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Hazardous substances in fjords and coastal waters - 2011

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Abstract

The Norwegian contribution to OSPAR's Coordinated Environmental Monitoring Programme (CEMP) includes the monitoring of micropollutants (contaminants) in sediment and marine organisms (blue mussel, snails, prawns, cod, flatfish and deep water fish) along the coast of Norway from the Oslofjord and Hvaler region in the southeast to the Varangerfjord in the northeast. The stations are located both in areas with known or presumed point sources of contaminants, in areas of diffuse load of contamination like city areas, and in more remote areas exposed to presumed low and diffuse pollution. The mussel sites include supplementary stations for the Norwegian Index Programme. The programme includes the monitoring metals, organochlorines, pesticides, dioxins, brominated flame retardants, perfluorinated compounds, as well as biological effects methods. The results from 2011 supplied data to a total of 1035 time series of selected contaminants or biomarkers. Of these, 329 showed statistically significant trends of which 277 were downwards and 52 upwards. The dominance of downward trends indicates that the level of most contaminants is decreasing. Of the 628 median contaminant concentrations assessed in 2011 that could also be classified by Klifs environmental classification system, 78.5% were classified as insignificantly polluted, 16.9% as moderately polluted, 3.5% as markedly polluted (mostly cadmium, lead, chromium, HCB, PAHs), 0.6% as severely polluted (benzo[a]pyrene, carcinogen-PAHs, ppDDE) and 0.5% as extremely polluted (dioxins).

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Foreword

This report represents the Norwegian national comments on the 2011 investigations for the Coordinated Environmental Monitoring Programme (CEMP-a part of and referred to in earlier reports as the Joint Assessment and Monitoring Programme JAMP). CEMP is administered by the Oslo and Paris Commissions (OSPAR) in their effort to assess and remedy anthropogenic impact on the marine environment of the North East Atlantic. The current focus of the Norwegian contribution is on the levels, trends and effects of hazardous substances. CEMP-results from Norway and other OSPAR countries provide a basis for a paramount evaluation of the state of the marine environment. OSPAR receives guidance from the International Council for the Exploration of the Sea (ICES).

The Norwegian CEMP for 2011 was carried out by the Norwegian Institute for Water Research (NIVA) by contract from the Climate and Pollution Agency, Klif (former Norwegian Pollution Control Authority, SFT). The project leader at Klif was Jon L. Fuglestad.

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Oslo, 31th October 2012.

Norman W. Green
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Contents

1. Executive Summary/Sammendrag

The Norwegian contribution to OSPAR's Coordinated Environmental Monitoring Programme (CEMP) includes the monitoring of micropollutants (contaminants) in sediment and marine organisms (blue mussels, snails, prawns and fish). The 2011 investigation monitored blue mussel (38 stations), dog whelk (8 stations), common periwinkle (1 station), cod (11 stations) and flatfish (dab, flounder, plaice, megrim; 8 stations) along the coast of Norway from the Oslofjord and Hvaler region in the southeast to the Varangerfjord in the northeast. The stations are located both in areas with known or presumed point sources of contaminants, in areas of diffuse load of contamination like city areas, and in more remote areas exposed to presumed low and diffuse pollution. The mussel sites include supplementary stations for the Norwegian Index Programme. The programme includes the monitoring metals, organochlorines, pesticides, dioxins, brominated flame retardants, perfluorinated compounds, as well as biological effects methods.

The results from 2011 supplied data to a total of 1035 time series of selected contaminants or biomarkers. Of these, 329 showed statistically significant trends of which 277 were downwards (mostly organochlorines) and 52 upwards (mostly metals). The dominance of downward trends indicates that contamination is decreasing. Of the 628 median contaminant concentrations assessed in 2011 that could also be classified by Klifs environmental classification system, 78.5% were classified as insignificantly polluted, 16.9% as moderately polluted, 3.5% as markedly polluted (mostly cadmium, lead, chromium, HCB, PAHs), 0.6% as severely polluted (benzo[a]pyrene, carcinogen-PAHs, ppDDE) and 0.5% as extremely polluted (dioxins). The extremely polluted cases dioxins in mussels from the Grenlandsfjord area and here downward trends were registered. The cod fillet from the Inner Oslofjord that was markedly polluted with mercury and here there was also an upward trend. This was the only upward trend where the 2011-median concentration could also be classified as markedly, severely or extremely polluted. Cod and blue mussel from the outer parts of western and northern Norway were in general insignificantly polluted. The general situation for the two major impacted areas of CEMP is as follows:

Concentrations of contaminants in the Oslofjord, Hvaler and Grenlandsfjord areas

Metals in cod

Cod fillet from the Inner Oslofjord was markedly polluted by mercury, which had a significant upward trend for the period 1984-2011. Cod liver from the Inner Oslofjord had median concentrations of lead and cadmium higher than presumed high background, and there was a significant upward trend for cadmium in cod liver from the Inner Oslofjord for the same period. The concentration of mercury in cod fillet from the outer part of the Oslofjord (Færder) has increased slightly since 2009. The fillet was moderately polluted by mercury, but with no significant trend.

PCBs in cod

Cod liver from the Inner Oslofjord was markedly polluted with polychlorinated biphenyls (PCBs), but showed no significant trend. Cod fillet from the Inner Oslofjord was moderately polluted with PCBs but no significant trend was found.

Metals in blue mussel

Blue mussel from the Hvaler area and the Grenlandsfjord areas were up to moderately polluted by mercury. A significant downward long term trend was observed in the moderately polluted blue mussel from Bjørkøya (Grenlandsfjord). Upward trends were found in blue mussel from the Mid Oslofjord at Solbergstrand and Håøya and the Inner Oslofjord at Akershuskaia, however concentrations in 2011 were low (insignificantly polluted). For cadmium mussels from Gressholmen were moderately polluted and an upward significant trend was found for the period 1984-2011. Moderate concentrations were also found in mussels from Bjørkøy but no significant trend was found.

PCBs in blue mussel
Blue mussel from Gressholmen, Akershuskaia and Gåsøya in the Inner Oslofjord were moderately polluted by PCBs. There were significant downward trends for PCBs at Gressholmen and Akershuskaia for the entire monitoring period. The other blue mussel stations in the Oslofjord area were insignificantly polluted by PCBs.

Dioxins in blue mussel
Blue mussel from the stations in the Grenlandsfjord area were extremely polluted by dioxins. The blue mussel have been severely to extremely polluted by dioxins for the whole monitoring period (1996 to 2011). However, significant downward trends were observed at Bjørkøy and Croftholmen for this period (from 1996 or 2002 to 2011) which indicate an improvement in this area. Mussels from Gressholmen and Risøy were insignificantly polluted by dioxins.

Concentrations of contaminants in the Sørfjord and Hardangerfjord area

Metals in cod
Cod fillet from the Inner Sørfjord was moderately polluted by mercury. Cod from the Hardangerfjord (Strandebarm) was only insignificantly polluted by mercury. There was a significant upward trend for cadmium and a significant downward trend for lead in cod liver from the Inner Sørfjord for the monitoring period 1986-2011.

Organic contaminants in cod
Liver and fillet of cod from the Inner Sørfjord were moderately polluted by PCBs. Liver and fillet of cod from the Hardangerfjord were insignificantly polluted by PCBs. There was a significant downward trend for PCBs in cod liver from Strandebarm for the period 1990-2011. Cod liver and fillet from the Inner Sørfjord and Strandebarm was moderately polluted by ppDDE. Cod from Strandebarm showed significant downward trends for ppDDE in both liver for the same period.

Hg in flounder
Flounder from the Inner Sørfjord had concentration of mercury in the fillet that exceeded presumed high background level, and had a significant upward long-term trend (1988-2011).

PCBs in flounder
Flounder from the Inner Sørfjord was insignificantly polluted with PCB in fillet but showed concentrations of PCB in liver that exceeded presumed high background level.

Metals in blue mussel
In 2011 the blue mussel from some stations of the Sørfjord were moderately polluted by mercury, cadmium and lead. At these stations a significant downward trend was observe red at Kvalnes and Krossanes for mercury and Eitrheimsneset and Krossanes for cadmium and lead for the whole period (from 1987, 1989 or 1995 to 2011).

ppDDE in blue mussel
Blue mussel from Bjerkenes and Eitrheimsneset in the Inner Sørfjord and Ranaskjær near the mouth of the fjord were moderately to severely polluted with ppDDE. Kvalnes in the Mid Sørfjord had the highest concentrations.

Biological effects

Biological effects methods are included in the monitoring programme to evaluate whether marine organisms are affected by contaminants in their environment, something that cannot be assessed from concentrations of chemicals in tissues alone. Biological effects were investigated in cod from four areas: Inner Oslofjord, Lista (OH-pyrene only), Bømlo-Sotra (Karihavet) and the Inner Sørfjord. The median concentration of CYP1A protein levels was higher in the Inner Oslofjord compared to the Inner Sørfjord and Karihavet on the west coast, as was observed for the EROD activities. An explanation could be that the exposure to PCBs is higher in the Inner Oslofjord than in the Sørfjord and Karihavet. Since the year 2000, investigations have shown that EROD-activity in fish from the Inner Oslofjord is often higher than presumed cleaner stations. Median EROD-activities were, however, below the ICES/OSPAR assessment criterion (background assessment criteria, BAC) at all stations.

In 2011, the median concentration of OH-pyrene metabolites in bile from cod was higher in the Inner Oslofjord compared to samples from the Inner Sørfjord, the Bømlo-Sotra area and Lista. Changes in concentrations of PAHs measured in blue mussel from the Inner Oslofjord correlate moderately well with alterations in OH-pyrene concentrations in the bile of cod from the same area. Median OH-pyrene bile concentrations were in 2011 above the ICES/OSPAR assessment criterion (BAC) at all stations, except Lista (15B).

Reduced activities of ALA-D were shown in the Inner Oslofjord and the Inner Sørfjord, as compared to the Bømlo-Sotra area, also in 2011. Reduced activity of ALA-D reflects the higher exposure of lead in these areas.

Of the time series investigated for biological effects (imposex) of TBT in dog whelk, seven of eight stations showed significant downward trends. One station (Brashavn in the Varangerfjord) showed little effects and had no significant trend for the entire monitoring period. The effects from TBT were low (VDSI<2) at all stations investigated in 2011, however, 3 stations showed VDSI above the ICES/OSPAR assessment criteria (BAC).

Other important results

PBDEs and PFCs in cod

Polybrominated diphenyl ethers (PBDEs) and perfluroalkyl compounds (PFCs) have been investigated in cod liver since 2005. In 2011, the concentration of sum PBDE was highest in the Sørfjord and second highest in the Inner Oslofjord, which was opposite of what the results showed in 2010. PBDE was lowest in cod from Lofoten. BDE47 was the dominant PBDE in all samples. PFOS (usually the most abundant PFC) was highest in cod from Færder and lowest in Tromsø harbour. PFOSA (the second most abundant PFC) was highest in the Inner Oslofjord and lowest in Trondheim harbour.

PAHs and B[a]P in blue mussel

Blue mussel from two stations in the Ranfjord were markedly polluted by PAHs of which one station was severely polluted by benzo[a]pyrene (B[a]P). One blue mussel station in the Kristiansandsfjord was markedly polluted with B[a]P. Remedial actions have been implemented, however no significant trends were observed.

Blue mussel pollution index and reference index

Based on the occurrence of certain contaminants in blue mussel, a blue mussel pollution index and a reference index have been calculated from results of a group of polluted and non-polluted fjord areas. Based on nine fjord areas, that are affected by point sources of contaminants, the Pollution Index for 2011 was 2.8, which was 0.2 higher than in 2010. A value between 2 and 3 would be termed by the Klif environmental classification system as “markedly” polluted. For the Reference Index based on four fjord areas that are presumably little polluted with contaminants, the Index value for 2011 was 1.2, which was 0.2 higher than the index 2010. A reduction in the Pollution Index value indicates that contamination has decreased.

Sammendrag

Det norske bidraget til OSPARs felles overvåkingsprogram CEMP i 2010 inkluderer overvåking av miljøgifter i sediment og marine organismer (blåskjell, snegler, reker og fisk). Undersøkelsene i 2011 omfattet blåskjell (38 stasjoner inkludert stasjoner for beregning av forurensningsindeks), purpursnegl (8 stasjoner), strandsnegl (1 stasjon), torsk (11 stasjoner) og flatfisk (sandflyndre, skrubbe, rødspette, glassvar; 8 stasjoner) langs kysten fra Oslofjordområdet til Varangerfjorden. Stasjonene er lokalisert i områder med kjente eller antatte punktkilder av miljøgifter, i områder med diffus belastning som f.eks. byområder, og i mer avsidesliggende områder med antatt lav og diffus forurensning. Blåskjellstasjonene inkluderer supplerende stasjoner det norske indeksprogrammet. Programmet omfatter overvåking av metaller, klororganiske miljøgifter, pesticider, dioksiner, brominert flammehemmere, perfluorerte stoffer samt undersøkelse av biologiske effekter.

Undersøkelsene i 2011 bidrar med resultater til totalt 1035 tidsserier av utvalgte representative miljøgifter eller biomarkører. 329 av disse viste signifikante trender hvorav 277 viste en nedadgående (i hovedsak klororganiske miljøgifter) og 52 viste en oppadgående trend (i hovedsak metaller). Dominans av nedadgående trender tyder på mindre forurensning av miljøgifter. Av de 628 median miljøgift-konsentrasjonene vurdert i 2011 hvor stoffene kunne klassifiseres etter Klifs klassifiseringssystem var 78,5 % ubetydelig forurenset, 16,9 % var moderat forurenset, 3,5 % var markert forurenset (i hovedsak kadmium, bly, krom, HCB, PAHer), 0,6 % var sterkt forurenset (benzo[a]pyren, karsinogene-PAHer, ppDDE) og 0,5 % var meget sterkt forurenset (dioksiner). Tilfellene med sterk forurensning gjaldt dioksiner in blåskjell fra Grenlandsfjordområdet, og her var det registrert nedadgående trender. Torskefilet fra Indre Oslofjorden var markert forurenset med kvikksølv og hvor en oppadgående trend ble funnet. Dette var den eneste oppadgående trend hvor median konsentrasjonen i 2011 var markert, sterk eller meget sterk forurenset. Torsk og blåskjell fra ytre deler av Vest- og Nordkysten var i hovedsak ubetydelig forurenset. Tilstand og utvikling i to områder som er påvirket av forurensninger er som følger:

Konsentrasjoner av miljøgifter i Oslofjorden, Hvaler og Grenlandsfjorden

Metaller i torsk

Filet av torsk fra Indre Oslofjord var markert forurenset av kvikksølv, og det var en signifikant oppadgående trend for perioden 1984-2011. Torskelever fra Indre Oslofjord hadde nivåer av bly og kadmium som var over antatt høyt bakgrunnsnivå, og det var signifikant oppadgående trend for kadmium i torskelever for den samme perioden. Nivået av kvikksølv i torskefilet fra Ytre Oslofjord (Færder) har hatt en liten økning siden 2009, og var moderat forurenset men hadde ingen signifikant trend.

PCB i torsk

Torskelever fra Indre Oslofjord var markert forurenset av PCB, men uten noen entydig trend. Filet av torsk fra Indre Oslofjord var i 2011 moderat forurenset av PCB men hadde ingen signifikant trend.

Metaller i blåskjell

Blåskjell fra Hvalerområdet og Grenlandsområdet var opptil moderat forurenset av kvikksølv. De andre blåskjellstasjonene i Oslofjordområdet var ubetydelig forurenset av kvikksølv. Blåskjell fra Bjørkøya i Grenlandfjordsområdet var moderat forurenset av kvikksølv og hadde signifikant nedadgående langtidstrend. For kvikksølv var det oppadgående trender i blåskjell fra Midtre Oslofjord ved Solbergstrand og Håøya og fra Akershuskaia i Indre Oslofjord. Konsentrasjonene i 2011 var imidlertid lave Blåskjell fra Gressholmen var moderat forurenset av kadmium, og hadde oppadgående trend for hele undersøkelsesperioden. Blåskjell fra Bjørkøya var også moderat forurenset av kadmium men hadde ingen signifikant trend.

PCB i blåskjell

Blåskjell fra Gressholmen, Akershuskaia og Gåsøya i Indre Oslofjord var moderat forurenset av PCB. Det var signifikant nedadgående trender for PCB i blåskjell fra Gressholmen og Akershuskaia for hele overvåkingsperioden. De andre blåskjellstasjonene i Oslofjordområdet var ubetydelig forurenset av PCB.

Dioksiner i blåskjell
Blåskjell fra stasjonene i Grenlandsfjorden var meget sterkt forurenset av dioksiner. Blåskjellene i dette området har vært sterkt til meget sterkt forurenset av dioksiner i hele overvåkingsperioden (1996-2011). Imidlertid, var det signifikant nedadgående trender for dioksiner i blåskjell fra Bjørkøya og Croftholmen (fra henholdsvis 1996 og 2002 til 2011) som tyder på forbedringer i dette området. Blåskjell fra Gressholmen og Risøy var ubetydelig forurenset med dioksiner

Konsentrasjoner av miljøgifter i Sørfjorden og Hardangerfjorden

Metaller i torsk
Torskefilet fra Indre Sørfjorden var moderat forurenset av kvikksølv. Torsk fra Hardangerfjorden (Strandebarm) var bare ubetydelig forurenset av kvikksølv. Det var en signifikant oppadgående trend for kadmium i torskelever og signifikant nedadgående trend for bly i torskelever fra Indre Sørfjorden for overvåkingsperioden 1986-2011.

Organiske miljøgifter i torsk
Lever og filet av torsk fra Indre Sørfjorden var moderat forurenset av PCB. Torskelever og -filet fra Hardangerfjorden (Strandebarm) var ubetydelig forurenset av PCB. Det var en signifikant nedadgående trend for PCB i torskelever fra Strandebarm for perioden 1990-2011.
Torskelever og -filet fra både Indre Sørfjorden og Strandebarm var moderat forurenset av ppDDE. Torsk fra Strandebarm hadde nedadgående trend for ppDDE i både lever og filet for den samme perioden.

Hg i skrubbe
I filet fra skrubbe fra Indre Sørfjorden var kvikksølv på over antatt høyt bakgrunnsnivå, og hadde stigende trend for perioden 1986-2011.

PCB i skrubbe
Skrubbe fra Indre Sørfjorden var moderat forurenset av PCB i fileten og hadde nivå av PCB i lever som var over antatt høyt bakgrunnsnivå.

Metaller i blåskjell
I 2011 var blåskjellene fra noen av stasjonene i Sørfjorden moderat forurenset av kvikksølv, kadmium og bly. Det var signifikant nedadgående trender for kvikksølv i blåskjell fra Kvalnes og Krossanes. Det var også signifikant nedadgående trender for kadmium og bly i blåskjell fra Eitrheimsneset og Krossanes.

ppDDE i blåskjell
Blåskjell fra Byrkjenes og Eitrheimsneset i Indre Sørfjorden og Ranaskjær utenfor munningen av Sørfjorden var moderat til sterkt forurenset av ppDDE. Kvalnes i den midtre delen av Sørfjorden var sterkest forurenset av ppDDE.

Biologiske effekter

Biologiske effekt-parametre er inkludert i overvåkingsprogrammet for å bedømme eventuell forurensningspåvirkning på organismer, noe som ikke kan gjøres på basis av konsentrasjoner av kjemikalier i vevsprøver alene. Biologiske effekt-parametre ble undersøkt i torsk fra fire stasjoner langs kysten: Indre Oslofjord, Lista (bare OH-pyren), Bømlo–Sotra og Indre Sørfjorden. Effekt-parametrene er: OH-pyren (pyren metabolitt; markør for PAH-eksponering), δ-aminolevulinsyre dehydrase (ALA-D; markør for bly-eksponering), og mengde protein (CYP1A), samt aktivitet av cytokrom P4501A (EROD; markør for plane hydrokarboner, slik som PCB/PCN, PAH og dioksiner). Konsentrasjonen av CYP1A protein i torskelever var høyere i Indre Oslofjord enn i Sørfjorden og Karihavet. Dette ble også funnet for EROD aktivitet. En mulig forklaring kan være at eksponering for PCB er høyere i Indre Oslofjord enn i Sørfjorden og Karihavet. Siden 2000 har undersøkelser vist at EROD-aktivitet i fisk fra indre Oslofjord ofte er noe høyere enn på mindre belastede lokaliteter. Median EROD-aktiviteter var imidlertid lavere enn ICES/OSPAR kriteriet (*background assessment criteria*, BAC) på alle stasjonene.

I 2011 var konsentrasjonen av OH-pyren metabolitter i galle fra torsk høyere i Indre Oslofjord enn fra Indre Sørfjorden, Karihavet og Lista. Endringer i PAH-konsentrasjoner i blåskjell fra Indre Oslofjord korrelerte rimelig godt med OH-pyren i torskegalle fra samme område. Median OH-pyren konsentrasjon i galle var i 2011 høyere enn ICES/OSPAR kriteriet (BAC) på alle stasjoner, unntatt ved Lista (15B).

Redusert ALA-D aktivitet ble observert også i 2011 i Indre Oslofjord og Indre Sørfjorden, sammenlignet med Bømlo-Sotra-området. Redusert ALA-D aktivitet gjenspeiler den høyere eksponeringen for bly i disse områdene.

Biologiske effekter av TBT (imposex) ble undersøkt på purpursnegl. Sju av åtte stasjoner hadde signifikant nedadgående trender. En av stasjonene (Brashavn i Varangerfjorden) hadde ingen signifikant trend, og har vært meget lav i hele overvåkingsperioden. Effektene av TBT var lave (VDSI<2) på alle de undersøkte stasjonene i 2011, men 3 stasjoner viste VDSI over ICES/OSPAR kriteriet (BAC).

Andre viktige resultater

PBDEer og PFCer i torsk

Polybromerte difenyletere (PBDEer) og perfluroalkylerte stoffer (PFCer) har vært undersøkt i torskelever siden 2005. I 2011 var den høyeste konsentrasjonen av sum-PBDE i Sørfjord og deretter I Indre Oslofjord som var det motsatte av det undersøkelsene i 2010 viste. PBDE verdiene var lavest i torsk fra Lofoten. Det var mest av BDE47 av PBDE-stoffene i alle prøver. PFOS (det PFC-stoffet som oftest forekommer) var høyest i torsk fra Færder og lavest i Tromsøhavn. PFOSA (det PFC stoffet som forekommer nest oftest) var høyest i Indre Oslofjord og lavest i Trondheimhavn.

PAHs og B[a]P i blåskjell

Blåskjell fra to stasjoner I Ranfjord var markert forurenset av PAH hvorav en stasjon var sterkt forurenset av benzo[a]pyren (B[a]P). En stasjon Kristiansand var markert forurenset av B[a]P. Tiltak har vært gjennomført, men ingen signifikante trender har ennå blitt registrert.

Blåskjell forurensingsindeks og referanseindeks

Basert på konsentrasjoner av utvalgte miljøgifter har blåskjell fra bestemte forurensede stasjoner og fra lite forurensede stasjoner dannet grunnlag for beregning av hhv. en forurensnings- og referanseindeks. De utvalgte forurensede stasjoner er fra ni fjordområder. Blåskjell forurensningsindeks for 2011 var 2.8 og 0.2 høyere enn i 2010. En verdi mellom 2 og 3 kan betraktes som markert forurenset i Klifs klassifiseringssystem av miljøkvalitet. Blåskjell referanseindeks er basert på stasjoner fra fire områder, og indeksen i 2011 var 1.2, som var 0.2 høyere enn i 2010. En verdi mellom 1 og 2 kan betraktes som moderat forurenset i systemet.

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2. Introduction

2.1. Background

Environmental concerns include the risks due to the pollution of air, soil and water. The Norwegian Pollution Monitoring Programme, administered by the Norwegian Climate and Pollution Agency (Klif), is designed to deal with these aspects. A part of this programme focuses on the levels, trends and effects of hazardous substances in fjords and coastal waters, which also represents the Norwegian contribution to the Coordinated Environmental Monitoring Programme (CEMP). CEMP is a common European monitoring programme under the auspices of Oslo and Paris Commissions (OSPAR). The Norwegian contribution to CEMP addresses several aspects of OSPAR's assessment of hazardous substances. For this report, the term CEMP only refers to the Norwegian contribution.

An overview of CEMP stations in Norway is shown in the tables in Appendix E and maps in Appendix F. The program has included the monitoring of sediment, seawater and biota since 1981 with particular emphasis on four areas:

- Oslofjord-area (including the Hvaler area, Singlefjord and Grenland fjords area)
- Sørfjord/Hardangerfjord
- Orkdalsfjord area

During 1990-1995 and 2008-2011 Norway has also included

- Arendal and Lista areas

The previous investigations (cf. Appendix A) have shown that the Inner Oslofjord area has enhanced levels of PCBs in cod liver, mercury, lead and zinc in sediments and moderately elevated values of mercury in cod fillet. Investigations of the Sørfjord/Hardangerfjord have shown elevated levels of PCBs, DDT, cadmium, mercury and lead. It can be noted that environmental status is classified according to environmental quality criteria (based on Klif's classification system or presumed background levels) and must not be confused with limit values for human consumption and associated advice issued by the Norwegian Food Safety Authorities. Investigations in Orkdalsfjord were discontinued during the period 1996 to 2003 and from 2006. Blue mussel from the Orkdalsfjord were monitored for the period 1984-1996, and then again in 2004-2005 when bulk samples from three stations were investigated. The results from these investigations have been reported earlier (Green *et al.* 2007, Green & Ruus 2008).

In addition to the monitoring of Oslofjord area and Sørfjord/Hardangerfjord CEMP also includes the annual monitoring contaminants at selected stations in Lista and Bømlo areas on the south and west coast of Norway, respectively. During the periods 1993-1996 and 2006-2007 CEMP also included sampling of blue mussel from reference areas along the coast from Lofoten to the Russian border. The sampling also includes fish from four key areas north of Lofoten in the Finnsnes-Skjervøy area, Hammerfest-Honningsvåg area, and Varanger Peninsula area. Fish from the Lofoten and Varanger Peninsula areas are sampled annually. The intention is to assess the level of contaminants in reference areas, areas that are considered to be little affected by contaminants, and to assess possible temporal trends.

Concentrations of metals, organochlorines (including pesticides), polycyclic aromatic hydrocarbons, polybrominated diphenyl ethers or perfluorinated compounds in blue mussel or fish were determined at the Norwegian Institute for Water Research (NIVA). Dioxins were analysed by the Norwegian Institute for Air Research (NILU). TBT analyses on blue mussel and dog whelk were done at Eurofins.

Analytical methods have been described previously (Green *et al.* 2008a). Parameter abbreviations are given in Appendix C.

Biological effects methods, BEM or biomarkers were introduced in the Norwegian CEMP (former JAMP) in 1997. The purpose of these markers is, by investigations on molecular/cell/individual level, to give warning signals if ecosystems are affected by toxic compounds, i.e. contaminants, and to assist in establishing an understanding of the specific mechanisms involved. The reason to use biological effects methods within monitoring programmes is to evaluate whether marine organisms are affected by contaminant inputs. Such knowledge cannot be derived from tissue levels of contaminants only. Just one reason is the vast number of chemicals (known and unknown) that organisms are exposed to, in combination, in the environment. In addition to enable conclusions on the health of marine organisms, some biomarkers assist in the interpretation of contaminant bioaccumulation. The biological effects component of the Norwegian CEMP is possibly the most extensive of its type in Europe and includes imposex in gastropods as well as biomarkers in fish. The methods for fish were selected for specificity, for robustness and because they are among a limited set of methods proposed by international organisations, including OSPAR and ICES.

2.2. Purpose

The general purpose of CEMP is to assess the state of contamination in the marine environments in order to provide a basis for remedial action. The Norwegian contribution to CEMP is designed to address issues relevant to OSPAR (cf. OSPAR 2007, SIME 2004a) including OSPAR priority substances (SIME 2004b). Moreover, in this regard it will be relevant to implementation of international initiatives such as The Water Framework Directive (WFD) (2000/60/EC) and the Marine Strategy Framework Directive (MSFD) (2008/56/EC). One of the goals of both of these EU directives is to achieve concentrations of hazardous substances in the marine environment near background values for naturally occurring substances and close to zero for manmade synthetic substances. OSPAR has also adopted this goal (OSPAR 1998).

The state of contamination is divided into three issues of concern: levels, trends and effects. These are applied to the following regions:

- Oslofjord, Hvaler and Grenland area
- Sørfjord/Hardangerfjord
- Selected stations, remote from known point sources, along the entire coast of Norway
- Selected impacted blue mussel stations used for determination of Klif’s pollution index

Different monitoring strategies are used, in particular with regard to the selection of indicator media (sediment, blue mussel, cod liver etc.) and sampling frequencies (generally every 5-10 years for sediment, annually for biota). The programme may be supplemented with long or short-term investigations of hazardous substances that are not routinely monitored.

Where possible, CEMP is integrated with other national monitoring programmes to achieve a better practical and scientific solution to assessing the levels, trends and effects of micropollutants. In particular, this concerns Comprehensive Study on Riverine Inputs and Direct Discharges (RID) and The Norwegian Costal Monitoring Programme (*Kystovervåkingsprogrammet*, KYO). Both programmes are operated by NIVA on behalf of Klif.

3. Materials and methods

3.1. Sampling

The objective for the performed monitoring is to obtain updated information on levels and trends of selected hazardous substances known to have a potential for causing detrimental biological effects on humans and wildlife that feed on marine organisms. In the marine environment, these substances may accumulate in the bottom sediment/porewater and in fish and shellfish. Because these fish and shellfish are a food source for marine wildlife and humans, the substances may be transferred to higher levels in the food chain. In humans, long-term exposure to or consumption of sea foods contaminated with these substances can cause severe health problems. The source and pathway of contamination is not always obvious. Although hot spots tend to be directly linked to particular human activities, the substances are also found in organisms that are collected far away from point sources because of transport by ocean currents, atmosphere or migration of prey species. The transport of these substances by these means cannot be disregarded as an explanation for some of the results presented in this report.

Concentrations of hazardous substances in sediment/porewater, mussels and fish constitute time-integrating state indicators for coastal water quality. With respect to organism, these substances have a tendency to accumulate in their tissues (bioaccumulation), and show higher concentrations relative to their surroundings (water and in some cases also sediment). Hence, it follows that substances may be detected, which would otherwise be difficult when analysing water or sediment. Another advantage of using concentrations in biota as indicators, as opposed to using water or sediment, is that they are of direct ecological importance as well as being important for human health considerations and quality assurance related to commercial interests involved in harvesting marine resources.

CEMP uses sediment monitored at about 10-year intervals and blue mussels, cod, and several flatfish species monitored on a yearly basis. Blue mussel are attached to shallow-water surfaces, thus reflecting exposure at a fixed point (local pollution). Mussels are also abundant, robust and widely monitored in a comparable way. Mussels are, however, restricted to the coastal zone. Cod is a widely distributed and commercially important fish species. Cod and flatfish are predators and, as such, will reflect contamination levels in their prey.

Samples were collected and analysed, where practical, according to OSPAR guidelines (more explicitly for 2011 sampling: OSPAR 2003b and OSPAR 2009)[1] and screened and submitted to ICES by agreed procedures (ICES 1996).

The sampling for 2011 involved blue mussel (38 stations), dog whelk (eight stations), cod (11 stations), and flatfish (eight stations) (***Figure 1*** - ***Figure 4***, cf. Appendix E). Since 2009, the monitoring included the three cod-stations in the harbour areas of: Kristiansand (st. 13BH), Trondheim (st. 80BH) and Tromsø (st. 43BH). The Norwegian CEMP has been expanded since 1989 to include monitoring also in more diffusely polluted areas. Sufficient samples have not always been practical to obtain. When this applies to blue mussel, a new site in the vicinity is often chosen. As for fish, the quota of 25 individuals (±10 %), indicated in (Appendix E), was not always met.

[1] See also www.ospar.org/eng/ > measures > list of other agreements

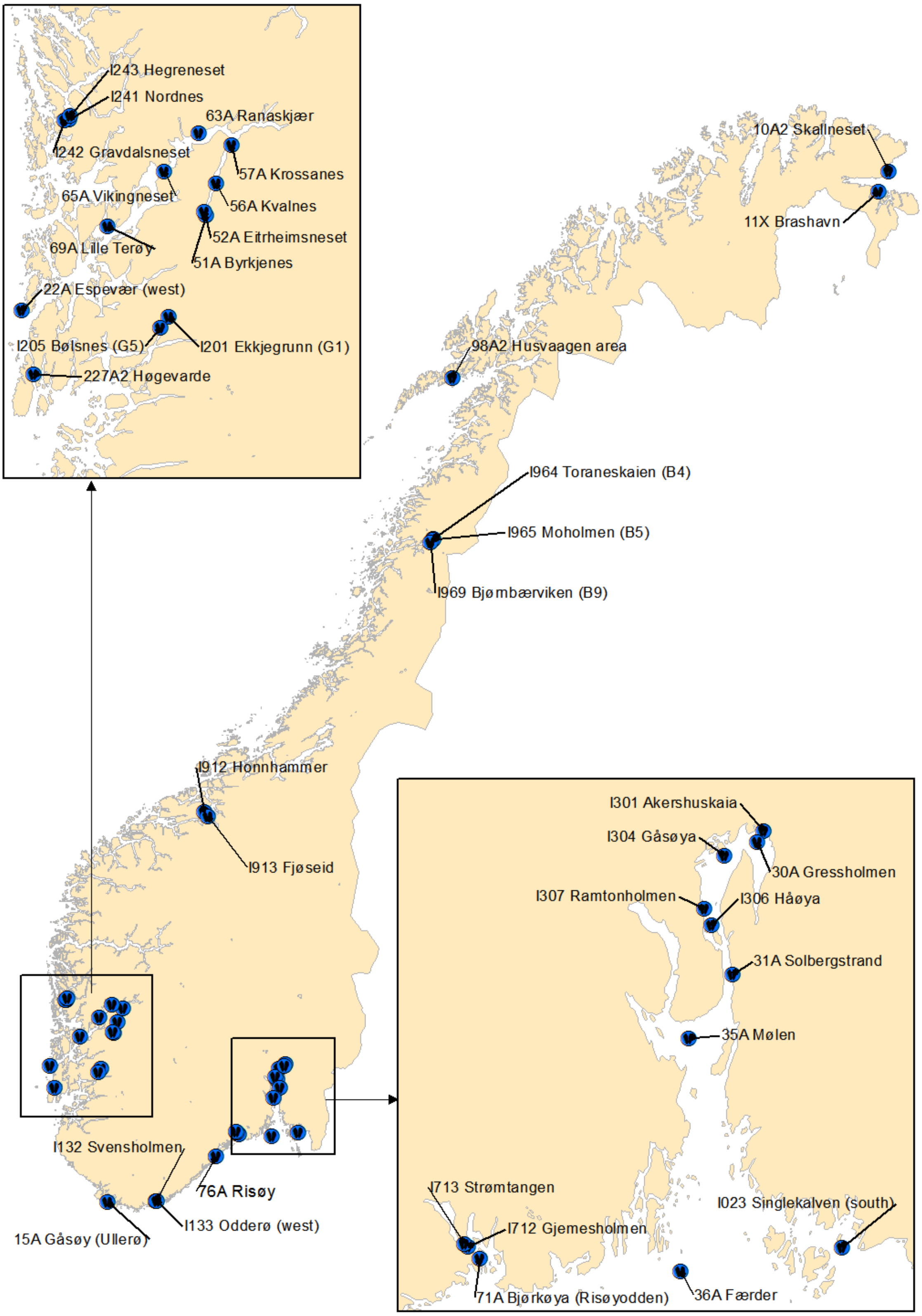


Figure 1. *Stations where blue mussel was sampled in 2011. See also station information in Appendix E and detailed maps in Appendix F.*

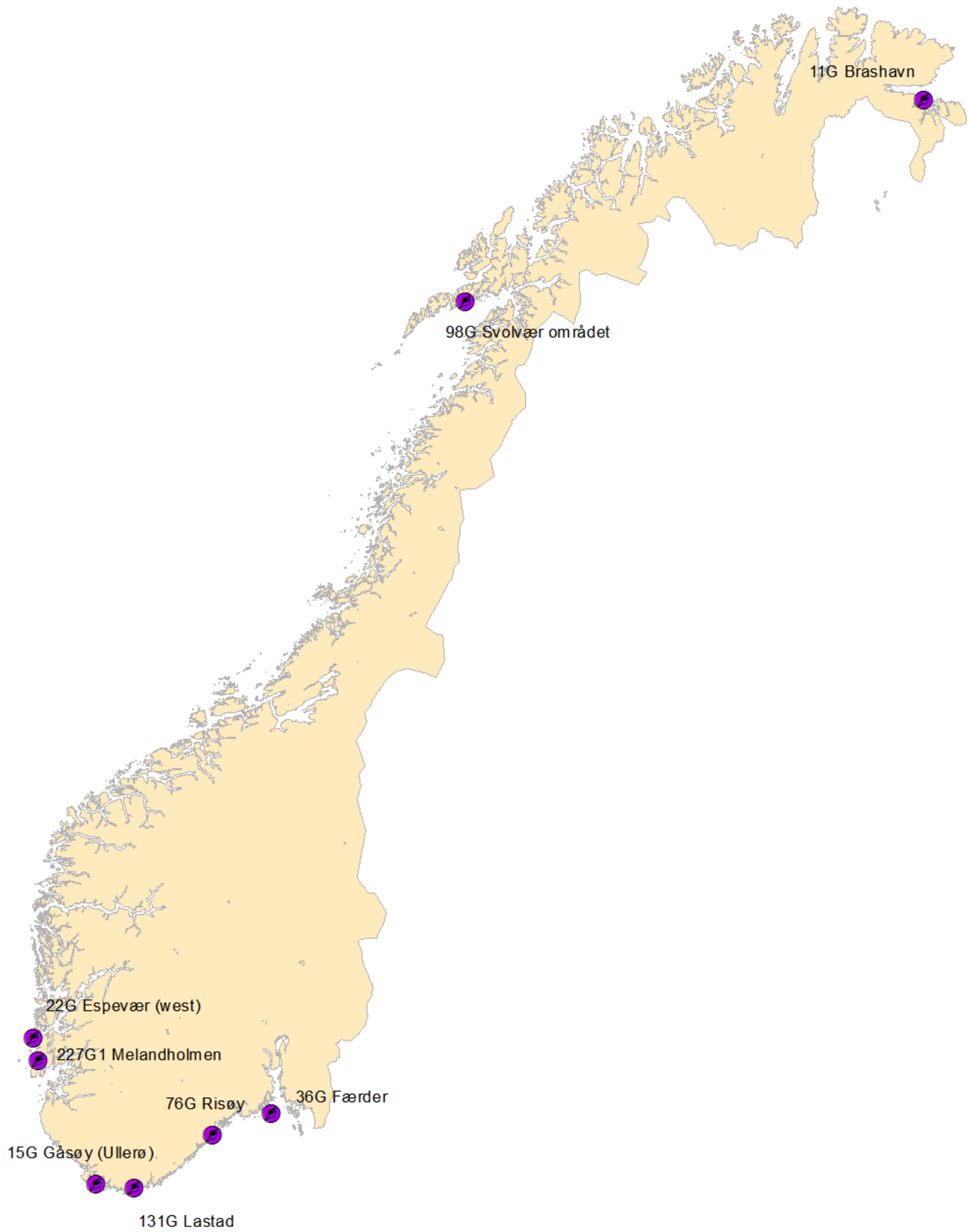


Figure 2. *Stations where dog whelk was sampled in 2011. See also station information in Appendix E and detailed maps in Appendix F.*

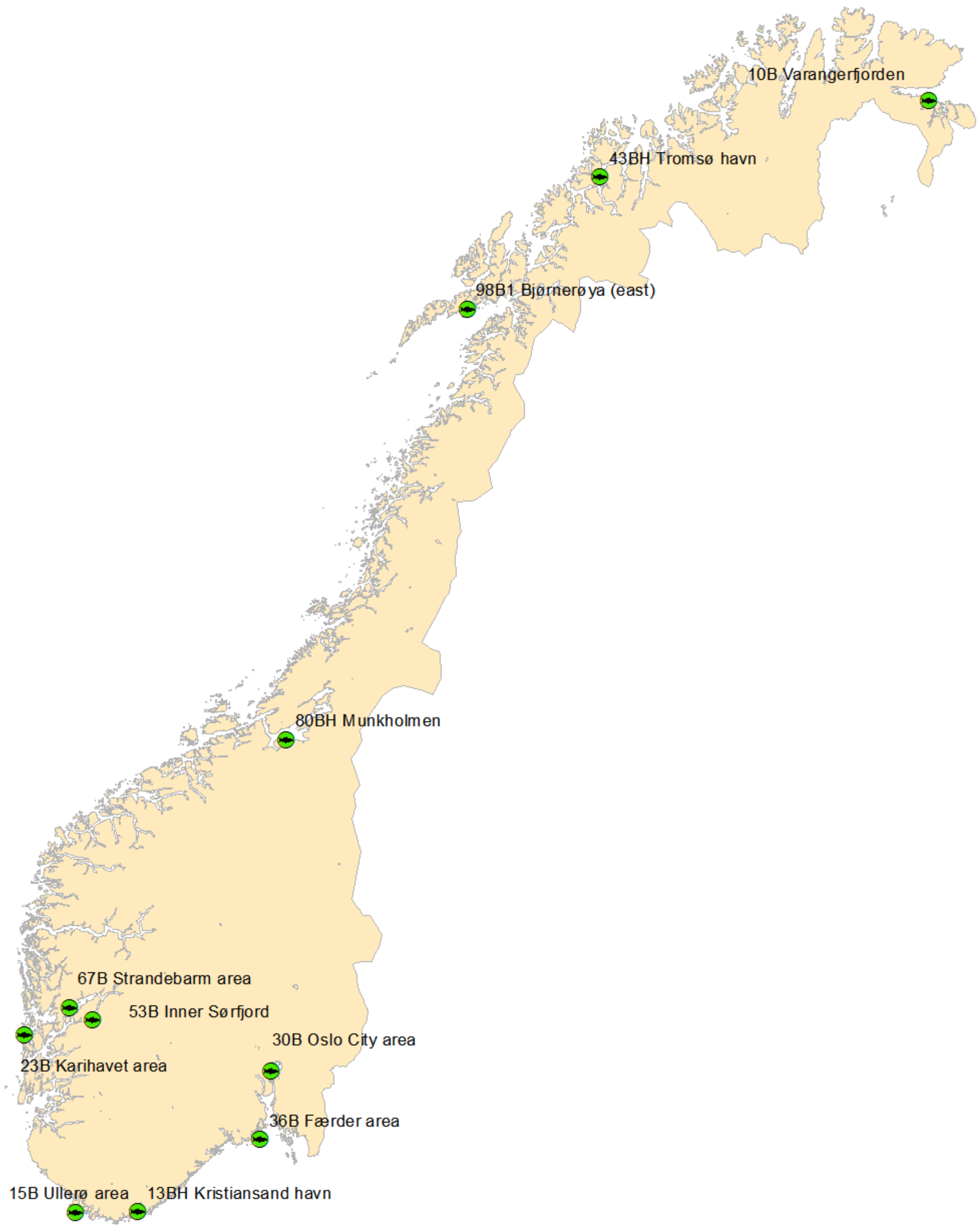


Figure 3. *Stations where cod was sampled in 2011. See also station information in Appendix E and detailed maps in Appendix F.*

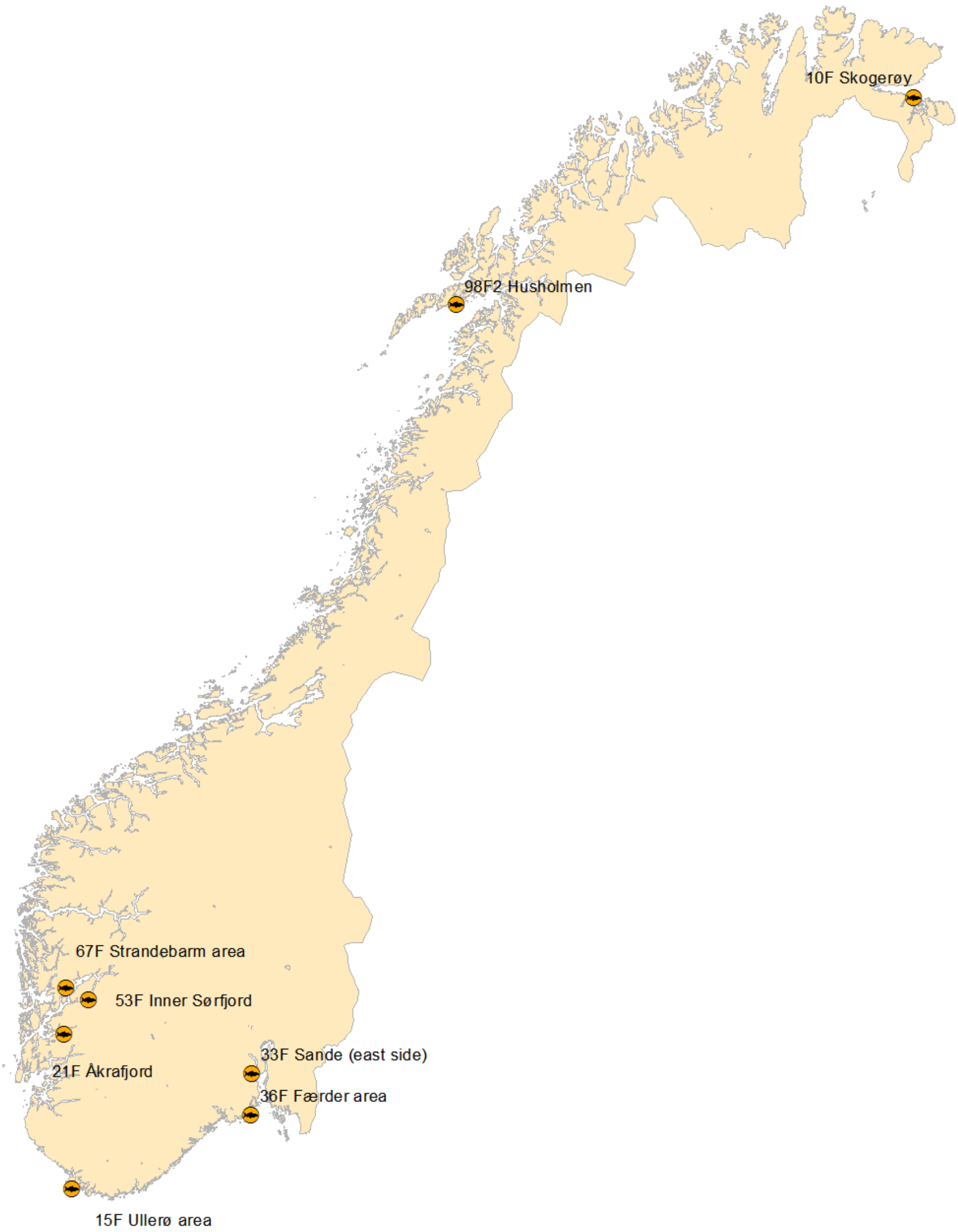


Figure 4. *Stations where flatfish were sampled in 2011. See also station information in Appendix E and detailed maps in Appendix F.*

Fish
For fish, 25 individuals of Atlantic Cod (*Gadus morhua)* or one flatfish species have been sampled for each station. If possible, the same species as collected in previous years at the selected stations where used. The order of preference for flatfish species is according to the OSPAR guidelines: dab (*Limanda limanda*), flounder (*Platichthys flesus*), plaice (*Pleuronectes platessa*), and megrim (*Lepidorhombus wiffiagonis*). For some areas the first preferred flatfish species was not available. In such cases the same species collected as in previous years at the selected stations were used to obtain best possible time series. Occasionally, ling (*Molva molva*) and/or tusk (*Brosme brosme*) are collected to investigate conditions in deeper waters (se Appendix E and also Green *et al.* 2010a).

If possible, the 25 individuals are sampled in five length classes (Table 1), five individuals in each class. Tissue samples from each fish are either prepared in the field and stored frozen (-20°C) until analysis or the fish is frozen directly and later prepared at NIVA.

Table 1. *Target length groups for sampling of cod and flatfish.*

Size-class	Cod (mm)	Flatfish (mm)
1	370-420	300-320
2	420-475	320-340
3	475-540	340-365
4	540-615	365-390
5	615-700	390-420

Cod
Cod were sampled at 11 stations along the Norwegian coast (***Figure 3***, Appendix E and maps in Appendix F). Cod have been collected in the port areas in Kristiansand (st. 13BH), Trondheim (st. 80BH) and Tromsø (st. 43BH) since 2009. The cod were sampled from August 29th to November 7th 2011. All the cod were sampled by local fishermen except for the cod in the Inner Oslofjord (st. 30B) that was collected by NIVA on November 7th 2011 by trawling from the research vessel *F/F Trygve Braarud* owned by University of Oslo.

Flatfish
Flatfish were collected at 8 stations along the Norwegian coast (***Figure 4***, Appendix E and maps in Appendix F). The flatfish species were dab (*Limanda limanda*), flounder (*Platichthys flesus*), plaice (*Pleuronectes platessa*) and megrim (*Lepidorhombus wiffiagonis*). The flatfish were collected in the period from September 1st to October 1st 2011. All flatfish were sampled by local fishermen.

Blue mussel
Blue mussel (*Mytilus edulis*) were sampled at 38 stations (including supplementary stations for Index and TBT) located along the coast of Norway (***Figure 1***, Appendix E and maps in Appendix F). The Index Programme in Norway started in 1995. It is a set of key contaminants monitored in blue mussel from selected fjords with historical discharges of contaminants. The indexes from the contaminated areas ("Pollution Index") are related to corresponding measurements at reference sites ("Reference Index"). In total, the monitoring programme covers a number of 32 pollution and 6 reference site stations in all five fjords.

Locations of stations are shown in ***Figure 1*** and Appendix F. The stations were chosen to show highly polluted stations and reference stations distributed along the Norwegian coast.

There is some evidence that the effect of shell length and difference in bulk sample size are of little or no significance (WGSAEM 1993; Bjerkeng & Green 1994). However, for historical reasons, three size groups of blue mussel (*Mytilus edulis*) have been sampled from most of the stations: 2-3, 3-4 and 4-5 cm. In order to obtain about 50 g wet weight, which is necessary for analyses and potential reanalyses of all variables, fifty to hundred individuals were sampled for each class. In 1992 a stricter approach (ICES 1992) was applied for new stations north of the Bømlo area at which 3 pooled samples of 20 individuals each were collected in the size range of 3-5 cm. Pending revision of the guidelines, all blue mussel samples from the new stations are collected according to this ICES method. Shell length was measured by slide callipers. The blue mussel were scraped clean on the outside by using knives or scalpels before taking out the tissue for the analysis.

To empty the intestinal canal (depuration) the mussels were kept alive for 12-24 hours in seawater (about 15 litres) collected in close proximity to the station. The shells were spread out on a perforated polyethylene platform and submerged in the collected seawater in a container. An aquarium pump supplied air to the bottom of the container, and kept the water oxygenated. The container used was lined with polyethylene plastic bags which were replaced for each station or sample. The temperature was kept at ambient conditions. Following depuration, the mussels were shucked and frozen (-20°C). The depuration was omitted if there was sufficient evidence that for a specific population/place the process has no significant influence on the body burden of the contaminants measured (cf. Green 1989; Green *et al.* 1996). With one exception (st. 227A2, Høgevarde in the Haugesund area) those samples that were not depurated were part of the Klif blue mussel pollution index (see Appendix M1).

The blue mussel samples were collected from August 28th to November 27th, 2011. Generally, blue mussel are not abundant on the exposed coastline from Lista (southern Norway) to the north of Norway. A number of samples were collected from dock areas, buoys or anchor lines. All blue mussel were collected by NIVA except for the blue mussel collected in the Ranfjord, Lofoten and Varangerfjord, which were collected by local contacts.

Dog whelk and periwinkle

Concentrations and effects of organotin in the dog whelk (*Nucella lapillus*) or periwinkle (*Littorina littorea*) were quantified at eight stations and one station, respectively, located along the coast of Norway (***Figure 2***, Appendix E and maps in Appendix F). TBT-induced development of male sex-characters in females, known as imposex, was quantified by the *Vas Deferens Sequence Index* (VDSI) analysed according to OSPAR-CEMP guidelines. The VDSI ranges from zero (no effect) to six (maximum effect) (Gibbs *et al.* 1987). Detailed information about the chemical analyses of the animals is given in Følsvik *et al.* (1999).

Effects (imposex) and concentrations of organotin in dog whelk or periwinkle were investigated using 50 individuals from each station. Individuals were kept alive in a refrigerator (at +4°C) until possible effects (imposex) were quantified. All snails were sampled by NIVA except for the dog whelk collected in Lofoten and in the Varangerfjord. The snails samples were collected from September 10th to October 27th 2011.

3.2. Chemical variables

Hazardous substances have been analysed in different species tissues (Table 2).

Table 2. *Number of stations (see Appendix E) analysed for each of the parameters and indicator media with results for 2011. Indicator media include: selected tissues from blue mussel, dog whelk, Atlantic cod and flatfish species. (See Appendix C for description of chemical codes.)*

Description	Blue mussel, soft body	Dog-whelk, soft body	Common periwinkle soft body	Atlantic cod bile	Atlantic cod blood	Atlantic cod liver	Atlantic cod fillet	Flatfish liver	Flatfish fillet
Cd, Cu, Pb, Zn, Ag, As, Co, Cr, Ni	38					11		8	
Ba, Mo, V	1								
Hg	38						11		8
TBT [1)]	15	8	1						
PCBs [2)]	32					11	11	8	8
HCB	32					11	11	8	8
DDT, DDE, DDD	32					11	11	8	8
α-, γ-HCH	32					11	11	8	8
Dioxins [3)]	7								
PBDE [4)]						8			
PFC [5)]						8			
PAHs [6)]	16								
Biological effects methods		8 imposex		4 OH-pyrene	3 ALA-D	3 EROD-activity, CYP1A			

[1)] Includes: DBTIN, DPTIN, MBTIN, MPTIN, TBTIN, TPTIN.
[2)] Includes the congeners: CB-28,-52,-101,-105,-118,-138,-153,-156,-180, 209, 5-CB, OCS and, when dioxins are analysed, the non-orto-PCBs, i.e. CB-77, -81, -126, -169.
[3)] Includes: CDD1N, CDD4X, CDD6P, CDD6X, CDD9X, CDDO, CDF2N, CDF2T, CDF4X, CDF6P, CDF6X, CDF9P, CDF9X, CDFDN, CDFDX, CDFO,TCDD.
[4)] Polybrominated diphenyl ethers (PBDE), including brominated flame retardants, and includes: BDE28, BDE47, BDE49, BDE66, BDE71, BDE77, BDE85, BDE99, BDE100, BDE119, BDE138, BDE153, BDE154, BDE183, BDE205 (and for some samples BDE196 and BDE209).
[5)] Includes: PFNA, PFOA, PFHpA, PFHxA, PFOS, PFBS, PFOSA.
[6)] Includes (with NPDs): ACNE, ACNLE, ANT, BAP, BBJF, BEP, BGHIP, BKF. BAA. CHR, DBA3A, DBT, DBTC1, DBTC2, DBTC3, FLE, FLU, ICDP, NAP, NAPC1, NAPC2, NAPC3, PA, PAC1, PAC2, PAC3, PER, PYR.

An overview of the applied analytic methods are presented in ***Table 3***. Chemical analyses were performed on each cod liver. Mercury was analysed on fillet samples of each cod. Furthermore, Biological Effects Methods (BEM) were performed on individual cod. The remaining chemical analyses were performed on homogenates of each size class.

***Table 3.** Overview of method of analyses (See Appendix C for description of chemical codes).*

Medium analysed	Basis	Detection limit.	Methods	Sample description
Biota	w.w.	µg/kg		
Mercury (Hg)	w.w.	5	NS-EN 1483 + NIVA's accredited method E4-3	bulk or individual
Cadmium (Cd)	w.w.	100	NIVA's accredited method E10-4 and E8-3	bulk or individual
Lead (Pb)	w.w.	1000	NIVA's accredited method E10-4 and E8-3	bulk or individual
Copper (Cu)	w.w.	200	NIVA's accredited method E10-4 and E8-3	bulk or individual
Zinc (Zn)	w.w.	150	NIVA's accredited method E10-4 and E8-3	bulk or individual
Arsenic (As)	w.w.	2000	NIVA's accredited method E10-4 and E8-3	bulk or individual
Barium (Ba)	w.w.	100	NIVA's accredited method E10-4 and E8-3	bulk or individual
Cobalt (Co)	w.w.	200	NIVA's accredited method E10-4 and E8-3	bulk or individual
Chromium (Cr)	w.w.	200	NIVA's accredited method E10-4 and E8-3 or E9-5	bulk or individual
Nickel (Ni)	w.w.	400	NIVA's accredited method E10-4 and E8-3	bulk or individual
Vanadium (V)	w.w.	100	NIVA's accredited method E10-4 and E8-3	bulk or individual
Persistent organic pollutants[1)]	w.w.	0.05-0.1	NIVA's accredited method H3-4	bulk or individual
PAH[2)]	w.w.	0.2-0.5	NIVA's accredited method H2-4	bulk or individual
TBT and others[3)]	w.w.	0.2-2	Eurofins methods MM-916	bulk
PBDE except for BDE-209[4)]	w.w.	0.1-0.5	NIVA method	bulk or individual
BDE-209[5)]	w. w	0.5-5	NIVA method	bulk or individual
PFCs except for PFOSA[6)]	w.w.	0.3-1	NIVA method	bulk or individual
PFOSA[7)]	w.w.	1-10	NIVA method	bulk or individual
Dioxins[8)]	w.w.	0.0001-0.00002	NILU method	bulk
OH-pyrene[9)]			NIVA method	individual samples of cod bile
Dry matter			NIVA accredited method B3	bulk or individual
Biological Effect Methods (BEM)				
EROD[9)]			NIVA method, after ICES (TIMES no. 13)	individual fish liver samples
CYP1A (when EROD is analysed)[9)]			NIVA method, after ICES (TIMES no. 23)	individual fish liver samples
ALA-D[9)]			NIVA method, after ICES- (TIMES no. 34)	individual fish blood samples
Other analyses				
Age determination			Otolith	individual fish
Imposex			After ICES (TIMES no. 24)	one station with 50 individuals

[1)] In this regard concerns organochlorines and ncludes the PCB congeners: CB-28,-52,-101,-105,-118,-138,-153,-156,-180, 209, 5-CB, OCS and, when dioxins are analysed, the non-orto-PCBs, i.e. CB-77, -81, -126, -169, see parameter group OC-CB, OC-DD, OC-CL, in Appendix C.
[2)] Polycyclic aromatic hydrocarbons and includes (with NPDs): ACNE, ACNLE, ANT, BAP, BBJF, BEP, BGHIP, BKF. BAA. CHR, DBA3A, DBT, DBTC1, DBTC2, DBTC3, FLE, FLU, ICDP, NAP, NAPC1, NAPC2, NAPC3, PA, PAC1, PAC2, PAC3, PER, PYR.
[3)] Includes the mono-, di- and tri forms of both butyltin and phenyltin, see parameter group O-MET in Appendix C.
[4)] Polybrominated diphenyl ethers (PBDE), and includes: BDE28, BDE47, BDE49, BDE66, BDE71, BDE77, BDE85, BDE99, BDE100, BDE119, BDE138, BDE153, BDE154, BDE183, BDE205 (and for some samples BDE196), see parameter group OC-BB in Appendix C.
[5)] Limit of detection is higher in some of the samples.
[6)] Perfluorinated alkylated substances and includes PFOS, see parameter group PFAS in Appendix C.
[7)] Limit of detection is higher in some of the samples.
[8)] Includes a number of dibenzodioxins and dibenzo furans, see parameter group OC-DX in Appendix C.
[9)] Cod only.

Several laboratories have been used in performing the chemical analysis since 1981 (cf. Green *et al.* 2008a). However, in general chemical analyses have been done at NIVA. Two exceptions are the analyses of dioxins that are carried out by the Norwegian Institute for Air Research (NILU) and analyses of TBT that are carried out by Eurofins. A brief description of the analytical methods used follows (from Green *et al.* 2008a) below.

Metals were analysed at NIVA. Before 2002, these were done using Atomic Absorption Spectrometry (AAS). Biota samples were extracted using nitric acid. Sediment samples were extracted using 'Total' digestion with mineral acids including hydrofluoric acid (HF). Concentrations are determined either by Flame AAS (FAAS, for high concentrations) or Graphite furnace AAS (GAAS, for low concentrations). GAAS was always used for zinc and often for copper determinations. Since 2002, metals have been determined using Inductively Coupled Plasma Mass Spectrometry (ICP-MS), except for chromium, which was determined using GAAS or ICP-Atomic Emission Spectroscopy (ICP-AES). Mercury (total) has been analysed using Cold-Vapour AAS (CVAAS).

Polychlorinated biphenyls (PCBs) and other chlororganic hazardous substances in biota were analysed at Foundation for Scientific and Industrial Research at the Norwegian Institute of Technology-SINTEF and at NIVA. Both laboratories have used gas chromatograph, with capillary column, (GC) and an electron capture detector (ECD). Fat content was extracted using a mixture of cyclohexane and acetone on the target tissue. Among the individual PCBs quantified, seven (ΣPCB-7) are commonly used for interpretation of the results[1] (Table 4).

Table 4. *Suggested PCB-congeners, which are to be quantified in biota (ICES 1986).*

IUPAC/CB no.	Structure
28	2 4-4'
52	2 5-2'5'
101	2 4 5-2'5'
118	2 4 5-3'4'
138	2 3 4-2'4'5'
153	2 4 5-2'4'5'
180	2 3 4 5-2'4'5'

Dioxin analyses performed by NILU. Determinations are made on the fat content of the target tissue using a high resolution GC-MS equipped for specific PCDD/PCDF analysis. Results are presented on a wet weight basis.

Polycyclic aromatic hydrocarbons (PAH) have been analysed at NIVA using a GC coupled to a Mass-selective detector (MSD). The individual PAHs are distinguished by the retention time and/or significant ions. All seven potentially carcinogen PAHs (IARC 1987) are included in the list of single components determined to constitute the total concentration of PAH.

Organic tin compounds have been analysed at NIVA except for the years 2001-2002 when GALAB (Germany) and Eurofins (Denmark) did the analyses. Analyses at NIVA were done using a GC-MSD in Selected Ion Monitoring mode (SIM). The other laboratories used a GC equipped with Atomic Emission Detector (AED), a method comparable to NIVA's.

Analyses of polybrominated diphenylether (PBDE) in cod liver were done at NIVA. Determinations are made on the fat content of the target tissue using a GC-MSD-SIM. Some alterations were needed to analyse BDE196 and BDE209 *inter alia* with respect to the temperature programme and steps taken to reduce the samples exposure to light. Results are presented on a wet weight basis.

Analysis of perfluoralkyl compounds (PFCs) in cod liver were done at NIVA. The analysis procedure for determination of PFC were different in 2010 and 2011 compared to 2009. The previous method including 2009-samples were done by using wet material (1g) that was added internal standards and extracted with a mixture of 0,25M Na_2CO_3 and 0,5M tetrabutyl ammonium hydrogensulphate using ultrasonic bath. After pH-adjustment the sample was extracted with diethyl ether. The ether extract was evaporated and the sample was dissolved in methanol before the LC/MS/MS-analysis (ESI negative mode). Method for 2010/2011-samples were done by using wet material (1g) that was added internal standards and extracted with acetonitrile using ultrasonic bath. The sample extract was added water and applied on an OASIS WAX SPE column. After several cleaning steps the PFC-compounds were eluted with 2% ammonium hydroxide in methanol. The extract was evaporated and further cleaned with EnviroCarb before the LC/MS/MS-analysis (ESI negative mode).

For fish, the target tissues are; liver and fillet for hazardous substance and liver; blood and bile for the biological effects methods (BEM) (cf. Table 5). The fish fillet are analysed for the mercury and PCBs content. In addition, the age, sex, and visual pathological state for each individual are determined. Other measurements include: fish weight and length, weight of liver, liver dry weight and fat content

[1] Several marine conventions (e.g. OSPAR and HELCOM[1]) use ΣPCB-7 to provide a common basis for PCB assessment.

(% total extractable fat), the fillet dry weight and its % fat content. These measurements are stored in the database and published periodically (e.g. Shi *et al.* 2008).

The mussels are analysed for all contaminants including organotin. The shell length of each mussel is measured. On a bulk basis the total shell weight, total soft tissue weight, dry weight and % fat content is measured. These measurements are stored in the database and published periodically.

The dog whelk are analysed for all organotin compounds and biological effects (imposex[1]).

3.3. Biological-effect analyses

Five biological effects methods (BEM) have been applied on an annual basis. Each method is more or less specific for one or a group of contaminants. An overview of the methods, tissues sampled and contaminant specificity is shown in **Table 5**. One of the major benefits of BEM used at the individual level (biomarkers) is the feasibility of integrating biological and chemical methods, as both analyses are done on the same individual.

BEM-sampling requires that the target fish is kept alive until just prior to sampling. Sampling for BEM-analyses are performed by trained personnel, most often under field conditions. Immediately after the fish are inactivated by a blow to the head samples are collected and stored in liquid nitrogen. OH-pyrene analyses can also be done on bile samples stored at -20°C.

Table 5. *The relevant contaminant-specific biological effects methods applied on an annual basis.*

Code	Name	Tissue sampled	Specificity
OH-pyrene	Pyrene metabolite	fish bile	PAH
ALA-D	δ-aminolevulinic acid dehydrase inhibition	fish red blood cells	Pb
EROD-activity	Cytochrome P4501A-activity (CYP1A/P4501A1, EROD)	fish liver	planar PCB/PCNs, PAHs, dioxins
CYP1A	Relative amount of cytochrome P450 1A-protein	fish liver	Supporting parameter for EROD-activity
TBT	Imposex	snail soft tissue	organotin

3.4. Information on Quality Assurance

NIVA has participated in all the QUASIMEME international intercalibration exercises relevant to chemical and imposex analyses. For chemical analyses, these include Round 66 of July-October 2011 and Round 66 of January-April 2012, which both apply to the 2011 samples. These QUASIMEME exercises included nearly all the contaminants as well as imposex analysed in this programme. The Quality assurance programme for NIVA is similar to the 2010 programme (cf. Green *et al.* 2011). In addition, NIVAs laboratory was accredited in 1993 by Norwegian Accreditation and is since 2001 accredited in accordance with NS-EN ISO/IEC 17025 (Test 009). A summary of the quality assurance programme at NIVA can be found in Appendix B.

NIVA participated in the QUASIMEME Laboratory Performance Studies "Exercise 846-Round 57 imposex and intersex in Marine Snails BE1" in April-August 2009. Shell height, penis-length-male, penis-length-female, average-shell-height and female-male-ratio were measured. NIVA got the score satisfactory for average-shell-height and female-male-ratio. The assigned value for VDSI (imposex stage values of all females sampled/number of females) was 0.868 compared to NIVAs lab average of 1.474, which resulted in a high z score and was deemed unsatisfactory. This could be due to the fact that the snails examined varied from stage 0 up to stage 4. NIVA also participated in the next

[1] Vas Deferens Stage Index

arrangement of QUASIMEME Laboratory Performance Studies for imposex and intersex for Marine Snails "Exercise 911-Round 70 BE1". Results were submitted August 2012.

In addition to the QUASIMEME exercises, certified reference materials (CRM) and in-house reference materials (HSD) are also analysed routinely with the CEMP samples. It should be noted that for biota the type of tissue used in the CRMs do not always match the target tissue for analysis. Uncertain values identified by the analytical laboratory or the reporting institute are flagged in the database. The results are also "screened" during the import to the database at NIVA and ICES.

3.5. Norwegian blue mussel Pollution and Reference Indices (The Index Programme)

The Climate and Pollution Agency (Klif) is interested in obtaining a small group of indices to assess the united quality of the environment with respect to a selected group of contaminants and stations. The blue mussel have been selected as the target medium since 1995.

The Index scale varies from 1 to 5, where 1 means that stations within an area are insignificantly polluted (Class I in Klif's classification system) with respect to contaminants measured. Index of 5 would mean that at least one station from any fjord or area is classified as "Extremely polluted" (Class V in the Klif system) for at least one of the contaminants measured. More details concerning the methods and results for 2011 are shown in Appendix J.

3.6. Classification of environmental quality

Classifications used in earlier CEMP-reports are based on the Climate and Pollution agency environmental classification system (Molvær *et al.* 1997). The revised classification system (Bakke *et al.* 2007a) are used for sediments (not investigated in 2011). Focus is on the principle cases where median concentrations exceeded the upper limit to Class I in the Climate and Pollution Agency's (Klif's) environmental quality classification system (cf. Molvær *et al.* 1997). The relevant part of the system is shown in Appendix D, and includes unofficial conversion to wet weight basis for metals in blue mussel and dry weight basis for organic contaminants in blue mussel so that the system can still be applied to results presented on preferred bases:

- dry weights for metals, organochlorines and PAHs in blue mussel;
- wet weights for dioxins in blue mussel and metals in snails and all contaminants in fish muscle and liver.

The choice of bases aimed at meeting several considerations: scientific validity, uniformity for groups of contaminants for particular tissues and a minimum loss of data. As to the latter, the choice of bases will affect the number of data that can be included in the assessment, depending on available information on dry weights, wet weights and lipid weights.

The system has five classes from Class I, insignificantly polluted, to Class V, extremely polluted. However, the system does not cover all the contaminants for the species and tissues used in CEMP. To assess concentrations not included in the system provisional presumed high background values were used (cf. Appendix D). The factor by which this limit or the Class I limit is exceeded is calculated (cf. Appendix H). High background concentration corresponds to the upper limit to Class I; insignificantly polluted, which in this context has no statistical implications.

The median concentration are assessed according to the Klif system, but where this is not possible, presumed high background levels are used. The term "significant" refers to the results of a statistical analysis of linear trends and can be found in the tables in Appendix H or figures in Appendix I. It should be noted that there is in general a need for periodic review and supplement of this list of limits in the light of results from reference localities and introduction of new analytical methods, and/or units. Because of changes in the limits, assessments of presumed high background levels over the years may not correspond.

Recommendations for changes to Class I (cf. Knutzen & Green 2001b, Green & Knutzen 2003) have been taken into account in this report. Revisions to corresponding Classes II-V have not been done, Klif is considering these recommendations in a current review of their classification system.

No attempt has been made to compensate for differences in size groups or number of individuals of blue mussel or fish. The exception was with mercury in fish fillet where six data sets in both cod and flatfish in this study showed significant differences between “small” and “large” fish (Appendix H). With respect to blue mussel, there is some evidence that concentrations do not vary significantly among the three size groups employed for this study (i.e. 2-3, 3-4 and 4-5 cm) (WGSAEM 1993).

With respect to Purpose A (health risk assessment), the Norwegian Food Safety Authority (*Mattilsynet*[1]) is responsible for official commentary as to possible health risk due to consumption of seafood. Hence, the results presented in this report pertaining to this purpose must be considered only as a partial basis for such an evaluation.

The results can also be useful as part of the implementation of The Water Framework Directive (WFD) (2000/60/EC) ratified by Norway in 2009, and the Marine Strategy Directive (MSFD) (2008/56/EC), which by late 2011 has not yet been ratified by Norway. These two directives together concern all waters out to territorial borders. They are the main policies at the EU level designed to achieve good "ecological" (WFD) or "environmental and chemical" (MSFD) status, herein termed GES, in the European marine environment, by the year 2015 (2021 for Norway) and 2020 at the latest, respectively. The directives also set out to ensure the continued protection and preservation of the environment and the prevention of deterioration. The Norwegian framework regulation on water management (the Water Regulation) was adopted on December 15th 2006, and incorporates the WFD into Norwegian law. The Environmental Quality Standards (EQS) for 33 priority substances or groups of substances have been outlined in the EQS Directive (EQSD) (2008/105/EC). Several of these substances are monitored by CEMP. The EQS apply to concentrations in water, and for three substances (mercury, hexachlorobenzene (HCB) and hexachlorobutadiene (HCBD)) in “prey tissue” (Table 6). There is also a provision which allows a country to use other EQS in sediment and biota provided these offer the same level of protection as the EQS set for water. It should be noted that application of the EQS set for “prey tissue” is in conflict with the best class in the Climate and Pollution Agency system for classification of environmental quality; e.g. lower than the Class I for mercury and higher for Class V for HCB in blue mussel. This has not been resolved and for this report, only the Klif system will be used.

Table 6. *The Water Framework Directive (WFD) Environmental Quality Standards for “prey tissue” (cf. Environmental Quality Standard Directive-2008/105/EC) and the Class I and V (upper limit to insignificant and extreme degree of pollution, respectively) in the Klif environmental classification system (Molvær et al. 1997). Concentrations in µg/kg wet weight.*

Media	Class	Mercury (Hg)	Hexachlorobenzene (HCB)	Hexachlorobutadiene (HCBD)
“Prey tissue” (EQS)		20	10	55
Blue mussel (Klif)	Class I [1)]	40	0.1	-
	Class V [1)]	40000	5	-
Cod liver (Klif)	Class I	-	20	-
	Class V	-	40	-
Cod fillet (Klif)	Class I	100	0.2	-
	Class V	1000	5	-

1) Conversion assuming 20% dry weight.

[1] see http://www.miljostatus.no/Tema/Hav-og-vann/Pavirkninger-pa-livet-i-vann/Miljogifter_vann/Miljogifter_marint/Kostholdsrad/

Proposed background assessment criteria (BAC) for EROD and OH-pyrene (ICES 2011) and VDSI (OSPAR 2005) were used to assess the results (***Table 7***).

Table 7. *Assessment criteria for biological effects measurements using background assessment criteria (BAC) and Ecotoxicological assessment criteria (EAC) (ICES 2011, OSPAR 2005).*

Biological effect	Applicable to:	BAC	EAC	Units, method
EROD	cod liver	145	-	pmol/min/ mg microsomal protein
OH-pyrene	cod liver	21	483	µg/ml, synchronous scan flurorescence 341/383 nm
VDSI	dog whelk, periwinkle	0.3	2	n.a.

3.7. Statistical time trends analyses

A simple three-model approach has been developed to study time trends for contaminants in biota based on median concentration (ASMO 1994). The method has been applied to Norwegian data and results are shown in Appendix G. The results are presented in a type as shown in ***Figure 5***.

The three model approach uses a Loess smoother based on a running six-year interval, a non-parametric curve fitted to median log-concentration (Nicholson *et al.* 1991, 1994 and 1997 with revisions noted by Fryer & Nicholson 1999) on the preferred basis mentioned above as well. Supplementary analyses were performed on a wet weight basis for blue mussel data and lipid weight basis for chlororganic contaminants in fish liver (see Appendix H). For statistical tests based on the fitted smoother to be valid the contaminants indices should be independent to a constant level of variance and the residuals for the fitted model should be log-normally distributed (cf. Nicholson *et al.* 1998). No transformation was applied to the imposex (VSDI) data.

The smoothed median for the last three sampling years is linearly projected for the next three years to assess the likelihood of presumed high background levels (not shown in figures).

An estimate of the power of the temporal trend series expressed as the number of years to detect a 10 % change per year with a 90% power (cf. Nicholson *et al.* 1997). The fewer the years the easier it is to detect a trend. The power is based on the percentage relative standard deviation (RLSD) estimated using the robust method described by ASMO (1994) and Nicholson *et al.* (1998). The estimate was made for series with at least three years of data and covers the entire period monitored. This fixed means of treating all the datasets may give misleading results especially where non-linear temporal changes are known to occur, such as for HCB in blue mussel from Grenland fjords area (***Figure 5***).

The statistical analysis was carried out on all the results, including those for biological effects parameters.

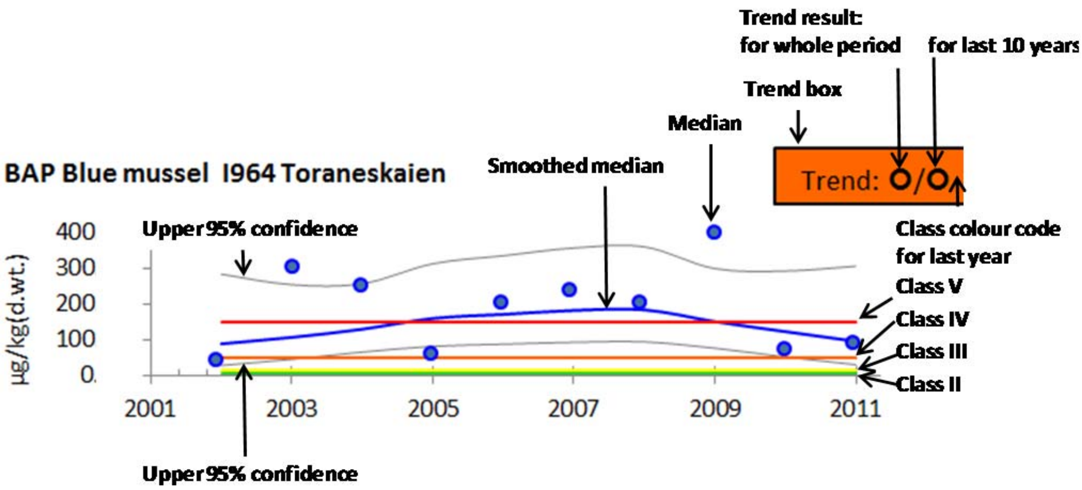


Figure 5. *Example time series that indicates the median concentration, running mean of median values (Loess smoother), 95 % confidence intervals. The horizontal lines indicate the lower boundaries to Klif classes of pollution: Class II (green line, moderate=upper boundary to Class I (insignificantly polluted, also herein termed as "acceptable")), III (yellow line, marked), IV (orange line, severe) and V (red line, extreme), or alternatively the Class II boundary is replaced by the upper boundary to provisional "high background level" as in which case no class-boundaries are shown. Further, if there are no Klif classes the background concentration is indicated by a Light grey line. (see text and refer to Appendix D). For biota, trend analyses (shown in the trend box) were done on time series with three or more years and the results, before the slash "/", are indicated by an upward (🡅) or downward (🡇) arrow where significant trends were found, or a zero (o) if no trend was detected. Where there was sufficient data a time series analysis was performed for the period 2002-2011 and the result is shown after the slash. A small filled square (▪) indicates that chemical analysis has been performed, but data either were insufficient to do a trend analysis or was not presented. Dark grey indicates concentrations higher than estimated high background levels. Light grey indicates concentrations lower than background levels. Note that scales for the x axis and y axis can vary from figure to figure.*

4. Results and discussion

4.1. General information on measurements

Samples for the investigation of contaminants were collected along the Norwegian coast, from the boarder to Sweden in the south to the border to Russia in the north (***Figure 1*** - ***Figure 4***, Appendix F). The stations and number of samples relevant for the 2011 investigations are noted in the tables in Appendix E. A summary of the results for 2011 are shown in ***Table 11*** and more details are given in Appendix H. The trend analyses for the entire monitored period are shown in Appendix H. Unless otherwise state assessment of trends in the text below refer to long-term trends, i.e. for the whole sampling period, whereas a short term trend refers to the analysis on data for the last 10 years, i.e. 2002-2011. Geographical distributions of contaminants are also shown in Appendix I.

Time trend analyses were performed on a selection of representative contaminants where the results included data for 2011 and totalled 1035 data series (***Table 8***). In 150 of the 1035 cases, concentrations were above what is expected in only diffusely contaminated areas (collectively termed: “over presumed high background concentrations”). The focus of the overview presented below is based on the 1035 time series, of which 277 were downwards trends and 52 were upwards trends. Of the 628 cases that could be classified by Klifs system, 78.5% were classified as insignificantly polluted, 16.9% as moderately polluted, 3.5% as markedly polluted, 0.6% as severely polluted and 0.5% as extremely polluted.

Generally the evaluation of the results focused primarily on those cases where median concentrations in 2011 were over presumed high background level (>Class I, insignificantly polluted, acceptable levels) occurred and where significant upward trends were found and to a lesser degree where there were no significant trends or significant downward trends were found. The evaluation focused secondarily on cases where median concentrations in 2011 were below presumed high background level (<Class I, insignificantly polluted) in combination with significant upward trends, no significant trends or significant downward trends. An overview of trends, classification and median concentrations is presented in Appendix H. The results are presented by classes and with results for observed trend analyses. Significant long-term trends means for the entire sampling period 1984-2011 and short-term trends means during the period 2002-2011. In the following text, we comment on long-term significant trends unless something else is specified. For some stations, there were insufficient data to do trend analyses and the term “no trends” was used.

Table 8. *Selection of representative contaminants and biological effects methods/BEM and number of time series assessed.*

Contaminant/BEM	**Description**	**Cod**	**Megrim**	**Dab**	**Common periwinkle**	**Blue mussel**	**Dog whelk**	**Flounder**	**Plaice**	**Total**
Ag	silver	11	2	2		36		3	2	56
ALAD	δ– aminolevulinic acid dehydrase inhibition	3								3
As	arsenic	11	2	2		36		3	2	56
B[a]P	benzo[a]pyrene					16				16
BDESS	sum of brominated diphenyl ethers	9								8
Ba	barium					1				1
PCB-7 (CB_S7)	sum of PCB congeners 28+52+101+118+138+153+180	22	4	4		31		6	4	71
Cd	cadmium	11	2	2		36		3	2	56
Co	cobalt	11	2	2		36		3	2	56
Cr	chromium	11	2	2		36		3	2	56
Cu	copper	11	2	2		36		3	2	56
ppDDE (DDEpp)	p,p'-DDE (a DDT metabolite)	22	4	4		31		6	4	71
EROD	cytochrome P4501A-activity	3								3
CYP1A	cytochrome P450 1A-protein	3								3
HCB	hexachlorobenzene	22	4	4		30		6	4	70
HCHG	γ HCH (Lindane)	22	4	4		31		6	4	71
Hg	mercury	11	2	2		36		3	2	56
Mo	molybden					1				1
Ni	nickel	11	2	2		36		3	2	56
OCS	octachlorostyren	22	4	4		31		6	4	71
PAHs (P_S)	sum nondicyclic PAHs					16				16
Pb	lead	11	2	2		36		3	2	56
PFOS	perfluoroctanoic sulfonate	9								9
KPAHs (PK_S)	sum carcinogen PAHs					16				16
Pyr10	pyrene (PAH compound) metabolite	4								4
TBT	tributyltin (formulation basis)				1	15	8			24
TCDDN	sum of TCDD-toxicity equivalents after Nordic model					7				7
VDSI	Vas Deferens Sequence Index						8			8
V	vanadium					1				1
Zn	zinc	11	2	2		36		3	2	56
TOTAL		251	40	40	1	587	16	60	40	1035

4.2. National levels and trends

An overview of samples collected in 2011 with results are presented in ***Figure 6 - Figure 31***, ***Table 11*** and Appendix H.

Mercury (Hg)

Cod fillet

The median concentration of Hg in cod fillet exceeded Class I (insignificantly polluted) at three of 11 cod stations analysed (***Figure 6***). The three stations were the Inner Oslofjord (st. 30B), Inner Sørfjord (st. 53B) and Trondheim harbour (st. 80BH, see ***Table 11***). Cod fillet in the Inner Oslofjord was markedly polluted (Class III) by Hg and showed both significant long-term and short-term upward trends. Cod fillet in the Inner Sørfjord and Trondheim harbour, both classified to Class II (moderately polluted), showed no significant long-term or short-term trends. Acceptable levels of Hg (Class I) and no significant trends were observed in the cod fillet from Færder (st. 36B), Ullerø area (st. 15B), Kristiansand harbour (st. 13BH), Karihavet area (st. 23B), Bjørnerøya (st. 98B1) and Tromsø harbour (st. 43BH). The cod fillet from Strandebarm (st. 67B) and the Varangerfjorden (st. 10B) showed significant downward trends and acceptable low levels of Hg (Class I).

Flounder fillet
Three flounder stations were analysed for Hg in fillet and the station in the Inner Sørfjord (st. 53F) showed a significant upward trend and the concentrations exceeded presumed high background (0.38 mg/kg w.w.). Flounder fillet at Sande (st. 33F) and Strandebarm (st. 67F) showed significant downward trends (***Figure 7***) and acceptable levels of Hg.

Dab fillet
Fish from two stations (Færder area (st. 36F) and Ullerø area (st. 15F) (***Figure 7***) were analysed for Hg in fillet. The median concentrations of Hg observed in dab from the Færder area exceeded the presumed high background, and showed a significant upward trend. The dab at the Ullerø area showed an acceptable level and no significant trend.

Plaice fillet
Plaice fillet from the two stations Skogerøy area (st. 10F***Figure 7***) in the Varangerfjord and Husholmen area (st. 98F2) in Lofoten were not polluted by Hg (below presumed high background) nor showed any significant trends.

Megrim fillet
Megrim fillet from two stations on the west coast of Norway were analysed for Hg (***Figure 7***). The station in the Strandebarm area in the Hardangerfjord showed a significant downward trend while the megrim in the Åkrafjord (st. 21F) showed no significant trend. Generally, there was insufficient data from reference areas to assess background conditions for megrim.

Blue mussel
The presence of Hg in blue mussel exceeded Class I (insignificantly polluted) at eight of 38 blue mussel stations analysed (cf. ***Table 11***). A graphical presentation of results from some of the stations is shown in ***Figure 8***. Of these eight stations, no significant trends were found at Singlekalven (st. I023) in the Hvaler area, Croftholmen (st. I712, earlier called Gjemesholmen) and Strømtangen (st. I713) in the Grenlandsfjord area, Svensholmen (st. I132) in the Kristiansandsfjord and Byrkjenes (st. 51A) in the Sørfjord (all Class II, moderately polluted). The combination of concentrations being over presumed high background and significant downward trends were found in mussels from Bjørkøya (st. 71A) in the Grenlandsfjord area, and Kvalnes (st. 56A) and Krossanes (st. 57A) in the Mid and Outer Sørfjord (Class II, moderately polluted).

In blue mussel that were not polluted by Hg (Class I), significant upward trends were found at Akershuskaia (st. I301), Håøya (st. I306) and Solbergstrand (st. 31A) in the Oslofjord, Bølsnes (st. I205) in the Inner part of the Saudafjord and Espevær (st. 22A) on the west coast.

Mussels from the majority of the stations did however revealed acceptable median levels of Hg (Class I) in combination with no significant trends (***Table 11***). This was the case for Gressholmen (st. 30A), Gåsøya (st. I304), Ramtonholmen (st. I307), Mølen (st. 35A) and Færder (st. 36A) in the Oslofjord. This was also the result for Gåsøy/Ullerø (st. 15A) and Lastad (st. I131A) in the southern part of Norway. Further, this was the case for Ekkjegrunn (st. I201) in the Inner part of the Saudafjord, and at Ranaskjær (st. 63A), Vikingneset (st. 65A) and Lille Terøy (st. 69A) in the Hardangerfjord. This was also the results at Risøy (st. 76A), Odderøy (st. I133) in the Kristiansandsfjord and at Nordnes (st. I241) and Hegreneset (st. I243) at the west coast. Blue mussel at Moholmen (st. I965), Toraneskaien (st. I964) and Bjørnbærviken (st. I969) in the Ranfjord, Husvaagen area (st. 98A2) in Lofoten and Brashavn (st. 11X) in the Varangerfjord showed also the same. In blue mussel that were not polluted by Hg (Class I), significant downward trends were found at Eitrheimsneset (st. 52A) in the Sørfjord, Høgevarde (st. 227A2) close to Haugesund and Skallneset (st. 10A2) in the Varangerfjord.

Concluding remarks on Hg
The 2011-median concentrations for all time series were at background level or moderately polluted with the exception of three cases. The exceptions concerned cod from the Inner Oslofjord, dab from Færder and flounder from the Inner Sørfjord. Cod fillet from the Inner Oslofjord, which was

markedly polluted 2011 and moderately polluted in 2010. A significant upward trend was detected at this station when considering the whole monitoring period.

An upward trend was observed for Hg in cod fillet from the Inner Oslofjord. Concentrations in flounder fillet from the Inner Sørfjord and dab fillet in the Færder area were above presumed high background and both showed significant upward trends.

Blue mussel from Akershuskaia, Håøya, Solbergstrand, Bølsnes and Espevær showed acceptable levels of Hg, but significant upward trends were detected.

All blue mussel stations in the Inner and Outer Oslofjord showed acceptable levels of Hg. Gitmark *et al.* (2012) did however find that mussels from Langøya in the Holmestrandfjord close to Mølen in 2011 were up to moderately polluted by Hg.

The concentrations of Hg in blue mussel at almost all stations in the Kristiansandsfjord in 2011 had increased slightly compared to the previous year (Schøyen *et al.* 2012).

Blue mussel collected in the Sørfjord in 2011 had concentrations of Hg up to markedly polluted, although slightly over the limit from Class II (Ruus *et al.* 2012a).

Based on high concentrations of dioxins and PCBs, the Norwegian Food Safety Authority (*Mattilsynet*[1]) has issued a general recommendation not to consume liver from fish caught inside the coastal baseline and for private use (*Mattilsynet*[2]). The area inside the baseline would include fjord and harbour areas.

It can be noted that the EU has provided Environmental Quality Standard (EQS) for “prey tissue” (cf. 2008/105/EC). The EQS for mercury is 0.02 mg/kg w.w. which is below the upper limit to insignificantly polluted (Class I) for blue mussel (0.04 mg/kg w.w.). No concentrations were above the EQS in blue mussel. The EQS cannot be directly compared to concentrations found in different tissues of fish. Furthermore, no concentrations were above the EU limit for foodstuffs of 0.5 mg/kg wet weight (1881/2006/EC).

OSPAR (2010) found 70-75% reduction in riverine and direct discharges of mercury to the North Sea for the period 1990-2006. There was a predominance of downward significant trends over upward significant trends in concentrations observed for sediment from the North Sea. Of significant trends discussed in the current investigation only two were found, both upwards; in blue mussel from Espevær and dab fillet from Færder.

[1] see http://www.miljostatus.no/Tema/Hav-og-vann/Pavirkninger-pa-livet-i-vann/Miljogifter_vann/Miljogifter_marint/Kostholdsrad/
[2] see http://www.matportalen.no/verktoy/advarsler/fisk_og_skalldyr_fra_visse_havner_fjorder_og_innsjoer

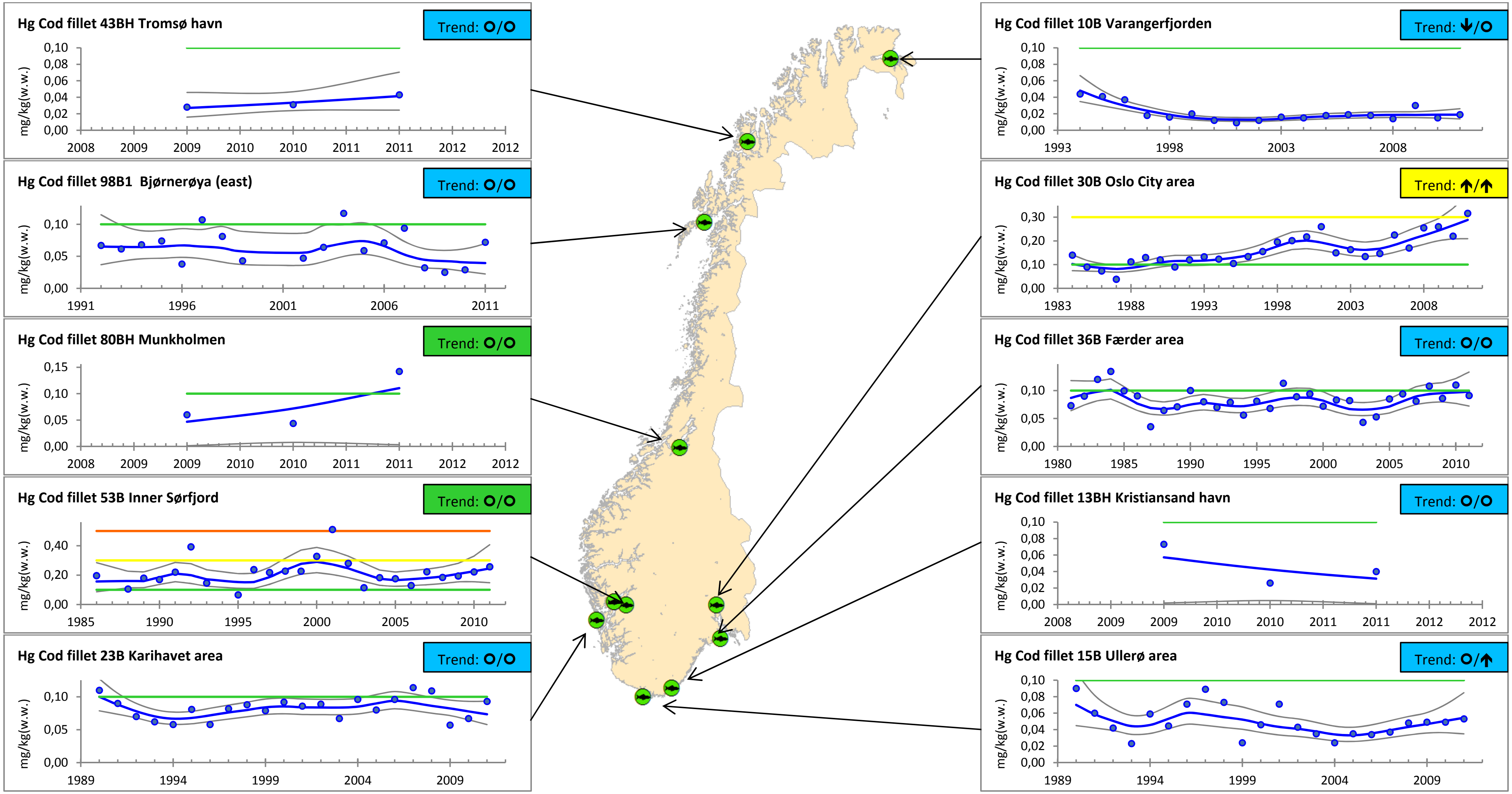


Figure 6. *Median concentration of Hg in cod fillet, mg/kg (mg Hg/kg) wet weight (cf. Appendix H, see otherwise key to detail in Figure 5 and, for trend, Table 11).*

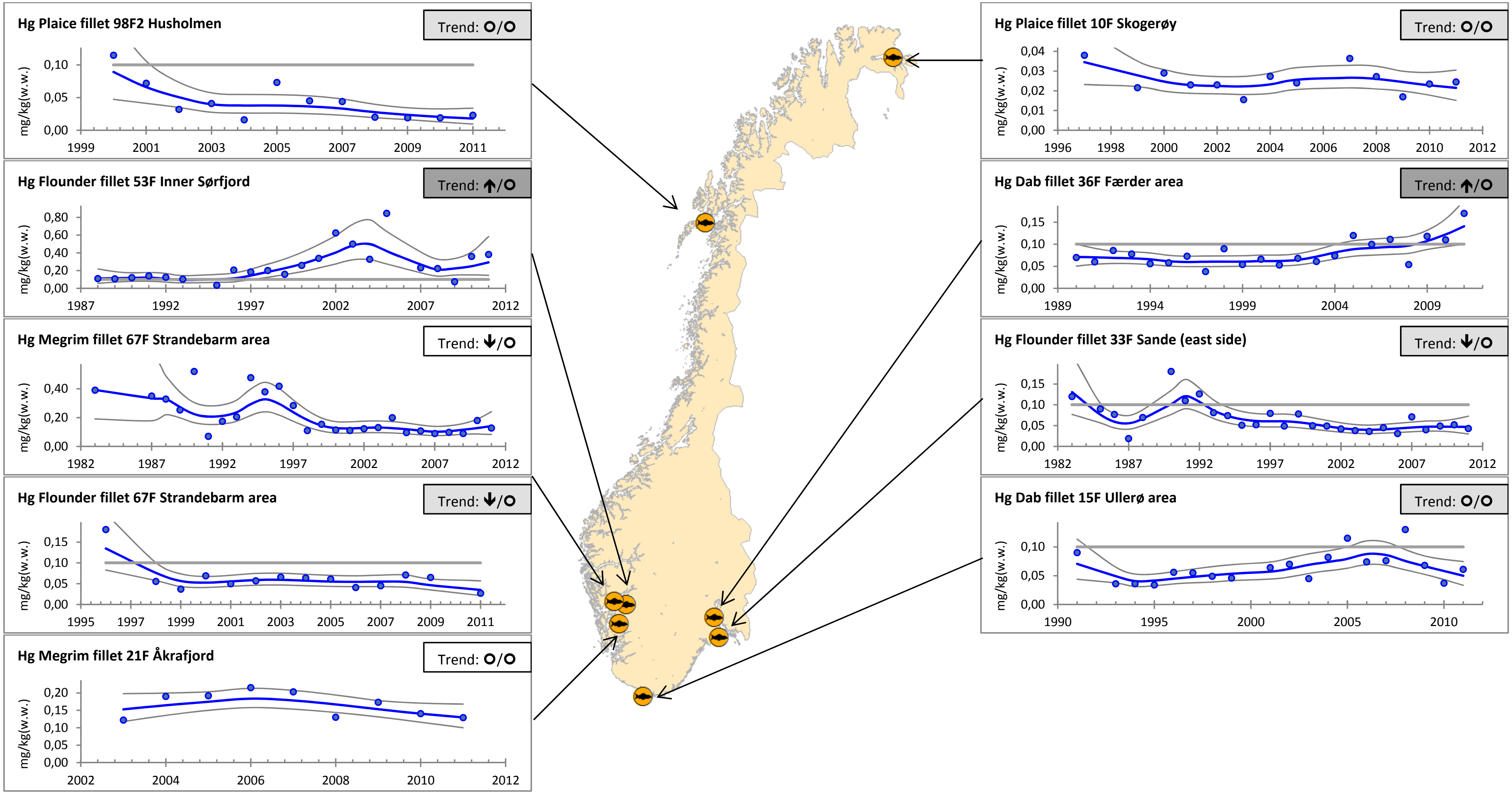


Figure 7. *Median concentration of Hg in flatfish fillet, mg/kg (mg Hg/kg) wet weight (cf. Appendix H, see otherwise key to detail in Figure 5 and, for trend, Table 11).*

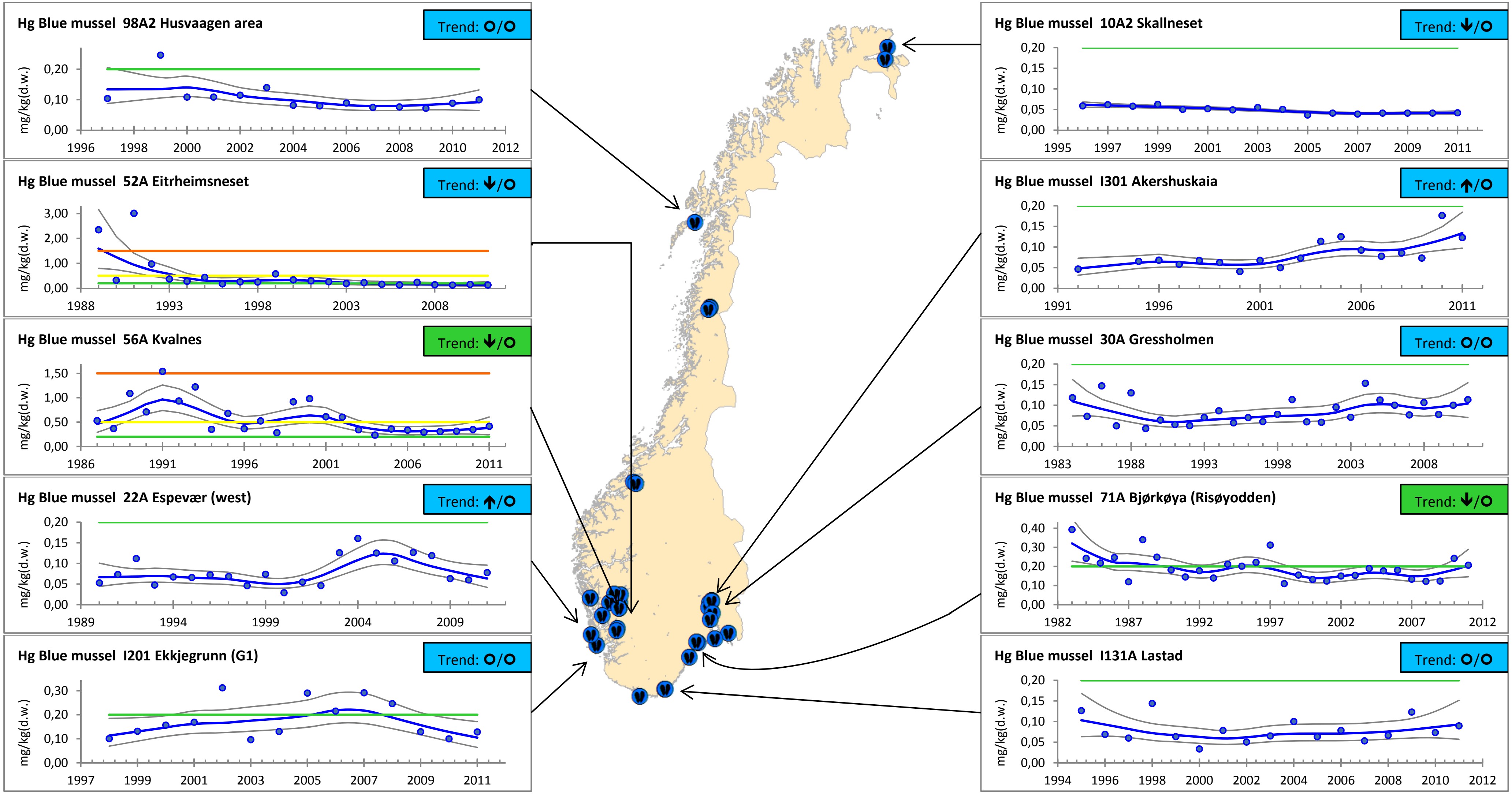


Figure 8. *Median concentration of Hg in blue mussel, mg/kg (mg Hg/kg) dry weight for selected stations (cf. Appendix H, see otherwise key to detail in Figure 5 and, for trend, Table 11).*

Cadmium (Cd)

Cod liver
Acceptable levels (below presumed high background) for Cd in cod liver is set to 0.3 mg/kg w.w. for the results from fish caught in 2011 and 2010 and not 0.1 mg/kg w.w. as for the 2009-results which comply with earlier investigations of background concentrations (Green & Knutzen 2003). The concentrations of Cd in cod liver showed acceptable background levels (Class I) at all the 11 stations along the Norwegian coast (***Table 11***, ***Figure 9***). A significant upward trend was observed at two stations, one in the Inner Oslofjord and the second in the Inner Sørfjord. Cod liver from Ullerø area, the Karihavet area and from Bjørnerøya showed no significant trends. These were also the results of cod at the harbours of Kristiansand, Trondheim and Tromsø. Significant downward trends were observed in liver samples from the Færder area, the Strandebarm area in the Hardangerfjord and in the Varangerfjord.

Flounder liver
Flounder from three stations were analysed for Cd in liver. All concentrations were under presumed high background level and showed significant downward trends (***Figure 10***).

Dab liver
Dab from the Færder area and Ullerø area were analysed for Cd in liver. The dab at Ullerø revealed concentrations over acceptable level while the fish at Færder had an acceptable concentration (***Figure 10***). The results from both stations showed no significant trends.

Plaice liver
The concentration of Cd in liver from plaice caught at Skogerøy in the Varangerfjord was over acceptable levels and in addition, a significant upward trend was observed (***Figure 10***). The concentration of Cd in liver from plaice caught at Husholmen in the Lofoten showed acceptable levels and no significant trend.

Megrim liver
The megrim from Strandebarm in the Hardangerfjord showed a significant downward trend while the megrim in the Åkrafjord showed no significant trend (***Figure 10***). There was insufficient data from other investigations to assess what is a presumed background concentration.

Blue mussel
The presence of Cd exceeded Class I (insignificantly polluted) in mussel samples from six out of 36 stations. Results from some of the stations are presented in ***Figure 11.*** Significant downward trends were observed in mussels from Byrkjenes (see ***Table 11***) and Kvalnes in the Sørfjord and mussels at both stations were markedly polluted (Class III). A significant upward trend was observed at Gressholmen in the Inner Oslofjord, and the mussels were moderately polluted. Significant downward trends were observed in mussels from Eitrheimsneset and Krossanes in the Sørfjord and the mussels were moderately polluted (Class II). Mussels at Bjørkøya in the Grenlandsfjord area were also moderately polluted (Class II), but no trends were observed.

In blue mussel that showed an acceptable level of Cd (Class I), significant upward trends were found at stations from the Inner Oslofjord and outward the fjord at Akershuskaia, Ramtonholmen, Solbergstrand, Mølen and Færder. Significant downward trends were observed at Ranaskjær, Vikingneset, and Lille Terøy in the Hardangerfjord and at Husvaagen area in the Lofoten, all were also insignificantly polluted (Class I).

Blue mussel stations that had low levels of Cd (Class I) and showed no significant trends were Gåsøya and Håøya in the Inner Oslofjord. This was also found at Singlekalven in the Hvaler area, and at Risøy, Lastad and Gåsøy/Ullerø in the southern part of Norway. Further, this was also found at Ekkjegrunn and Bølsnes in the Saudafjord, at Espevær on the west coast, at Moholmen, Toraneskaien and Bjørnbærviken in the Ranfjord and at Skallneset and Brashavn in the Varangerfjord. Blue mussel from the Grenland area (Strømtangen), the Kristiansandsfjord (Svensholmen, Odderøy), in the

Karmsund (Høgevarde), and in the Bergen area (Nordnes) and Hegreneset) had all acceptable levels of Cd and no significant trends.

Concluding remarks on Cd

Trend analyses of Cd showed concentrations below high background levels at all cod liver stations. Upward trends were however observed in the Inner Oslofjord and in the Inner Sørfjord. Similar results were also observed in 2010.

The cause of the upward trend in plaice from the Varangerfjord is uncertain. Elsewhere in the Varangerfjord, either no trends were found (two blue mussel stations) or a downward trend was registered (in cod). This could indicate a local impact on plaice.

Significant upward trends were observed in mussels from several stations in the Inner Oslofjord, but all had acceptable levels of Cd except for Gressholmen in the Inner Oslofjord where the mussels were moderately polluted. Mussels at Mølen had acceptable concentration of Cd and a significant upward trend. Gitmark *et al.* (2012) found that mussels were up to moderately polluted by Cd at Langøya in the Holmestrandfjord close to Mølen in 2011.

Blue mussel in the Kristiansandsfjord were insignificantly polluted by Cd. Schøyen *et al.* (2012) also reported that blue mussel at Odderøy and Svensholmen, among seven blue mussel stations in the Kristiansandsfjord, were insignificantly polluted by Cd in 2011. Blue mussel at Svensholmen had an acceptable level of Cd, not only in September when the CEMP-blue mussel were collected, but also in May and July in 2011.

Significant downward trends have been observed for Cd in blue mussel in the Inner and Mid Sørfjord during the last two decades, although they were up to markedly polluted. Ruus *et al.* (2012a) also reported that blue mussel at Kvalnes in the Sørfjord was markedly polluted with Cd.

Norwegian Food Safety Authority (*Mattilsynet*[1]) has issued recommendations regarding consumption of seafood from the Sørfjord for *inter alia* blue mussel (last updated 2010). It can be noted that environmental status is classified according to environmental quality criteria (based on Klif's classification system or on presumed background levels) and must not be confused with limit values for human consumption and associated advices issued by the Norwegian Food Safety Authorities. Furthermore, no concentrations in blue mussel were above the EU limit for foodstuffs of 1.0 mg/kg wet weight (1881/2006/EC).

[1] see http://www.miljostatus.no/Tema/Hav-og-vann/Pavirkninger-pa-livet-i-vann/Miljogifter_vann/Miljogifter_marint/Kostholdsrad/

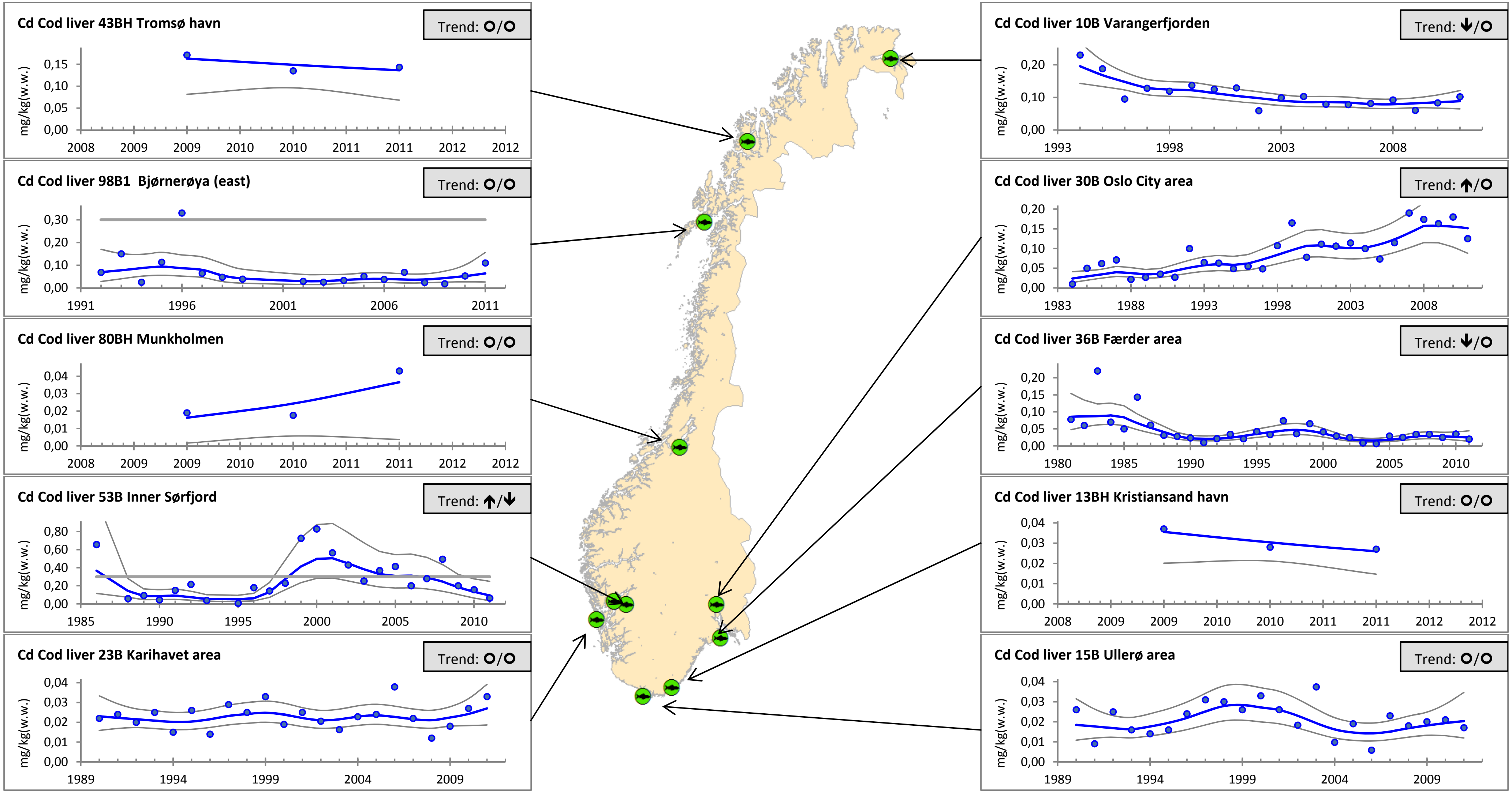


Figure 9. *Median concentration of Cd in cod liver, mg/kg (mg Cd/kg) wet weight (cf. Appendix H, see otherwise key to detail in Figure 5 and, for trend, Table 11).*

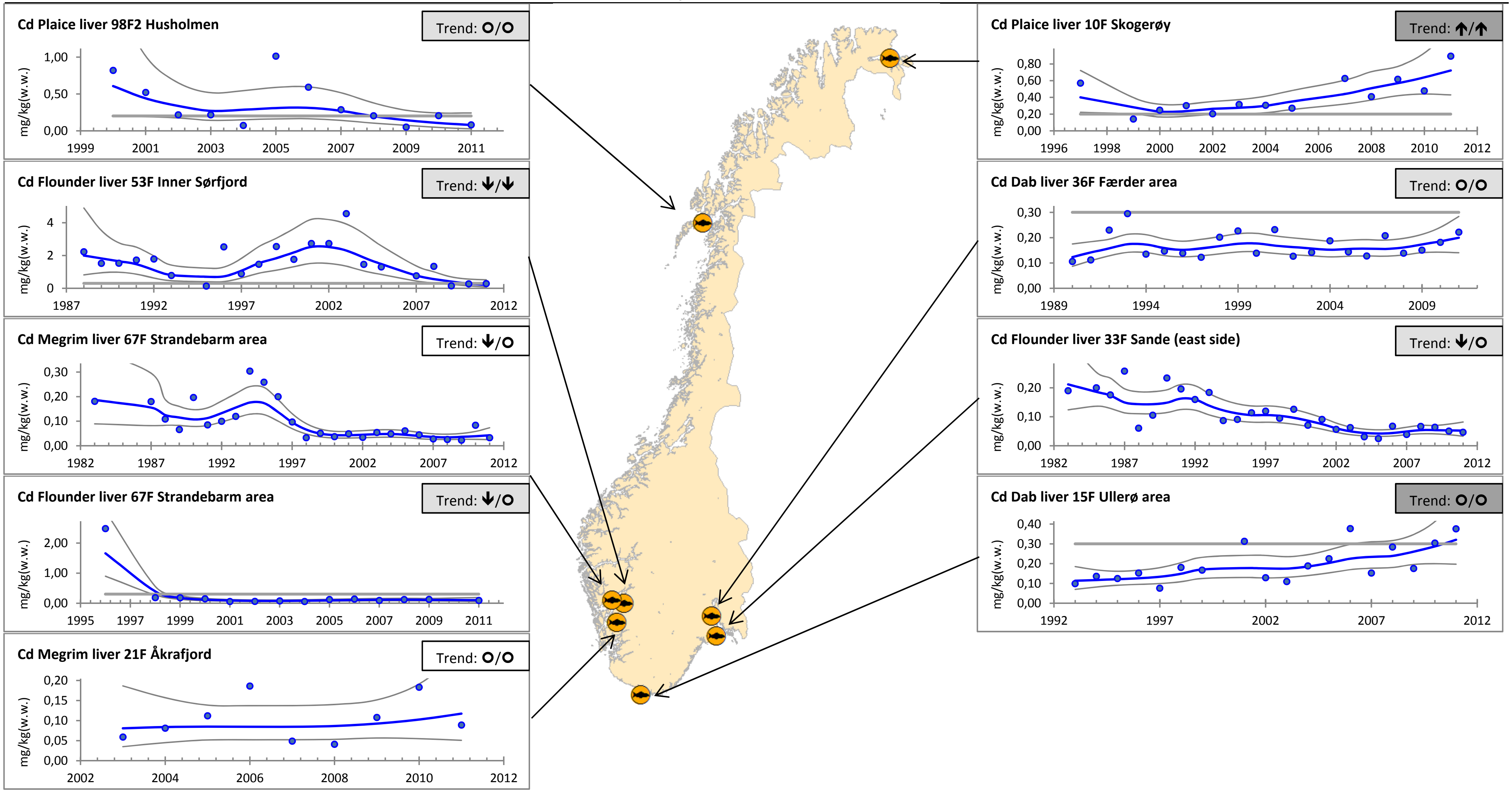


Figure 10. *Median concentration of Cd in flatfish liver, mg/kg (mg Cd/kg) wet weight (cf. Appendix H, see otherwise key to detail in Figure 5 and, for trend, Table 11).*

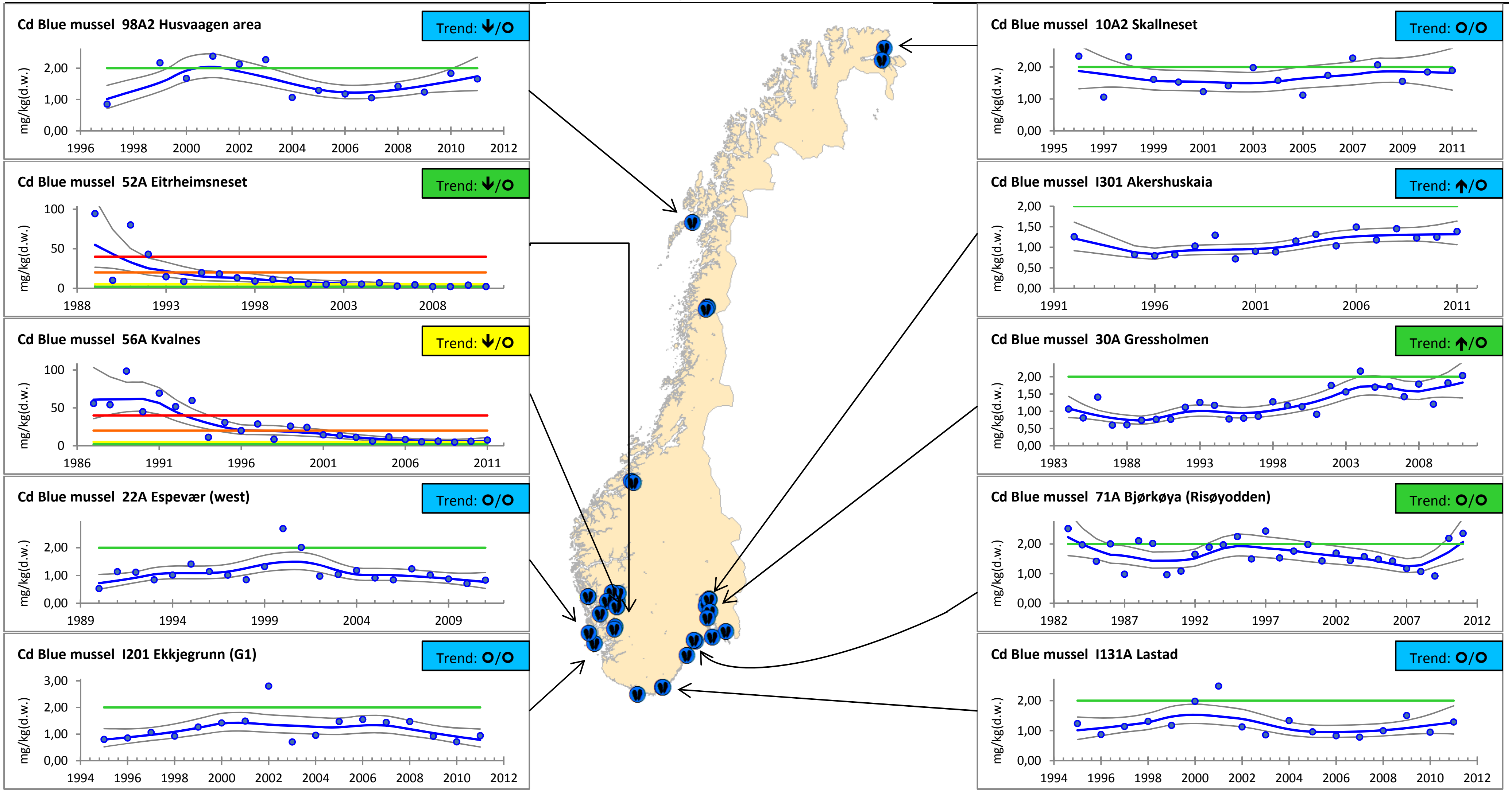


Figure 11. *Median concentration of Cd in blue mussel, mg/kg (mg Cd/kg) dry weight for selected stations (cf. Appendix H, see otherwise key to detail in Figure 5 and, for trend, Table 11).*

Lead (Pb)

Cod liver

There were observed acceptable median concentrations of Pb in cod liver at all 11 stations (***Figure 12***). Significant downward trends could be observed at all the following stations: the Inner Oslofjord, Færder area, Ullerø area, Inner Sørfjord, Strandebarm area, Karihavet area, Bjørnerøya and in the Varangerfjord (see also ***Table 11***). Cod at Kristiansand harbour and Trondheim harbour showed no significant trends. There was too many data below the detection limit to calculate trend at Tromsø harbour.

Flounder liver

Three flounder stations were analysed for Pb in liver. The flounder in the Inner Sørfjord exceeded presumed high background level of Pb and showed no significant trend (***Figure 13***). The flounder at Sande and Strandebarm had acceptable concentrations of Pb and showed significant downward trends.

Dab liver

There were observed acceptable levels of Pb in dab samples from the two stations analysed (Færder area and Ullerø area, ***Figure 13***) and both showed significant downward trends.

Plaice liver

An acceptable level and a significant downward trend were observed for Pb in plaice liver from Skogerøy in the Varangerfjord (***Figure 13***). Plaice from Husholmen in the Lofoten had an acceptable level of Pb and no significant trend.

Megrim liver

Megrim from the Strandebarm area in the Hardangerfjord showed a significant downward trend for Pb in liver (***Figure 13***). No significant trend was found for megrim from the Åkrafjord. There was insufficient data from reference areas to assess background conditions for megrim.

Blue mussel

The presence of Pb in blue mussel exceeded Class I (insignificantly polluted) at 10 of the 36 blue mussel stations analysed (results from some of the stations are presented in ***Figure 14*** and an overview of all the results is found in ***Table 11***).

No significant trends were observed in mussels from Odderøy in the Kristiansandsfjord, and Byrkjenes and Kvalnes in the Sørfjord (all Class III, markedly polluted).

No significant trends were observed at Moholmen and Toraneskaien in the Ranfjord (both Class II, moderately polluted). Significant downward trends were found at Eitrheimsneset and Krossanes in the Sørfjord (both Class II, moderately polluted). Blue mussel at Svensholmen in the Kristiansandsfjord, Nordnes and Hegreneset close to Bergen were all moderately polluted (Class II) and no significant trends were observed.

In blue mussel that were insignificantly polluted (Class I) of Pb, no significant trends were found in the Oslofjord at Akershuskaia, Gressholmen, Gåsøya, Ramtonholmen and Håøya. The same results were found in the Hvaler area in the Outer Oslofjord at Singlekalven, as well as at Croftholmen, Strømtangen and Lastad in the Frierfjord and Risøy and Gåsøy/Ullerø in the southern part of Norway. Further, insignificantly polluted mussels (Class I) and no significant trends were found at Ekkjegrunn and Bølsnes in the Saudafjord, Høgevarde in the Karmsund, at Vikingneset in the Hardangerfjord, at Bjørnbærviken in the Ranfjord and at Skallneset and Brashavn in the Varangerfjord. In blue mussel that were insignificantly polluted (Class I) of Pb, a significant downward trend was found at Solbergstrand, Mølen and Færder in the Oslofjord and at Bjørkøya/Risøyodden. The same were observed at Ranaskjær and Lille Terøy in the Hardangerfjord, at Espevær on the west coast, and at Husvaagen area in the Lofoten area.

Concluding remarks on Pb

There were observed acceptable median concentrations of Pb in cod liver at all 11 stations, and downward long-term trends dominated.

All blue mussel stations in the Inner and Outer Oslofjord had acceptable levels of Pb. Gitmark *et al.* (2012) found that mussels were up to moderately polluted by Pb at Langøya in the Holmestrandfjord close to Mølen in 2011.

Blue mussel at Odderøy in the Kristiansandsfjord were markedly polluted with Pb. Schøyen *et al.* (2012) reported that blue mussel at Bragdøy in the Kristiansandsfjord were markedly polluted by Pb in 2011. This study also showed that blue mussel at Odderøy, Voie/Kjosbukta and Flekkerøy/Kjeholmen in the Kristiansandsfjord were moderately polluted by Pb.

Blue mussel at Byrkjenes and Kvalnes in the Sørfjord were also markedly polluted with Pb. Ruus *et al.* (2012a) found the same result for blue mussel at Kvalnes and that all other blue mussel stations showed acceptable levels in the Sørfjord in 2011.

Blue mussel at Nordnes and Moholmen were moderately polluted in both 2011 and 2010, while they were markedly polluted in 2009.

The low levels of Pb in cod and the significant downward long-term trends, even close to highly populated areas such as Oslo, indicate that the ban of Pb in gasoline has had a positive effect. Still mussels from to stations in the Mid and Inner Sørfjord are markedly pollution by Pb and levels exceeding presumed high background level are observed in flounder from the Inner Sørfjord.

Norwegian Food Safety Authority (*Mattilsynet*[1]) has issued recommendations regarding consumption of seafood from the Kristiansandfjord regarding Pb, based to some extent on concentration in stationary "fat" fish and blue mussel (last updated 2010) and from the Sørfjord for *inter alia* blue mussel (last updated 2010). Furthermore, concentrations in blue mussel were above the EU limit for foodstuffs of 1.5 mg/kg wet weight (1881/2006/EC) at Byrkjenes and Kvalnes in the Sørfjord, Odderøy in the Kristiansandsfjord and Moholmen in the Ranfjord.

OSPAR (2010) found 50-80% reduction in riverine and direct discharges of lead to the North Sea for the period 1990-2006, however there was no predominance of significant trends. Of 10 timeseries observed at North Sea stations distant to point sources of pollution and analysed in the current study, seven showed a significant trend, all downwards, indicating a relatively good correlation with the general trend of the North Sea.

[1] see http://www.miljostatus.no/Tema/Hav-og-vann/Pavirkninger-pa-livet-i-vann/Miljogifter_vann/Miljogifter_marint/Kostholdsrad/

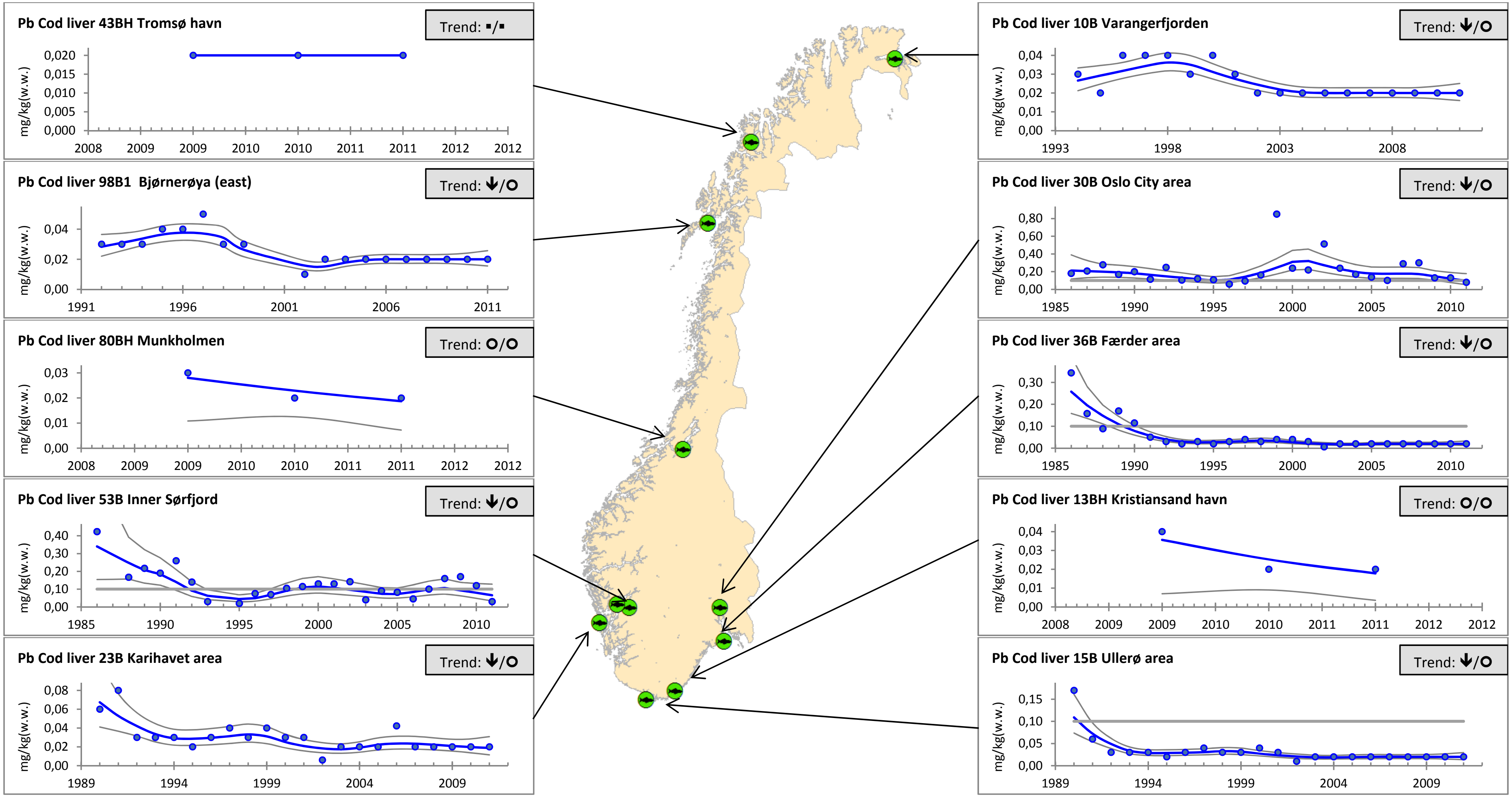


Figure 12. *Median concentration of Pb in cod liver, mg/kg (mg Pb/kg) wet weight (cf. Appendix H, see otherwise key to detail in Figure 5 and, for trend, Table 11).*

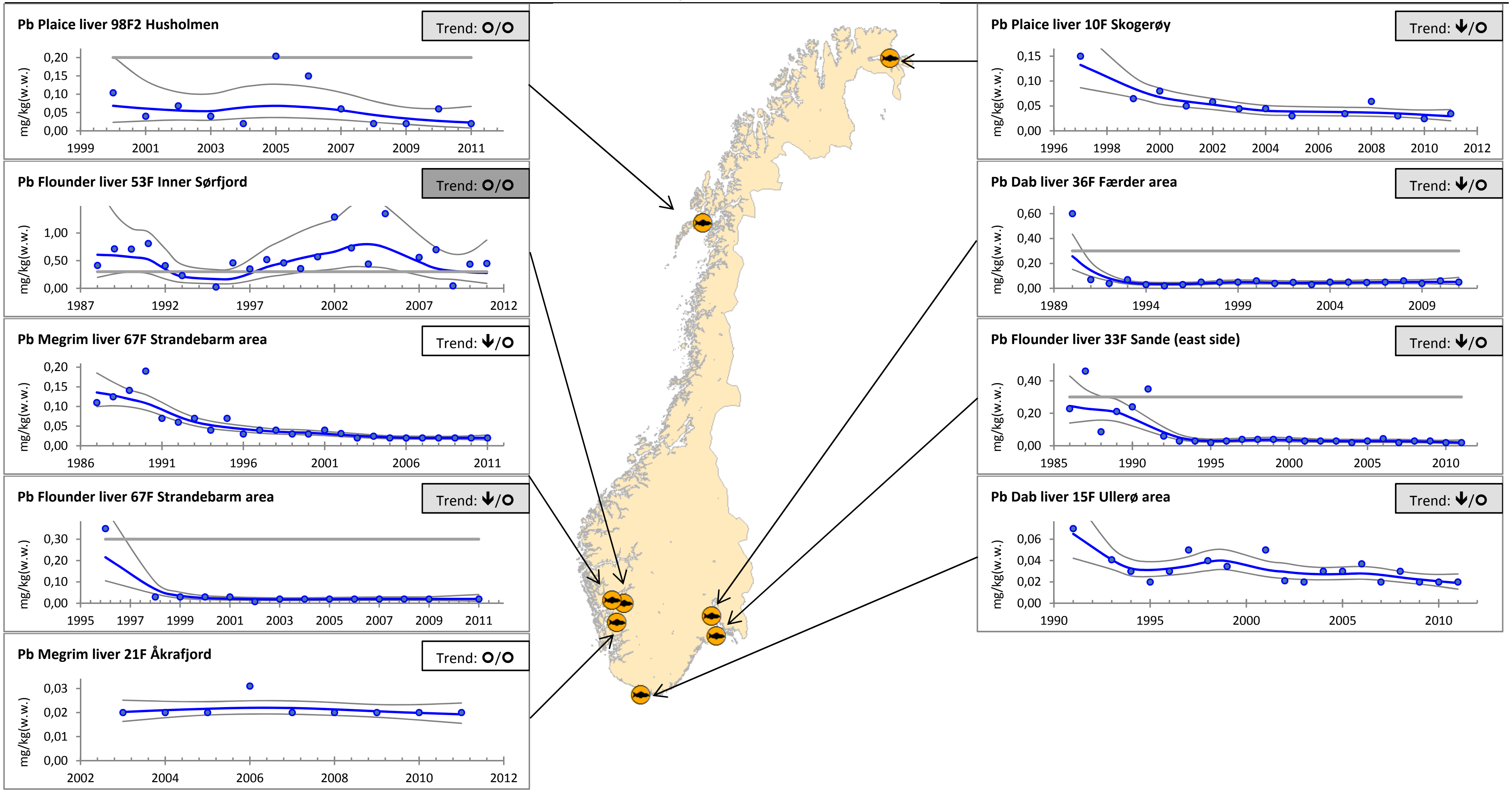


Figure 13. *Median concentration of Pb in flatfish liver, mg/kg (mg Pb/kg) wet weight (cf. Appendix H, see otherwise key to detail in Figure 5 and, for trend, Table 11).*

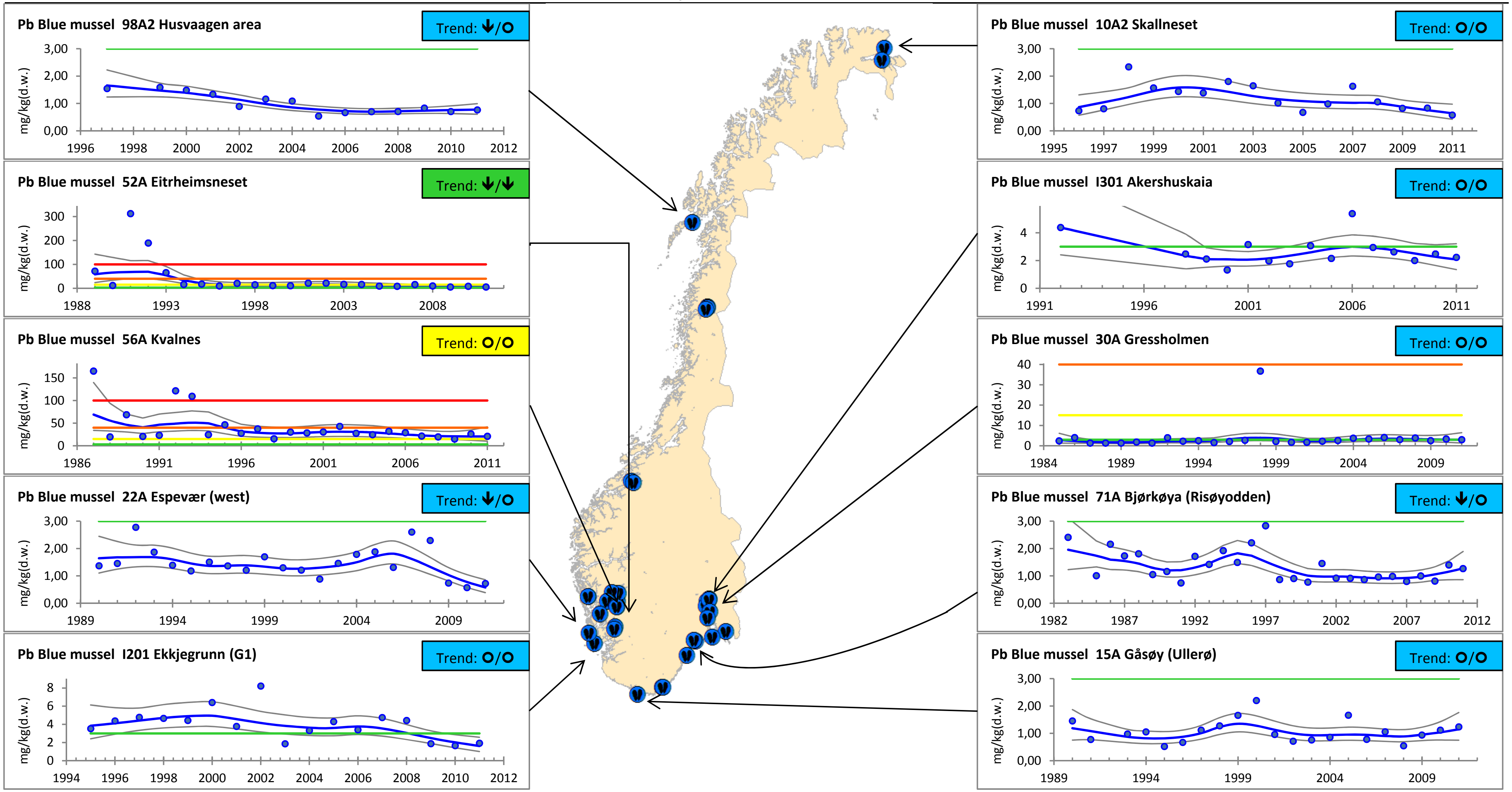


Figure 14. *Median concentration of Pb in blue mussel, mg/kg (mg Pb/kg) dry weight for selected stations (cf. Appendix H, see otherwise key to detail in Figure 5 and, for trend, Table 11).*

Copper (Cu)

Results for Cu are presented in ***Table 11***, Appendix H and Appendix I. Results from trend analyses are only presented for some blue mussel stations (cf. Appendix H).

Cod liver

Cod from all 11 stations along the coast; the Inner Oslofjord, Færder area, Ullerø area, Kristiansand harbour, the Inner Sørfjord, Strandebarm area, Karihavet area, Trondheim, Tromsø harbour, Bjørnerøya and the Varangerfjord showed concentrations below background levels. Three significant trends were found: two downwards at Færder and in the Varangerfjord, and one upward at the Inner Sørfjord. Cod at all the other stations showed no significant trends.

Flounder liver

Flounder at Sande and Strandebarm revealed concentrations of Cu over background level in liver. A significant downward trend was detected at Sande while no significant trend was found in Strandebarm. Flounder in the Inner Sørfjord had acceptable level of Cu in liver and no significant trend was observed.

Dab liver

Dab at Færder and Ullerø area showed acceptable concentrations of Cu. No significant trends were detected.

Plaice liver

Plaice at Skogerøy had acceptable levels of Cu, but a significant upward trend was found. Plaice at Husholmen in Lofoten had acceptable levels of Cu-concentration in the liver and no trend was detected.

Megrim liver

Two megrim stations were analysed for Cu in liver. No significant trend was observed in megrim from the Åkrafjord on the west coast, but a significant downward trend was found in fish from the Strandebarm area in the Hardangerfjord. Relevant values for background levels in megrim were not available.

Blue mussel

The concentrations of Cu observed in blue mussel exceeded Class I (insignificantly polluted) at two of 36 stations. The mussels were moderately polluted (Class II) at Odderøy in the Kristiansandsfjord and at Toraneskaien in the Ranfjord and no significant trends could be seen. Schøyen *et al.* (2012) also reported that blue mussel at Odderøy in the Kristiansandsfjord was moderately polluted by Cu in 2011 (based on one of the three CEMP-replicates) and this result was also found at two other stations in the Kristiansandsfjord.

Blue mussel were insignificantly polluted (Class I) and showed no significant trends at all the stations in the Oslofjord at Akershuskaia, Gressholmen, Gåsøya, Ramtonholmen, Håøya, Solbergstrand, Mølen and Færder. The same could be observed in the Hvaler area at Singlekalven, and at Croftholmen and Strømtangen in the Frierfjord. This was also the case in the southern part of Norway at Bjørkøya/Risøyodden, Risøy, Lastad and Gåsøy/Ullerø. Blue mussel at Bølsnes and Ekkjegrunn in the Saudafjord and Høgevarde in the Karmsundet had all acceptable levels of Cu (Class I) and no significant trends. Insignificant Cu-pollution (Class I) and no significant trends were observed at all four stations in the Sørfjord at Byrkjenes, Eitrheimsneset, Kvalnes and Krossanes, and outwards the Hardangerfjord at Ranaskjær, Vikingneset and Lille Terøy. The same could be observed at Espevær on the west coast, and at Nordnes and Hegreneset close to Bergen. This was also the result at Moholmen and Bjørnbærviken in the Ranfjord, in the Husvaagen area in Lofoten, and in Skallneset and Brashavn in the northern part of Norway.

Concluding remarks on Cu

Blue mussel were no more than moderately polluted by Cu (two stations in Class II) and no upward trends were found.

All blue mussel stations in the Inner and Outer Oslofjord had acceptable levels of Cu. Gitmark *et al.* (2012) found that all mussel stations investigated at Langøya in the Holmestrandfjord close to Mølen had acceptable levels of Cu in 2011.

Schøyen *et al.* (2012) also reported that blue mussel at Odderøy in the Kristiansandsfjord was moderately polluted by Cu in 2011 (based on one of the three CEMP-replicates) and this result was also found at two other stations in the Kristiansandsfjord.

The median concentration of Cu had decreased the recent years at Espevær where the blue mussel were severely polluted in 2007 and insignificantly polluted from 2008 to 2011. No significant trend was observed at Espevær.

Blue mussel from all stations in the Sørfjord had acceptable levels of Cu. This corresponds with the results in Ruus *et al.* (2012a) where blue mussel generally showed no exceedance of Class I (insignificantly polluted) for Cu, except at station Kvalnes in the Mid Sørfjord where the concentrations corresponded to Class III (markedly polluted) in 2011.

Zinc (Zn)

Results for Zn are presented in ***Table 11***, Appendix H and Appendix I. Trend analyses are only presented for some blue mussel stations (cf. Appendix H).

Cod liver
Cod from Kristiansand harbour showed concentrations of Zn over background level in liver, but the data showed no significant trend. Cod from all other stations in the Inner Oslofjord, the Inner Sørfjord, Strandebarm area, Karihavet area, Trondheim, Tromsø harbour, Bjørnerøya and the Varangerfjord revealed concentrations below background levels. No significant trends at these stations were observed. Downward trends were found in the areas of Færder and Ullerø in addition of no significant trends.

Flounder liver
The concentrations in liver from flounder at all three stations: Sande, Inner Sørfjord and Strandebarm revealed acceptable levels of Zn. No significant trends were detected in the Inner Sørfjord and Strandebarm, and a significant downward trend was found at Sande.

Dab liver
Dab at Færder and Ullerø area showed acceptable concentrations of Zn. No significant trends were detected.

Plaice liver
Plaice at Husholmen in Lofoten and Skogerøy in the Varangerfjord contained acceptable levels of Zn in the liver. No significant trends were detected.

Megrim liver
Two megrim stations were analysed for Zn in liver. No significant trends could be detected at either Åkrafjord on the west coast or in the Strandebarm area in the Hardangerfjord. Relevant values for background levels were not available.

Blue mussel
Blue mussel at 36 locations were analysed for Zn. Blue mussel at Moholmen and Toraneskaien in the Ranfjord were moderately polluted (Class II) by Zn while no significant trends were found.

Blue mussel from 34 stations were insignificantly polluted (Class I) by Zn. Significant upward trends were found at Mølen and Færder in the Outer Oslofjord and at Svensholmen in the Kristiansandsfjord. No significant trends were observed in the Oslofjord at Akershuskaia, Gressholmen, Gåsøya, Ramtonholmen, Håøya and Solbergstrand, and in the Hvaler area at Singlekalven. This was also seen at Croftholmen and Strømtangen in the Frierfjord and at Risøy, Lastad and Gåsøy/Ullerø in the southern part of Norway. The same result was observed at Odderøy in the Kristiansandsfjord, Bølsnes and Ekkjegrunn in the Saudafjord. Further, no significant trends were found at Høgevarde in the Karmsundet, at Espevær on the west coast and at Byrkjenes in the Sørfjord and at Hegreneset close to Bergen. No significant trends were also observed at Bjørnbærviken in the Ranfjord, at Husvaagen area in the Lofoten or at Skallneset and Brashavn in the Varangerfjord.

Significant downward trends were observed in mussels from Bjørkøya/Risøyodden and stations in the Sørfjord and Hardangerfjord; Eitrheimsneset, Kvalnes, Krossanes, Ranaskjær, Vikingneset and Lille Terøy. This was also the result at Nordnes close to Bergen.

Concluding remarks on Zn

All results for cod and flatfish showed acceptable levels of Zn except for cod in the Kristiansand harbour.

Of the 36 investigated blue mussel locations, 34 were insignificantly polluted. The two blue mussel stations with highest concentrations (moderately polluted) were found in the Ranfjord. All blue mussel stations in the Inner and Mid Oslofjord had an acceptable level of Zn.

The only upward trends for Zn were observed in blue mussel from Mølen, Svensholmen and Moholmen. All blue mussel stations in the Inner and Outer Oslofjord had acceptable levels of Zn. Gitmark *et al.* (2012) also found that all mussel stations had acceptable levels of Zn at Langøya in the Holmestrandfjord close to Mølen in 2011.

Schøyen *et al.* (2012) found that seven blue mussel stations in the Kristiansandsfjord, Odderøy and Svensholmen included, were insignificantly polluted by Zn in 2011. Blue mussel at Svensholmen had an acceptable level of Zn, not only in September when the CEMP-blue mussel were collected, but also in May and July in 2011.

All blue mussel stations in the Sørfjord showed an acceptable level of Zn. Similar results have also been observed by Ruus *et al.* (2012a).

Silver (Ag)

Results for Ag are presented in ***Table 11***, Appendix H and Appendix I. Relevant values for background levels of Ag are not available for any of the analysed fish species.

Cod liver

Cod liver from 11 stations were analysed for Ag. The observed range for median concentrations was 0.105-5.04 mg/kg w.w. The highest level was observed in fish from the Inner Oslofjord (cf. Appendix H). A significant upward trend was seen in cod from Bjørnerøya. The samples from all other 10 cod stations showed no significant trends for Ag.

Flounder liver

Flounder from Sande, the Inner Sørfjord and Strandebarm were analysed for Ag in liver. The observed median concentrations were 0.076, 0.052 and 0.007 mg/kg w.w., respectively. There were no significant trends for Ag in flounder liver.

Dab liver

Dab liver at the two stations, Færder area and Ullerø area were analysed for Ag. The observed median concentrations were 0.042 and 0.055 mg/kg w.w., respectively. No significant trends were found.

Plaice liver
Ag in plaice liver was analysed at the two stations Husholmen in Lofoten and at Skogerøy in the Varangerfjord. The results showed no significant trends and the observed median concentrations were 0.02 and 0.094 mg/kg w.w., respectively.

Megrim liver
Two megrim stations were analysed for Ag in liver; the Åkrafjord on the west coast and in the Strandebarm area in the Hardangerfjord. The observed median concentrations where 0.11 and 0.069 mg/kg w.w., respectively and no significant trends were detected. There was insufficient data from reference areas to assess background conditions for megrim.

Blue mussel
There was acceptable levels (Class I) of Ag at all the 36 other blue mussel stations (see ***Table 11***). Significant upward trends were found at Håøya in the Oslofjord, Ekkjegrunn in the Inner Saudafjord, Byrkjenes in the Inner Sørfjord, Lille Terøy in The Hardangerfjord and Espevær on the West coast. A significant downward trend was found at Moholmen in the Ranfjord. All other 30 blue mussel stations had no significant trends for Ag.

Concluding remarks on Ag
The levels of Ag in the cod from the Inner Oslofjord (5.04 mg/kg w.w.) were higher than from other sites (0.105-0.879 mg/kg w.w.). The cod liver in the Ullerø area had a concentration of 0.054 mg Ag/kg w.w., which was the lowest value of all cod stations.

All blue mussel were classified as insignificantly polluted by Ag. Similar results have also been observed by Schøyen *et al.* (2012) in mussels from Odderøy and Svensholmen in the Kristiansandsfjord in 2011. Blue mussel at Svensholmen showed an acceptable level of Ag, not only in September when the CEMP-blue mussel were collected, but also in May and July in 2011. Only one (in Marvika) of seven blue mussel stations in the Kristiansandsfjord was classified as moderately polluted with Ag.

Arsenic (As)

Results for As is presented in ***Table 11***, Appendix H and Appendix I. Relevant values for background levels of As are not available for any of the analysed fish species.

Cod liver
Cod at 11 stations were analysed for As and median concentrations varied between 2.66 mg/kg w.w. in the Varangerfjord and 10. 75 mg/kg w.w. in the Inner Sørfjord, with one exception; 21.8 mg/kg w.w. in the Inner Oslofjord. The reason for these maxima has not yet been clarified, although the concentration has decreased from 30.9 mg/kg w.w. from 2010. A significant downward trend could be seen for cod in the Inner Oslofjord. No significant trends for As were observed in cod liver at the 10 other stations.

Flounder liver
The As-levels in flounder were 1.61 mg/kg w.w. at Sande, 2.29 mg/kg w.w. in the Inner Sørfjord and 1.89 mg/kg w.w. in the Strandebarm area. No significant trends for As in cod liver were observed.

Dab liver
Dab liver at the two stations Ullerø area and Færder area were analysed for As and median concentration was 6.23 and 7.17 mg/kg w.w., respectively. No significant trends were detected.

Plaice liver
Liver in the two plaice stations at Husholmen in Lofoten and at Skogerøy in the Varangerfjord were analysed for As with Median concentrations were 3.47 and 10.77 mg/kg w.w., respectively. No significant trends were observed.

Megrim liver
Liver samples from the two stations Åkrafjord on the west coast and the Strandebarm area in the Hardangerfjord were analysed for As. Observed median concentrations were 8.21 and 3.86 mg/kg w.w., respectively, and no significant trends were observed. There was insufficient data from reference areas to assess background conditions for megrim.

Blue mussel
Blue mussel at 36 stations were analysed for As (see Appendix H). Only five of these blue mussel stations revealed acceptable levels (Class I) of As; Odderøy (west), Bjølsnes, Nordnes, Hegreneset and Brashavn.

Blue mussel at Høgevarde were markedly polluted (Class III) with As and no significant trend could be seen.

Blue mussel at Gåsøya and Ramtonholmen in the Oslofjord and Croftholmen in the Frierfjord were moderately polluted (Class II) with As and showed significant upward trends.

Blue mussel were moderately polluted (Class II) with no significant trends observed in samples from Akershuskaia, Gressholmen, Håøya and Mølen in the Oslofjord and at Singlekalven in the Hvaler area. Similar results were also observed at Strømtangen and Bjørkøya/Risøyodden in the Frierfjord, at Risøy close to Risør, at Svensholmen in the Kristiansandsfjord and at Lastad and Gåsøy/Ullerøy in the southern part of the country. This was also observed at Ekkjegrunn in the Saudafjord, Byrkjenes, Eitrheimsneset, Kvalnes and Krossanes in the Sørfjord, at Ranaskjær, Vikingneset and Lille Terøy in the Hardangerfjord. Moderately polluted (Class II) and no significant trends were also documented at Espevær on the west coast, at Toraneskaien, Moholmen and Bjørnbærviken in the Ranfjord, and at Husvaagen area in the Lofoten area. Blue mussel were moderately polluted (Class II) at Solbergstrand and at Færder but no trend could be calculated due to few data in the data series.

Blue mussel at Skallneset in the Varangerfjord was moderately polluted (Class II) of As and showed a significant downward trend.

Blue mussel were insignificantly polluted (Class I) and showed no significant trends at Odderøy in the Kristiansandsfjord, Bølsnes in the Saudafjord, Nordnes and Hegreneset close to Bergen and Brashavn in the Varangerfjord.

Concluding remarks on As
Most of the blue mussel were moderately polluted by As, but Høgevarde in the Karmsund were markedly polluted.

All blue mussel stations in the Inner and Outer Oslofjord were moderately polluted by As. This is in agreement with the findings of Gitmark *et al.* (2012) which observed that mussels were up to moderately polluted by As at Langøya in the Holmestrandfjord close to Mølen in 2011.

Blue mussel at Svensholmen in the Kristiansandsfjord were moderately polluted by As. Similar results were found by Schøyen *et al.* (2012) which found that six blue mussel stations in the Kristiansandsfjord, including Odderøy and Svensholmen, were moderately polluted by As in 2011. Blue mussel at Svensholmen were moderately polluted by As, not only in September when the CEMP-blue mussel were collected, but also in May and July in 2011. Only mussels at one station in the Outer Kristiansandsfjord at Flekkerøy/ Kjeholmen, was insignificantly polluted.

Nickel (Ni)

Results for Ni are presented in ***Table 11***, Appendix H and Appendix I. Relevant values for background levels of Ni are not available for any of the analysed fish samples.

Cod liver
Cod at 11 stations were analysed for Ni with a range of median concentrations of 0.02-0.12 mg/kg w.w. The highest concentration was observed in fish from Kristiansand harbour and the lowest concentration was found in fish from the Ullerø area. No significant trends for Ni in cod liver were observed.

Flounder liver
The Ni-levels in flounder were 0.05 mg/kg w.w. at Sande, 0.02 mg/kg w.w. in the Inner Sørfjord and 0.03 mg/kg w.w. in the Strandebarm. No significant trends for Ni in flounder liver were found.

Dab liver
Dab liver at the two stations Færder area and Ullerø area were analysed for Ni and the median concentrations were 0.07 and 0.06 mg/kg w.w., respectively. No significant trends were observed.

Plaice liver
Liver samples from the station at Husholmen in Lofoten and at Skogerøy in the Varangerfjord showed no significant trends. Median concentrations at the two stations were 0.07 and 0.073 mg/kg w.w., respectively.

Megrim liver
The two stations that were analysed for Ni in megrim liver were Åkrafjord on the west coast and the Strandebarm area in the Hardangerfjord. Median concentrations of Ni were 0.06 mg/kg w.w. and 0.055 mg/kg w.w., respectively. No significant trends were detected. There is insufficient data from reference areas to assess background concentrations for Ni in megrim.

Blue mussel
Blue mussel at 36 stations were analysed for Ni and six of these exceeded acceptable levels (see Appendix H). Mussel were moderately polluted (Class II) by Ni with no significant trends observed at Svensholmen and Odderøy in the Kristiansandsfjord, at Ekkjegrunn in the Saudafjord, at Høgevarde in the Karmsund, and at Toreneskaien in the Ranfjord. Blue mussel at Moholmen in the Ranfjord were also moderately polluted, but a significant downward trend could be observed in the material from these two stations.

Acceptable levels of Ni (Class I) and significant upward trends were observed at Akershuskaia, Gressholmen, Gåsøya and Ramtonholmen in the Inner Oslofjord. Acceptable levels of Ni (Class I) and significant downward trends were found at Lastad and Hegreneset. Blue mussel were insignificantly polluted (Class I) and no significant trends were seen for the rest of the 24 stations analysed for Ni.

Concluding remarks on Ni
Significant upward trends were observed in mussels from the four innermost stations in the Inner Oslofjord, although they had acceptable levels of Ni.

Blue mussel from two stations in the Ranfjord, Moholmen and Toraneskaien, were moderately polluted by Ni in 2011 and 2010. These blue mussels were markedly polluted in 2009.

All blue mussel stations in the Inner and Outer Oslofjord showed acceptable levels of Ni. Gitmark *et al.* (2012) did however observe that mussels were up to markedly polluted by Ni at one station at Langøya in the Holmestrandfjord close to Mølen in 2011.

Blue mussel were moderately polluted at both Svendsholmen and Odderøy in the Kristiansandsfjord. Schøyen *et al.* (2012) found that blue mussel at Svensholmen were insignificantly polluted in May, but markedly polluted by Ni in July and September in 2011. Mussels at two other stations in the Kristiansandsfjord, Lagmannsholmen and Bragdøy, were also moderately polluted by Ni.

Chromium (Cr)

Results for Cr are presented in ***Table 11***, Appendix H and Appendix I. Relevant values for background levels of Cr are not available for any of the analysed fish species.

Cod liver
Cod at 11 stations were analysed for Cr and all of them had a median concentration at or below the detection limit of 0.2 mg/kg w.w. Cod from the Strandebarm area revealed a decrease in concentration from 0.7 mg/kg w.w. in 2010. There were no significant trends in the Inner Oslofjord, Kristiansand harbour, Strandebarm, in the Karihavet, in Trondheim harbour and Tromsø harbour. There was too many data below the detection limit to calculate trends at Færder, Ullerø, in the Inner Sørfjord, Bjørnerøya and in the Varangerfjord.

Flounder liver
The values for Cr in flounder were 0.3 mg/kg w.w. in the Inner Sørfjord and 0.2 mg/kg w.w. at Sande and Strandebarm. There was no significant trend in the Inner Sørfjord, and no trend could be calculated based on the data from the Strandebarm area due to few years of measurements. There was too many data below the detection limit to calculate trend at Sande.

Dab liver
Dab liver at the two stations Færder area and Ullerø area were analysed for Cr. Both had median concentrations of 0.2 mg/kg w.w. There was too many data below the detection limit to calculate trends.

Plaice liver
Liver samples from Husholmen in Lofoten and at Skogerøy in the Varangerfjord revealed both a median concentrations of 0.2 mg/kg w.w. There was too many data below the detection limit to calculate trends.

Megrim liver
Megrim liver from the Åkrafjord on the Norwegian west coast and the Strandebarm area in the Hardangerfjord were analysed for Cr. Median concentrations for both samples were 0.2 mg/kg w.w. There was too many data below the detection limit to calculate trends. There was insufficient data from reference areas to assess background concentrations for megrim.

Blue mussel
Blue mussel at 36 stations were analysed for Cr (see Appendix H). Blue mussel at Toraneskaien and Moholmen in the Ranfjord were markedly polluted (Class III). No significant trend was observed at Toraneskaien, while a significant downward trend was seen at Moholmen.

Blue mussel were moderately polluted (Class II) with significant upward trends at Gåsøya and Solbergstrand in the Oslofjord, and at Singlekalven in the Hvaler area. Blue mussel were moderately polluted with no significant trends at Akershuskaia and Ramtonholmen in the Inner Oslofjord, at Svensholmen and Odderøy in the Kristiansandfjord, at Ekkjegrunn in the Inner Saudafjord and at Høgevarde in the Karmsund.

All the other 24 blue mussel stations were insignificantly polluted (Class I) by Cr and had no significant trends except for Croftholmen that had a significant downward trend (see Appendix H).

Concluding remarks on Cr
All flatfish showed a Cr-concentrations of 0.2 mg/kg w.w. except for flounder in the Inner Sørfjord (0.3 mg/kg w.w.). Similar results were observed the previous year.

Most of the blue mussel stations in the Inner Oslofjord were moderately polluted by Cr, but mussels in the Outer Oslofjord at Mølen and Færder had acceptable levels. Gitmark *et al.* (2012) found that mussels at one station at Langøya close to Mølen in the Holmenstrandfjord were up to severely polluted by Cr.

Blue mussel were moderately polluted at Svensholmen. This is in agreement with the findings of Schøyen *et al.* (2012). They observed that blue mussel at Odderøy and Svensholmen were moderately polluted. Furthermore, in 2011 mussels at Svensholmen were also moderately polluted in July, two months before the CEMP-sampling.

Two blue mussel stations in the Ranfjord were markedly polluted by Cr in 2011 and 2010, but severely polluted in 2009.

Cobalt (Co)

Results for Co are presented in Table 11, Appendix H and Appendix I. Relevant values for background levels of Co are not available for any of the analysed species.

Cod liver
Cod at 11 stations were analysed for Co with a range of median concentrations from 0.015 mg/kg w.w. (Strandebarm) to 0.044 mg/kg w.w. (Færder area). No significant trends could be observed.

Flounder liver
The median concentrations of Co in flounder liver were 0.093 mg/kg w.w. at Sande, 0.056 mg/kg w.w. in the Inner Sørfjord and 0.03 mg/kg w.w. in the Strandebarm area. No significant trend could be seen at Sande while a significant downward trend was observed in flounder from the Inner Sørfjord.

Dab liver
Dab liver at the two stations Færder area and Ullerø area were analysed for Co. Median concentrations were 0.177 mg/kg w.w. and 0.145 mg/kg w.w., respectively. No significant trend could be seen at Færder while a significant downward trend was found in the Ullerø area.

Plaice liver
Liver samples from Husholmen in Lofoten and at Skogerøy in the Varangerfjord were analysed, Observed median concentrations were 0.107 mg/kg w.w. and 0.32 mg/kg w.w., respectively and no significant trends were found.

Megrim liver
Megrim liver from the Åkrafjord on the Norwegian west coast and the Strandebarm area in the Hardangerfjord were analysed for Co with median concentrations of 0.087 mg/kg w.w. and 0.061 mg/kg w.w., respectively. No significant trends were found. There was insufficient data from reference areas to assess background conditions for megrim.

Blue mussel
Blue mussel at 36 stations were analysed for Co. There were no significant trends at all stations except for Akershuskaia where a significant upward trend was found. There were highest concentrations of Co at the two stations Toraneskaien (1.369 mg/kg d.w.) and Moholmen (0. 973 mg/kg d.w.) in the Ranfjord and at the two stations Odderøy (1.293 mg/kg d.w.) and Svensholmen (1.154 mg/kg d.w.) in the Kristiansandsfjord. There is no Klif classification for Co in blue mussel.

Concluding remarks on Co
The highest concentrations of Co were found in blue mussel in the Ranfjord and in the Kristiansandsfjord. Schøyen *et al.* (2012) found higher concentration than Odderøy and Svensholmen in blue mussel at Bragdøy (1.44 mg/kg d.w.) in 2011.

The Co-levels in dab liver were highest of all flatfish and cod tissues.

Vanadium (V)

Blue mussel were only analysed for V at Mølen and the concentration had decreased to 1.846 mg/kg d.w. in 2011 from 7.38 mg/kg d.w. in 2011 (Table 11, Appendix H and Appendix I). There was no significant trend and no Klif classification for V in blue mussel.

Molybden (Mo)

Blue mussel were only analysed for Mo at Mølen and the concentration was 0.545 mg/kg d.w. in 2011 (Table 11, Appendix H and Appendix I). There was no significant trend and no Klif classification for Mo in blue mussel.

Tributyltin (TBT)

Blue mussel

Concentrations of organotin (TBT) in blue mussel were quantified at 15 stations (results from some of the stations are presented in ***Figure 15***). The presence of TBT exceeded Class I (insignificantly polluted) at three blue mussel stations (Gressholmen, Croftholmen and Odderøy, all Class II, moderately polluted). Significant downward trends were observed at Gressholmen and Croftholmen. Blue mussel at Odderøy in the Kristiansandsfjord showed no significant trend. Blue mussel at Mølen and Svensholmen were insignificantly polluted (Class I) by TBT but no significant trends were observed. Significant downward trends were found in mussels at Akershuskaia, Færder, Strømtangen, Bjørkøya/Risøyodden, Risøy, Gåsøy/Ullerø, Høgevarde, Espevær, Husvaagen area and Brashavn (all Class I).

Concentrations of TBT in dog whelk (*Nucella lapillus*)

Concentrations of organotin (TBT) in dog whelks were quantified at 8 stations (results from some of the stations are presented in ***Figure 16***. Significant downward trends were found on the data from eight of the nine gastropod stations: Færder (st. 36G), Risøy (st. 76G), Lista at Gåsøy/Ullerø (st. 15G), Lastad (st. 131G), Melandsholmen (st. 227G1), Espevær (st. 22G), Svolvær (st. 98G) and Brashavn (st. 11G). The snails at Fugløyskjær (st. 71G) showed no significant long-term trend but a significant short time downward trend.

The concentrations of TBT were low (<0.0003 – 0.004 mg/kg w.w.) . As in the previous years, the highest organotin level was found at Melandsholmen/Flatskjær (***Figure 16***) close to Haugesund (0.004 mg/kg w.w.) on the west coast of Norway.

Concentrations of TBT in common periwinkle (*Littorina littorea*)

There was no significant trend of TBT at Fugløyskjær in the Grenland area. The concentration of TBT was 0.001 mg/kg w.w.

Biological effects of TBT (imposex/VDSI) in dog whelk

The effects from TBT were low (VDSI<2) at all eight stations investigated in 2011. There were significant downward trends at all the stations except for at Brashavn where no significant trend was found and where VDSI values have been low during the whole monitoring period (***Figure 17***). The VDSI in dog whelk from the Svolvær area had decreased from 3.03 in 2009 to 1.12 in 2010 and 0.65 in 2011. At Melandholmen in The Karmsundet the VDSI was 2.32 in 2009, 0.636 in 2010 and 1.958 in 2011 (***Figure 17***). At Espevær the VDSI was 1.58 in 2009, 0.125 in 2010 and 0.519 in 2011. No effects (VDSI = 0) were found at Færder, Risøy, Gåsøy/Ullerø and Brashavn (***Figure 17***). At Lastad the VDSI was 0.048 indicating no or only a slight effect.

Concluding remarks on TBT

No significant upward trends were found in either blue mussel or snails. All of the 15 blue mussel stations monitored in 2011 were insignificantly or moderately polluted by TBT. Of the time series investigated, eight snail stations and 12 mussel stations showed significant downward trends for TBT.

In the Inner Oslofjord, mussels were moderately polluted at Gressholmen, but insignificantly polluted at Akershuskaia. The TBT-levels were low in the Outer Oslofjord at Mølen and Færder. Gitmark *et al.* (2012) did however observe that mussels were up to markedly polluted by TBT (molecular basis) at one station at Langøya in the Holmestrandfjord close to Mølen in 2011.

In the Kristiansandsfjord, Schøyen *et al.* (2012) found that blue mussel were moderately polluted by TBT at Odderøy and insignificantly polluted at Svensholmen in 2011. The concentration of TBT at Svensholmen was highest in May (moderately polluted) and decreased through the summer in July and in September to an acceptable level, the same pattern was seen in 2010. The TBT-concentrations were lowest in the Inner (Marvika) and Outer (Flekkerøy/Kjeholmen) Kristiansandsfjord, and highest in the Mid part of the fjord, and the same result was seen in 2010.

The effects from TBT on dog whelk were relatively low (VDSI<1.958) at all eight stations investigated in 2011. All stations showed significant downward trends except for Brashavn where no significant trend could be seen and previous VDSI levels were low.

The VDSI was 0 at Færder, Risøy, Gåsøy/ Ullerø and Brashavn and 0.048 at Lastad. These results are below the OSPARs Background Assessment Criteria (BAC=0.3) (OSPAR 2005). The VDSI was 0.519 at Espevær, 1.958 at Melandsholmen and 0.65 at Svolvær. These results are over BAC but below the OSPARs Ecotoxicological Assessment Criteria (EAC=2) (OSPAR 2005).

Dog whelks at Melandsholmen in the Karmsund had an increase in VDSI from 0.636 in 2010 to 1.958 in 2011. It can be noticed that dog whelks from the Svolvær area showed a VDSI of 3.03 in 2009, but had decreased to 1.12 in 2010 and further down to 0.65 in 2011.

The results still show that the Norwegian legislation banning the use of organotins on ships shorter than 25 meters in 1990 and longer than 25 meters in 2003 has been effective in reducing imposex in dog whelk populations and some of the gastropod populations have re-established. The international convention that was initiated by the International Maritime Organization (IMO) has also resulted in a ban on the presence of organotin-based antifouling paints on the hulls of large ships from 2008.

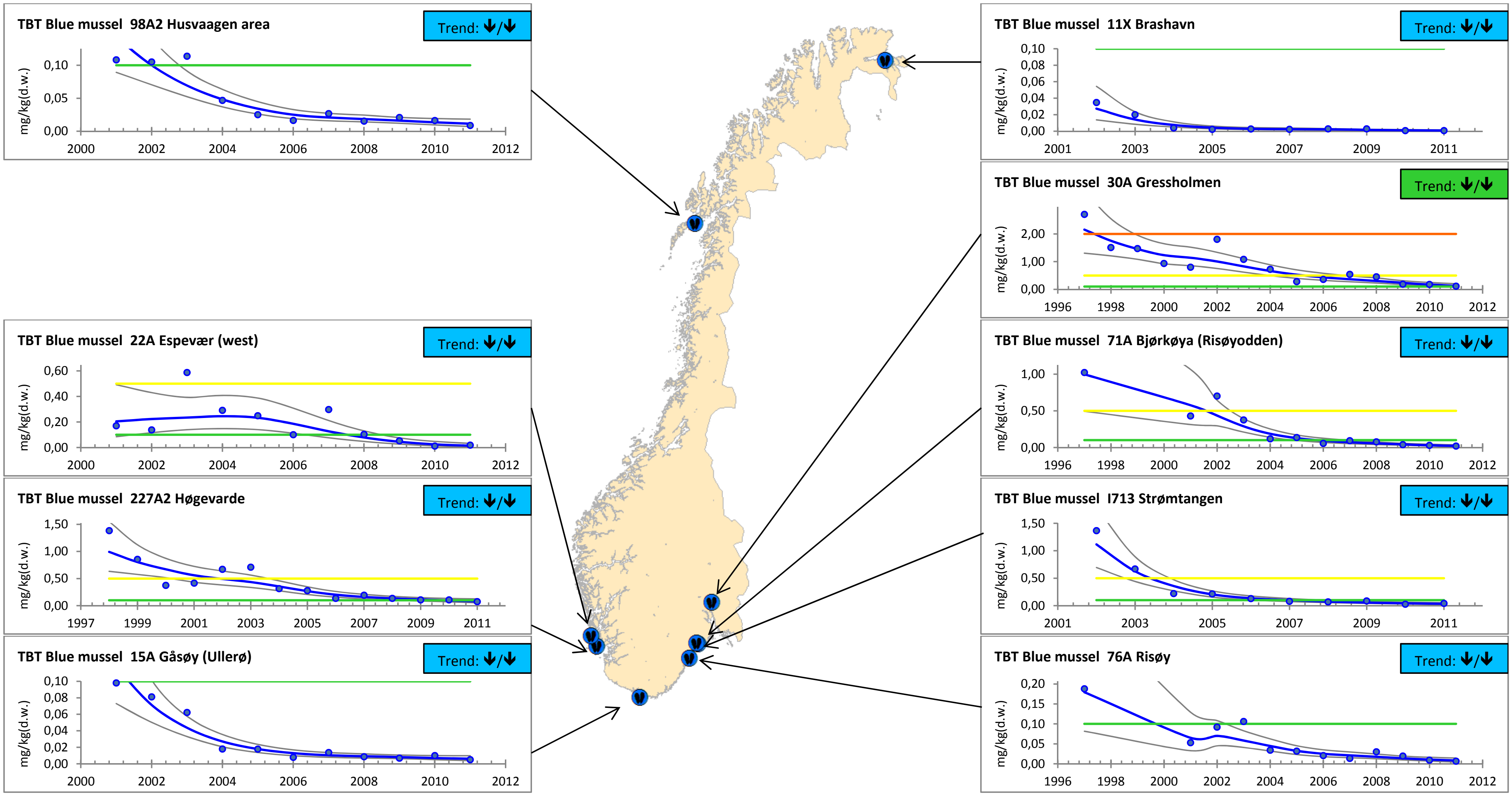


Figure 15. *Median concentration of TBT (on a formulation basis) in blue mussel, mg/kg (mg TBT/kg) dry weight (cf. Appendix H, see otherwise key to detail in Figure 5 and, for trend, Table 11).*

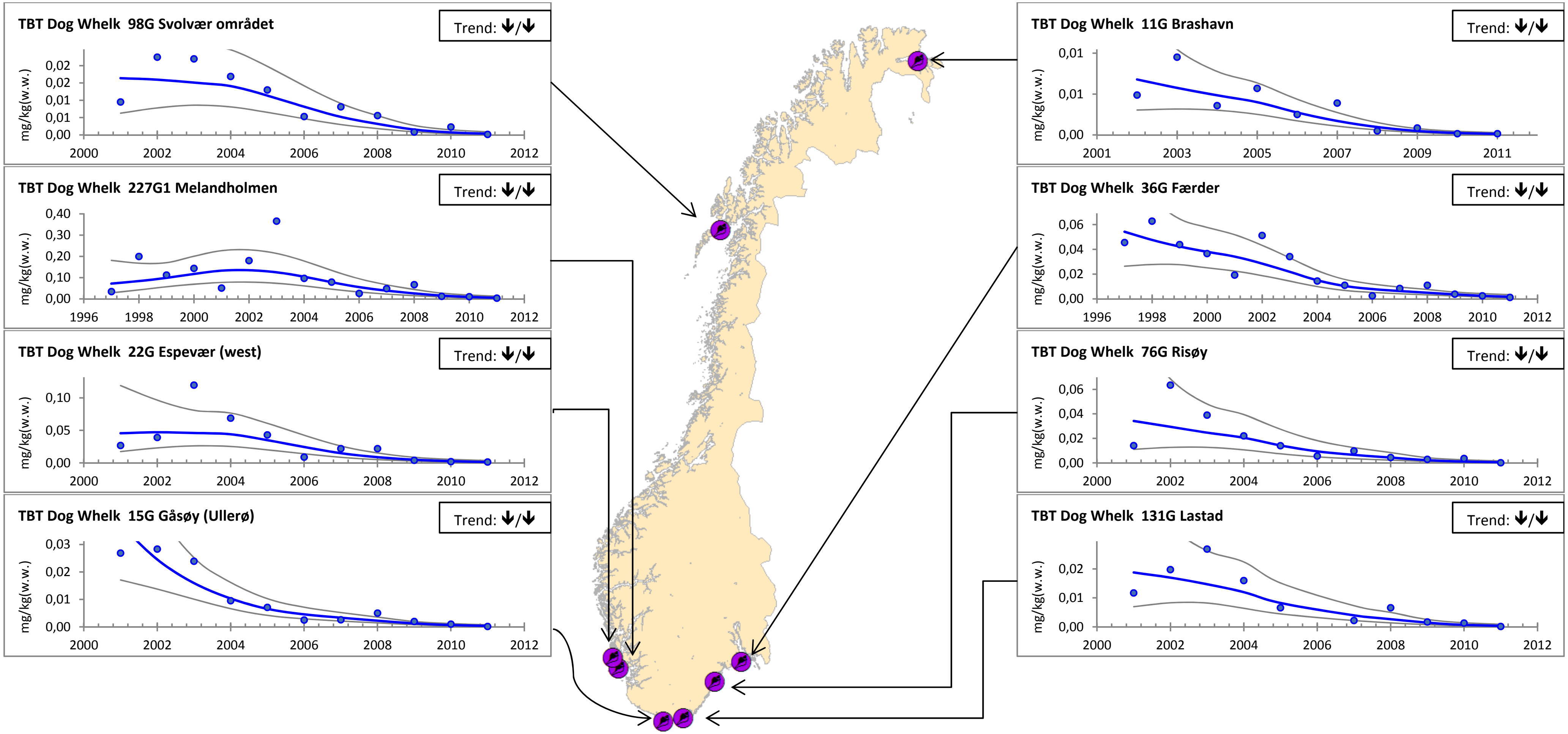


Figure 16. *Median concentration of TBT (on a formulation basis) in dog whelk at eight stations, mg/kg (mg TBT/kg) wet weight (cf. Appendix H, see otherwise key to detail in Figure 5 and, for trend, Table 11). There are no limits to classify the results.*

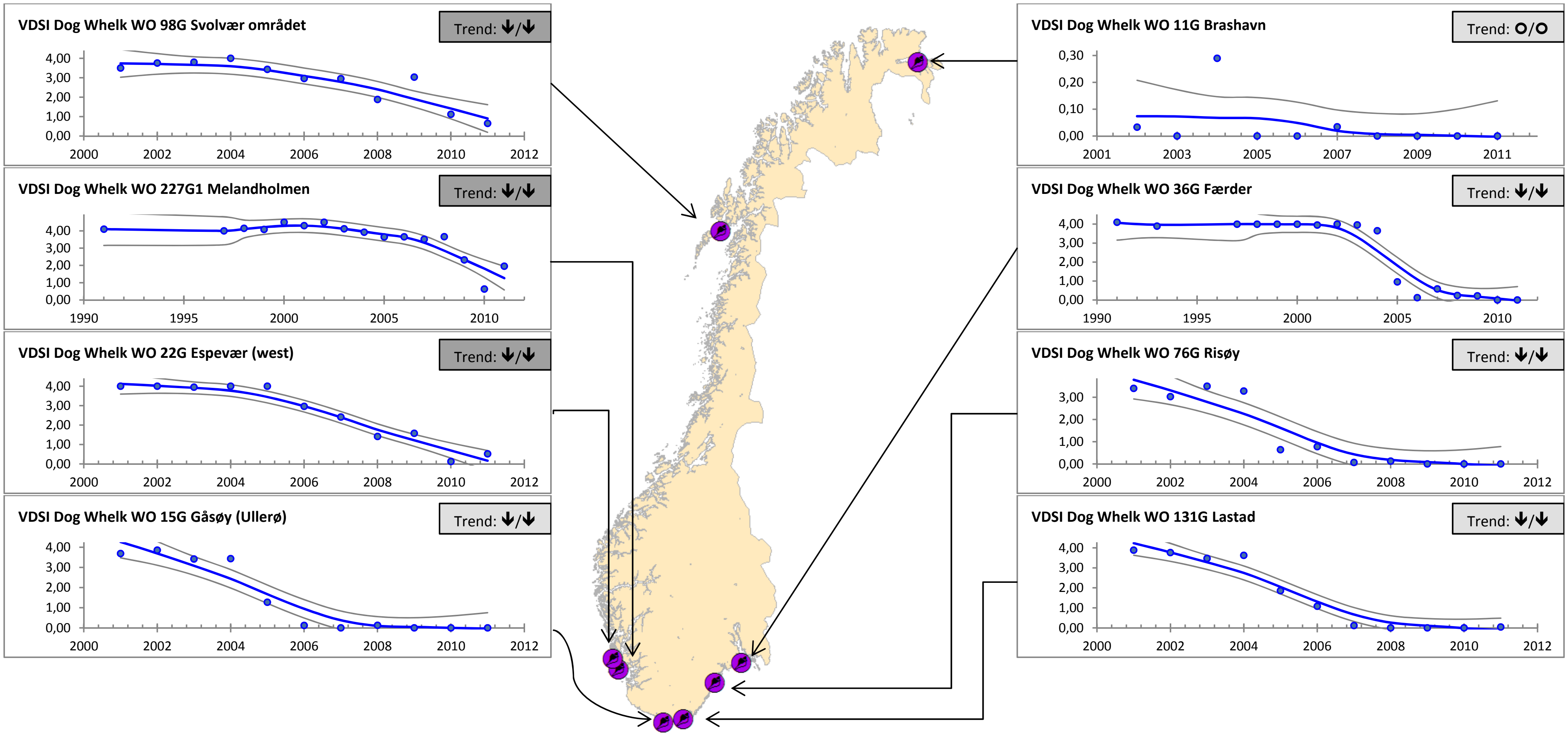


Figure 17. *Median values of imposex (VDSI) in dog whelk at eight stations. Data from 1991 (Harding et al. 1992) and 1993 (Walday et al. 1997) (cf. Appendix H, see otherwise key to detail in Figure 5 and, for trend, Table 11). There are no limits to classify the results.*

Polychlorinated biphenyls (ΣPCB-7)

Cod liver
The median concentration of ΣPCB-7 in cod liver exceeded Class I (insignificantly polluted) in only diffusely contaminated areas at three of the 11 stations (***Figure 19***). The observations from the station in the Inner Oslofjord (Class III, markedly polluted) revealed no significant trend (also on a lipid-weight basis) for the entire period and also for the period 2002 to 2011. Cod liver in Kristiansand harbour and in the Inner Sørfjord were moderately polluted (Class II) by ΣPCB-7, but no significant trends could be observed (also on a lipid-weight basis ***Figure 19***).

Cod liver in Tromsø harbour was insignificantly polluted (Class I) by ΣPCB-7 and no significant trend was observed (also on a lipid-weight basis). Cod liver that also were insignificantly polluted of ΣPCB-7 but had significant downward trends, were found at the seven stations; Færder area, Ullerø area, Strandebarm area, Karihavet area, Trondheim harbour, Bjørnerøya and in the Varangerfjord. However, on a lipid-weight basis no trend was found at Færder, Karihavet area, Trondheim harbour or Bjørnerøya.

Cod fillet
The median concentration of ΣPCB-7 in cod fillet exceeded Class I (insignificantly polluted) at two of the 11 cod stations (***Figure 20***). The stations in the Inner Oslofjord and Kristiansand harbour were moderately polluted (Class II) and showed no significant trends (also on a lipid-weight basis).

The cod fillet in the Færder area, the Strandebarm area, the Inner Sørfjord, the Karihavet area, Trondheim harbour, Bjørnerøya, Tromsø harbour and the Varangerfjord showed acceptable levels of ΣPCB-7 (Class I) and showed no significant trends. A significant downward trend was found for the cod fillet at Ullerø area (also on a lipid-weight basis, ***Figure 21***) and the level of ΣPCB-7 was acceptable (Class I). However, on a lipid-weight basis a significant downward trend was found at Bjørnerøya east and Varangerfjord.

Flounder liver
The ΣPCB-7 concentration in flounder liver from the Inner Sørfjord was over presumed high background level (***Figure 22***). No significant trend was observed although the concentration had decreased to 194.9 µg/kg in 2011 from 337.787 µg/kg in 2010. Results from Sande and Strandebarm showed ΣPCB-7 levels below the presumed high background level. No significant trend was found in Sande but a significant downward trend was observed in the Strandebarm area.

Flounder fillet
Observations of ΣPCB-7 in fillet from flounder caught at Sande were low (Class I) and no significant trend was observed (***Figure 23***). The flounder in the Inner Sørfjord and Strandebarm showed significant downward trends and acceptable levels of ΣPCB-7.

Dab liver
Results from analysis for ΣPCB-7 in liver of dab showed acceptable concentrations in samples from the Færder area and Ullerø area (***Figure 22***). A significant upward trend was observed in the data from Færder. No significant trend was observed at Ullerø.

Dab fillet
Results from analysis for ΣPCB-7 in fillet of dab showed acceptable levels at Færder and Ullerø area (***Figure 23***). No significant trend could be found at Ullerø while a significant downward trend could be seen at Færder.

Plaice liver
The presence of ΣPCB-7 in liver showed values below presumed high background level at Husholmen in the Lofoten area and Skogerøy in the Varangerfjord (***Figure 22***). There was no significant trend at Skogerøy and a significant downward trend at Husholmen.

Plaice fillet
The values in fillet from fish from Husholmen and Skogerøy were below presumed high background level of ΣPCB-7 (***Figure 23***). No significant trend was observed in plaice from Husholmen while a significant downward trend was found in fish from Skogerøy.

Megrim liver
Megrim liver from fish caught at two stations on the west coast of Norway (Åkrafjord and Strandebarm area in the Hardangerfjord) were analysed for ΣPCB-7. The results from megrim in Strandebarm showed a significant downward trend while the results from megrim in the Åkrafjord showed no significant trend (***Figure 22***). Values for background concentrations for ΣPCB-7 in liver from megrim are not given.

Megrim fillet
The results from megrim fillet from the Strandebarm area and Åkrafjord showed no significant trends (***Figure 23***). Values for background concentrations for ΣPCB-7 in fillet from megrim are not available.

Blue mussel
Blue mussel at 31 stations were analysed for ΣPCB-7. The presence of ΣPCB-7 in blue mussel exceeded Class I (insignificantly polluted) at six stations (some of the stations are presented in ***Figure 24***). Blue mussel at Nordnes and Hegreneset close to Bergen were markedly polluted (Class III, see ***Table 11***) in 2011 while they were moderately polluted (Class II) in 2010. Mussels at Nordnes showed no significant trend while mussels at Hegreneset had a significant downward trend. Blue mussel markedly polluted with no significant trends were found at Gåsøya in the Inner Oslofjord and Høgevarde in the Karmsund. Significant downward trends were observed in mussels from Akershuskaia and Gressholmen in the Inner Oslofjord (both Class II, moderately polluted).

Blue mussel were insignificantly polluted (Class I) with no significant trends at Håøya and Solbergstrand in the Inner Oslofjord at Strømtangen in the Frierfjord. The same results were found at Svensholmen in the Kristiansandsfjord, Lastad and Gåsøy/Ullerø close to Farsund in the southern part of Norway. This was also found at Byrkjenes, Eitrheimsneset, Kvalnes and Krossanes in the Sørfjord and at Ranaskjær and Lille Terøy in the Hardangerfjord. Insignificantly polluted mussels and no significant trends was also the case at Husvaagen area in Lofoten. Blue mussel were insignificantly polluted and significant downward trends were observed at 12 stations. These stations were Ramtonholmen in the Inner Oslofjord, Mølen and Færder in the Outer Oslofjord, Singlekalven in the Hvaler area, Bjørkøya/Risøyodden and Croftholmen in the Frierfjord, Risøy close to Risør and Odderøy in the Kristiansandsfjord. These were also the results at Vikingneset in the Hardangerfjord, at Espevær on the west coast and at Skallneset and at Brashavn in the Varangerfjord.

Concluding remarks on ΣPCB-7
Cod liver was markedly polluted and the fillet was moderately polluted by ΣPCB-7 in the Inner Oslofjord and no significant long- or short-term trends were observed.

Both cod liver and fillet were moderately polluted by ΣPCB-7 in the Kristiansand harbour and no significant trends were seen.

Cod liver in the Inner Sørfjord was moderately polluted with ∑PCB-7. Ruus *et al.* (2012a) classified ∑PCB-7 concentration in cod liver from the Sørfjord in 2011 moderately polluted and cod fillet to be insignificantly polluted.

Concentrations above presumed high background levels of ΣPCB-7 were found in blue mussel at six stations but no significant upward trends were observed. Hegreneset and Nordnes close to Bergen were the only stations that had markedly polluted blue mussel by ΣPCB-7.

Three blue mussel stations in the Inner Oslofjord (Akershuskaia, Gressholmen and Gåsøya) were moderately polluted by ΣPCB-7. Mussels outwards the Oslofjord at Ramtonholmen, Håøya, Solbergstrand, Mølen and Færder had acceptable levels of ΣPCB-7. Moderately polluted mussels have however been observed at Langøya close to Mølen in the Holmestrandfjord in 2011 (Gitmark *et al.* 2012).

Schøyen *et al.* (2012) found that seven blue mussel stations in the Kristiansandsfjord, including the CEMP stations at Odderøy and Svensholmen, were insignificantly polluted by ΣPCB-7 in 2011 and 2010. Blue mussel at Svensholmen had an acceptable level of ΣPCB-7, not only in September when the CEMP-blue mussel were collected, but also in May and July in 2011.

All four blue mussel stations in the Sørfjord and three stations in the Hardangerfjord were insignificantly polluted by ΣPCB-7. Ruus *et al.* (2012a) also found that blue mussel from all stations in the Sørfjord were insignificantly polluted with ∑PCB-7 in 2011.

Based on high concentrations of dioxins and PCBs, the Norwegian Food Safety Authority (*Mattilsynet*[1]) has issued a general recommendation not to consume liver from fish caught inside the coastal baseline and for private use (*Mattilsynet*[2]). The area inside the baseline would include fjord and harbour areas. The Authority has also issued a specific recommendations regarding consumption of mussels from Karmsundet (last updated 2010).

OSPAR (2010) found a predominance of downward trends for PCBs for those trends that were statistically significant in North Sea. Of 16 timeseries observed North Sea stations distant to point sources of pollution and analysed in the current study, nine showed a significant trend, eight downward and one upward, indicating a relatively good correlation with the general trend of the North Sea.

[1] see http://www.miljostatus.no/Tema/Hav-og-vann/Pavirkninger-pa-livet-i-vann/Miljogifter_vann/Miljogifter_marint/Kostholdsrad/
[2] see http://www.matportalen.no/verktoy/advarsler/fisk_og_skalldyr_fra_visse_havner_fjorder_og_innsjoer

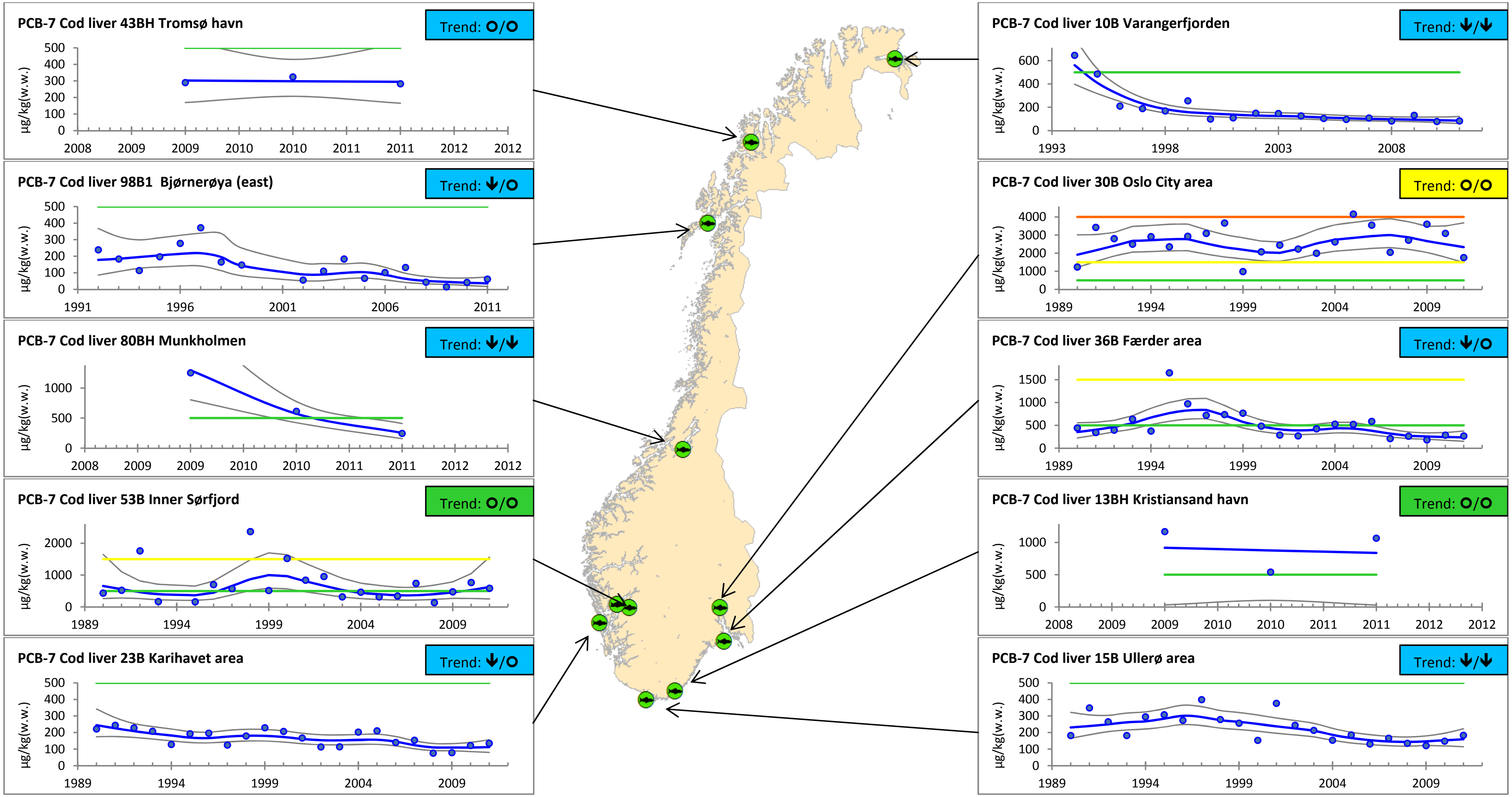


Figure 18. *Median concentration of ΣPCB-7 in cod liver, µg/kg (µg ΣPCB-7/kg) wet weight (cf. and Appendix H, see otherwise key to detail in Figure 5 and, for trend, Table 11).*

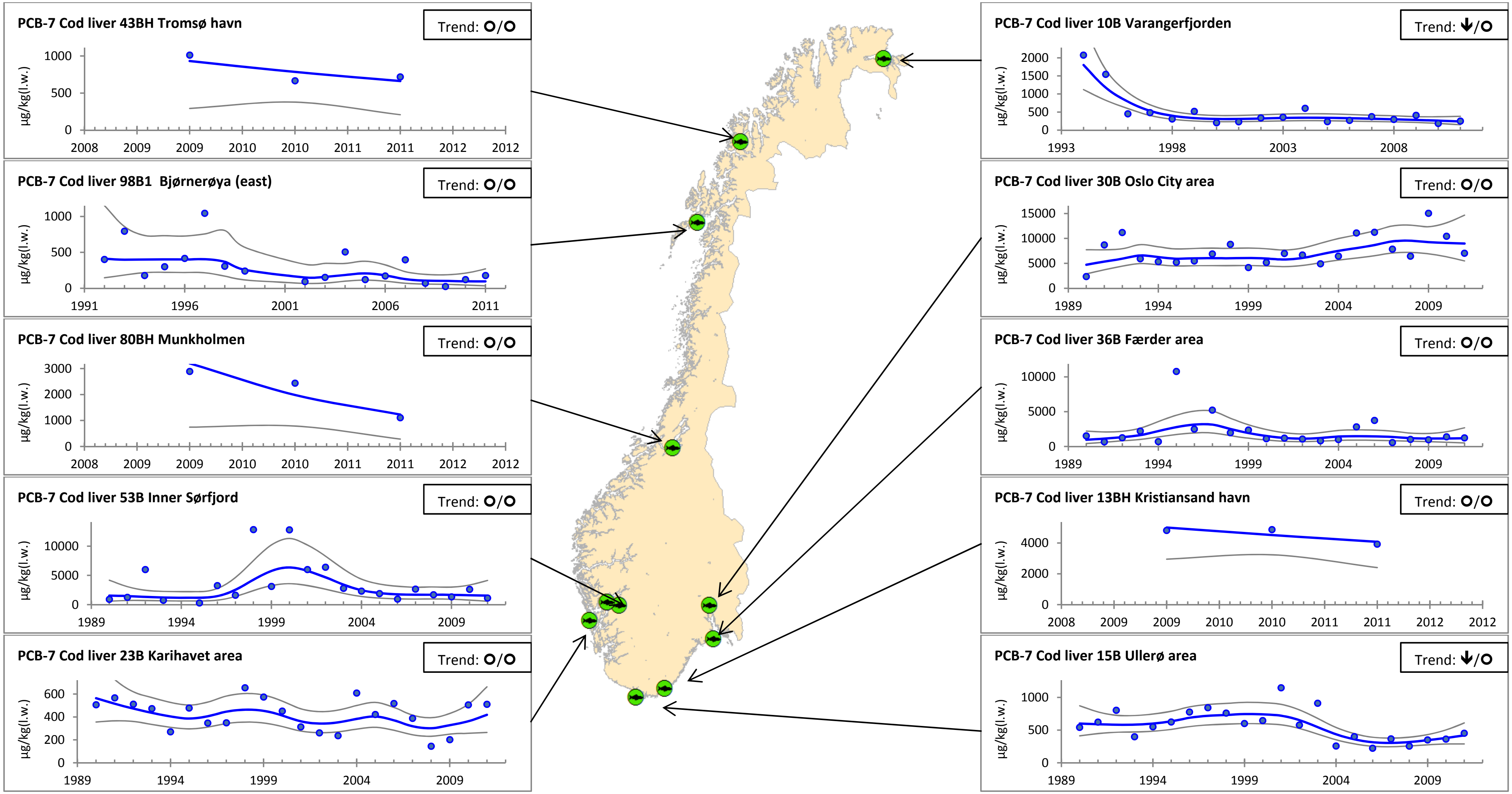


Figure 19. *Median concentration of ΣPCB-7 in cod liver, µg/kg (µg ΣPCB-7/kg)* ***lipid weight*** *(cf. and Appendix H, see otherwise key to detail in Figure 5 and, for trend, Table 11).*

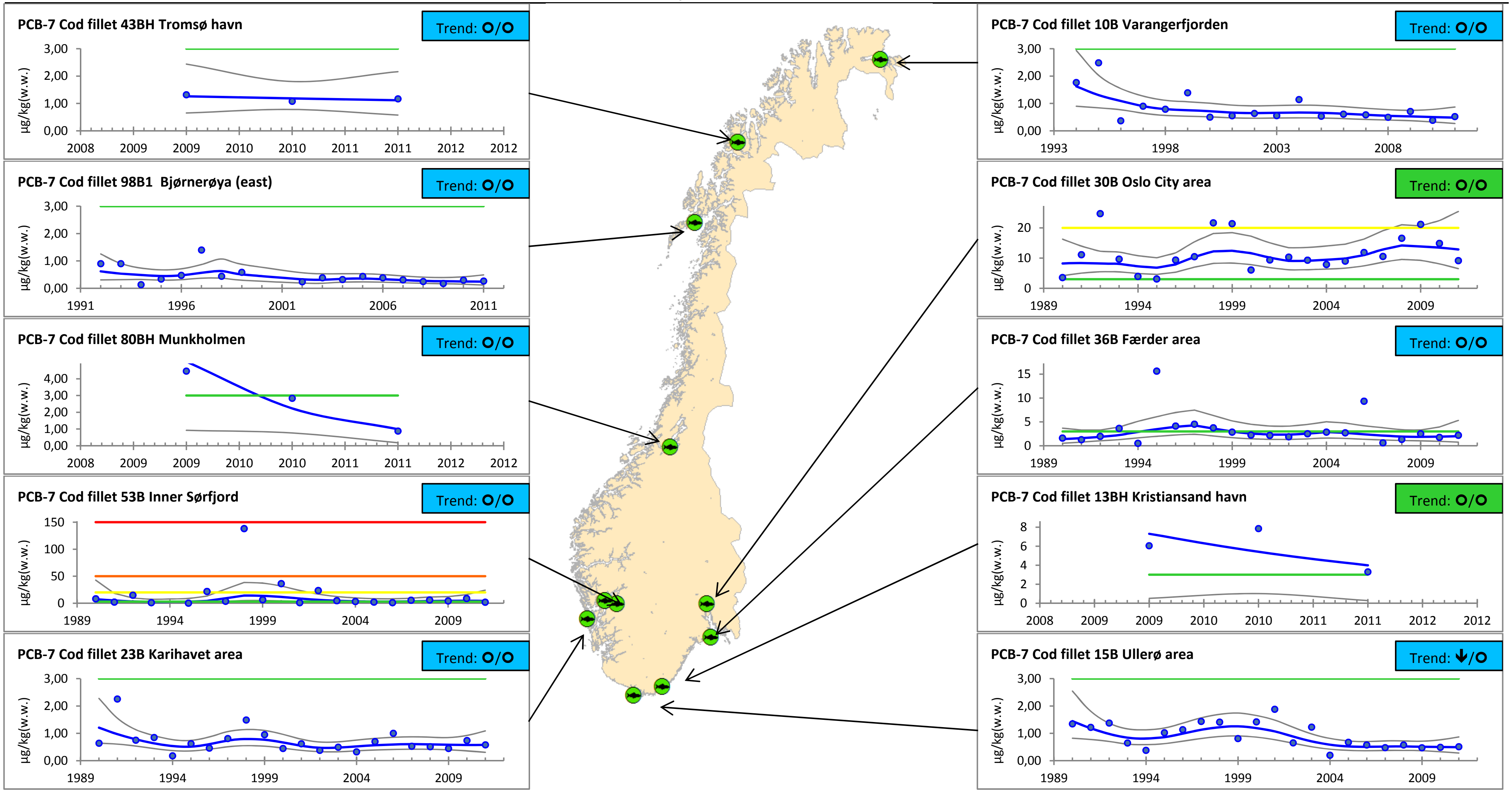


Figure 20. *Median concentration of ΣPCB-7 in cod fillet, µg/kg (µg ΣPCB-7 /kg) wet weight (cf. Appendix H, see otherwise key to detail in Figure 5 and, for trend, Table 11).*

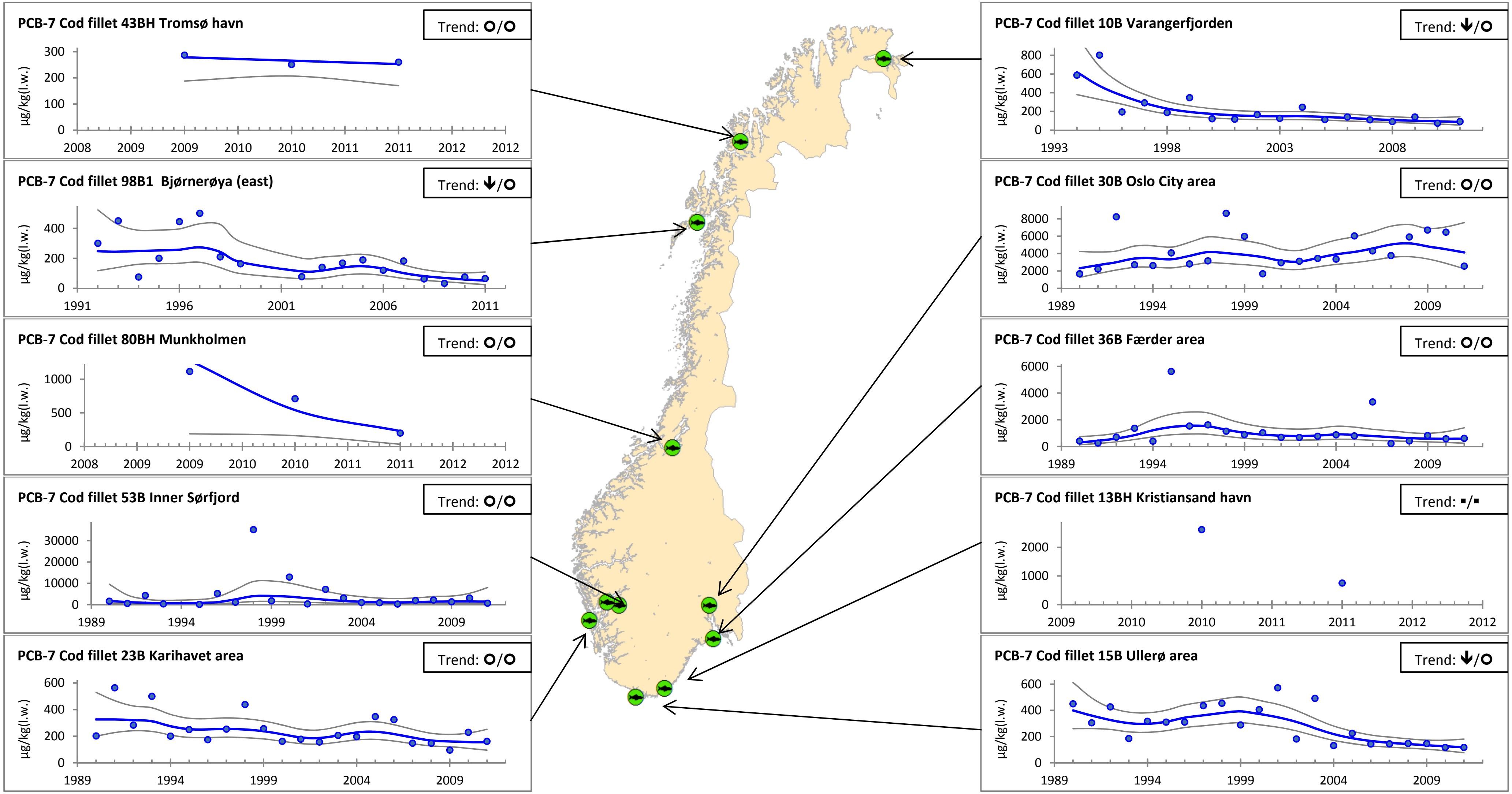


Figure 21. *Median concentration of ΣPCB-7 in cod filet, µg/kg (µg ΣPCB-7/kg)* ***lipid weight*** *(cf. and Appendix H, see otherwise key to detail in Figure 5 and, for trend, Table 11).*

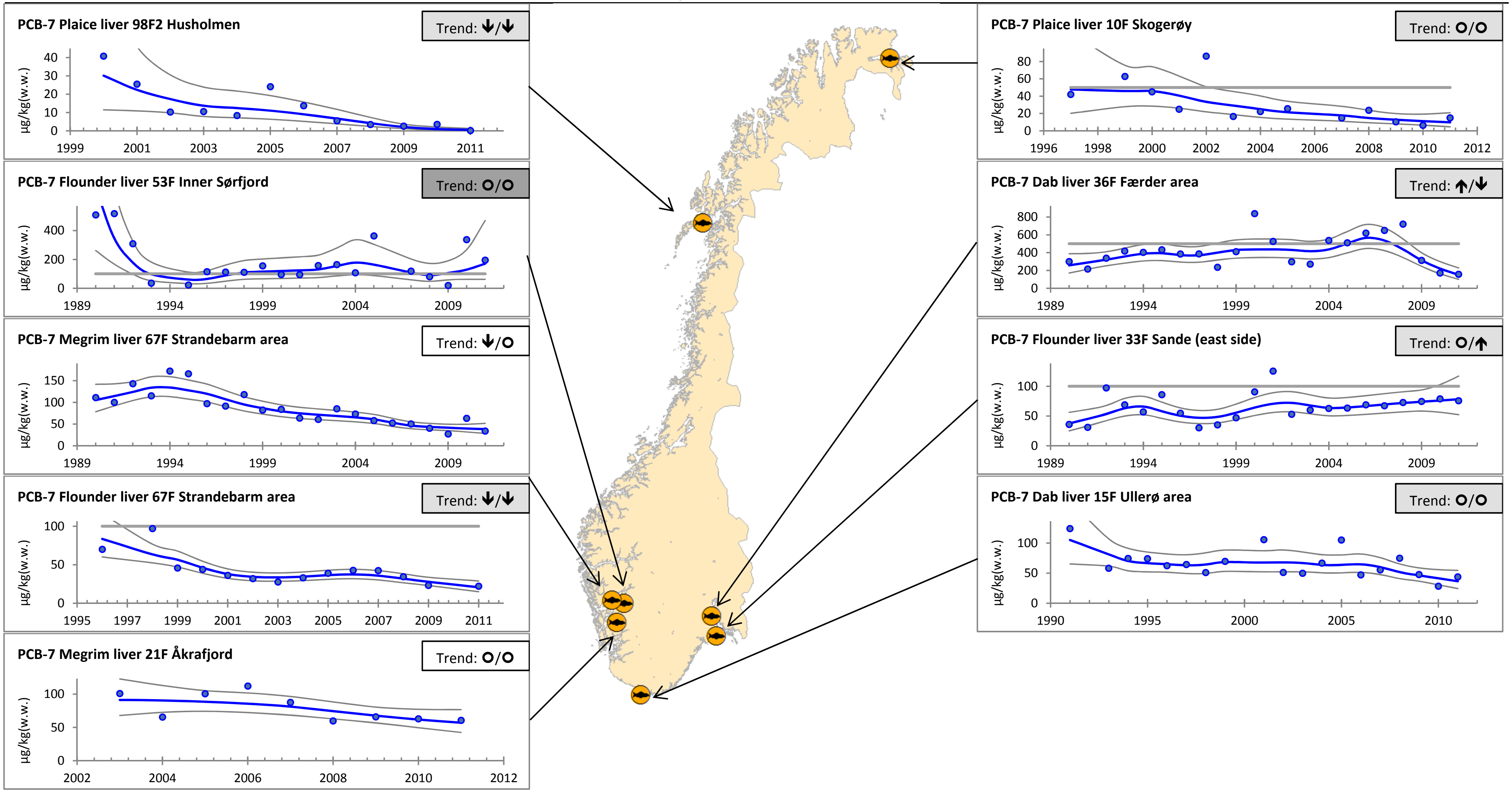


Figure 22. *Median concentration of ΣPCB-7 in flatfish liver, µg/kg (µg ΣPCB-7/kg) wet weight (cf. and Appendix H, see otherwise key to detail in Figure 5 and, for trend, Table 11).*

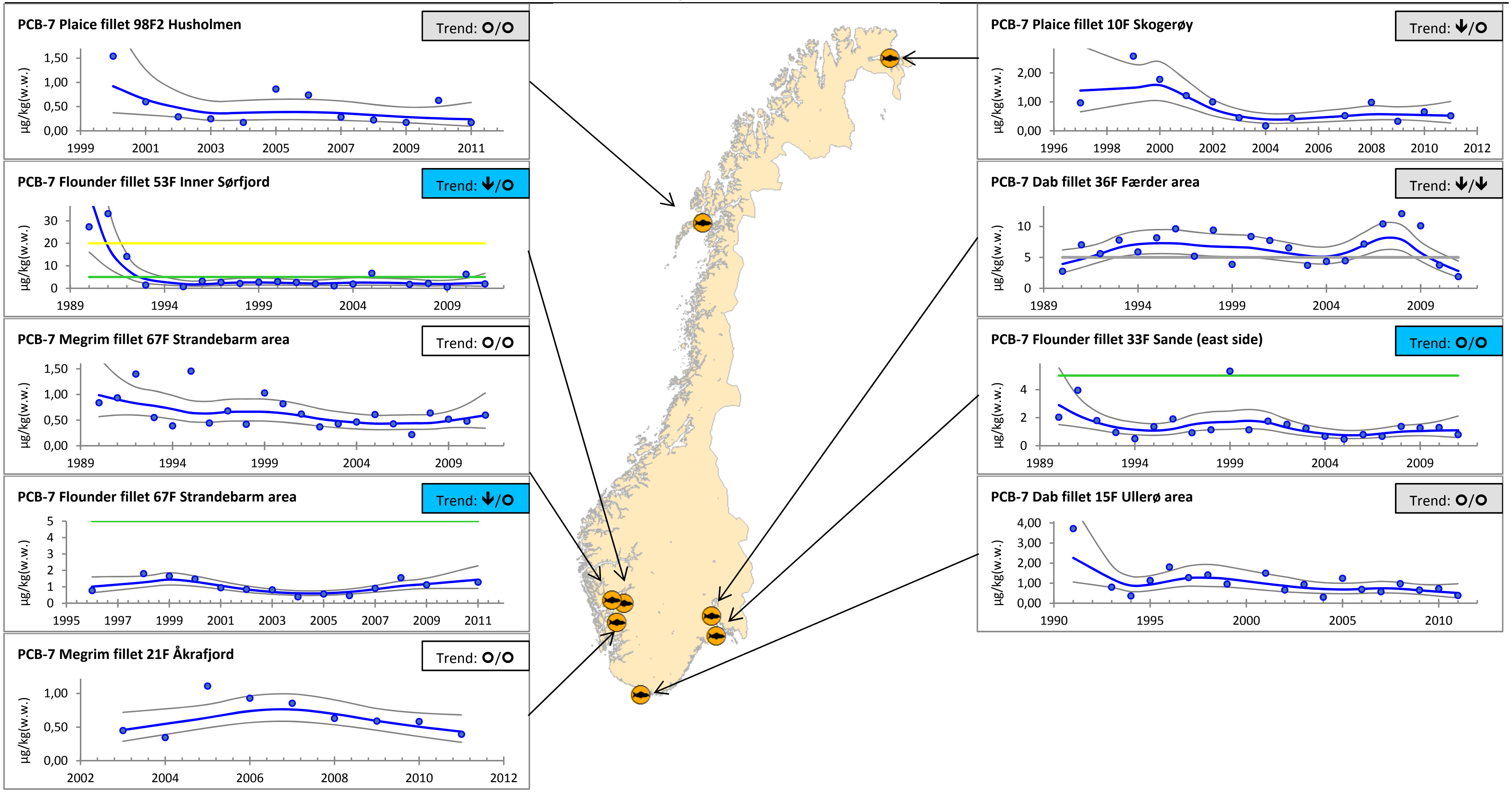


Figure 23. *Median concentration of ΣPCB-7 in flatfish fillet, µg/kg (µg ΣPCB-7/kg) wet weight (cf. Appendix H, see otherwise key to detail in Figure 5 and, for trend, Table 11).*

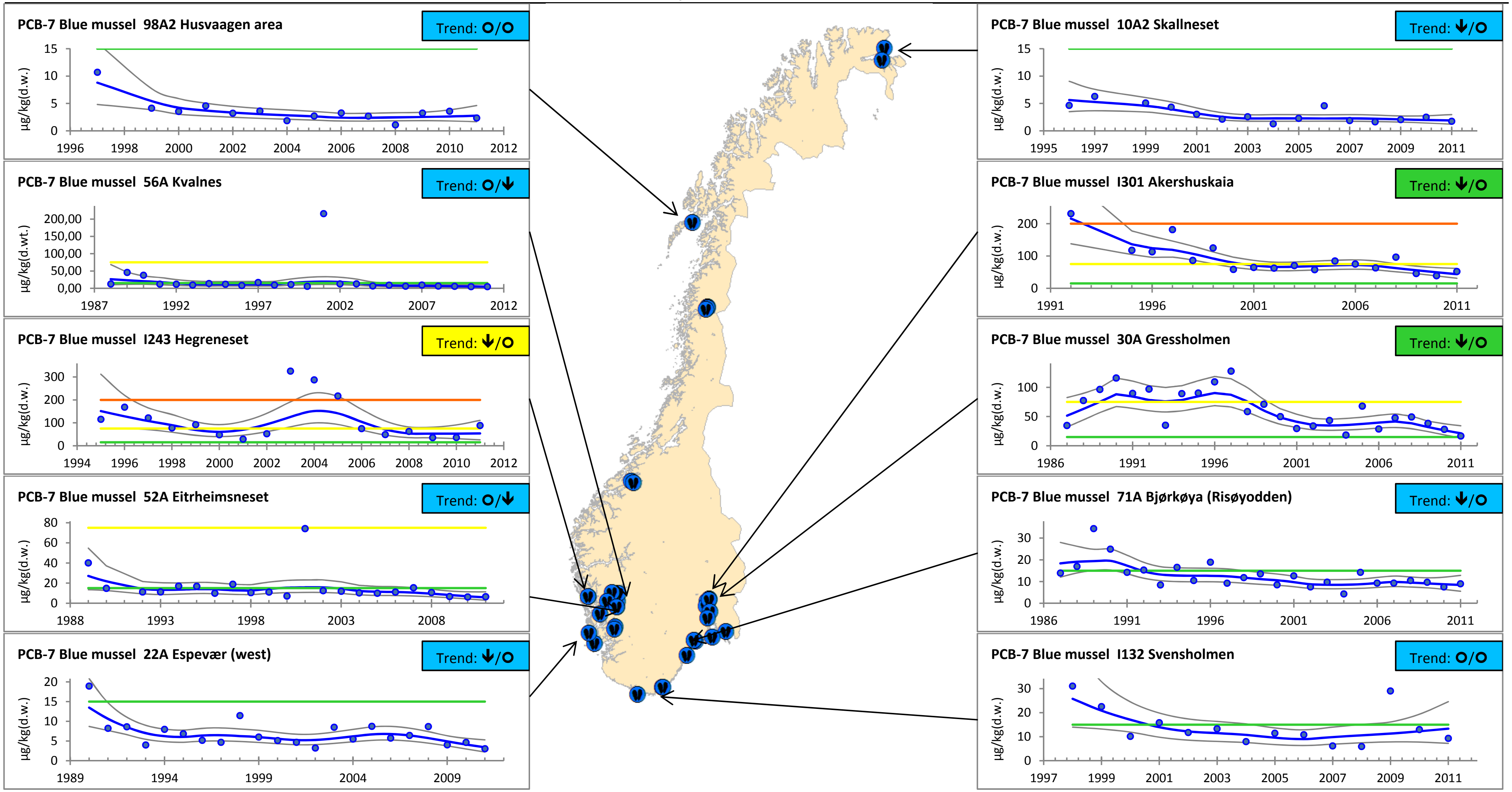


Figure 24. *Median concentration of ΣPCB-7 in blue mussel µg/kg (µg ΣPCB-7/kg) dry weight for selected stations (cf. Appendix H, see otherwise key to detail in Figure 5).*

Dichlorodiphenyldichloroethylene (ppDDE)

The concentrations of ppDDE are compared with Class limits for ΣDDT.

Cod liver

The concentrations of ppDDE in cod liver exceeded Class I (insignificantly polluted) in two of the 11 stations investigated (***Figure 25***). These stations were located in the Inner Sørfjord and the Strandebarm in the Hardangerfjord, both moderately polluted (Class II). In the Sørfjord, there was no significant trend while there was a significant downward trend in the Strandebarm area. Cod liver from the harbours of Kristiansand and Trondheim, and from the Ullerø area were insignificantly polluted by ppDDE and had no significant trends. Cod in the Inner Oslofjord, Færder area, Karihavet, Bjørnerøya in the Lofoten area, Tromsø and in the Varangerfjord contained ppDDE-levels equivalent to Class I (Class limits for ΣDDT) and had all significant downward trends.

Cod fillet

Concentration of ppDDE exceeding background levels was only observed in cod fillet from the Inner Sørfjord (Class II, moderately polluted) (***Table 11***). Cod at the other stations contained ppDDE-levels equivalent to Class I (insignificantly polluted). There were no significant trends in the Inner Oslofjord, in Kristiansand harbour, Ullerø area, Karihavet, Trondheim, Bjørnerøya, Tromsø and in the Varangerfjord. There were significant downward trends concerned the entire sampling period in the areas of Færder and Strandebarm in the Hardangerfjord.

Flounder liver

Flounder liver from three stations were analysed for ppDDE. The results from the stations in Sande and Strandebarm revealed concentrations of ppDDE below background levels and no significant trends could be observed (***Figure 26***). Flounder in the Inner Sørfjord also had acceptable concentrations while a significant downward trend was found.

Flounder fillet

Observed concentrations of ppDDE were in Class I (insignificantly polluted) in flounder fillet from Sande, the Inner Sørfjord and Strandebarm (***Table 11***). The data revealed significant downward trends at all three stations.

Dab liver

Both stations, Færder area and the Ullerø area revealed concentrations of ppDDE below background levels in only diffusely contaminated area (Class I) (***Figure 26***). No significant trends were detected.

Dab fillet

The results from Færder area and the Ullerø area revealed concentrations of ppDDE below background levels in only diffusely contaminated area (***Table 11***). A significant downward trend was detected at Færder while the dab at Ullerø showed no significant trend.

Plaice liver

There were acceptable levels and significant downward trends of ppDDE in plaice liver from Skogerøy in the Varangerfjord and at Husholmen in the Lofoten area (***Figure 26***).

Plaice fillet

The results revealed concentrations of ppDDE below background levels in only diffusely contaminated area in plaice fillet from Skogerøy in the Varangerfjord and from Husholmen (***Table 11***). A significant downward trend in plaice fillet from Skogerøy was detected, and no significant trend was observed at Husholmen.

Megrim liver

Fish from two stations on the west coast were analysed for ppDDE, the Åkrafjord and the Strandebarm area. The results from the station in Strandebarm showed a significant downward trend while the megrim in the Åkrafjord had no significant trend (***Figure 26***). There is insufficient data from reference areas to assess background conditions.

Megrim fillet
Fish from the Åkrafjord and the Strandebarm area were analysed for ppDDE. The results from the station in Strandebarm showed a significant downward trend while the megrim in the Åkrafjord revealed no significant trend (***Table 11***). There is insufficient data from reference areas to assess background conditions for megrim.

Blue mussel
The presence of ppDDE in blue mussel exceeded Class I (insignificantly polluted) in mussels from five of the 31 blue mussel stations (results from some of the stations are presented in ***Figure 27***). Mussels in the Sørfjord at Kvalnes were severely polluted (Class IV) and showed no significant trend. Mussels at Krossanes in the Outer Sørfjord were markedly polluted (Class III) and no significant trend was found. At Byrkjenes and Eitrheimsneset in the Inner Sørfjord and Ranaskjær in the Hardangerfjord the mussels were moderately polluted (Class II) and no significant trends were found.

Concentrations of ppDDE were below background level in only diffusely contaminated area (Class I) and no significant trends were observed in most of the data. This was the case for Akershuskaia, Gåsøya, Ramtonholmen, Håøya, Solbergstrand, Mølen and Færder in the Oslofjord. Similar results were also observed in mussels from Croftholmen, Strømtangen and Bjørkøya/Risøyodden in the Grenlandsfjord area, Risøy close to Risør, Odderøy and Svensholmen in the Kristiansandsfjord, Lastad in the southern part of Norway and Gåsøy/Ullerø close to Farsund. Further, this was also the result at Høgevarde in the Karmsundet, Vikingneset and Lille Terøy in the Hardangerfjord, Espevær on the west coast, and Nordnes and Hegreneset close to Bergen. Acceptable levels of ppDDE and no significant trends were also observed at Husvaagen area in the Lofoten, and Skallneset and Brashavn in the Varangerfjord. Significant downward trends and insignificantly polluted blue mussel were observed in samples from the Inner Oslofjord at Gressholmen and Singlekalven in the Hvaler area.

Concluding remarks on ppDDE
No upward trends for ppDDE were observed.

Both cod liver and fillet from the Inner Sørfjord were moderately polluted by ppDDE. Ruus *et al.* (2012a) also found that the average ∑DDT-concentration in cod fillet was moderately polluted, while the liver from the Sørfjord in 2011 were markedly polluted.

Blue mussel from Kvalnes in the Mid Sørfjord were classified as severely polluted with ppDDE in 2011 and 2010. Mussels at Krossanes in the Outer Sørfjord were markedly polluted and at Byrkjenes and Eitrheimsneset in the Inner Sørfjord and Ranaskjær in the Hardangerfjord the mussels were moderately polluted. Ruus *et al.* (2012a) found that concentrations of ∑DDT in blue mussel were classified up to extremely polluted (Class V) at Kvalnes and in the Outer Sørfjord at Utne in 2011. At the other stations, concentrations in mussels could be classified as insignificantly polluted to severely polluted.

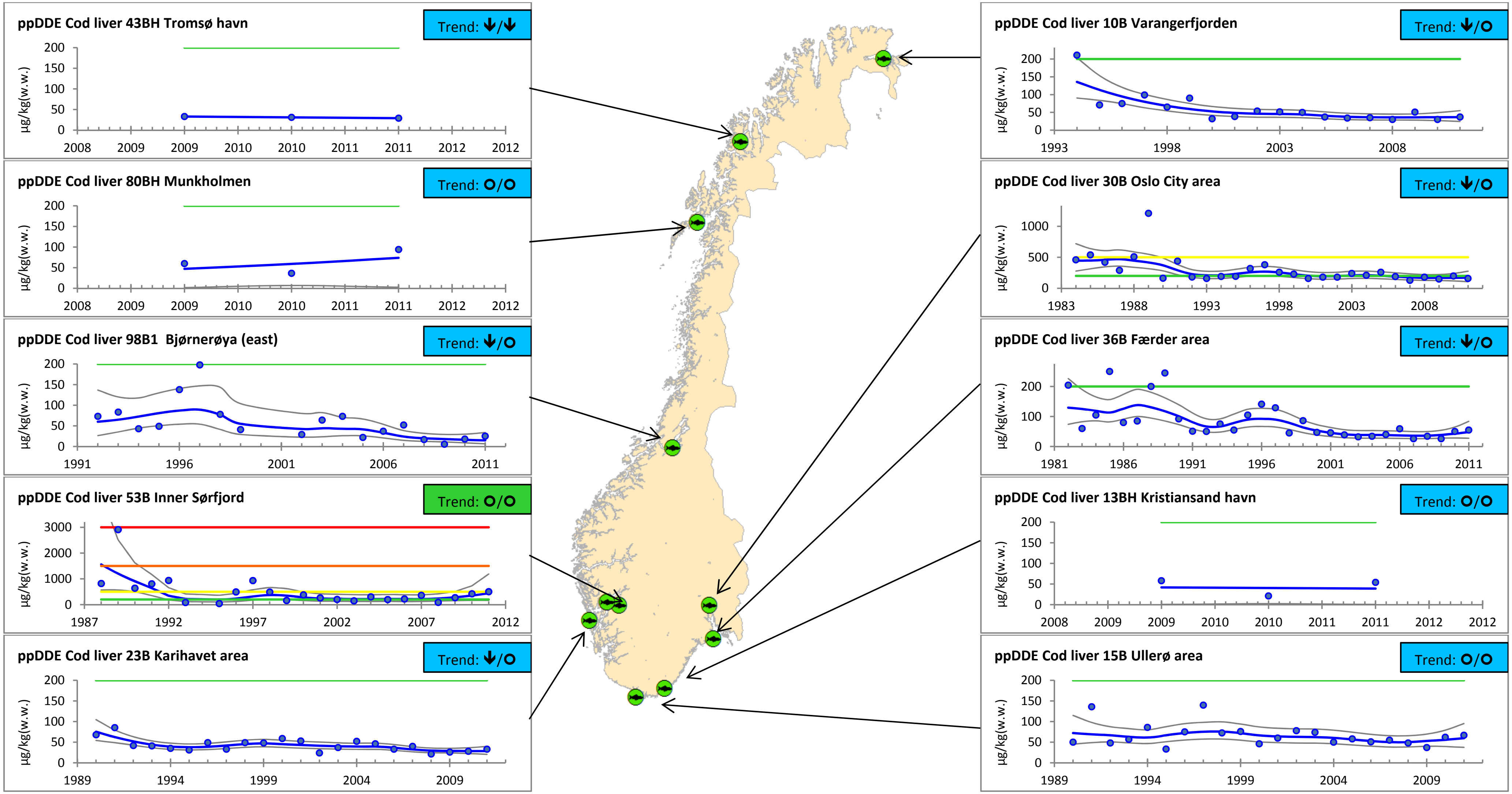


Figure 25. *Median concentration of ppDDE in cod liver, µg/kg (µg ppDDE/kg) wet weight (cf. Appendix H, see otherwise key to detail in Figure 5 and, for trend, Table 11). Note: Class limits for ΣDDT used.*

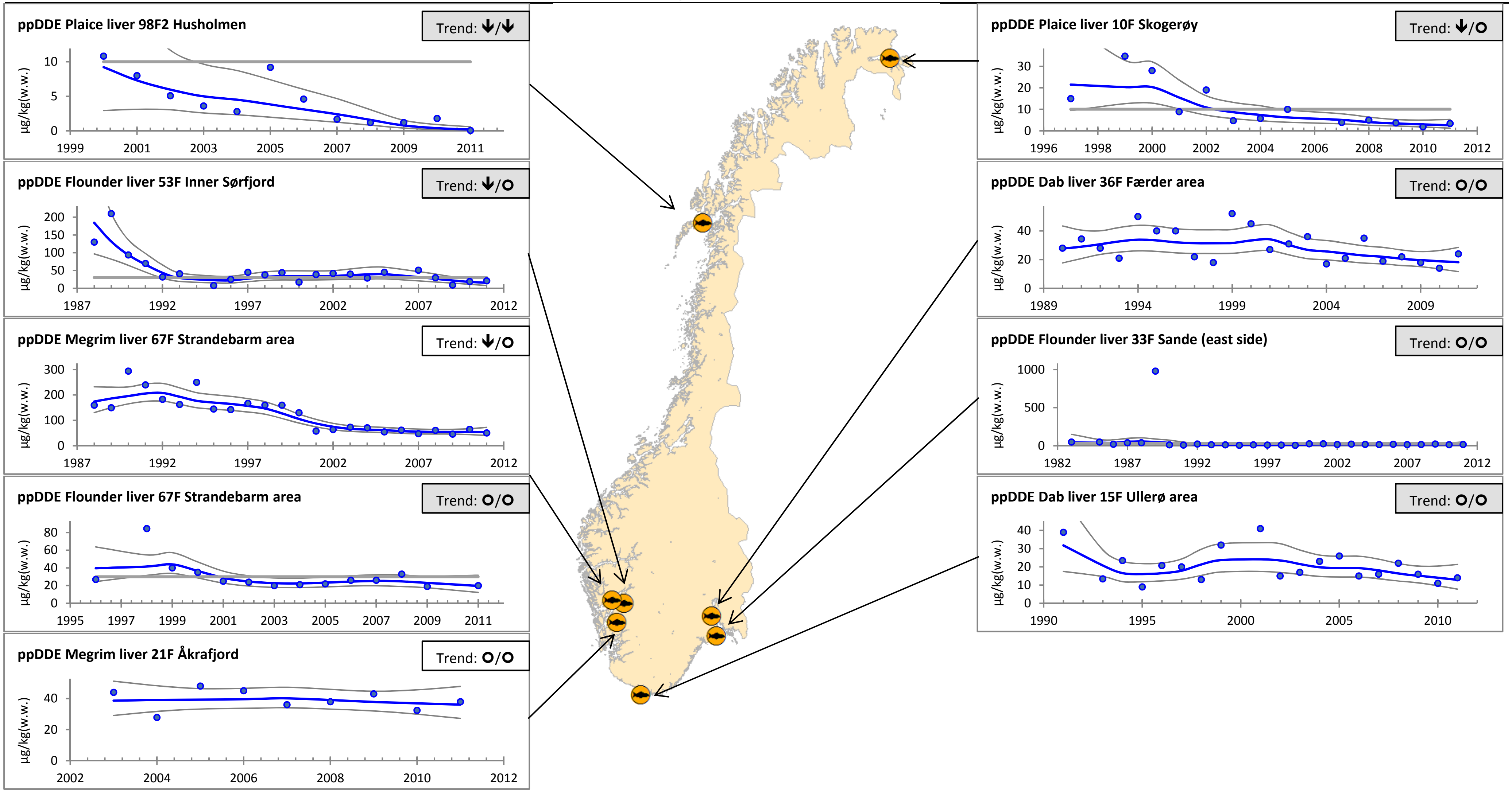


Figure 26. *Median concentration of ppDDE in flatfish liver, µg/kg (µg ppDDE/kg) wet weight (cf. Appendix H, see otherwise key to detail in Figure 5 and, for trend, Table 11). Note: Class limits for ΣDDT used.*

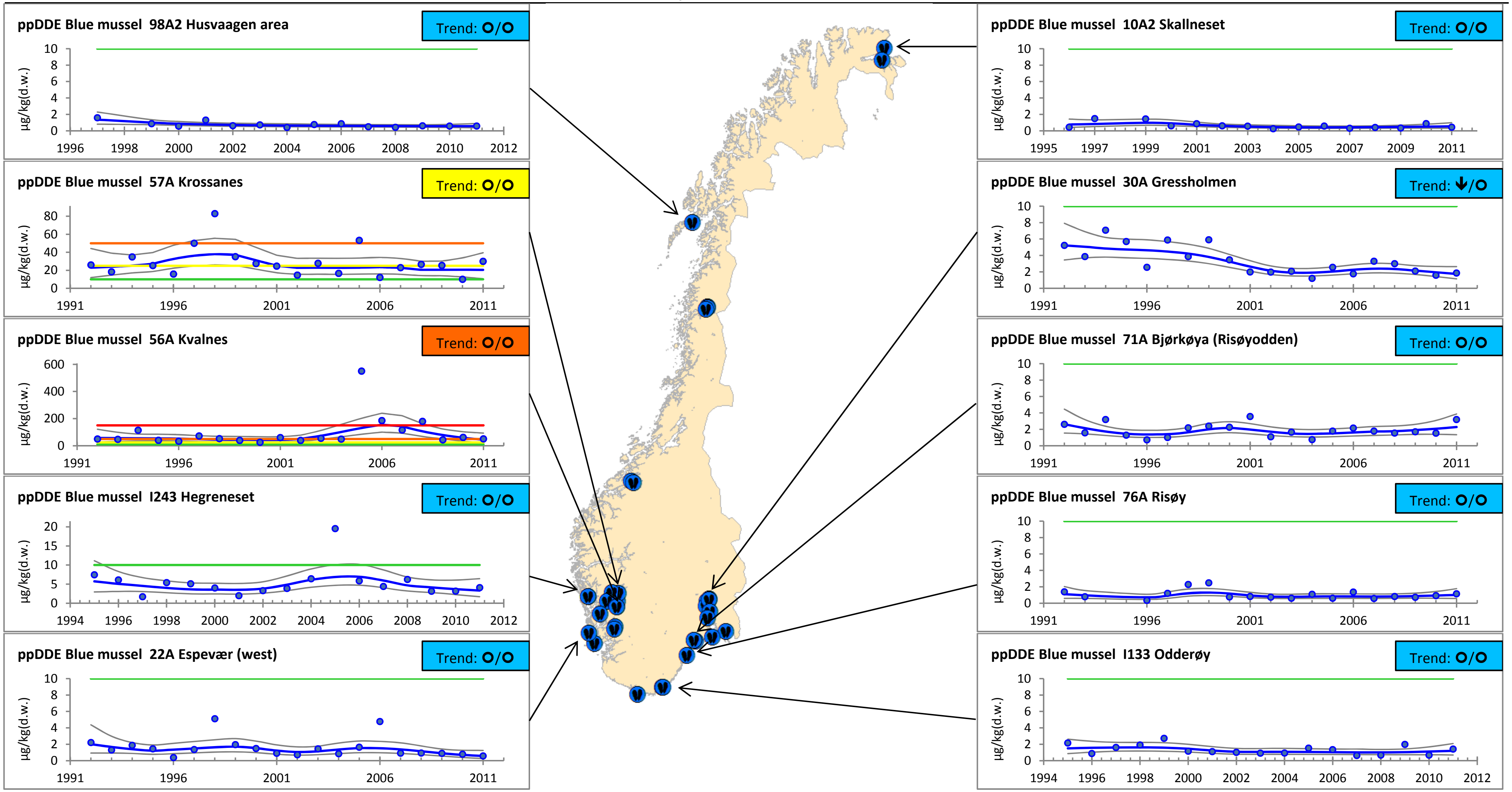


Figure 27. *Median concentration of ppDDE in blue mussel, µg/kg (µg ppDDE/kg) dry weight for selected stations (cf. Appendix H, see otherwise key to detail in Figure 5 and, for trend, Table 11).*

Hexachlorobenzene (HCB)

Cod liver
Concentrations in cod liver from 10 out of 11 stations revealed an acceptable level of HCB (Class I, insignificantly polluted) (***Figure 28***). Cod liver in the Kristiansand harbour was classified as moderately polluted (Class II) by HCB, but no significant trend was observed. There was acceptable levels (Class I) of HCB and an upward trend at Tromsø harbour. There were acceptable levels but no significant trends at Ullerø, Karihavet and Trondheim harbour. There were observed low levels of HCB and downward trends for data from six stations: the Inner Oslofjord, Færder area, the Inner Sørfjord, Strandebarm area, Bjørnerøya in the Lofoten and in the Varangerfjord.

Cod fillet
There were acceptable levels (Class I, insignificantly polluted) of HCB in cod fillet in 10 out of 11 stations investigated (see ***Table 11***), the exception being cod from the Kristiansand harbour that was markedly polluted (Class III) by HCB and no significant trend was detected. There were acceptable levels but no significant trends at the Inner Sørfjord, Karihavet, and Tromsø and in the Varangerfjord. Significant downward trends were observed in the data from six stations; the Inner Oslofjord, Færder area, Ullerø area, Strandebarm area, Trondheim harbour and Bjørnerøya in Lofoten.

Flounder liver
Flounder liver from three stations were analysed for HCB. Results from Sande, Strandebarm and the Inner Sørfjord did not reveal concentrations of HCB over presumed high background (***Figure 29***). No significant trend was found at Strandebarm while significant downward trends were found at Sande and in the Inner Sørfjord.

Flounder fillet
Flounder fillet from three stations were analysed for HCB. The results from Sande, Strandebarm and the Inner Sørfjord showed concentrations below a high background level for HCB (***Table 11***). No significant trend was found in Strandebarm while the flounder in Sande and in the Inner Sørfjord showed significant downward trends.

Dab liver
Concentrations below presumed high background levels of HCB were observed in dab liver from two investigated stations (***Figure 29***). There was not observed any significant trend for the data from Ullerø area. The results from dab from the Færder area revealed a significant downward trend.

Dab fillet
Concentrations below presumed high background levels were observed in dab fillet from both investigated stations (***Table 11***). No significant trend was observed in the data from the Ullerø area. The data for dab from the Færder area did show a significant downward trend.

Plaice liver
The results from Husholmen in the Lofoten area and Skogerøy in the Varangerfjord revealed concentrations below presumed high background levels (***Figure 29***). Both showed significant downward trends.

Plaice fillet
The data from plaice fillet from Husholmen in the Lofoten area and Skogerøy in the Varangerfjord showed HCB concentrations below the presumed high background level (***Table 11***). A significant downward trend was found at Skogerøy while no significant trend was seen at Husholmen.

Megrim liver
The two stations Åkrafjord and the Strandebarm area in the Mid Hardangerfjord were analysed for HCB in megrim liver. The data from the station in Strandebarm showed a significant downward trend while the data for megrim in the Åkrafjord showed no significant trend (***Figure 29***). There is insufficient data from reference areas to assess background conditions.

Megrim fillet
The same two stations Åkrafjord and Strandebarm were used for analysis of megrim fillet. Both showed no significant trends (***Table 11***). There is insufficient data from reference areas to assess background conditions.

Blue mussel
The presence of HCB in blue mussel exceeded Class I (insignificantly polluted) in samples from seven out of 30 stations investigated (some of the stations are presented in ***Figure 30***). Blue mussel were markedly polluted (Class III) at Croftholmen and Strømtangen in the Frierfjord. The data from Strømtangen showed no significant trend whereas a significant downward trend was observed in the data from Croftholmen. Blue mussel at Akershuskaia in the Inner Oslofjord, Svensholmen and Odderøy in the Kristiansandsfjord, and Byrkjenes in the Inner Sørfjord were moderately polluted (Class II) and no significant trends were observed. Mussels at Bjørkøya/Risøyodden were moderately polluted and showed a significant downward trend.

Acceptable level (Class I) and a significant upward trend was found at Lastad. Acceptable levels of HCB and no significant trends were observed in the data from Gåsøya, Ramtonholmen and Håøya in the Inner Oslofjord and at Singlekalven in the Hvaler area. Similar observations were also made based on the data from Risøy, Gåsøy/Ullerøy in the southern part of Norway, Eitrheimsneset, Kvalnes and Krossanes in the Inner Sørfjord, and at Ranaskjær and Vikingneset in the Hardangerfjord. Acceptable levels of HCB (Class I) and no significant trends were also observed at Høgevarde in the Karmsundet, Husvaagen in the Lofoten area, and Skallneset and Brashavn in the northern part of Norway. There were acceptable levels of HCB and significant downward trends in the data from Gressholmen, Solbergstrand, Mølen and Færder in the Oslofjord and Espevær on the west coast. This was also the result for Nordnes and Hegreneset close to Bergen.

Concluding remarks on HCB
Cod in the Kristiansand harbour were markedly polluted by HCB in fillet and liver. For all other stations, HCB in cod liver and fillet were at background levels. All flat fish in the survey had acceptable levels of HCB in liver and fillet and no upward trends.

Only blue mussel from Lastad close to Bergen showed a significant upward trend with levels classified as insignificantly polluted. Blue mussel in the Frierfjord were markedly polluted by HCB. Blue mussel in the Kristiansandsfjord were moderately polluted with HCB in 2011 while they were severely polluted (Class IV) in 2010. Schøyen *et al.* (2012) also found that HCB in mussels at Lagmannsholmen had dropped two classes since 2010 from severely to moderately polluted in 2011. They also found that blue mussel were markedly polluted at Svensholmen in May and July.

It can be noted that the EU has provided Environmental Quality Standard (EQS) for “prey tissue” (cf. 2008/105/EC). The EQS for HCB is 0.01 mg/kg w.w. which is above the upper limit to insignificantly polluted (Class I) for blue mussel (0.0001 mg/kg w.w.). All concentrations were well below the EQS in blue mussel where the whole soft tissue was measured. As noted above (see text for mercury) the EQS cannot be directly compared to concentrations found in different tissues of fish.

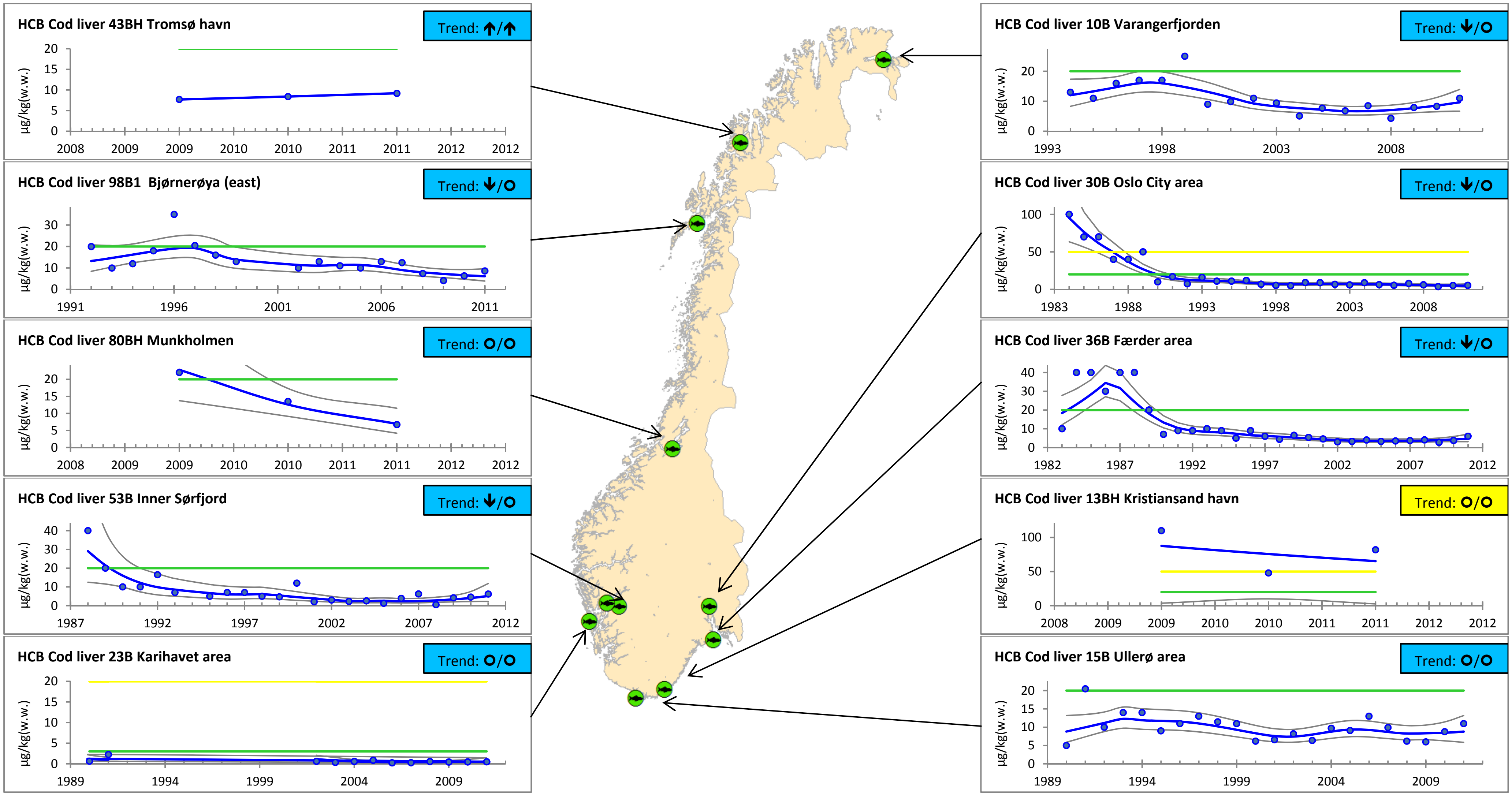


Figure 28. *Median concentration of HCB in cod liver, µg/kg (µg HCB/kg) wet weight (cf. Appendix H, see otherwise key to detail in Figure 5 and, for trend, Table 11).*

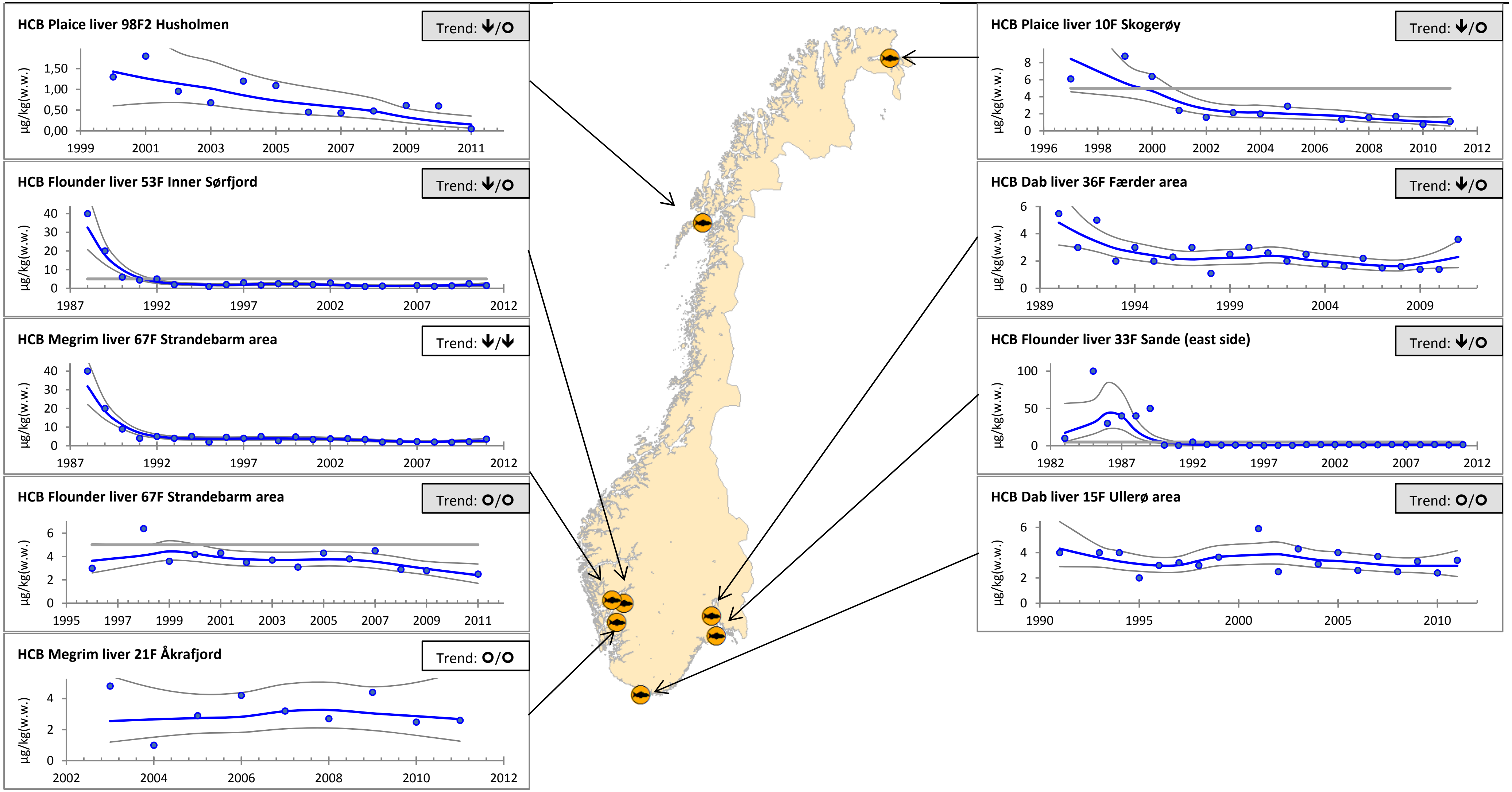


Figure 29. *Median concentration of HCB in flatfish liver, µg/kg (µg HCB/kg) wet weight (cf. Appendix H, see otherwise key to detail in Figure 5 and, for trend, Table 11).*

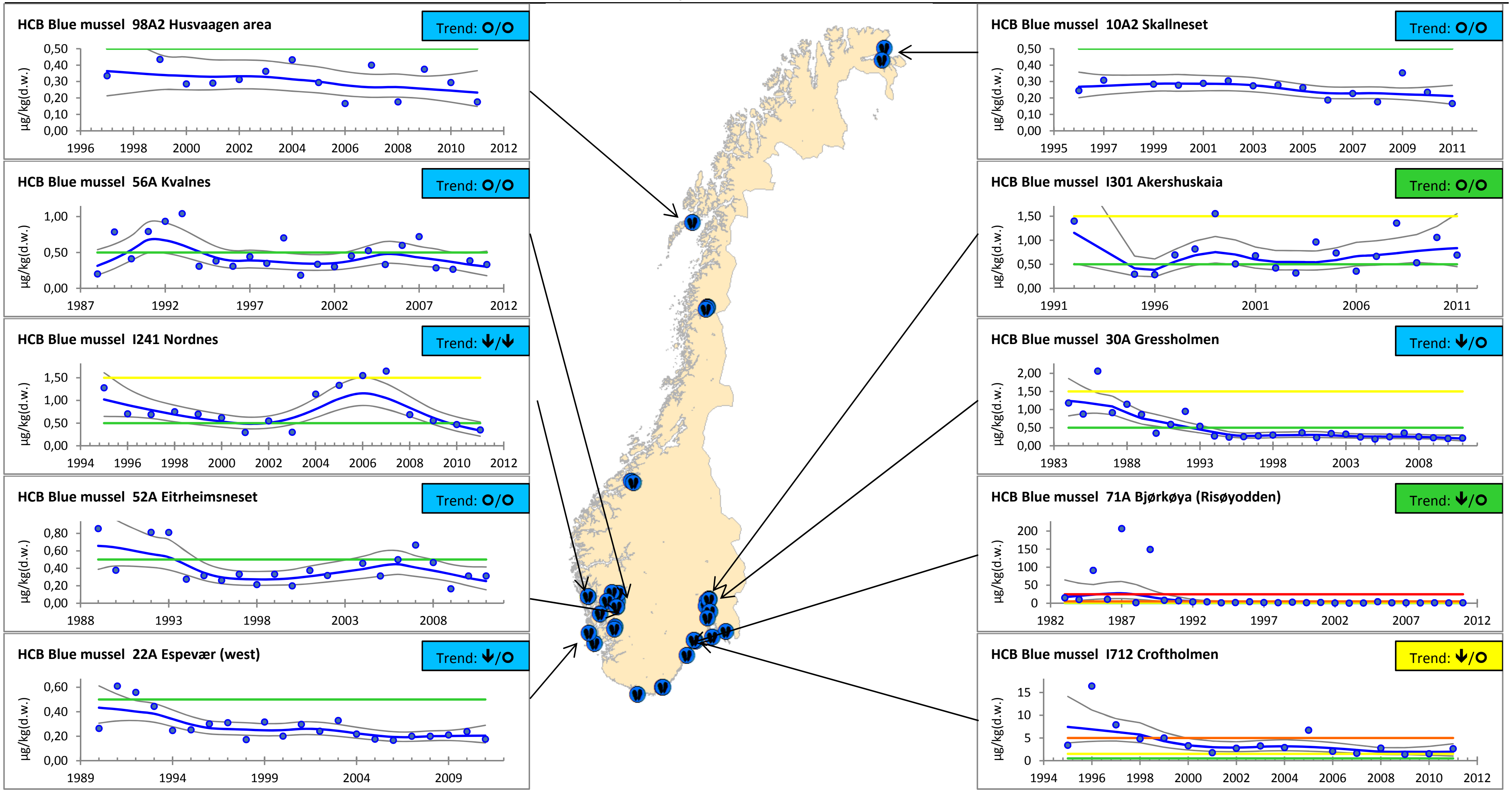


Figure 30. *Median concentration of HCB in blue mussel, µg/kg (µg HCB/kg) dry weight for selected stations (cf. Appendix H, see otherwise key to detail in Figure 5 and, for trend, Table 11).*

Gamma-hexachlorocyclohexane (HCHG)

There are class limits for ΣHCH, which is the sum of alpha-, beta- and gamma isomers (Molvær *et al.* 1997). However, not all isomers are analysed and hence, the classification system was applied directly to HCHG as a representative for the sum of all three isomers. The results are shown in Appendix H.

Cod liver
Samples of cod liver from all 11 stations that were analysed were insignificantly polluted (Class I) by HCHG. There were no significant trends at the harbours of Kristiansand and Trondheim. Significant downward trends were detected in the Inner Oslofjord, Færder and Ullerø. This result was also found in the Inner Sørfjord, Karihavet area on the west coast, at Strandebarm in the Hardangerfjord, Bjørnerøya in Lofoten and in the Varangerfjord. There was too many data below the detection limit to calculate trend at the harbour of Tromsø.

Cod fillet
Samples of cod fillet from all 11 stations that were analysed were insignificantly polluted by HCHG (Class I). No significant trends were found at found in the Inner Oslofjord, Ullerø area, the Inner Sørfjord, Trondheim harbour, Bjørnerøya in the Lofoten area and in the Varangerfjorden in the northern part of Norway. Significant downward trends were found at Færder, and Strandebarm and Karihavet area on the west coast. There were too many data below the detection limit to calculate trends at the harbours of Kristiansand and Tromsø.

Flounder liver
The samples from the three flounder stations in Sande, Strandebarm and in the Inner Sørfjord showed levels of HCHG in liver which were below a high background level. All stations showed significant downward trends.

Flounder fillet
All three flounder stations showed levels of HCHG in fillet that were insignificantly polluted and had significant downward trends.

Dab liver
Dab samples at both stations, Færder and Ullerø, showed levels of HCHG which were below a high background level for liver. The results also indicated significant downward trends at Færder and Ullerø.

Dab fillet
Both stations showed levels of HCHG which were below a high background level for fillet. The results from Færder and Ullerø also showed significant downward trends.

Plaice liver
Plaice from Husholmen in Lofoten and Skogerøy in the Varangerfjord showed levels of HCHG below a high background level for liver. No significant trend was detected at Husholmen while a significant downward trend was observed at Skogerøy.

Plaice fillet
Plaice from Husholmen and Skogerøy showed both levels of HCHG below a high background level for fillet in plaice. No significant trends were detected.

Megrim liver
Megrim from the Åkrafjord showed no significant trend for HCHG in liver while the megrim from Strandebarm showed a significant downward trend. There was insufficient data from reference areas to assess background conditions.

Megrim fillet
Both megrim stations showed no significant trends for HCHG in fillet. There is insufficient data from reference areas to assess background conditions.

Blue mussel
All 31 blue mussel stations where HCHG was analysed were insignificantly polluted (Class I), and all significant trends were downward except for Strømtangen in the Frierfjord and Høgevarde in Karmsundet where no significant trends were detected.

Concluding remarks on HCHG
All cod liver and fillet, and blue mussel samples that were analysed for HCHG were insignificantly polluted. All dab, flounder and megrim liver and fillet samples had acceptable levels of HCHG. Downward trends were dominating and no upward trends were detected.

Dioxins (dioxin toxicity equivalents-Nordic model, TCDDN)

Blue mussel
The classifications are based on analysis of TCDD/F and subsequent calculation of dioxin toxicity equivalents (TCDDN) after the Nordic model (Ahlborg 1989). Mussels from seven stations were investigated; in the Oslofjord (Gressholmen), the Grenlandsfjord area (Bjørkøya/Risøyodden, Risøy, Croftholmen and Strømtangen), and in the Kristiansandsfjord at Svensholmen and Odderøy (***Figure 31***). Blue mussel at Bjørkøya/Risodden, Croftholmen and Strømtangen in the Frierfjord were extremely polluted (Class V) by dioxins. No significant trend was observed at Strømtangen while significant downward trends were seen at Bjørkøya/Risodden and Croftholmen. In the Kristiansandsfjord, blue mussel samples were moderately polluted (Class II) at Odderøy, and insignificantly polluted (Class I) at Svensholmen but no significant trends were found. Blue mussel at Gressholmen and Risøy were insignificantly polluted (Class I) by dioxins. An upward trend could be seen at Risøy while a significant downward trend was documented at Gressholmen.

Concluding remarks on dioxins
Dioxins have been included in Klif's Pollution Index for blue mussel since 2002 (cf. chapter Appendix J). An upward trend was seen at Risøy, but the dioxin-concentration was at an acceptable level.

Blue mussel from three stations in the Grenlandsfjord were extremely polluted by dioxins in 2008, 2009, 2010 and 2011. Norwegian Food Safety Authority (*Mattilsynet*[1]) has issued recommendations regarding consumption of fish and shellfish in the Grenlandsfjord area due to the high concentrations of chlorinated organic compounds, in particular dioxins (last updated in 2012). Monitoring of contaminants in organisms from the Grenlandsfjord in 2011 showed that the dioxins content in blue mussel is far above presumed high background level, and this has not changed systematically since 1997 (Ruus *et al.* 2012b). The concentration of dioxins at Croftholmen in 2011 had decreased since 2010 and 2009, but the concentration at Klokkartangen in 2011 was the highest level ever observed since 1991.

In the Kristiansandsfjord, blue mussel were markedly polluted at Odderøy in 2009 and 2010, but moderately polluted in 2011. The blue mussel at Svensholmen were moderately polluted in 2009 and 2010, and insignificantly polluted in 2011. Schøyen *et al.* (2012) found that blue mussel at Svensholmen in July in 2011 was markedly polluted by dioxins based on the WHO model (Van den Berg m. fl. 2005). The dioxin-concentrations at Svensholmen were lowest in May and September (moderately polluted). The dioxin-concentrations were lowest in the Inner (Marvika) and Outer (Flekkerøy/Kjeholmen) part of the Kristiansandsfjord, and highest in the Mid part of the fjord. No concentrations were above the EU limit for foodstuffs of 4 ng/kg v.v. (1881/2006/EC). Norwegian Mattilsynet has given consumption advice based on concentration of dioxin in stationary "fat" fish and blue mussel in the Kristiansandfjord (last updated 2010).

[1] see http://www.miljostatus.no/Tema/Hav-og-vann/Pavirkninger-pa-livet-i-vann/Miljogifter_vann/Miljogifter_marint/Kostholdsrad/

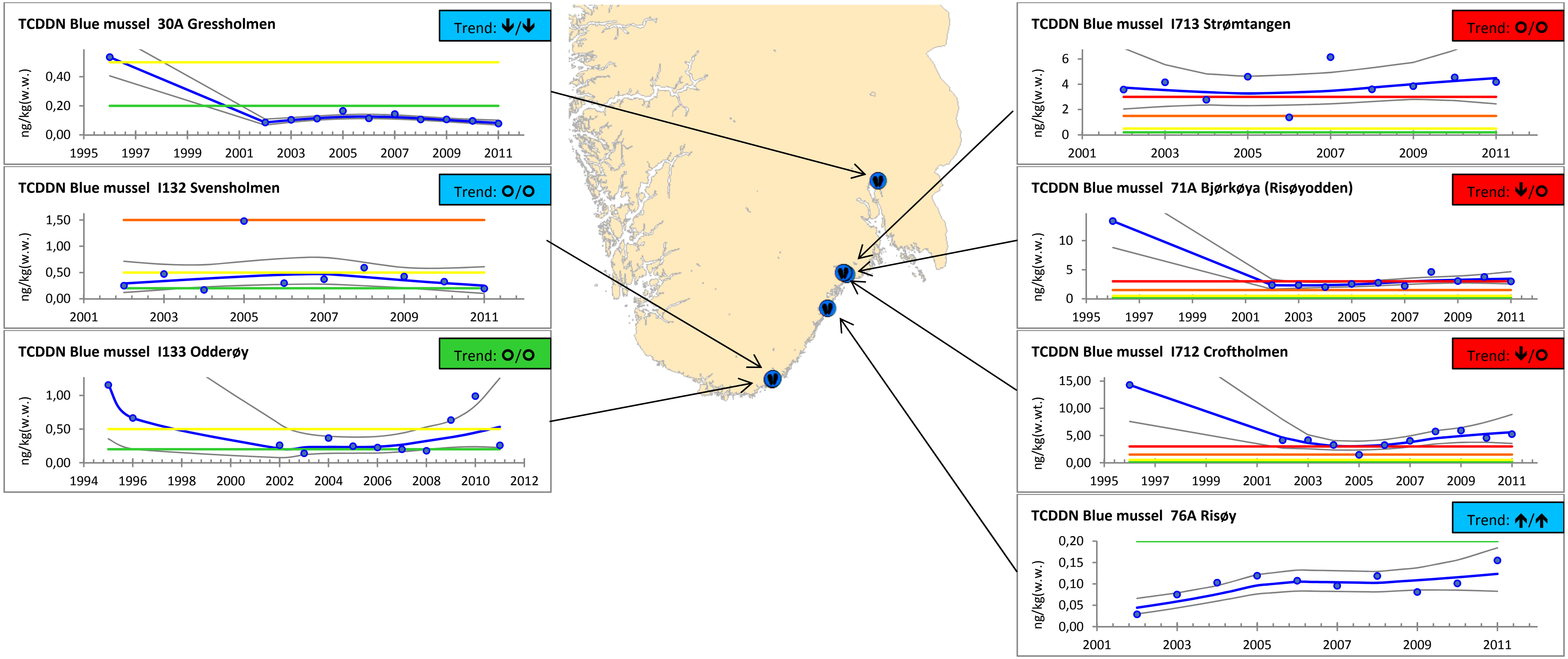


Figure 31. *Median concentration of dioxins TCDD-toxicity equivalents after Nordic model (TCDDN cf. Appendix C) in blue mussel, (ng/kg TCDDN/kg) wet weight (cf. Appendix H, see otherwise key to detail in Figure 5 and, for trend, Table 11).*

Polycyclic aromatic hydrocarbons (PAHs)

Blue mussel

The presence of PAHs in blue mussel exceeded Class I (insignificantly polluted) at seven of the 16 blue mussel stations (results from 10 of the stations are presented in ***Figure 32***). No significant trends were observed in mussels from Toraneskaien and Moholmen in the Ranfjord (both Class III, markedly polluted) and Akershuskaia in the harbour of Oslo, Odderøy in the Kristiansandsfjord and Bjørnbærviken in the Ranfjord (all Class II, moderately polluted). Mussels at Svensholmen and Ekkjegrunn in the Inner Saudafjord were moderately polluted by PAHs, while significant downward trends were detected.

Blue mussel from Gressholmen, Gåsøya, Ramtonholmen, Håøya and Mølen in the Oslofjord were insignificantly polluted (Class I) of PAHs and revealed no significant trends. Mussels from Lastad close to Mandal, Bølsnes in the Inner Saudafjord, and Honnhammer (st. I912) and Fjøseid (st. I913) in the Sunndalsfjord were also insignificantly polluted by PAHs, but for these stations significant downward trends were also observed.

Concluding remarks PAHs

No upward trends for PAHs in blue mussel were observed. Mussels from the Ranfjord were markedly polluted by PAHs. With just three exceptions the median concentrations of PAH, were markedly, severely or extremely polluted. This indicates that the impact of earlier discharges of PAHs is still in effect despite discontinued industrial activity that caused this waste. No significant trend was observed.

Blue mussel were moderately polluted by PAHs at Akershuskaia in the harbour of Oslo, but insignificantly polluted further out the Oslofjord at Gressholmen, Gåsøya, Ramtonholmen and Håøya in the Inner Oslofjord and at Mølen in the Outer part of the fjord. Gitmark *et al.* (2012) found that mussels were up to markedly polluted by PAHs at one station at Langøya in the Holmestrandfjord close to Mølen in 2011.

Blue mussel at Odderøy and Svensholmen in the Kristiansandsfjord were moderately polluted by PAHs. Schøyen *et al.* (2012) reported that blue mussel at Svensholmen were moderately polluted also in May and July in 2011. Remedial action has been implemented to reduce the impact of PAHs to this area.

There were significant downward trends in concentrations of PAHs in the Sunndalsfjord, although the blue mussel had acceptable levels of PAHs.

Norwegian Food Safety Authority (*Mattilsynet*[1]) has issued recommendations regarding consumption of seafood due to PAHs in blue mussels from the Kristiansandsfjord (last updated 2010), Saudafjord (last updated 2007), Karmsundet (last updated 2005), Sunndalsfjord (last updated 2005) and from the Ranfjord area (last updated 2005).

[1] see http://www.miljostatus.no/Tema/Hav-og-vann/Pavirkninger-pa-livet-i-vann/Miljogifter_vann/Miljogifter_marint/Kostholdsrad/

Sum carcinogenic polycyclic aromatic hydrocarbons (KPAHs)

Blue mussel

The presence of the potentially carcinogenic PAHs (KPAHs) in blue mussel exceeded Class I (insignificantly polluted) at six of 16 stations. Blue mussel at Toraneskaien in the Ranfjord were severely polluted (Class IV) by KPAHs and no significant trend were observed. Mussels at another station in the Ranfjord, Moholmen and at Odderøy in the Kristiansandsfjord were markedly polluted (Class III) and no significant trends were detected. At Akershuskaia in the Inner Oslofjord, blue mussel were moderately polluted (Class II) and no significant trend were seen. At Svensholmen in the Kristiansandsfjord and Ekkjegrunn in the Saudafjord, blue mussel were moderately polluted while significant downward trends were observed.

The combination of insignificantly polluted (Class I) blue mussel of KPAHs and no significant trends were found at Gressholmen, Gåsøya, Ramtonholmen, Håøya and Mølen in the Oslofjord. Similar observations were also seen mussels from Bjørnbærviken in the Ranfjord. Blue mussel were insignificantly polluted of KPAHs and significant downward trends were observed at Lastad close to Mandal, Bølsnes in the Inner Saudafjord, and Honnhammer and Fjøseid in the Sunndalsfjord.

Concluding remarks on KPAHs

No upward trends for KPAHs were observed in blue mussel from any of the analysed stations. The results from the analyses showed concentrations over presumed high background levels at six of 16 stations. The highest concentrations were observed in the Ranfjord where mussels were classified up to severely polluted. The blue mussel here have increased from markedly polluted (Class III) in 2010 to severely polluted (IV) in 2011, but they were extremely (Class V) polluted in 2009.

Blue mussel were moderately polluted by KPAHs at Akershuskaia in the harbour of Oslo, but insignificantly polluted outwards the Oslofjord at Gressholmen, Gåsøya, Ramtonholmen, Håøya and Mølen. Gitmark *et al.* (2012) found that mussels were up to severely polluted KPAHs at one station at Langøya in the Holmestrandfjord close to Mølen in 2011.

Blue mussel from the Kristiansandsfjord were at worst markedly polluted at Odderøy. In 2010 they were moderately polluted but in 2009 the mussels at this station were severely polluted. A significant downward trend could be observed in mussels from Svensholmen in the Kristiansandsfjord which was moderately polluted. Schøyen *et al.* (2012) reported that blue mussel at Svensholmen were markedly polluted by KPAH, not only in September when the CEMP-blue mussel were collected, but also in May and July in 2011. They observed markedly polluted mussels at other stations in the Kristiansandsfjord like Lagmannsholmen, Voie/Kjosbukta and Bragdøy. Schøyen *et al.* (2012) found acceptable levels of KPAHs in the Inner part (Marvika) and the Outer part (Flekkerøy/Kjeholmen) of the Kristiansandsfjord.

Benzo[a]pyrene B[a]P

Blue mussel

The presence of B[a]P in blue mussel exceeded Class I (insignificantly polluted) at eight of the 16 stations (some of the stations are presented in ***Figure 33***). Blue mussel at Toraneskaien and Moholmen in the Ranfjord were severely polluted (Class IV) and no significant trend were found. Mussels at Odderøy in the Kristiansandsfjord were markedly polluted (Class III) and no significant trend was observed. Mussels at Akershuskaia in the harbour area of Oslo, Svensholmen in the Kristiansandsfjord, Honnhammer in the Sunndalsfjord and Bjørnbærviken in the Ranfjord were moderately polluted (Class II) and no significant trends were observed. At Ekkjegrunn in the Inner Saudafjord, mussels were moderately polluted while a significant downward trend was calculated.

There were acceptable levels (Class I) of B[a]P in the rest of the eight mussel stations but significant upward trends were found at Håøya and Ramtonholmen in the Inner Oslofjord. No significant trends were observed at Gressholmen and Gåsøya in the Inner Oslofjord at and Mølen in the Outer Oslofjord. These were also the results at Lastad close to Mandal, Bølsnes in the Saudafjord and Fjøseid in the Sunndalsfjord.

Concluding remarks on B[a]P

Two blue mussel stations in the Ranfjord showed severely pollution of B[a]P. Although, the concentrations of B[a]P have decreased from extremely polluted (Class V) in 2009 at both stations. The only downward trend was found at Ekkjegrunn in the Inner Saudafjord where the mussels were moderately polluted by B[a]P.

The only upward trends of B[a]P were observed at Ramtonholmen and at Håøya in the Inner Oslofjord, even though the pollution level was insignificant. Blue mussel were moderately polluted by B[a]P at Akershuskaia in the harbour of Oslo, but insignificantly polluted further out the Oslofjord at Gressholmen, Gåsøya, Ramtonholmen and Håøya in the Inner Oslofjord and at Mølen in the Outer part of the fjord. Gitmark *et al.* (2012) found that mussels were up to severely polluted by B[a]P at one station at Langøya in the Holmestrandfjord close to Mølen in 2011.

Blue mussel in the Kristiansandsfjord were markedly polluted at Odderøy and moderately polluted at Svensholmen (based on three replicates) in 2011. Blue mussel at Odderøy were moderately polluted in 2010 but severely polluted in 2009. Schøyen *et al.* (2012) reported that blue mussel at Odderøy in the Kristiansandsfjord were markedly polluted by B[a]P, and that blue mussel at Svensholmen were moderately polluted by B[a]P in 2011 (based on one sample of the three replicates from the CEMP-results for 2011). The concentration of B[a]P at Svensholmen was highest in July and lowest in September. The B[a]P-concentrations were lowest in the Inner (Marvika) and Outer (Flekkerøy/Kjeholmen) Kristiansandsfjord, and highest in the Mid part of the fjord. Exceedences were found at Odderøy, Toraneskai and Moholmen with respect to EU limit for foodstuffs of 10 µg/kg (1881/2006/EC) which marks the lower limit for Class IV.

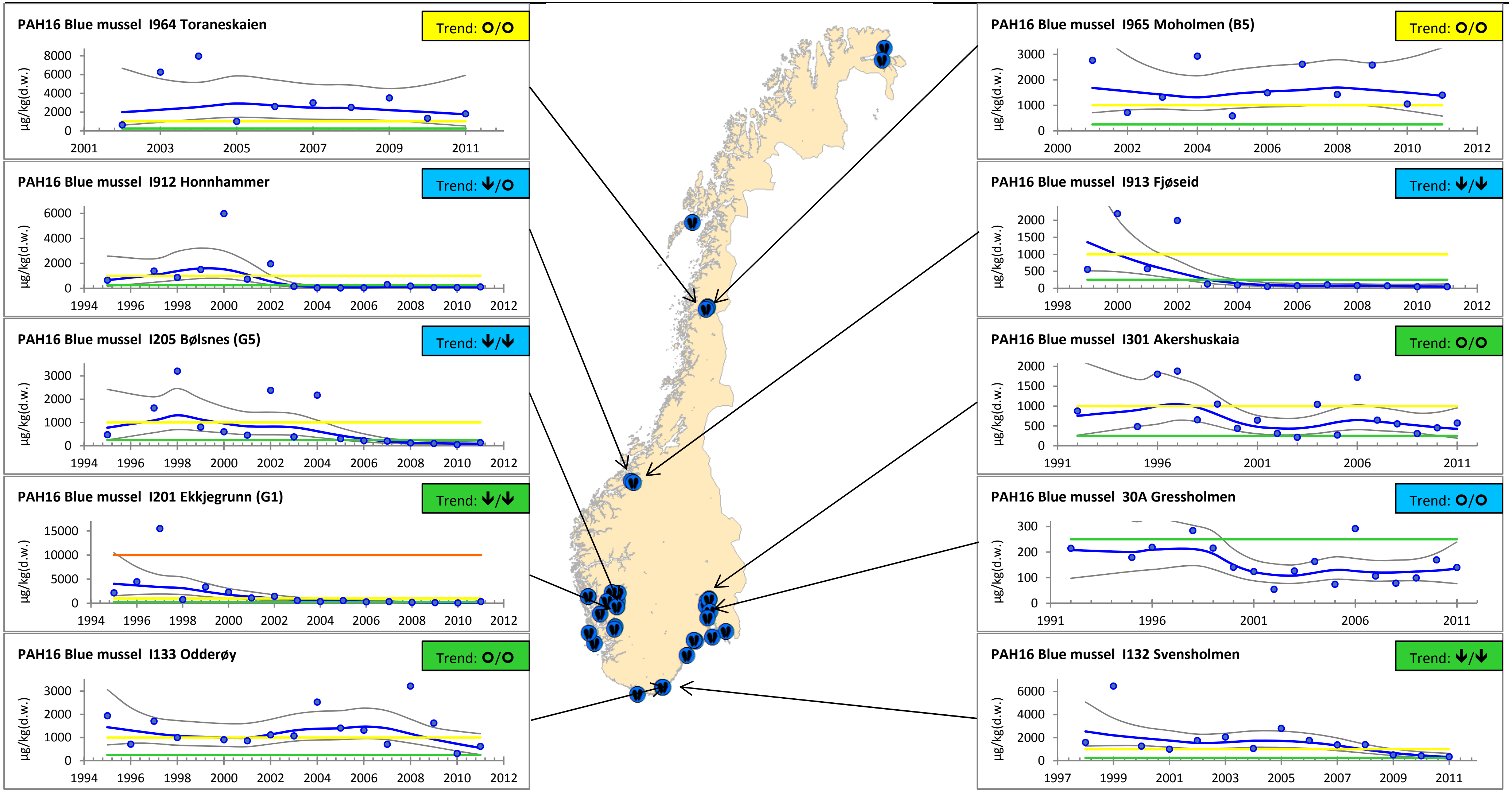


Figure 32. *Median concentration of PAH in blue mussel, µg/kg (µg PAH16/kg) dry weight for selected stations (cf. Appendix H, see otherwise key to detail in Figure 5 and, for trend, Table 11).*

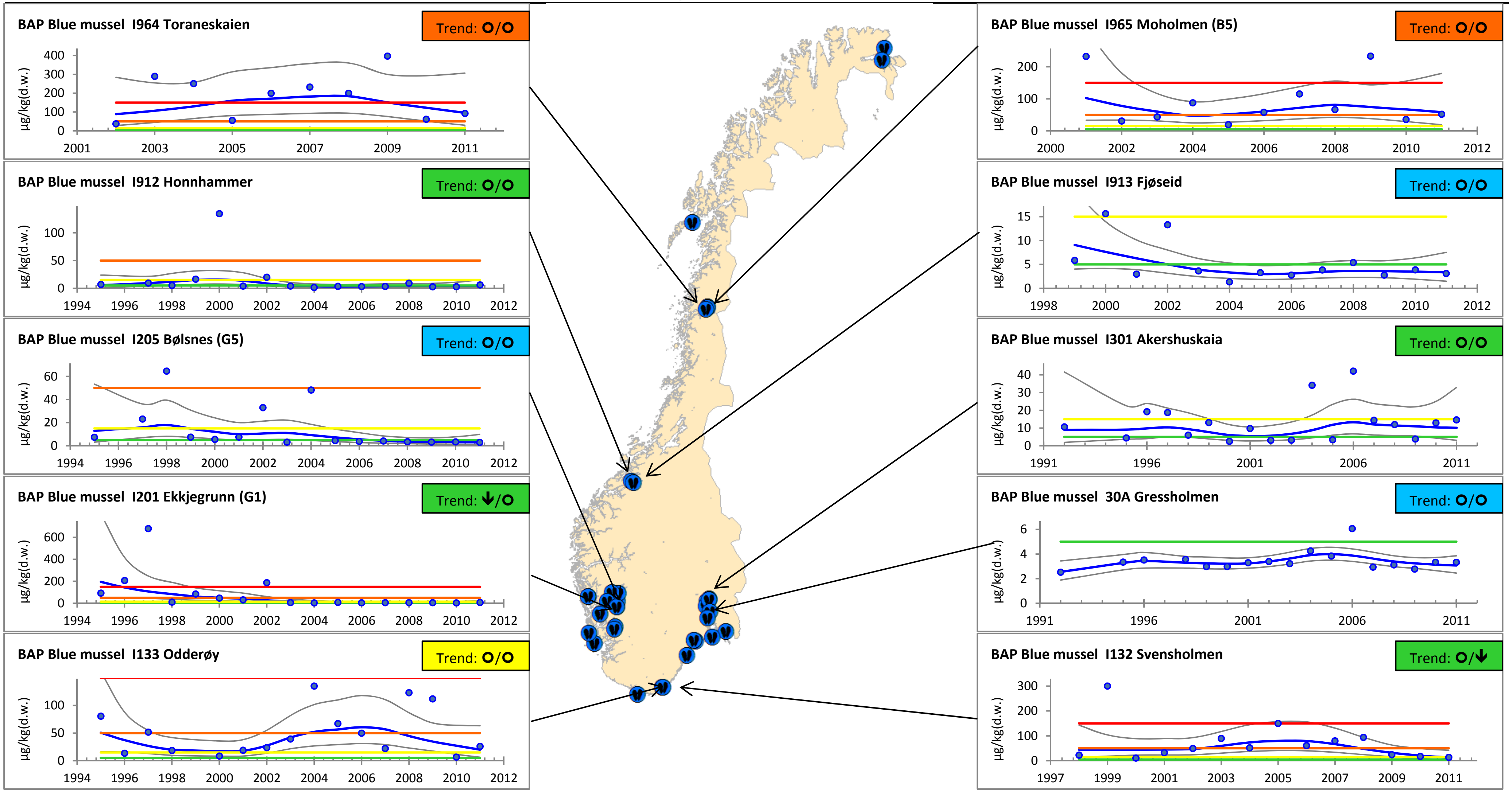


Figure 33. *Median concentration of B[a]P in blue mussel, µg/kg (µg B[a]P /kg) dry weight for selected stations (cf. Appendix H, see otherwise key to detail in Figure 5 and, for trend, Table 11).*

Polybrominated diphenyl ethers (PBDEs)

Cod liver

Polybrominated diphenyl ethers (PBDEs) have been investigated in cod liver annually since 2005. Cod from the Inner Oslofjord have also been analysed for samples collected in1993, 1996 and 2001. Samples for similar analyses were also collected from the Færder area in 1993 and 1996, and samples from Karihavet on the West Coast in 1996 and 2001. In 2011, PBDEs were analysed in cod from eight stations (see ***Table 9***, ***Figure 34*** and ***Figure 35***). Selected time-series are also seen in ***Figure 36***. The median concentration of sum PBDE was highest in the Inner Sørfjord (104.7 µg/kg w.w.). The lowest concentration was found at Lofoten (8.08 µg/kg w.w.). The only significant trend observed was downward found at one station; Karihavet, due to the relatively high concentration of 19.5 µg/kg w.w. found in 1993.

Table 9 *Median concentrations (µg/kg w.w.) of sum PBDE analysed in cod liver in 2011.*

Station	Sum PBDE	BDE47	BDE100	BDE49
The Inner Oslofjord (st. 30B)	65.2	46.0	11.0	2.6
Færder (st. 36B)	8.9	5.3	0.8	0.7
Kristiansand harbour (st. 13BH)	26.2	16.0	3.1	1.9
The Inner Sørfjord (st. 53B)	104.7	71.5	19.4	6.0
Karihavet area (st. 23B)	15.5	10.0	2.3	0.9
Trondheim harbour (st. 80BH)	45.7	31.0	4.8	6.5
Bjørnerøya (st. 98B1)	8.1	3.8	0.8	0.6
Tromsø harbour (st. 43BH)	24.9	15.0	2.7	1.4

The tetrabromodiphenyl ether BDE47 was the most dominant PBDE, whereas the pentabromodiphenyl ether BDE100 and the tetrabromodiphenyl ether BDE49 were either the second or the third most dominant (***Figure 34*** and ***Figure 35***).

Concluding remarks on PBDEs

The median concentration of PBDE was highest in cod liver from the Inner Sørfjord and the value was higher in 2011 (104.7 µg/kg w.w.) than the highest value recorded in 2010 (86.8 µg/kg w.w. at Inner Oslofjord). There is no apparent reason why either PBDE is on the rise in the Sørfjord or on the fall in the Oslofjord. It should be noted that no statistically significant trends could be detected in these two areas. The values at Færder, Kristiansand harbour, Karihavet, Trondheim harbour and Bjørnerøya in Lofoten have increased from 2010; up to three fold at Trondheim harbour, whereas the values have decreased in the Inner Oslofjord and Tromsø harbour from 2010.

Median concentrations found at presumed reference stations like Svolvær, Færder, Utsira and Bømlo-Sotra indicate that a high background level in diffusely contaminated areas might be 30 µg/kg w.w. for cod liver (Fjeld *et al.* 2005). This is higher than the median found in Færder, Kristiansand, Karihavet, Bjørnerøya in Lofoten and Tromsø and higher than the average concentrations found at two cod stations in the North Sea (14.6 and 15.4 µg/kg w.w.) (Green *et al.* 2011) and three cod stations in the Norwegian Sea (5.89, 12.9 and 19 µg/kg w.w.) (Green *et al.* 2012). It cannot be disregarded that this high background concentration might be too high. The median found in the Inner Oslofjord was 60 µg/kg w.w. and in the interval of 37-112 µg/kg w.w. found in other contaminated areas (Fjeld *et al.* 2005, Berge *et al.* 2006). Bakke *et al.* (2007b) found a range of mean concentrations in remote areas to be 3.4-29.0 µg/kg w.w.

The congeners BDE47, BDE 100 and BDE49 were observed to be most dominant. The low concentrations of BDE99 are probably due to the debromination to BDE47. Fjeld *et al.* (2012) found that mean concentrations of sum PBDE9 (seven major congeners) in trout, vendace and smelt caught in 2011 in lake Mjøsa were respectively 36, 6 and 6 ng/g w.w. The dominant congeners were BDE47, -99 and -47. The reduction through time was greatest for BDE99, which probably is due to a biotransformations (debromination) to BDE47.

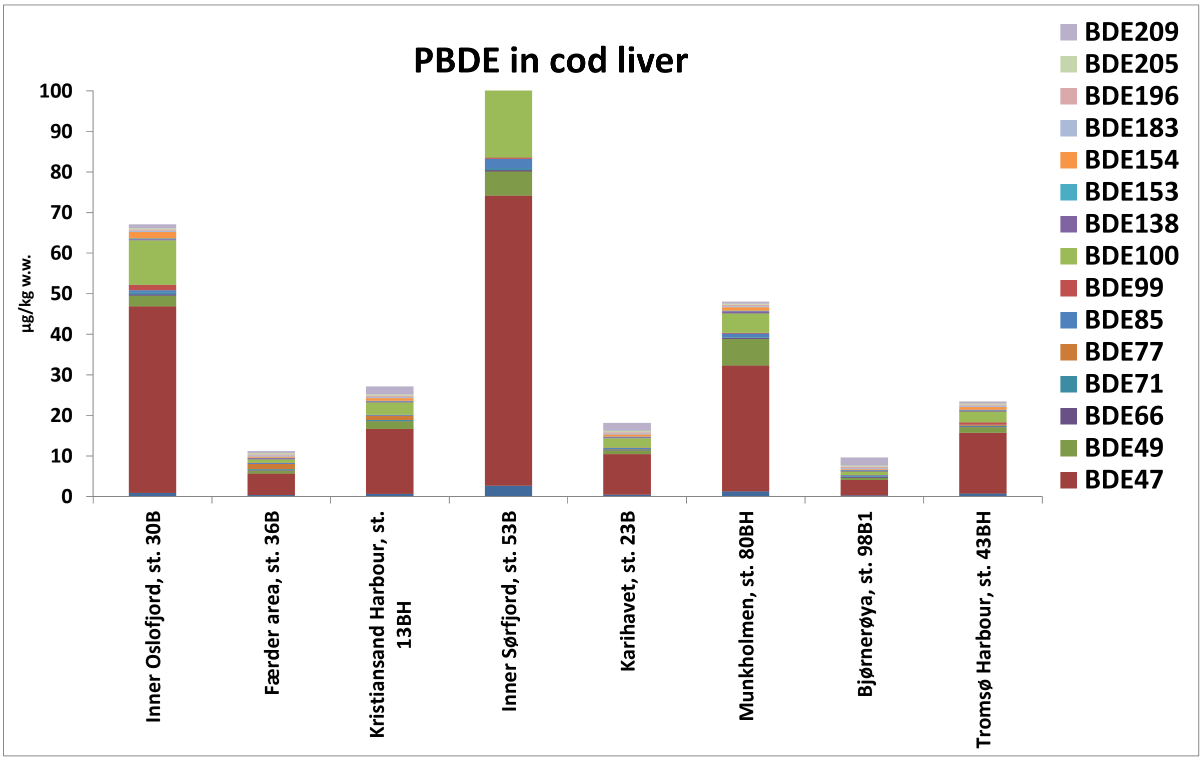


Figure 34. *Median concentrations (µg/kg w.w.) of PBDEs in cod liver in 2011.*

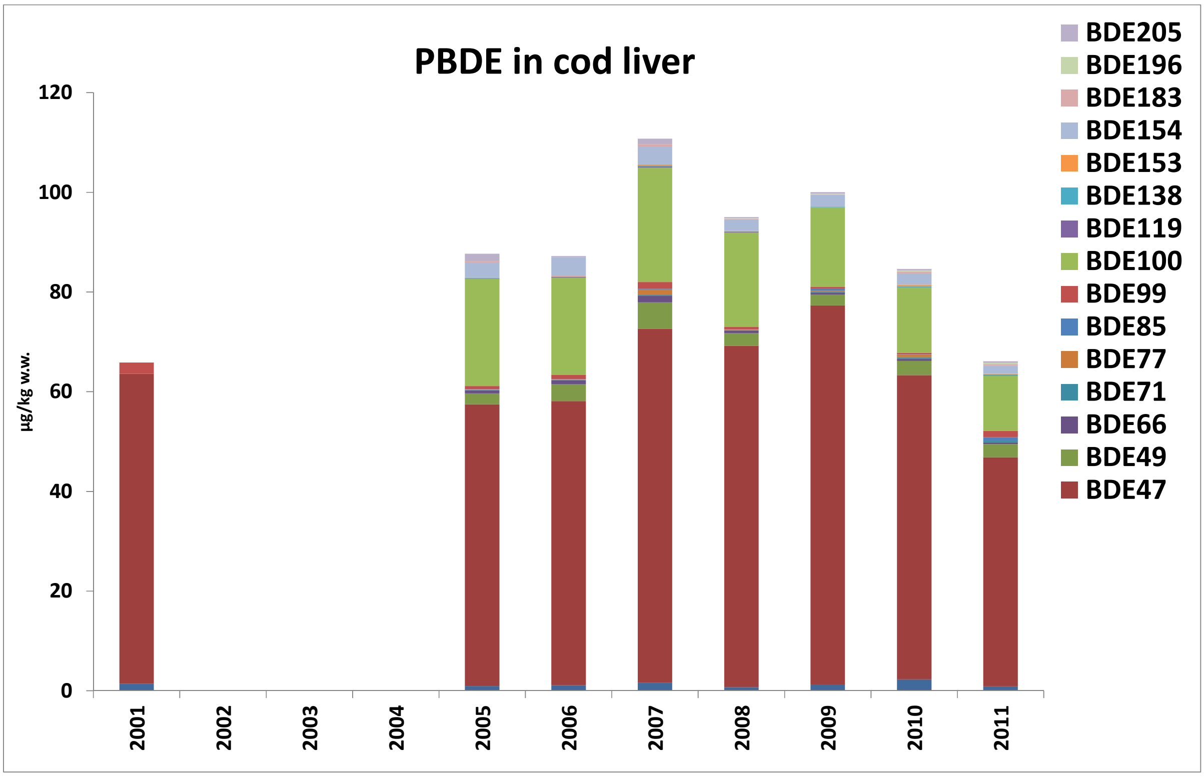


Figure 35. *Median concentrations (µg/kg w.w.) of PBDEs in cod liver from 2001 to 2011 in the Inner Oslofjord (st. 30B).*

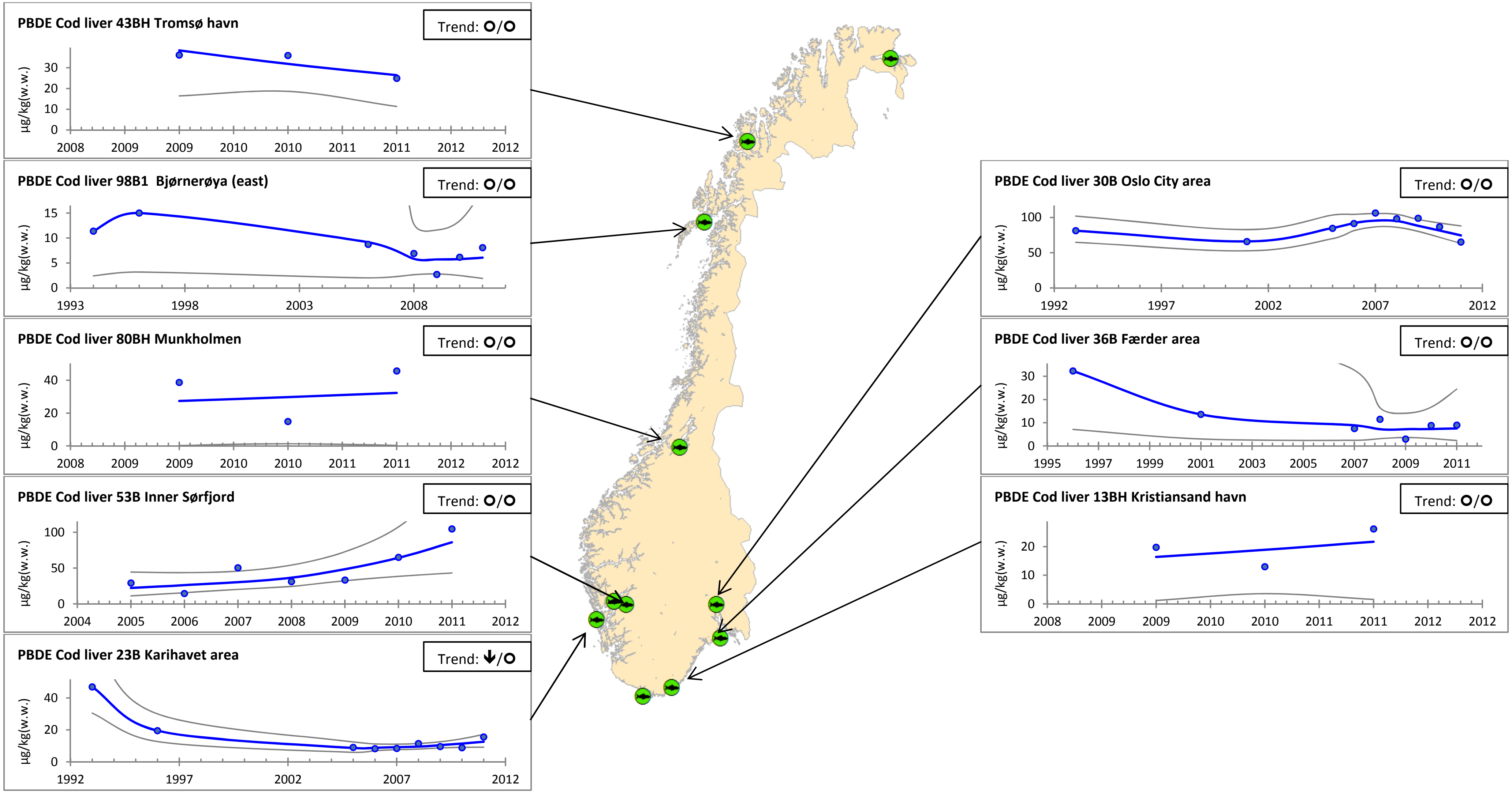


Figure 36. *Median concentration of PBDE in cod liver, µg/kg (µg PBDE/kg) wet weight (cf. Appendix H, see otherwise key to detail in Figure 5 and, for trend, Table 11). There are no limits to classify the results.*

Perfluoralkyl compounds (PFCs)

Cod liver

Perfluroalkyl compounds (PFCs[1]) have in this monitoring programme been analysed in cod liver annually since 2005. Samples from 1993 have also been analysed for PFCs from the Inner Oslofjord and Karihavet. In 2011, these compounds were analysed in cod liver from nine stations (***Figure 37*** and ***Figure 38***).

The median concentration of perfluoroctonoic sulphonate (PFOS) was highest at Færder in the Outer Oslofjord (15.5 µg/kg w.w.) and lowest in the Tromsø harbour (1.7 µg/kg w.w.) ***Table 10***. There were no significant trends for PFOS found at any of the nine stations except for significant downward long-term and short-term trends in Tromsø harbour.

Table 10 *Median concentrations (µg/kg w.w.) of the PFC-compounds PFOS, PFOSA, PFNA and PFOA analysed in cod liver in 2011.*

Stations	PFOS	PFOSA	PFNA	PFOA
The Inner Oslofjord (st. 30B)	5.0	19.0	1.0	1.0
Færder (st. 36B)	15.5	7.5	0.5	1.4
Kristiansand harbour (st. 13BH)	8.5	4.0	0.5	0.5
Ullerø area (st. 15B)	5.7	2.4	0.7	1.5
The Inner Sørfjord (st. 53B)	4.1	2.5	0.8	1.0
Karihavet area (st. 23B)	3.5	2.0	0.5	1.0
Trondheim harbour (st. 80BH)	4.3	1.3	0.6	1.0
Bjørnerøya (st. 98B1)	5.1	2.0	0.5	1.0
Tromsø harbour (st. 43BH)	1.7	2.0	0.5	1.0

The concentrations of PFOS from Færder in the Outer Oslofjord in 2011 was nearly as high as the maxima median value found in 2010, recorded at the Inner Oslofjord and Bjørnerøya in the Lofoten area (both at 16.0 µg/kg w.w.). PFOS was slightly higher (less than 2 fold) at all stations in 2011 compared to 2010 for Færder, Kristiansand, Inner Sørfjord and Trondheim. Lower concentrations were found in 2011 compared to 2010 at Inner Oslofjord (5 vs. 16 µg/kg w.w.), Karihavet (3.5 vs. 4 µg/kg w.w.), Bjørnerøya (5.1 vs. 16 µg/kg w.w.) and Tromsø harbour (1.7 vs. 3.3 µg/kg w.w.).

Perfluorooctane sulphonamid (PFOSA) had a maximum median concentration of 19.0 µg/kg w.w. in the Inner Oslofjord and a minimum at Trondheim (1.3 µg/kg w.w.).

The concentration of PFOSA was higher than PFOS in the Inner Oslofjord and Tromsø harbour. The median concentrations of the remaining PFCs (perfluorononanoic acid (PFNA), perfluorobutane sulphonate (PFBS), perfluoroheptanoic acid (PFHpA), perfluorohexanoic acid (PFHxA) and perfluorooctanoic acid (PFOA)) were not as dominant as PFOSA and PFOS. PFNA never exceed 14% of the PFOS and PFOSA combined.

Concluding remarks on PFCs

Median concentrations of PFOS in cod from presumed reference stations like Svolvær, Kvænangen/Olderfjord north of Skjervøy and the Varangerfjord indicated that high background concentrations in only diffusely contaminated areas might be around 10 µg/kg w.w. (Bakke *et al.* 2007b). Only the concentrations observed in the Outer Oslofjord were higher. The other stations were quite near this level or lower. It is uncertain why presumably reference stations like Færder and Lofoten have occasionally high concentrations.

PFOS was the dominant PFC in cod liver in the Inner Oslofjord in 2009 (median 48 µg/kg w.w.) compared with PFOSA (41.5 µg/kg w.w.). In 2010 and 2011, PFOSA dominated (18 and 19 µg/kg w.w., respectively) more than PFOS (16 and 5 µg/kg w.w., respectively). The average concentration of PFOS in cod from two stations in the North Sea was 1.55 and 0.95 µg/kg w.w. (Green *et al.*

[1] PFCs included PFOS, PFOSA, PFNA, PFBS, PFHpA, PFHxA and PFOA.

2011b) and from three stations in the Norwegian Sea was 0.75, 0.82 and 11 µg/kg w.w. (Green *et al.* 2012). Schøyen and Kringstad (2011) analysed PFCs in cod blood samples from the same individuals which were analysed in the CEMP-programme in 2009 from the Inner Oslofjord (Green *et al.* 2010b). They found that PFOSA was the most dominant PFC-compound with a median level 6 times higher than for PFOS. The median level of PFOSA in cod blood was about 5 times higher than in liver. The median level of PFOS in cod liver was about 1.5 times higher than in blood. Further, PFNA was also detected in cod blood.

Fjeld *et al.* (2011) found only PFOS and PFOSA in quantifiable amounts in the three fish species brown trout (*Salmo trutta)*, smelt (*Osmerus eperlanus*) and vendace (*Coregonus albula*) in lake Mjøsa for the period 2008-2010. In 2011 Fjeld *et al.* (2012) also detected PFOA, PFDcA and PFUnA in addition to PFOS and PFOSA. PFOS was found to be the dominant compound in all three species.

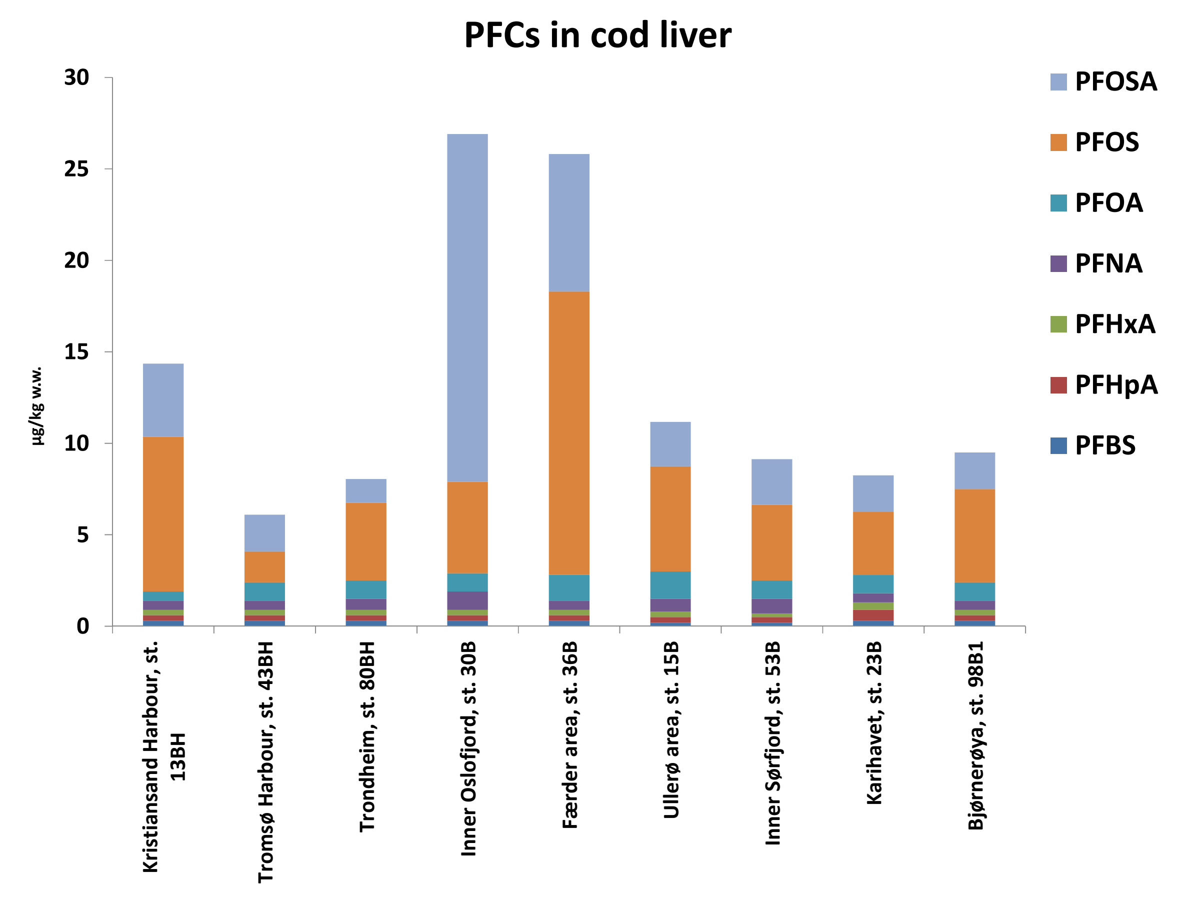


Figure 37. *Median concentrations (µg/kg w.w.) of PFCs in cod liver in 2011.*

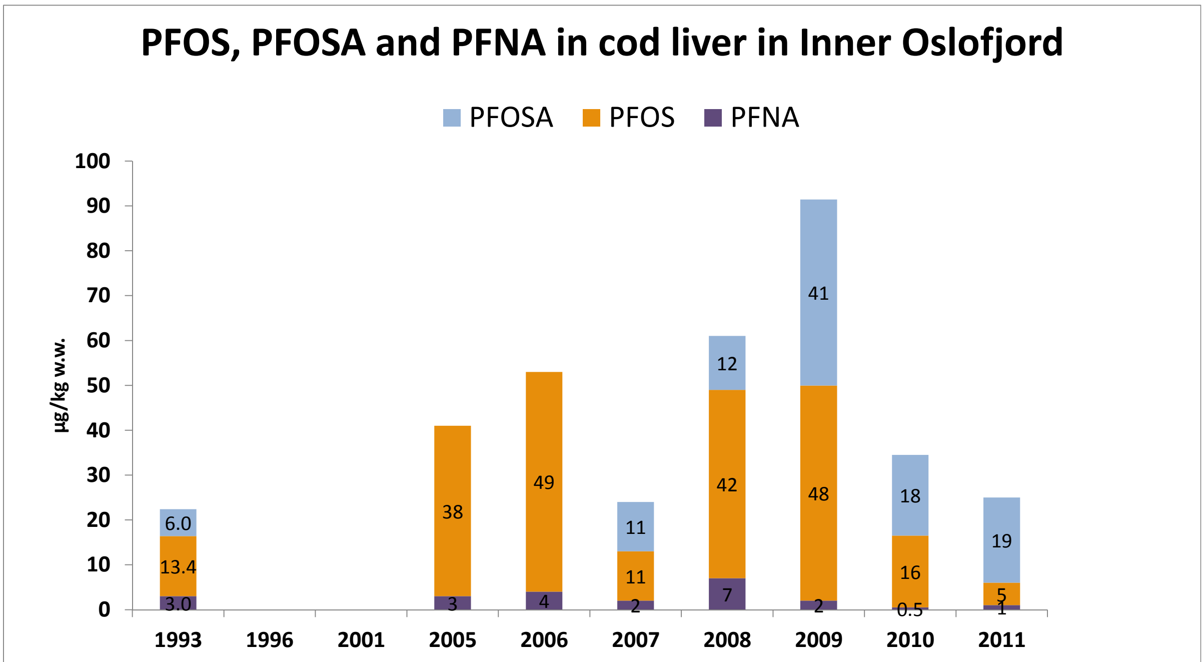


Figure 38. *Median concentrations (µg/kg w.w.) of PFOS and PFOSA in cod liver from 1993 to 2011 in the Inner Oslofjord (st. 30B).*

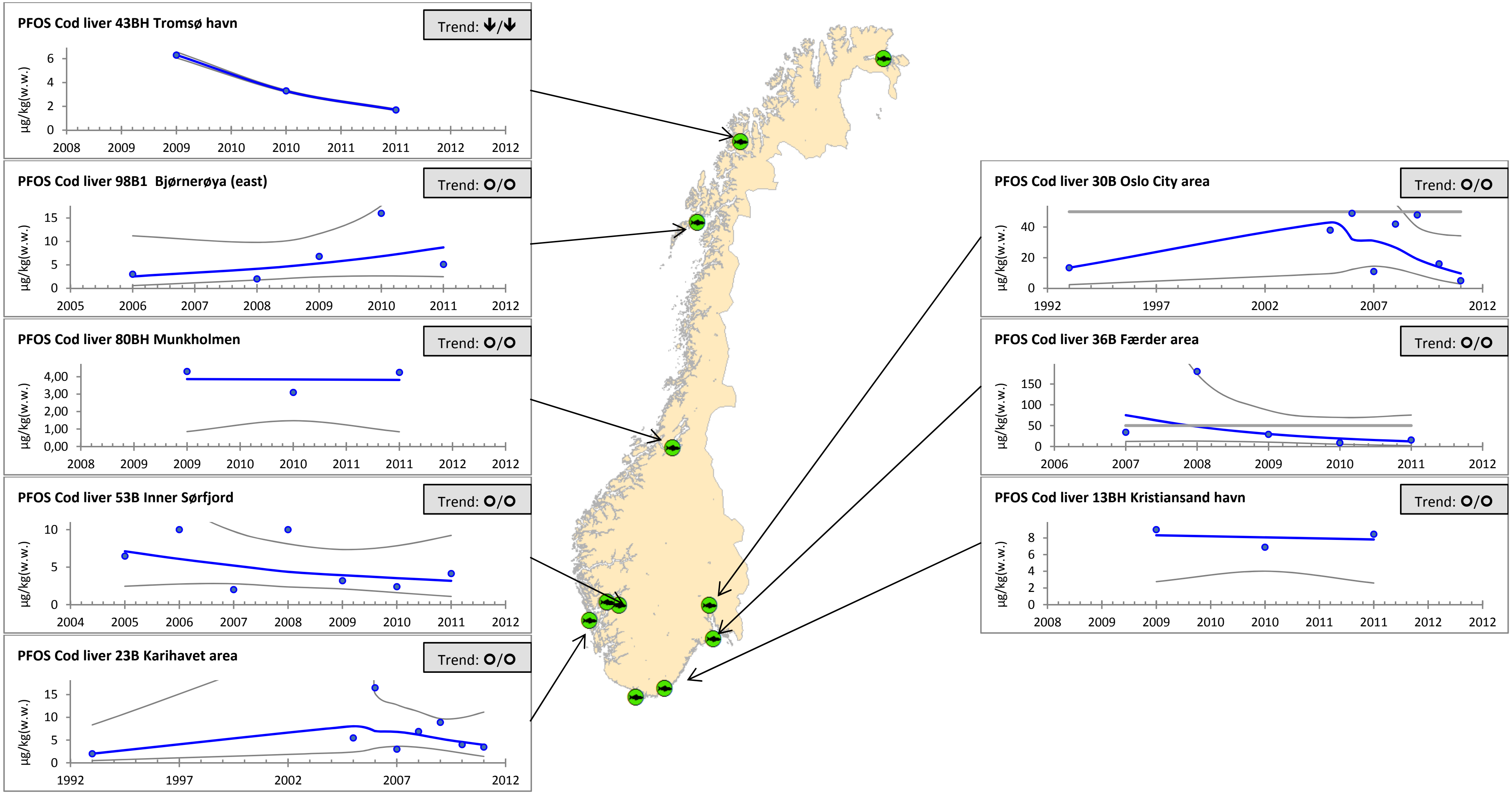


Figure 39. *Median concentration of PFOS in cod liver, µg/kg (µg PFOS/kg) wet weight (cf. Appendix H, see otherwise key to detail in Figure 5 and, for trend, Table 11).*

Table 11. *Overview of samples collected in 2011 with indication of levels and trends in concentrations of contaminants monitored. Classification is based on observed concentrations in cod, flatfish and blue mussel. Tissues: soft body (SB), muscle (MU), liver (LI), whole organism (WO), fish bile (BI) and fish blood (BL). Klif Classification system is used for biota (Molvær et al. 1997: Classes: I (blue), II (green), III (yellow), IV (orange) and V (red) (see Appendix D). For biota, trend analyses were done on time series with three or more years and the results, before the slash "/", are indicated by an upward (↑) or downward (↓) arrow where significant trends were found, or a zero (o) if no trend was detected. Where there was sufficient data a time series analysis was performed for the period 2002-2011 and the result is shown after the slash. A small filled square (▪) indicates that chemical analysis has been performed, but either data were insufficient to do a trend analysis or was not presented. Dark grey indicates concentrations higher than estimated high background levels. Light grey indicates concentrations lower than high background levels.* ***Note: Class limits for ΣDDT are used for ppDDE, and the Class limits for ΣHCH are used for HCHG.***

St.no.	Station name	Species	Tissue	Hg	Cd	Pb	Cu	Zn	Ag	As	Ni	Cr	Co	V	Mo	Ba	TBT	PCB-7	ppDDE	HCB	HCHG	OCS	PAH-16	KPAH	BaP	PBDE	PFOS	TCDDN	PYR1O	ALAD	EROD	CYP1A	VDSI
I023	Singlekalven (south)	Blue mussel	SB	o/o	o/o	o/o	o/o	o/o	o/o	o/o	o/o	↑/↑	o/o					↓/↓	↓/o	o/↓	↓/o	o/o											
I131A	Lastad	Blue mussel	SB	o/o	o/o	o/o	o/o	o/o	o/o	o/o	↓/↓	o/o	o/o					o/o	o/o	↑/o	↓/o	o/o	↓/o	↓/o	o/o								
I132	Svensholmen	Blue mussel	SB	o/o	o/o	o/o	↓/↓	↑/↑	o/o	o/o	o/o	o/o	o/o				o/o	o/o	o/o	o/o	↓/o	o/o	↓/↓	↓/↓	o/↓			o/o					
I133	Odderø (west)	Blue mussel	SB	o/o	o/o	o/o	o/o	o/o	o/o	o/o	o/o	o/o	o/o				o/o	↓/o	o/o	o/o	↓/↓	↑/o	o/o	o/o	o/o			o/o					
I201	Ekkjegrunn (G1)	Blue mussel	SB	o/o	o/o	o/o	o/o	o/o	↑/↑	o/o	o/o	o/o	o/o										↓/↓	↓/↓	↓/o								
I205	Bølsnes (G5)	Blue mussel	SB	↑/↓	o/o	o/o	o/o	o/o	o/o	o/o	o/o	o/o	o/o										↓/↓	↓/↓	o/o								
I241	Nordnes	Blue mussel	SB	o/o	o/o	o/o	o/o	↓/o	o/o	o/o	o/o	o/o	o/o					o/o	o/o	↓/↓	↓/↓	o/o											
I243	Hegreneset	Blue mussel	SB	o/o	o/o	o/o	o/o	o/o	o/o	o/o	↓/↓	o/o	o/o					↓/o	o/o	↓/↓	↓/o	o/o											
I301	Akershuskaia	Blue mussel	SB	↑/o	↑/o	o/o	o/o	o/o	o/o	o/o	↑/↑	o/o	↑/↑				↓/↓	↓/o	o/o	o/o	↓/o	o/o	o/o	o/o	o/o								
I304	Gåsøya	Blue mussel	SB	o/o	o/o	o/o	o/o	o/o	o/o	↑/↑	↑/↑	↑/↑	o/o					o/o	o/o	o/o	↓/o	o/o	o/o	o/o	o/o								
I306	Håøya	Blue mussel	SB	↑/o	o/o	o/o	o/o	o/o	↑/↑	o/o	o/o	o/o	o/o					o/o	o/o	o/o	↓/o	o/o	o/o	o/o	↑/o								
I307	Ramtonholmen	Blue mussel	SB	o/o	↑/o	o/o	o/o	o/o	o/o	↑/↑	↑/↑	o/o	o/o					↓/o	o/o	o/o	↓/↓	o/o	o/o	o/o	↑/o								
I712	Croftholmen	Blue mussel	SB	o/o	o/o	o/o	o/o	o/o	o/o	↑/↑	o/o	↓/↓	o/o				↓/↓	↓/o	o/o	↓/o	↓/↓	o/o						↓/o					
I713	Strømtangen	Blue mussel	SB	o/o	o/o	o/o	o/o	o/o	o/o	o/o	o/o	o/o	o/o				↓/↓	o/o	o/o	o/o	o/o	o/o						o/o					
I912	Honnhammer	Blue mussel	SB																				↓/o	↓/o	o/o								
I913	Fjøseid	Blue mussel	SB																				↓/↓	↓/↓	o/o								
I964	Toraneskaien	Blue mussel	SB	o/o	o/o	o/o	o/o	o/o	o/o	o/o	o/o	o/o	o/o										o/o	o/o	o/o								
I965	Moholmen (B5)	Blue mussel	SB	o/o	o/o	o/o	o/o	o/o	↓/↓	o/o	↓/↓	↓/↓	o/o										o/o	o/o	o/o								
I969	Bjørnbærviken (B9)	Blue mussel	SB	o/o	o/o	o/o	o/o	o/o	o/o	o/o	o/o	o/o	o/o										o/o	o/o	o/o								
10A2	Skallneset	Blue mussel	SB	↓/o	o/o	o/o	o/o	o/o	o/o	↓/↓	o/o	o/o	o/o					↓/o	o/o	o/o	↓/↓	o/o											
10B	Varangerfjorden	Cod	LI		↓/o	↓/o	↓/o	o/o	o/o	o/o	o/o	▪/▪	o/o					↓/↓	↓/o	↓/o	↓/o	↓/o											
10B	Varangerfjorden	Cod	MU	↓/o														o/o	o/o	o/o	o/o	o/↑											
10F	Skogerøy	Plaice	LI		↑/↑	↓/o	↑/o	o/o	o/o	o/o	o/o	▪/▪	o/o					o/o	↓/o	↓/o	↓/↓	o/o											
10F	Skogerøy	Plaice	MU	o/o														↓/o	↓/o	↓/o	o/o	↑/↑											
11G	Brashavn	Dog Whelk	SB														↓/↓																
11G	Brashavn	Dog Whelk	WO																														o/o
11X	Brashavn	Blue mussel	SB	o/o	o/o	o/o	o/o	o/o	o/o	o/o	o/o	o/o	o/o				↓/↓	↓/o	o/o	o/o	↓/↓	o/o											
13BH	Kristiansand havn	Cod	MU	o/o														o/o	o/o	o/o	▪/▪	o/o											

St.no.	Station name	Species	Tissue	Hg	Cd	Pb	Cu	Zn	Ag	As	Ni	Cr	Co	V	Mo	Ba	TBT	PCB-7	ppDDE	HCB	HCHG	OCS	PAH-16	KPAH	BaP	PBDE	PFOS	TCDDN	PYR1O	ALAD	EROD	CYP1A	VDSI
13BH	Kristiansand havn	Cod	LI		O/O	O/O	O/O	O/O	O/O	O/O	O/O	O/O	O/O					O/O	O/O	O/O	O/O	O/O				O/O	O/O						
131G	Lastad	Dog Whelk	SB														↓/↓																
131G	Lastad	Dog Whelk	WO																														↓/↓
15A	Gåsøy (Ullerø)	Blue mussel	SB	O/O	O/O	O/O	O/O	O/O	O/O	O/O	O/O	O/O	O/O				↓/↓	O/O	O/O	O/O	↓/↓	O/O											
15B	Ullerø area	Cod	BI																										↓/O				
15B	Ullerø area	Cod	LI		O/O	↓/O	O/O	↓/O	O/O	O/O	O/O	▪/▪	O/O					↓/↓	O/O	O/O	↓/O	↓/O					O/O						
15B	Ullerø area	Cod	MU	O/↑														↓/O	O/O	↓/O	O/O	O/↑											
15F	Ullerø area	Dab	MU	O/O														O/O	O/O	O/O	↓/O	↑/↑											
15F	Ullerø area	Dab	LI		O/O	↓/O	O/O	O/O	O/O	O/O	O/O	□/▪	↓/↓					O/O	O/O	O/O	↓/O	↓/O											
15G	Gåsøy (Ullerø)	Dog Whelk	WO																														↓/↓
15G	Gåsøy (Ullerø)	Dog Whelk	SB														↓/↓																
21F	Åkrafjord	Megrim	LI		O/O	O/O	O/O	O/O	O/O	O/O	O/O	▪/▪	O/O					O/O	O/O	O/O	O/O	O/O											
21F	Åkrafjord	Megrim	MU	O/O														O/O	O/O	O/O	O/O	O/O											
22A	Espevær (west)	Blue mussel	SB	↑/O	O/O	↓/O	O/O	O/O	↑/↑	O/O	O/O	O/O	O/O				↓/↓	↓/O	O/O	↓/O	↓/O	O/O											
22G	Espevær (west)	Dog Whelk	SB														↓/↓																
22G	Espevær (west)	Dog Whelk	WO																														↓/↓
227A2	Høgevarde	Blue mussel	SB	↓/↓	O/O	O/O	O/O	O/O	O/O	O/O	O/O	O/O	O/O				↓/↓	O/O	O/O	O/O	O/O	O/O											
227G1	Melandholmen	Dog Whelk	WO																														↓/↓
227G1	Melandholmen	Dog Whelk	SB														↓/↓																
23B	Karihavet area	Cod	LI		O/O	↓/O	O/O	O/O	O/O	O/O	O/O	O/O	O/O					↓/O	↓/O	O/O	↓/↓	↓/O				↓/O	O/O				O/O	O/O	
23B	Karihavet area	Cod	BL																											↑/O			
23B	Karihavet area	Cod	BI																										↓/O				
23B	Karihavet area	Cod	MU	O/O														O/O	O/O	O/O	↓/O	↓/↑											
30A	Gressholmen	Blue mussel	SB	O/O	↑/O	O/O	O/O	O/O	O/O	O/O	↑/↑	O/O	O/O				↓/↓	↓/O	↓/O	↓/O	↓/↓	↓/O	O/O	O/O	O/O			↓/↓					
30B	Oslo City area	Cod	LI		↑/O	↓/O	O/O	O/O	O/O	↓/↓	O/O	O/O	O/O					O/O	↓/O	↓/O	↓/↓	↓/↓				O/O	O/O				O/O	O/O	
30B	Oslo City area	Cod	BL																											O/O			
30B	Oslo City area	Cod	MU	↑/↑														O/O	O/O	↓/O	O/O	O/O											
30B	Oslo City area	Cod	BI																										↓/O				
31A	Solbergstrand	Blue mussel	SB	↑/↑	↑/O	↓/O	O/O	O/O	O/O	▪/▪	O/O	↑/↑	O/O					O/O	O/O	↓/O	↓/↓	O/O											
33F	Sande (east side)	Flounder	LI		↓/O	↓/O	↓/O	↓/O	O/O	O/O	O/O	▪/▪	O/O					O/↑	O/O	↓/O	↓/O	O/O											
33F	Sande (east side)	Flounder	MU	↓/O														O/O	↓/O	↓/O	↓/O	O/↑											
35A	Mølen	Blue mussel	SB	O/O	↑/O	↓/O	O/O	↑/O	O/O	O/O	O/O	O/O	O/O	O/O	O/O	O/O	O/O	↓/O	O/O	↓/O	↓/↓	↓/O	O/O	O/O	O/O								
36A	Færder	Blue mussel	SB	O/O	↑/O	↓/O	O/O	↑/O	▪/▪	▪/▪	O/▪	O/▪	▪/▪				↓/↓	↓/O	O/O	↓/O	↓/↓	O/O											
36B	Færder area	Cod	LI		↓/O	↓/O	↓/O	↓/O	O/O	O/O	O/O	▪/▪	O/O					↓/O	↓/O	↓/O	↓/↓	↓/O				O/O	O/O						
36B	Færder area	Cod	MU	O/O														O/O	↓/O	↓/↑	↓/O	↓/↑											
36F	Færder area	Dab	LI		O/O	↓/O	O/O	O/O	O/O	O/O	O/O	▪/▪	O/O					↑/↓	O/O	↓/O	↓/↓	O/O											
36F	Færder area	Dab	MU	↑/O														↓/↓	↓/O	↓/O	↓/O	↓/↑											
36G	Færder	Dog Whelk	WO																														↓/↓

St.no.	Station name	Species	Tissue	Hg	Cd	Pb	Cu	Zn	Ag	As	Ni	Cr	Co	V	Mo	Ba	TBT	PCB-7	ppDDE	HCB	HCHG	OCS	PAH-16	KPAH	BaP	PBDE	PFOS	TCDDN	PYR1O	ALAD	EROD	CYP1A	VDSI
36G	Færder	Dog Whelk	SB														↓/↓																
43BH	Tromsø havn	Cod	MU	o/o														o/o	o/o	o/o	▪/▪	▪/▪											
43BH	Tromsø havn	Cod	LI		o/o	▪/▪	o/o	o/o	o/o	o/o	o/o	o/o	o/o					o/o	↓/↓	↑/↑	▪/▪	▪/▪				o/o	↓/↓						
51A	Byrkjenes	Blue mussel	SB	o/↓	↓/↓	o/↓	o/o	o/o	↑/↑	o/o	o/o	o/o	o/o					o/↓	o/o	o/o	↓/o	o/o											
52A	Eitrheimsneset	Blue mussel	SB	↓/o	↓/o	↓/↓	o/o	↓/o	o/o	o/o	o/o	o/o	o/o					o/↓	o/o	o/o	↓/o	o/o											
53B	Inner Sørfjord	Cod	LI		↑/↓	↓/o	↑/o	o/o	o/o	o/o	o/o	▪/▪	o/o					o/o	o/o	↓/o	↓/o	↓/o				o/o	o/o				o/o	o/o	
53B	Inner Sørfjord	Cod	BI																										↓/o				
53B	Inner Sørfjord	Cod	MU	o/o														o/o	o/o	o/o	o/o	o/↑											
53B	Inner Sørfjord	Cod	BL																											o/o			
53F	Inner Sørfjord	Flounder	MU	↑/o														↓/o	↓/↓	↓/o	↓/o	↓/o											
53F	Inner Sørfjord	Flounder	LI		↓/↓	o/o	o/o	o/o	o/o	o/o	o/o	o/o	↓/↓					o/o	↓/o	↓/o	↓/o	↓/o											
56A	Kvalnes	Blue mussel	SB	↓/o	↓/o	o/o	o/o	↓/↓	o/o	o/o	o/o	o/o	o/o					o/↓	o/o	o/o	↓/o	o/o											
57A	Krossanes	Blue mussel	SB	↓/o	↓/o	↓/o	o/o	↓/o	o/o	o/o	o/o	o/o	o/o					o/o	o/o	o/o	↓/o	o/o											
63A	Ranaskjær	Blue mussel	SB	o/o	↓/o	↓/o	o/o	↓/o	o/o	o/o	o/o	o/o	o/o					o/o	o/o	o/o	↓/o	o/o											
65A	Vikingneset	Blue mussel	SB	o/o	↓/o	o/o	o/o	↓/o	o/o	o/o	o/o	o/o	o/o					↓/o	o/o	o/o	↓/o	o/o											
67B	Strandebarm area	Cod	MU	↓/o														o/o	↓/o	↓/o	↓/o	↓/↑											
67B	Strandebarm area	Cod	LI		↓/o	↓/o	o/o	o/o	o/o	o/o	o/o	o/o	o/o					↓/o	↓/o	↓/o	↓/↓	↓/o											
67F	Strandebarm area	Flounder	LI		↓/o	↓/o	o/o	o/o	o/o	o/o	o/o	▪/▪	o/o					↓/o	o/o	o/o	↓/o	o/o											
67F	Strandebarm area	Flounder	MU	↓/o														o/o	↓/o	o/o	o/o	↓/↑											
67F	Strandebarm area	Megrim	LI		↓/o	↓/o	o/o	o/o	o/o	o/o	o/o	▪/▪	o/o					↓/o	o/o	o/o	↓/o	o/o											
67F	Strandebarm area	Megrim	MU	↓/o														o/o	↓/o	o/o	o/o	↓/↑											
69A	Lille Terøy	Blue mussel	SB	o/o	↓/o	↓/o	o/o	↓/o	↑/↑	o/o	o/o	o/o	o/o					o/o	o/o		↓/o	o/o											
71A	Bjørkøya (Risøyodden)	Blue mussel	SB	↓/o	o/o	↓/o	o/o	↓/↓	o/o	o/o	o/o	o/o	o/o				↓/↓	↓/o	o/o	↓/o	↓/↓	o/o						↓/o					
71G	Fugløyskjær		SB														o/o																
76A	Risøy	Blue mussel	SB	o/o	o/o	o/o	o/o	o/o	o/o	o/o	o/o	o/o	o/o				↓/↓	↓/o	o/o	o/o	↓/↓	o/o						↑/↑					
76G	Risøy	Dog Whelk	SB														↓/↓																
76G	Risøy	Dog Whelk	WO																														↓/↓
80BH	Munkholmen	Cod	LI		o/o	o/o	o/o	o/o	o/o	o/o	o/o	o/o	o/o					↓/↓	o/o	o/o	o/o	o/o				o/o	o/o						
80BH	Munkholmen	Cod	MU	o/o														o/o	o/o	↓/↓	o/o	▪/▪											
98A2	Husvaagen area	Blue mussel	SB	o/o	↓/o	↓/o	o/o	o/o	o/o	o/o	o/o	o/o	o/o				↓/↓	o/o	o/o	o/o	↓/o	o/o											
98B1	Bjørnerøya (east)	Cod	MU	o/o														o/o	o/o	↓/o	o/o	o/↑											
98B1	Bjørnerøya (east)	Cod	LI		o/o	↓/o	o/o	o/o	↑/↑	o/o	o/o	▪/▪	o/o					↓/o	↓/o	↓/o	↓/o	o/o				o/o	o/o						
98F2	Husholmen	Plaice	LI		o/o	o/o	o/o	o/o	o/o	o/o	o/o	▪/▪	o/o					↓/↓	↓/↓	↓/o	o/o	o/o											
98F2	Husholmen	Plaice	MU	o/o														o/o	o/o	o/o	o/o	↑/↑											
98G	Svolvær området	Dog Whelk	SB														↓/↓																
98G	Svolvær området	Dog Whelk	WO																														↓/↓

4.3. Areas of special concern (Impacted)

Oslofjord/Hvaler/Grenlandsfjord area and Sørfjord/Hardangerfjord area

This part of the report focus on two main areas of special concern; the Oslofjord/Hvaler/Grenlandsfjord area, and the Sørfjord/Hardangerfjord area. There were 884 time series for selected contaminants or results from biological effects methods (cf. ***Table 8***) and 256 concerned the Oslofjord area, including the Hvaler area and Grenlandsfjord area. In 2011, 225 of the 256 series had concentrations that could be classified as insignificantly polluted (Class I), or did not exceed provisional “high background”. There were 115 significant trends, and 85 of these were downwards. The Sørfjord and Hardangerfjord area comprised 216 time series in 2011, and 183 of these had concentrations that could be classified as insignificantly polluted (Class I), or did not exceed provisional “high background”. Of these 216 time series, 82 had significant trends, 74 were downwards and 8 were upwards.

Oslofjord/Hvaler/Grenlandsfjord area

The investigations for the Oslofjord/Hvaler/Grenlandsfjord area in 2011 included 13 blue mussel stations, two flatfish stations, two cod stations and one dog whelk station. Points of concern are described below.

Mercury (Hg)

There was a significant upward trend for Hg in cod fillet from the Inner Oslofjord (st. 30B). Cod fillet from the Inner Oslofjord was markedly polluted (Class III) by Hg (***Figure 40***). The concentration of Hg was 0.316 mg/kg w.w. which is a 45% increase compared to 2010. Cod from the outer part of the Oslofjord, (Færder, st. 36B), was only insignificantly polluted (Class I) by Hg.

Blue mussel from the Hvaler area and the Grenlandsfjord areas were up to moderately polluted (Class II) by Hg. Blue mussel from Singlekalven (st. I023), were moderately polluted by Hg. A significant downward long term trend was observed in the moderately polluted blue mussel from Bjørkøya (st. 71A). Upward trends were found in blue mussel from the Mid Oslofjord at Solbergstrand (st. 31A) and Håøya (st. I306) and the Inner Oslofjord at Akershuskaia (st. I301), however concentrations in 2011 were low (Class I).

The discharge of mercury in Norway has been reduced by 60 % from 1995 to 2005. From 2008 products containing mercury were prohibited in Norway. In 2009 a survey of contaminants in freshwater fish in Norway revealed very high concentrations of mercury (Fjeld and Rognerud 2009). This increase was unexpected as the atmospheric mercury depositions most likely have decreased in southeast Norway since the beginning of the 1990s. Mercury in fish exists mainly as methyl mercury, and factors stimulating the mercury methylation, such as warmer and wetter climate and also forestry lumbering, may have contributed to the observed increase. This might also be the case for the contamination of cod in the Oslofjord. The mechanism for the increase of Hg in fish in Norway is not fully understood. An alternative explanation might be the increasing trends in dissolved organic carbon (DOC) that have been shown in surface waters in Norway (De Wit *et al.* 2007) and boreal areas elsewhere in North America and Europe (Monteith *et al.* 2007) which were attributed to a decline in sulphate deposition. The DOC is derived from soil organic material and may act as a carrier for organic pollutants (Ding and Wu 1997). Thus, the increase in DOC would contribute to increased transport of Hg sorbed to dissolved humus substances and wash-out to the fjord.

Cadmium (Cd)
There was a significant upward trend for Cd in cod liver from the Inner Oslofjord. The concentrations were below presumed high background level (***Figure 41***). Cod from the Færder area had concentrations of Cd that were below presumed high background level and showed a downward long-term trend. However, for the last 10 years there was no significant trend for Cd on this station. Blue mussel from Bjørkøy in the Grenlandsfjord were moderately polluted by Cd. Blue mussel from Gressholmen in the Inner Oslofjord were moderately polluted (Class I) by Cd and had an upward trend for the period 1984-2011. Blue mussel from the other stations in the Oslofjord area were only insignificantly/slightly polluted (Class I) by Cd.

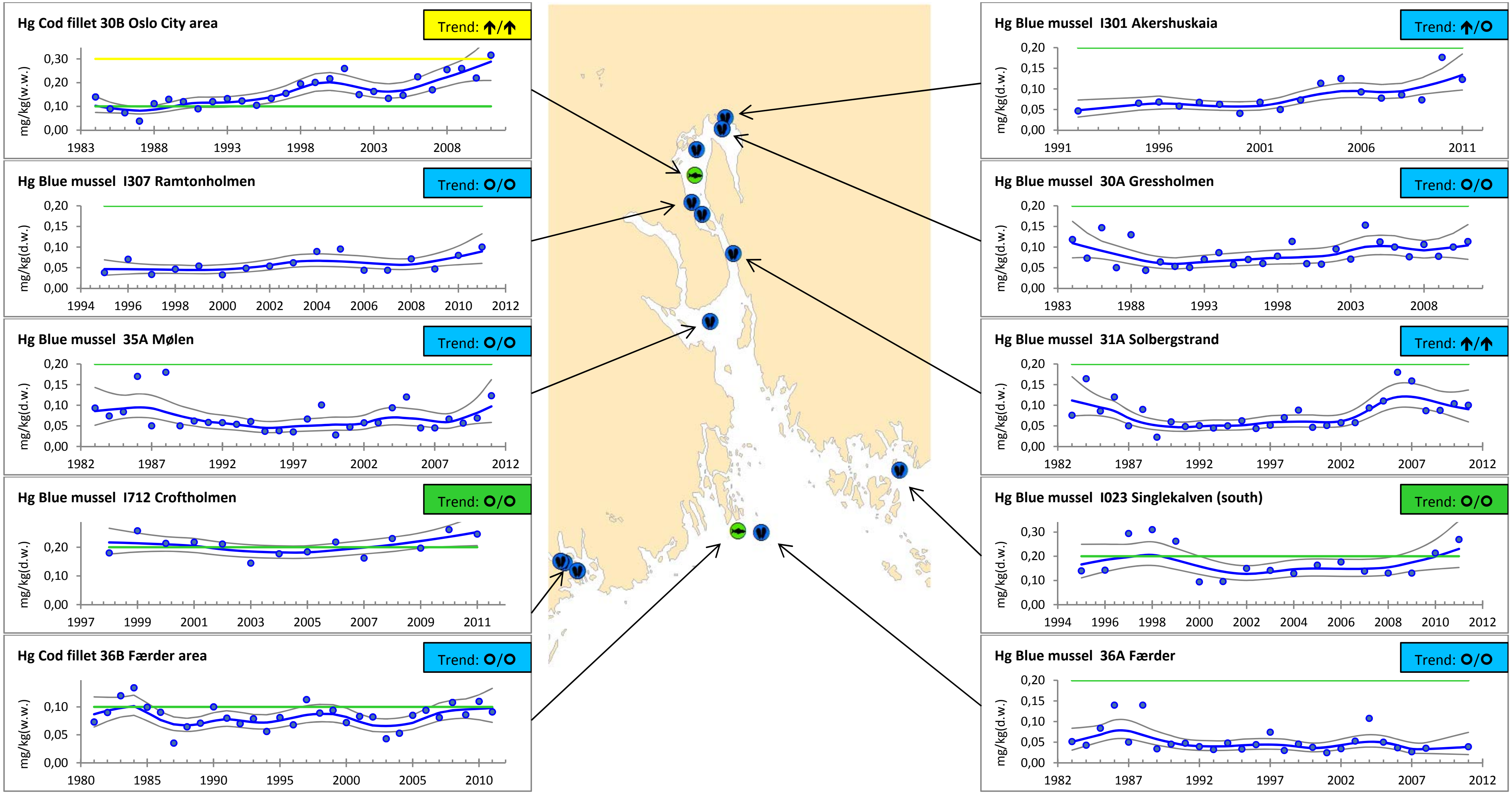


Figure 40. *Median Hg concentrations in cod and blue mussel from the Oslofjord area (cf. Appendix H, see otherwise key to detail in Figure 5 and, for trend, Table 11).*

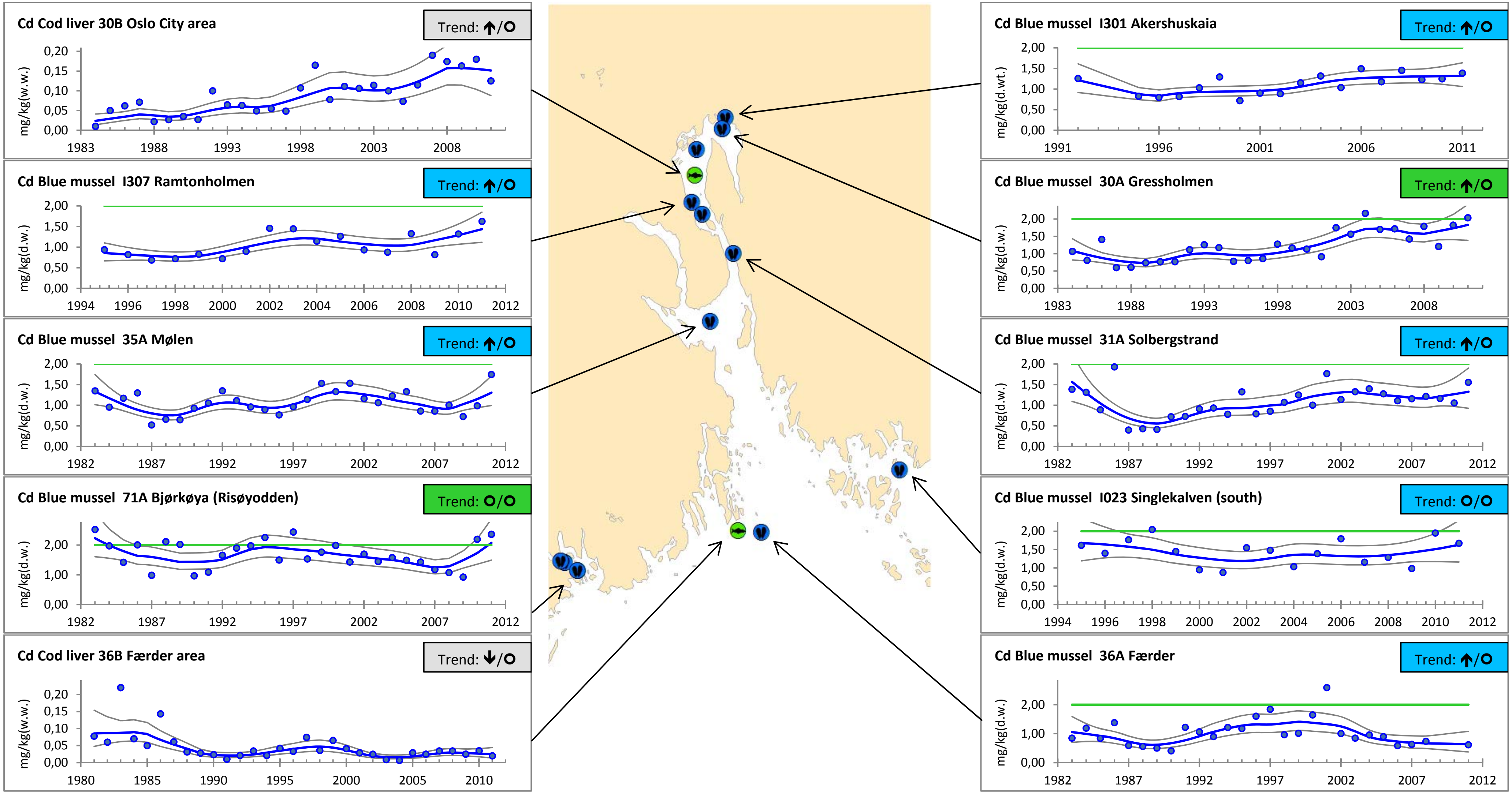


Figure 41. *Median Cd concentrations in cod and blue mussel from the Oslofjord area (cf. Appendix H, see otherwise key to detail in Figure 5 and, for trend, Table 11).*

Lead (Pb)
The concentration of Pb in cod liver from the Inner Oslofjord was reduced compared to 2010, and did not exceed presumed high background level. The concentrations of Pb in cod liver from the Inner Oslofjord have been high most of the years since 1989 (***Figure 42***). Cod from the Færder area (st. 36B) also showed low concentrations of Pb in the liver. There were significant downward long-term trends for Pb in cod liver from both Inner and Outer Oslofjord. Blue mussel from all stations in the Oslofjord area were insignificantly polluted (Class I) by Pb.

Polychlorinated biphenyls (ΣPCB-7)
Cod liver from the Inner Oslofjord was markedly polluted by PCBs, as it has been for many years (***Figure 43***). The concentration of ΣPCB-7 in cod fillet had decreased a little compared to 2010, and was in 2011 moderately polluted (Class II). Cod from the Færder area was insignificantly polluted (Class I) by ΣPCB-7 in both liver and fillet, and there was a significant downward long-term trend for ΣPCB-7 in cod liver. Blue mussel from Akershuskaia, Gressholmen and Gåsøya (st. I304) were moderately polluted (Class II) by ΣPCB-7, and data from Akershuskaia and Gressholmen showed significant long-term downward trends. The other blue mussel stations in the Oslofjord area were insignificantly/slightly polluted (Class I) by PCBs.

Based on high concentrations of dioxins and PCBs, the Norwegian Food Safety Authority (*Mattilsynet*[14]) has issued a general recommendation not to consume liver from fish caught inside the coastal baseline and for private use (*Mattilsynet*[15]). The area inside the baseline would include fjord and harbour areas such as the Inner Oslofjord. Blue mussel are found in shallow water, and are filter feeders. Cod are found in the whole water body, and feed on fish, prawns and benthic fauna. In 2008 relatively high concentrations were found in sediment and prawns from the Inner Oslofjord compared to the Outer Oslofjord; by a factor of six (Green *et al.* 2010b). Cod will therefore bioaccumulate contaminants like PCBs from sediments to a higher extent than blue mussel. This might be the reason for the observed differences in trends for ΣPCB-7 in blue mussel and cod. An alternative explanation might be that the upward trend in DOC might enhance the transport of organochlorines sorbed to dissolved humus substances, as explained for Hg.

From 2006 to 2008 approximately 440 000 m^3 polluted sediment was dredged from the harbour area in the Inner Oslofjord. Monitoring of contaminants in blue mussel in this period showed relatively high levels of PCBs (Class II-III) but no significant increase. Berge *et al.* (2009) concluded that the dredging activity probably was not the most important explanation for the observed elevated concentrations of contaminants in blue mussel in the harbour area.

[14] see http://www.miljostatus.no/Tema/Hav-og-vann/Pavirkninger-pa-livet-i-vann/Miljogifter_vann/Miljogifter_marint/Kostholdsrad/
[15] see http://www.matportalen.no/verktoy/advarsler/fisk_og_skalldyr_fra_visse_havner_fjorder_og_innsjoer

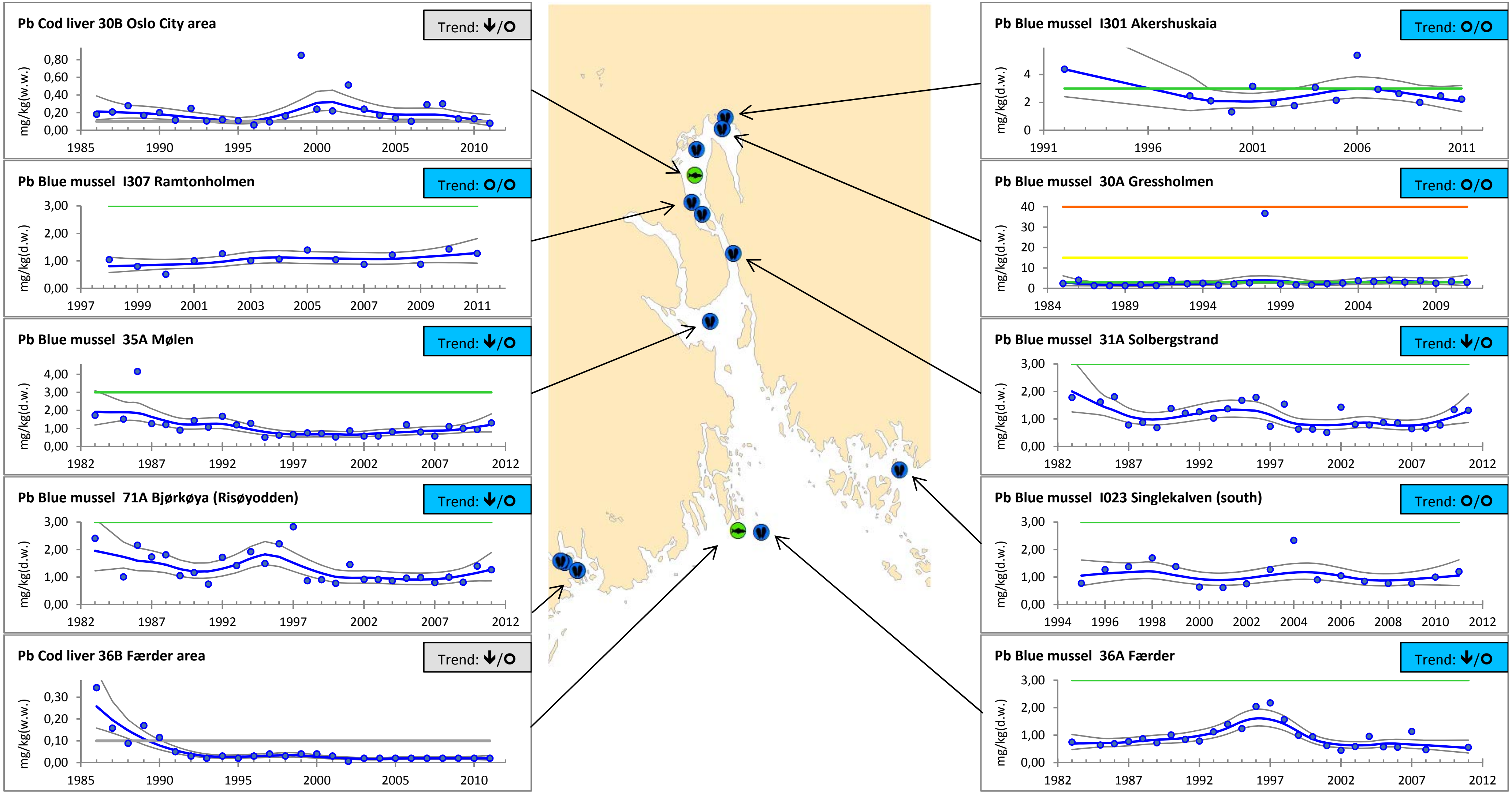


Figure 42. *Median Pb concentrations in cod liver and blue mussel from the Oslofjord area (cf. Appendix H, see otherwise key to detail in Figure 5 and, for trend, Table 11).*

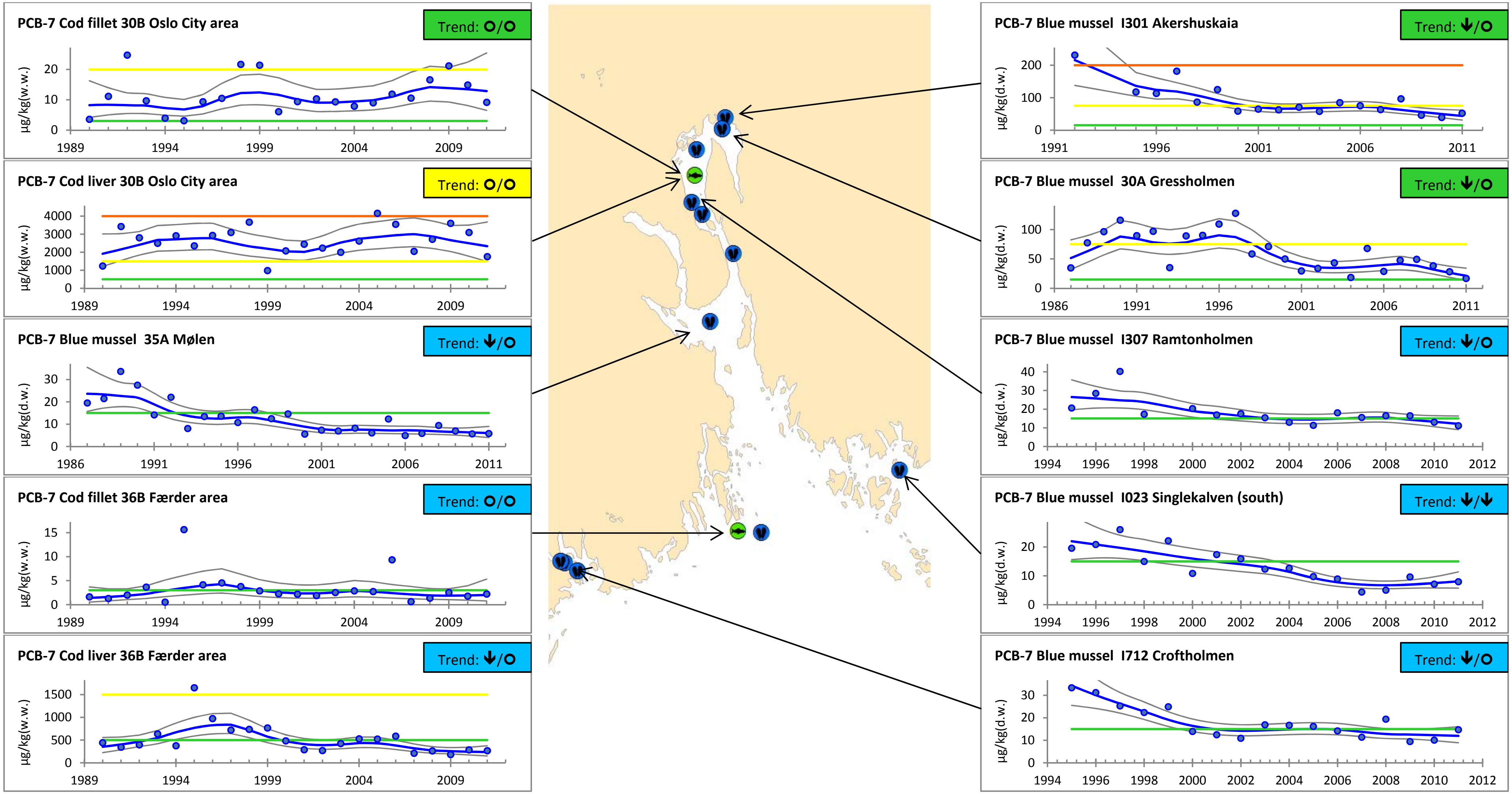


Figure 43. *Median ΣPCB-7 concentrations in cod and blue mussel from the Oslofjord area (cf. Appendix H, see otherwise key to detail in Figure 5 and, for trend, Table 11).*

Hexachlorobenzene (HCB)
Cod from both the Inner Oslofjord and the Færder area were insignificantly polluted (Class I) by HCB in both liver and fillet and showed downward long-term trends (***Table 11*** and ***Figure 44***). Blue mussel from Strømtangen (st. I713) and Croftholmen (st. I712) in the Grenlandsfjord area were markedly polluted (Class III) by HCB. Blue mussel from Bjørkøya and Akershuskaia were moderately polluted (Class II) by HCB. Blue mussel from the other stations in the Oslofjord area were insignificantly polluted (Class I) by HCB.

Dioxins (dioxin toxicity equivalents – Nordic model, TCDDN)
Blue mussel from the stations in the Grenlandsfjord area were extremely polluted (Class V) by dioxins (***Figure 45***). Significant downward long-term trends were observed for two of the stations (Bjørkøy and Croftholmen) for the whole monitoring period (from 1996 or 2002 to 2011). Blue mussel from the Inner Oslofjord (Gressholmen) and Risøy (st. 76A, south of the Grenlandsfjord area) were insignificantly polluted by dioxins.

Large reductions in the industrial effluents from the Grenland area resulted in a strong decline in contaminant levels in fish and shellfish around 1990, but still the dioxin concentrations in seafood from the Grenlandsfjord is too high. Concentrations of dioxins in blue mussel showed no reduction in the Grenlandsfjord area from 1997 to 2007 (Bakke *et al.* 2009).

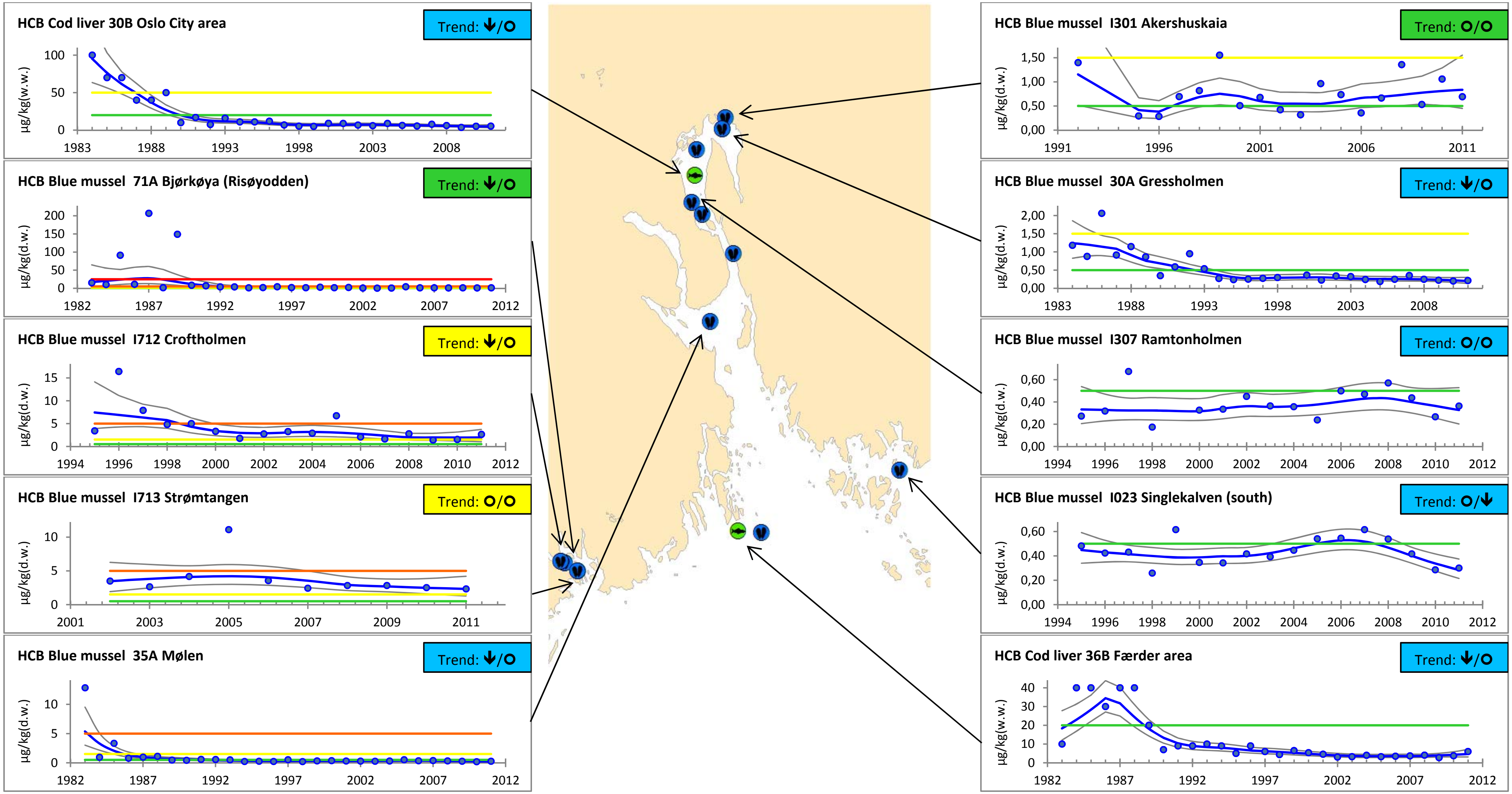


Figure 44. *Median HCB concentrations in cod and blue mussel from the Oslofjord area (cf. Appendix H, see otherwise key to detail in Figure 5 and, for trend, Table 11).*

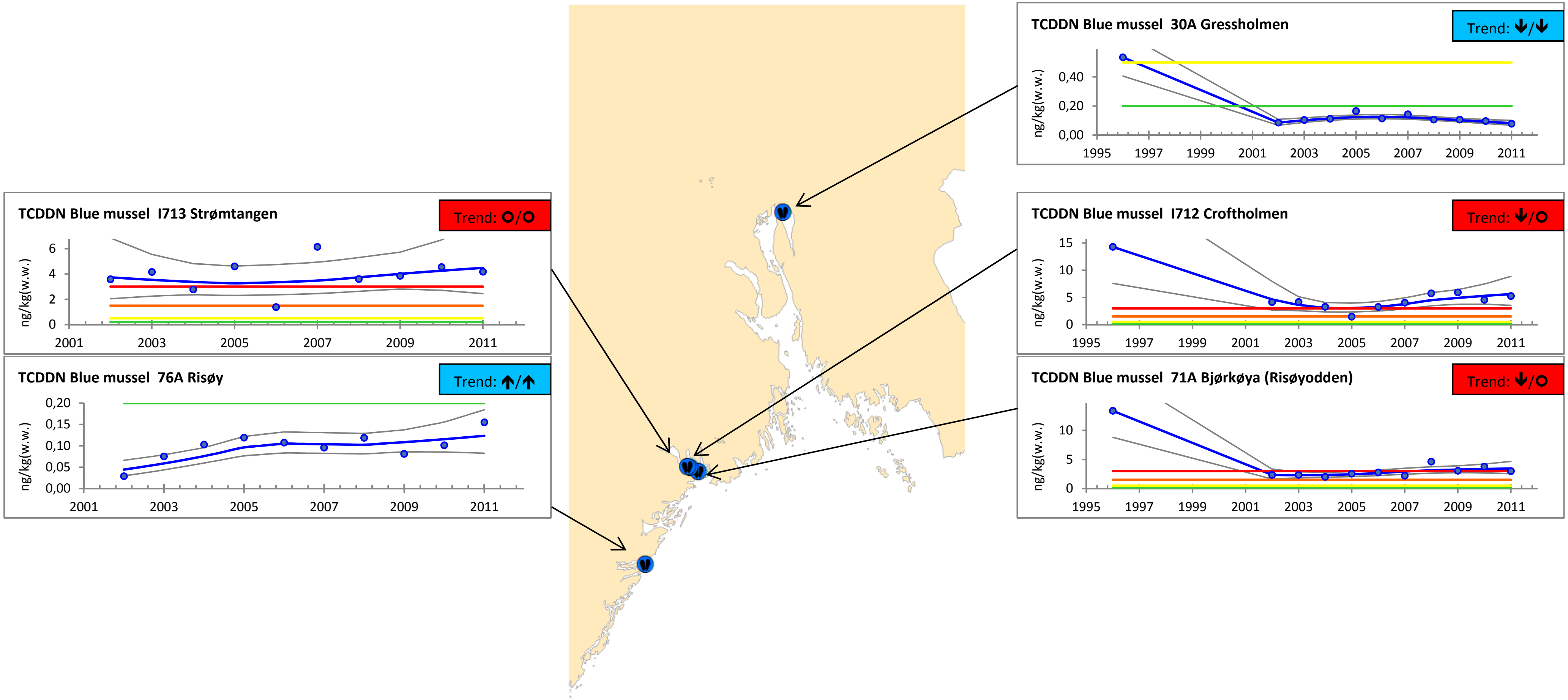


Figure 45. *Median concentrations for dioxins TCDDN-toxicity equivalents after Nordic model (TCDDN) in blue mussel, ng/kg TCDDN/kg from the Oslofjord area (cf. Appendix H, see otherwise key to detail in Figure 5 and, for trend, Table 11).*

The Sørfjord and Hardangerfjord areas

Investigations for 2011 in this area included seven blue mussel stations, two cod and three flatfish stations. Flounder were collected from Inner Sørfjord and both flounder and megrim were collected from the Hardangerfjord. Points of concern are described below.

Mercury (Hg)

Cod fillet from the Inner Sørfjord (st. 53B) was moderately polluted (Class II) by Hg (***Figure 46***). The median concentration of Hg in the fillet had increased a little compared to 2010 but there was no significant trend. Cod from Strandebarm (st. 67B) was insignificantly polluted by Hg and showed a significant downward long-term trend (1988-2011). Flounder from the Inner Sørfjord had concentration of Hg in the fillet that exceeded presumed high background level, and showed significant upward long-term trend. Flounder from Strandebarm in the Hardangerfjord were not polluted by Hg. Cod pray commonly on bottom dwelling organisms and the effect of contaminated sediment cannot be disregarded. CEMP investigations in 2004 revealed extreme concentrations (Class V) of Hg in sediment in the Sørfjord (Green *et al.* 2010b).

Two deep-water fish species from the Inner Sørfjord (st. 53D) and Strandebarm (st. 67D) in the Hardangerfjord and from the Høyanger area (st. 29D) in the Sognefjord were analysed in 2008 (Green *et al.* 2010b). Fillet of ling from the Inner Sørfjord had a median concentration of Hg close to the lower limit of Class IV for cod (there are no classification for ling and tusk) but the individual variation was very high. The concentration of Hg in fillet of ling from the Inner Sørfjord was much higher than in fillet of cod from the same fjord. Fillet from both tusk and ling from the Høyanger area were moderately contaminated by Hg, possibly linked to very high discharges of Hg from a factory in Høyanger.

Blue mussel from Byrkjenes (st. 51A), Kvalnes (st. 56A) and Krossanes (st. 57A) in the Sørfjord were moderately polluted (Class II) by Hg. There were significant downward long term trends for Hg in blue mussel from Kvalnes and Krossanes, and significant downward short-term trends at Byrkjenes and Kvalnes. Blue mussel from Eitrheimsneset (st. 52A) was insignificantly polluted (Class I) and showed significant downward long term and short-term trends. The other blue mussel stations in this area were only insignificantly polluted (Class I) by Hg.

The discharges may have been as high as 55 kg mercury per year, while authorized for only one kg per year (Klif letter ref 2008/28, 408/2002-032). The high levels of mercury in the fish fillet from the Høyanger area might be due to this extreme discharge of mercury. Fillet of ling from Strandebarm was insignificantly contaminated by mercury. Liver of ling from the Inner Sørfjord was moderately contaminated by PCBs.

Cadmium (Cd)

Cod from the Inner Sørfjord contained concentrations of Cd in the liver that was below presumed high background level (***Figure 41***). There was a significant upward trend for Cd in cod liver for this station for the period 1986-2011. Cod from Strandebarm in the Hardangerfjord showed a significant downward trend for the period 1987-2011 and median concentration of Cd at this station was below presumed high background level (***Table 11***). Flounder from the Inner Sørfjord and the Mid Hardangerfjord had concentrations of Cd in the liver that did not exceed presumed high background level, and showed significant downward trends. CEMP investigations in 2004 revealed elevated levels of Hg in sediment (up to Class V) in the Sørfjord. Also here CEMP investigations in 2004 revealed elevated concentrations (Class III) of Cd in sediment in the Sørfjord (Green *et al.* 2010b).

Blue mussel from Kvalnes and Byrkjenes were markedly polluted (Class III) by Cd, and had significant downward trends. Downward trends were also found for Cd in blue mussel from Eitrheimsneset and Krossanes, which were moderately polluted (Class II) by Cd. Blue mussel from the stations in the Mid Hardangerfjord were insignificantly polluted (Class I) by Cd and had significant downward trends.

Lead (Pb)
The concentration of Pb in the liver of cod from the Inner Sørfjord did not exceed presumed high background level (***Figure 48***) and showed a significant downward long-term trend. Inhibition of ALA-D in cod is commonly observed in the Sørfjord as a result of the Pb exposure (c.f. chapter 4.5). Cod liver from Strandebarm also had concentration of Pb below presumed high background level and showed a significant downward long-term trend.

Blue mussel from Byrkjenes and Kvalnes in the Sørfjord were markedly polluted (Class III) by Pb. At the stations Eitrheimsneset, Krossanes blue mussel were moderately contaminated (Class II) by Pb and showed significant downward trends. Blue mussel from the stations in the Hardangerfjord were only insignificantly polluted (Class I) by Pb. At all stations in the Sørfjord and Hardangerfjord area the concentrations of Pb had decreased a little compared to 2010. CEMP investigations in 2004 revealed extreme concentrations (Class V) of Pb in sediment in the Sørfjord (Green *et al.* 2010b).

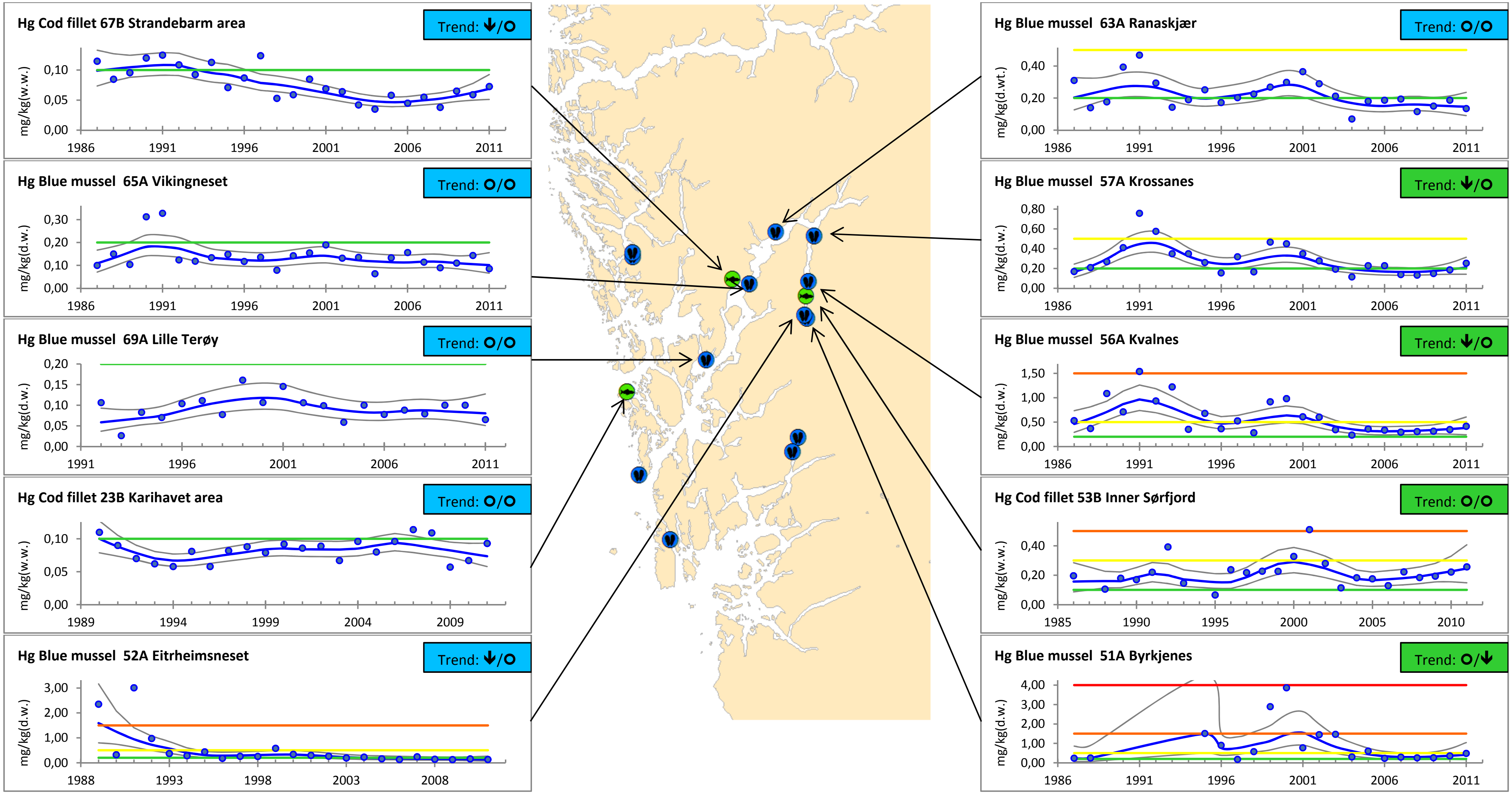


Figure 46. *Median concentrations for Hg in cod and blue mussel from the Sørfjord and Hardangerfjord area (cf. Appendix H, see otherwise key to detail in Figure 5 and, for trend, Table 11).*

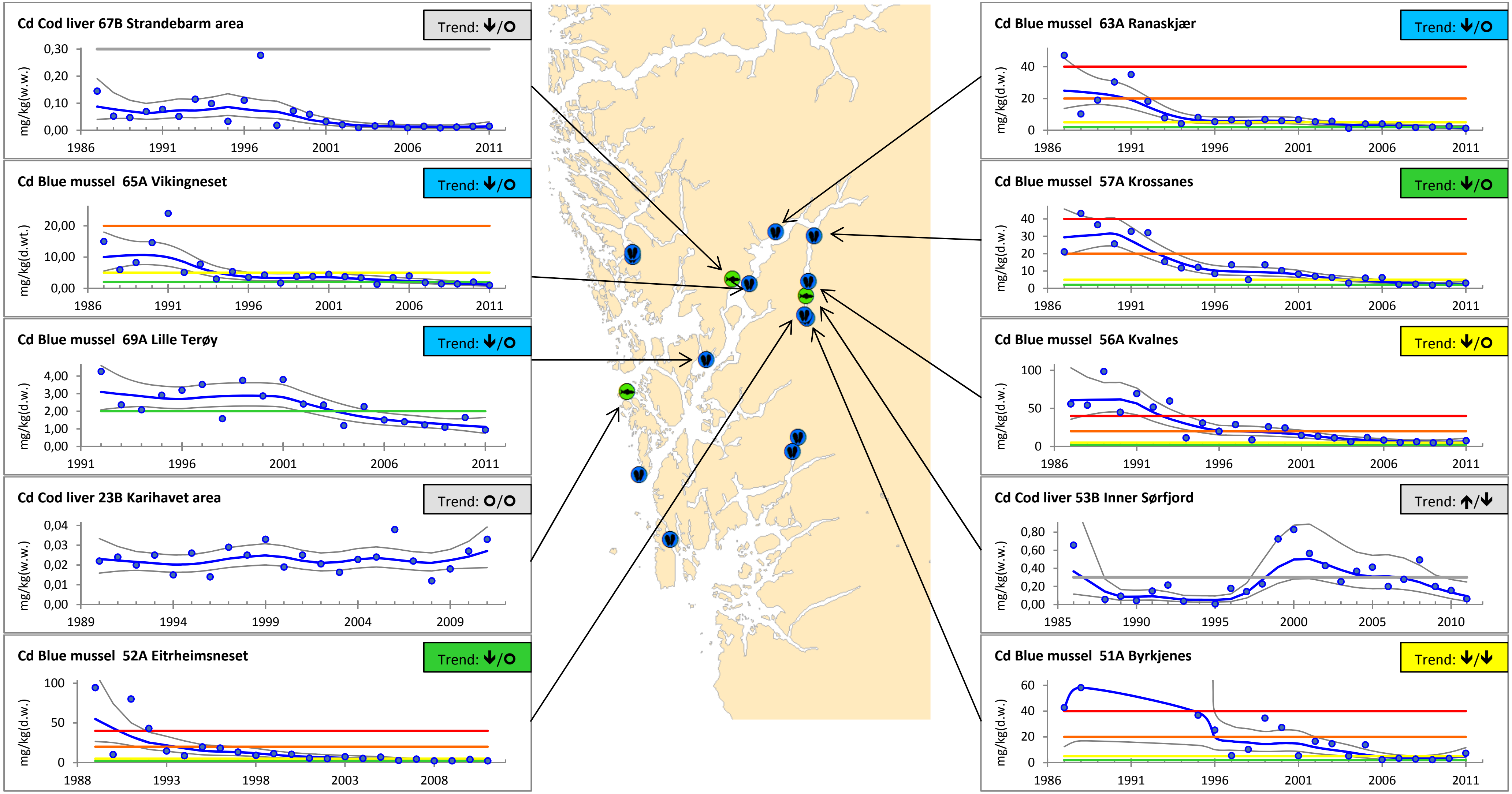


Figure 47. *Median concentrations for Cd in cod and blue mussel from the Sørfjord and Hardangerfjord area (cf. Appendix H, see otherwise key to detail in Figure 5 and, for trend, Table 11).*

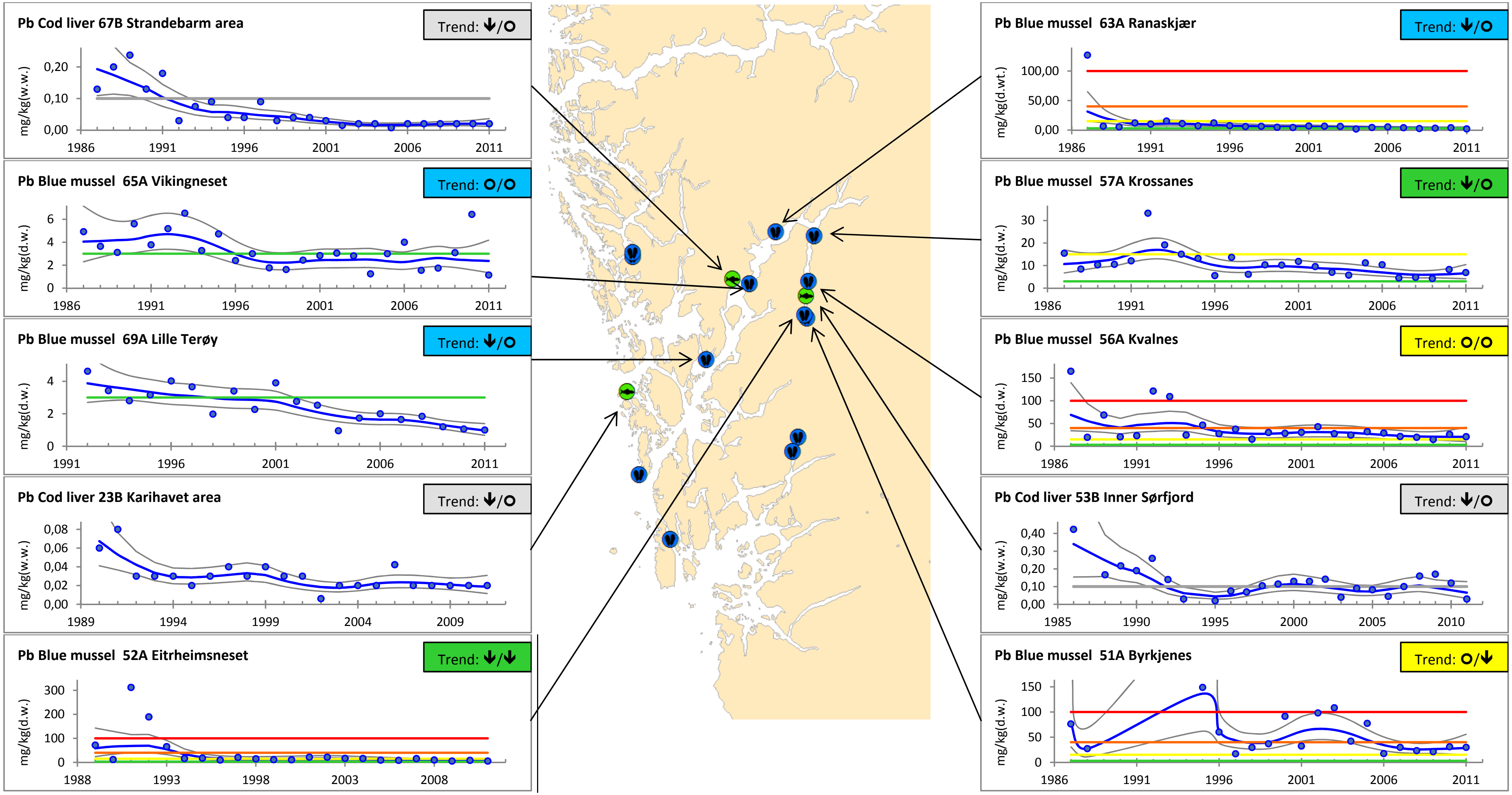


Figure 48. *Median concentrations of Pb in cod and blue mussel from the Sørfjord and Hardangerfjord area (cf. Appendix H, see otherwise key to detail in Figure 5 and, for trend, Table 11).*

Polychlorinated biphenyls (ΣPCB-7)

Liver of cod from the Inner Sørfjord was moderately polluted (Class II) by ΣPCB-7 (***Figure 49***). The fillet of cod were insignificantly polluted (Class I) by ΣPCB-7. Liver and fillet of cod from Strandebarm in the Hardangerfjord were insignificantly polluted (Class I) by ΣPCB-7. There was a significant downward long-term trend for ΣPCB-7 in cod liver from Strandebarm. Blue mussel in the Sørfjord and Hardangerfjord area were insignificantly polluted (Class I) by PCBs. There were significant downward short-term trends for ΣPCB-7 in blue mussel from the Sørfjord. As for metals, sediment contaminated with PCBs may affect concentrations in cod through the feeding habits of cod which consumes bottom dwelling organisms. CEMP investigations in 2004 revealed moderate concentrations of ΣPCB-7 in sediment in the Sørfjord (Green *et al.* 2010b).

Dichlorodiphenyldichloroethylene (ppDDE)

Cod liver and fillet from the Inner Sørfjord were moderately polluted (Class II, limits for ΣDDT) by ppDDE (***Figure 50***). Liver of cod from Strandebarm in the Hardangerfjord were also moderately polluted (Class II) by ppDDE. There were significant downward long-term trends for ppDDE in both cod liver and fillet from the Hardangerfjord. CEMP investigations in 2004 revealed moderate concentrations of ppDDE in sediment in the Sørfjord (Green *et al.* 2010b).

Blue mussel from Kvalnes was severely polluted (Class IV) by ppDDE. The other blue mussel stations in the Sørfjord were moderately polluted (Class II) by ppDDE. Blue mussel from the stations in the Hardangerfjord were insignificantly polluted (Class I) by ppDDE.

The Sørfjord area has a considerable number of fruit orchards. Earlier use and the persistence of DDT and leaching from contaminated soil is probably the main reason for the observed high concentrations of ppDDE in the Sørfjord area. It must however be noted that the use of DDT products have been prohibited in Norway since 1970. Green *et al*. (2004a) concluded that the source of ppDDE was uncertain. Analyses of supplementary stations between Kvalnes and Krossanes in 1999 indicated that there could be several sources (Green *et al*. 2001). A more intensive investigation in 2002 with seven sampling stations confirmed that there were two main areas with high concentrations north of Kvalnes and near Urdheim south of Krossanes (Green *et al.* 2004a). Skei *et al.* (2005) concluded that the variations in concentrations of ΣDDT and the ratio between p,p'-DDT/p,p'DDE (insecticide vs. metabolite) in blue mussel from Byrkjenes and Krossanes corresponds with periods with much precipitation and is most likely a result of wash-out from sources on shore. Botnen and Johansen (2006) set out passive samplers (SPMD- and PCC-18 samplers) at 12 locations along the Sørfjord to sample for DDT and its derivates in sea water. Blue mussel and sediments were also taken at some stations. The results indicated that further and more detailed surveys should be undertaken along the west side of the Sørfjord between Måge and Jåstad, and that replanting of old orchards might release DDT through erosion. Concentrations of ΣDDT in blue mussel in the Sørfjord in 2008-2011 showed up to Class V (extremely polluted) at Utne (Ruus *et al.* 2009, 2010a, 2011, 2012a). There was high variability in the concentrations of ΣDDT in replicate samples from Utne, indicating that the station is affected by DDT-compounds in varying degree, dependent on local conditions. The highest concentrations of ppDDE in sediment were observed in Mid Sørfjord (Green *et al.* 2010b).

Increased ΣDDT-concentrations in blue mussel from the Sørfjord were discussed by Ruus *et al.* (2010b). Possible explanations that were discussed were that an increase in DOC would contribute to increased transport of DDT sorbed to dissolved humus substances and wash-out to the fjord.

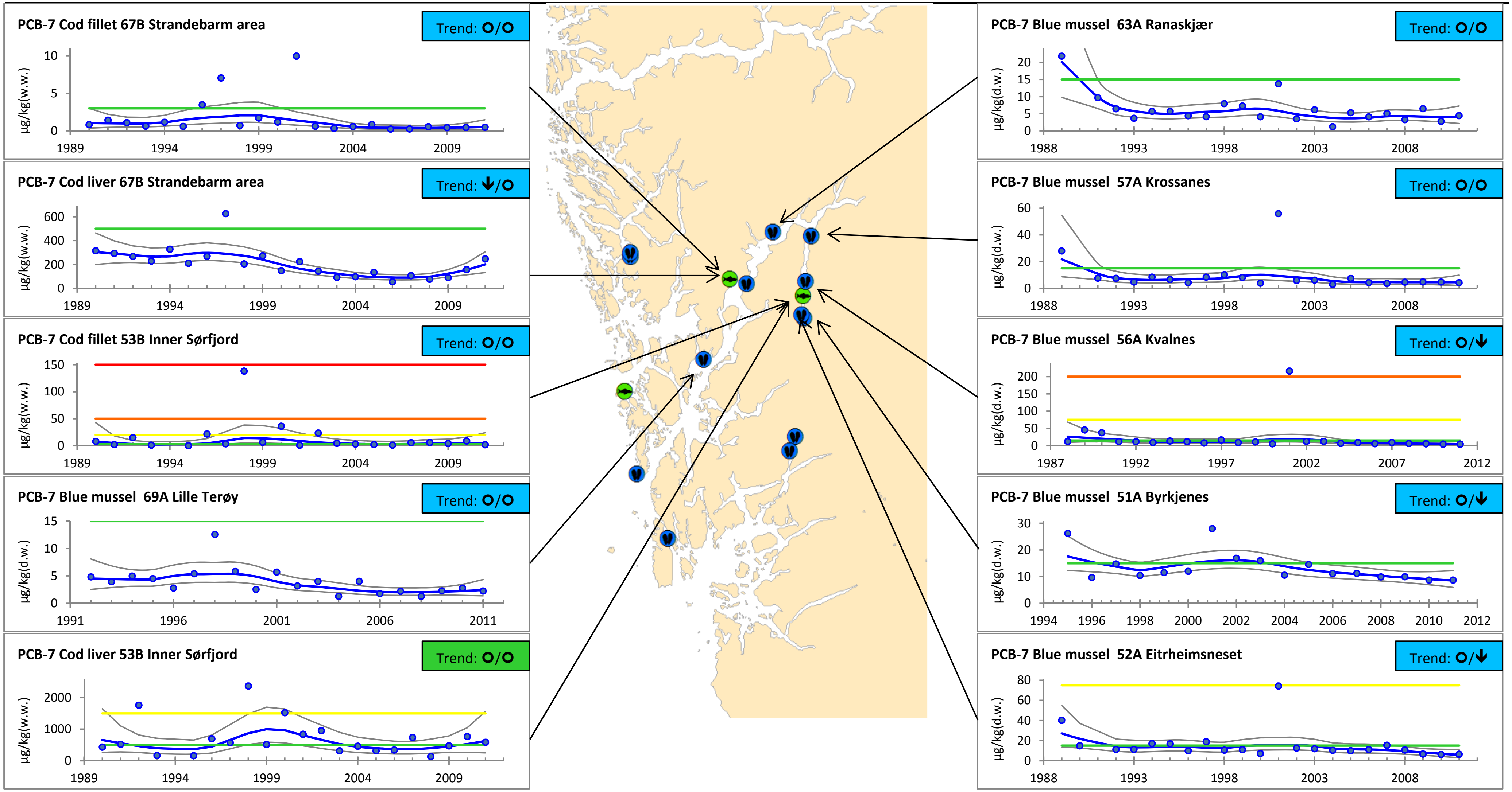


Figure 49. *Median concentrations of ΣPCB-7 in cod and blue mussel from the Sørfjord and Hardangerfjord area (cf. Appendix H, see otherwise key to detail in Figure 5 and, for trend, Table 11).*

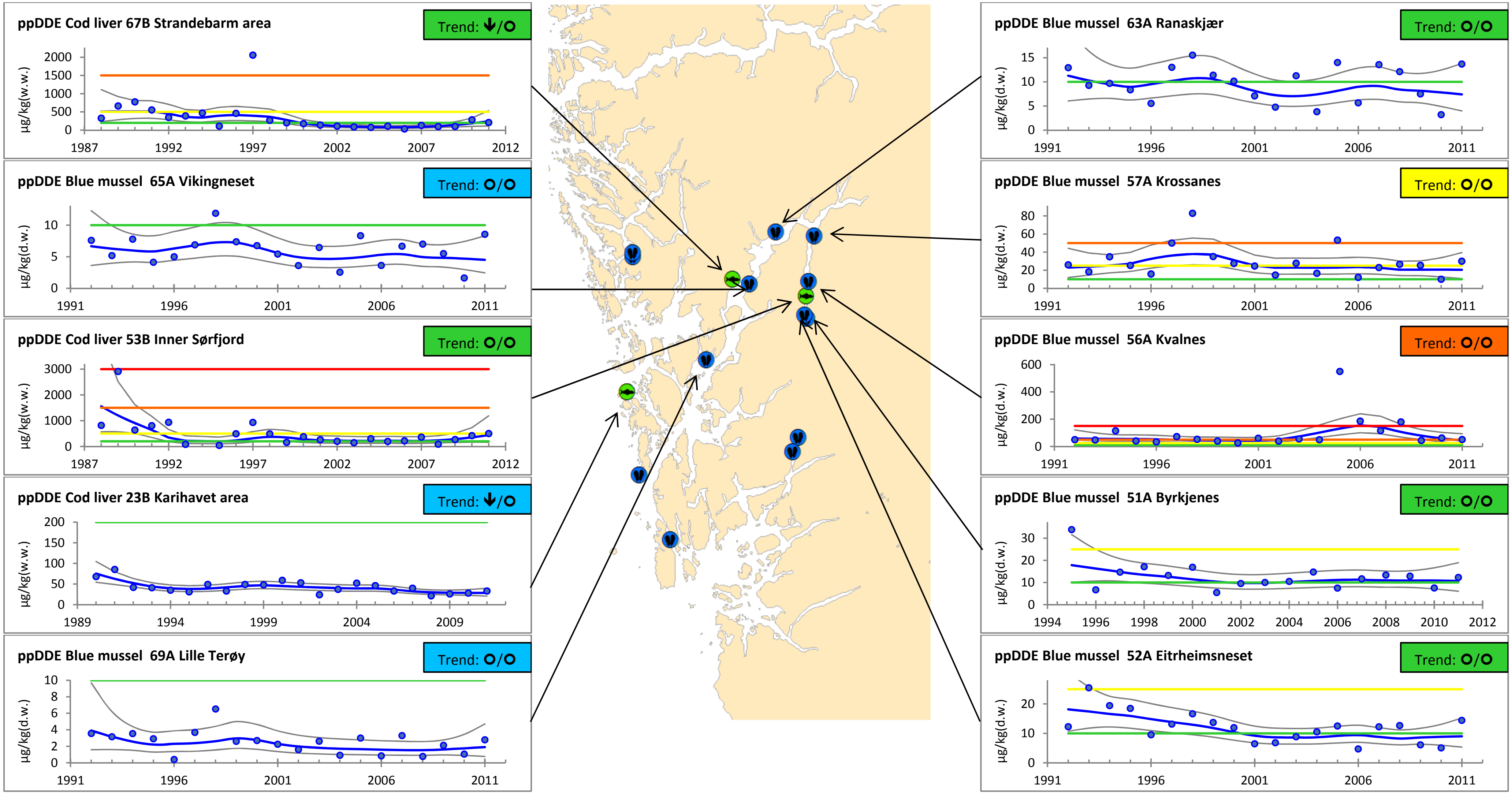


Figure 50. *Median concentrations of ppDDE in cod and blue mussel from the Sørfjord and Hardangerfjord area (cf. Appendix H and see otherwise key to map and detail in Figure 5 and, for trend, Table 11).*

4.4. Cod from harbour areas of Oslo, Kristiansand, the Inner Sørfjord, Trondheim and Tromsø

Cod from harbour areas of Oslo, Kristiansand, the Inner Sørfjord, Trondheim and Tromsø

In 2011, CEMP included investigations of cod from Oslo (Inner Oslofjord), Kristiansand, Trondheim and Tromsø harbours and the Inner Sørfjord. Nineteen contaminants were analysed including 11 metals, organochlorines, PBDEs and PFCs (represented here by PFOS) (***Figure 39***). The Klif classification system for contaminants in cod has not been developed to include arsenic, nickel, chromium, cobalt, tin, octachlorostyrene, pentachlorobenzene, PBDEs and PFCs. Points of concern are described below.

Inner Oslofjord

The cod from the Inner Oslofjord were markedly polluted (Class III) with mercury in fillet and ΣPCB-7 in liver and moderately polluted (Class II) with ΣPCB-7 in fillet. The classification system applied did not reveal any other elevated compound concentrations. ΣPCB-7 in liver was 1759 µg/kg w.w., over 50% higher than any of the four other stations considered here. The concentration of PBDE was 65.2 µg/kg w.w. and only the concentration found in cod from the Inner Sørfjord was higher. The concentration of PFOS was 5 µg/kg w.w. and only the concentration found in cod from the Kristiansandfjord was higher.

Kristiansand harbour

Liver and fillet of cod from Kristiansand were markedly polluted (Class III) with HCB. Both tissues were moderately polluted (Class II) with ΣPCB-7. The classification system applied did not reveal any other elevated concentrations. Octachlorostyrene in liver was 33 µg/kg w.w., more than 12 times higher than in the four other harbour areas. The reason for this has not been determined. The concentration of PBDE was lower than in the range found in the Inner Oslofjord and the Inner Sørfjord areas. The concentration of PFOS was 8.46 µg/kg w.w.

The Norwegian Food Safety Authority (*Mattilsynet*[16]) has issued advice against consumption of fish from the Kristiansand harbour area due to high concentrations of organochlorines including dioxins, PAHs and lead.

Inner Sørfjord

The cod from the Inner Sørfjord were moderately polluted (Class II) with mercury in fillet and ΣPCB-7 and ppDDE in liver. The classification system applied did not reveal any other elevated concentrations. ΣPCB-7 in liver was 586 µg/kg w.w., roughly on third of what was found in the Inner Oslofjord. The concentration of PBDE was 104.7 µg/kg w.w., the highest amongst the five stations. The concentration of PFOS was 4.1 µg/kg w.w., about half of what was found in Kristiansand harbour.

The Norwegian Food Safety Authority (*Mattilsynet*[17]) has issued advice against consumption of fish from the Inner Sørfjord area due to high concentrations of cadmium, lead, mercury, PCBs and dioxins.

Trondheim harbour

The liver of cod from Trondheim (Munkholmen) was insignificantly polluted (Class I) with ΣPCB-7. A more than 50 % reduction was observed as compared to 2010. Cod fillet was moderately polluted (Class II) by Hg. The classification systems applied did not indicate any other elevated concentrations. PBDE was 45.68 µg/kg w.w. The concentration of PFOS was low (4.25 µg/kg w.w.).

[16] se http://www.miljostatus.no/Tema/Hav-og-kyst/Miljogifter_marint/Kostholdsrad/
[17] se http://www.miljostatus.no/Tema/Hav-og-kyst/Miljogifter_marint/Kostholdsrad/

Tromsø harbour
The classification systems applied did not reveal any elevated concentrations. PBDE was about half of the range found in the Inner Oslofjord and the Inner Sørfjord areas. The concentration of PFOS was also very low, 1.7 µg/kg w.w.

The Norwegian Food Safety Authority (*Mattilsynet*) has issued advice against consumption of mussels from the Tromsø harbour area due to high concentrations of PAHs.

4.5. Norwegian blue mussel Pollution and Reference Indices (The Index Programme)

Stations involved in 2011 are shown in ***Figure 51***. More details on the methods and results for 2011 can be found in Appendix J.

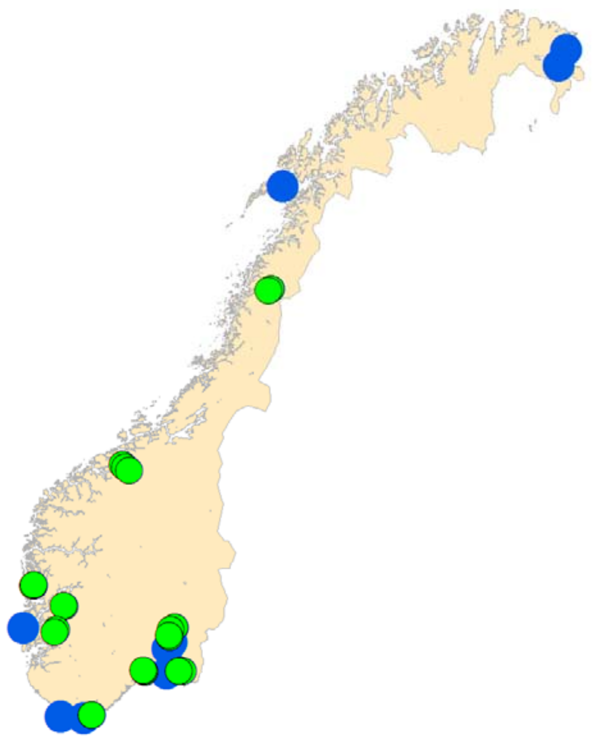


Figure 51. *Blue mussel Index stations sampled in 2011; pollution (green circles), reference (blue circles).*

Based on nine fjord areas and on the new calculation with the mentioned supplementary stations and supplementary analyses of dioxin and TBT, the Pollution Index for 2011 was 2.8, 0.2 higher than in 2010 and at the same level as in 2009 (Appendix M4, Green *et al.* 2010). Compared to 2010 HCB in the Inner Kristiansandsfjord was a class lower, but benzo[a]pyrene in the Saudafjord and the Inner Ranfjord and ∑PCB7 in the Bergen harbour area (Byfjorden) was a class higher. A value between 2 and 3 would be termed by the Klif system as “Marked” by the Klif system and between 3 and 4 "Severe".

For the Reference Index based on four fjord areas (Oslofjord, Lista area, Bømlo-Sotra area and Lofoten area), the Index for 2011 was 1.2, 0.2 higher than in 2010 and at the same level as in 2009 (see Appendix J). An index value between 1 and 2 would be termed by the Klif system as “moderately”.

An increase in the Pollution and Reference Indices indicates that the respective fjord areas are more contaminated.

It is not the intent of the application of the indices to give a station by station account. However, time trend analyses for the entire period (1995-2011) and also for the last 10 years (2002-2011) have been calculated and show both significant upward and downward trends in blue mussel (cf. Appendix H).

Some cases for downward and upward trends since 2002 are worth noting (classifications refer to 2011 median, maps refer to Appendix F):

Recent downward trends (2002-2011):

- Inner Oslofjord, Gressholmen (st. 30A, Map 1) - TBT, Class II
- Grenlandfjords, Croftholmen (st. I712, Map 2) – TBT, Class II
- Saudafjord, Ekkjegrunn (st. I201, Map 5) – carcinogen PAH, Class II
- Sørfjord, Bjerkjenes (st. 51A, Map 6) - Hg, Class II; Cd, Pb, Class III,
- Sørfjord, Eitrheimsneset (st. 52A, Map-6) - Pb, Class II
- Kristiansand harbour, Svensholmen (st. I132) - PAH, carcinogen PAH, BaP, Class II
- Ranfjord, Moholmen (st. I965, Map 15) - Ni, Class II; Cr, Class III
- Varangerfjorden, Skallneset (st. 10A2, Map 22) - As, Class II

The first year of the three times series for As, Cr and Ni was 2008 or 2009.

Recent upward trends (2002-2011):

- Hvaler area, Singlekalven (st. I023) (Map 2) - Cr, Class II
- Inner Oslofjord, Gåsøya (st. I304) (Map 1) - As, Cr, Class II
- Inner Oslofjord, Ramtonholmen (st. I307) (Map 1) - As, Class II
- Mid Oslofjord, Solbergstrand (st. 31A) (Map 1) - Cr, Class II
- Grenlandfjords, Croftholmen (st. I712, Map 2) – As, Class II

The first year of these six times series for As and Cr was 2008 or 2009.

4.6. Biological effects methods for cod

Rationale and overview

The rationale to use biological effects methods (BEM) within monitoring programmes is to evaluate whether marine organisms are exposed to contaminants to a degree that triggers biological effects. Such knowledge cannot be derived from tissue levels of contaminants only. Just one reason is the vast number of chemicals (known and unknown) that organisms are exposed to, in combination, in the environment. In addition to enable conclusions on the health of marine organisms, some biomarkers assist in the interpretation of contaminant exposure and bioaccumulation. The biological effects component of the Norwegian CEMP is possibly the most extensive of its type in Europe and includes imposex in gastropods as well as biomarkers in fish. The four chosen methods for fish were selected for specificity, for robustness and because they are among a limited set of methods proposed by international organisations, including OSPAR and ICES (see ***Table 5*** for parameter list with method specificity and ***Figure 3*** for map of stations).

A thorough analysis and review of BEM-results has been performed twice since their inclusion in 1997 (Ruus *et al.* 2003; Hylland *et al.* 2009). Clear relationships were shown between tissue contaminants, physiological status, and responses in BEM parameters in cod (Hylland *et al.* 2009). Although metals contributed substantially to the models for ALA-D and metallothionein (MT; included in the programme 1997-2001) and organochlorines in the model for CYP1A activity, other factors were also shown to be important. Liver lipid and liver somatic index (LSI) contributed for all three BEM-parameters, presumably reflecting the general health of the fish. Size or age of the fish also exerted significant contributions to the regression models. It was concluded that the biological effect methods clearly reflected relevant processes in the fish even if they may not be used alone to indicate pollution status for specific locations at given times. Furthermore, the study showed that it is important to integrate a range of biological and chemical methods in any assessment of contaminant impacts. Through continuous monitoring within CEMP, a unique BEM time series /dataset is generated, that will also be of high value as a basis of comparison for future environmental surveys.

Biological effect methods were first included in the programme in 1997, after which some modifications have been done. In 2002, reductions were made in parameters and species analysed. There have also been improvements in the methods, such as discontinuation of single wavelength fluorescence and use of HPLC in the analysis of bile metabolites (2000).

The CEMP-programme for 2011 included four biological effects methods (BEM) (cf. ***Table 5***). For the 2011 investigations OH-pyrene, ALA-D, EROD-activity and CYP1A were measured in Atlantic cod from the Inner Oslofjord (st. 30B), the Inner Sørfjord (st. 53B) and Karihavet (st. 23B). OH-pyrene was also analysed in cod from Lista (st. 15B).

Under controlled conditions the measures derived from OH-pyrene, EROD-activity and CYP1A increase with increased exposure to their respective inducing contaminants. The activity of ALA-D on the other hand is inhibited by contamination (i.e., lead), thus lower activity means a response to higher exposure.

As in most previous years, 25 individual cod were sampled for biological effects measurements. Since 2002, three stations (four for OH-pyrene) have been sampled, instead of eight stations as in previous years. No samples for BEM have taken from flatfish since 2002. All fish were collected by local contacts responsible for the catch and kept alive until sampling by NIVA staff within 5 days.

OH-pyrene metabolites in bile

Detection methods for OH-pyrene have been improved two times since the initiation of these analyses in the CEMP programme. In 1998, the wavelength for measurement of light absorbance of the support/normalisation parameter biliverdine was changed to 380 nm. In 2000, the use of single-wavelength fluorescence for quantification of OH-pyrene was replaced with HPLC separation proceeding fluorescence detection. The single wavelength fluorescence method is much less specific than the HPLC method. Although there is a good correlation between results from the two methods, they cannot be compared directly.

PAH compounds are effectively metabolized in vertebrates. As such, when fish are exposed to and take up PAHs, the compounds are biotransformed into polar metabolites which enhances the efficiency of excretion. It is therefore not suitable to analyse fish tissues for PAH parent compounds as a measure of exposure. However, since the bile is a dominant excretion route of PAH metabolites, and since the metabolites are stored for some time in the gall bladder, the bile is regarded as a suitable matrix for analyses of PAH metabolites as a measure of PAH exposure.

In 2011, as it has been since 2002, the median concentration of OH-pyrene metabolites in bile from cod were higher in the Inner Oslofjord (st. 30B) compared to samples from the Inner Sørfjord (st. 53B), the Bømlo-Sotra area (reference, st. 23B) and Lista (st. 15B), most likely reflecting the differences in PAH exposure between the areas (see also below). No significant temporal trend could be observed over the last 10 years (***Figure 53***, and Appendix H). Median OH-pyrene bile concentrations were in 2011 above the ICES/OSPAR assessment criterion (background assessment criteria, BAC) at all stations, except Lista (15B). Note that the unit of the assessment criterion is ng/ml, without normalization to absorbance at 380nm. Median transformed (un-normalized) bile concentrations decreased in the order 53B > 30B > 23B > 15B.

PAHs are measured in blue mussel from the Inner Oslofjord (stations 30A, I301, I304, I306, I307). The changes in concentrations in mussels (st. 30A) correlate moderately well to the changes in OH-pyrene in cod from the same area (st. 30B) (***Figure 52***). These results indicate general changes in PAH exposure in this fjord area, since cod and blue mussel apparently experience similar alterations in PAH exposure, despite biological differences. Blue mussel is a sessile, filtering organism in surface water, while cod is mobile, living in deeper part of the fjord and exposed to PAHs both through food and through direct partitioning from water (over respiratory surfaces).

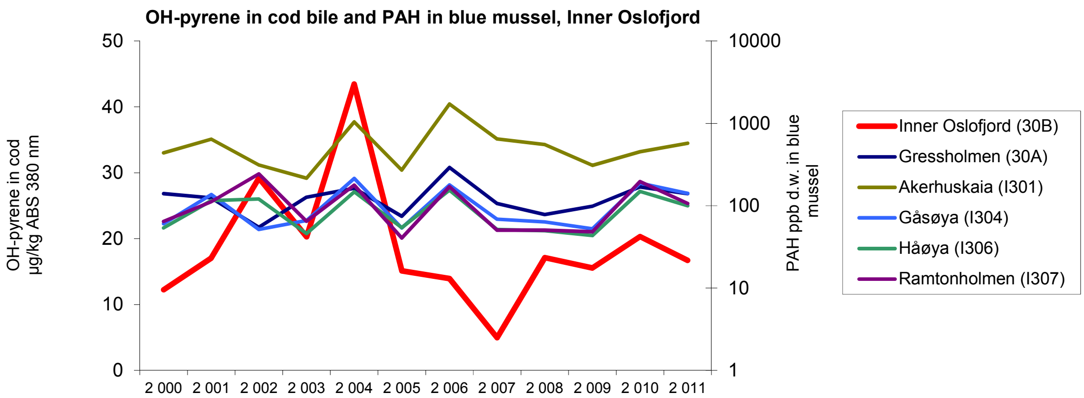


Figure 52. *Changes in median concentration of OH-pyrene (µg/kg ABS 380 nm) in bile from Atlantic cod collected from the Inner Oslofjord (st. 30B Inner Oslofjord; thick red line) and total PAH in blue mussel from the same area.*

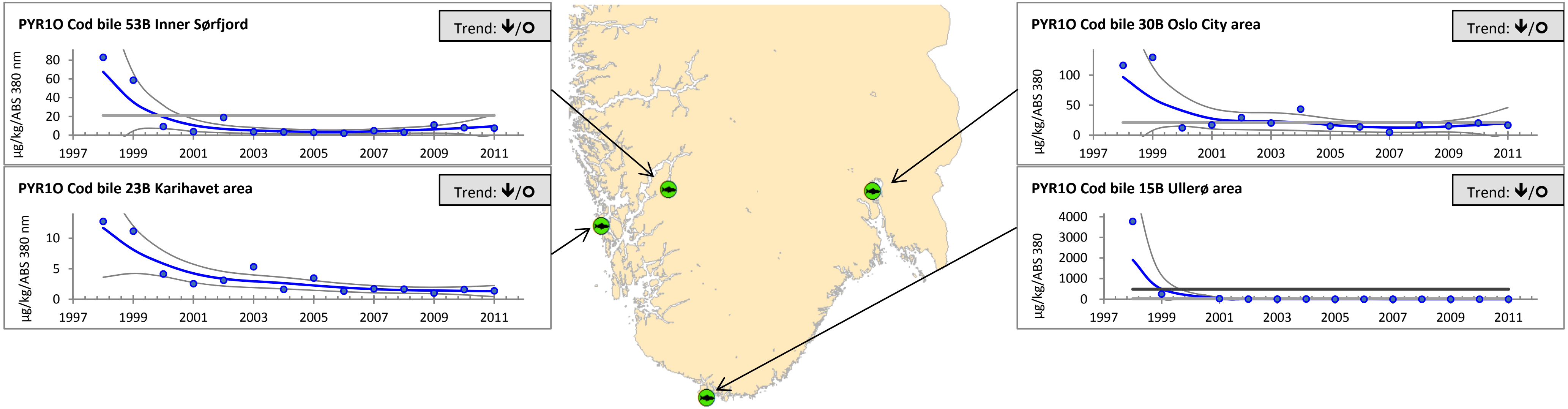


Figure 53. *Median concentration of OH-pyrene (µg/kg ABS 380 nm) in bile from Atlantic cod collected from southern Norway (cf. Appendix H and see otherwise key to detail in Figure 5). There is an OSPAR BAC limit to classify the result from 2011 (**Table 7**).*

ALA-D in blood cells

Inhibited activity of ALA-D indicates the influence of lead contamination. Although ALA-D inhibition is lead-specific, it is not possible to rule out interference by other metals or organic contaminants. Previous studies indicate that zinc may enhance the effect of lead to some extent, but the effect is variable and weak. Other studies have also shown ALA-D to be a remarkably robust biomarker and factors such as sex, age or season does not appear to affect the response.

In 2011, ALA-D activities in the blood of cod from the Inner Oslofjord (st. 30B) and Inner Sørfjord (st. 53B) were lower in the Bømlo-Sotra area (st. 23B). No significant temporal trends could be observed over the last 10 years (Appendix H).

Most years the activity of ALA-D in cod was somewhat inhibited in the Inner Oslofjord (st. 30B) and Inner Sørfjord (st. 53B), compared to reference stations, i.e. Outer Oslofjord (st. 36B; only data to 2001), Karihavet in the Bømlo-Sotra area (st. 23B), and Varangerfjord (st. 10B; only data to 2001, not shown) (***Figure 54***, Appendix H). For the years 1997-2006 and 2009-2011 the median activity of the enzyme in cod from Inner Sørfjord (st. 53B) was generally lower than on the open coast (Karihavet, st. 23B), about 130 km to the west. As mentioned (chapter 3.3), the lower activities of ALA-D in cod from the Inner Oslofjord and Sørfjord compared to the reference station (basis for comparison prior to 2007 and in 2009-2011) indicate the contamination of lead. The highest concentrations of lead in cod liver are observed in the Inner Oslofjord and the Inner Sørfjord, with relatively large individual variation at both sites (***Figure 62***).

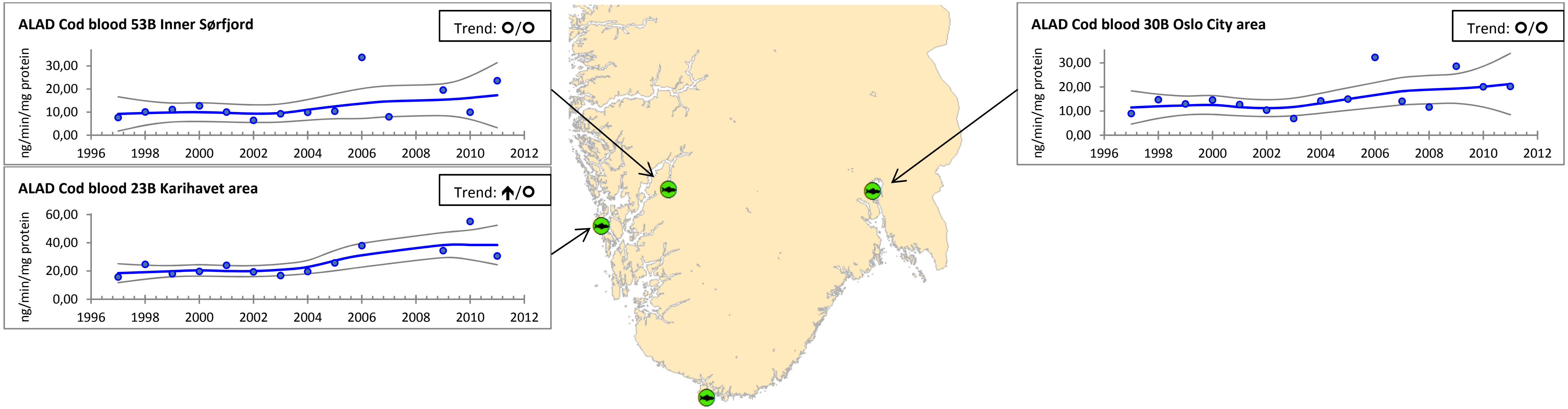


Figure 54. *Median activity of δ-aminolevulinic acid dehydrase (ALA-D, ng PBG/min/mg protein) in red blood cells from Atlantic cod collected from southern Norway (cf. Appendix H and see otherwise key to detail in Figure 5). There is no limit to classify the results from 2011. Note that lower activity means higher exposure and vice versa.*

EROD-activity and amount of CYP1A protein in liver

High activity of hepatic cytochrome P4501A activity (EROD-activity) normally occurs as a response to the contaminants indicated in ***Table 5***. It was expected that higher activity would be found at the stations that were presumed to be most impacted by planar PCBs, PCNs, PAHs or dioxins, i.e. Inner Oslofjord (st. 30B) and Inner Sørfjord (st. 53B/F). In 2011, median EROD-activity in liver of cod from the Inner Oslofjord (30B) was higher than in cod from the Sørfjord (53B) and Karihavet (23B). Since 2000, the median EROD-activity has been higher in the Inner Oslofjord compared to the reference station on the west coast (Karihavet, st. 23B). However, in the Inner Sørfjord EROD activities were not consistently higher than at the reference Karihavet. No significant temporal trends could be observed for EROD in cod liver at any station, and median EROD-activities were below the ICES/OSPAR assessment criterion (background assessment criteria, BAC) at all stations.

No adjustment for water temperature has been made. Fish are sampled at the same time of year (September-November) when differences between the sexes should be at a minimum. Statistical analyses indicate no clear difference in activity between the sexes (Ruus *et al.* 2003). It has been shown that generally higher activity occurs at more contaminated stations (Ruus *et al.* 2003). However, the response is inconsistent (cf. Appendix H), perhaps due to sampling of populations with variable exposure history. Besides, there is evidence from other fish species that continuous exposure to e.g. PCBs may cause adaptation, i.e. decreased EROD-activity response.

CYP1A protein levels in 2011 were also higher in the Inner Oslofjord compared to the Inner Sørfjord (st. 53B) and Karihavet (st. 23B), as was observed for the EROD activities. An explanation could be that the exposure to PCBs is higher in the Inner Oslofjord than in the Sørfjord and Karihavet (***Figure 64***). It was earlier observed, however, that EROD activities apparently were not significantly influenced by a substantial increase in cod liver PCB content (Ruus *et al.* 2006). Berge *et al.* (2012) also found higher values in the Inner Oslofjord compared to the Outer Oslofjord. An explanation (besides the adaptation hypothesis) may be that the inducing effect of specific contaminants may be inhibited by other contaminants present (e.g. dioxins or PAHs). No significant temporal trends in CYP1A protein content could be observed (***Figure 56***).

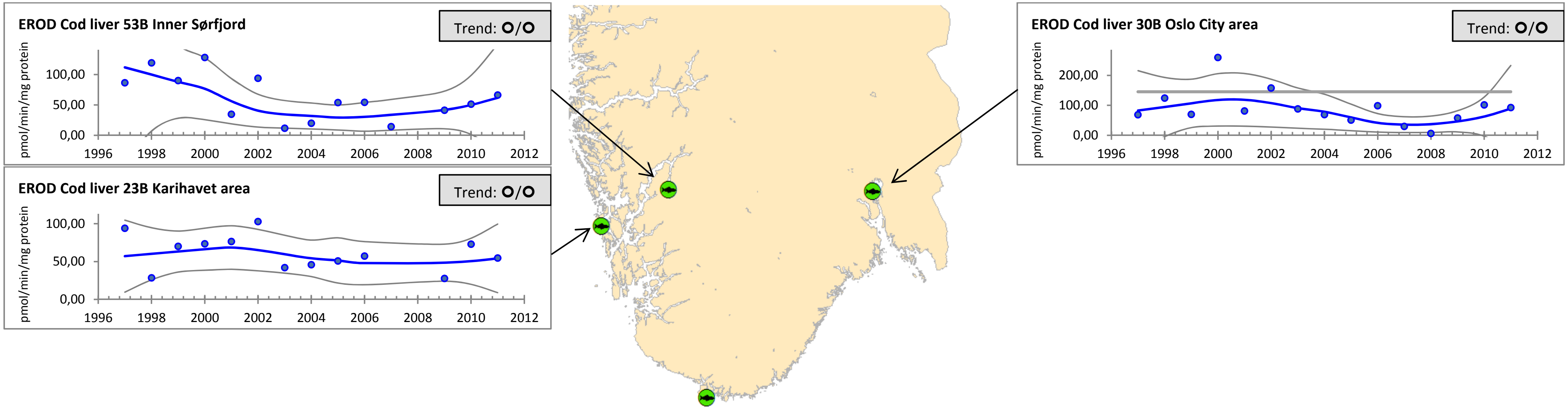


Figure 55. *Median activity of cytochrome P4501A (EROD-activity, pmol/min/mg protein) in liver from Atlantic cod collected from southern Norway (cf. Appendix H and see otherwise key to map and detail in Figure 5). There is an OSPAR BAC limit to classify the results from 2011 (**Table 7**).*

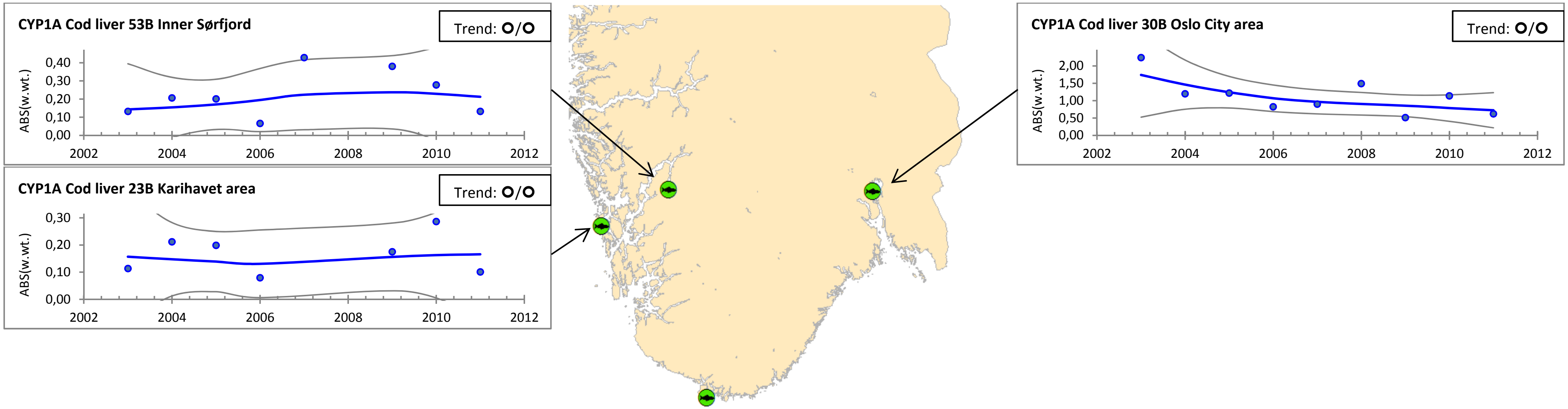


Figure 56. *Median activity of cytochrome CYP1A (relative amount of cytochrome P4501A-protein) in liver from Atlantic cod collected from southern Norway (cf. Appendix H and see otherwise key to map and detail in Figure 5). There is no limit to classify the results from 2011.*

5. Conclusions

The Norwegian contribution to OSPAR's Coordinated Environmental Monitoring Programme (CEMP) includes the monitoring of micropollutants (contaminants) in sediment and marine organisms (blue mussels, snails, prawns and fish). The 2011 investigation monitored blue mussel (38 stations), dog whelk (8 stations), common periwinkle (1 station), cod (11 stations) and flatfish (dab, flounder, plaice, megrim; 8 stations) along the coast of Norway from the Oslofjord and Hvaler region in the southeast to the Varangerfjord in the northeast. The stations are located both in areas with known or presumed point sources of contaminants, in areas of diffuse load of contamination like city areas, and in more remote areas exposed to presumed low and diffuse pollution. The mussel sites include supplementary stations for the Norwegian Index Programme.

The programme includes the monitoring metals, organochlorines, pesticides, dioxins, brominated flame retardants, perfluorinated compounds, as well as biological effects methods. The results from 2011 supplied data to a total of 1035 time series of 30 contaminants or biomarkers. (An additional 90 contaminants, mostly specific compounds associated with contaminant groups like PCBs, PAHs, PBDEs and dioxins, are analysed but not assessed in this report.) Of these, 329 showed statistically significant trends when considering the entire monitoring period. Of these 277 were downwards and 52 upwards. The downward trends were primarily associated with organochlorines (54%) of which lindane and secondarily HCB and PCBs (ΣPCB-7, sum of seven congeners) were most prominent. Metals represented 27% of the downward trends of which lead and secondarily cadmium were most prominent. There was no clear evidence that downward trends were exclusive either to impacted areas (e.g. Oslofjord, Sørfjord/Hardanger, harbours) or to areas remote to point sources. The dominance of downward trends indicates that the levels of contaminants is decreasing.

The 52 upward trends were mainly associated with metals (75%), primarily cadmium and secondarily mercury. Mercury in cod fillet from the Inner Oslofjord was the only case of an upward trend where a 2011-median concentration could be classified as markedly, severely or extremely polluted. Organochlorines represented only 17% of the upward trends, where octachlorstyrene (OCS) was the most prominent. As for the downward trends, there was no clear evidence that upward trends were exclusive either to impacted areas or to areas remote to point sources.

Of the 628 median contaminant concentrations assessed in 2011 that could also be classified by Klifs environmental classification system, 78.5% were classified as insignificantly polluted, 16.9% as moderately polluted, 3.5% as markedly polluted (mostly cadmium, lead, chromium, HCB, PAHs), 0.6% as severely polluted (benzo[a]pyrene, carcinogen-PAHs, ppDDE) and 0.5% as extremely polluted (dioxins). The extremely polluted cases concerned two blue mussel stations in the Grenlandsfjord and here significant downward trends were registered. Cod and blue mussel from the outer parts of western and northern Norway were in general insignificantly polluted.

Concentrations of contaminants in fish
Cod fillet from the Inner Oslofjord was markedly polluted by mercury, which had a significant upward trend for the period 1984-2011. Cod liver from the Inner Oslofjord had median concentrations of lead and cadmium higher than presumed high background, and there was a significant upward trend for cadmium in cod liver from the Inner Oslofjord for the same period. The concentration of mercury in cod fillet from the outer part of the Oslofjord (Færder) had increased slightly since 2009. The fillet was moderately polluted by mercury, but with no significant trend.

Cod liver from the Inner Oslofjord was markedly polluted with polychlorinated biphenyls (PCBs), but showed no significant trend. Cod fillet from the Inner Oslofjord was moderately polluted with PCBs but no significant trend was found.

Cod fillet from the Inner Sørfjord was moderately polluted by mercury. Cod from the Hardangerfjord (Strandebarm) was only insignificantly polluted by mercury. There was a significant upward trend for cadmium and a significant downward trend for lead in cod liver from the Inner Sørfjord for the monitoring period 1986-2011.

Liver and fillet of cod from the Inner Sørfjord were moderately polluted by PCBs. Liver and fillet of cod from the Hardangerfjord were insignificantly polluted by PCBs. There was a significant downward trend for PCBs in cod liver from Strandebarm for the period 1990-2011. Cod liver and fillet from the Inner Sørfjord and Strandebarm was moderately polluted by ppDDE. Cod from Strandebarm showed significant downward trends for ppDDE in both liver for the same period.

Flounder from the Inner Sørfjord had concentration of mercury in the fillet that exceeded presumed high background level, and had a significant upward long-term trend (1988-2011). Flounder from the Inner Sørfjord was insignificantly polluted with PCB in fillet but showed concentrations of PCB in liver that exceeded presumed high background level

Polybrominated diphenyl ethers (PBDEs) and perfluroalkyl compounds (PFCs) have been investigated in cod liver since 2005. In 2011, the concentration of sum PBDE was highest in the Sørfjord and second highest in the Inner Oslofjord, which was opposite of what the results showed in 2010. PBDE was lowest in cod from Lofoten. BDE47 was the dominant PBDE in all samples. PFOS (usually the most abundant PFC) was highest in cod from Færder and lowest in Tromsø harbour. PFOSA (the second most abundant PFC) was highest in the Inner Oslofjord and lowest in Trondheim harbour.

Cod and blue mussel from the outer parts of western and northern Norway were in general insignificantly polluted.

Concentrations of contaminants in blue mussel

Blue mussel from the Hvaler area and the Grenlandsfjord areas were up to moderately polluted by mercury. A significant downward long term trend was observed in the moderately polluted blue mussel from Bjørkøya (Grenlandsfjord). Upward trends were found in blue mussel from the Mid Oslofjord at Solbergstrand and Håøya and the Inner Oslofjord at Akershuskaia, however concentrations in 2011 were low (insignificantly polluted). For cadmium mussels from Gressholmen were moderately polluted and an upward significant trend was found for the period 1984-2011. Moderate concentrations were also found in mussels from Bjørkøy but no significant trend was found.

Blue mussel from Gressholmen, Akershuskaia and Gåsøya in the Inner Oslofjord were moderately polluted by PCBs. There were significant downward trends for PCBs at Gressholmen and Akershuskaia for the whole monitoring period. The other blue mussel stations in the Oslofjord area were insignificantly polluted by PCBs. Blue mussel from the stations in the Grenlandsfjord area were extremely polluted by dioxins. The blue mussel have been severely to extremely polluted by dioxins for the whole monitoring period. Significant downward trends were observed at Bjørkøy and Croftholmen for this period (from 1996 or 2002 to 2011). Mussels from Gressholmen and Risøy were insignificantly polluted by dioxins.

Blue mussel from the stations in the Grenlandsfjord area were extremely polluted by dioxins. The blue mussel have been severely to extremely polluted by dioxins for the whole monitoring period. (1996 to 2011). However, significant downward trends were observed at Bjørkøy and Croftholmen for this period (from 1996 or 2002 to 2011) which indicate an improvement in this area. Mussels from Gressholmen and Risøy were insignificantly polluted by dioxins.

In 2011 the blue mussel from some stations of the Sørfjord were moderately polluted by mercury, cadmium and lead. At these stations a significant downward trend was observe red at Kvalnes and Krossanes for mercury and Eitrheimsneset and Krossanes for cadmium and lead for the whole period (from 1987, 1989 or 1995 to 2011).

Blue mussel from Bjerkenes and Eitrheimsneset in the Inner Sørfjord and Ranaskjær near the mouth of the fjord were moderately to severely polluted with ppDDE. Kvalnes in the Mid Sørfjord had the highest concentrations.

Biological effects
The median concentration of CYP1A protein levels was higher in the Inner Oslofjord compared to the Inner Sørfjord and Karihavet on the west coast, as was observed for the EROD activities. An explanation could be that the exposure to PCBs is higher in the Inner Oslofjord than in the Sørfjord and Karihavet. Since the year 2000, investigations have shown that EROD-activity in fish from the Inner Oslofjord is often higher than presumed cleaner stations. Median EROD-activities were, however, below the ICES/OSPAR assessment criterion (background assessment criteria, BAC) at all stations.

In 2011, the median concentration of OH-pyrene metabolites in bile from cod was higher in the Inner Oslofjord compared to samples from the Inner Sørfjord, the Bømlo-Sotra area and Lista. Changes in concentrations of PAHs measured in blue mussel from the Inner Oslofjord correlate moderately well with alterations in OH-pyrene concentrations in the bile of cod from the same area. Median OH-pyrene bile concentrations were in 2011 above the ICES/OSPAR assessment criterion (BAC) at all stations, except Lista (15B).

Reduced activities of ALA-D, which reflects higher exposure to lead, were shown in the Inner Oslofjord and the Inner Sørfjord, as compared to the Bømlo-Sotra area. This reflects the higher exposure of lead in these areas.

Of the time series investigated for biological effects (imposex) of TBT in dog whelk, seven stations showed significant downward trends. One station (Brashavn in the Varangerfjord) showed little effects and had no significant trend for the entire monitoring period. The effects from TBT were low (VDSI<2) at all stations investigated in 2011, however, 3 stations showed VDSI above the ICES/OSPAR assessment criterion (BAC).

Blue mussel from two stations in the Ranfjord were markedly polluted by PAHs and severely polluted by benzo[a]pyrene (B[a]P). One blue mussel station in the Kristiansandsfjord was markedly polluted with B[a]P.

6. References

Titles translated to English in square brackets [ ] are not official.

2000/60/EC. Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy. [Water Framework Directive]. http://www.europa.eu.int/comm/environment/water/water-framework/index_en.html.

2008/105/EC. Directive 2008/105/EC of the European Parliament and of the Council of 16 December 2008 on environmental quality standards in the field of water policy, amending and subsequently repealing Council Directives 82/176/EEC, 83/513/EEC, 84/156/EEC, 84/491/EEC, 86/491/EEC, 86/280/EEC and amending Directive 2000/60/EC of the European Parliament and of the Council.

2008/56/EC. Directive 2000/56/EC of the European Parliament and of the Council of 17 June 2008 establishing a framework for Community action in the field of marine environmental policy. [Marine Strategy Framework Directive]. http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32008L0056:EN:NOT.

Ahlborg, U.G., 1989. Nordic risk assessment of PCDDs and PCDFs. Chemosphere 19:603-608.

Ahlborg, U.G., Becking G.B., Birnbaum, L.S., Brouwer, A, Derks, H.J.G.M., Feely, M., Golor, G., Hanberg, A., Larsen, J.C., J.C., Liem, A.K.G., Safe, S.H., Schlatter, C., Wärn, F., Younes, M., Yrjänheikki, E., 1994. Toxic equivalency factors for dioxin-like PCBs. Report on a WHO-ECEH and IPSC consultation, December 1993. Chemosphere 28:1049-1067.

ASMO, 1994. Draft assessment of temporal trends monitoring data for 1983-91: Trace metals and organic contaminants in biota. Environmental Assessment and Monitoring Committee (ASMO). Document ASMO(2) 94/6/1.

ASMO, 2007. Summary Record. Environmental Assessment and Monitoring Committee (ASMO). Document ASMO 07/13/1.

Bakke, T., Breedveld, G., Källqvist,T., Oen, A., Eek, E., Ruus, A., Kibsgaard, A., Helland, A., Hylland, K. 2007a.Veileder for klassifisering av miljøkvalitet i fjorder og kystvann. Revidering av klassifisering av metaller og organiske miljøgifter i vann og sedimenter. SFT TA 2229/2007. Statens Forurensningstilsyn, Oslo. 12pp. ISBN 978-82-7655-537-0.

Bakke, T., Fjeld, E., Skaare, B.B., Berge, J.A, Green, N., Ruus, A., Schlabach, M., Botnen, H. 2007b. *Kartlegging av metaller og utvalgte nye organiske miljøgifter 2007. Krom, arsen, perfluoralkylstoffer, dikoretan, klorbenzener, pentaklorfenol, HCBD og DEHP.* [Mapping of metals and selected new organic contaminants 2006. Chromium, Arsenic, Perfluorated substances, Dichloroethane, Chlorinated benzenes, Pentachlorophenol, HCBD and DEHP.] Norwegian Pollution Control Authority (SFT) report no. 990/2007 (TA-2284/2007). NIVA report no. 5464-2007. 105pp. + annexes. ISBN 978-82-577-5199-9.

Bakke, T., Ruus, A., Bjerkeng, B., Knutzen, J.A:, Schlabach, M., 2007c. *Overvåking av miljøgifter i fisk og skalldyr fra Grenlandsfjordene 2006* [Monitoring of contaminants in fish and shellfish from Grenland fjords 2006]. Norwegian Pollution Control Authority (SFT) report no. 998/2007 (TA-2319/2007). NIVA project no. O-24177, report no. 5504-2007. 93pp. ISBN no. 978-82-577-5239-2.

Bakke, T., Ruus, A., Bjerkeng, B., Knutsen, J.A. (HI). 2009. Overvåking av miljøgifter i fisk og skalldyr fra Grenlandsfjorden 2007. Monitoring of contaminants in fish and shellfish from Grenlandsfjordene 2007. NIVA report no. 5707-2009. 80pp. ISBN 978-82-577-5442-6.

Bakke, T., Ruus, A., Bjerkeng, B., Knutsen, J. A. 2010. Monitoring of contaminants in fish and shellfish from Grenlandsfjordene 2009. NIVA report no 5981-2010. Klif report TA-2670/2009.

Bakke, T., Ruus, A., Bjerkeng, B., Knutsen, H. 2011. Monitoring of contaminants in fish and shellfish from the Grenland fjords, 2010. Klif report TA-2836/2011. NIVA report no. 6201-2011. 65 pp. ISBN no. 978-82-577-5939-4.

Berge, J. 2009. Oppsummering av overvåkingsdata-Analyse av fisk fra Frognerkilen og Bekkelagsbassenget 2006/2007. O-28177. Notat 23.04.2009.

Berge, J. A. 2011. *Mudring og deponeringen i Oslo Havn-Langsiktig overvåking av miljøgifter i blåskjell, reker og fisk-2009/2010.* Dredging and deposition in Oslo harbour-Long term monitoring of contaminants in blue mussels, shrimps and fish-2009/2010. O-27476/O-10194. NIVA report 6137. 88pp. ISBN no. 978-82-577-5872-1.

Berge, J. 2011. Mudring og deponeringen i Oslo Havn-Langsiktig overvåking av miljøgifter i blåskjell, reker og fisk-2009/2010 [Dredging and deposition in Oslo harbour-Long term monitoring of contaminants in ble mussels, shripms and fish 2009/2010]. Klif-report TA-2770/2011. NIVA project no. O-27476, O-10194. NIVA report no. 6137-2011. 88 pp. ISBN no. 978-82-577-5872-1.

Berge, J., Schlabach, M., Fagerhaug, A., Rønneberg, J.E., 2006. *Kartlegging av utvalgte miljøgifter i Åsefjorden og omkringliggende områder. Bromerte flammehemmere, klororganiske forbindelser, kvikksølv og tribromanisol.* [Screening of selected contaminants in Åsefjord and vicinity. Brominated flame retardants2004. Brominated flame retardants, organic compounds, mercury and tribromanisol. Norwegian Pollution Control Authority (SFT) report no. 946/2006 (TA-2146/2006). NIVA report no. 5132-2006. 73pp. + annexes. ISBN 978-82-577-4843-9.

Berge, J., Schøyen, M., Øxnevad, S. 2009. Supplerende tiltaksovervåking i indre Oslofjord-miljøgifter i blåskjell. Årsrapport 2008. Norwegian Pollution Control Authority (SFT) report no. 2536/2009. NIVA report no. 5827-2009. 35pp. ISBN 978-82-577-5562-1.

Berge, J., Amundsen, R., Bergland, K., Bjerkeng, B., Gitmark, J., Gjørsæter, J., Holt, T.H., Hylland, K., Johnsen, T.M., Knutsen, H., Kroglund, T., Olsen, E.M., Paulsen, Ø., Ledang, A.B., Lomsland, E.R., Magnusson, J., Rohrlack, T., Sørsensen, K., 2012. Overvåking av Indre Oslofjord i 2011 – Vedleggsrapport. NIVA project no. O-11052. NIVA report no. 6372-2012. 153 pp. ISBN no. 978-82-577-6107-3.

Bjerkeng, B., Green, N. W., 1994. Shell length and metal concentrations in mussels (Mytilus edulis). Report of the Working Group on Statistical Aspects of Environmental Monitoring, St. Johns 26-29, April 1994. International Council for the Exploration of the Sea. C.M. 1994 ENV:6 Annex 11.

Bjerkeng, B., Green, N.W., Hylland, K. 1998. Sørfjorden, western Norway: as case for testing alternative monitoring strategies using accumulation in and effects on Atlantic cod (Gadus morhua). Paper presented at ICES 1998 Annual Scientific Conference –ASC 1998 CM 1998/P:2

Botnen, H., Johansen, P. 2006. Kartlegging av DDT-nivået langs Sørfjorden i Hardanger-2006. Høyteknologisenteret, Department of Biology, University of Bergen. Project no 408165. Report no 10/2006. 31pp.

De Wit, H.A., Mulder, J., hindar, A., Hole, L. 2007. Log-term increase in dissolved organic carbon in streamwaters in Norway is response to reduced acid deposition. Environmental Science and Technology 41, 7706-7713.

Ding, J.Y., Wu., S.C. 1997. Transport of organochlorine pesticides in soil columns enhanced by dissolved organic carbon. Water Science and technology 35, 139-145.

Enger, B., Frøslie, A., Kirkerud, L., Knutzen, J., Madsen, L., Martinsen, K., Norheim, G., 1984. Overvåking av PCB, kvikksølv og kadmium i sjøvannsmiljø. Oslofjordområdet 1981-82. [Investigations of PCB, mercury and cadmium in the marine environment. Oslofjord area 1981-82.] Norwegian Pollution Control Authority, Monitoring report no. 119/84. Norwegian Institute for Water Research project 80106, report number 1583, 24 pp.. ISBN number 82-577-0736-8.

Enger, B., Håstein, T., Kirkerud, L., Martinsen, K., Norheim, G., 1985. Overvåking av PCB, kvikksølv og kadmium i sjøvannsmiljø. Oslofjordområdet 1982-83. SFT overvåkingsrapport nr. 183/85. NIVA O-80106 (løpenummer 1717), 24 sider. [Investigations of PCB, mercury and cadmium in the marine environment. Oslofjord area 1982-83.] Norwegian Pollution Control Authority, Monitoring report no. 183/85. Norwegian Institute for Water Research project 80106, report number 1717, 24 pp.. ISBN number 82-577-0905-0.

Fjeld, E., Rognerud, S. 2009. Miljøgiffter i ferskvannsfisk, 2008. Kvikksølv i abbor og organiske miljøgifter i ørret. NIVA report no. 5851-2009. 66pp. ISBN 978-82-577-5586-7.

Fjeld, E., Schlabach, M., Berge, J.A., Green, N., Egge, T., Snilsberg, P., Vogelsang, C., Rognerud, S., Kãllberg, G., Enge, E.K., Borge, A., Gundersen, H., 2005. *Kartlegging av utvalgte nye organiske miljøgifter 2004. Bromerte flammehemmere, perfluorerte forbindelser, irgarol, diuron, BHT og dicofol*. Screening of selected new organic contaminants 2004. Brominated flame retardants, perfluorinated compounds, irgarol, diuron, BHT and dicofol. Norwegian Pollution Control Authority (SFT) report no. 927/2005 (TA-2096/2005). NIVA report no. 5011-2005. 97pp + annexes. ISBN 978-82-577-4710-6.

Fjeld, E., Enge, E. K., Rustadbakken, A. Løvik, J. E., Rognerud, S. 2011. Environmental contaminants in fish and zooplankton from Lake Mjøsa, 2010. Monitoring report 1087/2011 TA no. 2774/2011. Norwegian Institute for Water Research project 11003. Report no. 6141-2011. 62 pp. ISBN no. 987-82-577-5876-9.

Fjeld, E., Enge, E. K., Rognerud, S., Rustadbakken, A. Løvik, J. E. 2012. Environmental contaminants in fish and zooplankton from Lake Mjøsa, 2011. Monitoring report 1115/2012 TA no. 2889/2012. Norwegian Institute for Water Research project 12003. Report no. 6357-2012. 63 pp. ISBN no. 987-82-577-6092-2.

Følsvik, N., Berge J.A., Brevik E.M., Walday, M. 1999. Quantification of organotin compounds and determination of Imposex in populations of dog whelk (*Nucella lapillus*) from Norway. *Chemosphere*. 38 (3): 681-691.

Fryer, R., Nicholson, M., 1999. Using smoother for comprehensive assessments of contaminant time series in marine biota. ICES Jounral of Marine Science, 56: 779-790.

Gibbs, P.E., Bryan, G.W., Pascoe, P.L., Burt, G.R., 1987. The use of the Dog-whelk, *Nucella lapillus*, as an indicator of tributyltin (TBT) contamination. J. mar. biol. Ass. U.K. (1987), 67:507-523.

Gitmark, J., Green, N., Beylich, B., Høgåsen, T. 2012. Overvåking NOAH Langøya 2011. Miljøgifter i blåskjell, sedimentundersøkelser samt marinbiologiske registreringer. NIVA-rapport L. nr. 6306-2012. 74 s. ISBN 978-82-577-6041-0.

Green, N.W., 1987. "Joint Monitoring Group" (JMG). Felles monitoring program i Norge: Oslofjord-området, Sørfjorden og Hardangerfjorden, og Orkdalsfjorden. Programforslag for 1988. 4.Dec.1987. NIVA-project 80106, 12 pp.

Green, N.W., 1988. Felles europeisk overvåkingsprogram (JMP) i Norge. Overvåking av miljøgifter i sjøvannsmiljø. Oslofjord- området, Sørfjorden, Hardangerfjorden og Orkdalsfjord- området 1984-1985. NIVA project 80106, report number 2139. 76 pp.

Green, N.W., 1989. The effect of depuration on mussels analyses. Report of the 1989 meeting of the working group on statistical aspects of trend monitoring. The Hague, 24-27 April 1989. ICES-report C.M.1989/E:13 Annex 6:52-58.

Green, N.W., 1991. Joint Monitoring Programme. National Comments to the Norwegian Data for 1989. Norwegian Institute for Water Research (NIVA) memo 27pp. JMG 16/info 13-E.

Green, N.W., 1992. Joint Monitoring Programme (JMP) and North Sea Task Force - Master Monitoring Plan (NSTF/MMP) (contaminants only) National comments to the Norwegian Data for 1990, with special emphasis on contaminants in biota. NIVA project 80106, report 18.01.92 65pp. (Also as document JMG 17/3/18.).

Green, N.W., 1993a. Joint Monitoring Programme (JMP) National comments to the Norwegian Data for 1991. NIVA project 80106, report 22.01.93 74. (Also as document JMG 18/3/8-E(L).).

Green, N.W., 1993b. Joint Monitoring Programme - JMP. Overview of analytical methods employed by JMP in Norway 1981-1992. Norwegian Institute for Water Research. Project O-80106 report number 2971, 41 pp.. ISBN number 82-577-2390-8.

Green, N.W., 1994. Joint Monitoring Programme (JMP) National comments to the Norwegian Data for 1992. NIVA project 80106, report 18.01.94 85s.. (Also as document JMG 19/7/4-E(L).).

Green, N.W., 1995a. Joint Monitoring Programme (JMP) National comments to the Norwegian Data for 1993. NIVA project 80106, report 5.01.95 123s.. (Also as document SIME 95/6/1).

Green, N.W., 1995b. Joint Monitoring Programme (JMP) National comments to the Norwegian Data for 1994. NIVA project 80106, report 25.12.95 109.. (Also as document SIME 96/19/1).

Green, N.W., 1997a. Joint Assessment and Monitoring Programme (JAMP) National Comments to the Norwegian Data for 1995. Norwegian Pollution Control Authority, Monitoring report no. 685/97 TA no. 1405/1997. Norwegian Institute for Water Research project 80106, report number 3597-97, 124 pp.. ISBN number 82-577-3152-8. (Also as document SIME 97/5/5).

Green, N.W., 1997b. Joint Assessment and Monitoring Programme (JAMP) National Comments to the Norwegian Data for 1996. Norwegian Pollution Control Authority, Monitoring report no. 716/97 TA no. 1489/1997. Norwegian Institute for Water Research project 80106, report number 3730-97, 129 pp.. ISBN number 82-577-3299-0. (Also as document SIME (2) 97/3/16 Add.1).

Green, N. W, Klungsøyr, J. (HI), 1994. Norwegian 1990 sedimentdata for the North Sea Task Force (NSTF) and the Joint Monitoring Group (JMG). Norsk institutt for vannforskning (NIVA), report no. 3110-1994; 145 s. ISBN 82-577-2585-4.

Green, N.W., Knutzen, J., 1994. Miljøgiftsundersøkelse i indre Oslofjord. Delrapport nr. 2. Miljøgifter i organismer 1992 [Contaminants in the inner Oslofjord. Sub-report no.2. Contaminants in organisms 1992]. Norwegian Pollution Control Authority, Monitoring report no. 541/93 TA no. 1002/1994. Norwegian Institute for Water Research project 921315, report number 2972, 54 pp.. ISBN number 82-577-2401-7.

Green, N.W., Knutzen, J., 2001. Joint Assessment and Monitoring Programme (JAMP). Forurensnings- og referanseindeks basert på observasjoner av miljøgifter i blåskjell fra utvalgte områder 1995-1999.[Joint Assessment and Monitoring Programme (JAMP). Pollution and reference indicies based on contaminants in blue mussel 1995-1999]. Norwegian Pollution Control Authority, Monitoring report no. 821/01 TA no. 1799/2001. NIVA project O-80106, (report no. 4342-2001) 35 pp. ISBN no. 82-577-3977-4.

Green, N.W., Knutzen, J., 2003. Organohalogens and metals in marine fish and mussels and some relationships to biological variables at reference localities in Norway. *Marine Pollution Bulletin* 46(3):362-374.

Green, N.W., Nicholson M., 1996. Proposal for Voluntary International Contaminant-monitoring (VIC) for Temporal Trends to Compare Sampling Strategies for a Cooperative Revision of Guidelines 1998. Report of the 1996 meeting of the Working Group on the Statistical Aspects of Environmental Monitoring. Stockholm 18-22 March 1996. Annex 10: 89-91.

Green, N.W., Ruus, 2008. Joint Assessment and Monitoring Programme (JAMP). *Overvåking av miljøgifter i marine sedimenter og organismer 1981-2006.* Norwegian Pollution Control Authority, Monitoring report no. 1018/2008 TA no. 2372/2008. Norwegian Institute for Water Research projects 80106, 25106, 26106, and 27106 and report no. 5565-2008, 93 pp. ISBN no. 978- 82-577-5300-9.

Green, N.W., Rønningen, A., 1994. Contaminants in shellfish and fish. 1981-92. Joint Monitoring Programme (JMP) Norwegian biota data. Norwegian Pollution Control Authority, Monitoring report no. 585/94 TA no. 1156/1994. NIVA project O-80106/, (report number 3175), 351 pp.. ISBN number 82-577-2656-7.

Green, N.W., Rønningen, A., 1995. Contaminants in sediment 1986-92. The Joint Monitoring Programme (JMP) NIVA samples. Norwegian biota data. Norwegian Pollution Control Authority, Monitoring report no. 599/95 TA no. 1180/1995. NIVA project O-80106/, (report number 3192), 97 pp.. ISBN number 82-577-2679-6.

Green, N.W., Severinsen, G., 1999a. Joint Monitoring and Assessment Programme (JAMP). Contaminants in shellfish. 1993-1997. Norwegian biota data. Norwegian Pollution Control Authority, Monitoring report no. 775/99 TA no. 1667/1999. NIVA project O-80106, (report no. 4083-99), 206 pp. ISBN no. 82-577-3689-9.

Green, N.W., Severinsen, G., 1999b. Joint Monitoring and Assessment Programme (JAMP). Contaminants in fish. 1993-1997. Norwegian biota data. Norwegian Pollution Control Authority, Monitoring report no. 776/99 TA no. 1668/1999. NIVA project O-80106, (report no. 4084-99), 393 pp. ISBN no. 82-577-3690-2.

Green, N.W., Knutzen, J., Helland, A., Brevik, E.M., 1995. Overvåking av miljøgifter i sedimenter og organismer 1981-92. "Joint Monitoring Programme (JMP)". Statlig program for forurensningsovervåking rapport nr. 593/95 TA nr. 1172/1995 NIVA-rapport O-80106 (l.nr. 3184), 195 s. ISBN 978-82-577-2676-1.

Green, N.W., Bjerkeng B., Berge J.A., 1996. Depuration (12h) of metals, PCB and PAH concentrations by blue mussel (*Mytilus edulis*). Report of the Working Group on the Statistical Aspects of Environmental Monitoring. Stockholm 18-22 March 1996. ICES C.M.1996/D:1 Annex 13:108-117.

Green, N.W., Berge, J.A, Helland, A., Hylland, K., Knutzen, J., Walday, M., 1999. Joint Assessment and Monitoring Programme (JAMP) National Comments regarding the Norwegian Data for 1997. Norwegian Pollution Control Authority, Monitoring report no. 752/99 TA no. 1611/1999. Norwegian Institute for Water Research project 80106, report no. 3980-99, 129 pp. ISBN no. 82-577-3576-0. (Also presented as SIME document (1999)).

Green, N.W., Bjerkeng, B, Helland, A., Hylland, K., Knutzen, J., Walday, M., 2000. Joint Assessment and Monitoring Programme (JAMP) National Comments regarding the Norwegian Data for 1998 and supplementary investigations on cod (1996) and sediment (1996-1997). Norwegian Pollution Control Authority, Monitoring report no. 788/00 TA no. 1702/2000. Norwegian Institute for Water Research project 80106, report number 4171-2000, 206 pp.. ISBN number 82-577-3787-9. (Also presented as SIME 2000 document 00/3/6).

Green, N.W., Bjerkeng, B, Helland, A., Hylland, K., Knutzen, J., Walday, M., 2000. Joint Assessment and Monitoring Programme (JAMP) National Comments regarding the Norwegian Data for 1998 and supplementary investigations on cod (1996) and sediment (1996-1997). Norwegian Pollution Control Authority, Monitoring report no. 788/00 TA no. 1702/2000. Norwegian Institute for Water Research project 80106, report no. 4171-2000, 206 pp. ISBN no. 82-577-3787-9. (Also presented as SIME 2000 document 00/3/6).

Green, N.W., Hylland, K., Walday, M., 2001a. Joint Assessment and Monitoring Programme (JAMP). National Comments regarding the Norwegian Data for 1999. Norwegian Pollution Control Authority, Monitoring report no. 812/01 TA no. 1780/2001. Norwegian Institute for Water Research project 80106, report no. 4335-2001, 181 pp. ISBN no. 82-577-3969-3. (Also presented as SIME 2001 document 01/3/info. 4).

Green, N.W., Følsvik, N., Oredalen, T.J., Prestbakmo, G., 2001b. Joint Assessment and Monitoring Programme (JAMP). Overview of analytical methods 1981-2000. Norwegian Pollution Control Authority, Monitoring report no.822/01 TA no. 1800/2001. Norwegian Institute for Water Research project 80106, report no. 4353-2001, 68 pp. ISBN no. 82-577-3989-8.

Green, N.W., Helland, A., Hylland, K., Knutzen, J., Walday, M., 2001c. *Joint Assessment and Monitoring Programme* (JAMP). Overvåking av miljøgifter i marine sedimenter og organismer 1981-1999 [Joint Assessment and Monitoring Programme (JAMP). Investigations in marine sediment and organisms 1981-1999. Norwegian Pollution Control Authority, Monitoring report no. 819/01 TA no. 1797/2001. NIVA project O-80106, (report no. 4358) 191 pp. ISBN no. 82-577-3995-2.

Green, N.W., Hylland, K., Ruus, A., Walday, M., 2002a. Joint Assessment and Monitoring Programme (JAMP). National Comments regarding the Norwegian Data for 2000. Norwegian Pollution Control Authority, Monitoring report no. 842/02 TA no. 1854/2002. Norwegian Institute for Water Research project 80106, report no. 4468-2002, 197 pp. ISBN no. 82-577-4115-9. (Also presented as SIME 2002 document 02/2/info. 2).

Green, N.W., Severinsen G., Rogne, Å.K., 2002b. Joint Assessment and Monitoring Programme (JAMP). Contaminant data for sediments 1986-1997. Norwegian Pollution Control Authority, Monitoring report no. 861/02 TA no. 1918/2002. Norwegian Institute for Water Research project 80106, report no. 4599-2002, 230 pp. ISBN no. 82-577-4259-7.

Green, N.W., Severinsen G., Rogne, Å.K., 2002c. Joint Assessment and Monitoring Programme (JAMP). Contaminant data for shellfish 1998-2001. Norwegian Pollution Control Authority, Monitoring report no. 862/02 TA no. 1919/2002. Norwegian Institute for Water Research project 80106, report no. 4600-2002, 269 pp. ISBN no. 82-577-4260-0.

Green, N.W., Severinsen G., Rogne, Å.K., 2002d. Joint Assessment and Monitoring Programme (JAMP). Contaminant data for fish 1998-2001. Norwegian Pollution Control Authority, Monitoring report no. 863/02 TA no. 1920/2002. Norwegian Institute for Water Research project 80106, report no. 4601-2002, 336 pp. ISBN no. 82-577-4261-9.

Green, N.W., Severinsen G., Rogne, Å.K., 2002e. Joint Assessment and Monitoring Programme (JAMP). Summary statistics for contaminants in shellfish and fish 1981-2001. Norwegian Pollution Control Authority, Monitoring report no. 864/02 TA no. 1921/2002. Norwegian Institute for Water Research project 80106, report no. 4602-2002, 422 pp. ISBN no. 82-577-4262-7.

Green, N.W., Hylland, K., Ruus, A., Walday, M., 2003. Joint Assessment and Monitoring Programme (JAMP). National Comments regarding the Norwegian Data for 2001. Norwegian Pollution Control Authority, Monitoring report no. 867/02 TA no. 1926/2002. Norwegian Institute for Water Research project 80106, report no. 4618-2002, 217 pp. ISBN no. 82-577-4279-1.

Green, N.W., Hylland, K., Ruus, A., Walday, M., 2004a. Joint Assessment and Monitoring Programme (JAMP). National Comments regarding the Norwegian Data for 2002. Norwegian Pollution Control Authority, Monitoring report no. 894/2003 TA no. 2003/2003. Norwegian Institute for Water Research project 80106, report no. 4778-2004, 223 pp. ISBN no. 82-577-4454-9. Also as Trends and Effects of Substances in the Marine Environment (SIME) London (Secretariat) 24-26 Febraury 2004. SIME 04/02/info. 4 -E.

Green, N.W., Ruus, A., Walday, M., 2004b. Joint Assessment and Monitoring Programme (JAMP). National Comments regarding the Norwegian Data for 2003. Norwegian Pollution Control Authority, Monitoring report no. 921/2004 TA no. 2072/2004. Norwegian Institute for Water Research project 80106, report no. 4927-2004, 219 pp. ISBN no. 82-577-4618-5. Also as Trends and Effects of Substances in the Marine Environment (SIME) Vigo (Spain) 15-17 Mars 2005. SIME 05/02/info. 7-E.

Green, N.W., Ruus, A., Schøyen, M., Tveiten, L., Walday, M., 2005. Joint Assessment and Monitoring Programme (JAMP). National Comments regarding the Norwegian Data for 2004. Norwegian Pollution Control Authority, Monitoring report no. 944/2005 TA no. 2141/2005. Norwegian Institute for Water Research projects 80106 and 25106 report no. 5112-2005, 235 pp. ISBN no. 82-577-4822-6. Also as Trends and Effects of Substances in the Marine Environment (SIME) London (UK) 21-23 February 2006. SIME 06/02/07-E.

Green, N.W., Ruus, A., Bakketun, Å., Håvardstun, J., Rogne, Å.G., Schøyen, M., Tveiten, L., Øxenvad, S., 2007. Joint Assessment and Monitoring Programme (JAMP). National Comments regarding the Norwegian Data for 2005. Norwegian Pollution Control Authority, Monitoring report no. 974/2006 TA no. 2214/2006. Norwegian Institute for Water Research projects 80106, 25106, and 26106 and report no. 5315-2006, 191 pp. ISBN no. 82-577-5047-6. Also as Trends and Effects of Substances in the Marine Environment (SIME), Hamburg 6-8 March 2007. SIME 07/02/Info.3-E.

Green, N.W., Dahl, I., Kringstad, A., og Schlabach, 2008a. Joint Assessment and Monitoring Programme (JAMP). Overview of analytical methods 1981-2007. Norwegian Pollution Control Authority, Monitoring report no.1016/2008 TA no. 2370/2007. NIVA-rapport 5563-2008, 96 pp. ISBN no. 978-82-577-5298-9.

Green, N.W., Ruus, A., Bjerkeng, B., Håvardstun, Schøyen, M., Shi. L., Tveiten, L., Øxenvad, S., 2008b. Joint Assessment and Monitoring Programme (JAMP). National Comments regarding the Norwegian Data for 2006. Norwegian Pollution Control Authority, Monitoring report no. 1017/2008 TA no. 2371/2008. Norwegian Institute for Water Research projects 80106, 26106, and 27106 and report no. 5564-2008, 231 pp. ISBN no. 978- 82-577-5299-6. Also (extract) as Trends and Effects of Substances in the Marine Environment (SIME), Edinburgh, 11-13 March 2008. SIME 08/03/Info.3-E.

Green, N.W., Ruus, A., Bjerkeng, B., Brevik, E.M., Håvardstun, J., Mills, A., Rogne, Å.G., Schøyen, M., Shi, L., Tveiten, L., Øxnevad, S. 2009. Coordinated environmental monitoring programme (CEMP). Levels, trends and effects of hazardous substances in fjords and coastal waters-2007. Norwegian Pollution Control Authority, Monitoring report no. 1040/2008 TA no. 2454/2008. Norwegian Institute for Water Research projects 80106, 26106, 27106 and 28106 and report no. 5694-2008, 213 pp. ISBN no. 978- 82-577-5429-7.

Green, N.W., Schøyen, M., Øxnevad, S., Ruus, A., Høgåsen, T., Håvardstun, J., Rogne, Å.G., Tveiten, L., 2010a. Coordinated environmental monitoring programme (CEMP). Levels, trends and effects of hazardous substances in fjords and coastal waters-2008. Norwegian Pollution Control Authority, Monitoring report no. 1062/2010 TA no. 2566/2010. Norwegian Institute for Water Research project 10106 and report no. 5867-2010, 303 pp. ISBN no. 978- 82-577-5602-4.

Green, N.W., Schøyen, M., Øxnevad, S., Ruus, A., Høgåsen, T., Beylich, B., Håvardstun, J., Rogne, Å.G., Tveiten, L., 2010b. Coordinated environmental monitoring programme (CEMP). Levels, trends and effects of hazardous substances in fjords and coastal waters-2009. Norwegian Pollution Control Authority, Monitoring report no. 1079/2010 TA no. 2716/2010. Norwegian Institute for Water Research project 10106 and report no. 6048-2010, 287 pp. ISBN no. 978- 82-577-5783-0.

Green, N.W., Schøyen, M., Øxnevad, S., Ruus, A., Høgåsen, T., Beylich, B., Håvardstun, J., Rogne, Å.G., Tveiten, L., 2011a. Coordinated environmental monitoring programme (CEMP). Levels, trends and effects of hazardous substances in fjords and coastal waters-2010. Norwegian Pollution Control Authority, Monitoring report no. 1111/2011 TA no. 2862/2011. Norwegian Institute for Water Research project 11106 and report no. 6239-2011, 252 pp. ISBN no. 978- 82-577-5974-2.

Green, N.W., Heldal, H.E., Måge, A., Aas, W., Gäfvert, T., Schrum, C., Boitsov, S., Breivik, K., Iosjpe, M, Yakushev, K., Skogen, M., Høgåsen, T., Eckhardt, S., Christiansen, A.B., Daae, K.L., Durand D., Debloskaya, E., 2011b. Tilførselsprogrammet 2010. Overvåking av tilførsler og miljøtilstand i Nordsjøen. Klima og forurensningsdirektoratet (Klif) Rapport TA 2810/2011. Norsk institutt for vannforskning (NIVA) rapport nr. 6187-2011. 251 pp. ISBN 978-82-577-5922-3.

Green, N.W., Heldal, H.E., Måge, A., Aas, W., Gäfvert, T., Schrum, C., Boitsov, S., Breivik, K., Iosjpe, M, Yakushev, K., Skogen, M., Høgåsen, T., Eckhardt, S., Christiansen, A.B., Daae, K.L., Durand D., Ledang, A.B., Jaccard, P.F., 2012. Tilførselsprogrammet 2011. Overvåking av tilførsler og miljøtilstand i Norskehavet. Klima og forurensningsdirektoratet (Klif) Rapport TA 2935/2012. Norsk institutt for vannforskning (NIVA) rapport nr. 6360-2012. 251 pp. ISBN 978-82-577-6095-3.

Harding M.J.C., Bailey S.K. & I.M. Davies. 1992. TBT Imposex survey of the North Sea. Annex 7:Norway. Scottish Fisheries working paper No 10/92 (1992).

Hylland, K., Ruus, A., Grung, M., Green N. 2009. Relationships between physiology, tissue contaminants, and biomarker responses in Atlantic Cod (*Gadus morhua* L.). *Journal of Toxicology and Environmental Health-Part A*, 72:226-233.

IARC, 1987. IARC [International Agency for Research on Cancer] monographs on the evaluation of the carcinogenic risk of chemicals to humans. Overall evaluations of carcinogenicity: an updating of IARC monographs. Vol., 1-42. Suppl. 7. Lyon.

ICES, 1986. Interim reporting format for contaminants in fish and shellfish, JMP-version. ICES, May 1986.

ICES, 1988. Results of 1985 baseline study of contaminants in fish and shellfish. ICES Cooperative Research Report no. 151, 366 pp.

ICES, 1989. Statistical analysis of the ICES Cooperative Monitoring Programme data on contaminants in fish muscle tissue (1978.1985) for determination of temporal trends. ICES Cooperative Research Report no. 162, 147 pp.

ICES, 1991. Statistical analysis of the ICES Cooperative Monitoring Programme data on contaminants in fish liver tissue and *Mytilus edulis* (1978.1988) for determination of temporal trends. ICES Cooperative Research Report no. 176, 189 pp.

ICES, 1992. ICES Environmental data reporting formats, Version 2.1-January 1992.

ICES, 1996. ICES Environmental Data Reporting Formats. Version 2.2, revision 2-July 1996.

ICES. 2011. Report of the Study Group on Integrated Monitoring of Contaminants and Biological Effects (SGIMC), 14–18 March 2011, Copenhagen, Denmark. ICES CM 2011/ACOM:30. 265 pp.

ICES TIMES 13. Galgani, F., and Payne, J.F. 1991. Biological effects of contaminants: microplate method for measurement of ethoxyresorufin-O-deethylase (EROD) in fish. 11 pp.

ICES TIMES 23. Stagg, R., and McIntosh, A. 1998. Biological effects of contaminants: Determination of CYP1A-dependent mono-oxygenase activity in dab by fluorimetric measurement of EROD activity. 16 pp..

ICES TIMES 24. Gibbs, P.E. 1999. Biological effects of contaminants: Use of imposex in the dog whelk, (*Nucella lapillus*) as a bioindicator of tributyltin (TBT) pollution. 29 pp.

ICES TIMES 34. Hylland, K. 2004. Biological effects of contaminants: Quantification of d-aminolevulinic acid dehydratase (ALA-D) activity in fish blood. ICES Techniques in Marine Environmental Sciences. 9pp.

JMG, 1992. Results of the 1990 supplementary baseline study of contaminants in fish and shellfish. Seventeenth Meeting of the Joint Monitoring Group. Uppsala: 20-24 January 1992. JMG 17/3/13-E. 25pp. plus appendices.

JMG, 1993. Oslo and Paris Conventions for the Prevention of Marine Pollution,. Eighteenth Meeting of the Joint Monitoring Group. The Hague: 25-29 January 1993. Draft report on the results of the 1990/1991 baseline study of contaminants in sediments JMG 18/3/7-E. 33pp. plus tables, figures and appendices.

JMG, 1994. Oslo and Paris Conventions for the Prevention of Marine Pollution,. Eighteenth Meeting of the Joint Monitoring Group. The Hague: 25-29 January 1994. Draft report on the results of the 1990/1991 baseline study of contaminants in sediments JMG 18/3/7-E. 33pp. plus tables, figures and appendices.

Knutzen, J., Bjerkeng, B., Green, N.W., Kringstad, M., Schlaback, M., Skåre J.U., 2001. Overvåking av miljøgifter i fisk og skalldyr fra Grenlandsfjordene 2000. [Monitoring of micorpollutants in fish and shellfish from the Grenland fjords (S. Norway) 2000] Norwegian Pollution Control Authority, Monitoring report no. 835/01. TA no. 1832/2001. NIVA project O-800309, (report no. 4452-2001) 230 pp. ISBN no. 82-577-4098-5.

Knutzen, J., Green, N.W., 1995. Bakgrunnsnivåer av en del miljøgifter i fisk, blåskjell og reker. Data fra utvalgte norske prøvesteder innen den felles overvåking under Oslo-/Paris-kommisjonene 1990-1993. [Background levels of some micropollutants in fish, the blue mussel and shrimps. Data from selected Norwegian sampling sites within the joint monitoring of the Oslo-/Paris Commissions 1990-1993]. Norwegian Pollution Control Authority, Monitoring report no. 594/95 TA no. 1173/1995. NIVA project O-80106/E-91412, (report no. 3302) 105 pp. ISBN no. 82-577-2678-8.

Knutzen, J., Green, N.W., 2001a. Tiltaksorienterte miljøundersøkelser i Sørfjorden og Hardangerfjord 2000. Delrapport 2. Miljøgifter i organismer. [Investigation of micropollutants in the Sørfjord and Hardangerfjord 2000. Report 2. Contaminants in organisms.] Norwegian Pollution Control Authority, Monitoring report no. 836/01. TA no. 1833/2001. NIVA project O-800309, (report no. 4445-2001) 51 pp. ISBN no. 82-577-4091-8.

Knutzen, J., Green, N.W., 2001b. *Joint Assessment and Monitoring Programme* (JAMP). "Bakgrunnsnivåer" av miljøgifter i fisk og blåskjell basert på datamateriale fra 1990-1998.[Joint Assessment and Monitoring Programme (JAMP). Background levels of some contaminants in fish and blue mussel based on data from 1990-1998]. Norwegian Pollution Control Authority, Monitoring report no. 820/01 TA no. 1798/2001. NIVA project O-80106, (report no. 4339) 145 pp. ISBN no. 82-577-3973-1.

Milliken G.A., Johnson D.E., 1992: Analysis of Messy Data. Volume I: Designed experiments. Chapman & Hall, New York.

Molvær, J., Knutzen, J., Magnusson, J., Rygg, B., Skei J., Sørensen, J., 1997. Klassifisering av miljøkvalitet i fjorder og kystfarvann. Veiledning. *Classification of environmental quality in fjords and coastal waters. A guide.* Norwegian Pollution Control Authority. TA no. TA-1467/1997. 36 pp. ISBN 82-7655-367-2.

MON, 1993. Draft Summary record. Eleventh meeting of the Ad Hoc Working Group on Monitoring, Copenhagen: 8-12 November 1993. MON 11/1/7-E.

MON, 1998. Summary record. Ad Hoc Working Group on Monitoring, Copenhagen: 23-27 February 1998. MON 98/6/1-E.

MON, 2001. The first draft of a new OSPAR Strategy for a Joint Assessment and Monitoring Programme (JAMP). Working Group on Monitoring (MON), Belfast: 4-7 December 2001. MON 01/7/1-E.

Monteith, D.T, Stoddard, J.L., Evans, C.D., De Wit., H.A., Forsius, M., Høgåsen, T., Wilander, A., Skjelkvåle, B.L., Jeffries, D.S., Vuorenmaa, J., Keller, B., Kopácek, J., Vesley, J. 2007. Dissolved organic carbon trends resulting from changes in atmospheric deposition chemistry. Nature 450, 537-541.

Nicholson, M.D, Fryer, R.J., Larsen, J.R., 1998. Temporal trend monitoring: A robust method for analysing trend monitoring data, ICES Techniques in Marine Envrionmental Sciences, No.20 September 1998.

Nicholson, M.D., Fryer, R.J., Maxwell, D.M., 1997. A study of the power of various methods for detecting trends. ICES CM 1997/Env.11.

Nicholson, M.D., Fryer N.W., & Green, N.W., 1994. Focusing on key aspects of contaminant trend assessments. Report of the 1994 meeting of the Working Group on the Statistical Aspects of Environmental Monitoring. St. Johns 26-29 April 1994. Annex 7:65-67.

Nicholson, M.D., Green, N.W., & Wilson, S.J., 1991. Regression models for assessing trends in cadmium and PCBs in cod livers from the Oslofjord. Marine Pollution Bulletin 22(2):77-81.

OSPAR, 1990. Oslo and Paris Conventions. Principles and methodology of the Joint Monitoring Programme. [Monitoring manual for participants of the Joint Monitoring Programme (JMP) and North Sea Monitoring Master Plan (NSMMP)]. March 1990.

OSPAR, 1998. OSPAR OSPAR Strategy with regard to Hazardous Substances. OSPAR Convention for the Protection of the Marine Environment of the North-East Atlantic. Meeting of the OSPAR Commission (OSPAR). Sintra, 23-27 June, 1998. Summary Record Annex 34 (Reference no. 1998-16). 22 pp.

OSPAR, 2003a. OSPAR list of chemicals for priority action (up-date 2003). OSPAR Convention for the Protection of the Marine Environment of the North-East Atlantic. Meeting of the OSPAR Commission (OSPAR). Bremen, 23-27 June, 2003. Summary Record Annex 12 (Reference no. 2003-19). 4 pp.

OSPAR, 2003b, JAMP [Joint Assessment and Monitoring Programme] Guidelines Contaminant-specific biological Effects Monitoring. OSPAR Commission, ref.no. 2003-10. 38 pp.

OSPAR, 2005. North Sea Pilot Project on Ecological Quality Objectives. Background document on the Ecological Quality Objective on imposex in dog whelks *Nucella lapillus*. OSPAR publication number 2005/247. ISBN 1-904426-86-7.

OSPAR, 2007. OSPAR Coordinated Environmental Monitoring Programme (CEMP). OSPAR Convention for the Protection of the Marine Environment of the North-East Atlantic. OSPAR Commission. Reference no.: 2007-1. 25pp.

OSPAR, 2009. JAMP [Joint Assessment and Monitoring Programme] Guidelines for Monitoring Contaminants in Biota. OSPAR Commission, ref.no. 1992-2. 98 pp.

OSPAR, 2010. OSPAR, 2010. Quality Status Report 2010. OSPAR Commission. London. 176 pp (publication 497/2010). The OSPAR Commission encourages the hyperlinking to the QSR 2010 website: http://qsr2010.ospar.org.

Ruus, A., Green, N.W., 2002. Tiltaksorienterte miljøundersøkelser i Sørfjorden og Hardangerfjorden 2001. Delrapport 2. Miljøgifter i organismer. *Measure oriented environmental monitoring of Sørfjord and Hardangerfjord 2002. Report component 2. Contaminants in organisms.* Norwegian Pollution Control Authority, Monitoring report no. 865/02 TA no. 1922/2002. NIVA project 800309 (report no. 4612-2002), 41 pp. ISBN no. 82-577-4273-2.

Ruus, A., Green, N.W., 2003. Miljøforholdene i Sørfjorden i 2002. Delrapport 2. Overvåking av miljøforholdene i Sørfjørden. Miljøgifter i organismer i 2002. *Monitoring of environmental quality in the Sørfjord. Report component 2 Contaminants in organisms 2002.* Norwegian Pollution Control Authority, Monitoring report no. 885/03 TA no. 1983/2003. NIVA project 800309 (report no. 4724-2003), 45 pp. ISBN no. 82-577-4394-1.

Ruus, A., Green, N.W., 2004. Overvåking av miljøforholdene i Sørfjorden. Miljøgifter i organismer 2003. Delrapport 3. Miljøgifter i organismer. *Monitoring of environmental quality in the Sørfjord. Contaminants in organisms 2003. Report component 3. Contaminants in organisms.* Norwegian Pollution Control Authority, Monitoring report no. 908/04 TA no. 2045/2004. NIVA project 800309 (report no. 4880-2004), 54 pp. ISBN no. 82-577-4566-9.

Ruus, A., Green, N.W., 2005. Overvåking av miljøforholdene i Sørfjorden. Miljøgifter i organismer 2004. Delrapport 3. Miljøgifter i organismer. *Monitoring of environmental quality in the Sørfjord. Contaminants in organisms 2004. Report component 3. Contaminants in organisms.* Norwegian Pollution Control Authority, Monitoring report no. 938/05 TA no. 2123/2005. NIVA project 800309 (report no. 5069-2005), 61 pp. ISBN no. 82-577-4774-2.

Ruus, A., Green, N.W., 2006. Overvåking av miljøforholdene i Sørfjorden. Miljøgifter i organismer 2005. Miljøgifter i organismer. *Monitoring of environmental quality in the Sørfjord. Contaminants in organisms 2005. Contaminants in organisms.* Norwegian Pollution Control Authority, Monitoring report no. 959/2006 TA no. 2190/2006. NIVA project 800309 (report no. 5268-2006), 58 pp. ISBN no. 82-577-4995-8.

Ruus, A., Green, N.W., 2007. Overvåking av miljøforholdene i Sørfjorden. Miljøgifter i organismer 2006. Miljøgifter i organismer. *Monitoring of environmental quality in the Sørfjord. Contaminants in organisms 2006. Contaminants in organisms.* Norwegian Pollution Control Authority, Monitoring report no. 995/2007 TA no. 2299/2007. NIVA project 26461-2 (report no. 5495-2007), 65 pp. ISBN no. 978-82-577-5230-9.

Ruus, A., Hylland, K., Green, N., 2003. Joint Assessment and Monitoring Programme (JAMP). Biological Effects Methods, Norwegian Monitoring 1997-2001. Norwegian Pollution Control Authority, Monitoring report no. 869/03 TA no. 1948/2003. Norwegian Institute for Water Research project 80106, report no. 4649-2003, 139 pp. ISBN no. 82-577-4313-5.

Ruus A., Green N.W., Maage A, Skei J. 2006. PCB-containing paint and plaster caused extreme PCB-concentrations in biota from the Sørfjord (Western Norway)-a case study. *Marine Pollution Bulletin* 52, 100-103.

Ruus, A., Skei, J., Green, N. W., Schøyen, M. 2008. Overvåking av miljøforholdene i Sørfjorden 2007. Metaller i vannmassene. Sedimentundersøkelse. Miljøgifter i organismer. SFT-report TA-2429/2008., NIVA report no. 1034-2008, NIVA, 107s.

Ruus, A., Skei, J., Molvær, J., Green, N. W., Schøyen, M. 2009. Overvåking av miljøforholdene i Sørfjorden 2008. Metaller i vannmassene. Oksygen, nitrogen og fosfor i vannmassene. Miljøgifter i organismer. SFT-rapport TA-2519/2009., NIVA report no. 1049-2009, NIVA, 89 pp.

Ruus A., Skei, J., Green, N., Schøyen, M. 2010a. Overvåking av miljøforholdene i Sørfjorden 2009. Metaller i vannmassene, Miljøgifter i organismer. NIVA report no. 6018-2010. ISBN 978-82-577-5753-3.

Ruus, A., Green, N.W., Maage, A., Amundsen, C.E., Schøyen, M., Skei, J. 2010b. Post World War II orcharding creates present day DDT-problems in the Sørfjord (Western Norway)-A case study. Marine Pollution Bulletin, 60: 1856-1861.

Ruus, A., Skei, J., Lundmark, K. D., Green, N. W., Schøyen, M. 2011. Overvåking av miljøforholdene i Sørfjorden 2010. Metaller i vannmassene. Oksygen, nitrogen og fosfor i vannmassene. Miljøgifter i organismer. [Monitoring environmental conditions in the Sørfjord 2010. Metals in water. Oxygen, nitrogen and phosphorus in water. Contaminants in organisms]. Klif-report TA-2824/2011, NIVA project no. O-26461, NIVA report no. 1103-2011, NIVA, 99 pp. ISBN no. 978-82-577-5934-6.

Ruus, A., Kvassnes, A. J. S., Skei, J., Green, N. W., Schøyen, M. 2012a. Overvåking av miljøforholdene i Sørfjorden 2011. Metaller i vannmassene. Miljøgifter i organismer. Klif-rapport, TA-2947/2012, NIVA rapport, L. nr. 6399-2012. 95 s. ISBN 978-82-577-6134-9.

Ruus, A., Bakke, t., Bjerkeng, B, Knutsen, H., 2012b. *Overvåking av miljøforholdene i Grenlandsfjord 2011*. Monitoring of contaminants in fish and shellfish from Grenlandsfjordene 2011.. Klif-rapport, TA-2953/2012, NIVA rapport, L. nr. 6400-2012. 100 s. ISBN 978-82-577-6135-6.

Schøyen, M., Håvardstun, J., Øxnevad, S., Allan, I., Næs, K. 2012. Overvåking av miljøgifter i Kristiansandsfjorden i 2011. Undersøkelse av blåskjell, torsk og vann. NIVA O-10265. NIVA-rapport, L. nr. 6364-2012. 169 s. ISBN 978-82-577-6099-1.

Schøyen, M., Håvardstun, J., Øxnevad, S., Allan, I., Næs, K. 2010. Overvåking av miljøgifter i Kristiansandsfjorden i 2010. Undersøkelse av blåskjell, taskekrabber og passive prøvetakere i vann. [Monitoring of contaminants in the Kristiansandsfjord in 2010. Investigations of blue mussel, crabs and passive samplers in water]. NIVA-project O-10265 (report no. 6089-2010) 167 pp. ISBN no. 978-82-577-5824-0.

SFT, 1987. Overvåkingsresultater 1986. (Chapter) 8. Felles europeisk overvåkingsprogram (JMP) i Norge: Overvåking av PCB, DDT- derivater, kadmium, kvikksølv, kobber, bly og sink. Norwegian Pollution Control Authority (SFT) Report 288/87:84-85.

SFT, 1988. Overvåkingsresutater 1987. (Chapter) 8. Felles europeisk overvåkingsprogram (JMP) i Norge: Overvåking av PCB, DDT- derivater, kadmium, kvikksølv, kobber, bly og sink. Norwegian Pollution Control Authority (SFT) Report 330/88:96- 97.

SFT, 1989. Overvåkingsresultater 1988. (Chapter) 8. Overvåking av miljøgifter: Joint Monitoring Programme (JMP). Norwegian Pollution Control Authority (SFT) Report 379/89:98-101.

SFT, 1990. Overvåkingsresultater 1989. (Chapter) 8 Overvåking av miljøgifter-Joint Monitoring Programme (JMP). Norwegian Pollution Control Authority (SFT) Report 433/90:116-119.

SFT, 2009. Letter 2008/28, 408/2002-032. Utslipp fra luft til ERAS Metal AS. 3 pp.

Shi, L., Green, N., Rogne, Å., 2008. Joint Assessment and Monitoring Programme (JAMP). Contaminant and effects data for sediments, shellfish and fish 1981-2006. Norwegian Pollution Control Authority, Monitoring report no. 1015/2008 TA no. 2369/2008. Norwegian Institute for Water Research projects 80106, 25106, 26106, 27106, report no. 5562-2008), 96 pp. ISBN no. 978-82-577-5297-2.

SIME, 1997. Voluntary international contaminant-monitoring (VIC) for temporal trends with the aim to test sampling strategies for a co-operative revision of guidelines by 1999-Status report January 1997. Presented by the chairman of MON. Oslo and Paris Convention for the Prevention of Marine Pollution. Working Group on Concentrations, Trends and Effects of Substances in the Marine Environment (SIME) Ostend: 3-7 February 1997. SIME 97/6/5-E, 4 pp.

SIME, 2004a. OSPAR Convention for the Protection of the Marine Environment of the North East Atlantic. Working Group on Concentrations, Trends and Effects of Substances in the Marine Environment (SIME) London (Secretariat) 24-26 February 2004. SIME 04/6/1-E [JAMP implementation], 9 pp.

SIME, 2004b. Progress on the development of monitoring strategies for each of the substances and groups of substances on the OSPAR List of Chemicals for Priority Action. OSPAR Convention for the Protection of the Marine Environment of the North East Atlantic. Working Group on Concentrations, Trends and Effects of Substances in the Marine Environment (SIME) London (Secretariat) 24-26 February 2004. SIME 04/02/07-E The Joint Assessment and Monitoring Programme (JAMP), 58 pp.

SIME, 2004c. OSPAR Convention for the Protection of the Marine Environment of the North East Atlantic. Working Group on Concentrations, Trends and Effects of Substances in the Marine Environment (SIME) London (Secretariat) 24-26 February 2004. SIME 04/10/1-E [Summary record], 15 pp. + 11 annexes.

Skei, J., 2000. Tiltaksorienterte miljøundersøkelser i Sørfjorden og Hardangerfjorden 1999. Delrapport 1 Vannkjemi. [Investigation of Sørfjord and Hardangerfjord 1999. Report 1. Water Chemistry] Norwegian Pollution Control Authority, Monitoring report no. 796/00 TA no. 1724/2000. NIVA project O-800309, (report no. 4236-2000) 23 pp. ISBN no. 82-577-3858-1.

Skei, J., 2001. Tiltaksorienterte miljøundersøkelser i Sørfjorden og Hardangerfjorden 2000. Delrapport 1 Vannkjemi. [Investigation of Sørfjord and Hardangerfjord 2000. Report 1. Water Chemistry] Norwegian Pollution Control Authority, Monitoring report no. 830/01 TA no. 1818/2001. NIVA project O-800309, (report no. 4406-2001) 22 pp. ISBN no. 82-577-4048-9.

Skei, J., Knutzen, J., 2000. Utslipp av kvikksølv til Sørfjorden som følge av uhell ved Norzink AS vinteren 1999-2000. Miljømessige konsekvenser. [Accidental mercury discharge by Norzink AS to the Sørfjord, winter 1999-2000. Environmental consequences.] NIVA project O-89083 (report no. 4234-2000) 12pp. ISBN no. 82-577-3856-5.

Skei, J., Ruus, A., Måge, A. (Hardanger miljøsenter) 2005. Kildekartlegging av DDT i Sørfjorden, hordaland. Forprosjekt. NIVA project O-25140 (report no. 5038-2005) 44pp. ISBN no. 82-577-4740-8.

Skei, J., Rygg, B., Moy, F., Molvær, J., Knutzen, J., Hylland, K., Næs, K., Green, N. Johansen, T., 1998. Forurensningsutviklingen i Sørfjorden og Hardangerfjorden i perioden 1980-1997. Sammenstilling av resultater fra overvåking av vann, sedimenter og organismer. [The development of pollution in the Sørfjord and Hardangerfjord during the period 1980-1997. Summary of results from monitoring of water, sediment and organisms.] Norwegian Pollution Control Authority, Monitoring report no. 742/98 TA no. 1581/1998. NIVA project O-800310, (report no. 3922-98) 95 pp. ISBN no. 82-577-3507-8.

Van den Berg, M., L. Birnbaum, A.T.C. Bosveld, B. Brunström, P. Cook, M. Feeley, J.P. Giesy, A. Hanberg, R. Hasegawa, S.W. Kennedy, T. Kubiak, J.C. Larsen, F.X.R. van Leeuwen, A.K.D. Liem, C. Nolt, R.E. Peterson, L. Poellinger, S. Safe, D. Schrenk, D. Tillitt, M. Tysklind, M. Younes, F. Wærn and T. Zacharewski 1998. Toxic equivalency factors (TEFs) for PCBs, PCDDs, PCDFs for humans and wildlife. Environ Hlth. Perspect. 106:775-792.

Van den Berg, M., Birnbaum, L, S., Denison, M., De Vito, M., Farland, W. Feeley, M., Fiedler, H., Hakansson, H., Hanberg, A., Haws, L. Rose, M., Safe, S., Schrenk, D., Tohyama. C., Tritscher, A., Tuomisto, J., Tysklind, M., Walker, N., Peterson, R. 2006. The 2005 World Health Organizaation Reevaluation of Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-Like Compounds. Toxicological Sciences 93 (2). 223-221.

Walday M., Berge J.A. & N. Følsvik. 1997. Imposex and levels of organotin in populations of *Nucella lapillus* in Norway (English summary). Norwegian Institute for Water Research, report no. 3665-1997. 28pp. ISBN 978-82-577-3227-3.

Walday, M., Green, N., Gitmark, J., Høgåsen, T., Beylich, B. 2011. Overvåking NOAH Langøya 2010. Miljøgifter i blåskjell, sedimentundersøkelser samt marinbiologiske registreringer [Monitoring NOAH Langøya, SE Norway 2010. Littoral and sublittoral communities, micropollutants in mussel and environmental conditions in sediments]. NIVA project no. O-10202 (report no. 6117-2011) 73 pp. ISBN no. 978-82-577-5852-3.

Walday, M., Green, N., Hylland, K., 1995. Kostholds- og tilstandsindikatorer for miljøgifter i marine områder. Norwegian Institute for Water Research project 93254, report no. 3280, 39 pp. ISBN no. 82-577-2691-5.

WGSAEM, 1993. The length effect on contaminant concentrations in mussels. Section 13.2. in the Report of the Working Group on Statistical Aspects of Environmental Monitoring, Copenhagen, 27-30 April 1993. International Council for the Exploration of the Sea. C-M- 1993/ENV:6 Ref.: D and E, 61 pp.

WGSAEM, 2000. Fully exploit the voluntary international contaminant monitoring in temporal trends (VIC) data on contaminants in biota, in order to improve sampling strategies for the analyses of both temporal and spatial trends. Chapter 7 in the Report of the Working Group on Statistical Aspects of Environmental Monitoring, Nantes, 27-31 March 2000. International Council for the Exploration of the Sea. CM-2000/E:05 Ref.: ACME, 92 pp.

Økland, T.E., 2005. Kostholdsråd i norske havner og fjorder. En gjennomgang av kostholdsråd i norske havner og fjorder fra 1960-tallet til i dag. Bergfald & Co. ISBN 82-92650-01-6. 269pp.

Appendix A
Overview of previous CEMP investigations

Previous investigations

The results for CEMP have previously been presented for:
- 1981-1983 (only Oslofjord; Enger *et al.* 1984, 1985)
- 1984-1985 (Green 1988)
- 1986 (Green 1987; SFT 1987)
- 1987 (SFT 1988)
- 1988 (Green 1989; SFT 1989)
- 1989 (Green 1991, SFT 1990)
- 1990 (Green 1992, JMG 1994)
- 1991 (Green 1993a)
- 1992 (Green 1994, Green & Knutzen 1994)
- 1993 (Green 1995a)
- 1994 (Green 1995b)
- 1995 (Green 1997a)
- 1996 (Green 1997b)
- 1997 (Green *et al.* 1999)
- 1998 (Green *et al.* 2000)
- 1999 (Green *et al.* 2001a)
- 2000 (Green *et al.* 2002a)
- 2001 (Green *et al.* 2003)
- 2002 (Green *et al.* 2004a)
- 2003 (Green *et al.* 2004b)
- 2004 (Green *et al.* 2005)
- 2005 (Green *et al.* 2007)
- 2006 (Green *et al.* 2008b)
- 2007 (Green *et al.* 2009)
- 2008 (Green *et al.* 2010a)
- 2009 (Green *et al.* 2010b)
- 2010 (Green *et al.* 2011a)

The results have been incorporated in OSPAR's European regional assessments of sediment (JMG 1993) and biota (ICES 1988, JMG 1992) and temporal trends in biota (ICES 1989; 1991; ASMO 1994).

An overview of the analytical methods (1981-2000) has been presented in Green 1993b; Green *et al.* 2001b, Green *et al.* 2008a.

The raw data or statistical summaries have been presented for:
- sediment 1986-1997 (Green & Klungsøyr 1994; Green *et al.* 2002b)
- biota 1981-1992 (Green & Rønningen 1994)
- biota 1993-1997 (Green & Severinsen 1999a, b)
- biota 1998-2001 (Green *et al.* 2002c, d) and
- sediment and biota 1981-2006 (cf. Shi *et al.* 2008)

Summary assessments have been made for the periods:
- 1981-1992 (Green *et al.* 1995)
- 1981-1999 (Green *et al.* 2001c)
- 1981-2006 (Green & Ruus 2008)

An evaluation of "background" levels of contaminants in biota based on CEMP data has been done by Knutzen & Green (1995, 2001a) and Green & Knutzen (2003). Application of pollution and reference indices using the blue mussel and coordinated with CEMP has also been assessed (Green & Knutzen 2001). Results from biological effects methods 1997-2001 have been assessed as well (Ruus *et al.* 2003).

Appendix B
Quality assurance programme

Information on Quality Assurance

NIVA has participated in all the QUASIMEME international intercalibration exercises relevant to chemical and imposex analyses. For chemical analyses, these include Round 66 of July-October 2011 and Round 66 of January-April 2012, which both apply to the 2011 samples. These QUASIMEME exercises included nearly all the contaminants as well as imposex analysed in this programme. The Quality assurance programme for NIVA is similar to the 2010 programme (cf. Green *et al.* 2011).

NIVA participated in the QUASIMEME Laboratory Performance Studies "Exercise 846-Round 57 imposex and intersex in Marine Snails BE1" in April-August 2009. Shell height, penis-length-male, penis-length-female, average-shell-height and female-male-ratio were measured. NIVA got the score satisfactory for average-shell-height and female-male-ratio. The assigned value for VDSI (imposex stage values of all females sampled/number of females) was 0.868 compared to NIVAs lab average of 1.474, which resulted in a high z score and was deemed unsatisfactory. This could be due to the fact that the snails examined varied from stage 0 up to stage 4. NIVA also participated in the next arrangement of QUASIMEME Laboratory Performance Studies for imposex and intersex for Marine Snails "Exercise 911-Round 70 BE1". Results were submitted August 2012.

In addition to the QUASIMEME exercises, certified reference materials (CRM) and in-house reference materials (HSD) are also analysed routinely with the CEMP samples. It should be noted that for biota the type of tissue used in the CRMs does not always match the target tissue for analysis. Uncertain values identified by the analytical laboratory or the reporting institute are flagged in the database. The results are also "screened" during the import to the database at NIVA and ICES.

Accreditation
The laboratories at NIVA, which include the chemical, microbiological and eco toxicological laboratories were accredited in 1993 for quality assurance system by the National Measurement Service-Norwegian Accreditation and based on European Standard EN45000/ISO71EC Guide 25. The chemical laboratory has satisfied the requirements in NS-EN ISO/IEC 17025 since 2001 and has the reference number Test 009.

Summary of quality control results
Standard Reference Materials (SRM) as well as in-house reference materials (HSD) were analysed regularly (***Table 12***). Fish protein (DORM-3) or dogfish liver (DOLT-4) was used as SRM for the control of the determination of metals. Fish fillet (2525) and mussel tissue (2977) were used as SRM for controls of PCBs and PAHs respectively. Fish fillet (2525) was also used at NILU for control and determination of dioxins. Cod filet (HSD #8), mussel tissue (HSD #9) and fat from tusk liver (HSD #10) were used as in-house reference materials for the control of PCB determination. HSD # 9 was also used for the control of PAH determination. Fish fillet (2525) and fish oil (HSD#12) were, respectively, used as SRM and in-house reference materials for BDE determination.

The results for QUASIMEME-Round 66 (July-October 2011) and Round 68 (January-May 2012) apply to the 2011 samples. Overall, the results are good and mostly within the uncertainty limits of deviation from the true value with only a few exceptions.

ROUND 66

- QOR108BT (no. 1) and QOR109BT (no. 2) for PCB in biota
  The results were acceptable and within the uncertainty limits of the method with only a few exceptions.
- QPH063BT (no. 1) and QPH064BT (no. 2) for PAH in biota
  The results were acceptable and within the uncertainty limits of the method with only a few exceptions.

ROUND 68

- QTM093BT (no.1) and QTM094BT (no. 2) for metals in biota
  The results were acceptable and within the uncertainty limits of the method.

- QOR110MS (no.1) and QOR111MS (no.2) for PCB in biota
  The results were acceptable and within the uncertainty limits of the method.

- QPH065BT (no. 1) and QPH066BT (no. 2) for PAH in biota
  The results were acceptable and within the uncertainty limits of the method with only a few exceptions.

Table 12.** Summary of the quality control of results for the 2011 biota samples analysed in 2011-2012. The Standard Reference Materials (SRM) were DOLT-4* (dogfish liver) for fish liver, DORM-3* (fish protein) for blue mussel and fish fillet, EDF2525** (fish fillet) for fish (cyprinid), 2977 (mussel tissue) for blue mussel. The in-house reference materials were HSD#8 (cod fillet), HSD#9 (mussel tissue) and HSD#10 (tusk liver). In addition, a spiked fish liver sample was analysed for recovery. The SRMs and HSDs were analysed in series with the CEMP samples for the determination of metals (mg/kg d.w.), PAH (µg/kg d.w), PCB (µg/kg d.w) and BDE (µg/kg d.w). EDF2525 was analysed for dioxins (ng/kg) by NILU (Norwegian Institute for Air Research). The spiked fish liver sample was analysed for polyfluorinated compounds (PFCs, % recovery). Tissue types were: mussel soft body (SB), fish liver (LI) and fish fillet (MU), as well as fish oil (FO). SRMs and HSDs were measured several times (N) over a number of weeks (W).*

Code	Contaminant	Tissue type	SRM type	SRM value confidence interval	N	W	Mean value	Standard deviation
Ag	**Silver**	LI	DOLT-4	0.93 ± 0.07	11	13	0.82	0.048
As	**Arsenic**	LI	DOLT-4	9.66 ± 0.62	12	14	10.22	0.743
Cd	**Cadmium**	LI	DOLT-4	24.3 ± 0.8	12	14	22.91	1.596
Co	**Cobalt**	LI	DOLT-4	0.25[1)]	12	14	0.24	0.013
Cr	**Chromium**	LI	DOLT-4	1.4[1)]	6	2	1.41	0.103
Cu	**Copper**	LI	DOLT-4	31.2 ± 1.1	12	14	31.02	1.061
Mo	**Molybdenum**	LI	DOLT-4	1[1)]	12	14	1.16	0.038
Ni	**Nickel**	LI	DOLT-4	0.97 ± 0.11	11	14	1.007	0.146
Pb	**Lead**	LI	DOLT-4	0.16 ± 0.04	12	14	0.148	0.021
Sn	**Tin**	LI	DOLT-4	0.17[1)]	12	14	0.168	0.0097
V	**Vanadium**	LI	DOLT-4	0.6[1)]	12	14	0.63	0.082
Zn	**Zinc**	LI	DOLT-4	116 ± 6	12	14	122.67	7.114
Ag	**Silver**	SB	DORM-3	0.04[1]	7	22	0.029	0.0038
As	**Arsenic**	SB	DORM-3	6.88 ± 0.30	7	22	7.26	0.549
Cd	**Cadmium**	SB	DORM-3	0.290 ± 0.020	7	22	0.294	0.021
Co	**Cobalt**	SB	DORM-3	*Missing*	7	22	0.25	0.013
Cr	**Chromium**	SB	DORM-3	1.89 ± 5.5	6	12	2.19	0.311
Cu	**Copper**	SB	DORM-3	15.5 ± 0.63	7	22	14.4	0.55
Hg	**Mercury**	SB	DORM-3	0.382 ± 0.060	24	29	0.42	0.028
Ni	**Nickel**	SB	DORM-3	1.28 ± 0.24	6	13	1.30	0.118
Pb	**Lead**	SB	DORM-3	0.395 ± 0.050	7	22	0.37	0.013
Sn	**Tin**	SB	DORM-3	0.066 ± 0.012	7	22	0.08	0.010
Zn	**Zinc**	SB	DORM-3	51.3 ± 3.1	7	22	51.6	2.63
BDE100	**2,2',4,4',6-Pentabromodiphenylether**	MU	SRM2525	1.720 ±0.566	1	1	1.959	
BDE153	**2,2',4,4'5,5'-Hexabromodiphenylether**	MU	SRM2525	2.030 ± 0.506	1	1	2.146	
BDE154	**2,2',4,4',5,6'-Hexabromodiphenylether**	MU	SRM2525	2.550 ± 1.004	1	1	3.775	
BDE28	**2,2,4'-Tribromodiphenylether**	MU	SRM2525	0.312 ± 0.202	1	1	0.463	
BDE47	**2,2',4,4',-Tetrabromodiphenylether**	MU	SRM2525	9.080 ± 2.620	1	1	12.067	
BDE49	**2,2',4,5'-Tetrabromidiphenylether**	MU	SRM2525	0.524 ± 0.274	1	1	0.749	
BDE66	**2,3',4,4'-Tetrabromodiphenylether**	MU	SRM2525	0.262 ± 0.080	1	1	0.284	
BDE99	**2,2',4,4',5-**	MU	SRM2525	2.280 ± 0.472	1	1	2.577	

Code	Contaminant	Tis-sue type	SRM type	SRM value confidence interval	N	W	Mean value	Standard deviation
	Pentabromodiphenylether							
BDE183	**2,2',3,4,4,5',6-Heptabromodiphenylether**	MU	SRM2525	0.137 ± 0.050	1	1	<0.3	
BDE209	**Decabromodiphenylether**	MU	SRM2525	0.545 ± 0.0020	1	1	<0.5	
CB101	**PCB congener CB-101**	MU	SRM2525	82.7 ± 21,4	5	21	95.6	7.37
CB105	**PCB congener CB-105**	MU	SRM2525	50.1 ± 15.7	5	21	53.2	4.76
CB118	**PCB congener CB-118**	MU	SRM2525	122 ± 38	5	21	128.0	14.83
CB138	**PCB congener CB-138**	MU	SRM2525	178 ± 27.8	5	21	210.0	30.82
CB153	**PCB congener CB-153**	MU	SRM2525	226 ± 71.2	5	21	280.0	36.74
CB156	**PCB congener CB-156**	MU	SRM2525	13.1 ± 2.62	5	21	14.8	1.92
CB180	**PCB congener CB-180**	MU	SRM2525	108 ± 11.8	5	21	116.0	11.40
CB209	**PCB congener CB-209**	MU	SRM2525	3.5 ± 0.98	5	21	4.3	0.48
CB28	**PCB congener CB-28**	MU	SRM2525	7.1 ± 1.3	5	21	8.2	0.73
CB52	**PCB congener CB-52**	MU	SRM2525	27.1 ± 1.3	5	21	34.4	4.72
DDEPP	**4.4'-DDE**	MU	SRM2525	587 ± 140	5	21	668.0	53.6
DDTPP	**4.4'-DDT**	MU	SRM2525	9.1 ± 2.7	1	1	1.50	
HCB	**Hexachlorobenzene**	MU	SRM2525	18.1 ± 15.3	5	21	17.6	1.67
HCHA	**α -hexachlorocyclohexane**	MU	SRM2525	1.4 ± 1.14	5	21	1.75	0.089
HCHG	**γ –hexachlorocyclohexane**	MU	SRM2525	0.83 ± 0.43	5	21	0.22	0.057
TDEPP	**4.4'-DDD**	MU	SRM2525	97.6 ± 33.2	5	21	92.4	9.94
BDE100	**2,2',4,4',6-Pentabromodiphenylether**	FO	HSD#12	*Missing*	11	2	62.8	15.22
BDE153	**2,2',4,4'5,5'-Hexabromodiphenylether**	FO	HSD#12	*Missing*	11	2	9.2	2.34
BDE154	**2,2',4,4',5,6'-Hexabromodiphenylether**	FO	HSD#12	*Missing*	11	2	13.5	3.07
BDE28	**2,2,4'-Tribromodiphenylether**	FO	HSD#12	*Missing*	11	2	2.3	0.67
BDE47	**2,2',4,4',-Tetrabromodiphenylether**	FO	HSD#12	*Missing*	11	2	182.0	39.1
BDE49	**2,2',4,5'-Tetrabromodiphenylether**	FO	HSD#12	*Missing*	11	2	15.8	3.92
BDE66	**2,3',4,4'-Tetrabromodiphenylether**	FO	HSD#12	*Missing*	11	2	5.0	1.551,55
BDE71		FO	HSD#12	*Missing*	11	2	<0.2	
BDE85		FO	HSD#12	*Missing*	11	2	0.9	0.20
BDE99	**2,2',4,4',5-Pentabromodiphenylether**	FO	HSD#12	*Missing*	11	2	64.8	16.21
BDE138		FO	HSD#12	*Missing*	11	2	0.32	0.01
BDE153	**2,2',4,4'5,5'-Hexabromodiphenylether**	FO	HSD#12	*Missing*	11	2	9.3	2.34
BDE154	**2,2',4,4',5,6'-Hexabromodiphenylether**	FO	HSD#12	*Missing*	11	2	13.5	3.07
BDE183	**2,2',3,4,4,5',6-Heptabromodiphenylether**	FO	HSD#12	*Missing*	11	2	0.4	0.05
BDE205		FO	HSD#12	*Missing*	11	2	<0,3	
BDE209	**Decabromodiphenylether**	FO	HSD#12	*Missing*	11	2	<0,5	
BDE196		FO	HSD#12	*Missing*	11	2	<0,3	
CB101	**PCB congener CB-101**	MU	HSD#8	0.80 ± 0.12	7	18	0.71	0.058
CB105	**PCB congener CB-105**	MU	HSD#8	0.77 ± 0.10	7	18	0.75	0.044
CB118	**PCB congener CB-118**	MU	HSD#8	2.20 ± 0.29	7	18	2.1	0.13
CB138	**PCB congener CB-138**	MU	HSD#8	4.78 ± 0.62	7	18	4.7	0.33
CB153	**PCB congener CB-153**	MU	HSD#8	7.26 ± 0.94	7	18	7.2	0.46
CB156	**PCB congener CB-156**	MU	HSD#8	0.35 ± 0.05	7	18	0.31	0.013
CB180	**PCB congener CB-180**	MU	HSD#8	2.04 ± 0.26	7	18	2.1	0.14
CB209	**PCB congener CB-209**	MU	HSD#8	0.08 ± 0.02	7	18	0.07	0.007
CB52	**PCB congener CB-52**	MU	HSD#8	0.158 ± 0.02	7	18	0.14	0.013
DDEPP	**4.4'-DDE**	MU	HSD#8	1.05 ± 0.14	7	18	1.10	0.064
DDTPP	**4.4'-DDT**	MU	HSD#8	*Missing*	5	18	0.06	0.019
HCB	**Hexachlorobenzene**	MU	HSD#8	0.05 ± 0.01	7	18	0.047	0.0035
TDEPP	**4.4'-DDD**	MU	HSD#8	*Missing*	5	18	0.08	0.011
CB101	**PCB congener CB-101**	SB	HSD#9	1.32 ± 0.20	11	20	1.3	0.19
CB105	**PCB congener CB-105**	SB	HSD#9	0.44 ± 0.07	11	20	0.41	0.062
CB118	**PCB congener CB-118**	SB	HSD#9	1.36 ± 0.20	11	20	1.3	0.22
CB138	**PCB congener CB-138**	SB	HSD#9	1.38 ± 0.21	11	20	1.4	0.27
CB153	**PCB congener CB-153**	SB	HSD#9	1.56 ± 0.23	11	20	1.5	0.30

Code	Contaminant	Tissue type	SRM type	SRM value confidence interval	N	W	Mean value	Standard deviation
CB156	**PCB congener CB-156**	SB	HSD#9	*Missing*	5	8	0.05	0.011
CB180	**PCB congener CB-180**	SB	HSD#9	0.24 ± 0.04	11	20	0.25	0.044
CB28	**PCB congener CB-28**	SB	HSD#9	*Missing*	1	1	0.05	
CB52	**PCB congener CB-52**	SB	HSD#9	0.49 ± 0.07	10	16	0.47	0.090
DDEPP	**4.4'-DDE**	SB	HSD#9	0.32 ± 0.05	11	20	0.31	0.034
DDTPP	**4.4'-DDT**	SB	HSD#9	0.22 ± 0.04	4	8	0.16	0.047
HCB	**Hexachlorobenzene**	SB	HSD#9	0.06 ± 0.01	11	20	0.06	0.011
QCB	**Pentachlorobenzene**	SB	HSD#9	*Missing*	2	9	0.035	0.0071
TDEPP	**4.4'-DDD**	SB	HSD#9	0.13 ± 0.02	11	20	0.15	0.034
CB101	**PCB congener CB-101**	LI	HSD#10	33.2 ± 13.3	13	21	69.2	6.99
CB105	**PCB congener CB-105**	LI	HSD#10	15.5 ± 6.20	13	21	20.4	2.07
CB118	**PCB congener CB-118**	LI	HSD#10	44.9 ± 18.0	13	21	57.0	6.81
CB138	**PCB congener CB-138**	LI	HSD#10	194 ± 77.7	14	21	215.3	16.34
CB153	**PCB congener CB-153**	LI	HSD#10	277 ± 110.6	14	21	351.5	24.55
CB156	**PCB congener CB-156**	LI	HSD#10	6.07 ± 2.42	14	21	8.8	0.98
CB180	**PCB congener CB-180**	LI	HSD#10	33.1 ± 13.2	13	21	46.8	4.83
CB209	**PCB congener CB-209**	LI	HSD#10	1.44 ± 0.58	14	21	2.3	0.20
CB28	**PCB congener CB-28**	LI	HSD#10	6.29 ± 2.52	13	21	7.2	0.71
CB31	**PCB congener CB-31**	LI	HSD#10	3.16 ± 1.26	13	21	4.2	0.43
CB52	**PCB congener CB-52**	LI	HSD#10	14.5 ± 5.81	13	21	17.9	2.04
DDEPP	**4.4'-DDE**	LI	HSD#10	209 ± 83.7	14	21	251.4	16.88
DDTPP	**4.4'-DDT**	LI	HSD#10	41.3 ± 16.5	13	21	53.1	7.72
HCB	**Hexachlorobenzene**	LI	HSD#10	15.8 ± 6.33	12	21	21.9	2.17
HCHA	**α -hexachlorocyclohexane**	LI	HSD#10	0.95 ± 0.38	14	21	1.5	0.43
OCS	**Octachlorostyrene**	LI	HSD#10	39.5 ± 15.8	14	21	1.9	0.31
QCB	**Pentachlorobenzene**	LI	HSD#10	2.90 ± 1.16	14	21	2.5	0.52
TDEPP	**4.4'-DDD**	LI	HSD#10	68.0 ± 27.2	13	21	95.6	9.13
ACNE	**Acenaphthene**	SB	SRM2977	4.9 ± 1.2	2	6	3.5	0.21
ANT	**Anthracene**	SB	SRM2977	6.2 ± 1.4	3	8	4.0	1.46
BAP	**benzo[a]pyrene**	SB	SRM2977	5.30 ± 0.61	3	8	4.7	0.62
BBJF	**Benzo(b+j)flouranthene**[2)]	SB	SRM2977	*Missing*	3	8	18.0	2.00
BEP	**benzo[e]pyrene**	SB	SRM2977	13.29 ± 0.43	3	8	19.0	4.00
BGHIP	**benzo[ghi]perylene**	SB	SRM2977	9.45 ± 0.37	3	8	11.4	2.03
BKF	**benzo[k]fluoranthene**	SB	SRM2977	4.02 ± 0.75	3	8	6.6	1.50
BAA	**benzo[a]anthracene**	SB	SRM2977	20.19 ± 0.87	3	8	20.0	3.00
CHR	**Chrysene**	SB	SRM2977	42.2 ± 5.5	3	8	50.0	3.61
DBA3A	**Dibenz[a,h]anthracene**	SB	SRM2977	1.47 ± 0.33	3	8	1.7	0.15
FLE	**Fluorene**	SB	SRM2977	10.30 ± 0.13	3	8	9.2	1.39
FLU	**Fluoranthene**	SB	SRM2977	38.90 ± 0.63	3	8	40.0	5.57
ICDP	**indeno[1,2,3-cd]pyrene**	SB	SRM2977	4.76 ± 0.15	3	8	3.8	0.15
NAP	**Naphthalene**	SB	SRM2977	21.1 ± 1.4	3	8	7.4	2.69
NAPC1	**Sum methylnaphtalenes**	SB	SRM2977	*Missing*	3	8	18.0	6.08
NAPC2	**Sum dimethylnaphtalenes**	SB	SRM2977	*Missing*	3	8	130.0	26.45
NAPC3	**Sum trimethylnaphtalenes**	SB	SRM2977	*Missing*	9	8	1200.0	200.0
PA	**Phenanthrene**	SB	SRM2977	36.2 ± 2.5	3	8	42.7	5.86
PAC1	**Sum methylphenanthrenes**	SB	SRM2977	*Missing*	3	8	260.0	3.01
PAC2	**Sum dimethylphananthrenes**	SB	SRM2977	*Missing*	3	8	1166.7	152.8
PAC3	**Sum trimethylphananthrenes**	SB	SRM2977	*Missing*	3	8	856.7	86.2
PER	**Perylene**	SB	SRM2977	3.69 ± 0.38	3	8	2.6	0.53
PYR	**Pyrene**	SB	SRM2977	77.4 ± 2.1	3	8	81.7	11.50
ACNE	**Acenaphthene**	SB	HSD#9	0.50 ± 0.20	11	37	0.66	0.087
ACNLE	**Acenaphthylene**	SB	HSD#9	*Missing*	1	1	0.51	
ANT	**Anthracene**	SB	HSD#9	2.40 ± 0.96	12	37	2.82	0.404
BAP	**benzo[a]pyrene**	SB	HSD#9	22.0 ± 8.80	12	37	19.7	1.07
BBJF	**Benzo(b+j)flouranthene**[2)]	SB	HSD#9	149 ± 60.0	12	37	127.5	11.4
BEP	**benzo[e]pyrene**	SB	HSD#9	41.0 ± 16.0	12	37	33.0	3.19
BGHIP	**benzo[ghi]perylene**	SB	HSD#9	21.0 ± 8.40	12	37	21.3	1.92
BKF	**benzo[k]fluoranthene**	SB	HSD#9	61.0 ± 25.0	12	37	53.8	3.90
BAA	**benzo[a]anthracene**	SB	HSD#9	25.0 ± 10.0	12	37	26.4	1.68
CHR	**Chrysene**	SB	HSD#9	39.0 ± 16.0	12	37	35.6	3.03
DBA3A	**Dibenz[a,h]anthracene**	SB	HSD#9	13.0 ± 5.20	12	37	12.6	1.08
FLE	**Fluorene**	SB	HSD#9	3.70 ± 1.50	12	37	3.95	0.557
FLU	**Fluoranthene**	SB	HSD#9	15.0 ± 6.00	12	37	16.3	1.76
ICDP	**Indeno[1,2,3-cd]pyrene**	SB	HSD#9	29.0 ± 11.6	12	37	23.4	2.61

Code	Contaminant	Tissue type	SRM type	SRM value confidence interval	N	W	Mean value	Standard deviation
NAPC3	**Sum trimethylnaphtalenes**	SB	HSD#9	*Missing*	11	37	3.86	1.328
PA	**Phenanthrene**	SB	HSD#9	3.40 ± 1.36	12	37	4.72	0.552
PAC3	**Sum trimethylphananthrenes**	SB	HSD#9	*Missing*	12	37	2.73	0.754
PER	**Perylene**	SB	HSD#9	2.30 ± 0.92	12	37	2.80	0.400
PYR	**Pyrene**	SB	HSD#9	1.40 ± 0.56	12	37	1.84	0.305
CB126	**3,3',4,4',5-PeCB**	SB	EDF2525	647 ± 211	12	45	677	*Missing*
CB169	**3,3',4,4',5,5'-HxCB**	SB	EDF2525	55.8 ± 12.6	12	45	62.2	*Missing*
CB77	**3,3',4,4'-TeCB**	SB	EDF2525	1980 ± 659	12	45	2089	*Missing*
CB81	**3,4,4',5-TeCB**	SB	EDF2525	179 ± 35.1	12	45	176	*Missing*
CDD1N	**1,2,3,7,8-PeCDD**	SB	EDF2525	3.88 ± 1.22	12	45	4.00	*Missing*
CDD4X	**1,2,3,4,7,8-HxCDD**	SB	EDF2525	0.31 ± 0.14	12	45	0.29	*Missing*
CDD6X	**1,2,3,6,7,8-HxCDD**	SB	EDF2525	2.19 ± 0.76	12	45	1.92	*Missing*
CDD9X	**1,2,3,7,8,9-HxCDD**	SB	EDF2525	0.32 ± 0.11	12	45	0.29	*Missing*
CDDO	**OCDD**	SB	EDF2525	2.57 ± 2.59	12	45	3.78	*Missing*
CDF2N	**2,3,4,7,8-PeCDF**	SB	EDF2525	14.5 ± 2.41	12	45	16.6	*Missing*
CDF2T	**2,3,7,8-TCDF**	SB	EDF2525	24.5 ± 5.52	12	45	26.0	*Missing*
CDF4X	**2,3,4,6,7,8-HxCDF**	SB	EDF2525	1.09 ± 0.55	12	45	0.85	*Missing*
CDF6P	**1,2,3,4,6,7,8-HpCDF**	SB	EDF2525	0.59 ± 0.61	12	45	0.34	*Missing*
CDF6X	**1,2,3,6,7,8-HxCDF**	SB	EDF2525	1.65 ± 0.56	12	45	1.84	*Missing*
CDF9P	**1,2,3,4,7,8,9-HpCDF**	SB	EDF2525	0.08 ± 0.11	12	45	0.27	*Missing*
CDFDN	**1,2,3,7,8/1,2,3,4,8-PeCDF**	SB	EDF2525	4.88 ± 1.46	12	45	4.24	*Missing*
CDFDX	**1,2,3,4,7,8/1,2,3,4,7,9-HxCDF**	SB	EDF2525	5.8 ± 0.99	12	45	5.87	*Missing*
CDFO	**OCDF**	SB	EDF2525	0.78 ± 1	12	45	0.32	*Missing*
TCDD	**2,3,7,8-tetrachl-DiBpD (TCDD)**	SB	EDF2525	17.3 ± 2.58	12	45	20.5	*Missing*
PFBS	**Perfluorobutane sulphonate**	LI		100 %[3)]	22	8	102.5	8.84
PFHxA	**Perfluorohexane acid**	LI		100 %[3)]	22	8	90.5	7.79
PFHpA	**Perfluoroheptane acid**	LI		100 %[3)]	22	8	87.7	10.82
PFOA	**Perfluorooctane acid**	LI		100 %[3)]	22	8	79.8	13.04
PFNA	**Perfluorononane acid**	LI		100 %[3)]	22	8	86.4	6.43
PFOS	**Perfluorooctane sulphonate**	LI		100 %[3)]	22	8	105.8	6.06
PFOSA	**Perfluorooctane sulphone amide**	LI		100 %[3)]	22	8	97.8	11.91

* National Research Council Canada, Division of Chemistry, Marine Analytical Chemistry Standards.
** BCR, Community Bureau of Reference, Commission of the European Communities.
*** National Institute of Standards & Technology (NIST).
**** CIL, US.
1) Not certified value.
2) Calculated from separate values for **Benzo(b)fluoranthene** and **Benzo(j)fluoranthene.**
3) Recovery of spiked control sample

Appendix C
Abbreviations

Abbreviation[1]	English	*Norwegian*	Param. group
ELEMENTS			
Al	aluminium	*aluminium*	I-MET
As	arsenic	*arsen*	I-MET
Cd	cadmium	*kadmium*	I-MET
Co	cobalt	*kobolt*	I-MET
Cr	chromium	*krom*	I-MET
Cu	copper	*kobber*	I-MET
Fe	iron	*jern*	I-MET
Hg	mercury	*kvikksølv*	I-MET
Li	lithium	*litium*	I-MET
Mn	manganese	*mangan*	I-MET
Ni	nickel	*nikkel*	I-MET
Pb	lead	*bly*	I-MET
Pb210	lead-210	*bly-210*	I-RNC
Se	selenium	*selen*	I-MET
Ti	titanium	*titan*	I-MET
Zn	zinc	*sink*	I-MET
METAL COMPOUNDS			
TBT	Tributyltin (formulation basis =TBTIN*2.44)	*Tributyltinn* (formula basis =TBTIN*2.44)	O-MET
MBTIN	Monobutyltin	*Monobutyltinn*	O-MET
DBTIN	Dibutyltin	*dibutyltinn*	O-MET
TBTIN	Tributyltin (=TBT*0.40984)	*tributyltinn* (=TBT*0.40984)	O-MET
MPTIN	monophenyltin	*monofenyltinn*	O-MET
DPTIN	diphenyltin	*difenyltinn*	O-MET
TPTIN	triphenyltin	*trifenyltinn*	O-MET
PAHs			
PAH	polycyclic aromatic hydrocarbons	*polysykliske aromatiske hydrokarboner*	
ACNE [3]	acenaphthene	*acenaften*	PAH
ACNLE [3]	acenaphthylene	*acenaftylen*	PAH
ANT [3]	anthracene	*antracen*	PAH
BAA [3, 4]	benzo[*a*]anthracene	*benzo[a]antracen*	PAH
BAP [3, 4]	benzo[*a*]pyrene	*benzo[a]pyren*	PAH
BBF [3, 4]	benzo[*b*]fluoranthene	*benzo[b]fluoranten*	PAH
BBJKF [3, 4]	benzo[*b,j,k*]fluoranthene	*benzo[b,j,k]fluoranten*	PAH
BBJKF [3, 4]	benzo[b+j,k]fluoranthene	*benzo[b+j,k]fluoranten*	PAH
BBKF [3, 4]	benzo[*b+k*]fluoranthene	*benzo[b+k]fluoranten*	PAH
BEP	benzo[*e*]pyrene	*benzo[e]pyren*	PAH
BGHIP [3]	benzo[*ghi*]perylene	*benzo[ghi]perylen*	PAH
BIPN [2]	biphenyl	*bifenyl*	PAH
BJKF [3, 4]	benzo[*j,k*]fluoranthene	*benzo[j,k]fluorantren*	PAH
BKF [3, 4]	benzo[*k*]fluoranthene	*benzo[k]fluorantren*	PAH
CHR [3, 4]	chrysene	*chrysen*	PAH
CHRTR [3, 4]	chrysene+triphenylene	*chrysen+trifenylen*	PAH
COR	coronene	*coronen*	PAH
DBAHA [3, 4]	dibenz[*a,h*]anthracene	*dibenz[a,h]anthracen*	PAH
DBA3A [3, 4]	dibenz[*a,c/a,h*]anthracene	*dibenz[a,c/a,h]antracen*	PAH
DBP [4]	dibenzopyrenes	*dibenzopyren*	PAH
DBT	dibenzothiophene	*dibenzothiofen*	PAH
DBTC1	C_1-dibenzothiophenes	*C_1-dibenzotiofen*	PAH
DBTC2	C_2-dibenzothiophenes	*C_2-dibenzotiofen*	PAH
DBTC3	C_3-dibenzothiophenes	*C_3-dibenzotiofen*	PAH
FLE [3]	fluorene	*fluoren*	PAH
FLU [3]	fluoranthene	*fluoranten*	PAH
ICDP [3, 4]	indeno[*1,2,3-cd*]pyrene	*indeno[1,2,3-cd]pyren*	PAH
NAP [2]	naphthalene	*naftalen*	PAH
NAPC1 [2]	C_1-naphthalenes	*C_1-naftalen*	PAH
NAPC2 [2]	C_2-naphthalenes	*C_2-naftalen*	PAH
NAPC3 [2]	C_3-naphthalenes	*C_3-naftalen*	PAH
NAP1M [2]	1-methylnaphthalene	*1-metylnaftalen*	PAH

Abbreviation[1]	English	*Norwegian*	Param. group
NAP2M [2]	2-methylnaphthalene	*2-metylnaftalen*	PAH
NAPD2 [2]	1,6-dimethylnaphthalene	*1,6-dimetylnaftalen*	PAH
NAPD3 [2]	1,5-dimethylnaphthalene	*1,5-dimetylnaftalen*	PAH
NAPDI [2]	2,6-dimethylnaphthalene	*2,6-dimetylnaftalen*	PAH
NAPT2 [2]	2,3,6-trimethylnaphthalene	*2,3,6-trimetylnaftalen*	PAH
NAPT3 [2]	1,2,4-trimethylnaphthalene	*1,2,4-trimetylnaftalen*	PAH
NAPT4 [2]	1,2,3-trimethylnaphthalene	*1,2,3-trimetylnaftalen*	PAH
NAPTM [2]	2,3,5-trimethylnaphthalene	*2,3,5-trimetylnaftalen*	PAH
NPD	Collective term for naphthalenes, phenanthrenes and dibenzothiophenes	*Sammebetegnelse for naftalen, fenantren og dibenzotiofens*	PAH
PA [3]	phenanthrene	*fenantren*	PAH
PAC1	C_1-phenanthrenes	*C_1-fenantren*	PAH
PAC2	C_2-phenanthrenes	*C_2-fenantren*	PAH
PAC3	C_3-phenanthrenes	*C_3-fenantren*	PAH
PAM1	1-methylphenanthrene	*1-metylfenantren*	PAH
PAM2	2-methylphenanthrene	*2-metylfenantren*	PAH
PADM1	3,6-dimethylphenanthrene	*3,6-dimetylfenantren*	PAH
PADM2	9,10-dimethylphenanthrene	*9,10-dimetylfenantren*	PAH
PER	perylene	*perylen*	PAH
PYR [3]	pyrene	*pyren*	PAH
DI-Σn	sum of "n" dicyclic "PAH"s (footnote 2)	*sum "n" disykliske "PAH" (fotnote 2)*	
P-Σn/P_S	sum "n" PAH (DI-Σn not included, footnote 3)	*sum "n" PAH (DI-Σn ikke inkludert, fotnot 3)*	
PK-Σn/PK_S	sum carcinogen PAHs (footnote 4)	*sum kreftfremkallende PAH (fotnote 4)*	
PAHΣΣ	DI-Σn + P-Σn etc.	*DI-Σn + P-Σn mm.*	
SPAH	"total" PAH, specific compounds not quantified (outdated analytical method)	*"total" PAH, spesifikk forbindelser ikke kvantifisert (foreldret metode)*	
BAP_P	% BAP of PAHΣΣ	*% BAP av PAHΣΣ*	
BAPPP	% BAP of P-Σn	*% BAP av P-Σn*	
BPK_P	% BAP of PK_Sn	*% BAP av PK_Sn*	
PKn_P	% PK_Sn of PAHΣΣ	*% PK_Sn av PAHΣΣ*	
PKnPP	% PK_Sn of P-Σn	*% PK_Sn av P-Σn*	
PCBs			
PCB	polychlorinated biphenyls	*polyklorerte bifenyler*	
CB	individual chlorobiphenyls (CB)	*enkelte klorobifenyl*	
CB28	CB28 (IUPAC)	*CB28 (IUPAC)*	OC-CB
CB31	CB31 (IUPAC)	*CB31 (IUPAC)*	OC-CB
CB44	CB44 (IUPAC)	*CB44 (IUPAC)*	OC-CB
CB52	CB52 (IUPAC)	*CB52 (IUPAC)*	OC-CB
CB77 [5]	CB77 (IUPAC)	*CB77 (IUPAC)*	OC-CB
CB81 [5]	CB81 (IUPAC)	*CB81 (IUPAC)*	OC-CB
CB95	CB95 (IUPAC)	*CB95 (IUPAC)*	OC-CB
CB101	CB101 (IUPAC)	*CB101 (IUPAC)*	OC-CB
CB105	CB105 (IUPAC)	*CB105 (IUPAC)*	OC-CB
CB110	CB110 (IUPAC)	*CB110 (IUPAC)*	OC-CB
CB118	CB118 (IUPAC)	*CB118 (IUPAC)*	OC-CB
CB126 [5]	CB126 (IUPAC)	*CB126 (IUPAC)*	OC-CB
CB128	CB128 (IUPAC)	*CB128 (IUPAC)*	OC-CB
CB138	CB138 (IUPAC)	*CB138 (IUPAC)*	OC-CB
CB149	CB149 (IUPAC)	*CB149 (IUPAC)*	OC-CB
CB153	CB153 (IUPAC)	*CB153 (IUPAC)*	OC-CB
CB156	CB156 (IUPAC)	*CB156 (IUPAC)*	OC-CB
CB169 [5]	CB169 (IUPAC)	*CB169 (IUPAC)*	OC-CB
CB170	CB170 (IUPAC)	*CB170 (IUPAC)*	OC-CB
CB180	CB180 (IUPAC)	*CB180 (IUPAC)*	OC-CB
CB194	CB194 (IUPAC)	*CB194 (IUPAC)*	OC-CB
CB209	CB209 (IUPAC)	*CB209 (IUPAC)*	OC-CB
CB-Σ7	CB: 28+52+101+118+138+153+180	*CB: 28+52+101+118+138+153+180*	
CB-ΣΣ	Sum of CBs, includes CB-Σ7	*sum CBer, inkluderer CB-Σ7*	

Abbreviation[1]	English	*Norwegian*	Param. group
TECBW	Sum of CB-toxicity equivalents after WHO model, see **TEQ**	*Sum CB- toksitets ekvivalenter etter WHO modell, se **TEQ***	
TECBS	Sum of CB-toxicity equivalents after SAFE model, see **TEQ**	*Sum CB-toksitets ekvivalenter etter SAFE modell, se **TEQ***	
DIOXINs			
TCDD	2, 3, 7, 8-tetrachloro-dibenzo dioxin	*2, 3, 7, 8-tetrakloro-dibenzo dioksin*	OC-DX
CDDST	Sum of tetrachloro-dibenzo dioxins	*Sum tetrakloro-dibenzo dioksiner*	
CDD1N	1, 2, 3, 7, 8-pentachloro-dibenzo dioxin	*1, 2, 3, 7, 8-pentakloro-dibenzo dioksin*	OC-DX
CDDSN	Sum of pentachloro-dibenzo dioxins	*Sum pentakloro-dibenzo dioksiner*	
CDD4X	1, 2, 3, 4, 7, 8-hexachloro-dibenzo dioxin	*1, 2, 3, 4, 7, 8-heksakloro-dibenzo dioksin*	OC-DX
CDD6X	1, 2, 3, 6, 7, 8-hexachloro-dibenzo dioxin	*1, 2, 3, 6, 7, 8-heksakloro-dibenzo dioksin*	OC-DX
CDD9X	1, 2, 3, 7, 8, 9-hexachloro-dibenzo dioxin	*1, 2, 3, 7, 8, 9-heksakloro-dibenzo dioksin*	OC-DX
CDDSX	Sum of hexachloro-dibenzo dioxins	*Sum heksakloro-dibenzo dioksiner*	
CDD6P	1, 2, 3, 4, 6, 7, 8-heptachloro-dibenzo dioxin	*1, 2, 3, 4, 6, 7, 8-heptakloro-dibenzo dioksin*	OC-DX
CDDSP	Sum of heptachloro-dibenzo dioxins	*Sum heptakloro-dibenzo dioksiner*	
CDDO	Octachloro-dibenzo dioxin	*Oktakloro-dibenzo dioksin*	OC-DX
PCDD	Sum of polychlorinated dibenzo-p-dioxins	*Sum polyklorinaterte-dibenzo-p-dioksiner*	
CDF2T	2, 3, 7, 8-tetrachloro-dibenzofuran	*2, 3, 7, 8-tetrakloro-dibenzofuran*	OC-DX
CDFST	Sum of tetrachloro-dibenzofurans	*Sum tetrakloro-dibenzofuraner*	
CDFDN	1, 2, 3, 7, 8/1, 2, 3, 4, 8-pentachloro-dibenzofuran	*1, 2, 3, 7, 8/1, 2, 3, 4, 8-pentakloro-dibenzofuran*	OC-DX
CDF2N	2, 3, 4, 7, 8-pentachloro-dibenzofuran	*2, 3, 4, 7, 8-pentakloro-dibenzofuran*	OC-DX
CDFSN	Sum of pentachloro-dibenzofurans	*Sum pentakloro-dibenzofuraner*	
CDFDX	1, 2, 3, 4, 7, 8/1, 2, 3, 4, 7, 9-hexachloro-dibenzofuran	*1, 2, 3, 4, 7, 8/1, 2, 3, 4, 7, 9-heksakloro-dibenzofuran*	OC-DX
CDF6X	1, 2, 3, 6, 7, 8-hexachloro-dibenzofuran	*1, 2, 3, 6, 7, 8-heksakloro-dibenzofuran*	OC-DX
CDF9X	1, 2, 3, 7, 8, 9-hexachloro-dibenzofuran	*1, 2, 3, 7, 8, 9-heksakloro-dibenzofuran*	OC-DX
CDF4X	2, 3, 4, 6, 7, 8-hexachloro-dibenzofuran	*2, 3, 4, 6, 7, 8-heksakloro-dibenzofuran*	OC-DX
CDFSX	Sum of hexachloro-dibenzofurans	*Sum heksakloro-dibenzofuraner*	
CDF6P	1, 2, 3, 4, 6, 7, 8-heptachloro-dibenzofuran	*1, 2, 3, 4, 6, 7, 8-heptakloro-dibenzofuran*	OC-DX
CDF9P	1, 2, 3, 4, 7, 8, 9-heptachloro-dibenzofuran	*1, 2, 3, 4, 7, 8, 9-heptakloro-dibenzofuran*	OC-DX
CDFSP	Sum of heptachloro-dibenzofurans	*Sum heptakloro-dibenzofuraner*	OC-DX
CDFO	Octachloro-dibenzofurans	*Octakloro-dibenzofuran*	OC-DX
PCDF	Sum of polychlorinated dibenzo-furans	*Sum polyklorinated dibenzo-furaner*	
CDDFS	Sum of PCDD and PCDF	*Sum PCDD og PCDF*	
TCDDN	Sum of TCDD-toxicity equivalents after Nordic model, see **TEQ**	*Sum TCDD- toksitets ekvivalenter etter Nordisk modell, se **TEQ***	
TCDDI	Sum of TCDD-toxicity equivalents after international model, see **TEQ**	*Sum TCDD-toksitets ekvivalenter etter internasjonale modell, se **TEQ***	
PESTICIDES			
ALD	aldrin	*aldrin*	OC-DN
DIELD	dieldrin	*dieldrin*	OC-DN
ENDA	endrin	*endrin*	OC-DN
CCDAN	cis-chlordane (=α-chlordane)	*cis-klordan (=α-klordan)*	OC-DN
TCDAN	trans-chlordane (=γ-chlordane)	*trans-klordan (=γ-klordan)*	OC-DN
OCDAN	oxy-chlordane	*oksy-klordan*	OC-DN
TNONC	trans-nonachlor	*trans-nonaklor*	OC-DN
TCDAN	trans-chlordane	*trans-klordan*	OC-DN

Abbreviation[1]	English	*Norwegian*	Param. group
OCS	octachlorostyrene	*oktaklorstyren*	OC-CL
QCB	pentachlorobenzene	*pentaklorbenzen*	OC-CL
DDD	dichlorodiphenyldichloroethane 1,1-dichloro-2,2-bis-(4-chlorophenyl)ethane	*diklordifenyldikloretan* *1,1-dikloro-2,2-bis-(4-klorofenyl)etan*	OC-DD
DDE	dichlorodiphenyldichloroethylene (principle metabolite of DDT) 1,1-dichloro-2,2-bis-(4-chlorophenyl)ethylene*	*diklordifenyldikloretylen (hovedmetabolitt av DDT)* *1,1-dikloro-2,2-bis-(4-klorofenyl)etylen*	OC-DD
DDT	dichlorodiphenyltrichloroethane 1,1,1-trichloro-2,2-bis-(4-chlorophenyl)ethane	*diklordifenyltrikloretan* *1,1,1-trikloro-2,2-bis-(4-klorofenyl)etan*	OC-DD
DDEOP	o,p'-DDE	*o,p'-DDE*	OC-DD
DDEPP	p,p'-DDE	*p,p'-DDE*	OC-DD
DDTOP	o,p'-DDT	*o,p'-DDT*	OC-DD
DDTPP	p,p'-DDT	*p,p'-DDT*	OC-DD
TDEPP	p,p'-DDD	*p,p'-DDD*	OC-DD
DDTEP	p,p'-DDE + p,p'-DDT	*p,p'-DDE + p,p'-DDT*	OC-DD
DD-nΣ	sum of DDT and metabolites, n = number of compounds	*sum DDT og metabolitter, n = antall forbindelser*	OC-DD
HCB	hexachlorobenzene	*heksaklorbenzen*	OC-CL
HCHG	Lindane γ HCH = gamma hexachlorocyclohexane (γ BHC = gamma benzenehexachloride, outdated synonym)	*Lindan* *γ HCH = gamma heksaklorsykloheksan* *(γ BHC = gamma benzenheksaklorid, foreldret betegnelse)*	OC-HC
HCHA	α HCH = alpha HCH	*α HCH = alpha HCH*	OC-HC
HCHB	β HCH = beta HCH	*β HCH = beta HCH*	OC-HC
HC-nΣ	sum of HCHs, n = count	*sum av HCHs, n = antall*	
EOCl	extractable organically bound chlorine	*ekstraherbart organisk bundet klor*	OC-CL
EPOCl	extractable persistent organically bound chlorine	*ekstraherbart persistent organisk bundet klor*	OC-CL
PBDEs			
PBDE	polybrominated diphenyl ethers	*polybromerte difenyletere*	OC-BB
BDE	brominated diphenyl ethers		OC-BB
BDE-28	2,4,4'-tribromodiphenyl ether	*2,4,4'-tribromdifenyleter*	OC-BB
BDE-47	2,2',4,4'-tetrabromodiphenyl ether	*2,2',4,4'-tetrabromdifenyleter*	OC-BB
BDE-49*	2,2',4,5'- tetrabromodiphenyl ether	*2,2',4,5'- tetrabromdifenyleter*	OC-BB
BDE-66*	2,3',4',6- tetrabromodiphenyl ether	*2,3',4',6- tetrabromdifenyleter*	OC-BB
BDE-71*	2,3',4',6- tetrabromodiphenyl ether	*2,3',4',6- tetrabromdifenyleter*	OC-BB
BDE-77	3,3',4,4'-tetrabromodiphenyl ether	*3,3',4,4'-tetrabromdifenyleter*	OC-BB
BDE-85	2,2',3,4,4'-pentabromodiphenyl ether	2,2',3,4,4'-pentabromdifenyleter	OC-BB
BDE-99	2,2',4,4',5-pentabromodiphenyl ether	*2,2',4,4',5-pentabromdifenyleter*	OC-BB
BDE-100	2,2',4,4',6-pentabromodiphenyl ether	*2,2',4,4',6-pentabromdifenyleter*	OC-BB
BDE-119	2,3',4,4',6-pentabromodiphenyl ether	*2,3',4,4',6-pentabromdifenyleter*	OC-BB
BDE-138	2,2',3,4,4',5'-hexabromodiphenyl ether	*2,2',3,4,4',5'-heksabromdifenyleter*	OC-BB
BDE-153	2,2',4,4',5,5'-hexabromodiphenyl ether	*2,2',4,4',5,5'-heksabromdifenyleter*	OC-BB
BDE-154	2,2',4,4',5,6'-hexabromodiphenyl ether	*2,2',4,4',5,6'-heksabromdifenyleter*	OC-BB
BDE-183	2,2',3,4,4',5',6-heptabromodiphenyl ether	*2,2',3,4,4',5',6-heptabromdifenyleter*	OC-BB
BDE-196	2,2',3,3',4,4',5',6-octabromodiphenyl ether	*2,2',3,3',4,4',5',6-octabromdifenyleter*	OC-BB
BDE-205	2,2',3,3',4,4',5,5',6'-nonabromodiphenyl ether	*2,2',3,3',4,4',5,5',6'-nonabromdifenyleter*	OC-BB
BDE-209	Decabromodiphenyl ether	*Dekabromdifenyleter*	OC-BB
BDE5S	Sum of BDE -85, -99, -100, -119	Sum av BDE -85, -99, -100, -119	OC-BB
BDESS	Sum of all BDEs	Sum av alle BDEer	OC-BB

Abbreviation[1]	English	*Norwegian*	Param. group
PFAS	perfluorinated alkylated substances	perfluoralkylertestoffer	
PFBS	perfluorobutane sulfonate	perfluorbutan sulfonat	PFAS
PFHxA	perfluorohexanoic acid	perfluorhexansyre	PFAS
PFHpA	perfluoroheptanoic acid	perfluorheptansyre	PFAS
PFOA	perfluorooctanoic acid	perfluoroktansyre	PFAS
PFNA	perfluorononanoic acid	perfluornonansyre	PFAS
PFOS	perfluoroctanoic sulfonate	perfluoroktansulfonat	PFAS
PFOSA	perfluoroctanesulfonic acid	perfluoroktansulfon syre	PFAS
NTOT	total organic nitrogen	*total organisk nitrogen*	I-NUT
CTOT	total organic carbon	*total organisk karbon*	O-MAJ
CORG	organic carbon	*organisk karbon*	O-MAJ
GSAMT	grain size	*kornfordeling*	P-PHY
MOCON	moisture content	*vanninnhold*	P-PHY
Specific biological effects methods			
ALAD	δ-aminolevulinic acid dehydrase inhibition	*δ-aminolevulinsyre dehydrase*	BEM
CYP1A	cytochrome P450 1A-protein	*cytokrom P450 1A-protein*	BEM
EROD-activity	Cytochrome P4501A-activity (CYP1A/P4501A1, EROD)	*cytokrom P450 1A-aktivitet*	BEM
OH-pyrene	Pyrene metabolite	*pyren metabolitt*	BEM
VSDI	Vas Deferens Sequence Index		BEM
INSTITUTES			
EFDH	Eurofins [DK]	*Eurofins [DK]*	
FIER	Institute for Nutrition, Fisheries Directorate	*Fiskeridirektoratets Ernæringsinstitutt*	
FORC	FORCE Institutes, Div. for Isotope Technique and Analysis [DK]	*FORCE Institutterne, Div. for Isotopteknik og Analyse [DK]*	
GALG	GALAB Laboratories Gmbh [D]	*GALAB Laboratories Gmbh [D]*	
IFEN	Institute for Energy Technology	*Institutt for energiteknikk*	
IMRN	Institute of Marine Research (IMR)	*Havforskningsinstituttet*	
NACE	Nordic Analytical Center	*Nordisk Analyse Center*	
NILU	Norwegian Institute for Air Research	*Norsk institutt forluftforskning*	
NIVA	Norwegian Institute for Water Research	*Norsk institutt for vannforskning*	
SERI	Swedish Environmental Research Institute	*Institutionen för vatten- och luftvårdsforskning*	
SIIF	Fondation for Scientific and Industrial Research at the Norwegian Institute of Technology-SINTEF (a division, previously: Center for Industrial Research SI)	*Stiftelsen for industriell og teknisk forskning ved Norges tekniske høgskole- SINTEF (en avdeling, tidligere: Senter for industriforskning SI)*	
VETN	Norwegian Veterinary Institute	*Veterinærinstituttet*	
VKID	Water Quality Institute [DK]	*Vannkvalitetsintitutt [DK]*	

1) After: ICES Environmental Data Reporting Formats. International Council for the Exploration of the Sea. July 1996 and supplementary codes related to non-ortho and mono-ortho PCBs and "dioxins" (ICES pers. comm.)

2) Indicates "PAH" compounds that are dicyclic and not truly PAHs typically identified during the analyses of PAH, include naphthalenes and "biphenyls".

3) Indicates the sum of tri- to hexacyclic PAH compounds named in EPA protocol 8310 minus naphthalene (dicyclic), so that the Klif classification system can be applied

4) Indicates PAH compounds potentially cancerogenic for humans according to IARC (1987, updated 14.August 2007 at http://monographs.iarc.fr/ENG/Classification/crthgr01.php), i.e., categories 1, 2A, and 2B (are, possibly and probably carcinogenic). NB.: the update inlcludes Chrysene as cancerogenic and hence, KPAH with Chrysene should not be used in Klif's classification system for this sum-variable (Molvær *et al.* 1997).

5) Indicates non ortho- co-planer PCB compounds i.e., those that lack Cl in positions 1, 1', 5, and 5'

*) The Pesticide Index, second edition. The Royal Society of Chemistry, 1991.

Other abbreviations *andre forkortelser*

	English	*Norwegian*
TEQ	"Toxicity equivalency factors" for the most toxic compounds within the following groups: • polychlorinated dibenzo-p-dioxins and dibenzofurans (**PCDD/PCDFs**). Equivalents calculated after Nordic model (Ahlborg 1989) [1] or international model (Int./EPA, cf. Van den Berg *et al.* 1998) [2] • non-ortho and mono-ortho substituted chlorobiphenyls after WHO model (Ahlborg *et al.* 1994) [3] or Safe (1994, cf. NILU pers. comm.)	*"Toxisitetsekvivalentfaktorer" for de giftigste forbindelsene innen følgende grupper.* • *polyklorerte dibenzo-p-dioksiner og dibenzofuraner (**PCDD/PCDF**). Ekvivalentberegning etter nordisk modell (Ahlborg 1989) [1] eller etter internasjonal modell (Int./EPA, cf. Van den Berg* et al. *1998) [2]* • *non-orto og mono-orto substituerte klorobifenyler etter WHO modell (Ahlborg* et al. *1994) [3] eller Safe (1994, cf. NILU pers. medd.)*
ppm	parts per million, mg/kg	*deler pr. milliondeler, mg/kg*
ppb	parts per billion, μg/kg	*deler pr. milliarddeler, μg/kg*
ppp	parts per trillion, ng/kg	*deler pr. tusen-milliarddeler, ng/kg*
d.w.	dry weight basis	*tørrvekt basis*
w.w.	wet weight or fresh weight basis	*våtvekt eller friskvekt basis*

[1]) Ahlborg, U.G., 1989. Nordic risk assessment of PCDDs and PCDFs. Chemosphere 19:603-608.

[2]) Van den Berg, Birnbaum, L, Bosveld, A. T. C. and co-workers, 1998. Toxic equivalency factors (TEFs) for PCBs, PCDDs, PCDFs for humans and wildlife. Environ Hlth. Perspect. 106:775-792.

[3]) Ahlborg, U.G., Becking G.B., Birnbaum, L.S., Brouwer, A, Derks, H.J.G.M., Feely, M., Golor, G., Hanberg, A., Larsen, J.C., J.C., Liem, A.K.G., Safe, S.H., Schlatter, C., Wärn, F., Younes, M., Yrjänheikki, E., 1994. Toxic equivalency factors for dioxin-like PCBs. Report on a WHO-ECEH and IPSC consultation, December 1993. Chemosphere 28:1049-1067.

Appendix D
Classification of environmental quality

Table 13. *Climate and Pollution Agency environmental classification system of contaminants in blue mussel and fish (Molvær et al. 1997) and proposed revisions (shaded) for Class I concentrations (Knutzen & Green 2001b) used in this report.*

Contaminant			**Classification (upper limit for Classes I-IV)** *Degree of pollution*				
			I ***Insignificant***	**II** ***Moderate***	**III** ***Marked***	**IV** ***Severe***	**V** ***Extreme***
Blue mussel							
Arsenic (As)	mg/kg	w.w. 2)	10	30	70	140	>140
	mg/kg	d.w.	50	150	350	700	>700
Cadmium (Cd)	mg/kg	w.w. 2)	0.4	1	4	8	>8
	mg/kg	d.w.	2	5	20	40	>40
Copper (Cu)	mg/kg	w.w. 2)	2	6	20	40	>40
	mg/kg	d.w.	10	30	100	200	>200
Chromium (Cr)	mg/kg	w.w. 2)	0.2	1	3	10	>10
	mg/kg	d.w.	1	5	15	50	>50
Lead (Pb)	mg/kg	w.w. 2)	0.6	3	8	20	>20
	mg/kg	d.w.	3	15	40	100	>100
Mercury (Hg)	mg/kg	w.w. 2)	0.04	0.1	0.3	0.8	>0.8
	mg/kg	d.w.	0.2	0.5	1.5	4	>4
Nickel (Ni)	mg/kg	w.w. 2)	1	5	10	20	>20
	mg/kg	d.w.	5	25	50	100	>100
Silver (Ag)	mg/kg	d.w.	0.3	1	2	5	>5
Zinc (Zn)	mg/kg	w.w. 2)	40	80	200	500	>500
	mg/kg	d.w.	200	400	1000	2500	>2500
TBT 1)	mg/kg	d.w.	0.1	0.5	2	5	>5
∑PCB-7	µg/kg	w.w.	3 5)	15	40	100	>100
		d.w. 2)	15 2)	75	200	500	>500
∑DDT 11)	µg/kg	w.w.	2	5	10	30	>30
		d.w. 2)	10	25	50	150	>150
∑HCH 12)	µg/kg	w.w.	1	3	10	30	>30
		d.w. 2)	5	15	50	150	>150
HCB	µg/kg	w.w.	0.1	0.3	1	5	>5
		d.w. 2)	0.5	1.5	5	25	>25
∑PAH 13)	µg/kg	w.w.	50	200	2000	5000	>5000
		d.w. 2)	250	1000	10000	25000	>25000
∑KPAH	µg/kg	w.w.	10	30	100	300	>300
		d.w. 2)	50	150	500	1500	>1500
B[*a*]P	µg/kg	w.w.	1	3	10	30	>30
		d.w. 2)	5	15	50	150	>150
$TE_{PCDF/D}$ 3)	µg/t 4)	w.w.	0.2	0.5	1.5	3	>3
Cod, fillet							
Mercury (Hg)	mg/kg	w.w.	0.1	0.3	0.5	1	>1
∑PCB-7	µg/kg	w.w.	3 6)	20	50	150	>150
∑DDT 11)	µg/kg	w.w.	1	3	10	25	>25
∑HCH 12	µg/kg	w.w.	0.3 7)	2	5	15	>15
HCB	µg/kg	w.w.	0.2	0.5	2	5	>5
$TE_{PCDF/D}$	ng/kg	w.w.	< 0.1	0.3	1	2	> 2
Cod, liver							
∑PCB-7	µg/kg	w.w.	500	1500	4000	10000	>10000
∑DDT 11)	µg/kg	w.w.	200 8)	500	1500	3000	>3000
∑HCH 12)	µg/kg	w.w.	30 9)	200	500	1000	>1000
HCB	µg/kg	w.w.	20	50	200	400	>400
$TE_{PCDF/D}$ 3)	µg/t 4)	w.w.	10 10)	40	100	300	>300
Flounder, fillet							
∑PCB-7	µg/kg	w.w.	<5	20	50	150	>150
∑DDT 11)	µg/kg	w.w.	<2	4	15	40	>40
∑HCH 12)	µg/kg	w.w.	<1	3	10	30	>30
HCB	µg/kg	w.w.	<0.2	0.5	2	5	>5
$TE_{PCDF/D}$	ng/kg	w.w.	<0.1	0.3	1	3	>3

1) Tributyltin on a formula basis

2) Conversion assuming 20% dry weight

3) TCDDN (Appendix C)

4) µg/t = µg/ton = g/1000 kg (Appendix C)

5) Blue mussel-ΣPCB7: Decrease limit from 4 to 3

6) Cod fillet-ΣPCB7: Decrease limit from 5 to 3

7) Cod fillet-ΣHCH: Decrease limit from 0.5 to 0.3

8) Cod liver-ΣDDT: Proposal to either increase limit from 200 to 300 or, preferably, replace ΣDDT with p,p'-DDE and keep the limit (Knutzen & Green 2001b)

9) Cod liver-ΣHCH: Decrease limit from 50 to 30

10) Cod liver: TEPCDD/PCDF: Decrease limit from 15 to 10

11) Used in this investigation also for ppDDE

12) Used in this investigation also for γ-HCH (lindane)

13) The sum of tri- to hexacyclic PAH compounds named in EPA protocol 8310 minus naphthalene (dicyclic)-totalling 15 compounds, so that the Klif classification system can be applied

Table 14. *Provisional "high background levels" of selected contaminants, in* ***mg/kg dry weight*** *(blue mussel) and* ***mg/kg wet weight*** *(blue mussel and fish) used in this report. The respective "high background" limits are from Knutzen & Skei (1990) with mostly minor adjustments (Knutzen & Green 1995, 2001b; Molvær et al. 1997, Green & Knutzen 2003), except for dab where the suggested limit is based on CEMP-data (Knutzen & Green 1995). Especially uncertain values are marked with "?".*

Cont.	**Blue mussel** [1]		**Cod** [1]		**Flounder** [1]		**Dab** [1]		**Plaice** [1]	
			liver	**fillet**	**liver**	**fillet**	**liver**	**fillet**	**liver**	**fillet**
	mg/kg d.w.	mg/kg w.w.	mg/kg w.w.	mg/kg w.w.	mg/kg w.w.	mg/kg w.w.	mg/kg w.w.	mg/kg w.w.	mg/kg w.w.	mg/kg w.w.
Lead	3.0 [2)]	0.6 [3)]	0.1		0.3 ?		0.3 ?		0.2 ?	
Cadmium	2.0 [2)]	0.4 [3)]	0.3		0.3 ?		0.3 ?		0.2 ?	
Copper	10 [2)]	2 [3)]	20		10 ?		30 ?		10 ?	
Mercury	0.2 [2)]	0.04 [3)]		0.1 [2)]		0.1		0.1		0.1
Zinc	200 [2)]	40 [3)]	30		50 ?		60 ?		50 ?	
ΣPCB-7 [8)]	0.015 [3,9)]	0.003 [2 9)]	0.50 [2)]	0.003 [9)]	0.1	0.003 [9)]	0.5	0.005 [9)]	0.05 ?	0.004 [9)]
ppDDE	0.010 [3)]	0.002 [6)]	0.2 [9)]		0.03	0.001 [9)]	0.1	0.002 [9)]	0.01 ? [6)]	0.001 [9)]
γ HCH	0.005 [3)]	0.001 [6)]	0.03 [9)]	0.0003 [9)]	0.01	0.0003 [9)]	0.03	0.0005 [9)]	0.005 ? [6)]	0.0003 [9)]
HCB	0.0005 [3)]	0.0001 [2)]	0.02 [2)]		0.005	0.0001 [9)]	0.01	0.0002 [9)]	0.005 ?	0.0002 [9)]
TCDDN	0.000001 [3)] 0.0000002 [2)]		0.00001 [9)]							

1) Respectively: *Mytilus edulis, Gadus morhua, Platichthys flesus* and *Limanda limanda*

2) From the Norwegian Pollution Control Authority Environmental Class I ("good") (Molvær *et al.* 1997)

3) Conversion assuming 20% dry weight

4) Approximately 25% of ΣPCB-7 (Knutzen & Green 1995)

5) 1.5-2 times 75% quartile (cf. Annex B in Knutzen & Green 1995)

6) Assumed equal to limit for ΣDDT or ΣHCH, respectively, from the Norwegian Pollution Control Authority Environmental Class I ("good") (Molvær *et al.* 1997). Hence, limits for ppDDE and γHCH are probably too high (lacking sufficient and reliable reference values)

7) Mean plus 2 times standard deviation (cf. Annex B in Knutzen & Green 1995)

8) Estimated as sum of 7 individual PCB compounds (CB-28, -52, -101, -118, -138, -153 and -180) and assumed to be ca. 50% and 70% of total PCB for blue mussel and cod/flatfish, respectively

9) Flounder liver: Decrease limit from 5 to 3 and from 2 to 1 for ΣPCB7 and p,p-DDE, respectively, with regard to revisions suggested by Knutzen & Green (2001b) and Green & Knutzen (2003)

Appendix E
Overview of localities and sample count for biota 1981-2011

Nominal station positions are shown on maps in Appendix F

station: station code
stnam: station name
nomlon: Longitude (nominal)
nomlat: Latitude (nominal)
speci: species code (English, Norwegian (Latin))
MYTI EDU -blue mussel, blåskjell (*Mytilus edulis*)
NUCE LAP -dog whelk, purpursnegl (*Nucella lapillus*)
BROS BRO -tusk, brosme (*Brosme brosme)*
CHIM MON - rat fish, havmus (*Chimaera monstrosa*)
GADU MOR - Atlantic cod, torsk (*Gadus morhua*)
LEPI WHI - megrim, glassvar (*Lepidorhombus whiff-iagonis*)
LIMA LIM - dab, sandflyndre (*Limanda limanda*)
MICR KIT - lemon sole, lomre (*Microstomus kitt*)
MOLV MOL - ling, lange (*Molva molva*)
PAND BOR - shrimp, reker (*Pandalus borealis)*
PLAT FLE - flounder, skrubbe (*Platichthys flesus*)
PLEU PLA - plaice, rødspette (*Pleuronectes platessa*)
tissue: tissue:
SB: soft body
LI: liver
MU: fillet
TM: tail muscle

STATIONS AND SAMPLE COUNT FOR BIOTA

station	stnam	nomlat	nomlon	species	tissue	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
01A	Sponvika	59.089	11.226	MYTI EDU	SB		3			3					3																		3	2		
02A	Fugleskjær	59.115	10.983	MYTI EDU	SB		3			3					3																		2	3		
03A	Tisler	58.980	10.958	MYTI EDU	SB		2			3					3																		3	3		
10A1	Skagodden	70.104	30.263	MYTI EDU	SB														3	3																
10A2	Skallneset	70.104	30.263	MYTI EDU	SB																4	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
10B	Varangerfjorden	69.933	29.667	BROS BRO	LI														1																	
10B	Varangerfjorden	69.933	29.667	BROS BRO	MU														1																	
10B	Varangerfjorden	69.933	29.667	GADU MOR	BI																				22	21										
10B	Varangerfjorden	69.933	29.667	GADU MOR	BL																				25	25										
10B	Varangerfjorden	69.933	29.667	GADU MOR	LI														21	25	25	23	25	25	25	25	25	25	25	25	10	25	25	25	25	25
10B	Varangerfjorden	69.933	29.667	GADU MOR	MU														25	30	30	27	30	30	30	30	30	30	30	30	12	30	30	30	30	30
10F	Skogerøy	69.917	29.850	PLEU PLA	BI																				15	25										
10F	Skogerøy	69.917	29.850	PLEU PLA	BL																				11	24										
10F	Skogerøy	69.917	29.850	PLEU PLA	LI																	5		4	18	30	5	4	4	5		4	2	3	4	2
10F	Skogerøy	69.917	29.850	PLEU PLA	MU																	5		4	3	5	5	4	4	5		4	2	2	4	2
10G3	Vardø	70.378	31.108	NUCE LAP	SB																										2					
10G4	Vadsø	70.075	29.715	NUCE LAP	SB																										2					
11A1	Sildkrokneset (south)	69.785	30.185	MYTI EDU	SB														3	3																
11A2	Sildkrokneset (north)	69.785	30.185	MYTI EDU	SB																4	3														
11G	Brashavn	69.899	29.744	NUCE LAP	SB																						1	1	2	2	2	2	2	2	2	2
11X	Brashavn	69.899	29.744	MYTI EDU	SB																	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
131G	Lastad	58.056	7.709	NUCE LAP	SB																					1	1	1	1	2	2	2	1	2	2	2
13A	Langøsund	57.998	7.577	MYTI EDU	SB										1	4																	4	3		
13BH	Kristiansands havn	58.135	7.988	GADU MOR	LI																													25	25	25
13BH	Kristiansands havn	58.135	7.988	GADU MOR	MU																													30	30	30
14A	Aavigen	58.033	7.216	MYTI EDU	SB										3	4																	3	3		
15A	Gåsøy (Ullerø)	58.048	6.895	MYTI EDU	SB										4	4		3	3	4	4	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
15B	Ullerø area	58.050	6.717	GADU MOR	BI																	10	25	25		24	18	24	22	24	24	25	17	19	17	20
15B	Ullerø area	58.050	6.717	GADU MOR	BL																	24	25	25		23										
15B	Ullerø area	58.050	6.717	GADU MOR	LI										25	24	23	25	23	24	26	25	25	25	25	25	25	25	25	25	25	25	25	25	21	25
15B	Ullerø area	58.050	6.717	GADU MOR	MU										30	29	27	30	28	29	30	30	30	30	30	30	30	30	30	30	30	30	30	30	25	30
15C	Gåsøy (Ullerø)	57.988	7.244	PAND BOR	TM																												2			
15F	Ullerø area	58.050	6.717	LIMA LIM	BI																			20		22										
15F	Ullerø area	58.050	6.717	LIMA LIM	BL																			25		25										
15F	Ullerø area	58.050	6.717	LIMA LIM	LI											3		2	4	5	5	5	5	30	5	30	5	5	5	5	5	5	5	5	5	5
15F	Ullerø area	58.050	6.717	LIMA LIM	MU											3		2	4	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
15F	Ullerø area	58.050	6.717	MICR KIT	LI														1																	
15F	Ullerø area	58.050	6.717	MICR KIT	MU														1																	
15F	Ullerø area	58.050	6.717	PLEU PLA	LI												3	2																		
15F	Ullerø area	58.050	6.717	PLEU PLA	MU												3	2																		
15G	Gåsøy (Ullerø)	58.050	6.896	NUCE LAP	SB																					1	1	1	2	2	2	1	2	2	2	2
21D	Åkrafjord	59.800	6.183	BROS BRO	LI																			1		4										
21D	Åkrafjord	59.800	6.183	BROS BRO	MU																			1		4										
21D	Åkrafjord	59.800	6.183	CHIM MON	LI																			1		2										
21D	Åkrafjord	59.800	6.183	CHIM MON	MU																			1		2										
21D	Åkrafjord	59.800	6.183	MOLV MOL	LI																			1		4										

station	stnam	nomlat	nomlon	species	tissue	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
21D	Åkrafjord	59.800	6.183	MOLV MOL	MU																			1		4										
21F	Åkrafjord	59.750	6.117	LEPI WHI	LI																			5				5	5	5	3	5	5	5	4	3
21F	Åkrafjord	59.750	6.117	LEPI WHI	MU																			5				5	5	5	3	5	5	5	4	3
21F	Åkrafjord	59.750	6.117	LIMA LIM	LI																						5	5	5	5		5		3		
21F	Åkrafjord	59.750	6.117	LIMA LIM	MU																						5	5	5	5		5		3		
21F	Åkrafjord	59.750	6.117	PLAT FLE	BI																			11												
21F	Åkrafjord	59.750	6.117	PLAT FLE	BL																			11	25											
21F	Åkrafjord	59.750	6.117	PLAT FLE	LI																			14	11	5	5		1	5	5					
21F	Åkrafjord	59.750	6.117	PLAT FLE	MU																			3	5	5	5		1	5	5					
220G	Smørstakk	59.253	5.352	NUCE LAP	SB																	1	1	1					2							
221A	Stangeland	59.277	5.328	MYTI EDU	SB																		2	3												
221G	Stangeland	59.270	5.330	NUCE LAP	SB																		1	1												
222A	Kopervik harbour	59.283	5.316	MYTI EDU	SB																				3											
224G	Heggjelen	59.416	5.232	NUCE LAP	SB																	1	1	1	1											
226G	Karmsund bridge (east)	59.378	5.299	NUCE LAP	SB																		1	1	1											
226H	Karmsund bridge (west)	59.378	5.293	NUCE LAP	SB																	1			1											
226X	Karmsund bridge (east)	59.378	5.299	MYTI EDU	SB																		1	3	3											
227A2	Høgevarde	59.326	5.318	MYTI EDU	SB																		2	3	3	3	3	3	1	2	2	1	1	1	3	3
227G1	Melandholmen	59.337	5.313	NUCE LAP	SB																	1	1	1	1	1	1	1	1	2	2	1	2	2	2	2
22A	Espevær (west)	59.584	5.144	MYTI EDU	SB										3	3	3	3	3	3	5	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
22C	Bømlofjord	59.567	5.183	PAND BOR	TM										2																					
22F	Borøyfjorden	59.710	5.330	LIMA LIM	LI										5	5	4		5	2																
22F	Borøyfjorden	59.710	5.330	LIMA LIM	MU										5	5	4		5	2																
22F	Borøyfjorden	59.710	5.330	MICR KIT	LI													5																		
22F	Borøyfjorden	59.710	5.330	MICR KIT	MU													5																		
22F	Borøyfjorden	59.710	5.330	PLEU PLA	LI																5	5	5													
22F	Borøyfjorden	59.710	5.330	PLEU PLA	MU																5	5	5													
22G	Espevær vest	59.584	5.145	NUCE LAP	SB																					1	1	1	2	2	2	2	2	2	2	2
23A	Austvik	59.870	5.108	MYTI EDU	SB										3	3													3	3						
23B	Karihavet area	59.900	5.133	GADU MOR	BI																	22	23	24	23	25	25	25	24	25	25	23	23	25	25	25
23B	Karihavet area	59.900	5.133	GADU MOR	BL																	25	25	25	24	25	25	25	25	25	25					
23B	Karihavet area	59.900	5.133	GADU MOR	LI										25	25	25	25	25	25	26	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25
23B	Karihavet area	59.900	5.133	GADU MOR	MU										30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
23F	Karihavet area	59.900	5.133	MICR KIT	LI														1	4																
23F	Karihavet area	59.900	5.133	MICR KIT	MU														1	4																
23F	Karihavet area	59.900	5.133	PLAT FLE	LI														1																	
23F	Karihavet area	59.900	5.133	PLAT FLE	MU														1																	
23F	Karihavet area	59.900	5.133	PLEU PLA	LI														3																	
23F	Karihavet area	59.900	5.133	PLEU PLA	MU														3																	
24A	Vardøy	60.171	5.010	MYTI EDU	SB										3	3													3	3						
24G	Vardøy	60.171	5.010	NUCE LAP	SB																								1							
25A	Hinnøy	61.370	4.879	MYTI EDU	SB												3	3											3	3						
25G	Hinnøy	61.370	4.879	NUCE LAP	SB												1												1							
26A	Hamnen	61.876	5.222	MYTI EDU	SB												6	3											3	3						
26G	Hamnen	61.875	5.222	NUCE LAP	SB												1												1							
27A	Grinden	62.202	5.421	MYTI EDU	SB												2												3	3						
27G	Røydeskjær	62.183	5.740	NUCE LAP	SB												1												1							
27H	Storholmen	62.190	5.393	NUCE LAP	SB												1																			
28A	Eiksundet	62.252	5.864	MYTI EDU	SB												5	3											3	3						
28G	Grønevikholmen	62.247	5.883	NUCE LAP	SB												1												1							

station	stnam	nomlat	nomlon	species	tissue	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
	(Eiksundet)																																			
28H	Øveråneset (Hareid)	62.362	6.078	NUCE LAP	SB												1																			
29D	Høyanger area	61.150	5.840	BROS BRO	LI																												25			
29D	Høyanger area	61.150	5.840	BROS BRO	MU																												30			
29D	Høyanger area	61.150	5.840	MOLV MOL	LI																												25			
29D	Høyanger area	61.150	5.840	MOLV MOL	MU																												30			
302	Ormøya	59.878	10.758	MYTI EDU	SB												2																			
303	Malmøya	59.863	10.766	MYTI EDU	SB												1																			
304	Gåsøya	59.851	10.589	MYTI EDU	SB												3																			
305	Lysaker	59.906	10.643	MYTI EDU	SB												2																			
306	Håøya	59.713	10.555	MYTI EDU	SB												3																			
30A	Gressholmen	59.882	10.712	MYTI EDU	SB				3	3	3	4	3	3	3	3	3	3	3	3	4	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
30B	Oslo City area	59.799	10.560	GADU MOR	BI																		18	23	23	25	24	25	25	23	24	24	25	24	25	22
30B	Oslo City area	59.799	10.560	GADU MOR	BL																	20	20	25	25	25	25	25	25	25	25	25				
30B	Oslo City area	59.799	10.560	GADU MOR	LI				29	25	25	25	25	25	25	24	21	24	25	25	50	50	50	25	25	28	25	25	25	25	25	25	25	25	25	25
30B	Oslo City area	59.799	10.560	GADU MOR	MU				29	25	25	25	26	26	30	30	21	29	30	30	48	48	60	30	30	30	30	30	30	30	30	30	30	30	30	30
30C	Oslo City area	59.817	10.550	PAND BOR	TM				1								2																2			
30F	Oslo City area	59.783	10.567	PLEU PLA	LI												2		5	5																
30F	Oslo City area	59.783	10.567	PLEU PLA	MU												2		5	5																
30J	Spro	59.799	10.560	PAND BOR	TM															1																
30K	Storegrunn	59.799	10.560	PAND BOR	TM															1																
30X	West of Nesodden	59.808	10.600	GADU MOR	LI												22																			
30X	West of Nesodden	59.808	10.600	GADU MOR	MU												22																			
31A	Solbergstrand	59.619	10.650	MYTI EDU	SB	2		6	3	3	3	3	3	3	3	3	3	3	3	2	4	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
31B	Solbergstrand	59.615	10.640	GADU MOR	LI	10	27																													
31B	Solbergstrand	59.615	10.640	GADU MOR	MU	10	27																													
31C	Solbergstrand	59.615	10.640	PAND BOR	TM				1																											
31F	Solbergstrand	59.615	10.640	PLAT FLE	LI	8																														
31F	Solbergstrand	59.615	10.640	PLAT FLE	MU	8																														
32A	Rødtangen	59.525	10.427	MYTI EDU	SB	1	3			3																										
33C	Sande	59.528	10.350	PAND BOR	TM						1																									
33F	Sande (east side)	59.528	10.350	PLAT FLE	LI			25		1	1	1	1	1	5	5	5	5	5	5	15	15	13	5	5	5	5	5	5	5	5	3	5	5	5	5
33F	Sande (east side)	59.528	10.350	PLAT FLE	MU			25		25	1	1	1	1	5	5	5	5	5	5	10	10	8	5	5	5	5	5	5	5	5	3	5	5	5	5
33X	Sande (west side)	59.528	10.340	PLAT FLE	LI										3																					
33X	Sande (west side)	59.528	10.340	PLAT FLE	MU										3																					
35A	Mølen	59.488	10.498	MYTI EDU	SB	1	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
35C	Mølen-Moss	59.483	10.529	PAND BOR	TM		1						1		2																		2			
35C	Mølen-Moss	59.483	10.529	PAND BOR	XX								1																							
36A	Færder	59.027	10.526	MYTI EDU	SB	1		5	3	3	3	3	3	3	3	3	3	3	3	3	5	3	3	3	3	3	3	3	3	3	3	3	3			3
36B	Færder area	59.041	10.436	GADU MOR	BI																	21	25	25	23	25										
36B	Færder area	59.041	10.436	GADU MOR	BL																	20	25	25	23	25										
36B	Færder area	59.041	10.436	GADU MOR	LI	10	27	23	24	14	25	25	25	25	24	25	25	25	25	25	26	25	25	25	23	28	25	25	25	25	25	25	25	21	25	25
36B	Færder area	59.041	10.436	GADU MOR	MU	10	27	23	24	14	25	25	26	26	29	30	30	30	30	30	30	30	30	30	27	30	30	30	30	30	30	30	25	25	30	30
36C	Færder area	59.040	10.436	PAND BOR	TM																												2			
36F	Færder area	59.067	10.383	LIMA LIM	BI																			11	9	20										
36F	Færder area	59.067	10.383	LIMA LIM	BL																			20	9	20										
36F	Færder area	59.067	10.383	LIMA LIM	LI										5	5	5	5	5	5	5	5	5	25	14	24	5	5	5	5	5	5	5	5	5	3
36F	Færder area	59.067	10.383	LIMA LIM	MU										5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	3
36G	Færder	59.027	10.526	NUCE LAP	SB																	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2
41A	Fensneset (Grytøya)	68.935	16.641	MYTI EDU	SB														3	3	4	3									3	3				

station	stnam	nomlat	nomlon	species	tissue	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
41G	Harstad (Trondenes)	68.822	16.565	NUCE LAP	SB																				1						2					
41G1	Feneset	68.935	16.641	NUCE LAP	SB																										2					
42A	Tennskjær (Malangen)	69.478	18.302	MYTI EDU	SB														3	3											3	3				
42G	Finnsnes	69.226	17.975	NUCE LAP	SB																				1											
43A	Lyngneset (Langfjord)	70.101	20.547	MYTI EDU	SB														3	3		3									3	3				
43B	Kvænangen (Olderfjord)	70.226	21.397	GADU MOR	LI														25	25	25												20	21		
43B	Kvænangen (Olderfjord)	70.226	21.397	GADU MOR	MU														30	30	30												24	21		
43B1	Leisundet	70.226	21.397	GADU MOR	LI																										25	25				
43B1	Leisundet	70.226	21.397	GADU MOR	MU																										30	30				
43BH	Tromsø havn	69.653	18.974	GADU MOR	LI																													25	25	25
43BH	Tromsø havn	69.653	18.974	GADU MOR	MU																													30	30	30
43F	Kvænangen (Olderfjord)	70.224	21.397	LIMA LIM	LI																3															
43F	Kvænangen (Olderfjord)	70.224	21.397	LIMA LIM	MU																3															
43F	Kvænangen (Olderfjord)	70.224	21.397	MICR KIT	LI																1															
43F	Kvænangen (Olderfjord)	70.224	21.397	MICR KIT	MU																1															
43F1	Leisundet	70.224	21.397	PLEU PLA	LI																										4	5				
43F1	Leisundet	70.224	21.397	PLEU PLA	MU																										4	5				
43G	Skjervøy	70.036	20.996	NUCE LAP	SB																				1						2					
43G1	Lyngneset (Langfjord)	70.101	20.547	NUCE LAP	SB																										2					
44A	Elenheimsundet	70.516	22.246	MYTI EDU	SB														3	3	4	3									3	3				
44G	Alta	69.990	23.306	NUCE LAP	SB																				1											
44G1	Elenheimsundet	70.516	22.246	NUCE LAP	SB																										2					
45A	Sauhamneset	70.764	24.320	MYTI EDU	SB														3	3											3	3				
45B	Hammerfest area	70.767	24.108	GADU MOR	LI														24	25																
45B	Hammerfest area	70.767	24.108	GADU MOR	MU														29	30																
45B1	Revsbotn	70.767	24.108	GADU MOR	LI																										25	25				
45B1	Revsbotn	70.767	24.108	GADU MOR	MU																										30	30				
45F	Hammerfest area	70.667	24.667	PLEU PLA	LI																										5	5				
45F	Hammerfest area	70.667	24.667	PLEU PLA	MU																										5	5				
45G	Sauhamneset	70.764	24.320	NUCE LAP	SB																				1						2					
46A	Smines (Altesula)	70.973	25.802	MYTI EDU	SB														3	3	5										3	3				
46H	Honningsvåg	70.985	25.966	MYTI EDU	SB																										3					
46H	Honningsvåg	70.985	25.966	NUCE LAP	SB																				1						2					
47A	Kifjordneset	70.881	27.370	MYTI EDU	SB														3	3											2	3				
47G	Kifjordneset	70.881	27.370	NUCE LAP	SB																				1						2					
48A	Trollfjorden (Tanafjord)	70.694	28.555	MYTI EDU	SB														3	3	3										3	3				
48G	Mehamn	71.043	27.839	NUCE LAP	SB																				1											
48G1	Trollfjorden (Tanafjord)	70.694	28.555	NUCE LAP	SB																										2					
49A	Nordfjorden (Syltefjord)	70.550	30.086	MYTI EDU	SB														3	3											3	3				
49G	Syltefjorden	70.550	30.086	NUCE LAP	SB																										2					
51A	Byrkjenes	60.084	6.551	MYTI EDU	SB							3	3							1	3	3	3	6	3	3	3	3	3	3	3	3	3	3	3	3
52A	Eitrheimsneset	60.097	6.533	MYTI EDU	SB									3	3	3	3	2	3	3	3	3	3	6	3	3	3	3	3	3	3	3	3	3	3	3
53B	Inner Sørfjord	60.167	6.567	GADU MOR	BI																	15	28	24	25	25	24	24	25	24	24	25	22	19	24	25
53B	Inner Sørfjord	60.167	6.567	GADU MOR	BL																	15	30	25	25	25	25	25	25	25	25	25				
53B	Inner Sørfjord	60.167	6.567	GADU MOR	LI							13	1	12	25	25	22	25	25	25	50	30	30	25	25	25	25	25	25	25	25	25	25	19	25	25
53B	Inner Sørfjord	60.167	6.567	GADU MOR	MU							12	1	15	30	30	26	30	30	30	56	36	36	30	30	30	30	30	30	30	30	30	30	23	30	30
53B	Inner Sørfjord	60.167	6.567	SALM TRU	LI										12																					
53B	Inner Sørfjord	60.167	6.567	SALM TRU	MU										12																					
53D	Digraneset	60.183	6.575	BROS BRO	LI																					4										
53D	Digraneset	60.183	6.575	BROS BRO	MU																					4										

station	stnam	nomlat	nomlon	species	tissue	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
53D	Digraneset	60.183	6.575	CHIM MON	LI																					2										
53D	Digraneset	60.183	6.575	CHIM MON	MU																					2										
53D	Digraneset	60.183	6.575	MOLV MOL	LI																					5							25			
53D	Digraneset	60.183	6.575	MOLV MOL	MU																					5							30			
53F	Inner Sørfjord	60.167	6.567	GLYP CYN	LI							3																								
53F	Inner Sørfjord	60.167	6.567	GLYP CYN	MU							3																								
53F	Inner Sørfjord	60.167	6.567	PLAT FLE	BI																			25	11	12										
53F	Inner Sørfjord	60.167	6.567	PLAT FLE	BL																			23	11	12										
53F	Inner Sørfjord	60.167	6.567	PLAT FLE	LI				22				1	30	5	5	5	5	4	4	11	15	11	30	13	17	5	5	5	5		5	5	2	4	1
53F	Inner Sørfjord	60.167	6.567	PLAT FLE	MU				22				1	30	5	5	5	5	4	4	11	15	11	5	2	5	5	5	5	5		5	5	2	4	1
56A	Kvalnes	60.221	6.602	MYTI EDU	SB							3	15	3	3	3	3	3	3	3	3	3	3	6	3	3	3	3	3	3	3	3	3	3	3	3
56A1	Kvalnes (north)	60.225	6.604	MYTI EDU	SB																			3			2									
56A2	Kjeken	60.339	6.655	MYTI EDU	SB																			3			2									
56A3	Sekse	60.261	6.623	MYTI EDU	SB																						2									
56A4	Rosstadnes	60.287	6.624	MYTI EDU	SB																						2									
56A5	Lofthus (south)	60.323	6.652	MYTI EDU	SB																						2									
56D	Kvalnes	60.250	6.600	BROS BRO	LI																			3												
56D	Kvalnes	60.250	6.600	BROS BRO	MU																			3												
56D	Kvalnes	60.250	6.600	CHIM MON	LI																			1												
56D	Kvalnes	60.250	6.600	CHIM MON	MU																			1												
56D	Kvalnes	60.250	6.600	MOLV MOL	LI																			1												
56D	Kvalnes	60.250	6.600	MOLV MOL	MU																			1												
57A	Krossanes	60.387	6.689	MYTI EDU	SB							3	3	3	3	3	3	3	3	3	3	3	3	6	3	3	3	3	3	3	3	3	3	3	3	3
57A1	Urdheim	60.373	6.678	MYTI EDU	SB																			3			2									
57A2	Ernes	60.353	6.662	MYTI EDU	SB																						2									
63A	Ranaskjær	60.421	6.422	MYTI EDU	SB							3	3	3	3	3	3	3	3	3	3	3	3	6	3	3	3	3	3	3	3	3	3	3	3	3
65A	Vikingneset	60.242	6.153	MYTI EDU	SB							3	15	3	3	3	3	3	3	3	3	3	3	6	3	3	3	3	3	3	3	3	3	3	3	3
67B	Strandebarm area	60.267	6.033	GADU MOR	BI																	25	24	25	15	25										
67B	Strandebarm area	60.267	6.033	GADU MOR	BL																	25	25	25	13	24										
67B	Strandebarm area	60.267	6.033	GADU MOR	LI							22	1	22	16	19	8	12	18	25	35	25	25	25	25	25	25	25	25	25	25	25	20	25	14	2
67B	Strandebarm area	60.267	6.033	GADU MOR	MU							22	1	23	16	24	9	14	22	30	40	30	30	30	30	30	30	30	30	30	30	30	24	30	17	2
67D	Strandebarm	61.150	6.033	MOLV MOL	LI																												17			
67D	Strandebarm	61.150	6.033	MOLV MOL	MU																												21			
67F	Strandebarm area	60.267	6.033	LEPI WHI	LI				19			1	1	30	5	5	3	5	5	5	5	5	5	5	5	5	5	5	2	5	4	5	5	5	3	2
67F	Strandebarm area	60.267	6.033	LEPI WHI	MU				19			1	1	30	5	5	3	5	5	5	5	5	5	5	5	5	5	5	2	5	4	5	5	5	3	2
67F	Strandebarm area	60.267	6.033	LIMA LIM	LI																		5													
67F	Strandebarm area	60.267	6.033	LIMA LIM	MU																		5													
67F	Strandebarm area	60.267	6.033	PLAT FLE	BI																			25	22	25										
67F	Strandebarm area	60.267	6.033	PLAT FLE	BL																			25	23	23										
67F	Strandebarm area	60.267	6.033	PLAT FLE	LI																3		4	30	28	30	5	5	5	5	5	5	5	5		3
67F	Strandebarm area	60.267	6.033	PLAT FLE	MU																3		4	5	5	5	5	5	5	5	5	5	5	5		3
69A	Lille Terøy	59.982	5.753	MYTI EDU	SB												3	1	3	3	3	3	3	6	3	3	3	3	3	3	3	3	3	3	3	3
71A	Bjørkøya (Risøyodden)	59.023	9.754	MYTI EDU	SB	1	3	3	3	2	3	3	3	3	3	3	3	3	3	3	4	3	3	3	3	3	3	3	3	3	3	4	3	3	3	3
71G	Fugløyskjær	58.981	9.808	LITT LIT	SB																												1	1	1	1
71G	Fugløyskjær	58.981	9.808	NUCE LAP	SB																					1	1	1	1	1	1	2		2		
73A	Lyngholmen	59.045	10.295	MYTI EDU	SB										3																		3	5		
74A	Langholmane	58.955	9.868	MYTI EDU	SB										3																		3			
74G	Langholmane	58.955	9.868	NUCE LAP	SB																													2		
76A	Risøy	58.731	9.272	MYTI EDU	SB										3	3	3	3			3	3	3	3	3	3	3	3	3	3	3	3	5	3	4	3
76G	Risøy	58.728	9.276	NUCE LAP	SB																					1	1	1	1	2	2	2	2	2	2	2

station	stnam	nomlat	nomlon	species	tissue	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
77A	Nordstrand	58.524	8.942	MYTI EDU	SB										3	3																	3	5		
77B	Borøy area	58.550	9.017	GADU MOR	LI										14	25																	25	25		
77B	Borøy area	58.550	9.017	GADU MOR	MU										17	30																	30	30		
77C	Borøy area	58.483	9.167	PAND BOR	TM										2																		2			
77F	Borøy area	58.550	9.017	LIMA LIM	LI											3																	5	5		
77F	Borøy area	58.550	9.017	LIMA LIM	MU																												5	5		
79A	Gjerdsvoldsøyen (east)	58.413	8.742	MYTI EDU	SB										3	3																	3	3		
80A	Østmarknes	63.457	10.450	MYTI EDU	SB				1	2																										
80BH	Trondheim	63.442	10.392	GADU MOR	LI																													21	4	15
80BH	Trondheim	63.442	10.392	GADU MOR	MU																													25	5	18
81A	Biologisk Stasjon	63.442	10.349	MYTI EDU	SB				1																											
82A	Flakk	63.450	10.206	MYTI EDU	SB				1	2	2	3	1	2		3	2	2		3	3								3	3						
82G	Flakk	63.451	10.203	NUCE LAP	SB												1												1							
83A	Frøsetskjær	63.428	10.107	MYTI EDU	SB				1																											
84A	Tråsåvika	63.347	9.957	MYTI EDU	SB				2	3	3	3	3	3		3	3	3		3	3								3	3						
84B	Tråsåvika	63.349	9.961	GADU MOR	LI				13	1	1	1	1																							
84B	Tråsåvika	63.349	9.961	GADU MOR	MU				13	10	1	1	1																							
84B	Tråsåvika	63.349	9.961	MELA AEG	LI						1	1	1																							
84B	Tråsåvika	63.349	9.961	MELA AEG	MU						1	1	1																							
84B	Tråsåvika	63.349	9.961	MERL MNG	LI							1	1																							
84B	Tråsåvika	63.349	9.961	MERL MNG	MU							1	1																							
84B	Tråsåvika	63.349	9.961	POLL POL	LI					1	1		1																							
84B	Tråsåvika	63.349	9.961	POLL POL	MU					16	1		1																							
84B	Tråsåvika	63.349	9.961	POLL VIR	LI								1																							
84B	Tråsåvika	63.349	9.961	POLL VIR	MU								1																							
84F	Tråsåvika	63.349	9.961	MICR KIT	LI								1																							
84F	Tråsåvika	63.349	9.961	MICR KIT	MU								1																							
84G	Tråsåvika	63.347	9.957	NUCE LAP	SB												1																			
85A	Geitstrand	63.364	9.928	MYTI EDU	SB				1																											
86A	Geitnes	63.443	9.978	MYTI EDU	SB				1																											
87A	Ingdalsbukt	63.462	9.907	MYTI EDU	SB				1	1	1	1	1	1		1	1	1		2	2								1	3						
87G	Ingdalsbukt	63.462	9.907	NUCE LAP	SB												1												1							
88A	Rødberg	63.487	10.000	MYTI EDU	SB				1	1																										
91A	Nerdvika	63.353	8.157	MYTI EDU	SB												3	3	3											3						
92A1	Krokholmen	64.054	10.030	MYTI EDU	SB												6	3	3	3	3	3														
92A2	Nygården	64.054	10.030	MYTI EDU	SB																									3						
92B	Stokken area	64.171	9.887	GADU MOR	LI													25	24	25	25								25	25			25	25		
92B	Stokken area	64.171	9.887	GADU MOR	MU													30	29	30	30								30	30			30	25		
92F	Stokken area	64.171	9.887	LIMA LIM	LI															1																
92F	Stokken area	64.171	9.887	LIMA LIM	MU															1																
92F	Stokken area	64.171	9.887	PLEU PLA	LI															1										5						
92F	Stokken area	64.171	9.887	PLEU PLA	MU															1										5						
93A	Sætervik	64.395	10.483	MYTI EDU	SB												3	3											3	3						
93G	Sætervika (Stadsvikskjæret)	64.395	10.500	NUCE LAP	SB												1																			
94A	Landfast	65.644	12.006	MYTI EDU	SB												3	3											3	3						
94G	Steinskjær (Landfast)	65.641	11.998	NUCE LAP	SB												1												1							
95A	Sleipnesodden (south)	66.710	13.253	MYTI EDU	SB												3	3											3	3						
95G	Sleipnesodden (south)	66.707	13.238	NUCE LAP	SB												1												1							
96A	Breiviken	66.296	12.834	MYTI EDU	SB												6	3											3	3						

station	stnam	nomlat	nomlon	species	tissue	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
97A	Klokkholmen	67.665	14.743	MYTI EDU	SB												3	3											3	3						
97G	Varnesodden	67.801	14.750	NUCE LAP	SB												1												1							
97H	Småfloholmene	67.891	14.818	NUCE LAP	SB												1																			
98A1	Yitj-Skarvsundet	68.158	14.653	MYTI EDU	SB												3	3																		
98A2	Husvaagen area	68.258	14.664	MYTI EDU	SB																	3		3	3	3	3	3	3	3	3	3	3	3	3	3
98A3	Vatterfjord	68.258	14.664	MYTI EDU	SB																		3													
98B1	Bjørnerøya (east)	68.247	14.803	GADU MOR	LI												25	24	25	24	26	25	25	25			25	21	25	25	25	8	25	25	25	25
98B1	Bjørnerøya (east)	68.247	14.803	GADU MOR	MU												30	29	30	29	30	30	30	30			30	25	30	30	30	10	30	30	30	30
98B2	Austnesfjorden	68.247	14.803	GADU MOR	BI																				14	22										
98B2	Austnesfjorden	68.247	14.803	GADU MOR	BL																				5	25										
98B2	Austnesfjorden	68.247	14.803	GADU MOR	LI																				25	25										
98B2	Austnesfjorden	68.247	14.803	GADU MOR	MU																				30	30										
98F1	Bjørnerøya (east)	68.219	14.808	GLYP CYN	LI															1																
98F1	Bjørnerøya (east)	68.219	14.808	GLYP CYN	MU															1																
98F1	Bjørnerøya (east)	68.219	14.808	LIMA LIM	LI													4	1	1	5															
98F1	Bjørnerøya (east)	68.219	14.808	LIMA LIM	MU													4	1	1	5															
98F1	Bjørnerøya (east)	68.219	14.808	MICR KIT	LI														1	1																
98F1	Bjørnerøya (east)	68.219	14.808	MICR KIT	MU														1	1																
98F1	Bjørnerøya (east)	68.219	14.808	PLEU PLA	LI													3		5		4	5	1												
98F1	Bjørnerøya (east)	68.219	14.808	PLEU PLA	MU													3		5		4	5	1												
98F2	Husholmen	68.219	14.808	PLEU PLA	BI																				18	24										
98F2	Husholmen	68.219	14.808	PLEU PLA	BL																				13	19										
98F2	Husholmen	68.219	14.808	PLEU PLA	LI																				22	30	4	3	5	2	5	5	5	5	5	5
98F2	Husholmen	68.219	14.808	PLEU PLA	MU																				4	5	4	3	5	2	5	5	5	5	5	5
98G	Svolvær området	68.249	14.663	NUCE LAP	SB																					1	1	1	2	2	2	2	2	2	2	2
98X	Skrova harbour	68.165	14.659	MYTI EDU	SB														3	4	4															
99A	Brunvær	68.005	15.093	MYTI EDU	SB												6	3											3	3						
I001	Sponvikskansen	59.090	11.210	MYTI EDU	SB															3	3															
I011	Kråkenebbet	59.101	11.289	MYTI EDU	SB															3	3															
I021	Kjøkø (south)	59.130	10.952	MYTI EDU	SB															3	3	3	3		3	3	3									
I022	West Damholmen	59.102	11.045	MYTI EDU	SB															3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	
I023	Singlekalven (south)	59.095	11.137	MYTI EDU	SB															3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
I024	Kirkøy (north west)	59.080	10.986	MYTI EDU	SB															3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	
I080	Østmerknes	63.457	10.450	MYTI EDU	SB															3	3															
I131A	Lastad	58.056	7.709	MYTI EDU	SB															3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
I132	Svensholmen	58.125	7.989	MYTI EDU	SB																		3	3	3	3	3	3	3	3	3	3	4	3	3	3
I1321	Fiskåtangen	58.128	7.977	MYTI EDU	SB															4	4	3														
I133	Odderø (west)	58.132	8.002	MYTI EDU	SB															4	4	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
I201	Ekkjegrunn (G1)	59.643	6.357	MYTI EDU	SB															3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
I205	Bølsnes (G5)	59.592	6.300	MYTI EDU	SB															3		3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
I241	Nordnes	60.401	5.302	MYTI EDU	SB															3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
I242	Gravdalsneset	60.395	5.267	MYTI EDU	SB															3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	
I243	Hegreneset	60.415	5.305	MYTI EDU	SB															3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
I301	Akershuskaia	59.905	10.736	MYTI EDU	SB												2			3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
I304	Gåsøya	59.851	10.589	MYTI EDU	SB															3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
I306	Håøya	59.713	10.555	MYTI EDU	SB															3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
I307	Ramtonholmen	59.745	10.523	MYTI EDU	SB															3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
I711	Steinholmen	59.052	9.677	MYTI EDU	SB															3	4	3	3	3	3		3									
I712	Gjemesholmen	59.045	9.707	MYTI EDU	SB															3	4	3	3	3	3	3	3	3	3	3	3	3	3	4	3	3
I713	Strømtangen	59.050	9.692	MYTI EDU	SB																						3	3	3	3	3	3	3	3	3	3

station	stnam	nomlat	nomlon	species	tissue	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
I911	Horvika	62.735	8.523	MYTI EDU	SB															3	3															
I912	Honnhammer	62.853	8.162	MYTI EDU	SB															3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
I913	Fjøseid	62.810	8.275	MYTI EDU	SB																			3	3	3	3	3	3	3	3	3	3	3	3	3
I914	Flåøya (southeast)	62.756	8.445	MYTI EDU	SB																							3								
I915	Flåøya (northwest)	62.758	8.440	MYTI EDU	SB																							3	3	3	3	3	3	3		
I916	Sundalsfjord (Hydro kai)	62.684	8.552	MYTI EDU	SB																								3	3						
I962	Koksverktomta (B2)	66.326	14.140	MYTI EDU	SB															3	3	2	3													
I964	Toraneskaien	66.322	14.133	MYTI EDU	SB																						3	3	3	3	3	3	3	3	3	3
I965	Moholmen (B5)	66.312	14.126	MYTI EDU	SB																					3	3	3	3	3	3	3	4	3	3	3
I969	Bjørnbærviken (B9)	66.280	14.035	MYTI EDU	SB															3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3

Appendix F
Map of stations

Nominel station positions 1981-2011
(cf. Appendix G and Appendix J)

Appendix F (cont.) Map of stations

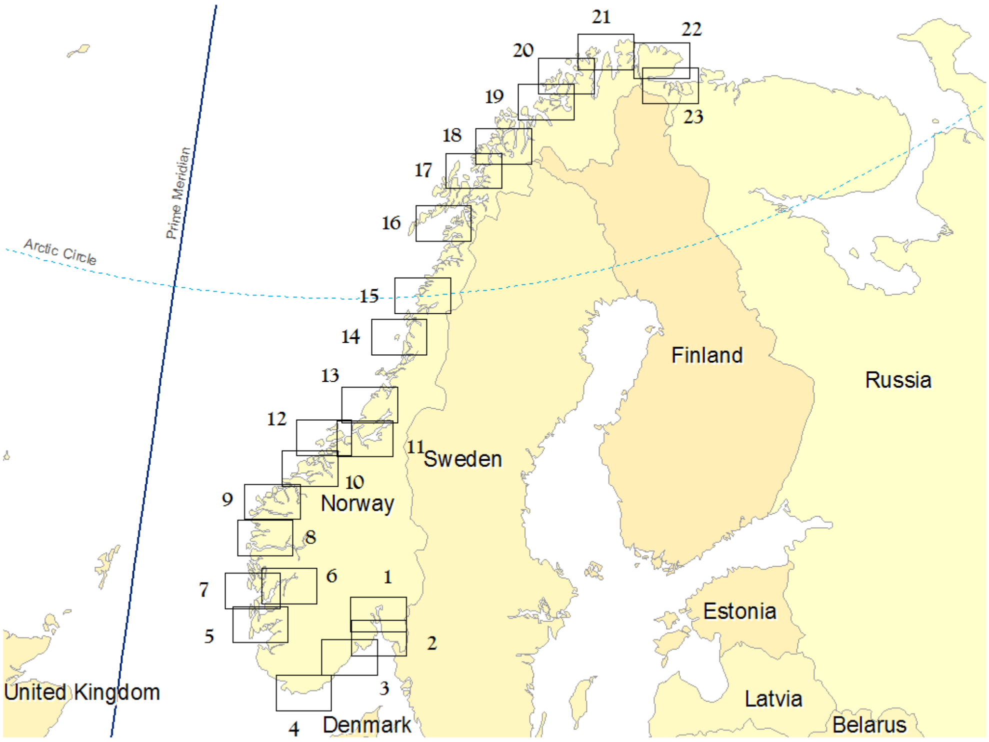
NOTES

The station's nominal position is plotted, and not the specific positions that may have differed from one year to another. The maps are generated using ArcGIS version 9.1.

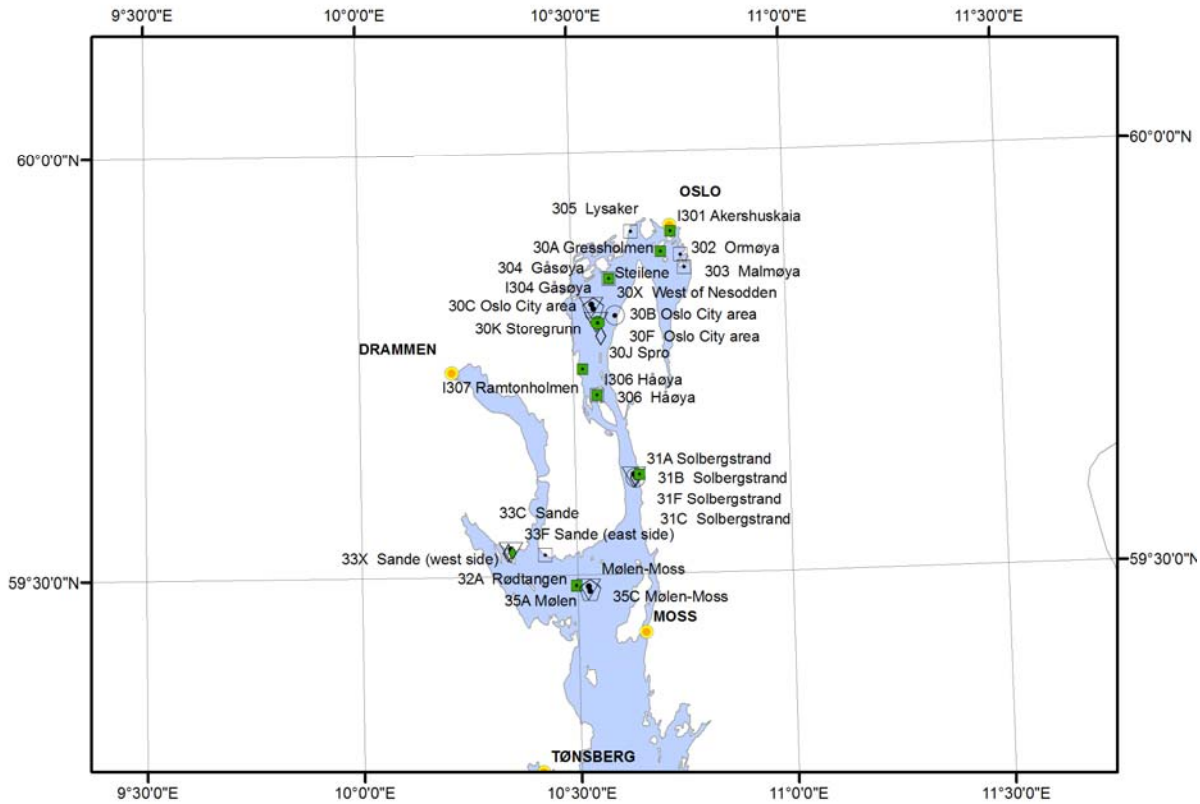
The following symbols and codes apply:

All years	2011	Explanation	Station code
		Sediment	<number>S
		Blue mussel	<number>A
		Blue mussel	I<number/letter> 1)
		Blue mussel	R<number/letter> 1)
		Dog whelk	<number>F
		Prawn	<number>C
		Atlantic cod	<number>A
		Flatfish	<number>D/E
		Other round fish	
		Town or city	

1) Supplementary station used in Klif blue mussel pollution (I) or reference (R) index (cf. Appendix J).

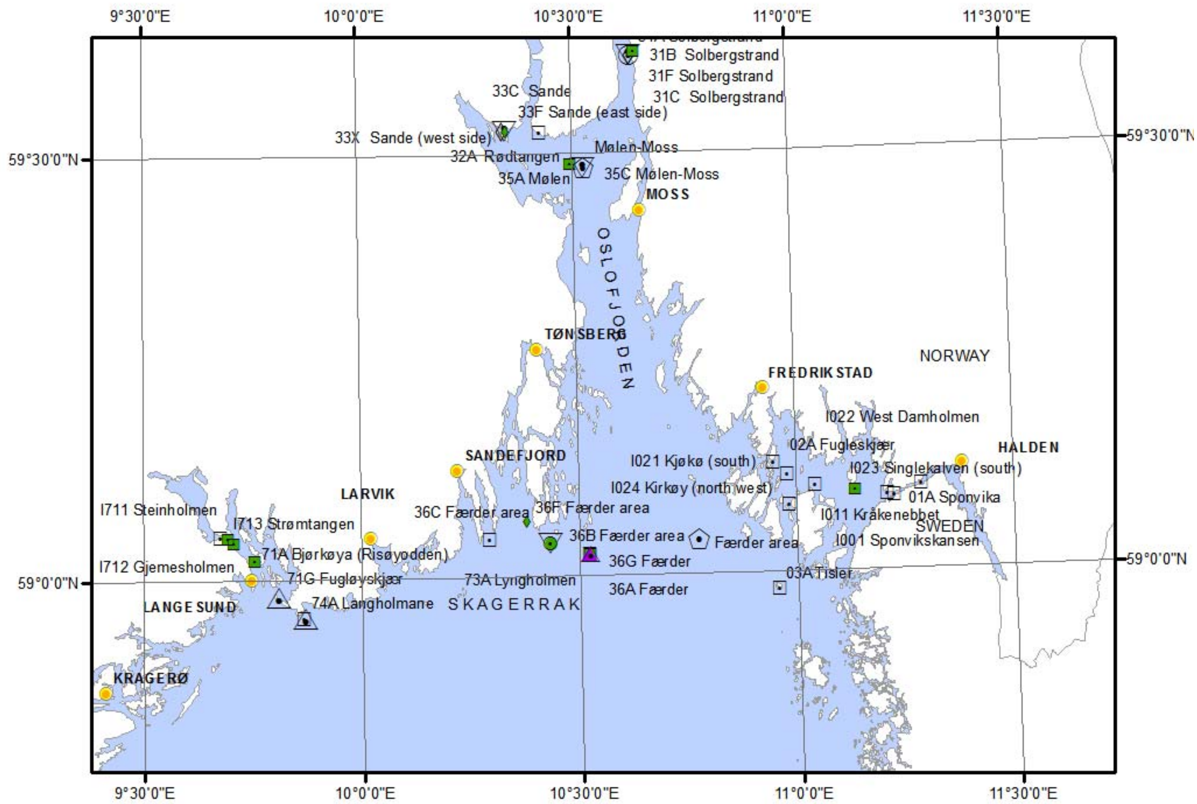


CEMP stations Norway. Numbers indicate map reference that follow.
Note: distance between two lines of latitude is 15 nautical miles (= 27.8 km).



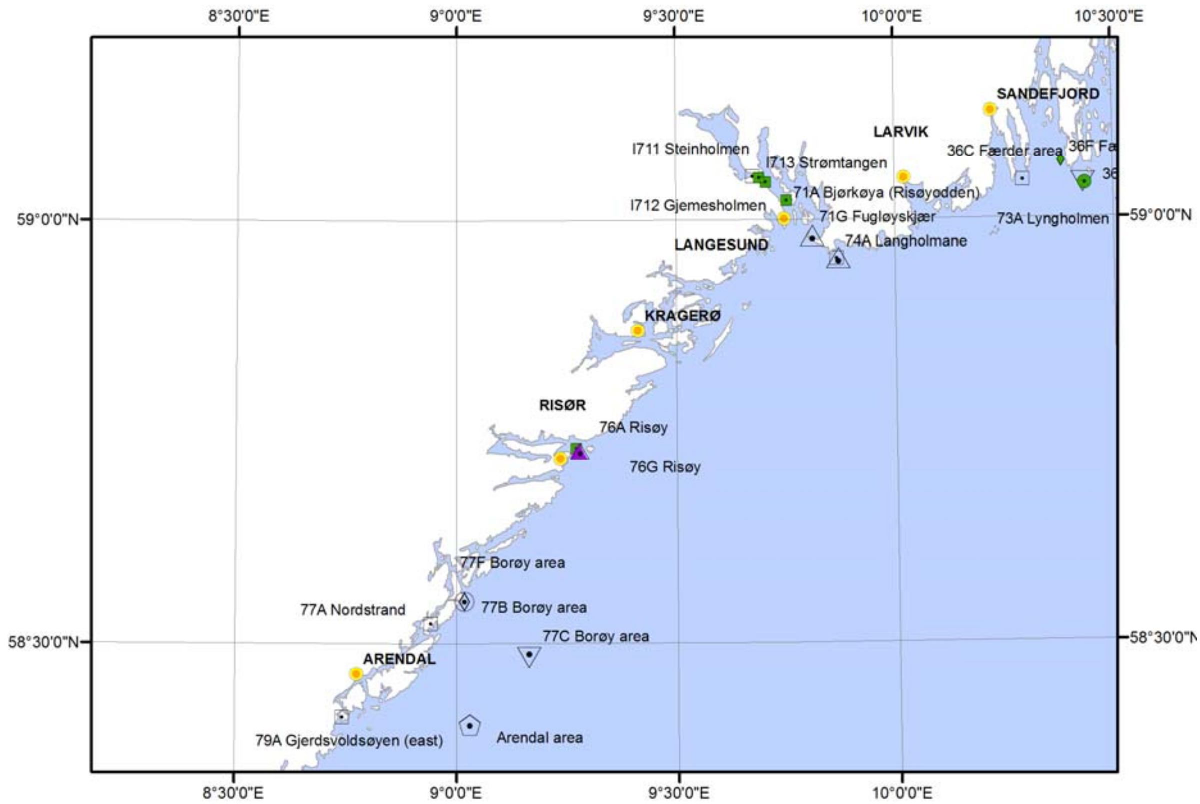
OSLO
305 Lysaker
I301 Akershuskaia
30A Gressholmen
302 Ormøya
304 Gåsøya
Steilene
303 Malmøya
I304 Gåsøya
30X West of Nesodden
30C Oslo City area
30B Oslo City area
30K Storegrunn
30F Oslo City area
30J Spro
DRAMMEN
I306 Håøya
I307 Ramtonholmen
306 Håøya
31A Solbergstrand
31B Solbergstrand
31F Solbergstrand
31C Solbergstrand
33C Sande
33F Sande (east side)
33X Sande (west side)
Mølen-Moss
32A Rødtangen
35A Mølen
35C Mølen-Moss
MOSS
TØNSBERG

MAP 1

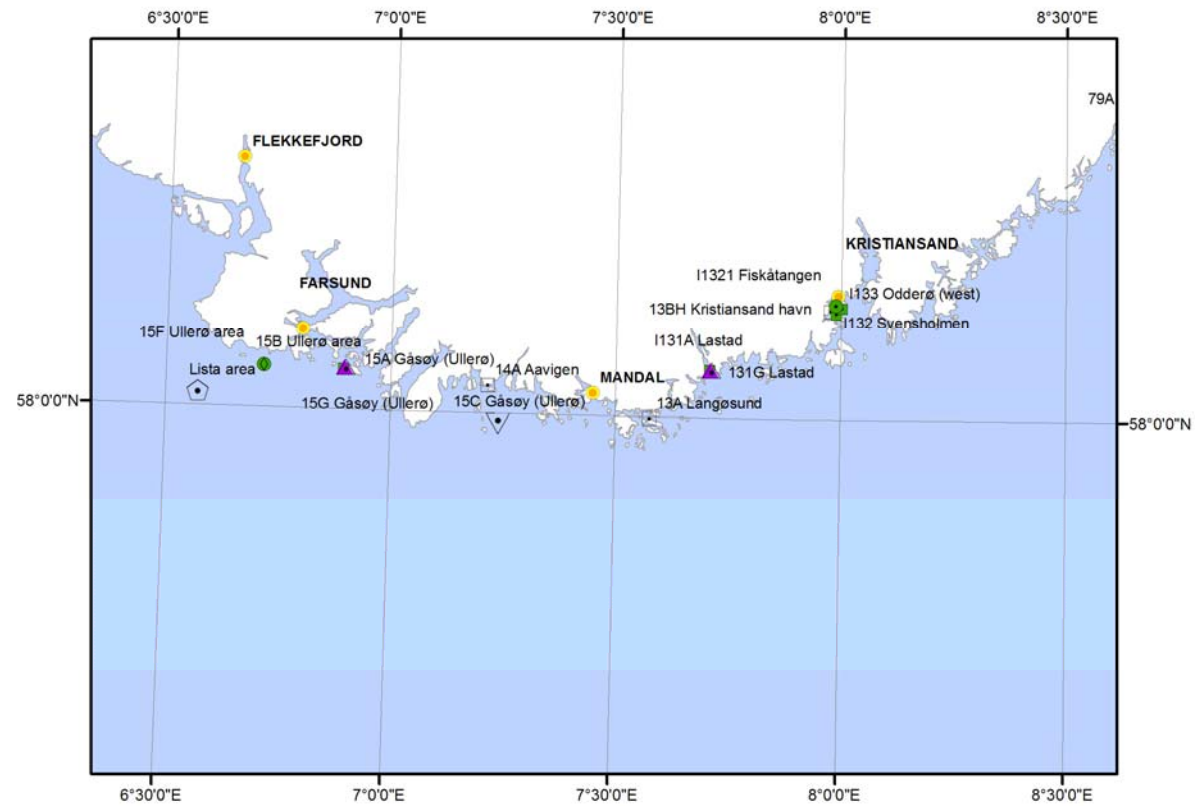


31B Solbergstrand
31F Solbergstrand
31C Solbergstrand
33C Sande
33F Sande (east side)
33X Sande (west side)
Mølen-Moss
32A Rødtangen
35A Mølen
35C Mølen-Moss
MOSS
OSLOFJORDEN
TØNSBERG
NORWAY
FREDRIKSTAD
I022 West Damholmen
02A Fugleskjær
HALDEN
SANDEFJORD
I021 Kjøkø (south)
I023 Singlekalven (south)
I024 Kirkøy (north west)
01A Sponvika
LARVIK
I711 Steinholmen
36C Færder area
36F Færder area
I011 Kråkenebbet
I713 Strømtangen
SWEDEN
36B Færder area
Færder area
I001 Sponvikskansen
71A Bjørkøya (Risøyodden)
36G Færder
I712 Gjemesholmen
71G Fugløyskjær
73A Lyngholmen
03A Tisler
36A Færder
LANGESUND
74A Langholmane
SKAGERRAK
KRAGERØ

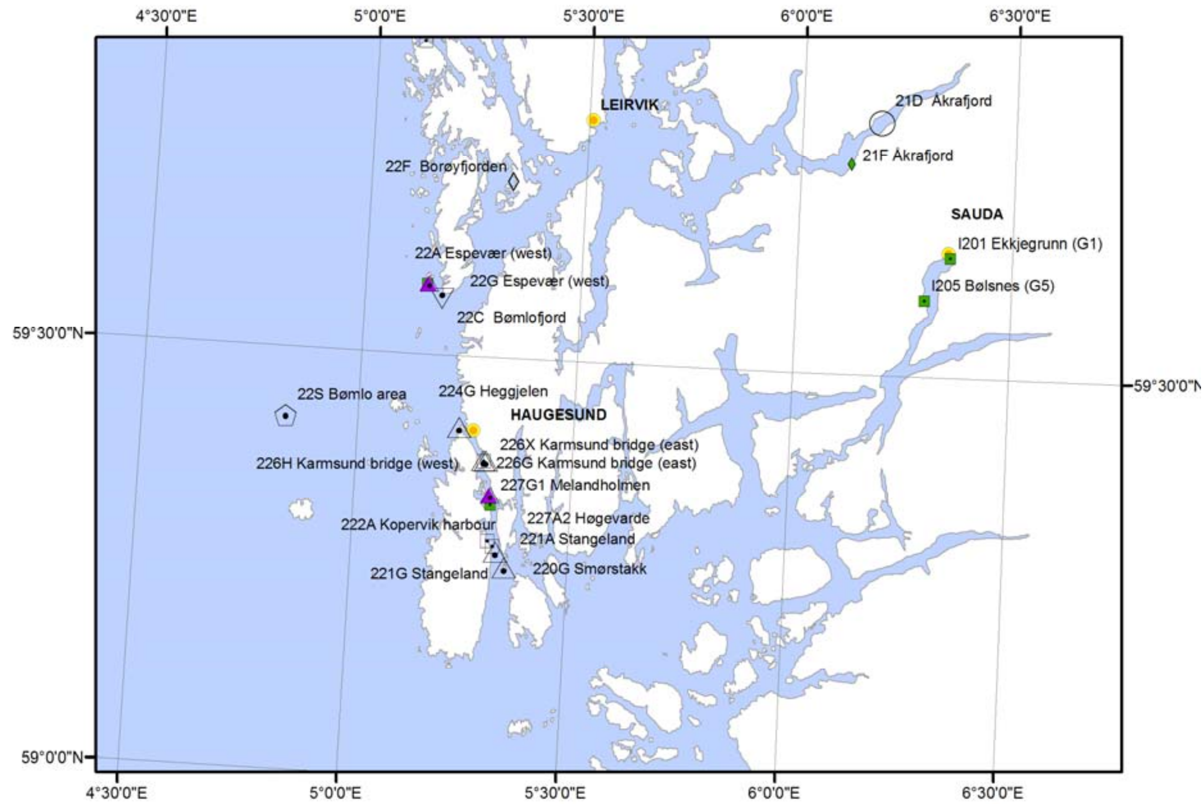
MAP 2


SANDEFJORD
LARVIK
I711 Steinholmen
I713 Strømtangen
36C Færder area
36F Fa
71A Bjørkøya (Risøyodden)
I712 Gjemesholmen
71G Fugløyskjær
73A Lyngholmen
LANGESUND
74A Langholmane
KRAGERØ
RISØR
76A Risøy
76G Risøy
77F Borøy area
77A Nordstrand
77B Borøy area
77C Borøy area
ARENDAL
79A Gjerdsvoldsøyen (east)
Arendal area
8°30'0"E
9°0'0"E
9°30'0"E
10°0'0"E
10°30'0"E
59°0'0"N
58°30'0"N

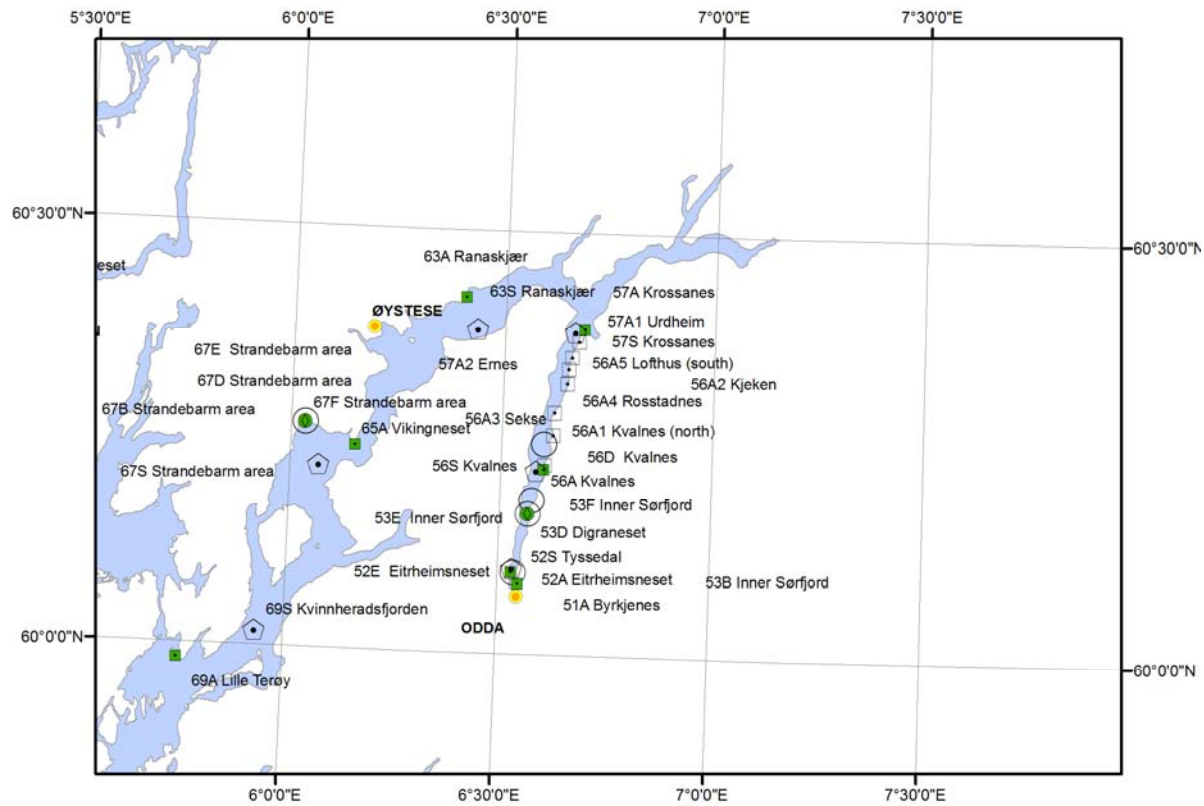
MAP 3


79A
FLEKKEFJORD
KRISTIANSAND
I1321 Fiskåtangen
FARSUND
I133 Odderø (west)
13BH Kristiansand havn
I132 Svensholmen
15F Ullerø area
15B Ullerø area
I131A Lastad
15A Gåsøy (Ullerø)
Lista area
14A Aavigen
MANDAL
131G Lastad
15G Gåsøy (Ullerø)
15C Gåsøy (Ullerø)
13A Langøsund
6°30'0"E
7°0'0"E
7°30'0"E
8°0'0"E
8°30'0"E
58°0'0"N

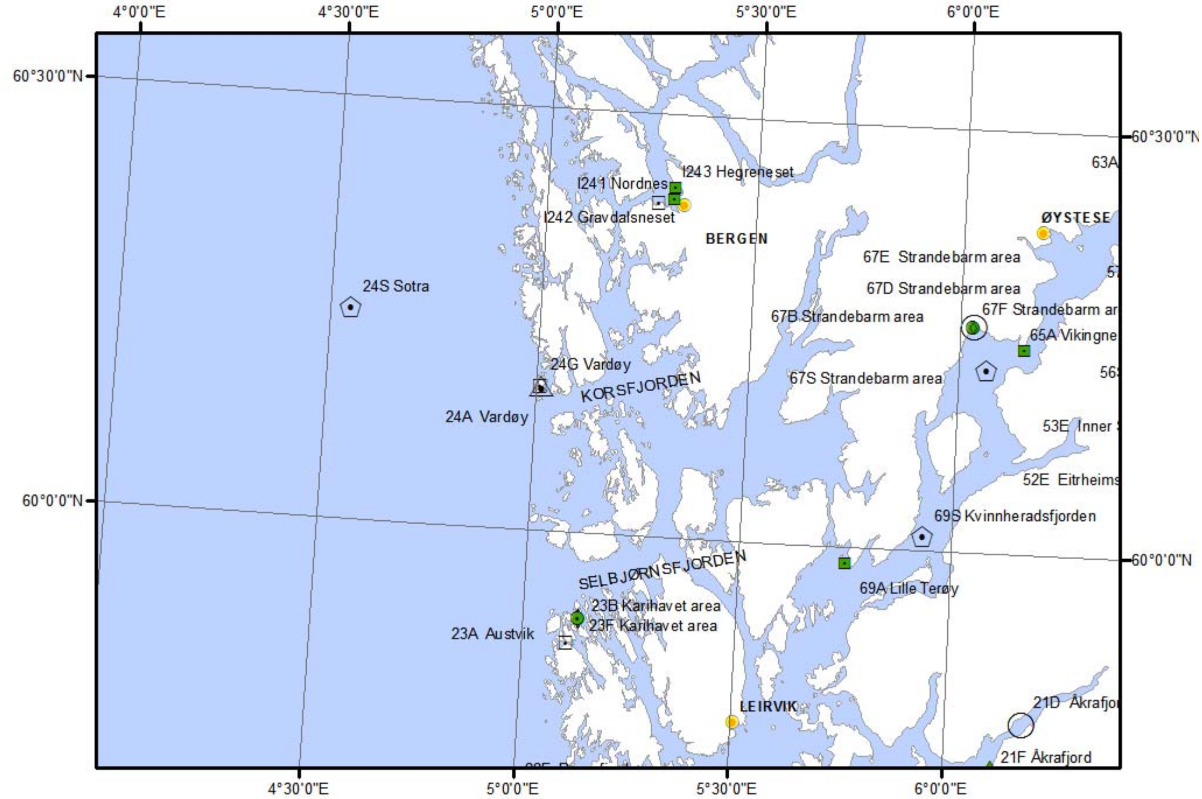
MAP 4


4°30'0"E
5°0'0"E
5°30'0"E
6°0'0"E
6°30'0"E
59°30'0"N
59°0'0"N
LEIRVIK
21D Åkrafjord
21F Åkrafjord
SAUDA
22F Borøyfjorden
I201 Ekkjegrunn (G1)
22A Espevær (west)
22G Espevær (west)
I205 Bølsnes (G5)
22C Bømlofjord
22S Bømlo area
224G Heggjelen
HAUGESUND
226X Karmsund bridge (east)
226H Karmsund bridge (west)
226G Karmsund bridge (east)
227G1 Melandholmen
222A Kopervik harbour
227A2 Høgevarde
221A Stangeland
221G Stangeland
220G Smørstakk

MAP 5

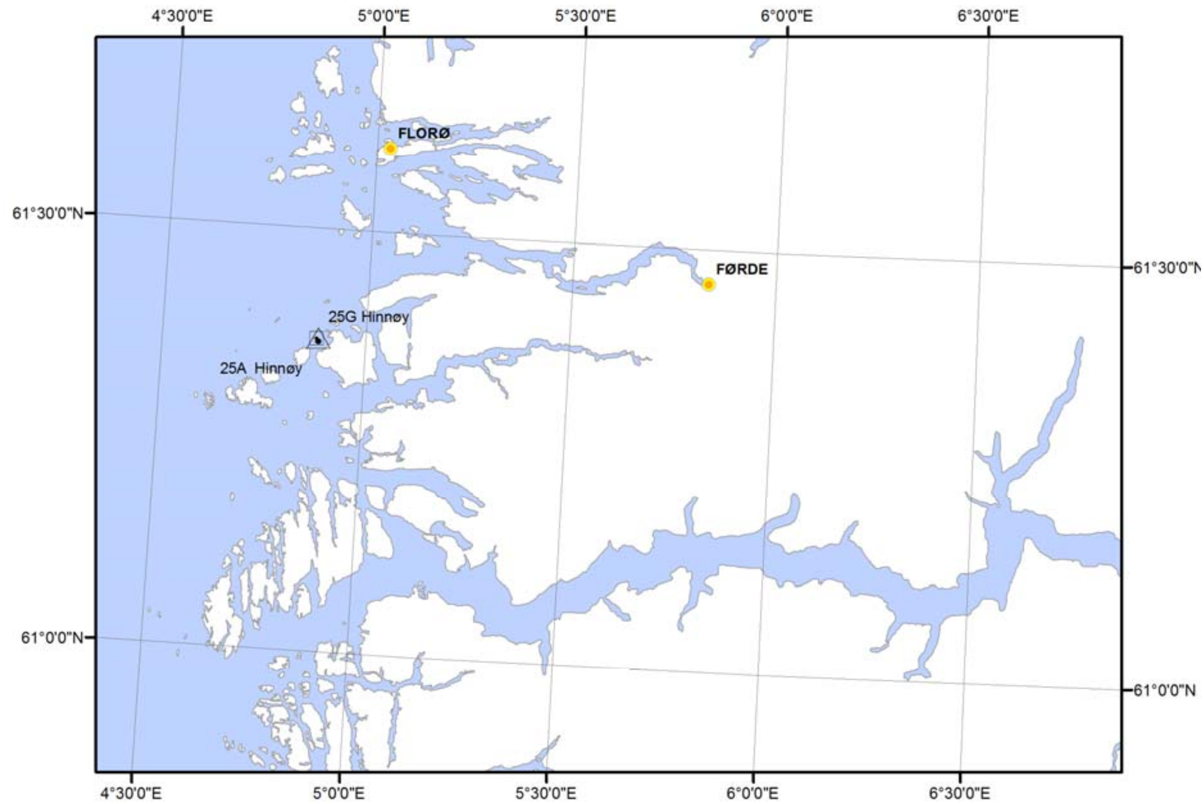

5°30'0"E
6°0'0"E
6°30'0"E
7°0'0"E
7°30'0"E
60°30'0"N
60°0'0"N
63A Ranaskjær
63S Ranaskjær
57A Krossanes
ØYSTESE
57A1 Urdheim
67E Strandebarm area
57S Krossanes
57A2 Ernes
56A5 Lofthus (south)
67D Strandebarm area
56A2 Kjeken
67B Strandebarm area
56A4 Rosstadnes
67F Strandebarm area
65A Vikingneset
56A3 Sekse
56A1 Kvalnes (north)
56D Kvalnes
56S Kvalnes
67S Strandebarm area
56A Kvalnes
53F Inner Sørfjord
53E Inner Sørfjord
53D Digraneset
52S Tyssedal
52E Eitrheimsneset
52A Eitrheimsneset
53B Inner Sørfjord
51A Byrkjenes
69S Kvinnheradsfjorden
ODDA
69A Lille Terøy

MAP 6



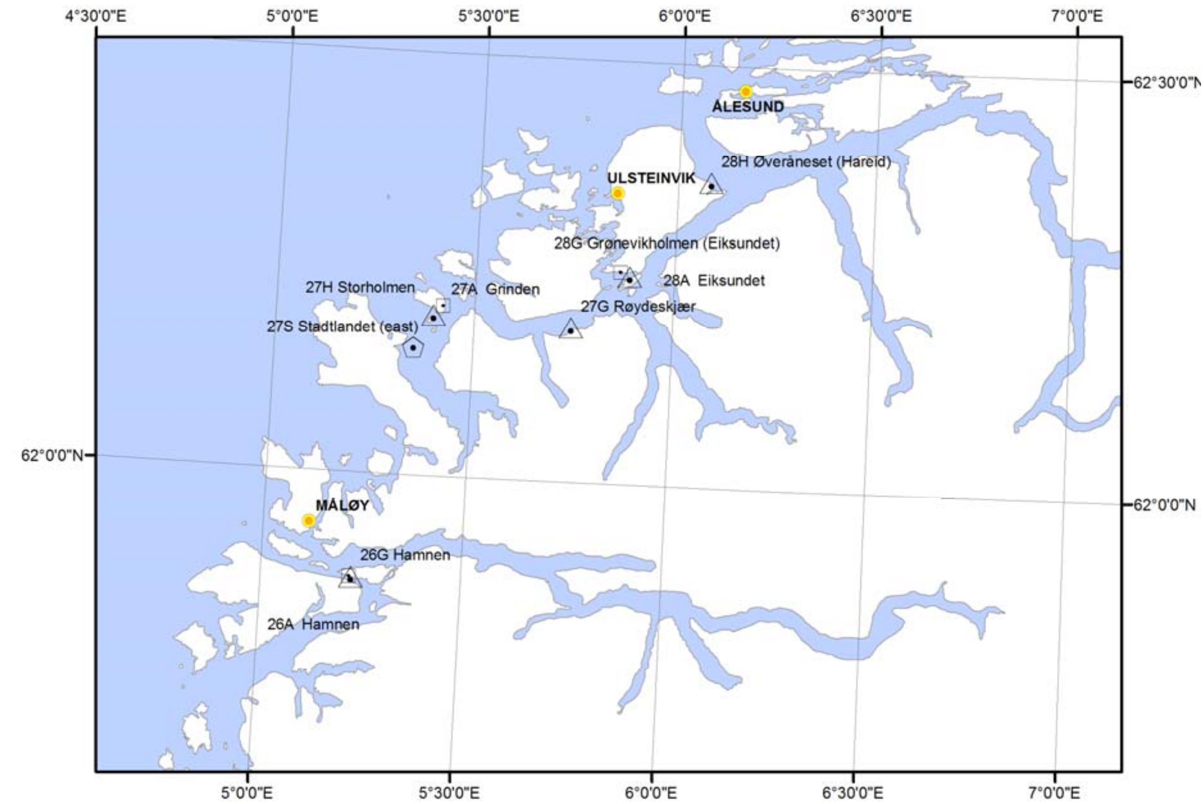
4°0'0"E
4°30'0"E
5°0'0"E
5°30'0"E
6°0'0"E
60°30'0"N
60°0'0"N
I243 Hegreneset
I241 Nordnes
I242 Gravdalsneset
BERGEN
ØYSTESE
63A
67E Strandebarm area
67D Strandebarm area
67F Strandebarm ar
67B Strandebarm area
65A Vikingne
24S Sotra
24G Vardøy
KORSFJORDEN
24A Vardøy
67S Strandebarm area
53E Inner
52E Eitrheims
69S Kvinnheradsfjorden
SELBJØRNSFJORDEN
69A Lille Terøy
23B Karihavet area
23F Karihavet area
23A Austvik
LEIRVIK
21D Åkrafjo
21F Åkrafjord

MAP 7

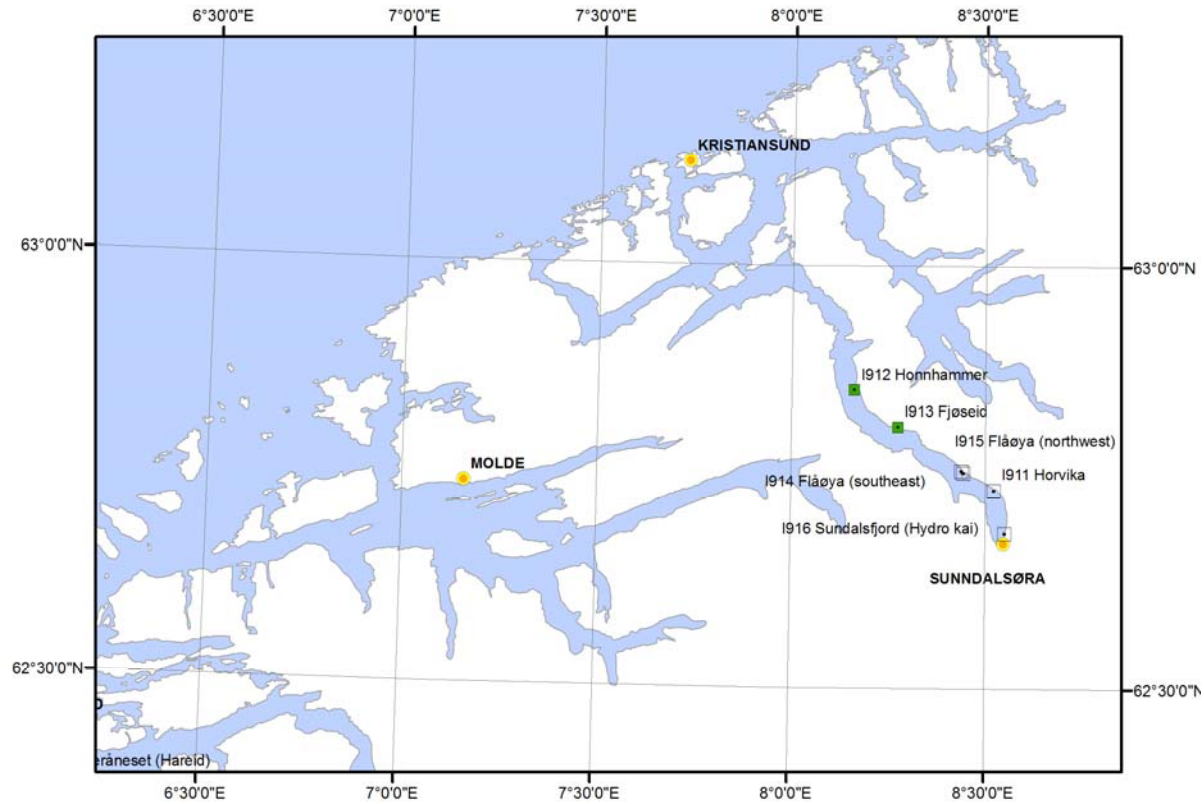


4°30'0"E
5°0'0"E
5°30'0"E
6°0'0"E
6°30'0"E
61°30'0"N
61°0'0"N
FLORØ
FØRDE
25G Hinnøy
25A Hinnøy

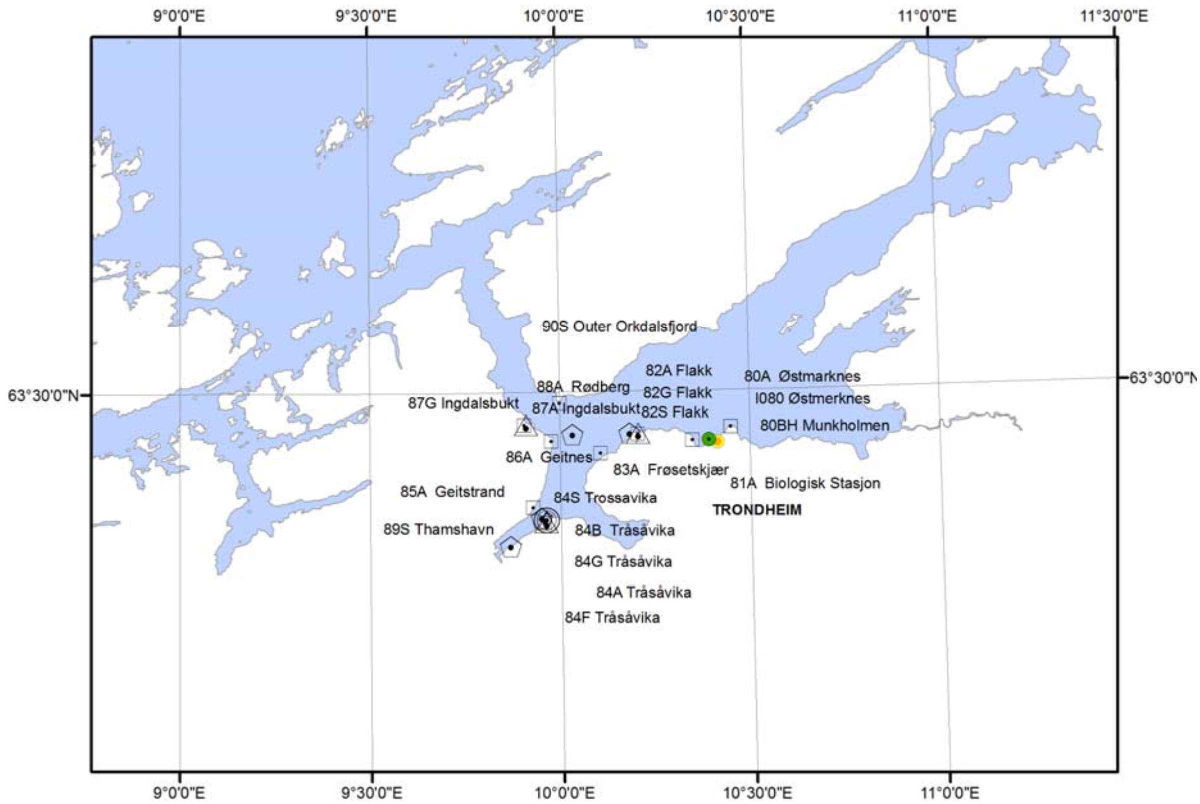
MAP 8


4°30'0"E
5°0'0"E
5°30'0"E
6°0'0"E
6°30'0"E
7°0'0"E
62°30'0"N
62°0'0"N
ÅLESUND
ULSTEINVIK
28H Øveråneset (Hareid)
28G Grønevikholmen (Eiksundet)
28A Eiksundet
27G Røydeskjær
27H Storholmen
27A Grinden
27S Stadtlandet (east)
MÅLØY
26G Hamnen
26A Hamnen

MAP 9

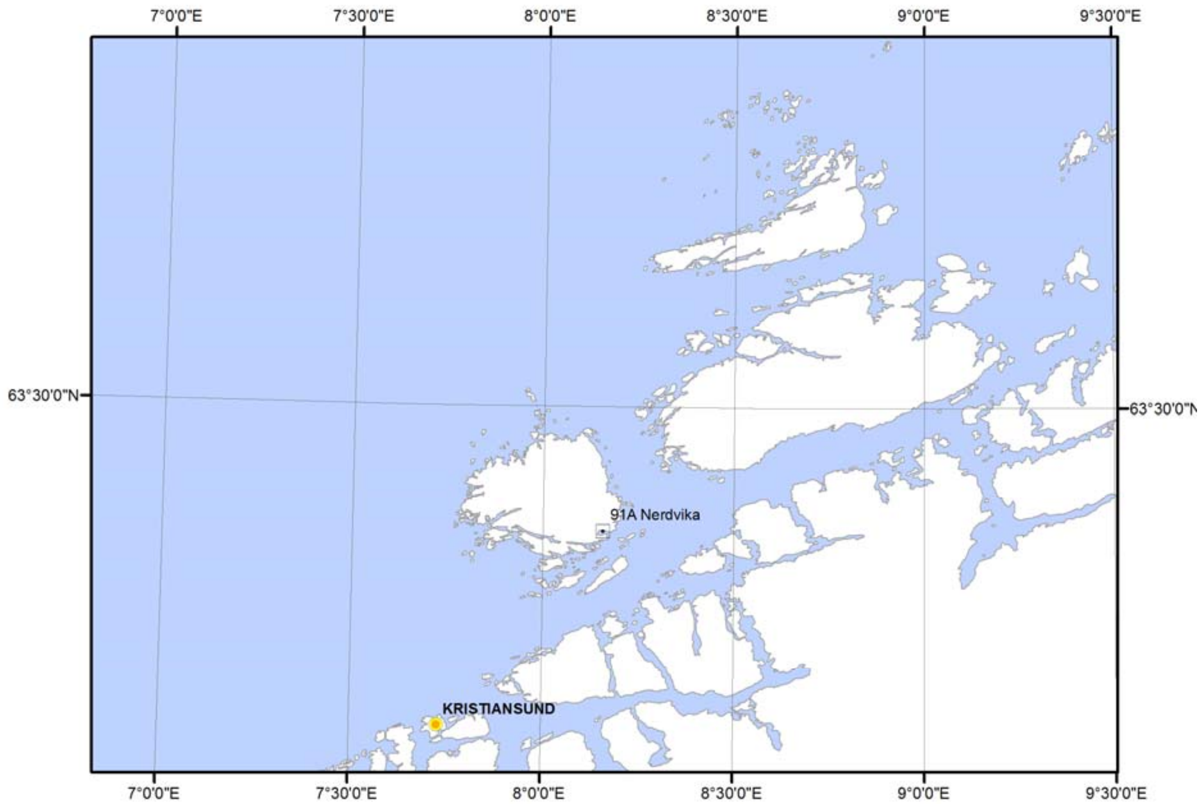

6°30'0"E
7°0'0"E
7°30'0"E
8°0'0"E
8°30'0"E
63°0'0"N
62°30'0"N
KRISTIANSUND
MOLDE
I912 Honnhammer
I913 Fjøseid
I915 Flåøya (northwest)
I914 Flåøya (southeast)
I911 Horvika
I916 Sundalsfjord (Hydro kai)
SUNNDALSØRA
eråneset (Hareid)

MAP 10



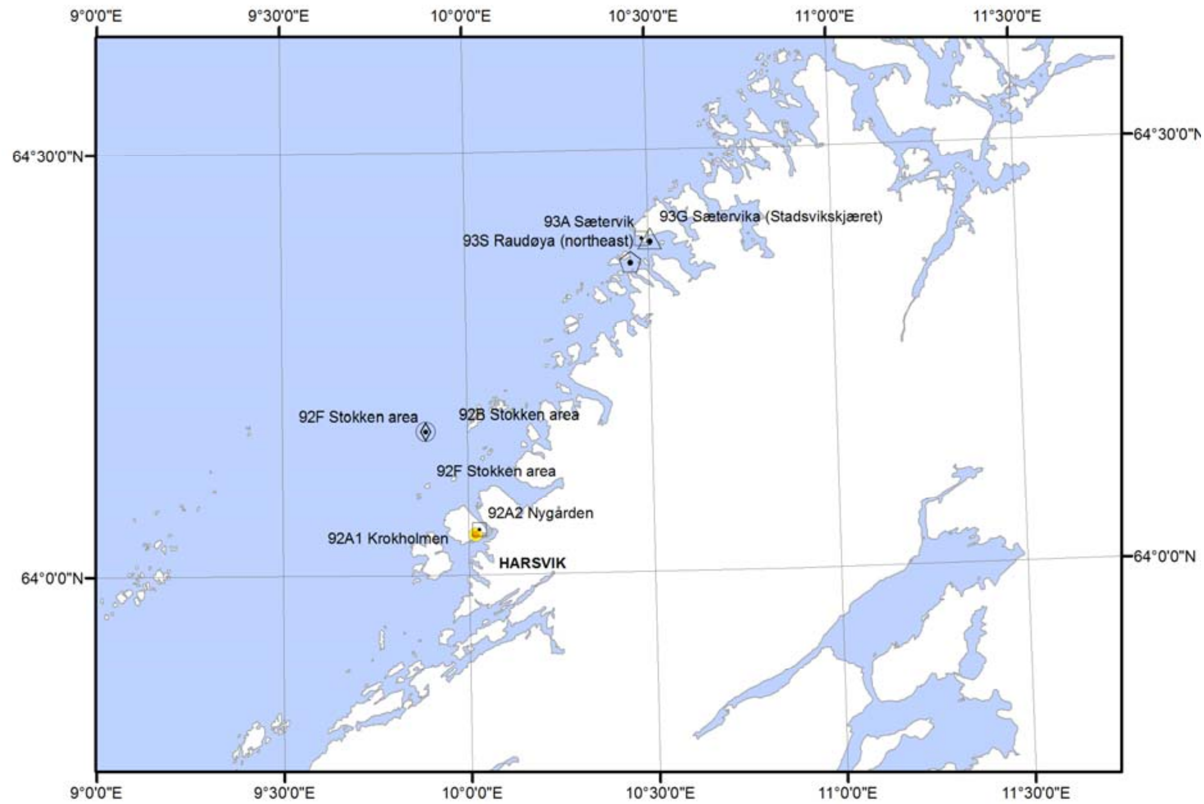
9°0'0"E
9°30'0"E
10°0'0"E
10°30'0"E
11°0'0"E
11°30'0"E
63°30'0"N
90S Outer Orkdalsfjord
82A Flakk
80A Østmarknes
88A Rødberg
82G Flakk
I080 Østmerknes
87G Ingdalsbukt
87A Ingdalsbukt
82S Flakk
80BH Munkholmen
86A Geitnes
83A Frøsetskjær
81A Biologisk Stasjon
85A Geitstrand
84S Trossavika
TRONDHEIM
89S Thamshavn
84B Tråsåvika
84G Tråsåvika
84A Tråsåvika
84F Tråsåvika

MAP 11

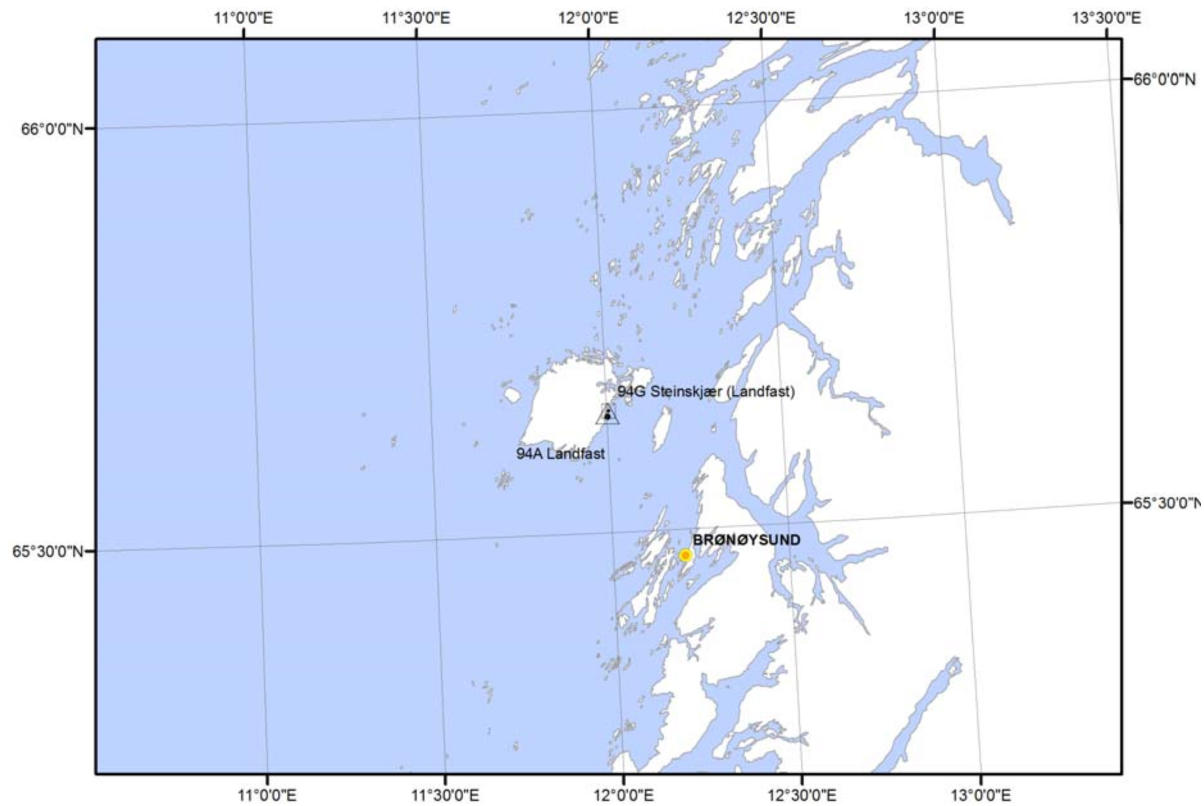


7°0'0"E
7°30'0"E
8°0'0"E
8°30'0"E
9°0'0"E
9°30'0"E
63°30'0"N
91A Nerdvika
KRISTIANSUND

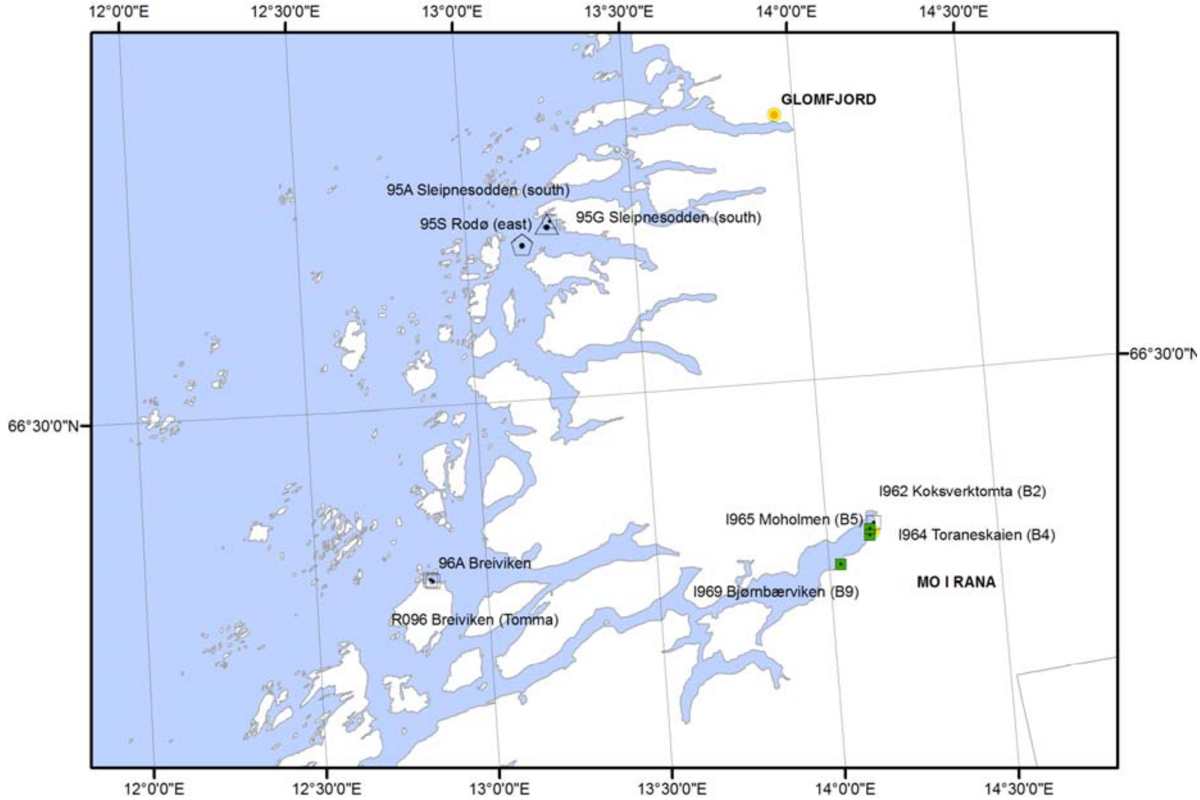
MAP 12


93A Sætervik
93G Sætervika (Stadsvikskjæret)
93S Raudøya (northeast)
92F Stokken area
92B Stokken area
92F Stokken area
92A2 Nygården
92A1 Krokholmen
HARSVIK
9°0'0"E
9°30'0"E
10°0'0"E
10°30'0"E
11°0'0"E
11°30'0"E
64°30'0"N
64°0'0"N

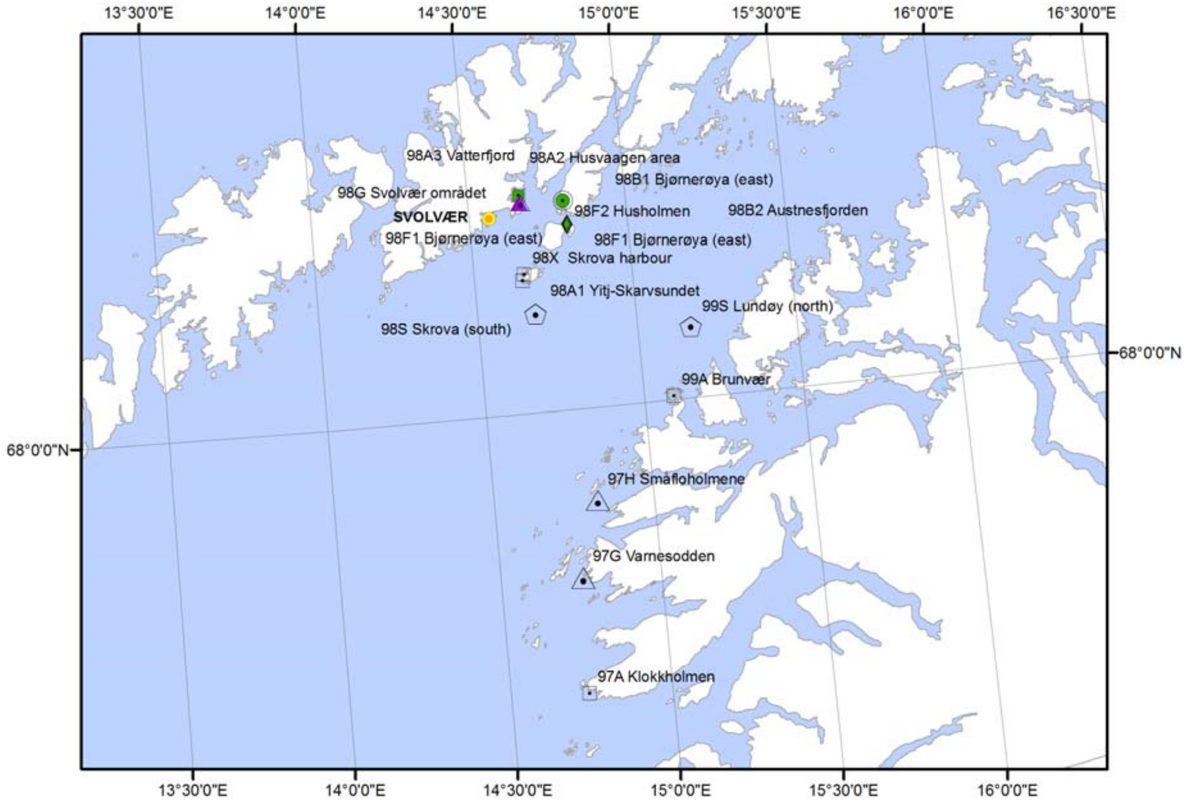
MAP 13


94G Steinskjær (Landfast)
94A Landfast
BRØNØYSUND
11°0'0"E
11°30'0"E
12°0'0"E
12°30'0"E
13°0'0"E
13°30'0"E
66°0'0"N
65°30'0"N

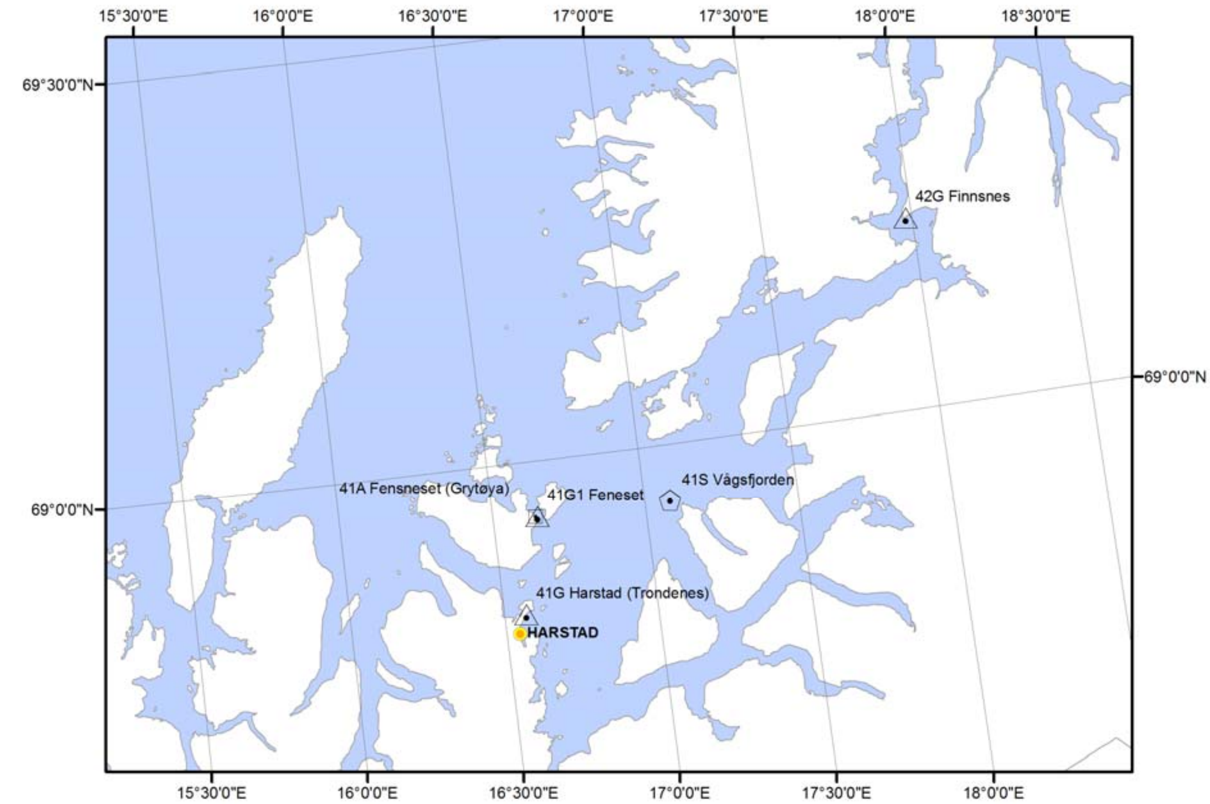
MAP 14


12°0'0"E
12°30'0"E
13°0'0"E
13°30'0"E
14°0'0"E
14°30'0"E
GLOMFJORD
95A Sleipnesodden (south)
95S Rodø (east)
95G Sleipnesodden (south)
66°30'0"N
I962 Koksverktomta (B2)
I965 Moholmen (B5)
I964 Toraneskaien (B4)
96A Breiviken
MO I RANA
I969 Bjørnbærviken (B9)
R096 Breiviken (Tomma)

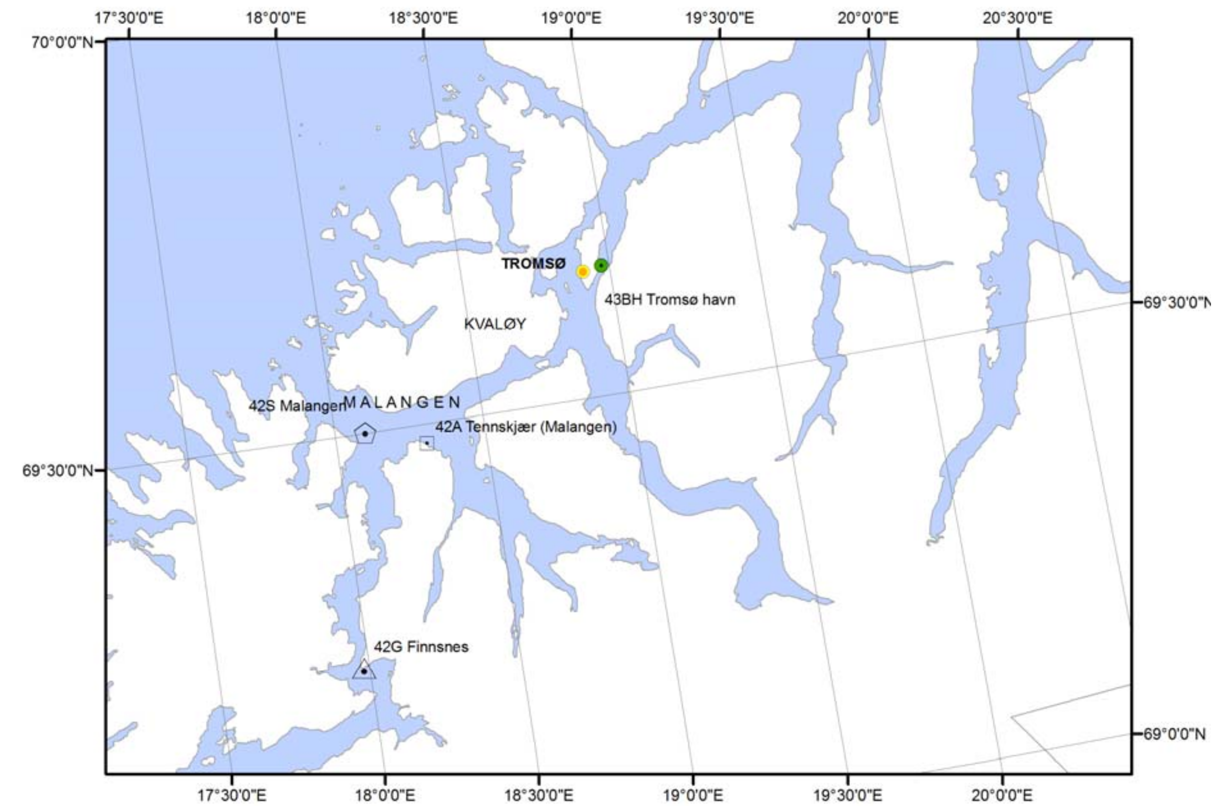
MAP 15


13°30'0"E
14°0'0"E
14°30'0"E
15°0'0"E
15°30'0"E
16°0'0"E
16°30'0"E
98A3 Vatterfjord
98A2 Husvaagen area
98B1 Bjørnerøya (east)
98G Svolvær området
SVOLVÆR
98F2 Husholmen
98B2 Austnesfjorden
98F1 Bjørnerøya (east)
98F1 Bjørnerøya (east)
98X Skrova harbour
98A1 Yitj-Skarvsundet
99S Lundøy (north)
98S Skrova (south)
68°0'0"N
99A Brunvær
97H Småfloholmene
97G Varnesodden
97A Klokkholmen

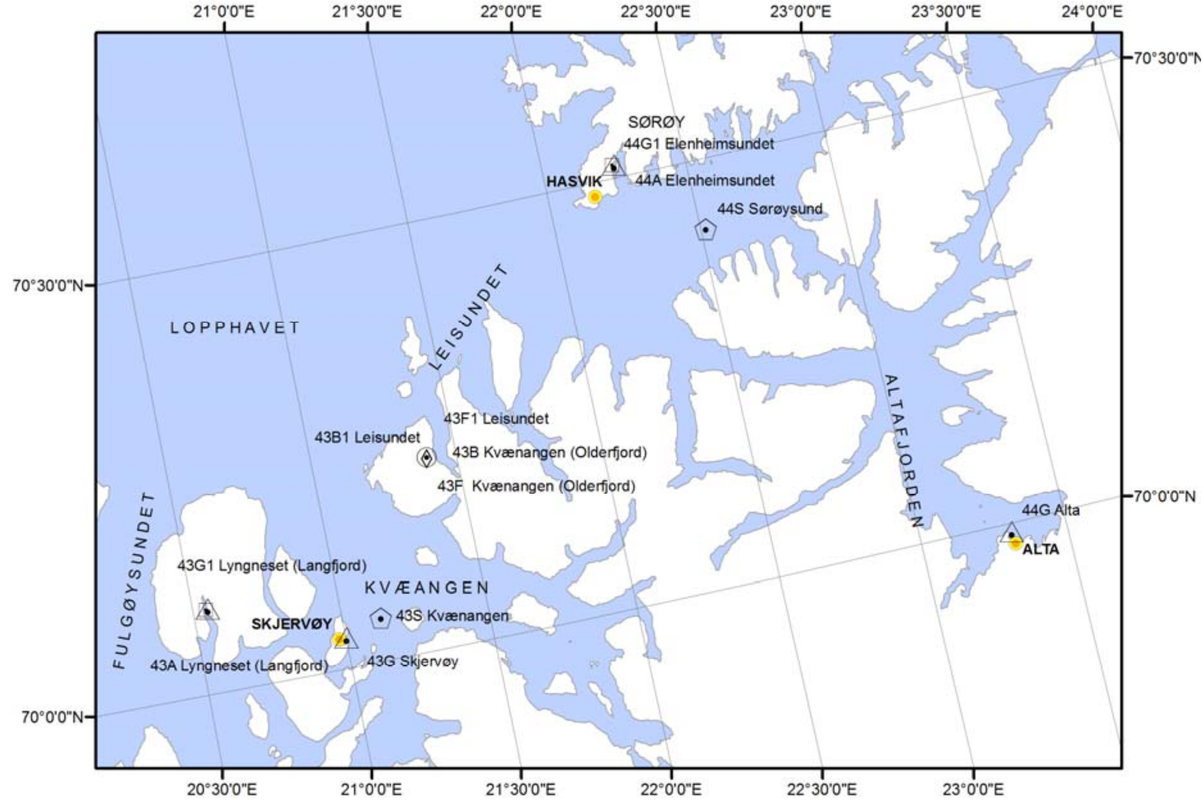
MAP 16


15°30'0"E
16°0'0"E
16°30'0"E
17°0'0"E
17°30'0"E
18°0'0"E
18°30'0"E
69°30'0"N
69°0'0"N
42G Finnsnes
41A Fensneset (Grytøya)
41G1 Feneset
41S Vågsfjorden
41G Harstad (Trondenes)
HARSTAD

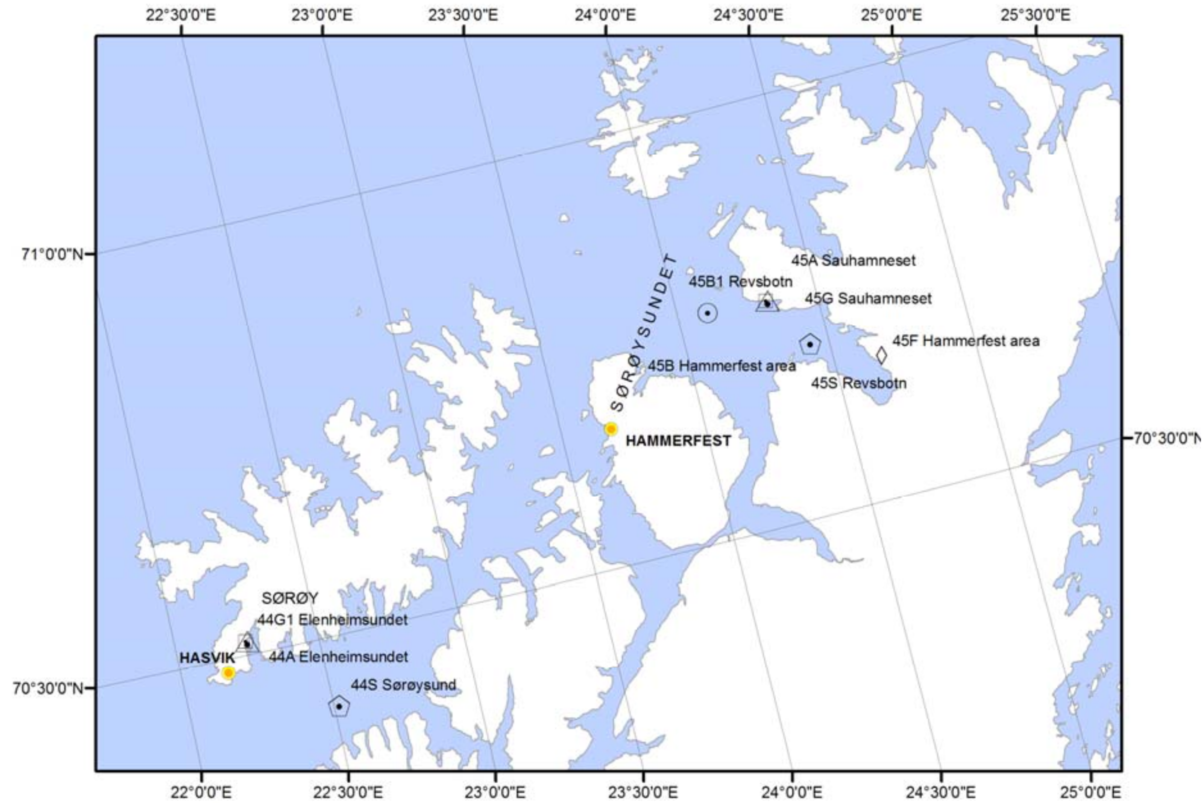
MAP 17


17°30'0"E
18°0'0"E
18°30'0"E
19°0'0"E
19°30'0"E
20°0'0"E
20°30'0"E
70°0'0"N
69°30'0"N
69°0'0"N
TROMSØ
43BH Tromsø havn
KVALØY
42S Malangen
MALANGEN
42A Tennskjær (Malangen)
42G Finnsnes

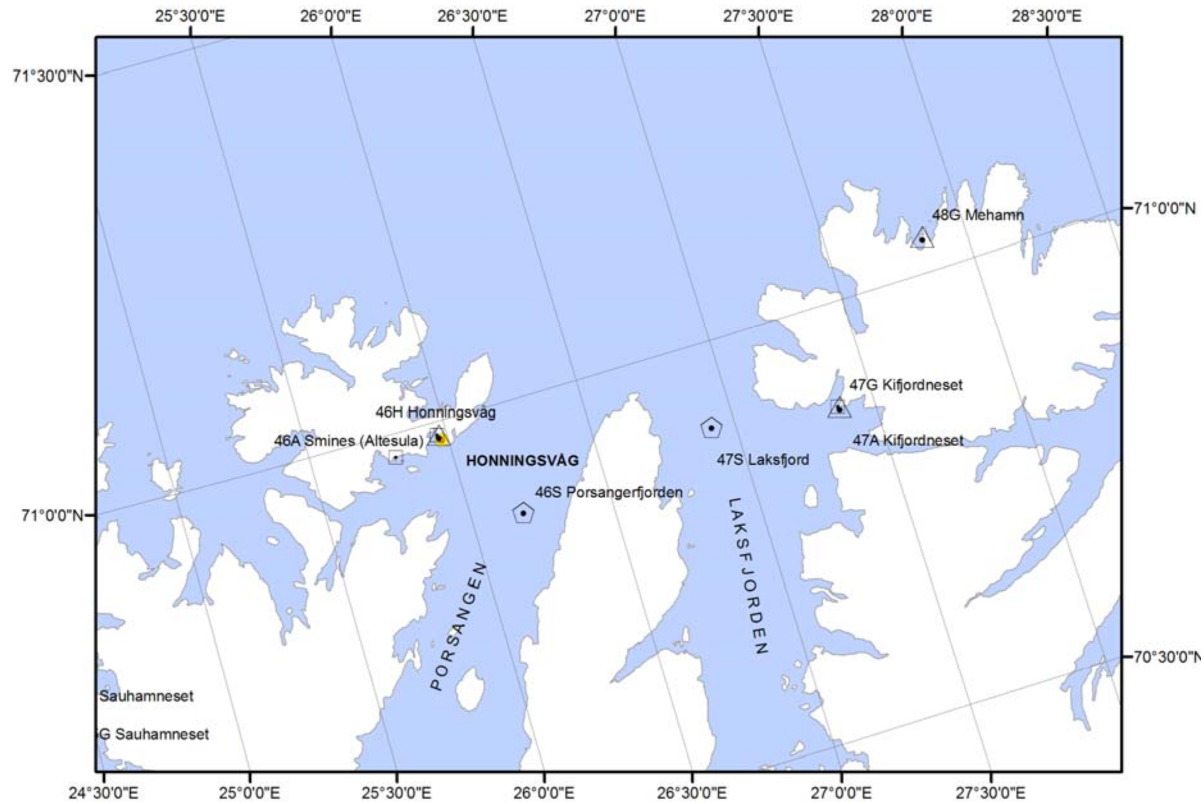
MAP 18


SØRØY
44G1 Elenheimsundet
HASVIK
44A Elenheimsundet
44S Sørøysund
LOPPHAVET
LEISUNDET
43F1 Leisundet
43B1 Leisundet
43B Kvænangen (Olderfjord)
43F Kvænangen (Olderfjord)
ALTAFJORDEN
44G Alta
ALTA
FULGØYSUNDET
43G1 Lyngneset (Langfjord)
KVÆANGEN
SKJERVØY
43S Kvænangen
43A Lyngneset (Langfjord)
43G Skjervøy

MAP 19

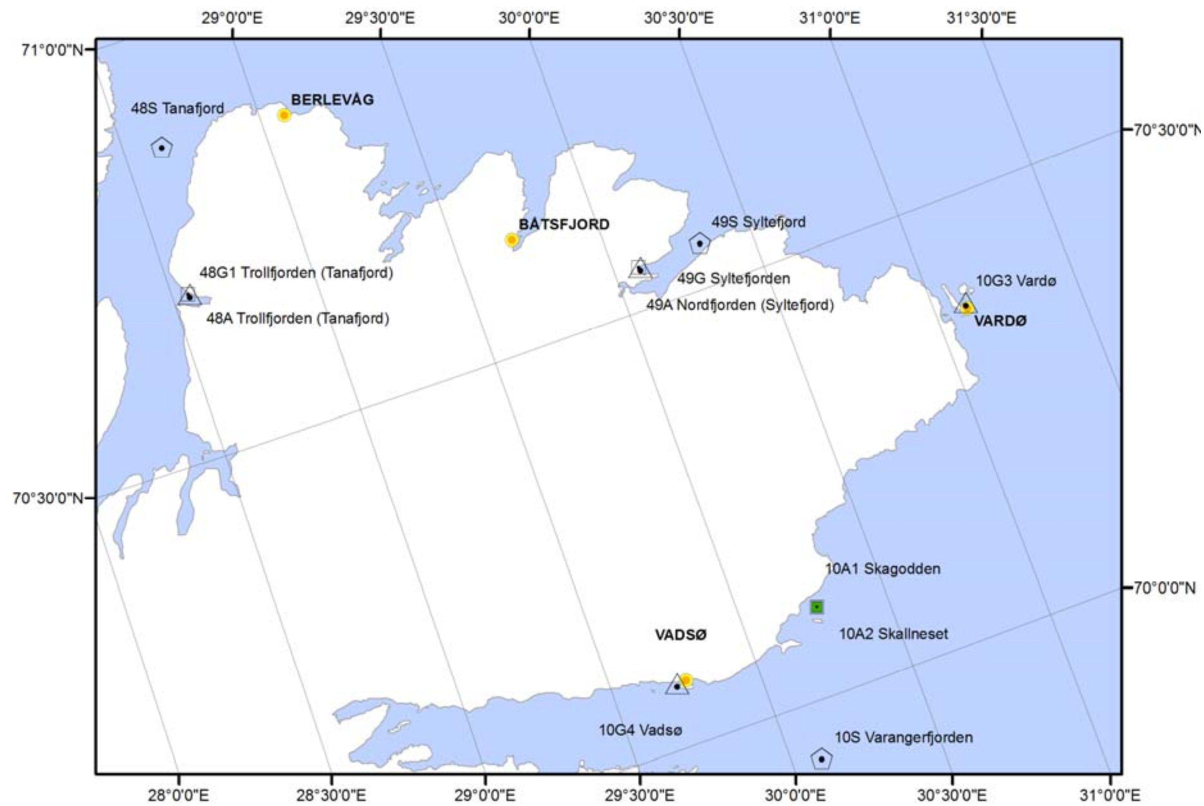

45A Sauhamneset
45B1 Revsbotn
45G Sauhamneset
SØRØYSUNDET
45F Hammerfest area
45B Hammerfest area
45S Revsbotn
HAMMERFEST
SØRØY
44G1 Elenheimsundet
HASVIK
44A Elenheimsundet
44S Sørøysund

MAP 20



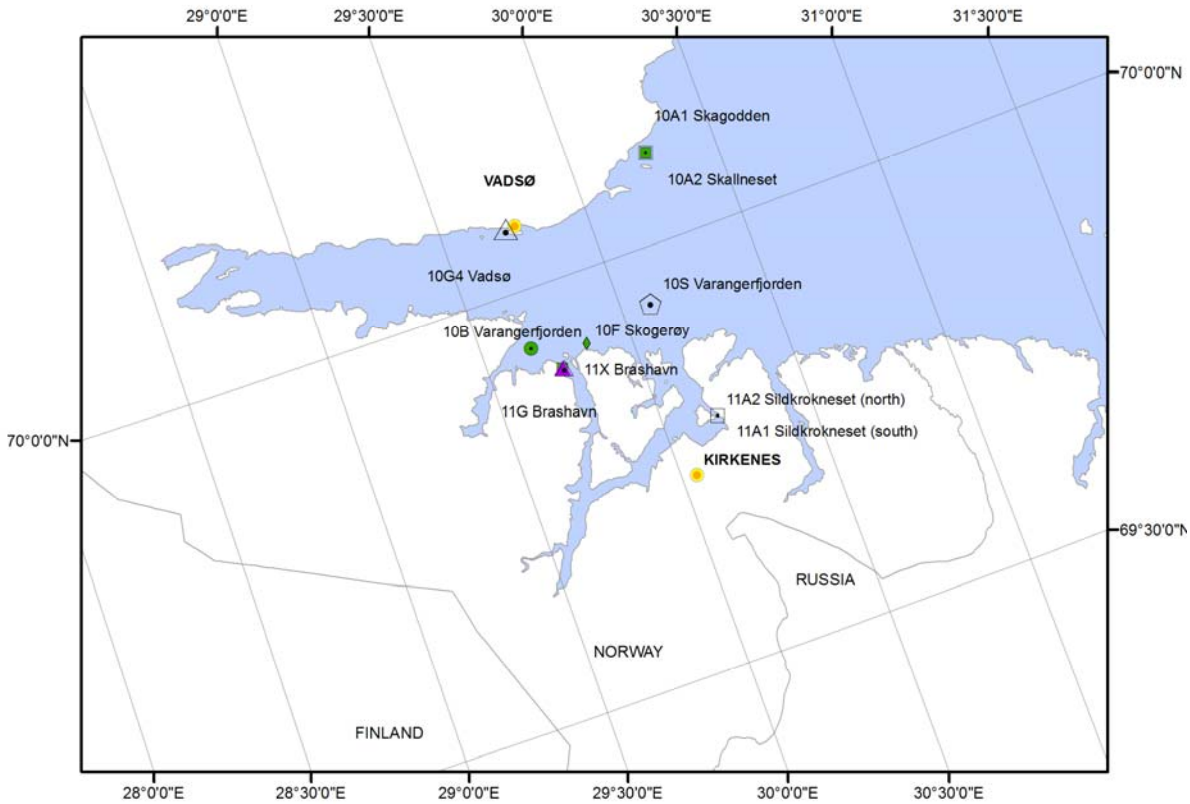
25°30'0"E
26°0'0"E
26°30'0"E
27°0'0"E
27°30'0"E
28°0'0"E
28°30'0"E
71°30'0"N
71°0'0"N
70°30'0"N
48G Mehamn
47G Kifjordneset
47A Kifjordneset
46H Honningsvåg
46A Smines (Altesula)
HONNINGSVÅG
47S Laksfjord
46S Porsangerfjorden
PORSANGEN
LAKSFJORDEN
Sauhamneset
G Sauhamneset
24°30'0"E
25°0'0"E
25°30'0"E
26°0'0"E
26°30'0"E
27°0'0"E
27°30'0"E

MAP 21



29°0'0"E
29°30'0"E
30°0'0"E
30°30'0"E
31°0'0"E
31°30'0"E
71°0'0"N
70°30'0"N
70°0'0"N
48S Tanafjord
BERLEVÅG
BÅTSFJORD
49S Syltefjord
48G1 Trollfjorden (Tanafjord)
48A Trollfjorden (Tanafjord)
49G Syltefjorden
49A Nordfjorden (Syltefjord)
10G3 Vardø
VARDØ
10A1 Skagodden
10A2 Skallneset
VADSØ
10G4 Vadsø
10S Varangerfjorden
28°0'0"E
28°30'0"E
29°0'0"E
29°30'0"E
30°0'0"E
30°30'0"E
31°0'0"E

MAP 22


29°0'0"E
29°30'0"E
30°0'0"E
30°30'0"E
31°0'0"E
31°30'0"E
70°0'0"N
10A1 Skagodden
10A2 Skallneset
VADSØ
10G4 Vadsø
10S Varangerfjorden
10B Varangerfjorden
10F Skogerøy
11X Brashavn
11G Brashavn
11A2 Sildkrokneset (north)
11A1 Sildkrokneset (south)
70°0'0"N
KIRKENES
69°30'0"N
RUSSIA
NORWAY
FINLAND
28°0'0"E
28°30'0"E
29°0'0"E
29°30'0"E
30°0'0"E
30°30'0"E

MAP 23

Appendix G
Overview of materials and analyses 2011

Nominal station positions are shown on maps in Appendix F

Me-Blue Mussel (*Mytilus edulis*)
Nl-Dog whelk (*Nucella lapillus*)
Gm-Atlantic cod (*Gadus morhua*)
Fl-flat fish:
Megrim (*Lepidorhombus whiff-iagonis*)
Dab (*Limanda limanda*)
Flounder (*Platichthys flesus*)

Tissue:
SB-Soft body tissue
LI-Liver tissue, in fish
MU-Muscle tissue, in fish
BL-Blood, in fish
BI-Bile, fish

ICES-parameter-group codes (See Appendix C for descriptions of codes):

ICES code	Description	Me-SB	NI-SB	Gm-BI	Gm-BL	Gm/Ff-LI	Gm/Ff-MU
I-MET	Cd, Cu, Pb, Zn	x				x	
I-MET	Hg	x					x
O-MET	TBT [1)]	x	x			x [3)]	
OC-CB	PCBs [2)]	x				x	x
OC-CL	HCB	x				x	x
OC-DD	DDT, DDE, DDD	x				x	x
OC-HC	α-, γ-HCH	x				x	x
OC-DX	Dioxins [3)]	x					
OC-BB	PBDE [4)]					x [3)]	
OC-PF	PFC [5)]					x [3)]	
PAH	PAHs [6)]	x					
BEM [7)]	Biological effects met.		Impo-sex	OH-pyrene	ALA-D	EROD-activity, CYP1A [8)]	

[1)] Includes: DBTIN, DPTIN, MBTIN, MPTIN, TBTIN, TPTIN
[2)] Includes the congeners: CB-28,-52,-101,-105,-118,-138,-153,-156,-180, 209, 5-CB, OCS and, when dioxins are analysed, the non-orto-PCBs, i.e. CB-77, -81, -126, -169
[3)] Includes: CDD1N, CDD4X, CDD6P, CDD6X, CDD9X, CDDO, CDF2N, CDF2T, CDF4X, CDF6P, CDF6X, CDF9P, CDF9X, CDFDN, CDFDX, CDFO,TCDD
[4)] Polybrominated diphenyl ethers (PBDE), including brominated flame retardants and includes: BDE28, BDE47, BDE49, BDE66, BDE71, BDE77, BDE85, BDE99, BDE100, BDE119, BDE138, BDE153, BDE154, BDE183, BDE205
[5)] Includes: PFNA, PFOA, PFHpA, PFHxA, PFOS, PFBS, PFOSA
[6)] Includes (with NPDs): ACNE, ACNLE, ANT, BAP, BBJF, BEP, BGHIP, BKF. BAA. CHR, DBA3A, DBT, DBTC1, DBTC2, DBTC3, FLE, FLU, ICDP, NAP, NAPC1, NAPC2, NAPC3, PA, PAC1, PAC2, PAC3, PER, PYR.
[7)] Biological effects methods
[8)] Cod only

Appendix G. Sampling and analyses for 2011 –biota.

jmpst	Station name	Latitude	Longitude	Species	Tissue	Sample count	I-MET	O-BR	OC-CB	OC-CL	OC-DD	OC-DX	OC-HC	O-FL	O-MET	O-PAH
10B	Varangerfjorden	69.933	29.667	GADU MOR	LI	25	25		25	25	25		25			
10F	Skogerøy	69.917	29.850	PLEU PLA	LI	2	2		2	2	2		2			
13BH	Kristiansand havn	58.135	7.988	GADU MOR	LI	25	25	25	25	25	25		25	25		
15B	Ullerø area	58.050	6.717	GADU MOR	LI	25	25	25	25	25	25		25	25		
15F	Ullerø area	58.050	6.717	LIMA LIM	LI	5	5		5	5	5		5			
21F	Åkrafjord	59.750	6.117	LEPI WHI	LI	3	3		3	3	3		3			
23B	Karihavet area	59.900	5.133	GADU MOR	LI	25	25	25	25	25	25		25	25		
30B	Oslo City area	59.799	10.560	GADU MOR	LI	25	25	25	25	25	25		25	25		
33F	Sande (east side)	59.528	10.350	PLAT FLE	LI	5	5		5	5	5		5			
36B	Færder area	59.041	10.436	GADU MOR	LI	25	25	25	25	25	25		25	25		
36F	Færder area	59.067	10.383	LIMA LIM	LI	3	3		3	3	3		3			
43BH	Tromsø havn	69.653	18.974	GADU MOR	LI	25	25	25	25	25	25		25	25		
53B	Inner Sørfjord	60.167	6.567	GADU MOR	LI	25	25	25	25	25	25		25	25		
53F	Inner Sørfjord	60.167	6.567	PLAT FLE	LI	1	1		1	1	1		1			
67B	Strandebarm area	60.267	6.033	GADU MOR	LI	2	2		2	2	2		2			
67F	Strandebarm area	60.267	6.033	LEPI WHI	LI	2	2		2	2	2		2			
67F	Strandebarm area	60.267	6.033	PLAT FLE	LI	3	3		3	3	3		3			
80BH	Trondheim	63.442	10.392	GADU MOR	LI	15	15	15	15	15	15		15	15		
98B1	Bjørnerøya (east)	68.247	14.803	GADU MOR	LI	25	25	25	25	25	25		25	25		
98F2	Husholmen	68.219	14.808	PLEU PLA	LI	5	5		5	5	5		5			
10B	Varangerfjorden	69.933	29.667	GADU MOR	MU	30	25		5	5	5		5			
10F	Skogerøy	69.917	29.850	PLEU PLA	MU	2	2		2	2	2		2			
13BH	Kristiansand havn	58.135	7.988	GADU MOR	MU	30	25		5	5	5		5			
15B	Ullerø area	58.050	6.717	GADU MOR	MU	30	25		5	5	5		5			
15F	Ullerø area	58.050	6.717	LIMA LIM	MU	5	5		5	5	5		5			
21F	Åkrafjord	59.750	6.117	LEPI WHI	MU	3	3		3	3	3		3			
23B	Karihavet area	59.900	5.133	GADU MOR	MU	30	25		5	5	5		5			
30B	Oslo City area	59.799	10.560	GADU MOR	MU	30	25		5	5	5		5			
33F	Sande (east side)	59.528	10.350	PLAT FLE	MU	5	5		5	5	5		5			
36B	Færder area	59.041	10.436	GADU MOR	MU	30	25		5	5	5		5			
36F	Færder area	59.067	10.383	LIMA LIM	MU	3	3		3	3	3		3			
43BH	Tromsø havn	69.653	18.974	GADU MOR	MU	30	25		5	5	5		5			
53B	Inner Sørfjord	60.167	6.567	GADU MOR	MU	30	25		5	5	5		5			
53F	Inner Sørfjord	60.167	6.567	PLAT FLE	MU	1	1		1	1	1		1			
67B	Strandebarm area	60.267	6.033	GADU MOR	MU	2	2		2	2	2		2			
67F	Strandebarm area	60.267	6.033	LEPI WHI	MU	2	2		2	2	2		2			
67F	Strandebarm area	60.267	6.033	PLAT FLE	MU	3	3		3	3	3		3			
80BH	Trondheim	63.442	10.392	GADU MOR	MU	18	15		3	3	3		3			
98B1	Bjørnerøya (east)	68.247	14.803	GADU MOR	MU	30	25		5	5	5		5			
98F2	Husholmen	68.219	14.808	PLEU PLA	MU	5	5		5	5	5		5			
10A2	Skallneset	70.104	30.263	MYTI EDU	SB	3	3		3	3	3		3			
11G	Brashavn	69.899	29.744	NUCE LAP	SB	1									1	
11X	Brashavn	69.899	29.744	MYTI EDU	SB	3	3		3	3	3		3		2	
131G	Lastad	58.056	7.709	NUCE LAP	SB	1									1	
15A	Gåsøy (Ullerø)	58.048	6.895	MYTI EDU	SB	3	3		3	3	3		3		2	
15G	Gåsøy (Ullerø)	58.050	6.896	NUCE LAP	SB	1									1	
227A2	Høgevarde	59.326	5.318	MYTI EDU	SB	3	3		3	3	3		3		2	
227G1	Melandholmen	59.337	5.313	NUCE LAP	SB	1									1	
22A	Espevær (west)	59.584	5.144	MYTI EDU	SB	3	3		3	3	3		3		2	
22G	Espevær vest	59.584	5.145	NUCE LAP	SB	1									1	
30A	Gressholmen	59.882	10.712	MYTI EDU	SB	3	3		3	3	3	2	3		2	3
31A	Solbergstrand	59.619	10.650	MYTI EDU	SB	3	3		3	3	3		3			
35A	Mølen	59.488	10.498	MYTI EDU	SB	3	3		3	3	3		3		1	1
36A	Færder	59.027	10.526	MYTI EDU	SB	3	3		3	3	3		3		2	
36G	Færder	59.027	10.526	NUCE LAP	SB	1									1	
51A	Byrkjenes	60.084	6.551	MYTI EDU	SB	3	3		3	3	3		3			
52A	Eitrheimsneset	60.097	6.533	MYTI EDU	SB	3	3		3	3	3		3			
56A	Kvalnes	60.221	6.602	MYTI EDU	SB	3	3		3	3	3		3			
57A	Krossanes	60.387	6.689	MYTI EDU	SB	3	3		3	3	3		3			
63A	Ranaskjær	60.421	6.422	MYTI EDU	SB	3	3		3	3	3		3			
65A	Vikingneset	60.242	6.153	MYTI EDU	SB	3	3		3	3	3		3			
69A	Lille Terøy	59.982	5.753	MYTI EDU	SB	3	3		3	3	3		3			
71A	Bjørkøya (Risøyodden)	59.023	9.754	MYTI EDU	SB	3	3		3	3	3	2	3		2	
71G	Fugløyskjær	58.981	9.808	LITT LIT	SB	1									1	
76A	Risøy	58.731	9.272	MYTI EDU	SB	3	3		3	3	3	2	3		2	
76G	Risøy	58.728	9.276	NUCE LAP	SB	1									1	
98A2	Husvaagen area	68.258	14.664	MYTI EDU	SB	3	3		3	3	3		3		2	
98G	Svolvær området	68.249	14.663	NUCE LAP	SB	1									1	
I023	Singlekalven (south)	59.095	11.137	MYTI EDU	SB	3	3		3	3	3		3			
I131A	Lastad	58.056	7.709	MYTI EDU	SB	3	3		3	3	3		3			3
I132	Svensholmen	58.125	7.989	MYTI EDU	SB	3	3		3	3	3	2	3		2	3
I133	Odderø (west)	58.132	8.002	MYTI EDU	SB	3	3		3	3	3	2	3		2	3
I201	Ekkjegrunn (G1)	59.643	6.357	MYTI EDU	SB	3	3									3
I205	Bølsnes (G5)	59.592	6.300	MYTI EDU	SB	3	3									3

jmpst	Station name	Latitude	Longitude	Species	Tissue	Sample count	I-MET	O-BR	OC-CB	OC-CL	OC-DD	OC-DX	OC-HC	O-FL	O-MET	O-PAH
I241	Nordnes	60.401	5.302	MYTI EDU	SB	3	3		3	3	3		3			
I243	Hegreneset	60.415	5.305	MYTI EDU	SB	3	3		3	3	3		3			
I301	Akershuskaia	59.905	10.736	MYTI EDU	SB	3	3		3	3	3		3		2	3
I304	Gåsøya	59.851	10.589	MYTI EDU	SB	3	3		3	3	3		3			3
I306	Håøya	59.713	10.555	MYTI EDU	SB	3	3		3	3	3		3			3
I307	Ramtonholmen	59.745	10.523	MYTI EDU	SB	3	3		3	3	3		3			3
I712	Gjemesholmen	59.045	9.707	MYTI EDU	SB	3	3		3	3	3	1	3		2	
I713	Strømtangen	59.050	9.692	MYTI EDU	SB	3	3		3	3	3	1	3		2	
I912	Honnhammer	62.853	8.162	MYTI EDU	SB	3										3
I913	Fjøseid	62.810	8.275	MYTI EDU	SB	3										3
I964	Toraneskaien	66.322	14.133	MYTI EDU	SB	3	3									3
I965	Moholmen (B5)	66.312	14.126	MYTI EDU	SB	3	3									3
I969	Bjørnbærviken (B9)	66.280	14.035	MYTI EDU	SB	3	3									3

Appendix H
Temporal trend analyses of contaminants and biomarkers in biota 1981-2011

Median concentrations only shown for the period 2002-2011

Sorted by alphabetically by contaminant (and unit), species and area/station:

Code descriptions are given in Appendix C

Mercury (Hg)
Cadmium (Cd)
Lead (Pb)
Copper (Cu)
Zinc (Zn)
Silver (Ag)
Arsenic (As)
Nickel (Ni)
Chromium (Cr)
Cobolt (Co)
Vanadium (V)
Molibium (Mo)
Barium (Ba)
TBT (Tributyltin)

Sum PCB-7 or **CB_S7** (CB: 28+52+101+118+138+153+180)
DDEPP (ppDDE)
HCB
HCHG (gamma-hexachlorocyclohexane)
OCS (octachlorstyrene)
PAH-16 (sum carcinogen PAHs, cf. Appendix B)
KPAH (sum of PAHs, dicyclic "PAHs" not included, cf. Appendix B)
B[a]P (benzo[*a*]pyrene)
PBDE (Sum brominated flame retardants)
PFOS (perfluoroctanoic sulphonate**)**
TCDDN (Dioxin toxicity equivalents-Nordic model)
OH-pyrene or PYR10 (Pyrene metabolite)
ALA-D (δ-amino levulinic acid dehydrase inhibition)
EROD-activity (Cytochrome P4501A-activity)
CYP1A (relative amount of Cytochrome P4501A protein)
VDSI (measurement of imposex)

CEMP-stations
"Index"-stations
MYTI EDU-Blue Mussel (*Mytilus edulis***)**
LITT LIT-Common periwinkle (*Littorina littorea***)**
NUCE LAP-Dog whelk (*Nucella lapillus***)**
GADU MOR-Atlantic cod (*Gadus morhua***)**
LEPI WHI-Megrim (*Lepidorhombus whiff-iagonis***)**
LIMA LIM-Dab (*Limanda limanda***)**
PLAT FLE-Flounder (*Platichthys flesus***)**
PLEU PLA-Plaice (*Pleuronectes platessa***)**

Tsu -tissue:
SB-Soft body tissue
LI-Liver tissue
MU-Muscle tissue
BL-Blood
BI-Bile

(continues on next page)

OC Overconcentration expressed as quotient of median of last year and upper limit to presumed "high background" ("m" missing background value)
SD Standard deviation for last year

Power (long) POWER; estimated number of years to detect a hypothetical situation of 10% trend a year with a 90% power – for the entire sampling period.
First Yr (long) First year in timeseries for entire sampling period
Last Yr (long) Last year in timeseries for entire sampling period
No.Yrs (long) Number of years in timeseries for entire sampling period

Power (short) POWER; estimated number of years to detect a hypothetical situation of 10% trend a year with a 90% power – for the entire sampling period.
First Yr (short) First year in timeseries for the last 10-year-sampling period
Last Yr (short) Last year in timeseries for the last 10-year-sampling period
No. Yrs (short) Number of years in timeseries for the last 10-year-sampling period

Trend Indication of levels and trends in concentrations of contaminants monitored. Classification is based on observed median concentrations in cod, flatfish and blue mussel. Klif Classification system is used for biota (Molvær et al. 1997: Classes: I (blue), II (green), III (yellow), IV (orange) and V (red) (see Appendix D). For biota, trend analyses were done on time series with three or more years and the results, before the slash "/", are indicated by an upward (🡅) or downward (🡇) arrow where significant trends were found, or a zero (○) if no trend was detected. Where there was sufficient data a time series analysis was performed for the period 2002-2011 and the result is shown after the slash. A small filled square (▪) indicates that chemical analysis has been performed, but either data were insufficient to do a trend analysis or was not presented. Dark grey indicates concentrations higher than estimated high background levels. Light grey indicates concentrations lower than high background levels. Note: Class limits for ΣDDT are used for ppDDE, and the Class limits for ΣHCH are used for HCHG.

The analyses are done on the the preferred basis as follows:

- dry weights for metals, organochlorines and PAHs in blue mussel;
- wet weights for dioxins in blue mussel and metals in snails and all contaminants in fish muscle and liver.

Supplementary analyses on wet weight basis These were done for blue mussel for mercury, cadmium, lead, PCB-7, PAH16, KPAH and B[a]P

Supplementary analyses on lipid weight basis These were done for fish liver for PCB-7, ppDDE, HCB and OCS.

Note on detection limit: for values designated below detection limit, half of this limit is used.

Parameter	Unit	St. Code	Station Name	County	Species	Tissue	Basis	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	SD	OC	Power (long)	First Yr. (long)	Last Yr. (long)	No Yrs (long)	Power (short)	First Yr. (short)	Last Yr. (short)	No Yrs (short)	Trend
Ag	mg/kg	10A2	Skallneset	Finnmark	MYTI EDU	SB	D							0.112	0.124	0.141	0.111	0	no	8	2008	2011	4	8	2008	2011	4	O/O
Ag	mg/kg	10B	Varangerfjorden	Finnmark	GADU MOR	LI	W								0.15	0.054	0.245	0.55	m	25	2009	2011	3	25	2009	2011	3	O/O
Ag	mg/kg	10F	Skogerøy	Finnmark	PLEU PLA	LI	W								0.18	0.193	0.094	0.021	m	12	2009	2011	3	12	2009	2011	3	O/O
Ag	mg/kg	11X	Brashavn	Finnmark	MYTI EDU	SB	D								0.138	0.11	0.13	0.001	no	8	2009	2011	3	8	2009	2011	3	O/O
Ag	mg/kg	13BH	Kristiansand havn	Aust-Agder	GADU MOR	LI	W								2.11	0.31	0.827	0.681	m	>25	2009	2011	3	>25	2009	2011	3	O/O
Ag	mg/kg	15A	Gåsøy (Ullerø)	Vest-Agder	MYTI EDU	SB	D								0.065	0.067	0.053	0.001	no	7	2009	2011	3	7	2009	2011	3	O/O
Ag	mg/kg	15B	Ullerø area	Vest-Agder	GADU MOR	LI	W								0.328	0.17	0.105	0.27	m	6	2009	2011	3	6	2009	2011	3	O/O
Ag	mg/kg	15F	Ullerø area	Vest-Agder	LIMA LIM	LI	W								0.059	0.058	0.055	0.043	m	<=5	2009	2011	3	<=5	2009	2011	3	O/O
Ag	mg/kg	21F	Åkrafjord	Hordaland	LEPI WHI	LI	W								0.078	0.14	0.11	0.032	m	13	2009	2011	3	13	2009	2011	3	O/O
Ag	mg/kg	227A2	Høgevarde	Rogaland	MYTI EDU	SB	D								0.033	0.033	0.029	0	no	<=5	2009	2011	3	<=5	2009	2011	3	O/O
Ag	mg/kg	22A	Espevær (west)	Hordaland	MYTI EDU	SB	D							0.018	0.024	0.043	0.065	0.001	no	6	2008	2011	4	6	2008	2011	4	↑/↑
Ag	mg/kg	23B	Karihavet area	Hordaland	GADU MOR	LI	W						0.47		3.77	0.486	0.687	1.219	m	24	1993	2011	5	>25	2007	2011	4	O/O
Ag	mg/kg	30A	Gressholmen	Oslo	MYTI EDU	SB	D							0.056	0.161	0.073	0.043	0	no	19	2008	2011	4	19	2008	2011	4	O/O
Ag	mg/kg	30B	Oslo City area	Akershus	GADU MOR	LI	W						5.51		10.7	10.1	5.04	4.392	m	14	1993	2011	5	16	2007	2011	4	O/O
Ag	mg/kg	31A	Solbergstrand	Akershus	MYTI EDU	SB	D								0.06	0.055	0.036	0.001	no	8	2009	2011	3	8	2009	2011	3	O/O
Ag	mg/kg	33F	Sande (east side)	Vestfold	PLAT FLE	LI	W								0.09	0.075	0.076	0.165	m	6	2009	2011	3	6	2009	2011	3	O/O
Ag	mg/kg	35A	Mølen	Buskerud	MYTI EDU	SB	D								0.057	0.044	0.045	0	no	7	2009	2011	3	7	2009	2011	3	O/O
Ag	mg/kg	36A	Færder	Vestfold	MYTI EDU	SB	D							0.044			0.067	0	no		2008	2011	2		2008	2011	2	□
Ag	mg/kg	36B	Færder area	Vestfold	GADU MOR	LI	W								0.611	1.035	0.56	0.641	m	15	2009	2011	3	15	2009	2011	3	O/O
Ag	mg/kg	36F	Færder area	Vestfold	LIMA LIM	LI	W								0.028	0.046	0.042	0.045	m	10	2009	2011	3	10	2009	2011	3	O/O
Ag	mg/kg	43BH	Tromsø havn	Troms	GADU MOR	LI	W								0.19	0.338	0.316	0.672	m	11	2009	2011	3	11	2009	2011	3	O/O
Ag	mg/kg	51A	Byrkjenes	Hordaland	MYTI EDU	SB	D								0.036	0.06	0.092	0	no	<=5	2009	2011	3	<=5	2009	2011	3	↑/↑
Ag	mg/kg	52A	Eitrheimsneset	Hordaland	MYTI EDU	SB	D							0.053	0.053	0.063	0.089	0	no	7	2008	2011	4	7	2008	2011	4	O/O
Ag	mg/kg	53B	Inner Sørfjord	Hordaland	GADU MOR	LI	W								0.238	0.321	0.391	0.464	m	<=5	2009	2011	3	<=5	2009	2011	3	O/O
Ag	mg/kg	53F	Inner Sørfjord	Hordaland	PLAT FLE	LI	W								0.022	0.043	0.052		m	10	2009	2011	3	10	2009	2011	3	O/O
Ag	mg/kg	56A	Kvalnes	Hordaland	MYTI EDU	SB	D								0.038	0.046	0.054	0	no	<=5	2009	2011	3	<=5	2009	2011	3	O/O
Ag	mg/kg	57A	Krossanes	Hordaland	MYTI EDU	SB	D								0.03	0.075	0.1	0.001	no	11	2009	2011	3	11	2009	2011	3	O/O
Ag	mg/kg	63A	Ranaskjær	Hordaland	MYTI EDU	SB	D								0.031	0.033	0.029	0	no	6	2009	2011	3	6	2009	2011	3	O/O
Ag	mg/kg	65A	Vikingneset	Hordaland	MYTI EDU	SB	D								0.025	0.047	0.03	0	no	15	2009	2011	3	15	2009	2011	3	O/O
Ag	mg/kg	67B	Strandebarm area	Hordaland	GADU MOR	LI	W								0.115	0.245	0.669	0.064	m	7	2009	2011	3	7	2009	2011	3	O/O
Ag	mg/kg	67F	Strandebarm area	Hordaland	LEPI WHI	LI	W								0.056	0.069	0.069	0.057	m	6	2009	2011	3	6	2009	2011	3	O/O
Ag	mg/kg	67F	Strandebarm area	Hordaland	PLAT FLE	LI	W								0.005		0.007	0.024	m		2009	2011	2		2009	2011	2	▪/▪
Ag	mg/kg	69A	Lille Terøy	Hordaland	MYTI EDU	SB	D								0.028	0.031	0.035	0	no	<=5	2009	2011	3	<=5	2009	2011	3	↑/↑
Ag	mg/kg	71A	Bjørkøya (Risøyodden)		MYTI EDU	SB	D							0.065	0.038	0.05	0.04	0	no	10	2008	2011	4	10	2008	2011	4	O/O
Ag	mg/kg	76A	Risøy	Aust-Agder	MYTI EDU	SB	D								0.029	0.04	0.095	0.001	no	10	2009	2011	3	10	2009	2011	3	O/O
Ag	mg/kg	80BH	Munkholmen	Sør-Trøndelag	GADU MOR	LI	W								0.19	0.15	0.17	0.158	m	8	2009	2011	3	8	2009	2011	3	O/O
Ag	mg/kg	98A2	Husvaagen area	Nordland	MYTI EDU	SB	D							0.053	0.042	0.036	0.047	0	no	9	2008	2011	4	9	2008	2011	4	O/O
Ag	mg/kg	98B1	Bjørnerøya (east)	Nordland	GADU MOR	LI	W								0.07	0.284	0.879	0.446	m	7	2009	2011	3	7	2009	2011	3	↑/↑
Ag	mg/kg	98F2	Husholmen	Nordland	PLEU PLA	LI	W								0.048	0.13	0.02	0.01	m	>25	2009	2011	3	>25	2009	2011	3	O/O
Ag	mg/kg	I023	Singlekalven (south)	Østfold	MYTI EDU	SB	D								0.038	0.033	0.05	0	no	10	2009	2011	3	10	2009	2011	3	O/O
Ag	mg/kg	I131A	Lastad	Vest-Agder	MYTI EDU	SB	D								0.038	0.033	0.026	0	no	<=5	2009	2011	3	<=5	2009	2011	3	O/O
Ag	mg/kg	I132	Svensholmen	Vest-Agder	MYTI EDU	SB	D								0.058	0.136	0.054	0	no	20	2009	2011	3	20	2009	2011	3	O/O
Ag	mg/kg	I133	Odderøy	Vest-Agder	MYTI EDU	SB	D								0.043	0.146	0.1	0	no	19	2009	2011	3	19	2009	2011	3	O/O
Ag	mg/kg	I201	Ekkjegrunn (G1)	Rogaland	MYTI EDU	SB	D								0.029	0.038	0.05	0	no	<=5	2009	2011	3	<=5	2009	2011	3	↑/↑
Ag	mg/kg	I205	Bølsnes (G5)	Rogaland	MYTI EDU	SB	D								0.033	0.04	0.041	0	no	<=5	2009	2011	3	<=5	2009	2011	3	O/O
Ag	mg/kg	I241	Nordnes	Hordaland	MYTI EDU	SB	D								0.028	0.028	0.025	0	no	<=5	2009	2011	3	<=5	2009	2011	3	O/O
Ag	mg/kg	I243	Hegreneset	Hordaland	MYTI EDU	SB	D								0.026	0.036	0.025	0	no	11	2009	2011	3	11	2009	2011	3	O/O
Ag	mg/kg	I301	Akershuskaia	Oslo	MYTI EDU	SB	D								0.033	0.035	0.038	0	no	<=5	2009	2011	3	<=5	2009	2011	3	O/O
Ag	mg/kg	I304	Gåsøya	Akershus	MYTI EDU	SB	D							0.033	0.043	0.038	0.038	0	no	7	2008	2011	4	7	2008	2011	4	O/O
Ag	mg/kg	I306	Håøya	Akershus	MYTI EDU	SB	D								0.033	0.036	0.038	0	no	<=5	2009	2011	3	<=5	2009	2011	3	↑/↑
Ag	mg/kg	I307	Ramtonholmen	Buskerud	MYTI EDU	SB	D							0.036	0.05	0.036	0.045	0	no	9	2008	2011	4	9	2008	2011	4	O/O
Ag	mg/kg	I712	Croftholmen	Telemark	MYTI EDU	SB	D								0.035	0.042	0.038	0	no	7	2009	2011	3	7	2009	2011	3	O/O
Ag	mg/kg	I713	Strømtangen	Telemark	MYTI EDU	SB	D								0.038	0.031	0.038	0	no	9	2009	2011	3	9	2009	2011	3	O/O
Ag	mg/kg	I964	Toraneskaien	Nordland	MYTI EDU	SB	D								0.048	0.048	0.046	0	no	<=5	2009	2011	3	<=5	2009	2011	3	O/O
Ag	mg/kg	I965	Moholmen (B5)	Nordland	MYTI EDU	SB	D								0.043	0.039	0.036	0	no	<=5	2009	2011	3	<=5	2009	2011	3	↓/↓
Ag	mg/kg	I969	Bjørnbærviken (B9)	Nordland	MYTI EDU	SB	D								0.026	0.033	0.024	0	no	10	2009	2011	3	10	2009	2011	3	O/O
ALAD	ng/min/mg protein	23B	Karihavet area	Hordaland	GADU MOR	BL	W	19.37	16.83	19.66	25.75	38.01			34.43	55.07	30.64	7.427	m	10	1997	2011	13	11	2002	2011	8	↑/O
ALAD	ng/min/mg protein	30B	Oslo City area	Akershus	GADU MOR	BL	W	10.399	6.911	14.21	15.01	32.26	14.06	11.66	28.61	20.09	20.21	5.123	m	13	1997	2011	15	14	2002	2011	10	O/O

Parameter	Unit	St. Code	Station Name	County	Species	Tissue	Basis	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	SD	OC	Power (long)	First Yr. (long)	Last Yr. (long)	No Yrs (long)	Power (short)	First Yr. (short)	Last Yr. (short)	No Yrs (short)	Trend
ALAD	ng/min/mg protein	53B	Inner Sørfjord	Hordaland	GADU MOR	BL	W	6.436	9.317	9.948	10.39	33.72	7.978		19.57	10	23.62	9.109	m	15	1997	2011	14	17	2002	2011	9	O/O
As	mg/kg	10A2	Skallneset	Finnmark	MYTI EDU	SB	D							16.176	14.765	12.889	10.611	0.015	1,06	<=5	2008	2011	4	<=5	2008	2011	4	↓/↓
As	mg/kg	10B	Varangerfjorden	Finnmark	GADU MOR	LI	W								4.64	2.36	2.66	2.338	m	12	2009	2011	3	12	2009	2011	3	O/O
As	mg/kg	10F	Skogerøy	Finnmark	PLEU PLA	LI	W								11.4	7.515	10.766	1.527	m	12	2009	2011	3	12	2009	2011	3	O/O
As	mg/kg	11X	Brashavn	Finnmark	MYTI EDU	SB	D								10.571	8.6	9.444	0.068	no	7	2009	2011	3	7	2009	2011	3	O/O
As	mg/kg	13BH	Kristiansand havn	Aust-Agder	GADU MOR	LI	W								5.1	6.15	4	1.868	m	11	2009	2011	3	11	2009	2011	3	O/O
As	mg/kg	15A	Gåsøy (Ullerø)	Vest-Agder	MYTI EDU	SB	D								20.235	21.375	16.684	0.074	1,67	7	2009	2011	3	7	2009	2011	3	O/O
As	mg/kg	15B	Ullerø area	Vest-Agder	GADU MOR	LI	W								4.69	4.06	3.83	2.473	m	<=5	2009	2011	3	<=5	2009	2011	3	O/O
As	mg/kg	15F	Ullerø area	Vest-Agder	LIMA LIM	LI	W								5.81	10.1	6.23	1.281	m	14	2009	2011	3	14	2009	2011	3	O/O
As	mg/kg	21F	Åkrafjord	Hordaland	LEPI WHI	LI	W								9.91	14.874	8.21	4.376	m	14	2009	2011	3	14	2009	2011	3	O/O
As	mg/kg	227A2	Høgevarde	Rogaland	MYTI EDU	SB	D								31.6	39.8	31.294	0.041	3,13	9	2009	2011	3	9	2009	2011	3	O/O
As	mg/kg	22A	Espevær (west)	Hordaland	MYTI EDU	SB	D							28.882	16.762	14.05	15.722	0.015	1,57	10	2008	2011	4	10	2008	2011	4	O/O
As	mg/kg	23B	Karihavet area	Hordaland	GADU MOR	LI	W								48.5	6.449	6.77	6.614	m	22	2009	2011	3	22	2009	2011	3	O/O
As	mg/kg	30A	Gressholmen	Oslo	MYTI EDU	SB	D							9.25	13.389	16.667	14.533	0.013	1,45	9	2008	2011	4	9	2008	2011	4	O/O
As	mg/kg	30B	Oslo City area	Akershus	GADU MOR	LI	W								43.5	30.9	21.8	16.591	m	<=5	2009	2011	3	<=5	2009	2011	3	↓/↓
As	mg/kg	31A	Solbergstrand	Akershus	MYTI EDU	SB	D									14.085	18.929	0.269	1,89		2010	2011	2		2010	2011	2	▪/▪
As	mg/kg	33F	Sande (east side)	Vestfold	PLAT FLE	LI	W								15.7	1.47	1.61	0.333	m	25	2009	2011	3	25	2009	2011	3	O/O
As	mg/kg	35A	Mølen	Buskerud	MYTI EDU	SB	D	7.701	66.495	12.625	13.438	8.571	19.3	12.611	14.87	21	12.923	0.035	1,29	18	1996	2011	16	19	2002	2011	10	O/O
As	mg/kg	36A	Færder	Vestfold	MYTI EDU	SB	D							13.278			20.389	0.039	2,04		2008	2011	2		2008	2011	2	▪/▪
As	mg/kg	36B	Færder area	Vestfold	GADU MOR	LI	W								4.18	8.219	4.511	2.032	m	16	2009	2011	3	16	2009	2011	3	O/O
As	mg/kg	36F	Færder area	Vestfold	LIMA LIM	LI	W								9.61	19.3	7.17	8.79	m	19	2009	2011	3	19	2009	2011	3	O/O
As	mg/kg	43BH	Tromsø havn	Troms	GADU MOR	LI	W								6.17	7.11	5.56	3.337	m	8	2009	2011	3	8	2009	2011	3	O/O
As	mg/kg	51A	Byrkjenes	Hordaland	MYTI EDU	SB	D								13.286	10.8	14.077	0.018	1,41	9	2009	2011	3	9	2009	2011	3	O/O
As	mg/kg	52A	Eitrheimsneset	Hordaland	MYTI EDU	SB	D							13.067	18.235	9.611	12.235	0.018	1,22	12	2008	2011	4	12	2008	2011	4	O/O
As	mg/kg	53B	Inner Sørfjord	Hordaland	GADU MOR	LI	W								4.21	5.08	10.749	8.404	m	10	2009	2011	3	10	2009	2011	3	O/O
As	mg/kg	53F	Inner Sørfjord	Hordaland	PLAT FLE	LI	W								9.559	2.07	2.29		m	19	2009	2011	3	19	2009	2011	3	O/O
As	mg/kg	56A	Kvalnes	Hordaland	MYTI EDU	SB	D								25	15.385	19	0.018	1,9	11	2009	2011	3	11	2009	2011	3	O/O
As	mg/kg	57A	Krossanes	Hordaland	MYTI EDU	SB	D								19.1	13.286	20.077	0.077	2,01	12	2009	2011	3	12	2009	2011	3	O/O
As	mg/kg	63A	Ranaskjær	Hordaland	MYTI EDU	SB	D								21.471	18.267	17	0.056	1,7	<=5	2009	2011	3	<=5	2009	2011	3	O/O
As	mg/kg	65A	Vikingneset	Hordaland	MYTI EDU	SB	D								21.55	20.643	17	0.101	1,7	<=5	2009	2011	3	<=5	2009	2011	3	O/O
As	mg/kg	67B	Strandebarm area	Hordaland	GADU MOR	LI	W								3.045	5.72	3.347	0.198	m	16	2009	2011	3	16	2009	2011	3	O/O
As	mg/kg	67F	Strandebarm area	Hordaland	LEPI WHI	LI	W								3.52	5.64	3.862	0.863	m	13	2009	2011	3	13	2009	2011	3	O/O
As	mg/kg	67F	Strandebarm area	Hordaland	PLAT FLE	LI	W								1.1		1.892	2.645	m		2009	2011	2		2009	2011	2	▪/▪
As	mg/kg	69A	Lille Terøy	Hordaland	MYTI EDU	SB	D								17.647	15.438	11.696	0.033	1,17	<=5	2009	2011	3	<=5	2009	2011	3	O/O
As	mg/kg	71A	Bjørkøya (Risøyodden)		MYTI EDU	SB	D							13.235	10.415	14.071	13.133	0.019	1,31	8	2008	2011	4	8	2008	2011	4	O/O
As	mg/kg	76A	Risøy	Aust-Agder	MYTI EDU	SB	D								23.647	30.298	12.2	0.02	1,22	15	2009	2011	3	15	2009	2011	3	O/O
As	mg/kg	80BH	Munkholmen	Sør-Trøndelag	GADU MOR	LI	W								2.4	3.665	7.35	4.882	m	7	2009	2011	3	7	2009	2011	3	O/O
As	mg/kg	98A2	Husvaagen area	Nordland	MYTI EDU	SB	D							15.706	15.684	19.471	17.647	0.024	1,76	6	2008	2011	4	6	2008	2011	4	O/O
As	mg/kg	98B1	Bjørnerøya (east)	Nordland	GADU MOR	LI	W								3.49	5.03	6.26	5.502	m	<=5	2009	2011	3	<=5	2009	2011	3	O/O
As	mg/kg	98F2	Husholmen	Nordland	PLEU PLA	LI	W								3.75	4.44	3.47	1.896	m	9	2009	2011	3	9	2009	2011	3	O/O
As	mg/kg	I023	Singlekalven (south)	Østfold	MYTI EDU	SB	D								8.538	15.375	12.8	0.013	1,28	12	2009	2011	3	12	2009	2011	3	O/O
As	mg/kg	I131A	Lastad	Vest-Agder	MYTI EDU	SB	D								14.769	21.188	13.158	0.054	1,32	13	2009	2011	3	13	2009	2011	3	O/O
As	mg/kg	I132	Svensholmen	Vest-Agder	MYTI EDU	SB	D								18.4	16.357	13.923	0.014	1,39	<=5	2009	2011	3	<=5	2009	2011	3	O/O
As	mg/kg	I133	Odderøy	Vest-Agder	MYTI EDU	SB	D								15.869	14.167	10	0.012	1	7	2009	2011	3	7	2009	2011	3	O/O
As	mg/kg	I201	Ekkjegrunn (G1)	Rogaland	MYTI EDU	SB	D								6.353	6.333	10.214	0.006	1,02	9	2009	2011	3	9	2009	2011	3	O/O
As	mg/kg	I205	Bølsnes (G5)	Rogaland	MYTI EDU	SB	D								8.375	7	8.647	0.033	no	8	2009	2011	3	8	2009	2011	3	O/O
As	mg/kg	I241	Nordnes	Hordaland	MYTI EDU	SB	D								12.389	12.294	8.85	0.017	no	8	2009	2011	3	8	2009	2011	3	O/O
As	mg/kg	I243	Hegreneset	Hordaland	MYTI EDU	SB	D								11.5	13.467	9.15	0.012	no	10	2009	2011	3	10	2009	2011	3	O/O
As	mg/kg	I301	Akershuskaia	Oslo	MYTI EDU	SB	D								10.267	12.176	10.652	0.005	1,07	7	2009	2011	3	7	2009	2011	3	O/O
As	mg/kg	I304	Gåsøya	Akershus	MYTI EDU	SB	D							9.2	13.143	15.846	18	0.038	1,8	6	2008	2011	4	6	2008	2011	4	↑/↑
As	mg/kg	I306	Håøya	Akershus	MYTI EDU	SB	D								14.714	16	23	0.026	2,3	7	2009	2011	3	7	2009	2011	3	O/O
As	mg/kg	I307	Ramtonholmen	Buskerud	MYTI EDU	SB	D							12.357	13.625	17.5	24.909	0.021	2,49	6	2008	2011	4	6	2008	2011	4	↑/↑
As	mg/kg	I712	Croftholmen	Telemark	MYTI EDU	SB	D								12.287	13.692	14.929	0.027	1,49	<=5	2009	2011	3	<=5	2009	2011	3	↑/↑
As	mg/kg	I713	Strømtangen	Telemark	MYTI EDU	SB	D								15.231	11.882	13.769	0.023	1,38	8	2009	2011	3	8	2009	2011	3	O/O
As	mg/kg	I964	Toraneskaien	Nordland	MYTI EDU	SB	D				15.243	16.168	17.172	18.625		16.32	14.923	0.032	1,49	6	2005	2011	6	6	2005	2011	6	O/O
As	mg/kg	I965	Moholmen (B5)	Nordland	MYTI EDU	SB	D				12.979	14.067	13.846	18.33		16.614	14.4	0.03	1,44	7	2005	2011	6	7	2005	2011	6	O/O
As	mg/kg	I969	Bjørnbærviken (B9)	Nordland	MYTI EDU	SB	D				15.375	10.053	10.778	9.533	9.175	13.005	11.5	0.042	1,15	9	2005	2011	7	9	2005	2011	7	O/O
B[a]P	µg/kg	30A	Gressholmen	Oslo	MYTI EDU	SB	D	3.401	3.226	4.261	3.846	6.067	2.941	3.125	2.778	3.333	3.333	0.003	no	9	1992	2011	17	10	2002	2011	10	O/O
B[a]P	µg/kg	35A	Mølen	Buskerud	MYTI EDU	SB	D							5.333	2.273	3.125	4.545		no	15	2008	2011	4	15	2008	2011	4	O/O
B[a]P	µg/kg	I131A	Lastad	Vest-Agder	MYTI EDU	SB	D	2.793	3.731	8	3.401	3.846	3.333	3.333	3.846	3.333	2.632	0	no	11	1995	2011	17	12	2002	2011	10	O/O
B[a]P	µg/kg	I132	Svensholmen	Vest-Agder	MYTI EDU	SB	D	49.618	89.655	52.427	150	61.333	80	93.75	24.667	17.333	13.846	0.026	2,77	23	1998	2011	14	15	2002	2011	10	O/↓
B[a]P	µg/kg	I133	Odderøy	Vest-Agder	MYTI EDU	SB	D	23.678	39.262	135.135	67.273	50	22.308	123.077	112	6.667	26	0.129	5,2	23	1995	2011	16	24	2002	2011	10	O/O

Parameter	Unit	St. Code	Station Name	County	Species	Tissue	Basis	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	SD	OC	Power (long)	First Yr. (long)	Last Yr. (long)	No Yrs (long)	Power (short)	First Yr. (short)	Last Yr. (short)	No Yrs (short)	Trend
B[a]P	µg/kg	I201	Ekkjegrunn (G1)	Rogaland	MYTI EDU	SB	D	187.5	7.229	3.789	8.547	5	6.083	5.2	5.412	3.533	7.857	0.023	1,57	>25	1995	2011	17	23	2002	2011	10	↓/O
B[a]P	µg/kg	I205	Bølsnes (G5)	Rogaland	MYTI EDU	SB	D	33	3.165	48.227	4.505	3.846	4.167	3.571	3.125	3.333	2.941	0.009	no	23	1995	2011	16	23	2002	2011	10	O/O
B[a]P	µg/kg	I301	Akershuskaia	Oslo	MYTI EDU	SB	D	3.125	3.185	34.211	3.472	42.143	14.444	12	3.857	12.941	14.615	0.034	2,92	23	1992	2011	18	24	2002	2011	10	O/O
B[a]P	µg/kg	I304	Gåsøya	Akershus	MYTI EDU	SB	D	3.846	3.067	5.333	4.386	3.846	2.941	3.333	3.571	6	3.846	0.005	no	9	1995	2011	17	10	2002	2011	10	O/O
B[a]P	µg/kg	I306	Håøya	Akershus	MYTI EDU	SB	D	3.356	3.521	4.793	4.31	3.125	3.571	3.846	3.333	4.286	3.846	0	no	7	1995	2011	17	8	2002	2011	10	↑/O
B[a]P	µg/kg	I307	Ramtonholmen	Buskerud	MYTI EDU	SB	D	4.505	3.65	5.268	3.968	3.125	3.125	3.571	2.941	7.143	4.545	0.003	no	9	1995	2011	17	11	2002	2011	10	↑/O
B[a]P	µg/kg	I912	Honnhammer	Møre og Romsdal	MYTI EDU	SB	D	20	3.968	1.46	3.65	3.333	3.375	9.286	2.778	2.924	6.143	0.055	1,23	24	1995	2011	16	20	2002	2011	10	O/O
B[a]P	µg/kg	I913	Fjøseid	Møre og Romsdal	MYTI EDU	SB	D	13.333	3.65	1.361	3.289	2.778	3.846	5.417	2.778	3.876	3.125	0.003	no	18	1999	2011	13	17	2002	2011	10	O/O
B[a]P	µg/kg	I964	Toraneskaien	Nordland	MYTI EDU	SB	D	37.273	289.474	251.429	55.357	200	232.323	200	396.518	61.719	92.308	0.188	18,46	22	2002	2011	10	22	2002	2011	10	O/O
B[a]P	µg/kg	I965	Moholmen (B5)	Nordland	MYTI EDU	SB	D	30.769	43.636	87.719	19.31	58	115.385	66.483	233.362	35.433	52	0.083	10,4	22	2001	2011	11	20	2002	2011	10	O/O
B[a]P	µg/kg	I969	Bjørnbærviken (B9)	Nordland	MYTI EDU	SB	D	3.684	46.707	34.653	7.273	24.211	23.889	25	14.864	8.333	5.714	0.029	1,14	20	1995	2011	17	22	2002	2011	10	O/O
Ba	mg/kg	35A	Mølen	Buskerud	MYTI EDU	SB	D	9.086	0.652	0.48	0.887	0.714	0.45	0.526	1.639	7.313	2.091	0.009	m	23	1996	2011	13	23	2002	2011	10	O/O
Cd	mg/kg	10A2	Skallneset	Finnmark	MYTI EDU	SB	D	1.413	1.984	1.585	1.121	1.744	2.283	2.071	1.553	1.844	1.894	0.009	no	11	1996	2011	16	10	2002	2011	10	O/O
Cd	mg/kg	10B	Varangerfjorden	Finnmark	GADU MOR	LI	W	0.059	0.099	0.103	0.079	0.078	0.082	0.092	0.06	0.083	0.102	0.05	no	10	1994	2011	18	10	2002	2011	10	↓/O
Cd	mg/kg	10F	Skogerøy	Finnmark	PLEU PLA	LI	W	0.204	0.316	0.307	0.271		0.627	0.409	0.617	0.479	0.893	0.026	4,47	13	1997	2011	13	11	2002	2011	9	↑/↑
Cd	mg/kg	11X	Brashavn	Finnmark	MYTI EDU	SB	D	1.358	1.356	0.911	0.981	0.933	1.163	1.141	1.019	1.105	0.99	0.006	no	10	1997	2011	15	7	2002	2011	10	O/O
Cd	mg/kg	13BH	Kristiansand havn	Aust-Agder	GADU MOR	LI	W								0.037	0.028	0.027	0.029	no	7	2009	2011	3	7	2009	2011	3	O/O
Cd	mg/kg	15A	Gåsøy (Ullerø)	Vest-Agder	MYTI EDU	SB	D	1.312	0.737	0.926	0.788	1.013	0.718	0.622	0.835	1.188	1.116	0.006	no	14	1990	2011	21	10	2002	2011	10	O/O
Cd	mg/kg	15B	Ullerø area	Vest-Agder	GADU MOR	LI	W	0.018	0.037	0.01	0.019	0.006	0.023	0.018	0.02	0.021	0.017	0.015	no	14	1990	2011	22	17	2002	2011	10	O/O
Cd	mg/kg	15F	Ullerø area	Vest-Agder	LIMA LIM	LI	W	0.129	0.11	0.189	0.225	0.377	0.153	0.284	0.176	0.304	0.376	0.213	1,25	13	1993	2011	18	13	2002	2011	10	O/O
Cd	mg/kg	21F	Åkrafjord	Hordaland	LEPI WHI	LI	W		0.059	0.081	0.112	0.186	0.049	0.041	0.108	0.183	0.089	0.076	m	18	2003	2011	9	18	2003	2011	9	O/O
Cd	mg/kg	227A2	Høgevarde	Rogaland	MYTI EDU	SB	D								0.853	1.025	0.776	0.002	no	9	2009	2011	3	9	2009	2011	3	O/O
Cd	mg/kg	22A	Espevær (west)	Hordaland	MYTI EDU	SB	D	0.976	1.04	1.182	0.912	0.844	1.24	1.019	0.874	0.71	0.833	0.001	no	11	1990	2011	22	8	2002	2011	10	O/O
Cd	mg/kg	23B	Karihavet area	Hordaland	GADU MOR	LI	W	0.021	0.016	0.023	0.024	0.038	0.022	0.012	0.018	0.027	0.033	0.041	no	12	1990	2011	22	13	2002	2011	10	O/O
Cd	mg/kg	30A	Gressholmen	Oslo	MYTI EDU	SB	D	1.747	1.561	2.161	1.7	1.715	1.424	1.787	1.206	1.82	2.033	0.008	1,02	10	1984	2011	28	9	2002	2011	10	↑/O
Cd	mg/kg	30B	Oslo City area	Akershus	GADU MOR	LI	W	0.106	0.114	0.1	0.073	0.115	0.19	0.174	0.163	0.18	0.125	0.121	no	15	1984	2011	28	10	2002	2011	10	↑/O
Cd	mg/kg	31A	Solbergstrand	Akershus	MYTI EDU	SB	D	1.137	1.327	1.398	1.276	1.11	1.156	1.213	1.163	1.055	1.556	0.002	no	12	1983	2011	29	7	2002	2011	10	↑/O
Cd	mg/kg	33F	Sande (east side)	Vestfold	PLAT FLE	LI	W	0.057	0.063	0.031	0.025	0.068	0.039	0.067	0.064	0.051	0.047	0.047	no	13	1983	2011	28	13	2002	2011	10	↓/O
Cd	mg/kg	35A	Mølen	Buskerud	MYTI EDU	SB	D	1.16	1.062	1.225	1.331	0.86	0.855	1.005	0.726	0.988	1.745	0.003	no	10	1983	2011	29	10	2002	2011	10	↑/O
Cd	mg/kg	36A	Færder	Vestfold	MYTI EDU	SB	D	1.004	0.848	0.956	0.9	0.586	0.633	0.735			0.617	0.001	no	12	1983	2011	27	8	2002	2011	8	↑/O
Cd	mg/kg	36B	Færder area	Vestfold	GADU MOR	LI	W	0.025	0.009	0.007	0.029	0.025	0.034	0.034	0.025	0.035	0.02	0.03	no	15	1981	2011	31	16	2002	2011	10	↓/O
Cd	mg/kg	36F	Færder area	Vestfold	LIMA LIM	LI	W	0.127	0.142	0.188	0.144	0.128	0.208	0.139	0.151	0.182	0.222	0.084	no	11	1990	2011	22	9	2002	2011	10	O/O
Cd	mg/kg	43BH	Tromsø havn	Troms	GADU MOR	LI	W								0.171	0.135	0.143	0.175	no	7	2009	2011	3	7	2009	2011	3	O/O
Cd	mg/kg	51A	Byrkjenes	Hordaland	MYTI EDU	SB	D	16.587	14.677	5.209	13.82	2.35	3.417	2.84	2.286	3.267	7.3	0.011	3,65	19	1987	2011	19	16	2002	2011	10	↓/↓
Cd	mg/kg	52A	Eitrheimsneset	Hordaland	MYTI EDU	SB	D	5	7.383	5.367	7	2.875	4.411	2.221	2.247	4.056	2.331	0.012	1,17	17	1989	2011	23	13	2002	2011	10	↓/O
Cd	mg/kg	53B	Inner Sørfjord	Hordaland	GADU MOR	LI	W	0.431	0.253	0.368	0.414	0.2	0.279	0.494	0.2	0.156	0.064	0.108	no	21	1986	2011	24	14	2002	2011	10	↑/↓
Cd	mg/kg	53F	Inner Sørfjord	Hordaland	PLAT FLE	LI	W	2.74	4.56	1.46	1.31		0.765	1.34	0.152	0.276	0.289		no	19	1988	2011	22	19	2002	2011	9	↓/↓
Cd	mg/kg	56A	Kvalnes	Hordaland	MYTI EDU	SB	D	13.434	11.353	6.183	11.667	8.4	5.288	6.207	4.893	6.085	7.554	0.029	3,78	14	1987	2011	25	11	2002	2011	10	↓/O
Cd	mg/kg	57A	Krossanes	Hordaland	MYTI EDU	SB	D	6.957	6.316	3.123	5.941	6.207	2.339	2.428	1.833	2.757	3.062	0.013	1,53	13	1987	2011	25	13	2002	2011	10	↓/O
Cd	mg/kg	63A	Ranaskjær	Hordaland	MYTI EDU	SB	D	5.375	5.693	1.298	4	3.98	3.071	1.805	2.038	2.593	1.295	0.006	no	15	1987	2011	25	16	2002	2011	10	↓/O
Cd	mg/kg	65A	Vikingneset	Hordaland	MYTI EDU	SB	D	3.737	3.4	1.306	3.422	3.975	1.867	1.465	1.43	2.05	0.995	0.015	no	15	1987	2011	25	15	2002	2011	10	↓/O
Cd	mg/kg	67B	Strandebarm area	Hordaland	GADU MOR	LI	W	0.02	0.01	0.016	0.025	0.009	0.015	0.009	0.012	0.014	0.015	0.008	no	18	1987	2011	25	13	2002	2011	10	↓/O
Cd	mg/kg	67F	Strandebarm area	Hordaland	LEPI WHI	LI	W	0.034	0.054	0.049	0.061	0.045	0.028	0.026	0.023	0.084	0.033	0.008	m	15	1983	2011	26	14	2002	2011	10	↓/O
Cd	mg/kg	67F	Strandebarm area	Hordaland	PLAT FLE	LI	W	0.065	0.08	0.061	0.124	0.14	0.093	0.126	0.13		0.095	0.105	no	14	1996	2011	14	11	2002	2011	9	↓/O
Cd	mg/kg	69A	Lille Terøy	Hordaland	MYTI EDU	SB	D	2.414	2.363	1.185	2.263	1.51	1.406	1.228	1.094	1.644	0.948	0.004	no	12	1992	2011	20	11	2002	2011	10	↓/O
Cd	mg/kg	71A	Bjørkøya (Risøyodden)		MYTI EDU	SB	D	1.693	1.444	1.575	1.485	1.427	1.173	1.074	0.924	2.193	2.36	0.003	1,18	11	1983	2011	29	10	2002	2011	10	O/O
Cd	mg/kg	76A	Risøy	Aust-Agder	MYTI EDU	SB	D	1.45	1.054	1.007	0.829	0.816	1.025	0.953	1.006	1.69	0.673	0.004	no	11	1990	2011	20	11	2002	2011	10	O/O
Cd	mg/kg	80BH	Munkholmen	Sør-Trøndelag	GADU MOR	LI	W								0.019	0.018	0.043	0.027	no	14	2009	2011	3	14	2009	2011	3	O/O
Cd	mg/kg	98A2	Husvaagen area	Nordland	MYTI EDU	SB	D	2.131	2.272	1.067	1.294	1.178	1.053	1.424	1.239	1.836	1.659	0.006	no	10	1997	2011	14	9	2002	2011	10	↓/O
Cd	mg/kg	98B1	Bjørnerøya (east)	Nordland	GADU MOR	LI	W	0.029	0.025	0.033	0.051	0.038	0.069	0.024	0.018	0.053	0.11	0.06	no	19	1992	2011	18	16	2002	2011	10	O/O
Cd	mg/kg	98F2	Husholmen	Nordland	PLEU PLA	LI	W	0.217	0.218	0.073	1.013	0.593	0.287	0.205	0.051	0.206	0.082	0.069	no	22	2000	2011	12	23	2002	2011	10	O/O
Cd	mg/kg	I023	Singlekalven (south)	Østfold	MYTI EDU	SB	D	1.55	1.48	1.034	1.388	1.792	1.154	1.285	0.983	1.95	1.673	0.002	no	11	1995	2011	17	11	2002	2011	10	O/O
Cd	mg/kg	I131A	Lastad	Vest-Agder	MYTI EDU	SB	D	1.128	0.862	1.338	0.965	0.831	0.787	1	1.508	0.953	1.289	0.003	no	11	1995	2011	17	10	2002	2011	10	O/O
Cd	mg/kg	I132	Svensholmen	Vest-Agder	MYTI EDU	SB	D								1.219	1.12	1.485	0.003	no	8	2009	2011	3	8	2009	2011	3	O/O
Cd	mg/kg	I133	Odderøy	Vest-Agder	MYTI EDU	SB	D								1.851	1.692	1.493	0.005	no	<=5	2009	2011	3	<=5	2009	2011	3	O/O
Cd	mg/kg	I201	Ekkjegrunn (G1)	Rogaland	MYTI EDU	SB	D	2.804	0.707	0.957	1.474	1.554	1.442	1.475	0.924	0.713	0.943	0.002	no	12	1995	2011	17	14	2002	2011	10	O/O
Cd	mg/kg	I205	Bølsnes (G5)	Rogaland	MYTI EDU	SB	D	2.434	1.253	1.022	2.024	1.908	1.283	2.407	1.14	0.98	0.576	0.003	no	12	1995	2011	16	13	2002	2011	10	O/O
Cd	mg/kg	I241	Nordnes	Hordaland	MYTI EDU	SB	D								1.327	0.847	0.61	0.003	no	<=5	2009	2011	3	<=5	2009	2011	3	O/O
Cd	mg/kg	I243	Hegreneset	Hordaland	MYTI EDU	SB	D								1.235	1.14	0.56	0.002	no	11	2009	2011	3	11	2009	2011	3	O/O
Cd	mg/kg	I301	Akershuskaia	Oslo	MYTI EDU	SB	D	0.888	1.153	1.317	1.035	1.493	1.178	1.453	1.229	1.247	1.385	0.001	no	9	1992	2011	18	8	2002	2011	10	↑/O
Cd	mg/kg	I304	Gåsøya	Akershus	MYTI EDU	SB	D	1.3	1.374	1.102	1.342	1.354	0.889	1.107	1.157	1.377	1.477	0.001	no	9	1995	2011	17	8	2002	2011	10	O/O
Cd	mg/kg	I306	Håøya	Akershus	MYTI EDU	SB	D	0.872	1.28	0.992	1.109	0.806	0.65	1.162	0.773	0.95	1.169	0.001	no	9	1995	2011	17	10	2002	2011	10	O/O

Parameter	Unit	St. Code	Station Name	County	Species	Tissue	Basis	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	SD	OC	Power (long)	First Yr. (long)	Last Yr. (long)	No Yrs (long)	Power (short)	First Yr. (short)	Last Yr. (short)	No Yrs (short)	Trend
Cd	mg/kg	I307	Ramtonholmen	Buskerud	MYTI EDU	SB	D	1.456	1.444	1.143	1.262	0.933	0.876	1.329	0.818	1.32	1.625	0.002	no	9	1995	2011	17	9	2002	2011	10	↑/O
Cd	mg/kg	I712	Croftholmen	Telemark	MYTI EDU	SB	D								1.441	1.608	1.677	0.001	no	<=5	2009	2011	3	<=5	2009	2011	3	O/O
Cd	mg/kg	I713	Strømtangen	Telemark	MYTI EDU	SB	D								1.031	1.063	1.738	0.003	no	9	2009	2011	3	9	2009	2011	3	O/O
Cd	mg/kg	I964	Toraneskaien	Nordland	MYTI EDU	SB	D	1.573	0.652	0.92	2.146	2.109	2.04	2.056	1.547	1.744	1.438	0.004	no	13	2002	2011	10	13	2002	2011	10	O/O
Cd	mg/kg	I965	Moholmen (B5)	Nordland	MYTI EDU	SB	D	2.154	0.813	1.896	1.799	1.779	2.077	2.915	1.745	1.685	1.557	0.002	no	12	2001	2011	11	12	2002	2011	10	O/O
Cd	mg/kg	I969	Bjørnbærviken (B9)	Nordland	MYTI EDU	SB	D	0.8	0.557	0.615	1.188	0.432	0.461	0.564	0.503	0.577	0.619	0.001	no	12	1995	2011	17	12	2002	2011	10	O/O
Co	mg/kg	10A2	Skallneset	Finnmark	MYTI EDU	SB	D								0.285	0.334	0.371	0	m	<=5	2009	2011	3	<=5	2009	2011	3	O/O
Co	mg/kg	10B	Varangerfjorden	Finnmark	GADU MOR	LI	W								0.022	0.02	0.023	0.013	m	6	2009	2011	3	6	2009	2011	3	O/O
Co	mg/kg	10F	Skogerøy	Finnmark	PLEU PLA	LI	W								0.265	0.276	0.32	0.042	m	<=5	2009	2011	3	<=5	2009	2011	3	O/O
Co	mg/kg	11X	Brashavn	Finnmark	MYTI EDU	SB	D								0.299	0.203	0.239	0	m	10	2009	2011	3	10	2009	2011	3	O/O
Co	mg/kg	13BH	Kristiansand havn	Aust-Agder	GADU MOR	LI	W								0.084	0.052	0.038	0.02	m	6	2009	2011	3	6	2009	2011	3	O/O
Co	mg/kg	15A	Gåsøy (Ullerø)	Vest-Agder	MYTI EDU	SB	D								0.563	0.7	0.423	0.003	m	12	2009	2011	3	12	2009	2011	3	O/O
Co	mg/kg	15B	Ullerø area	Vest-Agder	GADU MOR	LI	W								0.038	0.025	0.023	0.017	m	8	2009	2011	3	8	2009	2011	3	O/O
Co	mg/kg	15F	Ullerø area	Vest-Agder	LIMA LIM	LI	W								0.212	0.176	0.145	0.069	m	<=5	2009	2011	3	<=5	2009	2011	3	↓/↓
Co	mg/kg	21F	Åkrafjord	Hordaland	LEPI WHI	LI	W								0.084	0.097	0.087	0.018	m	7	2009	2011	3	7	2009	2011	3	O/O
Co	mg/kg	227A2	Høgevarde	Rogaland	MYTI EDU	SB	D								0.621	0.556	0.753	0.015	m	9	2009	2011	3	9	2009	2011	3	O/O
Co	mg/kg	22A	Espevær (west)	Hordaland	MYTI EDU	SB	D								0.439	0.255	0.444	0.001	m	15	2009	2011	3	15	2009	2011	3	O/O
Co	mg/kg	23B	Karihavet area	Hordaland	GADU MOR	LI	W								0.291	0.039	0.042	0.024	m	22	2009	2011	3	22	2009	2011	3	O/O
Co	mg/kg	30A	Gressholmen	Oslo	MYTI EDU	SB	D								0.38	0.525	0.466	0.001	m	9	2009	2011	3	9	2009	2011	3	O/O
Co	mg/kg	30B	Oslo City area	Akershus	GADU MOR	LI	W								0.103	0.064	0.024	0.033	m	9	2009	2011	3	9	2009	2011	3	O/O
Co	mg/kg	31A	Solbergstrand	Akershus	MYTI EDU	SB	D								0.406	0.429	0.465	0.005	m	<=5	2009	2011	3	<=5	2009	2011	3	O/O
Co	mg/kg	33F	Sande (east side)	Vestfold	PLAT FLE	LI	W								0.828	0.069	0.093	0.031	m	>25	2009	2011	3	>25	2009	2011	3	O/O
Co	mg/kg	35A	Mølen	Buskerud	MYTI EDU	SB	D	0.211	0.377	0.3	0.387	0.265	0.345	0.247	0.26	0.406	0.568	0.002	m	12	1996	2011	16	10	2002	2011	10	O/O
Co	mg/kg	36A	Færder	Vestfold	MYTI EDU	SB	D										0.409	0.001	m		2011	2011	1		2011	2011	1	▪/▪
Co	mg/kg	36B	Færder area	Vestfold	GADU MOR	LI	W								0.048	0.06	0.044	0.019	m	10	2009	2011	3	10	2009	2011	3	O/O
Co	mg/kg	36F	Færder area	Vestfold	LIMA LIM	LI	W								0.205	0.2	0.177	0.014	m	<=5	2009	2011	3	<=5	2009	2011	3	O/O
Co	mg/kg	43BH	Tromsø havn	Troms	GADU MOR	LI	W								0.015	0.017	0.016	0.021	m	6	2009	2011	3	6	2009	2011	3	O/O
Co	mg/kg	51A	Byrkjenes	Hordaland	MYTI EDU	SB	D								0.459	0.793	0.64	0.001	m	12	2009	2011	3	12	2009	2011	3	O/O
Co	mg/kg	52A	Eitrheimsneset	Hordaland	MYTI EDU	SB	D								0.351	0.418	0.385	0.001	m	7	2009	2011	3	7	2009	2011	3	O/O
Co	mg/kg	53B	Inner Sørfjord	Hordaland	GADU MOR	LI	W								0.055	0.039	0.038	0.022	m	7	2009	2011	3	7	2009	2011	3	O/O
Co	mg/kg	53F	Inner Sørfjord	Hordaland	PLAT FLE	LI	W								0.188	0.103	0.056		m	<=5	2009	2011	3	<=5	2009	2011	3	↓/↓
Co	mg/kg	56A	Kvalnes	Hordaland	MYTI EDU	SB	D								0.549	0.747	0.728	0.001	m	8	2009	2011	3	8	2009	2011	3	O/O
Co	mg/kg	57A	Krossanes	Hordaland	MYTI EDU	SB	D								0.361	0.637	0.585	0.002	m	11	2009	2011	3	11	2009	2011	3	O/O
Co	mg/kg	63A	Ranaskjær	Hordaland	MYTI EDU	SB	D								0.473	0.627	0.348	0	m	13	2009	2011	3	13	2009	2011	3	O/O
Co	mg/kg	65A	Vikingneset	Hordaland	MYTI EDU	SB	D								0.4	0.501	0.294	0.001	m	12	2009	2011	3	12	2009	2011	3	O/O
Co	mg/kg	67B	Strandebarm area	Hordaland	GADU MOR	LI	W								0.034	0.055	0.015	0.006	m	20	2009	2011	3	20	2009	2011	3	O/O
Co	mg/kg	67F	Strandebarm area	Hordaland	LEPI WHI	LI	W								0.061	0.064	0.061	0.003	m	<=5	2009	2011	3	<=5	2009	2011	3	O/O
Co	mg/kg	67F	Strandebarm area	Hordaland	PLAT FLE	LI	W								0.016		0.03	0.076	m		2009	2011	2		2009	2011	2	▪/▪
Co	mg/kg	69A	Lille Terøy	Hordaland	MYTI EDU	SB	D								0.457	0.445	0.358	0.002	m	6	2009	2011	3	6	2009	2011	3	O/O
Co	mg/kg	71A	Bjørkøya (Risøyodden)		MYTI EDU	SB	D								0.346	0.389	0.46	0.001	m	<=5	2009	2011	3	<=5	2009	2011	3	O/O
Co	mg/kg	76A	Risøy	Aust-Agder	MYTI EDU	SB	D								0.557	0.538	0.44	0.001	m	6	2009	2011	3	6	2009	2011	3	O/O
Co	mg/kg	80BH	Munkholmen	Sør-Trøndelag	GADU MOR	LI	W								0.034	0.034	0.034	0.038	m	<=5	2009	2011	3	<=5	2009	2011	3	O/O
Co	mg/kg	98A2	Husvaagen area	Nordland	MYTI EDU	SB	D								0.354	0.317	0.335	0	m	6	2009	2011	3	6	2009	2011	3	O/O
Co	mg/kg	98B1	Bjørnerøya (east)	Nordland	GADU MOR	LI	W								0.015	0.034	0.035	0.026	m	12	2009	2011	3	12	2009	2011	3	O/O
Co	mg/kg	98F2	Husholmen	Nordland	PLEU PLA	LI	W								0.069	0.236	0.107	0.068	m	22	2009	2011	3	22	2009	2011	3	O/O
Co	mg/kg	I023	Singlekalven (south)	Østfold	MYTI EDU	SB	D								0.513	0.615	0.839	0.001	m	<=5	2009	2011	3	<=5	2009	2011	3	O/O
Co	mg/kg	I131A	Lastad	Vest-Agder	MYTI EDU	SB	D								0.634	0.499	0.333	0	m	6	2009	2011	3	6	2009	2011	3	O/O
Co	mg/kg	I132	Svensholmen	Vest-Agder	MYTI EDU	SB	D								1.007	1.207	1.154	0.002	m	6	2009	2011	3	6	2009	2011	3	O/O
Co	mg/kg	I133	Odderøy	Vest-Agder	MYTI EDU	SB	D								1.496	1.477	1.293	0.002	m	<=5	2009	2011	3	<=5	2009	2011	3	O/O
Co	mg/kg	I201	Ekkjegrunn (G1)	Rogaland	MYTI EDU	SB	D								0.323	0.335	0.75	0.001	m	12	2009	2011	3	12	2009	2011	3	O/O
Co	mg/kg	I205	Bølsnes (G5)	Rogaland	MYTI EDU	SB	D								0.304	0.31	0.34	0.002	m	<=5	2009	2011	3	<=5	2009	2011	3	O/O
Co	mg/kg	I241	Nordnes	Hordaland	MYTI EDU	SB	D								0.465	0.302	0.249	0	m	7	2009	2011	3	7	2009	2011	3	O/O
Co	mg/kg	I243	Hegreneset	Hordaland	MYTI EDU	SB	D								0.358	0.442	0.297	0.001	m	11	2009	2011	3	11	2009	2011	3	O/O
Co	mg/kg	I301	Akershuskaia	Oslo	MYTI EDU	SB	D								0.38	0.502	0.628	0	m	<=5	2009	2011	3	<=5	2009	2011	3	↑/↑
Co	mg/kg	I304	Gåsøya	Akershus	MYTI EDU	SB	D								0.469	0.657	0.588	0.001	m	9	2009	2011	3	9	2009	2011	3	O/O
Co	mg/kg	I306	Håøya	Akershus	MYTI EDU	SB	D								0.371	0.497	0.474	0	m	8	2009	2011	3	8	2009	2011	3	O/O
Co	mg/kg	I307	Ramtonholmen	Buskerud	MYTI EDU	SB	D								0.542	0.668	0.7	0.001	m	6	2009	2011	3	6	2009	2011	3	O/O
Co	mg/kg	I712	Croftholmen	Telemark	MYTI EDU	SB	D								0.513	0.48	0.488	0	m	<=5	2009	2011	3	<=5	2009	2011	3	O/O
Co	mg/kg	I713	Strømtangen	Telemark	MYTI EDU	SB	D								0.675	0.311	0.586	0.001	m	17	2009	2011	3	17	2009	2011	3	O/O
Co	mg/kg	I964	Toraneskaien	Nordland	MYTI EDU	SB	D								1.122	0.977	1.369	0.004	m	9	2009	2011	3	9	2009	2011	3	O/O
Co	mg/kg	I965	Moholmen (B5)	Nordland	MYTI EDU	SB	D								1.115	0.822	0.973	0.003	m	9	2009	2011	3	9	2009	2011	3	O/O
Co	mg/kg	I969	Bjørnbærviken (B9)	Nordland	MYTI EDU	SB	D								0.35	0.349	0.473	0.001	m	7	2009	2011	3	7	2009	2011	3	O/O
Cr	mg/kg	10A2	Skallneset	Finnmark	MYTI EDU	SB	D							2.765	1	1.176	1.778	0.036	no	16	2008	2011	4	16	2008	2011	4	O/O

Parameter	Unit	St. Code	Station Name	County	Species	Tissue	Basis	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	SD	OC	Power (long)	First Yr. (long)	Last Yr. (long)	No Yrs (long)	Power (short)	First Yr. (short)	Last Yr. (short)	No Yrs (short)	Trend
Cr	mg/kg	10B	Varangerfjorden	Finnmark	GADU MOR	LI	W								0.2	0.2	0.2	0	m	?	2009	2011	3	?	2009	2011	3	▪/▪
Cr	mg/kg	10F	Skogerøy	Finnmark	PLEU PLA	LI	W								0.2	0.2	0.2	0	m	?	2009	2011	3	?	2009	2011	3	▪/▪
Cr	mg/kg	11X	Brashavn	Finnmark	MYTI EDU	SB	D								0.667	0.476	0.5	0.002	no	8	2009	2011	3	8	2009	2011	3	O/O
Cr	mg/kg	13BH	Kristiansand havn	Aust-Agder	GADU MOR	LI	W								0.4	0.2	0.2	0.134	m	11	2009	2011	3	11	2009	2011	3	O/O
Cr	mg/kg	15A	Gåsøy (Ullerø)	Vest-Agder	MYTI EDU	SB	D								0.471	0.625	1.474	0.021	no	10	2009	2011	3	10	2009	2011	3	O/O
Cr	mg/kg	15B	Ullerø area	Vest-Agder	GADU MOR	LI	W							0.2	0.2	0.2	0.2	0	m	?	2008	2011	4	?	2008	2011	4	▪/▪
Cr	mg/kg	15F	Ullerø area	Vest-Agder	LIMA LIM	LI	W								0.2	0.2	0.2	0	m	?	2009	2011	3	?	2009	2011	3	▪/▪
Cr	mg/kg	21F	Åkrafjord	Hordaland	LEPI WHI	LI	W								0.2	0.2	0.2	0.058	m	?	2009	2011	3	?	2009	2011	3	▪/▪
Cr	mg/kg	227A2	Høgevarde	Rogaland	MYTI EDU	SB	D								1.333	2.143	10	0.244	3,33	15	2009	2011	3	15	2009	2011	3	O/O
Cr	mg/kg	22A	Espevær (west)	Hordaland	MYTI EDU	SB	D							0.706	0.565	0.5	1.111	0.013	no	14	2008	2011	4	14	2008	2011	4	O/O
Cr	mg/kg	23B	Karihavet area	Hordaland	GADU MOR	LI	W						0.3	0.2	0.2	0.2	0.2	0	m	8	1993	2011	6	8	2007	2011	5	O/O
Cr	mg/kg	30A	Gressholmen	Oslo	MYTI EDU	SB	D							1.25	0.824	1.333	2.267	0.015	no	13	2008	2011	4	13	2008	2011	4	O/O
Cr	mg/kg	30B	Oslo City area	Akershus	GADU MOR	LI	W						0.3	0.2	0.2	0.2	0.2	0	m	8	1993	2011	6	8	2007	2011	5	O/O
Cr	mg/kg	31A	Solbergstrand	Akershus	MYTI EDU	SB	D								1.533	2.195	3.429	0.142	1,14	<=5	2009	2011	3	<=5	2009	2011	3	↑/↑
Cr	mg/kg	33F	Sande (east side)	Vestfold	PLAT FLE	LI	W								0.2	0.2	0.2	0	m	?	2009	2011	3	?	2009	2011	3	▪/▪
Cr	mg/kg	35A	Mølen	Buskerud	MYTI EDU	SB	D	0.92	0.874	1.829	1.067	0.714	0.4	1.579	0.957	1.25	1.818	0.044	no	20	1992	2011	14	15	2002	2011	10	O/O
Cr	mg/kg	36A	Færder	Vestfold	MYTI EDU	SB	D							0.389			0.556	0.012	no	9	1992	2011	3		2008	2011	2	▪/▪
Cr	mg/kg	36B	Færder area	Vestfold	GADU MOR	LI	W							0.2	0.2	0.2	0.2	0.021	m	?	2008	2011	4	?	2008	2011	4	▪/▪
Cr	mg/kg	36F	Færder area	Vestfold	LIMA LIM	LI	W								0.2	0.2	0.2	0	m	?	2009	2011	3	?	2009	2011	3	▪/▪
Cr	mg/kg	43BH	Tromsø havn	Troms	GADU MOR	LI	W								0.1	0.2	0.2	0	m	11	2009	2011	3	11	2009	2011	3	O/O
Cr	mg/kg	51A	Byrkjenes	Hordaland	MYTI EDU	SB	D								1.5	3.308	2.615	0.017	no	14	2009	2011	3	14	2009	2011	3	O/O
Cr	mg/kg	52A	Eitrheimsneset	Hordaland	MYTI EDU	SB	D							0.467	0.412	1.25	0.588	0.001	no	17	2008	2011	4	17	2008	2011	4	O/O
Cr	mg/kg	53B	Inner Sørfjord	Hordaland	GADU MOR	LI	W								0.2	0.2	0.2	0	m	?	2009	2011	3	?	2009	2011	3	▪/▪
Cr	mg/kg	53F	Inner Sørfjord	Hordaland	PLAT FLE	LI	W								0.2	0.2	0.3		m	8	2009	2011	3	8	2009	2011	3	O/O
Cr	mg/kg	56A	Kvalnes	Hordaland	MYTI EDU	SB	D								1.5	1.538	2.385	0.006	no	9	2009	2011	3	9	2009	2011	3	O/O
Cr	mg/kg	57A	Krossanes	Hordaland	MYTI EDU	SB	D								0.95	0.714	1.538	0.016	no	15	2009	2011	3	15	2009	2011	3	O/O
Cr	mg/kg	63A	Ranaskjær	Hordaland	MYTI EDU	SB	D								1.765	1.333	1.19	0.007	no	6	2009	2011	3	6	2009	2011	3	O/O
Cr	mg/kg	65A	Vikingneset	Hordaland	MYTI EDU	SB	D								1	1.25	1.043	0.007	no	8	2009	2011	3	8	2009	2011	3	O/O
Cr	mg/kg	67B	Strandebarm area	Hordaland	GADU MOR	LI	W								0.2	0.7	0.2	0	m	25	2009	2011	3	25	2009	2011	3	O/O
Cr	mg/kg	67F	Strandebarm area	Hordaland	LEPI WHI	LI	W								0.2	0.2	0.2	0	m	?	2009	2011	3	?	2009	2011	3	▪/▪
Cr	mg/kg	67F	Strandebarm area	Hordaland	PLAT FLE	LI	W								0.2		0.2	0	m		2009	2011	2		2009	2011	2	▪/▪
Cr	mg/kg	69A	Lille Terøy	Hordaland	MYTI EDU	SB	D								0.667	0.625	0.87	0.012	no	8	2009	2011	3	8	2009	2011	3	O/O
Cr	mg/kg	71A	Bjørkøya (Risøyodden)		MYTI EDU	SB	D							1.176	0.667	1.429	1.667	0.014	no	14	2008	2011	4	14	2008	2011	4	O/O
Cr	mg/kg	76A	Risøy	Aust-Agder	MYTI EDU	SB	D								0.824	1.333	1.4	0.035	no	9	2009	2011	3	9	2009	2011	3	O/O
Cr	mg/kg	80BH	Munkholmen	Sør-Trøndelag	GADU MOR	LI	W								0.3	0.2	0.2	0.026	m	8	2009	2011	3	8	2009	2011	3	O/O
Cr	mg/kg	98A2	Husvaagen area	Nordland	MYTI EDU	SB	D							0.706	1.125	1.176	1.176	0.003	no	9	2008	2011	4	9	2008	2011	4	O/O
Cr	mg/kg	98B1	Bjørnerøya (east)	Nordland	GADU MOR	LI	W							0.2	0.2	0.2	0.2	0	m	?	2008	2011	4	?	2008	2011	4	▪/▪
Cr	mg/kg	98F2	Husholmen	Nordland	PLEU PLA	LI	W								0.2	0.2	0.2	0	m	?	2009	2011	3	?	2009	2011	3	▪/▪
Cr	mg/kg	I023	Singlekalven (south)	Østfold	MYTI EDU	SB	D								2.083	3.533	5.667	0.008	1,89	<=5	2009	2011	3	<=5	2009	2011	3	↑/↑
Cr	mg/kg	I131A	Lastad	Vest-Agder	MYTI EDU	SB	D								1.182	1.333	0.526	0	no	15	2009	2011	3	15	2009	2011	3	O/O
Cr	mg/kg	I132	Svensholmen	Vest-Agder	MYTI EDU	SB	D								2.062	2.5	3.231	0.002	1,08	<=5	2009	2011	3	<=5	2009	2011	3	O/O
Cr	mg/kg	I133	Odderøy	Vest-Agder	MYTI EDU	SB	D								3.019	2.833	3.071	0.014	1,02	<=5	2009	2011	3	<=5	2009	2011	3	O/O
Cr	mg/kg	I201	Ekkjegrunn (G1)	Rogaland	MYTI EDU	SB	D								0.824	1.333	9.286	0.043	3,1	18	2009	2011	3	18	2009	2011	3	O/O
Cr	mg/kg	I205	Bølsnes (G5)	Rogaland	MYTI EDU	SB	D								1.2	1.333	2.294	0.005	no	9	2009	2011	3	9	2009	2011	3	O/O
Cr	mg/kg	I241	Nordnes	Hordaland	MYTI EDU	SB	D								1.733	1.579	1	0.009	no	8	2009	2011	3	8	2009	2011	3	O/O
Cr	mg/kg	I243	Hegreneset	Hordaland	MYTI EDU	SB	D								1.895	1.333	1.45	0.018	no	9	2009	2011	3	9	2009	2011	3	O/O
Cr	mg/kg	I301	Akershuskaia	Oslo	MYTI EDU	SB	D								1.4	2.118	5.308	0.017	1,77	10	2009	2011	3	10	2009	2011	3	O/O
Cr	mg/kg	I304	Gåsøya	Akershus	MYTI EDU	SB	D							0.8	1.071	1.538	3.417	0.008	1,14	9	2008	2011	4	9	2008	2011	4	↑/↑
Cr	mg/kg	I306	Håøya	Akershus	MYTI EDU	SB	D								0.933	0.714	1.923	0.008	no	16	2009	2011	3	16	2009	2011	3	O/O
Cr	mg/kg	I307	Ramtonholmen	Buskerud	MYTI EDU	SB	D							2.5	1.235	1.429	3.5	0.013	1,17	17	2008	2011	4	17	2008	2011	4	O/O
Cr	mg/kg	I712	Croftholmen	Telemark	MYTI EDU	SB	D								3.523	2.833	2.214	0.004	no	<=5	2009	2011	3	<=5	2009	2011	3	↓/↓
Cr	mg/kg	I713	Strømtangen	Telemark	MYTI EDU	SB	D								1.692	0.625	1.846	0.002	no	22	2009	2011	3	22	2009	2011	3	O/O
Cr	mg/kg	I964	Toraneskaien	Nordland	MYTI EDU	SB	D								47.286	21.875	19.231	0.044	6,41	11	2009	2011	3	11	2009	2011	3	O/O
Cr	mg/kg	I965	Moholmen (B5)	Nordland	MYTI EDU	SB	D								36.733	20.472	12.143	0.159	4,05	<=5	2009	2011	3	<=5	2009	2011	3	↓/↓
Cr	mg/kg	I969	Bjørnbærviken (B9)	Nordland	MYTI EDU	SB	D								2.3	1.408	1.714	0.011	no	11	2009	2011	3	11	2009	2011	3	O/O
Cu	mg/kg	10A2	Skallneset	Finnmark	MYTI EDU	SB	D	6.402	7.418	6.952	6.789	8	6.261	6.412	6.235	7.176	6.167	0.015	no	7	1996	2011	16	6	2002	2011	10	O/O
Cu	mg/kg	10B	Varangerfjorden	Finnmark	GADU MOR	LI	W	3.43	4.182	4.451	4.26	4.06	2.52	2.754	3.66	2.14	3.36	2.401	no	9	1994	2011	18	10	2002	2011	10	↓/O
Cu	mg/kg	10F	Skogerøy	Finnmark	PLEU PLA	LI	W	1.64	4.452	3.516	2.54		3.917	2.892	4.22	6.018	4.219	0.156	no	12	1997	2011	13	13	2002	2011	9	↑/O
Cu	mg/kg	11X	Brashavn	Finnmark	MYTI EDU	SB	D	6.509	7.067	6.545	6.095	8.611	5.905	5.824	5.905	5.333	5.222	0.037	no	7	1997	2011	15	7	2002	2011	10	O/O
Cu	mg/kg	13BH	Kristiansand havn	Aust-Agder	GADU MOR	LI	W								7.44	4.03	9.41	5.598	no	18	2009	2011	3	18	2009	2011	3	O/O
Cu	mg/kg	15A	Gåsøy (Ullerø)	Vest-Agder	MYTI EDU	SB	D	5.678	8.067	6.466	6.813	6.813	7.588	5.895	6.235	7.438	6.053	0.056	no	8	1990	2011	21	8	2002	2011	10	O/O
Cu	mg/kg	15B	Ullerø area	Vest-Agder	GADU MOR	LI	W	3.47	5.75	2.04	2.42	1.98	2.61	3.15	5.04	2.39	1.601	1.342	no	16	1990	2011	22	14	2002	2011	10	O/O
Cu	mg/kg	15F	Ullerø area	Vest-Agder	LIMA LIM	LI	W	8.3	5.11	8.14	5.1	7.46	4.48	4.98	9.82	5.19	5.27	1.753	no	15	1991	2011	19	12	2002	2011	10	O/O

Parameter	Unit	St. Code	Station Name	County	Species	Tissue	Basis	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	SD	OC	Power (long)	First Yr. (long)	Last Yr. (long)	No Yrs (long)	Power (short)	First Yr. (short)	Last Yr. (short)	No Yrs (short)	Trend
Cu	mg/kg	21F	Åkrafjord	Hordaland	LEPI WHI	LI	W		9.31	7.81	8.82	14.4	6.48	6.09	11.8	15.573	15.8	2.524	m	12	2003	2011	9	12	2003	2011	9	O/O
Cu	mg/kg	227A2	Høgevarde	Rogaland	MYTI EDU	SB	D								6.933	7.133	7.941	0.019	no	<=5	2009	2011	3	<=5	2009	2011	3	O/O
Cu	mg/kg	22A	Espevær (west)	Hordaland	MYTI EDU	SB	D	5.859	7.813	14.901	6.824	8.722	144.667	9.824	6.391	5.5	6.056	0.004	no	19	1990	2011	22	24	2002	2011	10	O/O
Cu	mg/kg	23B	Karihavet area	Hordaland	GADU MOR	LI	W	8.73	9.97	6.204	9.01	13.5	7.834	2.41	7.46	7.472	8.74	9.408	no	13	1990	2011	22	16	2002	2011	10	O/O
Cu	mg/kg	30A	Gressholmen	Oslo	MYTI EDU	SB	D	6.293	7.677	8.548	9.313	8.2	7.353	7.438	8.444	8.267	7	0.015	no	9	1984	2011	27	7	2002	2011	10	O/O
Cu	mg/kg	30B	Oslo City area	Akershus	GADU MOR	LI	W	7.09	5.51	4.9	7.12	7.38	4.92	8.61	6.54	8.07	4.09	3.615	no	14	1986	2011	26	11	2002	2011	10	O/O
Cu	mg/kg	31A	Solbergstrand	Akershus	MYTI EDU	SB	D	5.474	6.308	6.729	6.862	8.4	6.375	5.867	6.225	29.462	7	0.095	no	13	1983	2011	27	16	2002	2011	10	O/O
Cu	mg/kg	33F	Sande (east side)	Vestfold	PLAT FLE	LI	W	12	16.6	13.4	14.3	15.7	8.41	11.9	15	16.2	16.2	1.946	1,62	10	1986	2011	26	10	2002	2011	10	↓/O
Cu	mg/kg	35A	Mølen	Buskerud	MYTI EDU	SB	D	6.514	7.377	8.313	7.938	6.55	5.571	6.579	6.478	8.25	7	0.052	no	9	1983	2011	28	7	2002	2011	10	O/O
Cu	mg/kg	36A	Færder	Vestfold	MYTI EDU	SB	D	5.214	6.316	6.964	6.235	6.273	6.188	6.294			7	0.014	no	9	1983	2011	26	6	2002	2011	8	O/O
Cu	mg/kg	36B	Færder area	Vestfold	GADU MOR	LI	W	7.55	4.58	4.21	7.72	8.51	8.1	6.85	6.14	6.826	5.483	3.173	no	10	1986	2011	26	11	2002	2011	10	↓/O
Cu	mg/kg	36F	Færder area	Vestfold	LIMA LIM	LI	W	3.93	8.09	9.57	4.9	6.99	5.27	5.01	7.23	9.31	6.8	0.899	no	12	1990	2011	22	12	2002	2011	10	O/O
Cu	mg/kg	43BH	Tromsø havn	Troms	GADU MOR	LI	W								3.59	6.13	5.82	3.803	no	10	2009	2011	3	10	2009	2011	3	O/O
Cu	mg/kg	51A	Byrkjenes	Hordaland	MYTI EDU	SB	D								4.857	5.2	6.846	0.011	no	8	1987	2011	9	6	2009	2011	3	O/O
Cu	mg/kg	52A	Eitrheimsneset	Hordaland	MYTI EDU	SB	D	7.447	9.195	6.211	7.467	5.556	8.111	5.267	6.944	5.875	5.471	0.01	no	16	1989	2011	23	9	2002	2011	10	O/O
Cu	mg/kg	53B	Inner Sørfjord	Hordaland	GADU MOR	LI	W	13.7	11.249	10.4	14.2	7.85	12.045	8.02	7.94	7.45	9.045	6.42	no	11	1986	2011	24	9	2002	2011	10	↑/O
Cu	mg/kg	53F	Inner Sørfjord	Hordaland	PLAT FLE	LI	W	14.3	22.8	7.28	6.82		10	16.8	11.625	10.2	9.75		no	14	1988	2011	22	13	2002	2011	9	O/O
Cu	mg/kg	56A	Kvalnes	Hordaland	MYTI EDU	SB	D	6	9.098	5.363	8	7.467	5.611	7	6.563	7.167	6.231	0.018	no	9	1987	2011	25	9	2002	2011	10	O/O
Cu	mg/kg	57A	Krossanes	Hordaland	MYTI EDU	SB	D	7.208	5.976	3.256	6.882	8.286	4.333	5.222	4.75	5.938	5.846	0.034	no	10	1987	2011	25	12	2002	2011	10	O/O
Cu	mg/kg	63A	Ranaskjær	Hordaland	MYTI EDU	SB	D	6.667	7.953	2.385	6.267	7	5.571	4.105	5.824	5.933	3.85	0.021	no	12	1987	2011	25	14	2002	2011	10	O/O
Cu	mg/kg	65A	Vikingneset	Hordaland	MYTI EDU	SB	D	6.537	7.706	2.806	6.944	6.765	4.615	6.75	5.368	7.063	4.619	0.022	no	12	1987	2011	25	13	2002	2011	10	O/O
Cu	mg/kg	67B	Strandebarm area	Hordaland	GADU MOR	LI	W	7.89	4.37	5.86	4.69	4.68	5.99	6.65	7.797	7.729	6.73	0.905	no	12	1987	2011	25	9	2002	2011	10	O/O
Cu	mg/kg	67F	Strandebarm area	Hordaland	LEPI WHI	LI	W	9.57	9.27	4.278	7.85	5.781	8.43	4.73	7.46	5.55	9.526	5.523	m	11	1987	2011	25	12	2002	2011	10	↓/O
Cu	mg/kg	67F	Strandebarm area	Hordaland	PLAT FLE	LI	W	7.09	8.82	11.7	9.81	12.8	6.38	11.6	11.2		12.8	3.186	1,28	12	1996	2011	14	11	2002	2011	9	O/O
Cu	mg/kg	69A	Lille Terøy	Hordaland	MYTI EDU	SB	D	5.808	12.553	3.06	5.842	5.55	6.059	6.389	5.611	6.688	6.217	0.035	no	11	1992	2011	20	14	2002	2011	10	O/O
Cu	mg/kg	71A	Bjørkøya (Risøyodden)		MYTI EDU	SB	D	7.123	11.218	8.814	8.929	10.118	8.133	7.722	6.222	7.429	7.125	0.015	no	8	1983	2011	27	8	2002	2011	10	O/O
Cu	mg/kg	76A	Risøy	Aust-Agder	MYTI EDU	SB	D	6.393	9.759	7.987	7.765	7	6.294	6.857	6.765	8.393	6.25	0.054	no	9	1990	2011	20	8	2002	2011	10	O/O
Cu	mg/kg	80BH	Munkholmen	Sør-Trøndelag	GADU MOR	LI	W								4.45	3.744	4.13	3.831	no	7	2009	2011	3	7	2009	2011	3	O/O
Cu	mg/kg	98A2	Husvaagen area	Nordland	MYTI EDU	SB	D	6.581	7.225	8.342	7.133	8.2	5.943	7.118	6.684	6.071	6.529	0.007	no	6	1997	2011	14	7	2002	2011	10	O/O
Cu	mg/kg	98B1	Bjørnerøya (east)	Nordland	GADU MOR	LI	W	4.91	3.85	3.579	8.65	7.86	5.383	4.34	1.94	3.73	6.93	2.837	no	15	1992	2011	18	15	2002	2011	10	O/O
Cu	mg/kg	98F2	Husholmen	Nordland	PLEU PLA	LI	W	2.242	4.72	1.67	2.575	2.49	2.25	3.59	2.15	4.57	2.73	0.752	no	13	2000	2011	12	13	2002	2011	10	O/O
Cu	mg/kg	I023	Singlekalven (south)	Østfold	MYTI EDU	SB	D								6.769	8.067	8.5	0.008	no	9	1995	2011	6	<=5	2009	2011	3	O/O
Cu	mg/kg	I131A	Lastad	Vest-Agder	MYTI EDU	SB	D								8.231	7.688	7.474	0.037	no	6	1995	2011	6	<=5	2009	2011	3	O/O
Cu	mg/kg	I132	Svensholmen	Vest-Agder	MYTI EDU	SB	D								12.199	10.5	9	0.005	no	<=5	2009	2011	3	<=5	2009	2011	3	↓/↓
Cu	mg/kg	I133	Odderøy	Vest-Agder	MYTI EDU	SB	D								10.986	9.615	16.4	0.117	1,64	11	2009	2011	3	11	2009	2011	3	O/O
Cu	mg/kg	I201	Ekkjegrunn (G1)	Rogaland	MYTI EDU	SB	D								4.412	4.667	5.929	0.006	no	6	2009	2011	3	6	2009	2011	3	O/O
Cu	mg/kg	I205	Bølsnes (G5)	Rogaland	MYTI EDU	SB	D								3.933	4.533	4.529	0.022	no	<=5	2009	2011	3	<=5	2009	2011	3	O/O
Cu	mg/kg	I241	Nordnes	Hordaland	MYTI EDU	SB	D								8.4	7.059	4.8	0.01	no	6	2009	2011	3	6	2009	2011	3	O/O
Cu	mg/kg	I243	Hegreneset	Hordaland	MYTI EDU	SB	D								7.211	7.5	5.65	0.007	no	8	2009	2011	3	8	2009	2011	3	O/O
Cu	mg/kg	I301	Akershuskaia	Oslo	MYTI EDU	SB	D								7.533	9.294	7.769	0.007	no	10	1992	2011	7	8	2009	2011	3	O/O
Cu	mg/kg	I304	Gåsøya	Akershus	MYTI EDU	SB	D								6.571	7	6.833	0.014	no	7	1995	2011	6	<=5	2009	2011	3	O/O
Cu	mg/kg	I306	Håøya	Akershus	MYTI EDU	SB	D								5.733	6.143	6.154	0.003	no	8	1995	2011	6	<=5	2009	2011	3	O/O
Cu	mg/kg	I307	Ramtonholmen	Buskerud	MYTI EDU	SB	D								6.471	6.5	6.455	0.005	no	<=5	1995	2011	6	<=5	2009	2011	3	O/O
Cu	mg/kg	I712	Croftholmen	Telemark	MYTI EDU	SB	D								5.615	6.385	6.231	0.016	no	<=5	2009	2011	3	<=5	2009	2011	3	O/O
Cu	mg/kg	I713	Strømtangen	Telemark	MYTI EDU	SB	D								6.846	7.188	6.154	0.009	no	6	2009	2011	3	6	2009	2011	3	O/O
Cu	mg/kg	I964	Toraneskaien	Nordland	MYTI EDU	SB	D						10.233		11.224	11.44	13.846	0.033	1,38	6	2007	2011	4	6	2007	2011	4	O/O
Cu	mg/kg	I965	Moholmen (B5)	Nordland	MYTI EDU	SB	D						7		10.199	7.874	9.857	0.028	no	9	2007	2011	4	9	2007	2011	4	O/O
Cu	mg/kg	I969	Bjørnbærviken (B9)	Nordland	MYTI EDU	SB	D						6.333		5.45	6.852	7.474	0.053	no	8	2007	2011	4	8	2007	2011	4	O/O
CYP1A	ABS	23B	Karihavet area	Hordaland	GADU MOR	LI	W		0.113	0.212	0.199	0.08			0.175	0.286	0.101	0.026	m	17	2003	2011	7	17	2003	2011	7	O/O
CYP1A	ABS	30B	Oslo City area	Akershus	GADU MOR	LI	W		2.239	1.198	1.219	0.822	0.902	1.491	0.513	1.139	0.621	0.232	m	13	2003	2011	9	13	2003	2011	9	O/O
CYP1A	ABS	53B	Inner Sørfjord	Hordaland	GADU MOR	LI	W		0.132	0.207	0.201	0.066	0.428		0.38	0.278	0.132	0.142	m	19	2003	2011	8	19	2003	2011	8	O/O
EROD	pmol/min/mg protein	23B	Karihavet area	Hordaland	GADU MOR	LI	W	102.82	41.93	45.92	50.81	57.23			27.77	72.93	54.74	23.963	no	15	1997	2011	13	14	2002	2011	8	O/O
EROD	pmol/min/mg protein	30B	Oslo City area	Akershus	GADU MOR	LI	W	157.943	88.25	69.003	50.94	98.65	29.69	6.119	57.825	101.6	92.48	50.88	no	20	1997	2011	15	21	2002	2011	10	O/O
EROD	pmol/min/mg protein	53B	Inner Sørfjord	Hordaland	GADU MOR	LI	W	93.875	11.65	19.971	53.89	54.24	14.258		41.38	51.38	66.29	27.165	no	19	1997	2011	14	21	2002	2011	9	O/O
HCB	µg/kg	10A2	Skallneset	Finnmark	MYTI EDU	SB	D	0.305	0.275	0.279	0.263	0.188	0.227	0.176	0.353	0.235	0.167	0	no	10	1996	2011	15	10	2002	2011	10	O/O
HCB	µg/kg	10B	Varangerfjorden	Finnmark	GADU MOR	LI	W	11	9.434	5.1	7.7	6.8	8.5	4.3	7.9	8.3	11	4.906	no	11	1994	2011	18	11	2002	2011	10	↓/O
HCB	µg/kg	10B	Varangerfjorden	Finnmark	GADU MOR	MU	W	0.13	0.09	0.09	0.1	0.085	0.09	0.08	0.1	0.1	0.14	0.011	no	11	1994	2011	18	7	2002	2011	10	O/O
HCB	µg/kg	10F	Skogerøy	Finnmark	PLEU PLA	LI	W	1.6	2.149	1.99	2.9		1.349	1.587	1.7	0.755	1.109	0.481	no	14	1997	2011	13	12	2002	2011	9	↓/O
HCB	µg/kg	10F	Skogerøy	Finnmark	PLEU PLA	MU	W	0.43	0.065	0.035	0.07		0.06	0.065	0.07	0.05	0.063	0.021	no	17	1997	2011	13	18	2002	2011	9	↓/O
HCB	µg/kg	11X	Brashavn	Finnmark	MYTI EDU	SB	D	0.236		0.279	0.381	0.167	0.571	0.176	0.905	0.476	0.222	0.017	no	16	1997	2011	14	19	2002	2011	9	O/O
HCB	µg/kg	13BH	Kristiansand havn	Aust-Agder	GADU MOR	LI	W								110	48	82	111.669	4,1	17	2009	2011	3	17	2009	2011	3	O/O

Parameter	Unit	St. Code	Station Name	County	Species	Tissue	Basis	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	SD	OC	Power (long)	First Yr. (long)	Last Yr. (long)	No Yrs (long)	Power (short)	First Yr. (short)	Last Yr. (short)	No Yrs (short)	Trend
HCB	µg/kg	13BH	Kristiansand havn	Aust-Agder	GADU MOR	MU	W								1.4	0.66	0.7	0.193	3,5	12	2009	2011	3	12	2009	2011	3	O/O
HCB	µg/kg	15A	Gåsøy (Ullerø)	Vest-Agder	MYTI EDU	SB	D	0.296	0.331	0.291	0.313	0.167	0.353	0.222	0.176	0.176	0.158	0.002	no	11	1990	2011	20	10	2002	2011	10	O/O
HCB	µg/kg	15B	Ullerø area	Vest-Agder	GADU MOR	LI	W	8.2	6.4	9.7	9.1	13	9.9	6.2	6	8.8	11	3.618	no	12	1990	2011	22	11	2002	2011	10	O/O
HCB	µg/kg	15B	Ullerø area	Vest-Agder	GADU MOR	MU	W	0.06	0.07	0.05	0.06	0.07	0.06	0.06	0.05	0.075	0.07	0.004	no	10	1990	2011	22	8	2002	2011	10	↓/O
HCB	µg/kg	15F	Ullerø area	Vest-Agder	LIMA LIM	LI	W	2.5	4.3	3.1	4	2.6	3.7	2.5	3.3	2.4	3.4	1.085	no	11	1991	2011	19	10	2002	2011	10	O/O
HCB	µg/kg	15F	Ullerø area	Vest-Agder	LIMA LIM	MU	W	0.04	0.09	0.03	0.09	0.05	0.06	0.07	0.06	0.08	0.05	0.026	no	14	1991	2011	19	14	2002	2011	10	O/O
HCB	µg/kg	21F	Åkrafjord	Hordaland	LEPI WHI	LI	W		4.8	1	2.9	4.2	3.2	2.7	4.4	2.482	2.6	0.231	m	17	2003	2011	9	17	2003	2011	9	O/O
HCB	µg/kg	21F	Åkrafjord	Hordaland	LEPI WHI	MU	W		0.04	0.03	0.07	0.06	0.03	0.04	0.04	0.04	0.03	0.006	m	12	2003	2011	9	12	2003	2011	9	O/O
HCB	µg/kg	227A2	Høgevarde	Rogaland	MYTI EDU	SB	D								0.267	0.333	0.333	0.001	no	6	2009	2011	3	6	2009	2011	3	O/O
HCB	µg/kg	22A	Espevær (west)	Hordaland	MYTI EDU	SB	D	0.242	0.329	0.219	0.176	0.167	0.2	0.2	0.211	0.238	0.176	0.001	no	11	1990	2011	22	9	2002	2011	10	↓/O
HCB	µg/kg	23B	Karihavet area	Hordaland	GADU MOR	LI	W	4.7	7.9	5.8	6.9	5.5	8.5	4.299	5.1	5.9	8	6.881	no	11	1990	2011	22	11	2002	2011	10	O/O
HCB	µg/kg	23B	Karihavet area	Hordaland	GADU MOR	MU	W	0.04	0.05	0.03	0.07	0.08	0.05	0.04	0.17	0.06	0.07	0.025	no	13	1990	2011	22	16	2002	2011	10	O/O
HCB	µg/kg	30A	Gressholmen	Oslo	MYTI EDU	SB	D	0.34	0.323	0.242	0.188	0.25	0.353	0.25	0.222	0.2	0.214	0.003	no	12	1984	2011	27	9	2002	2011	10	↓/O
HCB	µg/kg	30B	Oslo City area	Akershus	GADU MOR	LI	W	6.7	6	8.9	6.3	5.5	7.9	6.2	3.7	5.2	5.4	3.61	no	12	1984	2011	28	10	2002	2011	10	↓/O
HCB	µg/kg	30B	Oslo City area	Akershus	GADU MOR	MU	W	0.06	0.05	0.06	0.06	0.05	0.04	0.05	0.06	0.04	0.06	0.005	no	10	1990	2011	22	9	2002	2011	10	↓/O
HCB	µg/kg	31A	Solbergstrand	Akershus	MYTI EDU	SB	D	0.321	0.327	0.216	0.207	0.421	0.5	0.2	0.938	0.207	0.214	0.006	no	16	1983	2011	28	17	2002	2011	10	↓/O
HCB	µg/kg	33F	Sande (east side)	Vestfold	PLAT FLE	LI	W	1.6	1.9	1.2	1.3	1.8	1.7	1.5	1.8	1.2	1.4	0.241	no	21	1983	2011	28	9	2002	2011	10	↓/O
HCB	µg/kg	33F	Sande (east side)	Vestfold	PLAT FLE	MU	W	0.05	0.06	0.03	0.03	0.04	0.04	0.04	0.05	0.03	0.04	0.008	no	12	1983	2011	23	10	2002	2011	10	↓/O
HCB	µg/kg	35A	Mølen	Buskerud	MYTI EDU	SB	D	0.287	0.273	0.313	0.533	0.35	0.381	0.333	0.261	0.188	0.273	0.004	no	15	1983	2011	29	10	2002	2011	10	↓/O
HCB	µg/kg	36A	Færder	Vestfold	MYTI EDU	SB	D	0.214	0.292	0.216	0.353	0.182	0.2	0.294			0.444	0.061	no	16	1983	2011	26	11	2002	2011	8	↓/O
HCB	µg/kg	36B	Færder area	Vestfold	GADU MOR	LI	W	3.1	3.3	4	3.3	3.5	3.7	4.1	2.8	3.8	6	5.062	no	12	1983	2011	29	9	2002	2011	10	↓/O
HCB	µg/kg	36B	Færder area	Vestfold	GADU MOR	MU	W	0.03	0.03	0.03	0.04	0.04	0.03	0.04	0.045	0.06	0.06	0.015	no	10	1983	2011	23	8	2002	2011	10	↓/↑
HCB	µg/kg	36F	Færder area	Vestfold	LIMA LIM	LI	W	2	2.5	1.8	1.6	2.2	1.5	1.6	1.4	1.4	3.6	1.069	no	12	1990	2011	22	11	2002	2011	10	↓/O
HCB	µg/kg	36F	Færder area	Vestfold	LIMA LIM	MU	W	0.06	0.05	0.03	0.03	0.04	0.04	0.04	0.07	0.04	0.07	0.015	no	9	1990	2011	22	11	2002	2011	10	↓/O
HCB	µg/kg	43BH	Tromsø havn	Troms	GADU MOR	LI	W								7.7	8.4	9.2	4.755	no	<=5	2009	2011	3	<=5	2009	2011	3	↑/↑
HCB	µg/kg	43BH	Tromsø havn	Troms	GADU MOR	MU	W								0.08	0.08	0.07	0.011	no	<=5	2009	2011	3	<=5	2009	2011	3	O/O
HCB	µg/kg	51A	Byrkjenes	Hordaland	MYTI EDU	SB	D	0.476	0.403	0.49	0.575	0.5	0.769	0.467	0.583	0.462	0.538	0.078	1,08	11	1995	2011	17	9	2002	2011	10	O/O
HCB	µg/kg	52A	Eitrheimsneset	Hordaland	MYTI EDU	SB	D	0.318		0.458	0.313	0.5	0.667	0.467	0.167	0.313	0.313	0.001	no	14	1989	2011	21	14	2002	2011	9	O/O
HCB	µg/kg	53B	Inner Sørfjord	Hordaland	GADU MOR	LI	W	3	2.249	2.6	1.3	3.9	6.297	0.5	4.2	4.6	6.2	2.339	no	19	1988	2011	23	22	2002	2011	10	↓/O
HCB	µg/kg	53B	Inner Sørfjord	Hordaland	GADU MOR	MU	W	0.05	0.08	0.03	0.04	0.03	0.04	0.03	0.04	0.05	0.04	0	no	15	1990	2011	21	11	2002	2011	10	O/O
HCB	µg/kg	53F	Inner Sørfjord	Hordaland	PLAT FLE	LI	W	2.9	1.4	1	1.2		1.6	1.1	1.322	2.498	1.5		no	13	1988	2011	22	13	2002	2011	9	↓/O
HCB	µg/kg	53F	Inner Sørfjord	Hordaland	PLAT FLE	MU	W	0.05	0.13	0.03	0.07		0.04	0.08	0.049	0.09	0.04		no	14	1990	2011	20	17	2002	2011	9	↓/O
HCB	µg/kg	56A	Kvalnes	Hordaland	MYTI EDU	SB	D	0.301	0.451	0.526	0.333	0.6	0.722	0.286	0.267	0.385	0.333	0.001	no	15	1988	2011	24	13	2002	2011	10	O/O
HCB	µg/kg	57A	Krossanes	Hordaland	MYTI EDU	SB	D	0.254	0.397	0.237	0.533	0.538	0.696	0.278	0.75	0.357	0.462	0.004	no	13	1989	2011	22	14	2002	2011	10	O/O
HCB	µg/kg	63A	Ranaskjær	Hordaland	MYTI EDU	SB	D	0.329	0.352	0.154	0.533	0.235	0.882	0.263	0.625	0.333	0.5	0.004	1	14	1989	2011	22	17	2002	2011	10	O/O
HCB	µg/kg	65A	Vikingneset	Hordaland	MYTI EDU	SB	D	0.258	0.294	0.179	0.556	0.188	1.1	0.2	0.947	0.313	0.435		no	16	1988	2011	24	20	2002	2011	10	O/O
HCB	µg/kg	67B	Strandebarm area	Hordaland	GADU MOR	LI	W	4.6	5.1	5.3	7.699	5.3	8	3.7	3.999	5.144	7.899	0.141	no	11	1988	2011	24	11	2002	2011	10	↓/O
HCB	µg/kg	67B	Strandebarm area	Hordaland	GADU MOR	MU	W	0.05	0.05	0.04	0.07	0.04	0.05	0.05	0.05	0.05	0.055	0.007	no	8	1990	2011	22	9	2002	2011	10	↓/O
HCB	µg/kg	67F	Strandebarm area	Hordaland	LEPI WHI	LI	W	3.8	3.9	3.447	2	2.198	2.3	2	1.9	2.2	3.599	0.141	m	12	1988	2011	24	9	2002	2011	10	↓/↓
HCB	µg/kg	67F	Strandebarm area	Hordaland	LEPI WHI	MU	W	0.04	0.04	0.035	0.04	0.03	0.03	0.05	0.06	0.03	0.084	0.021	m	13	1990	2011	22	12	2002	2011	10	O/O
HCB	µg/kg	67F	Strandebarm area	Hordaland	PLAT FLE	LI	W	3.5	3.7	3.1	4.3	3.8	4.5	2.9	2.8		2.5	0.723	no	10	1996	2011	14	8	2002	2011	9	O/O
HCB	µg/kg	67F	Strandebarm area	Hordaland	PLAT FLE	MU	W	0.14	0.12	0.03	0.08	0.07	0.07	0.11	0.15		0.17	0.055	no	14	1996	2011	14	15	2002	2011	9	O/O
HCB	µg/kg	71A	Bjørkøya (Risøyodden)		MYTI EDU	SB	D	0.809	0.327	0.606	4.467	1.267	1.333	1.211	1.381	0.929	1.25	0.004	2,5	25	1983	2011	29	19	2002	2011	10	↓/O
HCB	µg/kg	76A	Risøy	Aust-Agder	MYTI EDU	SB	D	0.299	0.311	0.974	0.294	0.188	0.235	0.353	0.176	0.2	0.273	0.002	no	14	1990	2011	20	16	2002	2011	10	O/O
HCB	µg/kg	80BH	Munkholmen	Sør-Trøndelag	GADU MOR	LI	W								22	13.517	6.7	6.669	no	6	2009	2011	3	6	2009	2011	3	O/O
HCB	µg/kg	80BH	Munkholmen	Sør-Trøndelag	GADU MOR	MU	W								0.16	0.1	0.06	0.006	no	<=5	2009	2011	3	<=5	2009	2011	3	↓/↓
HCB	µg/kg	98A2	Husvaagen area	Nordland	MYTI EDU	SB	D	0.313	0.362	0.433	0.294	0.167	0.4	0.176	0.375	0.294	0.176	0	no	13	1997	2011	14	14	2002	2011	10	O/O
HCB	µg/kg	98B1	Bjørnerøya (east)	Nordland	GADU MOR	LI	W	10	13	11	10	13	12.49	7.4	4.1	6.3	8.6	4.47	no	13	1992	2011	18	12	2002	2011	10	↓/O
HCB	µg/kg	98B1	Bjørnerøya (east)	Nordland	GADU MOR	MU	W	0.07	0.09	0.08	0.11	0.08	0.095	0.07	0.05	0.08	0.08	0.015	no	11	1992	2011	18	10	2002	2011	10	↓/O
HCB	µg/kg	98F2	Husholmen	Nordland	PLEU PLA	LI	W	0.955	0.68	1.2	1.091	0.45	0.43	0.48	0.61	0.6	0.05	0.008	no	19	2000	2011	12	19	2002	2011	10	↓/O
HCB	µg/kg	98F2	Husholmen	Nordland	PLEU PLA	MU	W	0.045	0.04	0.03	0.065	0.04	0.04	0.04	0.03	0.05	0.05	0.005	no	11	2000	2011	12	11	2002	2011	10	O/O
HCB	µg/kg	I023	Singlekalven (south)	Østfold	MYTI EDU	SB	D	0.417	0.394	0.446	0.541	0.545	0.615	0.538	0.417	0.286	0.3	0	no	10	1995	2011	17	7	2002	2011	10	O/↓
HCB	µg/kg	I131A	Lastad	Vest-Agder	MYTI EDU	SB	D	0.292	0.373	1.4	0.724	0.643	0.625	0.643	0.769	0.2	0.158	0	no	15	1995	2011	17	16	2002	2011	10	↑/O
HCB	µg/kg	I132	Svensholmen	Vest-Agder	MYTI EDU	SB	D	2.363	1.565	1.939	6.417	4.933	0.625	3.55	0.667	8.571	1.154	0.001	2,31	25	1998	2011	14	25	2002	2011	10	O/O
HCB	µg/kg	I133	Odderøy	Vest-Agder	MYTI EDU	SB	D	1.621	2.45	3.761	7.182	4.086	0.615	4.308	1.871	7.692	1.214	0.008	2,43	23	1995	2011	17	23	2002	2011	10	O/O
HCB	µg/kg	I241	Nordnes	Hordaland	MYTI EDU	SB	D	0.55	0.299	1.14	1.333	1.55	1.647	0.688	0.556	0.471	0.35	0.002	no	13	1995	2011	17	14	2002	2011	10	↓/↓
HCB	µg/kg	I243	Hegreneset	Hordaland	MYTI EDU	SB	D	0.444	0.34	0.611	0.92	1.188	0.889	0.5	0.526	0.429	0.45	0.003	no	13	1995	2011	17	11	2002	2011	10	↓/↓
HCB	µg/kg	I301	Akershuskaia	Oslo	MYTI EDU	SB	D	0.423	0.318	0.965	0.735	0.357	0.667	1.357	0.533	1.059	0.692	0.002	1,38	16	1992	2011	18	16	2002	2011	10	O/O
HCB	µg/kg	I304	Gåsøya	Akershus	MYTI EDU	SB	D	0.385	0.307	0.5	0.439	0.286	0.333	0.733	0.357	0.308	0.417	0.001	no	13	1995	2011	16	13	2002	2011	10	O/O
HCB	µg/kg	I306	Håøya	Akershus	MYTI EDU	SB	D	0.336	0.352	0.462	0.431	0.438	0.357	0.462	0.357	0.286	0.385	0.001	no	12	1995	2011	16	8	2002	2011	10	O/O
HCB	µg/kg	I307	Ramtonholmen	Buskerud	MYTI EDU	SB	D	0.45	0.365	0.357	0.238	0.5	0.471	0.571	0.438	0.267	0.364	0	no	13	1995	2011	16	11	2002	2011	10	O/O
HCB	µg/kg	I712	Croftholmen	Telemark	MYTI EDU	SB	D	2.748	3.265	2.897	6.72	2.091	1.643	2.769	1.433	1.538	2.643	0.009	5,29	16	1995	2011	17	15	2002	2011	10	↓/O
HCB	µg/kg	I713	Strømtangen	Telemark	MYTI EDU	SB	D	3.493	2.645	4.174	11.111	3.562	2.444	2.833	2.833	2.529	2.333	0.008	4,67	15	2002	2011	10	15	2002	2011	10	O/O

Parameter	Unit	St. Code	Station Name	County	Species	Tissue	Basis	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	SD	OC	Power (long)	First Yr. (long)	Last Yr. (long)	No Yrs (long)	Power (short)	First Yr. (short)	Last Yr. (short)	No Yrs (short)	Trend
HCHG	µg/kg	10A2	Skallneset	Finnmark	MYTI EDU	SB	D	0.61	0.549	0.267	0.263	0.313	0.227	0.294	0.294	0.294	0.278	0	no	11	1996	2011	15	9	2002	2011	10	↓/↓
HCHG	µg/kg	10B	Varangerfjorden	Finnmark	GADU MOR	LI	W	1.6	2	1	1	2	0.6	1	0.5	1	0.5	0.22	no	14	1994	2011	18	14	2002	2011	10	↓/O
HCHG	µg/kg	10B	Varangerfjorden	Finnmark	GADU MOR	MU	W	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0	no	15	1994	2011	18	<=5	2002	2011	10	O/O
HCHG	µg/kg	10F	Skogerøy	Finnmark	PLEU PLA	LI	W	1.2	0.5	0.5	1		0.3	0.224	0.2	0.2	0.2	0	no	13	1997	2011	13	14	2002	2011	9	↓/↓
HCHG	µg/kg	10F	Skogerøy	Finnmark	PLEU PLA	MU	W	0.05	0.05	0.05	0.05		0.05	0.1	0.05	0.1	0.05	0	no	11	1997	2011	13	12	2002	2011	9	O/O
HCHG	µg/kg	11X	Brashavn	Finnmark	MYTI EDU	SB	D	0.472	0.465	0.265	0.238	0.278	0.238	0.278	0.238	0.238	0.25	0.001	no	12	1997	2011	15	8	2002	2011	10	↓/↓
HCHG	µg/kg	13BH	Kristiansand havn	Aust-Agder	GADU MOR	LI	W								1	1	0.5	0.241	no	11	2009	2011	3	11	2009	2011	3	O/O
HCHG	µg/kg	13BH	Kristiansand havn	Aust-Agder	GADU MOR	MU	W								0.05	0.05	0.05	0	no	?	2009	2011	3	?	2009	2011	3	▪/▪
HCHG	µg/kg	15A	Gåsøy (Ullerø)	Vest-Agder	MYTI EDU	SB	D	0.591	0.662	0.338	0.294	0.278	0.294	0.263	0.294	0.294	0.263	0.001	no	15	1990	2011	20	8	2002	2011	10	↓/↓
HCHG	µg/kg	15B	Ullerø area	Vest-Agder	GADU MOR	LI	W	1.7	1	1.5	1.5	2	1	0.8	1	2	1	0.291	no	14	1990	2011	22	13	2002	2011	10	↓/O
HCHG	µg/kg	15B	Ullerø area	Vest-Agder	GADU MOR	MU	W	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0	no	10	1990	2011	21	<=5	2002	2011	10	O/O
HCHG	µg/kg	15F	Ullerø area	Vest-Agder	LIMA LIM	LI	W	1	1	1	1	1	0.5	0.5	1	0.5	0.4	0	no	12	1991	2011	19	12	2002	2011	10	↓/O
HCHG	µg/kg	15F	Ullerø area	Vest-Agder	LIMA LIM	MU	W	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.1	0.05	0	no	14	1991	2011	19	10	2002	2011	10	↓/O
HCHG	µg/kg	21F	Åkrafjord	Hordaland	LEPI WHI	LI	W		1.2	1.414	0.4	1	0.5	0.5	1	0.707	0.3	0	m	16	2003	2011	9	16	2003	2011	9	O/O
HCHG	µg/kg	21F	Åkrafjord	Hordaland	LEPI WHI	MU	W		0.05	0.05	0.05	0.05	0.05	0.06	0.05	0.05	0.05	0	m	6	2003	2011	9	6	2003	2011	9	O/O
HCHG	µg/kg	227A2	Høgevarde	Rogaland	MYTI EDU	SB	D								0.333	0.667	0.294	0	no	18	2009	2011	3	18	2009	2011	3	O/O
HCHG	µg/kg	22A	Espevær (west)	Hordaland	MYTI EDU	SB	D	0.483	0.658	0.365	0.294	0.278	0.333	0.313	0.238	0.476	0.278	0	no	13	1990	2011	22	11	2002	2011	10	↓/O
HCHG	µg/kg	23B	Karihavet area	Hordaland	GADU MOR	LI	W	2.6	3	2	1.5	1	2	1	0.5	1	0.5	0.303	no	13	1990	2011	22	13	2002	2011	10	↓/↓
HCHG	µg/kg	23B	Karihavet area	Hordaland	GADU MOR	MU	W	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0	no	11	1990	2011	22	<=5	2002	2011	10	↓/O
HCHG	µg/kg	30A	Gressholmen	Oslo	MYTI EDU	SB	D	0.68	0.645	0.403	0.313	0.333	0.294	0.313	0.278	0.333	0.333	0	no	21	1986	2011	25	7	2002	2011	10	↓/↓
HCHG	µg/kg	30B	Oslo City area	Akershus	GADU MOR	LI	W	2	1.5	2	2	1	0.47	0.56	0.6	1	0.5	0.187	no	20	1986	2011	26	13	2002	2011	10	↓/↓
HCHG	µg/kg	30B	Oslo City area	Akershus	GADU MOR	MU	W	0.05	0.1	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0	no	11	1990	2011	21	10	2002	2011	10	O/O
HCHG	µg/kg	31A	Solbergstrand	Akershus	MYTI EDU	SB	D	0.753	0.654	0.36	0.338	0.263	0.313	0.333	0.313	0.305	0.313	0.002	no	21	1986	2011	25	8	2002	2011	10	↓/↓
HCHG	µg/kg	33F	Sande (east side)	Vestfold	PLAT FLE	LI	W	1.2	1.1	1	1	1	0.5	0.5	1	1	0.4	0	no	24	1986	2011	26	13	2002	2011	10	↓/O
HCHG	µg/kg	33F	Sande (east side)	Vestfold	PLAT FLE	MU	W	0.05	0.05	0.05	0.08	0.05	0.05	0.05	0.05	0.05	0.05	0	no	12	1990	2011	22	8	2002	2011	10	↓/O
HCHG	µg/kg	35A	Mølen	Buskerud	MYTI EDU	SB	D	0.575	0.515	0.305	0.333	0.238	0.25	0.263	0.227	0.313	0.455	0.001	no	22	1986	2011	25	9	2002	2011	10	↓/↓
HCHG	µg/kg	36A	Færder	Vestfold	MYTI EDU	SB	D	0.651	0.585	0.36	0.278	0.227	0.333	0.294			0.278	0	no	21	1986	2011	23	9	2002	2011	8	↓/↓
HCHG	µg/kg	36B	Færder area	Vestfold	GADU MOR	LI	W	1.5	2	1.3	0.92	1	0.6	0.8	0.5	1	0.37	0.155	no	16	1986	2011	26	12	2002	2011	10	↓/↓
HCHG	µg/kg	36B	Færder area	Vestfold	GADU MOR	MU	W	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0	no	11	1990	2011	22	<=5	2002	2011	10	↓/O
HCHG	µg/kg	36F	Færder area	Vestfold	LIMA LIM	LI	W	1.6	2	1	1	0.5	0.6	0.5	0.5	0.5	0.4	0	no	15	1990	2011	22	10	2002	2011	10	↓/↓
HCHG	µg/kg	36F	Færder area	Vestfold	LIMA LIM	MU	W	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0	no	11	1990	2011	22	<=5	2002	2011	10	↓/O
HCHG	µg/kg	43BH	Tromsø havn	Troms	GADU MOR	LI	W								1	1	1	0.345	no	?	2009	2011	3	?	2009	2011	3	▪/▪
HCHG	µg/kg	43BH	Tromsø havn	Troms	GADU MOR	MU	W								0.05	0.05	0.05	0	no	?	2009	2011	3	?	2009	2011	3	▪/▪
HCHG	µg/kg	51A	Byrkjenes	Hordaland	MYTI EDU	SB	D	0.787	0.806	0.345	0.562	0.313	0.417	0.333	0.714	0.667	0.385	0.001	no	14	1995	2011	17	13	2002	2011	10	↓/O
HCHG	µg/kg	52A	Eitrheimsneset	Hordaland	MYTI EDU	SB	D	0.5	0.671	0.327	0.313	0.313	0.313	1.067	0.278	0.588	0.294	0	no	24	1989	2011	22	16	2002	2011	10	↓/O
HCHG	µg/kg	53B	Inner Sørfjord	Hordaland	GADU MOR	LI	W	0.64	1	1	1	0.77	0.5	0.2	1	1	1	0.187	no	15	1988	2011	23	16	2002	2011	10	↓/O
HCHG	µg/kg	53B	Inner Sørfjord	Hordaland	GADU MOR	MU	W	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0	no	15	1990	2011	21	<=5	2002	2011	10	O/O
HCHG	µg/kg	53F	Inner Sørfjord	Hordaland	PLAT FLE	LI	W	1	0.5	1	0.21		0.5	0.5	0.707	1	0.3		no	18	1988	2011	22	17	2002	2011	9	↓/O
HCHG	µg/kg	53F	Inner Sørfjord	Hordaland	PLAT FLE	MU	W	0.05	0.05	0.05	0.05		0.05	0.05	0.05	0.05	0.05		no	9	1990	2011	20	<=5	2002	2011	9	↓/O
HCHG	µg/kg	56A	Kvalnes	Hordaland	MYTI EDU	SB	D	0.602	0.746	0.329	0.417	0.357	0.313	0.357	0.333	0.769	0.385	0.001	no	22	1989	2011	23	12	2002	2011	10	↓/O
HCHG	µg/kg	57A	Krossanes	Hordaland	MYTI EDU	SB	D	0.508	0.592	0.237	0.333	0.357	0.217	0.278	0.25	0.714	0.385	0.002	no	18	1989	2011	22	13	2002	2011	10	↓/O
HCHG	µg/kg	63A	Ranaskjær	Hordaland	MYTI EDU	SB	D	0.658	0.787	0.166	0.357	0.313	0.357	0.263	0.313	0.667	0.25	0	no	17	1989	2011	22	16	2002	2011	10	↓/O
HCHG	µg/kg	65A	Vikingneset	Hordaland	MYTI EDU	SB	D	0.515	0.588	0.128	0.333	0.313	0.238	0.25	0.25	0.625	0.238	0.001	no	21	1989	2011	23	16	2002	2011	10	↓/O
HCHG	µg/kg	67B	Strandebarm area	Hordaland	GADU MOR	LI	W	2.3	3	2	1.5	2	1	1	1	1	0.515	0.021	no	13	1988	2011	24	11	2002	2011	10	↓/↓
HCHG	µg/kg	67B	Strandebarm area	Hordaland	GADU MOR	MU	W	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0	no	13	1990	2011	21	<=5	2002	2011	10	↓/O
HCHG	µg/kg	67F	Strandebarm area	Hordaland	LEPI WHI	LI	W	1.1	1.2	2	0.44	0.5	0.5	0.3	0.5	1	0.3	0	m	18	1988	2011	24	17	2002	2011	10	↓/O
HCHG	µg/kg	67F	Strandebarm area	Hordaland	LEPI WHI	MU	W	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0	m	12	1990	2011	22	<=5	2002	2011	10	O/O
HCHG	µg/kg	67F	Strandebarm area	Hordaland	PLAT FLE	LI	W	1.1	2	2	1.2	1.2	0.5	0.5	1		0.21	0.068	no	15	1996	2011	14	16	2002	2011	9	↓/O
HCHG	µg/kg	67F	Strandebarm area	Hordaland	PLAT FLE	MU	W	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05		0.05	0	no	10	1996	2011	14	<=5	2002	2011	9	↓/O
HCHG	µg/kg	69A	Lille Terøy	Hordaland	MYTI EDU	SB	D	0.57	0.532	0.154	0.316	0.263	0.294	0.278	0.278	0.625	0.217	0.001	no	16	1992	2011	20	15	2002	2011	10	↓/O
HCHG	µg/kg	71A	Bjørkøya (Risøyodden)		MYTI EDU	SB	D	478.528	0.641	0.394	0.357	0.333	0.333	0.278	0.238	0.357	0.333	0	no	>25	1986	2011	25	>25	2002	2011	10	↓/↓
HCHG	µg/kg	76A	Risøy	Aust-Agder	MYTI EDU	SB	D	1.194	0.621	0.336	0.294	0.313	0.294	0.333	0.294	0.333	0.25	0.001	no	13	1990	2011	20	10	2002	2011	10	↓/↓
HCHG	µg/kg	80BH	Munkholmen	Sør-Trøndelag	GADU MOR	LI	W								1	1	0.5	0.318	no	11	2009	2011	3	11	2009	2011	3	O/O
HCHG	µg/kg	80BH	Munkholmen	Sør-Trøndelag	GADU MOR	MU	W								0.05	0.1	0.05	0	no	17	2009	2011	3	17	2009	2011	3	O/O
HCHG	µg/kg	98A2	Husvaagen area	Nordland	MYTI EDU	SB	D	0.625	0.725	0.256	0.294	0.278	0.333	0.294	0.278	0.588	0.294	0	no	12	1997	2011	14	13	2002	2011	10	↓/O
HCHG	µg/kg	98B1	Bjørnerøya (east)	Nordland	GADU MOR	LI	W	2.2	3	3	1.5	2	1	1	2	1	0.8	0.336	no	14	1992	2011	17	13	2002	2011	10	↓/O
HCHG	µg/kg	98B1	Bjørnerøya (east)	Nordland	GADU MOR	MU	W	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0	no	12	1992	2011	18	<=5	2002	2011	10	O/O
HCHG	µg/kg	98F2	Husholmen	Nordland	PLEU PLA	LI	W	0.219	0.22	1	0.2	0.2	0.1	0.6	0.1	0.2	0.05	0	no	21	2000	2011	12	22	2002	2011	10	O/O
HCHG	µg/kg	98F2	Husholmen	Nordland	PLEU PLA	MU	W	0.05	0.05	0.05	0.05	0.05	0.05	0.1	0.05	0.1	0.05	0	no	11	2000	2011	12	12	2002	2011	10	O/O
HCHG	µg/kg	I023	Singlekalven (south)	Østfold	MYTI EDU	SB	D	0.833	0.787	0.431	0.431	0.385	0.385	0.385	0.769	0.333	0.5	0.001	no	12	1995	2011	17	11	2002	2011	10	↓/O
HCHG	µg/kg	I131A	Lastad	Vest-Agder	MYTI EDU	SB	D	0.559	0.725	0.333	0.34	0.385	0.333	0.333	0.385	0.333	0.263	0	no	12	1995	2011	17	10	2002	2011	10	↓/O
HCHG	µg/kg	I132	Svensholmen	Vest-Agder	MYTI EDU	SB	D	0.764	0.69	0.485	2.333	0.333	0.333	0.323	0.333	0.333	0.385	0	no	17	1998	2011	14	17	2002	2011	10	↓/O
HCHG	µg/kg	I133	Odderøy	Vest-Agder	MYTI EDU	SB	D	0.791	0.845	0.431	0.455	0.521	0.385	0.385	0.404	0.385	0.333	0	no	10	1995	2011	17	9	2002	2011	10	↓/↓

Parameter	Unit	St. Code	Station Name	County	Species	Tissue	Basis	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	SD	OC	Power (long)	First Yr. (long)	Last Yr. (long)	No Yrs (long)	Power (short)	First Yr. (short)	Last Yr. (short)	No Yrs (short)	Trend
HCHG	µg/kg	I241	Nordnes	Hordaland	MYTI EDU	SB	D	0.667	0.599	0.439	0.583	0.385	0.313	0.313	0.278	0.278	0.25	0	no	11	1995	2011	17	7	2002	2011	10	↓/↓
HCHG	µg/kg	I243	Hegreneset	Hordaland	MYTI EDU	SB	D	0.588	0.637	0.382	0.92	0.313	0.294	0.385	0.263	0.333	0.25	0	no	13	1995	2011	17	13	2002	2011	10	↓/O
HCHG	µg/kg	I301	Akershuskaia	Oslo	MYTI EDU	SB	D	0.625	0.637	0.439	0.347	0.357	0.278	0.333	0.667	0.294	0.385	0	no	12	1992	2011	18	11	2002	2011	10	↓/O
HCHG	µg/kg	I304	Gåsøya	Akershus	MYTI EDU	SB	D	0.769	0.613	0.394	0.439	0.385	0.294	0.333	0.714	0.385	0.385	0	no	13	1995	2011	16	11	2002	2011	10	↓/O
HCHG	µg/kg	I306	Håøya	Akershus	MYTI EDU	SB	D	0.671	0.704	0.391	0.431	0.313	0.643	0.385	0.667	0.357	0.385	0	no	14	1995	2011	16	12	2002	2011	10	↓/O
HCHG	µg/kg	I307	Ramtonholmen	Buskerud	MYTI EDU	SB	D	0.901	0.73	0.42	0.397	0.333	0.313	0.357	0.588	0.357	0.455	0	no	12	1995	2011	16	10	2002	2011	10	↓/↓
HCHG	µg/kg	I712	Croftholmen	Telemark	MYTI EDU	SB	D	0.813	0.68	0.459	0.4	0.455	0.313	0.357	0.345	0.417	0.385	0	no	9	1995	2011	17	8	2002	2011	10	↓/↓
HCHG	µg/kg	I713	Strømtangen	Telemark	MYTI EDU	SB	D	0.738	0.787	0.435	0.352	0.685	0.278	0.385	0.385	0.313	0.385	0	no	12	2002	2011	10	12	2002	2011	10	O/O
Hg	mg/kg	10A2	Skallneset	Finnmark	MYTI EDU	SB	D	0.049	0.055	0.05	0.037	0.041	0.039	0.041	0.041	0.041	0.042	0	no	6	1996	2011	16	6	2002	2011	10	↓/O
Hg	mg/kg	10B	Varangerfjorden	Finnmark	GADU MOR	MU	W	0.012	0.016	0.015	0.018	0.019	0.018	0.014	0.03	0.015	0.019	0.008	no	11	1994	2011	18	10	2002	2011	10	↓/O
Hg	mg/kg	10F	Skogerøy	Finnmark	PLEU PLA	MU	W	0.023	0.015	0.027	0.024		0.036	0.027	0.017	0.023	0.024	0.001	no	11	1997	2011	13	11	2002	2011	9	O/O
Hg	mg/kg	11X	Brashavn	Finnmark	MYTI EDU	SB	D	0.037	0.037	0.037	0.043	0.039	0.042	0.047	0.043	0.035	0.04	0	no	10	1997	2011	15	6	2002	2011	10	O/O
Hg	mg/kg	13BH	Kristiansand havn	Aust-Agder	GADU MOR	MU	W								0.073	0.026	0.04	0.027	no	18	2009	2011	3	18	2009	2011	3	O/O
Hg	mg/kg	15A	Gåsøy (Ullerø)	Vest-Agder	MYTI EDU	SB	D	0.045	0.06	0.095	0.075	0.063	0.047	0.053	0.076	0.081	0.074	0	no	14	1990	2011	21	10	2002	2011	10	O/O
Hg	mg/kg	15B	Ullerø area	Vest-Agder	GADU MOR	MU	W	0.043	0.035	0.024	0.035	0.034	0.037	0.048	0.049	0.049	0.053	0.02	no	13	1990	2011	22	8	2002	2011	10	O/↑
Hg	mg/kg	15F	Ullerø area	Vest-Agder	LIMA LIM	MU	W	0.07	0.045	0.082	0.115	0.074	0.076	0.13	0.068	0.037	0.061	0.052	no	12	1991	2011	19	13	2002	2011	10	O/O
Hg	mg/kg	21F	Åkrafjord	Hordaland	LEPI WHI	MU	W		0.122	0.19	0.192	0.215	0.203	0.13	0.173	0.141	0.129	0.066	m	9	2003	2011	9	9	2003	2011	9	O/O
Hg	mg/kg	227A2	Høgevarde	Rogaland	MYTI EDU	SB	D								0.2	0.181	0.167	0	no	<=5	2009	2011	3	<=5	2009	2011	3	↓/↓
Hg	mg/kg	22A	Espevær (west)	Hordaland	MYTI EDU	SB	D	0.046	0.126	0.161	0.125	0.106	0.127	0.119	0.063	0.06	0.078	0	no	12	1990	2011	22	13	2002	2011	10	↑/O
Hg	mg/kg	23B	Karihavet area	Hordaland	GADU MOR	MU	W	0.089	0.067	0.096	0.08	0.096	0.114	0.109	0.057	0.067	0.093	0.066	no	9	1990	2011	22	11	2002	2011	10	O/O
Hg	mg/kg	30A	Gressholmen	Oslo	MYTI EDU	SB	D	0.095	0.071	0.153	0.113	0.1	0.076	0.106	0.078	0.1	0.113	0	no	12	1984	2011	28	11	2002	2011	10	O/O
Hg	mg/kg	30B	Oslo City area	Akershus	GADU MOR	MU	W	0.15	0.163	0.134	0.147	0.225	0.17	0.255	0.26	0.22	0.316	0.101	3,16	11	1984	2011	28	9	2002	2011	10	↑/↑
Hg	mg/kg	31A	Solbergstrand	Akershus	MYTI EDU	SB	D	0.058	0.058	0.094	0.11	0.18	0.159	0.087	0.088	0.104	0.1	0	no	13	1983	2011	29	11	2002	2011	10	↑/↑
Hg	mg/kg	33F	Sande (east side)	Vestfold	PLAT FLE	MU	W	0.042	0.038	0.036	0.045	0.031	0.071	0.04	0.049	0.052	0.043	0.032	no	13	1983	2011	27	10	2002	2011	10	↓/O
Hg	mg/kg	35A	Mølen	Buskerud	MYTI EDU	SB	D	0.057	0.057	0.094	0.12	0.045	0.045	0.067	0.057	0.069	0.123	0	no	14	1983	2011	29	13	2002	2011	10	O/O
Hg	mg/kg	36A	Færder	Vestfold	MYTI EDU	SB	D	0.034	0.053	0.108	0.05	0.036	0.027	0.035			0.039	0	no	14	1983	2011	27	15	2002	2011	8	O/O
Hg	mg/kg	36B	Færder area	Vestfold	GADU MOR	MU	W	0.082	0.043	0.053	0.085	0.094	0.081	0.108	0.086	0.11	0.091	0.05	no	11	1981	2011	31	11	2002	2011	10	O/O
Hg	mg/kg	36F	Færder area	Vestfold	LIMA LIM	MU	W	0.068	0.061	0.074	0.12	0.1	0.111	0.054	0.118	0.11	0.17	0.256	1,7	11	1990	2011	22	12	2002	2011	10	↑/O
Hg	mg/kg	43BH	Tromsø havn	Troms	GADU MOR	MU	W								0.028	0.031	0.043	0.027	no	6	2009	2011	3	6	2009	2011	3	O/O
Hg	mg/kg	51A	Byrkjenes	Hordaland	MYTI EDU	SB	D	1.452	1.468	0.304	0.607	0.231	0.292	0.257	0.264	0.36	0.485	0.001	2,42	20	1987	2011	19	14	2002	2011	10	O/↓
Hg	mg/kg	52A	Eitrheimsneset	Hordaland	MYTI EDU	SB	D	0.264	0.195	0.228	0.163	0.135	0.244	0.143	0.129	0.159	0.131	0	no	17	1989	2011	23	10	2002	2011	10	↓/O
Hg	mg/kg	53B	Inner Sørfjord	Hordaland	GADU MOR	MU	W	0.28	0.114	0.183	0.176	0.129	0.223	0.184	0.194	0.222	0.257	0.113	2,57	14	1986	2011	24	11	2002	2011	10	O/O
Hg	mg/kg	53F	Inner Sørfjord	Hordaland	PLAT FLE	MU	W	0.625	0.5	0.328	0.845		0.231	0.224	0.074	0.36	0.382		3,82	16	1988	2011	22	18	2002	2011	9	↑/O
Hg	mg/kg	56A	Kvalnes	Hordaland	MYTI EDU	SB	D	0.602	0.346	0.235	0.358	0.336	0.294	0.307	0.313	0.346	0.415	0.002	2,08	13	1987	2011	25	10	2002	2011	10	↓/O
Hg	mg/kg	57A	Krossanes	Hordaland	MYTI EDU	SB	D	0.277	0.193	0.115	0.229	0.229	0.139	0.133	0.15	0.186	0.254	0.001	1,27	12	1987	2011	25	12	2002	2011	10	↓/O
Hg	mg/kg	63A	Ranaskjær	Hordaland	MYTI EDU	SB	D	0.289	0.213	0.07	0.18	0.187	0.194	0.116	0.15	0.187	0.135	0.001	no	13	1987	2011	25	14	2002	2011	10	O/O
Hg	mg/kg	65A	Vikingneset	Hordaland	MYTI EDU	SB	D	0.132	0.135	0.064	0.133	0.156	0.114	0.09	0.11	0.144	0.086	0.001	no	13	1987	2011	25	12	2002	2011	10	O/O
Hg	mg/kg	67B	Strandebarm area	Hordaland	GADU MOR	MU	W	0.064	0.042	0.035	0.058	0.045	0.055	0.038	0.065	0.059	0.073	0.057	no	10	1987	2011	25	10	2002	2011	10	↓/O
Hg	mg/kg	67F	Strandebarm area	Hordaland	LEPI WHI	MU	W	0.123	0.131	0.199	0.096	0.108	0.09	0.098	0.09	0.18	0.128	0.016	m	14	1983	2011	26	11	2002	2011	10	↓/O
Hg	mg/kg	67F	Strandebarm area	Hordaland	PLAT FLE	MU	W	0.057	0.066	0.064	0.061	0.041	0.045	0.071	0.065		0.027	0.008	no	12	1996	2011	14	11	2002	2011	9	↓/O
Hg	mg/kg	69A	Lille Terøy	Hordaland	MYTI EDU	SB	D	0.106	0.099	0.059	0.1	0.078	0.088	0.079	0.1	0.1	0.065	0	no	13	1992	2011	20	10	2002	2011	10	O/O
Hg	mg/kg	71A	Bjørkøya (Risøyodden)		MYTI EDU	SB	D	0.15	0.154	0.189	0.177	0.18	0.133	0.122	0.124	0.243	0.207	0	1,03	11	1983	2011	29	9	2002	2011	10	↓/O
Hg	mg/kg	76A	Risøy	Aust-Agder	MYTI EDU	SB	D	0.058	0.084	0.101	0.082	0.058	0.082	0.093	0.1	0.133	0.07	0	no	12	1990	2011	20	11	2002	2011	10	O/O
Hg	mg/kg	80BH	Munkholmen	Sør-Trøndelag	GADU MOR	MU	W								0.06	0.043	0.142	0.08	1,42	18	2009	2011	3	18	2009	2011	3	O/O
Hg	mg/kg	98A2	Husvaagen area	Nordland	MYTI EDU	SB	D	0.115	0.14	0.082	0.08	0.089	0.075	0.076	0.072	0.088	0.1	0	no	11	1997	2011	14	8	2002	2011	10	O/O
Hg	mg/kg	98B1	Bjørnerøya (east)	Nordland	GADU MOR	MU	W	0.047	0.064	0.117	0.059	0.071	0.094	0.032	0.025	0.029	0.072	0.029	no	15	1992	2011	18	16	2002	2011	10	O/O
Hg	mg/kg	98F2	Husholmen	Nordland	PLEU PLA	MU	W	0.032	0.041	0.016	0.073	0.045	0.044	0.02	0.019	0.019	0.023	0.006	no	15	2000	2011	12	15	2002	2011	10	O/O
Hg	mg/kg	I023	Singlekalven (south)	Østfold	MYTI EDU	SB	D	0.15	0.142	0.129	0.164	0.177	0.138	0.131	0.131	0.213	0.27	0	1,35	12	1995	2011	17	9	2002	2011	10	O/O
Hg	mg/kg	I131A	Lastad	Vest-Agder	MYTI EDU	SB	D	0.05	0.065	0.1	0.063	0.079	0.053	0.067	0.123	0.073	0.089	0	no	13	1995	2011	17	11	2002	2011	10	O/O
Hg	mg/kg	I132	Svensholmen	Vest-Agder	MYTI EDU	SB	D								0.143	0.15	0.223	0	1,12	8	2009	2011	3	8	2009	2011	3	O/O
Hg	mg/kg	I133	Odderøy	Vest-Agder	MYTI EDU	SB	D								0.177	0.192	0.2	0.001	no	<=5	2009	2011	3	<=5	2009	2011	3	O/O
Hg	mg/kg	I201	Ekkjegrunn (G1)	Rogaland	MYTI EDU	SB	D	0.313	0.096	0.13	0.291	0.215	0.292	0.247	0.129	0.1	0.129	0	no	13	1998	2011	14	15	2002	2011	10	O/O
Hg	mg/kg	I205	Bølsnes (G5)	Rogaland	MYTI EDU	SB	D	0.218	0.151	0.142	0.306	0.285	0.267	0.314	0.18	0.127	0.106	0	no	11	1998	2011	14	11	2002	2011	10	↑/↓
Hg	mg/kg	I241	Nordnes	Hordaland	MYTI EDU	SB	D								0.178	0.112	0.11	0	no	9	2009	2011	3	9	2009	2011	3	O/O
Hg	mg/kg	I243	Hegreneset	Hordaland	MYTI EDU	SB	D								0.116	0.133	0.08	0	no	11	2009	2011	3	11	2009	2011	3	O/O
Hg	mg/kg	I301	Akershuskaia	Oslo	MYTI EDU	SB	D	0.05	0.073	0.114	0.125	0.093	0.078	0.086	0.073	0.176	0.123	0	no	11	1992	2011	18	12	2002	2011	10	↑/O
Hg	mg/kg	I304	Gåsøya	Akershus	MYTI EDU	SB	D	0.046	0.049	0.063	0.07	0.062	0.047	0.047	0.057	0.077	0.077	0	no	10	1995	2011	17	8	2002	2011	10	O/O
Hg	mg/kg	I306	Håøya	Akershus	MYTI EDU	SB	D	0.04	0.051	0.074	0.069	0.05	0.05	0.069	0.053	0.073	0.085	0	no	10	1995	2011	17	9	2002	2011	10	↑/O
Hg	mg/kg	I307	Ramtonholmen	Buskerud	MYTI EDU	SB	D	0.054	0.062	0.089	0.095	0.044	0.044	0.071	0.047	0.08	0.1	0	no	12	1995	2011	17	12	2002	2011	10	O/O
Hg	mg/kg	I712	Croftholmen	Telemark	MYTI EDU	SB	D	0.211	0.145	0.178	0.184	0.218	0.163	0.231	0.197	0.262	0.246	0	1,23	8	1998	2011	14	8	2002	2011	10	O/O
Hg	mg/kg	I713	Strømtangen	Telemark	MYTI EDU	SB	D	0.111	0.177	0.157	0.108	0.164	0.117	0.192	0.131	0.138	0.223	0	1,12	11	2002	2011	10	11	2002	2011	10	O/O
Hg	mg/kg	I964	Toraneskaien	Nordland	MYTI EDU	SB	D	0.136	0.059	0.049	0.155	0.17	0.163	0.157	0.116	0.086	0.085	0	no	14	2002	2011	10	14	2002	2011	10	O/O
Hg	mg/kg	I965	Moholmen (B5)	Nordland	MYTI EDU	SB	D	0.2	0.09	0.168	0.124	0.107	0.123	0.15	0.086	0.079	0.093	0	no	11	2002	2011	10	11	2002	2011	10	O/O

Parameter	Unit	St. Code	Station Name	County	Species	Tissue	Basis	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	SD	OC	Power (long)	First Yr. (long)	Last Yr. (long)	No Yrs (long)	Power (short)	First Yr. (short)	Last Yr. (short)	No Yrs (short)	Trend
Hg	mg/kg	I969	Bjørnbærviken (B9)	Nordland	MYTI EDU	SB	D	0.063	0.042	0.036	0.103	0.042	0.067	0.047	0.04	0.033	0.048	0	no	13	2002	2011	10	13	2002	2011	10	O/O
KPAH	µg/kg	30A	Gressholmen	Oslo	MYTI EDU	SB	D	11.565	17.613	45.726	14.154	45.067	18.235	14.667	11.111	25.867	22.8	0.094	no	16	1992	2011	17	17	2002	2011	10	O/O
KPAH	µg/kg	35A	Mølen	Buskerud	MYTI EDU	SB	D							20.556	5.682	7.813	11.364	0.022	no	18	2008	2011	4	18	2008	2011	4	O/O
KPAH	µg/kg	I131A	Lastad	Vest-Agder	MYTI EDU	SB	D	15.497	26.594	126.667	20.141	9.615	8.333	13.133	9.615	8.333	12.947	0.061	no	18	1995	2011	17	20	2002	2011	10	↓/O
KPAH	µg/kg	I132	Svensholmen	Vest-Agder	MYTI EDU	SB	D	782.545	1261.38	569.725	813.333	400.667	404.667	484.08	162.133	124.467	111.923	0.412	2,24	19	1998	2011	14	13	2002	2011	10	↓/↓
KPAH	µg/kg	I133	Odderøy	Vest-Agder	MYTI EDU	SB	D	476.131	579.95	1198.2	451.364	345.104	196.857	598.571	568	77.846	151.733	0.582	3,03	20	1995	2011	16	20	2002	2011	10	O/O
KPAH	µg/kg	I201	Ekkjegrunn (G1)	Rogaland	MYTI EDU	SB	D	413.393	189.157	110.714	212.414	118.867	148.75	78.533	52.588	38.267	80.357	0.356	1,61	21	1995	2011	17	14	2002	2011	10	↓/↓
KPAH	µg/kg	I205	Bølsnes (G5)	Rogaland	MYTI EDU	SB	D	1648	97.468	807.801	98.198	57.154	56.333	34.5	27.933	13.333	16.882	0.062	no	23	1995	2011	16	22	2002	2011	10	↓/↓
KPAH	µg/kg	I301	Akershuskaia	Oslo	MYTI EDU	SB	D	43.662	38.415	313.158	40.903	268.533	108.5	75.667	35.857	85.588	105.769	0.337	2,12	21	1992	2011	18	22	2002	2011	10	O/O
KPAH	µg/kg	I304	Gåsøya	Akershus	MYTI EDU	SB	D	9.615	8.013	69.917	15.462	27.714	10.059	10.533	8.929	42.385	16.5	0.047	no	20	1995	2011	17	21	2002	2011	10	O/O
KPAH	µg/kg	I306	Håøya	Akershus	MYTI EDU	SB	D	12.081	8.803	52.734	12.583	18.2	10.067	11.923	8.929	32.5	14.308	0.032	no	18	1995	2011	17	19	2002	2011	10	O/O
KPAH	µg/kg	I307	Ramtonholmen	Buskerud	MYTI EDU	SB	D	29.279	9.69	74.018	13.571	16.813	9.647	11.357	7.353	51.786	17.727	0.036	no	19	1995	2011	17	21	2002	2011	10	O/O
KPAH	µg/kg	I912	Honnhammer	Møre og Romsdal	MYTI EDU	SB	D	412	27.851	10.621	9.124	8.333	30.063	36.25	8.944	7.31	25.286	0.058	no	25	1995	2011	16	24	2002	2011	10	↓/O
KPAH	µg/kg	I913	Fjøseid	Møre og Romsdal	MYTI EDU	SB	D	405.333	28.832	20.89	8.224	8.667	14.313	20.643	11.647	9.69	7.813	0.03	no	21	1999	2011	13	19	2002	2011	10	↓/↓
KPAH	µg/kg	I964	Toraneskaien	Nordland	MYTI EDU	SB	D	368.182	2371.71	2094.19	500.893	915	1073	993.333	1606.38	395.902	626.923	2.2	12,54	20	2002	2011	10	20	2002	2011	10	O/O
KPAH	µg/kg	I965	Moholmen (B5)	Nordland	MYTI EDU	SB	D	430.769	468.485	853.6	181.151	357.143	612.308	404.366	989.628	232.835	312.143	1.254	6,24	18	2001	2011	11	18	2002	2011	10	O/O
KPAH	µg/kg	I969	Bjørnbærviken (B9)	Nordland	MYTI EDU	SB	D	39.737	625.15	361.386	73.6	188.421	169.889	188	89.994	56.512	46.136	0.452	no	20	1995	2011	17	23	2002	2011	10	O/O
Mo	mg/kg	35A	Mølen	Buskerud	MYTI EDU	SB	D				0.84	0.6	0.7	0.579	0.757	0.688	0.545	0.008	m	8	2005	2011	7	8	2005	2011	7	O/O
Ni	mg/kg	10A2	Skallneset	Finnmark	MYTI EDU	SB	D							1.882	1.294	1.765	2.056	0.019	no	10	2008	2011	4	10	2008	2011	4	O/O
Ni	mg/kg	10B	Varangerfjorden	Finnmark	GADU MOR	LI	W								0.11	0.05	0.06	0.021	m	14	2009	2011	3	14	2009	2011	3	O/O
Ni	mg/kg	10F	Skogerøy	Finnmark	PLEU PLA	LI	W								0.1	0.135	0.073	0.021	m	13	2009	2011	3	13	2009	2011	3	O/O
Ni	mg/kg	11X	Brashavn	Finnmark	MYTI EDU	SB	D								1.143	0.952	1.35	0.002	no	10	2009	2011	3	10	2009	2011	3	O/O
Ni	mg/kg	13BH	Kristiansand havn	Aust-Agder	GADU MOR	LI	W								0.39	0.18	0.12	0.146	m	8	2009	2011	3	8	2009	2011	3	O/O
Ni	mg/kg	15A	Gåsøy (Ullerø)	Vest-Agder	MYTI EDU	SB	D								1.294	1.313	1	0.03	no	7	2009	2011	3	7	2009	2011	3	O/O
Ni	mg/kg	15B	Ullerø area	Vest-Agder	GADU MOR	LI	W								0.06	0.05	0.02	0.016	m	12	2009	2011	3	12	2009	2011	3	O/O
Ni	mg/kg	15F	Ullerø area	Vest-Agder	LIMA LIM	LI	W								0.11	0.07	0.06	0.046	m	7	2009	2011	3	7	2009	2011	3	O/O
Ni	mg/kg	21F	Åkrafjord	Hordaland	LEPI WHI	LI	W								0.02	0.02	0.06	0.038	m	15	2009	2011	3	15	2009	2011	3	O/O
Ni	mg/kg	227A2	Høgevarde	Rogaland	MYTI EDU	SB	D								2.533	2.563	7	0.107	1,4	14	2009	2011	3	14	2009	2011	3	O/O
Ni	mg/kg	22A	Espevær (west)	Hordaland	MYTI EDU	SB	D							1.059	1	0.6	1.278	0.007	no	14	2008	2011	4	14	2008	2011	4	O/O
Ni	mg/kg	23B	Karihavet area	Hordaland	GADU MOR	LI	W						0.045		0.5	0.085	0.04	0.022	m	>25	1993	2011	5	>25	2007	2011	4	O/O
Ni	mg/kg	30A	Gressholmen	Oslo	MYTI EDU	SB	D							0.813	1	1.533	1.867	0.008	no	6	2008	2011	4	6	2008	2011	4	↑/↑
Ni	mg/kg	30B	Oslo City area	Akershus	GADU MOR	LI	W						0.055		0.17	0.13	0.1	0.054	m	15	1993	2011	5	16	2007	2011	4	O/O
Ni	mg/kg	31A	Solbergstrand	Akershus	MYTI EDU	SB	D								1.667	2.012	3.071	0.092	no	12	1983	2011	4	7	2009	2011	3	O/O
Ni	mg/kg	33F	Sande (east side)	Vestfold	PLAT FLE	LI	W								0.44	0.04	0.05	0.017	m	>25	2009	2011	3	>25	2009	2011	3	O/O
Ni	mg/kg	35A	Mølen	Buskerud	MYTI EDU	SB	D	1.029	0.831	2.043	1.153	0.619	0.5	0.789	1.13	1.688	1.636	0.035	no	18	1983	2011	16	14	2002	2011	10	O/O
Ni	mg/kg	36A	Færder	Vestfold	MYTI EDU	SB	D							0.889			1.333	0.009	no	10	1983	2011	4		2008	2011	2	▪/▪
Ni	mg/kg	36B	Færder area	Vestfold	GADU MOR	LI	W								0.07	0.115	0.069	0.055	m	14	2009	2011	3	14	2009	2011	3	O/O
Ni	mg/kg	36F	Færder area	Vestfold	LIMA LIM	LI	W								0.09	0.07	0.07	0.02	m	7	2009	2011	3	7	2009	2011	3	O/O
Ni	mg/kg	43BH	Tromsø havn	Troms	GADU MOR	LI	W								0.06	0.04	0.06	0.052	m	12	2009	2011	3	12	2009	2011	3	O/O
Ni	mg/kg	51A	Byrkjenes	Hordaland	MYTI EDU	SB	D								1.286	2.538	1.692	0.009	no	15	2009	2011	3	15	2009	2011	3	O/O
Ni	mg/kg	52A	Eitrheimsneset	Hordaland	MYTI EDU	SB	D							0.467	0.944	1.313	0.765	0.003	no	15	2008	2011	4	15	2008	2011	4	O/O
Ni	mg/kg	53B	Inner Sørfjord	Hordaland	GADU MOR	LI	W								0.15	0.07	0.05	0.038	m	9	2009	2011	3	9	2009	2011	3	O/O
Ni	mg/kg	53F	Inner Sørfjord	Hordaland	PLAT FLE	LI	W								0.063	0.042	0.02		m	8	2009	2011	3	8	2009	2011	3	O/O
Ni	mg/kg	56A	Kvalnes	Hordaland	MYTI EDU	SB	D								1.375	1.615	2	0.003	no	<=5	2009	2011	3	<=5	2009	2011	3	O/O
Ni	mg/kg	57A	Krossanes	Hordaland	MYTI EDU	SB	D								1	1.071	1.462	0.011	no	7	2009	2011	3	7	2009	2011	3	O/O
Ni	mg/kg	63A	Ranaskjær	Hordaland	MYTI EDU	SB	D								1.529	1.667	1.095	0.007	no	10	2009	2011	3	10	2009	2011	3	O/O
Ni	mg/kg	65A	Vikingneset	Hordaland	MYTI EDU	SB	D								1.25	1.75	1.174	0.01	no	12	2009	2011	3	12	2009	2011	3	O/O
Ni	mg/kg	67B	Strandebarm area	Hordaland	GADU MOR	LI	W								0.039	0.5	0.053	0.021	m	>25	2009	2011	3	>25	2009	2011	3	O/O
Ni	mg/kg	67F	Strandebarm area	Hordaland	LEPI WHI	LI	W								0.02	0.04	0.055	0.007	m	8	2009	2011	3	8	2009	2011	3	O/O
Ni	mg/kg	67F	Strandebarm area	Hordaland	PLAT FLE	LI	W								0.03		0.03	0.032	m		2009	2011	2		2009	2011	2	▪/▪
Ni	mg/kg	69A	Lille Terøy	Hordaland	MYTI EDU	SB	D								1	1.125	1.043	0.012	no	6	2009	2011	3	6	2009	2011	3	O/O
Ni	mg/kg	71A	Bjørkøya (Risøyodden)		MYTI EDU	SB	D							1	0.857	1.286	1.533	0.009	no	11	1983	2011	5	9	2008	2011	4	O/O
Ni	mg/kg	76A	Risøy	Aust-Agder	MYTI EDU	SB	D								1.8	1.897	1.85	0.017	no	<=5	2009	2011	3	<=5	2009	2011	3	O/O
Ni	mg/kg	80BH	Munkholmen	Sør-Trøndelag	GADU MOR	LI	W								0.1	0.055	0.04	0.077	m	7	2009	2011	3	7	2009	2011	3	O/O
Ni	mg/kg	98A2	Husvaagen area	Nordland	MYTI EDU	SB	D							0.765	1.188	1	1.176	0.003	no	9	2008	2011	4	9	2008	2011	4	O/O
Ni	mg/kg	98B1	Bjørnerøya (east)	Nordland	GADU MOR	LI	W								0.03	0.05	0.11	0.059	m	7	2009	2011	3	7	2009	2011	3	O/O
Ni	mg/kg	98F2	Husholmen	Nordland	PLEU PLA	LI	W								0.05	0.15	0.07	0.022	m	21	2009	2011	3	21	2009	2011	3	O/O
Ni	mg/kg	I023	Singlekalven (south)	Østfold	MYTI EDU	SB	D								2.25	2.8	4.667	0.005	no	7	2009	2011	3	7	2009	2011	3	O/O
Ni	mg/kg	I131A	Lastad	Vest-Agder	MYTI EDU	SB	D								1.692	1	0.579	0.002	no	<=5	2009	2011	3	<=5	2009	2011	3	↓/↓
Ni	mg/kg	I132	Svensholmen	Vest-Agder	MYTI EDU	SB	D								6.633	5.929	6.308	0.005	1,26	6	2009	2011	3	6	2009	2011	3	O/O
Ni	mg/kg	I133	Odderøy	Vest-Agder	MYTI EDU	SB	D								5.179	4.667	6.5	0.019	1,3	9	2009	2011	3	9	2009	2011	3	O/O
Ni	mg/kg	I201	Ekkjegrunn (G1)	Rogaland	MYTI EDU	SB	D								0.706	1.467	6.286	0.028	1,26	12	2009	2011	3	12	2009	2011	3	O/O

Parameter	Unit	St. Code	Station Name	County	Species	Tissue	Basis	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	SD	OC	Power (long)	First Yr. (long)	Last Yr. (long)	No Yrs (long)	Power (short)	First Yr. (short)	Last Yr. (short)	No Yrs (short)	Trend
Ni	mg/kg	I205	Bølsnes (G5)	Rogaland	MYTI EDU	SB	D								0.733	1.267	1.765	0.003	no	6	2009	2011	3	6	2009	2011	3	O/O
Ni	mg/kg	I241	Nordnes	Hordaland	MYTI EDU	SB	D								1.4	1.105	0.7	0.005	no	6	2009	2011	3	6	2009	2011	3	O/O
Ni	mg/kg	I243	Hegreneset	Hordaland	MYTI EDU	SB	D								1.4	1.2	1.05	0.011	no	<=5	2009	2011	3	<=5	2009	2011	3	↓/↓
Ni	mg/kg	I301	Akershuskaia	Oslo	MYTI EDU	SB	D								1.133	1.882	3.385	0.011	no	<=5	2009	2011	3	<=5	2009	2011	3	↑/↑
Ni	mg/kg	I304	Gåsøya	Akershus	MYTI EDU	SB	D							0.8	1.357	1.714	2.786	0.008	no	6	2008	2011	4	6	2008	2011	4	↑/↑
Ni	mg/kg	I306	Håøya	Akershus	MYTI EDU	SB	D								1.4	1.429	1.692	0.007	no	<=5	2009	2011	3	<=5	2009	2011	3	O/O
Ni	mg/kg	I307	Ramtonholmen	Buskerud	MYTI EDU	SB	D							1.214	1.529	2	2.917	0.008	no	<=5	2008	2011	4	<=5	2008	2011	4	↑/↑
Ni	mg/kg	I712	Croftholmen	Telemark	MYTI EDU	SB	D								2.719	2.167	1.462	0.001	no	6	2009	2011	3	6	2009	2011	3	O/O
Ni	mg/kg	I713	Strømtangen	Telemark	MYTI EDU	SB	D								2.083	0.765	1.538	0.001	no	20	2009	2011	3	20	2009	2011	3	O/O
Ni	mg/kg	I964	Toraneskaien	Nordland	MYTI EDU	SB	D								28.335	14.453	12.417	0.028	2,48	10	2009	2011	3	10	2009	2011	3	O/O
Ni	mg/kg	I965	Moholmen (B5)	Nordland	MYTI EDU	SB	D								22.558	13.228	7.286	0.083	1,46	<=5	2009	2011	3	<=5	2009	2011	3	↓/↓
Ni	mg/kg	I969	Bjørnbærviken (B9)	Nordland	MYTI EDU	SB	D								1.75	1.174	1.524	0.004	no	11	2009	2011	3	11	2009	2011	3	O/O
OCS	µg/kg	10A2	Skallneset	Finnmark	MYTI EDU	SB	D	0.305	0.275	0.267	0.263	0.313	0.227	0.294	0.294	0.294	0.278	0	m	10	1996	2011	15	7	2002	2011	10	O/O
OCS	µg/kg	10B	Varangerfjorden	Finnmark	GADU MOR	LI	W	1.2	1.6	0.78	1	2	1	1	1	1	0.88	0.418	m	12	1994	2011	18	12	2002	2011	10	↓/O
OCS	µg/kg	10B	Varangerfjorden	Finnmark	GADU MOR	MU	W	0.03	0.03	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0	m	14	1994	2011	18	7	2002	2011	10	O/↑
OCS	µg/kg	10F	Skogerøy	Finnmark	PLEU PLA	LI	W	0.6	0.3	0.3	1		0.3	0.2	0.2	0.2	0.2	0	m	16	1997	2011	13	15	2002	2011	9	O/O
OCS	µg/kg	10F	Skogerøy	Finnmark	PLEU PLA	MU	W	0.03	0.03	0.03	0.05		0.05	0.05	0.05		0.05	0	m	8	1997	2011	12	8	2002	2011	8	↑/↑
OCS	µg/kg	11X	Brashavn	Finnmark	MYTI EDU	SB	D	0.236	0.233	0.265	0.238	0.278	0.238	0.278	0.238	0.238	0.25	0.001	m	11	1997	2011	15	6	2002	2011	10	O/O
OCS	µg/kg	13BH	Kristiansand havn	Aust-Agder	GADU MOR	LI	W								70	13	33	36.194	m	>25	2009	2011	3	>25	2009	2011	3	O/O
OCS	µg/kg	13BH	Kristiansand havn	Aust-Agder	GADU MOR	MU	W								0.46	0.21	0.22	0.166	m	13	2009	2011	3	13	2009	2011	3	O/O
OCS	µg/kg	15A	Gåsøy (Ullerø)	Vest-Agder	MYTI EDU	SB	D	0.251	0.331	0.338	0.294	0.278		0.263	0.294	0.294	0.263	0.001	m	11	1993	2011	18	7	2002	2011	9	O/O
OCS	µg/kg	15B	Ullerø area	Vest-Agder	GADU MOR	LI	W	1.1	0.99	0.81	1.4	2	1.5	0.8	1	2	1	0.272	m	17	1990	2011	22	13	2002	2011	10	↓/O
OCS	µg/kg	15B	Ullerø area	Vest-Agder	GADU MOR	MU	W	0.03	0.03	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0	m	13	1990	2011	22	7	2002	2011	10	O/↑
OCS	µg/kg	15F	Ullerø area	Vest-Agder	LIMA LIM	LI	W	0.5	0.5	0.5	1	1	0.5		1	0.5	0.4	0	m	15	1991	2011	18	13	2002	2011	9	↓/O
OCS	µg/kg	15F	Ullerø area	Vest-Agder	LIMA LIM	MU	W	0.03	0.03	0.05	0.05	0.05	0.05	0.05	0.05		0.05	0	m	11	1991	2011	18	7	2002	2011	9	↑/↑
OCS	µg/kg	21F	Åkrafjord	Hordaland	LEPI WHI	LI	W		0.6	0.707	0.3	1	0.5	0.5	1	0.707	0.3	0	m	16	2003	2011	9	16	2003	2011	9	O/O
OCS	µg/kg	21F	Åkrafjord	Hordaland	LEPI WHI	MU	W		0.03	0.03	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0	m	7	2003	2011	9	7	2003	2011	9	↑/↑
OCS	µg/kg	227A2	Høgevarde	Rogaland	MYTI EDU	SB	D								0.333	0.667	0.294	0	m	18	2009	2011	3	18	2009	2011	3	O/O
OCS	µg/kg	22A	Espevær (west)	Hordaland	MYTI EDU	SB	D	0.242	0.329	0.365	0.294	0.278		0.313	0.238	0.476	0.278	0	m	14	1992	2011	19	11	2002	2011	9	O/O
OCS	µg/kg	23B	Karihavet area	Hordaland	GADU MOR	LI	W	1.5	1.5	1	1	1	2	1	0.5	1	0.5	0.521	m	12	1990	2011	22	13	2002	2011	10	↓/O
OCS	µg/kg	23B	Karihavet area	Hordaland	GADU MOR	MU	W	0.03	0.03	0.03	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0	m	12	1990	2011	22	7	2002	2011	10	↓/↑
OCS	µg/kg	30A	Gressholmen	Oslo	MYTI EDU	SB	D	0.34	0.323	0.403	0.313	0.333	0.294	0.313	0.278	0.333	0.333	0	m	9	1992	2011	20	7	2002	2011	10	↓/O
OCS	µg/kg	30B	Oslo City area	Akershus	GADU MOR	LI	W	4.8	4.6	4.4	4.7	3.7	3.1	4.1	2.6	2	2.6		m	13	1990	2011	22	9	2002	2011	10	↓/↓
OCS	µg/kg	30B	Oslo City area	Akershus	GADU MOR	MU	W	0.03	0.05	0.03	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0	m	12	1990	2011	22	9	2002	2011	10	O/O
OCS	µg/kg	31A	Solbergstrand	Akershus	MYTI EDU	SB	D	0.321	0.327	0.36	0.338	0.263	0.313	0.333	0.313	0.793	0.313	0.002	m	12	1992	2011	20	12	2002	2011	10	O/O
OCS	µg/kg	33F	Sande (east side)	Vestfold	PLAT FLE	LI	W	0.6	0.5	0.5	1	1	0.5		1	1	0.4	0	m	19	1990	2011	21	14	2002	2011	9	O/O
OCS	µg/kg	33F	Sande (east side)	Vestfold	PLAT FLE	MU	W	0.03	0.03	0.03	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0	m	12	1990	2011	22	7	2002	2011	10	O/↑
OCS	µg/kg	35A	Mølen	Buskerud	MYTI EDU	SB	D	0.287	0.258	0.305	0.333	0.238	0.25	0.263	0.217	0.313	0.455	0.001	m	11	1992	2011	20	9	2002	2011	10	↓/O
OCS	µg/kg	36A	Færder	Vestfold	MYTI EDU	SB	D	0.214	0.292	0.36	0.278	0.227	0.333	0.294			0.278	0	m	11	1992	2011	18	10	2002	2011	8	O/O
OCS	µg/kg	36B	Færder area	Vestfold	GADU MOR	LI	W	0.73	3	2.4	1.6	1.2	0.655	0.8	0.88	1	0.81	0.526	m	12	1990	2011	22	15	2002	2011	10	↓/O
OCS	µg/kg	36B	Færder area	Vestfold	GADU MOR	MU	W	0.03	0.03	0.03	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0	m	11	1990	2011	22	7	2002	2011	10	↓/↑
OCS	µg/kg	36F	Færder area	Vestfold	LIMA LIM	LI	W	0.8	1	0.71	1	0.5	0.6	9.4	0.5	0.5	0.4	0	m	21	1990	2011	22	24	2002	2011	10	O/O
OCS	µg/kg	36F	Færder area	Vestfold	LIMA LIM	MU	W	0.03	0.03	0.03	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0	m	11	1990	2011	22	7	2002	2011	10	↓/↑
OCS	µg/kg	43BH	Tromsø havn	Troms	GADU MOR	LI	W								1	1	1	0.339	m	?	2009	2011	3	?	2009	2011	3	▪/▪
OCS	µg/kg	43BH	Tromsø havn	Troms	GADU MOR	MU	W								0.05	0.05	0.05	0	m	?	2009	2011	3	?	2009	2011	3	▪/▪
OCS	µg/kg	51A	Byrkjenes	Hordaland	MYTI EDU	SB	D	0.394	0.403	0.345	0.562	0.313	0.417	0.333	0.714	13.333	0.385	0	m	23	1995	2011	17	>25	2002	2011	10	O/O
OCS	µg/kg	52A	Eitrheimsneset	Hordaland	MYTI EDU	SB	D	0.223	0.336	0.327	0.313	0.313	0.313	0.333	0.278	0.625	0.294	0	m	14	1992	2011	20	11	2002	2011	10	O/O
OCS	µg/kg	53B	Inner Sørfjord	Hordaland	GADU MOR	LI	W	0.5	0.5	1	1	0.5	0.917	0.26	1	1	1	0.286	m	15	1990	2011	21	16	2002	2011	10	↓/O
OCS	µg/kg	53B	Inner Sørfjord	Hordaland	GADU MOR	MU	W	0.035	0.03	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0	m	14	1990	2011	21	7	2002	2011	10	O/↑
OCS	µg/kg	53F	Inner Sørfjord	Hordaland	PLAT FLE	LI	W	0.5	0.3	0.5	0.54		0.5	0.5	0.707	1	0.3		m	16	1990	2011	20	14	2002	2011	9	↓/O
OCS	µg/kg	53F	Inner Sørfjord	Hordaland	PLAT FLE	MU	W	0.03	0.03	0.03	0.05		0.05	0.1	0.05	0.05	0.05		m	13	1990	2011	20	11	2002	2011	9	↓/O
OCS	µg/kg	56A	Kvalnes	Hordaland	MYTI EDU	SB	D	0.301	0.373	0.329	0.417	0.357	0.313	0.333	0.333	0.769	0.385	0.001	m	14	1992	2011	20	11	2002	2011	10	O/O
OCS	µg/kg	57A	Krossanes	Hordaland	MYTI EDU	SB	D	0.254	0.296	0.237	0.333	0.357	0.217	0.278	0.25	0.714	0.385	0.002	m	14	1992	2011	20	12	2002	2011	10	O/O
OCS	µg/kg	63A	Ranaskjær	Hordaland	MYTI EDU	SB	D	0.329	0.394	0.166	0.357	0.313	0.357	0.263	0.313	0.667	0.25	0	m	14	1992	2011	20	14	2002	2011	10	O/O
OCS	µg/kg	65A	Vikingneset	Hordaland	MYTI EDU	SB	D	0.244	0.294	0.128	0.278	0.313	0.238	0.25	0.25	0.625	0.238	0.001	m	14	1992	2011	20	14	2002	2011	10	O/O
OCS	µg/kg	67B	Strandebarm area	Hordaland	GADU MOR	LI	W	1.249	1.5	1	0.8	1	1	1	1	1	0.935	0.007	m	9	1990	2011	22	8	2002	2011	10	↓/O
OCS	µg/kg	67B	Strandebarm area	Hordaland	GADU MOR	MU	W	0.03	0.03	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0	m	13	1990	2011	22	7	2002	2011	10	↓/↑
OCS	µg/kg	67F	Strandebarm area	Hordaland	LEPI WHI	LI	W	0.5	0.6	1	0.4	0.5	0.5		0.5	1	0.3	0	m	16	1990	2011	21	15	2002	2011	9	↓/O
OCS	µg/kg	67F	Strandebarm area	Hordaland	LEPI WHI	MU	W	0.03	0.03	0.03	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0	m	12	1990	2011	22	7	2002	2011	10	↓/↑
OCS	µg/kg	67F	Strandebarm area	Hordaland	PLAT FLE	LI	W	0.4	1	1	1	0.6	0.5	0.5	1		0.16	0.038	m	22	1996	2011	14	17	2002	2011	9	O/O
OCS	µg/kg	67F	Strandebarm area	Hordaland	PLAT FLE	MU	W	0.03	0.03	0.05	0.05	0.05	0.05	0.05	0.05		0.05	0	m	9	1996	2011	14	7	2002	2011	9	↑/↑
OCS	µg/kg	69A	Lille Terøy	Hordaland	MYTI EDU	SB	D	0.259	0.266	0.154	0.263	0.263	0.294	0.278	0.278	0.625	0.217	0.001	m	14	1992	2011	20	13	2002	2011	10	O/O
OCS	µg/kg	71A	Bjørkøya (Risøyodden)		MYTI EDU	SB	D		0.321	0.394	0.357	0.333		0.278	0.238	0.357	0.333	0	m	12	1992	2011	18	8	2003	2011	8	O/O

Parameter	Unit	St. Code	Station Name	County	Species	Tissue	Basis	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	SD	OC	Power (long)	First Yr. (long)	Last Yr. (long)	No Yrs (long)	Power (short)	First Yr. (short)	Last Yr. (short)	No Yrs (short)	Trend
OCS	µg/kg	76A	Risøy	Aust-Agder	MYTI EDU	SB	D	0.249	0.311	0.336	0.294	0.313		0.333	0.294	0.333	0.25	0.001	m	12	1992	2011	17	7	2002	2011	9	O/O
OCS	µg/kg	80BH	Munkholmen	Sør-Trøndelag	GADU MOR	LI	W								1	1	0.79	0.689	m	7	2009	2011	3	7	2009	2011	3	O/O
OCS	µg/kg	80BH	Munkholmen	Sør-Trøndelag	GADU MOR	MU	W								0.05		0.05	0	m		2009	2011	2		2009	2011	2	▪/▪
OCS	µg/kg	98A2	Husvaagen area	Nordland	MYTI EDU	SB	D	0.313	0.362	0.256	0.294	0.278	0.333	0.294	0.278	0.588	0.294	0	m	11	1997	2011	14	11	2002	2011	10	O/O
OCS	µg/kg	98B1	Bjørnerøya (east)	Nordland	GADU MOR	LI	W	1	1.5	1.5	1.5	2	1.049	1	2	1	1	0.325	m	14	1992	2011	18	12	2002	2011	10	O/O
OCS	µg/kg	98B1	Bjørnerøya (east)	Nordland	GADU MOR	MU	W	0.03	0.03	0.03	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0	m	14	1992	2011	18	7	2002	2011	10	O/↑
OCS	µg/kg	98F2	Husholmen	Nordland	PLEU PLA	LI	W	0.1	0.1	0.5	0.2	0.2	0.1	0.4	0.1	0.2	0.05	0	m	20	2000	2011	12	20	2002	2011	10	O/O
OCS	µg/kg	98F2	Husholmen	Nordland	PLEU PLA	MU	W	0.03	0.03	0.03	0.05	0.05	0.05	0.05	0.05		0.05	0	m	8	2000	2011	11	7	2002	2011	9	↑/↑
OCS	µg/kg	I023	Singlekalven (south)	Østfold	MYTI EDU	SB	D	0.417	0.394	0.431	0.431	0.385	0.385	0.385	0.769	0.333	0.5	0.001	m	11	1995	2011	17	11	2002	2011	10	O/O
OCS	µg/kg	I131A	Lastad	Vest-Agder	MYTI EDU	SB	D	0.279	0.373	0.333	0.34	0.385	0.333	0.333	0.418	0.333	0.263	0	m	10	1995	2011	17	8	2002	2011	10	O/O
OCS	µg/kg	I132	Svensholmen	Vest-Agder	MYTI EDU	SB	D	0.382	0.345	0.485	0.417	0.333	0.333	0.323	0.333	0.333	0.385	0	m	9	1998	2011	14	7	2002	2011	10	O/O
OCS	µg/kg	I133	Odderøy	Vest-Agder	MYTI EDU	SB	D	0.396	0.422	0.431	0.455	0.521	0.385	0.385	0.404	0.385	0.333	0	m	8	1995	2011	17	6	2002	2011	10	↑/O
OCS	µg/kg	I241	Nordnes	Hordaland	MYTI EDU	SB	D	0.278	0.284	0.263	0.417	0.294	0.313	0.313	0.278	0.278	0.25	0	m	12	1995	2011	17	8	2002	2011	10	O/O
OCS	µg/kg	I243	Hegreneset	Hordaland	MYTI EDU	SB	D	0.278	0.471	0.308	0.526	0.313	0.294	0.385		0.333	0.25	0	m	12	1995	2011	16	11	2002	2011	9	O/O
OCS	µg/kg	I301	Akershuskaia	Oslo	MYTI EDU	SB	D	0.313	0.347	0.439	0.347	0.357	0.278	0.333	0.667	0.294	0.385	0	m	13	1992	2011	18	11	2002	2011	10	O/O
OCS	µg/kg	I304	Gåsøya	Akershus	MYTI EDU	SB	D	0.385	0.307	0.394	0.439	0.385	0.294	0.333	0.714	0.385	0.385	0	m	12	1995	2011	16	11	2002	2011	10	O/O
OCS	µg/kg	I306	Håøya	Akershus	MYTI EDU	SB	D	0.336	0.352	0.391	0.431	0.313	0.357	0.385	0.667	0.357	0.385	0	m	12	1995	2011	16	10	2002	2011	10	O/O
OCS	µg/kg	I307	Ramtonholmen	Buskerud	MYTI EDU	SB	D	0.45	0.365	0.42	0.397	0.313	0.313	0.357	0.588	0.357	0.455	0	m	12	1995	2011	16	9	2002	2011	10	O/O
OCS	µg/kg	I712	Croftholmen	Telemark	MYTI EDU	SB	D	0.407	0.34	0.459	0.4	0.455	0.313	0.357	0.345	0.417	0.385	0	m	11	1995	2011	17	8	2002	2011	10	O/O
OCS	µg/kg	I713	Strømtangen	Telemark	MYTI EDU	SB	D	0.369	0.394	0.435	0.352	0.685	0.278	0.385	0.385	0.313	0.385	0	m	11	2002	2011	10	11	2002	2011	10	O/O
P_S	µg/kg	30A	Gressholmen	Oslo	MYTI EDU	SB	D	54.851	126.478	163.468	74.563	291.733	106.588	78.438	98.889	169.6	139.933	0.258	no	15	1992	2011	17	16	2002	2011	10	O/O
P_S	µg/kg	35A	Mølen	Buskerud	MYTI EDU	SB	D							103.333	38.273	57	69.455	0.054	no	16	2008	2011	4	16	2008	2011	4	O/O
P_S	µg/kg	I131A	Lastad	Vest-Agder	MYTI EDU	SB	D	95.029	133.478	344.133	108.873	80.643	70	98.933	43.846	49.267	86.474	0.223	no	14	1995	2011	17	16	2002	2011	10	↓/O
P_S	µg/kg	I132	Svensholmen	Vest-Agder	MYTI EDU	SB	D	1749.08	2053.38	1062.02	2803.25	1763.47	1382.08	1396.72	513.4	429.714	349.692	0.412	1,4	16	1998	2011	14	13	2002	2011	10	↓/↓
P_S	µg/kg	I133	Odderøy	Vest-Agder	MYTI EDU	SB	D	1116.81	1070.12	2531.38	1407.73	1319.69	708.5	3216.92	1626.8	315.583	618.067	1.027	2,47	17	1995	2011	16	19	2002	2011	10	O/O
P_S	µg/kg	I201	Ekkjegrunn (G1)	Rogaland	MYTI EDU	SB	D	1441.96	579.398	381.488	569.07	303.2	358.25	196	137.235	88.667	337.857	0.473	1,35	20	1995	2011	17	16	2002	2011	10	↓/↓
P_S	µg/kg	I205	Bølsnes (G5)	Rogaland	MYTI EDU	SB	D	2383.49	383.836	2174.47	309.274	221.462	204.25	123.714	100.875	53.867	139	0.407	no	20	1995	2011	16	20	2002	2011	10	↓/↓
P_S	µg/kg	I301	Akershuskaia	Oslo	MYTI EDU	SB	D	311.972	215.549	1043.86	271.324	1725.71	646.563	553.25	308.4	452.647	574.692	0.866	2,3	18	1992	2011	18	19	2002	2011	10	O/O
P_S	µg/kg	I304	Gåsøya	Akershus	MYTI EDU	SB	D	51.471	66.135	214.667	53.596	178.929	68.765	63.667	52.5	188.571	141.083	0.226	no	18	1995	2011	17	18	2002	2011	10	O/O
P_S	µg/kg	I306	Håøya	Akershus	MYTI EDU	SB	D	120.805	45.874	147.462	53.917	154.75	51.5	49.923	43.5	149.067	100.077	0.137	no	17	1995	2011	17	18	2002	2011	10	O/O
P_S	µg/kg	I307	Ramtonholmen	Buskerud	MYTI EDU	SB	D	243.694	64.818	178.036	40.635	169.938	50.313	50.5	48.294	196.933	106.25	0.102	no	19	1995	2011	17	20	2002	2011	10	O/O
P_S	µg/kg	I912	Honnhammer	Møre og Romsdal	MYTI EDU	SB	D	1965	163.802	42.345	32.878	42.933	304.571	185.25	61.722	57.151	116.615	0.148	no	23	1995	2011	16	25	2002	2011	10	↓/O
P_S	µg/kg	I913	Fjøseid	Møre og Romsdal	MYTI EDU	SB	D	1995.33	128.244	98.095	55.13	75.667	102.875	84.917	73.611	48.043	49.4	0.092	no	20	1999	2011	13	19	2002	2011	10	↓/↓
P_S	µg/kg	I964	Toraneskaien	Nordland	MYTI EDU	SB	D	642.727	6267.11	7960.8	1008.93	2592.6	2986.77	2503.33	3513.06	1336.39	1822.54	2.294	7,29	23	2002	2011	10	23	2002	2011	10	O/O
P_S	µg/kg	I965	Moholmen (B5)	Nordland	MYTI EDU	SB	D	720.385	1317.58	2928.96	586.828	1495.07	2615	1430.88	2582.89	1055.78	1400	2.382	5,6	18	2001	2011	11	18	2002	2011	10	O/O
P_S	µg/kg	I969	Bjørnbærviken (B9)	Nordland	MYTI EDU	SB	D	136.316	2338.22	1537.28	283.394	660.211	831.667	744.071	640.595	608.93	343.857	1.477	1,38	20	1995	2011	17	23	2002	2011	10	O/O
Pb	mg/kg	10A2	Skallneset	Finnmark	MYTI EDU	SB	D	1.802	1.648	1.016	0.674	0.988	1.63	1.059	0.824	0.833	0.579	0.002	no	12	1996	2011	16	11	2002	2011	10	O/O
Pb	mg/kg	10B	Varangerfjorden	Finnmark	GADU MOR	LI	W	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.001	no	9	1994	2011	18	<=5	2002	2011	10	↓/O
Pb	mg/kg	10F	Skogerøy	Finnmark	PLEU PLA	LI	W	0.058	0.045	0.045	0.03		0.035	0.059	0.03	0.024	0.035	0.028	no	11	1997	2011	13	11	2002	2011	9	↓/O
Pb	mg/kg	11X	Brashavn	Finnmark	MYTI EDU	SB	D	0.74	0.279	0.37	0.323	0.539	0.331	0.389	0.3	0.238	0.25	0.001	no	16	1997	2011	15	12	2002	2011	10	O/O
Pb	mg/kg	13BH	Kristiansand havn	Aust-Agder	GADU MOR	LI	W								0.04	0.02	0.02	0.018	no	11	2009	2011	3	11	2009	2011	3	O/O
Pb	mg/kg	15A	Gåsøy (Ullerø)	Vest-Agder	MYTI EDU	SB	D	0.714	0.76	0.857	1.663	0.781	1.059	0.545	0.941	1.118	1.238	0.018	no	13	1990	2011	21	12	2002	2011	10	O/O
Pb	mg/kg	15B	Ullerø area	Vest-Agder	GADU MOR	LI	W	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.021	no	12	1990	2011	22	8	2002	2011	10	↓/O
Pb	mg/kg	15F	Ullerø area	Vest-Agder	LIMA LIM	LI	W	0.021	0.02	0.03	0.03	0.037	0.02	0.03	0.02	0.02	0.02	0.004	no	11	1991	2011	19	10	2002	2011	10	↓/O
Pb	mg/kg	21F	Åkrafjord	Hordaland	LEPI WHI	LI	W		0.02	0.02	0.02	0.031	0.02	0.02	0.02	0.02	0.02	0.006	m	8	2003	2011	9	8	2003	2011	9	O/O
Pb	mg/kg	227A2	Høgevarde	Rogaland	MYTI EDU	SB	D								3.533	2.188	2.778	0.012	no	12	2009	2011	3	12	2009	2011	3	O/O
Pb	mg/kg	22A	Espevær (west)	Hordaland	MYTI EDU	SB	D	0.884	1.457	1.788	1.882	1.311	2.6	2.294	0.739	0.571	0.722	0.001	no	12	1990	2011	22	14	2002	2011	10	↓/O
Pb	mg/kg	23B	Karihavet area	Hordaland	GADU MOR	LI	W	0.006	0.02	0.02	0.02	0.042	0.02	0.02	0.02	0.02	0.02	0.005	no	14	1990	2011	22	13	2002	2011	10	↓/O
Pb	mg/kg	30A	Gressholmen	Oslo	MYTI EDU	SB	D	2.245	2.581	3.739	3.377	4.12	3.059	3.867	2.544	3.333	3	0.006	1	18	1985	2011	27	8	2002	2011	10	O/O
Pb	mg/kg	30B	Oslo City area	Akershus	GADU MOR	LI	W	0.513	0.24	0.17	0.138	0.101	0.29	0.3	0.13	0.13	0.08	0.118	no	16	1986	2011	26	14	2002	2011	10	↓/O
Pb	mg/kg	31A	Solbergstrand	Akershus	MYTI EDU	SB	D	1.429	0.805	0.781	0.869	0.855	0.647	0.667	0.778	1.341	1.313	0.004	no	12	1983	2011	28	10	2002	2011	10	↓/O
Pb	mg/kg	33F	Sande (east side)	Vestfold	PLAT FLE	LI	W	0.03	0.03	0.02	0.03	0.044	0.02	0.03	0.03	0.02	0.02	0.013	no	15	1986	2011	26	11	2002	2011	10	↓/O
Pb	mg/kg	35A	Mølen	Buskerud	MYTI EDU	SB	D	0.571	0.574	0.813	1.213	0.805	0.571	1.105	1	0.938	1.308	0.004	no	12	1983	2011	28	11	2002	2011	10	↓/O
Pb	mg/kg	36A	Færder	Vestfold	MYTI EDU	SB	D	0.449	0.585	0.956	0.578	0.559	1.133	0.471			0.556	0.002	no	11	1983	2011	26	14	2002	2011	8	↓/O
Pb	mg/kg	36B	Færder area	Vestfold	GADU MOR	LI	W	0.006	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0	no	14	1986	2011	26	11	2002	2011	10	↓/O
Pb	mg/kg	36F	Færder area	Vestfold	LIMA LIM	LI	W	0.048	0.03	0.05	0.05	0.047	0.05	0.06	0.04	0.06	0.05	0.006	no	14	1990	2011	22	10	2002	2011	10	↓/O
Pb	mg/kg	43BH	Tromsø havn	Troms	GADU MOR	LI	W								0.02	0.02	0.02	0.003	no	?	2009	2011	3	?	2009	2011	3	▪/▪
Pb	mg/kg	51A	Byrkjenes	Hordaland	MYTI EDU	SB	D	98.425	108.462	42.23	77.528	17.625	29.833	23.429	21.214	31	29.769	0.064	9,92	16	1987	2011	19	14	2002	2011	10	O/↓
Pb	mg/kg	52A	Eitrheimsneset	Hordaland	MYTI EDU	SB	D	21.83	16.913	16.316	9.267	8.438	15.813	9.857	5.5	8.5	5.313	0.049	1,77	20	1989	2011	23	12	2002	2011	10	↓/↓
Pb	mg/kg	53B	Inner Sørfjord	Hordaland	GADU MOR	LI	W	0.142	0.04	0.09	0.082	0.045	0.1	0.16	0.17	0.12	0.03	0.037	no	17	1986	2011	24	18	2002	2011	10	↓/O
Pb	mg/kg	53F	Inner Sørfjord	Hordaland	PLAT FLE	LI	W	1.29	0.73	0.44	1.35		0.56	0.7	0.045	0.437	0.45		1,5	22	1988	2011	22	24	2002	2011	9	O/O
Pb	mg/kg	56A	Kvalnes	Hordaland	MYTI EDU	SB	D	42.857	27.794	24.658	32	28.857	21.375	19.6	15	26.231	21	0.203	7	17	1987	2011	25	10	2002	2011	10	O/O

Parameter	Unit	St. Code	Station Name	County	Species	Tissue	Basis	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	SD	OC	Power (long)	First Yr. (long)	Last Yr. (long)	No Yrs (long)	Power (short)	First Yr. (short)	Last Yr. (short)	No Yrs (short)	Trend
Pb	mg/kg	57A	Krossanes	Hordaland	MYTI EDU	SB	D	9.594	7.018	5.789	11.267	10.429	4.565	4.778	4.278	8.286	6.923	0.05	2,31	13	1987	2011	25	13	2002	2011	10	↓/O
Pb	mg/kg	63A	Ranaskjær	Hordaland	MYTI EDU	SB	D	6.572	6.299	1.921	4.533	5.36	4.05	2.632	3.188	4.133	2.15	0.016	no	17	1987	2011	25	15	2002	2011	10	↓/O
Pb	mg/kg	65A	Vikingneset	Hordaland	MYTI EDU	SB	D	3.052	2.824	1.25	3	4.006	1.557	1.75	3.1	6.438	1.143	0.042	no	15	1987	2011	25	19	2002	2011	10	O/O
Pb	mg/kg	67B	Strandebarm area	Hordaland	GADU MOR	LI	W	0.015	0.02	0.02	0.008	0.02	0.02	0.02	0.02	0.02	0.02	0	no	15	1987	2011	25	13	2002	2011	10	↓/O
Pb	mg/kg	67F	Strandebarm area	Hordaland	LEPI WHI	LI	W	0.031	0.02	0.024	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0	m	11	1987	2011	25	7	2002	2011	10	↓/O
Pb	mg/kg	67F	Strandebarm area	Hordaland	PLAT FLE	LI	W	0.008	0.02	0.02	0.02	0.02	0.02	0.02	0.02		0.02	0.023	no	15	1996	2011	14	10	2002	2011	9	↓/O
Pb	mg/kg	69A	Lille Terøy	Hordaland	MYTI EDU	SB	D	2.758	2.527	0.957	1.737	2.005	1.647	1.842	1.2	1.063	1	0.002	no	11	1992	2011	20	12	2002	2011	10	↓/O
Pb	mg/kg	71A	Bjørkøya (Risøyodden)		MYTI EDU	SB	D	0.919	0.915	0.866	0.962	0.98	0.797	1	0.81	1.4	1.267	0.002	no	12	1983	2011	28	8	2002	2011	10	↓/O
Pb	mg/kg	76A	Risøy	Aust-Agder	MYTI EDU	SB	D	0.766	0.938	1.477	0.778	1.194	1.059	1.765	1.353	1.503	0.6	0.003	no	13	1990	2011	20	13	2002	2011	10	O/O
Pb	mg/kg	80BH	Munkholmen	Sør-Trøndelag	GADU MOR	LI	W								0.03	0.02	0.02	0.005	no	8	2009	2011	3	8	2009	2011	3	O/O
Pb	mg/kg	98A2	Husvaagen area	Nordland	MYTI EDU	SB	D	0.892	1.159	1.088	0.54	0.667	0.699	0.706	0.833	0.706	0.765	0.001	no	9	1997	2011	14	10	2002	2011	10	↓/O
Pb	mg/kg	98B1	Bjørnerøya (east)	Nordland	GADU MOR	LI	W	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0	no	9	1992	2011	18	8	2002	2011	10	↓/O
Pb	mg/kg	98F2	Husholmen	Nordland	PLEU PLA	LI	W	0.068	0.04	0.02	0.204	0.15	0.06	0.02	0.02	0.06	0.02	0	no	21	2000	2011	12	22	2002	2011	10	O/O
Pb	mg/kg	I023	Singlekalven (south)	Østfold	MYTI EDU	SB	D	0.754	1.277	2.339	0.901	1.046	0.846	0.769	0.769	1	1.2	0.001	no	12	1995	2011	17	13	2002	2011	10	O/O
Pb	mg/kg	I131A	Lastad	Vest-Agder	MYTI EDU	SB	D								1.538	1.133	1.211	0.004	no	8	2009	2011	3	8	2009	2011	3	O/O
Pb	mg/kg	I132	Svensholmen	Vest-Agder	MYTI EDU	SB	D								3.833	3.867	4.615	0.007	1,54	6	2009	2011	3	6	2009	2011	3	O/O
Pb	mg/kg	I133	Odderøy	Vest-Agder	MYTI EDU	SB	D								12.803	23.846	15.067	0.032	5,02	15	2009	2011	3	15	2009	2011	3	O/O
Pb	mg/kg	I201	Ekkjegrunn (G1)	Rogaland	MYTI EDU	SB	D	8.214	1.867	3.333	4.31	3.407	4.75	4.438	1.882	1.667	1.929	0.001	no	13	1995	2011	17	15	2002	2011	10	O/O
Pb	mg/kg	I205	Bølsnes (G5)	Rogaland	MYTI EDU	SB	D	9.273	3.396	2.761	6.296	5.262	3.333	7.286	2.8	2.133	1.765	0.008	no	14	1995	2011	16	15	2002	2011	10	O/O
Pb	mg/kg	I241	Nordnes	Hordaland	MYTI EDU	SB	D								18.667	5.647	6.65	0.046	2,22	17	2009	2011	3	17	2009	2011	3	O/O
Pb	mg/kg	I243	Hegreneset	Hordaland	MYTI EDU	SB	D								8.889	9.8	3.5	0.011	1,17	15	2009	2011	3	15	2009	2011	3	O/O
Pb	mg/kg	I301	Akershuskaia	Oslo	MYTI EDU	SB	D	1.975	1.768	3.07	2.153	5.379	2.944	2.625	2	2.471	2.231	0.005	no	12	1992	2011	15	12	2002	2011	10	O/O
Pb	mg/kg	I304	Gåsøya	Akershus	MYTI EDU	SB	D	1.3	1.159	1.732	1.947	2.162	1.588	1.471	1.5	2.214	1.429	0.004	no	12	1998	2011	14	9	2002	2011	10	O/O
Pb	mg/kg	I306	Håøya	Akershus	MYTI EDU	SB	D	0.658	0.704	1.077	1.091	0.938	0.867	1.154	0.714	1.143	1.077	0.002	no	11	1998	2011	14	9	2002	2011	10	O/O
Pb	mg/kg	I307	Ramtonholmen	Buskerud	MYTI EDU	SB	D	1.261	1.008	1.066	1.393	1.044	0.875	1.214	0.875	1.429	1.273	0.001	no	11	1998	2011	14	9	2002	2011	10	O/O
Pb	mg/kg	I712	Croftholmen	Telemark	MYTI EDU	SB	D								3.287	4.75	1.923	0.001	no	16	2009	2011	3	16	2009	2011	3	O/O
Pb	mg/kg	I713	Strømtangen	Telemark	MYTI EDU	SB	D								1.833	1.188	2.077	0.002	no	14	2009	2011	3	14	2009	2011	3	O/O
Pb	mg/kg	I964	Toraneskaien	Nordland	MYTI EDU	SB	D	8.75	3.487	6.57	13.03	13.3	13.721	15.375	10.735	8.75	8.308	0.034	2,77	13	2002	2011	10	13	2002	2011	10	O/O
Pb	mg/kg	I965	Moholmen (B5)	Nordland	MYTI EDU	SB	D	12.692	6.446	13.12	12.483	13.714	16.615	29.396	18.38	13.926	11	0.04	3,67	13	2001	2011	11	12	2002	2011	10	O/O
Pb	mg/kg	I969	Bjørnbærviken (B9)	Nordland	MYTI EDU	SB	D	2.579	1.847	1.59	3.919	2.105	1.944	1.933	2.128	1.62	1.789	0.015	no	12	1995	2011	17	11	2002	2011	10	O/O
PBDE	µg/kg	13BH	Kristiansand havn	Aust-Agder	GADU MOR	LI	W								19.77	12.984	26.158	5.214	m	15	2009	2011	3	15	2009	2011	3	O/O
PBDE	µg/kg	15B	Ullerø area	Vest-Agder	GADU MOR	LI	W						16.5	20.18			20.76	5.198	m	11	1996	2011	4	7	2007	2011	3	O/O
PBDE	µg/kg	23B	Karihavet area	Hordaland	GADU MOR	LI	W				9.06	8.215	8.405	11.436	9.521	8.81	15.52	4.841	m	9	1993	2011	9	9	2005	2011	7	↓/O
PBDE	µg/kg	30B	Oslo City area	Akershus	GADU MOR	LI	W				84.602	91.44	106.26	98.17	98.933	86.78	65.22	19.705	m	7	1993	2011	9	7	2005	2011	7	O/O
PBDE	µg/kg	36B	Færder area	Vestfold	GADU MOR	LI	W						7.505	11.47	2.945	8.789	8.931	2.06	m	19	1996	2011	7	18	2007	2011	5	O/O
PBDE	µg/kg	43BH	Tromsø havn	Troms	GADU MOR	LI	W								36.13	35.92	24.9	4.362	m	8	2009	2011	3	8	2009	2011	3	O/O
PBDE	µg/kg	53B	Inner Sørfjord	Hordaland	GADU MOR	LI	W				29.22	14.407	50.5	31.2	33.2	64.92	104.65	29.564	m	15	2005	2011	7	15	2005	2011	7	O/O
PBDE	µg/kg	80BH	Munkholmen	Sør-Trøndelag	GADU MOR	LI	W								38.725	14.861	45.668	15.056	m	22	2009	2011	3	22	2009	2011	3	O/O
PBDE	µg/kg	98B1	Bjørnerøya (east)	Nordland	GADU MOR	LI	W					8.73		6.91	2.695	6.14	8.08	1.447	m	17	1994	2011	7	17	2006	2011	5	O/O
PCB-7	µg/kg	10A2	Skallneset	Finnmark	MYTI EDU	SB	D	2.134	2.582	1.285	2.289	4.594	1.886	1.647	2.059	2.5	1.763	0.006	no	13	1996	2011	15	14	2002	2011	10	↓/O
PCB-7	µg/kg	10B	Varangerfjorden	Finnmark	GADU MOR	LI	W	149.1	146.238	126.5	103.7	96.6	108.2	82.4	130.9	77.8	83.3	12.843	no	11	1994	2011	18	9	2002	2011	10	↓/↓
PCB-7	µg/kg	10B	Varangerfjorden	Finnmark	GADU MOR	MU	W	0.635	0.555	1.145	0.535	0.609	0.585	0.495	0.71	0.385	0.52	0.078	no	15	1994	2011	18	12	2002	2011	10	O/O
PCB-7	µg/kg	10F	Skogerøy	Finnmark	PLEU PLA	LI	W	86.2	16.588	22.25	25.7		14.859	23.802	10.47	6.356	14.96	2.857	no	17	1997	2011	13	17	2002	2011	9	O/O
PCB-7	µg/kg	10F	Skogerøy	Finnmark	PLEU PLA	MU	W	1	0.457	0.175	0.435		0.525	0.986	0.333	0.658	0.52	0.078	no	15	1997	2011	13	17	2002	2011	9	↓/O
PCB-7	µg/kg	11X	Brashavn	Finnmark	MYTI EDU	SB	D	1.934	1.934	1.285	3.024	2.111	1.905	2.25	1.738	2.4	1.694	0.009	no	11	1997	2011	15	11	2002	2011	10	↓/O
PCB-7	µg/kg	13BH	Kristiansand havn	Aust-Agder	GADU MOR	LI	W								1168.2	540.7	1067	198.101	2,13	18	2009	2011	3	18	2009	2011	3	O/O
PCB-7	µg/kg	13BH	Kristiansand havn	Aust-Agder	GADU MOR	MU	W								6.06	7.855	3.31	1.367	1,1	15	2009	2011	3	15	2009	2011	3	O/O
PCB-7	µg/kg	15A	Gåsøy (Ullerø)	Vest-Agder	MYTI EDU	SB	D	3.153	2.733	2.736	3.344	2.563	4.382	4.182	4.5	3.75	2.5	0.013	no	12	1990	2011	20	9	2002	2011	10	O/O
PCB-7	µg/kg	15B	Ullerø area	Vest-Agder	GADU MOR	LI	W	244	213.2	153.9	185.6	130.6	166	135.3	121.2	148.1	183.5	35.07	no	11	1990	2011	22	8	2002	2011	10	↓/↓
PCB-7	µg/kg	15B	Ullerø area	Vest-Agder	GADU MOR	MU	W	0.655	1.23	0.2	0.675	0.575	0.48	0.575	0.475	0.49	0.515	0.105	no	15	1990	2011	22	16	2002	2011	10	↓/O
PCB-7	µg/kg	15F	Ullerø area	Vest-Agder	LIMA LIM	LI	W	51.2	49.8	66.8	105.1	47.1	55.48	74.88	47.7	28.3	43.92	6.582	no	12	1991	2011	19	12	2002	2011	10	O/O
PCB-7	µg/kg	15F	Ullerø area	Vest-Agder	LIMA LIM	MU	W	0.665	0.94	0.305	1.245	0.695	0.575	0.98	0.66	0.73	0.39	0.115	no	16	1991	2011	19	15	2002	2011	10	O/O
PCB-7	µg/kg	21F	Åkrafjord	Hordaland	LEPI WHI	LI	W		100.9	65.6	100.69	112.1	87.58	59.71	65.9	63.011	60.65	9.272	m	10	2003	2011	9	10	2003	2011	9	O/O
PCB-7	µg/kg	21F	Åkrafjord	Hordaland	LEPI WHI	MU	W		0.45	0.345	1.11	0.93	0.855	0.63	0.59	0.584	0.395	0.039	m	12	2003	2011	9	12	2003	2011	9	O/O
PCB-7	µg/kg	227A2	Høgevarde	Rogaland	MYTI EDU	SB	D								25.567	17.8	37.861	0.161	2,52	15	2009	2011	3	15	2009	2011	3	O/O
PCB-7	µg/kg	22A	Espevær (west)	Hordaland	MYTI EDU	SB	D	3.237	8.5	5.511	8.735	5.765	6.433	8.676	4.043	4.65	3.056	0.01	no	13	1990	2011	22	12	2002	2011	10	↓/O
PCB-7	µg/kg	23B	Karihavet area	Hordaland	GADU MOR	LI	W	113.15	113.8	202.4	210.4	140.5	153.4	75.696	78.1	121.6	135.5	41.477	no	11	1990	2011	22	12	2002	2011	10	↓/O
PCB-7	µg/kg	23B	Karihavet area	Hordaland	GADU MOR	MU	W	0.38	0.495	0.325	0.7	1.005	0.53	0.515	0.45	0.74	0.58	0.077	no	16	1990	2011	22	12	2002	2011	10	O/O
PCB-7	µg/kg	30A	Gressholmen	Oslo	MYTI EDU	SB	D	33.946	43.396	18.429	67.938	28.769	47.706	49.375	38.333	28.133	16.9	0.039	1,13	13	1987	2011	25	14	2002	2011	10	↓/O
PCB-7	µg/kg	30B	Oslo City area	Akershus	GADU MOR	LI	W	2232	1995	2616.6	4156.7	3545.4	2046	2717.6	3603	3091.8	1758.7	700.645	3,52	13	1990	2011	22	12	2002	2011	10	O/O
PCB-7	µg/kg	30B	Oslo City area	Akershus	GADU MOR	MU	W	10.315	9.31	7.905	9.005	11.865	10.565	16.575	21.155	14.885	9.145	1.433	3,05	17	1990	2011	22	11	2002	2011	10	O/O
PCB-7	µg/kg	31A	Solbergstrand	Akershus	MYTI EDU	SB	D	8.973	7.584	3.849	13.759	9.3	5.324	11.5	11.031	116.28	4.625	0.018	no	20	1987	2011	25	25	2002	2011	10	O/O
PCB-7	µg/kg	33F	Sande (east side)	Vestfold	PLAT FLE	LI	W	53	60.1	62.8	63.4	68.9	67.3	72.8	74.6	79	75.8	9.839	no	12	1990	2011	22	<=5	2002	2011	10	O/↑

Parameter	Unit	St. Code	Station Name	County	Species	Tissue	Basis	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	SD	OC	Power (long)	First Yr. (long)	Last Yr. (long)	No Yrs (long)	Power (short)	First Yr. (short)	Last Yr. (short)	No Yrs (short)	Trend
PCB-7	µg/kg	33F	Sande (east side)	Vestfold	PLAT FLE	MU	W	1.53	1.25	0.675	0.48	0.805	0.675	1.38	1.275	1.31	0.8	0.142	no	16	1990	2011	22	12	2002	2011	10	O/O
PCB-7	µg/kg	35A	Mølen	Buskerud	MYTI EDU	SB	D	6.971	8.196	6.063	12.333	4.909	5.857	9.447	6.957	5.625	5.773	0.008	no	12	1987	2011	25	12	2002	2011	10	↓/O
PCB-7	µg/kg	36A	Færder	Vestfold	MYTI EDU	SB	D	6.032	5.749	5.11	6.921	3.614	2.938	5.556			4.972	0.016	no	12	1987	2011	23	12	2002	2011	8	↓/O
PCB-7	µg/kg	36B	Færder area	Vestfold	GADU MOR	LI	W	269.3	425	527	522.5	586	209.8	260.5	180.5	283.8	266.3	56.315	no	13	1990	2011	22	12	2002	2011	10	↓/O
PCB-7	µg/kg	36B	Færder area	Vestfold	GADU MOR	MU	W	1.895	2.52	2.88	2.71	9.34	0.63	1.36	2.527	1.78	2.22	0.281	no	21	1990	2011	22	20	2002	2011	10	O/O
PCB-7	µg/kg	36F	Færder area	Vestfold	LIMA LIM	LI	W	297.4	271.7	538.1	511.3	620.1	650	720.8	313.1	171.7	158.1	46.555	no	12	1990	2011	22	11	2002	2011	10	↑/↓
PCB-7	µg/kg	36F	Færder area	Vestfold	LIMA LIM	MU	W	6.56	3.73	4.34	4.465	7.18	10.42	12.07	10.11	3.765	1.89	0.793	no	13	1990	2011	22	14	2002	2011	10	↓/↓
PCB-7	µg/kg	43BH	Tromsø havn	Troms	GADU MOR	LI	W								290.1	323.8	282.7	49.636	no	7	2009	2011	3	7	2009	2011	3	O/O
PCB-7	µg/kg	43BH	Tromsø havn	Troms	GADU MOR	MU	W								1.32	1.08	1.17	0.209	no	7	2009	2011	3	7	2009	2011	3	O/O
PCB-7	µg/kg	51A	Byrkjenes	Hordaland	MYTI EDU	SB	D	16.905	16	10.552	14.526	11.188	11.208	9.893	9.929	8.733	8.731	0.029	no	11	1995	2011	17	7	2002	2011	10	O/↓
PCB-7	µg/kg	52A	Eitrheimsneset	Hordaland	MYTI EDU	SB	D	12.545	12.013	10.329	9.969	11.125	15.438	10.733	6.778	6.278	6.528	0.018	no	16	1989	2011	22	9	2002	2011	10	O/↓
PCB-7	µg/kg	53B	Inner Sørfjord	Hordaland	GADU MOR	LI	W	955.7	316.823	462.58	317.1	340.3	741.968	135.79	474.3	767.5	586.4	253.567	1,17	20	1990	2011	21	18	2002	2011	10	O/O
PCB-7	µg/kg	53B	Inner Sørfjord	Hordaland	GADU MOR	MU	W	23.63	4.84	3.22	2.2	1.12	5.715	6.015	4.445	8.915	2.12	0.351	no	>25	1990	2011	21	19	2002	2011	10	O/O
PCB-7	µg/kg	53F	Inner Sørfjord	Hordaland	PLAT FLE	LI	W	158.2	164.6	107.6	363		119.1	80.74	19.438	337.787	194.9	20.205	1,95	21	1990	2011	20	23	2002	2011	9	O/O
PCB-7	µg/kg	53F	Inner Sørfjord	Hordaland	PLAT FLE	MU	W	2.015	1.125	1.955	6.725		1.76	2.185	0.588	6.299	1.985	0.251	no	20	1990	2011	20	22	2002	2011	9	↓/O
PCB-7	µg/kg	56A	Kvalnes	Hordaland	MYTI EDU	SB	D	12.974	13.088	6.732	9.333	6.036	9.528	6.5	5.813	4.833	4.967	0.01	no	21	1988	2011	24	10	2002	2011	10	O/↓
PCB-7	µg/kg	57A	Krossanes	Hordaland	MYTI EDU	SB	D	5.888	6.159	2.895	7.467	4.281	3.737	4.65	4.875	4.75	4.192	0.01	no	18	1989	2011	22	12	2002	2011	10	O/O
PCB-7	µg/kg	63A	Ranaskjær	Hordaland	MYTI EDU	SB	D	3.537	6.197	1.25	5.3	4.088	5.071	3.25	6.5	2.8	4.45	0.018	no	16	1989	2011	22	17	2002	2011	10	O/O
PCB-7	µg/kg	65A	Vikingneset	Hordaland	MYTI EDU	SB	D	2.732	3.729	1.237	4.75	3.281	3.905	2.675	2.786	2.647	2.857	0.015	no	16	1988	2011	24	14	2002	2011	10	↓/O
PCB-7	µg/kg	67B	Strandebarm area	Hordaland	GADU MOR	LI	W	144.8	92.6	97.2	134.4	56.1	106.5	77.074	89.3	158.472	246.909	35.866	no	12	1990	2011	22	12	2002	2011	10	↓/O
PCB-7	µg/kg	67B	Strandebarm area	Hordaland	GADU MOR	MU	W	0.61	0.35	0.57	0.865	0.235	0.255	0.557	0.43	0.455	0.487	0.042	no	22	1990	2011	22	15	2002	2011	10	O/O
PCB-7	µg/kg	67F	Strandebarm area	Hordaland	LEPI WHI	LI	W	60.9	85.2	73.26	58.02	52.475	50.35	40.35	27.26	63.2	33.952	4.383	m	10	1990	2011	22	11	2002	2011	10	↓/O
PCB-7	µg/kg	67F	Strandebarm area	Hordaland	LEPI WHI	MU	W	0.37	0.43	0.464	0.61	0.428	0.22	0.64	0.52	0.48	0.598	0.068	m	15	1990	2011	22	13	2002	2011	10	O/O
PCB-7	µg/kg	67F	Strandebarm area	Hordaland	PLAT FLE	LI	W	32	27.6	33.1	39	42.7	42.51	34.4	23.3		22.12	2.517	no	10	1996	2011	14	8	2002	2011	9	↓/↓
PCB-7	µg/kg	67F	Strandebarm area	Hordaland	PLAT FLE	MU	W	0.845	0.82	0.395	0.565	0.47	0.91	1.555	1.125		1.285	0.128	no	12	1996	2011	14	12	2002	2011	9	↓/O
PCB-7	µg/kg	69A	Lille Terøy	Hordaland	MYTI EDU	SB	D	3.182	4.011	1.27	4.026	1.75	2.175	1.278	2.265	2.778	2.239	0.011	no	15	1992	2011	20	15	2002	2011	10	O/O
PCB-7	µg/kg	71A	Bjørkøya (Risøyodden)		MYTI EDU	SB	D	7.546	9.744	4.322	14.267	9.333	9.3	10.5	9.714	7.542	8.969	0.024	no	13	1987	2011	25	13	2002	2011	10	↓/O
PCB-7	µg/kg	76A	Risøy	Aust-Agder	MYTI EDU	SB	D	5.124	5.06	5.487	3.265	4.594	4.676	5.912	5.235	5.362	6.425	0.024	no	11	1990	2011	20	8	2002	2011	10	↓/O
PCB-7	µg/kg	80BH	Munkholmen	Sør-Trøndelag	GADU MOR	LI	W								1252.7	613.178	245.02	74.488	no	6	2009	2011	3	6	2009	2011	3	↓/↓
PCB-7	µg/kg	80BH	Munkholmen	Sør-Trøndelag	GADU MOR	MU	W								4.458	2.84	0.88	0.133	no	12	2009	2011	3	12	2009	2011	3	O/O
PCB-7	µg/kg	98A2	Husvaagen area	Nordland	MYTI EDU	SB	D	3.234	3.623	1.851	2.722	3.267	2.7	1.094	3.25	3.588	2.353	0.005	no	14	1997	2011	14	14	2002	2011	10	O/O
PCB-7	µg/kg	98B1	Bjørnerøya (east)	Nordland	GADU MOR	LI	W	56.3	110.2	183.4	67.2	101.7	132.406	43.6	14.9	42.4	62.3	11.205	no	17	1992	2011	18	19	2002	2011	10	↓/O
PCB-7	µg/kg	98B1	Bjørnerøya (east)	Nordland	GADU MOR	MU	W	0.24	0.385	0.32	0.435	0.385	0.307	0.25	0.175	0.3	0.265	0.016	no	17	1992	2011	18	10	2002	2011	10	O/O
PCB-7	µg/kg	98F2	Husholmen	Nordland	PLEU PLA	LI	W	10.265	10.52	8.4	24.093	13.76	5.53	3.49	2.56	3.55	0.175	0	no	20	2000	2011	12	20	2002	2011	10	↓/↓
PCB-7	µg/kg	98F2	Husholmen	Nordland	PLEU PLA	MU	W	0.291	0.25	0.175	0.862	0.74	0.285	0.225	0.175	0.63	0.175	0	no	19	2000	2011	12	19	2002	2011	10	O/O
PCB-7	µg/kg	I023	Singlekalven (south)	Østfold	MYTI EDU	SB	D	15.932	12.34	12.634	9.73	8.909	4.385	5.038	9.615	7.143	7.955	0.008	no	11	1995	2011	17	11	2002	2011	10	↓/↓
PCB-7	µg/kg	I131A	Lastad	Vest-Agder	MYTI EDU	SB	D	29.441	8.134	4.676	9.648	4.654	3.533	12.25	6.719	4.844	4.263	0.017	no	16	1995	2011	17	17	2002	2011	10	O/O
PCB-7	µg/kg	I132	Svensholmen	Vest-Agder	MYTI EDU	SB	D	11.76	13.31	7.961	11.5	10.867	6.188	5.922	29.067	13	9.346	0.016	no	15	1998	2011	14	16	2002	2011	10	O/O
PCB-7	µg/kg	I133	Odderøy	Vest-Agder	MYTI EDU	SB	D	9.238	9.229	9.53	10	9.677	9.583	6.423	16.745	8.833	12.25	0.034	no	11	1995	2011	17	11	2002	2011	10	↓/O
PCB-7	µg/kg	I241	Nordnes	Hordaland	MYTI EDU	SB	D	96.389	124.62	117.523	61.833	48.529	46.412	55	51.467	30.765	148.25	0.598	9,88	15	1995	2011	17	15	2002	2011	10	O/O
PCB-7	µg/kg	I243	Hegreneset	Hordaland	MYTI EDU	SB	D	52.529	325.714	287.71	217.474	75.176	48.941	63	35.9	36.333	88.7	0.268	5,91	17	1995	2011	17	19	2002	2011	10	↓/O
PCB-7	µg/kg	I301	Akershuskaia	Oslo	MYTI EDU	SB	D	62.606	70.366	57.895	84.69	75.357	63.167	96.625	45.933	39.235	52	0.09	3,47	11	1992	2011	18	10	2002	2011	10	↓/O
PCB-7	µg/kg	I304	Gåsøya	Akershus	MYTI EDU	SB	D	24.412	27.485	30	21.387	23.5	23.944	33.588	17.714	15.179	20.5	0.029	1,37	11	1995	2011	16	10	2002	2011	10	O/O
PCB-7	µg/kg	I306	Håøya	Akershus	MYTI EDU	SB	D	15.705	15.385	17.885	12.888	17.563	20.7	12.654	12.286	11.967	12.769	0.019	no	12	1995	2011	16	9	2002	2011	10	O/O
PCB-7	µg/kg	I307	Ramtonholmen	Buskerud	MYTI EDU	SB	D	17.544	15.401	12.992	11.31	18.063	15.531	16.464	16.471	13.036	11.136	0.012	no	10	1995	2011	16	8	2002	2011	10	↓/O
PCB-7	µg/kg	I712	Croftholmen	Telemark	MYTI EDU	SB	D	10.916	16.871	16.697	16.16	14.182	11.375	19.385	9.466	10.077	14.692	0.027	no	10	1995	2011	17	11	2002	2011	10	↓/O
PCB-7	µg/kg	I713	Strømtangen	Telemark	MYTI EDU	SB	D	12.525	14.97	16.892	18.074	15.682	12.778	13.692	13.115	16.25	13.458	0.026	no	7	2002	2011	10	7	2002	2011	10	O/O
PFOS	µg/kg	13BH	Kristiansand havn	Aust-Agder	GADU MOR	LI	W								9	6.9	8.458	17.339	no	9	2009	2011	3	9	2009	2011	3	O/O
PFOS	µg/kg	15B	Ullerø area	Vest-Agder	GADU MOR	LI	W						31.496	140			5.739	6.631	no	>25	2007	2011	3	>25	2007	2011	3	O/O
PFOS	µg/kg	23B	Karihavet area	Hordaland	GADU MOR	LI	W				5.477	16.492	3	6.9	8.9	3.999	3.45	2.867	no	19	1993	2011	8	18	2005	2011	7	O/O
PFOS	µg/kg	30B	Oslo City area	Akershus	GADU MOR	LI	W				38	48.99	11	42	47.958	16	5	4.283	no	22	1993	2011	8	21	2005	2011	7	O/O
PFOS	µg/kg	36B	Færder area	Vestfold	GADU MOR	LI	W						34	180	29	8.939	15.492	30.221	no	25	2007	2011	5	25	2007	2011	5	O/O
PFOS	µg/kg	43BH	Tromsø havn	Troms	GADU MOR	LI	W								6.3	3.3	1.7	2.602	no	<=5	2009	2011	3	<=5	2009	2011	3	↓/↓
PFOS	µg/kg	53B	Inner Sørfjord	Hordaland	GADU MOR	LI	W				6.481	10	2	10	3.2	2.4	4.142	6.793	no	19	2005	2011	7	19	2005	2011	7	O/O
PFOS	µg/kg	80BH	Munkholmen	Sør-Trøndelag	GADU MOR	LI	W								4.3	3.1	4.25	4.481	no	11	2009	2011	3	11	2009	2011	3	O/O
PFOS	µg/kg	98B1	Bjørnerøya (east)	Nordland	GADU MOR	LI	W					3		2	6.8	16	5.1	4.738	no	20	2006	2011	5	20	2006	2011	5	O/O
ppDDE	µg/kg	10A2	Skallneset	Finnmark	MYTI EDU	SB	D	0.61	0.576	0.267	0.474	0.588	0.318	0.412	0.353	0.882	0.444	0.001	no	15	1996	2011	15	14	2002	2011	10	O/O
ppDDE	µg/kg	10B	Varangerfjorden	Finnmark	GADU MOR	LI	W	54	51.478	50	37	34	35	30	51	30	37	16.894	no	12	1994	2011	18	9	2002	2011	10	↓/O
ppDDE	µg/kg	10B	Varangerfjorden	Finnmark	GADU MOR	MU	W	0.23	0.18	0.41	0.17	0.175	0.26	0.19	0.27	0.11	0.17	0.042	no	16	1994	2011	18	13	2002	2011	10	O/O
ppDDE	µg/kg	10F	Skogerøy	Finnmark	PLEU PLA	LI	W	19	4.743	5.791	10		3.9	5.02	3.7	1.849	3.421	3.323	no	16	1997	2011	13	16	2002	2011	9	↓/O
ppDDE	µg/kg	10F	Skogerøy	Finnmark	PLEU PLA	MU	W	0.4	0.134	0.067	0.18		0.2	0.139	0.11	0.1	0.133	0.099	no	16	1997	2011	13	16	2002	2011	9	↓/O
ppDDE	µg/kg	11X	Brashavn	Finnmark	MYTI EDU	SB	D	0.472	0.465	0.317	0.524	0.389	0.286	1.167	0.45	0.45	0.476	0.004	no	13	1997	2011	15	14	2002	2011	10	O/O
ppDDE	µg/kg	13BH	Kristiansand havn	Aust-Agder	GADU MOR	LI	W								58	21	54	21.704	no	21	2009	2011	3	21	2009	2011	3	O/O

Parameter	Unit	St. Code	Station Name	County	Species	Tissue	Basis	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	SD	OC	Power (long)	First Yr. (long)	Last Yr. (long)	No Yrs (long)	Power (short)	First Yr. (short)	Last Yr. (short)	No Yrs (short)	Trend
ppDDE	µg/kg	13BH	Kristiansand havn	Aust-Agder	GADU MOR	MU	W								0.31	0.24	0.22	0.188	no	6	2009	2011	3	6	2009	2011	3	O/O
ppDDE	µg/kg	15A	Gåsøy (Ullerø)	Vest-Agder	MYTI EDU	SB	D	0.854	0.667	0.857	0.688	0.722	0.706	1.167	0.765	0.563	0.842	0.013	no	15	1993	2011	19	10	2002	2011	10	O/O
ppDDE	µg/kg	15B	Ullerø area	Vest-Agder	GADU MOR	LI	W	78	74	50	58	51	55	48	37	62	67	48.643	no	13	1990	2011	22	9	2002	2011	10	O/O
ppDDE	µg/kg	15B	Ullerø area	Vest-Agder	GADU MOR	MU	W	0.22	0.39	0.07	0.21	0.18	0.15	0.15	0.12	0.135	0.19	0.118	no	14	1990	2011	22	16	2002	2011	10	O/O
ppDDE	µg/kg	15F	Ullerø area	Vest-Agder	LIMA LIM	LI	W	15	17	23	26	15	16	22	16	11	14	6.787	no	14	1991	2011	19	10	2002	2011	10	O/O
ppDDE	µg/kg	15F	Ullerø area	Vest-Agder	LIMA LIM	MU	W	0.18	0.28	0.1	0.46	0.24	0.16	0.35	0.23	0.2	0.12	0.168	no	17	1991	2011	19	16	2002	2011	10	O/O
ppDDE	µg/kg	21F	Åkrafjord	Hordaland	LEPI WHI	LI	W		44	27.875	48	45	36	38	43	32.404	38	9.539	m	9	2003	2011	9	9	2003	2011	9	O/O
ppDDE	µg/kg	21F	Åkrafjord	Hordaland	LEPI WHI	MU	W		0.27	0.15	0.6	0.38	0.46	0.43	0.35	0.273	0.26	0.056	m	13	2003	2011	9	13	2003	2011	9	O/O
ppDDE	µg/kg	227A2	Høgevarde	Rogaland	MYTI EDU	SB	D								0.933	0.733	1.167	0.005	no	12	2009	2011	3	12	2009	2011	3	O/O
ppDDE	µg/kg	22A	Espevær (west)	Hordaland	MYTI EDU	SB	D	0.725	1.457	0.861	1.647	4.778	0.933	0.938	0.895	0.8	0.588	0.003	no	18	1992	2011	20	16	2002	2011	10	O/O
ppDDE	µg/kg	23B	Karihavet area	Hordaland	GADU MOR	LI	W	24	37	52	46	33	40	21.354	26	28	33	39.032	no	11	1990	2011	22	11	2002	2011	10	↓/O
ppDDE	µg/kg	23B	Karihavet area	Hordaland	GADU MOR	MU	W	0.1	0.13	0.08	0.17	0.29	0.15	0.07	0.09	0.18	0.18	0.066	no	17	1990	2011	22	15	2002	2011	10	O/O
ppDDE	µg/kg	30A	Gressholmen	Oslo	MYTI EDU	SB	D	1.973	2.075	1.217	2.563	1.769	3.294	3	2.111	1.6	1.867	0.005	no	12	1992	2011	20	12	2002	2011	10	↓/O
ppDDE	µg/kg	30B	Oslo City area	Akershus	GADU MOR	LI	W	180	240	210	260	190	130	180	150	200	160	156.607	no	14	1984	2011	28	9	2002	2011	10	↓/O
ppDDE	µg/kg	30B	Oslo City area	Akershus	GADU MOR	MU	W	0.73	0.7	0.66	0.73	0.65	0.58	0.82	1.1	0.88	0.77	0.198	no	16	1990	2011	22	8	2002	2011	10	O/O
ppDDE	µg/kg	31A	Solbergstrand	Akershus	MYTI EDU	SB	D	1.795	1.007	1.25	3.172	6.316	3.941	3.467	2.938	2.5	2	0.053	no	17	1992	2011	20	14	2002	2011	10	O/O
ppDDE	µg/kg	33F	Sande (east side)	Vestfold	PLAT FLE	LI	W	17	22	19	16	20	16	18	24	15	18	3.899	no	22	1983	2011	28	9	2002	2011	10	O/O
ppDDE	µg/kg	33F	Sande (east side)	Vestfold	PLAT FLE	MU	W	0.43	0.53	0.25	0.16	0.25	0.22	0.29	0.39	0.19	0.25	0.181	no	17	1983	2011	23	12	2002	2011	10	↓/O
ppDDE	µg/kg	35A	Mølen	Buskerud	MYTI EDU	SB	D	2.171	1.803	2.938	5.467	2.4	2.857	3.947	3.13	2.625	3	0.009	no	17	1992	2011	20	12	2002	2011	10	O/O
ppDDE	µg/kg	36A	Færder	Vestfold	MYTI EDU	SB	D	1.336	0.76	1.471	1.556	1.409	0.733	1.235			1.778	0.003	no	15	1992	2011	18	13	2002	2011	8	O/O
ppDDE	µg/kg	36B	Færder area	Vestfold	GADU MOR	LI	W	39	32	34	40	59	26	34	26	50	55	31.762	no	15	1982	2011	30	12	2002	2011	10	↓/O
ppDDE	µg/kg	36B	Færder area	Vestfold	GADU MOR	MU	W	0.22	0.21	0.26	0.41	0.38	0.08	0.22	0.221	0.29	0.34	0.149	no	17	1983	2011	23	16	2002	2011	10	↓/O
ppDDE	µg/kg	36F	Færder area	Vestfold	LIMA LIM	LI	W	31	36	17	21	35	19	22	18	14	24	25.12	no	13	1990	2011	22	12	2002	2011	10	O/O
ppDDE	µg/kg	36F	Færder area	Vestfold	LIMA LIM	MU	W	0.61	0.53	0.13	0.31	0.38	0.46	0.35	0.41	0.32	0.33	0.466	no	13	1990	2011	22	15	2002	2011	10	↓/O
ppDDE	µg/kg	43BH	Tromsø havn	Troms	GADU MOR	LI	W								33	31	29	16.299	no	<=5	2009	2011	3	<=5	2009	2011	3	↓/↓
ppDDE	µg/kg	43BH	Tromsø havn	Troms	GADU MOR	MU	W								0.14	0.09	0.12	0.115	no	12	2009	2011	3	12	2009	2011	3	O/O
ppDDE	µg/kg	51A	Byrkjenes	Hordaland	MYTI EDU	SB	D	9.524	10	10.49	14.737	7.5	11.667	13.333	12.857	7.538	12.308	0.02	1,23	15	1995	2011	17	11	2002	2011	10	O/O
ppDDE	µg/kg	52A	Eitrheimsneset	Hordaland	MYTI EDU	SB	D	6.818	8.861	10.526	12.5	4.706	12.222	12.667	6.111	5.056	14.444	0.07	1,44	14	1992	2011	20	16	2002	2011	10	O/O
ppDDE	µg/kg	53B	Inner Sørfjord	Hordaland	GADU MOR	LI	W	200	144.914	300	198.997	220	360	87	268.328	420	500	269.763	2,5	21	1988	2011	23	16	2002	2011	10	O/O
ppDDE	µg/kg	53B	Inner Sørfjord	Hordaland	GADU MOR	MU	W	1.786	2.4	1.9	4.2	0.63	1.9	1.8	1.296	2.1	1.1	0.691	1,1	25	1990	2011	21	17	2002	2011	10	O/O
ppDDE	µg/kg	53F	Inner Sørfjord	Hordaland	PLAT FLE	LI	W	42	40	29	45		51	30	9.439	19.183	21		no	16	1988	2011	22	15	2002	2011	9	↓/O
ppDDE	µg/kg	53F	Inner Sørfjord	Hordaland	PLAT FLE	MU	W	0.66	0.81	0.57	1.3		0.67	0.73	0.273	0.372	0.22		no	15	1990	2011	20	13	2002	2011	9	↓/↓
ppDDE	µg/kg	56A	Kvalnes	Hordaland	MYTI EDU	SB	D	40	55.147	49.342	550	185.714	116.667	180	44	62.5	50.667	0.173	5,07	18	1992	2011	20	19	2002	2011	10	O/O
ppDDE	µg/kg	57A	Krossanes	Hordaland	MYTI EDU	SB	D	14.721	27.815	16.588	53.333	12.143	23.043	26.667	25.5	10	30	0.265	3	16	1992	2011	20	17	2002	2011	10	O/O
ppDDE	µg/kg	63A	Ranaskjær	Hordaland	MYTI EDU	SB	D	4.762	11.268	3.824	14	5.667	13.571	12.105	7.5	3.2	13.684	0.096	1,37	16	1992	2011	20	19	2002	2011	10	O/O
ppDDE	µg/kg	65A	Vikingneset	Hordaland	MYTI EDU	SB	D	3.608	6.471	2.551	8.333	3.625	6.667	7	5.5	1.647	8.571	0.099	no	16	1992	2011	20	18	2002	2011	10	O/O
ppDDE	µg/kg	67B	Strandebarm area	Hordaland	GADU MOR	LI	W	110	89	74	110	34	130	96.488	100	283.725	209.762	14.142	1,05	18	1988	2011	24	15	2002	2011	10	↓/O
ppDDE	µg/kg	67B	Strandebarm area	Hordaland	GADU MOR	MU	W	0.44	0.24	0.31	0.66	0.12	0.34	0.554	0.47	1.1	0.465	0.021	no	21	1990	2011	22	18	2002	2011	10	↓/O
ppDDE	µg/kg	67F	Strandebarm area	Hordaland	LEPI WHI	LI	W	64	73	71.134	55	61.579	48	61	46	65	50.823	15.556	m	10	1988	2011	24	8	2002	2011	10	↓/O
ppDDE	µg/kg	67F	Strandebarm area	Hordaland	LEPI WHI	MU	W	0.39	0.59	0.483	0.57	0.37	0.28	0.76	0.66	0.33	1.049	0.071	m	16	1990	2011	22	15	2002	2011	10	↓/O
ppDDE	µg/kg	67F	Strandebarm area	Hordaland	PLAT FLE	LI	W	24	20	21	22	26	26	33	19		20	3.215	no	12	1996	2011	14	9	2002	2011	9	O/O
ppDDE	µg/kg	67F	Strandebarm area	Hordaland	PLAT FLE	MU	W	0.63	0.68	0.11	0.33	0.26	0.7	1	0.87		1.2	0.058	no	16	1996	2011	14	18	2002	2011	9	↓/O
ppDDE	µg/kg	69A	Lille Terøy	Hordaland	MYTI EDU	SB	D	1.606	2.618	0.909	3	0.85	3.294	0.778	2.118	1.063	2.783	0.042	no	20	1992	2011	20	19	2002	2011	10	O/O
ppDDE	µg/kg	71A	Bjørkøya (Risøyodden)		MYTI EDU	SB	D	1.104	1.667	0.763	1.8	2.167	1.8	1.556	1.714	1.533	3.2	0.01	no	14	1992	2011	20	13	2002	2011	10	O/O
ppDDE	µg/kg	76A	Risøy	Aust-Agder	MYTI EDU	SB	D	0.746	0.621	1.104	0.611	1.375	0.588	0.824	0.733	0.931	1.15	0.002	no	15	1992	2011	18	12	2002	2011	10	O/O
ppDDE	µg/kg	80BH	Munkholmen	Sør-Trøndelag	GADU MOR	LI	W								60	36.332	94	110.957	no	18	2009	2011	3	18	2009	2011	3	O/O
ppDDE	µg/kg	80BH	Munkholmen	Sør-Trøndelag	GADU MOR	MU	W								0.209	0.15	0.28	0.083	no	14	2009	2011	3	14	2009	2011	3	O/O
ppDDE	µg/kg	98A2	Husvaagen area	Nordland	MYTI EDU	SB	D	0.625	0.725	0.415	0.778	0.867	0.5	0.438	0.611	0.588	0.588	0.002	no	12	1997	2011	14	11	2002	2011	10	O/O
ppDDE	µg/kg	98B1	Bjørnerøya (east)	Nordland	GADU MOR	LI	W	29	64	73	22	37	52.23	17	5.6	18	25	23.177	no	18	1992	2011	18	20	2002	2011	10	↓/O
ppDDE	µg/kg	98B1	Bjørnerøya (east)	Nordland	GADU MOR	MU	W	0.09	0.12	0.21	0.14	0.09	0.148	0.05	0.05	0.08	0.1	0.044	no	19	1992	2011	18	14	2002	2011	10	O/O
ppDDE	µg/kg	98F2	Husholmen	Nordland	PLEU PLA	LI	W	5.096	3.6	2.8	9.192	4.6	1.7	1.2	1.2	1.8	0.05	0.004	no	22	2000	2011	12	23	2002	2011	10	↓/↓
ppDDE	µg/kg	98F2	Husholmen	Nordland	PLEU PLA	MU	W	0.135	0.09	0.05	0.434	0.34	0.08	0.05	0.05	0.11	0.05	0	no	21	2000	2011	12	21	2002	2011	10	O/O
ppDDE	µg/kg	I023	Singlekalven (south)	Østfold	MYTI EDU	SB	D	3.305	1.417	1.29	1.473	1.455	0.923	1	1.769	1.813	1.909	0.005	no	13	1995	2011	17	11	2002	2011	10	↓/O
ppDDE	µg/kg	I131A	Lastad	Vest-Agder	MYTI EDU	SB	D	1.111	0.942	1.367	2.394	0.846	0.733	2.071	1.462	0.75	1.105	0.007	no	15	1995	2011	17	16	2002	2011	10	O/O
ppDDE	µg/kg	I132	Svensholmen	Vest-Agder	MYTI EDU	SB	D	1.26	1.172	0.917	1.833	1.133	0.5	0.548	1.867	1.143	1.231	0.001	no	14	1998	2011	14	15	2002	2011	10	O/O
ppDDE	µg/kg	I133	Odderøy	Vest-Agder	MYTI EDU	SB	D	1.025	0.925	0.94	1.545	1.354	0.643	0.692	2	0.692	1.429	0.007	no	14	1995	2011	17	15	2002	2011	10	O/O
ppDDE	µg/kg	I241	Nordnes	Hordaland	MYTI EDU	SB	D	4.4	4.371	5.489	6.167	3	3.882	11.875	5.556	3.647	3.4	0.009	no	15	1995	2011	17	15	2002	2011	10	O/O
ppDDE	µg/kg	I243	Hegreneset	Hordaland	MYTI EDU	SB	D	3.316	3.882	6.412	19.54	5.882	4.412	6.231	3.158	3.2	4.1	0.005	no	16	1995	2011	17	15	2002	2011	10	O/O
ppDDE	µg/kg	I301	Akershuskaia	Oslo	MYTI EDU	SB	D	5.063	3.537	4.474	5.172	3.571	4.056	6.533	3	2.824	3.769	0.008	no	14	1992	2011	18	11	2002	2011	10	O/O
ppDDE	µg/kg	I304	Gåsøya	Akershus	MYTI EDU	SB	D	2.615	1.731	2.713	1.429	1.846	3.167	3.067	1.929	1.615	3.5	0.006	no	15	1995	2011	16	13	2002	2011	10	O/O
ppDDE	µg/kg	I306	Håøya	Akershus	MYTI EDU	SB	D	1.923	1.119	1.736	1.091	2.467	1.857	2.462	1.714	1.643	3.077	0.002	no	17	1995	2011	16	12	2002	2011	10	O/O
ppDDE	µg/kg	I307	Ramtonholmen	Buskerud	MYTI EDU	SB	D	2.281	1.095	1.345	0.873	2.5	2.313	2.071	2.313	1.714	2.545	0.003	no	14	1995	2011	16	13	2002	2011	10	O/O
ppDDE	µg/kg	I712	Croftholmen	Telemark	MYTI EDU	SB	D	1.603	2.653	2.936	1.36	2.364	1.75	2.385	1.05	2.021	4.692	0.015	no	14	1995	2011	17	15	2002	2011	10	O/O

Parameter	Unit	St. Code	Station Name	County	Species	Tissue	Basis	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	SD	OC	Power (long)	First Yr. (long)	Last Yr. (long)	No Yrs (long)	Power (short)	First Yr. (short)	Last Yr. (short)	No Yrs (short)	Trend
ppDDE	µg/kg	I713	Strømtangen	Telemark	MYTI EDU	SB	D	1.609	2.262	2.957	0.676	2.192	2.167	1.692	1.615	2.875	4.429	0.01	no	16	2002	2011	10	16	2002	2011	10	O/O
PYR1O	µg/kg/ABS 380 nm	15B	Ullerø area	Vest-Agder	GADU MOR	BI	W	6.324	5.658	16.66	1.097	2.606	1.138	1.702	2.694	2.071	0.83	0.805	no	21	1998	2011	13	21	2002	2011	10	↓/O
PYR1O	µg/kg/ABS 380 nm	23B	Karihavet area	Hordaland	GADU MOR	BI	W	3.104	5.319	1.62	3.464	1.341	1.72	1.669	1.017	1.594	1.386	2.724	no	14	1998	2011	14	14	2002	2011	10	↓/O
PYR1O	µg/kg/ABS 380 nm	30B	Oslo City area	Akershus	GADU MOR	BI	W	29.216	20.28	43.471	15.12	13.941	4.952	17.13	15.55	20.31	16.72	6.235	no	18	1998	2011	14	16	2002	2011	10	↓/O
PYR1O	µg/kg/ABS 380 nm	53B	Inner Sørfjord	Hordaland	GADU MOR	BI	W	18.832	3.648	3.391	3.04	2.18	4.842	3.19	10.894	7.961	7.53	3.159	no	19	1998	2011	14	16	2002	2011	10	↓/O
TBT	mg/kg	11G	Brashavn	Finnmark	NUCE LAP	SB	W	0.005	0.01	0.004	0.006	0.003	0.004	0.001	0.001	0	0		m	18	2002	2011	10	18	2002	2011	10	↓/↓
TBT	mg/kg	11X	Brashavn	Finnmark	MYTI EDU	SB	D	0.035	0.02	0.004	0.002	0.003	0.002	0.003	0.003	0.001	0.001	0.002	no	16	2002	2011	10	16	2002	2011	10	↓/↓
TBT	mg/kg	131G	Lastad	Vest-Agder	NUCE LAP	SB	W	0.02	0.027	0.016	0.007		0.002	0.007	0.002	0.001	0		m	19	2001	2011	10	19	2002	2011	9	↓/↓
TBT	mg/kg	15A	Gåsøy (Ullerø)	Vest-Agder	MYTI EDU	SB	D	0.081	0.062	0.018	0.018	0.008	0.014	0.009	0.007	0.01	0.005	0.014	no	13	2001	2011	11	13	2002	2011	10	↓/↓
TBT	mg/kg	15G	Gåsøy (Ullerø)	Vest-Agder	NUCE LAP	SB	W	0.028	0.024	0.01	0.007	0.003	0.003	0.005	0.002	0.001	0		m	17	2001	2011	11	17	2002	2011	10	↓/↓
TBT	mg/kg	227A2	Høgevarde	Rogaland	MYTI EDU	SB	D	0.672	0.709	0.314	0.277	0.134	0.193	0.135	0.106	0.107	0.074	0.18	no	13	1998	2011	14	10	2002	2011	10	↓/↓
TBT	mg/kg	227G1	Melandholmen	Rogaland	NUCE LAP	SB	W	0.181	0.366	0.097	0.079	0.026	0.048	0.067	0.012	0.011	0.004		m	20	1997	2011	15	18	2002	2011	10	↓/↓
TBT	mg/kg	22A	Espevær (west)	Hordaland	MYTI EDU	SB	D	0.138	0.587	0.291	0.249	0.1	0.297	0.103	0.053	0.012	0.019	0.025	no	19	2001	2011	11	19	2002	2011	10	↓/↓
TBT	mg/kg	22G	Espevær (west)	Hordaland	NUCE LAP	SB	W	0.039	0.12	0.069	0.043	0.009	0.022	0.022	0.004	0.002	0.001		m	20	2001	2011	11	20	2002	2011	10	↓/↓
TBT	mg/kg	30A	Gressholmen	Oslo	MYTI EDU	SB	D	1.807	1.082	0.723	0.282	0.36	0.543	0.455	0.187	0.181	0.114	0.353	1,14	14	1997	2011	15	13	2002	2011	10	↓/↓
TBT	mg/kg	35A	Mølen	Buskerud	MYTI EDU	SB	D							0.1	0.033	0.037	0.035		no	14	2008	2011	4	14	2008	2011	4	O/O
TBT	mg/kg	36A	Færder	Vestfold	MYTI EDU	SB	D	0.079	0.103	0.06	0.022	0.017	0.028	0.026			0.009	0.052	no	18	1997	2011	13	14	2002	2011	8	↓/↓
TBT	mg/kg	36G	Færder	Vestfold	NUCE LAP	SB	W	0.051	0.034	0.014	0.011	0.003	0.009	0.011	0.004	0.003	0.001		m	17	1997	2011	15	17	2002	2011	10	↓/↓
TBT	mg/kg	71A	Bjørkøya (Risøyodden)		MYTI EDU	SB	D	0.702	0.375	0.119	0.136	0.057	0.093	0.077	0.039	0.029	0.02	0.121	no	13	1997	2011	12	13	2002	2011	10	↓/↓
TBT	mg/kg	71G	Fugløyskjær	Vestfold	LITT LIT	SB	W							0.005	0.007	0.003	0.001		m	16	2008	2011	4	16	2008	2011	4	O/O
TBT	mg/kg	76A	Risøy	Aust-Agder	MYTI EDU	SB	D	0.092	0.106	0.034	0.032	0.021	0.014	0.03	0.02	0.009	0.007	0.04	no	14	1997	2011	12	14	2002	2011	10	↓/↓
TBT	mg/kg	76G	Risøy	Aust-Agder	NUCE LAP	SB	W	0.063	0.039	0.022	0.014	0.006	0.01	0.004	0.003	0.004	0		m	22	2001	2011	11	20	2002	2011	10	↓/↓
TBT	mg/kg	98A2	Husvaagen area	Nordland	MYTI EDU	SB	D	0.105	0.114	0.047	0.025	0.017	0.027	0.015	0.021	0.016	0.009	0.048	no	13	2001	2011	11	12	2002	2011	10	↓/↓
TBT	mg/kg	98G	Svolvær området	Nordland	NUCE LAP	SB	W	0.022	0.022	0.017	0.013	0.005	0.008	0.006	0.001	0.002	0		m	20	2001	2011	11	19	2002	2011	10	↓/↓
TBT	mg/kg	I132	Svensholmen	Vest-Agder	MYTI EDU	SB	D	0.474		0.458	0.128	0.21	0.081	0.184	0.207	0.085	0.08	0.028	no	16	2002	2011	9	16	2002	2011	9	O/O
TBT	mg/kg	I133	Odderøy	Vest-Agder	MYTI EDU	SB	D		1	0.232	0.222	0.286	0.124	0.25	0.21	0.11	0.112	0.588	1,12	15	2003	2011	9	15	2003	2011	9	O/O
TBT	mg/kg	I301	Akershuskaia	Oslo	MYTI EDU	SB	D	2.593	2.106	2.827	2.937	1.265	1.417	0.561	0.364	0.175	0.019	3.559	no	16	2002	2011	10	16	2002	2011	10	↓/↓
TBT	mg/kg	I712	Croftholmen	Telemark	MYTI EDU	SB	D	1.2	0.912	0.3	0.268	0.219	0.18	0.204	0.148	0.097	0.149	0.325	1,49	11	2002	2011	10	11	2002	2011	10	↓/↓
TBT	mg/kg	I713	Strømtangen	Telemark	MYTI EDU	SB	D	1.366	0.668	0.22	0.213	0.13	0.08	0.069	0.085	0.027	0.041	0.187	no	13	2002	2011	10	13	2002	2011	10	↓/↓
TCDDN	ng/kg	30A	Gressholmen	Oslo	MYTI EDU	SB	W	0.086	0.104	0.112	0.165	0.114	0.143	0.107	0.106	0.096	0.078	0.011	no	8	1996	2011	11	8	2002	2011	10	↓/↓
TCDDN	ng/kg	71A	Bjørkøya (Risøyodden)		MYTI EDU	SB	W	2.345	2.354	2.004	2.552	2.764	2.198	4.622	3.054	3.761	3.006	0.317	15,03	10	1996	2011	11	10	2002	2011	10	↓/O
TCDDN	ng/kg	76A	Risøy	Aust-Agder	MYTI EDU	SB	W	0.029	0.075	0.103	0.119	0.107	0.095	0.119	0.081	0.101	0.155	0.013	no	12	2002	2011	10	12	2002	2011	10	↑/↑
TCDDN	ng/kg	I132	Svensholmen	Vest-Agder	MYTI EDU	SB	W	0.251	0.473	0.171	1.48	0.3	0.373	0.593	0.425	0.327	0.194	0.025	no	19	2002	2011	10	19	2002	2011	10	O/O
TCDDN	ng/kg	I133	Odderøy	Vest-Agder	MYTI EDU	SB	W	0.262	0.139	0.367	0.246	0.227	0.199	0.178	0.635	0.991	0.26	0.031	1,3	18	1995	2011	12	18	2002	2011	10	O/O
TCDDN	ng/kg	I712	Croftholmen	Telemark	MYTI EDU	SB	W	4.15	4.173	3.26	1.471	3.241	4.022	5.753	5.919	4.566	5.262	0.576	26,31	12	1996	2011	11	12	2002	2011	10	↓/O
TCDDN	ng/kg	I713	Strømtangen	Telemark	MYTI EDU	SB	W	3.585	4.158	2.775	4.596	1.389	6.141	3.605	3.849	4.547	4.175	0.387	20,88	15	2002	2011	10	15	2002	2011	10	O/O
V	mg/kg	35A	Mølen	Buskerud	MYTI EDU	SB	D	0.457	10.82	0.656	0.555	2.135	6.35	1.211	2.596	7.375	1.846	0.006	m	>25	1996	2011	16	>25	2002	2011	10	O/O
VDSI		11G	Brashavn	Finnmark	NUCE LAP	WO	W	0.033	0	0.289	0	0	0.034	0	0	0	0		no	7	2002	2011	10	7	2002	2011	10	O/O
VDSI		131G	Lastad	Vest-Agder	NUCE LAP	WO	W	3.769	3.474	3.625	1.857	1.08	0.118	0	0	0	0.048		no	15	2001	2011	11	15	2002	2011	10	↓/↓
VDSI		15G	Gåsøy (Ullerø)	Vest-Agder	NUCE LAP	WO	W	3.857	3.419	3.435	1.276	0.125	0	0.129	0	0	0		no	17	2001	2011	11	17	2002	2011	10	↓/↓
VDSI		227G1	Melandholmen	Rogaland	NUCE LAP	WO	W	4.5	4.125	3.923	3.652	3.656	3.519	3.667	2.32	0.636	1.958		6,53	16	1991	2011	16	18	2002	2011	10	↓/↓
VDSI		22G	Espevær (west)	Hordaland	NUCE LAP	WO	W	4	3.95	4	4	2.964	2.412	1.412	1.577	0.125	0.519		1,73	14	2001	2011	11	14	2002	2011	10	↓/↓
VDSI		36G	Færder	Vestfold	NUCE LAP	WO	W	4	3.96	3.654	0.96	0.125	0.583	0.24	0.217	0	0		no	17	1991	2011	17	19	2002	2011	10	↓/↓
VDSI		76G	Risøy	Aust-Agder	NUCE LAP	WO	W	3.033	3.5	3.281	0.643	0.778	0.067	0.13	0	0	0		no	18	2001	2011	11	19	2002	2011	10	↓/↓
VDSI		98G	Svolvær området	Nordland	NUCE LAP	WO	W	3.76	3.8	4	3.433	2.966	2.955	1.882	3.031	1.12	0.65		2,17	16	2001	2011	11	17	2002	2011	10	↓/↓
Zn	mg/kg	10A2	Skallneset	Finnmark	MYTI EDU	SB	D	133.721	100	149.468	87.368	87.5	100	108.235	110.588	99.444	87.778	0.045	no	8	1996	2011	16	9	2002	2011	10	O/O
Zn	mg/kg	10B	Varangerfjorden	Finnmark	GADU MOR	LI	W	18.1	19.849	19.945	17.7	18.8	18.247	19.799	13.9	13	19.1	5.28	no	8	1994	2011	18	8	2002	2011	10	O/O
Zn	mg/kg	10F	Skogerøy	Finnmark	PLEU PLA	LI	W	33.1	38.15	37.538	38.6		42.05	30.145	38.6	40.498	42.14	4.313	no	8	1997	2011	13	7	2002	2011	9	O/O
Zn	mg/kg	11X	Brashavn	Finnmark	MYTI EDU	SB	D	89.623	72.444	78.212	80.5	85.556	59.474	85	73	60	67.222	0.514	no	9	1997	2011	15	8	2002	2011	10	O/O
Zn	mg/kg	13BH	Kristiansand havn	Aust-Agder	GADU MOR	LI	W								29.6	26	31.1	9.426	1,04	7	2009	2011	3	7	2009	2011	3	O/O
Zn	mg/kg	15A	Gåsøy (Ullerø)	Vest-Agder	MYTI EDU	SB	D	109.548	101.333	113.514	103.125	111.875	101.765	92.632	107.059	111.25	116.316	0.112	no	11	1990	2011	21	6	2002	2011	10	O/O
Zn	mg/kg	15B	Ullerø area	Vest-Agder	GADU MOR	LI	W	22.7	31.3	17.4	13.9	11.5	18.1	19.7	20.4	14.2	15.35	5.657	no	10	1990	2011	22	11	2002	2011	10	↓/O
Zn	mg/kg	15F	Ullerø area	Vest-Agder	LIMA LIM	LI	W	29.7	27.5	34.8	24.2	37.7	28.4	28.8	38.8	28.7	26.8	4.359	no	9	1991	2011	19	9	2002	2011	10	O/O
Zn	mg/kg	21F	Åkrafjord	Hordaland	LEPI WHI	LI	W		90.9	88.9	64.1	98.1	57.3	78	86.2	74.998	51.1	6.298	m	10	2003	2011	9	10	2003	2011	9	O/O
Zn	mg/kg	227A2	Høgevarde	Rogaland	MYTI EDU	SB	D								139.333	124.667	130	0.551	no	<=5	2009	2011	3	<=5	2009	2011	3	O/O
Zn	mg/kg	22A	Espevær (west)	Hordaland	MYTI EDU	SB	D	90.338	133.775	142.187	120.588	88.824	147.333	118	103.478	92.5	111.667	0.249	no	10	1990	2011	22	10	2002	2011	10	O/O
Zn	mg/kg	23B	Karihavet area	Hordaland	GADU MOR	LI	W	25.2	25.8	26.046	24.7	33.7	26.398	17.85	25.5	25.897	26.1	11.177	no	8	1990	2011	22	9	2002	2011	10	O/O
Zn	mg/kg	30A	Gressholmen	Oslo	MYTI EDU	SB	D	115.646	122.581	141.429	117.5	124.667	105.882	134.375	116.667	120.667	114	0.129	no	9	1984	2011	28	6	2002	2011	10	O/O
Zn	mg/kg	30B	Oslo City area	Akershus	GADU MOR	LI	W	28.8	25.1	20.9	25.7	29.3	25	30.7	30.6	27.4	17.5	5.965	no	13	1986	2011	26	8	2002	2011	10	O/O
Zn	mg/kg	31A	Solbergstrand	Akershus	MYTI EDU	SB	D	92.949	126.846	128.058	115.862	108.333	100	103.75	110	124.39	126.25	0.449	no	10	1983	2011	29	7	2002	2011	10	O/O
Zn	mg/kg	33F	Sande (east side)	Vestfold	PLAT FLE	LI	W	40.8	44.9	41.6	37.7	41.1	39.1	47	45.2	46.6	46	3.581	no	8	1986	2011	26	<=5	2002	2011	10	↓/O
Zn	mg/kg	35A	Mølen	Buskerud	MYTI EDU	SB	D	84.571	106.186	130.625	117.5	80.5	83.5	92.632	80.435	120.625	120.909	0.529	no	9	1983	2011	29	9	2002	2011	10	↑/O
Zn	mg/kg	36A	Færder	Vestfold	MYTI EDU	SB	D	102.024	124.551	98.561	90.556	83.636	91.875	90.588			71.579	0.149	no	9	1983	2011	27	7	2002	2011	8	↑/O

Parameter	Unit	St. Code	Station Name	County	Species	Tissue	Basis	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	SD	OC	Power (long)	First Yr. (long)	Last Yr. (long)	No Yrs (long)	Power (short)	First Yr. (short)	Last Yr. (short)	No Yrs (short)	Trend
Zn	mg/kg	36B	Færder area	Vestfold	GADU MOR	LI	W	32.2	21.6	18.3	24.5	31.3	26.2	23.1	27.2	25.744	26.05	9.866	no	9	1986	2011	26	9	2002	2011	10	↓/O
Zn	mg/kg	36F	Færder area	Vestfold	LIMA LIM	LI	W	20.9	25	34.5	26.4	25	25.8	23.1	27.1	30.2	30.2	2.166	no	8	1990	2011	22	8	2002	2011	10	O/O
Zn	mg/kg	43BH	Tromsø havn	Troms	GADU MOR	LI	W								23.8	21.3	21.5	7.232	no	<=5	2009	2011	3	<=5	2009	2011	3	O/O
Zn	mg/kg	51A	Byrkjenes	Hordaland	MYTI EDU	SB	D								83.333	93.333	86.154	0.06	no	11	1987	2011	9	6	2009	2011	3	O/O
Zn	mg/kg	52A	Eitrheimsneset	Hordaland	MYTI EDU	SB	D	90.625	137.415	105.921	104.118	90.625	105.625	95	94.118	81.176	88.75	0.208	no	11	1989	2011	23	8	2002	2011	10	↓/O
Zn	mg/kg	53B	Inner Sørfjord	Hordaland	GADU MOR	LI	W	38.699	32.79	37.5	37.8	27.7	34.8	44.8	28.7	25	27.4	6.815	no	11	1986	2011	24	9	2002	2011	10	O/O
Zn	mg/kg	53F	Inner Sørfjord	Hordaland	PLAT FLE	LI	W	43.6	57.3	30.3	31		51	42.2	38.108	39	41.7		no	10	1988	2011	22	10	2002	2011	9	O/O
Zn	mg/kg	56A	Kvalnes	Hordaland	MYTI EDU	SB	D	145.963	151.128	178.289	170.833	140	99.286	125	101.333	106.667	99.231	0.112	no	12	1987	2011	25	8	2002	2011	10	↓/↓
Zn	mg/kg	57A	Krossanes	Hordaland	MYTI EDU	SB	D	108	98.817	84.36	112	105	63.75	78.889	67	92.143	104.615	0.43	no	11	1987	2011	25	9	2002	2011	10	↓/O
Zn	mg/kg	63A	Ranaskjær	Hordaland	MYTI EDU	SB	D	105.921	119.2	54.636	110	112.941	98.235	77.895	82.5	112	72	0.065	no	12	1987	2011	25	12	2002	2011	10	↓/O
Zn	mg/kg	65A	Vikingneset	Hordaland	MYTI EDU	SB	D	145.361	151.176	69.643	139.444	147.333	94.762	128	92.857	119.286	101.429	0.244	no	11	1987	2011	25	11	2002	2011	10	↓/O
Zn	mg/kg	67B	Strandebarm area	Hordaland	GADU MOR	LI	W	23.5	16.5	21.6	19.9	12.9	19.6	20.3	21.319	22.499	17.599	0.283	no	10	1987	2011	25	9	2002	2011	10	O/O
Zn	mg/kg	67F	Strandebarm area	Hordaland	LEPI WHI	LI	W	81.9	98.1	72.513	70.3	61.002	63.3	44.3	38.6	93.4	68.516	3.041	m	10	1987	2011	25	11	2002	2011	10	O/O
Zn	mg/kg	67F	Strandebarm area	Hordaland	PLAT FLE	LI	W	44.3	43	48.5	44	47.8	42.9	52	43.8		48	2.173	no	8	1996	2011	14	6	2002	2011	9	O/O
Zn	mg/kg	69A	Lille Terøy	Hordaland	MYTI EDU	SB	D	135.859	177.473	83.951	122.632	92.5	105.882	113.684	98	108.125	95.652	0.236	no	9	1992	2011	20	9	2002	2011	10	↓/O
Zn	mg/kg	71A	Bjørkøya (Risøyodden)		MYTI EDU	SB	D	134.104	121.154	117.323	105	95.294	85.557	104.444	86.111	95	130	0.22	no	9	1983	2011	29	7	2002	2011	10	↓/↓
Zn	mg/kg	76A	Risøy	Aust-Agder	MYTI EDU	SB	D	122.951	126.875	128.188	107.059	92.632	120.588	115.882	114.118	103.923	88.5	0.234	no	9	1990	2011	20	7	2002	2011	10	O/O
Zn	mg/kg	80BH	Munkholmen	Sør-Trøndelag	GADU MOR	LI	W								23	18.64	24.6	9.055	no	9	2009	2011	3	9	2009	2011	3	O/O
Zn	mg/kg	98A2	Husvaagen area	Nordland	MYTI EDU	SB	D	84.459	86.957	87.981	91.667	81.667	97.857	108.235	92.632	105.294	108.235	0.063	no	6	1997	2011	14	6	2002	2011	10	O/O
Zn	mg/kg	98B1	Bjørnerøya (east)	Nordland	GADU MOR	LI	W	15	17	15.95	22.7	18.4	22.278	14.8	13	19	24.5	7.488	no	10	1992	2011	18	9	2002	2011	10	O/O
Zn	mg/kg	98F2	Husholmen	Nordland	PLEU PLA	LI	W	25.187	38.8	25.7	30.735	25.8	24.6	29.4	25.3	33	29.9	5.08	no	9	2000	2011	12	8	2002	2011	10	O/O
Zn	mg/kg	I023	Singlekalven (south)	Østfold	MYTI EDU	SB	D								105.385	124.286	188	0.147	no	11	1995	2011	6	7	2009	2011	3	O/O
Zn	mg/kg	I131A	Lastad	Vest-Agder	MYTI EDU	SB	D								123.846	95.333	100	0.609	no	7	1995	2011	6	7	2009	2011	3	O/O
Zn	mg/kg	I132	Svensholmen	Vest-Agder	MYTI EDU	SB	D								102.404	118.667	133.077	0.105	no	<=5	2009	2011	3	<=5	2009	2011	3	↑/↑
Zn	mg/kg	I133	Odderøy	Vest-Agder	MYTI EDU	SB	D								151.772	157.5	150	0.361	no	<=5	2009	2011	3	<=5	2009	2011	3	O/O
Zn	mg/kg	I201	Ekkjegrunn (G1)	Rogaland	MYTI EDU	SB	D								118.235	110	170	0.193	no	10	2009	2011	3	10	2009	2011	3	O/O
Zn	mg/kg	I205	Bølsnes (G5)	Rogaland	MYTI EDU	SB	D								106.667	106.667	110.588	0.883	no	<=5	2009	2011	3	<=5	2009	2011	3	O/O
Zn	mg/kg	I241	Nordnes	Hordaland	MYTI EDU	SB	D								134	131.053	100.5	0.786	no	8	1995	2011	6	7	2009	2011	3	↓/O
Zn	mg/kg	I243	Hegreneset	Hordaland	MYTI EDU	SB	D								130	174	132	0.591	no	8	1995	2011	6	10	2009	2011	3	O/O
Zn	mg/kg	I301	Akershuskaia	Oslo	MYTI EDU	SB	D								145	126.471	166.923	0.259	no	8	1992	2011	7	9	2009	2011	3	O/O
Zn	mg/kg	I304	Gåsøya	Akershus	MYTI EDU	SB	D								130	151.538	126.923	0.199	no	9	1995	2011	6	8	2009	2011	3	O/O
Zn	mg/kg	I306	Håøya	Akershus	MYTI EDU	SB	D								94.667	98.571	120.769	0.248	no	8	1995	2011	6	6	2009	2011	3	O/O
Zn	mg/kg	I307	Ramtonholmen	Buskerud	MYTI EDU	SB	D								95.882	108.571	128.182	0.133	no	7	1995	2011	6	<=5	2009	2011	3	O/O
Zn	mg/kg	I712	Croftholmen	Telemark	MYTI EDU	SB	D								118.311	136.17	108.571	0.171	no	8	2009	2011	3	8	2009	2011	3	O/O
Zn	mg/kg	I713	Strømtangen	Telemark	MYTI EDU	SB	D								96.154	86.25	107.5	0.234	no	8	2009	2011	3	8	2009	2011	3	O/O
Zn	mg/kg	I964	Toraneskaien	Nordland	MYTI EDU	SB	D				346.465	243	309	358.571	233.075	234.375	293.846	1.028	1,47	9	2005	2011	7	9	2005	2011	7	O/O
Zn	mg/kg	I965	Moholmen (B5)	Nordland	MYTI EDU	SB	D				200	237.143	240	303.998	377.701	317.323	252.857	0.454	1,26	8	2005	2011	7	8	2005	2011	7	O/O
Zn	mg/kg	I969	Bjørnbærviken (B9)	Nordland	MYTI EDU	SB	D				111.875	112.632	133.684	131.333	90.857	76.389	86.19	0.043	no	8	1995	2011	10	8	2005	2011	7	O/O
Selelected analyses on a wet weight basis																												
B[a]P	µg/kg	30A	Gressholmen	Oslo	MYTI EDU	SB	W	0.5	0.5	0.51	0.5	0.91	0.5	0.5	0.5	0.5	0.5	0	no	8	1992	2011	17	9	2002	2011	10	O/O
B[a]P	µg/kg	35A	Mølen	Buskerud	MYTI EDU	SB	W							0.96	0.5	0.5	0.5		no	11	2008	2011	4	11	2008	2011	4	O/O
B[a]P	µg/kg	I131A	Lastad	Vest-Agder	MYTI EDU	SB	W	0.5	0.5	1.2	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0	no	11	1995	2011	17	12	2002	2011	10	O/O
B[a]P	µg/kg	I132	Svensholmen	Vest-Agder	MYTI EDU	SB	W	6.497	13	5.5	18	8.5	12	15	3.7	2.6	1.8	0.2	1,8	23	1998	2011	14	16	2002	2011	10	O/↓
B[a]P	µg/kg	I133	Odderøy	Vest-Agder	MYTI EDU	SB	W	2.993	4.648	15	7.4	4.8	2.9	16	13	0.84	3.9	0.751	3,9	23	1995	2011	16	24	2002	2011	10	O/O
B[a]P	µg/kg	I201	Ekkjegrunn (G1)	Rogaland	MYTI EDU	SB	W	21	1.2	0.61	1	0.71	0.77	0.8	0.83	0.53	1.1	0.166	1,1	25	1995	2011	17	21	2002	2011	10	↓/O
B[a]P	µg/kg	I205	Bølsnes (G5)	Rogaland	MYTI EDU	SB	W	3.3	0.5	6.8	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0	no	23	1995	2011	16	23	2002	2011	10	O/O
B[a]P	µg/kg	I301	Akershuskaia	Oslo	MYTI EDU	SB	W	0.5	0.5	4	0.5	5.9	2.5	1.8	0.54	2.2	1.9	0.265	1,9	22	1992	2011	18	24	2002	2011	10	O/O
B[a]P	µg/kg	I304	Gåsøya	Akershus	MYTI EDU	SB	W	0.5	0.5	0.64	0.5	0.5	0.5	0.5	0.5	0.78	0.5	0	no	7	1995	2011	17	9	2002	2011	10	O/O
B[a]P	µg/kg	I306	Håøya	Akershus	MYTI EDU	SB	W	0.5	0.5	0.58	0.5	0.5	0.5	0.5	0.5	0.61	0.5	0	no	<=5	1995	2011	17	6	2002	2011	10	O/O
B[a]P	µg/kg	I307	Ramtonholmen	Buskerud	MYTI EDU	SB	W	0.5	0.5	0.6	0.5	0.5	0.5	0.5	0.5	1	0.5	0	no	9	1995	2011	17	10	2002	2011	10	O/O
B[a]P	µg/kg	I912	Honnhammer	Møre og Romsdal	MYTI EDU	SB	W	3.2	0.5	0.2	0.5	0.5	0.52	1.3	0.5	0.5	0.86	0.375	no	23	1995	2011	17	20	2002	2011	10	O/O
B[a]P	µg/kg	I913	Fjøseid	Møre og Romsdal	MYTI EDU	SB	W	2	0.5	0.2	0.5	0.5	0.5	0.65	0.5	0.5	0.5	0	no	17	1999	2011	13	16	2002	2011	10	O/O
B[a]P	µg/kg	I964	Toraneskaien	Nordland	MYTI EDU	SB	W	4.1	44	44	6.1	21	22	16	41	7.9	12	1	12	24	2002	2011	10	24	2002	2011	10	O/O
B[a]P	µg/kg	I965	Moholmen (B5)	Nordland	MYTI EDU	SB	W	4	7.2	11	2.8	8.7	15	6.997	27	4.5	7.8	0.416	7,8	21	2001	2011	11	20	2002	2011	10	O/O
B[a]P	µg/kg	I969	Bjørnbærviken (B9)	Nordland	MYTI EDU	SB	W	0.7	7.8	6.5	1.2	4.6	4.3	3.5	2.6	1.8	1.2	0.058	1,2	19	1995	2011	17	22	2002	2011	10	O/O
Cd	mg/kg	10A2	Skallneset	Finnmark	MYTI EDU	SB	W	0.234	0.361	0.298	0.213	0.294	0.494	0.352	0.264	0.332	0.341	0.037	no	12	1996	2011	16	11	2002	2011	10	O/O
Cd	mg/kg	11X	Brashavn	Finnmark	MYTI EDU	SB	W	0.288	0.293	0.163	0.206	0.168	0.224	0.2	0.214	0.233	0.193	0.014	no	10	1997	2011	15	9	2002	2011	10	O/O
Cd	mg/kg	15A	Gåsøy (Ullerø)	Vest-Agder	MYTI EDU	SB	W	0.261	0.112	0.137	0.128	0.173	0.116	0.12	0.142	0.195	0.212	0.04	no	14	1990	2011	21	11	2002	2011	10	O/O

Parameter	Unit	St. Code	Station Name	County	Species	Tissue	Basis	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	SD	OC	Power (long)	First Yr. (long)	Last Yr. (long)	No Yrs (long)	Power (short)	First Yr. (short)	Last Yr. (short)	No Yrs (short)	Trend
Cd	mg/kg	227A2	Høgevarde	Rogaland	MYTI EDU	SB	W								0.128	0.163	0.132	0.014	no	9	2009	2011	3	9	2009	2011	3	O/O
Cd	mg/kg	22A	Espevær (west)	Hordaland	MYTI EDU	SB	W	0.202	0.157	0.162	0.155	0.152	0.194	0.163	0.201	0.142	0.15	0.005	no	11	1990	2011	22	7	2002	2011	10	↓/O
Cd	mg/kg	30A	Gressholmen	Oslo	MYTI EDU	SB	W	0.242	0.231	0.266	0.269	0.227	0.242	0.284	0.217	0.273	0.305	0.044	no	9	1984	2011	28	7	2002	2011	10	↑/O
Cd	mg/kg	31A	Solbergstrand	Akershus	MYTI EDU	SB	W	0.166	0.203	0.188	0.189	0.217	0.195	0.182	0.182	0.177	0.249	0.058	no	11	1981	2011	30	7	2002	2011	10	↑/O
Cd	mg/kg	35A	Mølen	Buskerud	MYTI EDU	SB	W	0.203	0.216	0.196	0.202	0.172	0.171	0.191	0.167	0.158	0.208	0.026	no	9	1981	2011	31	6	2002	2011	10	↓/O
Cd	mg/kg	36A	Færder	Vestfold	MYTI EDU	SB	W	0.248	0.147	0.13	0.153	0.129	0.095	0.123			0.112	0.003	no	13	1981	2011	28	9	2002	2011	8	↓/O
Cd	mg/kg	51A	Byrkjenes	Hordaland	MYTI EDU	SB	W	2.09	1.87	0.771	1.23	0.376	0.411	0.426	0.315	0.443	0.949	0.082	2,37	16	1987	2011	19	14	2002	2011	10	↓/↓
Cd	mg/kg	52A	Eitrheimsneset	Hordaland	MYTI EDU	SB	W	1.1	1.1	0.848	1.15	0.46	0.794	0.311	0.427	0.649	0.373	0.073	no	16	1989	2011	23	13	2002	2011	10	↓/O
Cd	mg/kg	56A	Kvalnes	Hordaland	MYTI EDU	SB	W	2.23	1.51	0.946	1.44	1.26	0.933	0.885	0.734	0.791	0.982	0.275	2,45	12	1987	2011	25	10	2002	2011	10	↓/↓
Cd	mg/kg	57A	Krossanes	Hordaland	MYTI EDU	SB	W	1.37	1.08	0.659	1	0.869	0.538	0.437	0.33	0.386	0.398	0.156	no	11	1987	2011	25	10	2002	2011	10	↓/↓
Cd	mg/kg	63A	Ranaskjær	Hordaland	MYTI EDU	SB	W	0.865	0.733	0.392	0.6	0.597	0.497	0.343	0.326	0.389	0.259	0.044	no	13	1987	2011	25	10	2002	2011	10	↓/↓
Cd	mg/kg	65A	Vikingneset	Hordaland	MYTI EDU	SB	W	0.766	0.578	0.512	0.616	0.636	0.392	0.293	0.286	0.328	0.209	0.097	no	12	1987	2011	25	9	2002	2011	10	↓/↓
Cd	mg/kg	69A	Lille Terøy	Hordaland	MYTI EDU	SB	W	0.478	0.43	0.384	0.356	0.302	0.248	0.227	0.192	0.263	0.218	0.03	no	10	1992	2011	20	7	2002	2011	10	↓/↓
Cd	mg/kg	71A	Bjørkøya (Risøyodden)		MYTI EDU	SB	W	0.289	0.221	0.2	0.219	0.237	0.186	0.204	0.194	0.32	0.354	0.02	no	10	1982	2011	30	8	2002	2011	10	O/O
Cd	mg/kg	76A	Risøy	Aust-Agder	MYTI EDU	SB	W	0.248	0.175	0.15	0.141	0.138	0.167	0.162	0.171	0.253	0.141	0.013	no	9	1990	2011	20	9	2002	2011	10	↓/O
Cd	mg/kg	98A2	Husvaagen area	Nordland	MYTI EDU	SB	W	0.341	0.309	0.208	0.22	0.212	0.162	0.242	0.233	0.257	0.292	0.037	no	8	1997	2011	14	8	2002	2011	10	↓/↓
Cd	mg/kg	I023	Singlekalven (south)	Østfold	MYTI EDU	SB	W	0.186	0.188	0.126	0.179	0.233	0.15	0.167	0.137	0.275	0.177	0.011	no	10	1995	2011	17	11	2002	2011	10	O/O
Cd	mg/kg	I131A	Lastad	Vest-Agder	MYTI EDU	SB	W	0.2	0.119	0.186	0.137	0.115	0.111	0.15	0.175	0.143	0.245	0.018	no	11	1995	2011	17	10	2002	2011	10	↓/O
Cd	mg/kg	I132	Svensholmen	Vest-Agder	MYTI EDU	SB	W								0.183	0.167	0.193	0.025	no	7	2009	2011	3	7	2009	2011	3	O/O
Cd	mg/kg	I133	Odderøy	Vest-Agder	MYTI EDU	SB	W								0.214	0.203	0.213	0.025	no	<=5	2009	2011	3	<=5	2009	2011	3	O/O
Cd	mg/kg	I201	Ekkjegrunn (G1)	Rogaland	MYTI EDU	SB	W	0.314	0.12	0.154	0.171	0.21	0.173	0.236	0.153	0.107	0.132	0.014	no	10	1995	2011	17	12	2002	2011	10	O/O
Cd	mg/kg	I205	Bølsnes (G5)	Rogaland	MYTI EDU	SB	W	0.258	0.198	0.139	0.251	0.254	0.154	0.337	0.171	0.147	0.108	0.009	no	12	1995	2011	16	12	2002	2011	10	O/O
Cd	mg/kg	I241	Nordnes	Hordaland	MYTI EDU	SB	W								0.227	0.144	0.122	0.014	no	7	2009	2011	3	7	2009	2011	3	O/O
Cd	mg/kg	I243	Hegreneset	Hordaland	MYTI EDU	SB	W								0.224	0.171	0.112	0.008	no	<=5	2009	2011	3	<=5	2009	2011	3	O/O
Cd	mg/kg	I301	Akershuskaia	Oslo	MYTI EDU	SB	W	0.142	0.182	0.159	0.149	0.217	0.201	0.225	0.18	0.212	0.18	0.006	no	8	1992	2011	18	8	2002	2011	10	↑/O
Cd	mg/kg	I304	Gåsøya	Akershus	MYTI EDU	SB	W	0.169	0.224	0.14	0.153	0.176	0.16	0.177	0.162	0.179	0.192	0.014	no	9	1995	2011	17	8	2002	2011	10	O/O
Cd	mg/kg	I306	Håøya	Akershus	MYTI EDU	SB	W	0.131	0.183	0.124	0.122	0.125	0.097	0.151	0.109	0.14	0.152	0.01	no	9	1995	2011	17	9	2002	2011	10	O/O
Cd	mg/kg	I307	Ramtonholmen	Buskerud	MYTI EDU	SB	W	0.166	0.195	0.136	0.159	0.14	0.142	0.186	0.135	0.198	0.185	0.013	no	8	1995	2011	17	8	2002	2011	10	O/O
Cd	mg/kg	I712	Croftholmen	Telemark	MYTI EDU	SB	W								0.223	0.195	0.223	0.005	no	7	2009	2011	3	7	2009	2011	3	O/O
Cd	mg/kg	I713	Strømtangen	Telemark	MYTI EDU	SB	W								0.134	0.147	0.221	0.029	no	7	2009	2011	3	7	2009	2011	3	O/O
Cd	mg/kg	I964	Toraneskaien	Nordland	MYTI EDU	SB	W	0.173	0.101	0.155	0.221	0.229	0.194	0.185	0.166	0.218	0.187	0.022	no	10	2002	2011	10	10	2002	2011	10	O/O
Cd	mg/kg	I965	Moholmen (B5)	Nordland	MYTI EDU	SB	W	0.28	0.135	0.248	0.25	0.249	0.27	0.295	0.228	0.222	0.223	0.01	no	10	2001	2011	11	10	2002	2011	10	O/O
Cd	mg/kg	I969	Bjørnbærviken (B9)	Nordland	MYTI EDU	SB	W	0.152	0.088	0.108	0.19	0.082	0.087	0.079	0.098	0.124	0.133	0.005	no	12	1995	2011	17	12	2002	2011	10	O/O
Hg	mg/kg	10A2	Skallneset	Finnmark	MYTI EDU	SB	W	0.008	0.01	0.009	0.007	0.007	0.008	0.007	0.007	0.007	0.008	0.001	no	7	1996	2011	16	7	2002	2011	10	↓/O
Hg	mg/kg	11X	Brashavn	Finnmark	MYTI EDU	SB	W	0.008	0.008	0.007	0.009	0.007	0.008	0.008	0.009	0.007	0.008	0	no	9	1997	2011	15	7	2002	2011	10	O/O
Hg	mg/kg	15A	Gåsøy (Ullerø)	Vest-Agder	MYTI EDU	SB	W	0.009	0.009	0.014	0.012	0.011	0.007	0.01	0.013	0.013	0.015	0.001	no	13	1990	2011	21	10	2002	2011	10	O/O
Hg	mg/kg	227A2	Høgevarde	Rogaland	MYTI EDU	SB	W								0.03	0.029	0.03	0.002	no	<=5	2009	2011	3	<=5	2009	2011	3	O/O
Hg	mg/kg	22A	Espevær (west)	Hordaland	MYTI EDU	SB	W	0.01	0.019	0.022	0.02	0.019	0.02	0.019	0.014	0.012	0.014	0.001	no	10	1990	2011	22	9	2002	2011	10	↑/O
Hg	mg/kg	30A	Gressholmen	Oslo	MYTI EDU	SB	W	0.014	0.011	0.019	0.018	0.016	0.013	0.017	0.014	0.015	0.017	0.001	no	11	1984	2011	28	9	2002	2011	10	O/O
Hg	mg/kg	31A	Solbergstrand	Akershus	MYTI EDU	SB	W	0.009	0.009	0.013	0.016	0.036	0.027	0.013	0.015	0.017	0.016	0.002	no	12	1981	2011	30	12	2002	2011	10	↓/O
Hg	mg/kg	35A	Mølen	Buskerud	MYTI EDU	SB	W	0.01	0.012	0.015	0.018	0.009	0.009	0.012	0.013	0.011	0.014	0.002	no	12	1981	2011	31	10	2002	2011	10	↓/O
Hg	mg/kg	36A	Færder	Vestfold	MYTI EDU	SB	W	0.008	0.009	0.015	0.009	0.008	0.004	0.006			0.007	0	no	14	1981	2011	28	12	2002	2011	8	↓/O
Hg	mg/kg	51A	Byrkjenes	Hordaland	MYTI EDU	SB	W	0.183	0.182	0.045	0.054	0.037	0.035	0.037	0.036	0.052	0.063	0.006	1,57	18	1987	2011	19	12	2002	2011	10	↓/↓
Hg	mg/kg	52A	Eitrheimsneset	Hordaland	MYTI EDU	SB	W	0.06	0.029	0.036	0.027	0.023	0.04	0.02	0.022	0.027	0.021	0.002	no	16	1989	2011	23	11	2002	2011	10	↓/O
Hg	mg/kg	56A	Kvalnes	Hordaland	MYTI EDU	SB	W	0.097	0.047	0.036	0.045	0.048	0.05	0.048	0.047	0.045	0.054	0.016	1,35	12	1987	2011	25	10	2002	2011	10	↓/O
Hg	mg/kg	57A	Krossanes	Hordaland	MYTI EDU	SB	W	0.055	0.033	0.024	0.036	0.032	0.032	0.025	0.028	0.026	0.033	0.011	no	10	1987	2011	25	10	2002	2011	10	↓/O
Hg	mg/kg	63A	Ranaskjær	Hordaland	MYTI EDU	SB	W	0.044	0.029	0.021	0.027	0.028	0.031	0.022	0.024	0.028	0.026	0.004	no	11	1987	2011	25	9	2002	2011	10	↓/O
Hg	mg/kg	65A	Vikingneset	Hordaland	MYTI EDU	SB	W	0.027	0.023	0.025	0.024	0.025	0.024	0.018	0.022	0.023	0.018	0.005	no	10	1987	2011	25	7	2002	2011	10	O/O
Hg	mg/kg	69A	Lille Terøy	Hordaland	MYTI EDU	SB	W	0.021	0.018	0.019	0.017	0.015	0.016	0.015	0.018	0.016	0.015	0.001	no	12	1992	2011	20	6	2002	2011	10	O/↓
Hg	mg/kg	71A	Bjørkøya (Risøyodden)		MYTI EDU	SB	W	0.026	0.024	0.023	0.025	0.029	0.02	0.023	0.026	0.034	0.032	0.003	no	10	1982	2011	30	8	2002	2011	10	↓/O
Hg	mg/kg	76A	Risøy	Aust-Agder	MYTI EDU	SB	W	0.011	0.014	0.015	0.014	0.011	0.014	0.014	0.017	0.02	0.014	0.001	no	11	1990	2011	20	8	2002	2011	10	O/O
Hg	mg/kg	98A2	Husvaagen area	Nordland	MYTI EDU	SB	W	0.019	0.019	0.016	0.013	0.016	0.011	0.013	0.013	0.015	0.017	0.001	no	10	1997	2011	14	7	2002	2011	10	O/↓
Hg	mg/kg	I023	Singlekalven (south)	Østfold	MYTI EDU	SB	W	0.019	0.019	0.015	0.019	0.023	0.018	0.017	0.016	0.032	0.027	0.001	no	11	1995	2011	17	10	2002	2011	10	O/O
Hg	mg/kg	I131A	Lastad	Vest-Agder	MYTI EDU	SB	W	0.009	0.009	0.015	0.009	0.011	0.008	0.01	0.014	0.011	0.017	0.001	no	11	1995	2011	17	10	2002	2011	10	O/O
Hg	mg/kg	I132	Svensholmen	Vest-Agder	MYTI EDU	SB	W								0.021	0.021	0.029	0.002	no	8	2009	2011	3	8	2009	2011	3	O/O
Hg	mg/kg	I133	Odderøy	Vest-Agder	MYTI EDU	SB	W								0.02	0.023	0.029	0.003	no	<=5	2009	2011	3	<=5	2009	2011	3	O/O
Hg	mg/kg	I201	Ekkjegrunn (G1)	Rogaland	MYTI EDU	SB	W	0.035	0.016	0.021	0.034	0.032	0.035	0.037	0.022	0.015	0.018	0.002	no	11	1998	2011	14	12	2002	2011	10	O/O
Hg	mg/kg	I205	Bølsnes (G5)	Rogaland	MYTI EDU	SB	W	0.024	0.024	0.019	0.035	0.037	0.032	0.044	0.027	0.019	0.019	0.001	no	10	1998	2011	14	10	2002	2011	10	O/O
Hg	mg/kg	I241	Nordnes	Hordaland	MYTI EDU	SB	W								0.032	0.019	0.022	0.001	no	11	2009	2011	3	11	2009	2011	3	O/O
Hg	mg/kg	I243	Hegreneset	Hordaland	MYTI EDU	SB	W								0.023	0.02	0.016	0.001	no	<=5	2009	2011	3	<=5	2009	2011	3	O/O
Hg	mg/kg	I301	Akershuskaia	Oslo	MYTI EDU	SB	W	0.008	0.011	0.014	0.018	0.013	0.013	0.012	0.011	0.03	0.016	0.001	no	10	1992	2011	18	12	2002	2011	10	O/O
Hg	mg/kg	I304	Gåsøya	Akershus	MYTI EDU	SB	W	0.006	0.008	0.008	0.008	0.008	0.008	0.007	0.008	0.01	0.01	0	no	9	1995	2011	17	7	2002	2011	10	O/↑
Hg	mg/kg	I306	Håøya	Akershus	MYTI EDU	SB	W	0.006	0.007	0.009	0.008	0.008	0.007	0.009	0.008	0.011	0.011	0.001	no	8	1995	2011	17	7	2002	2011	10	↑/↑

Parameter	Unit	St. Code	Station Name	County	Species	Tissue	Basis	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	SD	OC	Power (long)	First Yr. (long)	Last Yr. (long)	No Yrs (long)	Power (short)	First Yr. (short)	Last Yr. (short)	No Yrs (short)	Trend
Hg	mg/kg	I307	Ramtonholmen	Buskerud	MYTI EDU	SB	W	0.006	0.008	0.01	0.012	0.007	0.007	0.01	0.008	0.012	0.011	0.001	no	11	1995	2011	17	10	2002	2011	10	O/O
Hg	mg/kg	I712	Croftholmen	Telemark	MYTI EDU	SB	W	0.026	0.021	0.021	0.023	0.024	0.026	0.031	0.029	0.033	0.034	0.002	no	<=5	1998	2011	14	6	2002	2011	10	↑/↑
Hg	mg/kg	I713	Strømtangen	Telemark	MYTI EDU	SB	W	0.015	0.022	0.018	0.015	0.012	0.021	0.024	0.017	0.019	0.029	0.001	no	11	2002	2011	10	11	2002	2011	10	O/O
Hg	mg/kg	I964	Toraneskaien	Nordland	MYTI EDU	SB	W	0.016	0.009	0.008	0.016	0.017	0.014	0.013	0.012	0.011	0.011	0.001	no	11	2002	2011	10	11	2002	2011	10	O/O
Hg	mg/kg	I965	Moholmen (B5)	Nordland	MYTI EDU	SB	W	0.026	0.015	0.021	0.018	0.015	0.016	0.015	0.011	0.01	0.013	0.001	no	9	2002	2011	10	9	2002	2011	10	↓/↓
Hg	mg/kg	I969	Bjørnbærviken (B9)	Nordland	MYTI EDU	SB	W	0.012	0.007	0.007	0.017	0.008	0.012	0.007	0.008	0.007	0.01	0.002	no	13	2002	2011	10	13	2002	2011	10	O/O
KPAH	µg/kg	30A	Gressholmen	Oslo	MYTI EDU	SB	W	1.7	2.56	5.67	1.84	6.76	3.1	2.3	2	3.88	3.3	0.64	m	16	1992	2011	17	16	2002	2011	10	O/O
KPAH	µg/kg	35A	Mølen	Buskerud	MYTI EDU	SB	W							3.7	1.25	1.25	1.25	0.204	m	14	2008	2011	4	14	2008	2011	4	O/O
KPAH	µg/kg	I131A	Lastad	Vest-Agder	MYTI EDU	SB	W	2.65	3.67	19	2.86	1.25	1.25	1.97	1.25	1.25	2.46	0.323	m	18	1995	2011	17	21	2002	2011	10	↓/O
KPAH	µg/kg	I132	Svensholmen	Vest-Agder	MYTI EDU	SB	W	102.466	182.9	58.3	97.6	56.9	60.7	74.993	24.32	18.67	14.55	3.165	m	19	1998	2011	14	14	2002	2011	10	↓/↓
KPAH	µg/kg	I133	Odderøy	Vest-Agder	MYTI EDU	SB	W	60.192	68.65	136.9	49.65	33.13	25.45	83.8	67.6	9.65	22.76	3.947	m	20	1995	2011	16	20	2002	2011	10	O/O
KPAH	µg/kg	I201	Ekkjegrunn (G1)	Rogaland	MYTI EDU	SB	W	47.6	31.4	18.11	25.35	17.83	17.85	11.78	8.55	5.74	11.25	2.544	m	21	1995	2011	17	12	2002	2011	10	↓/↓
KPAH	µg/kg	I205	Bølsnes (G5)	Rogaland	MYTI EDU	SB	W	164.8	15.4	113.9	10.9	7.43	6.76	4.83	4.21	2	2.87	0.344	m	22	1995	2011	16	21	2002	2011	10	↓/↓
KPAH	µg/kg	I301	Akershuskaia	Oslo	MYTI EDU	SB	W	6.2	6.2	35.8	5.89	39.3	18.95	11.15	5.02	14.55	13.75	2.593	m	20	1992	2011	18	21	2002	2011	10	O/O
KPAH	µg/kg	I304	Gåsøya	Akershus	MYTI EDU	SB	W	1.25	1.25	8.39	1.77	3.88	1.71	1.58	1.25	5.71	2.2	0.351	m	19	1995	2011	17	20	2002	2011	10	O/O
KPAH	µg/kg	I306	Håøya	Akershus	MYTI EDU	SB	W	1.8	1.25	6.75	1.51	2.74	1.51	1.55	1.25	4.56	1.86	0.246	m	18	1995	2011	17	19	2002	2011	10	O/O
KPAH	µg/kg	I307	Ramtonholmen	Buskerud	MYTI EDU	SB	W	3.25	1.25	8.54	1.71	2.69	1.64	1.59	1.25	7.25	1.95	0.309	m	19	1995	2011	17	21	2002	2011	10	O/O
KPAH	µg/kg	I912	Honnhammer	Møre og Romsdal	MYTI EDU	SB	W	62.8	3.37	1.54	1.25	1.25	4.72	4.85	1.61	1.25	3.54	0.415	m	24	1995	2011	17	24	2002	2011	10	↓/O
KPAH	µg/kg	I913	Fjøseid	Møre og Romsdal	MYTI EDU	SB	W	60.8	3.95	3.05	1.25	1.56	1.92	2.49	2	1.25	1.25	0.192	m	21	1999	2011	13	19	2002	2011	10	↓/↓
KPAH	µg/kg	I964	Toraneskaien	Nordland	MYTI EDU	SB	W	41.7	370.4	362.9	53.6	91.5	107.3	86.1	154.1	49.24	81.5	17.099	m	22	2002	2011	10	22	2002	2011	10	O/O
KPAH	µg/kg	I965	Moholmen (B5)	Nordland	MYTI EDU	SB	W	56	77.3	108	25.18	50	79.6	44.296	119.7	30.73	43.7	8.657	m	17	2001	2011	11	17	2002	2011	10	O/O
KPAH	µg/kg	I969	Bjørnbærviken (B9)	Nordland	MYTI EDU	SB	W	7.55	98.6	67.6	12.76	35.8	30.89	28.07	15.65	12.15	9.61	2.178	m	19	1995	2011	17	22	2002	2011	10	O/O
P_S	µg/kg	30A	Gressholmen	Oslo	MYTI EDU	SB	W	7.75	19.61	20.27	11.93	43.76	18.12	11.9	17.8	25.44	20.34	1.75	m	15	1992	2011	17	16	2002	2011	10	O/O
P_S	µg/kg	35A	Mølen	Buskerud	MYTI EDU	SB	W							18.6	8.42	9.12	7.64	0.488	m	11	2008	2011	4	11	2008	2011	4	O/O
P_S	µg/kg	I131A	Lastad	Vest-Agder	MYTI EDU	SB	W	16.25	18.42	51.75	15.46	10.89	9.09	14.84	6.47	7.39	16.43	1.174	m	15	1995	2011	17	17	2002	2011	10	↓/O
P_S	µg/kg	I132	Svensholmen	Vest-Agder	MYTI EDU	SB	W	229.023	297.74	115.07	336.39	248.82	204.95	215.675	77.01	60.16	45.46	3.17	m	17	1998	2011	14	14	2002	2011	10	↓/↓
P_S	µg/kg	I133	Odderøy	Vest-Agder	MYTI EDU	SB	W	141.187	126.672	287.73	154.85	125.14	85.02	444.15	190.75	40.86	92.71	6.938	m	18	1995	2011	16	20	2002	2011	10	O/O
P_S	µg/kg	I201	Ekkjegrunn (G1)	Rogaland	MYTI EDU	SB	W	164	96.18	61.45	69.03	45.48	42.99	29.8	23.33	13.04	47.3	3.378	m	20	1995	2011	17	14	2002	2011	10	↓/↓
P_S	µg/kg	I205	Bølsnes (G5)	Rogaland	MYTI EDU	SB	W	252.65	61.03	306.04	36.37	28.79	24.51	17.32	16.14	8.08	24.04	2.233	m	20	1995	2011	16	20	2002	2011	10	↓/↓
P_S	µg/kg	I301	Akershuskaia	Oslo	MYTI EDU	SB	W	47	35.35	119	36.9	241.6	110.45	84.55	46.26	76.95	74.71	6.663	m	18	1992	2011	18	18	2002	2011	10	O/O
P_S	µg/kg	I304	Gåsøya	Akershus	MYTI EDU	SB	W	6.95	10.78	25.76	6.11	25.05	11.69	9.55	7.75	26.25	18.55	1.722	m	18	1995	2011	17	18	2002	2011	10	O/O
P_S	µg/kg	I306	Håøya	Akershus	MYTI EDU	SB	W	18	6.56	19.17	6.37	24.76	7.21	6.49	6.09	22.36	13.01	1.052	m	18	1995	2011	17	19	2002	2011	10	O/O
P_S	µg/kg	I307	Ramtonholmen	Buskerud	MYTI EDU	SB	W	27.05	8.88	21.06	5.12	26.33	8.05	7.07	8.21	28.95	12.14	0.893	m	19	1995	2011	17	20	2002	2011	10	O/O
P_S	µg/kg	I912	Honnhammer	Møre og Romsdal	MYTI EDU	SB	W	313.9	19.82	6.05	4.46	5.77	43.11	22.23	11.11	9.44	15.97	1.075	m	22	1995	2011	17	25	2002	2011	10	↓/O
P_S	µg/kg	I913	Fjøseid	Møre og Romsdal	MYTI EDU	SB	W	288.7	17.27	14.42	8.49	13.62	13.71	10.19	13.22	6.4	7.9	0.583	m	20	1999	2011	13	20	2002	2011	10	↓/↓
P_S	µg/kg	I964	Toraneskaien	Nordland	MYTI EDU	SB	W	73.1	952.6	1333.69	103.92	259.26	295.69	215.5	363.25	163.04	236.93	17.978	m	25	2002	2011	10	25	2002	2011	10	O/O
P_S	µg/kg	I965	Moholmen (B5)	Nordland	MYTI EDU	SB	W	93.65	217.4	376.24	85.09	209.31	315.42	156.745	309.69	142.53	210	16.537	m	18	2001	2011	11	17	2002	2011	10	O/O
P_S	µg/kg	I969	Bjørnbærviken (B9)	Nordland	MYTI EDU	SB	W	25.9	367.1	302.53	46.76	125.44	149.7	104.17	118.47	130.92	72.9	7.15	m	20	1995	2011	17	23	2002	2011	10	O/O
Pb	mg/kg	10A2	Skallneset	Finnmark	MYTI EDU	SB	W	0.293	0.3	0.19	0.128	0.158	0.366	0.18	0.14	0.15	0.11	0.01	no	13	1996	2011	16	13	2002	2011	10	O/O
Pb	mg/kg	11X	Brashavn	Finnmark	MYTI EDU	SB	W	0.159	0.06	0.07	0.068	0.097	0.066	0.07	0.06	0.05	0.05	0	no	16	1997	2011	15	11	2002	2011	10	O/O
Pb	mg/kg	15A	Gåsøy (Ullerø)	Vest-Agder	MYTI EDU	SB	W	0.142	0.13	0.12	0.266	0.134	0.16	0.12	0.16	0.19	0.26	0.1	no	12	1990	2011	21	11	2002	2011	10	O/O
Pb	mg/kg	227A2	Høgevarde	Rogaland	MYTI EDU	SB	W								0.53	0.33	0.5	0.067	no	13	2009	2011	3	13	2009	2011	3	O/O
Pb	mg/kg	22A	Espevær (west)	Hordaland	MYTI EDU	SB	W	0.183	0.22	0.24	0.32	0.236	0.39	0.39	0.17	0.12	0.13	0.01	no	11	1990	2011	22	11	2002	2011	10	↓/↓
Pb	mg/kg	30A	Gressholmen	Oslo	MYTI EDU	SB	W	0.334	0.4	0.45	0.536	0.622	0.52	0.59	0.458	0.5	0.43	0.026	no	18	1985	2011	27	6	2002	2011	10	O/↑
Pb	mg/kg	31A	Solbergstrand	Akershus	MYTI EDU	SB	W	0.232	0.12	0.1	0.133	0.171	0.11	0.1	0.14	0.23	0.2	0.049	no	12	1983	2011	28	12	2002	2011	10	↓/O
Pb	mg/kg	35A	Mølen	Buskerud	MYTI EDU	SB	W	0.1	0.12	0.13	0.194	0.169	0.12	0.21	0.23	0.15	0.15	0.025	no	12	1983	2011	28	10	2002	2011	10	↓/O
Pb	mg/kg	36A	Færder	Vestfold	MYTI EDU	SB	W	0.108	0.1	0.13	0.104	0.123	0.17	0.08			0.1	0.006	no	9	1983	2011	26	11	2002	2011	8	↓/O
Pb	mg/kg	51A	Byrkjenes	Hordaland	MYTI EDU	SB	W	12.5	13.6	6.25	7.05	2.82	3.58	3.3	2.97	4.28	3.87	0.492	6,45	13	1987	2011	19	11	2002	2011	10	↓/↓
Pb	mg/kg	52A	Eitrheimsneset	Hordaland	MYTI EDU	SB	W	4.89	2.52	2.48	1.46	1.35	2.53	1.38	0.99	1.53	0.92	0.276	1,53	18	1989	2011	23	12	2002	2011	10	↓/↓
Pb	mg/kg	56A	Kvalnes	Hordaland	MYTI EDU	SB	W	6.9	3.78	3.62	3.98	4.04	3.28	2.94	2.25	3.41	2.73	1.654	4,55	15	1987	2011	25	9	2002	2011	10	O/↓
Pb	mg/kg	57A	Krossanes	Hordaland	MYTI EDU	SB	W	1.89	1.2	1.21	1.69	1.46	1.05	0.86	0.77	1.16	0.9	0.498	1,5	11	1987	2011	25	10	2002	2011	10	↓/O
Pb	mg/kg	63A	Ranaskjær	Hordaland	MYTI EDU	SB	W	0.999	0.82	0.58	0.68	0.804	0.567	0.5	0.51	0.62	0.43	0.093	no	16	1987	2011	25	9	2002	2011	10	↓/↓
Pb	mg/kg	65A	Vikingneset	Hordaland	MYTI EDU	SB	W	0.592	0.48	0.49	0.54	0.62	0.327	0.35	0.62	1.03	0.24	0.238	no	13	1987	2011	25	15	2002	2011	10	O/O
Pb	mg/kg	69A	Lille Terøy	Hordaland	MYTI EDU	SB	W	0.546	0.46	0.31	0.27	0.401	0.292	0.35	0.22	0.17	0.23	0.02	no	9	1992	2011	20	10	2002	2011	10	↓/↓
Pb	mg/kg	71A	Bjørkøya (Risøyodden)		MYTI EDU	SB	W	0.159	0.14	0.11	0.13	0.157	0.13	0.18	0.17	0.2	0.19	0.015	no	10	1983	2011	28	8	2002	2011	10	↓/↑
Pb	mg/kg	76A	Risøy	Aust-Agder	MYTI EDU	SB	W	0.133	0.15	0.22	0.14	0.191	0.18	0.26	0.23	0.229	0.12	0.006	no	12	1990	2011	20	10	2002	2011	10	O/O
Pb	mg/kg	98A2	Husvaagen area	Nordland	MYTI EDU	SB	W	0.132	0.16	0.22	0.091	0.12	0.098	0.12	0.15	0.11	0.13	0.01	no	11	1997	2011	14	11	2002	2011	10	↓/O
Pb	mg/kg	I023	Singlekalven (south)	Østfold	MYTI EDU	SB	W	0.095	0.18	0.29	0.11	0.119	0.11	0.1	0.1	0.15	0.12	0	no	12	1995	2011	17	13	2002	2011	10	O/O
Pb	mg/kg	I131A	Lastad	Vest-Agder	MYTI EDU	SB	W								0.2	0.17	0.23	0.02	no	9	2009	2011	3	9	2009	2011	3	O/O
Pb	mg/kg	I132	Svensholmen	Vest-Agder	MYTI EDU	SB	W								0.575	0.58	0.6	0.055	1	<=5	2009	2011	3	<=5	2009	2011	3	O/O

Parameter	Unit	St. Code	Station Name	County	Species	Tissue	Basis	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	SD	OC	Power (long)	First Yr. (long)	Last Yr. (long)	No Yrs (long)	Power (short)	First Yr. (short)	Last Yr. (short)	No Yrs (short)	Trend
Pb	mg/kg	I133	Odderøy	Vest-Agder	MYTI EDU	SB	W								1.48	2.94	2.26	0.139	3,77	14	2009	2011	3	14	2009	2011	3	O/O
Pb	mg/kg	I201	Ekkjegrunn (G1)	Rogaland	MYTI EDU	SB	W	0.92	0.31	0.53	0.51	0.511	0.57	0.68	0.32	0.24	0.27	0.006	no	11	1995	2011	17	13	2002	2011	10	↓/O
Pb	mg/kg	I205	Bølsnes (G5)	Rogaland	MYTI EDU	SB	W	1.02	0.54	0.37	0.72	0.684	0.4	1.02	0.49	0.32	0.32	0.015	no	13	1995	2011	16	14	2002	2011	10	O/O
Pb	mg/kg	I241	Nordnes	Hordaland	MYTI EDU	SB	W								3.2	0.96	1.33	0.231	2,22	18	2009	2011	3	18	2009	2011	3	O/O
Pb	mg/kg	I243	Hegreneset	Hordaland	MYTI EDU	SB	W								1.6	1.43	0.7	0.055	1,17	11	2009	2011	3	11	2009	2011	3	O/O
Pb	mg/kg	I301	Akershuskaia	Oslo	MYTI EDU	SB	W	0.316	0.28	0.35	0.31	0.781	0.53	0.42	0.29	0.42	0.29	0.042	no	11	1992	2011	15	12	2002	2011	10	O/O
Pb	mg/kg	I304	Gåsøya	Akershus	MYTI EDU	SB	W	0.169	0.19	0.21	0.22	0.286	0.27	0.25	0.23	0.31	0.18	0.02	no	10	1998	2011	14	8	2002	2011	10	O/O
Pb	mg/kg	I306	Håøya	Akershus	MYTI EDU	SB	W	0.098	0.1	0.14	0.12	0.15	0.13	0.15	0.1	0.16	0.14	0.012	no	11	1998	2011	14	9	2002	2011	10	O/O
Pb	mg/kg	I307	Ramtonholmen	Buskerud	MYTI EDU	SB	W	0.14	0.13	0.12	0.17	0.167	0.14	0.17	0.14	0.2	0.14	0	no	10	1998	2011	14	8	2002	2011	10	O/O
Pb	mg/kg	I712	Croftholmen	Telemark	MYTI EDU	SB	W								0.483	0.57	0.25	0.006	no	14	2009	2011	3	14	2009	2011	3	O/O
Pb	mg/kg	I713	Strømtangen	Telemark	MYTI EDU	SB	W								0.22	0.18	0.27	0.032	no	11	2009	2011	3	11	2009	2011	3	O/O
Pb	mg/kg	I964	Toraneskaien	Nordland	MYTI EDU	SB	W	1.05	0.54	1.1	1.29	1.33	1.23	1.14	1.04	1.12	1.08	0.23	1,8	10	2002	2011	10	10	2002	2011	10	O/O
Pb	mg/kg	I965	Moholmen (B5)	Nordland	MYTI EDU	SB	W	1.65	1.07	1.69	1.79	1.92	2.16	2.945	2.13	1.88	1.57	0.309	2,62	10	2001	2011	11	9	2002	2011	10	O/O
Pb	mg/kg	I969	Bjørnbærviken (B9)	Nordland	MYTI EDU	SB	W	0.49	0.29	0.31	0.627	0.4	0.35	0.29	0.37	0.35	0.36	0.047	no	12	1995	2011	17	11	2002	2011	10	O/O
PCB-7	µg/kg	10A2	Skallneset	Finnmark	MYTI EDU	SB	W	0.35	0.47	0.23	0.435	0.675	0.415	0.28	0.35	0.425	0.335	0.033	no	12	1996	2011	15	13	2002	2011	10	↓/O
PCB-7	µg/kg	11X	Brashavn	Finnmark	MYTI EDU	SB	W	0.41	0.41	0.235	0.635	0.38	0.4	0.405	0.365	0.48	0.35	0.044	no	12	1997	2011	15	12	2002	2011	10	O/O
PCB-7	µg/kg	15A	Gåsøy (Ullerø)	Vest-Agder	MYTI EDU	SB	W	0.64	0.41	0.41	0.535	0.41	0.425	0.765	0.765	0.61	0.475	0.063	no	13	1990	2011	20	11	2002	2011	10	O/O
PCB-7	µg/kg	227A2	Høgevarde	Rogaland	MYTI EDU	SB	W								3.835	2.67	6.815	0.931	1,7	17	2009	2011	3	17	2009	2011	3	O/O
PCB-7	µg/kg	22A	Espevær (west)	Hordaland	MYTI EDU	SB	W	0.67	1.36	0.755	1.485	1.04	0.965	1.475	0.93	0.93	0.55	0.053	no	13	1990	2011	22	12	2002	2011	10	O/O
PCB-7	µg/kg	30A	Gressholmen	Oslo	MYTI EDU	SB	W	4.99	6.78	2.58	10.87	4.01	8.11	7.9	6.9	4.22	2.535	0.261	no	14	1987	2011	25	15	2002	2011	10	↓/O
PCB-7	µg/kg	31A	Solbergstrand	Akershus	MYTI EDU	SB	W	1.52	1.13	0.535	1.995	1.86	0.905	1.725	1.765	19.07	0.74	0.08	no	20	1987	2011	25	25	2002	2011	10	↓/O
PCB-7	µg/kg	35A	Mølen	Buskerud	MYTI EDU	SB	W	1.22	1.59	0.97	1.85	1.005	1.23	1.795	1.6	0.9	0.635	0.061	no	12	1987	2011	25	12	2002	2011	10	↓/O
PCB-7	µg/kg	36A	Færder	Vestfold	MYTI EDU	SB	W	1.45	0.96	0.695	1.185	0.725	0.445	1			0.895	0.086	no	14	1987	2011	23	13	2002	2011	8	↓/O
PCB-7	µg/kg	51A	Byrkjenes	Hordaland	MYTI EDU	SB	W	2.13	2.08	1.53	1.31	1.79	1.375	1.41	1.39	1.22	1.135	0.223	no	14	1995	2011	17	7	2002	2011	10	O/↓
PCB-7	µg/kg	52A	Eitrheimsneset	Hordaland	MYTI EDU	SB	W	2.8	1.8	1.57	1.585	1.77	2.47	1.59	1.22	1.13	1.165	0.106	no	15	1989	2011	22	10	2002	2011	10	O/O
PCB-7	µg/kg	56A	Kvalnes	Hordaland	MYTI EDU	SB	W	2.53	1.78	1.03	1.12	0.875	1.545	0.955	0.845	0.6	0.665	0.068	no	20	1988	2011	24	11	2002	2011	10	O/↓
PCB-7	µg/kg	57A	Krossanes	Hordaland	MYTI EDU	SB	W	1.16	0.99	0.605	1.12	0.645	0.82	0.87	0.975	0.71	0.625	0.055	no	18	1989	2011	22	10	2002	2011	10	O/O
PCB-7	µg/kg	63A	Ranaskjær	Hordaland	MYTI EDU	SB	W	0.52	0.88	0.395	0.795	0.655	0.71	0.585	1.04	0.42	0.89	0.088	no	14	1989	2011	22	13	2002	2011	10	↓/O
PCB-7	µg/kg	65A	Vikingneset	Hordaland	MYTI EDU	SB	W	0.53	0.66	0.465	0.855	0.525	0.82	0.535	0.545	0.4	0.6	0.068	no	15	1988	2011	24	11	2002	2011	10	↓/O
PCB-7	µg/kg	69A	Lille Terøy	Hordaland	MYTI EDU	SB	W	0.63	0.73	0.425	0.665	0.315	0.36	0.23	0.405	0.45	0.515	0.048	no	13	1992	2011	20	11	2002	2011	10	↓/O
PCB-7	µg/kg	71A	Bjørkøya (Risøyodden)		MYTI EDU	SB	W	1.23	1.52	0.56	1.98	1.365	1.395	1.935	2.04	0.94	1.39	0.158	no	14	1987	2011	25	14	2002	2011	10	O/O
PCB-7	µg/kg	76A	Risøy	Aust-Agder	MYTI EDU	SB	W	1.03	0.84	0.845	0.565	0.815	0.795	1.005	0.86	0.804	1.285	0.118	no	10	1990	2011	20	9	2002	2011	10	↓/O
PCB-7	µg/kg	98A2	Husvaagen area	Nordland	MYTI EDU	SB	W	0.52	0.5	0.375	0.49	0.61	0.405	0.175	0.555	0.61	0.4	0.03	no	14	1997	2011	14	14	2002	2011	10	O/O
PCB-7	µg/kg	I023	Singlekalven (south)	Østfold	MYTI EDU	SB	W	1.88	1.65	1.415	1.08	0.98	0.57	0.655	1.4	1.07	0.83	0.078	no	11	1995	2011	17	11	2002	2011	10	↓/O
PCB-7	µg/kg	I131A	Lastad	Vest-Agder	MYTI EDU	SB	W	5.27	1.09	0.72	1.37	0.605	0.53	1.715	1.075	0.775	0.81	0.089	no	16	1995	2011	17	17	2002	2011	10	↓/O
PCB-7	µg/kg	I132	Svensholmen	Vest-Agder	MYTI EDU	SB	W	1.54	1.93	0.82	1.38	1.63	0.99	0.917	3.81	1.82	1.215	0.126	no	15	1998	2011	14	16	2002	2011	10	O/O
PCB-7	µg/kg	I133	Odderøy	Vest-Agder	MYTI EDU	SB	W	1.168	1.092	1.115	1.1	0.93	1.15	0.835	1.79	1.075	1.715	0.227	no	10	1995	2011	17	10	2002	2011	10	↓/O
PCB-7	µg/kg	I241	Nordnes	Hordaland	MYTI EDU	SB	W	19.11	22.93	12.81	7.42	8.25	7.26	8.8	8.31	5.23	29.65	2.988	7,41	14	1995	2011	17	15	2002	2011	10	O/O
PCB-7	µg/kg	I243	Hegreneset	Hordaland	MYTI EDU	SB	W	9.86	53.75	39.76	20.7	12.78	8.45	7.57	6.99	5.45	17.74	1.342	4,44	16	1995	2011	17	18	2002	2011	10	↓/O
PCB-7	µg/kg	I301	Akershuskaia	Oslo	MYTI EDU	SB	W	9.74	11.15	6.6	12.28	10.55	11.37	15.46	6.89	6.67	6.76	0.694	1,69	12	1992	2011	18	11	2002	2011	10	↓/O
PCB-7	µg/kg	I304	Gåsøya	Akershus	MYTI EDU	SB	W	3.19	4.48	3.77	2.545	3.27	4.31	5.71	2.75	2.055	2.46	0.225	no	11	1995	2011	16	12	2002	2011	10	O/O
PCB-7	µg/kg	I306	Håøya	Akershus	MYTI EDU	SB	W	2.42	2.2	2.325	1.525	2.81	3.105	1.645	1.72	1.795	1.66	0.143	no	12	1995	2011	16	11	2002	2011	10	↓/O
PCB-7	µg/kg	I307	Ramtonholmen	Buskerud	MYTI EDU	SB	W	1.95	2.11	1.585	1.425	2.89	2.485	2.305	2.8	1.825	1.285	0.109	no	11	1995	2011	16	11	2002	2011	10	↓/O
PCB-7	µg/kg	I712	Croftholmen	Telemark	MYTI EDU	SB	W	1.41	2.48	1.82	2.02	1.56	1.82	2.65	1.372	1.31	1.91	0.199	no	10	1995	2011	17	11	2002	2011	10	↓/O
PCB-7	µg/kg	I713	Strømtangen	Telemark	MYTI EDU	SB	W	1.697	1.901	1.875	2.44	1.175	2.17	1.78	1.705	2.6	1.615	0.195	no	11	2002	2011	10	11	2002	2011	10	O/O
Selelected analyses on a lipid weight basis																												
HCB	µg/kg	10B	Varangerfjorden	Finnmark	GADU MOR	LI	L	27.473	27.301	18.966	17.593	15.51	25	15	25.161	21.111	33.333	2.979	m	11	1994	2011	18	10	2002	2011	10	O/O
HCB	µg/kg	10B	Varangerfjorden	Finnmark	GADU MOR	MU	L	28.889	23.684	23.684	23.81	19.539	16.981	14.815	23.404	19.149	25	0	m	11	1994	2011	18	8	2002	2011	10	↓/O
HCB	µg/kg	10F	Skogerøy	Finnmark	PLEU PLA	LI	L	6.4	19.54	21.059	14.444		13.203	13.129	21.212	9.932	18.332	0.03	m	15	1997	2011	13	14	2002	2011	9	O/O
HCB	µg/kg	10F	Skogerøy	Finnmark	PLEU PLA	MU	L	53.75	12.263	21.693	21.053		12.599	14.003	13.593	12.354	12.403	0	m	14	1997	2011	13	14	2002	2011	9	↓/O
HCB	µg/kg	13BH	Kristiansand havn	Aust-Agder	GADU MOR	LI	L								555.556	196.429	333.333	57.47	m	19	2009	2011	3	19	2009	2011	3	O/O
HCB	µg/kg	13BH	Kristiansand havn	Aust-Agder	GADU MOR	MU	L									235.714	155.556	0.001	m		2010	2011	2		2010	2011	2	▪/▪
HCB	µg/kg	15B	Ullerø area	Vest-Agder	GADU MOR	LI	L	17.081	21.44	20	18.421	20.968	22.308	12.667	14.5	19.672	18.966	2.708	m	10	1990	2011	22	9	2002	2011	10	↓/O
HCB	µg/kg	15B	Ullerø area	Vest-Agder	GADU MOR	MU	L	16.667	28	28.571	17.647	18.421	17.647	16.216	13.889	17.575	15.556	0	m	11	1990	2011	22	10	2002	2011	10	↓/O
HCB	µg/kg	15F	Ullerø area	Vest-Agder	LIMA LIM	LI	L	10.154	15	13.478	17.143	10	20.385	12.857	12.727	9.63	15	0.456	m	11	1991	2011	19	11	2002	2011	10	O/O
HCB	µg/kg	15F	Ullerø area	Vest-Agder	LIMA LIM	MU	L	10	13.333	27.273	18	10.87	15.556	12.281	10.345	10.526	8.475	0	m	12	1991	2011	19	12	2002	2011	10	O/O
HCB	µg/kg	21F	Åkrafjord	Hordaland	LEPI WHI	LI	L			2.68	12.5	17.5	9.143	9.6	17.826	11.896	11.304	0.085	m	17	2004	2011	8	17	2004	2011	8	O/O
HCB	µg/kg	21F	Åkrafjord	Hordaland	LEPI WHI	MU	L		12	14.815	22.222	19.355	9.524	13.514	12.5	11.765	13.043	0	m	11	2003	2011	9	11	2003	2011	9	O/O
HCB	µg/kg	23B	Karihavet area	Hordaland	GADU MOR	LI	L	11.071	15.278	13.684	17.778	21.818	21.569	8.435	11.154	18.125	21.918	4.098	m	12	1990	2011	22	12	2002	2011	10	O/O
HCB	µg/kg	23B	Karihavet area	Hordaland	GADU MOR	MU	L	15.152	20	15	41.176	25.806	13.889	11.111	36.17	17.647	19.444	0	m	14	1990	2011	22	15	2002	2011	10	O/O

Parameter	Unit	St. Code	Station Name	County	Species	Tissue	Basis	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	SD	OC	Power (long)	First Yr. (long)	Last Yr. (long)	No Yrs (long)	Power (short)	First Yr. (short)	Last Yr. (short)	No Yrs (short)	Trend
HCB	µg/kg	30B	Oslo City area	Akershus	GADU MOR	LI	L	21.311	18.077	19.643	18.842	17.5	20.339	15.926	19.231	15.251	18.5	2.754	m	11	1984	2011	28	7	2002	2011	10	↓/O
HCB	µg/kg	30B	Oslo City area	Akershus	GADU MOR	MU	L	18.182	19.231	22.222	35.294	20	13.793	17.647	17.647	17.391	13.333	0	m	11	1990	2011	22	10	2002	2011	10	O/O
HCB	µg/kg	33F	Sande (east side)	Vestfold	PLAT FLE	LI	L	6.4	9.524	5.6	6.071	6.923	7.083	6.818	7.5		6.667	0.117	m	17	1983	2011	27	9	2002	2011	9	↓/O
HCB	µg/kg	33F	Sande (east side)	Vestfold	PLAT FLE	MU	L	9.615	10	8.333	8.333	9.756	11.429	6.977	9.434	6.522	5.814	0	m	14	1990	2011	22	8	2002	2011	10	↓/O
HCB	µg/kg	36B	Færder area	Vestfold	GADU MOR	LI	L	10.833	7.727	10	12.368	17.333	10.146	14.194	10	16.489	30	2.484	m	13	1983	2011	29	12	2002	2011	10	↓/O
HCB	µg/kg	36B	Færder area	Vestfold	GADU MOR	MU	L	10	8.333	8.333	12.5	14.815	10.714	13.333	13.975	19.355	15.789	0	m	11	1990	2011	22	9	2002	2011	10	↓/↑
HCB	µg/kg	36F	Færder area	Vestfold	LIMA LIM	LI	L	9.13	9.259	9.333	8.696	8	7.826	8.235	10		12.857	0.254	m	9	1990	2011	21	<=5	2002	2011	9	↓/↑
HCB	µg/kg	36F	Færder area	Vestfold	LIMA LIM	MU	L	8.219	6.557	20	21.053	11.111	8	8.511	11.765	8.511	9.459	0	m	13	1990	2011	22	14	2002	2011	10	O/O
HCB	µg/kg	43BH	Tromsø havn	Troms	GADU MOR	LI	L								21.923	20.857	21.818	2.829	m	<=5	2009	2011	3	<=5	2009	2011	3	O/O
HCB	µg/kg	43BH	Tromsø havn	Troms	GADU MOR	MU	L								17.778	18.605	16.667	0	m	6	2009	2011	3	6	2009	2011	3	O/O
HCB	µg/kg	53B	Inner Sørfjord	Hordaland	GADU MOR	LI	L	18.235	25.173	13.265	17.5	9.756	18.64	10.556	11.404	9.811	12.807	1.766	m	14	1988	2011	23	11	2002	2011	10	↓/O
HCB	µg/kg	53B	Inner Sørfjord	Hordaland	GADU MOR	MU	L	15.152	37.5	11.765	20	8.571	12.121	10.714	11.595	15.625	12.121	0	m	16	1990	2011	21	14	2002	2011	10	O/O
HCB	µg/kg	53F	Inner Sørfjord	Hordaland	PLAT FLE	LI	L	13.483	11.429	6.25	6.981		8	12.727	12.415	14.454	5.556		m	16	1988	2011	22	13	2002	2011	9	↓/O
HCB	µg/kg	53F	Inner Sørfjord	Hordaland	PLAT FLE	MU	L	12.821	26.531	8.333	13.725		8	19.048	8.392	11.833	7.843		m	13	1990	2011	20	15	2002	2011	9	↓/O
HCB	µg/kg	67B	Strandebarm area	Hordaland	GADU MOR	LI	L	10.435	9.038	11.774	14.804	10.526	15.645	9.012	8.744	11.977	13.638	0.417	m	10	1988	2011	24	10	2002	2011	10	↓/O
HCB	µg/kg	67B	Strandebarm area	Hordaland	GADU MOR	MU	L	13.514	10.417	15.625	25	9.302	18.182	14.153	13.158	16.129	16.667	0	m	11	1990	2011	22	12	2002	2011	10	↓/O
HCB	µg/kg	67F	Strandebarm area	Hordaland	LEPI WHI	LI	L	13.655	12.857	9.232	10	10.521	7.667	14.615	12	9.63	13.088	0.064	m	14	1988	2011	24	10	2002	2011	10	↓/O
HCB	µg/kg	67F	Strandebarm area	Hordaland	LEPI WHI	MU	L	10.169	9.302	11.785	14.286	8.257	10.345	14.286	20.69	8.108	15.826	0	m	14	1990	2011	22	13	2002	2011	10	↓/O
HCB	µg/kg	67F	Strandebarm area	Hordaland	PLAT FLE	LI	L	16.333	15.417	11.923	13.913	13.913	18	11.905	11.2		10.417	0.279	m	9	1996	2011	14	8	2002	2011	9	O/O
HCB	µg/kg	67F	Strandebarm area	Hordaland	PLAT FLE	MU	L	21.212	12.329	30	15.152	26.923	11.111	11.875	13.333		11.333	0.001	m	14	1996	2011	14	13	2002	2011	9	O/O
HCB	µg/kg	80BH	Munkholmen	Sør-Trøndelag	GADU MOR	LI	L								52.174	36.87	17.568	4.859	m	8	2009	2011	3	8	2009	2011	3	O/O
HCB	µg/kg	80BH	Munkholmen	Sør-Trøndelag	GADU MOR	MU	L								40.05	25	15.789	0	m	<=5	2009	2011	3	<=5	2009	2011	3	↓/↓
HCB	µg/kg	98B1	Bjørnerøya (east)	Nordland	GADU MOR	LI	L	16.064	19.403	17	17.5	22.222	36.751	13.514	6.835	14.412	24.167	3.051	m	15	1992	2011	18	16	2002	2011	10	O/O
HCB	µg/kg	98B1	Bjørnerøya (east)	Nordland	GADU MOR	MU	L	25	34.392	57.143	50	27.273	56.195	17.5	9.615	20	20	0	m	16	1992	2011	18	16	2002	2011	10	O/O
HCB	µg/kg	98F2	Husholmen	Nordland	PLEU PLA	LI	L	11.314	7.417	8.824	14.083	10.429	9.773	9.861	9.016	8.871	10.87	0	m	9	2000	2011	12	9	2002	2011	10	O/O
HCB	µg/kg	98F2	Husholmen	Nordland	PLEU PLA	MU	L	16.903	7.843	12.5	48.85	11.429	22.727	9.302	5.66	10.417	8.475	0	m	17	2000	2011	12	18	2002	2011	10	O/O
OCS	µg/kg	10B	Varangerfjorden	Finnmark	GADU MOR	LI	L	2.77	3.117	3.069	2.419	4.545	2.857	2.941	3.529	2.3	2.273	0.187	m	12	1994	2011	18	10	2002	2011	10	↓/O
OCS	µg/kg	10B	Varangerfjorden	Finnmark	GADU MOR	MU	L	6.977	7.5	13.158	12.195	11.513	9.434	9.434	10.638	10	8.929	0	m	15	1994	2011	18	8	2002	2011	10	O/O
OCS	µg/kg	10F	Skogerøy	Finnmark	PLEU PLA	LI	L	2.804	2.727	3.397	5.556		3.192	1.654	2.5	2.649	3.306	0	m	12	1997	2011	13	11	2002	2011	9	O/O
OCS	µg/kg	10F	Skogerøy	Finnmark	PLEU PLA	MU	L	3.797	5.727	18.787	13.889		9.905	10.803	9.709		9.806	0	m	12	1997	2011	12	14	2002	2011	8	↑/O
OCS	µg/kg	13BH	Kristiansand havn	Aust-Agder	GADU MOR	LI	L								274.194	92	163.043	13.823	m	19	2009	2011	3	19	2009	2011	3	O/O
OCS	µg/kg	13BH	Kristiansand havn	Aust-Agder	GADU MOR	MU	L									77.778	48.889	0.001	m		2010	2011	2		2010	2011	2	▪/▪
OCS	µg/kg	15B	Ullerø area	Vest-Agder	GADU MOR	LI	L	2.649	4.091	1.613	2.381	2.985	3.509	1.818	3.175	4.255	1.818	0.241	m	16	1990	2011	22	14	2002	2011	10	↓/O
OCS	µg/kg	15B	Ullerø area	Vest-Agder	GADU MOR	MU	L	8.333	12	25	14.706	12.821	15.152	13.514	13.889	11.905	11.111	0	m	14	1990	2011	22	11	2002	2011	10	O/O
OCS	µg/kg	15F	Ullerø area	Vest-Agder	LIMA LIM	LI	L	1.992	1.923	2.083	4	3.846	3.333		3.846	2.778	1.667	0.017	m	13	1991	2011	18	10	2002	2011	9	↓/O
OCS	µg/kg	15F	Ullerø area	Vest-Agder	LIMA LIM	MU	L	6.117	4.286	38.462	9.091	10.417	11.364	9.091	8.197		7.937	0	m	17	1991	2011	18	19	2002	2011	9	O/O
OCS	µg/kg	21F	Åkrafjord	Hordaland	LEPI WHI	LI	L			2.311	1.224	4.545	1.786	2.083	4.348	3.514	1.364	0.005	m	17	2004	2011	8	17	2004	2011	8	O/O
OCS	µg/kg	21F	Åkrafjord	Hordaland	LEPI WHI	MU	L		11.111	12	17.241	16.129	15.625	17.241	15.625	14.706	21.739	0	m	8	2003	2011	9	8	2003	2011	9	O/O
OCS	µg/kg	23B	Karihavet area	Hordaland	GADU MOR	LI	L	3.093	2.5	2.5	3.2	4.762	4	2	1.503	3.247	1.786	0.33	m	12	1990	2011	22	13	2002	2011	10	↓/O
OCS	µg/kg	23B	Karihavet area	Hordaland	GADU MOR	MU	L	10.345	12	15	23.81	16.129	13.889	13.889	10.87	15.152	13.514	0	m	14	1990	2011	22	9	2002	2011	10	↓/O
OCS	µg/kg	30B	Oslo City area	Akershus	GADU MOR	LI	L	14.762	15.143	10	16.923	13.158	9.302	11.957	11.667	8.633	3.881		m	14	1990	2011	22	11	2002	2011	10	↓/↓
OCS	µg/kg	30B	Oslo City area	Akershus	GADU MOR	MU	L	9.375	19.231	11.538	29.412	18.898	17.241	17.241	15.625	21.739	12.821	0	m	14	1990	2011	22	12	2002	2011	10	O/O
OCS	µg/kg	33F	Sande (east side)	Vestfold	PLAT FLE	LI	L	2.727	2.778	2.151	5	3.704	2.083		4.545		1.905	0.018	m	16	1990	2011	20	15	2002	2011	8	↓/O
OCS	µg/kg	33F	Sande (east side)	Vestfold	PLAT FLE	MU	L	5.769	5	8.333	13.889	12.195	17.241	8.772	9.434	9.804	8.065	0	m	16	1990	2011	22	10	2002	2011	10	↓/↑
OCS	µg/kg	36B	Færder area	Vestfold	GADU MOR	LI	L	2.885	8.868	7.25	10.127	10	2	2.5	2.564	3.134	2.917	0.19	m	15	1990	2011	22	16	2002	2011	10	↓/O
OCS	µg/kg	36B	Færder area	Vestfold	GADU MOR	MU	L	10	8.333	8.333	15.152	18.519	16.129	14.286	15.625	15.625	13.158	0	m	12	1990	2011	22	9	2002	2011	10	↓/↑
OCS	µg/kg	36F	Færder area	Vestfold	LIMA LIM	LI	L	3.478	3.704	3.087	5.263	2	2.667	36.154	3.571		1.667	0.009	m	21	1990	2011	21	24	2002	2011	9	O/O
OCS	µg/kg	36F	Færder area	Vestfold	LIMA LIM	MU	L	4.11	4.545	20	26.316	11.905	9.434	9.615	9.434	7.937	6.757	0	m	16	1990	2011	22	15	2002	2011	10	↓/O
OCS	µg/kg	43BH	Tromsø havn	Troms	GADU MOR	LI	L								3.077	2.174	1.923	0.225	m	6	2009	2011	3	6	2009	2011	3	O/O
OCS	µg/kg	43BH	Tromsø havn	Troms	GADU MOR	MU	L								11.111	12.5	11.111	0	m	7	2009	2011	3	7	2009	2011	3	O/O
OCS	µg/kg	53B	Inner Sørfjord	Hordaland	GADU MOR	LI	L	2.941	4.456	3.125	3.415	1.25	2.83	2.6	3.125	2.252	1.961	0.188	m	13	1990	2011	21	13	2002	2011	10	↓/O
OCS	µg/kg	53B	Inner Sørfjord	Hordaland	GADU MOR	MU	L	10.831	17.647	16.667	20	14.286	17.241	16.667	14.494	15.625	15.152	0	m	14	1990	2011	21	8	2002	2011	10	O/O
OCS	µg/kg	53F	Inner Sørfjord	Hordaland	PLAT FLE	LI	L	2.388	2.727	2.941	2.714		2.5	3.226	6.64	3.571	1.111		m	16	1990	2011	20	15	2002	2011	9	↓/O
OCS	µg/kg	53F	Inner Sørfjord	Hordaland	PLAT FLE	MU	L	6.25	6.122	8.333	11.364		10.417	30.303	8.565	7.692	9.804		m	15	1990	2011	20	14	2002	2011	9	O/O
OCS	µg/kg	67B	Strandebarm area	Hordaland	GADU MOR	LI	L	2.326	2.586	2.174	2.083	1.818	2.105	2.41	2.151	2.401	1.614	0.044	m	9	1990	2011	22	8	2002	2011	10	↓/O
OCS	µg/kg	67B	Strandebarm area	Hordaland	GADU MOR	MU	L	8.108	7.692	18.519	15.625	13.158	20	14.706	13.158	16.129	15.215	0	m	14	1990	2011	22	10	2002	2011	10	↓/O
OCS	µg/kg	67F	Strandebarm area	Hordaland	LEPI WHI	LI	L	1.766	2.069	2.678	1.538	2.132	1.667		3.333	3.704	1.091	0.002	m	18	1990	2011	21	15	2002	2011	9	↓/O
OCS	µg/kg	67F	Strandebarm area	Hordaland	LEPI WHI	MU	L	5.769	7.143	10.206	17.857	12.696	17.241	14.706	17.241	13.514	9.458	0	m	15	1990	2011	22	9	2002	2011	10	↓/↑
OCS	µg/kg	67F	Strandebarm area	Hordaland	PLAT FLE	LI	L	1.739	4.167	3.846	3.333	2.143	2.5	2.174	4		0.708	0.017	m	19	1996	2011	14	16	2002	2011	9	O/O
OCS	µg/kg	67F	Strandebarm area	Hordaland	PLAT FLE	MU	L	3.659	3.125	41.667	8.475	19.231	8.333	3.846	5		3.333	0	m	20	1996	2011	14	22	2002	2011	9	O/O
OCS	µg/kg	80BH	Munkholmen	Sør-Trøndelag	GADU MOR	LI	L								2.439	2.881	2.687	0.479	m	7	2009	2011	3	7	2009	2011	3	O/O
OCS	µg/kg	80BH	Munkholmen	Sør-Trøndelag	GADU MOR	MU	L								12.049		11.364	0	m		2009	2011	2		2009	2011	2	▪/▪
OCS	µg/kg	98B1	Bjørnerøya (east)	Nordland	GADU MOR	LI	L	1.507	2.459	2.941	2.459	3.39	3.146	1.818	3.367	3.704	2	0.25	m	12	1992	2011	18	12	2002	2011	10	↓/O

Parameter	Unit	St. Code	Station Name	County	Species	Tissue	Basis	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	SD	OC	Power (long)	First Yr. (long)	Last Yr. (long)	No Yrs (long)	Power (short)	First Yr. (short)	Last Yr. (short)	No Yrs (short)	Trend
OCS	µg/kg	98B1	Bjørnerøya (east)	Nordland	GADU MOR	MU	L	9.677	10.911	15.789	20.833	15.625	29.617	12.5	9.434	12.5	12.5	0	m	15	1992	2011	18	12	2002	2011	10	O/O
OCS	µg/kg	98F2	Husholmen	Nordland	PLEU PLA	LI	L	1.179	1	2.632	2.582	4.651	2.083	8	2.381	3.774	10.87	0	m	17	2000	2011	12	17	2002	2011	10	O/O
OCS	µg/kg	98F2	Husholmen	Nordland	PLEU PLA	MU	L	11.339	6.25	12.5	37.689	14.286	31.25	11.628	8.929		8.929	0	m	16	2000	2011	11	17	2002	2011	9	↑/O
PCB-7	µg/kg	10B	Varangerfjorden	Finnmark	GADU MOR	LI	L	337.872	358.795	602.903	234.186	271.364	374.722	294.706	410.444	185.6	250.55	4.73	m	13	1994	2011	18	13	2002	2011	10	↓/O
PCB-7	µg/kg	10B	Varangerfjorden	Finnmark	GADU MOR	MU	L	165.714	126.136	244.643	113.095	140.254	110.377	91.667	140.278	74.038	92.373	0	m	14	1994	2011	18	12	2002	2011	10	↓/O
PCB-7	µg/kg	10F	Skogerøy	Finnmark	PLEU PLA	LI	L	426.733	150.803	195.148	131.111		158.085	196.851	158.636	89.277	247.28	0.174	m	14	1997	2011	13	14	2002	2011	9	O/O
PCB-7	µg/kg	10F	Skogerøy	Finnmark	PLEU PLA	MU	L	129.054	90.351	151.625	120		105.319	213.021	64.696	170.95	101.962	0	m	14	1997	2011	13	14	2002	2011	9	O/O
PCB-7	µg/kg	13BH	Kristiansand havn	Aust-Agder	GADU MOR	LI	L								4818.93	4866.09	3926.23	67.859	m	6	2009	2011	3	6	2009	2011	3	O/O
PCB-7	µg/kg	13BH	Kristiansand havn	Aust-Agder	GADU MOR	MU	L									2618.33	753.333	0.005	m		2010	2011	2		2010	2011	2	▪/▪
PCB-7	µg/kg	15B	Ullerø area	Vest-Agder	GADU MOR	LI	L	578.199	910.8	256.935	400.794	223.582	366.346	255.676	350.217	362.903	451.786	15.296	m	12	1990	2011	22	13	2002	2011	10	↓/O
PCB-7	µg/kg	15B	Ullerø area	Vest-Agder	GADU MOR	MU	L	181.944	492	132.143	225	143.75	145.455	147.436	146.875	117.849	117.045	0	m	13	1990	2011	22	14	2002	2011	10	↓/O
PCB-7	µg/kg	15F	Ullerø area	Vest-Agder	LIMA LIM	LI	L	203.984	198	278.333	380	181.154	285.789	321.65	191.923	112.381	183	1.78	m	12	1991	2011	19	12	2002	2011	10	O/O
PCB-7	µg/kg	15F	Ullerø area	Vest-Agder	LIMA LIM	MU	L	154.054	145	250	226.364	130.208	179.688	178.182	104.762	103.947	63.559	0.001	m	11	1991	2011	19	11	2002	2011	10	↓/↓
PCB-7	µg/kg	21F	Åkrafjord	Hordaland	LEPI WHI	LI	L			254.054	468.326	509.545	299.276	215.8	304.762	278.199	275.682	1.939	m	12	2004	2011	8	12	2004	2011	8	O/O
PCB-7	µg/kg	21F	Åkrafjord	Hordaland	LEPI WHI	MU	L		166.667	184.375	310.345	357.692	251.351	225	140.476	135.294	171.739	0	m	11	2003	2011	9	11	2003	2011	9	O/O
PCB-7	µg/kg	23B	Karihavet area	Hordaland	GADU MOR	LI	L	260.816	236.14	609.355	421.944	518	388.261	144.591	202.269	505.425	510.69	19.049	m	13	1990	2011	22	15	2002	2011	10	O/O
PCB-7	µg/kg	23B	Karihavet area	Hordaland	GADU MOR	MU	L	156.25	206.25	196.875	347.619	324.194	147.222	147.143	95.745	229.032	161.111	0	m	14	1990	2011	22	13	2002	2011	10	O/O
PCB-7	µg/kg	30B	Oslo City area	Akershus	GADU MOR	LI	L	6678.42	4914.89	6456.97	11093.5	11243	7867.65	6453.72	15043	10441	7034.8	285.741	m	14	1990	2011	22	13	2002	2011	10	O/O
PCB-7	µg/kg	30B	Oslo City area	Akershus	GADU MOR	MU	L	3125.76	3448.15	3370.46	6040	4309.09	3773.21	5919.64	6716.67	6471.74	2550	0.006	m	16	1990	2011	22	12	2002	2011	10	O/O
PCB-7	µg/kg	33F	Sande (east side)	Vestfold	PLAT FLE	LI	L	214.091	365.263	251.2	243.846	255.185	280.417	280	315.185		421.111	1.982	m	10	1990	2011	21	9	2002	2011	9	↓/O
PCB-7	µg/kg	33F	Sande (east side)	Vestfold	PLAT FLE	MU	L	242.857	333.333	153.409	166.667	240.741	232.759	205.97	210.484	233.051	135.593	0.001	m	14	1990	2011	22	11	2002	2011	10	↓/O
PCB-7	µg/kg	36B	Færder area	Vestfold	GADU MOR	LI	L	1067.5	817.857	997.872	2814.58	3743.75	567.269	1011.52	968.837	1395.67	1244.21	16.113	m	19	1990	2011	22	18	2002	2011	10	O/O
PCB-7	µg/kg	36B	Færder area	Vestfold	GADU MOR	MU	L	676.786	763.636	872.727	792.424	3335.71	225	412.121	815.475	574.194	605.128	0.001	m	19	1990	2011	22	20	2002	2011	10	O/O
PCB-7	µg/kg	36F	Færder area	Vestfold	LIMA LIM	LI	L	1062.14	1006.3	2542.22	2790.44	2067	3527.5	3171	2057.86		658.75	11.174	m	13	1990	2011	21	12	2002	2011	9	↑/↓
PCB-7	µg/kg	36F	Færder area	Vestfold	LIMA LIM	MU	L	841.026	518.056	3043.1	2197.37	1422.22	2084	1978.72	1655.56	597.619	262.5	0.006	m	16	1990	2011	22	17	2002	2011	10	↓/↓
PCB-7	µg/kg	43BH	Tromsø havn	Troms	GADU MOR	LI	L								1011.85	666.571	718.5	24.594	m	9	2009	2011	3	9	2009	2011	3	O/O
PCB-7	µg/kg	43BH	Tromsø havn	Troms	GADU MOR	MU	L								286.957	251.163	260	0.001	m	6	2009	2011	3	6	2009	2011	3	O/O
PCB-7	µg/kg	53B	Inner Sørfjord	Hordaland	GADU MOR	LI	L	6391.3	2792.12	2318.44	1882.5	945.577	2646.28	1697.38	1329.38	2614.8	1130.77	147.998	m	21	1990	2011	21	14	2002	2011	10	O/O
PCB-7	µg/kg	53B	Inner Sørfjord	Hordaland	GADU MOR	MU	L	7160.61	3080	990	921.053	311.111	1970.69	2148.21	1328.08	3074.14	683.871	0.001	m	>25	1990	2011	21	20	2002	2011	10	O/O
PCB-7	µg/kg	53F	Inner Sørfjord	Hordaland	PLAT FLE	LI	L	778.09	1266.15	615.625	2061.79		520.2	621.077	182.534	1146.52	721.852	5.455	m	19	1990	2011	20	19	2002	2011	9	O/O
PCB-7	µg/kg	53F	Inner Sørfjord	Hordaland	PLAT FLE	MU	L	459.836	229.592	558.571	1342.5		352	455.208	100.709	828.146	389.216	0.001	m	20	1990	2011	20	21	2002	2011	9	O/O
PCB-7	µg/kg	67B	Strandebarm area	Hordaland	GADU MOR	LI	L	341.034	149.483	199.13	343.514	102	207.073	263.5	221.509	398.863	426.276	20.747	m	15	1990	2011	22	14	2002	2011	10	↓/O
PCB-7	µg/kg	67B	Strandebarm area	Hordaland	GADU MOR	MU	L	164.865	71.429	223.077	250	75	115.909	157.543	106.667	142.188	148.183	0	m	23	1990	2011	22	16	2002	2011	10	O/O
PCB-7	µg/kg	67F	Strandebarm area	Hordaland	LEPI WHI	LI	L	213.655	293.793	196.217	367.909	216.649	143.857	269	192.417	274.783	123.483	1.212	m	13	1990	2011	22	13	2002	2011	10	↓/O
PCB-7	µg/kg	67F	Strandebarm area	Hordaland	LEPI WHI	MU	L	94.872	136.667	157.977	290.476	113.885	115.789	200	186.207	129.73	113.096	0	m	14	1990	2011	22	13	2002	2011	10	↓/O
PCB-7	µg/kg	67F	Strandebarm area	Hordaland	PLAT FLE	LI	L	106.667	130	139.13	129.565	148.696	160.588	151.355	106.059		92.167	0.583	m	9	1996	2011	14	7	2002	2011	9	↓/↓
PCB-7	µg/kg	67F	Strandebarm area	Hordaland	PLAT FLE	MU	L	128.03	83.696	218.75	123.485	243.333	120.909	122.812	95.667		85.667	0.002	m	13	1996	2011	14	13	2002	2011	9	↓/O
PCB-7	µg/kg	80BH	Munkholmen	Sør-Trøndelag	GADU MOR	LI	L								2887.83	2439.53	1107.03	39.507	m	11	2009	2011	3	11	2009	2011	3	O/O
PCB-7	µg/kg	80BH	Munkholmen	Sør-Trøndelag	GADU MOR	MU	L								1115.92	710	200	0.001	m	13	2009	2011	3	13	2009	2011	3	O/O
PCB-7	µg/kg	98B1	Bjørnerøya (east)	Nordland	GADU MOR	LI	L	94.21	151.899	505.735	122.13	171.75	396.453	70.851	25.036	121.176	178.088	5.177	m	21	1992	2011	18	23	2002	2011	10	O/O
PCB-7	µg/kg	98B1	Bjørnerøya (east)	Nordland	GADU MOR	MU	L	77.419	139.976	168.421	189.13	120.313	182.141	62.5	33.019	75	65	0	m	17	1992	2011	18	15	2002	2011	10	↓/O
PCB-7	µg/kg	98F2	Husholmen	Nordland	PLEU PLA	LI	L	117.844	90.25	75	311.043	270.286	125.682	50.417	37.81	81.452	38.043	0	m	17	2000	2011	12	17	2002	2011	10	O/O
PCB-7	µg/kg	98F2	Husholmen	Nordland	PLEU PLA	MU	L	110.185	49.02	72.917	650.131	370	163.636	47.872	31.818	150	31.25	0	m	23	2000	2011	12	23	2002	2011	10	O/O
ppDDE	µg/kg	10B	Varangerfjorden	Finnmark	GADU MOR	LI	L	112.971	132.13	200	84.444	88.636	110.714	105.882	177.419	72.414	92.5	5.862	m	14	1994	2011	18	13	2002	2011	10	↓/O
ppDDE	µg/kg	10B	Varangerfjorden	Finnmark	GADU MOR	MU	L	52.273	40.909	80.357	38.095	40.411	48.148	35.185	53.191	22.917	27.119	0	m	14	1994	2011	18	12	2002	2011	10	↓/O
ppDDE	µg/kg	10F	Skogerøy	Finnmark	PLEU PLA	LI	L	87.963	43.122	53.952	55.556		41.492	41.517	54.545	25	56.54	0.204	m	13	1997	2011	13	13	2002	2011	9	↓/O
ppDDE	µg/kg	10F	Skogerøy	Finnmark	PLEU PLA	MU	L	50	26.486	49.055	47.368		40.078	29.939	21.272	25.031	26.018	0	m	13	1997	2011	13	11	2002	2011	9	↓/O
ppDDE	µg/kg	13BH	Kristiansand havn	Aust-Agder	GADU MOR	LI	L								209.677	134.783	189.744	11.314	m	12	2009	2011	3	12	2009	2011	3	O/O
ppDDE	µg/kg	13BH	Kristiansand havn	Aust-Agder	GADU MOR	MU	L									136.667	71.111	0.001	m		2010	2011	2		2010	2011	2	▪/▪
ppDDE	µg/kg	15B	Ullerø area	Vest-Agder	GADU MOR	LI	L	182.464	296	85.484	118.367	78.788	121.277	89.189	100	144.186	189.655	21.589	m	13	1990	2011	22	13	2002	2011	10	↓/O
ppDDE	µg/kg	15B	Ullerø area	Vest-Agder	GADU MOR	MU	L	61.111	154.167	50	67.647	45	48.387	38.462	34.375	34.222	43.182	0	m	12	1990	2011	22	13	2002	2011	10	↓/O
ppDDE	µg/kg	15F	Ullerø area	Vest-Agder	LIMA LIM	LI	L	59.761	68	95.833	92.857	57.692	68.421	110	69.565	40.952	58.333	2.298	m	14	1991	2011	19	12	2002	2011	10	O/O
ppDDE	µg/kg	15F	Ullerø area	Vest-Agder	LIMA LIM	MU	L	37.838	41.667	81.818	83.636	43.75	50	61.404	36.508	25.974	20.339	0.002	m	13	1991	2011	19	12	2002	2011	10	↓/↓
ppDDE	µg/kg	21F	Åkrafjord	Hordaland	LEPI WHI	LI	L			91.652	195.918	204.545	114.815	158.333	204.762	143.066	172.727	1.766	m	12	2004	2011	8	12	2004	2011	8	O/O
ppDDE	µg/kg	21F	Åkrafjord	Hordaland	LEPI WHI	MU	L		88	93.75	135.714	146.154	137.838	121.622	83.333	62	113.043	0	m	11	2003	2011	9	11	2003	2011	9	O/O
ppDDE	µg/kg	23B	Karihavet area	Hordaland	GADU MOR	LI	L	58	67.143	108.824	109.091	130	89.362	44.412	56.522	105.505	114.516	21.503	m	12	1990	2011	22	13	2002	2011	10	O/O
ppDDE	µg/kg	23B	Karihavet area	Hordaland	GADU MOR	MU	L	30.303	54.167	47.059	88.235	93.548	41.667	20.588	19.565	52.941	45.455	0	m	14	1990	2011	22	15	2002	2011	10	O/O
ppDDE	µg/kg	30B	Oslo City area	Akershus	GADU MOR	LI	L	605.263	914.286	466.667	794.872	619.048	458.333	636.364	785.714	786.687	590.937	83.025	m	14	1984	2011	28	11	2002	2011	10	O/O
ppDDE	µg/kg	30B	Oslo City area	Akershus	GADU MOR	MU	L	221.212	259.259	276.667	352.941	232.143	207.143	292.857	343.75	382.609	187.097	0.001	m	14	1990	2011	22	11	2002	2011	10	O/O
ppDDE	µg/kg	33F	Sande (east side)	Vestfold	PLAT FLE	LI	L	77.273	126.316	92.473	75	74.074	66.667	80	88.889		95.455	0.693	m	15	1983	2011	27	9	2002	2011	9	↓/O
ppDDE	µg/kg	33F	Sande (east side)	Vestfold	PLAT FLE	MU	L	82.692	95	56.818	53.659	56.098	75.862	50.746	64.151	39.13	40.323	0.002	m	12	1990	2011	22	10	2002	2011	10	↓/O
ppDDE	µg/kg	36B	Færder area	Vestfold	GADU MOR	LI	L	150	71.429	73.077	230.088	256.522	81.45	137.037	135.714	283.422	215	13.159	m	17	1982	2011	30	17	2002	2011	10	↓/O
ppDDE	µg/kg	36B	Færder area	Vestfold	GADU MOR	MU	L	78.571	63.636	72.222	146.875	140.741	28.571	66.667	69.175	100	94.444	0.001	m	16	1990	2011	22	16	2002	2011	10	O/O

Parameter	Unit	St. Code	Station Name	County	Species	Tissue	Basis	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	SD	OC	Power (long)	First Yr. (long)	Last Yr. (long)	No Yrs (long)	Power (short)	First Yr. (short)	Last Yr. (short)	No Yrs (short)	Trend
ppDDE	µg/kg	36F	Færder area	Vestfold	LIMA LIM	LI	L	139.13	131.25	86.957	125	124.138	104.348	110	112		100	5.772	m	9	1990	2011	21	8	2002	2011	9	↓/O
ppDDE	µg/kg	36F	Færder area	Vestfold	LIMA LIM	MU	L	92.727	70.13	120.69	163.158	86.111	83.636	68.085	75.926	50.794	45.833	0.004	m	11	1990	2011	22	11	2002	2011	10	↓/↓
ppDDE	µg/kg	43BH	Tromsø havn	Troms	GADU MOR	LI	L								100	76.087	84.091	9.66	m	8	2009	2011	3	8	2009	2011	3	O/O
ppDDE	µg/kg	43BH	Tromsø havn	Troms	GADU MOR	MU	L								31.373	21.951	28.571	0.001	m	11	2009	2011	3	11	2009	2011	3	O/O
ppDDE	µg/kg	53B	Inner Sørfjord	Hordaland	GADU MOR	LI	L	969.697	1422.33	1450	2611.45	547.619	1405.28	615.385	897.218	1068.25	1000	121.713	m	21	1988	2011	23	15	2002	2011	10	O/O
ppDDE	µg/kg	53B	Inner Sørfjord	Hordaland	GADU MOR	MU	L	511.137	1470.59	633.333	1789.47	180	655.172	642.857	375.735	617.647	303.03	0.002	m	>25	1990	2011	21	20	2002	2011	10	O/O
ppDDE	µg/kg	53F	Inner Sørfjord	Hordaland	PLAT FLE	LI	L	230.337	363.636	227.273	254.237		224.138	176.923	88.641	71.364	77.778		m	14	1988	2011	22	11	2002	2011	9	↓/↓
ppDDE	µg/kg	53F	Inner Sørfjord	Hordaland	PLAT FLE	MU	L	163.934	160.526	154.054	302.326		164	147.619	46.849	64.661	43.137		m	16	1990	2011	20	13	2002	2011	9	↓/↓
ppDDE	µg/kg	67B	Strandebarm area	Hordaland	GADU MOR	LI	L	222.727	153.448	186.364	289.474	64.151	269.231	269.43	265.517	677.15	362.143	17.112	m	20	1988	2011	24	17	2002	2011	10	↓/O
ppDDE	µg/kg	67B	Strandebarm area	Hordaland	GADU MOR	MU	L	127.027	55.556	160	193.75	28.947	148.387	156.944	113.953	343.75	141.421	0	m	23	1990	2011	22	20	2002	2011	10	↓/O
ppDDE	µg/kg	67F	Strandebarm area	Hordaland	LEPI WHI	LI	L	248.148	241.379	190.521	350	247.672	160	389.474	306.667	265.217	184.842	4.646	m	14	1988	2011	24	12	2002	2011	10	↓/O
ppDDE	µg/kg	67F	Strandebarm area	Hordaland	LEPI WHI	MU	L	100	140.476	164.429	225	98.499	105.263	237.5	232	89.189	198.383	0.002	m	15	1990	2011	22	15	2002	2011	10	↓/O
ppDDE	µg/kg	67F	Strandebarm area	Hordaland	PLAT FLE	LI	L	85.714	83.333	82.609	78.261	92.857	96.296	106.452	96.154		80	1.192	m	12	1996	2011	14	6	2002	2011	9	O/O
ppDDE	µg/kg	67F	Strandebarm area	Hordaland	PLAT FLE	MU	L	95.455	54.348	110	75.758	128.571	95	83.333	65.333		80	0.006	m	13	1996	2011	14	11	2002	2011	9	↓/O
ppDDE	µg/kg	80BH	Munkholmen	Sør-Trøndelag	GADU MOR	LI	L								151.111	121.203	218.182	66.331	m	12	2009	2011	3	12	2009	2011	3	O/O
ppDDE	µg/kg	80BH	Munkholmen	Sør-Trøndelag	GADU MOR	MU	L								52.327	37.5	73.684	0	m	14	2009	2011	3	14	2009	2011	3	O/O
ppDDE	µg/kg	98B1	Bjørnerøya (east)	Nordland	GADU MOR	LI	L	44.947	93.22	243.333	42.609	62.5	147.652	29.73	9.615	47.619	68.627	12.574	m	23	1992	2011	18	23	2002	2011	10	O/O
ppDDE	µg/kg	98B1	Bjørnerøya (east)	Nordland	GADU MOR	MU	L	30.556	46.188	131.25	58.333	28.125	87.86	13.158	9.434	20	25	0	m	22	1992	2011	18	20	2002	2011	10	O/O
ppDDE	µg/kg	98F2	Husholmen	Nordland	PLEU PLA	LI	L	58.443	30	22.308	118.673	81.429	38.636	16.304	16.19	34.667	12	0	m	18	2000	2011	12	19	2002	2011	10	O/O
ppDDE	µg/kg	98F2	Husholmen	Nordland	PLEU PLA	MU	L	53.072	17.647	20.833	327.352	136.111	50	11.628	9.259	26.829	8.929	0	m	24	2000	2011	12	25	2002	2011	10	O/O

Appendix I
Geographical distribution of contaminants and biomarkers in biota 2009-2011

Sorted by contaminant and species:

Cadmium (Cd)
Mercury (Hg)
Lead (Pb)
Sum of 7 CBs (CB-28, -52, 101, -118, -138, -153 and -180)
DDEPP (ppDDE)
HCB
TCDDN
PBDE
OH-pyrene
ALA-D (δ-amino levulinic acid dehydrase inhibition)
EROD-activity (Cytochrome P4501A-activity)
CYP1A (relative amount of cytochrome P4501A-protein)
TBT
VDSI

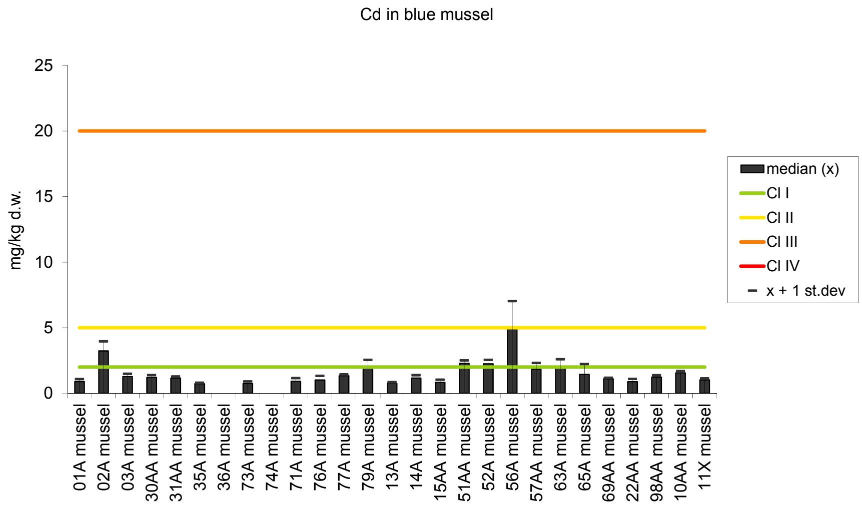
MYTI EDU-Blue Mussel (*Mytilus edulis*)
GADU MOR-Atlantic cod (*Gadus morhua*)
PLAT FLE-Flounder (*Platichthys flesus*)
LIMA LIM-Dab (*Limanda limanda*)
PLEU PLA-Plaice (*Pleuronectes platessa*)
MICR KIT-Lemon sole (*Microstomus kitt*)
LEPI WHI-Megrim (*Lepidorhombus whiff-iagonis*)

Station positions are shown on maps in Appendix F

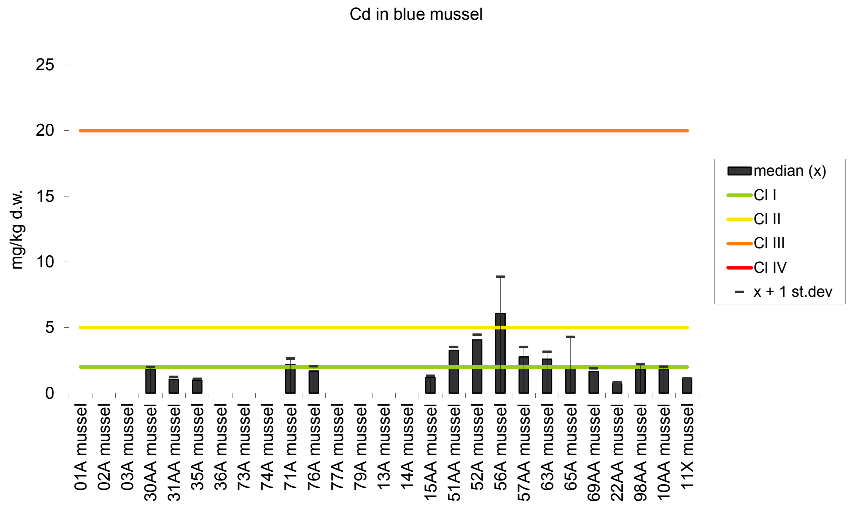
Results are presented for three periods as noted in figure text
The average of the median concentrations was used for each period.
Cf. Appendix E. sample overview

Appendix I
Geographical distribution of contaminants and biomarkers in biota 2009-2011
(cont.)

A



B



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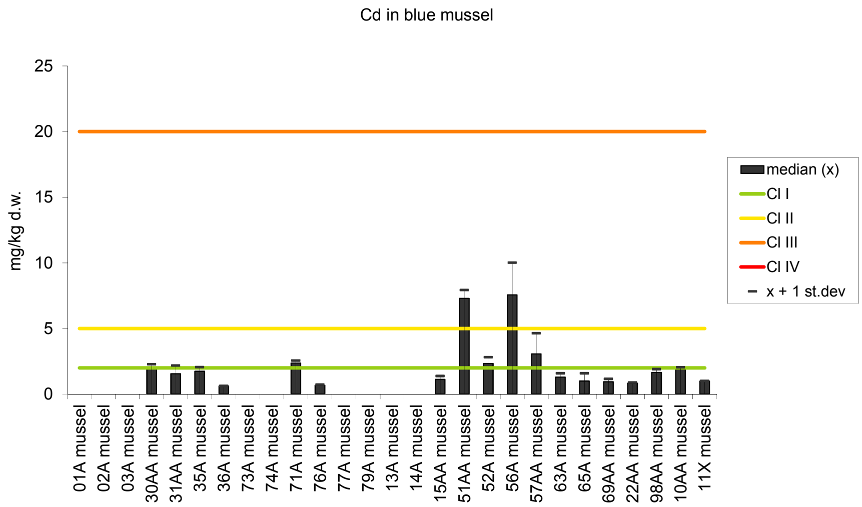
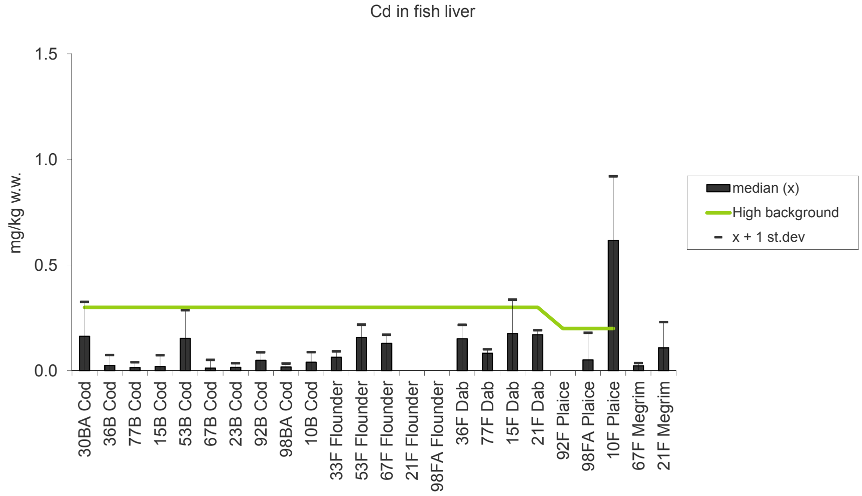


Figure 57. *Median, standard deviation and upper limit to Klif Classes or provisional "high background" concentration for cadmium in blue mussel 2009 (**A**), 2009 (**B**) and 2010 (**C**), ppm (mg/kg) dry weight (see maps in Appendix F).*

A



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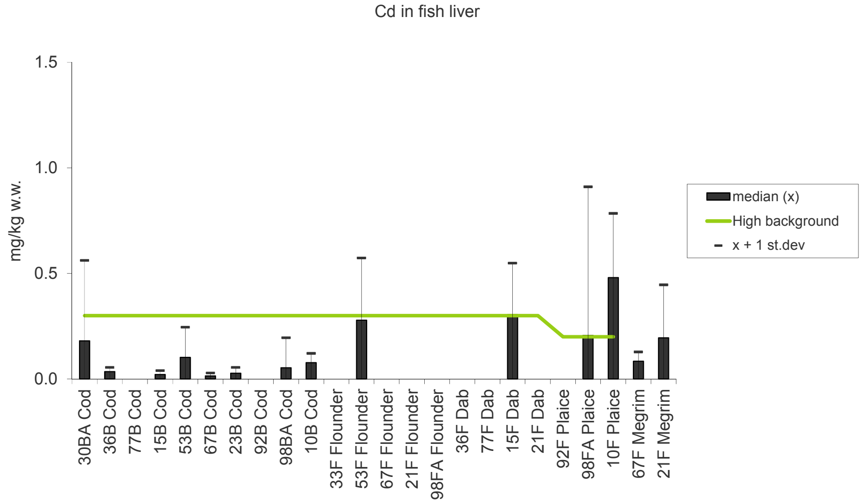


C

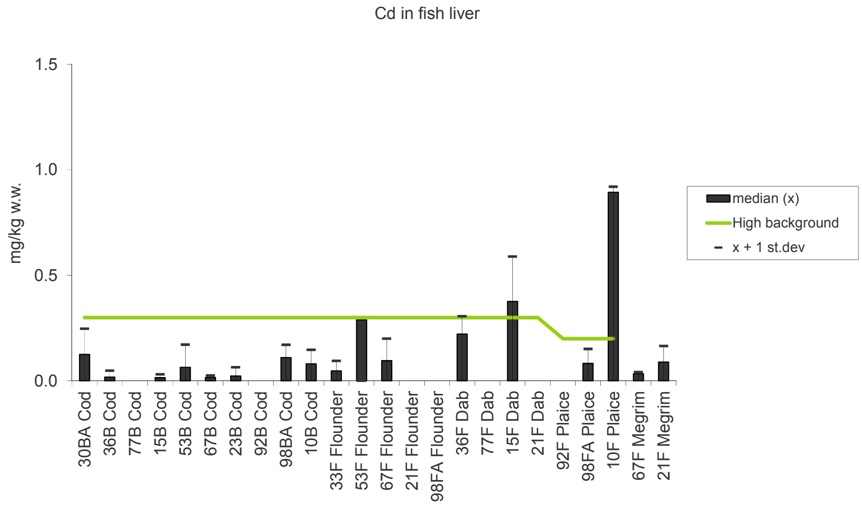
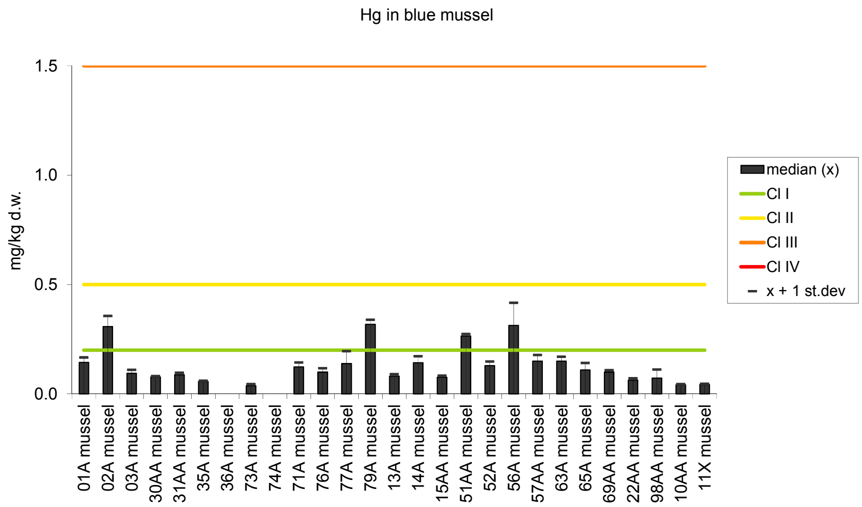
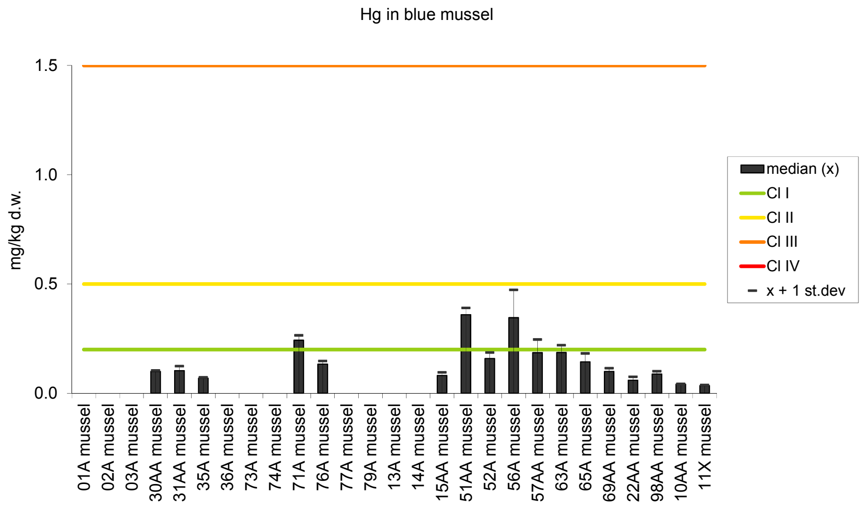


Figure 58. *Median, standard deviation and upper limit to Klif Classes or provisional "high background" concentration for cadmium in fish liver 2009* ***(A),*** *2010 (**B**) and 2011 (**C**), ppm (mg/kg) wet weight. "Cl.-B" indicates that only upper limit to Klif Classes or provisional high background concentration is indicated for all fish, (see maps in Appendix F).*

A



B



C

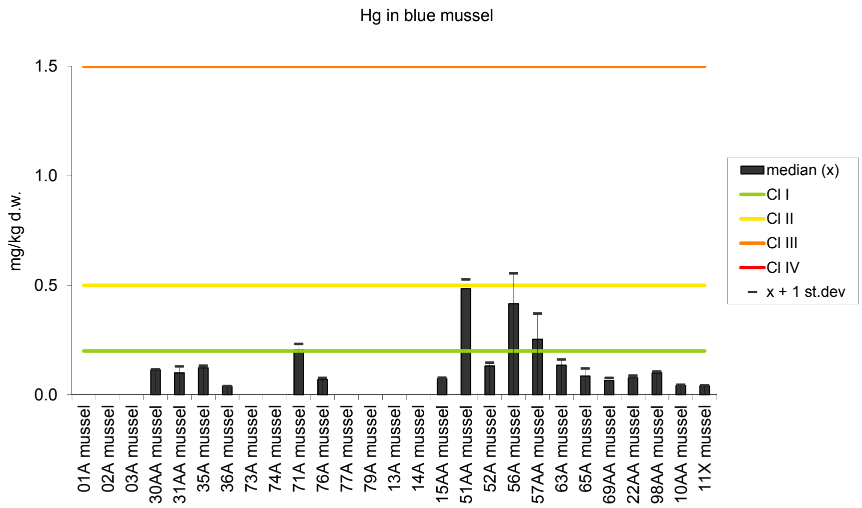
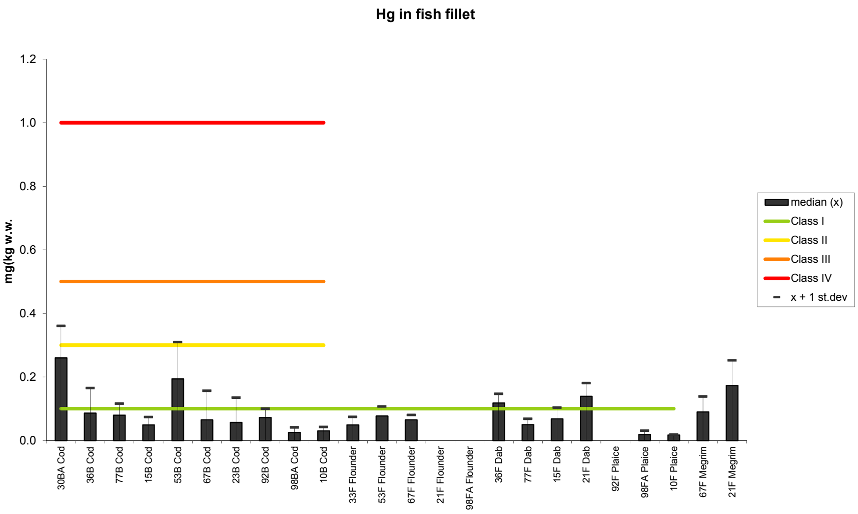
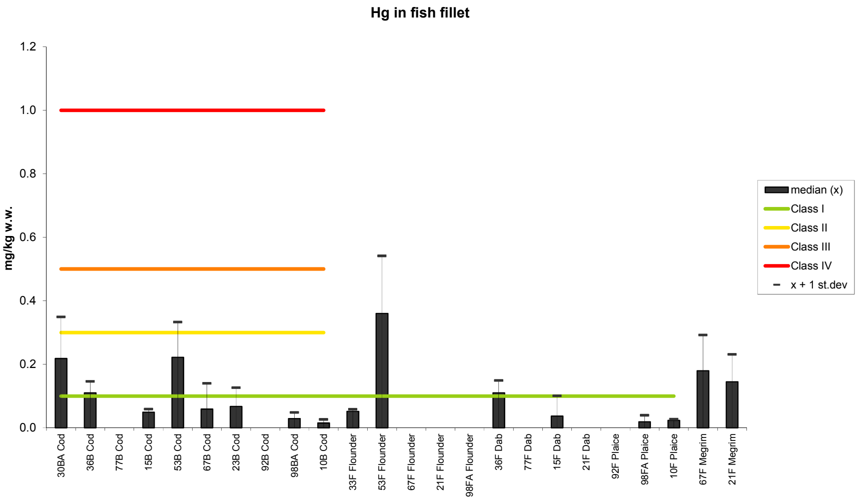


Figure 59. *Median, standard deviation and upper limit to Klif Classes or provisional "high background" concentration for mercury in blue mussel 2009 (**A**), 2010 (**B**) and 2011 (**C**), ppm (mg/kg) dry weight (see maps in Appendix F).*

A



B



C

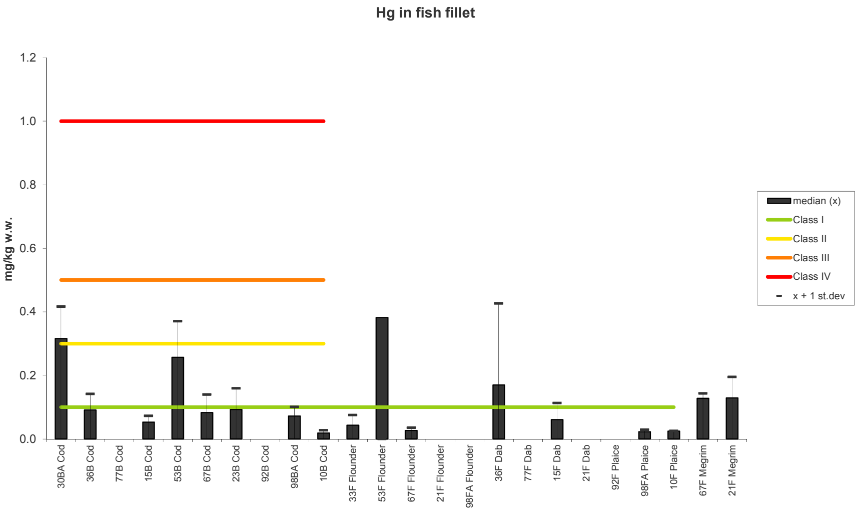
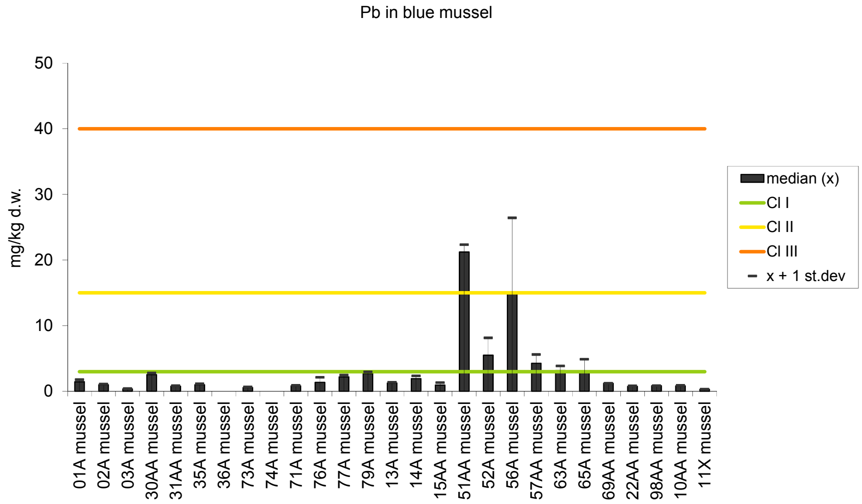
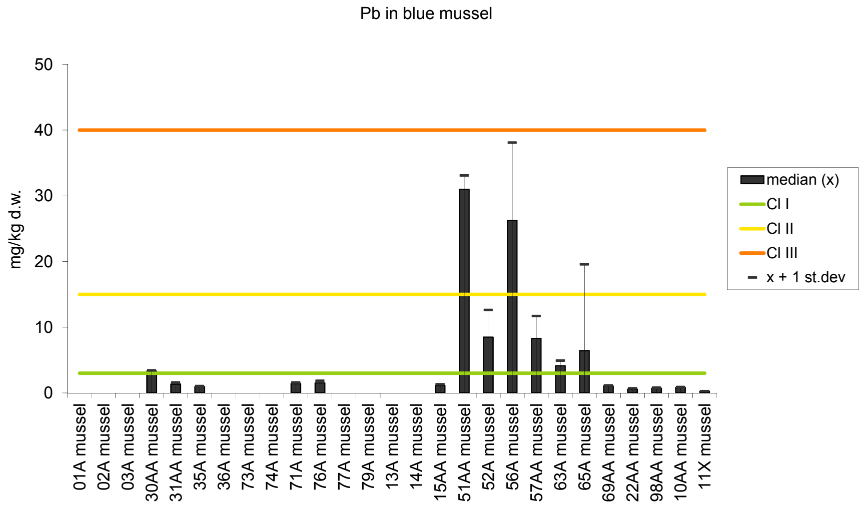


Figure 60. *Median, standard deviation and upper limit to Klif Classes or provisional "high background" concentration for mercury in fish fillet 2009 (**A**), 2010 (**B**) and 2011 (**C**), ppm (mg/kg) wet weight, "Cl.-B" indicates that only upper limit to Klif Classes or provisional high background concentration is indicated for flatfish, (see maps in Appendix F).*

A



B



C

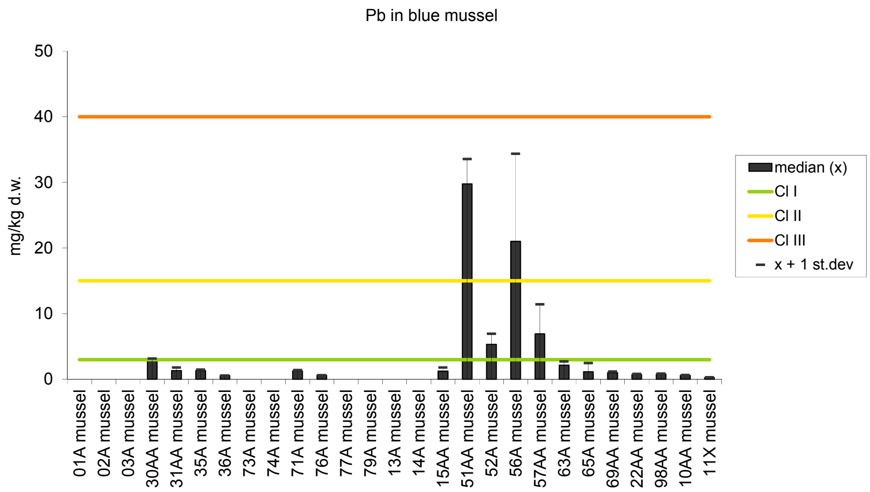
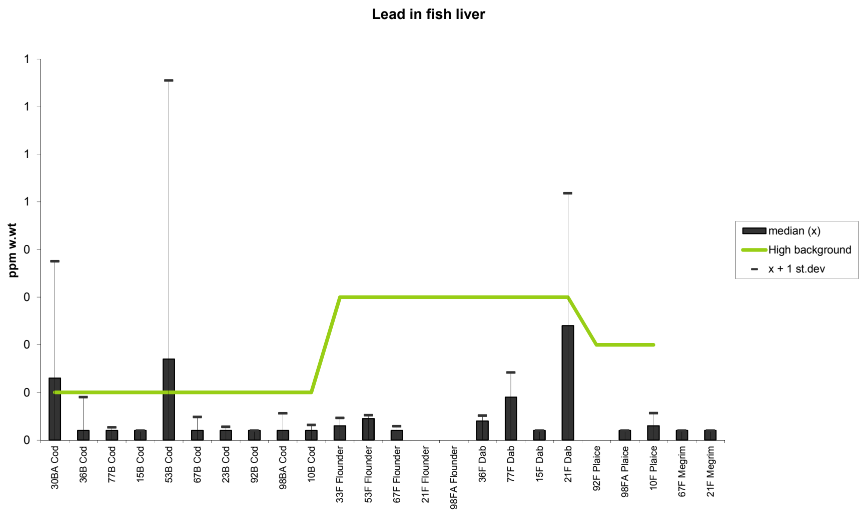
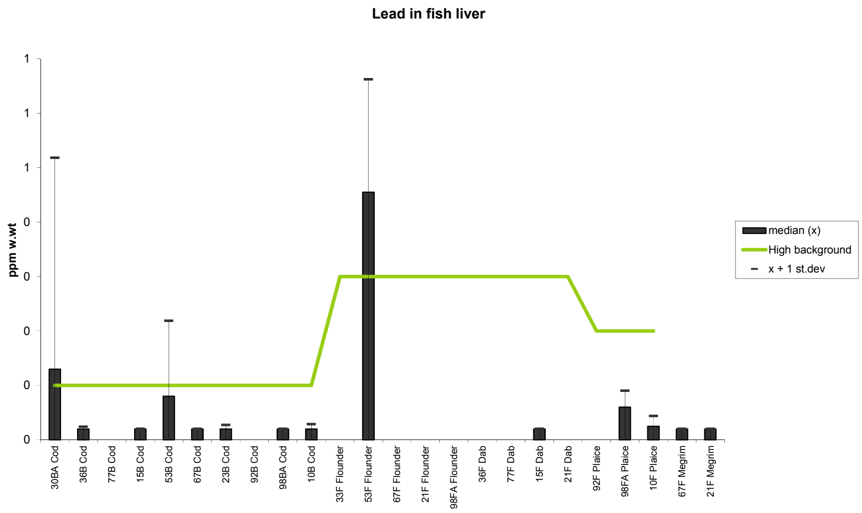


Figure 61. *Median, standard deviation and upper limit to Klif Classes or provisional "high background" concentration for lead in blue mussel 2009 (**A**), 2010 (**B**) and 2011 (**C**), ppm (mg/kg) dry weight (see maps in Appendix F).*

A



B



C

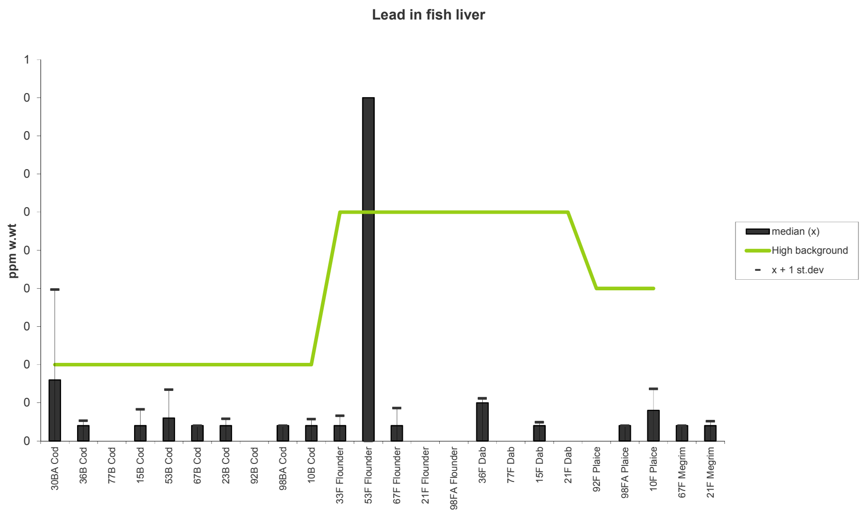


***Figure 62.** Median, standard deviation and upper limit to Klif Classes or provisional "high background" concentration for lead in fish liver 2009 (**A**), 2010 (**B**) and 2011 (**C**), ppm (mg/kg) wet weight, "Cl.-B" indicates that only upper limit to Klif Classes or provisional high background concentration is indicated for all fish, (see maps in Appendix F).*

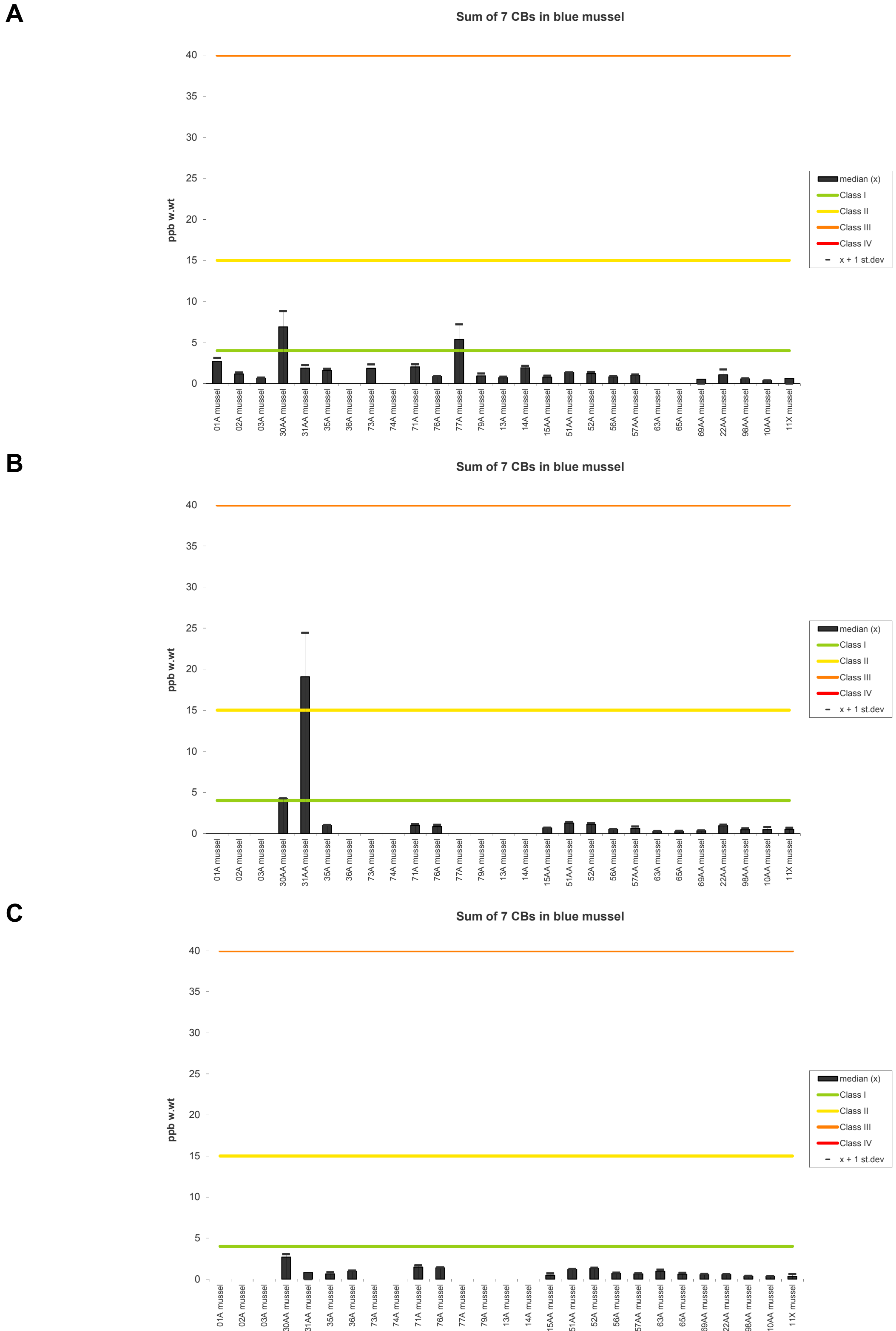


Figure 63. *Median, standard deviation and upper limit to Klif Classes or provisional "high background" concentration for sum of 7 PCBs (CB-28, -52, 101, -118, -138, -153 and -180) in blue mussel 2009 (**A**), 2010 (**B**) and 2011 (**C**), ppb (µg/kg) wet weight (see maps in Appendix F).*

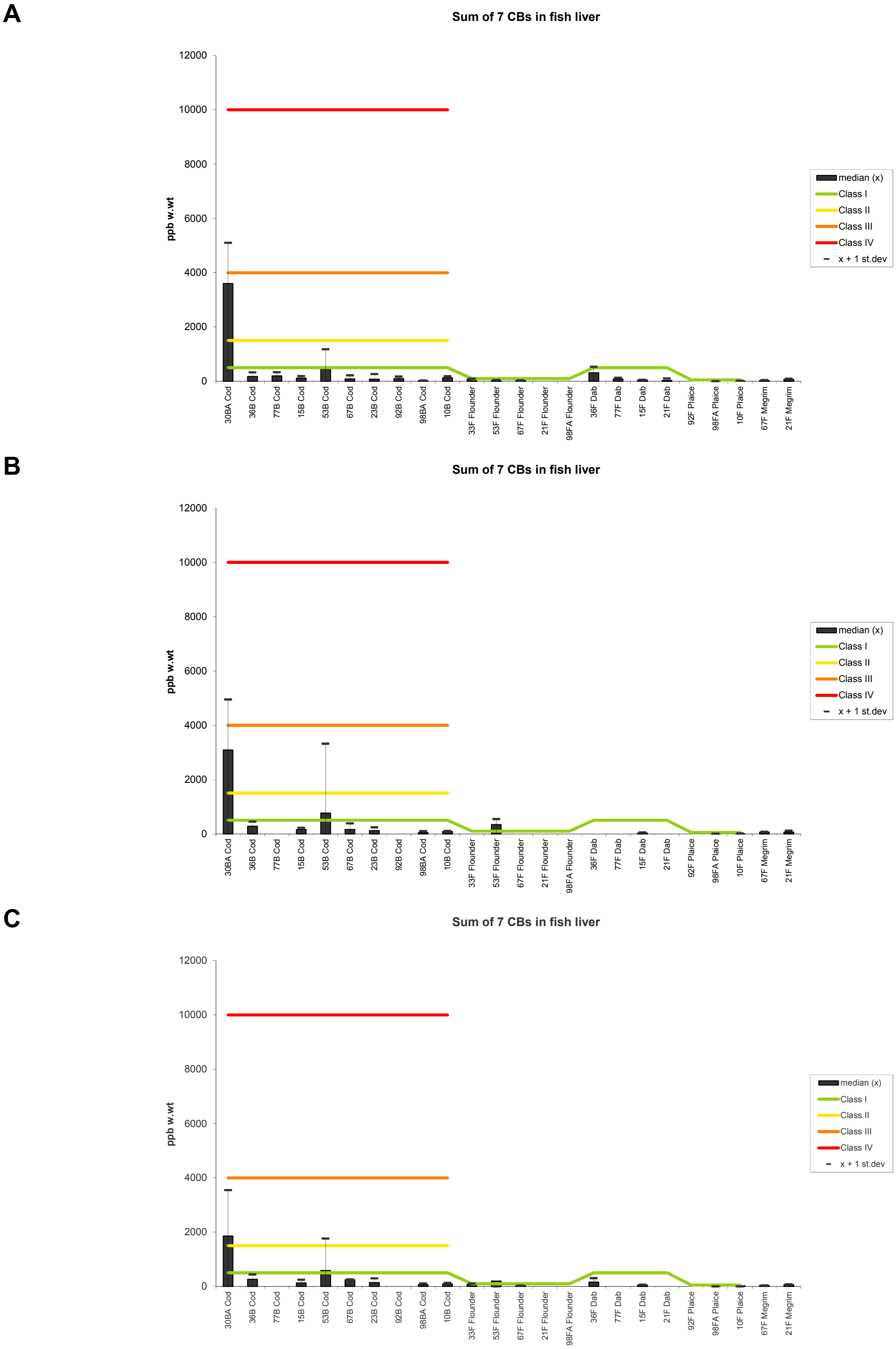
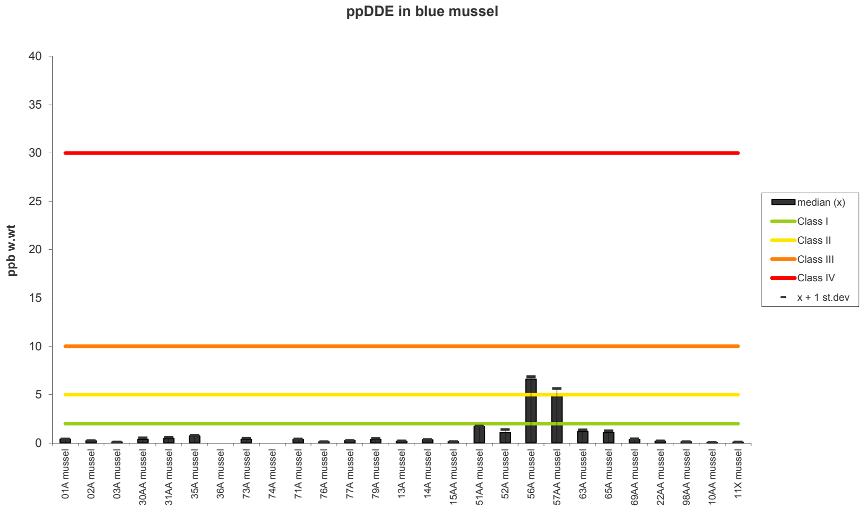
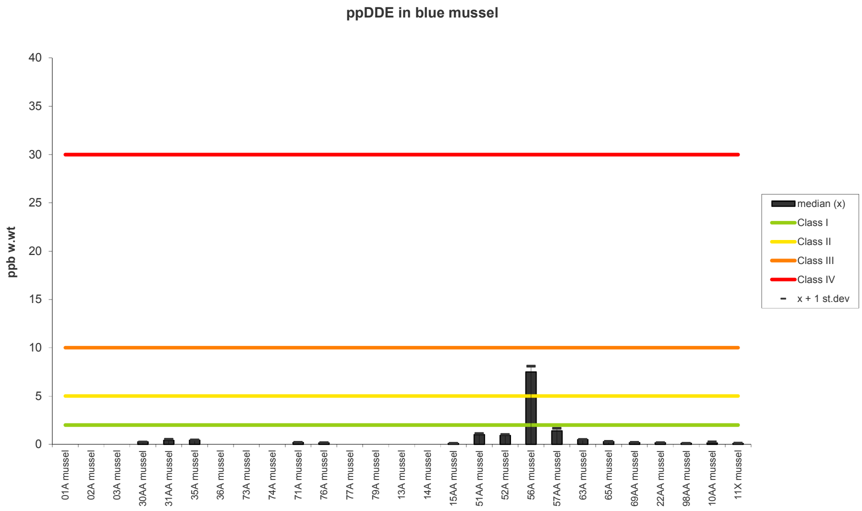


Figure 64. *Median, standard deviation and upper limit to Klif Classes or provisional "high background" concentration for sum of 7 PCBs (CB-28, -52, 101, -118, -138, -153 and -180) in fish liver 2009 (**A**), 2010 (**B**) and 2011 (**C**), ppb (µg/kg) wet weight, "Cl. I-B" indicates that only upper limit to Klif Classes or provisional high background concentration is indicated for flatfish, (see maps in Appendix F).*

A



B



C

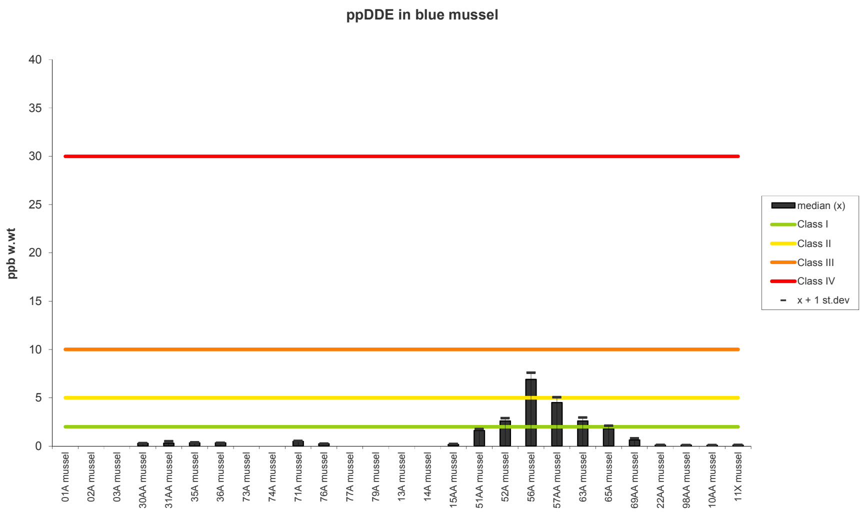
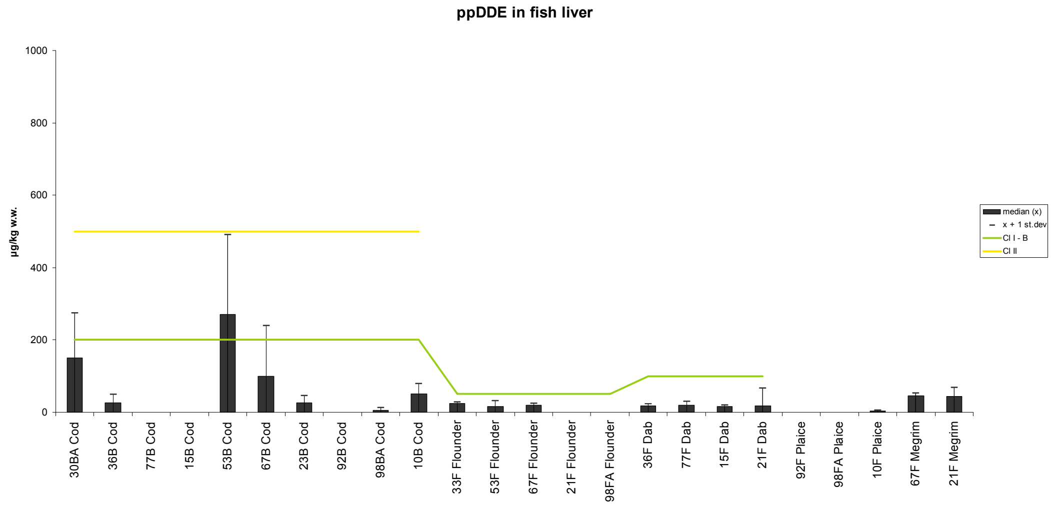
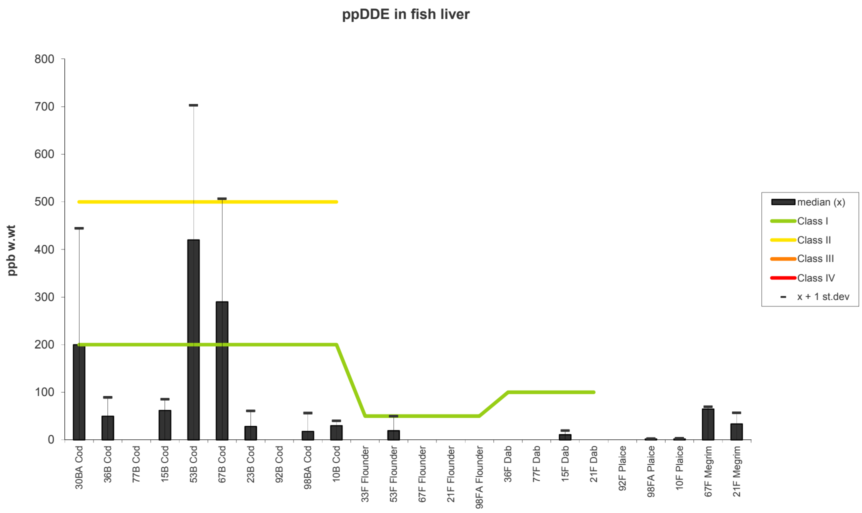


Figure 65. *Median, standard deviation and upper limit to Klif Classes or provisional "high background" concentration for ppDDE (DDEPP) in blue mussel 2009 (**A**), 2010 (**B**) and 2011 (**C**), ppb (µg/kg) wet weight (see maps in Appendix F). (See also footnote in Table 14).* ***Note: Class limits for ΣDDT used.***

A



B



C

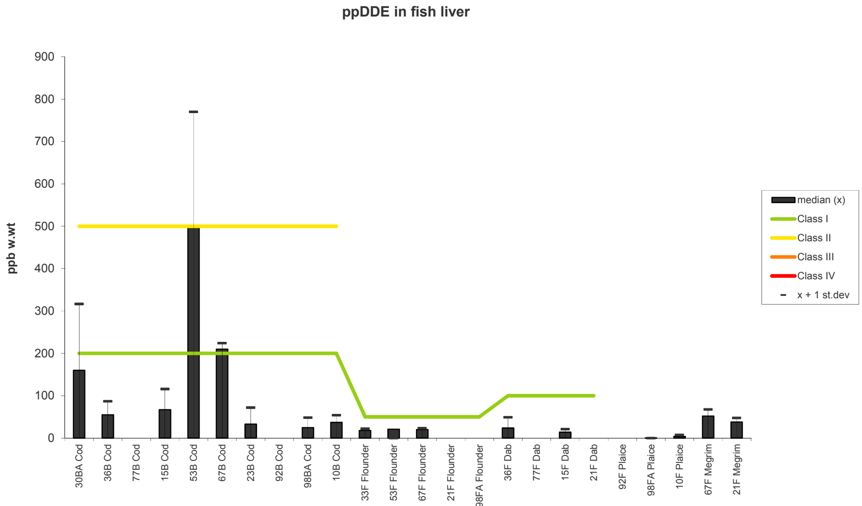
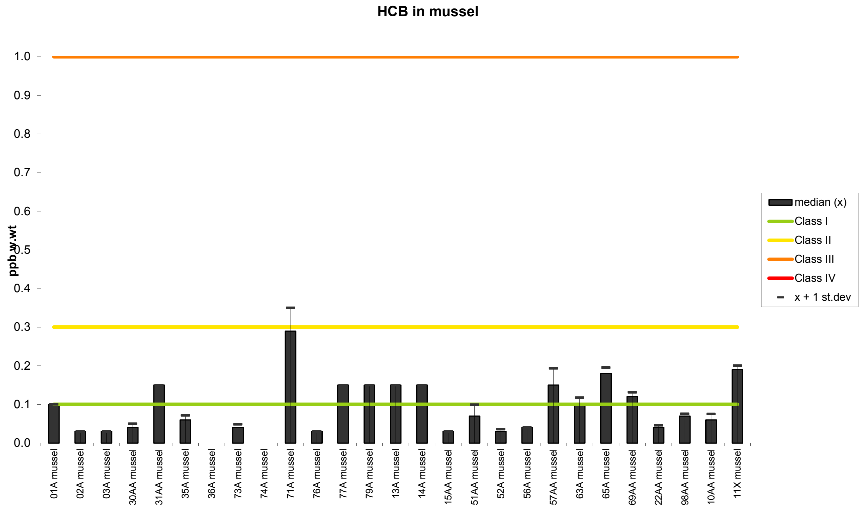
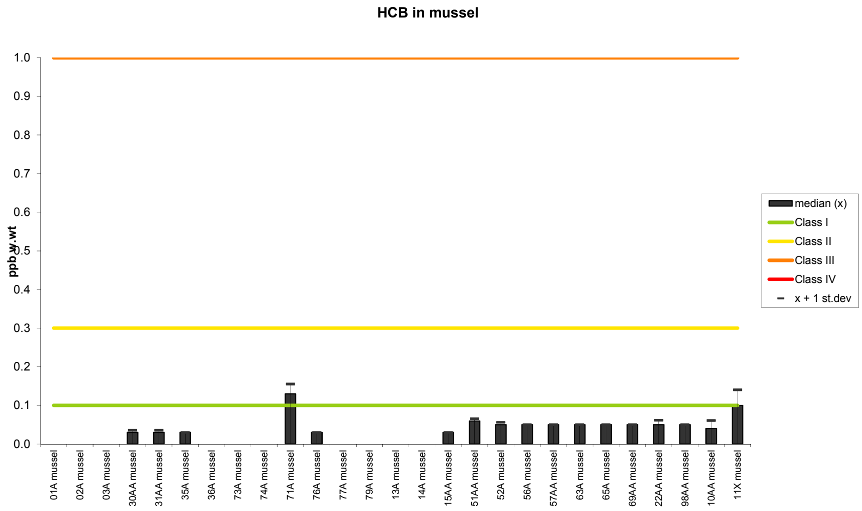


Figure 66. *Median, standard deviation and upper limit to Klif Classes or provisional "high background" concentration for ppDDE (DDEPP) in fish liver 2009 (**A**), 2010 (**B**) and 2011 (**C**), ppb (μg/kg) wet weight, "Cl.-B" indicates that only upper limit to Klif Classes or provisional high background concentration is indicated for flatfish, (see maps in Appendix F). (See also footnote in Table 14).* ***Note: Class limits for ΣDDT used.***

A



B



C

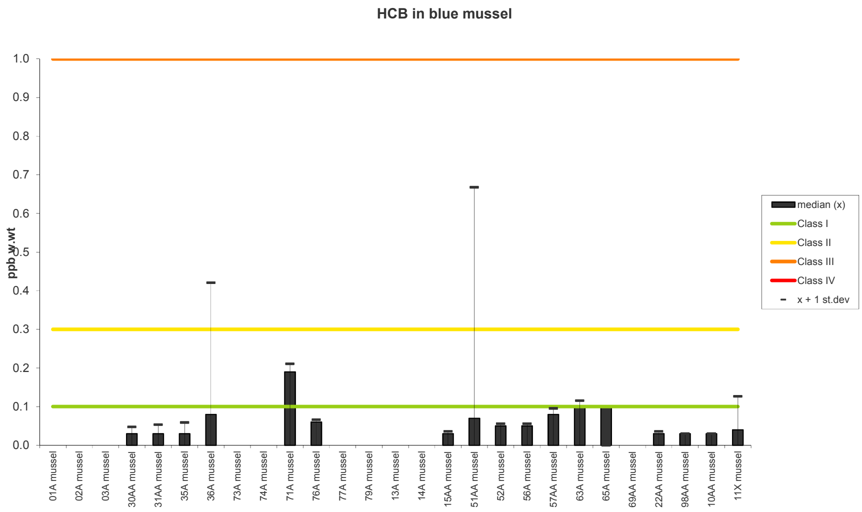
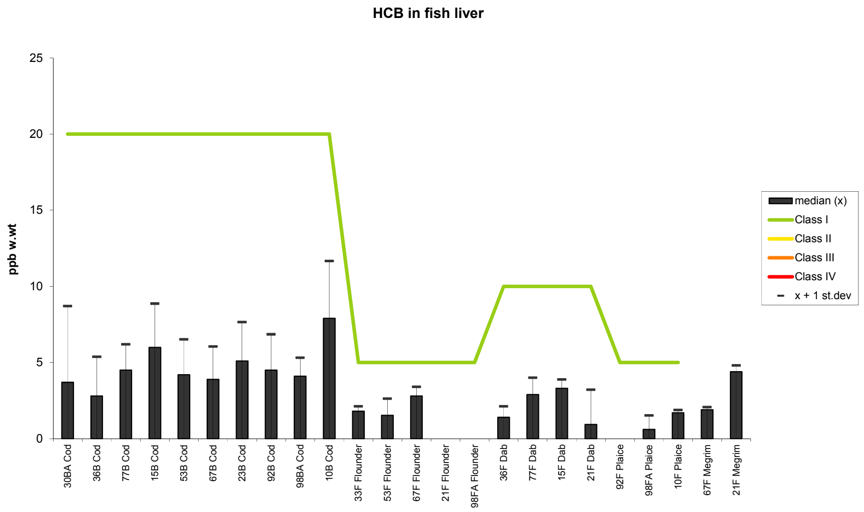
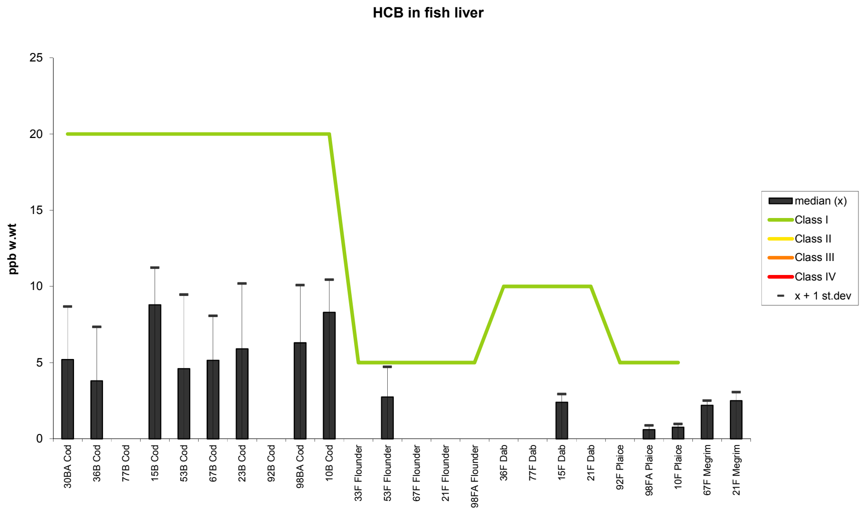


***Figure 67.** Median, standard deviation and upper limit to Klif Classes or provisional "high background" concentration for HCB in blue mussel 2009 (**A**), 2010 (**B**) and 2011 (**C**), ppb (μg/kg) wet weight (see maps in Appendix F).*

A



B



C

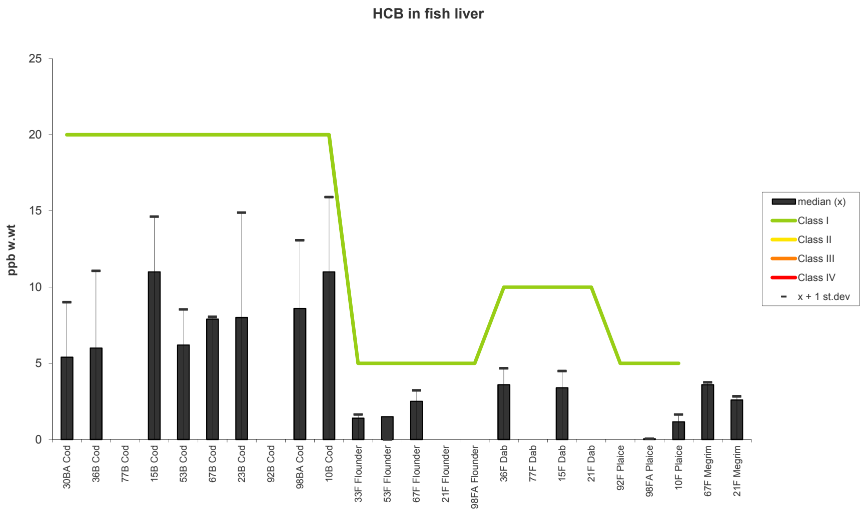


Figure 68. *Median, standard deviation and upper limit to Klif Classes or provisional "high background" concentration for HCB in fish liver 2009 (**A**), 2010 (**B**) and 2011 (**C**), ppb (µg/kg) wet weight, "Cl.-B" indicates that only upper limit to Klif Classes or provisional high background concentration is indicated for all fish, (see maps in Appendix F).*

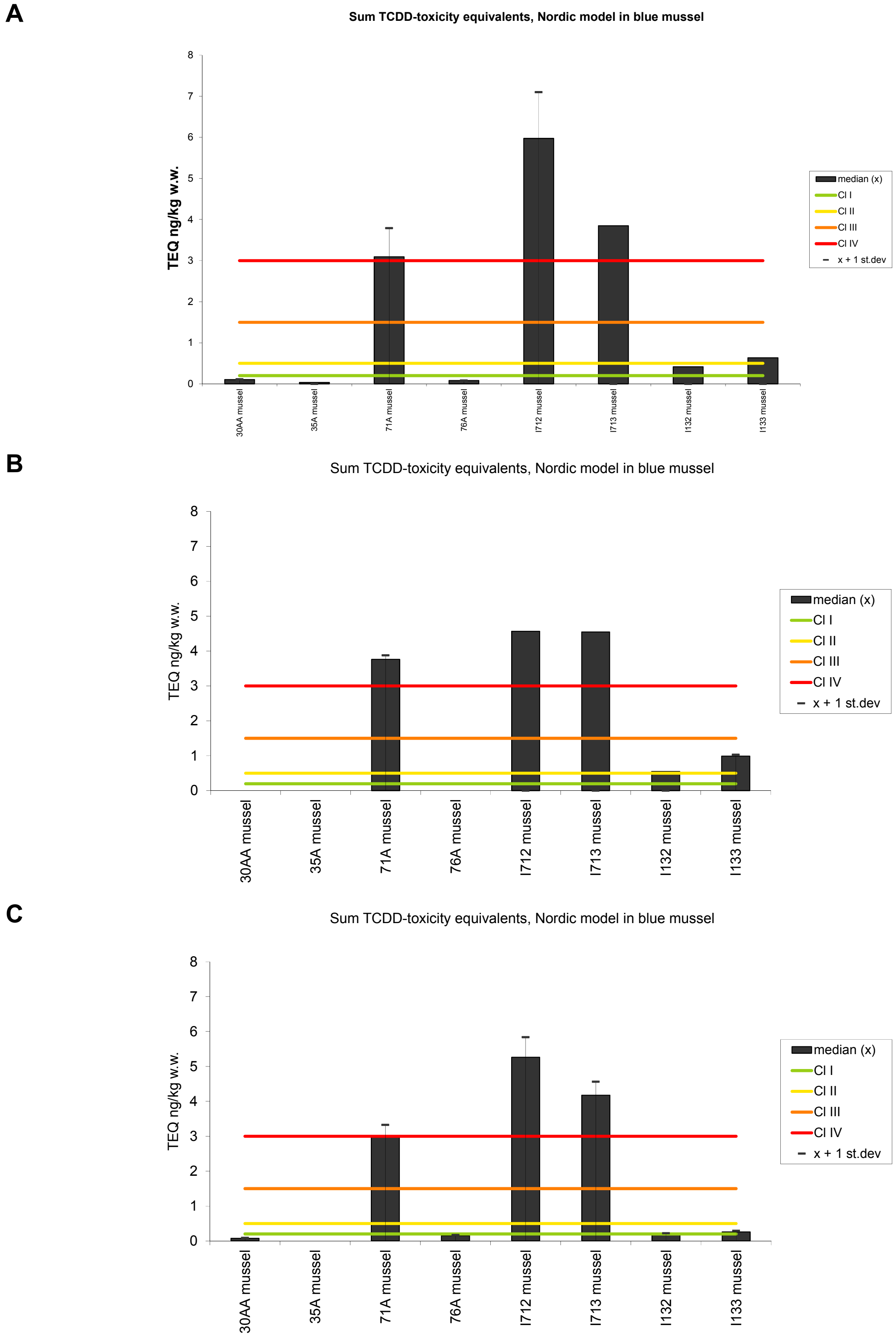


Figure 69. *Median, standard deviation and upper limit to Klif Classes or provisional "high background" concentration for dioxin TCDD-toxicity equivalents after Nordic model (TCDDN) in blue mussel 2009 (**A**), 2010 (**B**) and 2011 (**C**), ppp (ng/kg) wet weight (see maps in Appendix F). NB: TCDDN is a sum of specific dioxin compounds of which may include compounds of uncertain quantification.*

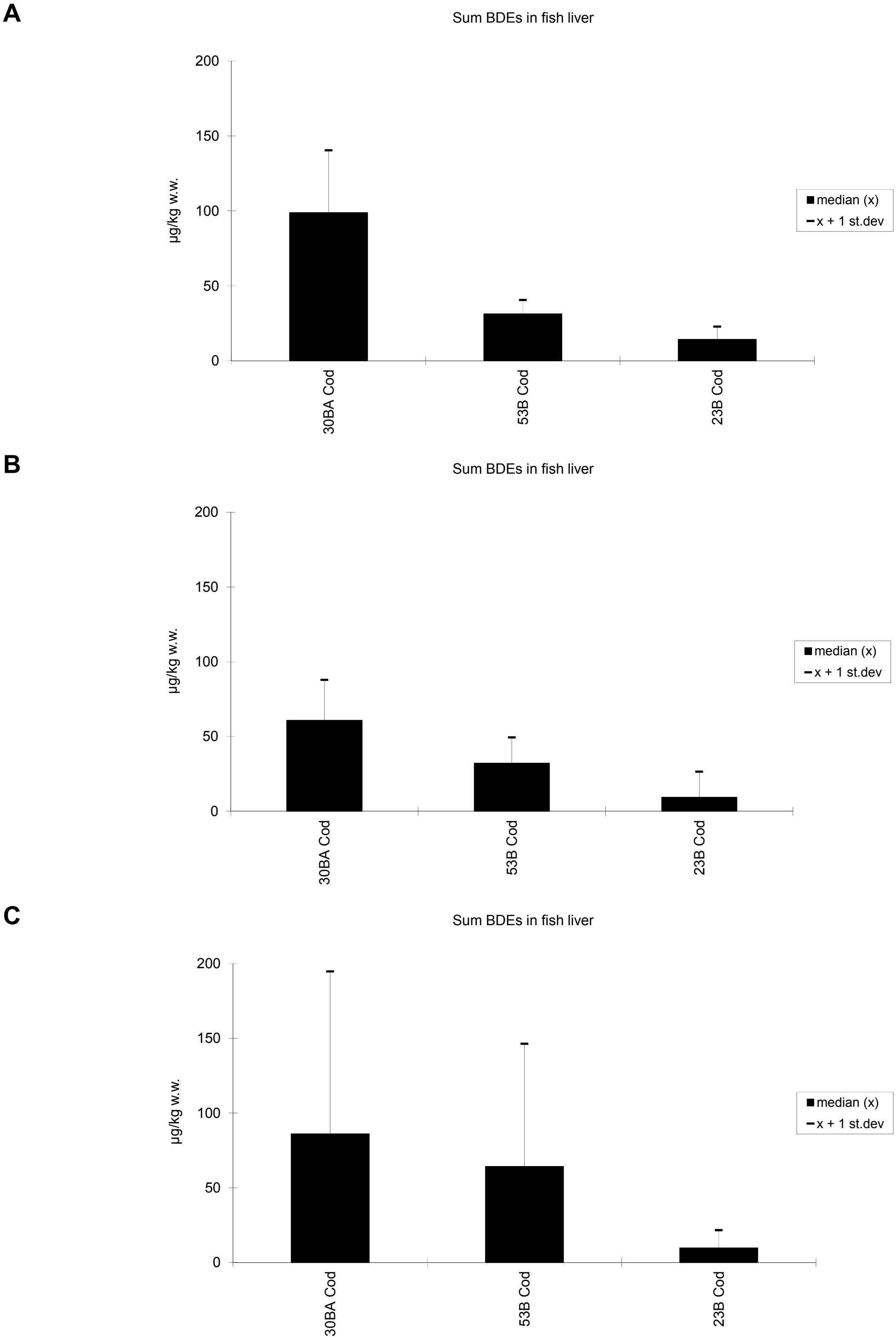


Figure 70. *Median concentration for brominated flame retardant in cod liver 2009 (**A**), 2010 (**B**) and 2011 (**C**) ppb (µg/kg) wet weight for three CEMP stations (Inner Oslofjord-st. 30B, Inner Sørfjord-st. 53B and Karihavet-st. 23B) (see maps in Appendix F), and from two other investigations (see text). Polybrominated diphenyl ethers (PBDE), including brominated flame retardants, and includes: BDE28, BDE47, BDE49, BDE66, BDE71, BDE77, BDE85, BDE99, BDE100, BDE119, BDE138, BDE153, BDE154, BDE183, BDE205 (and for some samples BDE196 and BDE209).*

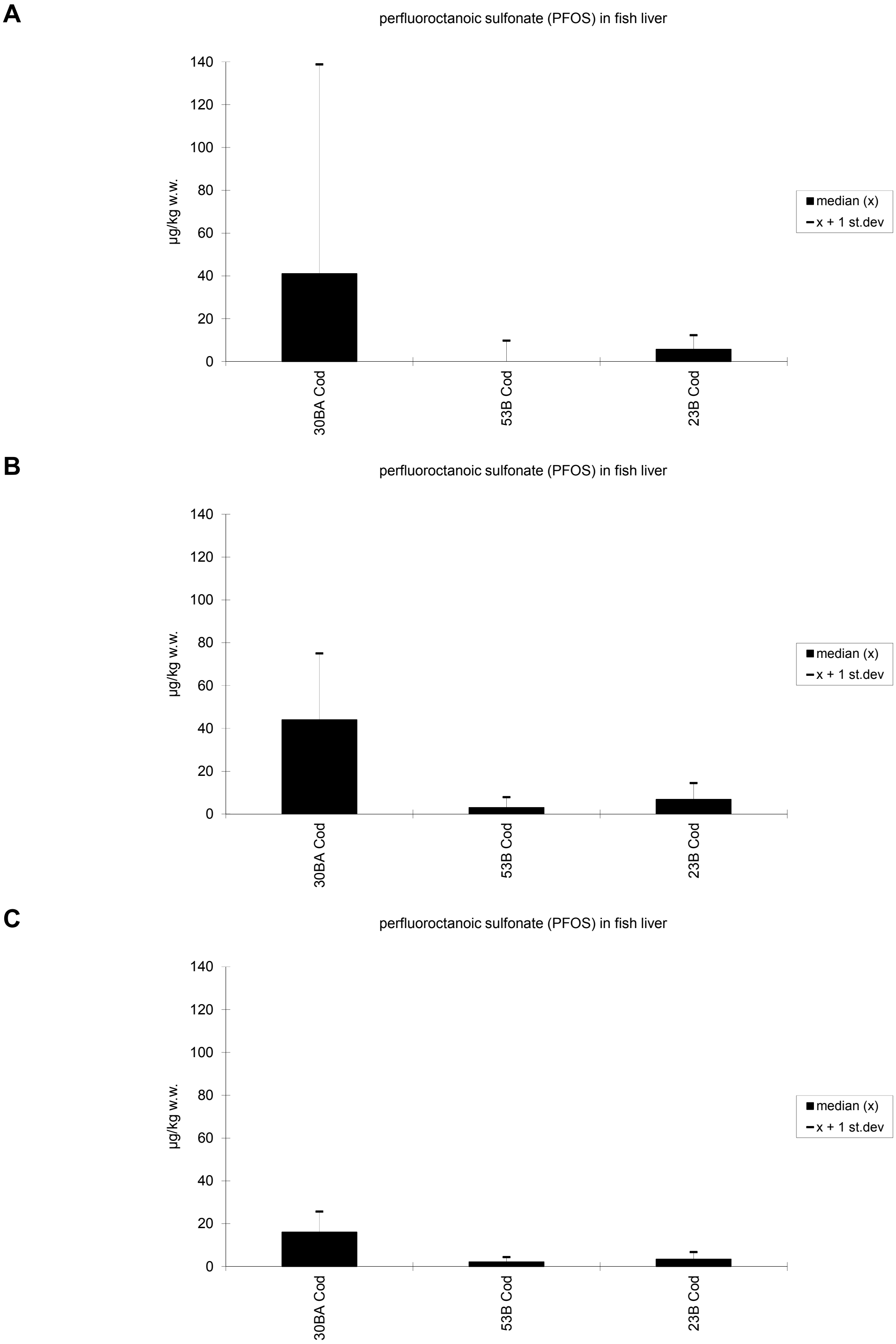
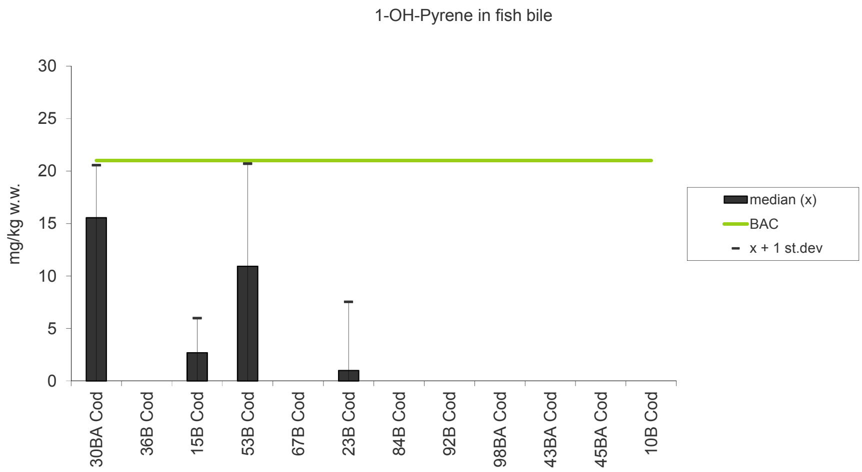
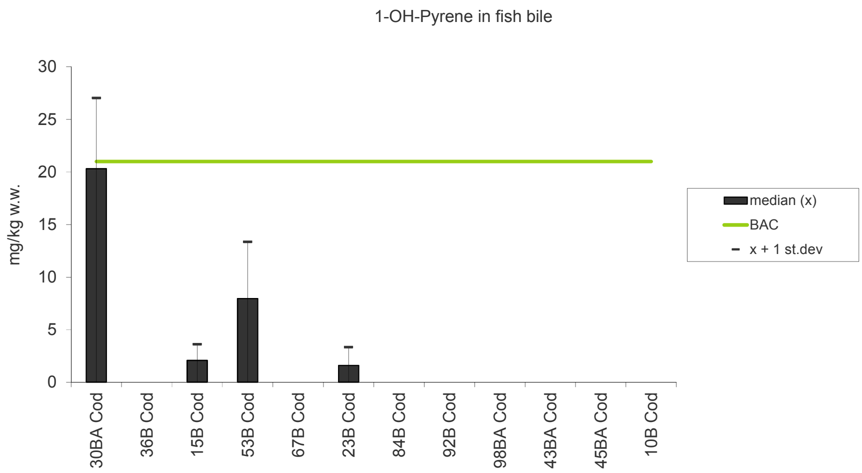


Figure 71. *Median concentration for perfluoroctanoic sulfonate (PFOS) in cod liver 2009 (**A**), 2010 (**B**) and 2011 (**C**) ppb (µg/kg) wet weight for three CEMP stations (Inner Oslofjord-st. 30B, Inner Sørfjord-st. 53B and Karihavet-st. 23B) (see maps in Appendix F), and from two other investigations (see text).*

A



B



C

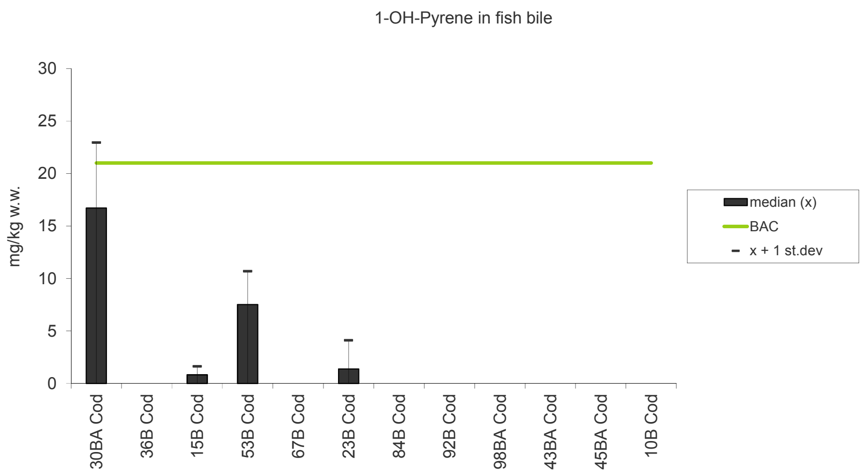
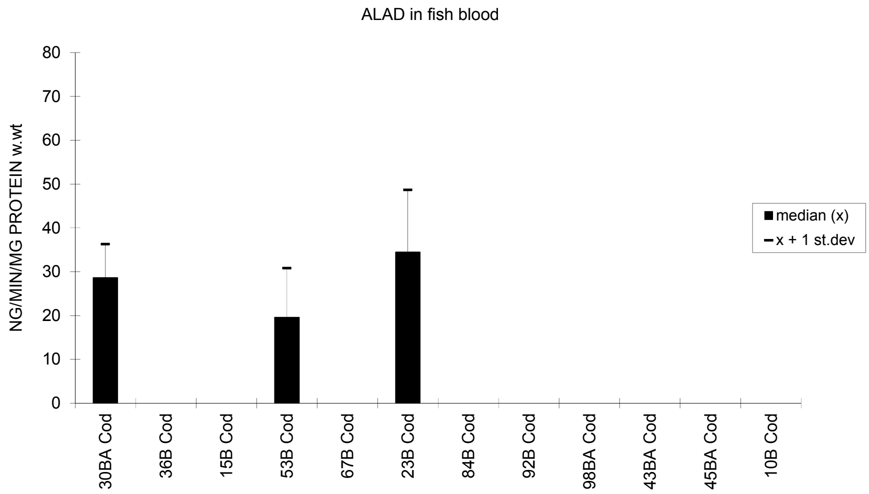
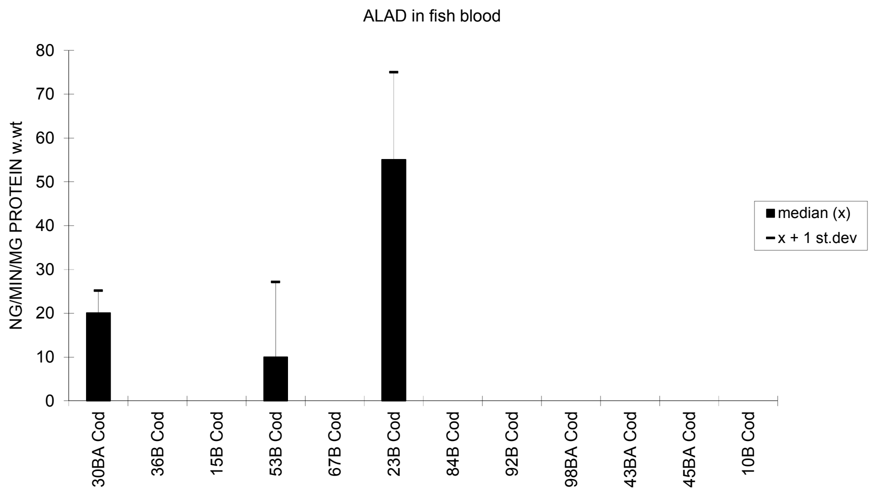


Figure 72. *Median and standard deviation concentration for OH-pyrene (Pyrene metabolite) in fish bile 2009 (**A**), 2010 (**B**) and 2011 (**C**), μg/kg/ABS (absorbance) 380 nm (see maps in Appendix F).*

A



B



C

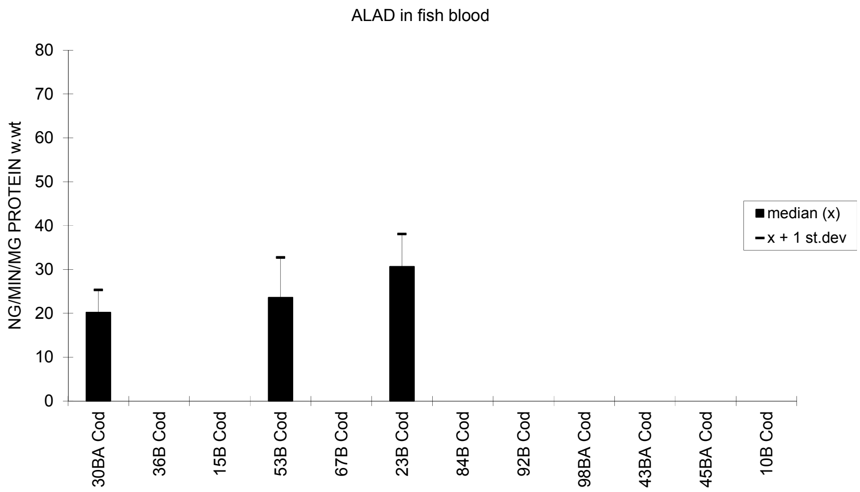
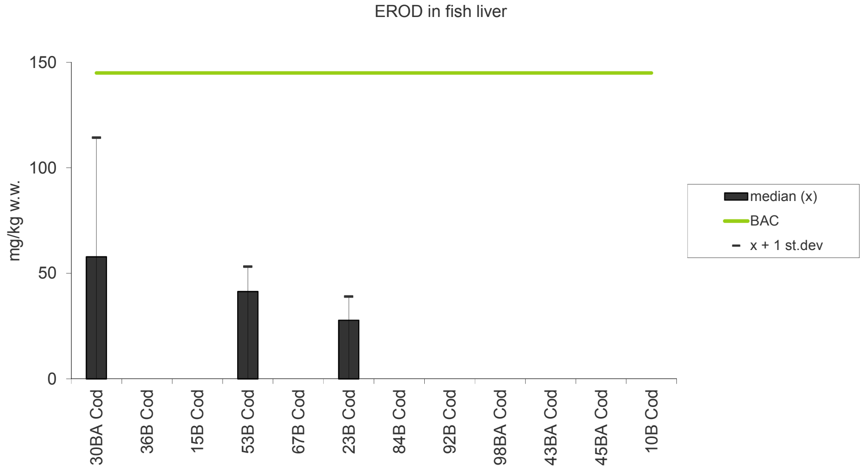
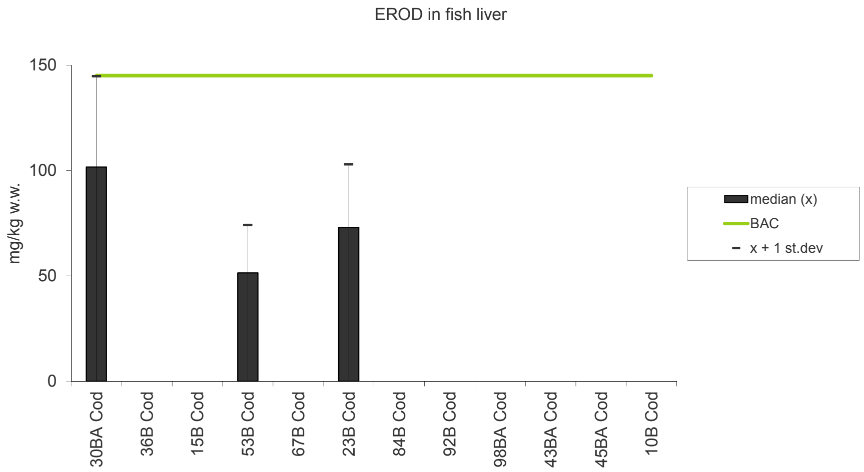


Figure 73. *Median and standard deviation activity for ALA-D (δ-amino levulinic acid dehydrase inhibition) in fish blood 2009 (**A**), 2010 (**B**) and 2011 (**C**), ng PBG (porphobilinogen)/min/mg protein (see maps in Appendix F).*

A



B



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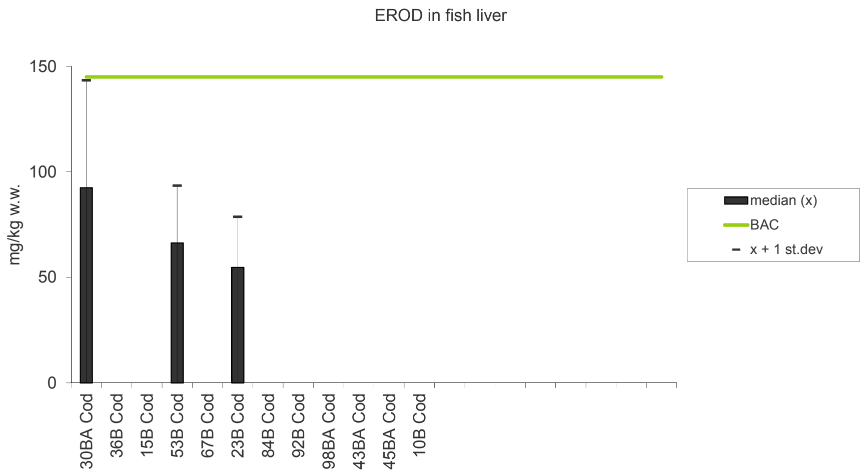

***Figure 74.** Median and standard deviation activity for EROD (Cytochrome P4501A-activity) in fish liver 2009 (**A**), 2010 (**B**) and 2011 (**C**), pmol/min/mg protein (see maps in Appendix F).*

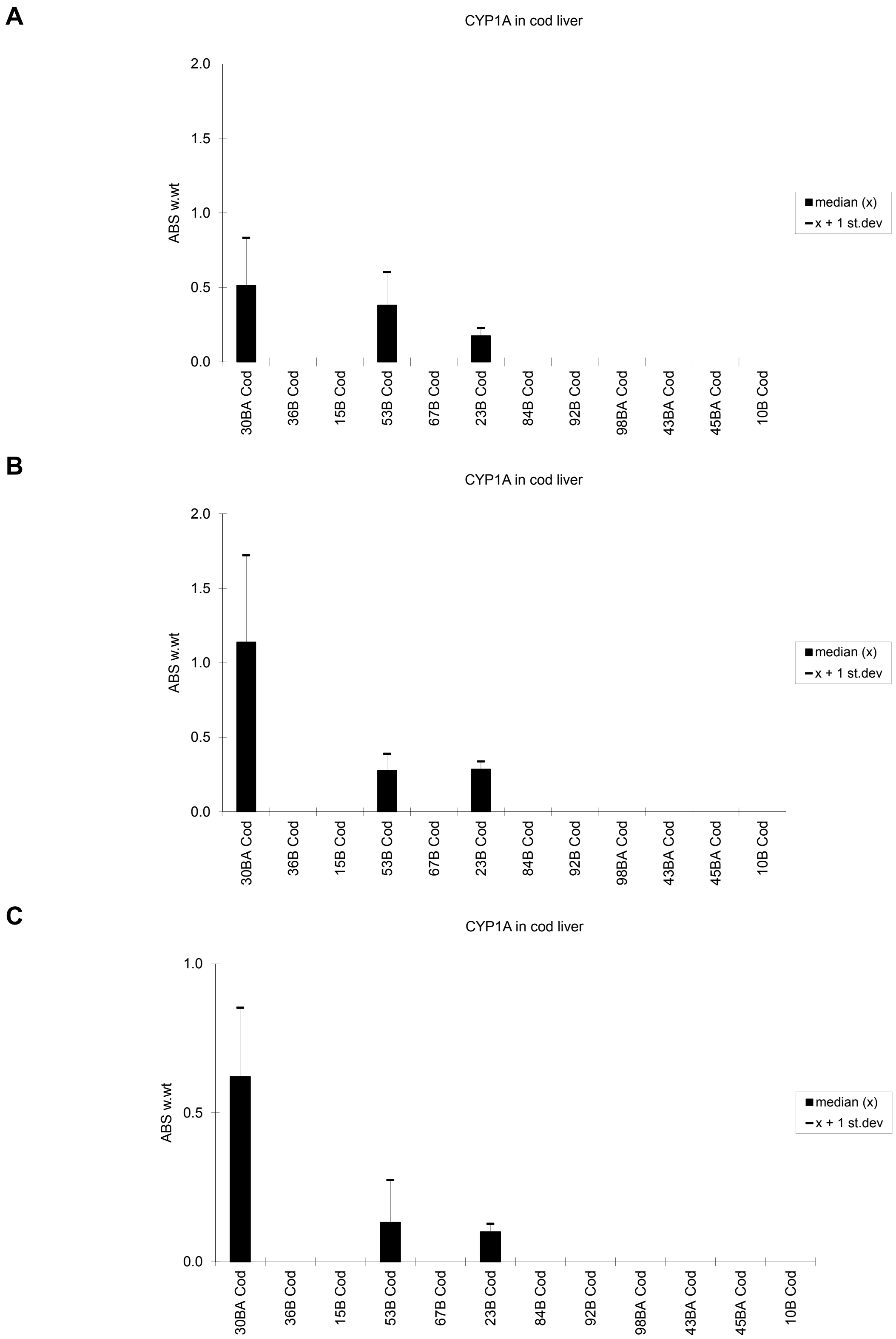

Figure 75. *Median and standard deviation activity for CYP1A (relative amount of Cytochrome P4501A-protein) in fish liver 2009 (**A**), 2010 (**B**) and 2011 (**C**), pmol/min/mg protein (see maps in Appendix F).*

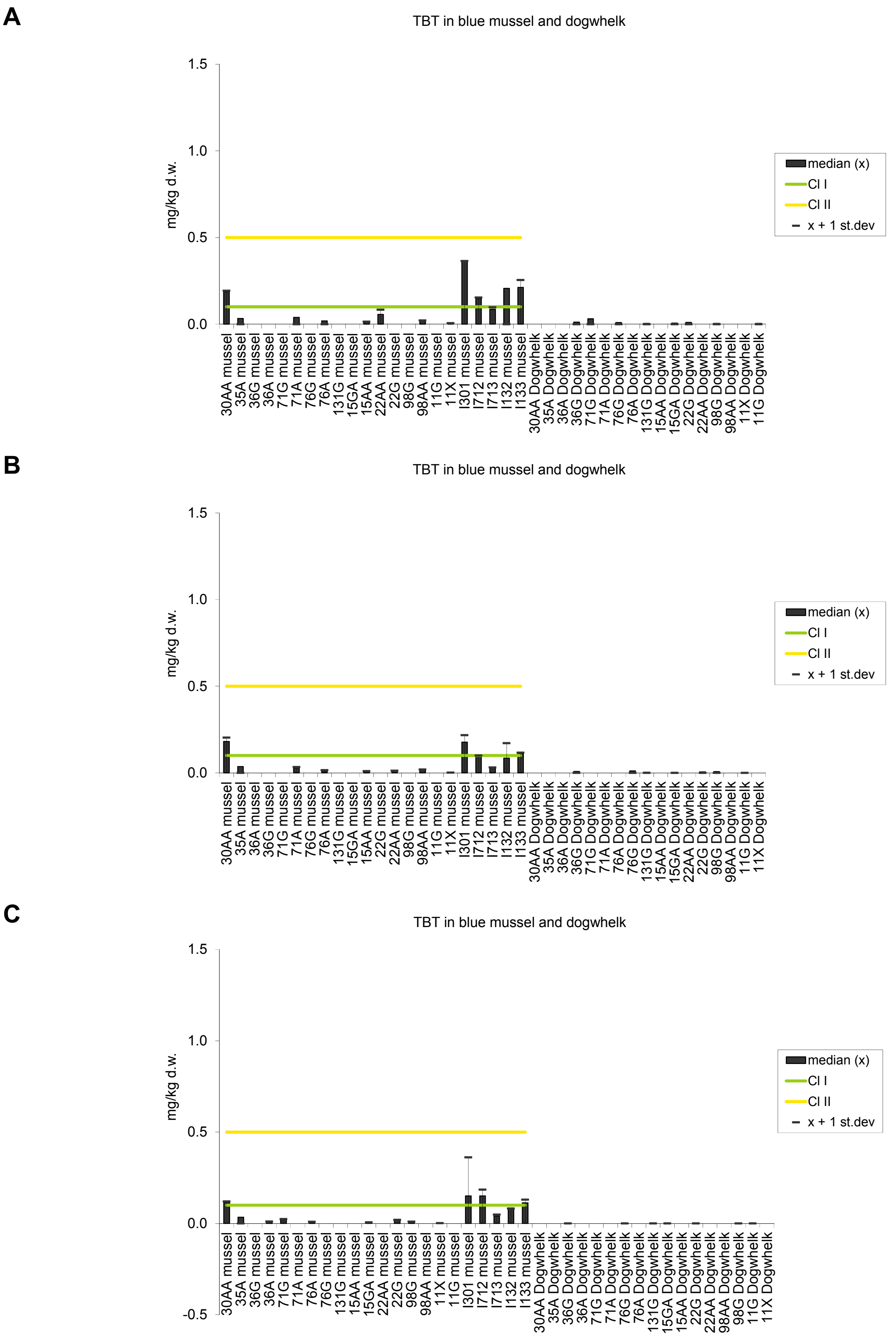

Figure 76. *Median, standard deviation and upper limit to Klif Classes or provisional "high background" concentration for tributyltin (TBT-concentration on a formulation basis) in blue mussel and dog whelk 2009 (**A**), 2010 (**B**) and 2011 (**C**), ppm (2.44* mg Sn/kg) dry weight (see maps in Appendix F).*|

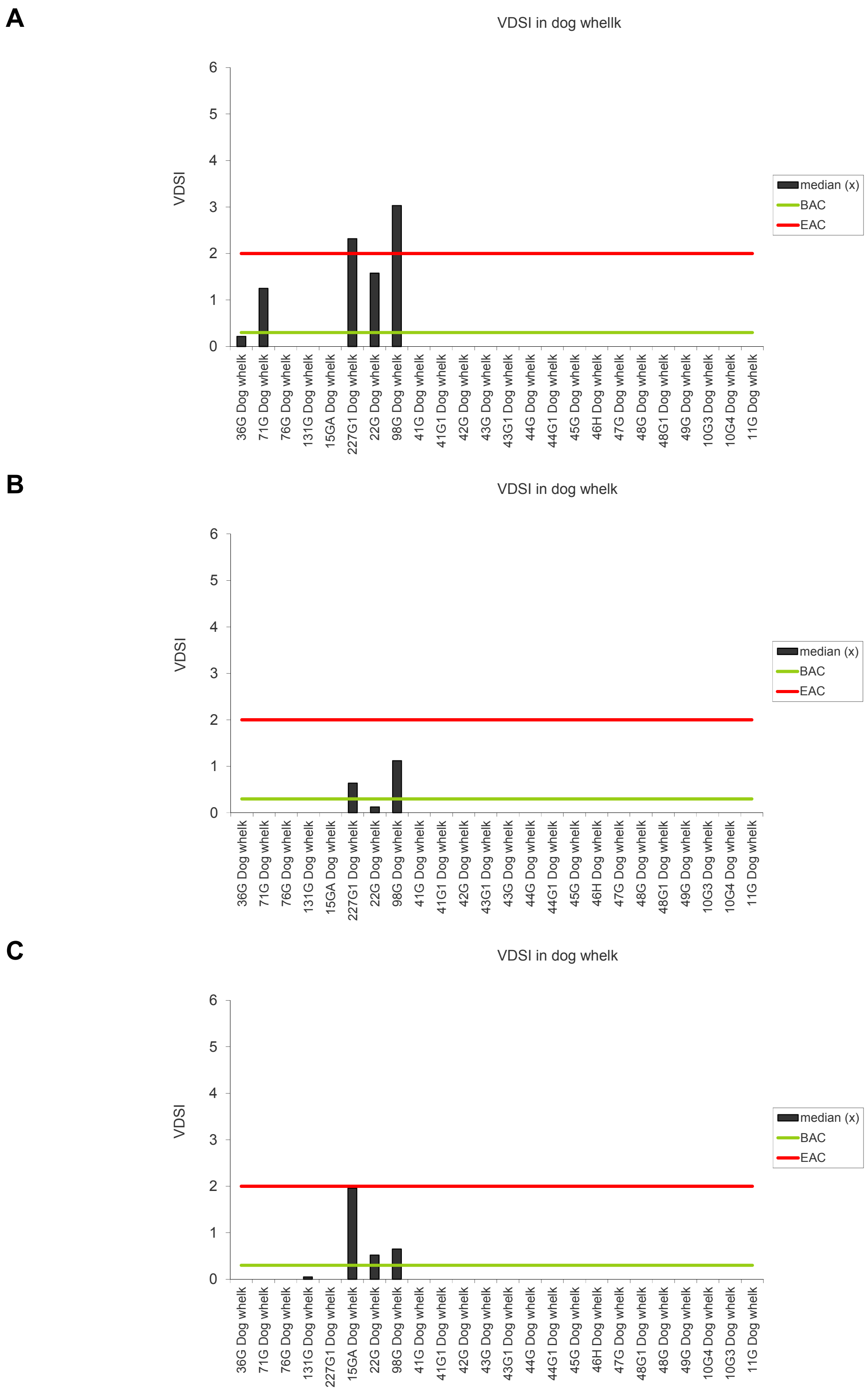

Figure 77. *Average VDSI in dog whelk 2009 (**A**), 2010 (**B**) and 2011 (**C**) (see maps in Appendix F).*

Appendix J
Results from INDEX determinations 1995-2011

Introduction

The blue mussel pollution and reference indices are two indices used to evaluate levels of certain hazardous substances in blue mussel from a selection of fjord areas in Norway (***Figure 78***). The pollution index is based on 26 stations from nine fjord areas regarded as polluted. The reference index is based on results from 8 stations remote from point sources of pollution in five fjord areas.

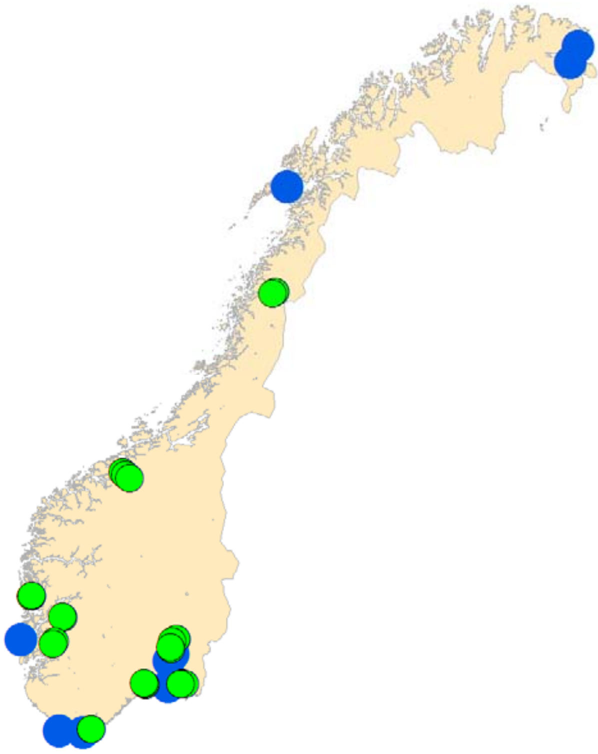

Figure 78. *Blue mussel Index stations sampled in 2010; pollution (green circles), reference (blue circles).*

The Index scale varies from 1 to 5 and is based on Klifs classification system, *viz*:

- 1: all areas or fjords are "Insignificantly" polluted (Class I),
- 1-2: between "Insignificantly" and "Moderate" (Class I and II).
- 2-3: between "Moderate" and "Marked" (Class II and III)
- 3-4: between "Marked" and "Severe" (Class III and IV)
- 4-5: between "Severe" and "Extremely" (Class IV and V)
- 5: at least one sample from each area or fjord is "Extremely" polluted (Class V)

To calculate the index each area or fjord is given a class according to the highest classification registered, e.g. if one station within an area is classified as Class IV, the area is designated with Maximum Environmental Class (Max.E.C.) of IV, provided that this is the highest classification found for all the stations in that area. A Max.E.C. of 1 means that all stations within an area are insignificantly polluted (Class I in Klif's classification system). There is one Max. E.C. determined for each fjord or fjord area and the average of these is the index. An index of 5 would mean that all the fjords or fjord areas have a Max.E.C. of V or "Extreme" in Klif's classification system.

The indices have been used since 1995 based on contaminant concentrations in blue mussel from 14-19 areas (cf. Green *et al.* 2004a). An assessment of their application suggested that the pollution index needed mainly two improvements (Green & Knutzen 2001): 1) more stations to avoid the consequences of insufficient sample size and 2) inclusion of more relevant contaminant analyses with respect to the pollution load expected and the Klif classification system for environmental quality (Molvær *et al.* 1997). Klif provided funds to improve the index in 2002. Three additional stations have since been established: one in the Frierfjord area (I713 Strømtangen, about 800 m east of I711 Steinsholmen), one in the inner Ranfjord (I964 Toraneskaien, about 500 m north of I965 Moholmen) and one in the Sunndalsfjord area (I915 Flåøya, northwest, about halfway between I913 and the inner most part of the fjord). Dioxin and TBT analyses were added to the programme for samples collected in the Frierfjord area, inner Oslofjord and the inner Kristiansandsfjord TBT-analyses were also included for some of the reference stations (see Annex A). These changes affect the outcome of the index and comparison to previous years should be cautioned. For results up to and including 2001 Klif has presented only the results using the old method of calculation, for 2002 the results for both the old and new methods are presented, and for 2003 and since then only the results for the new method are presented. Comparison of the two methods for 2002 and 2003 has been done earlier (Green *et al.*, 2004 a, b).

The Klif Classes are based on the provisional "high background" levels. This system has been revised (Molvær *et al.* 1997); where among other changes the sum of PCB congeners 28, 52, 101, 118, 138, 153, and 180 (∑PCB7) is now a distinct parameter for classification. The sum of all PAHs excluding the dicyclic PAHs (PAH_Σ) was compared to the system's "sum-PAH". Previously this was the calculation of sum-PAH that included the dicyclic PAHs. As analytical methods improved through the years additional PAHs could be quantified, and included the C1-, C2-, and C3-dibenzpthiophenes, and C1-, C2-, C3- alkylated phenathrenes. These were included in the sum of all non-dicyclic PAHs, and comparison between years could be misleading. For the *National Comments* 2006 (Green *et al.,* 2008), PAH_Σ was re-calculated, also for previous years, using only the 15 non-dycyclic PAH listed in the EPA protocol 8310[1]. The recalculation revealed only one difference from previously reported index values, and that was for the Reference Index 2006 reported to Klif as 1.6 in June of 2007, but the recalculation was 1.4 because PAH_Σ at Lista dropped into Class I from Class II.

It should also be noted that the Klif classification system is under revision and may affect calculations of the indices in the future. One likely change will be the lowering of limits to the classes for PCBs taking into consideration a lower background from 4 to 3 ppb wet weight suggested by Green & Knutzen (2003).

No special considerations were made when it was only possible to sample one but not all the stations within an area. The lack of sufficient samples has occurred several times for the Pollution Index: (st. I205 Bølsnes from Saudafjord 1996, st. I911 Horvika in the Sunndalsfjord since 1999, I915 in the Sundalsfjorden 2010 and 2011, st. I021 in the Hvaler area 1999, st.I022 and I024 in the Hvalerområdet 2011, st.I962 in the Inner Ranfjord since 1999, and st. I711 Steinholmen in the Frierfjord 2001,). There was also lack of sufficient samples for the Reference Index at st. 31A Solbergstrand 2010 and the sampling was moved a short distance to a very small boat harbour. The results for PCBs and OCS at this station were deemed abnormally high for unknown reasons and not representative. Hence, these data were not included.

Because insufficient amount of blue mussel were found at station Horvika in the Sunndalsfjord, two new stations were introduced; Fjøseid (I913) in 1999 and Flåøya, northwest (I915), in 2003, about 15

[1] Acenaphthene, acenaphthylene, anthracene, benzo[*a*]anthracene, benzo[*a*]pyrene, benzo[b]fluoranthene, benzo[ghi]perlyene, benzo[*k*]fluoranthene, chrysene, dibenzo[*a,h*]anthracene, fluoranthene, indeno[*1,2,3-cd*]pyrene, phenanthrene and pyrene. NB. for NIVA's PAH_Σ, where these cannot be distinguished but included in a group, such as benzo[*b*]fluoranthene benzo[*b,b,f*]fluoranthene, the value for the group is used. A single compound can not be included in more than one group.

and 5 km further out the fjord from Horvika, respectively. It can be noted that inclusion of supplementary analyse of blue mussel from the “Hydro kai” (I916), innermost in Sunndalsfjord, would have increased the index. Because sufficient amount of blue mussel was not found at station I962 Koksverktomta in the Ranfjord since 1999, a new station (I965 - Moholmen) was introduced in 2001 about 2 km south of Koksverktomta.

It should be noted that the 2010 pollution index has previously (NIVA note 9 June 2011) been reported and incorrectly reported as 2.3 and 0.3 units too low. This was due to a technical error which excluded dioxin from the Grenlandsfjord area. The correction was accounted for in the CEMP annual report (Green *et al.* 2011).

Based on nine fjord areas and on the new calculation with the mentioned supplementary stations and supplementary analyses of dioxin and TBT, the Pollution Index for 2011 was 2.8, 0.2 higher than in 2010 and at the same level as in 2009 (***Figure 79***, ***Table 15***). Compared to 2010 HCB in the inner Kristiansandsfjord was a class lower, but benzo[a]pyrene in the Saudafjord and the Inner Ranfjord and ∑PCB7 in the Bergen harbour area (Byfjorden) was a class higher. A value between 2 and 3 would be termed by the Klif system as “Marked” and between 3 and 4 "Severe".

Only five fjords/areas were monitored for the Reference Index for 1998-2011 compared to 7 for 1997 and 8 for 1995-1996 (***Table 16***). However, only four of these provided a common basis (cf., ***Table 16***). Similar to the application Pollution Index, the Reference Index made no special considerations when one but not all the stations within an area were sampled. For the four common areas, this has occurred several times, all in the Varangerfjord area (st.48A since 1997 and st.11A since 1998). With Lofoten and the supplementary analyses of TBT included, the Reference Index for 2011 was 1.2, 0.2 higher than in 2010 and at the same level as in 2009 (***Figure 79***, ***Table 16***). The index increased one class for the Mid and Outer Oslofjord area because of high concentration of chromium. An index value of 1 would be termed by the Klif system as “Insignificant”.

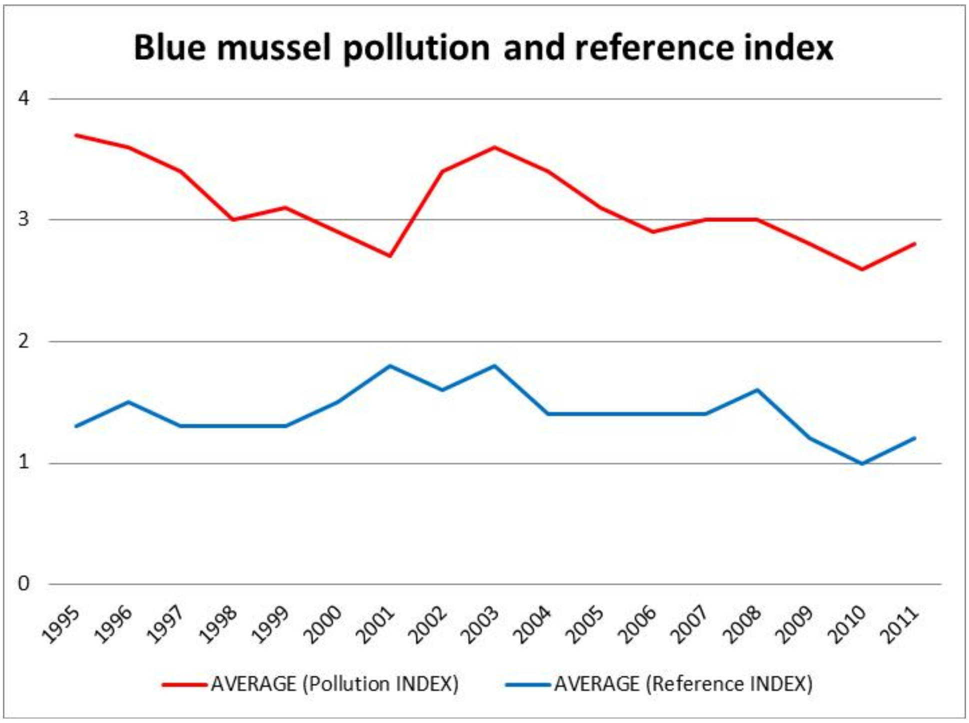

Figure 79. *Blue mussel Pollution and Reference Index 1995-2011.*

Table 15. *Maximum environmental classification for fjords selected for Pollution Index. (See text).*

Index Area [1)]	1995	1996	1997 [2)]	1998	1999	2000	2001	2002	2002 new [7)]	2003	2003 new [7)]	2004 new [7)]	2005 new [7)]	2006 new [7)]	2007 new [7)]	2008 new [7)]	2009 new [7)]	2010 new [7)]	2011 new [7)]
Hvaler/Singlefjord	2	2	2	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Iddefjord	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Inner Oslofjord	3	3	4	2	3	2	2	2	4	2	4	4	4	3	3	3	2	2	2
Frierfjord, Grenlandsfjords	3	4	3	3	3	3	3	5 [6)]	5	3 [6)]	5	5	5	5	5	5	5	5	5
Inner Kristiansandsfjord	5	5	5	5	5	4	3	3	3	4	4	4	4	3	4	4	4	4	3
Saudafjord	4	5	5	3	4	3	3	4	4	2	2	3	2	2	2	2	1	1	2
Sørfjord	5	4	3	3	4	4	3	4	4	5	5	4	4	3	3	3	3	3	3
Byfjorden, Bergen [3)]	3	3	3	2	2	2	2	3	3	4	4	3	3	3	2	2	2	2	3
Sunndalsfjord	3	3	3 [4)]	2	3	4	2	3	3	1 [6)]	1	1	1	1	2	2	1	1	1
Orkdalsfjord	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Inner Ranfjord	5	3	3 [5)]	4	2	2	3	3 [6)]	3	3 [8)]	5	5	3	4	4	4	5	3	4
AVERAGE (Pollution INDEX)	**3.7**	**3.6**	**3.4**	**3.0**	**3.1**	**2.9**	**2.7**	**3.2**	**3.4**	**2.9**	**3.6**	**3.4**	**3.1**	**2.9**	**3.0**	**3.0**	**2.8**	**2.6**	**2.8**

[1)] Iddefjord and Orkdalsfjord not sampled since 1997, hence the indices 1995-96 do not include the local indices from these fjords

[2)] Copper, zinc and TCDDN excluded since 1997, hence indices for 1995-96 excludes these contaminants

[3)] PCB (DDTΣ, HCB, HCHΣΣ and CBΣΣ) analysed in stored samples for 1995-1996

[4)] Change in classification (cf. Green *et al.* 1999) due to recalculation of PAHs that excluded the dicyclic compounds

[5)] Change in classification (cf. Green *et al.* 1999) due to calculation error

[6)] Results from supplementary station would not influence the outcome of classification

[7)] Inclusion of supplementary a station in Frierfjord, Inner Ranfjord, and Sunndalsfjord (2003), and supplementary dioxin and TBT analyses for Inner Oslofjord, Frierfjord, and Inner Kristiansandsfjord.

[8)] Results from supplementary station would influence the outcome of classification.

Table 16. *Maximum environmental classification for fjords selected for Reference Index. (See text).*

Index Area	1995	1996	1997	1998	1999	2000	2001	2002	2002 new [5]	2003	2003 new [5]	2004 new [5]	2005 new [5]	2006 new [5]	2007 new [5]	2008 new [5]	2009 new [5]	2010 new [5]	2011 new [5]
Mid and Outer Oslofjord [1]	2	2	2	1	1	1	2	1	1	1	2	1	1	2	1	2	2	1	2
Lista	1	1	1	1	2	2	2	2	2	1	1	2	2	1	1	1	1	1	1
Bømlo-Sotra	1	1	1	1	1	2	2	1	2	1	3	2	2	2	2	2	1	1	1
Outer Ranfjord, Helgeland [2]	(1)	(1)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lofoten [3]	(2)	(2)	(1)	(2)	(2)	(1)	(2)	(2)	2	(2)	2	1	1	1	1	1	1	1	1
Finnsnes-Skjervøy [2]	(2)	(1)	(1)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hammerfest-Honningsvåg [2]	(2)	(3) [4]	(2)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Varanger Peninsula	1	2	1	2	1	1	1	1	1	1	1	1	1	1	2	2	1	1	1
AVERAGE (Reference INDEX)	**1.3**	**1.5**	**1.3**	**1.3**	**1.3**	**1.5**	**1.8**	**1.3**	**1.6**	**1.2**	**1.8**	**1.4**	**1.4**	**1.4**	**1.4**	**1.6** [6]	**1.2**	**1.0**	**1.2**

[1] Inclusion of results for arsenic, nickel and silver in 1996 did not affect the classification

[2] Outer Ranfjord, Finnsnes-Skjervøy and Hammerfest-Honningsvåg stations were not sampled in 1998, hence, the index for 1995-97 did not take these results into account. See cf., Green *et al.* 2000 for more details for Outer Ranfjord.

[3] Inconsistency in sampling site, st. 98X in 1995-96 and st. 98A in 1997, hence, results from Lofoten excluded. See cf., Green *et al.* 2000 for more details for st. 98X.

[4] Change in classification (cf. Green *et al.* 1999) due to recalculation of PAHs that excluded the dicyclic compounds.

[5] Inclusion of supplementary TBT analyses for Mid and Outer Oslofjord, Lista, Bømlo-Sotra, Lofoten and Varangerfjord Peninsula.

[6] 1.4 reported earlier.

Appendix J1
INDEX-Sampling and analyses for 1995-2011

Appendix J1. *Blue mussel samples planned or used in INDEX and other purposes besides CEMP 1995-2006, where P = "Pollution Index" and R = "Reference Index" (contaminated and assumed "background" stations, respectively). + indicates CEMP sampling and analyses (i.e. equivalent to analysis code A). The number indicates the number samples analysed. Codes for analysis (A, B etc.) are defined in Appendix J2. See Walday et al. (1995) for discussion of selection of stations and analyses.*

	st.	STATION	INDEX	+	A	B	C	D	E	F	G	H	I	J	K	CM
				---------------- ANALYSIS CODE ---------------------												
		HVALER/SINGLEFJORD AREA														
	I021	Kjøkø, south	P	.	3	.	.	.	.	.	.	.	.	.	.	
	I024	Kirøy, north west	P	.	3	.	.	.	.	.	.	.	.	.	.	
	I022	West Damholmen	P	.	3	.	.	.	.	.	.	.	.	.	.	
	I023	Singlekalven, south	P	.	3	.	.	.	.	.	.	.	.	.	.	
		IDDEFJORD														
	I001	Sponvikskansen	P	.	.	3	.	.	.	.	.	.	.	.	.	
	I011	Kråkenebbet	P	.	.	3	.	.	.	.	.	.	.	.	.	
		OSLOFJORD, inner														
	30A	Gressholmen	P	+	3	.	.	.	.	.	.	3	.	2	2	
	I301	Akershuskaia	P	.	.	.	3	.	.	.	.	.	.	.	2	
	I304	Gåsøya	P	.	.	.	3	.	.	.	.	.	.	.	.	
	I307	Ramtonholmen	P	.	.	.	3	.	.	.	.	.	.	.	.	
	I306	Håøya	P	.	.	.	3	.	.	.	.	.	.	.	.	
		OSLOFJORD, Mid and Outer														
	31A	Solbergstrand	R	+	3	.	.	.	.	.	.	.	.	.	.	
	35A	Mølen	R	+	3	.	.	.	.	.	.	.	.	.	.	
	36A	Færder	R	+	3	.	.	.	.	.	.	.	.	.	2	
		FRIERFJORD AREA, west of Outer Oslofjord														
	I712	Croftholmen	P	.	.	.	.	3	.	.	.	.	.	2	2	
	I713	Strømtangen	P	.	.	.	.	3	.	.	.	.	.	1	2	
	71A	Bjørkøya	P	+	3	.	.	.	.	.	.	.	.	2	1	
	76A	Risøy	R	+	3	.	.	.	.	.	.	.	.	2	1	
		INNER KRISTRIANSANDSFJORD														
	I1321	Fiskåtangen	P	.	.	.	.	.	3	.	.	.	.	2	2	
	I133	Odderø, west	P	.	.	.	.	.	3	.	.	.	.	1	2	
		LISTA AREA														
	15A	Gåsøya	R	+	3	.	.	.	.	.	.	.	.	.	2	
	I131A	Lastad	R	.	.	.	3.	.	.	.	.	.	.	.	.	g
		SAUDAFJORD														
	I201	Ekkjegrunn (G1)	P	.	.	.	.	.	.	3	.	.	.	.	.	
**	I205	Bølsnes (G5)	P	.	.	.	.	.	.	3	.	.	.	.	.	
		[HAUGESUND AREA not related to INDEX investigation]														
	227A1	Melandsholmen	O	.	3	.	.	.	.	.	.	.	.	.	1	
		BØMLO-SOTRA AREA														
	22A	Espevær, west	R	+	3	.	.	.	.	.	.	.	.	.	2	c,a
		SØRFJORD														
*	51A	Byrkjeneset	P	.	3	.	.	.	.	.	.	.	.	.	.	
	52A	Eirtrheimsneset	P	+	3	.	.	.	.	.	.	.	.	.	.	c

Appendix J1

	st.	STATION	INDEX					+	A	B	C	D	E	F	G	H	I	J	K	CM
		BYFJORDEN, BERGEN																		
	I242	Valheimsneset	P	.	.	.	.	.	.	.	.	.	.	.	3	.	.	.	.	
	I241	Nordnes	P	.	.	.	.	.	.	.	.	.	.	.	3	.	.	.	.	
	I243	Hagreneset	P	.	.	.	.	.	.	.	.	.	.	.	3	.	.	.	.	
		SUNNDALSFJORD																		
	I912	Honnhammer	P	.	.	.	.	.	.	.	.	.	.	.	.	3	.	.	.	
	I913	Fjøseid	P	.	.	.	.	.	.	.	.	.	.	.	.	3	.	.	.	
	I914	Flåøya, southeast	P	.	.	.	.	.	.	.	.	.	.	.	.	3	.	.	.	
	I915	Flåøya, northwest	P	.	.	.	.	.	.	.	.	.	.	.	.	3	.	.	.	
		[TRONDHEIM AREA-not related to index investigation]																		
*	80A	Østmarknes	-	.	.	.	.	.	.	.	.	.	.	.	.	.	3	.	.	
		ORKDALSFJORD AREA (not suggested in Walday *et al.* 1995)																		
	82A	Flakk	P	.	.	.	.	+	3	.	.	.	.	.	.	.	.	.	.	
	84A	Trossavika	P	.	.	.	.	+	3	.	.	.	.	.	.	.	.	.	.	
	87A	Ingdalsbukta	P	.	.	.	.	+	3	.	.	.	.	.	.	.	.	.	.	
		INNER RANFJORD																		
	I962	Koksverkkaien (B2)	P	.	.	.	.	.	.	.	.	.	.	.	.	.	3	.	.	c
	I964	Toraneskaien	P	.	.	.	.	.	.	.	.	.	.	.	.	.	3	.	.	
	I965	Moholmen (B5)	P	.	.	.	.	.	.	.	.	.	.	.	.	.	3	.	.	
	I969	Bjørnbærviken (B9)	P	.	.	.	.	.	.	.	.	.	.	.	.	.	3	.	.	
		OUTER RANFJORD, HELGELAND AREA																		
*	R096	Breivika, Tomma	R	.	.	.	.	.	3	.	.	.	.	.	.	.	.	.	.	a
	96A	Breivika, Tomma	R	.	.	.	.	.	3	.	.	.	.	.	.	.	.	.	.	a
		LOFOTEN AREA																		
	98A	Husvågen	R	.	.	.	.	+	3	.	.	.	.	.	.	.	.	.	2	e
		FINNSNES-SKJERVØY AREA																		
	41A	Fensneset, Grytøya	R	.	.	.	.	.	3	.	.	.	.	.	.	.	.	.	.	c
		HAMMERFEST-HONNINGSVÅG AREA																		
	44A	Elenheimsundet	R	.	.	.	.	.	3	.	.	.	.	.	.	.	.	.	.	a,f
	46A	Smineset in Altesula	R	.	.	.	.	.	3	.	.	.	.	.	.	.	.	.	.	c,f
		VARANGER PENINSULA AREA																		
	48A	Trollfjorden i Tanafjord	R	.	.	.	.	.	3	.	.	.	.	.	.	.	.	.	.	
	10A1	Skagoodden	R	.	.	.	.	+	3	.	.	.	.	.	.	.	.	.	.	b
	11X	Brashavn	R	.	.	.	.	+	3	.	.	.	.	.	.	.	.	.	2	

*-CEMP station but not sampled in accordance to CEMP guidelines, see Appendix text.
**-Sufficient mussel-sample not found in 1996.

Notes (CM):

a-blue mussel collected from buoy and/or buoy anchor lines.
b- blue mussel collected from sand/gravel bottom.
c- blue mussel collected from iron/cement pilings.
d- blue mussel collected from metal navigation buoys.
e- blue mussel collected from floating dock.
f- blue mussel collected from wooden docks.
g- blue mussel collected from tire on jetty.

Appendix J2
INDEX-Key to analysis codes and sample counts
(Used in Appendix J1)

***ANALYSIS CODES*[1)]** *See Walday et al. (1995) for discussion of selection of analyses.*

Contaminant		Analysis code										
		A	B	C	D	E	F	G	H	I	J	K
Lead	. . . . . .	x	x	.	.	.	x	.	.	x	.	.
Cadmium	. . . . . .	x	x	x	.	.	x	.	.	x	.	.
Copper [2])	. . . . . .	x	x	x	.	.	.	.	.	.	.	.
Mercury	. . . . . .	x	x	x	.	.	.	.	.	.	.	.
Zinc [2])	. . . . . .	x	x	x	.	.	.	x	.	x	.	.
EPOCl	. . . . . .	.	.	.	.	x	.	.	.	.	.	.
PAHs	. . . . . .	.	.	x	.	x	x	.	x	x	.	.
PCBs	. . . . . .	x	.	x	x	x	.	x	.	.	.	.
“Dioxin” [3])	. . . . . .	.	.	.	.	.	.	.	.	.	x	.
TBT [4])	. . . . . .	.	.	.	.	.	.	.	.	.	.	x

[1]) Concerns MUSSEL-1 size group (3-5 cm), 3 replicate samples each a bulk of 20 individuals (see text).
[2]) Concerns MUSSEL-discontinued since 1996.
[3]) Concerns MUSSEL-discontinued since 1995, but reinstated 2002 for st. 30A, 71A, I711, I712, I713, 76A, I132 and I133.
[4]) Concerns MUSSEL-not included in Walday *et al.* (1995).

Appendix J3
INDEX-Klif Environmental quality classes

(Molvær *et al.* 1997)

As	Arsenic
Pb	Lead
F	Fluoride
Cd	Cadmium
Cu	Copper
Cr	Chromium
Hg	Mercury
Ni	Nickel
Zn	Zinc
Ag	Silver
TBT	Tributyltin
PAH_S	total PAH excluding dicyclic (=PAH_Σ)*
BAP	benzo[*a*]pyrene
DDTSS	DDTPP+DDEPP+TDEPP (=DDTΣΣ)*
HCB	hexachlorobenzene
HCHSS	HCHG+HCHA+HCHB (=HCHΣΣ)*
CBSSe	sum of CB: 28+52+101+118+138+153+180 *
TCDDN	Sum of TCDD-toxicity equivalents *

*) See also **Appendix C** for definitions.

Basis: D = dry weight, W = wet weight
Units: M = ppm (mg/kg), U = ppb (μg/kg), P = ppp (ng/kg)

Klif's Environmental quality classes for blue mussel (Molvær et al. 1997).

Contaminant	basis	unit	Class I Insignifcant	Class II Moderate	Class III Marked	Class IV Severe	Class V Extreme
As	D	M	<10	10-30	30-100	100-200	>200
Pb	D	M	<3	3-15	15-40	40-100	>100
F	D	M	<15	15-50	50-150	150-300	>300
Cd	D	M	<2	2-5	5-20	20-40	>40
Cu	D	M	<10	10-30	30-100	100-200	>200
Cr	D	M	<3	3-10	10-30	30-60	>60
Hg	D	M	<0.2	0.2-0.5	0.5-1.5	1.5-4	>4
Ni	D	M	<5	5-20	20-50	50-100	>100
Zn	D	M	<200	200-400	400-1000	1000-2500	>2500
Ag	D	M	<0.3	0.3-1	1-2	2-5	>5
TBT	D	M	<0.1	0.1-0.5	0.5-2	2-5	>5
ΣPAH	W	U	<50	50-200	200-2000	2000-5000	>5000
BAP	W	U	<1	1-3	3-10	10-30	>30
ΣDDT	W	U	<2	2-5	5-10	10-30	>30
HCB	W	U	<0.1	0.1-0.3	0.3-1	1-5	>5
ΣHCH	W	U	<1	1-3	3-10	10-30	>30
ΣPCB7	W	U	<4	4-15	15-40	40-100	>100
TCDDN	W	P	<0.2	0.2-0.5	0.5-1.5	1.5-3	>3

Appendix J4
INDEX-Summary table "Pollution index" 2010-2011

Pollution index 2010-new (with supplementary analyses and stations)

Classification environmental classification (E.C.) is indicated by colour: blue = I, green = II, yellow = III, orange = IV, red = V (see also Annex A4 table)
i = not included for this index
w = some dioxin compounds are flagged as "suspect", however if these values were accepted TCDDN would be in Class I (blue)

Max(median). Statistics for alle areas: (n = Index-station measured, N = Station programmed for index, s=suspect value)

Average of Max E.C is 2,6

Index areaname (Pollution area) 2010	n	N	Pb ppm d.wt	F ppm d.wt	Cd ppm d.wt	Cu ppm d.wt	Cr ppm d.wt	Hg ppm d.wt	Ni ppm d.wt	Zn ppm d.wt	Ag ppm d.wt	∑PAH ppb w.wt	BAP ppb w.wt	∑DDT ppb w.wt	HCB ppb w.wt	∑HCH ppb w.wt	∑PCB ppb w.wt	TCDDN ppp w.wt	TBT ppm d.wt	Max E.C I:V
Hvaler/Singlefjorden	3	4	1,50	i	2,06	i	i	0,29	i	i	i	i	i	<0,48	0,04	<0,05	<1,12	i	i	II
Iddefjord	0	2	i	i	i	i	i	i	i	i	i	i	i	i	i	i	i	i	i	miss
Inner Oslofjord	5	5	i	i	1,82	i	i	0,18	i	i	i	<77,20	2,20	1,33	0,18	<0,05	6,67	s	0,18	II
Frierfjorden	3	4	i	i	i	i	i	i	i	i	i	i	i	0,86	0,43	<0,05	2,60	4,57	0,03	V
Inner Kristiansandsfjord	2	3	i	i	i	i	i	i	i	i	i	<60,16	2,60	0,51	1,20	<0,05	<1,82	0,99	0,11	IV
Saudafjord	2	2	2,13	i	0,98	i	i	i	i	i	i	<12,29	0,53	i	i	i	i	i	i	I
Sørfjord	2	2	31,00	i	4,06	i	i	0,36	i	i	i	i	i	3,44	0,06	<0,10	<1,26	i	i	III
Byfjorden	3	3	i	i	i	i	i	i	i	i	i	i	i	1,86	0,08	<0,05	5,45	i	i	II
Sunndalsfjord	2	4	i	i	i	i	i	i	i	i	i	<7,94	<0,50	i	i	i	i	i	i	I
Orkdalsfjord area	0	3	i	i	i	i	i	i	i	i	i	i	i	i	i	i	i	i	i	miss
Inner Ranfjord	3	4	13,93	i	1,74	i	i	i	i	i	i	<163,29	7,90	i	i	i	i	i	i	III

Pollution index 2011-new (with supplementary analyses and stations)

Classification environmental classification (E.C.) is indicated by colour: blue = **I**, green = **II**, yellow = **III**, orange = **IV**, red = **V** (see also Annex A4 table)
i = not included for this index
w = some dioxin compounds are flagged as "suspect", however if these values were accepted TCDDN would be in Class **I** (blue)

Max(median). Statistics for alle areas: (n = Index-station measured, N = Station programmed for index)

Average of Max E.C is 2.8

Index areaname (Pollution area) 2011	n	N	Pb ppm d.wt	F ppm d.wt	Cd ppm d.wt	Cu ppm d.wt	Cr ppm d.wt	Hg ppm d.wt	Ni ppm d.wt	Zn ppm d.wt	Ag ppm d.wt	∑PAH ppb w.wt	BAP ppb w.wt	∑DDT ppb w.wt	HCB ppb w.wt	∑HCH ppb w.wt	∑PCB7 ppb w.wt	TCDDN ppp w.wt	TBT ppm d.wt	Max E.C I:V
Hvaler/Singlefjorden	1	4	1.2	i	1.67	i	i	0.27	i	i	i	i	i	<0.39	<0.03	<0.05	<0.85	i	i	II
Iddefjord	0	2	i	i	i	i	i	i	i	i	i	i	i	i	i	i	i	i	i	miss
Inner Oslofjord	5	5	i	i	2.03	i	i	0.12	i	i	i	<74.96	1.9	1.27	0.09	<0.05	<7.16	w	0.15	II
Frierfjorden	3	4	i	i	i	i	i	i	i	i	i	i	i	1.03	0.36	<0.10	1.91	5.26	0.15	V
Inner Kristiansandsfjord	2	3	i	i	i	i	i	i	i	i	i	<92.96	3.9	<0.31	0.17	<0.05	2.13	0.28	0.11	III
Saudafjord	2	2	1.93	i	0.94	i	i	i	i	i	i	<47.55	1.1	i	i	i	i	i	i	II
Sørfjord	2	2	29.77	i	7.3	i	i	0.48	i	i	i	i	i	4.14	0.07	<0.05	<1.30	i	i	III
Byfjorden	2	3	i	i	i	i	i	i	i	i	i	i	i	2.47	0.09	<0.05	29.65	i	i	III
Sunndalsfjord	2	4	i	i	i	i	i	i	i	i	i	<15.47	0.86	i	i	i	i	i	i	I
Orkdalsfjord area	0	3	i	i	i	i	i	i	i	i	i	i	i	i	i	i	i	i	i	miss
Inner Ranfjord	3	4	11	i	1.56	i	i	i	i	i	i	236.93	12	i	i	i	i	i	i	IV

Appendix J5
INDEX-Summary table “Reference Index”
2010-2011

Reference index 2010-new (with supplementary analyses and stations)

Classification environmental classification (E.C.) is indicated by colour: blue = I, green = II, yellow = III, orange = IV, red = V (see also Annex A4 table)
i = not included for this index

Max(median). Statistics for alle areas: (n = Index-station measured, N = Station programmed for index)

Average of Max E.C is 1,0

Index areaname	n	N	Pb	F	Cd	Cu	Cr	Hg	Ni	Zn	Ag	PAH_S	BAP	DDTSS	HCB	HCHSS	CBSSe	TCDDN	TBT	Max
(Reference area)			ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppb	ppb	ppb	ppb	ppb	ppb	ppp	ppm	E.C
2010			d.wt	d.wt	d.wt	d.wt	d.wt	d.wt	d.wt	d.wt	d.wt	w.wt	w.wt	w.wt	w.wt	w.wt	w.wt	w.wt	d.wt	I:V
Mid and outer Oslofjord	1	2	0,94		0,99		1,25	0,07	1,69		0,04	<7,37	<0,50	0,80	0,03	<0,05	<0,95		0,04	I
Lista area	2	3	1,13		1,19		1,33	0,08	1,31		0,07	<5,64	<0,50	<0,32	<0,03	<0,05	<0,80		0,03	I
Bømlo-Sotra area	1	1	0,57		0,71		<0,50	0,06	0,60		0,04			<0,56	<0,05	<0,10	<0,93		0,01	I
Outer Ranfjord, Helgeland area	0	2																		miss
Lofoten area	1	3	0,71		1,84		1,18	0,09	1,00		0,04			<0,40	0,05	<0,10	<0,46		0,02	I
Finnsnes- Skjervøy area	0	1																		miss
Hammerfest-Honningsvåg area	0	2																		miss
Varanger peninsula area	1	5	0,83		1,84		1,18	0,04	1,76		0,14			<0,35	0,04	<0,05	<0,45			I

Reference index 2011-new (with supplementary analyses and stations)

Classification environmental classification (E.C.) is indicated by colour: blue = I, green = II, yellow = III, orange = IV, red = V (see also Annex A4 table)
i = not included for this index

Max(median). Statistics for alle areas: (n = Index-station measured, N = Station programmed for index)

Average of Max E.C is 1.2

Index areaname (Reference area) 2011	n	N	Pb ppm d.wt	F ppm d.wt	Cd ppm d.wt	Cu ppm d.wt	Cr ppm d.wt	Hg ppm d.wt	Ni ppm d.wt	Zn ppm d.wt	Ag ppm d.wt	∑PAH ppb w.wt	BAP ppb w.wt	∑DDT ppb w.wt	HCB ppb w.wt	∑HCH ppb w.wt	∑PCB7 ppb w.wt	TCDDN ppp w.wt	TBT ppm d.wt	Max E.C I:V
Mid and outer Oslofjord	2	3	1.31	i	1.75	i	3.43	0.12	3.07	i	<0.05	<5.64	<0.50	<0.53	<0.03	<0.05	<0.81	i	i	II
Lista area	2	3	1.24	i	1.29	i	1.47	0.09	1	i	0.05	<15.43	<0.50	0.78	<0.03	<0.05	<0.85	i	0.01	I
Bømlo-Sotra area	1	1	0.72	i	0.83	i	1.11	0.08	1.28	i	0.06	i	i	<0.30	<0.03	<0.05	<0.56	i	0.02	I
Outer Ranfjord, Helgeland area	0	2	i	i	i	i	i	i	i	i	i	i	i	i	i	i	i	i	i	miss
Lofoten area	1	3	0.76	i	1.66	i	1.18	0.1	1.18	i	0.05	i	i	<0.30	<0.03	<0.05	<0.38	i	0.01	I
Finnsnes- Skjervøy area	0	1	i	i	i	i	i	i	i	i	i	i	i	i	i	i	i	i	i	miss
Hammerfest-Honningsvåg area	0	2	i	i	i	i	i	i	i	i	i	i	i	i	i	i	i	i	i	miss
Varanger peninsula area	1	5	0.58	i	1.89	i	1.78	0.04	2.06	i	0.11	i	i	<0.28	<0.03	<0.05	<0.34	i	i	I

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Statlig program for forurensningsovervåking omfatter overvåking av forurensningsforholdene i luft og nedbør, skog, vassdrag, fjorder og havområder.
Overvåkingsprogrammet dekker langsiktige undersøkelser av:

- overgjødsling
- forsuring (sur nedbør)
- ozon (ved bakken og i stratosfæren)
- klimagasser
- miljøgifter

Overvåkingsprogrammmet skal gi informasjon om tilstanden og utviklingen av forurensningssituasjonen, og påvise eventuell uheldig utvikling på et tidlig tidspunkt. Programmet skal dekke myndighetenes informasjonsbehov om forurensningsforholdene, registrere virkningen av iverksatte tiltak for å redusere forurensningen, og danne grunnlag for vurdering av nye tiltak. Klif er ansvarlig for gjennomføringen av overvåkningsprogrammet.

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