1,6	0,46	0,21	0,21
p,p'-DDD	<0,05	0,17	0,27	0,14	0,08	0,07
p,p'-DDT	<0,2	<0,2	<0,2	<0,2	<0,2	<0,2
o,p'-DDT	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1
PCB153/DDE	0,80	2,2	1,2	2,8	2,7	2,3
transnonachlor	0,16	0,17	0,25	0,25	0,08	0,07
a-chlordan	0,13	0,11	0,12	0,11	0,09	0,05
g-chlordan	<0,5	<0,2	<0,3	<0,5	<0,9	<0,3
oxychlordan	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1
Tox-26	0,16	0,16	0,18	0,19	0,12	0,08
Tox-50	0,21	0,22	0,29	0,24	0,19	0,11
Tox-62	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1
PBDE-47	0,46	0,18	0,26	0,66	0,15	0,07
PBDE-99	0,26	<0,1	0,10	0,22	<0,1	<0,1
PBDE-100	<0,1	<0,1	<0,1	0,20	<0,1	<0,1
% extracted fat/g dw	3,97	8,85	8,26	4,94	3,74	4,61

* PCB #118, 138 and 153

Table 9b. Persistent organochlorines in Blue mussel (*Mytilus edulis*, ng/g dw) 2011

	Straumur 2011	Bolaklettur 2011	Mjóifj. II, Brekka 2011	Mjóifj. Fjörður 2011	Seljaland, Álftaf. 2011
PCB28	<0,25	<0,25	<0,25	<0,25	<0,25
PCB31	<0,20	<0,20	<0,20	<0,20	<0,20
PCB52	<0,1	<0,1	0,11	<0,1	0,11
PCB101	0,28	0,29	0,24	0,15	0,26
PCB105	0,17	0,13	0,14	<0,1	<0,1
PCB118	0,31	0,33	0,20	0,10	0,18
PCB138	0,92	0,78	0,96	0,18	0,28
PCB153	1,1	0,97	0,85	0,23	0,31
PCB156	<0,1	<0,1	<0,1	<0,1	<0,1
PCB170	<0,05	<0,05	<0,05	<0,05	<0,05
PCB180	<0,1	<0,1	0,25	<0,1	<0,1
Σ3PCB*	2,3	2,1	2,0	0,50	0,77
HCB	0,21	0,06	0,20	0,24	0,05
a-HCH	<0,05	0,06	0,07	0,08	0,14
b-HCH	<0,1	<0,1	<0,1	<0,1	<0,1
g-HCH	<0,1	<0,1	0,10	0,20	<0,1
p,p'-DDE	0,42	0,35	0,27	0,21	0,24
p,p'-DDD	0,22	0,15	0,10	0,14	0,09
p,p'-DDT	<0,2	<0,2	<0,2	<0,2	<0,2
o,p'-DDT	0,14	<0,1	<0,1	<0,1	<0,1
PCB153/DDE	2,5	2,8	3,1	1,1	1,3
transnonachlor	0,11	0,14	0,15	0,11	0,10
a-chlordan	0,07	0,11	0,10	0,09	0,10
g-chlordan	<0,3	<0,2	<0,5	<0,6	<0,2
oxychlordan	<0,1	<0,1	<0,1	<0,1	<0,1
Tox-26	0,15	0,16	0,13	0,19	0,13
Tox-50	0,19	0,18	0,27	0,30	0,24
Tox-62	<0,1	<0,1	<0,1	<0,1	<0,1
PBDE-47	0,26	0,25	0,08	0,06	0,11
PBDE-99	0,10	<0,1	<0,1	<0,1	<0,1
PBDE-100	0,12	<0,1	<0,1	<0,1	<0,1
% extracted fat/g dw	6,85	8,78	5,16	5,75	4,96

* PCB #118, 138 and 153

Table 10a. Persistent organochlorines in cod liver 2012 (ng/g ww)

	COD N(NW2) H1	COD N(NW2) H2	COD N(NW2) H4
PCB28	1,9	1,9	2,0
PCB31	1,3	1,4	1,4
PCB52	5,4	5,4	5,2
PCB101	6,3	5,8	4,9
PCB105	2,3	2,0	1,4
PCB118	7,9	6,7	5,6
PCB138	11,0	9,2	7,2
PCB153	20,2	16,7	12,3
PCB156	0,68	0,50	0,42
PCB170	1,4	1,3	0,80
PCB180	4,2	3,7	2,6
Σ7PCB*	56,9	49,4	39,7
HCB	14,9	17,9	19,8
a-HCH	1,9	2,0	2,6
b-HCH	0,39	0,45	0,62
g-HCH	0,57	0,59	0,83
p,p'-DDE	41,7	34,8	28,9
p,p'-DDD	12,4	12,2	11,6
p,p'-DDT	4,4	5,1	4,4
o,p'-DDT	4,0	4,5	4,0
ΣDDT	62,4	56,6	48,9
PCB153/DDE	0,49	0,48	0,42
transnonachlor	19,8	18,8	16,0
a-chlordan	13,1	12,2	11,8
g-chlordan	4,0	4,4	4,5
oxychlordan	3,1	3,3	2,9
ΣCHL	40,1	38,7	35,2
Tox-26	21,7	21,3	18,9
Tox-50	30,9	30,4	28,4
Tox-62	9,8	11,9	12,6
PBDE-47	2,5	2,3	2,2
PBDE-99	<0.2	<0.2	<0.2
PBDE-100	0,46	0,40	0,40
% extracted fat	48,6%	59,5%	70,1%

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

Table 10b. Persistent organochlorines in cod liver 2012 (ng/g ww)

	COD NE H3	COD NE H4	COD NE H5
PCB28	1,9	1,8	2,1
PCB31	1,3	1,1	1,2
PCB52	5,1	5,1	6,0
PCB101	5,6	6,0	6,7
PCB105	1,6	1,8	2,0
PCB118	6,1	6,7	6,4
PCB138	8,3	9,1	8,6
PCB153	14,8	16,5	14,9
PCB156	0,54	0,62	0,53
PCB170	1,1	1,2	1,1
PCB180	3,2	3,5	3,4
Σ7PCB*	44,8	48,6	48,1
HCB	18,0	16,8	21,0
a-HCH	2,0	1,6	2,1
b-HCH	0,43	0,36	0,64
g-HCH	0,60	0,53	0,59
p,p'-DDE	29,6	32,1	33,6
p,p'-DDD	11,6	11,1	12,4
p,p'-DDT	4,0	4,4	4,5
o,p'-DDT	4,2	4,3	5,3
ΣDDT	49,4	51,9	55,9
PCB153/DDE	0,50	0,51	0,44
transnonachlor	17,0	17,6	19,5
a-chlordan	13,5	13,9	14,9
g-chlordan	4,4	4,2	4,8
oxychlordan	2,9	2,7	2,7
ΣCHL	37,7	38,3	41,9
Tox-26	19,0	19,8	20,6
Tox-50	26,8	27,1	29,4
Tox-62	9,6	10,0	10,4
PBDE-47	2,1	2,3	2,6
PBDE-99	<0.2	<0.2	<0.2
PBDE-100	0,36	0,38	0,41
% extracted fat	52,4%	48,9%	61,3%

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

Appendix VI.

Graphs of biological variation in Cod (*Gadus morhua*) 1990- 2012

Biological variation in 30-45 cm Cod (*Gadus morhua*) from Icelandic waters in March 1990-2012

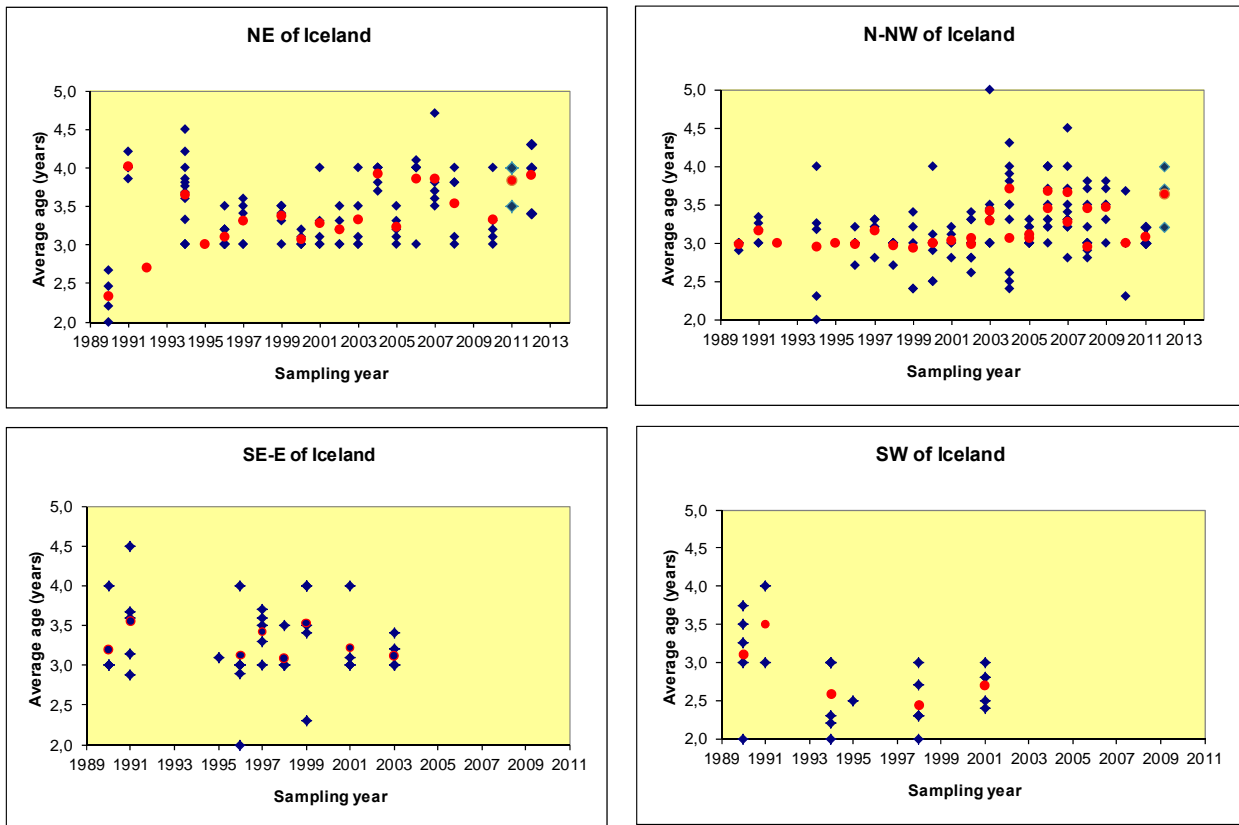


Figure 2a. Average age in 30-45 cm Cod (*Gadus morhua*) from Icelandic waters in March 1990-2012. The red dots represent the average values.

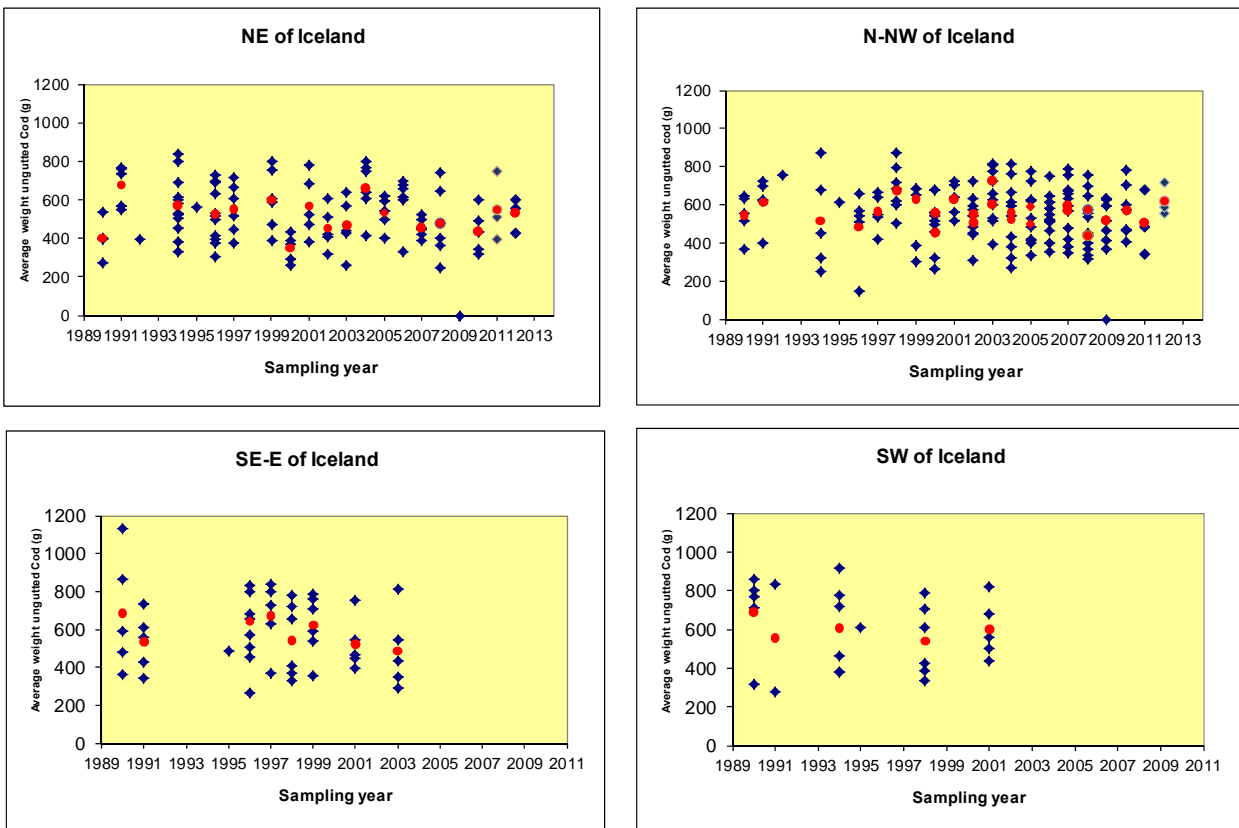


Figure 2b. Average weight ungutted Cod (*Gadus morhua*), 30-45 cm, from Icelandic waters in March 1990-2012. The red dots represent the average values.

Biological variation in 30-45 cm Cod (*Gadus morhua*) from Icelandic waters in March 1990-2012

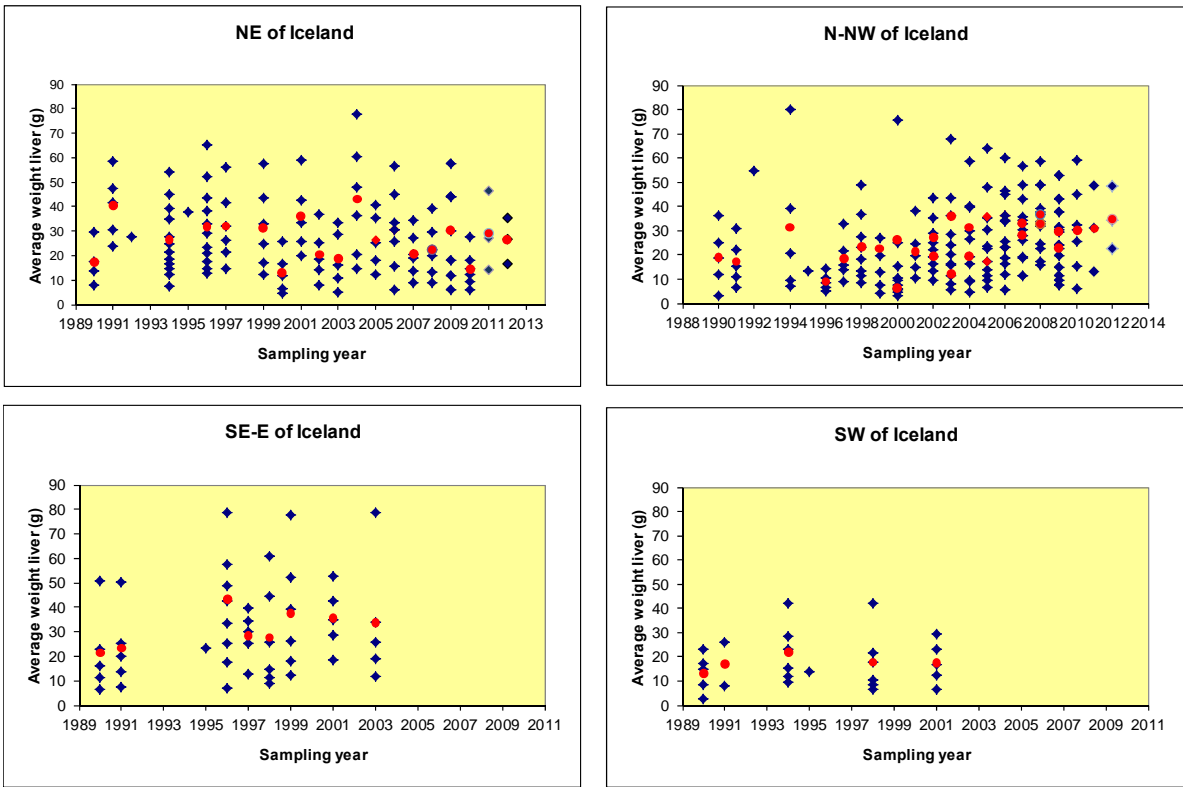


Figure 2c. Average weight liver of Cod (*Gadus morhua*), 30-45 cm, from Icelandic waters in March 1990-2012. The red dots represent the average values.

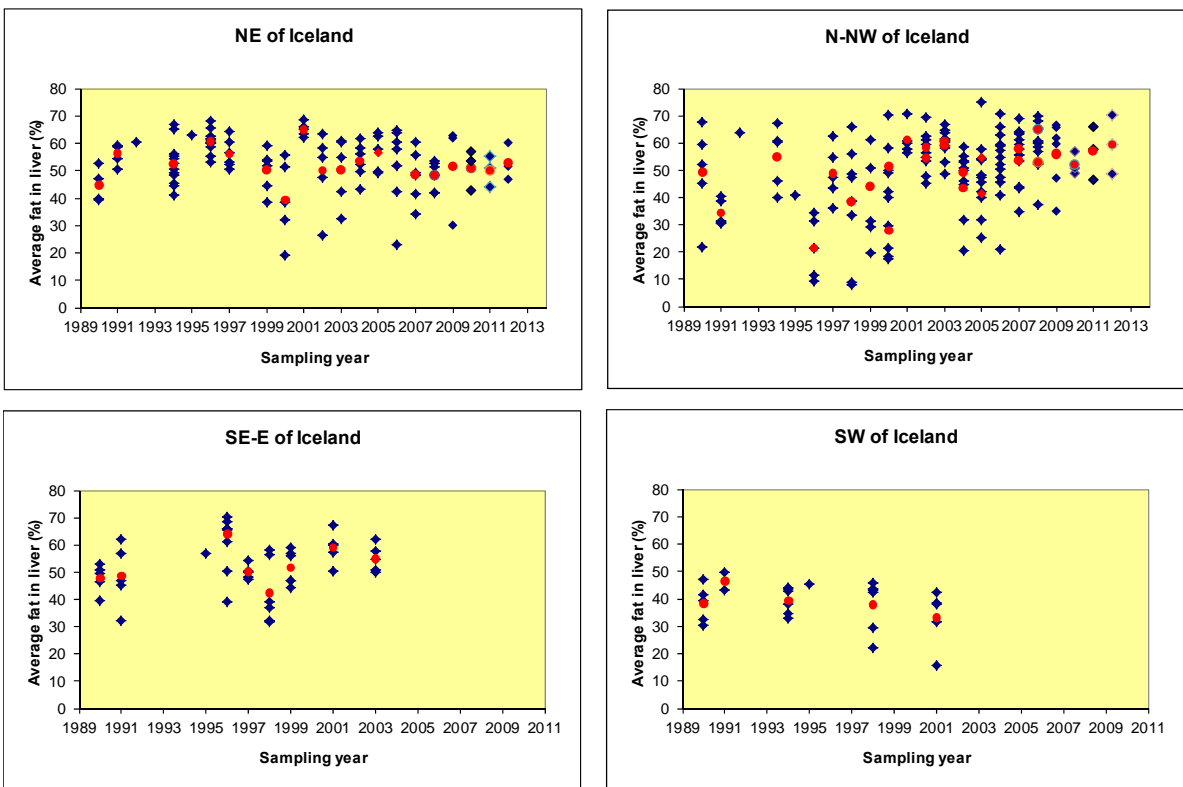


Figure 2d. Average fat (%) in liver of Cod (*Gadus morhua*), 30-45 cm, from Icelandic waters in March 1990-2012. The red dots represent the average values.

Appendix VII.

Graphs of metals and organic compounds in Blue mussel (*Mytilus edulis*) 1990-2011

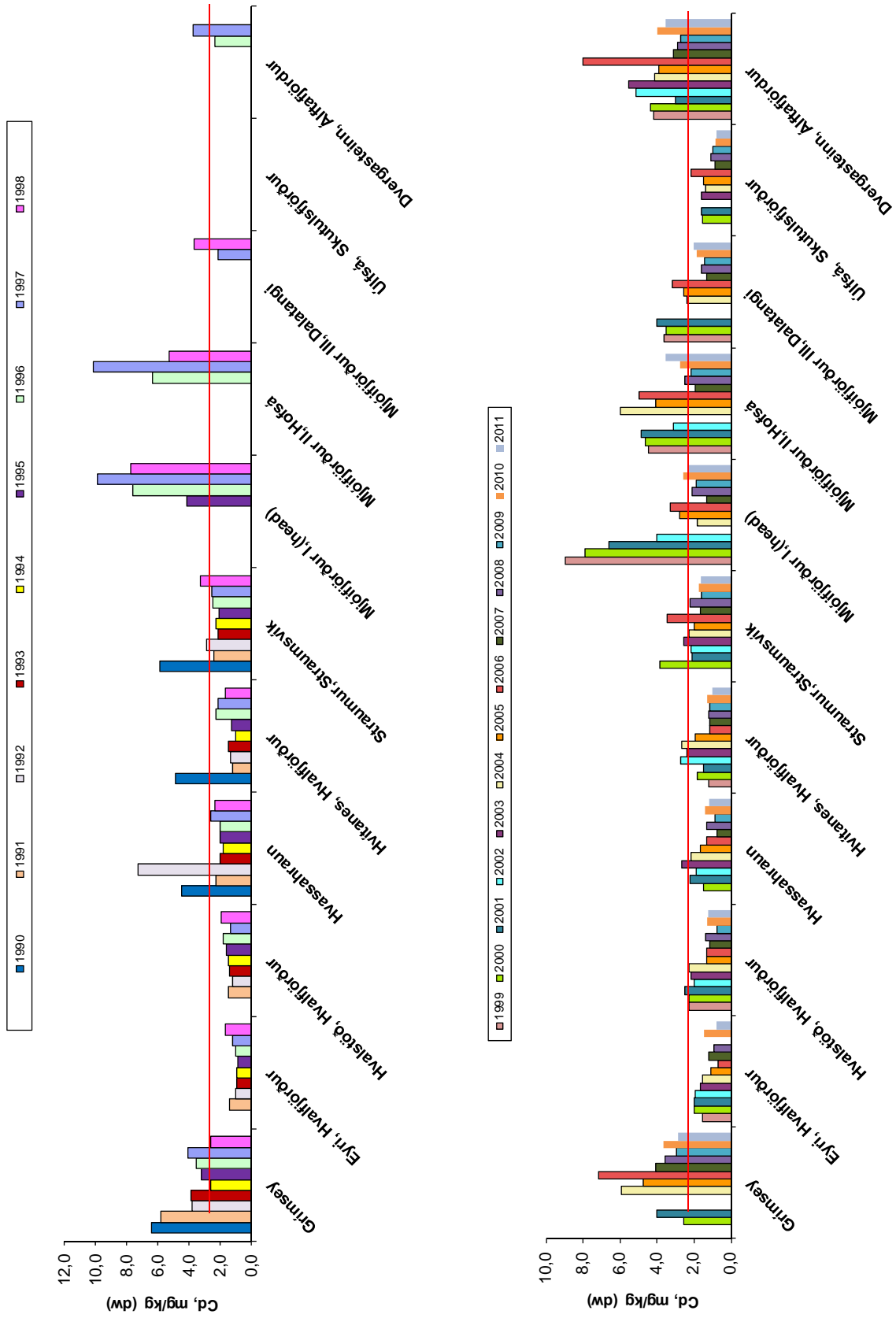


Figure 3a. Cadmium concentration (dw) in Blue mussel (*Mytilus edulis*) around Iceland 1991-2011. Red line indicates ICES 90.75% baseline (11).

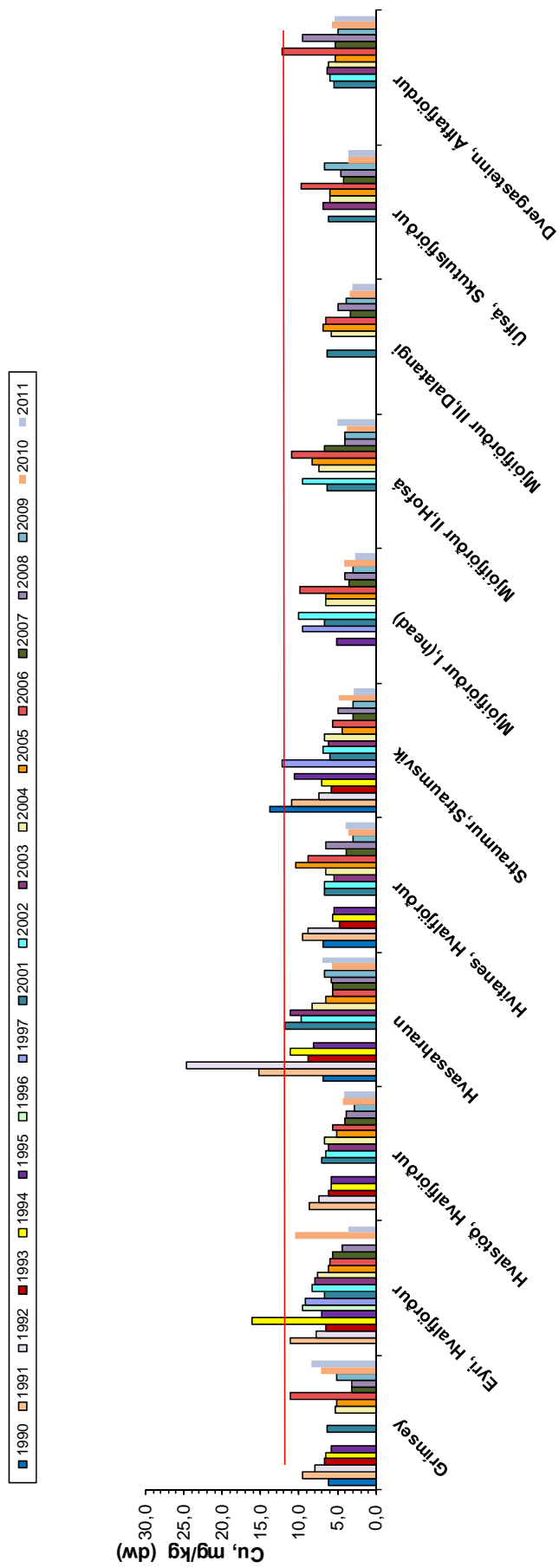


Figure 3b. Copper concentration (dw) in Blue mussel (*Mytilus edulis*) around Iceland 1990-2011. Red line indicates ICES 90 75% baseline (11).

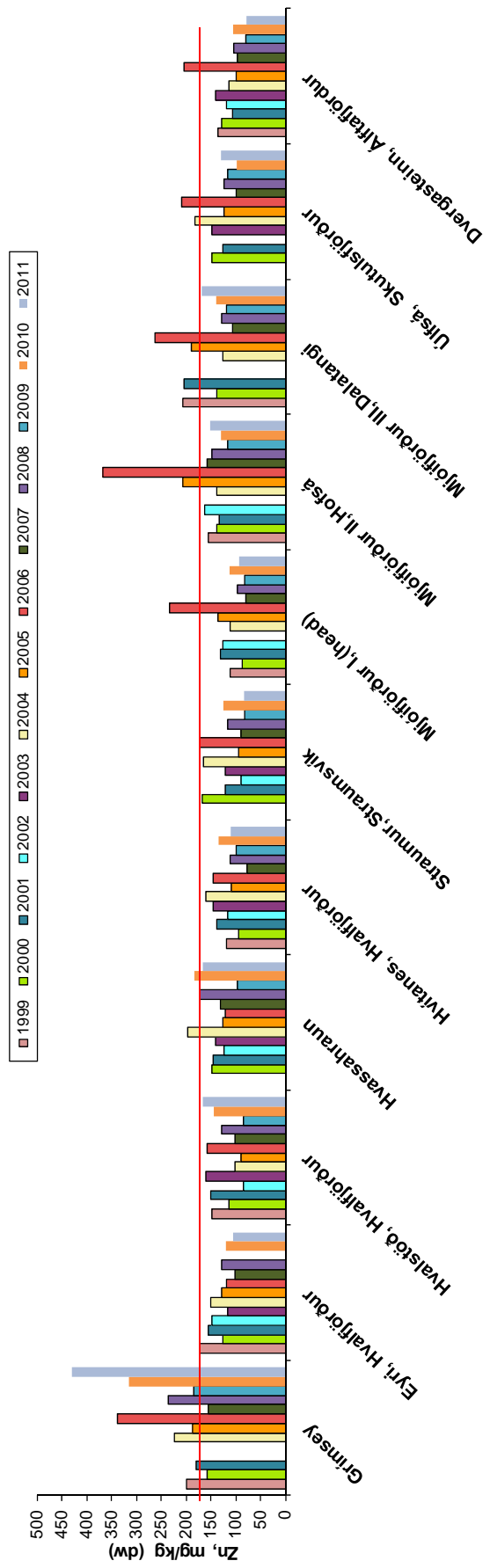
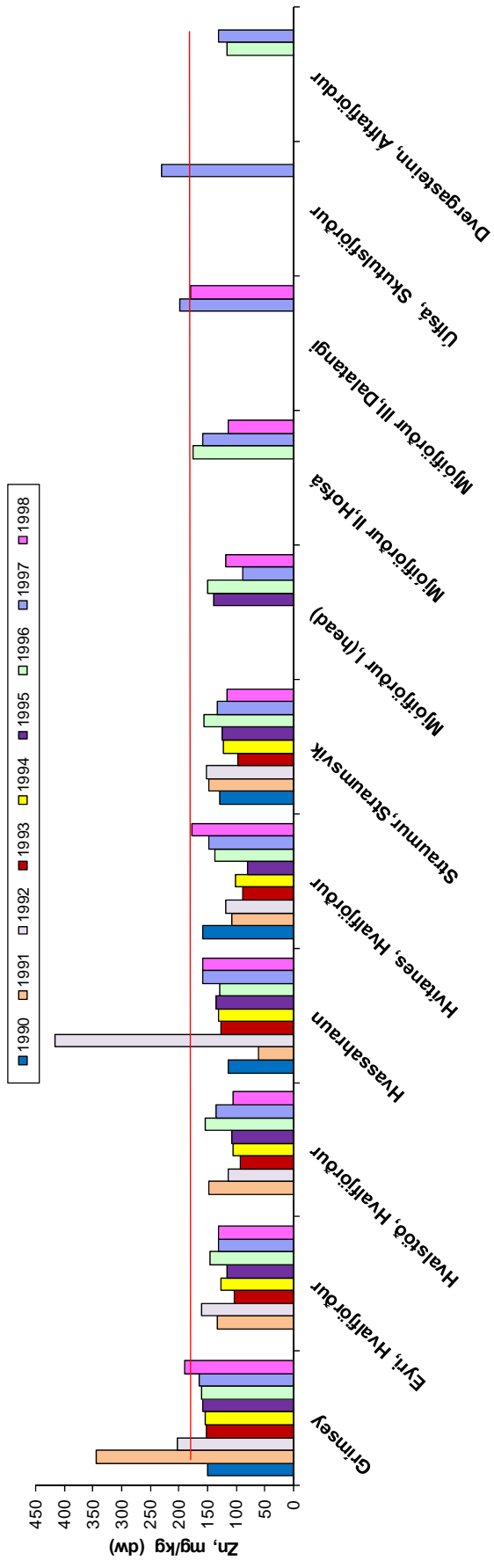


Figure 3c. Zinc concentration (dw) in Blue mussel (Mytilus edulis) around Iceland 1990-2011. Red line indicates ICES 90.75% baseline (11).

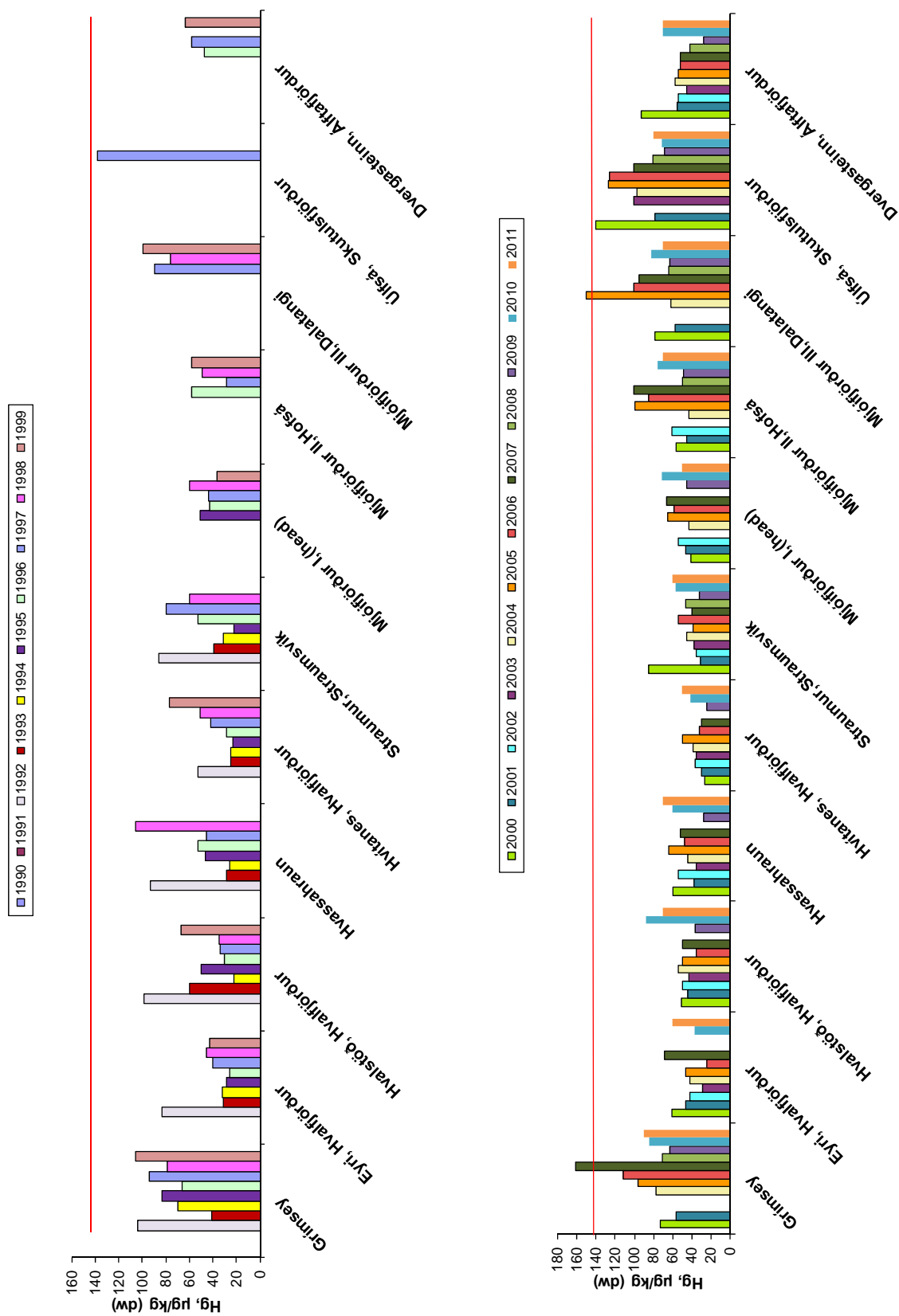


Figure 3d. Mercury concentration (dw) in Blue mussel (*Mytilus edulis*) around Iceland 90-75% baseline (11). Red line indicates ICES 90-75% baseline (11).

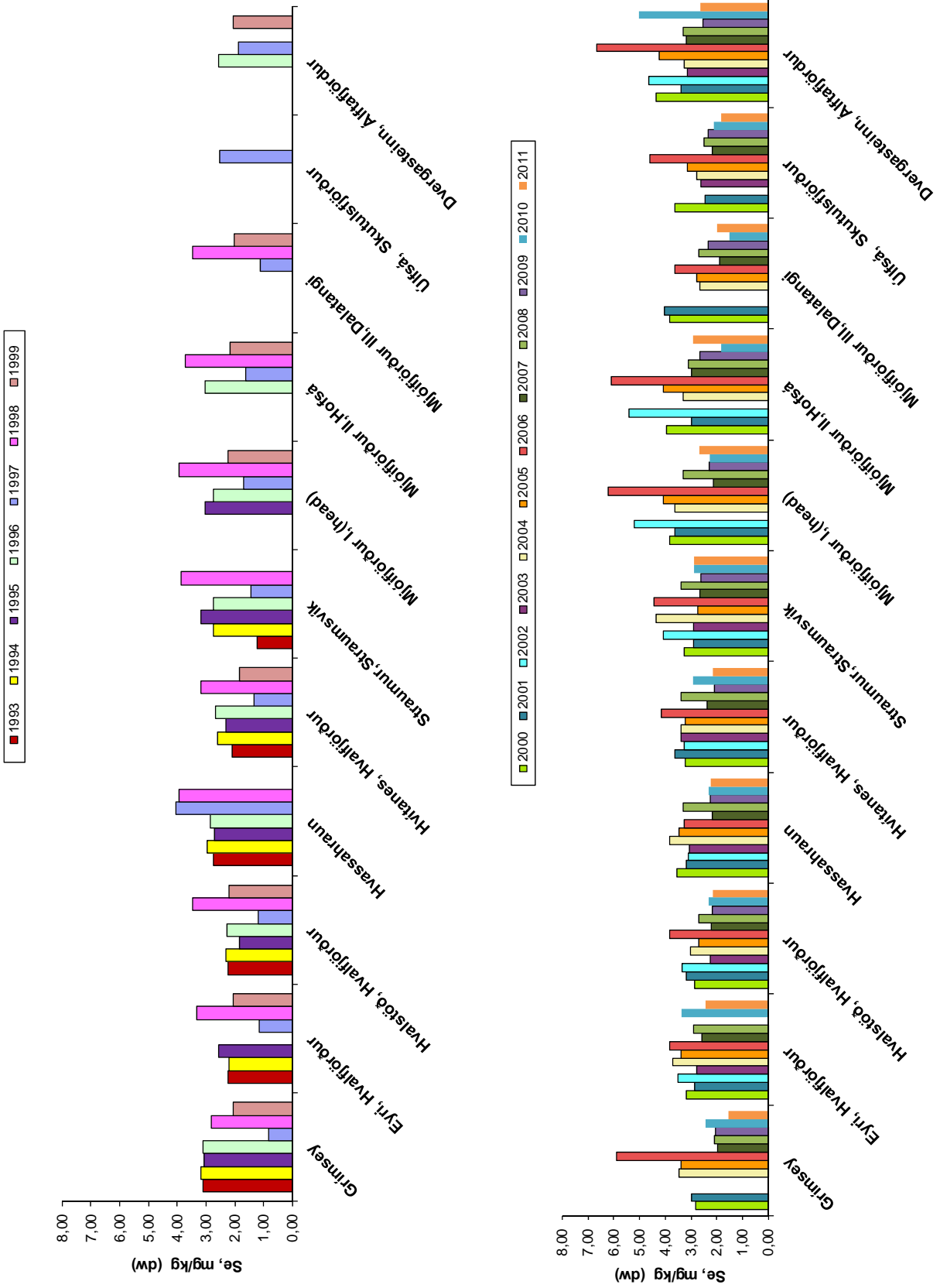


Figure 3e. Selenium concentration (dw) in Blue mussel (*Mytilus edulis*) around Iceland 1993-2011.

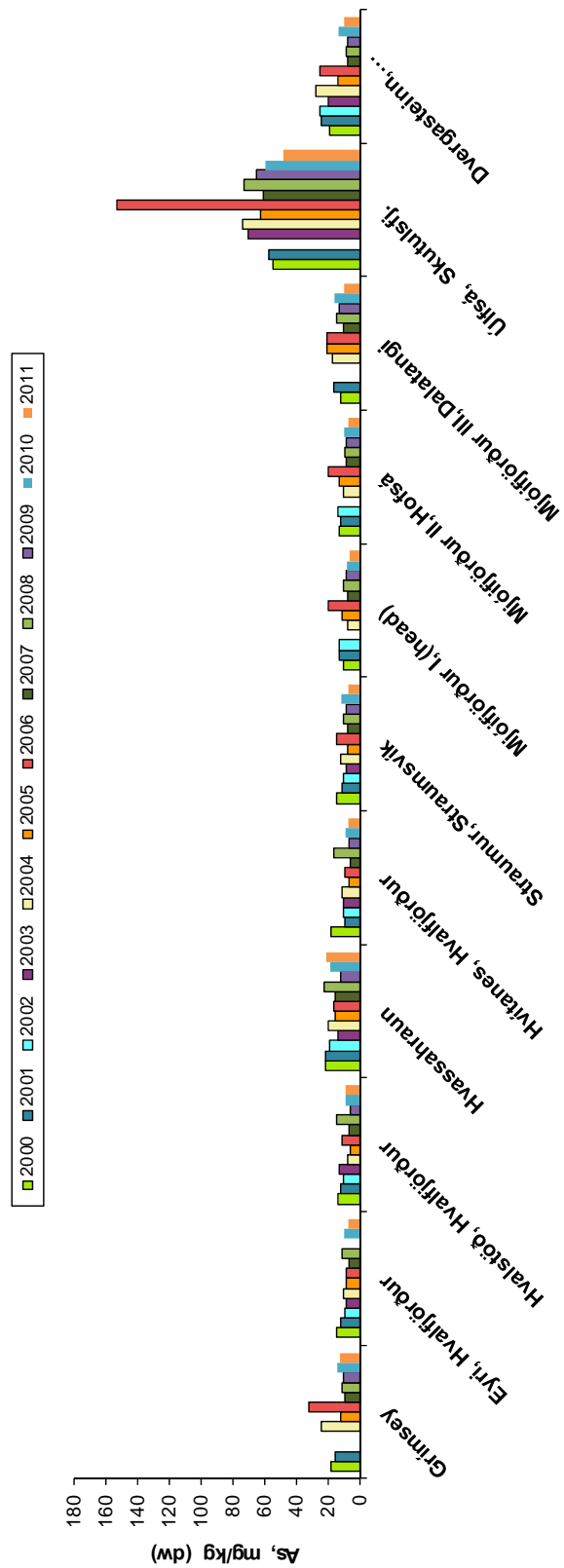
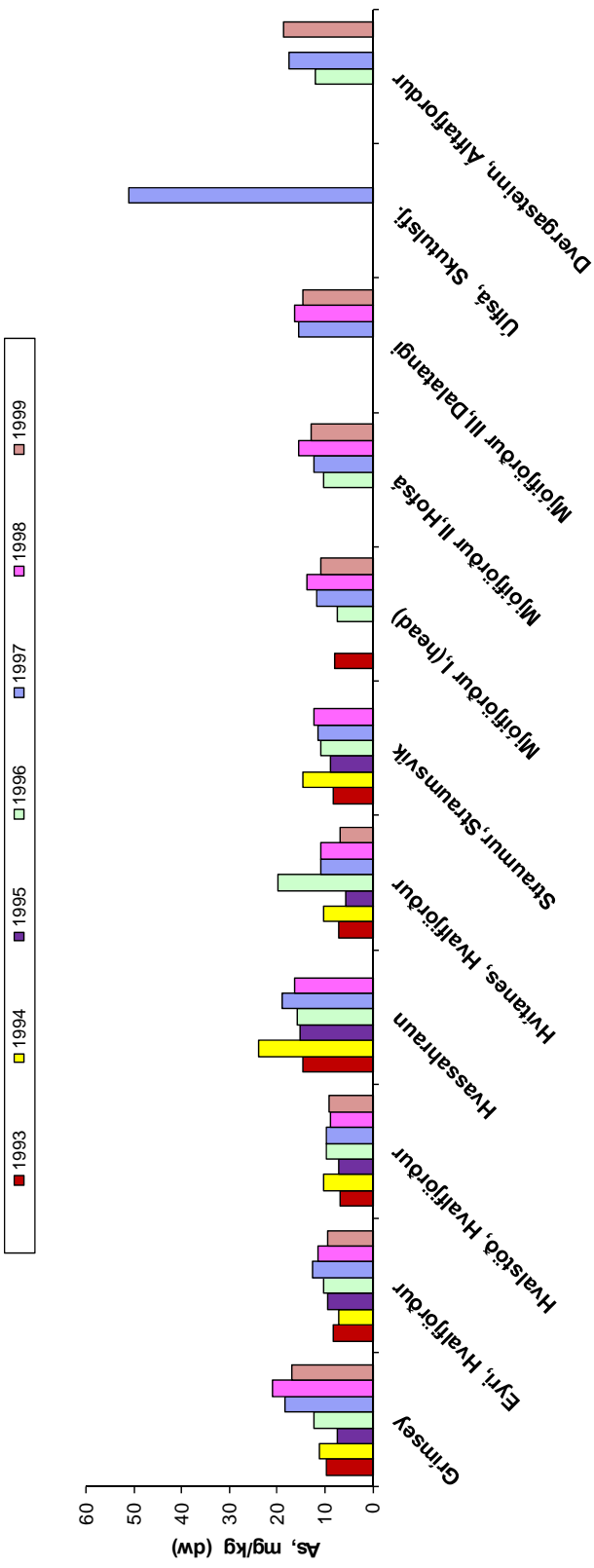


Figure 3f. Arsenic concentration (dw) in Blue mussel (*Mytilus edulis*) around Iceland 1993-2011.

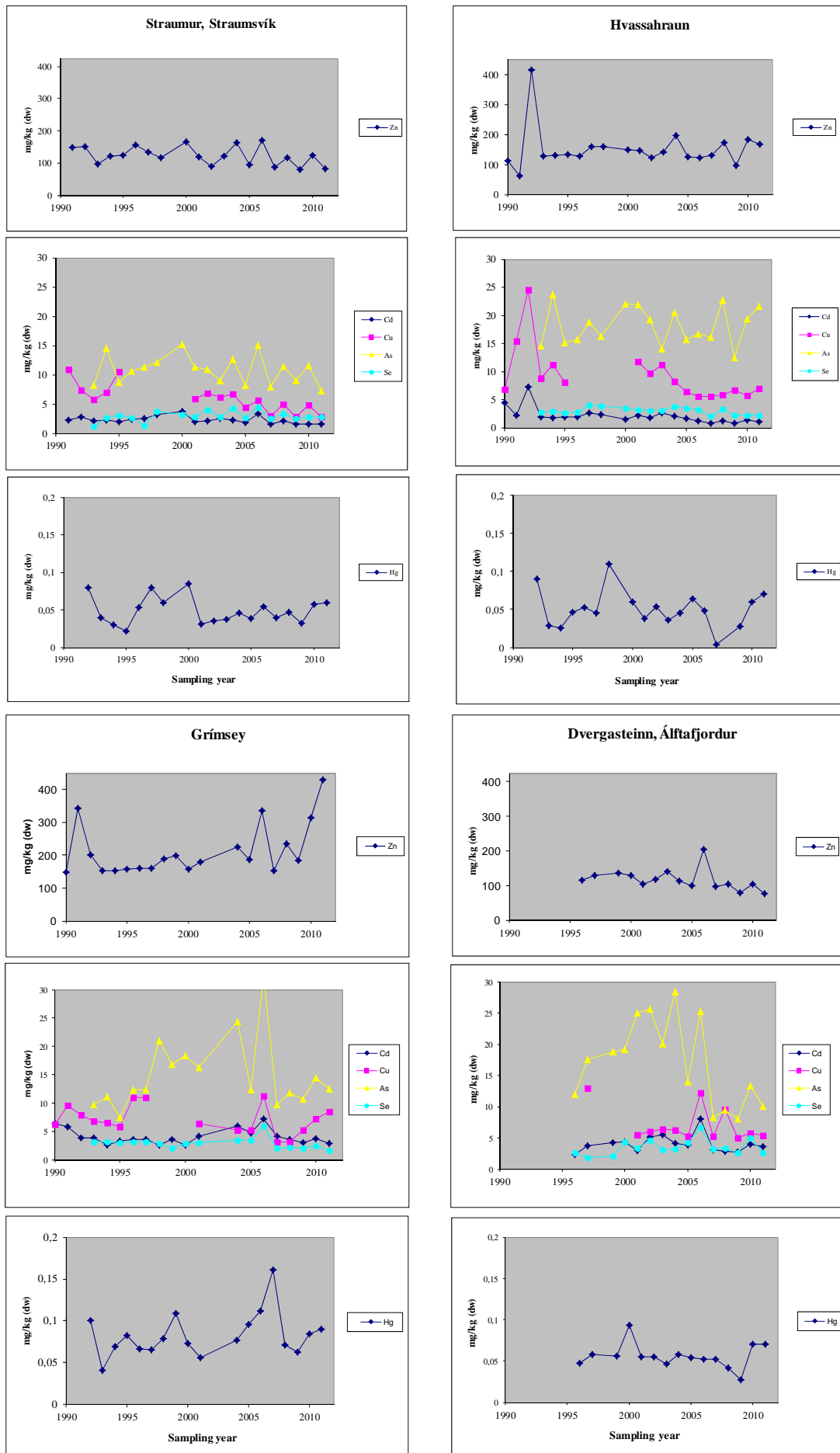


Figure 4a. Concentration of heavy metals (dry weight) in Blue mussel from different sampling sites around Iceland, 1990-2011.

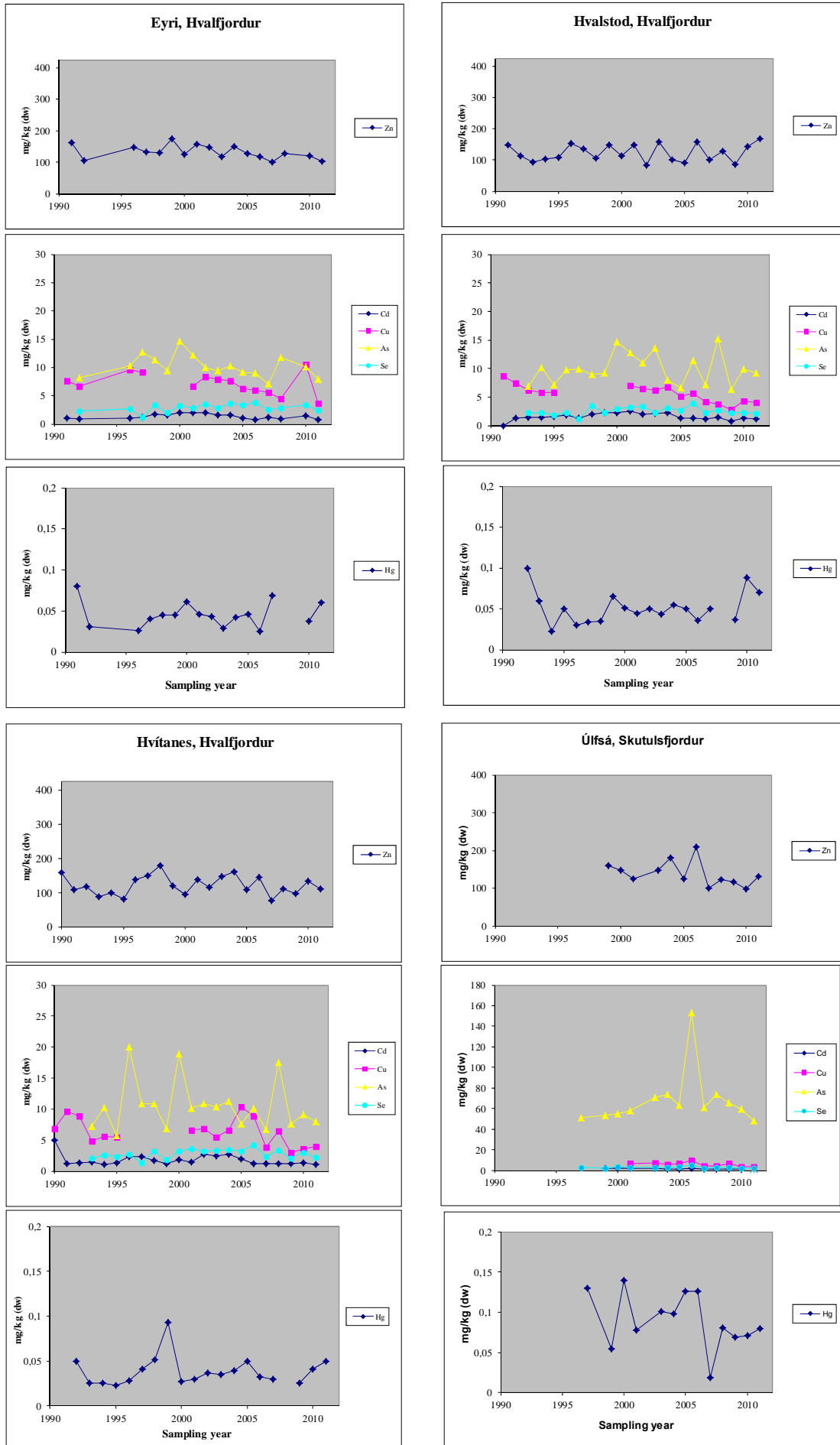


Figure 4b. Concentration of heavy metals (dry weight) in blue mussel from different sampling sites around Iceland, 1990-2011.

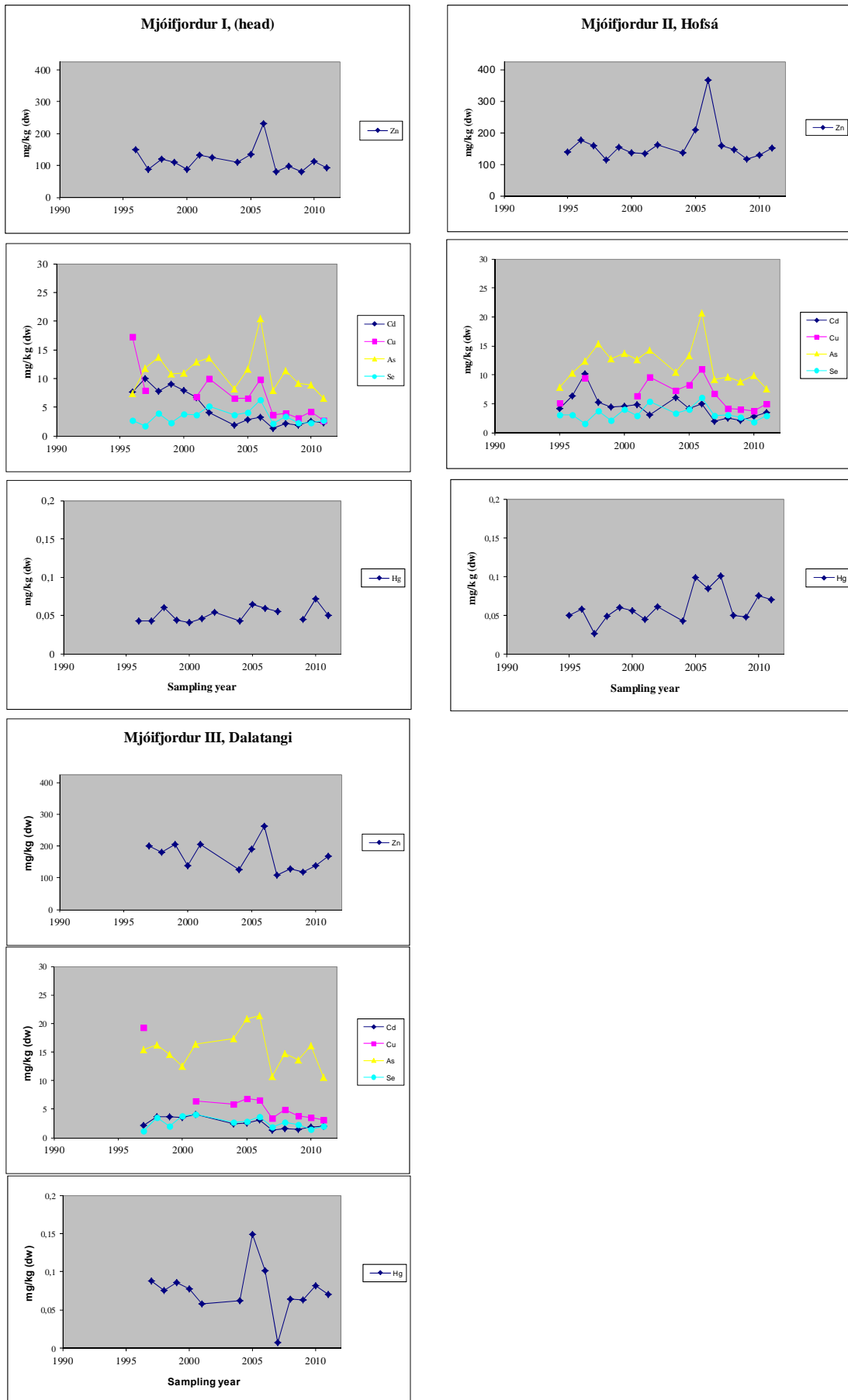


Figure 4c. Concentration of heavy metals (dry weight) in blue mussel from different sampling sites around Iceland, 1990-2011.

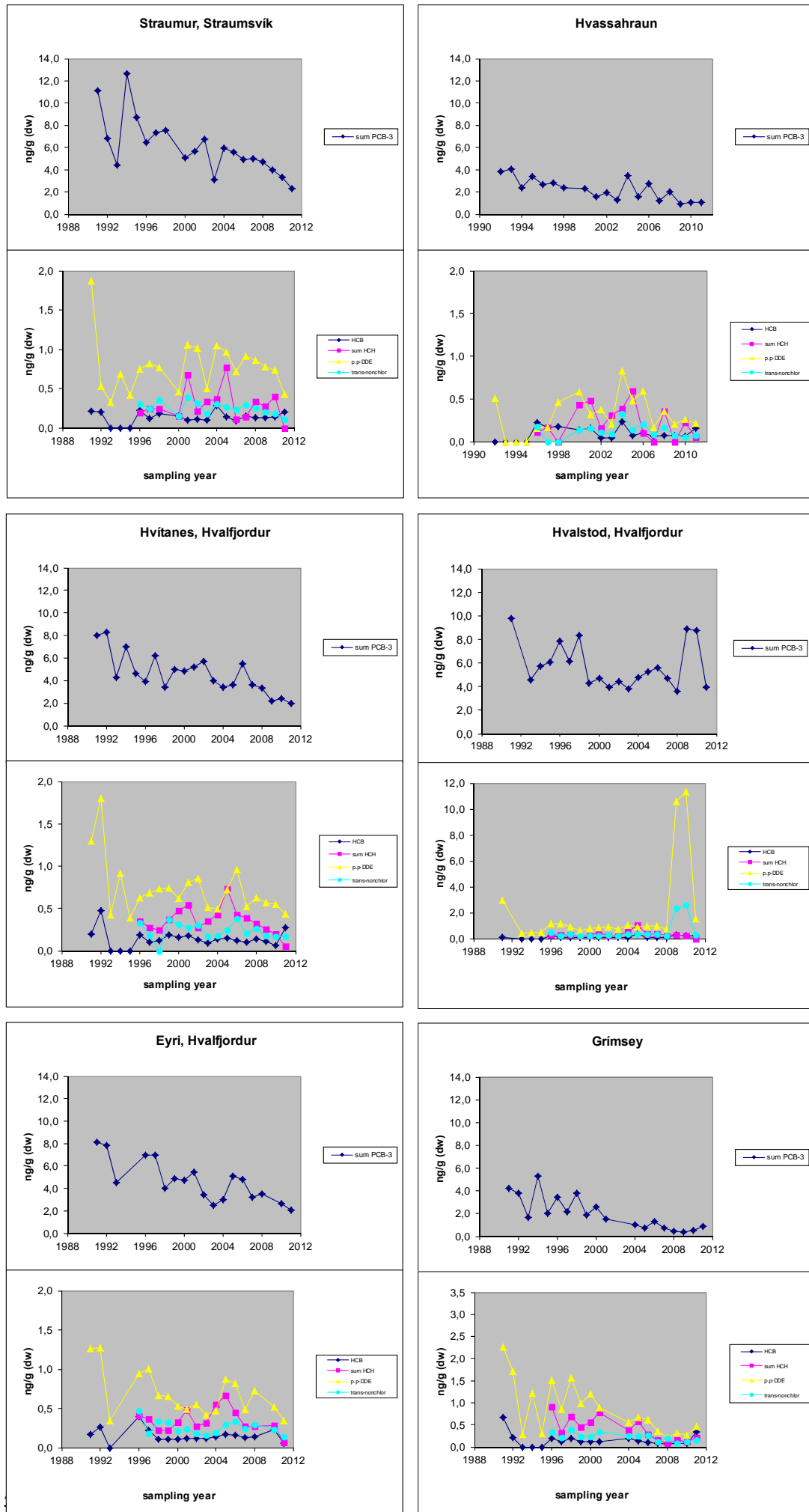


Figure 5a. Concentration of organochlorine compounds (dw) in Blue mussel (*Mytilus edulis*) at different locations 1991-2011.

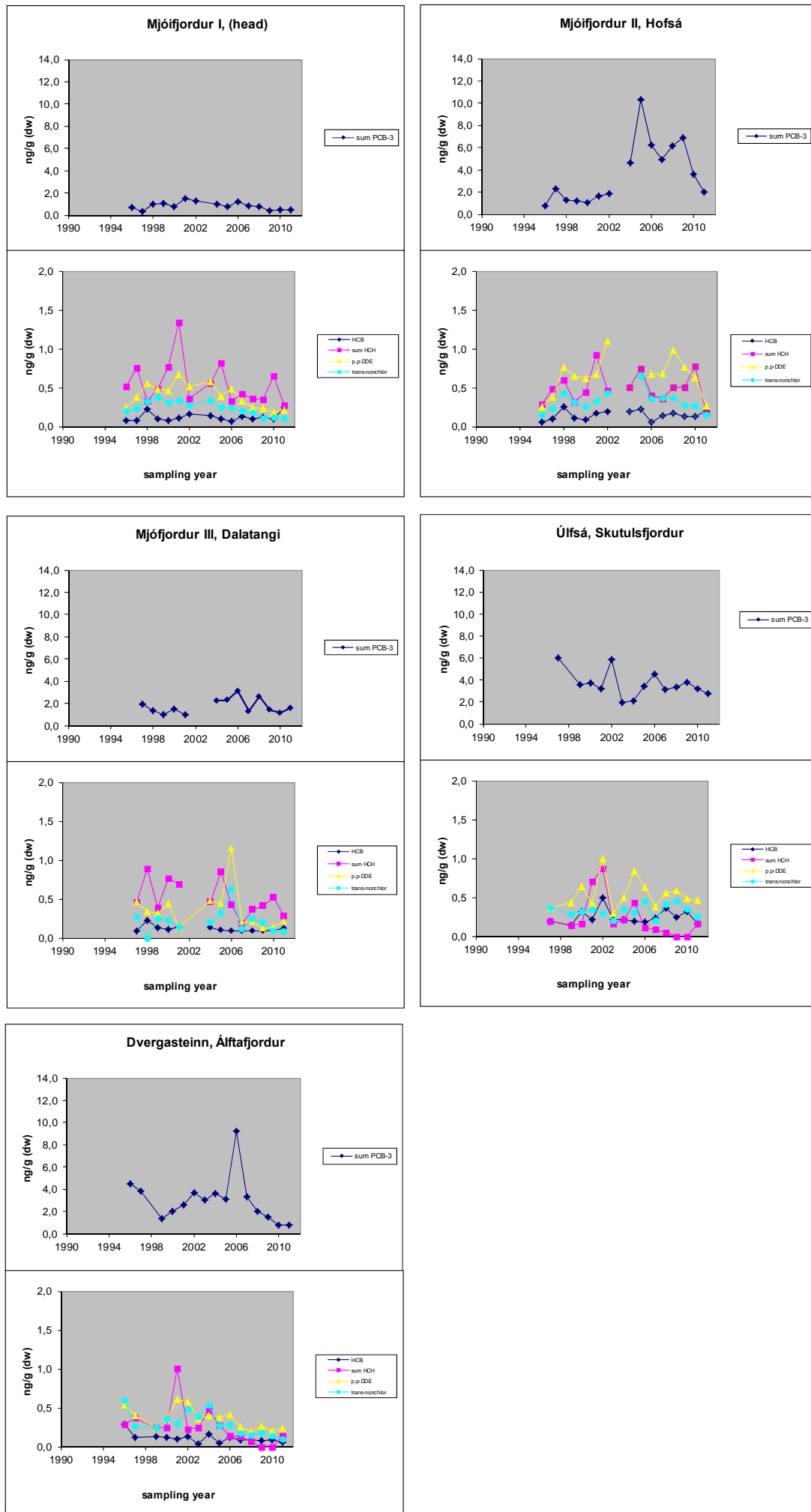


Figure 5b. Concentration of organochlorine compounds (dw) in Blue mussel (*Mytilus edulis*) at different locations 1991-2011.

Appendix VIII.

Graphs of metals and organic compounds in Cod (*Gadus morhua*) 1990-2012

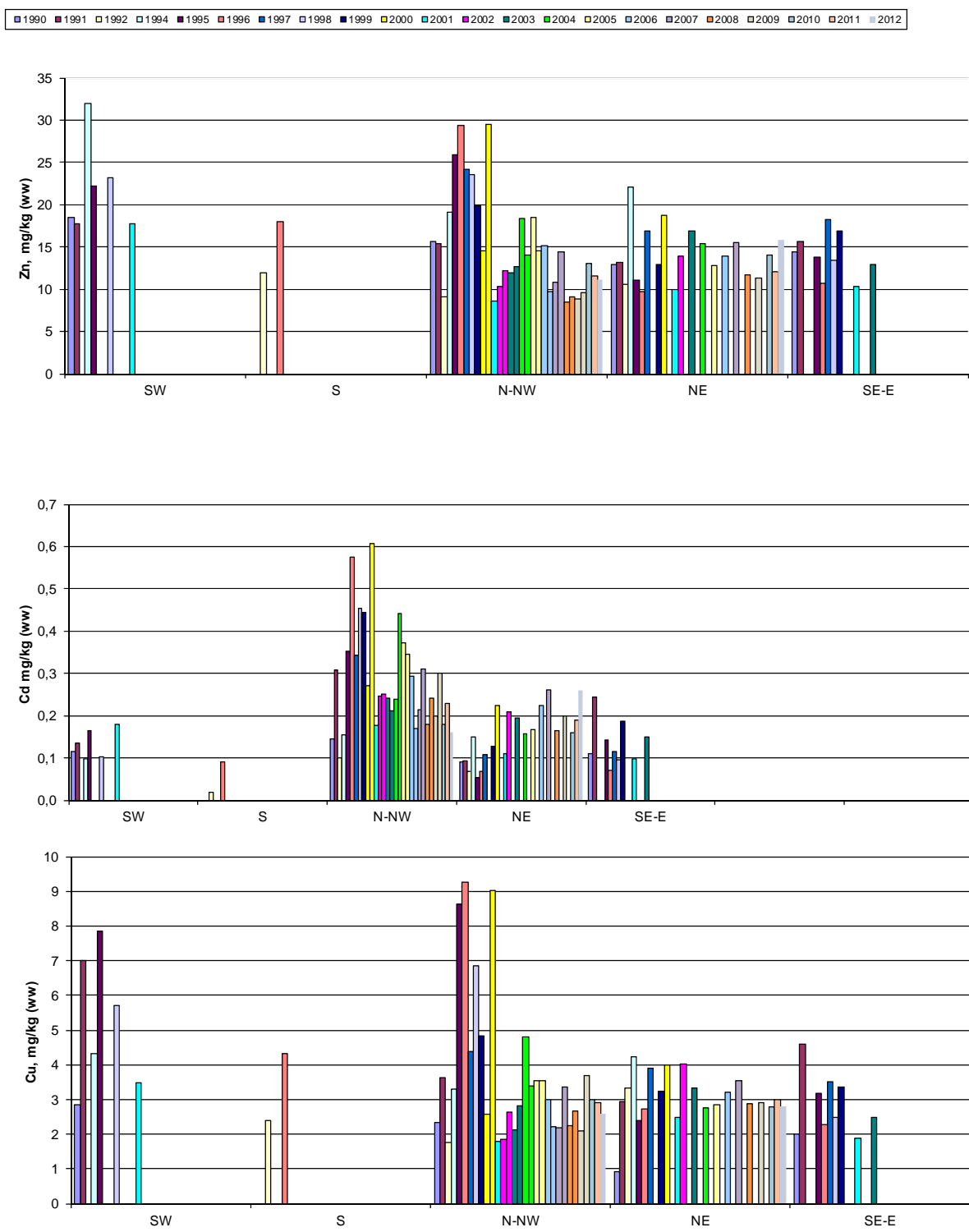


Figure 6a. Heavy metal concentration (ww) in livers of 30-45 cm cod (*Gadus morhua*) from Icelandic waters in March 1990-2012.

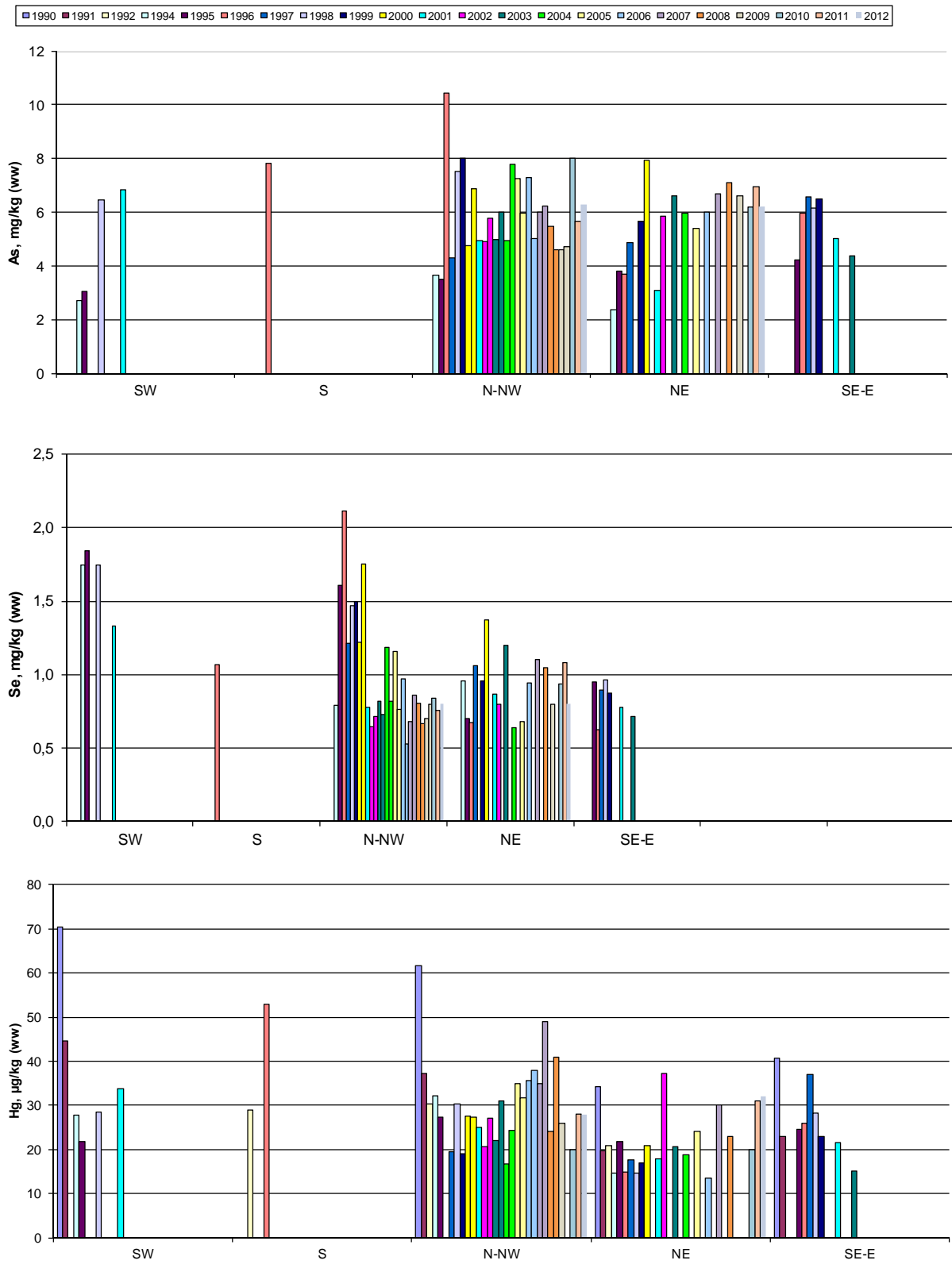


Figure 6b. Heavy metal concentration (ww) in livers of 30-45cm cod (*Gadus morhua*) from Icelandic waters in March 1990-2012
Mercury (Hg) was analysed in the flesh

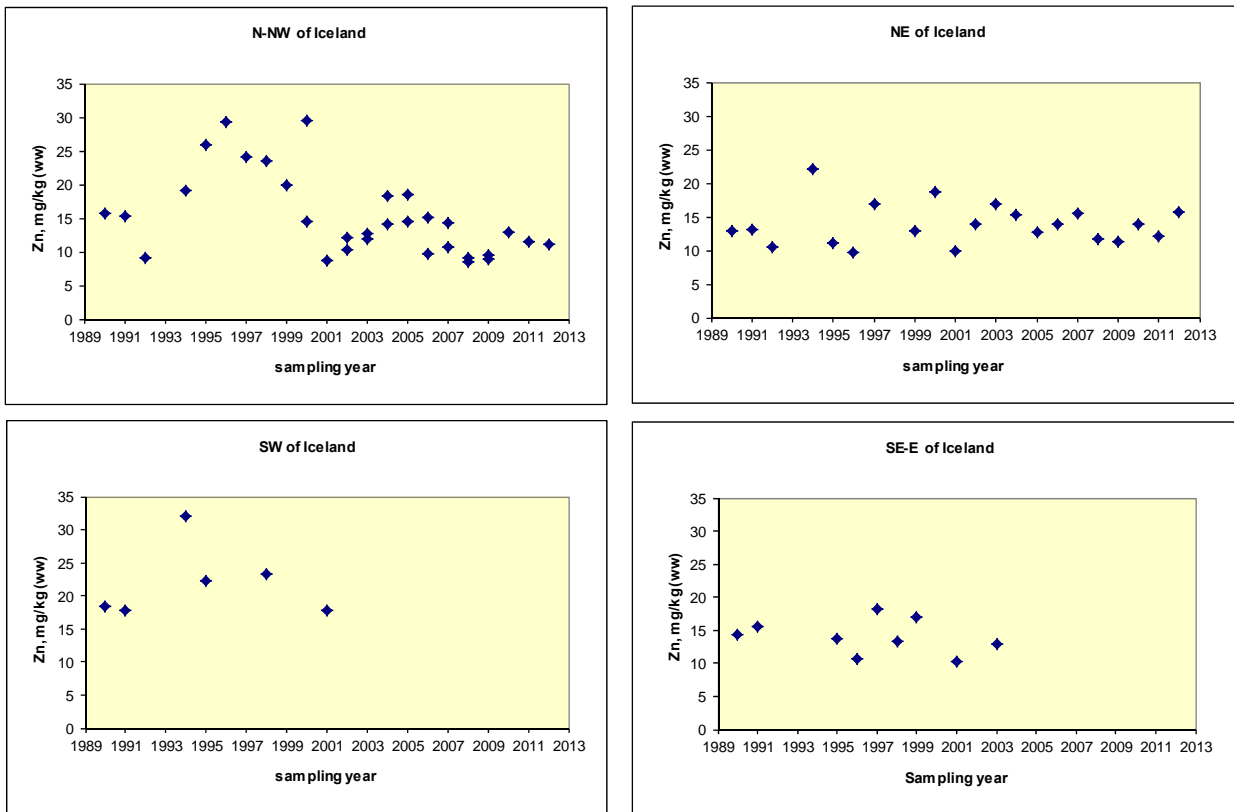


Figure 7a. Average concentration of Zinc (ww) in livers of 30-45 cm Cod (*Gadus morhua*) from different locations in Icelandic waters in March 1990-2012.

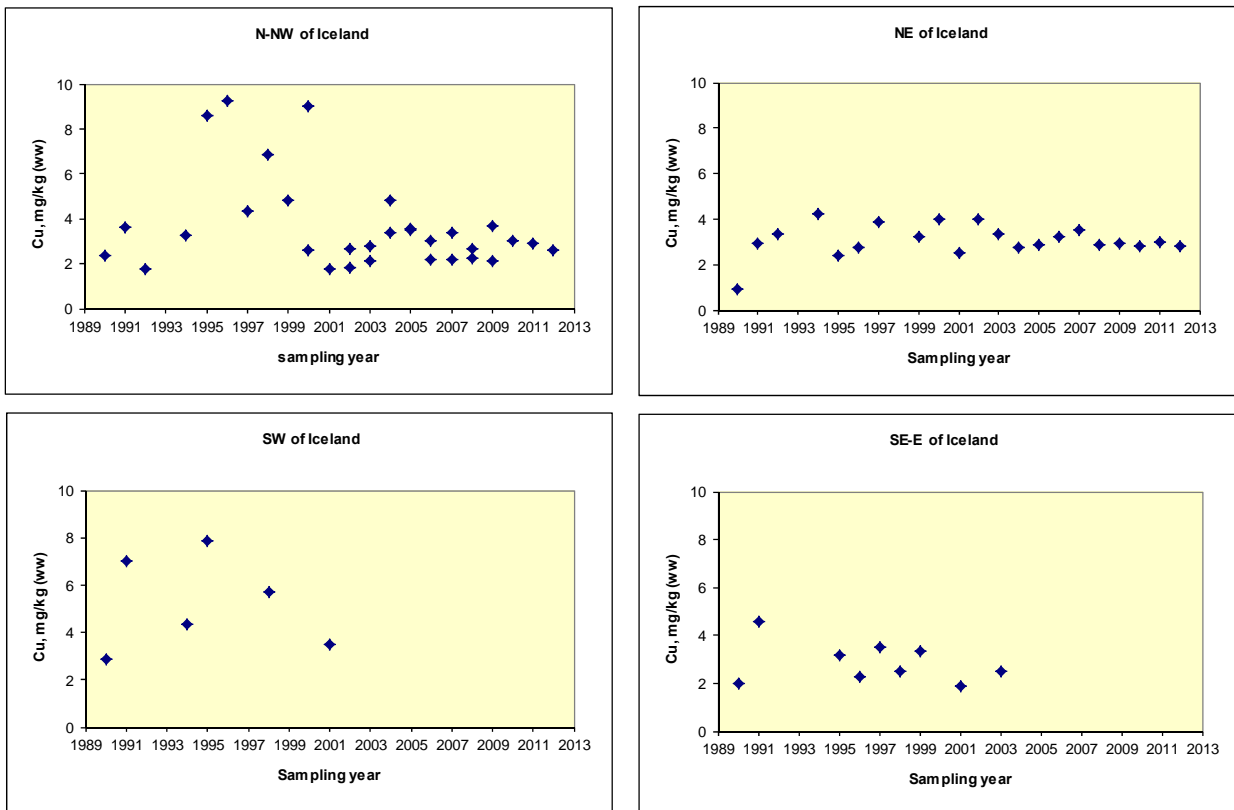


Figure 7b. Average concentration of Copper (ww) in livers of 30-45 cm Cod (*Gadus morhua*) from different locations in Icelandic waters in March 1990-2012.

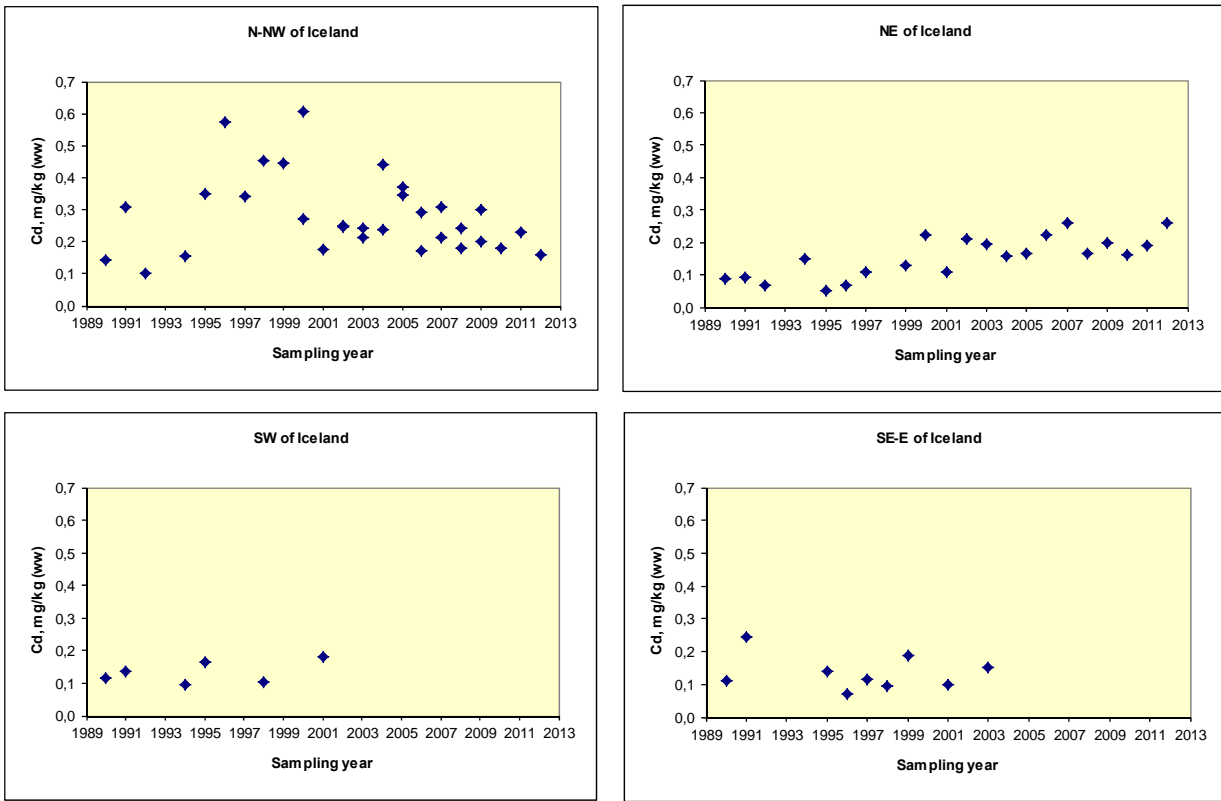


Figure 7c. Average concentration of Cadmium (ww) in livers of 30-45 cm Cod (*Gadus morhua*) from different locations in Icelandic waters in March 1990-2012.

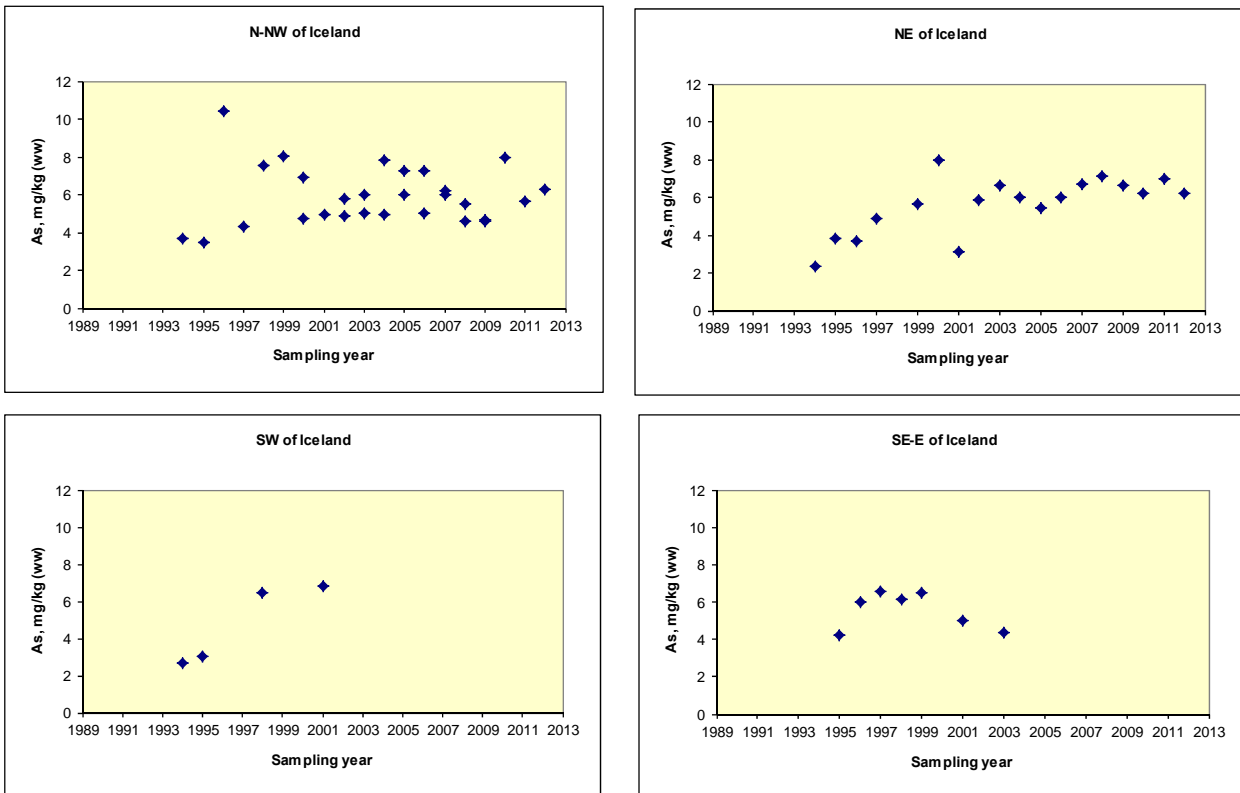


Figure 7d. Average concentration of Arsenic (ww) in livers of 30-45 cm Cod (*Gadus morhua*) from different locations in Icelandic waters in March 1990-2012.

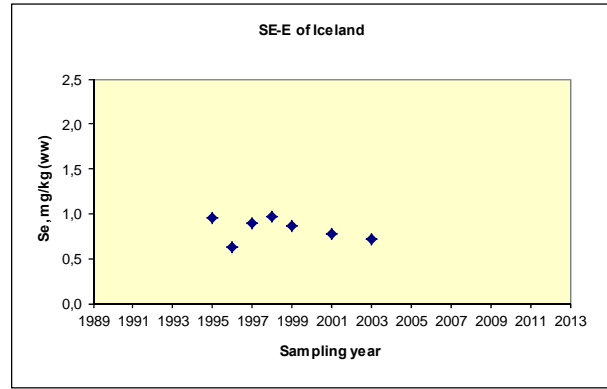
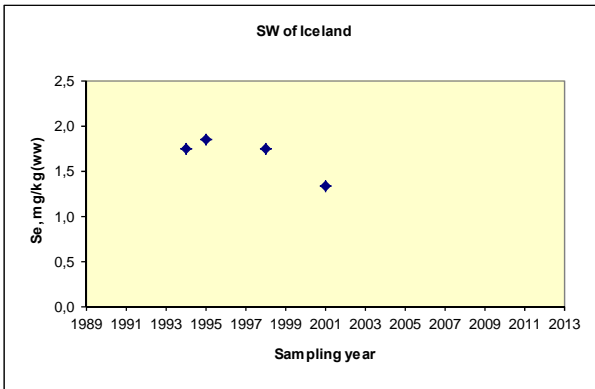
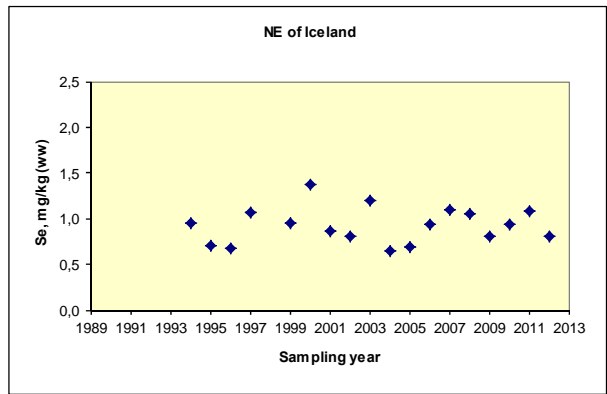
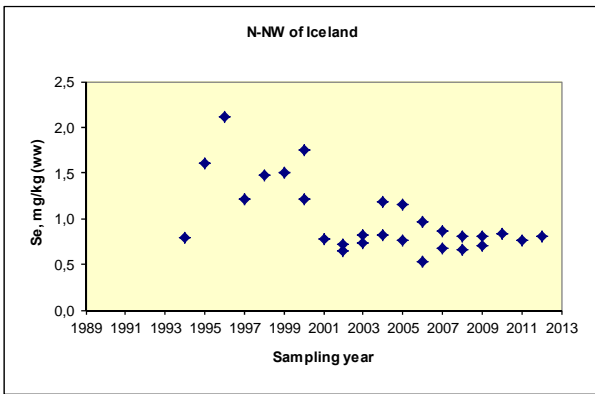


Figure 7e. Average concentration of Selenium (ww) in livers of 30-45 cm Cod (*Gadus morhua*) from different locations in Icelandic waters in March 1990-2012.

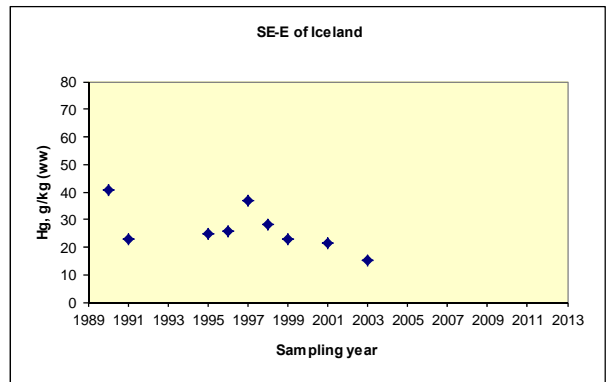
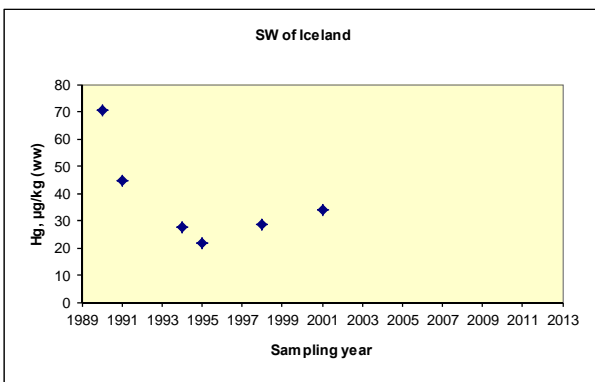
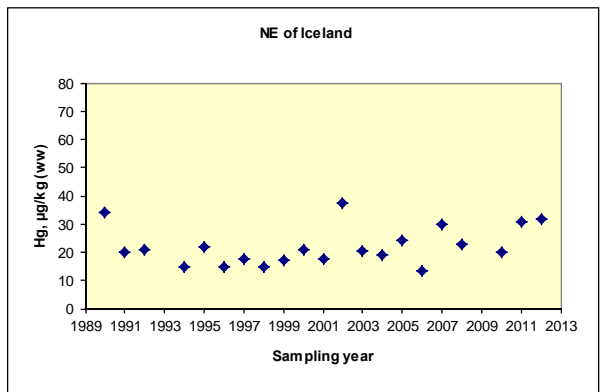
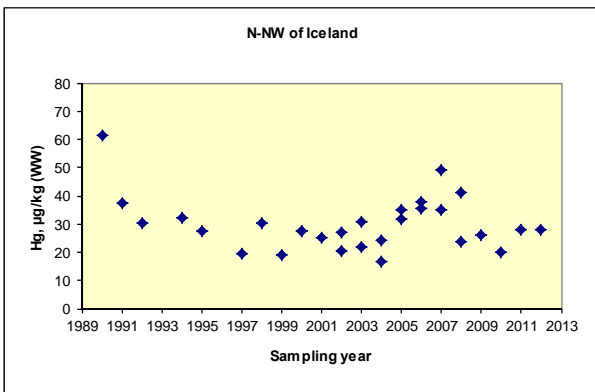


Figure 7f. Average concentration of Mercury (ww) in flesh of 30-45 cm Cod (*Gadus morhua*) from different locations in Icelandic waters in March 1990-2012.

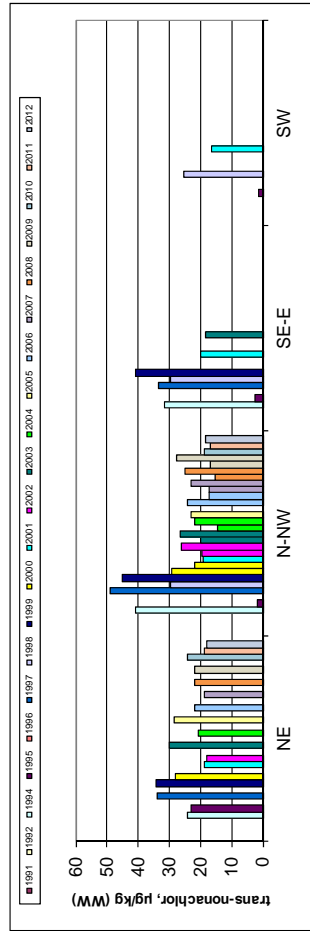
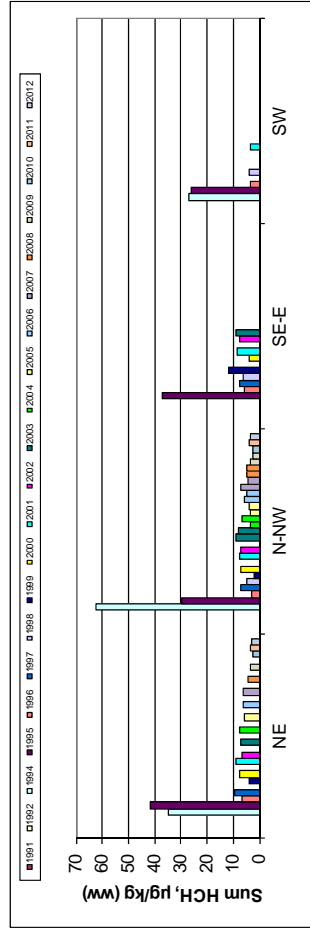
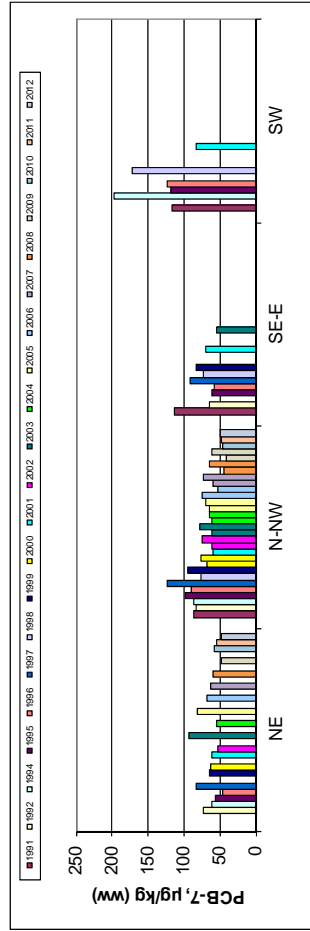
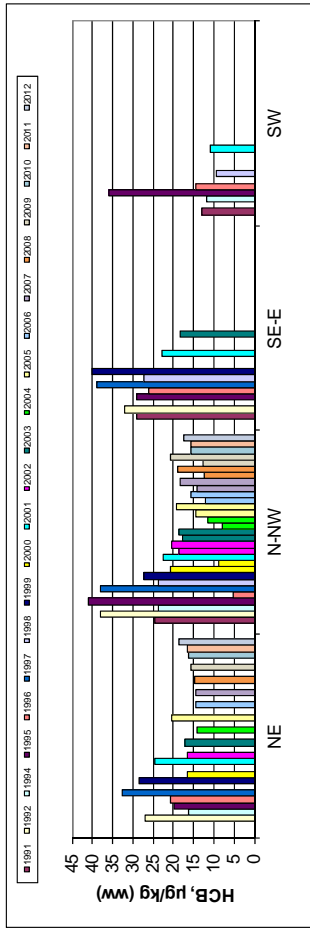
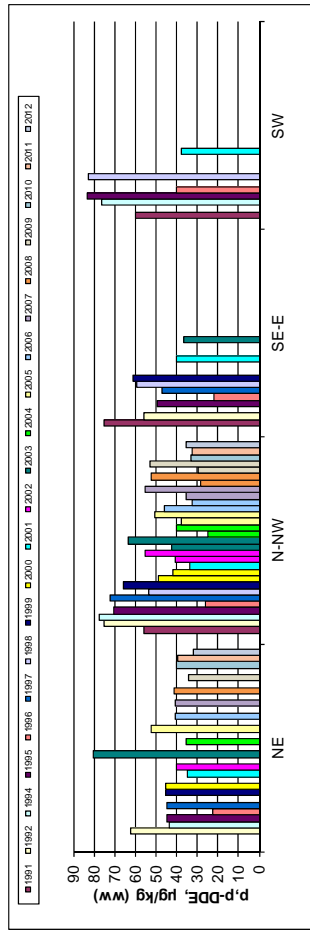


Figure 8. Average concentration of organochlorine compounds (ww) in livers of 30-45 cm Cod (*Gadus morhua*) from different locations in Icelandic waters in March 1991-2012.

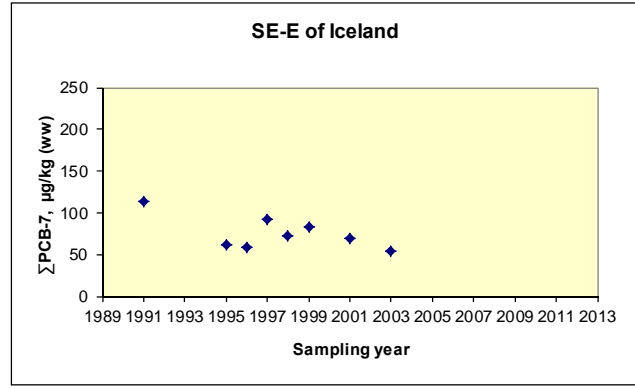
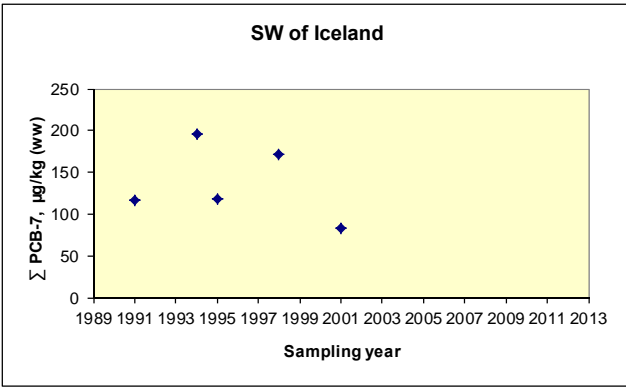
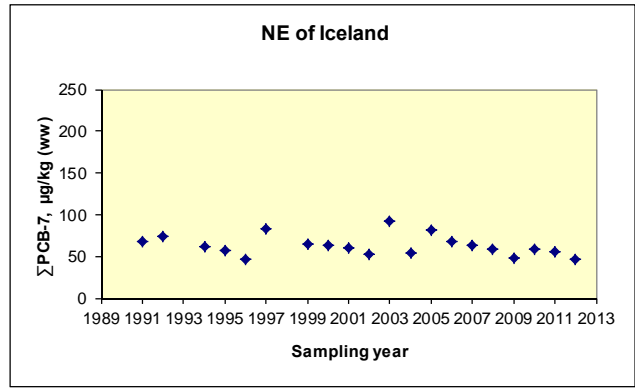
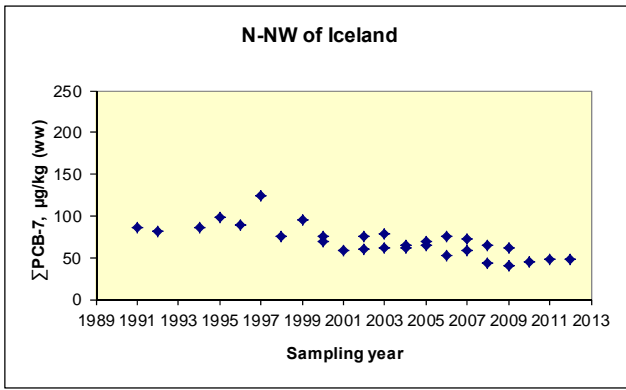


Figure 9a. Average concentration of Σ PCB-7 (ww) in livers of 30-45 cm Cod (*Gadus morhua*) from different locations in Icelandic waters in March 1991-2012.

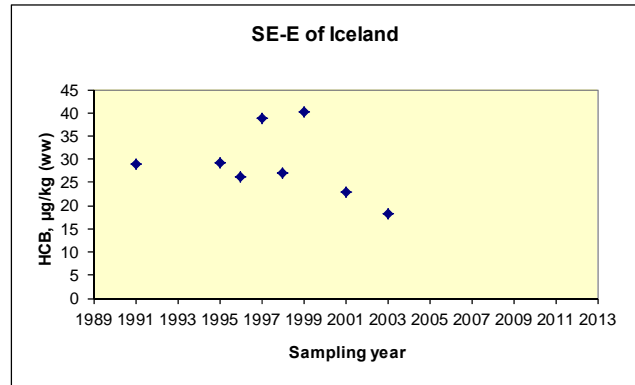
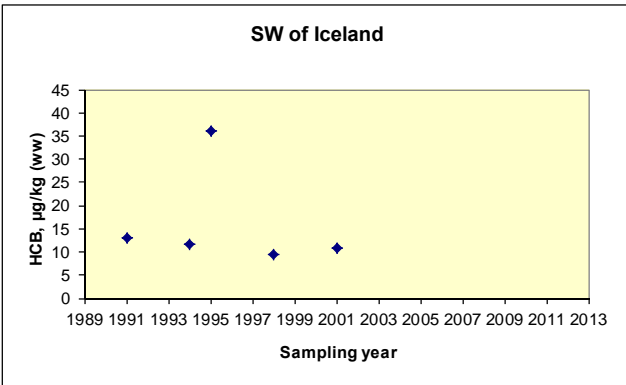
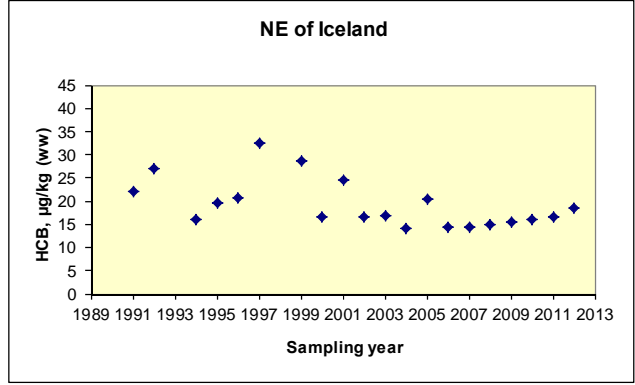
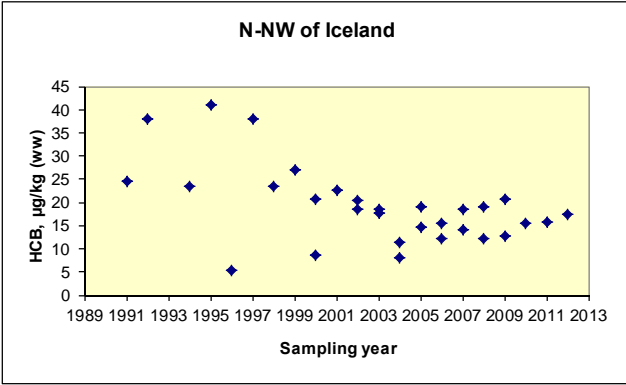


Figure 9b. Average concentration of HCB (ww) in livers of 30-45 cm Cod (*Gadus morhua*) from different locations in Icelandic waters in March 1991-2012.

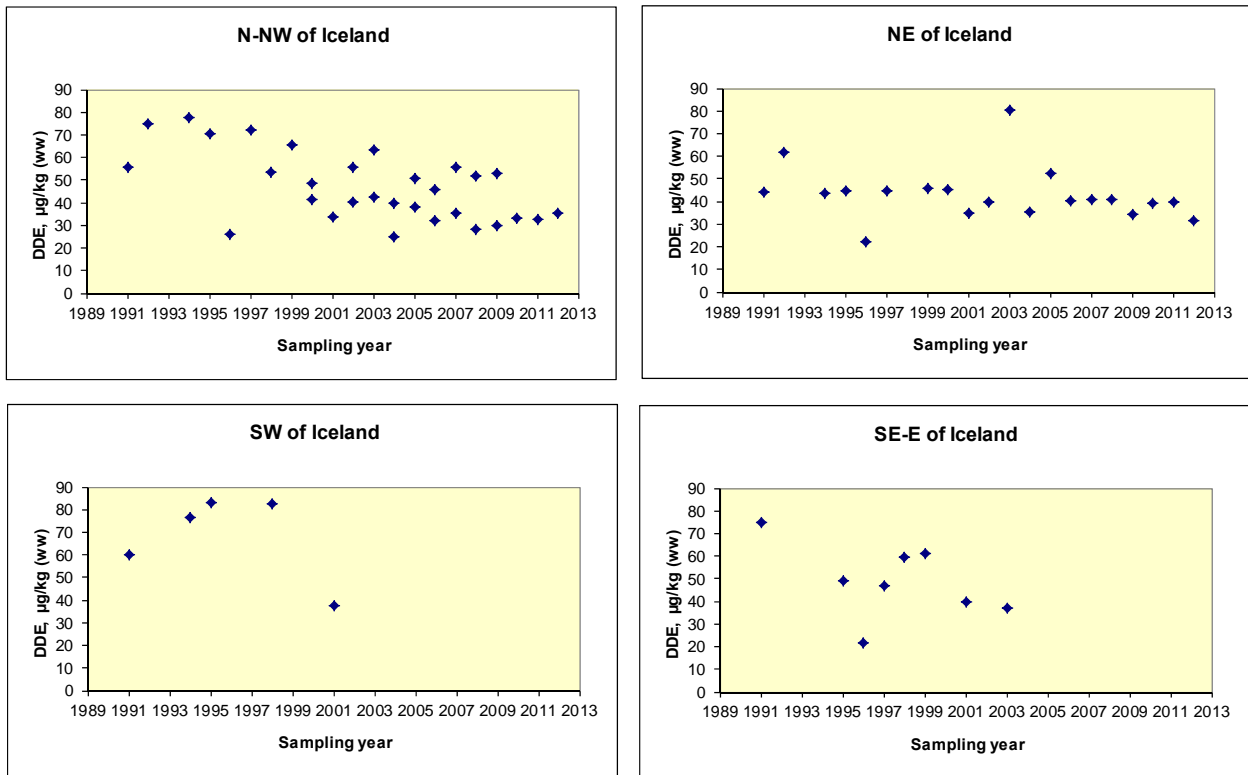


Figure 9c. Average concentration of DDE (ww) in livers of 30-45 cm Cod (*Gadus morhua*) from different locations in Icelandic waters in March 1991-2012.

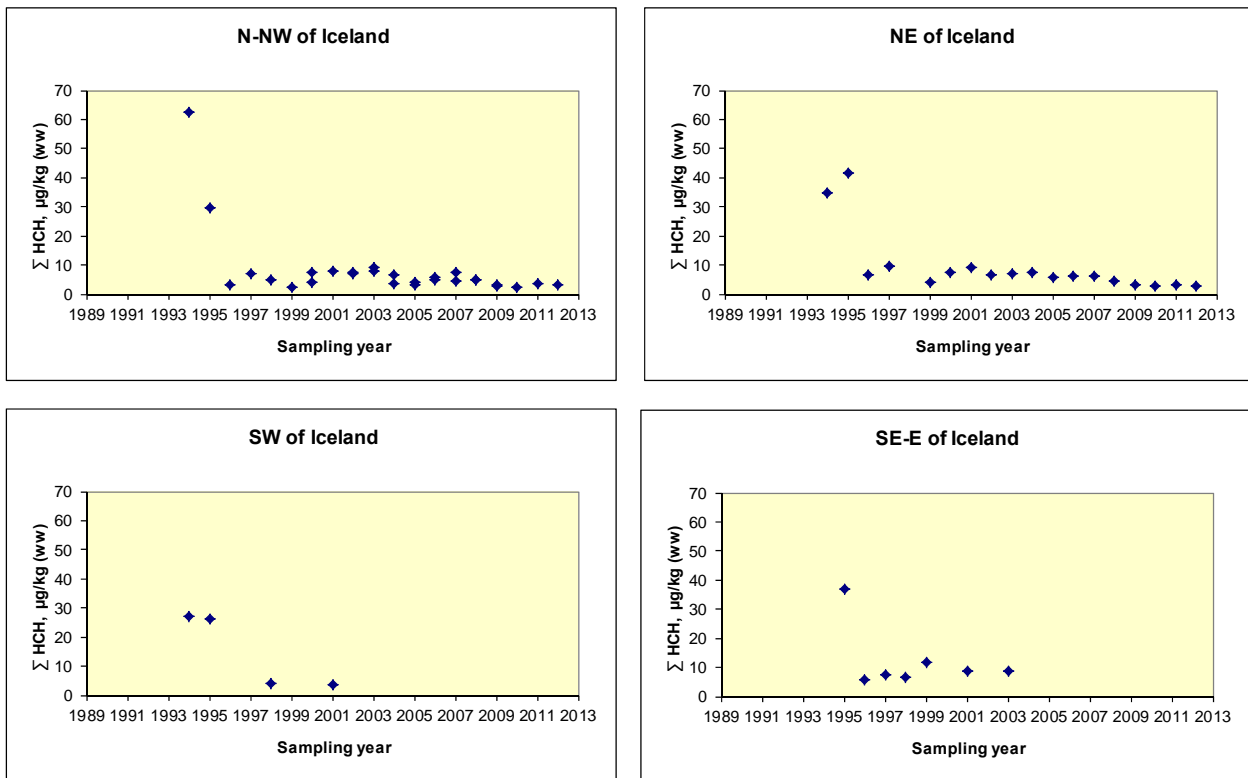


Figure 9d. Average concentration of ΣHCH (ww) in livers of 30-45 cm Cod (*Gadus morhua*) from different locations in Icelandic waters in March 1991-2012.

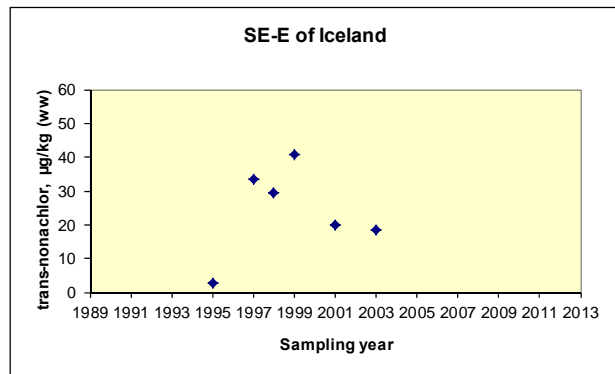
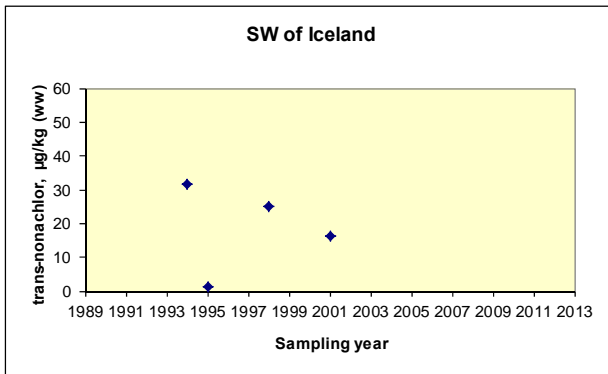
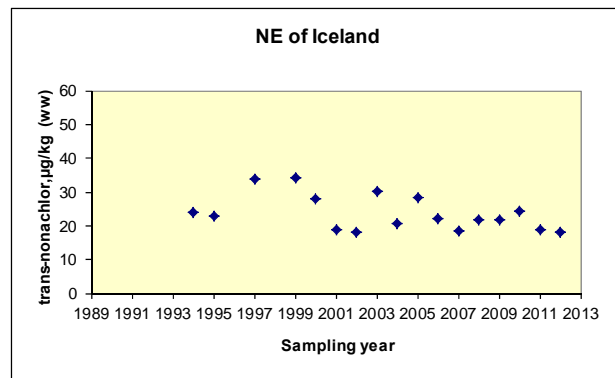
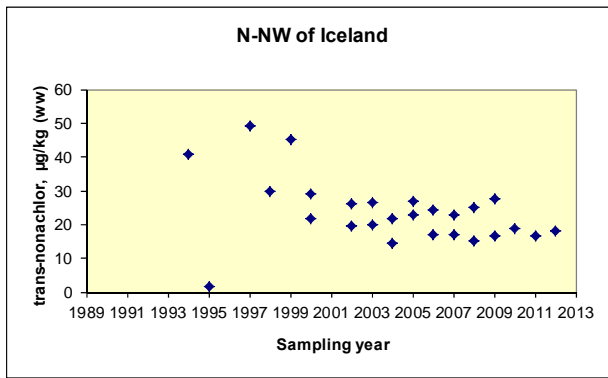


Figure 9e. Average concentration of transnonachlor (ww) in livers of 30-45 cm Cod (*Gadus morhua*) from different locations in Icelandic waters in March 1991-2012.