Norwegian State Pollution Monitoring Programme

National Comments regarding the Norwegian data for 2000

Rapport 842/02

Joint Assessment and Monitoring Programme (JAMP)

SFT

NIVA

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REPORT

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Abstract

This report is part of the Norwegian contribution to the SIME 2002 meeting administrated by OSPAR. JAMP 2000 included the monitoring of micropollutants in blue mussels (42 stations) and fish (16 stations) along the coast of Norway from Oslo to Bergen, Lofoten and Varangerfjord. The results indicated elevated levels of contaminants (i.e. over provisional "high background") in: Oslofjord proper (PCBs, mercury and lead in cod; PCBs in mussels), Langesundsfjord (HCB in mussels) and Sørfjord and Hardangerfjord (cadmium, lead, mercury and ppDDE in mussels and cod; and PCBs in cod). Significant upward trends were found for mercury in cod from the inner Oslofjord and mussels from the outer Sørfjord and a downward trend was found for cadmium in mussels from the Hardangerfjord. The results from the remaining stations showed low or moderately levels of contamination. The "pollution" index classification improved from "bad" to just within class "poor" in 2000, whereas the "reference" index remained in classification "fair". Studies were also conducted in two areas on the southern/south-western coast using biological effects methods in cod (8 stations), flatfish (7 stations) and imposex/intersex in dogwhelks (13 stations). Contamination of organotin in mussels and imposex in dogwhelks were still apparent, especially in the Haugesund area.

4 keywords, Norwegian	4 keywords, English
1. Miljøgifter	1. Contaminants
2. Organismer	2. Organisms
3. Marin	3. Marine
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OSPAR CONVENTION FOR THE PROTECTION OF THE MARINE ENVIRONMENT OF THE NORTHEAST ATLANTIC

WORKING GROUP ON CONCENTRATIONS, TRENDS AND EFFECTS OF SUBSTANCES IN THE MARINE ENVIRONMENT (SIME)

OUDENBURG 29-31 JANUARY 2002

O-80106

JOINT ASSESSMENT AND MONITORING PROGRAMME (JAMP)

NATIONAL COMMENTS REGARDING

THE NORWEGIAN DATA FOR 2000

Oslo, 3. January 2002

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Foreword

This report presents the Norwegian national comments on the 2000 investigations for the Joint Assessment and Monitoring Programme (JAMP). JAMP is administered by the Oslo and Paris Commissions (OSPAR) and their Environmental Assessment and Monitoring Committee (ASMO). JAMP receives guidance from the International Council for the Exploration of the Sea (ICES). ASMO has delegated implementation of part of the programme to the Working Group on Concentrations, Trends and Effects of Substances in the Marine Environment (SIME). The Norwegian 2000 investigations are directed to particular JAMP issues relating to contaminants and implemented by SIME. Some JAMP issues to be addressed lack adequate guidelines, in such cases guidelines used by the Joint Monitoring Programme (JMP) were applied.

The Norwegian JAMP for 2000 was carried out by the Norwegian Institute for Water Research (NIVA) by contract from the Norwegian Pollution Control Authority (SFT), (NIVA contract O-80106).

The Norwegian contribution to the JMP/JAMP was initiated by SFT in 1981 as part of the national monitoring programme. It now comprises three areas: the Oslofjord and adjacent areas (Hvaler-Singlefjord area and Langesundsfjord, 1981-), Sørfjord/Hardangerfjord (1983-84, 1987-) and Orkdalsfjord area (1984-89, 1991-93, 1995-96).

Since the North Sea Task Force Monitoring Master Plan was implemented in 1990 additional areas have also been monitored. These include: Arendal, Lista and Bømlo-Sotra areas. On the initiative of SFT and NIVA "reference" or merely diffusely contaminated areas from Bergen to Lofoten have been monitored since 1992 and from Lofoten to the Norwegian-Russian border from 1994.

The comments are presented in accordance with the agreed standardised format (ASMO 1997, Annex 12).

Thanks are due to many colleagues at NIVA, especially: Unni Efraimsen, Åse Kristine Rogne, Sigurd Øxnevad, Tom Tellefsen for field work, sample preparations, data entry; Torgunn Sætre, Alfhild Kringstad, Einar Brevik and colleagues for organic analyses; Norunn Følsvik for organotin analyses; Bente Hiort Lauritzen and her colleagues for metal analyses; Randi Romstad and her collegues for biological effects measurements, Gunnar Severinsen for data programme management and operation; and to the authors Ketil Hylland (biological effects methods), and Mats Walday (organotin). Thanks go also to the numerous fishermen and their boat crews we have had the pleasure of working with.

Oslo,3 January 2002.

Norman W. Green
Project co-ordinator

Contents

1. General Details

1.1 Executive Summary

The Norwegian JAMP 2000 included the monitoring of micropollutants (contaminants) in blue mussels (42 stations including supplementary stations for the Norwegian Index programme and for and TBT analyses), dog whelks (13 stations) and fish (16 cod/flatfish stations) from the border of Sweden in the south along the coast of Norway to the Bergen area, Lofoten and the Varangerfjord bordering Russia. The results indicated elevated levels of contaminants (i.e. over provisional "high background") in:

- JAMP area 26: Oslofjord proper (PCBs (sum of seven congeners), and to a lesser extent mercury, and lead) and Langesundsfjord (HCB). The median concentrations of PCB found in cod liver and cod fillet from the inner Oslofjord were the lowest since 1990 and 1996, respectively. A significant upward trend was detected for mercury in cod fillet from "large" and "small" individuals from the inner Oslofjord 1984-2000.

- JAMP areas 63 and 62: Sørfjord and Hardangerfjord (cadmium, lead, mercury and ppDDE and to a lesser extent PCB). A significant downward trend was found for cadmium in mussels at one station in the Hardangerfjord and an upward trend for mercury in mussels at one station in outer Sørfjord 1987-2000.

Two environmental indices have been applied annually since 1995 to assess the levels of contamination in mussels from "polluted" and "reference" areas. The results were just within the class "poor" (i.e., in the Norwegian Pollution Control Authority classification system) when applying the "pollution" index, an improvement from class "bad" in 1999, whereas a "fair" condition when applying the "reference" index.

The biological effects methods OH-pyrene (pyrene metabolite), δ-aminolevulinic acid dehydrase (ALA-D), cytochrome P4501A activity (EROD) and metallothionein (MT) were determined in cod and flatfish, from six and five stations, respectively, from the southern and south-western coast from 1997 to 2000. In 2000 two stations from northern Norway were added (both for cod and flatfish). Six of the seven flatfish stations observed were in close proximity to the cod stations. With respect to OH-pyrene metabolites in 2000, there were somewhat elevated levels at sites where fish are moderately exposed to PAH (inner Sørfjord, inner Oslofjord; Lista samples not analysed). Results for ALA-D and EROD in the moderately polluted stations compared to the diffusely polluted stations were inconsistent for the four years. EROD analyses in cod and flatfish from Varangerfjord indicated that the fish were exposed to contaminants even though this area is considered to be only diffusely affected and OH-pyrene was low. For cod, different MT-analysis methods were used in 2000 (DPP) compared to 1997-1999 (ELISA).

The presence of organotin (e.g. TBT) in Norwegian waters was still a problem in 2000, more severe close to harbours and major ship-routes. Two reference sites in northern Norway appeared to be unaffected, and the Haugesund area is still the most heavily contaminated. Levels of TBT in blue mussels have decreased since last year. However, the ban on the use of TBT in antifouling on boats <25m of length has not lead to a clear improvement in the investigated areas.

1.2 Introduction

The Norwegian contribution to the "Joint Assessment and Monitoring Programme (JAMP) was initiated by the Norwegian Pollution Control Authority (SFT) and is integrated with SFT's State Pollution Monitoring Programme. The procedures and practice of JAMP has also provided a basis for other investigations of interest to SFT but not necessarily requested by JAMP (e.g. SFT's Index Programme (Pollution and Reference Indices), Chapter 1.3.8).

Data are submitted to ICES under three categories: for Purpose A (health assessment) on a voluntary basis, Purpose C (spatial distribution) on a voluntary basis and Purpose D (temporal trend assessment) on a mandatory basis. Where practical, data collection was in accordance to agreed procedures (OSPAR 1990, 1997). Data were screened and submitted to ICES in accordance with procedures outlined by ICES (1996).

This report focuses on issues and situations in Norway concerning contaminants and considered of interest to the implementation of JAMP (Table 1). It should be noted that these issues are being revised (cf., MON 2001).

Table 1. Extract from list of JAMP issues, subjects and descriptions to which the Norwegian investigations for 2000 can be addressed (cf. ASMO 1997, Annex 30).

Issue	Subject	Description
1.2	Hg, Cd, and Pb	What are the concentrations and fluxes in sediments and biota?
1.3	TBT	To what extent do biological effects occur in the vicinity of major shipping routes, offshore installations, marinas and shipyards?
1.7	PCBs	Do high concentrations pose a risk to the marine ecosystem?
1.8	PCBs	Do high concentrations of non-ortho and mono-ortho CBs in seafood pose a risk to human health?
1.10	PAHs	What are the concentrations in the maritime area?
1.11	PAHs	Do PAHs affect fish and shellfish?
1.12	Other synthetic compounds	How widespread are synthetic organic compounds within the maritime area?
1.15	Chlorinated dioxins and dibenzofurans	What concentrations occur and have the policy goals (for the relevant parts of the maritime area) been met?
1.17	Biological effects of pollutants	Where do pollutants cause deleterious biological effects?
5.3	Chemical used [mariculture]	In which areas do pesticides and antibiotics affect marine biota?
6.1	Ecosystem health	How can ecosystem health be assessed in order to determine the extent of human impact?

This report is structured at the first and second level according to agreed format (ASMO 1997, Annex 12) which *inter alia* presents results before methodology.

1.3 Information on measurements

An overview of JAMP stations in Norway is shown in the tables in Appendix E. and maps in Appendix F. . The stations and sample counts relevant to the 2000 investigations are noted in the tables in Appendix E. .

Blue mussels were sampled at 43 stations (including supplementary stations for Index and TBT) and fish from 16 cod/flatfish stations from the border to Sweden in the south to the border to Russia in the north. Generally, mussels are not abundant on the exposed coastline from Lista (south Norway) to the North of Norway. A number of samples were collected from dock areas, buoys or anchor lines.

1.3.1 Oslofjord area

Moderate overconcentrations of ΣPCB-7 (sum of congeners: 28, 52, 101, 118, 138, 153, and 180) in mussels were found in the inner Oslofjord (st.30A, up to nearly 3 times provisional "high background" - see Chapter 2.1.2) (Figure 1, Appendix I. , and temporal trend analyses in Appendix H.). Marked overconcentrations were also found in cod liver from the inner Oslofjord (st.30B, 4 times “high background”; Figure 2). However the median concentration was 2080 ppb w.w. and the lowest since 1990. Similarly, the median concentration in cod fillet for 2000 was 6.1 ppb and lowest since 1996 (Appendix H.). No overconcentrations were found in cod liver from the outer Oslofjord (st.36B).

In 1994 the Norwegian Food Control Authority (SNT) advised not to consume liver of cod from the inner Oslofjord (north of st.31A) due to concerns about PCB contamination (Table 3, page 31).

The reason for higher concentrations of PCB in 1999 may have been partly due to analytical aspects (Green *et al.* 2001a). Control analyses of certified reference material were on the average about 30% higher for CB-153, one of the more persistent PCB congeners, in 1999 (cf., Green *et al.* 2001a) but the control analyses for 2000 were within the given confidence interval (Table 7, Appendix A.).

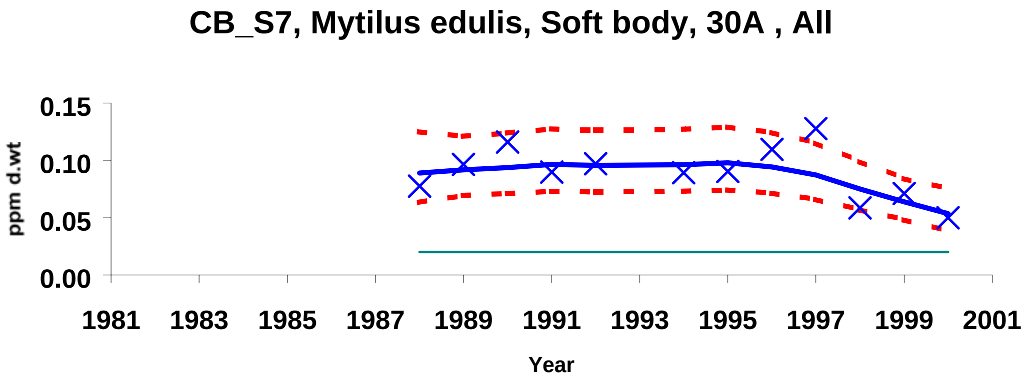
No significant linear trend was detected (see method description in Chapter 2.1.3) for PCB in mussels from four stations (30A, 31A, 35A and 36A) from 1988 to 2000 or for cod (30B and 36B) from 1990 to 2000.

Power analyses (see Chapter 2.1.3) indicated that a hypothetical trend of 10% change per year in ΣPCB-7 concentration in the blue mussel or cod liver from the inner Oslofjord would take 10 or 12 years, respectively, to be detected with 90% significance (Appendix H.).

Moderate overconcentrations of mercury were found in the fillet of both “large” and "small" cod (st.30B) from the inner Oslofjord (Figure 3), about 2 times "high background". A significant *upward trend* was detected for the period 1984-2000 for both size groups. No overconcentration was found for cod from the outer Oslofjord (st.36B). The power, indicated as number of years to detect a hypothetical 10% change per year, for mercury in cod fillet from either station was slightly better for “small” fish (10-11 years) than “large” fish (13-14 years) (cf. Appendix H.). Concentrations of mercury when considering the entire period were significantly higher in "large" cod compared to "small" cod. No overconcentrations were found in fillet of flounder from mid Oslofjord (st.33B).

Median concentration of lead in cod liver from the inner Oslofjord (30B) was 0.24 ppm w.w. and over 2 times "high background".

A



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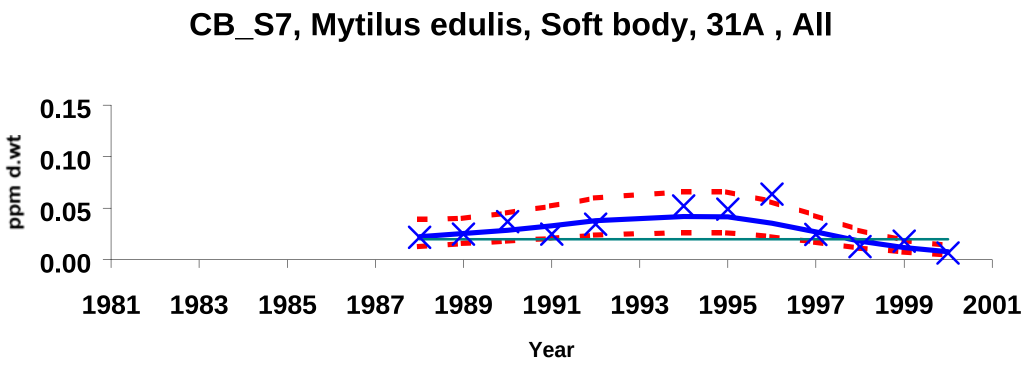

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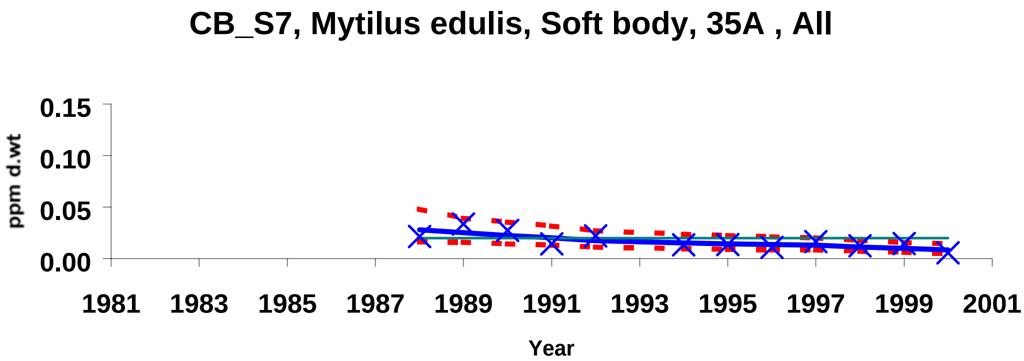

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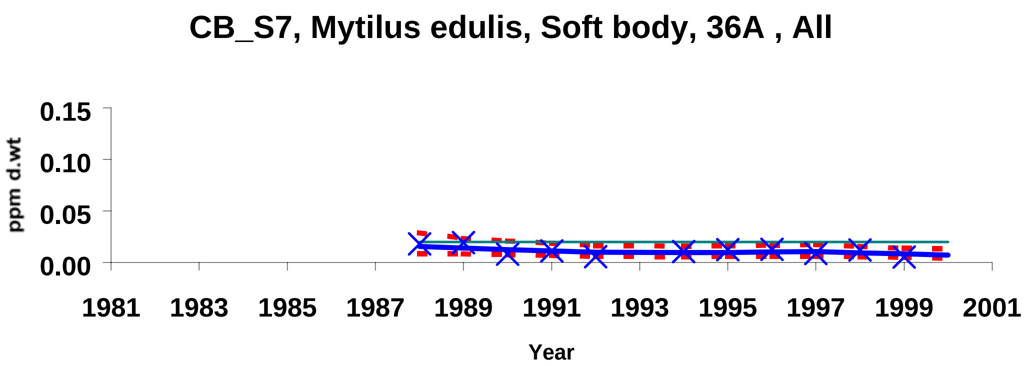


Figure 1. Median CB_S7 (=ΣPCB-7, sum of PCB 28, 52, 101, 118, 138, 153 and 180) concentration in blue mussel (*Mytilus edulis*) from inner (st.30A) to outer (st.36A) Oslofjord. (cf. Appendix F. and key in Figure 18, page 36).

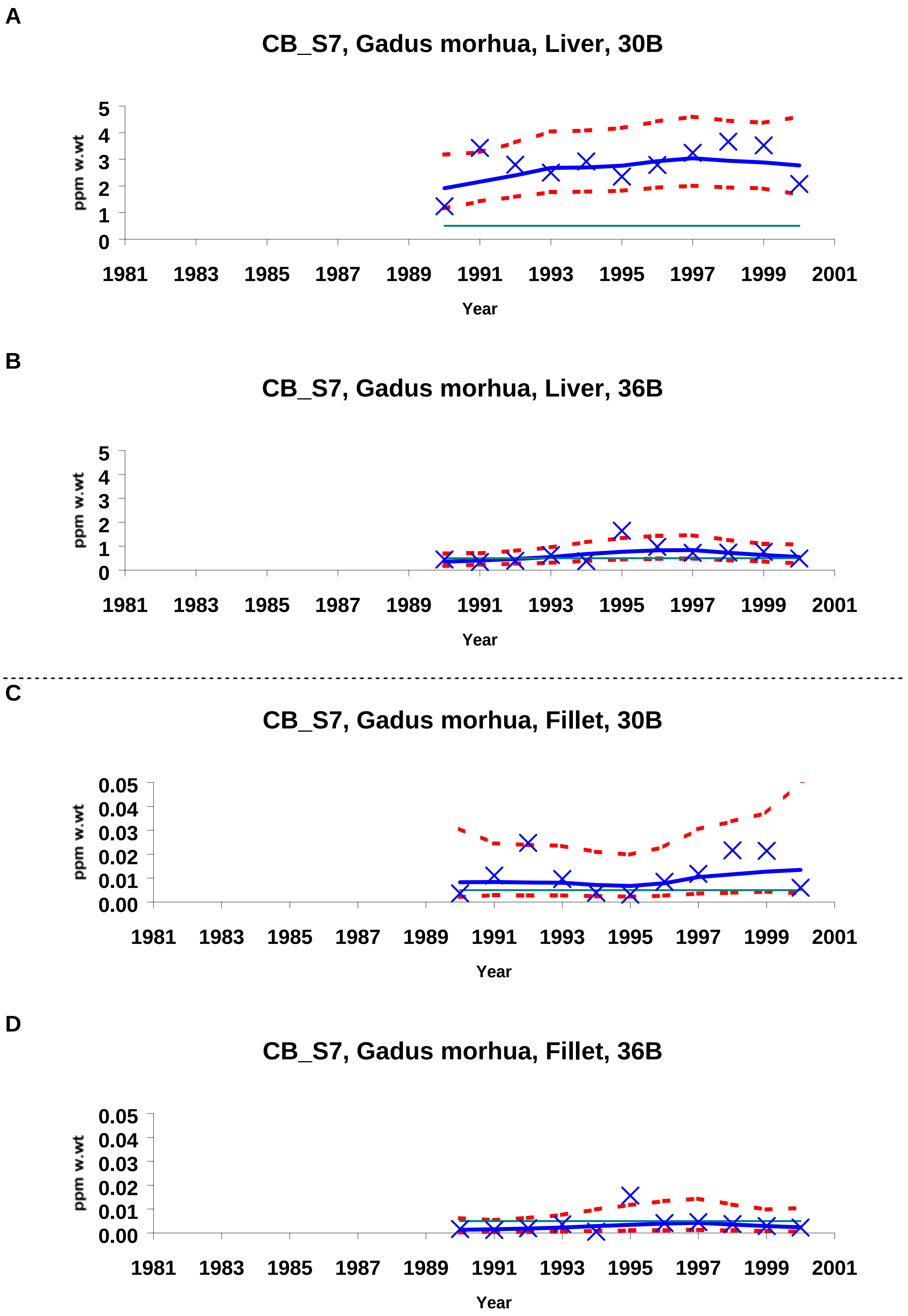


Figure 2. Median CB_S7 (=ΣPCB-7, sum of PCB 28, 52, 101, 118, 138, 153 and 180) concentration in liver and fillet of cod (*Gadus morhua*) from the inner (st.30B) to outer (st.36B) Oslofjord. (cf. Appendix F. and key in Figure 18).

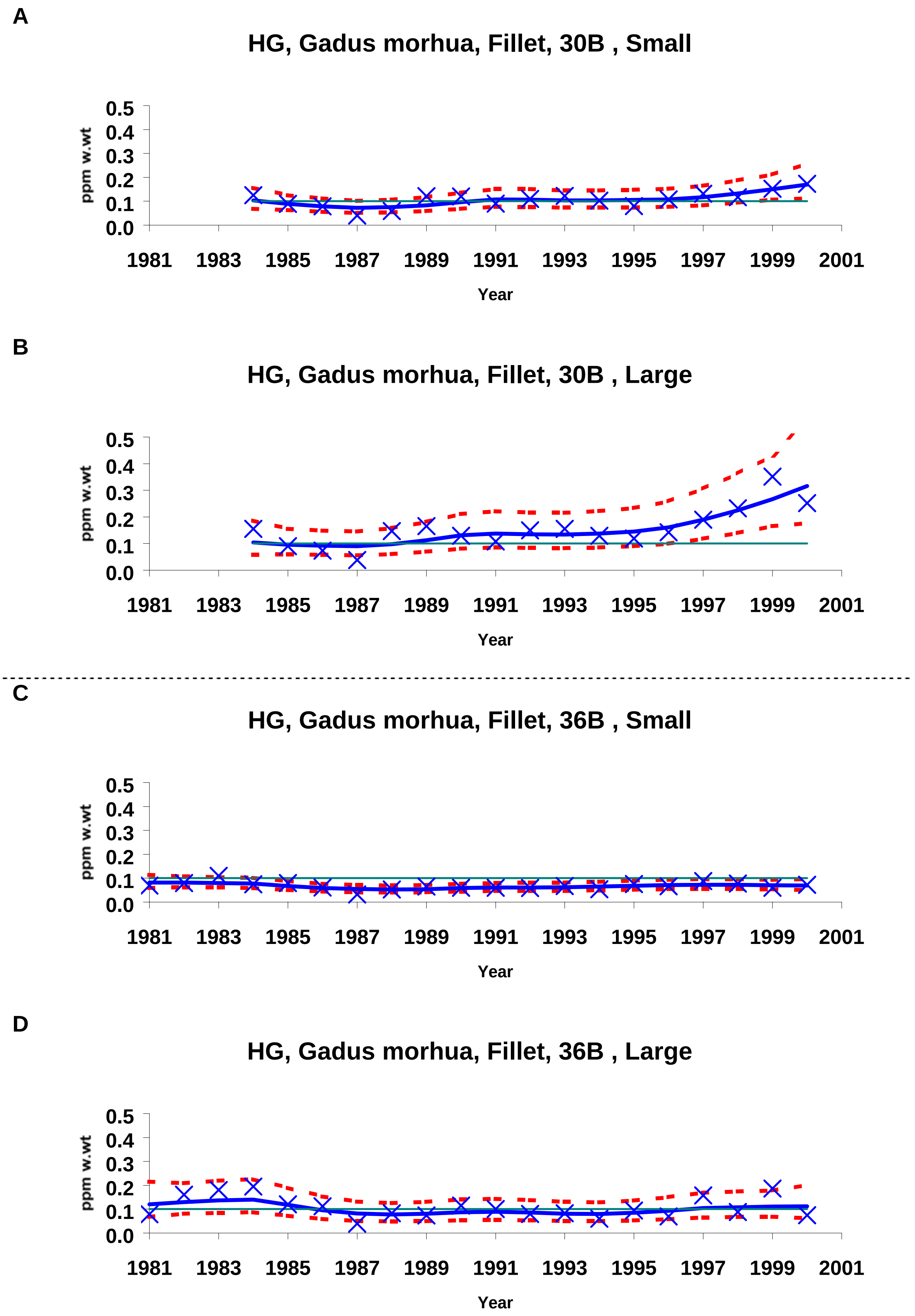


Figure 3. Median mercury (Hg) concentration in fillet of cod (*Gadus morhua*): for the inner Oslofjord (st.30B) “small” (**A**) and “large” (**B**) fish, and for the outer Oslofjord (st.36B) “small” (**C**) and “large” (**D**) fish. (cf. Appendix F. and key in Figure 18).

Mussels from Langesundsfjord (st.71A) had in 2000 marked overconcentrations of HCB (over 3 times "high background", Appendix H.). Concentrations have varied greatly during the investigation period (since 1983) but median value have decreased distinctly since 1989 (Figure 4) due to about a 99% reduction in discharge of HCB and other organochlorines from a magnesium factory after 1990 (cf. Knutzen *et al.* 2001).

The variability in the data is much less after 1989. The relatively large variability found in this series prior to 1990 accounts for the poor power. The power of the monitoring program for the period 1990-2000 is 14 years and better than the power for the entire period which is over 25 years (cf. Appendix H. for entire period). Separate analysis for the 1983-2000 data also indicated no significant trend. The 1990-2000 period had a significant *downward* trend.

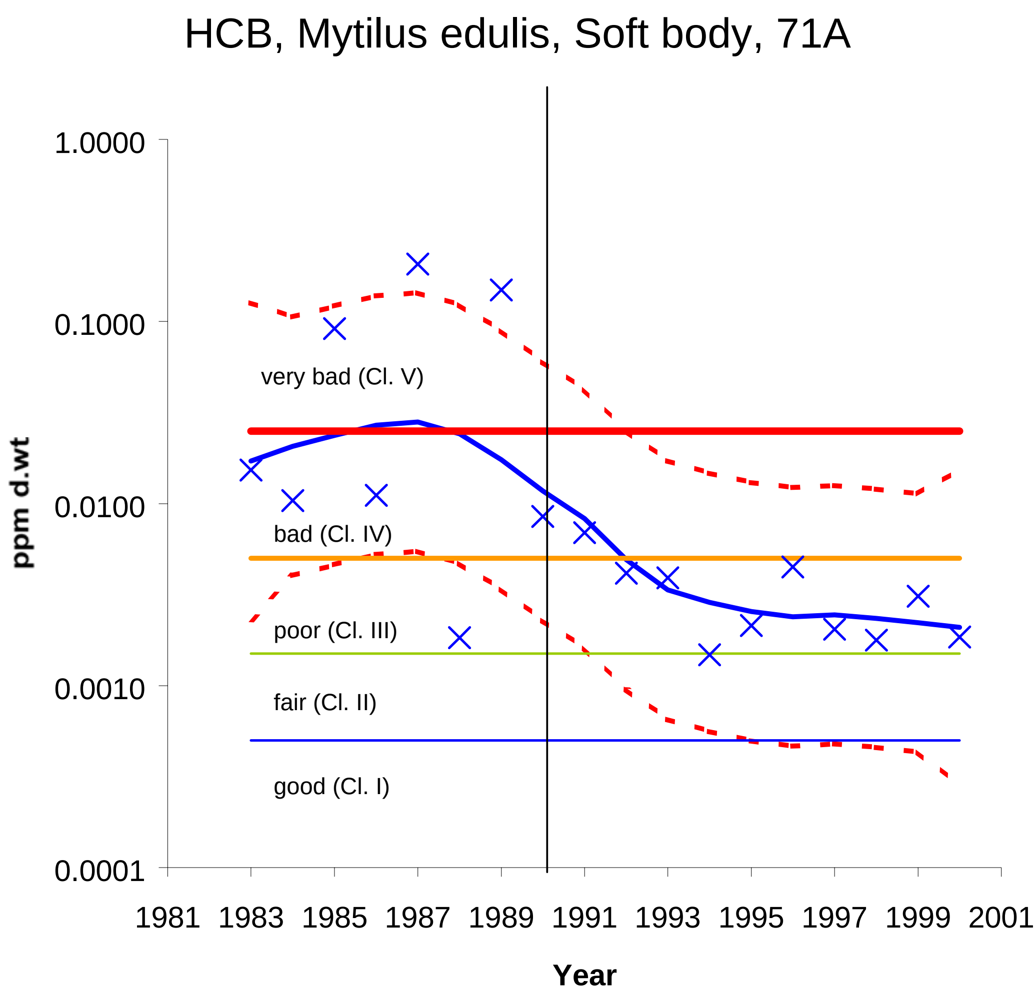


Figure 4. Median HCB concentration in blue mussel (*Mytilus edulis*) from Langesundsfjord (west of Oslofjord). (cf. Appendix F. and key in Figure 18). Vertical line indicates when a magnesium factory reduced it's discharge by 99%. Horizontal lines indicate classes as defined in Table 6. **NB: log-scale.**

1.3.2 Sørfjord and Hardangerfjord

The development of the contaminant conditions in these connected fjords and the main remedial actions that have been taken, have been outlined in the national comments for 1989 (Green 1991) and in a recent report concerning Sørfjord in particular (Skei 2000, Skei & Knutzen 2000). The results from JAMP 2000 are coupled to other studies in this area (cf.. Knutzen & Green 2001a) and confirm that the fjords continue to be contaminated especially with cadmium (e.g. Figure 5 and Figure 6), lead, mercury, ppDDE (e.g. Figure 7 and Figure 8) and to a lesser extent PCB.

Results for mussels collected from the Sørfjord (st. 51A, 52A, 56A and 57A) indicated up to severe overconcentrations of cadmium (3-13 times provisional "high background", Appendix H.), lead (1-30 times) and mercury (1-19 times). Overconcentrations of cadmium, lead and mercury could be traced to Ranaskjær (st.63A) in the Hardangerfjord, about 60 km from the head of Sørfjord. A significant *downward* trend was found for cadmium at st. 63A, 1990-2000, and a significant *upward* trend was found for mercury at st.57A, 1987-2000 (Appendix H.). In 2001 the Norwegian Food Control Authority (SNT) extended their advice against the consumption of mussels to include all seafood in the Sørfjord (Table 3) due to concerns about metal and PCB contamination.

Marked overconcentrations were found for cadmium in cod liver and flounder liver from inner Sørfjord (8 and 6 times "high background", respectively). Moderate to marked overconcentrations were found for mercury in fillet in cod and flounder, and slight overcentrations of lead in liver for these fish species.

The median mercury concentrations for mussels collected near Odda at the head of the Sørfjord (st.51A) in 2000 was 3.9 ppm d.w. and the highest found for this investigation. (Samples from this station were not depurated but evidence indicates that there is not significant difference compared to samples that have been depurated (Green 1989, Green *et al.* 2001a)). Higher median concentrations for 2000 compared to 1999 were found in mussels from st.56A, 63A and 65A, cod and flounder from station 53. These results may in part be due to an accidental discharge of mercury during the winter/spring of 1999-2000 (Skei & Knutzen 2001). The average of monthly surface water samples from November 1999 to June 2000 from seven stations within 11km of Odda was 109 ng/l (n=64, range: 1-2090), compared to an average of 6 ng/l (n=120, range: 1-57) for the 10 months prior and the 5 months after this period (cf. Skei 2000, 2001).

The power of the sampling strategies for mussels was relatively poor for samples collected from Odda; the innermost part of Sørfjord (st.51A or 52A). For example for lead in mussels, it is estimated that it would take 22-25 years to detect a hypothetical trend of 10% per year with 90% significance (Appendix H.). This reflects the large variability found in the data series from this area. The variability is mostly due to the irregular/accidental input of contaminated discharges. The power improved with distance from Odda, and at Ranaskjær (st.63A, ca.50km from Odda) it was only 10 years.

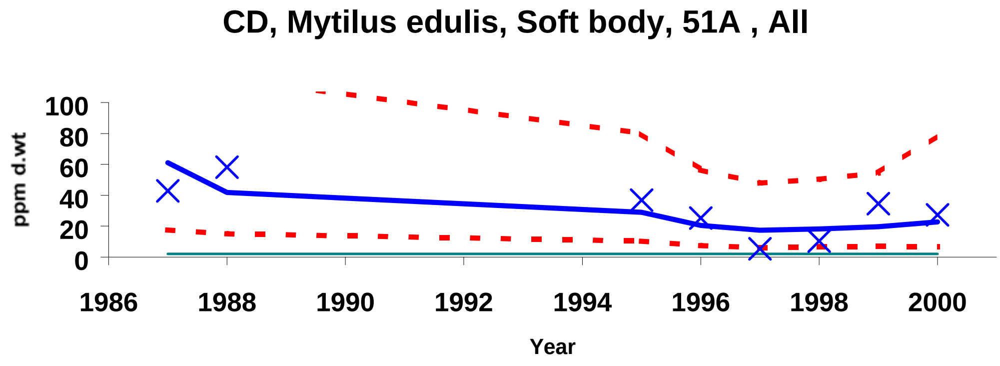
Overconcentrations of ppDDE were found in mussels from the head of the Sørfjord to about 60 km towards the open coast (Figure 7 and Figure 8). The highest median concentration in mussels was 27 ppb d.w. (overconcentrations of about 3 times). Moderate overconcentrations of ppDDE were found in cod liver from the inner Sørfjord (st.53B), close to 3 times "high background" (Figure 9, Appendix H.).

The source of ppDDE is uncertain. Analyses of supplementary stations (51A, 56A-1, 56A-2 and 57A-1) between 56A and 57A indicated for 1999 that there may be several sources (cf., Green *et al.* 2001a, c). The Sørfjord and Hardangerfjord area has a considerable number of fruit orchards. Earlier use and persistence of DDT and leaching from contaminated soil is probably the main reason for the elevated levels found. DDT products have been prohibited in Norway since 1970 (excepting the dipping of spruce seedling until 1987).

Median concentrations of ΣPCB-7 (sum of congeners: 28, -52, 101, -118, -138, -153 and -180) (Appendix H. and Appendix I.) in cod liver from Sørfjord was 3 times "high background". During the period 1990-2000, the concentrations have ranged from 100 to 700 ppb w.w., except for the years 1993, 1998 and 2000 where the median values varied between 1500 and 2400 ppb w.w. This indicates that cod is subject to a variable exposure from PCB, but the cause of this variation is not clear. So far (2000) mussel data have merely indicated one minor local source to surfaces waters (Knutzen & Green, 2001a). In 2001 the Norwegian Food Control Authority (SNT) has advised against consumption of cod liver from the inner Sørfjord (Table 3) due to concerns about PCB contamination.

No trends were evident in these organisms for ppDDE and CB153 during the period 1990-2000.

A



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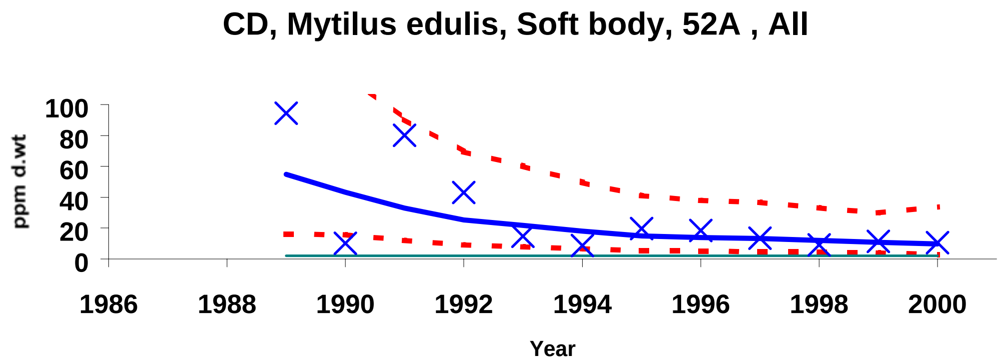

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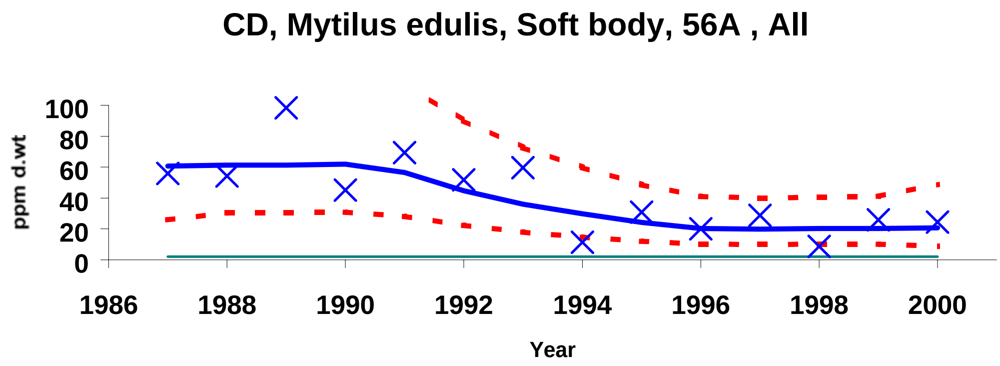

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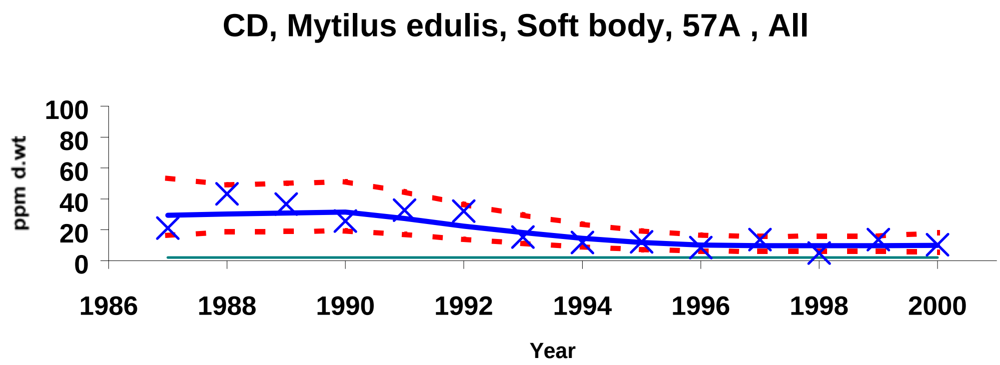

Figure 5. Median cadmium (Cd) concentration in blue mussel (*Mytilus edulis*) from inner (st.51A) to outer (st.57A) Sørfjord. NB: (cf. Appendix F. and key in Figure 18). **Note: for some years the upper confidence interval line is off-scale in figures A and B. Note: horizontal line for Class I near x-axis.**

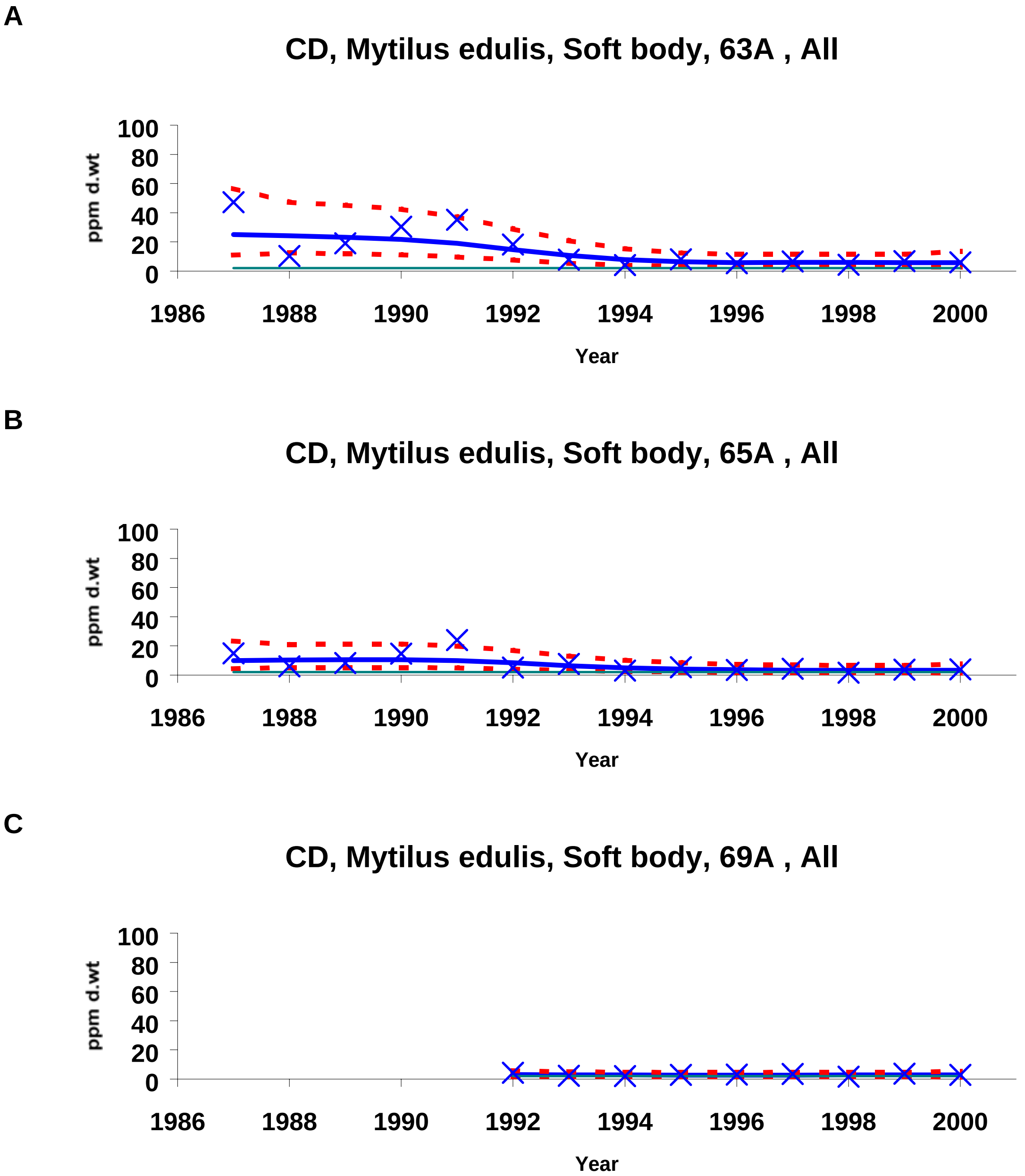

Figure 6. Median cadmium (Cd) concentration in blue mussel (*Mytilus edulis*) from Hardangerfjord (st. 63A, 65A and 69A). (cf. Appendix F. and key in Figure 18). **Note: horizontal line for Class I near x-axis.**

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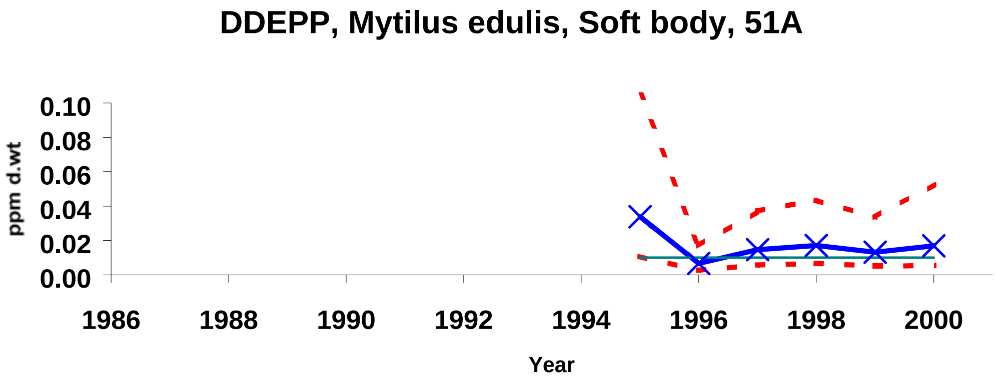

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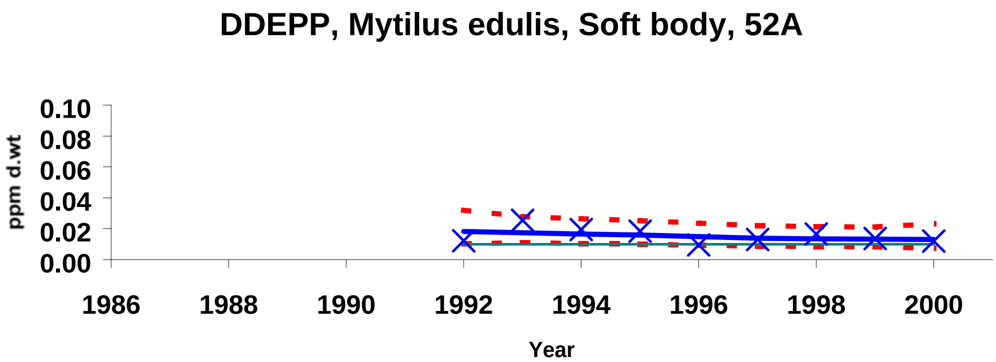

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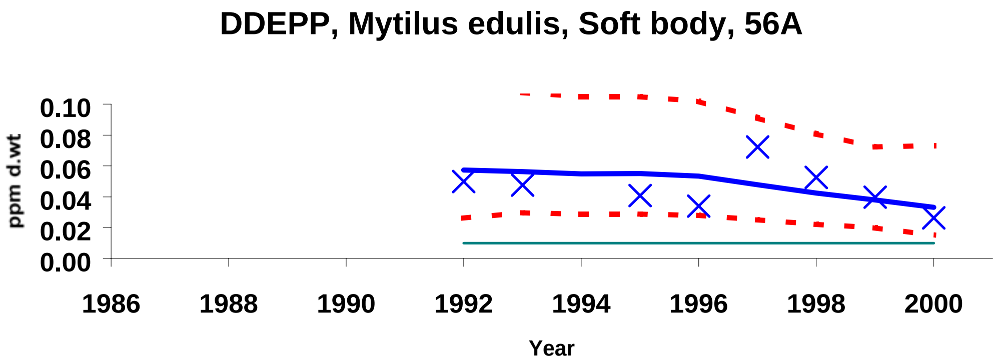

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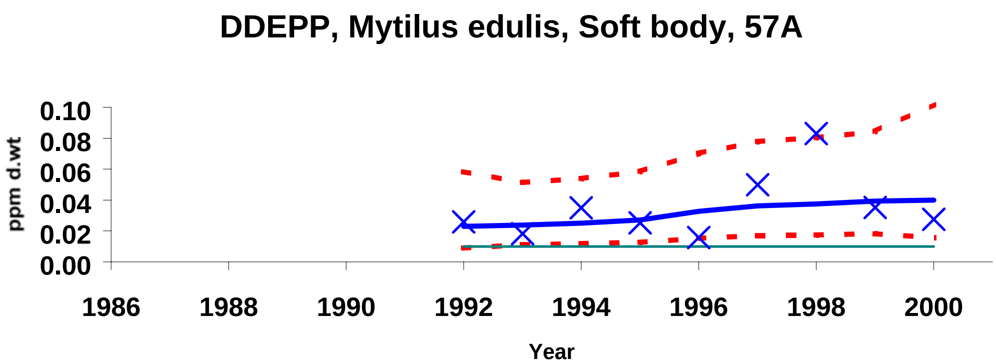

Figure 7. Median ppDDE (DDEPP) concentration in blue mussel (*Mytilus edulis*) from inner (st.51A) to outer (st.57A) Sørfjord. (cf. Appendix F. and key in Figure 18). **Note: for some years the upper confidence interval line is off-scale in figures A and C. Note: horizontal line for Class I near x-axis.**

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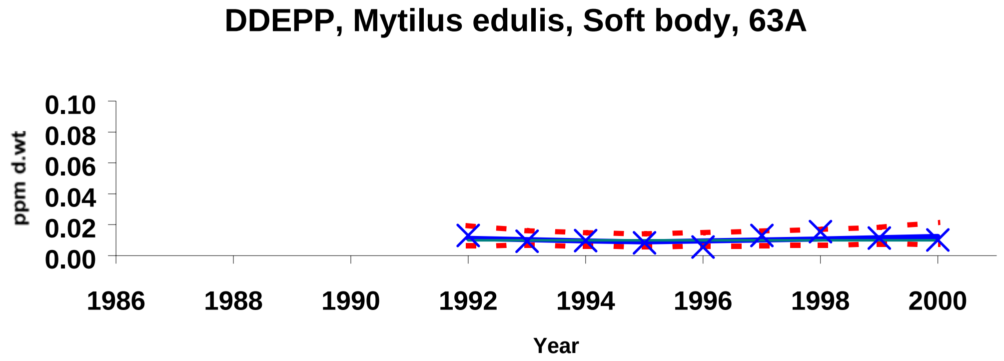

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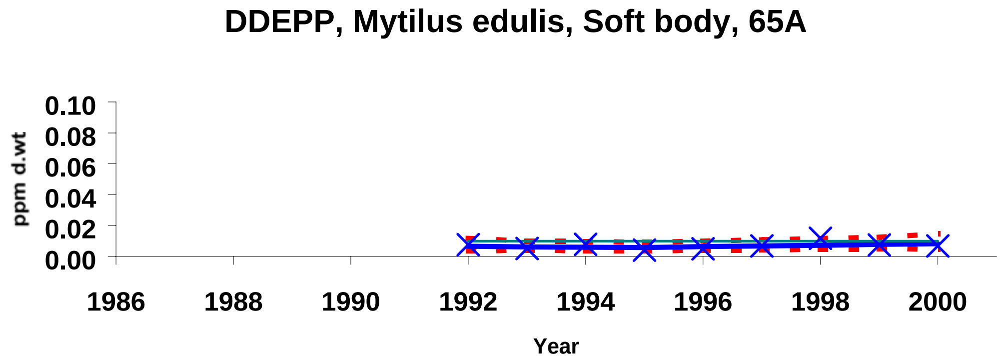

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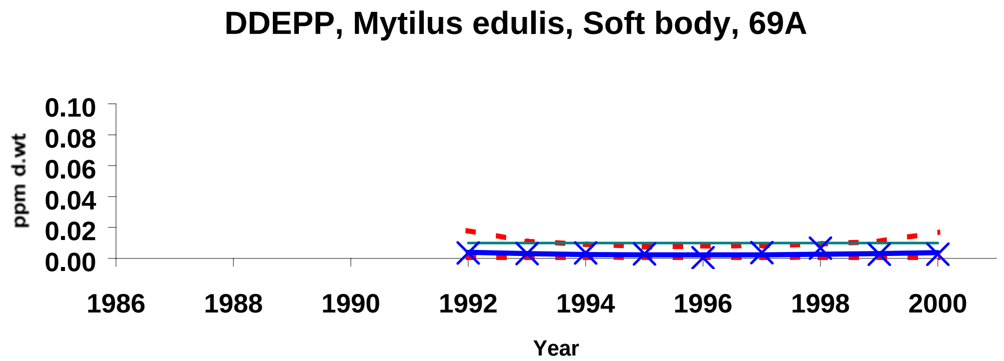


Figure 8. Median ppDDE (DDEPP) concentrations in blue mussel (*Mytilus edulis*) from Hardangerfjord (st. 63A, 65A and 69A). (cf. Appendix F. and key in Figure 18). **Note: horizontal line for Class I near x-axis.**

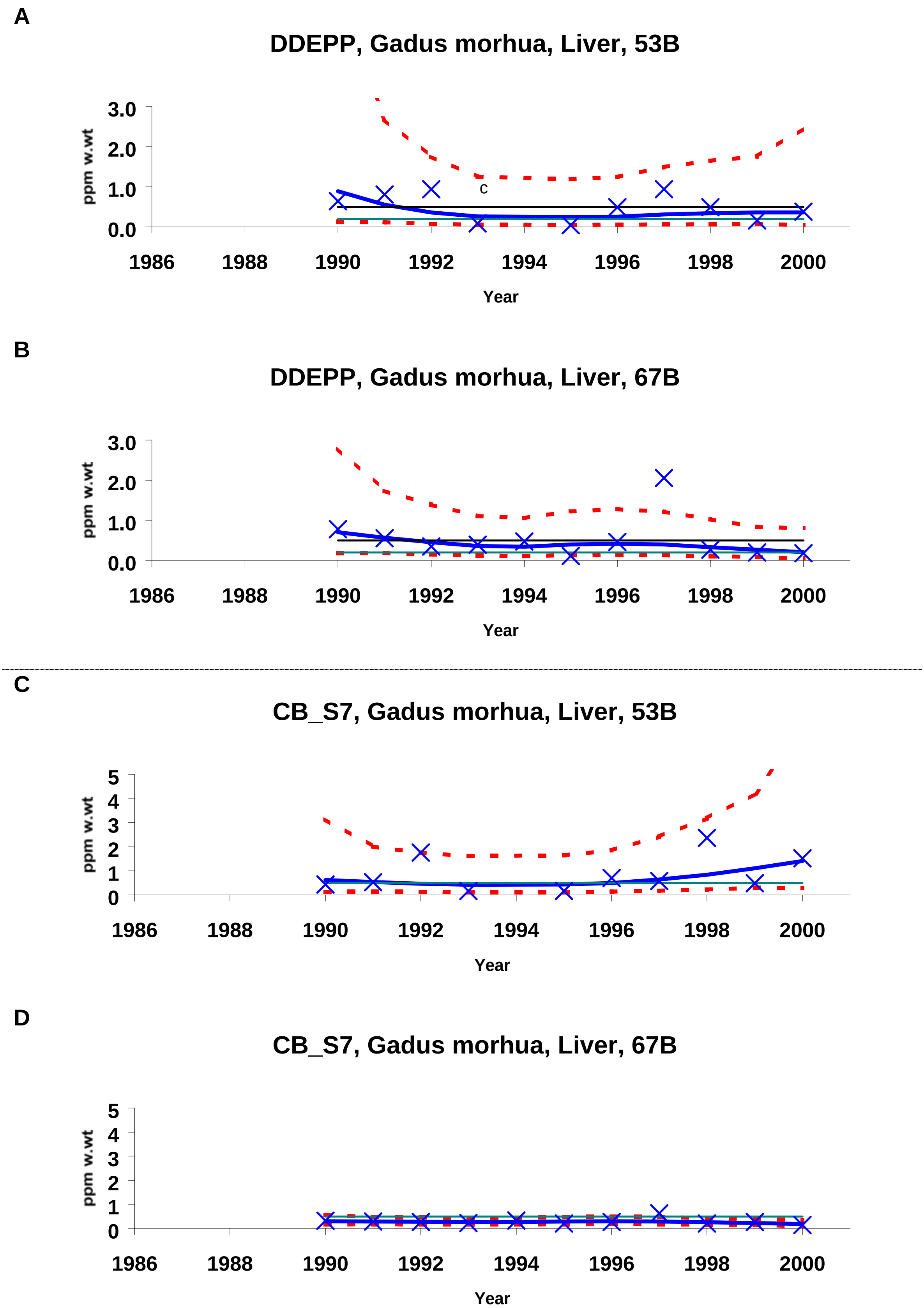


Figure 9. Median ppDDE (DDEPP) and CB_S7 (=ΣPCB-7) concentrations in cod (*Gadus morhua*) from Sørfjord (st.53B) and Hardangerfjord (st.67B) (cf. Appendix F. and key in Figure 18). **Note that for some years the upper confidence interval line is off-scale in Figure A.**

1.3.3 Lista area

No overconcentrations of metals or chlorinated hydrocarbons were found in mussels, cod or dab (st.15A/B/F, Appendix H. and Appendix I.).

1.3.4 Bømlo-Sotra area

It was impractical to continue sampling for flatfish at st.22F Borøyfjorden. Thus, a new station in Åkrafjorden, 21F Kyrping, was initiated. This station is about 82km south-east of 22F, but like 22F, is considered in a reference area.

Slight overconcentrations of cadmium (less than 2 times "high background") were found in mussels from this area (22A, Appendix H. and Appendix I.).

1.3.5 Orkdalsfjord area

Investigations in the area have been discontinued. Data for mussels is available for the period 1984-1996.

1.3.6 Open coast areas from Bergen to Lofoten

This stretch of coastline covers 7° of latitude to 68°N (Appendix F.). Only one mussel station (st.98A) was investigated. Mussels were collected from 98A in 1992-1993. However, during the period 1994-1996 mussels were not found at this station but were collected from nearby Skrova harbour (98X). Since 1997 a "new" 98A location was found roughly 18 km north in a small fjord remote from apparent point source of contamination.

In 2000, moderate overconcentrations (4 times "high background") of cadmium and slight overconcentrations (less than 2 times) of mercury in fillet and ppDDE in liver of plaice. Otherwise no other overconcentrations were found in this species or in cod and mussels (st.98A/B/F, Appendix H. and Appendix I.).

1.3.7 Exposed area of Varangerfjord near the Russian border

The remaining and northern area of JAMP in Norway stretches north of 68°N and a longitude from 17 to 29°E (Appendix F.). In 2000 only two mussel stations, one cod and one plaice station were investigated in the Varangerfjord that borders with Russia (at approximately 70°N).

Slight overconcentrations (less than 2 times “high background”) of cadmium in liver of cod and plaice (st.10B/F) (Appendix H. and Appendix I.). Overconcentrations of ppDDE (about 3 times) and HCB (less than 2 times) were found in plaice liver.

1.3.8 Norwegian Pollution and Reference Indices (The Index Programme)

The Norwegian Pollution Control Authority (SFT) has requested a select and small group of indices to assess the quality of the environment with respect to contaminants. One index is based on the levels and trends of contaminant concentrations in the blue mussel collected annually from a selection of the more contaminated fjords in Norway (Appendix J.). SFT has also requested the testing of this index against “reference” stations from selected areas and fjords.

The Index scale varies from 1, in which no overconcentrations were found at any station, to 5, in which at least one sample from each area or fjord could be classified as “very bad” in SFT's system.

Nine fjord areas were used to calculate the Pollution Index. The Index for 2000 is 2.9, down from 3.2 in 1999. A value between 2 and 3 is "Poor" in SFT's Environmental Classification System (Molvær *et al.* 1997).

Only four fjord/areas were included in Reference Index for 1998-2000 compared to seven to eight used in previous years. The Index for 2000 is 1.4. A value between 1 and 2 would be classified as “Fair”.

The use of the indices to assess the general level of pollution in contaminated or reference areas of coastal water for the period 1995 to 1999 has been reviewed (Green & Knutzen, 2001). The conclusions were mainly that the sample and analytical strategies lacked adequate coverage of the relevant contaminants and geographical areas. Hence, the results can be misleading. Furthermore, the report suggested supplementing the assessment of this type with relevant analyses of sediment.

It is not the intent of the application of the indices to give a station by station account, however, after 6 years of use (1995-2000) analyses showed some significant trends (cf. Appendix H.). Two cases were of particular interest and should be monitored closely:

- St.I201, Ekkjegrunn in the Saudafjorden on the West Coast where an *upward* trend was detected for lead in mussels; these had moderate overconcentrations in 2000 (2.1 times "high background").
- St.I132, Fiskåtangen in the Kristiansand harbour where severe overconcentrations of HCB were found in 2000 (9.5 times); here a *downward* trend was detected.

1.4 Biological effects methods for cod and flatfish

The JAMP-programme for 2000 included five biological effects methods (BEM): FAC, ALA-D, EROD, MT and TBT (Table 2). The first four are discussed in this chapter (**Figure 10** to **Figure 13**, Appendix K.) and TBT is discussed separately (cf., Chapter 1.5).

FAC, ALA-D, EROD and MT were measured in Atlantic cod collected at seven locations (23B, 30B, 36B, 53B, 67B, 98B, 10B). The same parameters were also measured in flounder at three locations (21F, 53F, 67F), dab at one location (36F) and plaice at two locations (98F, 10F). No data from station 15B/F was obtained in 2000. The locations can be divided into two groups: one group of stations can be considered to be moderately to markedly polluted (30B, 53B/F, 67B/F), whereas the other locations were from areas with little or no known pollution input.

Table 2. Summary of biological methods employed by the JAMP-2000.

Code	Name	tissue sampled	Specificity
FAC	Pyrene metabolites	fish bile	PAH
ALA-D	δ-amino levulinic acid dehydrase inhibition	fish red blood cells	Pb
EROD	Cytochrome P4501A-activity (CYP1A/P4501A1, EROD)	fish liver	planar PCB/PCNs, PAHs, dioxins
MT	Metallothionein	fish liver	Cd Cu Zn (Hg)
TBT	Imposex/Intersex	snail soft tissue	organotin

The reason to use biological effects methods within monitoring programmes is to evaluate whether marine organisms are affected by contaminant inputs. Such knowledge can not be derived from tissue levels of contaminants only. 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 JAMP 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.

The measures derived from FAC, EROD and MT (cf. Table 2) 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 higher exposure.

As in previous years, 25 individual cod were sampled for biological effects measurements at the stations 23B, 30B, 36B, 53B and 67B. In addition, 15 cod were sampled at each of the new locations (10B and 98B). Similarly, 9 dab were collected at 36F and 11 to 24 flounder at 21F, 53F and 67F. At 10F and 98F, 15 and 18 plaice were collected, respectively. All fish were collected by local fishermen and kept alive until arrival of NIVA staff within 5 days. Obviously, only live fish is sampled. There is an ongoing process to train and inform the fishermen that collect fish for JAMP to ensure the quality of the material.

1.4.1 OH-pyrene metabolites in bile

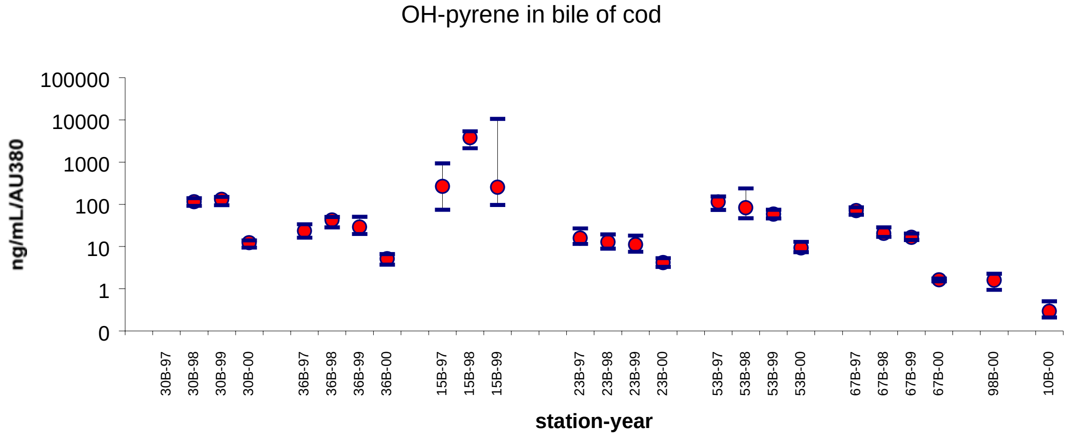
The concentrations of OH-pyrene metabolites in bile were significantly higher in cod from station 15B in 1997-1999 than the other stations ($p<0.0001$, ANOVA on $\log_e$ transformed data (MINITAB release 12.21); no data from 2000 at this station) (**Figure 10**). Furthermore, concentrations in 1997 were significantly higher at stations 53B and 67B than the other stations besides 15B (but see below). Higher concentrations of pyrene metabolites in cod were found from stations 30B and 53B in 1998 - 2000 compared to other locations. The concentrations of pyrene metabolites in bile of fish from station 10B/F and 98B/F 2000 were low. The consistently high levels in cod from station 15B merits further study. This is an area with a large discharge to water from an aluminium-smelter, the main source of PAH. The fish are collected on the open coast and the discharge from the smelter is a small bay about 2-3 km away.

Bile metabolites of PAH can be detected within a short period (hours) after exposure, and holding conditions prior to sampling may affect results. However, measures were taken in 1998 and 1999 to minimise or remove this exposure. Given the precautions taken, it is unlikely that the observed levels have been caused by storage prior to sampling. The increased level of pyrene metabolites in cod from station 67B in 1997 were presumably due to holding conditions as the fish were moved to a more contaminated location before sampling could be effected (see comment under ALA-D). The increased levels of pyrene metabolites at stations 53B and 30B (1998 and 1999) presumably reflect the general contamination of the two areas (inner Sørfjord and inner Oslofjord).

A similarly increased level of OH-pyrene metabolites in bile was found in dab collected in the same area, 15F (**Figure 10**). Somewhat surprisingly, flatfish (flounder) from the polluted area 53F did not have higher levels of metabolites in bile than flatfish from other locations. An improved method for the analysis of PAH-metabolites has now been implemented (using HPLC separation and synchronous scan fluorimetry detection). In 1999, both the former and the new method were used in parallel. The results indicate good agreement between the two methods.

On all stations the OH-pyrene concentrations decreased from 1999 to 2000 (in both cod and flatfish).

A



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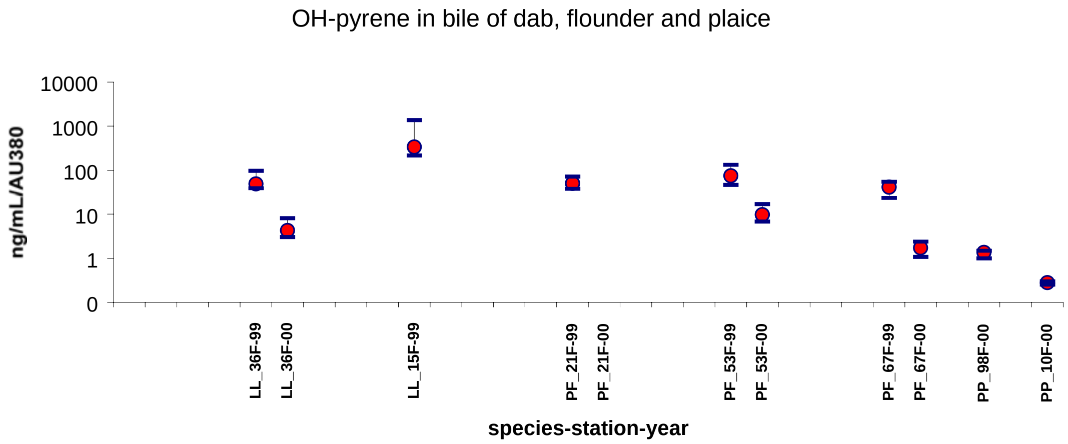

Figure 10. Concentration of OH-pyrene (ng/mL/AU_{380}) in bile from Atlantic cod (A) and flatfish (B - LL, st.15F, 36F), flounder (PF, st.21F, 53F, 67F) and plaice (PP, st.98F, 10F)) collected at the indicated stations from 1997 to 2000. Medians and quartiles (25%, 75%). Note logarithmic axis and that values were standardised to absorbance at 380 nm. No values are available for 30B in 1997 and 15B/F in 2000. Generally, stations 36B/F, 23B/21 67B/F, 98B/F and 10B/F are considered less perturbed than stations 15B, 30B and 53B/F with regard to PAH

1.4.2 ALA-D in blood cells

The activity of ALA-D in cod was generally significantly inhibited (indicating the influence of lead contamination) at the two most contaminated stations, i.e. 30B and 53B, compared to cleaner stations (i.e. 36B, 23B, 98B, and 10B) for 1997, 1998 and 2000 (**Figure 11**). For 1998, 1999 and 2000 the activity of the enzyme at st.53B in the Sørfjorden was significantly lower than the less contaminated station 67B in the Hardangerfjord, about 65 km away. In 1997, ALA-D was inhibited in cod from station 67B, presumably due to post-capture exposure (see above), and not significantly different from 53B.

In the Oslofjord, cod from the inner part (st.30B) had significantly lower enzyme activity than fish from the outer Oslofjord (st.36B) every year except 1999, cod from st.53B had significantly lower activity of the enzyme than cod collected at 23B and 67B. In 2000, cod from st.53B had significantly lower activity of the enzyme than cod collected at all the other stations but 30B. At the two new locations (98B and 10B) ALA-D activities were similar to those at 23B and 36B.

The pattern seen for cod in 1999-2000 was also found in flounder – ALA-D was significantly lower in fish from the more contaminated station 53F compared to 67F (**Figure 11**). In 2000, flounder was also significantly lower than the assumed "reference" station 21F. Activity in dab from the outer Oslofjord (1999, 2000) and Lista area (1999) or in plaice from Lofoten (98F) and Varangerfjord (10F) were similar.

The activity of ALA-D is known to be inhibited by exposure to lead. The results indicated that fish from the Sørfjord (st.53B/F) and inner Oslofjord (st.30B) are affected by the exposure to lead. During the period 1998-2000 slight overconcentrations of lead in cod have been found in the Sørfjord (1-1.3 times provisional "high background" concentrations) and for the period 1997-2000 in cod from the inner Oslofjord (1-8.4 times, cf. Appendix H.). During the period 1997-2000, no overcentrations were found for cod from Hardangerfjord (67B) or outer Oslofjord (36B). For flounder from the Sørfjord (53F), overconcentrations of 1-1.7 were found during this period but none for flounder from the Hardangerfjord (67F). This indicates that ALA-D might be better indicator of lead-exposure than concentration measurements in fish liver.

Although ALA-D inhibition is lead-specific, it is not possible to rule out interference by other metals or organic contaminants. Also, there is likely that different species will respond differently to the same exposure, and this needs to be taken into account when comparing different areas with different indicator organisms (e.g. flounder, dab and plaice).

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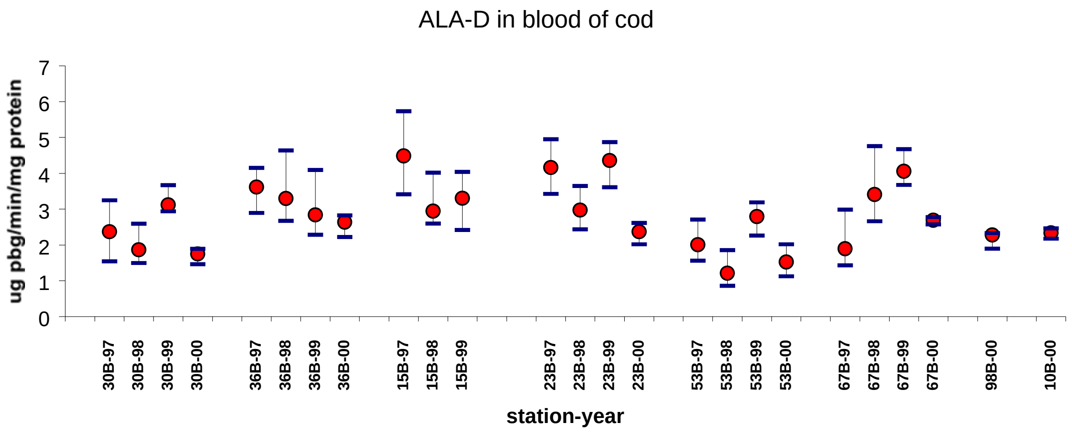

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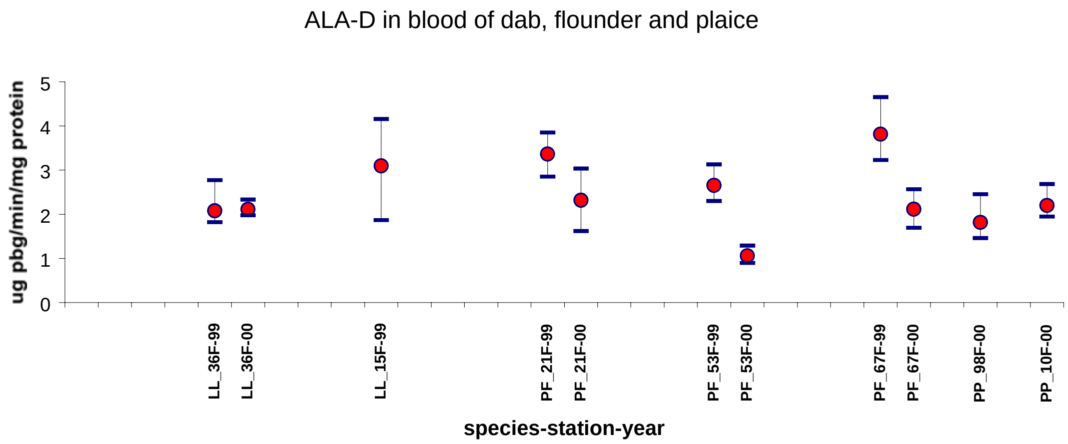

Figure 11. Activity of δ-aminolevulinic acid dehydrase (ALA-D, µg PBG/min/mg protein) in red blood cells from Atlantic cod (A) and flatfish (B - LL, st.15F, 36F), flounder (PF, st.21F, 53F, 67F) and plaice (PP, st.98F, 10F)) collected at the indicated stations from 1997 to 2000. Medians and quartiles (25%, 75%). Generally, stations 36B/F, 15B/F, 23B, 21F, 98B/F and 10B/F are considered less perturbed than stations 30B, 67B/F, 53B/F with regard to lead.

1.4.3 EROD in liver

High activity of hepatic cytochrome P4501A (EROD) indicates a response to contaminant exposure. It was expected that higher activity would be found at the stations that were presumed to be most perturbed by planar PCBs, PCNs, PAHs or dioxins, which were st.30B (inner Oslofjord) and 53B/F (inner Sørfjord). However, these stations were not consistently higher than other stations. Comparison could be made for cod from 1997 to 2000 and for founder in the Sørfjord/Hardangerfjord for 1999 and 2000. However, significantly higher activity in cod (xxB) or flounder (xxF) liver at these stations was only found at (cf. **Figure 12**):

- St.53B in 1997 compared to all stations,
- St.53B in 1998 compared to st. 23B (Karihav, West Coast) 36B (outer Oslofjord) and 15B (Lista area),
- St.53B in 2000 compared to st.36B and 98B (Lofoten),
- St.30B in 1998 compared to st. 23B, 36B and 15B,
- St.30B in 2000 compared to all stations,

Activity in cod from 15B was the lowest in 1997 and the highest in 1999. As mentioned above, an exposure to PAHs is indicated for this cod population (15B), and may, periodically, affect the activity in this species. Unfortunately, no data were obtained from station 15B/F in 2000 to see if the elevated EROD activities were sustained.

The 1999-2000 results for dab (st. 36F and 15F) and plaice (st. 98F and 10F) were similar to each other but higher than flounder (st. 53F, 67F and 21F, **Figure 12**). No significant difference was found in flounder from the more polluted st.53F in the Sørfjord compared to st.67F in the Hardangerfjord about 65 km away.

Data from 2000 also indicate an induction of EROD in both cod and plaice from the diffusely contaminated area Varangerfjord (10B/F) although OH-pyrene was low (see above). PCB-data from 1995 have shown great variations in liver concentrations in cod, indicating variable exposure for cod in the area, or a point source. Plaice from Lofoten (98F) also showed elevated EROD activities as compared to flounder from the moderately contaminated 53F station, indicating interspecies differences in “background” activities. EROD activities in cod from Lofoten (98B) were the lowest recorded in this investigation and may indicate "background" activity, compared to all other stations.

No adjustment for water temperature, season, size or sex has been made. Fish is sampled at a time of year (September-November) when differences between the sexes should be at a minimum. Generally, higher activity was found at more contaminated stations though the response was inconsistent. This inconsistency might indicate that populations with variable exposure history are sampled. Besides, there is evidence from other fish species that continuous exposure to e.g. PCBs may cause adaptation, i.e. decreased EROD response.

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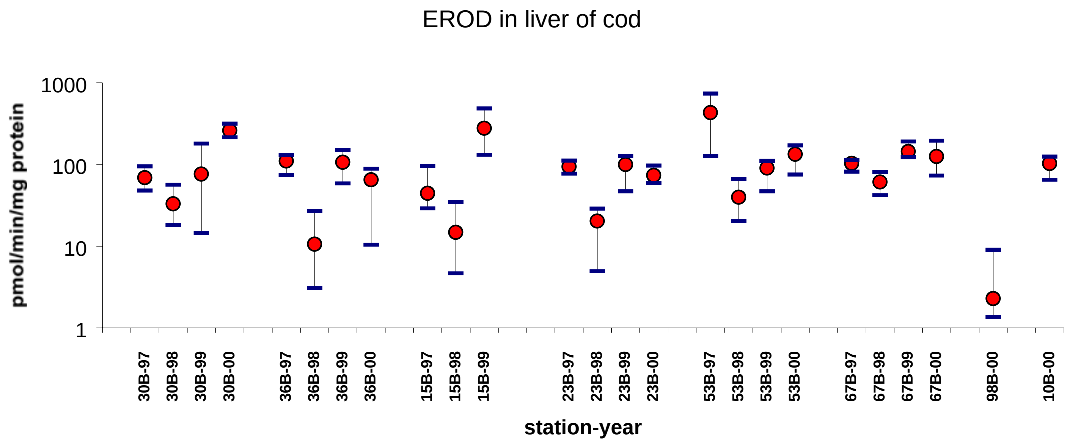

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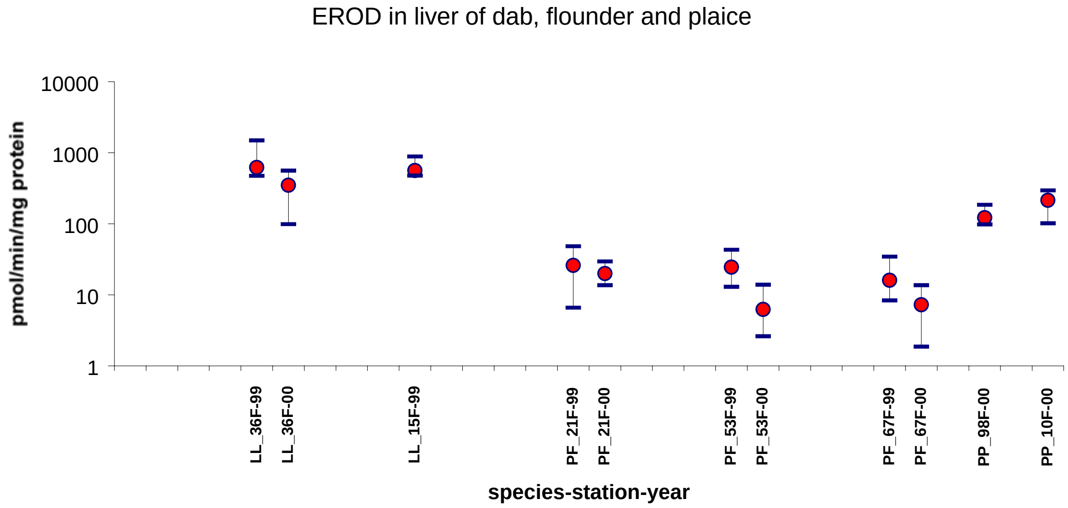

Figure 12. Activity of cytochrome P4501A (EROD, pmol/min/mg protein) in liver from Atlantic cod (A) and flatfish (B - LL, st.15F, 36F), flounder (PF, st.21F, 53F, 67F) and plaice (PP, st.98F, 10F)) collected at the indicated stations from 1997 to 2000. Medians and quartiles (25%, 75%). Note logarithmic axis. Values for individual years (for cod) were standardised to median value at station 23B (in reality very close to real values expressed in pmol/min/mg protein). No values are available for 15B/F in 2000. Generally, stations 23B, 21F, 98B/F and 10B/F are considered less perturbed than stations 30B, 67B/F, 53B/F, with regard to planar organic contaminants.

1.4.4 Metallothionein in liver

For cod, different MT-analysis methods were used in 2000 (DPP) compared to 1997-1999 (ELISA). Data from 1997, 1998 and 2000 are presented (**Figure 13**), however the samples from 1997-1999 are being reanalysed. In 2000 higher MT concentrations were found (indicating metal exposure) in fish from all stations, compared to 1997 and 1998 due to the methodological differences, thus comparisons between 2000 and other years cannot be done.

There were no clear trends in the hepatic concentrations of the metal-binding protein metallothionein (MT) in cod from the six stations (xxB) in 1997, 1998 and 2000 and in flounder from two stations (xxF) in 1999 and 2000 (**Figure 13**), and a number of unexpected relations between MT-levels at different stations were recorded:

- For all years higher levels at st.67B/F than at the more contaminated 53B/F,
- In 1998 higher in outer Oslofjord (36B) than in the inner part (30B),
- In 1998 also highest MT at a reference station (23B) and lowest in the Oslofjord (36B, 30B),
- In 2000 next to lowest MT in cod from the generally contaminated inner Oslofjord

For flounder, MT-concentrations in 1999 and 2000 were significantly higher at st.67F in Hardangerfjord, than st.53F in the Sørfjord (**Figure 13**).

MT-levels in plaice from 10F and 98F were low in 2000 compared to the other species.

This protein is induced by and binds the metals cadmium, zinc, copper and mercury, and differences in median metal concentration should indicate differences in exposure. However, for some metals the median concentrations was higher in cod liver from 67B than at 53B, in 1997 (copper, copper, cadmium and zinc) and 2000 (copper), likewise in flounder liver in 1999 and 2000 (copper and zinc). Furthermore; cod liver concentrated more metals at 36B than 30B in 1997 (cadmium, copper and zinc), and in 1998/2000 (copper and zinc) (Appendix H.).

As for EROD, no adjustment has been made for sex, size or metal levels in tissues. Furthermore, differences between species have to be considered when comparing different areas.

1.4.5 Concluding remarks

The application of BEM methods within JAMP in previous years (1997 - 1999) has indicated that the location 15B, previously regarded as only diffusely polluted, has an input of PAH which is sufficient to markedly affect fish in the area. Chronic exposure to PAHs may lead to liver lesions and reproductive disorders in fish, as shown through National Ocean and Atmospheric Administration's (NOAA (USA)) studies in Puget Sound. The highest levels of PAH metabolites observed in the bile of cod from station 15B are high compared to other studies, but it is not at present possible to infer population effects on cod in the area. It would be relevant to include DNA adduct analyses at some stage to clarify whether the cellular repair system of cod is sufficient to protect against damage from PAH radicals.

Results for the period 1997-2000 clearly indicated that there are lead effects, shown by decreased activity of the enzyme ALA-D in the two most strongly polluted areas, i.e. cod from the inner Oslofjord (30B) and cod and flounder from the inner Sørfjord (53B/F).

New EROD-data (2000) indicate that Lofoten (98B) is the least contaminated station for cod. EROD analyses also indicated that cod from Varangerfjord (10B), presumed to be only diffusely contaminated, was influenced by planar organic contaminants.

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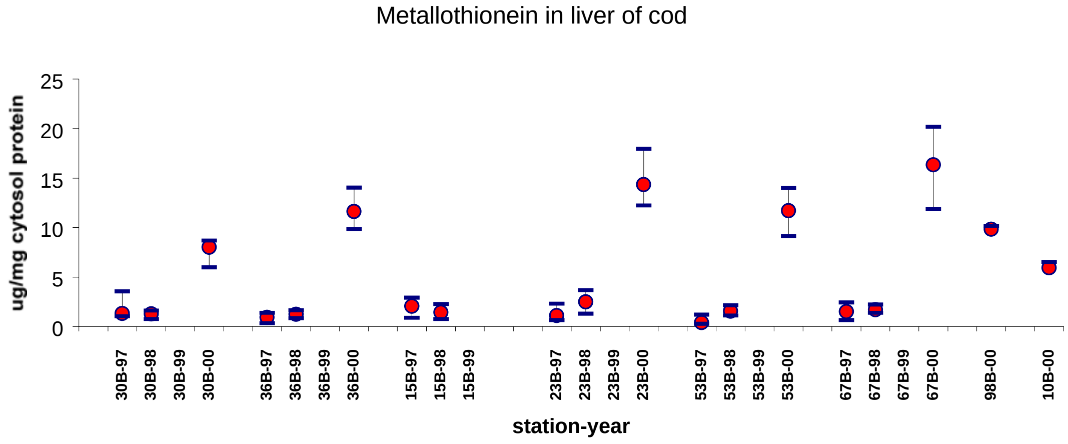

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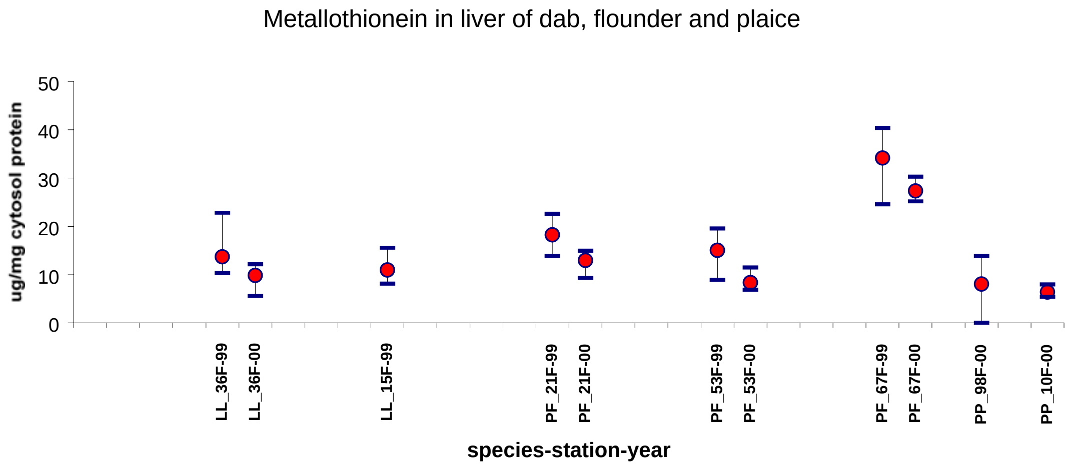


Figure 13. Hepatic concentrations of metallothionein (MT, µg/mg cytosol protein) in liver from Atlantic cod (A) and flatfish (B - LL, st.15F, 36F), flounder (PF, st.21F, 53F, 67F) and plaice (PP, st.98F, 10F)) collected at the indicated stations from 1997 to 2000. Medians and quartiles (25%, 75%). Different analysis methods were used in 2000 compared to earlier years. The 1997-1999 material will be reanalysed. No values are available for 15F in 2000. Generally, stations 36B/F, 15B/F, 23B/21 98B/F and 10B/F are considered less perturbed than stations 30B, 67B/F, 53B/F with regard to cadmium, copper, mercury and zinc.

1.5 Effects and concentrations of organotin

Effects from organotin in dogwhelks (*Nucella lapillus*) and concentrations in dogwhelks and blue mussels (*Mytilus edulis*) were investigated in two areas on the coast of southern Norway and along the coast of northern Norway 2000.

Dogwhelks were sampled at four stations in the Haugesund area and one in outer Oslofjord (st.36G) in October 2000 (Appendix F. , Map 5), and from eight stations in the area Harstad - Mehamn in northern Norway during 2000 (Maps 17-22). As in 1999, there was a low abundance of dogwhelks at st. 226G and 226X in the Haugesund area. Station 226X is sampled close to, but on the opposite side of the sound to st. 226G. The snails were also scarce in Mehamn (st.48G) in northern Norway. Blue mussels were sampled from three stations in the Haugesund area, one in outer Oslofjord and one in inner Oslofjord area. TBT-induced development of male sex-characters in females, known as imposex (VDSI and RPSI), was analysed according to OSPAR-JAMP guidelines. Detailed information about the chemical analyses of the animals is given in Følsvik *et al*. (1999).

1.5.1 Dogwhelks

Evident effects from organotin was in 2000 observed at all stations except outer Saughamneset (45G) and Kifjordneset (47G) in northern Norway (**Figure 14**). Concentrations of organotin were also very low (<7 µg Sn/kg d.w.) in snails from the two latter stations. Most heavily affected were snails from the Haugesund area (VDSI>4), and the highest organotin levels were also found in this area (>150 µg Sn/kg d.w., cf. Appendix L.)

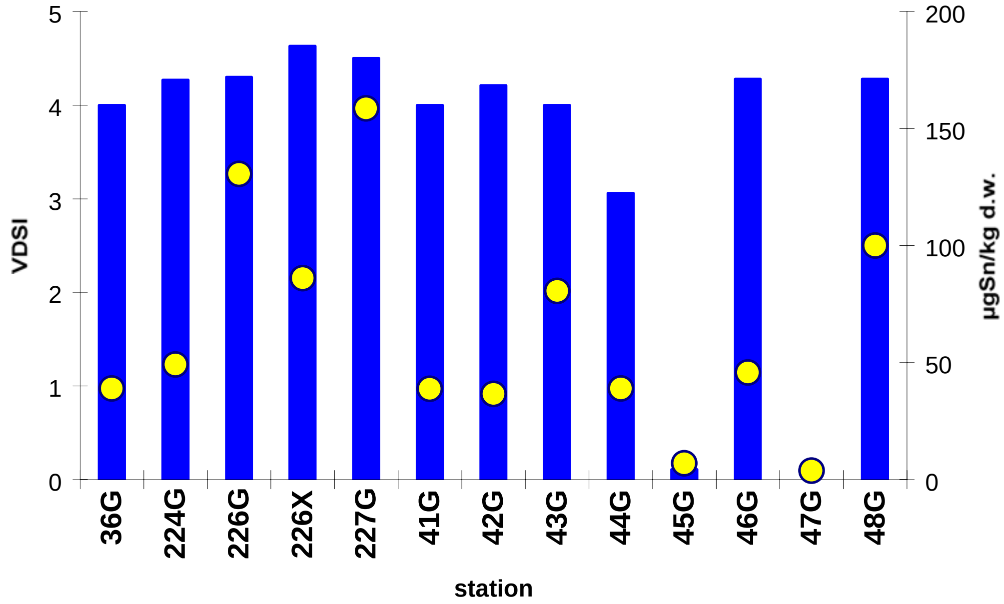


Figure 14. Concentrations of TBT (µg Sn/kg d.w.; circles) and imposex (VDSI; columns) in dogwhelks from 13 stations of the coast of Norway 2000. Station 226X is a new station sampled close to, but on the opposite side of the sound to st. 226G.

Generally, there was an evident improvement in VDSI from 1991/1993 to 1997, but there has been little change since then, and the conditions in the Haugesund area got slightly worse last year (**Figure 15**). The northern stations have not changed much either (**Figure 15**). Stations at Alta (44G) and Honningsvåg (46G) had to be moved, and the apparent improvement at 44G might be a result from this station now being closer to the open sea. The two "reference" stations at outer Saughamneset (45G) and Kifjordneset (47G) are still very little affected by organotin.

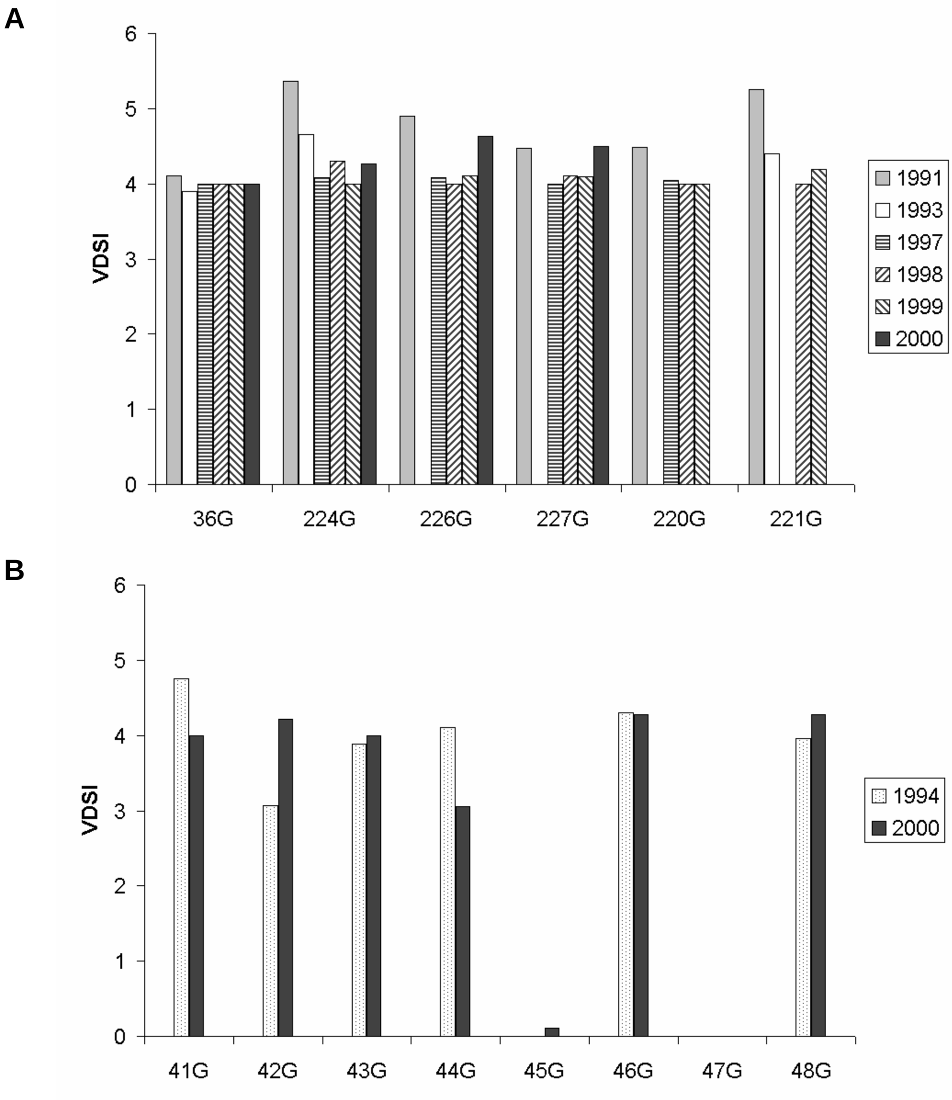


Figure 15. Imposex (VDSI) in dogwhelks (*Nucella lapillus*) at 6 stations in southern Norway (A) and 8 stations in northern Norway (B), 1991-2000. Other investigations for data from 1991 (Harding *et al*. (1992) and 1993 and 1994 (Walday *et al*. 1997). (cf. Maps 2, 5, 17-22).

The development of the 'relative penis size index' (RPSI) is not consistent with the VDSI over the years and the variation from year to year is generally higher. Except for some of the northern stations, the Færder area (st. 36G) is the clearly least affected area considering the RPSI-index and 226G and 227G in the Haugesund area are the most heavily affected ones (cf.
Figure 16).

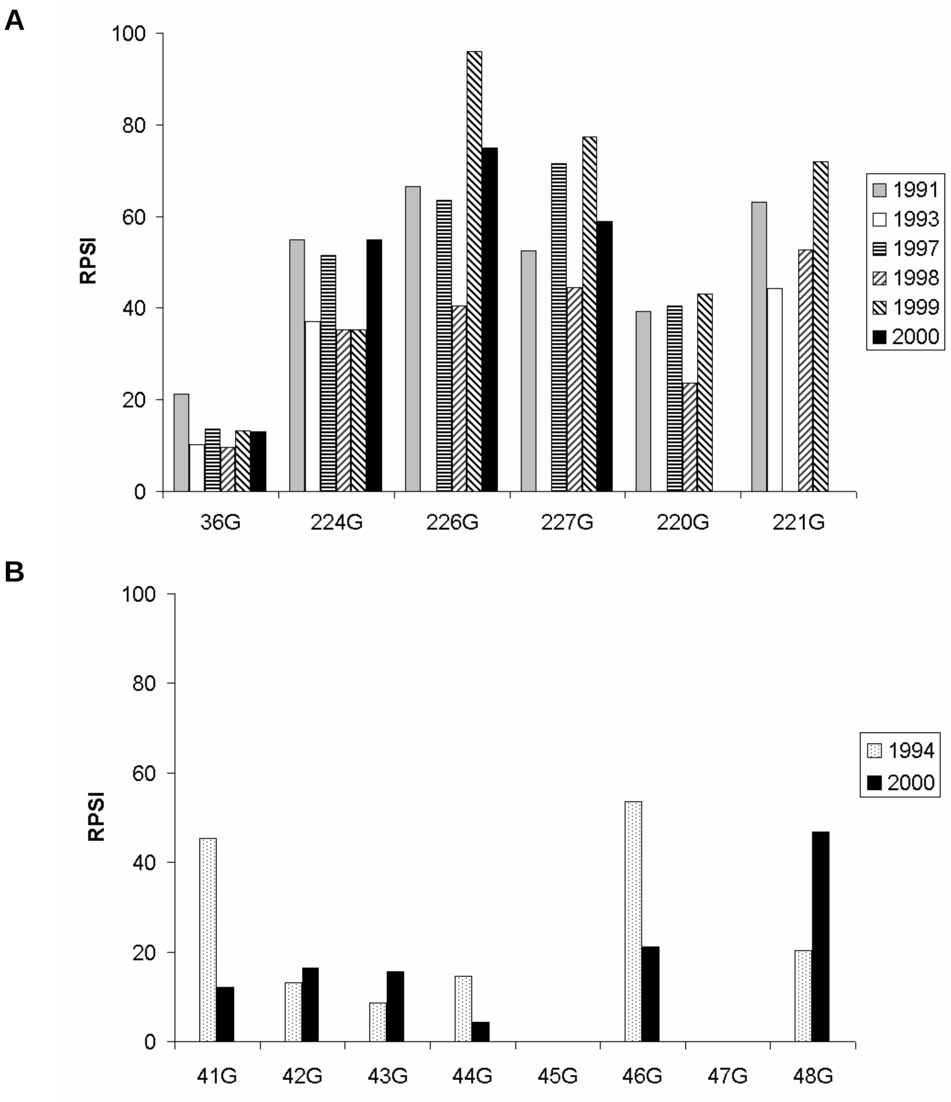


Figure 16. Imposex (RPSI) in dogwhelks (*Nucella lapillus*) at 6 stations in southern Norway (A) and 8 stations in northern Norway (B). Other investigations for data from 1991 (Harding *et al*. (1992) and 1993 and 1994 (Walday *et al*. 1997). (cf. Maps 2, 5, 17-22).

1.5.2 Mussels

Three parallels were analysed for station 30A and 221A. Two parallels were analysed for 36A while one was analysed for 226A and 227A. Concentrations of organotin in mussels were high in most areas, except for the Outer Oslofjord (st. 36A), and highest in the harbour of Kopervik (221A) in the Haugesund area, as it has been during the investigation period (**Figure 17**). Levels ranged between 34 and 747 µg Sn/kg d.w. (**Figure 17** and Table 14 in Appendix L.). According to the Norwegian classification of environmental quality (Molvær *et al.* 1997) the inner Oslofjord- and two of the Haugesund stations were markedly polluted with TBT, while outer Oslofjord and station 227A were moderately polluted. Generally, levels were lower at all stations compared to previous years.

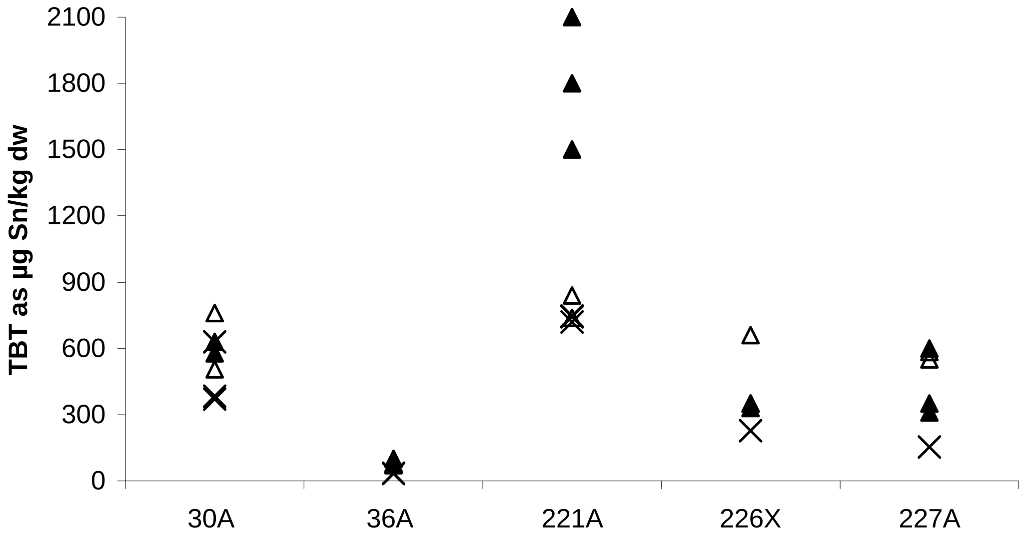


Figure 17. Levels of TBT (µg Sn/kg d.w.) in blue mussels (*Mytilus edulis*) from parallels at five stations in Southern Norway in 1998 (∆),1999 (▲) and 2000 (x). Station 226X is a new station sampled close to, but on the opposite side of the sound to st. 226A (cf. **Appendix F.** , Map 2 and 5).

1.5.3 Concluding remark

The presence of organotin (as TBT) in Norwegian waters was still a problem in 2000. Concentrations of organotin in mussels and dogwhelks were elevated, and biological effects from TBT were found in dogwhelks from most of the investigated areas. Only exception were two reference stations in northern Norway. There is no clear improvement through the years according to imposex, but concentrations of TBT in mussels were lower than previous years. It is a cause for concern that the ban on the use of TBT in antifouling on boats <25 m of length has not lead to a clear improvement in the investigated areas.

1.6 Overall conclusions

In regards to JMP/JAMP Purpose A (health assessment), attention should be called to the list from Norwegian Food Control Authority (SNT) which names the restrictions and recommendations concerning the sale and consumption of seafood in Norway (Table 3).

In regards to JMP/JAMP Purpose C (spatial distribution assessment), the concentrations found in 2000 are indicated in the bar graphs shown in Appendix I. . Provisional “high background" levels were used to identify elevated concentrations. This initial assessment revealed no new areas of concern that are not currently under surveillance.

In regards to JMP/JAMP Purpose D (temporal trend assessment) there is evidence that the median concentrations of:

- Mercury in fish fillet from the inner Oslofjord has increased since 1984,
- Mercury in mussel from the outer Sørfjord has increased since 1987,
- Cadmium in mussels from one station in the Hardangerfjord has decreased since 1987.

Table 3. Summary of action taken by the Norwegian Food Control Authority (SNT, http://www.snt.no/nytt/tema/kosthold/kyst.html) concerning the consumption and sale of fish products along the Norwegian Coast. (Area designations from SFT, pers. comm. 2000).

Area of concern (km^2)	Last year of issue/ evaluation	Main parameters of concern	Main fish/shellfish product of concerned	Recommendations or restrictions of concern:
Inner Oslofjord (190)	2000	PCB	fish liver	Consumption
Inner Drammensfjord (45)	1992	Dioxins/PCB	fish liver	Consumption and Sale
Inner Sandefjordfjord (3)	1993	PCB	round fish liver	Consumption and Sale
Grenlandsfjords, Langesundsfjord (84)	2000	Dioxins	fish, shellfish	Consumption and Sale
Tvedestrand (2)	2000	PCB	fish liver	Consumption
Arendal (9)	2000	PCB	fish liver	Consumption
Inner Kristiansandsfjord (29)	2000	Dioxins/PCB	fish, shellfish	Consumption
Farsund (42)	2000	PCB PAH	fish, mussels	Consumption
Fedafjord (13)	1995	PAH	mussels	Consumption
Flekkefjord (3)	2000	PCB	fish liver	Consumption
Stavanger	2001	PCB PAH	fish liver, mussels	Consumption
Sandnes	2001	PAH	mussels	Consumption
Karmsund-Eidsbotn	2001	PCB [1)], PAH	fish liver, shellfish	Consumption
Saudafjord (21)	1992	PAH	fish liver, mussels	Consumption
Sørfjord (80)	2001	Cd Pb Hg PCB	fish, shellfish	Consumption
Bergen area including Herdlefjord, Byfjord, Hjeltefjord, Grimstadfjord and Raunefjord (180)	1998	PCB	fish, shellfish	Consumption and Sale
Inner Årdalsfjord (8)	1995	PAH	mussels	Consumption
Inner Sunndalsfjord (15)	1993	PAH	fish liver, mussels	Consumption
Hommelvik (Trondheimsfjord) (5)	1985	PAH	mussels	Consumption
Inner Ranfjord (15)	1997	PAH Pb Hg	mussels	Consumption
Vefsnfjord (50)	1992	PAH	mussels	Consumption
Ramsund	2000	PCB	fish, shellfish	Consumption
Harstad (1)	2000	PCB heavy metals	fish liver, mussels	Consumption
Tromsø (17)	2000	PAH	mussels	Consumption
Hammerfest (2)	2000	PAH	mussels	Consumption
Honningsvåg (2)	2000	PAH	mussels	Consumption

[1)] Concerns only Eidsbotn

Study of the power of temporal trend monitoring was useful in assessing existing sampling strategies, however, modifications might be needed to account for local conditions (see Appendix O in Green *et al.* 2000).

The 2000 investigation also includes results on Norwegian Pollution Control Authority Pollution Indices (Appendix J.), and discussion of the results of biological effects methods including imposex and intersex (Chapter 1.4 and Chapter 1.5).

The JAMP issues to which these investigations are relevant are shown in Table 4.

Table 4. JAMP issues relating to the Norwegian JAMP (cf., SIME 1997, Annex 11).

Subject	JAMP issue	Question	Recent Norwegian contribution
Hg, Cd and Pb	JAMP issue 1.2.	What are the concentrations and fluxes in sediments and biota?	1996-1997: Levels in sediment (cf., Green *et al.* 2000) 2000: Levels and trends in biota (annual investigations since 1981, Chapter 1.3) 2000: INDEX for blue mussels from selected stations (annual investigations since 1995, cf. Chapter 1.3.8)
TBT	JAMP issue 1.3.	To what extent do biological effects occur in the vicinity of major shipping routes offshore installations, marinas and shipyards	2000: Levels and trends in mussels and snails (annual investigations since 1997, cf. Chapter 1.5)
PCBs	JAMP issue 1.7.	Do high concentrations pose a risk to the marine ecosystem	[as for JAMP issue 1.2]
PCBs	JAMP issue 1.8.	Do high concentrations of non-ortho and mono-ortho CBs in seafood pose a risk to human health?	1995: INDEX for blue mussels from selected stations (cf. Green 1997) 1996: Levels in cod (cf. Green *et al.* 2000)
PAHs	JAMP issue 1.10.	What are the concentrations in the maritime [1)] area?	1992: Levels in shellfish (Green *et al.* 1995) 1992-1993: Levels in fish and mussels for selected stations (Knutzen & Green 1995) 1996-1997: Levels in sediment (cf., Green *et al.* 2000) 2000: INDEX for blue mussels from selected stations (annual investigations since 1995, Chapter 1.3.8)
PAHs	JAMP issue 1.11.	Do PAHs affect fish and shellfish?	1998: Biological effects methods in cod (cf. Chapter 1.4)
Other synthetic organic compounds	JAMP issue 1.12.	How widespread are synthetic organic compounds within the maritime [1)] area?	2000: Levels and trends in biota (annual investigations since 1983 of selected organochlorines, cf. Chapter 1.3) 1996: Introductory investigation of organochlorines in cod livers (cf. Green *et al.* 2000)
Chlorinated dioxins and dibenzofurans	JAMP issue 1.15.	What concentrations occur and have the policy goals (for the relevant parts of the maritime [1)] area) been met?	1995: INDEX for blue mussels from selected stations (cf. Green 1997) 1996: Introductory investigation of organochlorines in cod livers (cf. Green *et al.* 2000)
Biological effects of pollutants	JAMP issue 1.17.	Where do pollutants cause deleterious biological effects?	2000: Southern Coast, planar PCBs, metals, PAHs in cod (annual investigations since 1997, cf. Chapter 1.4)
Chemicals used	JAMP issue 5.3.	In which areas do pesticides and antibiotics affect marine biota?	2000: Levels and trends in biota (cf. Chapter 1.3)
Ecosystem health	JAMP issue 6.1.	How can ecosystem health be assessed in order to determine the extent of human impact?	Results for the other issues are also relevant here

[1]) Not defined in original text

2. Technical Details

2.1 Compliance with guidelines/procedures

2.1.1 JAMP programme

Samples were collected and analysed, where practical, according to OSPAR guidelines (OSPAR 1990, 1997) and screened and submitted to ICES by agreed procedures (ICES 1996). The most important point of concern are those stations where insufficient number of fish were collected (cf. Appendix G.).

2.1.2 Overconcentrations and classification of environmental quality

This report focuses on the principle cases where *median* concentrations exceeded provisional "high background" ("normal"). The median concentration can be derived from the tables in Appendix H. or figures in Appendix I. , depending on the year and concentration basis in question. The provisional "high background" limits are summarised in Table 5. The factor by which concentrations exceeded "high background" is termed **overconcentration**. "High background" limits have not been set for all contaminants and species. 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 overconcentrations for years prior to 1997 made in this report may not correspond to figures and assessments made in previous national comments.

In addition to the use of "high background", the Norwegian Pollution Control Authority's (SFT's) (Molvær *et al.* 1997) system for **classification of environmental quality** has been applied (Table 6).

A review of provisional "high background" concentrations based on recent JAMP-data generally confirmed that the reference concentrations (i.e., upper limit for Class I) in SFT's classification system, but recommended the following revisions (Knutzen & Green 2001b, concentrations in µg/kg wet weight):

- Cod liver - ΣDDT: Either increase limit from 200 to 300 or preferably replace ΣDDT with p,p-DDE and keep the limit at 200
- Cod liver - ΣHCH: Decrease limit from 50 to 30.
- Cod liver - TEPCDD/PCDF: Decrease limit from 0,015 to 0,01
- Cod fillet - ΣPCB7: Decrease limit from 5 to 3
- Cod fillet - ΣHCH: Decrease limit from 0,5 to 0,3
- Blue mussel - ΣPCB7: Decrease limit from 4 to 3

Mostly based on data from other studies the review (Knutzen & Green 2001b) also suggested the following decreases for Class I in fillet of flounder (µg/kg w.w.):

- ΣPCB7: from 5 to 3.
- From 2 for ΣDDT to 1 for p,p-DDE

The review did not recommend changes in the Class I limits for mercury in fish fillet (1 mg/kg w.w.) or mercury, cadmium, lead, zinc and copper in mussels (in the same order 0,2; 2; 3; 200 and 10 mg/kg d.w.). However, for chromium and nickel in mussels limits should be decreased from 3 to 2 and from 5 to 3 mg/kg d.w., respectively. Further, reference values for organochlorines were indicated for fillet and liver of fish species that are not included in the classification system (dab, plaice, lemon sole) and for lead and cadmium in liver of cod.

These recommendations for changes have not been taken into account in this report.

No attempt has been made to compensate for differences in size groups or number of individuals of mussels or fish. The exception was with mercury in fish fillet where seven and seventeen data sets in this study showed significant differences between “small” and “large” fish (Appendix H.). In regards to mussels, 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 Control Authority (SNT) is responsible for official commentary as to possible health risk due to consumption of seafood. Hence, the results of the JAMP pertaining to this purpose are presented only as a partial basis for evaluation.

Table 5. Provisional "high background levels" of selected contaminants, in **ppm (mg/kg) dry weight** (blue mussel) and **ppm (mg/kg wet weight)** (blue mussel and fish). The respective "high background" limits are from Knutzen & Skei (1990) with mostly minor adjustments (Knutzen & Green 1995; Molvær *et al.* 1997), except for dab where the suggested limit is based on JAMP-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**
	ppm d.w.	ppm w.w.	ppm w.w.	ppm w.w.	ppm w.w.	ppm w.w.	ppm w.w.	ppm w.w.	ppm w.w.	ppm w.w.
Lead	3.0 [2)]	0.6 [3)]	0.1		0.3 ?		0.3 ?		0.2 ?	
Cadmium	2.0 [2)]	0.4 [3)]	0.1		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)]	0.020 [3)]	0.004 [2)]	0.5 [2)]	0.005	0.5 ?	0.010 ?	0.10 ?	0.005 ? [2)]	0.05 ?	0.002 ?
ppDDE	0.010 [3)]	0.002 [6)]	0.2 [2)]		0.1 ? [6)]		0.03 ? [6)]		0.01 ? [6)]	
γ HCH	0.005 [3)]	0.001 [6)]	0.05 [2,6)]		0.03 ? [6)]		0.01 ? [6)]		0.005 ? [6)]	
HCB	0.0005 [3)]	0.0001 [2)]	0.02 [2)]		0.01 ?		0.005 ?		0.005 ?	
TCDDN	0.000001 [3)]	0.0000002 [2)]								

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.

Table 6. Extracts of the Norwegian Pollution Control Authority revised environmental classification system of contaminants in blue mussels and fish (from Molvær *et al.* 1997).

Contaminant			Classification (upper limit for classes I-IV)				
			I	II	III	IV	V
			"good"	*"fair"*	*"poor"*	*"bad"*	*"very bad"*
BLUE MUSSEL							
Lead	ppm	d.w.	3	15	40	100	>100
Cadmium	ppm	d.w.	2	5	20	40	>40
Copper	ppm	d.w.	10	30	100	200	>200
Mercury	ppm	d.w.	0.2	0.5	1.5	4	>4
Zinc	ppm	d.w.	200	400	1000	2500	>2500
TBT 1)	ppm	d.w.	0.1	0.5	2	5	>5
∑PCB-7	ppb	w.w.	4	15	40	100	>100
∑DDT	ppb	w.w.	2	5	10	30	>30
∑HCH	ppb	w.w.	1	3	10	30	>30
HCB	ppb	w.w.	0.1	0.3	1	5	>5
HCB in d.w. 2)	ppb	d.w.	0.5	1.5	5	25	>25
$TE_{PCDF/D}$ 3)	ppp 4)	w.w.	0.2	0.5	1.5	3	>3
COD, fillet							
Mercury	ppm	w.w.	0.1	0.3	0.5	1	>1
COD, liver							
∑PCB-7	ppb	w.w.	500	1500	4000	10000	>10000
∑DDT	ppb	w.w.	200	500	1500	3000	>3000
∑HCH	ppb	w.w.	50	200	500	1000	>1000
HCB	ppb	w.w.	20	50	200	400	>400
$TE_{PCDF/D}$ 2)	ppp 4)	w.w.	15	40	100	300	>300

1) Tributyltin on a formula basis

2) Conversion assuming 20% dry weight.

3) TCDDN (cf. Appendix B.)

4) µg/1000kg (cf. Appendix B.)

2.1.3 Comparison with previous data

A simple 3-model approach has been developed to study time trends for contaminants in biota based on *median* concentrations (ASMO 1994). A variation of this method was applied to mercury in fish fillet to distinguish trends in "large" and "small" individuals. The method was first used on a large-scale basis by the Ad Hoc Working Group on Monitoring that met in Copenhagen 8-12. November 1993 (MON 1993). At this meeting it was agreed to apply the method on contaminants in fish muscle and liver on a wet weight basis and contaminants in soft tissue of mussels on a dry weight basis. The results for this assessment are presented earlier (cf. ASMO 1994). The method has been applied to Norwegian data and results are shown in Appendix G. . The results can be presented as in Figure 18.

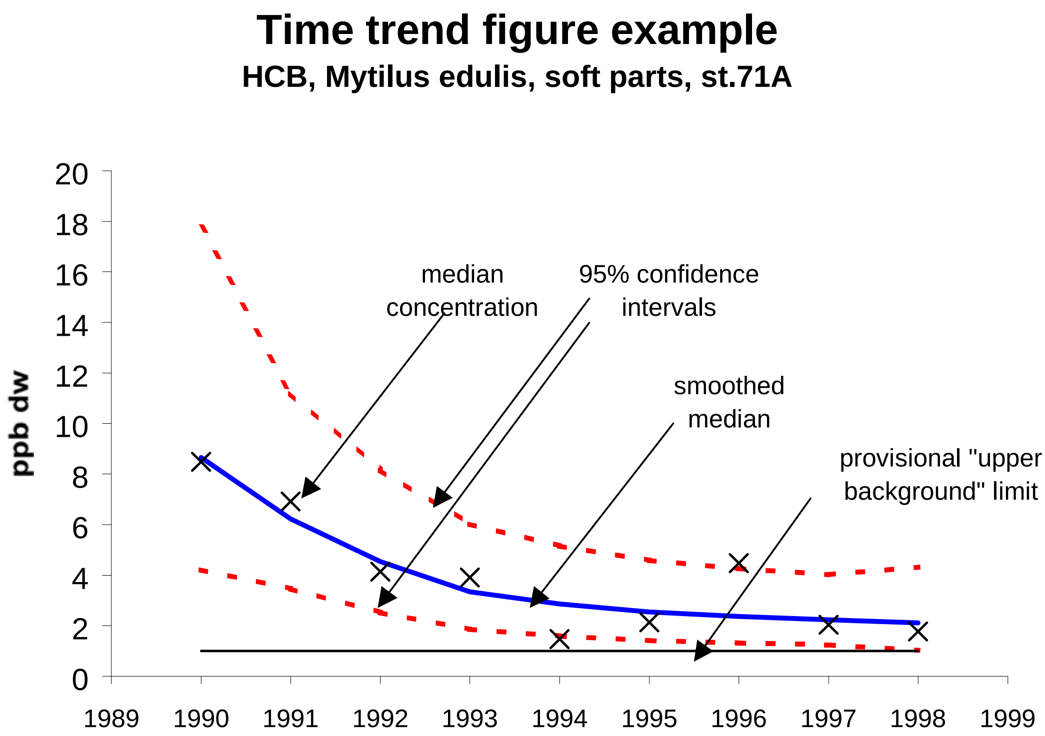


Figure 18. Example presentation and variation in contaminant concentration with time, indicating median concentrations, running mean of median values (Loess smoother), 95% confidence intervals. The provisional "high background level" is marked with a horizontal line and corresponds to values listed in Table 5 (see text).

The method of calculating the smoother is in accordance to the methods employed at Ad Hoc Working Group on Monitoring that met in Copenhagen 23-27. February 1998 (MON 1998). A Loess smoother is based on a running seven-year interval, a non-parametric curve fitted to median log-concentrations (Nicholson *et al.*1997). For statistical tests based on a 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 lognormally distributed (cf. Nicholson *et al.* 1998).

The National Comments since 1994 have included two additional analyses. The first is that the smoothed median for the last three sampling years is linearly projected for the next three years. This deviates from previous reports where the upper 95 confidence interval was used to assess the likelihood of overconcentrations (Nicholson, *et al.* 1994). The projected estimate is based on the results for the temporal trend analyses of at least 6 years of data.

The second is 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 ASMO (1994) and Nicholson *et al.* (1998). The estimate was made for series with at least 3 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 mussels from Langesundsfjord (Figure 4).

The statistical analysis was carried out on temporal trend data series for cadmium, copper, mercury, lead, zinc, the ΣPCB-7 (congeners: 28, 53, 101, 118, 138, 153, 180), ppDDE (ICES code DDEPP), γ-HCH (ICES code HCHG) and HCB. Except for ΣPCB-7 , assessment focused on individual compounds instead of “sum variables”.

2.1.4 The effect of depuration and freezing on mussels

Based on samples collected in the Sørfjord and Hardangerfjord, the JAMP-method of pre-treatment of mussels (i.e., depuration and then cleaning) contrasted significantly to the Index-method (freezing then cleaning) (Green *et al.* 2001a). Using the JAMP-method and based on a dryweight basis, cadmium concentrations were significantly higher (24%), whereas significant lower concentrations were found for lead (45%), zinc (14%), PCBs (CB101, -118, -138, -153 27-52%) and DDTs (50-64%). Lower concentrations indicated that these contaminants are associated with the particle load.

The results were not consistent with a previous study from this region that indicated no significant difference between the methods for mercury, cadmium, copper, lead and zinc (Green 1989). A study on mussels from the mouth of the Glomma River in Southern Norway showed the lead and copper were significantly lower in depurated samples (Green *et al.* 1996); however, no differences were found for PCBs or DDTs (on a lipid basis). The PCB concentrations found in the Glomma study were 3-4 times higher than Sørfjord/Hardangerfjord.

Mercury was the only contaminant common to all three studies that had consistent results; that there is no significant difference between the two methods.

The difference in methods has indicated an effect on the concentration of contaminants in mussels. However, with the exception of mercury, the results for Sørfjord/Hardangerfjord 2000 are inconsistent with two other studies in Norway. Revision of JAMP guidelines and assessment of data should take these results into consideration.

2.2 Information on Quality Assurance

NIVA has participated in all the QUASIMEME international intercalibration exercises, including Round 26 (2001). These exercises have included nearly all the contaminants analysed for JAMP. Quality assurance programme for NIVA is similar to the 1999 programme (cf. Green *et al.* 2001a). In addition, NIVA was accredited in 1993 in accordance with the EN45000 standard by the Norwegian Accreditation (reference P009). A summary of the quality assurance programme at NIVA is given in Appendix A. . A summary of the intercalibrations exercises that NIVA has participated in is given in Appendix C. .

2.3 Description of the Programme

The sampling for 2000 involved sampling of blue mussel at 42 stations and at least one flatfish species or cod was sampled at 16 stations (cf. Appendix E.). The Norwegian JAMP has been expanded since 1989 to include monitoring in more diffusely polluted areas. Though new stations are initially intended for annual monitoring (temporal trends), there has not always been sufficient funds to do this for every station. Sample/station reduction measures have been taken to reduce costs. Furthermore, sufficient samples have not always been practical to obtain. When this applies to mussels, a new site in the vicinity is often chosen. As for fish, the quota of 25 individuals (±10%), indicated in Appendix E. ,as either 25 individuals or 5 bulked samples consisting of 5 fish per bulked sample, was met for all but 3 stations in 2000 (53F, 98F and 10F).

Concentrations of metals, chlorinated hydrocarbons (including pesticides) and polycyclic aromatic hydrocarbons in mussels and fish were determined at the Norwegian Institute for Water Research (JAMP code NIVA).

An overview of the methods applied up to and including 2000 sample material has been presented by Green *et al*. (2001b). An overview of the samples collected from 1981 to 2000 is given in Appendix E. . An overview of analyses applied from 1981 to 2000 for biological material is given in Appendix D. . Parameter abbreviations are given in Appendix B. .

3. References

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

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, 1997. Summary Record. Environmental Assessment and Monitoring Committee (ASMO). Document ASMO 97/9/1.

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

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., 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., 1997. 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., 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 mussels 1995-1999]. Norwegian Pollution Control Authority, Monitoring report no. 821/01 TA no. 1799/2001. NIVA project O-80106, (report number 4342-2001) 35 pp.. ISBN number 82-577-3977-4.

Green, N.W., Knutzen, J., Helland, A., Brevik, E.M., 1995. Overvåking av miljøgifter i sedimenter og organismer 1981-92. "Joint Monitoring Programme (JMP)". [Monitoring av contamiants in sediment and organisms 1981-92 "Joint Assessment and Monitoring Programme (JMP)".] Norwegian Pollution Control Authority, Monitoring report no. 593/95. Norwegian Institute for Water Research project 80106, report number 3184, 195 pp.. ISBN-82-577-2676-1.

Green, N.W., Bjerkeng B., Berge J.A., 1996. Depuration (12h) of metals, PCB and PAH concentrations by blue mussels (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 number 3980-99, 129 pp.. ISBN number 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., Hylland, K., Walday, M., 2001a. Joint Assessment and Monitoring Programme (JAMP). National Comments regarding the Norwegian Data for 1999. SFT Statlig overvåkingsprogram 812/01 TA no. 1780/2001. NIVA, rapport nr. 4335-2001, 181 s. ISBN nr. 82-577-3969-3.

Green, N.W., Følsvik, N., Oredalen, T.J., Prestbakmo, G., 2001b. Joint Assessment and Monitoring Programme (JAMP). Overview of analytical methods 1981-2000. SFT Statlig overvåkingsprogram rapport nr. 822/01, TA nr. 1800/2001. NIVA, rapport nr. 4353-2001, 68 s. ISBN nr. 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. SFT Statlig overvåkingsprogram rapport nr. 819/01, TA nr. 1797/2001. NIVA, rapport nr. 4358-2001, 191 s. ISBN nr. 82-577-3995-2.

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).

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

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.

Knutzen, J., Skei, J., 1990. Kvalitetskriterier for miljøgifter i vann, sedimenter og organismer samt foreløpige forslag til klassifikasjon av miljøkvalitet. [Quality criteria for water, sediments and organisms and preliminary proposals for classification of environmental quality]. NIVA-prosjekt O-8000309 (NIVA report no. 2540), 139 sider. ISBN.82-577-1855-6.

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. 594/94 TA no. 1173/1994. NIVA project O-80106/E-91412, (report number 3302) 105 pp.. ISBN number 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. 1818/2001. NIVA project O-800309, (report number 4445-2001) 51 pp.. ISBN number 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 number 4339) 145 pp.. ISBN number 82-577-3973-1.

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 number 4452-2001) 230 pp.. ISBN number 82-577-4098-5.

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.

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.

Nicholson, M., Fryer, R.J., Green, N.W., 1994. Focusing on key aspects of contaminant trend assessments. Nineteenth meeting of the Joint Monitoring Group 24-29 . January, 1994. Document JMG 19/3/3.

Nicholson, M., 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., 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.

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, 1997. JAMP Guidelines. Oslo and Paris Commissions, Joint Assessment and Monitoring Programme (including chapter updates 1998-1999).

SIME, 1997. Summary Record. Oslo and Paris Conventions for the Prevention of Marine Pollution. Working Group on Concentrations, Trends and Effects of Substances in the Marine Environment (SIME), Bonn: 17-21 November 1997. SIME (2) 97/12/1-E, 29 pp. + Annexes.

Skei, J., 2000. Tiltaksorienterte miljøundersøkelser i Sørfjorden og Harangerjforden 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 number 4236-2000) 23 pp.. ISBN number 82-577-3858-1.

Skei, J., 2001. Tiltaksorienterte miljøundersøkelser i Sørfjorden og Harangerjforden 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 number 4406-2001) 22 pp.. ISBN number 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 number 4234-2000) 12pp.. ISBN number 82-577-3856-5.

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.

Walday, M., Green, N., Hylland, K., 1995. Kostholds- og tilstandsindikatorer for miljøgifter i marine områder. Norwegian Institute for Water Research project 93254, report number 3280, 39 pp.. ISBN number 82-577-2691-5.

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. 3665-97. 28pp.

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.

Appendix A.
Quality assurance programme

Accreditation

The laboratories at NIVA, both the chemical, microbiological and the ecotoxicological laboratories, were accredited in 1993 for quality assurance system by the National Measurement Service - Norwegian Accreditation and based on European Standard EN45000. NIVA has reference number P009.

Summary of quality control results

A summary of the results for the analyses of the SRM for sediment and biota are shown in Table A1 and A2, respectively.

Marine sediment standard reference material (SRM) MESS-2 and 1941 was used as control for determinations of metals and PCBs/PAHs, respectively.

Dogfish muscle (DORM-2) or dogfish liver (DOLT-2) was used as SRM for the control of the determination of metals (see Table A1). Mackerel oil (350) and mussel tissue (2974) was used as SRM for controls of PCBs and PAHs, respectively. In addition to SRM 2974, an internal standard was used for quality control.

The results were generally satisfactory, the mean was within 2 standard deviations of SRM-mean. Based on these findings, PCBs, DDE and naphthalenes in **sediment** may have been underestimated, whereas benzo(a)pyrene and benzo(ghi)perylene may have been overestimated. It should be noted that SRM values for PCBs, DDE and naphthalenes are listed as not certified. Based on the results for **biota** SRM, lead, benzo(a)pyrene and benzo(e)pyrene may have been underestimated and zinc overestimated. It should be noted that the SRM value for lead is close to the detection limit for this reporting lab.

See also results from intercalibrations exercises listed in Appendix C. .

NIVA has also participated in QUASIMEME exercises up to and including: Round 24 (April 2001): Matrices QTM054MS, QTM054MS, and QTM055MS for metals, QOR064MS and QOR065MS for CBs/OCPs and QPH028MS and QPH028MS for PAHs in sediment; and matrices QTM049BT and QTM050BT for metals, QOR066BT and QOR067BT for CBs/OCPs in biota; Round 16: Matrix QPH010BT for PAHs in biota. The latest round would apply to the 2000 samples analysed in 2000-2001. The results from this round were generally acceptable (z-scores between -2 and 2).

Table 7. Summary of the quality control results for the 2000 biota samples analysed 2000-2001. The Standard Reference Materials (SRM) were DORM-2* (dogfish muscle) for mussels and fish fillet, DOLT-2* (dogfish liver) for fish liver, 350** (mackerel oil) for mussels and fish liver and 2974*** (mussel tissue) for mussels. SRM was analysed in series with the JAMP-samples for analyses of metals (mg/kg w.w.), organic chlorines or PAH (µg/kg w.w.). Tissue types were: mussel softbody (SB), fish liver (LI) and fish fillet (MU). SRMs 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
Cd	**cadmium**	SB	DORM	0.043 ± 0.008	4	3	0.044	0.003
		LI	DOLT	20.80 ± 0.5	9	10	20.0	0.6
Cu	**copper**	SB	DORM	2.34 ± 0.16	2	3	2.30	0.30
		LI	DOLT	25.80 ± 1.1	9	10	24.9	1.5
Pb	**lead**	SB	DORM	0.065 ± 0.007	4	3	0.087	0.025
		LI	DOLT	0.22 ± 0.02	9	10	0.24	0.03
Hg	**mercury**	SB	DORM	4.64 ± 0.26	11	8	4.80	0.28
Zn	**zinc**	SB	DORM	25.6 ± 2.3	2	3	25.0	2.1
		LI	DOLT	85.8 ± 2.5	9	10	94.5	1.8
CB-28	**PCB congener CB-28**	(all)	350	22.5 ± 4	15	26	17.3	1.3
CB-52	**PCB congener CB-52**	(all)	350	62. ± 9	15	26	62.1	3.5
CB-101	**PCB congener CB-101**	(all)	350	164 ± 9	15	26	137	9.5
CB-118	**PCB congener CB-118**	(all)	350	142 ± 20	15	26	114	9.0
CB-153	**PCB congener CB-153**	(all)	350	317 ± 20	15	26	293	23
CB-180	**PCB congener CB-180**	(all)	350	73. ± 13	15	26	63.5	4.7
PA	**phenanthrene**	SB	2974	22.2 ± 2.5				
ANT	**anthracene**	SB	2974	6.1 ± 1.7	1	1	10.4	
FLU	**fluoranthene**	SB	2974	163.7 ± 10.3	1	1	159	
PYR	**pyrene**	SB	2974	151.6 ± 8.0	1	1	275	
BAA	**benzo[*a*]anthracene**	SB	2974	32.5 ± 4.8	1	1	24.8	
BAP	**benzo[*a*]pyrene**	SB	2974	15.63 ± 0.80	1	1	4.2	
BEP	**benzo[*e*]pyrene**	SB	2974	84.0 ± 3.2				
PER	**perylene**	SB	2974	7.68 ± 2.3				
ICDP	**indeno[1,2,3-*cd*]pyrene**	SB	2974	14.2 ± 2.8	1	1	9.9	
BGHIP	**benzo[*ghi*]perylene**	SB	2974	22.0 ± 2.3	1	1	18.2	

*) 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)

Appendix B.
Abbreviations

Abbreviation[1]	English	*Norwegian*
ELEMENTS		
Al	aluminium	*aluminium*
As	arsenic	*arsen*
Cd	cadmium	*kadmium*
Co	cobalt	*kobolt*
Cr	chromium	*krom*
Cu	copper	*kobber*
Fe	iron	*jern*
Hg	mercury	*kvikksølv*
Li	lithium	*litium*
Mn	manganese	*mangan*
Ni	nickel	*nikkel*
Pb	lead	*bly*
Pb210	lead-210	*bly-210*
Se	selenium	*selen*
Ti	titanium	*titan*
Zn	zinc	*sink*
PAHs		
PAH	polycyclic aromatic hydrocarbons	*polysykliske aromatiske hydrokarboner*
ACNE	acenaphthene	*acenaften*
ACNLE	acenaphthylene	*acenaftylen*
ANT	anthracene	*antracen*
BAA [3]	benzo[*a*]anthracene	*benzo[a]antracen*
BAP [3]	benzo[*a*]pyrene	*benzo[a]pyren*
BBF [3]	benzo[*b*]fluoranthene	*benzo[b]fluoranten*
BBJKF [3]	benzo[*b,j,k*]fluoranthene	*benzo[b,j,k]fluoranten*
BBJKF [3]	benzo[b+j,k]fluoranthene	*benzo[b+j,k]fluoranten*
BBKF [3]	benzo[*b+k*]fluoranthene	*benzo[b+k]fluoranten*
BEP	benzo[e]pyrene	*benzo[e]pyren*
BGHIP	benzo[*ghi*]perylene	*benzo[ghi]perylen*
BIPN [2]	biphenyl	*bifenyl*
BJKF [3]	benzo[*j,k*]fluoranthene	*benzo[j,k]fluorantren*
BKF [3]	benzo[*k*]fluoranthene	*benzo[k]fluorantren*
CHR	chrysene	*chrysen*
CHRTR	chrysene+triphenylene	*chrysen+trifenylen*
COR	coronene	*coronen*
DBAHA [3]	dibenz[*a,h*]anthracene	*dibenz[a,h]anthracen*
DBA3A [3]	dibenz[*a,c/a,h*]anthracene	*dibenz[a,c/a,h]antracen*
DBP [3]	dibenzopyrenes	*dibenzopyren*
DBT	dibenzothiophene	*dibenzothiofen*
DBTC1	C_1-dibenzothiophenes	*C_1-dibenzotiofen*
DBTC2	C_2-dibenzothiophenes	*C_2-dibenzotiofen*
DBTC3	C_3-dibenzothiophenes	*C_3-dibenzotiofen*
FLE	fluorene	*fluoren*
FLU	fluoranthene	*fluoranten*

Abbreviation[1]	English	*Norwegian*
PAHs (cont.)		
ICDP [3]	indeno[*1,2,3-cd*]pyrene	*indeno[1,2,3-cd]pyren*
NAP [2]	naphthalene	*naftalen*
NAPC1 [2]	C_1-naphthalenes	*C_1-naftalen*
NAPC2 [2]	C_2-naphthalenes	*C_2-naftalen*
NAPC3 [2]	C_3-naphthalenes	*C_3-naftalen*
NAP1M [2]	1-methylnaphthalene	*1-metylnaftalen*
NAP2M [2]	2-methylnaphthalene	*2-metylnaftalen*
NAPD2 [2]	1,6-dimethylnaphthalene	*1,6-dimetylnaftalen*
NAPD3 [2]	1,5-dimethylnaphthalene	*1,5-dimetylnaftalen*
NAPDI [2]	2,6-dimethylnaphthalene	*2,6-dimetylnaftalen*
NAPT2 [2]	2,3,6-trimethylnaphthalene	*2,3,6-trimetylnaftalen*
NAPT3 [2]	1,2,4-trimethylnaphthalene	*1,2,4-trimetylnaftalen*
NAPT4 [2]	1,2,3-trimethylnaphthalene	*1,2,3-trimetylnaftalen*
NAPTM [2]	2,3,5-trimethylnaphthalene	*2,3,5-trimetylnaftalen*
NPD	Collective term for naphthalenes, phenanthrenes and dibenzothiophenes	*Sammebetegnelse for naftalen, fenantren og dibenzotiofens*
PA	phenanthrene	*fenantren*
PAC1	C_1-phenanthrenes	*C_1-fenantren*
PAC2	C_2-phenanthrenes	*C_2-fenantren*
PAM1	1-methylphenanthrene	*1-metylfenantren*
PAM2	2-methylphenanthrene	*2-metylfenantren*
PAMD1	3,6-dimethylphenanthrene	*3,6-dimetylfenantren*
PAMD2	9,10-dimethylphenanthrene	*9,10-dimetylfenantren*
PER	perylene	*perylen*
PYR	pyrene	*pyren*
DI-Σn	sum of "n" dicyclic "PAH"s (footnote 2)	*sum "n" disykliske "PAH" (fotnote 2)*
P-Σn	sum "n" PAH	*sum "n" PAH*
PK-Σn	sum carcinogen PAH's (footnote 3)	*sum kreftfremkallende PAH (fotnote 3)*
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)*

Abbreviations (cont'd.)

Abbreviation[1]	English	*Norwegian*
PCBs		
PCB	polychlorinated biphenyls	*polyklorerte bifenyler*
CB	individual chlorobiphenyls (CB)	*enkelte klorobifenyl*
CB28	CB28 (IUPAC)	*CB28 (IUPAC)*
CB31	CB31 (IUPAC)	*CB31 (IUPAC)*
CB44	CB44 (IUPAC)	*CB44 (IUPAC)*
CB52	CB52 (IUPAC)	*CB52 (IUPAC)*
CB77 [4]	CB77 (IUPAC)	*CB77 (IUPAC)*
CB81 [4]	CB81 (IUPAC)	*CB81 (IUPAC)*
CB95	CB95 (IUPAC)	*CB95 (IUPAC)*
CB101	CB101 (IUPAC)	*CB101 (IUPAC)*
CB105	CB105 (IUPAC)	*CB105 (IUPAC)*
CB110	CB110 (IUPAC)	*CB110 (IUPAC)*
CB118	CB118 (IUPAC)	*CB118 (IUPAC)*
CB126 [4]	CB126 (IUPAC)	*CB126 (IUPAC)*
CB128	CB128 (IUPAC)	*CB128 (IUPAC)*
CB138	CB138 (IUPAC)	*CB138 (IUPAC)*
CB149	CB149 (IUPAC)	*CB149 (IUPAC)*
CB153	CB153 (IUPAC)	*CB153 (IUPAC)*
CB156	CB156 (IUPAC)	*CB156 (IUPAC)*
CB169 [4]	CB169 (IUPAC)	*CB169 (IUPAC)*
CB170	CB170 (IUPAC)	*CB170 (IUPAC)*
CB180	CB180 (IUPAC)	*CB180 (IUPAC)*
CB194	CB194 (IUPAC)	*CB194 (IUPAC)*
CB209	CB209 (IUPAC)	*CB209 (IUPAC)*
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*
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***

Abbreviations (cont'd.)

Abbreviation[1]	English	*Norwegian*
DIOXINs		
TCDD	2, 3, 7, 8-tetrachloro-dibenzo dioxin	*2, 3, 7, 8-tetrakloro-dibenzo dioksin*
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*
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*
CDD6X	1, 2, 3, 6, 7, 8-hexachloro-dibenzo dioxin	*1, 2, 3, 6, 7, 8-heksakloro-dibenzo dioksin*
CDD9X	1, 2, 3, 7, 8, 9-hexachloro-dibenzo dioxin	*1, 2, 3, 7, 8, 9-heksakloro-dibenzo dioksin*
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*
CDDSH	Sum of heptachloro-dibenzo dioxins	*Sum heptakloro-dibenzo dioksiner*
CDDO	Octachloro-dibenzo dioxin	*Oktakloro-dibenzo dioksin*
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*
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*
CDF2N	2, 3, 4, 7, 8-pentachloro-dibenzofurans	*2, 3, 4, 7, 8-pentakloro-dibenzofuran*
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*
CDF6X	1, 2, 3, 6, 7, 8-hexachloro-dibenzofuran	*1, 2, 3, 6, 7, 8-heksakloro-dibenzofuran*
CDF9X	1, 2, 3, 7, 8, 9-hexachloro-dibenzofuran	*1, 2, 3, 7, 8, 9-heksakloro-dibenzofuran*
CDF4X	2, 3, 4, 6, 7, 8-hexachloro-dibenzofuran	*2, 3, 4, 6, 7, 8-heksakloro-dibenzofuran*
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*
CDF9P	1, 2, 3, 4, 7, 8, 9-heptachloro-dibenzofuran	*1, 2, 3, 4, 7, 8, 9-heptakloro-dibenzofuran*
CDFSP	Sum of heptachloro-dibenzofurans	*Sum heptakloro-dibenzofuraner*
CDFO	Octachloro-dibenzofurans	*Octakloro-dibenzofuran*
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***

Abbreviations (cont'd.)

Abbreviation[1]	English	*Norwegian*
PESTICIDES		
ALD	aldrin	*aldrin*
DIELD	dieldrin	*dieldrin*
ENDA	endrin	*endrin*
CCDAN	cis-chlordane (=α-chlordane)	*cis-klordan (=α-klordan)*
TCDAN	trans-chlordane (=γ-chlordane)	*trans-klordan (=γ-klordan)*
OCDAN	oxy-chlordane	*oksy-klordan*
TNONC	trans-nonachlor	*trans-nonaklor*
TCDAN	trans-chlordane	*trans-klordan*
OCS	octachlorostyrene	*oktaklorstyren*
QCB	pentachlorobenzene	*pentaklorbenzen*
DDD	dichlorodiphenyldichloroethane 1,1-dichloro-2,2-bis- (4-chlorophenyl)ethane	*diklordifenyldikloretan* *1,1-dikloro-2,2-bis-(4-klorofenyl)etan*
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*
DDT	dichlorodiphenyltrichloroethane 1,1,1-trichloro-2,2-bis- (4-chlorophenyl)ethane	*diklordifenyltrikloretan* *1,1,1-trikloro-2,2-bis-(4-klorofenyl)etan*
DDEOP	o,p'-DDE	*o,p'-DDE*
DDEPP	p,p'-DDE	*p,p'-DDE*
DDTOP	o,p'-DDT	*o,p'-DDT*
DDTPP	p,p'-DDT	*p,p'-DDT*
TDEPP	p,p'-DDD	*p,p'-DDD*
DDTEP	p,p'-DDE + p,p'-DDT	*p,p'-DDE + p,p'-DDT*
DD-nΣ	sum of DDT and metabolites, n = number of compounds	*sum DDT og metabolitter,* *n = antall forbindelser*
HCB	hexachlorobenzene	*heksaklorbenzen*
HCHG	Lindane γ HCH = gamma hexachlorocyclohexane (γ BHC = gamma benzenehexachloride, outdated synonym)	*Lindan* *γ HCH = gamma heksaklorsykloheksan* *(γ BHC = gamma benzenheksaklorid,* *foreldret betegnelse)*
HCHA	α HCH = alpha HCH	*α HCH = alpha HCH*
HCHB	β HCH = beta HCH	*β HCH = beta HCH*
HC-nΣ	sum of HCHs, n = count	*sum av HCHs, n = antall*
EOCl	extractable organically bound chlorine	*ekstraherbart organisk bundet klor*
EPOCl	extractable persistent organically bound chlorine	*ekstraherbart persistent organisk bundet klor*
NTOT	total organic nitrogen	*total organisk nitrogen*
CTOT	total organic carbon	*total organisk karbon*
CORG	organic carbon	*organisk karbon*
GSAMT	grain size	*kornfordeling*
MOCON	moisture content	*vanninnhold*

Abbreviations (cont'd.)

Abbreviation[1]	English	*Norwegian*
INSTITUTES		
IFEN	Institute for Energy Technology	*Institutt for energiteknikk*
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]*
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*
VETN	Norwegian Veterinary Institute	*Veterinærinstituttet*
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)*

[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 PCB’s and “dioxins” (ICES pers. comm.)

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

[3]) Indicates PAH compounds potentially cancerogenic for humans according to IARC (1987), i.e., categories 2A+2B (possibly and probably carcinogenic).

[4]) Indicates non ortho- co-planer PCB compounds ie., 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 C.
Participation in intercalibration exercises

Participation in intercalibration exercises

General: The main contributor to JAMP in 1996 has been NIVA which has participated in all QUASIMEME exercises relevant to the parameter and tissues monitored

Sea water:

4H ICES/JMG Fifth Round Intercalibration on Trace Metals in Sea Water - Section 4, analysis for Hg - 1983 - (5/TM/SW:4).

4I JMG Sixth Intercalibration on Trace Metals in Estuarine Waters - 1986 - (6/TM/SW).

4Z Intercalibration exercise for SIIF/SERI (Cd) and NIVA/IAMK (IAMK=Chalmers Inst., Göteborg) - 1985.

Seabed sediment:

7E ICES, First Intercalibration Exercise on Trace metals in Marine Sediments - 1984 - (1/TM/MS).

8B ICES/OSPAR, First Intercomparison Exercise on Organochlorines (individual chlorobiphenyl congeners) in Marine Sediments - Phase 1, analysis of standard solutions - 1989 - (1/OC/MS:1).

8C ICES/OSPAR, First Intercomparison Exercise on Organochlorines (individual chlorobiphenyl congeners) in Marine Sediments - Phase 2, analysis of standard solutions - 1991 - (1/OC/MS:2).

8B ICES/IOC/OSPAR Intercomparison Programme on the Analysis of Chlorobiphenyls in Marine Media - Step 1 - (analysis of standard solutions) - 1989 - (1/OC/MS-1).

8C ICES/IOC/OSPAR Intercomparison Programme on the Analysis of Chlorobiphenyls in Marine Media - Step 2 - 1990 - (1/OC/MS-2).

8D ICES/IOC/OSPAR Intercomparison Programme on the Analysis of Chlorobiphenyls in Marine Media - Step 3a (1/OC/MS-3a) 1991.

8E ICES/IOC/OSPAR Intercomparison Programme on the Analysis of Chlorobiphenyls in Marine Media - Step 3b - (1/OC/MS-3b) 1992.

8F ICES/IOC/OSPAR Intercomparison Programme on the Analysis of Chlorobiphenyls in Marine Media - Step 4 - (1/OC/MS-4) 1993.

Marine biota:

1E ICES, Fifth Intercalibration Exercise on Trace Metals in Biological Tissues - 1978 - (5/TM/BT).

1F ICES, Sixth Intercalibration Exercise on Trace Metals (Cadmium and Lead only) in Biological Tissues - 1979 - (6/TM/BT).

1G ICES, Seventh Intercalibration Exercise on Trace Metals in Biological Tissues - Part A - 1983 - (7/TM/BT).

1H	ICES, Seventh Intercalibration Exercise on Trace Metals in Biological Tissues - Part B - 1985 - (7/TM/BT) (preliminary report 1987).
1Z VETN	Interlabcalibration exercise with VETN and SIIF 1983, mercury and cadmium in cod filet and liver.
1Z NIVA	Interlabcalibration exercise with VETN, NACE and NIVA 1986 (Hg, Cd, Cu, Pb and Zn in 6 samples).
2D	ICES Fourth Intercalibration Exercise on Organochlorines (mainly PCBs) in Biological Tissues (Sample No.5) - 1979 - (4/OC/BT).
2E	ICES Fifth Intercalibration Exercise on Organochlorines (PCBs only) in Biological Tissues - 1982 - (5/OC/BT).
2G	ICES/IOC/OSPAR Intercomparison Programme on the Analysis of Chlorobiphenyls in Marine Media - Step 1 - (analysis of standard solutions) - 1989 - (7/OC/BT-1).
2H	ICES/IOC/OSPAR Intercomparison Programme on the Analysis of Chlorobiphenyls in Marine Media - Step 2 - 1990 - (7/OC/BT-2).
2I	ICES/IOC/OSPAR Intercomparison Programme on the Analysis of Chlorobiphenyls in Marine Media - Step 3a - (7/OC/BT-3a) 1991.
2J	ICES/IOC/OSPAR Intercomparison Programme on the Analysis of Chlorobiphenyls in Marine Media - Step 3b - (7/OC/BT-3b) 1992.
2K	ICES/IOC/OSPAR Intercomparison Programme on the Analysis of Chlorobiphenyls in Marine Media - Step 4 - (7/OC/BT-4) 1993.
2Z VETN	Interlabcalibration exercise with VETN among others, 1983, PCB and HCB in cod liver.
2Z NACE	Interlabcalibration exercise with NACE, VETNand SIIF 1986 (PCB (all labs), DDE, OCS, HCB and DCB (NACE and VETN).

Appendix D.
Analytical overview

Sorted by:
- Contaminant, year, laboratory, intercalibration

Abbreviations are defined in Appendix B. and Appendix C.

Contamin.	**Contaminant defined in Appendix B.**
Mon. Year	**Monitoring year**
Lab.	**Analytical laboratory (cf. Appendix B.)**
Intercalibr. +basis	**Intercalibration exercise (cf. Appendix C.) and basis where W = wet weight and D = dry weight .**
Detect limit	**"Normal" detection limit**
Count below d.lim	**Number of analyses below normal detection limit**
N (<) above d.lim	**Number of analyses where detection limit was higher than normal.**

Tissue				Fish liver					Fish fillet, Shrimp tail, Mussel, Other				
Contamin.	Mon. Year - Lab.	Inter-calibr.	+basis	Analys method code	Detect limit (ppb)	Total value count	Count below d.lim	N (<) above d.lim	Analys method code	Detect limit (ppb)	Total value count	Count below d.lim	N (<) above d.lim
ACNE	1992-NIVA		W	309	0.2	8			309	0.2	46		
	1995-NIVA		W						309	0.2	72		20
	1996-NIVA		W						309	0.2	65		19
	1997-NIVA		W						309	0.5	34		
	1998-NIVA	CI	W						309	0.5	39		
	1999-NIVA		W						309	0.5	34		
	2000-NIVA		W						309	0.5	38		
ACNLE	1992-NIVA		W	309	0.2	8			309	0.2	46		
	1995-NIVA		W						309	0.2	72		49
	1996-NIVA		W						309	0.2	65		42
	1997-NIVA		W						309	0.5	34		
	1998-NIVA		W						309	0.5	39		
	1999-NIVA		W						309	0.5	34		
	2000-NIVA		W						309	0.5	39		
AG	1996-NIVA		W						999	miss	3		
ANT	1992-NIVA		W	309	0.2	8			309	0.2	45		
	1995-NIVA		W						309	0.2	72		28
	1996-NIVA		W						309	0.2	65		30
	1997-NIVA		W						309	0.5	35		
	1998-NIVA	CI	W						309	0.5	39		
	1999-NIVA	EK	W						309	0.5	34		
	2000-NIVA		W						309	0.5	39		
AS	1996-NIVA		W						999	miss	3		
BAP	1992-NIVA		W	309	0.2	8			309	0.2	45		
	1995-NIVA		W						309	0.2	72		21
	1996-NIVA		W						309	0.2	65		26
	1997-NIVA	AL	W						309	0.5	36		
	1998-NIVA	CI	W						309	0.5	39		
	1999-NIVA	EK	W						309	0.5	34		
	2000-NIVA		W						309	0.5	39		
BBF	1992-NIVA		W	309	0.2	8			309	0.2	45		
	1995-NIVA		W						309	0.2	59		9
	1996-NIVA		W						309	0.2	57		6
BBJKF	1995-NIVA		W						309	0.2	12		
	1996-NIVA		W						309	0.2	8		
	1997-NIVA		W						309	0.2	36		1
	1998-NIVA		W						309	0.2	39		
	1999-NIVA		W						309	0.2	34		
	2000-NIVA		W						309	0.2	39		10
BEP	1992-NIVA		W	309	0.2	8			309	0.2	45		
	1995-NIVA		W						309	0.2	72		5
	1996-NIVA		W						309	0.2	65		6
	1997-NIVA		W						309	0.2	36		
	1998-NIVA	CI	W						309	0.2	38		
	1999-NIVA	EK	W						309	0.2	34		
	2000-NIVA		W						309	0.2	39		10
BGHIP	1992-NIVA		W	309	0.2	8			309	0.2	46		
	1995-NIVA		W						309	0.2	72		20
	1996-NIVA		W						309	0.2	65		10
	1997-NIVA		W						309	0.5	36		
	1998-NIVA	CI	W						309	0.5	35		
	1999-NIVA	EK	W						309	0.5	34		
	2000-NIVA		W						309	0.5	39		
BIPN	1992-NIVA		W	309	0.2	8			309	0.2	46		
	1995-NIVA		W						309	0.2	72		52
	1996-NIVA		W						309	0.2	62		39
	1997-NIVA		W						309	0.5	34		
	1998-NIVA		W						309	0.5	39	1	

Tissue				Fish liver					Fish fillet, Shrimp tail, Mussel, Other				
Contamin.	Mon. Year Lab.	Inter-calibr.	+basis	Analys method code	Detect limit (ppb)	Total value count	Count below d.lim	N (<) above d.lim	Analys method code	Detect limit (ppb)	Total value count	Count below d.lim	N (<) above d.lim
	1999-NIVA		W						309	0.5	34		
	2000-NIVA		W						309	0.5	38		1
BJKF	1992-NIVA		W	309	0.2	8			309	0.2	45		
	1995-NIVA		W						309	0.2	24		21
	1996-NIVA		W						309	0.2	57		16
BAA	1992-NIVA		W	309	0.2	8			309	0.2	44		
	1995-NIVA		W						309	0.2	72		9
	1996-NIVA		W						309	0.2	65		8
	1997-NIVA		W						309	0.5	36		
	1998-NIVA	CI	W						309	0.5	39		
	1999-NIVA	EK	W						309	0.5	34		
	2000-NIVA		W						309	0.5	39		
CB101	1987-SIIF		W						111	0.2	21	1	
	1988-SIIF		D						111	0.1	6		
	1988-SIIF		W						111	0.1	22		
	1989-NACE		W	510	20	93							
	1989-SIIF		W						111	0.1	36		
	1990-NIVA	2G	W	340	1	169	1		341	0.05	58		
	1990-SIIF	2G	W						111	0.4	41	6	
	1991-NIVA	2H	W	340	1	179		8	341	0.05	62		
	1991-SIIF	2H	W						111	0.2	35		1
	1992-NIVA	2J	W	340	5	192	3		341	0.1	140		
	1993-NIVA	2K	W	340	4	212	12		341	0.1	133		
	1994-NIVA	2Z	W	340	3	300	3		341	0.05	165	39	
	1995-NIVA		W	340	3	318	10		341	0.05	225	10	
	1996-NIVA		W	340	3	332	14		341	0.05	237	9	
	1997-NIVA		W	340	3	260	24						
	1997-NIVA	AJ	W						341	0.05	221	4	
	1998-NIVA		W	340	3	284	19	1					
	1998-NIVA	CH	W						341	0.05	197	1	3
	1999-NIVA		W	340	3	249	6						
	1999-NIVA	EG	W						341	0.05	226		13
	2000-NIVA		W	340	3	230	24		341	0.05	180	11	7
CB105	1991-NIVA	2H	W	340	1	87		1	341	0.05	47		
	1992-NIVA		W	340	5	192	3		341	0.1	140		
	1993-NIVA	QM	W	340	4	212	21		341	0.1	133		
	1994-NIVA	2Z	W	340	3	300	8		341	0.05	165	53	
	1995-NIVA		W	340	3	318	13		341	0.05	224	34	
	1996-NIVA		W	340	3	332	22		341	0.05	231	23	
	1997-NIVA		W	340	3	260	24		341	0.05	221	3	1
	1998-NIVA		W	340	3	284	31	19					
	1998-NIVA	CH	W						341	0.05	201	11	16
	1999-NIVA		W	340	3	249	17						
	1999-NIVA	EG	W						341	0.05	226	4	61
	2000-NIVA		W	340	3	230	32		341	0.05	180	21	37
CB118	1989-NACE		W	510	20	93							
	1989-SIIF		W						111	0.1	36		
	1990-NIVA	2G	W	340	1	169			341	0.05	58		
	1990-SIIF	2G	W						111	0.2	41	1	
	1991-NIVA	2H	W	340	1	179			341	0.05	62		
	1991-SIIF	2H	W						111	0.2	35		1
	1992-NIVA	2J	W	340	5	192	2		341	0.1	140		
	1993-NIVA	2K	W	340	4	212	10		341	0.1	133		
	1994-NIVA	2Z	W	340	3	300	2		341	0.05	165	25	
	1995-NIVA		W	340	3	318	2		341	0.05	225	2	
	1996-NIVA		W	340	3	332	6		341	0.05	237	4	
	1997-NIVA		W	340	3	260	5						
	1997-NIVA	AJ	W						341	0.05	221		

Tissue				Fish liver					Fish fillet, Shrimp tail, Mussel, Other				
Contamin.	Mon. Year Lab.	Inter-calibr.	+basis	Analys method code	Detect limit (ppb)	Total value count	Count below d.lim	N (<) above d.lim	Analys method code	Detect limit (ppb)	Total value count	Count below d.lim	N (<) above d.lim
	1998-NIVA		W	340	3	284	6	1					
	1998-NIVA	CH	W						341	0.05	203	3	1
	1999-NIVA		W	340	3	249	2						
	1999-NIVA	EG	W						341	0.05	226		7
	2000-NIVA		W	340	3	230	5		341	0.05	180	6	7
CB126	1995-NILU		W						841	2E-05	6		
	1996-NILU		W						841	0.0001	18		
CB138	1988-SIIF		D						111	0.1	6		
	1988-SIIF		W						111	0.1	21		
	1989-NACE		W	510	20	93							
	1989-SIIF		W						111	0.1	36		
	1990-NIVA	2G	W	340	1	169			341	0.05	58		
	1990-SIIF	2G	W						111	0.3	41		
	1991-NIVA	2H	W	340	1	179			341	0.05	62		
	1991-SIIF	2H	W						111	0.3	35		1
	1992-NIVA	2J	W	340	5	192			341	0.1	137		
	1993-NIVA	QM	W	340	4	212	3		341	0.1	133		
	1994-NIVA	2Z	W	340	3	300			341	0.05	165	12	
	1995-NIVA		W	340	3	318	2		341	0.05	225		
	1996-NIVA		W	340	3	331	1		341	0.05	235		
	1997-NIVA		W	340	3	260	1						
	1997-NIVA	AJ	W						341	0.05	221		1
	1998-NIVA		W	340	3	284	3						
	1998-NIVA	CH	W						341	0.05	203		
	1999-NIVA		W	340	3	249							
	1999-NIVA	EG	W						341	0.05	226		1
	2000-NIVA		W	340	3	230	3		341	0.05	180	3	
CB153	1988-SIIF		D						111	0.1	6		
	1988-SIIF		W						111	0.1	22		
	1989-NACE		W	510	20	93							
	1989-SIIF		W						111	0.1	36		
	1990-NIVA	2G	W	340	1	169			341	0.05	58		
	1990-SIIF	2G	W						111	0.3	41		
	1991-NIVA	2H	W	340	1	179			341	0.05	62		
	1991-SIIF	2H	W						111	0.5	35		1
	1992-NIVA	2J	W	340	5	192			341	0.1	140		
	1993-NIVA	2K	W	340	4	212	3		341	0.1	133		
	1994-NIVA	2Z	W	340	3	300			341	0.05	165	9	
	1995-NIVA		W	340	3	318	1		341	0.05	225		
	1996-NIVA		W	340	3	332	1		341	0.05	237		
	1997-NIVA		W	340	3	260							
	1997-NIVA	AJ	W						341	0.05	221		
	1998-NIVA		W	340	3	284	1						
	1998-NIVA	CH	W						341	0.05	203	1	1
	1999-NIVA		W	340	3	249							
	1999-NIVA	EG	W						341	0.05	226		1
	2000-NIVA		W	340	3	230	3		341	0.05	180	1	
CB156	1991-NIVA	2H	W	340	1	87		15	341	0.05	47		5
	1992-NIVA		W	340	5	192	3		341	0.1	140		
	1993-NIVA	QM	W	340	4	212	31		341	0.1	133		
	1994-NIVA	2Z	W	340	3	300	24	1	341	0.05	162	70	
	1995-NIVA		W	340	3	317	27		341	0.05	225	67	
	1996-NIVA		W	340	3	332	48		341	0.05	237	62	
	1997-NIVA		W	340	3	260	46						
	1997-NIVA	AJ	W						341	0.05	221	9	10
	1998-NIVA		W	340	3	284	52	70					
	1998-NIVA	CH	W						341	0.05	203	37	47
	1999-NIVA		W	340	3	249	39	2					

Tissue				Fish liver					Fish fillet, Shrimp tail, Mussel, Other				
Contamin.	Mon. Year Lab.	Inter-calibr.	+basis	Analys method code	Detect limit (ppb)	Total value count	Count below d.lim	N (<) above d.lim	Analys method code	Detect limit (ppb)	Total value count	Count below d.lim	N (<) above d.lim
	1999-NIVA	EG	W						341	0.05	225	12	134
	2000-NIVA		W	340	3	230	71	5	341	0.05	180	28	90
CB169	1995-NILU		W						841	2E-05	6		
	1996-NILU		W						841	0.0001	18	2	
CB180	1987-SIIF		W						111	0.2	21	6	
	1988-SIIF		D						111	0.1	6		
	1988-SIIF		W						111	0.1	22		
	1989-NACE		W	510	20	93	1						
	1989-SIIF		W						111	0.1	36		
	1990-NIVA	2G	W	340	1	169			341	0.05	58		
	1990-SIIF	2G	W						111	0.2	41	8	
	1991-NIVA	2H	W	340	1	179			341	0.05	62		
	1991-SIIF	2H	W						111	0.2	35		
	1992-NIVA	2J	W	340	5	192	3		341	0.1	140		
	1993-NIVA	2K	W	340	4	212	15		341	0.1	133		
	1994-NIVA	2Z	W	340	3	300	3		341	0.05	162	49	
	1995-NIVA		W	340	3	318	5		341	0.05	225	22	
	1996-NIVA		W	340	3	332	14		341	0.05	237	25	
	1997-NIVA		W	340	3	260	18						
	1997-NIVA	AJ	W						341	0.05	221	1	1
	1998-NIVA		W	340	3	284	20	14					
	1998-NIVA	CH	W						341	0.05	203	18	44
	1999-NIVA		W	340	3	249	7	1					
	1999-NIVA	EG	W						341	0.05	226	2	77
	2000-NIVA		W	340	3	230	15		341	0.05	180	15	80
CB209	1990-NIVA		W	340	2	169	24	11	341	0.05	58		
	1991-NIVA		W	340	2	179	11	88	341	0.05	62	5	7
	1992-NIVA		W	340	5	192	3		341	0.1	140		1
	1993-NIVA		W	340	4	212	46	14	341	0.1	133		
	1994-NIVA		W	340	3	300	29	24	341	0.05	165	91	
	1995-NIVA		W	340	3	318	36		341	0.05	225	92	5
	1996-NIVA		W	340	3	332	255		341	0.05	237	107	9
	1997-NIVA		W	340	3	260	196		341	0.05	221	30	14
	1998-NIVA		W	340	3	283	120	121	341	0.05	203	50	69
	1999-NIVA		W	340	3	243	163	17	341	0.05	224	19	172
	2000-NIVA		W	340	3	228	151	18	341	0.05	172	33	105
CB28	1988-SIIF		D						111	0.1	6		
	1988-SIIF		W						111	0.1	22		
	1989-NACE		W	510	20	93							
	1989-SIIF		W						111	0.1	36		1
	1990-NIVA	2G	W	340	1	169	2	2	341	0.05	58		
	1990-SIIF	2G	W						111	0.2	41	7	
	1991-NIVA	2H	W	340	1	179	2	52	341	0.05	62	5	1
	1991-SIIF	2H	W						111	0.3	35		
	1992-NIVA	2J	W	340	5	192	3		341	0.1	137		
	1993-NIVA	2K	W	340	4	212	44	5	341	0.1	133		
	1994-NIVA	2Z	W	340	3	282	18	4	341	0.05	163	73	
	1995-NIVA		W	340	3	313	27		341	0.05	225	75	
	1996-NIVA		W	340	3	332	107		341	0.05	236	70	
	1997-NIVA		W	340	3	260	81						
	1997-NIVA	AJ	W						341	0.05	221	22	14
	1998-NIVA		W	340	3	284	96	99					
	1998-NIVA	CH	W						341	0.05	201	33	46
	1999-NIVA		W	340	3	249	96	18					
	1999-NIVA	EG	W						341	0.05	226	14	143
	2000-NIVA		W	340	3	230	110	7	341	0.05	180	26	60
CB52	1987-SIIF		W						111	0.2	20	1	
	1988-SIIF		D						111	0.1	6		

Tissue				Fish liver					Fish fillet, Shrimp tail, Mussel, Other				
Contamin.	Mon. Year Lab.	Inter-calibr.	+basis	Analys method code	Detect limit (ppb)	Total value count	Count below d.lim	N (<) above d.lim	Analys method code	Detect limit (ppb)	Total value count	Count below d.lim	N (<) above d.lim
	1988-SIIF		W						111	0.1	22		
	1989-NACE		W	510	20	93							
	1989-SIIF		W						111	0.1	36		
	1990-NIVA	2G	W	340	1	169	2	6	341	0.05	58		
	1990-SIIF	2G	W						111	0.4	41	7	
	1991-NIVA	2H	W	340	1	179	1	37	341	0.05	62	5	1
	1991-SIIF	2H	W						111	0.3	35		
	1992-NIVA	2J	W	340	5	192	3		341	0.1	137		
	1993-NIVA	2K	W	340	4	212	40		341	0.1	133		
	1994-NIVA	2Z	W	340	3	300	9		341	0.05	165	64	
	1995-NIVA		W	340	3	312	19		341	0.05	214	28	
	1996-NIVA		W	340	3	332	49		341	0.05	235	31	
	1997-NIVA		W	340	3	260	116						
	1997-NIVA	AJ	W						341	0.05	221	25	10
	1998-NIVA		W	340	3	281	47	44	341	0.05	168	12	17
	1999-NIVA		W	340	3	249	52	11					
	1999-NIVA	EG	W						341	0.05	216	7	71
	2000-NIVA		W	340	3	230	65	4	341	0.05	177	22	20
CB77	1995-NILU		W						841	2E-05	6		
	1996-NILU		W						841	0.0001	18		
CB81	1995-NILU		W						841	2E-05	6		
	1996-NILU		W						841	0.0001	18		
CD	1981-SIIF	1E	W	130	10	28			130	5	27		
	1981-SIIF	1F	W						130	10	7		
	1982-SIIF	1F	W						130	10	18		
	1982-VETN		W	230	10	54							
	1983-SIIF	1F	W						130	10	17		
	1983-VETN	1Z	W	230	10	46							
	1984-FIER	1H	W	402	1	23							
	1984-SIIF	1G	W						130	10	27		
	1984-VETN	1Z	W	230	10	66							
	1985-SIIF	1G	D						130	10	35		
	1985-VETN	1Z	W	230	10	45		3					
	1986-NIVA	1H	D	312	30	56	1		312	30	20		
	1987-FIER	1G	W	402	1	37							
	1987-NIVA	1H	D	312	30	57		4	312	30	37		
	1988-NIVA	1H	D	312	30	61	11	1	312	30	55		
	1989-NIVA	1H	D	312	30	135	11	8					
	1989-NIVA	1H	W						312	30	36		
	1990-NIVA	1H	W	312	10	189	9	2	312	30	77	5	
	1991-NIVA	1H	W	312	10	190	29	2	312	10	67		
	1992-NIVA	1H	W	312	10	191	4		312	10	111		
	1993-NIVA	1H	W	312	50	221	98		312	50	79		
	1994-NIVA	1Z	W	312	50	302	134		312	50	81		
	1995-NIVA		W	312	50	318	129		312	50	139	2	
	1996-NIVA	V1	W						312	50	125		
	1996-NIVA	V2	W	312	50	368	128						
	1997-NIVA		W	312	50	287	90						
	1997-NIVA	AH	W						312	50	107		
	1998-NIVA		W	312	50	285	101		312	50	93		
	1999-NIVA		W	312	50	235	79						
	1999-NIVA	EF	W						312	50	132	15	
	2000-NIVA		W	312	50	227	82		312	50	90		
CDD1N	1995-NILU		W						841	2E-05	6	1	1
	1996-NILU		W						841	1E-05	18		2
CDD4X	1995-NILU		W						841	2E-05	6	3	1
	1996-NILU		W						841	2E-05	18		1
CDD6P	1995-NILU		W						841	2E-05	6		

Tissue			Fish liver					Fish fillet, Shrimp tail, Mussel, Other				
Contamin.	Mon. Year Lab.	Inter-calibr. +basis	Analys method code	Detect limit (ppb)	Total value count	Count below d.lim	N (<) above d.lim	Analys method code	Detect limit (ppb)	Total value count	Count below d.lim	N (<) above d.lim
	1996-NILU	W						841	4E-05	18		
CDD6X	1995-NILU	W						841	2E-05	6		1
	1996-NILU	W						841	2E-05	18		1
CDD9X	1995-NILU	W						841	2E-05	6	2	1
	1996-NILU	W						841	2E-05	18		1
CDDO	1995-NILU	W						841	2E-05	6		
	1996-NILU	W						841	0.0001	18		
CDDSN	1995-NILU	W						841	2E-05	5		
	1996-NILU	W						841	1E-05	18		3
CDDSP	1995-NILU	W						841	2E-05	6		
	1996-NILU	W						841	4E-05	18		
CDDST	1995-NILU	W						841	2E-05	6		
	1996-NILU	W						841	1E-05	18		
CDDSX	1995-NILU	W						841	2E-05	5		
	1996-NILU	W						841	2E-05	18		2
CDF2N	1995-NILU	W						841	2E-05	6		
	1996-NILU	W						841	1E-05	18		1
CDF2T	1995-NILU	W						841	2E-05	6		
	1996-NILU	W						841	1E-05	18		
CDF4X	1995-NILU	W						841	2E-05	6		
	1996-NILU	W						841	2E-05	18		1
CDF6P	1995-NILU	W						841	2E-05	6		
	1996-NILU	W						841	4E-05	18	2	1
CDF6X	1995-NILU	W						841	2E-05	6		
	1996-NILU	W						841	2E-05	18		1
CDF9P	1995-NILU	W						841	2E-05	6	2	1
	1996-NILU	W						841	8E-05	17	3	1
CDF9X	1995-NILU	W						841	2E-05	6	3	1
	1996-NILU	W						841	2E-05	18		1
CDFDN	1995-NILU	W						841	2E-05	6		
	1996-NILU	W						841	1E-05	18		1
CDFDX	1995-NILU	W						841	2E-05	6		
	1996-NILU	W						841	2E-05	18		1
CDFO	1995-NILU	W						841	2E-05	6		1
	1996-NILU	W						841	0.0001	18	3	1
CDFSN	1995-NILU	W						841	2E-05	6		
	1996-NILU	W						841	1E-05	18		1
CDFSP	1995-NILU	W						841	2E-05	6		
	1996-NILU	W						841	8E-05	18	6	1
CDFST	1995-NILU	W						841	2E-05	6		
	1996-NILU	W						841	1E-05	18		
CDFSX	1995-NILU	W						841	2E-05	6		
	1996-NILU	W						841	2E-05	18		1
CHR	1992-NIVA	W	309	0.2	8			309	0.2	44		
	1995-NIVA	W						309	0.2	56		
	1996-NIVA	W						309	0.2	65		3
CHRTR	1995-NIVA	W						309	0.2	15		2
	1997-NIVA	W						309	0.5	36		
	1998-NIVA	W						309	0.5	39		
	1999-NIVA	W						309	0.5	34		
	2000-NIVA	W						309	0.5	39		
CO	1996-NIVA	W						999	miss	3		
COR	1992-NIVA	W	309	0.2	8			309	0.2	46		
CR	1992-NIVA	W						312	10	6		
	1996-NIVA	W						999	miss	3		
CU	1983-SIIF	1G W						130	10	12		

Tissue				Fish liver					Fish fillet, Shrimp tail, Mussel, Other				
Contamin.	Mon. Year Lab.	Inter- calibr. +basis		Analys method code	Detect limit (ppb)	Total value count	Count below d.lim	N (<) above d.lim	Analys method code	Detect limit (ppb)	Total value count	Count below d.lim	N (<) above d.lim
	1984-SIIF	1G	W						130	10	27		
	1986-NIVA	1H	D	311	150	56			311	150	20		
	1987-FIER	1G	W	404	50	37							
	1987-NIVA	1H	D	311	150	57			311	150	37		
	1988-NIVA	1H	D	311	150	61			311	150	55		
	1989-NIVA	1H	D	311	150	135							
	1989-NIVA	1H	W						311	150	36		
	1990-NIVA	1H	W	311	150	189			311	150	77		
	1991-NIVA	1H	W	311	50	193	2		311	50	67		
	1992-NIVA	1H	W	311	10	191			311	10	111		
	1993-NIVA	1H	W	311	10	221			311	10	79		
	1994-NIVA	1Z	W	311	10	302			311	10	81		
	1995-NIVA		W	311	10	318			311	10	124		
	1996-NIVA	V1	W						311	10	113		
	1996-NIVA	V2	W	311	10	368							
	1997-NIVA		W	311	5000a	287	1						
	1997-NIVA	AH	W						311	10	96		
	1998-NIVA		W	311	10	285							
	1998-NIVA	CF	W						311	10	51		
	1999-NIVA		W	311	10	235							
	1999-NIVA	EF	W						311	10	99		
	2000-NIVA		W	311	10	227			311	10	51		
DBA3A	1992-NIVA		W	309	0.2	8			309	0.2	46		
	1995-NIVA		W						309	0.2	71		48
	1996-NIVA		W						309	0.2	65		53
	1997-NIVA		W						309	0.5	36		
	1998-NIVA		W						309	0.5	39		
	1999-NIVA		W						309	0.5	34		
	2000-NIVA		W						309	0.5	39		
DBP	1992-NIVA		W	309	0.2	8			309	0.2	46		
DBT	1998-NIVA		W						309	0.5	39		
	1999-NIVA		W						309	0.5	34		
	2000-NIVA		W						309	0.5	39		
DBTC1	1995-NIVA		W						309	0.2	57		14
	1996-NIVA		W						309	0.2	65		9
DBTC2	1995-NIVA		W						309	0.2	56		9
	1996-NIVA		W						309	0.2	62		11
DBTC3	1995-NIVA		W						309	0.2	57		4
	1996-NIVA		W						309	0.2	65		5
DBTIN	1997-NIVA		D						320	5	8		
	1998-NIVA		D						320	5	15		
	1999-NIVA		D						320	5	13		
	1999-NIVA		W						320	5	6	2	
	2000-NIVA		W						320	0.5	23		
DBTIO	1997-NIVA		W						309	0.5	34		
DDEPP	1982-VETN		W	210	50	53							
	1983-VETN	2E	W	210	50	48			211a	50	48		
	1984-VETN	2E	W	210	50	66							
	1985-VETN	2E	W	210	50	45							
	1986-NACE	2Z	W	510	20	56							
	1987-NACE	2Z	W	510	40	53							
	1988-NACE	2Z	W	510	40	61							
	1989-NACE	2Z	W	510	20	93							
	1990-NIVA		W	340	1	169			341	0.05	58		
	1991-NIVA		W	340	1	179			341	0.05	62		
	1992-NIVA		W	340	5	192	2		341	0.1	140		
	1993-NIVA		W	340	4	212	3		341	0.1	133		
	1994-NIVA	2Z	W	340	4	300			341	0.1	165	27	

Tissue			Fish liver					Fish fillet, Shrimp tail, Mussel, Other				
Contamin.	Mon. Year Lab.	Inter-calibr. +basis	Analys method code	Detect limit (ppb)	Total value count	Count below d.lim	N (<) above d.lim	Analys method code	Detect limit (ppb)	Total value count	Count below d.lim	N (<) above d.lim
	1995-NIVA	W	340	4	318	2		341	0.1	225	30	
	1996-NIVA	W	340	4	332	2		341	0.1	237	47	
	1997-NIVA	W	340	4	260	3		341	0.1	221	1	
	1998-NIVA	W	340	4	284	6						
	1998-NIVA	CH W						341	0.1	203	4	
	1999-NIVA	W	340	4	249							
	1999-NIVA	EG W						341	0.1	226	2	
	2000-NIVA	W	340	4	230	7		341	0.1	179	6	
DDTEP	1983-SIIF	W						111	0.5	12		
	1984-SIIF	W						111	0.5	24		1
	1985-SIIF	W						111	0.5	27	1	5
	1986-SIIF	W						111	0.5	21		
	1987-SIIF	W						111	0.5	21	1	
	1988-SIIF	D						111	0.5	6		
	1988-SIIF	W						111	0.5	22	1	
	1989-SIIF	W						111	0.5	36	1	
	1990-SIIF	W						111	0.2	41	1	
	1991-SIIF	W						111	0.3	35		
DDTPP	1986-NACE	W	510	40	56							
	1987-NACE	W	510	40	53							
	1988-NACE	W	510	40	61							
	1989-NACE	W	510	20	93							
	1995-NIVA	W						340	0.05	72		
	1996-NIVA	W	340	0.05	54		4	340	0.05	45		
	1997-NIVA	W	340	2	32							
	1997-NIVA	AJ W						340	0.05	48		
	1998-NIVA	W	340	2	37	1	8	340	0.05	68		24
	1999-NIVA	W	340	2	29		4	340	0.05	93		7
	2000-NIVA	W	340	2	22			340	0.05	48		6
DPTIN	1997-NIVA	D						320	5	8		
	1998-NIVA	D						320	5	15	9	
	1999-NIVA	D						320	5	13	12	
	1999-NIVA	W						320	5	6	6	
	2000-NIVA	W						320	0.5	23	1	1
EOCL	1989-SIIF	W						605	170	5		
EPOCL	1986-NACE	W	610	800	56							
	1986-SIIF	W						605	5000	21	21	
	1987-NACE	W	610	800	53							
	1987-SIIF	W						605	40	20		
	1988-NACE	W	610	800	60							
	1988-SIIF	W						605	40	27		
	1989-NACE	W	610	800	89	1						
	1989-SIIF	W						605	40	35		
	1990-NIVA	W	615	40	117		3					
	1990-SIIF	W						605	40	41		
	1991-NIVA	W	615	40	116		12					
	1991-SIIF	W						605	130	35		
	1997-IFEN	W						607	50	6		
	1998-IFEN	W						607	1	6		
	2000-SINT	W						607	1	6		
FLE	1992-NIVA	W	309	0.2	8			309	0.2	45		
	1995-NIVA	W						309	0.2	72		22
	1996-NIVA	W						309	0.2	65		6
	1997-NIVA	AL W						309	0.5	34		
	1998-NIVA	CI W						309	0.5	39		
	1999-NIVA	W						309	0.5	34		
	2000-NIVA	W						309	0.5	39		
FLU	1992-NIVA	W	309	0.2	8			309	0.2	44		

Tissue				Fish liver					Fish fillet, Shrimp tail, Mussel, Other				
Contamin.	Mon. Year Lab.	Inter-calibr.	+basis	Analys method code	Detect limit (ppb)	Total value count	Count below d.lim	N (<) above d.lim	Analys method code	Detect limit (ppb)	Total value count	Count below d.lim	N (<) above d.lim
	1995-NIVA		W						309	0.2	72		
	1996-NIVA		W						309	0.2	65		
	1997-NIVA	AL	W						309	0.2	36		
	1998-NIVA	CI	W						309	0.2	39		
	1999-NIVA	EK	W						309	0.2	34		
	2000-NIVA		W						309	0.2	39		
HCB	1983-SIIF		W						111	0.5	12		
	1983-VETN	2Z	W	210	10	48			211a	10	48		
	1984-SIIF		W						111	0.2	24		1
	1984-VETN	2Z	W	210	10	66							
	1985-SIIF		W						111	0.2	30	6	2
	1985-VETN	2Z	W	210	10	45		4					
	1986-NACE	2Z	W	510	10	56							
	1986-SIIF	2Z	W						111	0.2	21	3	
	1987-NACE	2Z	W	510	40	53							
	1987-SIIF	2Z	W						111	0.2	21	4	
	1988-NACE	2Z	W	510	40	61							
	1988-SIIF	2Z	D						111	0.2	6		
	1988-SIIF	2Z	W						111	0.2	22	2	
	1989-NACE	2Z	W	510	20	93							
	1989-SIIF	2Z	W						111	0.05	36		
	1990-NIVA		W	340	1	169	2		341	0.05	58		
	1990-SIIF	2Z	W						111	0.05	41	3	
	1991-NIVA		W	340	1	179	4	13	341	0.05	62	5	
	1991-SIIF	2Z	W						111	0.1	35		
	1992-NIVA		W	340	5	189	3		341	0.1	140		
	1993-NIVA		W	340	4	212	31		341	0.1	133		
	1994-NIVA	2Z	W	340	3	300	24	1	341	0.05	165	33	
	1995-NIVA		W	340	3	317	37		341	0.05	225	30	
	1996-NIVA		W	340	3	332	52		341	0.05	237	37	
	1997-NIVA		W	340	2	260	39						
	1997-NIVA	AJ	W						341	0.05	221	7	
	1998-NIVA		W	340	2	284	48	13	341	0.05	203	67	2
	1999-NIVA		W	340	2	249	18						
	1999-NIVA	EG	W						341	0.05	226	18	8
	2000-NIVA		W	340	2	230	40		341	0.05	180	43	1
HCHA	1990-NIVA		W	340	1	168			341	0.05	58		
	1991-NIVA		W	340	1	179	2	111	341	0.05	62	5	10
	1992-NIVA		W	340	5	192	3		341	0.1	140		
	1993-NIVA		W	340	4	212	45	22	341	0.1	133		
	1994-NIVA	2Z	W	340	3	296	32	3	341	0.05	165	85	
	1995-NIVA		W	340	3	318	45		341	0.05	225	98	
	1996-NIVA		W	340	3	332	111		341	0.05	231	100	
	1997-NIVA		W	340	0.5	260	2	10	341	0.05	221	20	11
	1998-NIVA		W	340	0.5	284	8	208	341	0.05	202	25	121
	1999-NIVA		W	340	0.5	249	17	78	341	0.05	226	23	150
	2000-NIVA		W	340	0.5	230	31	62	341	0.05	180	42	78
HCHG	1986-NACE		W	510	30	56	1						
	1986-SIIF		W						111	3	21		
	1987-NACE		W	510	40	53							
	1987-SIIF		W						111	5	21		1
	1988-NACE		W	510	40	61							
	1989-NACE		W	510	20	93							
	1989-SIIF		W						111	50	36		
	1990-NIVA		W	340	1	169	1	9	341	0.05	58		
	1990-SIIF		W						111	0.1	41		
	1991-NIVA		W	340	1	179	3	18	341	0.05	62	5	1
	1991-SIIF		W						111	0.3	35		

Tissue				Fish liver					Fish fillet, Shrimp tail, Mussel, Other				
Contamin.	Mon. Lab. Year	Inter-calibr.	+basis	Analys method code	Detect limit (ppb)	Total value count	Count below d.lim	N (<) above d.lim	Analys method code	Detect limit (ppb)	Total value count	Count below d.lim	N (<) above d.lim
	1992-NIVA		W	340	5	192	3		341	0.1	140		
	1993-NIVA		W	340	4	212	42	17	341	0.1	133		
	1994-NIVA	2Z	W	340	3	300	24	1	341	0.05	165	46	
	1995-NIVA		W	340	3	313	31		341	0.05	213	29	
	1996-NIVA		W	340	3	330	68		341	0.05	220	8	
	1997-NIVA		W	340	2	260	47						
	1997-NIVA	AJ	W						341	0.05	221	3	9
	1998-NIVA		W	340	2	284	25	63					
	1998-NIVA	AJ	W						341	0.05	203	10	23
	1999-NIVA		W	340	2	249	52	3	341	0.05	226	19	62
	2000-NIVA		W	340	2	230	65	29	341	0.05	180	27	9
HG	1981-SIIF	1E	W	120	10	15		1	120	10	35		
	1982-SIIF	1E	W						120	10	18		
	1982-VETN		W	220	10	51			220	10	54		
	1983-SIIF	1E	W						120	10	17		
	1983-VETN	1Z	W						220	10	48		
	1984-FIER	1G	W						401	10	39		
	1984-SIIF	1G	W						120	10	27	6	
	1984-VETN	1Z	W						220	10	66		
	1985-SIIF	1G	D						120	10	30		
	1985-VETN	1Z	W						220	10	90		
	1986-NIVA	1H	D						310	10	74		
	1987-FIER	1G	W						401	10	38		
	1987-NIVA	1H	D						310	10	93		14
	1988-NIVA	1H	D						310	10	116		
	1989-NIVA	1H	D						310	100	134		
	1989-NIVA	1H	W						310	10	36	5	
	1990-NIVA	1H	W						310	10	266		
	1991-NIVA	1H	W						310	100a	264	126	
	1992-NIVA	1H	W						310	100a	303	122	
	1993-NIVA	1H	W						310	5	300		
	1994-NIVA	1Z	W						310	5	381		
	1995-NIVA		W						310	5	442	1	
	1996-NIVA	V1	W						310	5	481		
	1997-NIVA	AH	W						310	5	383		
	1998-NIVA	CF	W						310	5	381		
	1999-NIVA		W	310	5	3							
	1999-NIVA	EF	W						310	5	386		
	2000-NIVA		W						310	5	330		
ICDP	1992-NIVA		W	309	0.2	8			309	0.2	46		
	1995-NIVA		W						309	0.2	72		29
	1996-NIVA		W						309	0.2	65		23
	1997-NIVA		W						309	0.5	36		
	1998-NIVA	CI	W						309	0.5	37	2	
	1999-NIVA	EK	W						309	0.5	34		
	2000-NIVA		W						309	0.5	39		
MBTIN	1997-NIVA		D						320	5	8		
	1998-NIVA		D						320	5	15		
	1999-NIVA		D						320	5	13		
	1999-NIVA		W						320	5	6	6	
	2000-NIVA		W						320	0.5	23		
MN	1984-SIIF		W						132	40	27		
	1985-SIIF		D						132	40	35		
MPTIN	1997-NIVA		D						320	5	8		
	1998-NIVA		D						320	5	15	9	
	1999-NIVA		D						320	5	13	13	
	1999-NIVA		W						320	5	6	6	
	2000-NIVA		W						320	0.5	23	3	

Tissue			Fish liver					Fish fillet, Shrimp tail, Mussel, Other				
Contamin.	Mon. Year Lab.	Inter-calibr. +basis	Analys method code	Detect limit (ppb)	Total value count	Count below d.lim	N (<) above d.lim	Analys method code	Detect limit (ppb)	Total value count	Count below d.lim	N (<) above d.lim
NAP	1992-NIVA	W	309	0.2	8			309	0.2	46		
	1995-NIVA	W						309	0.2	70		21
	1996-NIVA	W						309	0.2	61		11
	1997-NIVA	W						309	0.2	34		1
	1998-NIVA	CI W						309	0.2	37		
	1999-NIVA	W						309	0.2	34		1
	2000-NIVA	W						309	0.2	37		7
NAP1M	1992-NIVA	W	309	0.2	8			309	0.2	46		
	1995-NIVA	W						309	0.2	15		13
	1997-NIVA	W						309	0.5	34		
	1998-NIVA	W						309	0.5	37		
	1999-NIVA	W						309	0.5	34		
	2000-NIVA	W						309	0.5	39		
NAP2M	1992-NIVA	W	309	0.2	8			309	0.2	46		
	1995-NIVA	W						309	0.2	15		13
	1997-NIVA	W						309	0.5	34		
	1998-NIVA	W						309	0.5	37		
	1999-NIVA	W						309	0.5	34		
	2000-NIVA	W						309	0.5	39		
NAPC1	1995-NIVA	W						309	0.2	55		6
	1996-NIVA	W						309	0.2	61		
NAPC2	1995-NIVA	W						309	0.2	57		6
	1996-NIVA	W						309	0.2	60		
NAPC3	1995-NIVA	W						309	0.2	57		5
	1996-NIVA	W						309	0.2	60		
NAPD2	1997-NIVA	W						309	0.5	34		
	1998-NIVA	W						309	0.5	39		
	1999-NIVA	W						309	0.5	34		
	2000-NIVA	W						309	0.5	39		
NAPD3	1997-NIVA	W						309	0.5	34		
	1998-NIVA	W						309	0.5	39		
	1999-NIVA	W						309	0.5	34		
	2000-NIVA	W						309	0.5	39		
NAPDI	1992-NIVA	W	309	0.2	8			309	0.2	46		
	1995-NIVA	W						309	0.2	15		6
	1997-NIVA	W						309	0.5	34		
	1998-NIVA	W						309	0.5	39		
	1999-NIVA	W						309	0.5	34		
	2000-NIVA	W						309	0.5	39		
NAPT2	1997-NIVA	W						309	0.5	34		
	1998-NIVA	W						309	0.5	39		
	1999-NIVA	W						309	0.5	34		
	2000-NIVA	W						309	0.5	39		
NAPT3	1997-NIVA	W						309	0.5	34		
	1998-NIVA	W						309	0.5	39		
	1999-NIVA	W						309	0.5	34		
	2000-NIVA	W						309	0.5	39		
NAPT4	1997-NIVA	W						309	0.5	34		
	1998-NIVA	W						309	0.5	39		
	1999-NIVA	W						309	0.5	34		
	2000-NIVA	W						309	0.5	39		
NAPTM	1992-NIVA	W	309	0.2	8			309	0.2	46		
	1995-NIVA	W						309	0.2	15		11
	1997-NIVA	W						309	0.5	34		
	1998-NIVA	W						309	0.5	39		
	1999-NIVA	W						309	0.5	34		
	2000-NIVA	W						309	0.5	39		

Tissue				Fish liver					Fish fillet, Shrimp tail, Mussel, Other				
Contamin.	Mon. Year Lab.	Inter-calibr.	+basis	Analys method code	Detect limit (ppb)	Total value count	Count below d.lim	N (<) above d.lim	Analys method code	Detect limit (ppb)	Total value count	Count below d.lim	N (<) above d.lim
NI	1983-SIIF	1G	W						130	20	12		
	1992-NIVA		W						312	10	6		
	1996-NIVA		W						999	miss	3		
OCS	1990-NIVA		W	340	2	169	31	24	341	0.05	58		1
	1991-NIVA		W	340	2	179	14	81	341	0.05	62	5	8
	1992-NIVA		W	340	5	192	3		341	0.1	140		
	1993-NIVA		W	340	4	212	51	16	341	0.1	133		
	1994-NIVA		W	340	3	300	39	22	341	0.05	165	96	
	1995-NIVA		W	340	3	318	44		341	0.05	225	102	
	1996-NIVA		W	340	3	332	287		341	0.05	237	114	
	1997-NIVA		W	340	2	260	100		341	0.05	221	30	14
	1998-NIVA		W	340	2	277	132	101	341	0.05	203	182	1
	1999-NIVA		W	340	2	249	148	2	341	0.05	226	80	26
	2000-NIVA		W	340	2	230	140	21	341	0.05	180	103	58
PA	1992-NIVA		W	309	0.2	8			309	0.2	45		
	1995-NIVA		W						309	0.2	72		
	1996-NIVA		W						309	0.2	65		
	1997-NIVA	AL	W						309	0.2	36		
	1998-NIVA	CI	W						309	0.2	39		
	1999-NIVA	EK	W						309	0.2	34		
	2000-NIVA		W						309	0.2	39		
PAC1	1995-NIVA		W						309	0.2	57		1
	1996-NIVA		W						309	0.2	65		
PAC2	1995-NIVA		W						309	0.2	56		
	1996-NIVA		W						309	0.2	65		2
PAH	1987-NIVA		W	309	0.02	1							
PAM1	1992-NIVA		W	309	0.2	8			309	0.2	45		
	1995-NIVA		W						309	0.2	15		2
	1997-NIVA		W						309	0.5	36		
	1998-NIVA		W						309	0.5	39		
	1999-NIVA		W						309	0.5	34		
	2000-NIVA		W						309	0.5	39		
PAM2	1997-NIVA		W						309	0.5	36		
	1998-NIVA		W						309	0.5	39		
	1999-NIVA		W						309	0.5	34		
	2000-NIVA		W						309	0.5	38		
PAMD1	1997-NIVA		W						309	0.5	36		
	1998-NIVA		W						309	0.5	39		
	1999-NIVA		W						309	0.5	34		
	2000-NIVA		W						309	0.5	39		
PAMD2	1997-NIVA		W						309	0.5	36		
	1998-NIVA		W						309	0.5	39		
	1999-NIVA		W						309	0.5	34		
	2000-NIVA		W						309	0.5	39		1
PB	1983-SIIF	1G	W						130	20	12		
	1984-SIIF	1G	W						130	20	27		2
	1985-SIIF	1G	D						130	20	35		
	1986-NIVA	1Z	D	312	150	56	4		312	150	20		
	1987-FIER	1G	W	403	10	37	1						
	1987-NIVA	1Z	D	312	150	57		12	312	150	37		
	1988-NIVA	1Z	D	312	150	61	17	3	312	150	55		
	1989-NIVA	1Z	D	312	150	135	9	9					
	1989-NIVA	1Z	W						312	150	36		
	1990-NIVA	1Z	W	312	50	187	3	1	312	150	77	3	
	1991-NIVA	1Z	W	312	50	193	14		312	50	67		
	1992-NIVA	1Z	W	312	50	191	119		312	50	111	2	
	1993-NIVA	1H	W	312	30	221	40		312	30	79		

Tissue				Fish liver					Fish fillet, Shrimp tail, Mussel, Other				
Contamin.	Mon. Year Lab.	Inter-calibr. +basis		Analys method code	Detect limit (ppb)	Total value count	Count below d.lim	N (<) above d.lim	Analys method code	Detect limit (ppb)	Total value count	Count below d.lim	N (<) above d.lim
	1994-NIVA	1Z	W	312	30	302	3		312	30	81		
	1995-NIVA		W	312	30	318	162	30	312	30	124		
	1996-NIVA	V1	W						312	30	110		
	1996-NIVA	V2	W	312	30	368		109					
	1997-NIVA		W	312	40	287	10	28	312	40	92		
	1998-NIVA		W	312	40	285	126	2					
	1998-NIVA	CF	W						312	40	90		
	1999-NIVA		W	312	40	235	118	11					
	1999-NIVA	EF	W						312	40	129	10	
	2000-NIVA		W	312	40	227	67	4	312	40	87		
PCB	1981-SIIF	2D	W	110	10	27			110	10	35		
	1982-SIIF	2D	W						111	5	17		
	1982-VETN		W	210	50	53			211	50	54		
	1983-SIIF	2E	W						111	5	14		
	1983-VETN	2E	W						211	50	48		
	1983-VETN	2Z	W	210	50	48							
	1984-SIIF	2E	W						111	5	24		
	1984-VETN	2E	W						211	50	66		
	1984-VETN	2Z	W	210	50	66							
	1985-SIIF	2E	W						111	5	32		6
	1985-VETN	2E	W						211	50	90		1
	1985-VETN	2Z	W	210	50	45							
	1986-NACE	2Z	W	511a	40a	56			511	20	56		
	1986-SIIF	2E	W						111	5	21		
	1987-NACE	2Z	W	510	40	53			511	20	54		
	1987-NIVA		W	340	0.1	2							
	1987-SIIF	2E	W						111	5	21		
	1988-NACE	2Z	W	510	40	61			511	20	13		
	1988-SIIF	2E	D						111	5	6		
	1988-SIIF	2E	W						111	5	22	4	
	1989-NACE	2Z	W	510	20	93			511	20	17		
	1989-SIIF	2E	W						111	5	36	6	
	1990-SIIF	2E	W						111	5	41		
	1991-SIIF	2E	W						111	5	35		
PCC26	1996-NILU		W						842	0.001	6		
PCC32	1996-NILU		W						842	0.003	6		4
PCC50	1996-NILU		W						842	0.001	6		
PCC62	1996-NILU		W						842	0.025	6		6
PCDD	1995-NILU		W						841	2E-05	6		
	1996-NILU		W						841	0.0001	18		
PCDF	1995-NILU		W						841	2E-05	6		
	1996-NILU		W						841	0.0001	18		
PER	1992-NIVA		W	309	0.2	8			309	0.2	46		
	1995-NIVA		W						309	0.2	72		32
	1996-NIVA		W						309	0.2	65		40
	1997-NIVA		W						309	0.5	36		
	1998-NIVA		W						309	0.5	39		
	1999-NIVA	EK	W						309	0.5	34		
	2000-NIVA		W						309	0.5	39		
PYR	1992-NIVA		W	309	0.2	8			309	0.2	44		
	1995-NIVA		W						309	0.2	72		4
	1996-NIVA		W						309	0.2	65		1
	1997-NIVA	AL	W						309	0.2	36		
	1998-NIVA	CI	W						309	0.2	39		
	1999-NIVA	EK	W						309	0.2	34		
	2000-NIVA		W						309	0.2	39		
QCB	1990-NIVA		W	340	2	169	33	39	341	0.05	58		
	1991-NIVA		W	340	2	178	13	97	341	0.05	57	5	7

Tissue				Fish liver					Fish fillet, Shrimp tail, Mussel, Other				
Contamin.	Mon. Year Lab.	Inter-calibr.	+basis	Analys method code	Detect limit (ppb)	Total value count	Count below d.lim	N (<) above d.lim	Analys method code	Detect limit (ppb)	Total value count	Count below d.lim	N (<) above d.lim
	1992-NIVA		W	340	5	192	3		341	0.1	125		
	1993-NIVA		W	340	4	212	52	24	341	0.1	133		
	1994-NIVA		W	340	3	299	38	23	341	0.05	165	93	
	1995-NIVA		W	340	3	318	45		341	0.05	225	103	
	1996-NIVA		W	340	3	332	306		341	0.05	237	109	
	1997-NIVA		W	340	2	260	79		341	0.05	221	27	10
	1998-NIVA		W	340	2	284	121	101	341	0.05	203	171	1
	1999-NIVA		W	340	2	242	185	2	341	0.05	226	84	14
	2000-NIVA		W	340	2	230	198	1	341	0.05	180	123	1
SE	1982-VETN		W	240	10	46			240	10	54		
TBTIN	1997-NIVA		D						320	5	8		
	1998-NIVA		D						320	5	15		
	1999-NIVA		D						320	5	13		
	1999-NIVA		W						320	5	6		
	2000-NIVA		W						320	0.5	23		
TCDD	1995-NILU		W						841	2E-05	6	1	
	1996-NILU		W						841	1E-05	18		
TDEPP	1991-NIVA		W	340	1	138		1	341	0.05	62		
	1992-NIVA		W	340	5	191	3		341	0.1	140		
	1993-NIVA		W	340	4	212	24	3	341	0.1	133		
	1994-NIVA	2Z	W	340	3	300	17	5	341	0.05	165	47	
	1995-NIVA		W	340	3	318	36		341	0.05	222	51	
	1996-NIVA		W	340	3	332	23		341	0.05	237	16	
	1997-NIVA		W	340	3	260	23						
	1997-NIVA	AJ	W						341	0.05	221	11	
	1998-NIVA		W	340	3	278	19	26					
	1998-NIVA	CH	W						341	0.05	203	1	44
	1999-NIVA		W	340	3	249	6	1					
	1999-NIVA	EG	W						341	0.05	226	2	71
	2000-NIVA		W	340	3	230	35	4	341	0.05	179	11	67
TPTIN	1997-NIVA		D						320	5	8		
	1998-NIVA		D						320	5	15		5
	1999-NIVA		D						320	5	13		
	1999-NIVA		W						320	5	6	4	
	2000-NIVA		W						320	0.5	23		
V	1996-NIVA		W						999	miss	3		
ZN	1983-SIIF	1G	W						131	400	12		
	1984-SIIF	1G	W						132	400	27		
	1985-SIIF	1G	D						132	400	35		
	1986-NIVA	1H	D	311	3000	56			311	3000	20		
	1987-FIER	1G	W	405	20	37							
	1987-NIVA	1H	D	311	3000	57			311	3000	37		
	1988-NIVA	1H	D	311	3000	61			311	3000	55		
	1989-NIVA	1H	D	311	3000	135		1					
	1989-NIVA	1H	W						311	3000	36		
	1990-NIVA	1H	W	311	3000	189			311	3000	77		
	1991-NIVA	1H	W	311	1000	193			311	1000	67		
	1992-NIVA	1H	W	311	1000	191			311	1000	111		
	1993-NIVA	1H	W	311	1000	221			311	1000	79		
	1994-NIVA	1Z	W	311	1000	302			311	1000	81		
	1995-NIVA		W	311	1000	318			311	1000	142		
	1996-NIVA	V1	W						311	1000	131		
	1996-NIVA	V2	W	311	1000	368							
	1997-NIVA		W	311	1000	287							
	1997-NIVA	AH	W						311	1000	110		
	1998-NIVA		W	311	1000	285							
	1998-NIVA	CF	W						311	1000	51		
	1999-NIVA		W	311	1000	235							

Tissue				Fish liver					Fish fillet, Shrimp tail, Mussel, Other				
Contamin.	Mon. Year	Lab.	Inter-calibr. +basis	Analys method code	Detect limit (ppb)	Total value count	Count below d.lim	N (<) above d.lim	Analys method code	Detect limit (ppb)	Total value count	Count below d.lim	N (<) above d.lim
	1999-NIVA		EF W						311	1000	99		
	2000-NIVA		W	311	1000	227			311	1000	51		
Sum of counts						61983	7647	2241			54693	4603	3218

a(7) > ambigous value (Maximum value displayed)

Appendix E.
Overview of localities and samples 1981-2000

Station positions are shown on maps in Appendix F. .

jmpco: JAMP area code (J99 = unclassified)
jmpst: station code
stnam: station code
Lon: Longitude
Lat: Latitude
icear: ICES area
speci: species code (English, Norwegian (Latin))
- MYTI EDU - blue mussel, blåskjell (*Mytilus edulis*)
- BROS BRO - torsk, brosme (*Brosme brosme)*
- CHIM MON - rabbitfish, 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 - witch, 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*)

tissu: tissue:
- SB - soft body
- LI - liver
- MU - fillet
- TM - tail muscle

STASJONER FOR INNSAMLING AV BIOLOGISK MATERIALE

jmpco	jmpst	stnam	Lon	Lat	icear	speci	tissu	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	00
J26	01A	Sponvika	11° 12.50'	59° 5.10'	47G13	MYTI EDU	SB		3																		
J26	01A	Sponvika	11° 12.50'	59° 5.40'	47G13	MYTI EDU	SB										3										
J26	01A	Sponvika	11° 13.90'	59° 5.10'	47G13	MYTI EDU	SB					3															
J26	02A	Fugleskjær	10° 59.0'	59° 6.90'	47G09	MYTI EDU	SB		3			3															
J26	02A	Fugleskjær	10° 59.30'	59° 6.60'	47G09	MYTI EDU	SB										3										
J26	03A	Tisler	10° 57.50'	58° 58.80'	46G07	MYTI EDU	SB					3															
J26	03A	Tisler	10° 57.80'	58° 59.0'	46G07	MYTI EDU	SB		2								3										
J26	301	Akershuskaia	10° 45.47'	59° 54.23'	48G07	MYTI EDU	SB												2								
J26	302	Ormøya	10° 45.46'	59° 52.69'	48G07	MYTI EDU	SB												2								
J26	303	Malmøya	10° 45.95'	59° 51.78'	48G07	MYTI EDU	SB												2								
J26	304	Gåsøya	10° 35.51'	59° 51.11'	48G04	MYTI EDU	SB												3								
J26	305	Lysaker	10° 38.60'	59° 54.36'	48G04	MYTI EDU	SB												2								
J26	306	Håøya	10° 33.35'	59° 42.69'	48G05	MYTI EDU	SB												3								
J26	30A	Gressholmen	10° 43.0'	59° 52.50'	48G07	MYTI EDU	SB				3	3	3	4	3	3	3	3	3	3	3	3	4				
J26	30A	Gressholmen	10° 43.0'	59° 52.75'	48G07	MYTI EDU	SB																	3	3	3	3
J26	30B	Oslo City area	10° 32.0'	59° 44.0'	48G05	GADU MOR	LI						25	25	25		25	24									
J26	30B	Oslo City area	10° 32.0'	59° 44.0'	48G05	GADU MOR	MU						25	25	26		30	30									
J26	30B	Oslo City area	10° 32.50'	59° 48.50'	48G05	GADU MOR	LI																30	30	30		
J26	30B	Oslo City area	10° 32.50'	59° 48.50'	48G05	GADU MOR	MU																36	36	36		
J26	30B	Oslo City area	10° 33.0'	59° 49.0'	48G05	GADU MOR	LI												21	24	25	25				25	25
J26	30B	Oslo City area	10° 33.0'	59° 49.0'	48G05	GADU MOR	MU												21	29	30	30				30	30
J26	30B	Oslo City area	10° 33.20'	59° 44.0'	48G05	GADU MOR	LI																	10	10		
J26	30B	Oslo City area	10° 33.20'	59° 44.0'	48G05	GADU MOR	MU																	12	12		
J26	30B	Oslo City area	10° 34.70'	59° 42.80'	48G05	GADU MOR	LI																10				
J26	30B	Oslo City area	10° 34.70'	59° 42.80'	48G05	GADU MOR	MU																12				
J26	30B	Oslo City area	10° 35.50'	59° 47.0'	48G05	GADU MOR	LI																10	10	10		
J26	30B	Oslo City area	10° 35.50'	59° 47.0'	48G05	GADU MOR	MU																12	12	12		
J26	30B	Oslo City area	10° 39.0'	59° 52.0'	48G04	GADU MOR	LI				29	25				25											
J26	30B	Oslo City area	10° 39.0'	59° 52.0'	48G04	GADU MOR	MU				29	25				26											
J26	30F	Oslo City area	10° 34.0'	59° 47.0'	48G05	PLEU PLA	LI												2		5	5					

jmpco	jmpst	stnam	Lon	Lat	icear	speci	tissu	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	00
J26	30F	Oslo City area	10° 34.0'	59° 47.0'	48G05	PLEU PLA	MU												2		5	5					
J26	30G	Spro	10° 34.50'	59° 45.80'	48G05	PAND BOR	TM															1					
J26	30H	Storegrunn	10° 33.50'	59° 48.50'	48G05	PAND BOR	TM															1					
J26	30X	West of Nesodden	10° 36.0'	59° 48.50'	48G05	GADU MOR	LI												22								
J26	30X	West of Nesodden	10° 36.0'	59° 48.50'	48G05	GADU MOR	MU												22								
J26	40C	Steilene	10° 33.0'	59° 49.0'	48G05	PAND BOR	TM				1								2								
J26	31A	Solbergstrand	10° 39.40'	59° 36.90'	48G06	MYTI EDU	SB	2		6	3	3	3	3	3	3	3	3	3	3	3	2	4	3	3	3	3
J26	31B	Solbergstrand	10° 39.40'	59° 36.90'	48G06	GADU MOR	LI	10	27																		
J26	31B	Solbergstrand	10° 39.40'	59° 36.90'	48G06	GADU MOR	MU	10	27																		
J26	31B	Solbergstrand	10° 39.40'	59° 36.90'	48G06	PLAT FLE	LI	8																			
J26	31B	Solbergstrand	10° 39.40'	59° 36.90'	48G06	PLAT FLE	MU	8																			
J26	31C	Solbergstrand	10° 39.40'	59° 36.90'	48G06	PAND BOR	TM				1																
J26	32A	Rødtangen	10° 25.60'	59° 31.50'	48G06	MYTI EDU	SB	1	3			3															
J26	33B	Sande (east side)	10° 21.0'	59° 31.70'	48G06	PLAT FLE	LI			25		1	23	1	26	1	5	5	5	5	5	5	15	15	13	5	5
J26	33B	Sande (east side)	10° 21.0'	59° 31.70'	48G06	PLAT FLE	MU			25		25	1	1	26	1	5	5	5	5	5	5	15	15	13	5	5
J26	33C	Sande	10° 21.0'	59° 31.70'	48G06	PAND BOR	TM						1														
J26	33X	Sande (west side)	10° 20.40'	59° 31.70'	48G06	PLAT FLE	LI										3										
J26	33X	Sande (west side)	10° 20.40'	59° 31.70'	48G06	PLAT FLE	MU										3										
J26	35A	Mølen	10° 30.10'	59° 29.20'	47G04	MYTI EDU	SB	1	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
J26	35C	Homlmestrand-Mølen	10° 27.0'	59° 29.0'	47G04	PAND BOR	TM		1						1		2										
J26	35C	Homlmestrand-Mølen	10° 27.0'	59° 29.0'	47G04	PAND BOR	XX								1												
J26	36A	Færder	10° 31.70'	59° 1.60'	47G06	MYTI EDU	SB	1		5	3	3	3	3	3	3	3	3	3	3	3	3	5	3	3	3	3
J26	36B	Færder	10° 27.0'	59° 2.0'	47G06	GADU MOR	LI										24	25	25	25	25	25	25				
J26	36B	Færder	10° 27.0'	59° 2.0'	47G06	GADU MOR	MU										29	30	30	30	30	30	30				
J26	36B	Færder	10° 32.0'	59° 2.0'	47G06	GADU MOR	LI	10	27	23	24	14	25	25	25	25								25	25	25	23
J26	36B	Færder	10° 32.0'	59° 2.0'	47G06	GADU MOR	MU	10	27	23	24	14	25	25	26	26								30	30	30	27
J26	36F	Færder area	10° 23.0'	59° 4.0'	47G06	LIMA LIM	LI										5	5	5	5	5	5	5	5	5	5	5
J26	36F	Færder area	10° 23.0'	59° 4.0'	47G06	LIMA LIM	MU										5	5	5	5	5	5	5	5	5	5	5
J26	73A	Lyngholmen	10° 18.10'	59° 2.60'	47G03	MYTI EDU	SB										3										
J26	74A	Oddneskjær	9° 52.10'	58° 57.30'	46F97	MYTI EDU	SB										3										
J26	71A	Bjørkøya (Risøyodd.)	9° 45.40'	59° 1.40'	47F99	MYTI EDU	SB	1	3	3	3	2	3	3	3	3	3	3	3	3	3	3	4	3	3	3	3
J99	76A	Risøy	9° 17.0'	58° 43.60'	46F92	MYTI EDU	SB										3	3	3	3			3	3	3	3	3
J99	77A	Flostafjord	8° 56.90'	58° 31.50'	46F89	MYTI EDU	SB										3	3									

jmpco	jmpst	stnam	Lon	Lat	icear	speci	tissu	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	00
J99	77B	Borøy area	9° 1.0'	58° 33.0'	46F93	GADU MOR	LI										14	25									
J99	77B	Borøy area	9° 1.0'	58° 33.0'	46F93	GADU MOR	MU										17	30									
J99	77B	Borøy area	9° 1.0'	58° 33.0'	46F93	LIMA LIM	LI											3									
J99	77C	Borøy area	9° 10.0'	58° 29.0'	45F91	PAND BOR	TM										2										
J99	79A	Gjerdsvoldsøyen east	8° 45.30'	58° 24.80'	45F87	MYTI EDU	SB										3	3									
J99	13A	Langøsund	7° 34.60'	57° 59.80'	44F74	MYTI EDU	SB										1	4									
J99	14A	Aavigen	7° 13.20'	58° 2.20'	45F73	MYTI EDU	SB										3	4									
J99	15A	Gåsøy	6° 53.16'	58° 3.7'	45F69	MYTI EDU	SB													3	3	4	4	3	3	3	3
J99	15A	Gåsøy	6° 54.80'	58° 2.60'	45F69	MYTI EDU	SB										4	4									
J99	15B	Ullerø area	6° 43.0'	58° 3.0'	45F69	GADU MOR	LI										25	24	23	30	23	25	25	25	25	25	25
J99	15B	Ullerø area	6° 43.0'	58° 3.0'	45F69	GADU MOR	MU										30	29	27	30	28	29	30	30	30	30	30
J99	15F	Ullerø area	6° 43.0'	58° 3.0'	45F69	LIMA LIM	LI											3		2	4	5	5	5	5	5	5
J99	15F	Ullerø area	6° 43.0'	58° 3.0'	45F69	LIMA LIM	MU											3		2	4	5	5	5	5	5	5
J99	15F	Ullerø area	6° 43.0'	58° 3.0'	45F69	PLEU PLA	LI												3	2							
J99	15F	Ullerø area	6° 43.0'	58° 3.0'	45F69	PLEU PLA	MU												3	2							
J99	15F	Ullerø area	6° 43.0'	58° 3.0'	45F69	MICR KIT	LI														1						
J99	15F	Ullerø area	6° 43.0'	58° 3.0'	45F69	MICR KIT	MU														1						
J63	51A	Byrkjenes	6° 33.10'	60° 5.10'	49F66	MYTI EDU	SB							3	3							1	3	3	3	6	3
J63	52A	Eitrheimsneset	6° 32.20'	60° 5.80'	49F66	MYTI EDU	SB									3	3	3	3	2	3	3	3	3	3	6	3
J63	53B	Inner Sørfjord	6° 32.50'	60° 8.0'	49F66	GADU MOR	LI																25	15			
J63	53B	Inner Sørfjord	6° 32.50'	60° 8.0'	49F66	GADU MOR	MU																28	18			
J63	53B	Inner Sørfjord	6° 33.50'	60° 7.30'	49F66	GADU MOR	LI																25	15			
J63	53B	Inner Sørfjord	6° 33.50'	60° 7.30'	49F66	GADU MOR	MU																28	18			
J63	53B	Inner Sørfjord	6° 34.0'	60° 10.0'	49F65	GADU MOR	LI							13	26	12	25	25	22	25	25	25			30	25	25
J63	53B	Inner Sørfjord	6° 34.0'	60° 10.0'	49F65	GADU MOR	MU							12	26	15	30	30	26	30	30	30			36	30	30
J63	53B	Inner Sørfjord	6° 32.0'	60° 5.0'	49F66	PLAT FLE	LI																3	5			
J63	53B	Inner Sørfjord	6° 32.0'	60° 5.0'	49F66	PLAT FLE	MU																3	5			
J63	53B	Inner Sørfjord	6° 32.50'	60° 8.0'	49F66	PLAT FLE	LI																3	5			
J63	53B	Inner Sørfjord	6° 32.50'	60° 8.0'	49F66	PLAT FLE	MU																3	5			
J63	53B	Inner Sørfjord	6° 33.50'	60° 7.30'	49F66	PLAT FLE	LI																5	5			
J63	53B	Inner Sørfjord	6° 33.50'	60° 7.30'	49F66	PLAT FLE	MU																5	5			
J63	53B	Inner Sørfjord	6° 34.0'	60° 10.0'	49F65	PLAT FLE	LI				22				22	30	5	5	5	5	4	4			11	5	2
J63	53B	Inner Sørfjord	6° 34.0'	60° 10.0'	49F65	PLAT FLE	MU				22				22	30	5	5	5	5	4	4			11	5	2

jmpco	jmpst	stnam	Lon	Lat	icear	speci	tissu	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	00
J63	53B	Inner Sørfjord	6° 34.0'	60° 10.0'	49F65	GLYP CYN	LI							3													
J63	53B	Inner Sørfjord	6° 34.0'	60° 10.0'	49F65	GLYP CYN	MU							3													
J63	53B	Inner Sørfjord	6° 34.0'	60° 10.0'	49F65	SALM TRU	LI										12										
J63	53B	Inner Sørfjord	6° 34.0'	60° 10.0'	49F65	SALM TRU	MU										12										
J63	56A	Kvalnes	6° 36.10'	60° 13.40'	49F65	MYTI EDU	SB							3	15	3	3	3	3	3	3	3	3	3	3	6	3
J63	5610	Kvalnes, north	6° 36.45'	60° 13.60'	49F65	MYTI EDU	SB																			3	
J63	5620	Kjeken, neat Helland	6° 39.50'	60° 20.58'	49F64	MYTI EDU	SB																			3	
J63	5710	Urdhem, s. of Krossanes	6° 40.65'	60° 22.17'	49F67	MYTI EDU	SB																			3	
J63	57A	Krossanes	6° 41.20'	60° 23.20'	49F67	MYTI EDU	SB							3	3	3	3	3	3	3	3	3	3	3	3	6	3
J62	63A	Ranaskjær	6° 24.50'	60° 25.10'	49F64	MYTI EDU	SB							3	3	3	3	3	3	3	3	3	3	3	3	6	3
J62	65A	Vikingneset	6° 9.60'	60° 14.50'	49F62	MYTI EDU	SB							3	15	3	3	3	3	3	3	3	3	3	3	6	3
J62	67B	Strandebarm	6° 2.0'	60° 16.0'	49F62	GADU MOR	LI							22	26	22	16	19	8	12	18	25	35	25	25	25	25
J62	67B	Strandebarm	6° 2.0'	60° 16.0'	49F62	GADU MOR	MU							22	26	23	16	24	9	14	22	30	40	30	30	30	30
J62	67B	Strandebarm	5° 59.50'	60° 13.10'	49F58	PLAT FLE	LI																3				
J62	67B	Strandebarm	5° 59.50'	60° 13.10'	49F58	PLAT FLE	MU																3				
J62	67B	Strandebarm	6° 2.0'	60° 16.0'	49F62	PLAT FLE	LI																		4	5	5
J62	67B	Strandebarm	6° 2.0'	60° 16.0'	49F62	PLAT FLE	MU																		4	5	5
J62	67B	Strandebarm	6° 2.0'	60° 16.0'	49F62	LIMA LIM	LI																		5		
J62	67B	Strandebarm	6° 2.0'	60° 16.0'	49F62	LIMA LIM	MU																		5		
J62	67B	Strandebarm	6° 2.0'	60° 16.0'	49F62	LEPI WHI	LI				19			1	26	30	5	5	3	5	5	5	5	5	5	5	5
J62	67B	Strandebarm	6° 2.0'	60° 16.0'	49F62	LEPI WHI	MU				19			1	26	30	5	5	3	5	5	5	5	5	5	5	5
J62	69A	Lille Terøy	5° 45.35'	59° 58.79'	48F57	MYTI EDU	SB												3	1	3	3	3	3	3	6	3
J99	22A	Espevær, west	5° 8.50'	59° 35.20'	48F53	MYTI EDU	SB										3	3	3	3	3	3	5	3	3	3	3
J99	22C	Bømlofjord	5° 11.0'	59° 34.0'	48F53	PAND BOR	TM										2										
J99	22F	Borøyfjorden	5° 21.0'	59° 43.0'	48F55	LIMA LIM	LI										5	5	4		5	2					
J99	22F	Borøyfjorden	5° 21.0'	59° 43.0'	48F55	LIMA LIM	MU										5	5	4		5	2					
J99	22F	Borøyfjorden	5° 21.0'	59° 43.0'	48F55	PLEU PLA	LI																5	5	5		
J99	22F	Borøyfjorden	5° 21.0'	59° 43.0'	48F55	PLEU PLA	MU																5	5	5		
J99	22F	Borøyfjorden	5° 21.0'	59° 43.0'	48F55	MICR KIT	LI													5							
J99	22F	Borøyfjorden	5° 21.0'	59° 43.0'	48F55	MICR KIT	MU													5							
J99	221A	Stangeland	5° 19.70'	59° 16.62'	47F52	MYTI EDU	SB																		3	3	
J99	226X	Karmsund bridge (east)	5° 17.91'	59° 22.68'	47F51	MYTI EDU	SB																		1	3	3
J99	227A	Melandholmen	5° 18.90'	59° 20.4'	47F51	MYTI EDU	SB																		3	3	

jmpco	jmpst	stnam	Lon	Lat	icear	speci	tissu	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	00
J99	23A	Austvik	5° 6.60'	59° 52.20'	48F51	MYTI EDU	SB										3	3									
J99	23B	Karihavet area	5° 7.0'	59° 55.0'	48F51	GADU MOR	LI										25	25	25	25	26	25	25	25	25	25	25
J99	23B	Karihavet area	5° 7.0'	59° 55.0'	48F51	GADU MOR	MU										30	30	30	30	30	30	30	30	30	30	30
J99	23B	Karihavet area	5° 7.0'	59° 55.0'	48F51	PLAT FLE	LI														1						
J99	23B	Karihavet area	5° 7.0'	59° 55.0'	48F51	PLAT FLE	MU														1						
J99	23B	Karihavet area	5° 7.0'	59° 55.0'	48F51	PLEU PLA	LI														3						
J99	23B	Karihavet area	5° 7.0'	59° 55.0'	48F51	PLEU PLA	MU														3						
J99	23B	Karihavet area	5° 7.0'	59° 55.0'	48F51	MICR KIT	LI														1	4					
J99	23B	Karihavet area	5° 7.0'	59° 55.0'	48F51	MICR KIT	MU														1	4					
J99	24A	Vardøy	5° 0.80'	60° 10.20'	49F52	MYTI EDU	SB										3	3									
J65	80A	Østmarknes	10° 27.50'	63° 27.50'	55G04	MYTI EDU	SB				1	2															
J65	81A	Biologisk Stasjon	10° 21.40'	63° 26.50'	55G04	MYTI EDU	SB				1																
J65	82A	Flakk	10° 12.60'	63° 27.10'	55G01	MYTI EDU	SB				1	2	2	3	1	2		3	2	2		3	3				
J65	83A	Frøsetskjær	10° 7.80'	63° 25.50'	55G01	MYTI EDU	SB				1																
J65	84A	Trossavika	9° 57.80'	63° 20.80'	55F97	MYTI EDU	SB				2	3	3	3	3	3		3	3	3		3	3				
J65	84B	Trossavika	9° 57.80'	63° 20.80'	55F97	GADU MOR	LI				13	1	1	1	5												
J65	84B	Trossavika	9° 57.80'	63° 20.80'	55F97	GADU MOR	MU				13	10	1	1	5												
J65	84B	Trossavika	9° 57.80'	63° 20.80'	55F97	MICR KIT	LI								3												
J65	84B	Trossavika	9° 57.80'	63° 20.80'	55F97	MICR KIT	MU								3												
J65	84B	Trossavika	9° 57.80'	63° 20.80'	55F97	MELA AEG	LI						14	1	4												
J65	84B	Trossavika	9° 57.80'	63° 20.80'	55F97	MELA AEG	MU						1	1	5												
J65	84B	Trossavika	9° 57.80'	63° 20.80'	55F97	MERL MNG	LI							1	7												
J65	84B	Trossavika	9° 57.80'	63° 20.80'	55F97	MERL MNG	MU							1	7												
J65	84B	Trossavika	9° 57.80'	63° 20.80'	55F97	POLL POL	LI					1	1		8												
J65	84B	Trossavika	9° 57.80'	63° 20.80'	55F97	POLL POL	MU					16	1		8												
J65	84B	Trossavika	9° 57.80'	63° 20.80'	55F97	POLL VIR	LI								4												
J65	84B	Trossavika	9° 57.80'	63° 20.80'	55F97	POLL VIR	MU								4												
J65	85A	Geitstrand	9° 56.30'	63° 21.90'	55F97	MYTI EDU	SB				1																
J65	86A	Geitnes	9° 59.20'	63° 26.60'	55F97	MYTI EDU	SB				1																
J65	87A	Ingdalsbukt	9° 54.80'	63° 27.80'	55F97	MYTI EDU	SB				1	1	1	1	1	1		1	2	1		2	2				
J65	88A	Rødberg	10° 0.0'	63° 29.20'	55G01	MYTI EDU	SB				1	1															
J99	25A	Hinnøy	4° 52.80'	61° 22.20'	51F47	MYTI EDU	SB												3	3							
J99	26A	Hamnen	5° 13.60'	61° 52.70'	52F51	MYTI EDU	SB												6	3							

jmpco	jmpst	stnam	Lon	Lat	icear	speci	tissu	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	00
J99	27A	Grinden	5° 25.40'	62° 12.20'	53F55	MYTI EDU	SB												2								
J99	28A	Eiksundet	5° 51.60'	62° 15.0'	53F58	MYTI EDU	SB													3							
J99	28A	Eiksundet	5° 54.50'	62° 14.90'	53F58	MYTI EDU	SB												6								
J99	91A	Nerdvika	8° 17.60'	63° 23.80'	55F81	MYTI EDU	SB												4								
J99	91A	Nerdvika	8° 9.60'	63° 21.20'	55F81	MYTI EDU	SB													3	3						
J99	92A	Stokken	10° 0.70'	64° 4.60'	57G03	MYTI EDU	SB												7	3	3	3	3				
J99	92A	Stokken	10° 1.10'	64° 2.21'	57G03	MYTI EDU	SB																	3			
J99	92B	Stokken area	9° 53.0'	64° 9.85'	57F99	GADU MOR	LI													25	24	25	25				
J99	92B	Stokken area	9° 53.0'	64° 9.85'	57F99	GADU MOR	MU													30	29	30	30				
J99	92B	Stokken area	9° 53.0'	64° 9.85'	57F99	LIMA LIM	LI															1					
J99	92B	Stokken area	9° 53.0'	64° 9.85'	57F99	LIMA LIM	MU															1					
J99	92B	Stokken area	9° 53.0'	64° 9.85'	57F99	PLEU PLA	LI															1					
J99	92B	Stokken area	9° 53.0'	64° 9.85'	57F99	PLEU PLA	MU															1					
J99	93A	Sætervik	10° 28.0'	64° 23.50'	57G04	MYTI EDU	SB												7								
J99	93A	Sætervik	10° 29.0'	64° 23.68'	57G04	MYTI EDU	SB													3							
J99	94A	Landfast	12° 0.50'	65° 38.40'	60G23	MYTI EDU	SB												3	3							
J99	95A	Flatskjær	13° 15.80'	66° 42.60'	62G32	MYTI EDU	SB												3	3							
J99	96A	Breiviken	12° 50.50'	66° 17.60'	61G28	MYTI EDU	SB												6	3							
J99	97A	Klakholmen	14° 44.60'	67° 39.90'	64G49	MYTI EDU	SB												4	3							
J99	98A	Svolvær området	14° 39.30'	68° 9.40'	65G46	MYTI EDU	SB												4	3							
J99	98A	Svolvær området	14° 40.10'	68° 16.90'	65G48	MYTI EDU	SB																		3	3	3
J99	98A	Svolvær området	14° 40.60'	68° 15.40'	65G48	MYTI EDU	SB																	3			
J99	98B	Lille Molla	14° 48.0'	68° 12.0'	65G48	GADU MOR	LI												25	29	25	24	25	25	25	25	25
J99	98B	Lille Molla	14° 48.0'	68° 12.0'	65G48	GADU MOR	MU												30	29	30	29	30	30	30	30	30
J99	98B	Lille Molla	14° 48.0'	68° 12.0'	65G48	LIMA LIM	LI													4							
J99	98B	Lille Molla	14° 48.0'	68° 12.0'	65G48	LIMA LIM	MU													4							
J99	98F	Lille Molla	14° 48.0'	68° 12.0'	65G48	LIMA LIM	LI														1	1	5				
J99	98F	Lille Molla	14° 48.0'	68° 12.0'	65G48	LIMA LIM	MU														1	1	5				
J99	98F	Lille Molla	14° 48.0'	68° 12.0'	65G48	PLEU PLA	LI													3		5		4	5	1	4
J99	98F	Lille Molla	14° 48.0'	68° 12.0'	65G48	PLEU PLA	MU													3		5		4	5	1	4
J99	98F	Lille Molla	14° 48.0'	68° 12.0'	65G48	MICR KIT	LI														1	1					
J99	98F	Lille Molla	14° 48.0'	68° 12.0'	65G48	MICR KIT	MU														1	1					
J99	98F	Lille Molla	14° 48.0'	68° 12.0'	65G48	GLYP CYN	LI															1					

jmpco	jmpst	stnam	Lon	Lat	icear	speci	tissu	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	00
J99	98F	Lille Molla	14° 48.0'	68° 12.0'	65G48	GLYP CYN	MU															1					
J99	98X	Skrova	14° 40.15'	68° 10.50'	65G48	MYTI EDU	SB														3	4	4				
J99	99A	Brunvær	15° 5.60'	68° 0.30'	65G53	MYTI EDU	SB												7	3							
J99	41A	Fensneset,Grytøya	16° 38.47'	68° 56.90'	66G64	MYTI EDU	SB														3	3	4	3			
J99	42A	Tennskjær,Malangen	18° 18.0'	69° 28.60'	67G81	MYTI EDU	SB														3	3					
J99	43A	Lyngneset,Langfjord	20° 32.79'	70° 6.20'	69H06	MYTI EDU	SB														3	3		3			
J99	43B	Kvænangen	21° 22.0'	70° 9.0'	69H16	GADU MOR	LI														25	25	25				
J99	43B	Kvænangen	21° 22.0'	70° 9.0'	69H16	GADU MOR	MU														30	30	30				
J99	43F	Kvænangen,Olderfjord	21° 22.0'	70° 9.0'	69H16	LIMA LIM	LI																3				
J99	43F	Kvænangen,Olderfjord	21° 22.0'	70° 9.0'	69H16	LIMA LIM	MU																3				
J99	43F	Kvænangen,Olderfjord	21° 22.0'	70° 9.0'	69H16	MICR KIT	LI																1				
J99	43F	Kvænangen,Olderfjord	21° 22.0'	70° 9.0'	69H16	MICR KIT	MU																1				
J99	44A	Elenheimsundet	22° 14.80'	70° 30.97'	70H23	MYTI EDU	SB														3	3	4	3			
J99	45A	Yttre Sauhamnneset	24° 19.22'	70° 45.81'	70H42	MYTI EDU	SB														3	3					
J99	46A	Smines ved Altesula	25° 48.14'	70° 58.38'	70H57	MYTI EDU	SB														3	3	5				
J99	46B	Hammerfest area	23° 44.0'	70° 50.0'	70H37	GADU MOR	LI														24	25					
J99	46B	Hammerfest area	23° 44.0'	70° 50.0'	70H37	GADU MOR	MU														29	30					
J99	47A	Kifjordneset	27° 22.17'	70° 52.89'	70H74	MYTI EDU	SB														3	3					
J99	48A	Trollfjorden i Tanafjord	28° 33.28'	70° 41.61'	70H85	MYTI EDU	SB														3	3	3				
J99	49A	Nordfjorden,Syltefj.	30° 5.17'	70° 33.10'	70J03	MYTI EDU	SB														3	3					
J99	10A	Skallneset	30° 21.7'	70° 8.3'	69J06	MYTI EDU	SB																		3	3	3
J99	10A	Skallneset	30° 9.83'	70° 4.19'	69J03	MYTI EDU	SB														3	3	4	3			
J99	10B	Varangerfjorden	29° 40.0'	69° 56.0'	68H97	GADU MOR	LI														21	25	25	23	25	25	25
J99	10B	Varangerfjorden	29° 40.0'	69° 56.0'	68H97	GADU MOR	MU														25	30	30	27	30	30	30
J99	10B	Varangerfjorden	29° 40.0'	69° 56.0'	68H97	BROS BRO	LI														1						
J99	10B	Varangerfjorden	29° 40.0'	69° 56.0'	68H97	BROS BRO	MU														1						
J99	10F	Skogerøy	29° 51.0'	69° 55.0'	68H97	PLEU PLA	LI																	5		4	3
J99	10F	Skogerøy	29° 51.0'	69° 55.0'	68H97	PLEU PLA	MU																	5		4	3
J99	11A	Sildkroneset,Bøkfj	30° 11.10'	69° 47.2'	68J02	MYTI EDU	SB														3	3	4	3			
J99	11X	Brashavn	29° 44.65'	69° 53.92'	68H97	MYTI EDU	SB																	3	3	3	3
J26	I001	Sponvikskansen	11° 12.50'	59° 5.40'	47G13	MYTI EDU	SB															3	3				
J26	I011	Kråkenebbet	11° 17.30'	59° 6.10'	47G13	MYTI EDU	SB															3	3				
J26	I021	Kjøkø,south	10° 57.10'	59° 7.79'	47G09	MYTI EDU	SB																	3			

jmpco	jmpst	stnam	Lon	Lat	icear	speci	tissu	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	00
J26	I021	Kjøkø,south	10° 57.10'	59° 7.80'	47G09	MYTI EDU	SB															3	3				
J26	I021	Kjøkø,south	10° 57.11'	59° 7.79'	47G09	MYTI EDU	SB																		3		3
J26	I022	West Damholmen	10° 57.90'	59° 6.20'	47G09	MYTI EDU	SB															3	3	3	3	3	3
J26	I023	Singlekalven, south	11° 8.20'	59° 5.70'	47G13	MYTI EDU	SB															3	3	3	3	3	3
J26	I024	Kirkøy, north west	10° 59.20'	59° 4.90'	47G09	MYTI EDU	SB															3	3	3	3	3	3
J26	I301	Akershuskaia	10° 45.47'	59° 54.23'	48G07	MYTI EDU	SB															3	3	3	3	3	3
J26	I304	Gåsøya	10° 35.51'	59° 51.11'	48G04	MYTI EDU	SB															3	3	3	3	3	3
J26	I306	Håøya	10° 33.35'	59° 42.69'	48G05	MYTI EDU	SB															3	3	3	3	3	3
J26	I307	Ramtonholmen	10° 31.40'	59° 44.70'	48G05	MYTI EDU	SB															3	3	3	3	3	3
J99	I711	Steinholmen	9° 40.70'	59° 3.15'	47F99	MYTI EDU	SB															3	4	3	3	3	3
J99	I712	Gjemesholmen	9° 42.47'	59° 2.75'	47F99	MYTI EDU	SB															3	4	3	3	3	3
J99	I131	Lastad	7° 42.40'	58° 3.30'	45F79	MYTI EDU	SB															3	3	3	3	3	3
J99	I132	Fiskåtangen	7° 58.60'	58° 7.70'	45F79	MYTI EDU	SB															4	4	3			
J99	I132	Fiskåtangen	7° 58.60'	58° 7.75'	45F79	MYTI EDU	SB																		3	3	3
J99	I133	Odderø,west	8° 0.15'	58° 7.90'	45F83	MYTI EDU	SB																		3	3	3
J99	I133	Odderø,west	8° 0.20'	58° 7.90'	45F83	MYTI EDU	SB															4	4	3			
J99	I201	Ekkjegrunn (G1)	6° 21.38'	59° 38.65'	48F66	MYTI EDU	SB															3	3	3	3	3	3
J99	I205	Bølsnes (G5)	6° 18.30'	59° 35.50'	48F63	MYTI EDU	SB															3		3	3	3	3
J99	I241	Nordnes	5° 18.20'	60° 24.10'	49F51	MYTI EDU	SB															3	3	3	3	3	3
J99	I242	Valheimneset	5° 16.10'	60° 23.70'	49F51	MYTI EDU	SB															3	3	3	3	3	3
J99	I243	Hegreneset	5° 18.50'	60° 24.90'	49F51	MYTI EDU	SB															3	3	3	3	3	3
J99	I911	Horvika	8° 31.40'	62° 44.10'	54F85	MYTI EDU	SB															3	3				
J99	I913	Fjøseid	8° 16.48'	62° 48.59'	54F82	MYTI EDU	SB																			3	3
J99	I912	Honnhammer	8° 9.70'	62° 51.20'	54F81	MYTI EDU	SB															3	3	3	3	3	3
J65	I080	Østmerknes	10° 27.50'	63° 27.50'	55G04	MYTI EDU	SB															3	3				
J99	I962	Koksverktomta (B2)	14° 8.38'	66° 19.57'	61G42	MYTI EDU	SB															3	3	2	3		
J99	I969	Bjørnbærviken (B9)	14° 2.13'	66° 16.79'	61G42	MYTI EDU	SB															3	3	3	3	3	3
J99	R096	Breiviken, Tomma	12° 50.50'	66° 17.60'	61G28	MYTI EDU	SB															3	3				
J26	A3*	Svartskjær	9° 49.90'	58° 58.90'	46F97	MYTI EDU	SB	1																			
J26	36G	Færder	10° 31.70'	59° 1.60'	47G06	NUCE LAP	SB																			1	1
J26	36G	Færder	10° 31.70'	59° 1.60'	47G06	NUCE LAP	WO																		1		
J62	67E	Strandebarm	6° 2.0'	60° 16.0'	49F62	ANGU ANG	MU																			5	
J63	52E	Eitrheimsneset	6° 32.20'	60° 5.80'	49F66	ANGU ANG	MU																			5	

jmpco	jmpst	stnam	Lon	Lat	icear	speci	tissu	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	00
J63	53E	Inner Sørfjord	6° 34.0'	60° 10.0'	49F65	ANGU ANG	MU																			5	
J99	21D	Åkrafjord	4° 0.0'	60° 0.0'	49F43	CHIM MON	LI																			1	
J99	21D	Åkrafjord	4° 0.0'	60° 0.0'	49F43	CHIM MON	MU																			1	
J99	21D	Åkrafjord	4° 0.0'	60° 0.0'	49F43	MOLV MOL	LI																			1	
J99	21D	Åkrafjord	4° 0.0'	60° 0.0'	49F43	MOLV MOL	MU																			1	
J99	220G	Smørstakk	5° 21.14'	59° 15.21'	47F55	NUCE LAP	SB																			1	
J99	220G	Smørstakk	5° 21.14'	59° 15.21'	47F55	NUCE LAP	WO																		1		
J99	221G	Stangeland	5° 19.70'	59° 16.2'	47F52	NUCE LAP	SB																			1	
J99	221G	Stangeland	5° 19.70'	59° 16.62'	47F52	NUCE LAP	WO																		1		
J99	224G	Heggjelen	5° 13.90'	59° 25.0'	47F51	NUCE LAP	SB																			1	1
J99	224G	Heggjelen	5° 13.90'	59° 25.0'	47F51	NUCE LAP	WO																		1		
J99	226A	Karmsund bridge (west)	5° 17.70'	59° 22.68'	47F51	NUCE LAP	SB																				1
J99	226G	Karmsund bridge (east)	5° 17.91'	59° 22.68'	47F51	NUCE LAP	SB																			1	1
J99	226G	Karmsund bridge (east)	5° 17.91'	59° 22.68'	47F51	NUCE LAP	WO																		1		
J99	227G	Melandholmen	5° 18.90'	59° 20.4'	47F51	NUCE LAP	SB																			1	1
J99	227G	Melandholmen	5° 18.90'	59° 20.4'	47F51	NUCE LAP	WO																		1		
J99	41G	Harstad,Trondenes	16° 33.92'	68° 49.30'	66G65	NUCE LAP	SB																				1
J99	42G	Finnsnes,	17° 58.50'	69° 13.55'	67G78	NUCE LAP	SB																				1
J99	43G	Skjervøy	20° 59.71'	70° 2.16'	69H09	NUCE LAP	SB																				1
J99	44G	Alta	23° 18.70'	69° 59.40'	68H31	NUCE LAP	SB																				1
J99	45G	Sauhamneset	24° 19.80'	70° 45.80'	70H42	NUCE LAP	SB																				1
J99	46G	Honningsvåg	25° 57.77'	70° 59.12'	70H57	NUCE LAP	SB																				1
J99	47G	Kifjordneset	27° 22.20'	70° 52.86'	70H74	NUCE LAP	SB																				1
J99	48G	Mehamn	27° 50.35'	71° 2.55'	71H79	NUCE LAP	SB																				1
J99	222A	Kopervik harbour	5° 18.94'	59° 17.2'	47F52	MYTI EDU	SB																				3
J99	227X	Høievarde	5° 19.11'	59° 19.43'	47F52	MYTI EDU	SB																				3
J99	21F	Åkrefjord	6° 7.0'	59° 45.0'	48F62	PLAT FLE	LI																			3	5
J99	21F	Åkrefjord	6° 7.0'	59° 45.0'	48F62	PLAT FLE	MU																			3	5
J99	21F	Åkrefjord	6° 7.0'	59° 45.0'	48F62	LEPI WHI	LI																			5	
J99	21F	Åkrefjord	6° 7.0'	59° 45.0'	48F62	LEPI WHI	MU																			5	
J99	21D	Åkrafjord	4° 0.0'	60° 0.0'	49F43	BROS BRO	LI																			1	
J99	21D	Åkrafjord	4° 0.0'	60° 0.0'	49F43	BROS BRO	MU																			1	

Appendix F.
Map of stations

Station positions 1981-2000
(cf. Appendix G. and Appendix J.)

Appendix F. (cont.) Map of stations

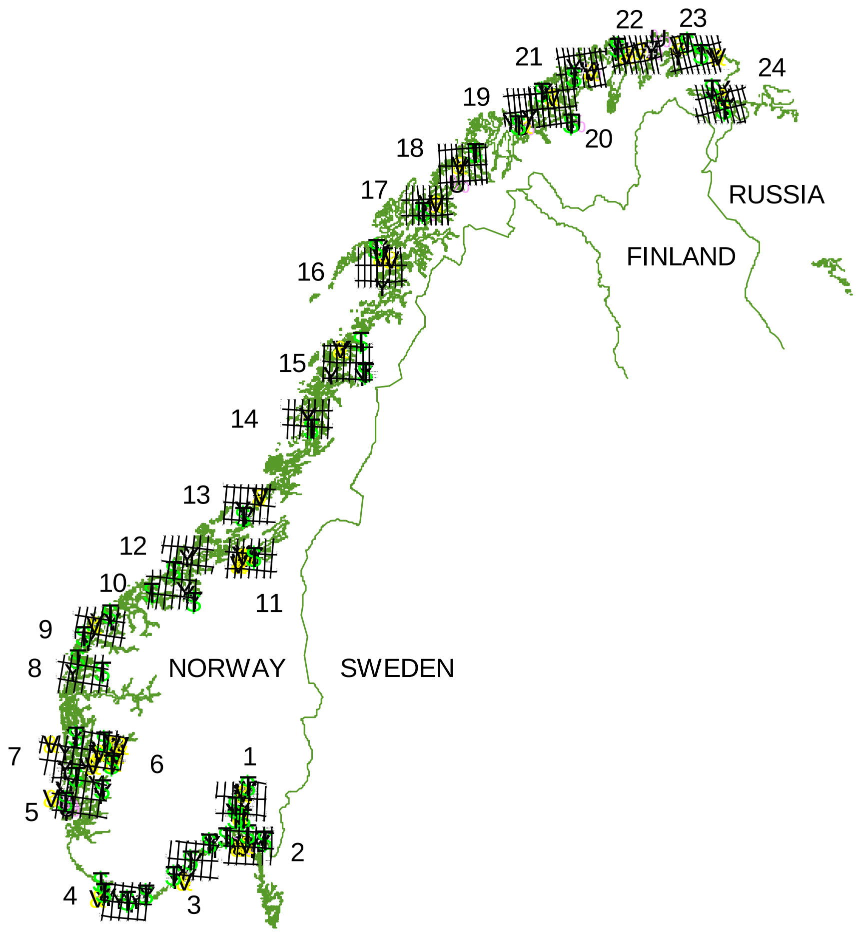
NOTES

For a few station the positions of sampling has varied in order to collect sufficient material (e.g., st. 36B and 98A) or investigate local geographical variations (e.g., in the inner Oslofjord and Sørfjord). Hence, the same station name may appear more than once on a map.

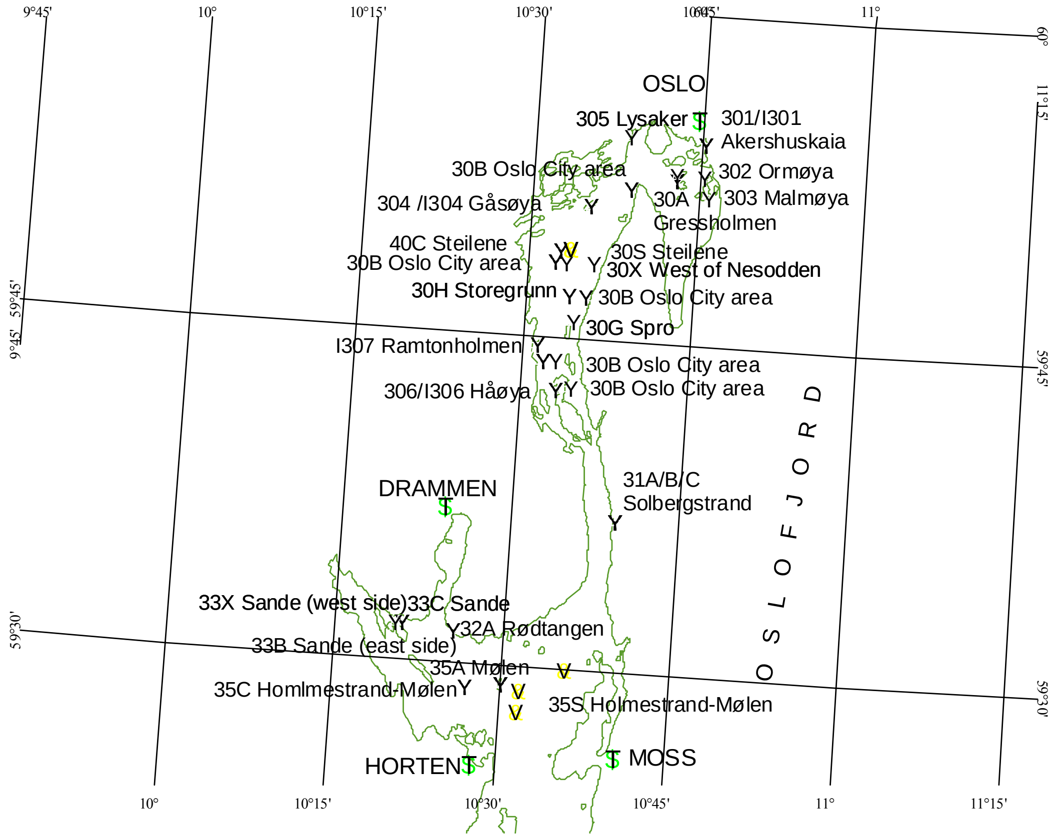
The letter A following the station identification number indicates that blue mussels were sampled. The letter B indicates sampling for cod and the letter F indicates sampling for flatfish. This system for fish is not consistent for some older stations (30, 33, 52 and 67) where only the letter B is used indicating that either cod or flatfish or both were sampled. The letter G indicates sampling for dog whelks and S indicates sampling for sediment.

The letter "I" preceding the station identification number indicates an INDEX station for evaluating a "pollution" index. The letter R indicates a station for evaluating a "reference" index. Only blue mussels are used for these indices. The indices are based on a selection of JAMP and INDEX stations (cf. 3.Appendix J.).

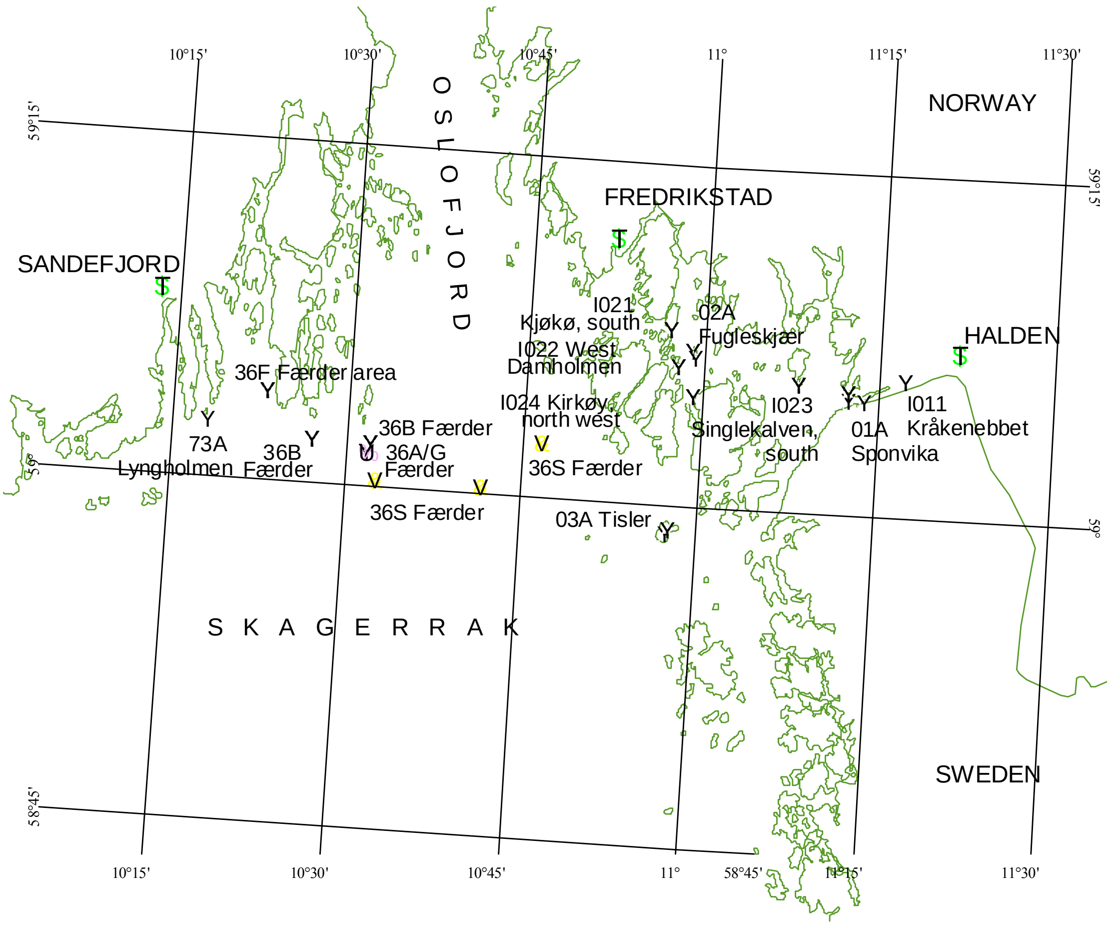
The maps are generated using ArcView GIS version 3.1.



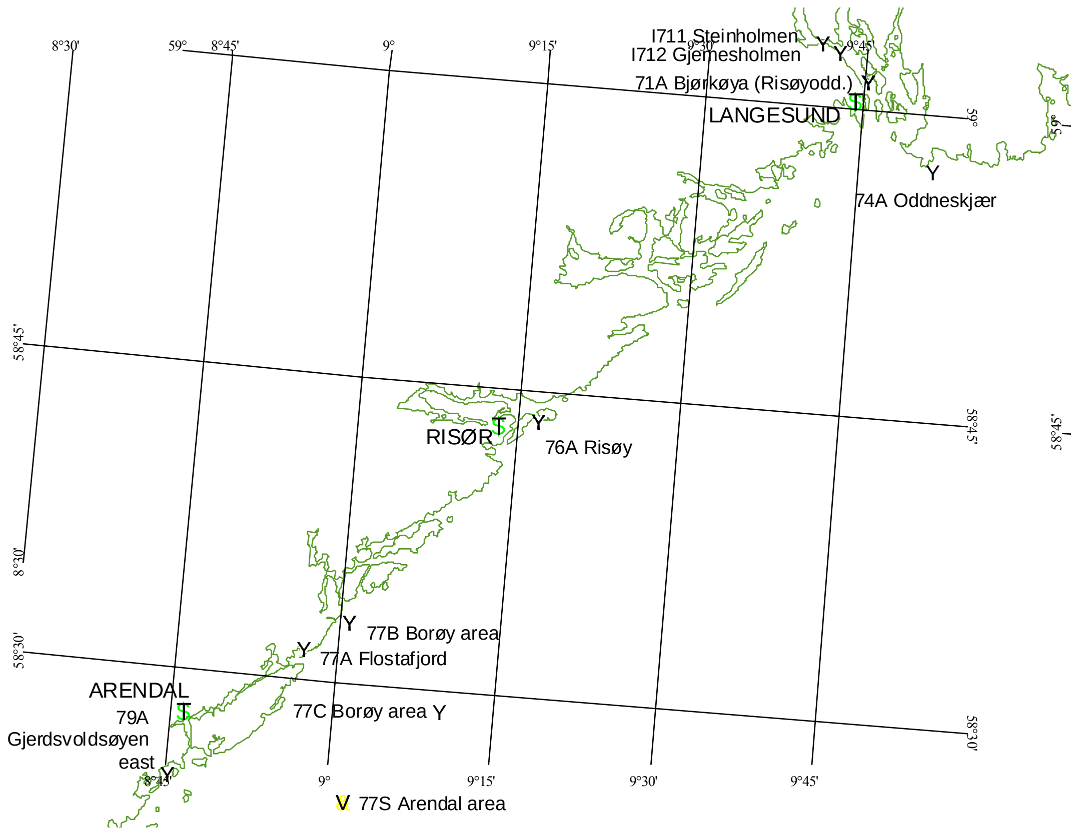
JAMP stations Norway. Numbers indicate map reference


OSLO
305 Lysaker
301/I301 Akershuskaia
30B Oslo City area
302 Ormøya
304 /I304 Gåsøya
30A Gressholmen
303 Malmøya
40C Steilene
30B Oslo City area
30S Steilene
30X West of Nesodden
30H Storegrunn
30B Oslo City area
30G Spro
I307 Ramtonholmen
30B Oslo City area
306/I306 Håøya
30B Oslo City area
OSLOFJORD
DRAMMEN
31A/B/C Solbergstrand
33X Sande (west side)
33C Sande
32A Rødtangen
33B Sande (east side)
35A Mølen
35C Homlmestrand-Mølen
35S Holmestrand-Mølen
HORTEN
MOSS

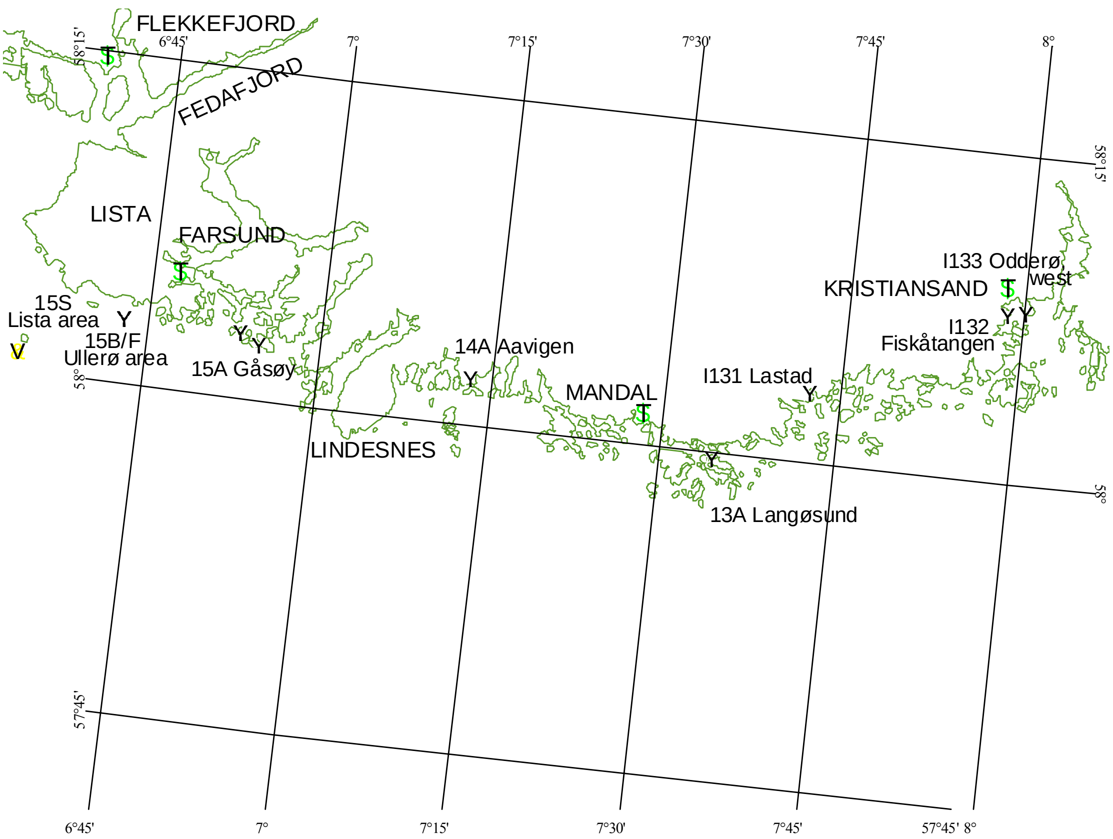
MAP 1


NORWAY
OSLOFJORD
FREDRIKSTAD
SANDEFJORD
I021 Kjøkø, south
02A Fugleskjær
HALDEN
I022 West Damholmen
36F Færder area
I024 Kirkøy, north west
I023 Singlekalven, south
01A Sponvika
I011 Kråkenebbet
36B Færder
73A Lyngholmen
36B Færder
36A/G Færder
36S Færder
36S Færder
03A Tisler
SKAGERRAK
SWEDEN

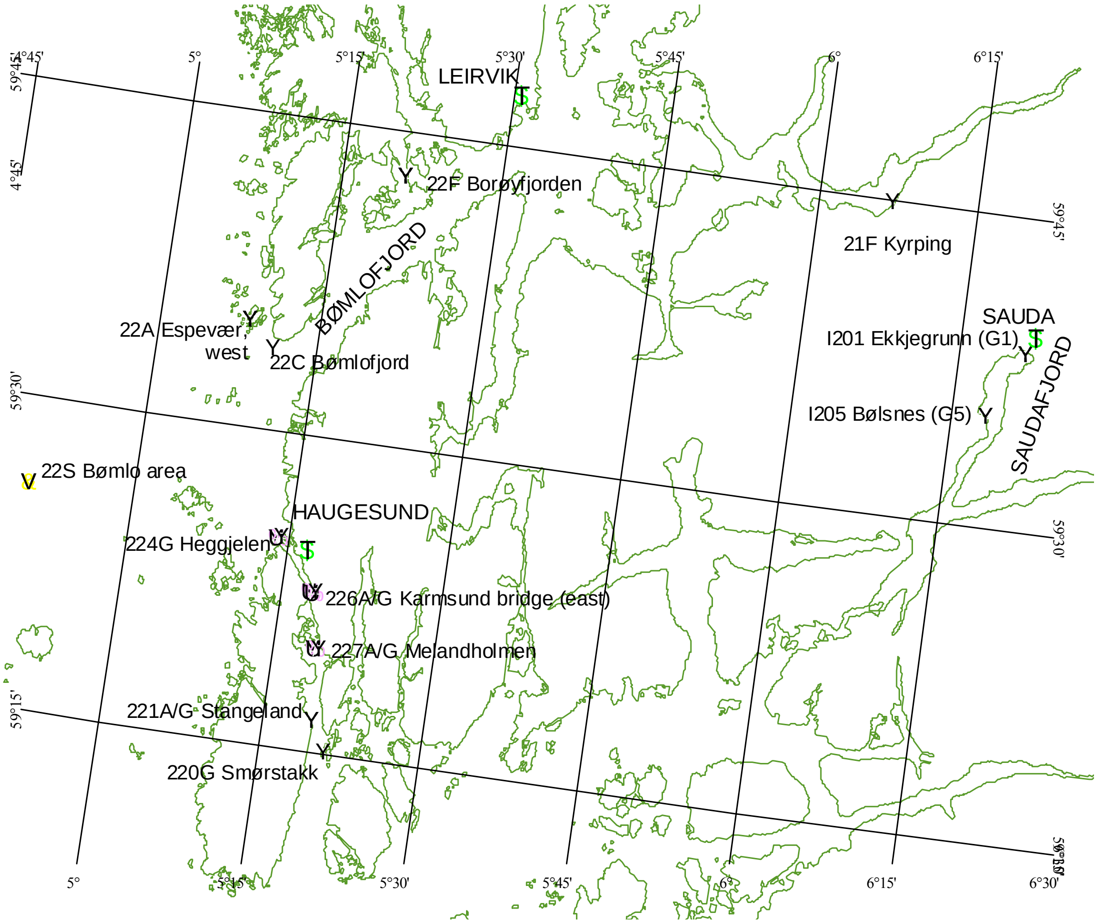
MAP 2


I711 Steinholmen
I712 Gjemesholmen
71A Bjørkøya (Risøyodd.)
LANGESUND
74A Oddneskjær
RISØR
76A Risøy
77B Borøy area
77A Flostafjord
ARENDAL
79A
Gjerdsvoldsøyen
east
77C Borøy area
77S Arendal area
8°30'
59°
8°45'
9°
9°15'
9°30'
9°45'
58°45'
58°30'

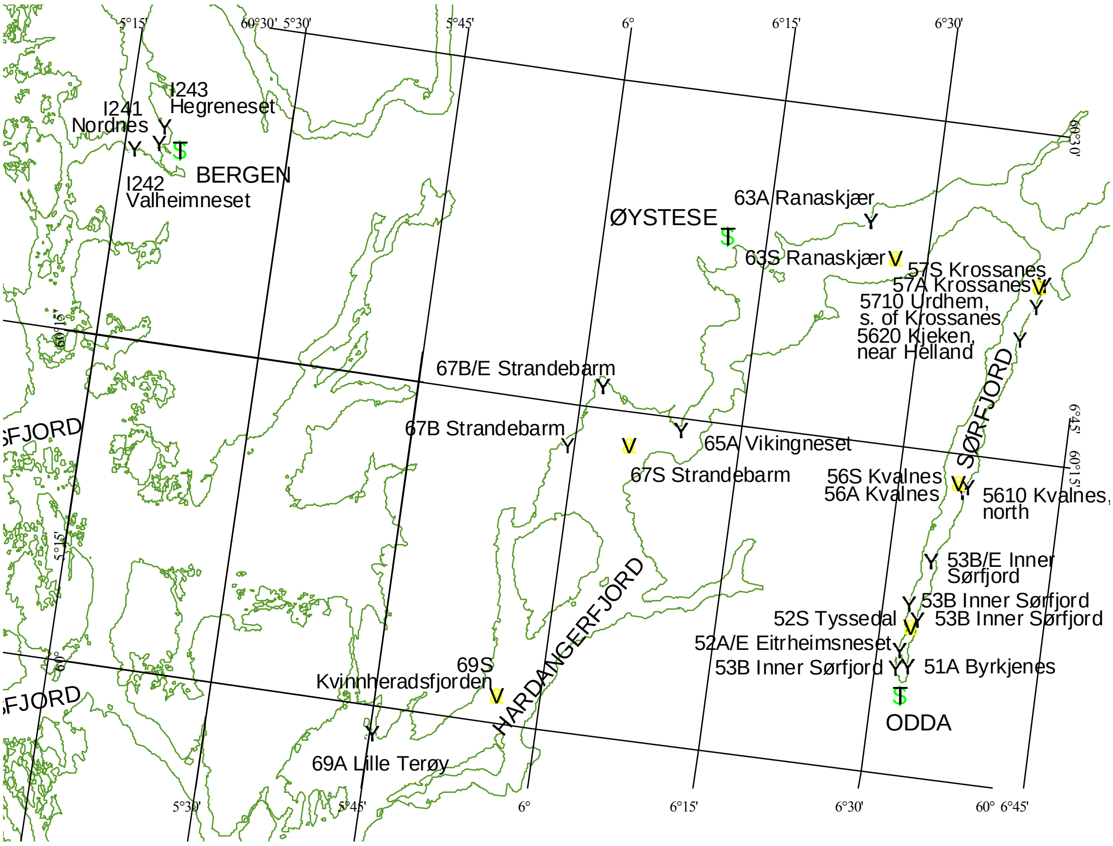
MAP 3


FLEKKEFJORD
FEDAFJORD
LISTA
FARSUND
15S
Lista area
15B/F
Ullerø area
15A Gåsøy
14A Aavigen
LINDESNES
MANDAL
I131 Lastad
13A Langøsund
KRISTIANSAND
I133 Odderø, west
I132
Fiskåtangen
6°45'
7°
7°15'
7°30'
7°45'
8°
58°15'
58°
57°45'

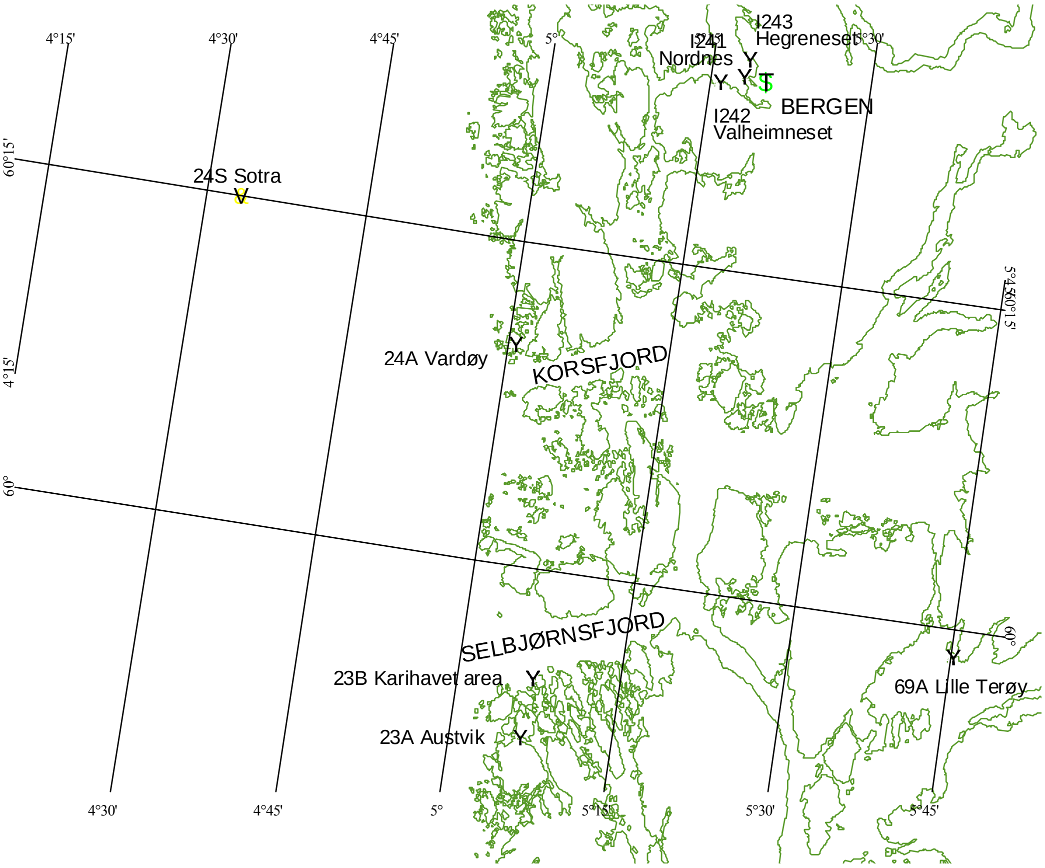
MAP 4


LEIRVIK
22F Borøyfjorden
21F Kyrping
BØMLOFJORD
22A Espevær, west
22C Bømlofjord
SAUDA
I201 Ekkjegrunn (G1)
I205 Bølsnes (G5)
SAUDAFJORD
22S Bømlo area
HAUGESUND
224G Heggjelen
226A/G Karmsund bridge (east)
227A/G Melandholmen
221A/G Stangeland
220G Smørstakk

MAP 5

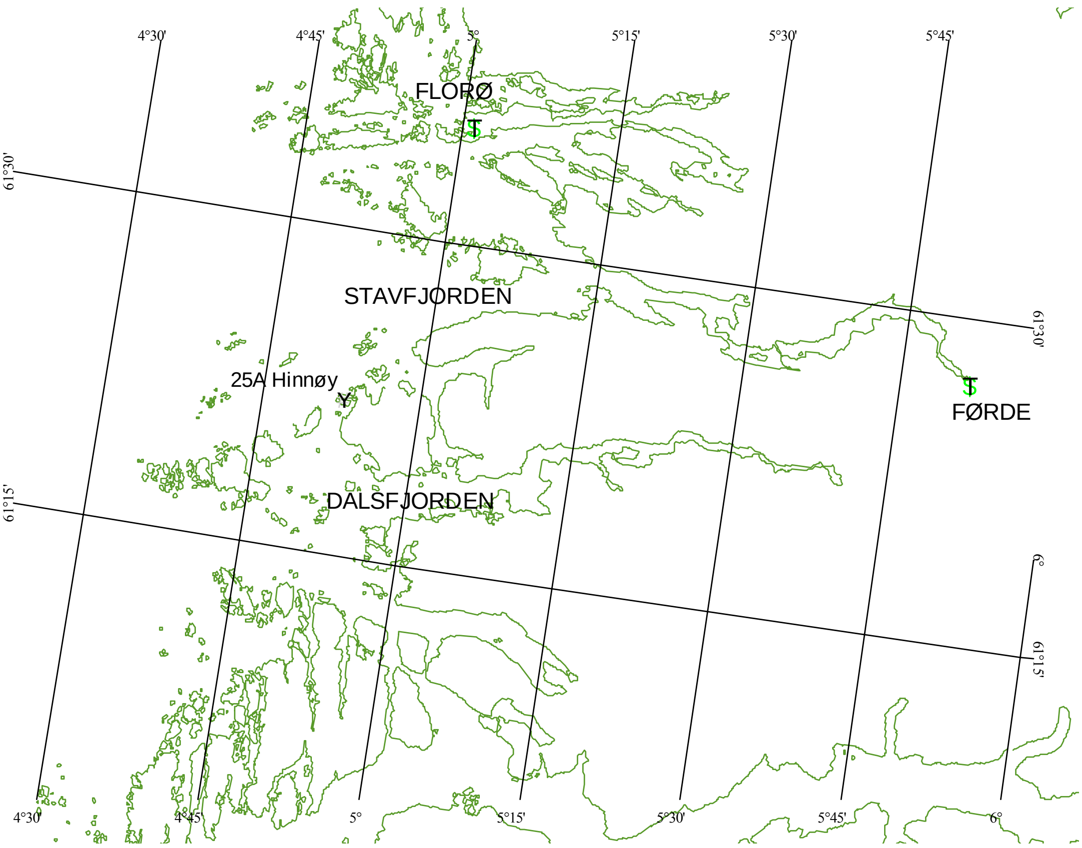

I243 Hegreneset
I241 Nordnes
BERGEN
I242 Valheimneset
63A Ranaskjær
ØYSTESE
63S Ranaskjær
57S Krossanes
57A Krossanes
5710 Urdhem, s. of Krossanes
5620 Kjeken, near Helland
67B/E Strandebarm
67B Strandebarm
65A Vikingneset
67S Strandebarm
56S Kvalnes
56A Kvalnes
5610 Kvalnes, north
SØRFJORD
53B/E Inner Sørfjord
53B Inner Sørfjord
53B Inner Sørfjord
52S Tyssedal
52A/E Eitrheimsneset
53B Inner Sørfjord
51A Byrkjenes
ODDA
69S Kvinnheradsfjorden
HARDANGERFJORD
69A Lille Terøy

MAP 6



I243
Hegreneset
I241
Nordnes
BERGEN
I242
Valheimneset
24S Sotra
24A Vardøy
KORSFJORD
SELBJØRNSFJORD
23B Karihavet area
23A Austvik
69A Lille Terøy

MAP 7

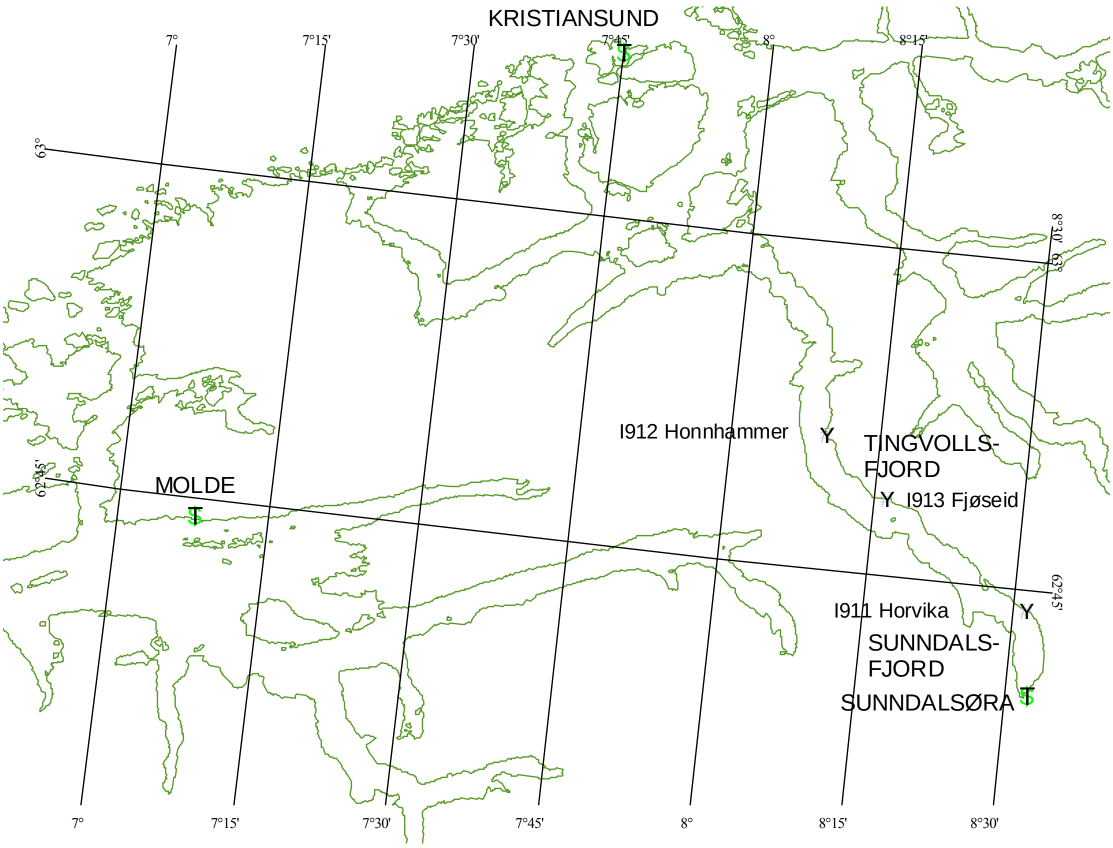


FLORØ
STAVFJORDEN
25A Hinnøy
DALSFJORDEN
FØRDE

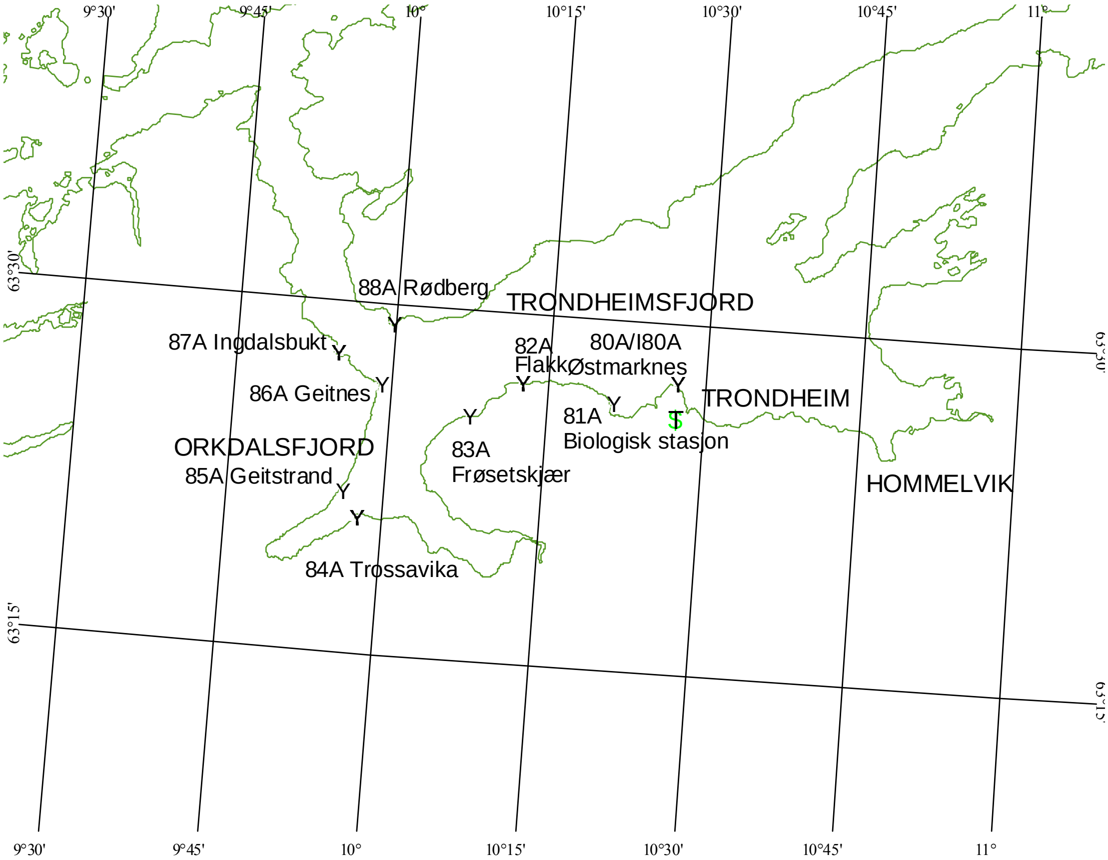
MAP 8


4°45'
5°
5°15'
5°30'
5°45'
6°
6°15'
62°15'
62°
4°45'
ULSTEINVIK
VARTDALSFJORD
28A Eiksundet
27A Grinden
STADLANDET
27S Stattlandet (east of)
VANYLVS-
FJORD
MÅLØY
26A Hamnen
5°
5°15'
5°30'
5°45'
6°
6°15'

MAP 9

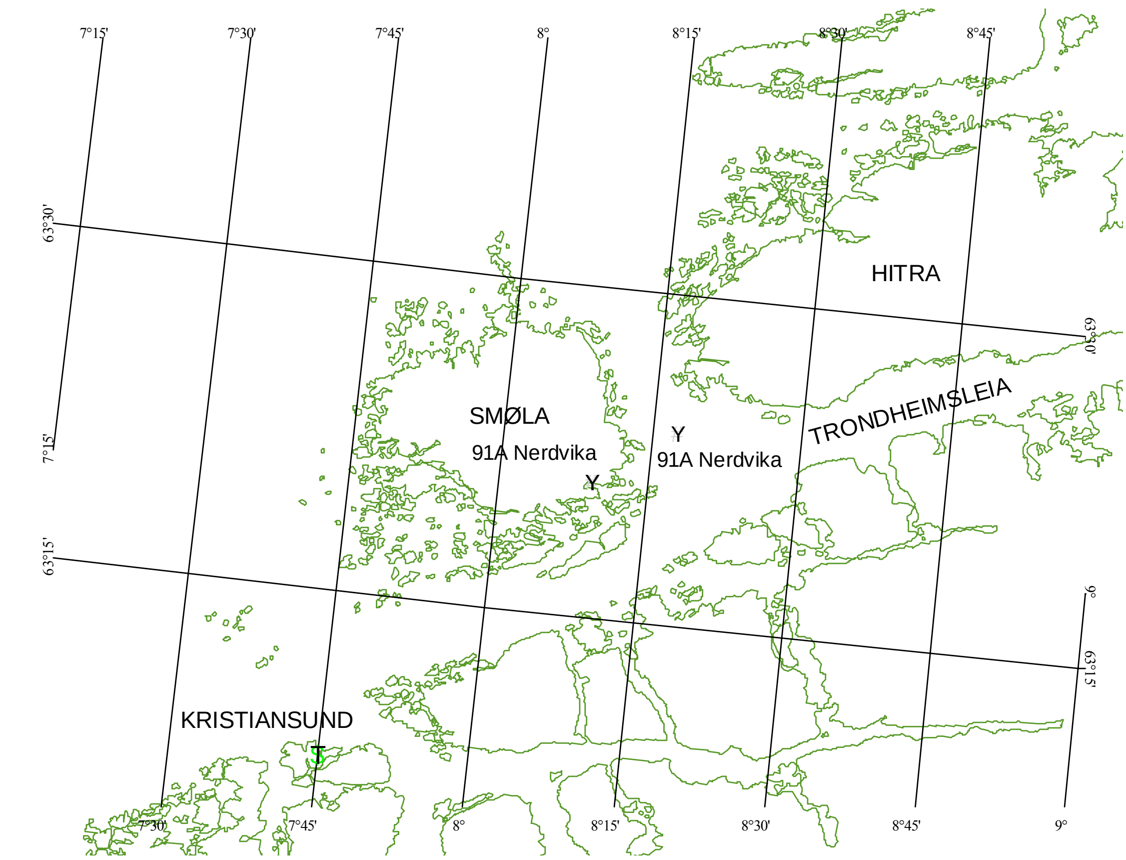

KRISTIANSUND
7°
7°15'
7°30'
7°45'
8°
8°15'
63°
8°30'
I912 Honnhammer
TINGVOLLS-
FJORD
I913 Fjøseid
MOLDE
62°45'
I911 Horvika
SUNNDALS-
FJORD
SUNNDALSØRA
7°
7°15'
7°30'
7°45'
8°
8°15'
8°30'

MAP 10



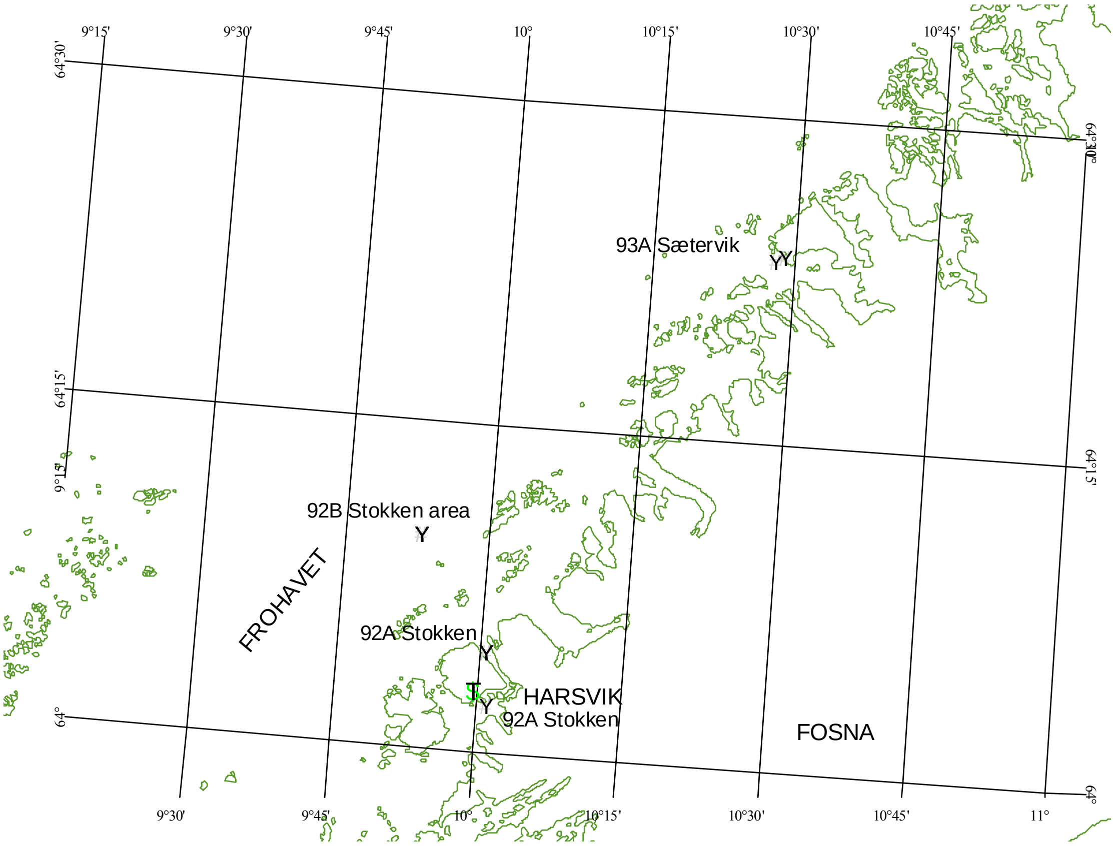
9°30'
9°45'
10°
10°15'
10°30'
10°45'
11°
63°30'
63°15'
88A Rødberg
TRONDHEIMSFJORD
87A Ingdalsbukt
82A
Flakk
80A/I80A
Østmarknes
86A Geitnes
TRONDHEIM
81A
Biologisk stasjon
83A
Frøsetskjær
ORKDALSFJORD
85A Geitstrand
HOMMELVIK
84A Trossavika

MAP 11

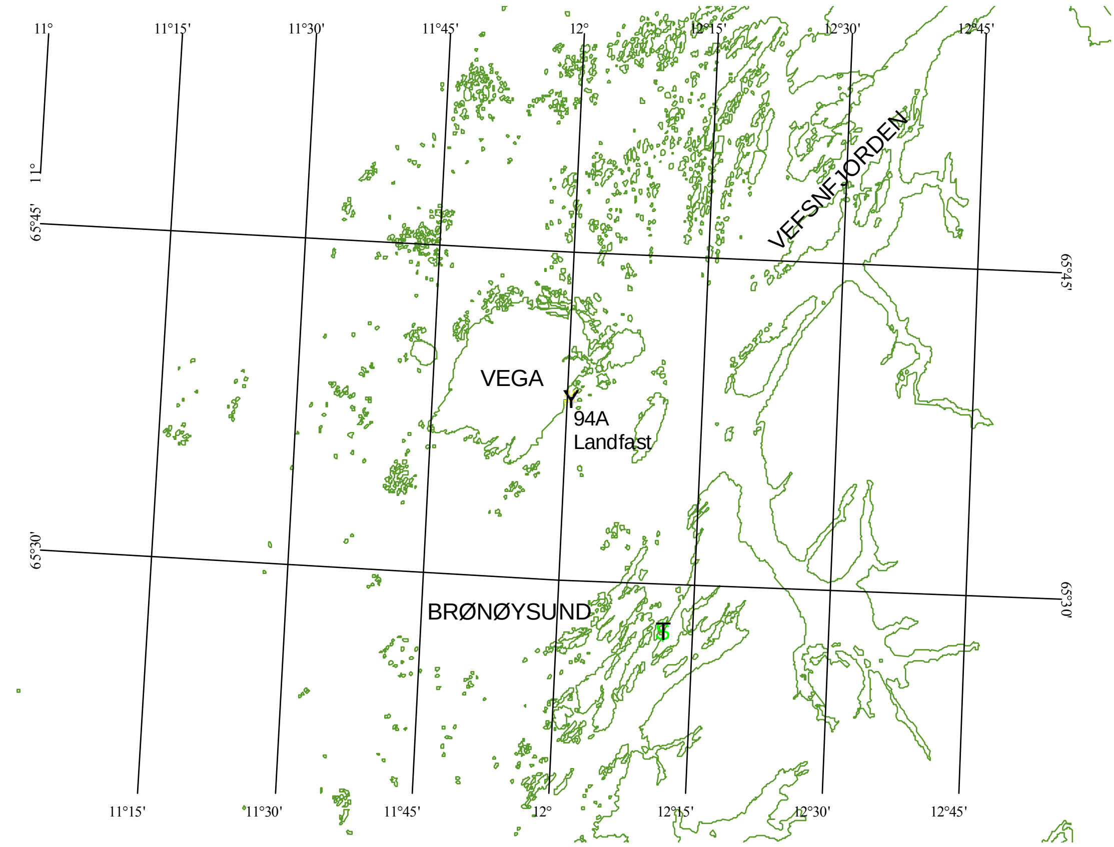


7°15'
7°30'
7°45'
8°
8°15'
8°30'
8°45'
9°
63°30'
63°15'
HITRA
SMØLA
91A Nerdvika
91A Nerdvika
TRONDHEIMSLEIA
KRISTIANSUND

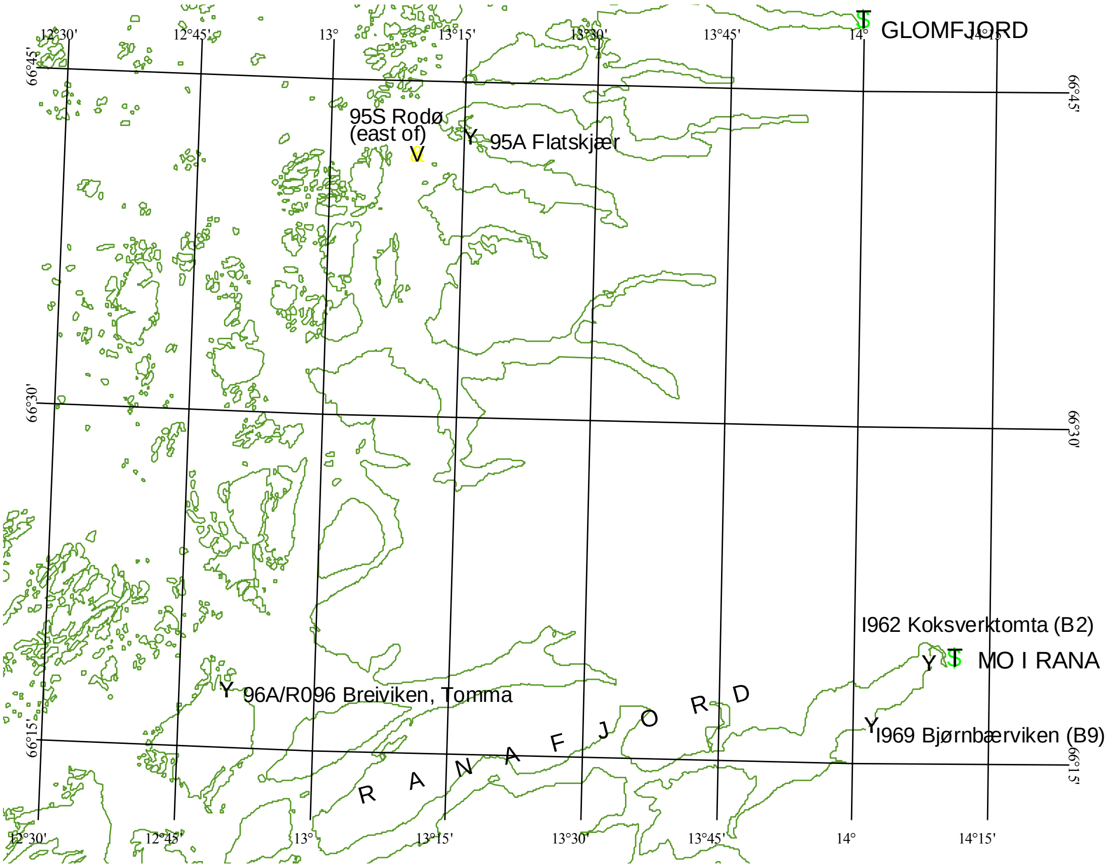
MAP 12


93A Sætervik
92B Stokken area
FROHAVET
92A Stokken
HARSVIK
92A Stokken
FOSNA
9°15'
9°30'
9°45'
10°
10°15'
10°30'
10°45'
11°
64°30'
64°15'
64°

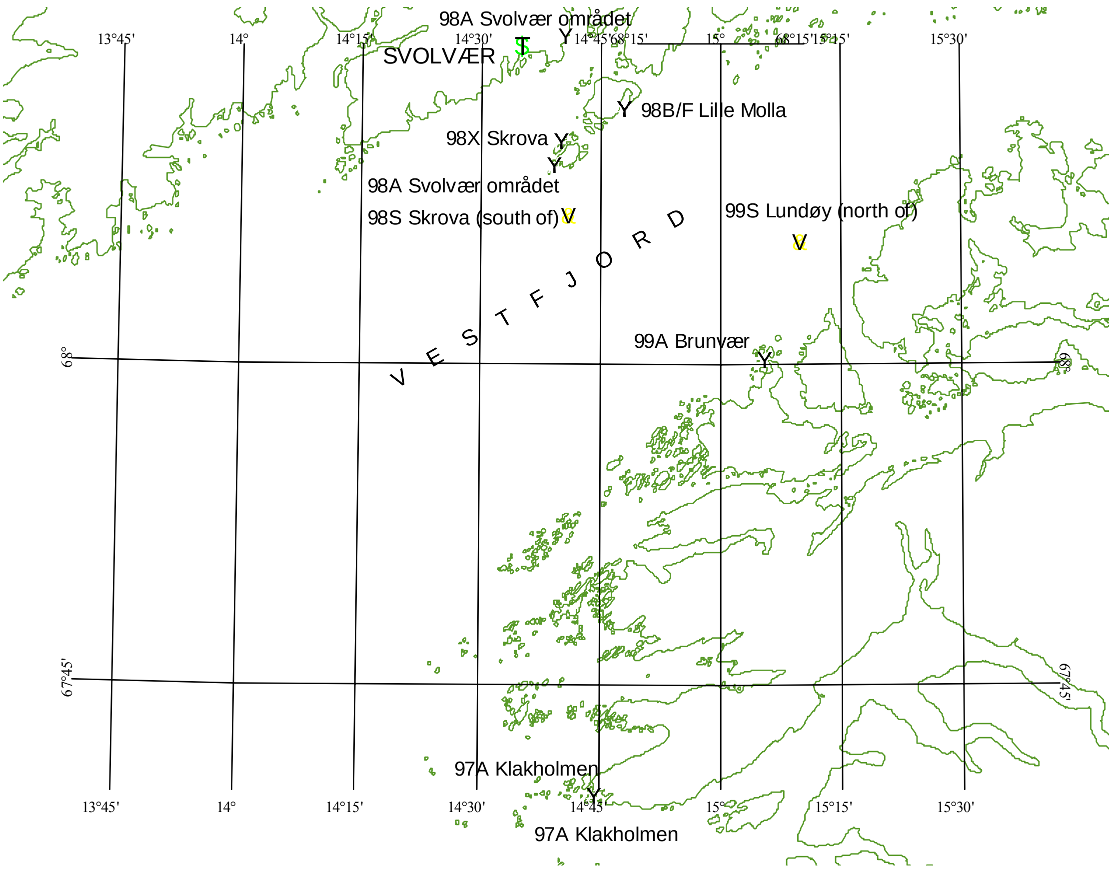
MAP 13


VEFSNFJORDEN
VEGA
94A
Landfast
BRØNØYSUND
11°
11°15'
11°30'
11°45'
12°
12°15'
12°30'
12°45'
65°45'
65°30'

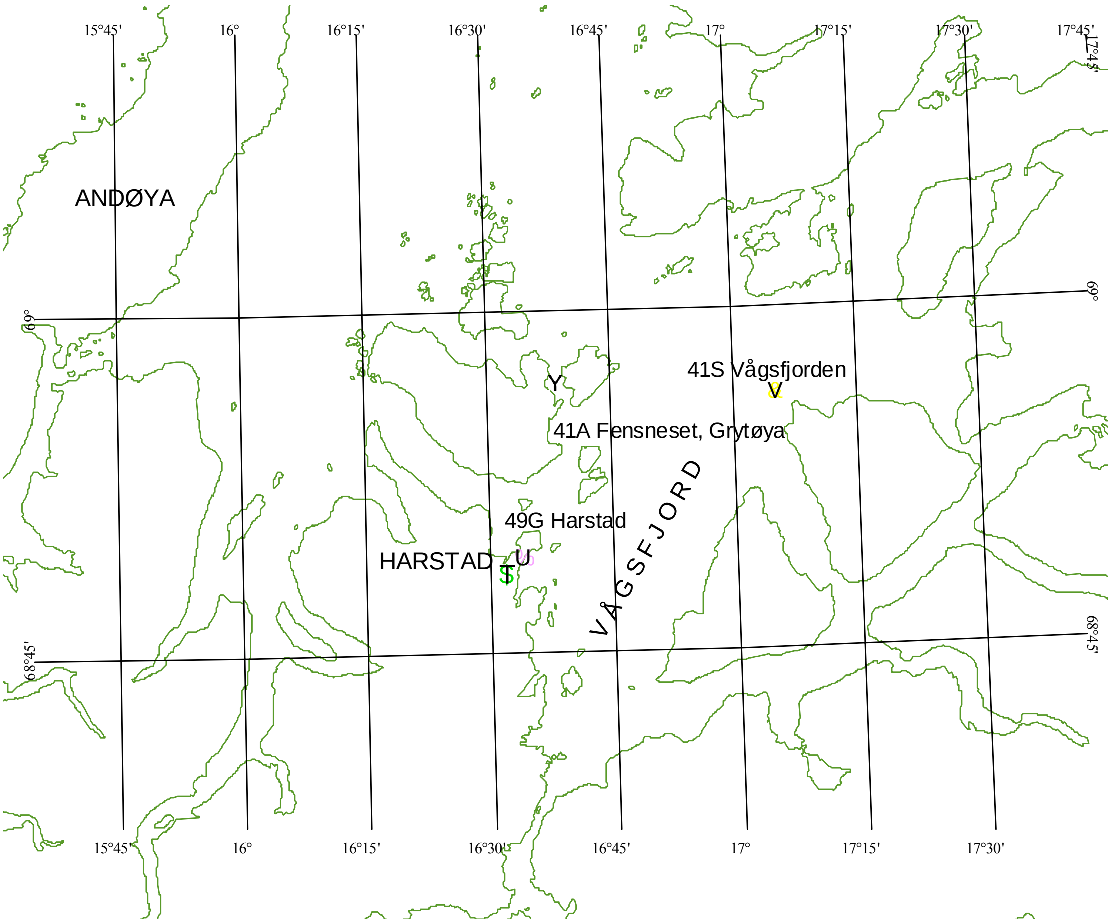
MAP 14


GLOMFJORD
95S Rodø
(east of)
95A Flatskjær
I962 Koksverktomta (B2)
MO I RANA
96A/R096 Breiviken, Tomma
I969 Bjørnbærviken (B9)
R A N A F J O R D
12°30'
12°45'
13°
13°15'
13°30'
13°45'
14°
14°15'
66°45'
66°30'
66°15'

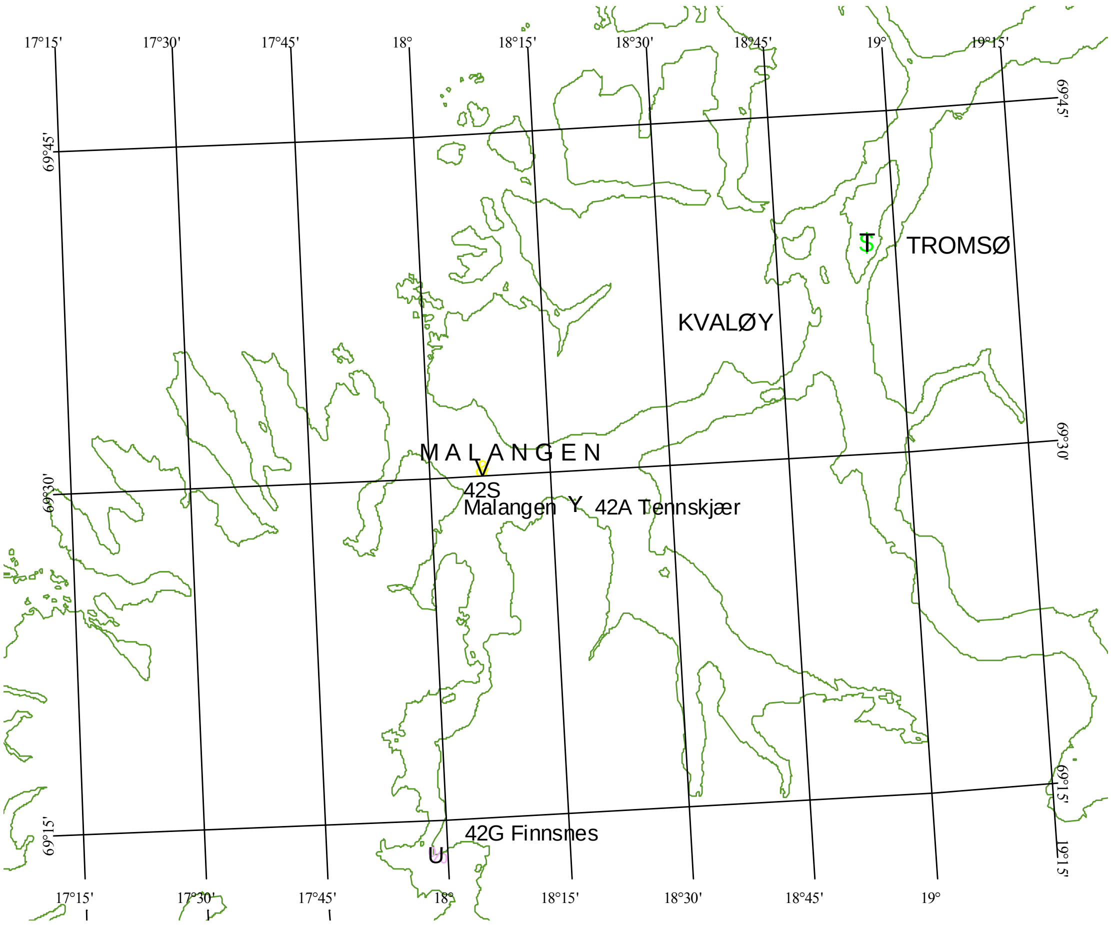
MAP 15


98A Svolvær området
SVOLVÆR
98B/F Lille Molla
98X Skrova
98A Svolvær området
98S Skrova (south of)
99S Lundøy (north of)
V E S T F J O R D
99A Brunvær
97A Klakholmen
97A Klakholmen
13°45'
14°
14°15'
14°30'
14°45'
15°
15°15'
15°30'
68°
67°45'

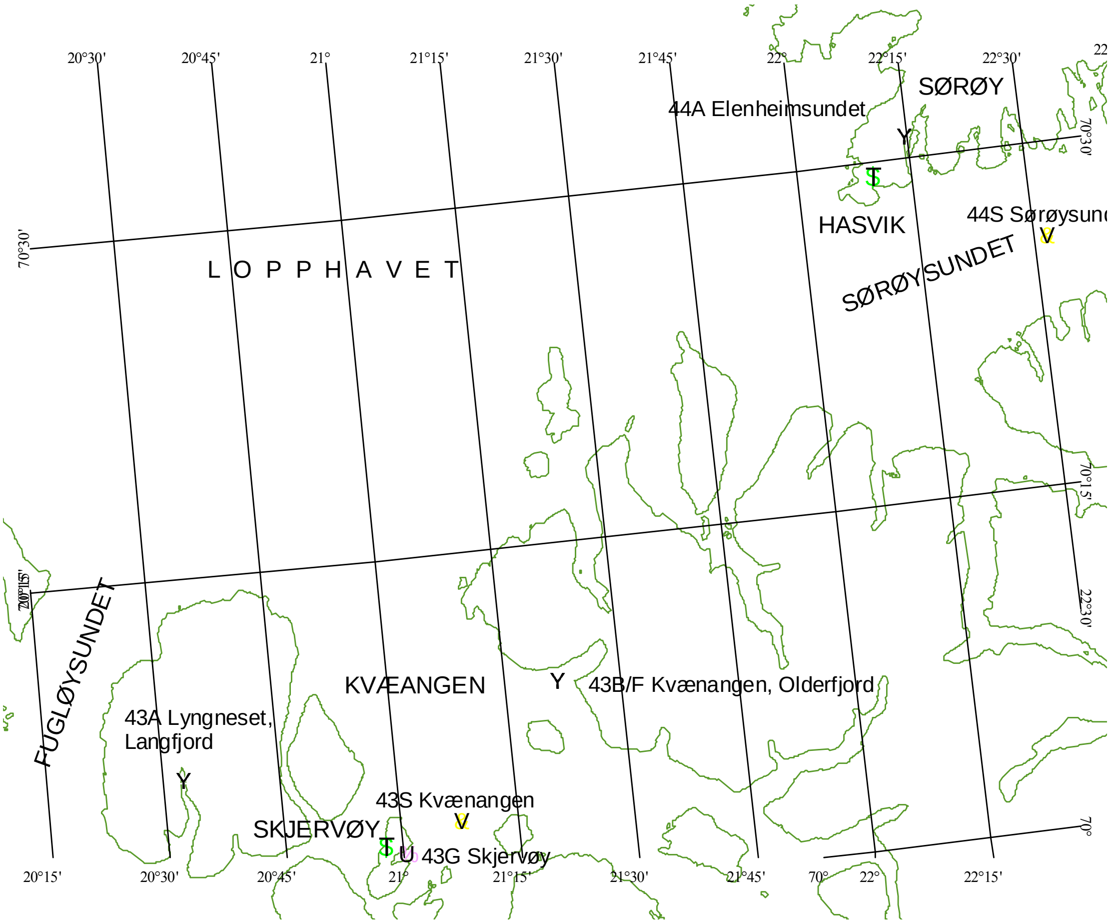
MAP 16


15°45'
16°
16°15'
16°30'
16°45'
17°
17°15'
17°30'
17°45'
ANDØYA
69°
41S Vågsfjorden
41A Fenseset, Grytøya
49G Harstad
HARSTAD
VÅGSFJORD
68°45'

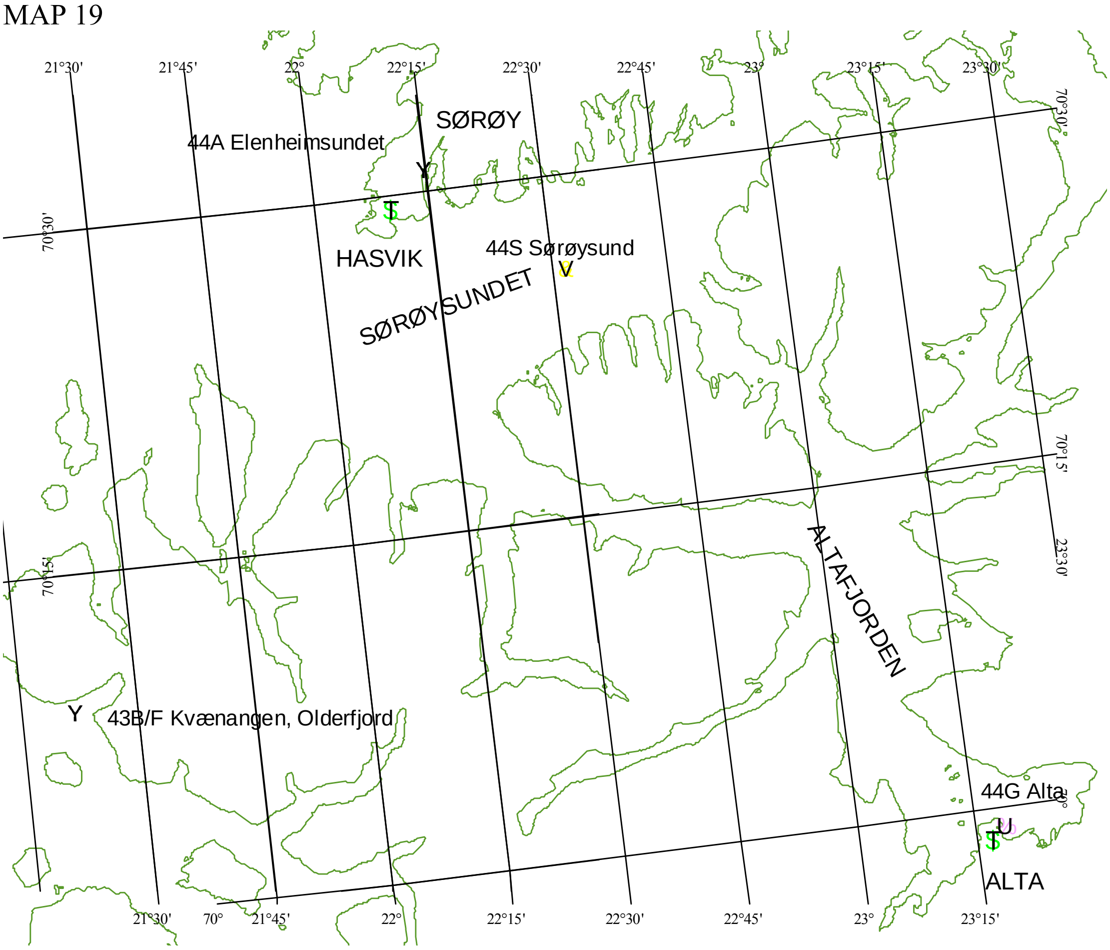
MAP 17


17°15'
17°30'
17°45'
18°
18°15'
18°30'
18°45'
19°
19°15'
69°45'
TROMSØ
KVALØY
MALANGEN
69°30'
42S
Malangen
42A Tennskjær
69°15'
42G Finnsnes

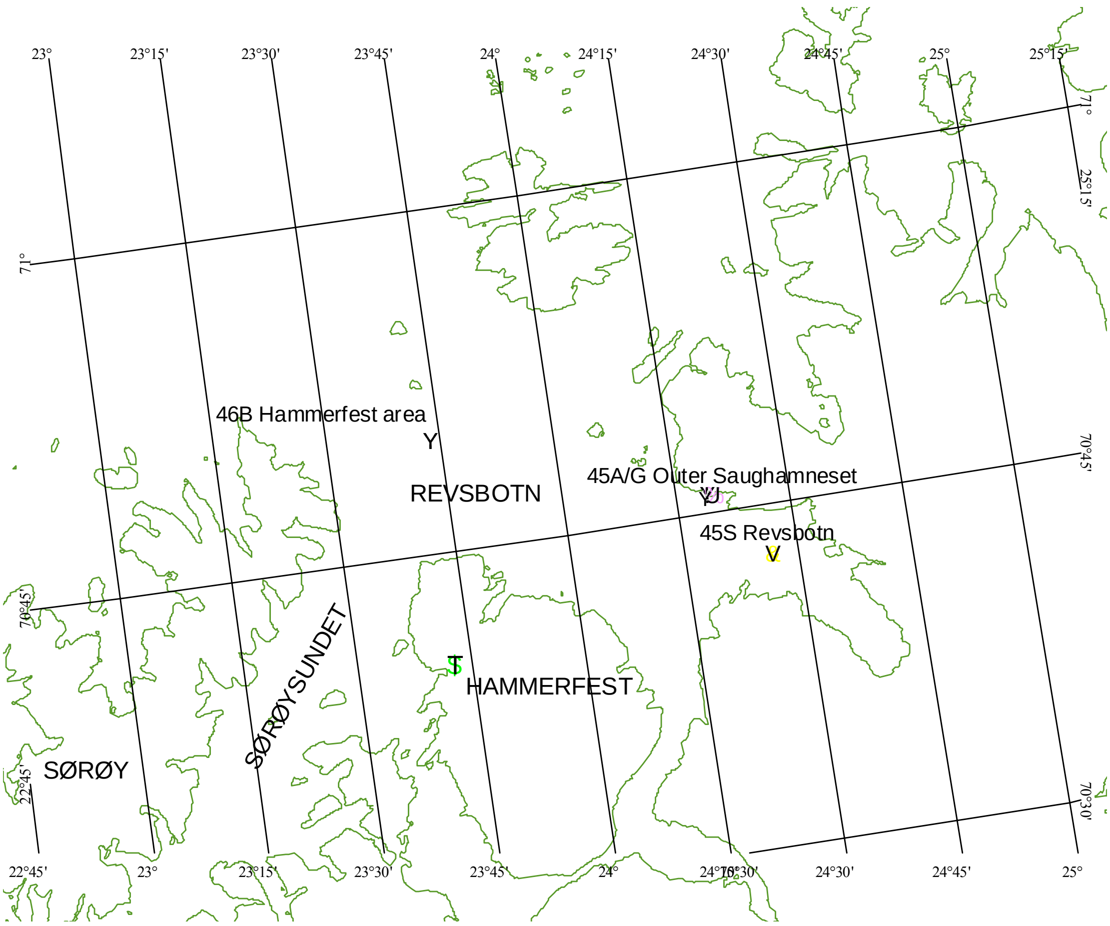
MAP 18


44A Elenheimsundet
SØRØY
HASVIK
44S Sørøysund
SØRØYSUNDET
L O P P H A V E T
FUGLØYSUNDET
KVÆANGEN
43B/F Kvænangen, Olderfjord
43A Lyngneset, Langfjord
43S Kvænangen
SKJERVØY
43G Skjervøy

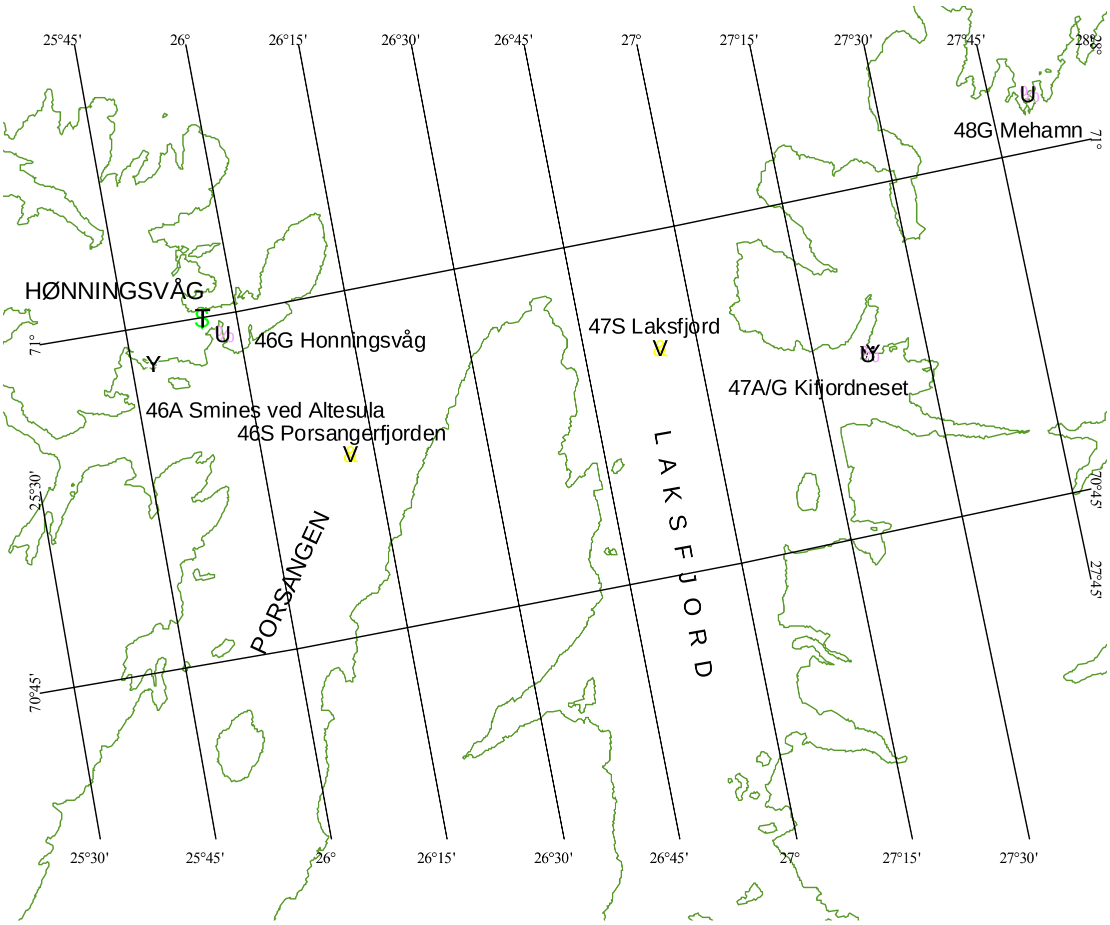
MAP 19


44A Elenheimsundet
SØRØY
HASVIK
44S Sørøysund
SØRØYSUNDET
ALTAFJORDEN
43B/F Kvænangen, Olderfjord
44G Alta
ALTA

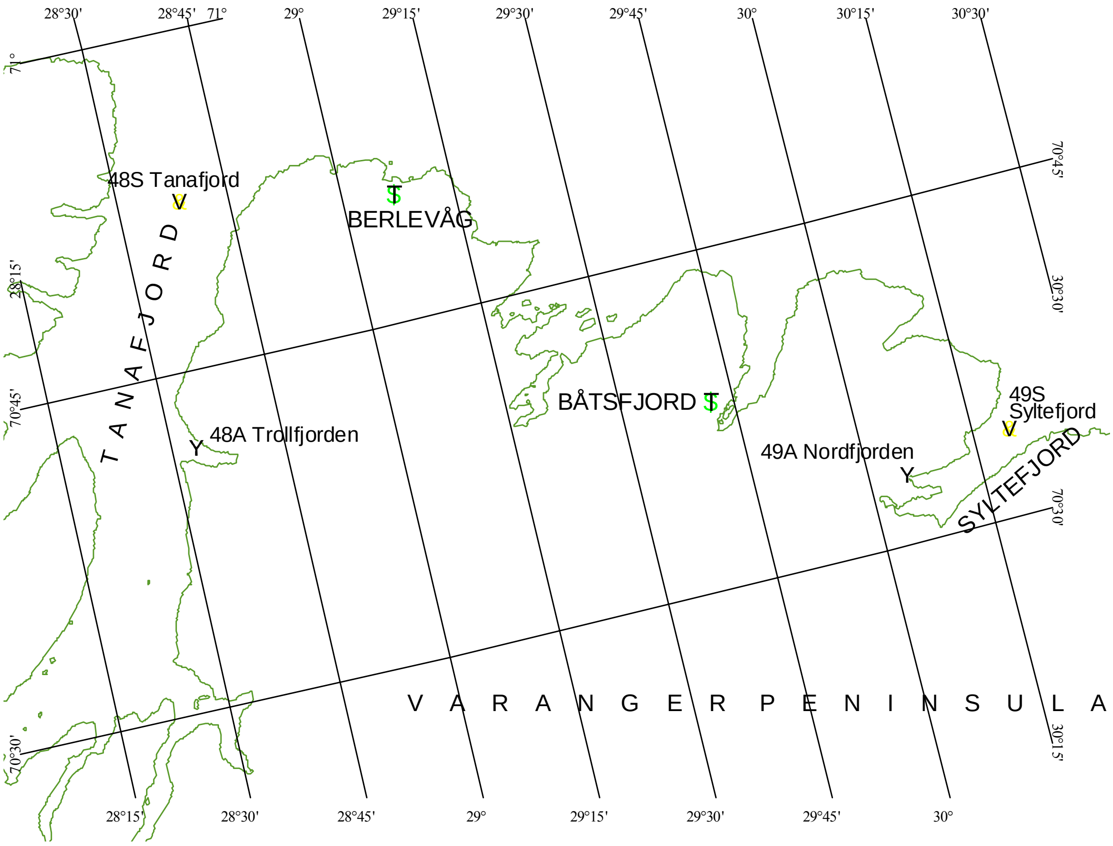
MAP 20


46B Hammerfest area
REVSBOTN
45A/G Outer Saughamneset
45S Revsbotn
SØRØYSUNDET
HAMMERFEST
SØRØY

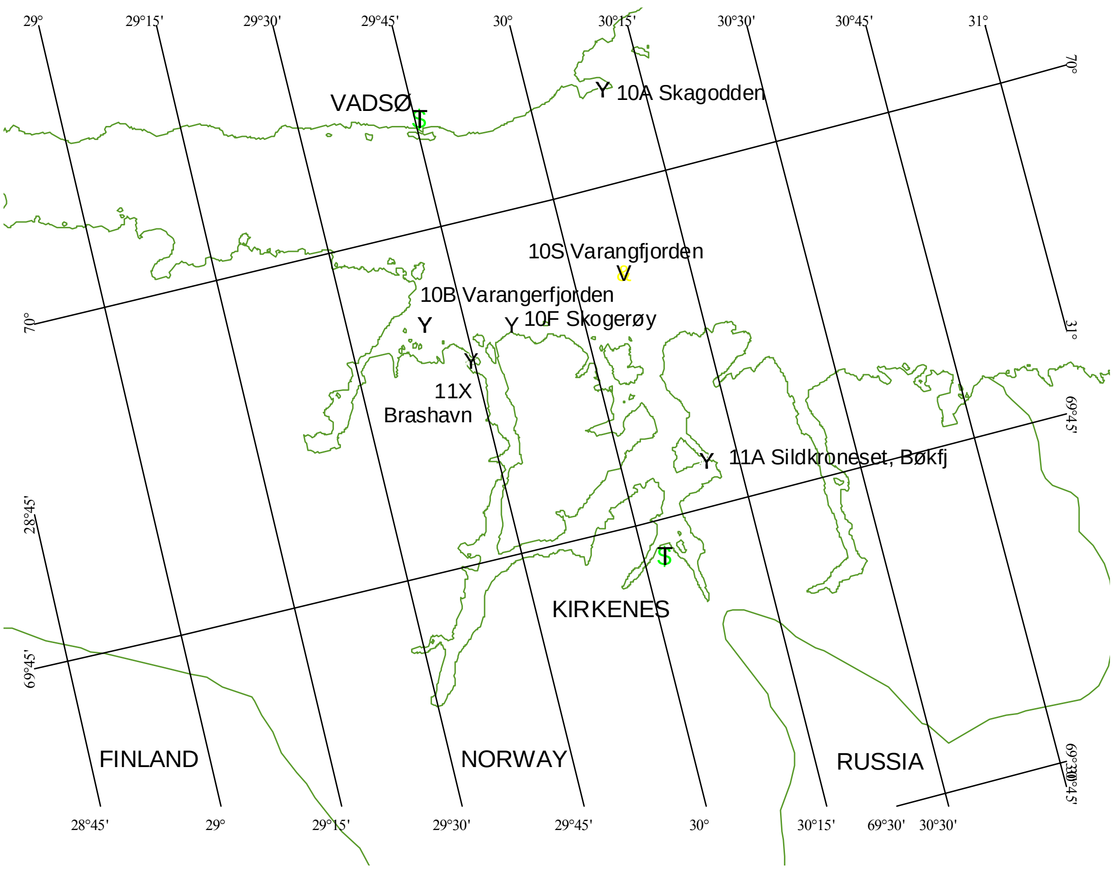
MAP 21


48G Mehamn
HØNNINGSVÅG
46G Honningsvåg
47S Laksfjord
47A/G Kifjordneset
46A Smines ved Altesula
46S Porsangerfjorden
PORSANGEN
LAKSFJORD

MAP 22


48S Tanafjord
BERLEVÅG
TANAFJORD
48A Trollfjorden
BÅTSFJORD
49S Syltefjord
49A Nordfjorden
SYLTEFJORD
V A R A N G E R P E N I N S U L A

MAP 23


VADSØ
10A Skagodden
10S Varangfjorden
10B Varangerfjorden
10F Skogerøy
11X Brashavn
11A Sildkroneset, Bøkfj
KIRKENES
FINLAND
NORWAY
RUSSIA

MAP 24

Appendix G.
Overview of materials and analyses 2000

Station positions are shown on maps in Appendix F. .

Appendix G. 1. Sampling and analyses for 2000, L-liver, F-fillet. (See Appendix G. 2 for descriptions of codes for analysis (M0, M1, M3, M4, M5, C2, C4, A1, G1), fish (P, F, D, L, M, C) and counts). Analytical overview for liver (-L) or fillet (-F) tissue is distinguished.

JAMP area		STATION	WATER	SEDIMENT				MUSSEL/			OTHER		FISH							
													FLAT- (P,F,D,M)				COD- (C)			
													-L	M4	C2	A1	-L	M4	C2	A1
			M0	M1	C4	A1	G1	M3	C2	A1	M3	C2	-F	M5	C2	A1	-F	M5	C2	A1
26		**OSLOFJORD AREA CENTRAL**, Oslofjord proper																		
26	30A	Gressholmen	1	.	.	.	.	3	3	.	.	.	.	.	.	.	.	.	.	.
26	30B	Oslo city Area / Håøya	.	.	.	.	.	.	.	.	.	.	.	.	.	.	C-L	25	25	.
			.	.	.	.	.	.	.	.	.	.	.	.	.	.	C-F	25	5B	.
26	31A	Solbergstrand	1	.	.	.	.	3	3	.	.	.	.	.	.	.	.	.	.	.
26	33B	Sande, east side	.	.	.	.	.	.	.	.	.	.	F-L	5B	5B	.	.	.	.	.
			.	.	.	.	.	.	.	.	.	.	F-F	5B	5B	.	.	.	.	.
26	35A	Mølen	1	.	.	.	.	3	3	.	.	.	.	.	.	.	.	.	.	.
26	36A	Færder	1	.	.	.	.	3	3	.	.	.	.	.	.	.	.	.	.	.
26	36B	Færder area	.	.	.	.	.	.	.	.	.	.	.	.	.	.	C-L	25	25	.
			.	.	.	.	.	.	.	.	.	.	.	.	.	.	C-F	25	5B	.
20	36F	Færder area	.	.	.	.	.	.	.	.	.	.	D-L	5B	5B	.	.	.	.	.
			.	.	.	.	.	.	.	.	.	.	D-F	5B	5B	.	.	.	.	.
26		**OSLOFJORD AREA WEST**, outer Sandefjord-Langesundsfjord																		
26	71A	Bjørkøya	1	.	.	.	.	3	3	.	.	.	.	.	.	.	.	.	.	.
		ARENDAL AREA																		
	76A	Risøy	1	.	.	.	.	3	3	.	.	.	.	.	.	.	.	.	.	.
		LISTA AREA																		
	15A	Ullerø area	1	.	.	.	.	3	3	.	.	.	.	.	.	.	.	.	.	.
	15B	Ullerø area	.	.	.	.	.	.	.	.	.	.	.	.	.	.	C-L	25	25	.
			.	.	.	.	.	.	.	.	.	.	.	.	.	.	C-F	25	5B	.
	15F	Ullerø area	.	.	.	.	.	.	.	.	.	.	D-L	5B	5B	.	.	.	.	.
			.	.	.	.	.	.	.	.	.	.	D-F	5B	5B	.	.	.	.	.
		BØMLO-SOTRA AREA																		
	21F	Kyrping (Åkrafjord 2000)	.	.	.	.	.	.	.	.	.	.	P-L	5B	5B	.	.	.	.	.
			.	.	.	.	.	.	.	.	.	.	P-F	5B	5B	.	.	.	.	.
	22A	Espevær, west	1	.	.	.	.	3	3	.	.	.	.	.	.	.	.	.	.	.
	23B	Karihavet	.	.	.	.	.	.	.	.	.	.	.	.	.	.	C-L	25	25	.
			.	.	.	.	.	.	.	.	.	.	.	.	.	.	C-F	25	5B	.
62		**HARDANGERFJORDEN**																		
62	69A	Lille Terøy	1	.	.	.	.	3[1]	3[1]	.	.	.	.	.	.	.	.	.	.	.
62	67B	Strandebarm											ML	5B	5B	.	C-L	25	25	.
			.	.	.	.	.	.	.	.	.	.	MF	5B	5B	.	C-F	25	5B	.
62	65A	Vikingneset	1	.	.	.	.	3[1]	3[1]	.	.	.	.	.	.	.	.	.	.	.
62	63A	Ranaskjær	1	.	.	.	.	3[1]	3[1]	.	.	.	.	.	.	.	.	.	.	.
63		**SØRFJORDEN**																		
63	52A	Eitrheimsneset	1	.	.	.	.	3[1]	3[1]	.	.	.	.	.	.	.	.	.	.	.
63	53B	Inner Sørfjord	.	.	.	.	.	.	.	.	.	.	P-L	5B	5B	.	C-L	25	25	.
			.	.	.	.	.	.	.	.	.	.	P-F	5B	5B	.	C-F	25	5B	.
63	56A	Kvalnes	1	.	.	.	.	3[1]	3[1]	.	.	.	.	.	.	.	.	.	.	.
63	57A	Krossanes	1	.	.	.	.	3[1]	3[1]	.	.	.	.	.	.	.	.	.	.	.

Appendix G. 1 (cont.)

JAMP area	STATION	WATER	SEDIMENT				MUSSEL/			OTHER		FISH FLAT- (P,F,D,M)				FISH COD- (C)			
												-L -F	M4 M5	C2 C2	A1 A1	-L -F	M4 M5	C2 C2	A1 A1
		M0	M1	C4	A1	G1	M3	C2	A1										
	LOFOTEN AREA																		
98A	Husvågen (1997)	1	.	.	.	.	3	3	.	.	.	.	.	.	.	.	.	.	.
98B	Lille Molla	.	.	.	.	.	.	.	.	.	.	.	.	.	.	C-L	25	25	.
		.	.	.	.	.	.	.	.	.	.	.	.	.	.	C-F	25	5B	.
98F	Lille Molla	.	.	.	.	.	.	.	.	.	.	D-L	5B	5B	.	.	.	.	.
		.	.	.	.	.	.	.	.	.	.	D-F	5B	5B	.	.	.	.	.
	VARANGER PENINSULA AREA																		
10A	Skagodden	1	.	.	.	.	3	3	.	.	.	.	.	.	.	.	.	.	.
10B	Varangerfjorden	.	.	.	.	.	.	.	.	.	.	.	.	.	.	C-L	25	25	.
		.	.	.	.	.	.	.	.	.	.	.	.	.	.	C-F	25	5B	.
10F	Varangerfjorden	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
11X	Brashavn (1997)	1	.	.	.	.	3	3	.	.	.	.	.	.	.	.	.	.	.

NOTES:
[1]) Parallel samples collected for analysis that were frozen directly and not depurated prior to cleaning

Appendix G. 2: Key to analysis codes and sample counts used in Appendix G. 1.

ANALYSIS CODES:

Code	Analyses
M0	suspended matter
M1	Hg, Cd, Cu, Pb, Zn, Li (normalising element) total organic carbon (TOC)
M3	Hg, Cd, Cu, Pb, Zn
M4	Cd Cu Pb Zn (for fish liver)
M5	Hg (for fish fillet)
C1	CB-28,-52,-101,-105,-118,-138,-153,-156,-180, 209, 5-CB, OCS, a+gHCH, HCB, DDE, DDD, EPOCl (optional), dry weight percent
C2	CB-28,-52,-101,-105,-118,-138,-153,-156,-180, 209, 5-CB, OCS, a+gHCH, HCB, DDE, DDD, EPOCl (optional), fat and dry weight percent
A1	PAH
G1	Sediment core geological dating

SAMPLE COUNT CODES:

Medium	Count	Explanation
SEAWATER	1	sample for suspended matter determination
SEDIMENT	17	17 samples for metal analyses; two cores each with samples from 0-1, 1-2, 2-4, 4-6, 6-10, 10-15, 15-20 cm and deepest 5 cm slice plus one core with sample from 0-1 cm.
	4	4 samples for PCB or PAH analyses; two each cores with samples from 0-1cm and deepest 5cm slice.
	3	3 samples for metal analyses; three cores each with samples from 0-1cm.
MUSSEL	3/6	3 size groups (2-3, 3-4, 4-5 cm) each a bulk of ca.50 individuals and/or 1 size group (3-4 or 4-5 cm), 3 parallel samples each a bulk of 20 individuals.
	1/2	1 size group (2-3 or 3-4 cm), 2 parallel samples each a bulk of 50 individuals.
SHRIMP	2	2 samples of 100 individuals (edible size)
FISH		The number of individual fish or bulk samples of fish (-B) for analyses is shown. Bulk samples of fish consist of 5 fish. The five longest fish make up one bulk sample, the next five longest fish make up the another bulk sample and so on. The letter following the number indicates the fish type: D=dab, F=flounder, L=lemon sole, M=megrim, P=plaice, W=witch and C=cod.

Appendix H.
Temporal trend analyses of contaminants in biota 1981-2000

Sorted by contaminant, species and area/station:

Cadmium (Cd)
Mercury (Hg)
Lead (Pb)
Sum PCB-7 (CB: 28+52+101+118+138+153+180)
DDEPP (ppDDE)
γHCH (HCHG)
HCB

MYTI EDU - Blue Mussel (*Mytilus edulis*)
JAMP-stations
"Index"-stations
GADU MOR - Atlantic cod (*Gadus morhua*)
LEPI WHI - Megrim (*Lepidorhombus whiff-iagonis*)
LIMA LIM - Dab (*Limanda limanda*)
PLAT FLE - Flounder (*Platichthys flesus*)
(s) - Small fish
(l) - Large fish
SB - Soft body tissue
LI - Liver tissue
MU - Muscle tissue

OC	**Overconcentration expressed as quotient of median of last year and “high background” ("?" missing background value)**	
TRND	**trend**	
	D-	**Significant linear trend, downward**
	U-	**Significant linear trend, upward**
	--	**No significant trend**
	-?	**No significant linear trend, systematic non-linear trend can not be tested because of insufficient data (<6 years)**
	-Y	**No significant linear trend, but a systematic non-linear trend**
	DY or UY	**Significant linear trend (downward or upward) and a significant non-linear trend. This is considered the same as "-Y"**
	SIZE length effect (mercury in fillet)	
	L	**Significant difference in concentration levels but pattern of variation same**
	D	**As "L" but pattern of variation significantly different**
	-	**No significant difference between “small” and “large” fish**
SM+3	**Projected smoothed median for three years expressed as quotient of value and “high background” ("?" if missing background or if number of years is less than seven)**	
POWER	**Estimated number of years to detect a hypothetical situation of 10% trend a year with a 90% power**	

Annual median concentration of CD (ppm)

																									ANALYSIS		
St	Species	Tissue	Base	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	OC	TRND	SM+3	POWER
30A	MYTI EDU	SB	d.wt				1.1	0.81	1.4	0.6	0.61	0.74	0.77	0.77	1.1	1.3	1.2	0.78	0.8	0.86	1.3	1.2	1.1	no	--	no	10
31A	MYTI EDU	SB	d.wt			1.4	1.3	0.89	1.9	0.4	0.43	0.41	0.72	0.73	0.91	0.93	0.78	1.3	0.79	0.85	1.1	1.2	1	no	--	no	13
35A	MYTI EDU	SB	d.wt			1.3	0.95	1.2	1.3	0.52	0.66	0.65	0.93	1.1	1.3	1.1	0.96	0.89	0.77	0.97	1.1	1.5	1.3	no	--	no	10
36A	MYTI EDU	SB	d.wt			0.85	1.2	0.84	1.4	0.59	0.56	0.5	0.41	1.2	1.1	0.9	1.2	1.2	1.6	1.8	0.97	1	1.6	no	--	no	13
71A	MYTI EDU	SB	d.wt			2.5	2	1.4	2	0.98	2.1	2	0.97	1.1	1.7	1.9	2	2.3	1.5	2.4	1.5	1.8	2	no	--	no	12
76A	MYTI EDU	SB	d.wt										0.64	0.86	0.96	1.1			1.2	1.2	1.2	1.3	0.82	no	UY	no	8
15A	MYTI EDU	SB	d.wt										0.5	0.83		1.2	0.79	1.4	1.2	1.1	1	0.84	1.4	no	--	no	11
51A	MYTI EDU	SB	d.wt							43	58							37	25	5.4	10	35	27	13.7	--	14.6	19
52A	MYTI EDU	SB	d.wt									94	10	80	43	15	8.7	20	18	13	9.1	11	11	5.3	--	3.1	21
56A	MYTI EDU	SB	d.wt							56	54	98	45	69	52	60	11	31	20	29	8.7	26	24	12.2	--	10.8	17
57A	MYTI EDU	SB	d.wt							21	43	37	26	33	32	15	12	12	8.5	14	5	14	10	5.1	D-	5.1	13
63A	MYTI EDU	SB	d.wt							47	10	19	30	35	18	7.8	4.2	8.2	5.4	6.6	4.4	6.9	6	3.0	D-	2.9	16
65A	MYTI EDU	SB	d.wt							15	6	8.3	15	24	5.1	7.7	3	5.4	3.5	4.3	1.7	3.8	3.9	1.9	--	1.5	17
69A	MYTI EDU	SB	d.wt												4.3	2.4	2.1	2.9	3.2	3.5	1.6	3.8	2.9	1.4	--	1.4	13
22A	MYTI EDU	SB	d.wt										0.53	1.1	1.1	0.84	1	1.4	1.1	1	0.85	1.3	2.7	1.3	--	1.3	12
82A	MYTI EDU	SB	d.wt				1.4	1.2	2.3	0.99	0.4	1.3		1.2	1.2	1.1		0.98	1.2					no	--	no	15
84A	MYTI EDU	SB	d.wt				1.4	1.9	2.4	2.1	0.96	1.2		1.8	2.1	1.6		1.6	1.3					no	--	no	12
87A	MYTI EDU	SB	d.wt				0.97	1	1.9	0.77	0.69	0.76		0.87	0.98	0.93		1.1	1.3					no	--	no	12
91A	MYTI EDU	SB	d.wt												1.7	1.3	1.8							no	-?	?	11
92A	MYTI EDU	SB	d.wt												1.1	0.54	0.94	0.74	0.69	0.72				no	--	no	11
98A	MYTI EDU	SB	d.wt												1.1	1.1				0.85	1.6	2.2	1.7	no	--	no	12
98X	MYTI EDU	SB	d.wt														0.71	0.69	0.78					no	-?	?	6
41A	MYTI EDU	SB	d.wt														1.9	2.9	1.6	1.9				no	-?	?	12
43A	MYTI EDU	SB	d.wt														3.5	4.3		3.9				1.9	-?	?	8
44A	MYTI EDU	SB	d.wt														1.7	2.7	2	1.5				no	-?	?	12
46A	MYTI EDU	SB	d.wt														2.7	2.1	2.7					1.4	-?	?	10
48A	MYTI EDU	SB	d.wt														1.4	1.3	1.4					no	-?	?	<=5
10A	MYTI EDU	SB	d.wt														1.7	1.7	2.3	1.1	2.3	1.6	1.5	no	--	no	12
11A	MYTI EDU	SB	d.wt														1.3	1.3	1.1	1.6				no	-?	?	9
11X	MYTI EDU	SB	d.wt																	1.6	0.67	1.1	1.1	no	-?	?	15

Annual median concentration of CD (ppm)

																								ANALYSIS		
St	Species	Tissue	Base	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	OC	TRND	SM+3	POWER
I022	MYTI EDU	SB	d.wt															1.4	1.4	1.3	2.1	1.9	1.3	no	--	no	10
I023	MYTI EDU	SB	d.wt															1.6	1.4	1.8	2	1.4	0.95	no	--	no	11
I024	MYTI EDU	SB	d.wt															1.3	1.6	2	2.6	2.5	1.8	no	--	no	10
30A	MYTI EDU	SB	d.wt				1.1	0.81	1.4	0.6	0.61	0.74	0.77	0.77	1.1	1.3	1.2	0.78	0.8	0.86	1.3	1.2	1.1	no	--	no	10
I301	MYTI EDU	SB	d.wt															0.82	0.8	0.82	1	1.3	0.72	no	--	no	10
I304	MYTI EDU	SB	d.wt															1.3	0.72	0.78	1	0.99	0.92	no	--	no	10
I306	MYTI EDU	SB	d.wt															0.81	0.78	0.65	0.71	0.84	0.59	no	--	no	8
I307	MYTI EDU	SB	d.wt															0.94	0.82	0.69	0.72	0.83	0.72	no	--	no	7
I131	MYTI EDU	SB	d.wt															1.2	0.88	1.1	1.3	1.2	2	no	--	1.4	10
I201	MYTI EDU	SB	d.wt															0.8	0.86	1.1	0.93	1.3	1.4	no	U-	1.1	7
I205	MYTI EDU	SB	d.wt															0.82		1.4	0.86	1.5	2	no	-?	?	11
51A	MYTI EDU	SB	d.wt							43	58							37	25	5.4	10	35	27	13.7	--	14.6	19
52A	MYTI EDU	SB	d.wt									94	10	80	43	15	8.7	20	18	13	9.1	11	11	5.3	--	3.1	21
I962	MYTI EDU	SB	d.wt															0.75	0.61	0.64	0.52			no	-?	?	6
I969	MYTI EDU	SB	d.wt															0.5	0.6	0.32	0.61	0.59	0.83	no	--	no	12

Annual median concentration of CD (ppm)

																								ANALYSIS		
St	Species	Tissue	Base	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	OC	TRND	SM+3	POWER
30B	GADU MOR	LI	w.wt				0.01	0.05	0.062	0.071	0.022	0.027	0.035	0.027	0.1	0.064	0.063	0.049	0.045	0.045	0.11	0.17	0.078	no	--	1.8	17
36B	GADU MOR	LI	w.wt	0.078	0.06	0.22	0.07	0.05	0.14	0.061	0.031	0.028	0.023	0.01	0.021	0.034	0.021	0.042	0.033	0.074	0.036	0.065	0.041	no	DY	no	16
15B	GADU MOR	LI	w.wt										0.026	0.009	0.025	0.016	0.014	0.016	0.024	0.031	0.03	0.026	0.033	no	--	no	13
53B	GADU MOR	LI	w.wt						0.66		0.058	0.093	0.045	0.15	0.21	0.038		0.007	0.18	0.14	0.23	0.73	0.83	8.3	--	21.6	>25
67B	GADU MOR	LI	w.wt							0.14	0.052	0.047	0.069	0.077	0.051	0.11	0.099	0.033	0.11	0.28	0.018	0.071	0.059	no	--	no	21
23B	GADU MOR	LI	w.wt										0.022	0.024	0.02	0.025	0.015	0.026	0.014	0.029	0.025	0.033	0.019	no	--	no	12
84B	GADU MOR	LI	w.wt				0.13	0.095	0.069		0.029													no	D?	?	6
92B	GADU MOR	LI	w.wt													0.036	0.029	0.022	0.066					no	-?	?	16
98B	GADU MOR	LI	w.wt												0.069	0.15	0.025	0.11	0.33	0.064	0.047	0.039	0.14	1.4	--	no	24
43B	GADU MOR	LI	w.wt														0.17	0.18	0.097					no	-?	?	12
10B	GADU MOR	LI	w.wt														0.23	0.19	0.095	0.13	0.12	0.14	0.13	1.3	--	1.2	10

Annual median concentration of CD (ppm)

																								ANALYSIS		
St	Species	Tissue	Base	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	OC	TRND	SM+3	POWER
33B	PLAT FLE	LI	w.wt			0.19		0.19	0.18	0.25	0.061	0.11	0.23	0.2	0.16	0.18	0.087	0.091	0.11	0.11	0.11	0.13	0.071	no	--	no	14
53B	PLAT FLE	LI	w.wt								2.2	1.5	1.5	1.7	1.8	0.79		0.13	2.5	0.89	1.5	2.6	1.8	5.9	--	12.4	22
67B	PLAT FLE	LI	w.wt																2.5		0.19	0.19	0.15	no	-?	?	19
36F	LIMA LIM	LI	w.wt										0.11	0.11	0.23	0.29	0.14	0.15	0.14	0.12	0.2	0.23	0.14	no	--	no	13
15F	LIMA LIM	LI	w.wt													0.099	0.14	0.13	0.15	0.076	0.18	0.17		no	--	no	12
22F	LIMA LIM	LI	w.wt										0.095	0.091	0.13		0.17	0.12						no	-?	?	9
98F	LIMA LIM	LI	w.wt														0.98	0.18	0.23					no	-?	?	21
30F	PLEU PLA	LI	w.wt												0.11		0.1	0.22						1.1	-?	?	15
22F	PLEU PLA	LI	w.wt																0.23	0.23	0.24			1.2	-?	?	<=5
98F	PLEU PLA	LI	w.wt													0.1		0.75		0.32	0.2	0.21	0.82	4.1	--	8.2	22
10F	PLEU PLA	LI	w.wt																	0.57		0.14	0.25	1.2	-?	?	19
67B	LEPI WHI	LI	w.wt			0.18				0.18	0.11	0.066	0.2	0.085	0.1	0.12	0.3	0.26	0.2	0.097	0.033	0.051	0.037	m	DY	m	15

Annual median concentration of HG (ppm)

St	Species	Tissue	Base	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	ANALYSIS OC	TRND	SM+3	POWER
30A	MYTI EDU	SB	d.wt				0.118	0.073	0.147	0.05	0.13	0.0437	0.0641	0.0533	0.0508	0.0703	0.0865	0.0574	0.07	0.0604	0.0778	0.114	0.0599	no	--	no	13
31A	MYTI EDU	SB	d.wt			0.0757	0.164	0.086	0.12	0.05	0.09	0.0225	0.0599	0.0485	0.0508	0.0446	0.0502	0.0623	0.0435	0.0515	0.0699	0.0881	0.0464	no	--	no	14
35A	MYTI EDU	SB	d.wt			0.0933	0.0741	0.084	0.17	0.05	0.18	0.05	0.0617	0.0585	0.0578	0.0537	0.0607	0.0369	0.0383	0.0354	0.0667	0.101	0.028	no	--	no	16
36A	MYTI EDU	SB	d.wt			0.0516	0.0427	0.084	0.14	0.05	0.14	0.034	0.0452	0.0476	0.0394	0.0321	0.0481	0.0333	0.0442	0.0743	0.0299	0.0455	0.0377	no	--	no	14
71A	MYTI EDU	SB	d.wt			0.393	0.242	0.218	0.247	0.12	0.34	0.249	0.182	0.145	0.178	0.14	0.212	0.201	0.222	0.312	0.11	0.155	0.132	no	--	no	12
76A	MYTI EDU	SB	d.wt										0.0709	0.0682	0.0498	0.0205			0.057	0.0824	0.0632	0.101	0.0328	no	--	no	16
15A	MYTI EDU	SB	d.wt										0.0561	0.0522		0.0244	0.0503	0.0217	0.0488	0.0558	0.0529	0.0437	0.163	no	--	no	15
51A	MYTI EDU	SB	d.wt							0.24	0.25							1.51	0.901	0.175	0.577	2.89	3.86	19.3	--	26.4	24
52A	MYTI EDU	SB	d.wt									2.35	0.321	3.01	0.976	0.372	0.282	0.437	0.178	0.26	0.258	0.58	0.34	1.7	--	2.6	21
56A	MYTI EDU	SB	d.wt							0.53	0.37	1.09	0.71	1.54	0.935	1.22	0.352	0.679	0.365	0.526	0.282	0.917	0.982	4.9	--	6.1	15
57A	MYTI EDU	SB	d.wt							0.17	0.21	0.269	0.411	0.758	0.576	0.349	0.35	0.26	0.155	0.319	0.166	0.467	0.451	2.3	UY	3.1	13
63A	MYTI EDU	SB	d.wt							0.31	0.14	0.177	0.394	0.468	0.294	0.143	0.19	0.252	0.172	0.203	0.226	0.268	0.299	1.5	--	1.8	14
65A	MYTI EDU	SB	d.wt							0.1	0.15	0.104	0.312	0.328	0.124	0.119	0.134	0.148	0.118	0.136	0.0792	0.142	0.155	no	--	no	14
69A	MYTI EDU	SB	d.wt												0.106	0.0263	0.0829	0.0704	0.104	0.111	0.0773	0.161	0.107	no	--	no	16
22A	MYTI EDU	SB	d.wt										0.0529	0.0732	0.112	0.0476	0.0673	0.0657	0.0723	0.0683	0.046	0.0736	0.0288	no	--	no	13
82A	MYTI EDU	SB	d.wt				0.0508	0.11	0.17	0.08	0.12	0.0668		0.0743	0.0519	0.0787		0.0493	0.0691					no	--	no	13
84A	MYTI EDU	SB	d.wt				0.0766	0.112	0.15	0.08	0.24	0.0571		0.0657	0.0902	0.0568		0.0542	0.0433					no	--	no	15
87A	MYTI EDU	SB	d.wt				0.178		0.15	0.05	0.26	0.0462		0.0564	0.0543	0.0488		0.0439	0.0623					no	--	no	17
91A	MYTI EDU	SB	d.wt												0.0539	0.0758	0.0943							no	-?	?	<=5
92A	MYTI EDU	SB	d.wt												0.0548	0.0335	0.0521	0.0407	0.0234	0.067				no	--	no	14
98A	MYTI EDU	SB	d.wt												0.0865	0.0857				0.104	0.155	0.246	0.109	no	--	no	13
98X	MYTI EDU	SB	d.wt														0.335	0.34	0.328					1.6	-?	?	<=5
41A	MYTI EDU	SB	d.wt														0.0686	0.0635	0.064	0.0848				no	-?	?	8
43A	MYTI EDU	SB	d.wt														0.0844	0.0946		0.104				no	-?	?	<=5
44A	MYTI EDU	SB	d.wt														0.0552	0.05	0.0517	0.0592				no	-?	?	6
46A	MYTI EDU	SB	d.wt														0.0387	0.0618	0.0564					no	-?	?	10
48A	MYTI EDU	SB	d.wt														0.0726	0.0599	0.0524					no	-?	?	<=5
10A	MYTI EDU	SB	d.wt														0.0526	0.0488	0.0588	0.0617	0.0581	0.0625	0.0503	no	--	no	6
11A	MYTI EDU	SB	d.wt														0.182	0.145	0.0859	0.146				no	-?	?	13
11X	MYTI EDU	SB	d.wt																	0.0811	0.0366	0.0564	0.0667	no	-?	?	14

Annual median concentration of HG (ppm)

																									ANALYSIS		
St	Species	Tissue	Base	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	OC	TRND	SM+3	POWER
30A	MYTI EDU	SB	d.wt										0.0641	0.0533	0.0508	0.0703	0.0865	0.0574	0.07	0.0604	0.0778	0.114	0.0599	no	--	no	11
10A	MYTI EDU	SB	d.wt														0.0526	0.0488	0.0588	0.0617	0.0581	0.0625	0.0503	no	--	no	6
I022	MYTI EDU	SB	d.wt															0.13	0.134	0.321	0.404	0.415	0.182	no	--	no	16
I023	MYTI EDU	SB	d.wt															0.14	0.143	0.295	0.31	0.263	0.0944	no	--	no	17
I024	MYTI EDU	SB	d.wt															0.107	0.18	0.45	0.543	0.425	0.12	no	--	no	21
I301	MYTI EDU	SB	d.wt															0.0656	0.0682	0.0582	0.0675	0.0625	0.0408	no	--	no	8
I304	MYTI EDU	SB	d.wt															0.047	0.0694	0.0395	0.0541	0.0503	0.0294	no	--	no	11
I306	MYTI EDU	SB	d.wt															0.0447	0.0617	0.0387	0.061	0.0508	0.0355	no	--	no	11
I307	MYTI EDU	SB	d.wt															0.0383	0.0705	0.0337	0.0465	0.0542	0.0327	no	--	no	12
I711	MYTI EDU	SB	d.wt																		0.382	0.287	0.198	no	D?	?	<=5
I712	MYTI EDU	SB	d.wt																		0.181	0.257	0.214	1.1	-?	?	10
I131	MYTI EDU	SB	d.wt															0.127	0.0691	0.0601	0.144	0.0635	0.0337	no	--	no	15
I201	MYTI EDU	SB	d.wt																		0.101	0.132	0.157	no	-?	?	<=5
I205	MYTI EDU	SB	d.wt																		0.0974	0.171	0.205	1.0	-?	?	8

Annual median concentration of HG (ppm)

St	Species	Tissue	Base	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	ANALYSIS OC	TRND	SM+3	POWER
30B	GADU MOR (s	MU	w.wt				0.125	0.0894	0.0788	0.0402	0.0585	0.121	0.12	0.09	0.11	0.122	0.102	0.08	0.108	0.131	0.117	0.153	0.173	1.7	U-L	2.2	11
30B	GADU MOR (l	MU	w.wt				0.155	0.09	0.0735	0.0379	0.147	0.166	0.13	0.108	0.15	0.155	0.129	0.119	0.142	0.19	0.232	0.351	0.252	2.5	U-L	4.5	13
36B	GADU MOR (s	MU	w.wt	0.069	0.08	0.11	0.0748	0.08	0.0612	0.0317	0.0529	0.0685	0.06	0.06	0.0592	0.0674	0.0535	0.0759	0.0665	0.0885	0.0778	0.06	0.072	no	--L	no	10
36B	GADU MOR (l	MU	w.wt	0.079	0.16	0.18	0.195	0.12	0.112	0.0393	0.083	0.0739	0.115	0.1	0.08	0.0829	0.0599	0.0946	0.0695	0.157	0.088	0.186	0.075	no	--L	1.2	14
15B	GADU MOR (s	MU	w.wt										0.0648	0.04	0.026	0.018	0.045	0.0435	0.0585	0.0761	0.0435	0.023	0.0377	no	--L	no	14
15B	GADU MOR (l	MU	w.wt										0.12	0.07	0.063	0.0394	0.081	0.0455	0.0874	0.108	0.09	0.0265	0.0465	no	--L	no	15
53B	GADU MOR (s	MU	w.wt						0.223		0.105	0.16	0.184	0.204	0.36	0.0896		0.0535	0.229	0.128	0.151	0.175	0.209	2.1	---	2.7	17
53B	GADU MOR (l	MU	w.wt						0.196		0.105	0.203	0.17	0.269	0.396	0.141		0.0904	0.277	0.243	0.298	0.285	0.395	4.0	---	5.5	15
67B	GADU MOR (s	MU	w.wt							0.1	0.0847	0.0902	0.0794	0.1	0.0847	0.0925	0.12	0.0712	0.073	0.117	0.0505	0.0575	0.0735	no	---	no	11
67B	GADU MOR (l	MU	w.wt							0.17	0.0847	0.102	0.255	0.13	0.141	0.0828	0.106	0.072	0.089	0.16	0.068	0.0595	0.107	1.1	---	no	14
23B	GADU MOR (s	MU	w.wt										0.0648	0.07	0.06	0.0415	0.0515	0.069	0.0595	0.073	0.075	0.0605	0.0833	no	--L	no	9
23B	GADU MOR (l	MU	w.wt										0.17	0.11	0.0837	0.0981	0.0735	0.109	0.057	0.105	0.116	0.113	0.107	1.1	--L	1.4	11
84B	GADU MOR (s	MU	w.wt				0.0346	0.04	0.0246		0.0439													no	-?-	?	12
84B	GADU MOR (l	MU	w.wt				0.06	0.04	0.0246		0.0439													no	-?-	?	14
92B	GADU MOR (s	MU	w.wt													0.0464	0.0785	0.0795	0.077					no	-?-	?	10
92B	GADU MOR (l	MU	w.wt													0.058	0.091	0.074	0.117					1.2	-?-	?	10
98B	GADU MOR (s	MU	w.wt												0.0665	0.0543	0.069	0.0685	0.0395	0.095	0.0664	0.0465	0.0953	no	---	no	13
98B	GADU MOR (l	MU	w.wt												0.065	0.064	0.069	0.0863	0.037	0.128	0.0895	0.043	0.09	no	---	no	15
43B	GADU MOR (s	MU	w.wt														0.065	0.054	0.047					no	-?-	?	<=5
43B	GADU MOR (l	MU	w.wt														0.05	0.059	0.0568					no	-?-	?	6
10B	GADU MOR (s	MU	w.wt														0.044	0.0339	0.0285	0.011	0.0135	0.0165	0.0105	no	D-L	no	12
10B	GADU MOR (l	MU	w.wt														0.0555	0.0525	0.0395	0.02	0.019	0.032	0.015	no	--L	no	12

Annual median concentration of HG (ppm)

St	Species	Tissue	Base	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	ANALYSIS OC	TRND	SM+3	POWER
33B	PLAT FLE (s	MU	w.wt			0.11		0.09	0.0769	0.019	0.0694		0.175	0.0877	0.116	0.0918	0.0694	0.053	0.048	0.076	0.0384	0.0455	0.0495	no	---	no	16
33B	PLAT FLE (l	MU	w.wt			0.139		0.1	0.0769	0.0238	0.0694		0.195	0.135	0.196	0.103	0.088	0.049	0.06	0.087	0.0699	0.119	0.0778	no	---	1.2	16
53B	PLAT FLE (s	MU	w.wt								0.111	0.0738	0.139	0.154	0.141	0.0712		0.0352	0.165	0.13	0.165	0.249	0.289	2.9	---	5.0	15
53B	PLAT FLE (l	MU	w.wt								0.111	0.128	0.09	0.124	0.1	0.116		0.0356	0.208	0.221	0.257	0.157	0.233	2.3	---	3.3	16
67B	PLAT FLE (s	MU	w.wt																0.1		0.0426	0.0363	0.0638	no	-?-	?	15
67B	PLAT FLE (l	MU	w.wt																0.246		0.0608	0.0337	0.082	no	-?-	?	20
36F	LIMA LIM (s	MU	w.wt										0.0447	0.0707	0.066	0.0703	0.0495	0.0539	0.0487	0.0306	0.0615	0.0375	0.0563	no	--L	no	11
36F	LIMA LIM (l	MU	w.wt										0.098	0.0742	0.133	0.101	0.0756	0.0997	0.0659	0.0906	0.0915	0.0676	0.102	1.0	--L	no	10
15F	LIMA LIM (s	MU	w.wt											0.09		0.038	0.0368	0.0245	0.0374	0.0475	0.042	0.036		no	---	no	12
15F	LIMA LIM (l	MU	w.wt											0.15		0.034	0.036	0.0564	0.108	0.0727	0.0884	0.059		no	---	no	17
22F	LIMA LIM (s	MU	w.wt										0.0837	0.04	0.207		0.045	0.063						no	-?-	?	20
22F	LIMA LIM (l	MU	w.wt										0.174	0.152	0.282		0.223	0.372						3.7	-?-	?	11
30F	PLEU PLA (s	MU	w.wt												0.058		0.0275	0.0372						no	-?-	?	13
30F	PLEU PLA (l	MU	w.wt												0.035		0.0559	0.0476						no	-?-	?	10
22F	PLEU PLA (s	MU	w.wt																0.0287	0.0431	0.0495			no	-?-	?	7
22F	PLEU PLA (l	MU	w.wt																0.0506	0.0505	0.0827			no	-?-	?	9
98F	PLEU PLA (s	MU	w.wt													0.017		0.0475		0.0384	0.0292	0.049	0.0579	no	---	1.0	13
98F	PLEU PLA (l	MU	w.wt													0.025		0.0751		0.0259	0.0588	0.049	0.164	1.6	---	3.0	18
10F	PLEU PLA (s	MU	w.wt																	0.032		0.014	0.029	no	-?-	?	18
10F	PLEU PLA (l	MU	w.wt																	0.0415		0.0339	0.031	no	D?-	?	<=5
67B	LEPI WHI (s	MU	w.wt			0.235				0.35	0.329	0.21	0.343	0.0748	0.174	0.187	0.305	0.364	0.398	0.172	0.0663	0.11	0.104	m	--L	m	16
67B	LEPI WHI (l	MU	w.wt			0.499				0.35	0.329	0.32	0.589	0.147	0.327	0.336	0.422	0.341	0.372	0.331	0.275	0.392	0.33	m	--L	m	13

Annual median concentration of PB (ppm)

																								ANALYSIS			
St	Species	Tissue	Base	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	OC	TRND	SM+3	POWER
30A	MYTI EDU	SB	d.wt										1.9	1.4	4	2.3	2.5	1.6	2.1	2.7	37	2.1	1.7	no	--	1.0	25
31A	MYTI EDU	SB	d.wt										1.4	1.2	1.3	1	1.4	1.7	1.8	0.73	1.5	0.63	0.63	no	--	no	12
35A	MYTI EDU	SB	d.wt										1.4	1.1	1.7	1.2	1.3	0.51	0.63	0.66	0.76	0.71	0.52	no	D-	no	11
36A	MYTI EDU	SB	d.wt										1	0.85	0.79	1.1	1.4	1.2	2	2.2	1.6	1	0.94	no	UY	no	10
71A	MYTI EDU	SB	d.wt										1.2	0.74	1.7	1.4	1.9	1.5	2.2	2.8	0.87	0.9	0.77	no	--	no	13
76A	MYTI EDU	SB	d.wt										1.8	0.97	1.5	0.91			0.8	1.8	1.2	2	0.6	no	--	no	15
15A	MYTI EDU	SB	d.wt										1.5	0.78		0.98	1.1	0.52	0.67	1.1	1.3	1.7	2.2	no	UY	1.2	11
51A	MYTI EDU	SB	d.wt															150	60	17	30	37	92	30.6	--	59.0	22
52A	MYTI EDU	SB	d.wt										12	310	190	66	16	18	9.8	21	15	12	11	3.7	--	3.0	25
56A	MYTI EDU	SB	d.wt										21	23	120	110	25	46	28	37	16	30	28	9.5	--	7.3	19
57A	MYTI EDU	SB	d.wt										11	12	33	19	15	13	5.6	14	6.1	10	10	3.4	--	3.3	15
63A	MYTI EDU	SB	d.wt										12	10	15	11	7.2	12	7.6	6.1	6.4	4.8	4.5	1.5	D-	no	10
65A	MYTI EDU	SB	d.wt										5.6	3.8	5.2	6.5	3.3	4.7	2.4	3	1.8	1.6	2.4	no	D-	no	12
69A	MYTI EDU	SB	d.wt												4.6	3.4	2.8	3.2	4	3.7	2	3.4	2.3	no	--	no	11
22A	MYTI EDU	SB	d.wt										1.4	1.5	2.8	1.9	1.4	1.2	1.5	1.4	1.2	1.7	1.3	no	--	no	11
82A	MYTI EDU	SB	d.wt											1.3	0.93	0.92		0.62	0.67					no	D?	?	7
84A	MYTI EDU	SB	d.wt											1	1.2	1.4		1.4	0.83					no	-?	?	11
87A	MYTI EDU	SB	d.wt											0.97	0.87	0.63		1.4	2.5					no	-?	?	14
91A	MYTI EDU	SB	d.wt												0.9	1.5	2							no	-?	?	6
92A	MYTI EDU	SB	d.wt												0.93	0.63	1.1	0.66	0.65	2.2				no	--	1.4	16
98A	MYTI EDU	SB	d.wt												1.9	1.8				1.5	2.4	1.6	1.5	no	--	no	9
98X	MYTI EDU	SB	d.wt														4.3	3.1	4.1					1.4	-?	?	11
41A	MYTI EDU	SB	d.wt														1.3	0.9	0.79	0.65				no	D?	?	6
43A	MYTI EDU	SB	d.wt														1.6	1.5		0.85				no	-?	?	8
44A	MYTI EDU	SB	d.wt														2.8	2.6	1.7	1.2				no	D?	?	7
46A	MYTI EDU	SB	d.wt														1.3	1.6	1.4					no	-?	?	8
48A	MYTI EDU	SB	d.wt														0.68	1.1	0.33					no	-?	?	19
10A	MYTI EDU	SB	d.wt														1.9	2.8	0.74	0.81	2.3	1.6	1.4	no	--	no	17
11A	MYTI EDU	SB	d.wt														1.5	1.5	0.34	0.37				no	-?	?	16
11X	MYTI EDU	SB	d.wt																	0.74	0.52	0.31	1.1	no	-?	?	19

Annual median concentration of PB (ppm)

																									ANALYSIS		
St	Species	Tissue	Base	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	OC	TRND	SM+3	POWER
30A	MYTI EDU	SB	d.wt										1.9	1.4	4	2.3	2.5	1.6	2.1	2.7	37	2.1	1.7	no	--	1.0	25
10A	MYTI EDU	SB	d.wt														1.9	2.8	0.74	0.81	2.3	1.6	1.4	no	--	no	17
I022	MYTI EDU	SB	d.wt															1	0.6	1.2	1.3	1.9	1	no	--	no	13
I023	MYTI EDU	SB	d.wt															0.77	1.3	1.4	1.7	1.4	0.64	no	--	no	14
I024	MYTI EDU	SB	d.wt															0.97	1.1	1.2	1.7	1.8	0.62	no	--	no	15
I301	MYTI EDU	SB	d.wt																		2.5	2.1	1.3	no	-?	?	7
I304	MYTI EDU	SB	d.wt																		2.2	1.2	0.76	no	-?	?	6
I306	MYTI EDU	SB	d.wt																		1.3	0.68	0.54	no	-?	?	9
I307	MYTI EDU	SB	d.wt																		1	0.8	0.51	no	-?	?	6
I201	MYTI EDU	SB	d.wt															3.5	4.4	4.8	4.7	4.4	6.4	2.1	U-	2.9	7
I205	MYTI EDU	SB	d.wt															4.8		7	4	6	7.1	2.4	-?	?	11
51A	MYTI EDU	SB	d.wt															150	60	17	30	37	92	30.6	--	59.0	22
52A	MYTI EDU	SB	d.wt										12	310	190	66	16	18	9.8	21	15	12	11	3.7	--	3.0	25
I962	MYTI EDU	SB	d.wt															4.4	5.3	3.5	3			no	-?	?	9
I969	MYTI EDU	SB	d.wt															2.5	2.1	1.6	2.9	5.1	3	1.0	--	1.3	13

Annual median concentration of PB (ppm)

																									ANALYSIS		
St	Species	Tissue	Base	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	OC	TRND	SM+3	POWER
30B	GADU MOR	LI	w.wt										0.2	0.11	0.25	0.1	0.12	0.11	0.06	0.1	0.16	0.85	0.24	2.4	--	7.6	18
36B	GADU MOR	LI	w.wt										0.11	0.05	0.03	0.02	0.03	0.02	0.03	0.04	0.03	0.04	0.04	no	DY	no	11
15B	GADU MOR	LI	w.wt										0.17	0.06	0.03	0.03	0.03	0.02	0.03	0.04	0.03	0.03	0.04	no	DY	no	12
53B	GADU MOR	LI	w.wt										0.19	0.26	0.14	0.03		0.02	0.075	0.07	0.1	0.11	0.13	1.3	--	2.3	18
67B	GADU MOR	LI	w.wt										0.13	0.18	0.03	0.075	0.09	0.04	0.04	0.09	0.03	0.04	0.04	no	--	no	18
23B	GADU MOR	LI	w.wt										0.06	0.08	0.03	0.03	0.03	0.02	0.03	0.04	0.03	0.04	0.03	no	--	no	11
92B	GADU MOR	LI	w.wt													0.02	0.03	0.03	0.04					no	-?	?	7
98B	GADU MOR	LI	w.wt												0.03	0.03	0.03	0.04	0.04	0.05	0.03	0.03	0.04	no	--	no	9
43B	GADU MOR	LI	w.wt														0.03	0.03	0.03					no	-?	?	<=5
10B	GADU MOR	LI	w.wt														0.03	0.02	0.04	0.04	0.04	0.03	0.04	no	--	no	11

Annual median concentration of PB (ppm)

St	Species	Tissue	Base	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	ANALYSIS OC	TRND	SM+3	POWER
33B	PLAT FLE	LI	w.wt										0.24	0.35	0.06	0.03	0.03	0.02	0.03	0.04	0.04	0.04	0.04	no	DY	no	15
53B	PLAT FLE	LI	w.wt										0.71	0.81	0.41	0.23		0.024	0.46	0.35	0.52	0.46	0.36	1.2	--	2.6	24
67B	PLAT FLE	LI	w.wt																0.35		0.03	0.03	0.03	no	-?	?	20
36F	LIMA LIM	LI	w.wt										0.6	0.07	0.04	0.07	0.03	0.02	0.03	0.05	0.05	0.05	0.06	no	DY	no	17
15F	LIMA LIM	LI	w.wt											0.07		0.041	0.03	0.02	0.03	0.05	0.04	0.035		no	--	no	12
22F	LIMA LIM	LI	w.wt										0.25	0.16	0.042		0.06	0.07						no	-?	?	18
98F	LIMA LIM	LI	w.wt														0.02	0.04	0.03					no	-?	?	14
30F	PLEU PLA	LI	w.wt												0.74		0.54	0.57						2.8	-?	?	7
22F	PLEU PLA	LI	w.wt																0.28	0.28	0.46			2.3	-?	?	9
98F	PLEU PLA	LI	w.wt													0.03		0.31		0.05	0.04	0.22	0.1	no	--	1.2	25
10F	PLEU PLA	LI	w.wt																	0.15		0.065	0.08	no	-?	?	13
67B	LEPI WHI	LI	w.wt										0.19	0.07	0.06	0.07	0.04	0.07	0.03	0.04	0.04	0.03	0.03	m	D-	m	12

Annual median concentration of CB_S7 (ppb)

																								ANALYSIS			
St	Species	Tissue	Base	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	OC	TRND	SM+3	POWER
30A	MYTI EDU	SB	d.wt								77.5	96.5	116	89.6	97		89.3	90.4	110	128	58.5	71.1	49.9	2.5	--	1.1	10
31A	MYTI EDU	SB	d.wt								21.7	24.9	37.1	24.7	34.6		52.2	49	63.8	24.6	12.9	18	6.49	no	DY	no	13
35A	MYTI EDU	SB	d.wt								21.5	33.6	27.5	14.2	22.1		13.4	13.6	10.7	16.5	12.5	14.6	5.52	no	D-	no	13
36A	MYTI EDU	SB	d.wt								11	17.9	19.3	7.94	11.2		5.69	10.5	12.3	12.7	8.62	12.1	5.28	no	--	no	13
71A	MYTI EDU	SB	d.wt								17	34.4	25	14.2	15.3		16.5	10.5		9.27	11.8	13.6	8.52	no	--	no	12
76A	MYTI EDU	SB	d.wt										16.6	6.49	7.21				16.3	19.1	14.4	16.4	6.34	no	--	no	16
15A	MYTI EDU	SB	d.wt										11.8				6.29	3.06	2.41	3.88	4.72	5.28	2.56	no	--	no	14
51A	MYTI EDU	SB	d.wt															26.2	9.69	14.7	10.5	11.5	12	no	--	no	13
52A	MYTI EDU	SB	d.wt									40.2	14.9		11.3	11.3	17.1	16.9	10	19	10.6	11.2	7.19	no	--	no	13
56A	MYTI EDU	SB	d.wt								12.5	45.8	37.7	12.1	12	9.41	13.8	11.9		16.8	9.55	11.2	5.98	no	--	no	16
57A	MYTI EDU	SB	d.wt									28		7.63	7.55	4.74	8.38	6.54	4.18	8.41	10.3	8.16	3.89	no	--	no	15
63A	MYTI EDU	SB	d.wt									21.8		9.71	6.45	3.68	5.7	5.72		4.15	7.95	7.26	4.09	no	--	no	13
65A	MYTI EDU	SB	d.wt								6.05	11.1	33.4	9.29	5.59	3.69	5.55	3.37	5.19	3.76	7.62	6.44	3	no	--	no	17
69A	MYTI EDU	SB	d.wt												4.82		4.97	4.51	2.77	5.41	12.6	5.83	2.53	no	--	no	17
22A	MYTI EDU	SB	d.wt										18.9	8.23	8.61		7.97	6.84	5.19	4.69	11.5	6.01	5.14	no	--	no	13
84A	MYTI EDU	SB	d.wt								5.25	20.5		5.05	8.44			3.6	6.37					no	--	no	18
92A	MYTI EDU	SB	d.wt												4.46	2.49	5.83	4.05	2.89	7.74				no	--	no	15
98A	MYTI EDU	SB	d.wt												20.5	5.68				10.7	8.4	4.14	3.54	no	--	no	17
98X	MYTI EDU	SB	d.wt														87.3	78.4	46.4					2.3	-?	?	9
41A	MYTI EDU	SB	d.wt														3.49	4.26	2.39	2.58				no	-?	?	10
43A	MYTI EDU	SB	d.wt														2.92	3.1		3.02				no	-?	?	<=5
44A	MYTI EDU	SB	d.wt															7.31	8.46	29.4				1.5	-?	?	15
46A	MYTI EDU	SB	d.wt														5.74	4.16	3.11					no	D?	?	<=5
48A	MYTI EDU	SB	d.wt														6.22	4.04	3.1					no	-?	?	6
10A	MYTI EDU	SB	d.wt														6.03	4.29	4.66	6.29		5.11	4.33	no	--	no	9
11A	MYTI EDU	SB	d.wt														7.48	6.92	4.32	5.75				no	-?	?	10
11X	MYTI EDU	SB	d.wt																	3.34	3.56	4.48	2.79	no	-?	?	10

Annual median concentration of CB_S7 (ppb)

St	Species	Tissue	Base	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	ANALYSIS OC	TRND	SM+3	POWER
I022	MYTI EDU	SB	d.wt															32	26	41	22	29	19	no	--	no	11
I023	MYTI EDU	SB	d.wt															20	21	26	15	22	11	no	--	no	12
I024	MYTI EDU	SB	d.wt															32	36	46	37	29	17	no	--	no	12
30A	MYTI EDU	SB	d.wt								77.5	96.5	116	89.6	97		89.3	90.4	110	128	58.5	71.1	49.9	2.5	--	1.1	10
I301	MYTI EDU	SB	d.wt															120	110	180	86	130	59	2.9	--	1.7	13
I304	MYTI EDU	SB	d.wt															35	24	44	36		20	no	-?	?	13
I306	MYTI EDU	SB	d.wt															16	16	54	26		22	1.1	-?	?	17
I307	MYTI EDU	SB	d.wt															21	29	40	17		20	1.0	-?	?	13
71A	MYTI EDU	SB	d.wt								17	34.4	25	14.2	15.3		16.5	10.5		9.27	11.8	13.6	8.52	no	--	no	12
I711	MYTI EDU	SB	d.wt															25	13	13	21	22	18	no	--	no	12
I712	MYTI EDU	SB	d.wt															33	31	25	22	25	14	no	D-	no	8
I131	MYTI EDU	SB	d.wt															7.9	12	13	22	13	10	no	--	no	13
I132	MYTI EDU	SB	d.wt															27	34	32	31	23	10	no	--	no	13
I133	MYTI EDU	SB	d.wt															23	22	22	25	23	10	no	--	no	11
51A	MYTI EDU	SB	d.wt															26.2	9.69	14.7	10.5	11.5	12	no	--	no	13
52A	MYTI EDU	SB	d.wt									40.2	14.9		11.3	11.3	17.1	16.9	10	19	10.6	11.2	7.19	no	--	no	13
I241	MYTI EDU	SB	d.wt															54	79	47	55	81	56	2.8	--	3.2	11
I242	MYTI EDU	SB	d.wt															63	82	30	46	60	37	1.8	--	1.5	13
I243	MYTI EDU	SB	d.wt															120	170	120	78	92	48	2.4	D-	no	11

Annual median concentration of CB_S7 (ppb)

																									ANALYSIS		
St	Species	Tissue	Base	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	OC	TRND	SM+3	POWER
30B	GADU MOR	LI	w.wt										1240	3430	2800	2500	2910	2350	2790	3240	3660	3520	2080	4.2	--	5.0	12
36B	GADU MOR	LI	w.wt										441	344	396	636	376	1650	974	720	735	766	482	no	--	no	14
15B	GADU MOR	LI	w.wt										182	349	266	182	295	307	274	399	279	257	153	no	--	no	11
53B	GADU MOR	LI	w.wt										435	524	1760	166		162	701	576	2370	487	1520	3.0	--	4.5	24
67B	GADU MOR	LI	w.wt										316	293	268	226	329	209	269	627	206	273	148	no	--	no	13
23B	GADU MOR	LI	w.wt										222	244	228	208	128	193	196	125	179	229	207	no	--	no	10
92B	GADU MOR	LI	w.wt													135	152	311	369					no	U?	?	9
98B	GADU MOR	LI	w.wt												239	183	114	197	278	372	165	147	131	no	--	no	13
43B	GADU MOR	LI	w.wt														325	329	140					no	-?	?	13
10B	GADU MOR	LI	w.wt														645	485	210	189	168	255	99.4	no	D-	no	13
30B	GADU MOR	MU	w.wt										3.58	11.1	24.7	9.65	3.94	3.12	8.46	11.8	21.7	21.4	6.05	1.2	--	3.3	21
36B	GADU MOR	MU	w.wt										1.61	1.28	2	3.65	0.525	15.6	4.14	4.53	3.77	2.86	2.26	no	--	no	23
15B	GADU MOR	MU	w.wt										1.35	1.22	1.38	0.65	0.38	1.02	1.13	1.44	1.41	0.81	1.42	no	--	no	14
53B	GADU MOR	MU	w.wt										8.2	2.23	15	1.1		0.37	21.9	3.76	138	6.61	36.3	7.3	--	14.4	>25
67B	GADU MOR	MU	w.wt										0.835	1.43	1.1	0.624	1.15	0.605	3.49	7.07	0.73	1.72	1.18	no	--	no	21
23B	GADU MOR	MU	w.wt										0.64	2.25	0.75	0.85	0.18	0.625	0.46	0.81	1.49	0.95	0.45	no	--	no	19
92B	GADU MOR	MU	w.wt													0.55	0.225	0.36	0.905					no	-?	?	19
98B	GADU MOR	MU	w.wt												0.9	0.9	0.135	0.34	0.475	1.4	0.44	0.585	2.02	no	--	no	21
43B	GADU MOR	MU	w.wt														0.515	0.815	0.39					no	-?	?	16
10B	GADU MOR	MU	w.wt														1.76	2.48	0.367	0.9	0.79	1.39	0.5	no	--	no	20

Annual median concentration of CB_S7 (ppb)

																								ANALYSIS			
St	Species	Tissue	Base	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	OC	TRND	SM+3	POWER
33B	PLAT FLE	LI	w.wt										36	31.1	97.5	69	57	86	38.3	40.4	30.5	47.2	90.7	no	--	no	14
53B	PLAT FLE	LI	w.wt										509	517	309	36		22.8	115	113	111	156	95.8	no	--	1.8	21
67B	PLAT FLE	LI	w.wt																70		96.9	45.8	44	no	-?	?	13
33B	PLAT FLE	MU	w.wt										2.04	3.96	1.8	0.95	0.51	1.37	1.37	0.995	0.85	5.32	1.14	no	--	no	19
53B	PLAT FLE	MU	w.wt										27.4	33.2	14.2	1.45		0.757	3.19	2.74	2.19	2.73	3	no	D-	no	21
67B	PLAT FLE	MU	w.wt																0.775		1.8	1.66	1.48	no	-?	?	12
36F	LIMA LIM	LI	w.wt										301	217	339	418	404	433	386	387	236	412	838	1.7	--	1.5	12
15F	LIMA LIM	LI	w.wt											124		58.2	77	74	62.5	64.4	51.1	69.6		no	--	no	10
22F	LIMA LIM	LI	w.wt										170	127	140		60	88.7						no	-?	?	11
36F	LIMA LIM	MU	w.wt										2.76	7.05	5.6	7.8	5.9	8.18	9.62	5.18	9.41	3.88	8.38	no	--	no	13
15F	LIMA LIM	MU	w.wt											3.72		0.806	0.369	1.13	1.81	1.28	1.41	0.959		no	--	no	20
22F	LIMA LIM	MU	w.wt										1.97	5	3.82		1.24	5.14						no	-?	?	20
98F	LIMA LIM	MU	w.wt														0.845	1.34	3.3					no	-?	?	9
30F	PLEU PLA	LI	w.wt												313		207	216						4.3	-?	?	8
22F	PLEU PLA	LI	w.wt																21	20.1	14.5			no	-?	?	7
98F	PLEU PLA	LI	w.wt													9.38		37.5		27.8	24.1	24.7	40.8	no	--	1.3	15
10F	PLEU PLA	LI	w.wt																	42.1		62.8	45	no	-?	?	11
30F	PLEU PLA	MU	w.wt												6.82		3.01	1.45						no	-?	?	9
22F	PLEU PLA	MU	w.wt																1.39	0.95	3.33			1.7	-?	?	19
98F	PLEU PLA	MU	w.wt													0.45		2.51		0.581	0.83	0.435	1.54	no	--	1.2	21
10F	PLEU PLA	MU	w.wt																	0.97		2.58	1.78	no	-?	?	15
67B	LEPI WHI	LI	w.wt										111	100	143	101	172	166	97.2	91.5	118	82.3	83.8	m	--	m	10
67B	LEPI WHI	MU	w.wt										0.84	0.935	1.4	0.55	0.48	1.45	0.445	0.68	0.42	1.03	0.82	m	--	m	16

Annual median concentration of DDEPP (ppb)

																								ANALYSIS		
St	Species	Tissue	Base	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	OC	TRND	SM+3	POWER
30A	MYTI EDU	SB	d.wt												5.2	3.9	7.1	5.7	2.6	5.9	3.9	5.9	3.5	no	--	no	14
31A	MYTI EDU	SB	d.wt												3.3	1.9	3.4	1.8	0.5	3.4	3.5	5.5	1.2	no	--	no	22
35A	MYTI EDU	SB	d.wt												4.9	2.1	3.1	2.8	0.57	3.9	3.7	5.9	1.6	no	--	no	21
36A	MYTI EDU	SB	d.wt												2.8	1.1	1	1.8	0.44	2.1	1.8	3	1.5	no	--	no	18
71A	MYTI EDU	SB	d.wt												2.6	1.6	3.2	1.3	0.74	1	2.2	2.4	2.3	no	--	no	15
76A	MYTI EDU	SB	d.wt												1.4	0.79			0.36	1.2	2.3	2.5	0.78	no	--	no	21
15A	MYTI EDU	SB	d.wt													0.98	1.7	0.73	0.29	1	1.4	2.1	0.54	no	--	no	20
51A	MYTI EDU	SB	d.wt															34	6.7	15	17	13	17	1.7	--	1.5	17
52A	MYTI EDU	SB	d.wt												12	25	19	18	9.5	13	17	14	12	1.2	--	1.3	12
56A	MYTI EDU	SB	d.wt												50	48	110	41	34	72	53	40	26	2.6	--	1.9	15
57A	MYTI EDU	SB	d.wt												26	18	35	25	16	50	83	35	27	2.7	--	4.4	17
63A	MYTI EDU	SB	d.wt												13	9.3	9.7	8.4	5.5	13	16	11	10	1.0	--	1.5	12
65A	MYTI EDU	SB	d.wt												7.6	5.2	7.8	4.1	5	6.9	12	7.4	6.8	no	--	no	12
69A	MYTI EDU	SB	d.wt												3.6	3.2	3.5	2.9	0.4	3.7	6.5	2.6	2.7	no	--	no	23
22A	MYTI EDU	SB	d.wt												2.2	1.3	1.9	1.5	0.39	1.4	5.1	2	1.5	no	--	no	20
84A	MYTI EDU	SB	d.wt												3.1	2.2		0.99	0.74					no	D?	?	<=5
92A	MYTI EDU	SB	d.wt												0.68	2.1	1.4	0.77	0.28	1.9				no	--	no	22
98A	MYTI EDU	SB	d.wt												5.8	2.3				1.6	1.9	0.87	0.57	no	D-	no	13
98X	MYTI EDU	SB	d.wt														32	23	5.2					no	-?	?	15
41A	MYTI EDU	SB	d.wt														0.62	0.42	0.29	0.61				no	-?	?	15
44A	MYTI EDU	SB	d.wt															0.49	0.34	1.4				no	-?	?	20
46A	MYTI EDU	SB	d.wt														1	0.76	0.27					no	-?	?	11
48A	MYTI EDU	SB	d.wt														1.7	1.1	0.29					no	-?	?	14
10A	MYTI EDU	SB	d.wt														0.85	0.78	0.44	1.5		1.5	0.61	no	--	no	17
11A	MYTI EDU	SB	d.wt														1.3	1.9	0.41	1.2				no	-?	?	21
11X	MYTI EDU	SB	d.wt																	0.81	1	1	0.77	no	-?	?	9

Annual median concentration of DDEPP (ppb)

																								ANALYSIS			
St	Species	Tissue	Base	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	OC	TRND	SM+3	POWER
I022	MYTI EDU	SB	d.wt															3.9	1.4	7.1	4.6	8	4.9	no	--	no	18
I023	MYTI EDU	SB	d.wt															1.8	1.3	3.8	2.3	6.1	2.4	no	--	no	16
I024	MYTI EDU	SB	d.wt															3.5	3.5	8.9	7.2	9	4.9	no	--	no	14
30A	MYTI EDU	SB	d.wt												5.2	3.9	7.1	5.7	2.6	5.9	3.9	5.9	3.5	no	--	no	14
I301	MYTI EDU	SB	d.wt															2.6	3.7	18	6	7.5	5.6	no	--	no	19
I304	MYTI EDU	SB	d.wt															2.1	0.75	3.4	3.9		2	no	-?	?	20
I306	MYTI EDU	SB	d.wt															1.8	0.45	4.3	3.3		2.4	no	-?	?	23
I307	MYTI EDU	SB	d.wt															2.2	1	3.4	2.7		2.1	no	-?	?	16
71A	MYTI EDU	SB	d.wt												2.6	1.6	3.2	1.3	0.74	1	2.2	2.4	2.3	no	--	no	15
I711	MYTI EDU	SB	d.wt															3.5	0.72	1.5	2.2	2.2	3.8	no	--	no	18
I712	MYTI EDU	SB	d.wt															2.4	1.3	3.1	3.1	3.5	3.5	no	--	no	12
I131	MYTI EDU	SB	d.wt															1.5	0.69	1.9	2.1	1.7	1.1	no	--	no	15
I132	MYTI EDU	SB	d.wt															1.9	1.4	2.2	2	2.1	1.2	no	--	no	11
I133	MYTI EDU	SB	d.wt															2.2	0.88	1.6	1.9	2.7	1.2	no	--	no	15
51A	MYTI EDU	SB	d.wt															34	6.7	15	17	13	17	1.7	--	1.5	17
52A	MYTI EDU	SB	d.wt												12	25	19	18	9.5	13	17	14	12	1.2	--	1.3	12
I241	MYTI EDU	SB	d.wt															6.4	6.2	2.3	6.5	5.6	4.5	no	--	no	15
I242	MYTI EDU	SB	d.wt															6.5	9.7	1.6	3.5	9.5	3.5	no	--	no	21
I243	MYTI EDU	SB	d.wt															7.5	6.1	1.7	5.4	5.1	4	no	--	no	17

Annual median concentration of DDEPP (ppb)

																								ANALYSIS		
St	Species	Tissue	Base	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	OC	TRND	SM+3	POWER
30B	GADU MOR	LI	w.wt										160	440	180	160	190	190	310	380	260	230	160	no	--	no	13
36B	GADU MOR	LI	w.wt										92	51	50	75	55	110	140	130	45	86	47	no	--	no	14
15B	GADU MOR	LI	w.wt										50	140	48	57	86	33	75	140	72	76	46	no	--	no	16
53B	GADU MOR	LI	w.wt										640	810	940	85		42	490	940	490	160	380	1.9	--	1.9	>25
67B	GADU MOR	LI	w.wt										780	550	350	390	470	110	460	2100	270	200	180	no	--	no	22
23B	GADU MOR	LI	w.wt										68	85	42	41	35	31	49	33	49	48	59	no	DY	no	10
92B	GADU MOR	LI	w.wt													53	50	50	200					no	-?	?	17
98B	GADU MOR	LI	w.wt												73	83	43	49	140	200	78	41	58	no	--	no	17
43B	GADU MOR	LI	w.wt														130	69	60					no	-?	?	9
10B	GADU MOR	LI	w.wt														210	71	75	99	65	90	32	no	--	no	15
30B	GADU MOR	MU	w.wt										0.45	1.2	2	1	0.32	0.29	0.97	1	1.5	1.5	0.44	no	--	no	20
36B	GADU MOR	MU	w.wt										0.34	0.29	0.2	0.5	0.09	0.93	0.58	0.88	0.31	0.32	0.17	no	--	no	20
15B	GADU MOR	MU	w.wt										0.47	0.36	0.35	0.2	0.12	0.26	0.35	0.51	0.23	0.32	0.31	no	--	no	13
53B	GADU MOR	MU	w.wt										2.4	2.2	6.7	1.8		0.08	4.1	4.6	4.6	3.2	2.5	2.5	--	5.9	>25
67B	GADU MOR	MU	w.wt										2.2	3	1.4	1	2.5	1.1	7	19	1	1.1	1.1	1.1	--	no	24
23B	GADU MOR	MU	w.wt										0.21	0.59	0.1	0.2	0.04	0.16	0.14	0.18	0.14	0.18	0.12	no	--	no	19
92B	GADU MOR	MU	w.wt													0.1	0.09	0.17	0.49					no	-?	?	14
98B	GADU MOR	MU	w.wt												0.4	0.4	0.06	0.05	0.24	0.6	0.18	0.15	0.4	no	--	no	24
43B	GADU MOR	MU	w.wt														0.23	0.23	0.14					no	-?	?	9
10B	GADU MOR	MU	w.wt														0.74	0.68	0.12	0.4	0.26	0.41	0.15	no	--	no	19

Annual median concentration of DDEPP (ppb)

St	Species	Tissue	Base	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	ANALYSIS OC	TRND	SM+3	POWER
33B	PLAT FLE	LI	w.wt										13	9.1	24	14	13	7	10	9.7	8.6	6.8	27	no	--	no	15
53B	PLAT FLE	LI	w.wt										94	70	32	41		8	25	45	38	44	18	no	--	1.1	18
67B	PLAT FLE	LI	w.wt																27		84	40	35	1.2	-?	?	18
36F	LIMA LIM	LI	w.wt										28	34	28	21	50	40	40	22	18	52	45	no	--	no	14
15F	LIMA LIM	LI	w.wt											39		13	23	9	21	20	13	32		no	--	no	16
22F	LIMA LIM	LI	w.wt										69	48	40		21	9.2						no	D?	?	10
30F	PLEU PLA	LI	w.wt												21		13	12						1.2	-?	?	6
22F	PLEU PLA	LI	w.wt																7.8	12	2.8			no	-?	?	21
98F	PLEU PLA	LI	w.wt													3		8		15	6.2	7.8	11	1.1	--	1.8	16
10F	PLEU PLA	LI	w.wt																	15		35	28	2.8	-?	?	13
67B	LEPI WHI	LI	w.wt										290	240	180	160	250	140	140	170	160	160	130	m	--	m	9

Annual median concentration of HCHG (ppb)

St	Species	Tissue	Base	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	OC	ANALYSIS TRND	SM+3	POWER
30A	MYTI EDU	SB	d.wt										2	3.6	1.5	1.6	1.7	1.5	0.65	1.6	1.8	1.2	0.84	no	--	no	14
31A	MYTI EDU	SB	d.wt										2	3.7	2.2	1.4	1.4	0.78	0.66	2.7	1.2	0.94	0.69	no	--	no	16
35A	MYTI EDU	SB	d.wt										2.7	4.1	2.3	1.5	1.6	1.1	0.84	4.5	1	0.67	1.3	no	--	no	18
36A	MYTI EDU	SB	d.wt										3.6	5.5	2.8	1.6	0.77	1.3	0.56	2.9	2	1.7	0.91	no	--	no	17
71A	MYTI EDU	SB	d.wt										2.1	4.8	2	2.1	0.96	0.79	0.48	1	1.9	1.1	0.94	no	--	no	16
76A	MYTI EDU	SB	d.wt										1.6	2.2	1.4	2.4			0.61	1.7	2.4	1.2	0.94	no	--	no	16
15A	MYTI EDU	SB	d.wt										1.7			2	1.1	1.1	0.37	2	2.3	1.4	0.6	no	--	no	19
51A	MYTI EDU	SB	d.wt															1.7	1.1	1.2	2.3	1.1	0.92	no	--	no	13
52A	MYTI EDU	SB	d.wt										1		0.94	1.1	1.3	1.3	2.6	1.2	2.2	1.1	1	no	--	no	12
56A	MYTI EDU	SB	d.wt										1.8	2.4	0.93	1	1.2	1.2	1.7	1.3	2.3	1	0.73	no	--	no	13
57A	MYTI EDU	SB	d.wt											2.3	1.4	0.79	0.86	1	2.5	1	3.6	1	0.73	no	--	no	17
63A	MYTI EDU	SB	d.wt											2.9	1.5	0.71	0.98	0.86	1.3	0.78	2.8	1.1	0.77	no	--	no	16
65A	MYTI EDU	SB	d.wt										2.2	2.6	1.3	0.74	1.2	0.65	2.9	1	2.9	1.1	0.82	no	--	no	17
69A	MYTI EDU	SB	d.wt												1.6	1.1	0.94	0.65	0.36	1.3	3.1	0.79	0.89	no	--	no	19
22A	MYTI EDU	SB	d.wt										0.8	1.9	1.7	1.3	1.1	1	0.58	1.2	2.3	0.8	1.1	no	--	no	15
84A	MYTI EDU	SB	d.wt											1.5	0.63	1.1		0.79	0.52					no	-?	?	13
92A	MYTI EDU	SB	d.wt												0.68	0.84	0.99	0.77	0.41	0.86				no	--	no	13
98A	MYTI EDU	SB	d.wt												0.62	0.57				0.6	1.2	0.75	0.57	no	--	no	12
98X	MYTI EDU	SB	d.wt														1.5	0.64	0.42					no	-?	?	8
41A	MYTI EDU	SB	d.wt														0.68	0.53	0.29	0.43				no	-?	?	12
43A	MYTI EDU	SB	d.wt														0.52	0.41		0.45				no	-?	?	8
44A	MYTI EDU	SB	d.wt															0.54	0.29	0.64				no	-?	?	18
46A	MYTI EDU	SB	d.wt														0.44	0.47	0.33					no	-?	?	8
48A	MYTI EDU	SB	d.wt														0.34	0.48	0.33					no	-?	?	12
10A	MYTI EDU	SB	d.wt														0.52	0.54	0.44	0.4		1.1	0.5	no	--	no	13
11A	MYTI EDU	SB	d.wt														0.44	0.51	0.34	0.46				no	-?	?	10
11X	MYTI EDU	SB	d.wt																	0.34	0.99	1.2	0.73	no	-?	?	17

Annual median concentration of HCHG (ppb)

																								ANALYSIS			
St	Species	Tissue	Base	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	OC	TRND	SM+3	POWER
30A	MYTI EDU	SB	d.wt						15	23		220	2	3.6	1.5	1.6	1.7	1.5	0.65	1.6	1.8	1.2	0.84	no	D-	no	>25
10A	MYTI EDU	SB	d.wt														0.52	0.54	0.44	0.4		1.1	0.5	no	--	no	13
I022	MYTI EDU	SB	d.wt															1.6	1.1	2.3	1	0.93	0.87	no	--	no	13
I023	MYTI EDU	SB	d.wt															1.2	0.96	2.3	0.86	1.3	1.2	no	--	no	14
I024	MYTI EDU	SB	d.wt															1.7	1.4	1.9	1.1	0.94	0.93	no	D-	no	9
I301	MYTI EDU	SB	d.wt															0.98	1.2	2.4	2.6	1.9	1.1	no	--	no	15
I304	MYTI EDU	SB	d.wt															1.1	0.87	2.5	2.5		0.94	no	-?	?	18
I306	MYTI EDU	SB	d.wt															1.4	0.68	3.3	2.3		0.89	no	-?	?	20
I307	MYTI EDU	SB	d.wt															1.6	1	2.8	2.2		0.85	no	-?	?	17
I711	MYTI EDU	SB	d.wt															1.5	0.72	0.88	1	1.1	1	no	--	no	11
I712	MYTI EDU	SB	d.wt															1	1	1.8	1.7	1.1	0.85	no	--	no	13
I131	MYTI EDU	SB	d.wt															0.91	1.1	2.3	2.2	0.73	1.1	no	--	no	16
I132	MYTI EDU	SB	d.wt															4	6.9	2.1	3.4	1	0.85	no	D-	no	16
I133	MYTI EDU	SB	d.wt															2.9	4.4	1.4	1.9	1	1	no	D-	no	13
51A	MYTI EDU	SB	d.wt															1.7	1.1	1.2	2.3	1.1	0.92	no	--	no	13
52A	MYTI EDU	SB	d.wt										1		0.94	1.1	1.3	1.3	2.6	1.2	2.2	1.1	1	no	--	no	12
I241	MYTI EDU	SB	d.wt															2.7	3.2	1.1	1.2	1	0.88	no	D-	no	11
I242	MYTI EDU	SB	d.wt															2.2	2.4	1.1	1.5	0.95	0.85	no	D-	no	10
I243	MYTI EDU	SB	d.wt															2.2	2	0.88	1.7	0.88	0.92	no	--	no	12

Annual median concentration of HCHG (ppb)

																							ANALYSIS		
St	Species	Tissue	Base	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	OC	TRND	SM+3	POWER
30B	GADU MOR	LI	w.wt										3	15	5	5	10	7	10	11	4	2.5	4	no	--	no	17
36B	GADU MOR	LI	w.wt										6.5	14	9	9	17	3	11	6	8.1	6.9	6.4	no	--	no	16
15B	GADU MOR	LI	w.wt										11	37	7	9	10	6	13	10	8.1	6.5	3.4	no	--	no	16
53B	GADU MOR	LI	w.wt										12	8.5	5	6		6	7	8	10	3.5	3.1	no	--	no	13
67B	GADU MOR	LI	w.wt										12	7	10	7	6.3	5	10	11	21	4.8	4	no	--	no	16
23B	GADU MOR	LI	w.wt										13	5.9	11	5	8	5	13	8	9.4	5.5	5	no	--	no	13
92B	GADU MOR	LI	w.wt													6	6	4	6					no	-?	?	10
98B	GADU MOR	LI	w.wt												5		8	3	6	3	8	5	0.71	no	--	no	20
43B	GADU MOR	LI	w.wt														3	3	4					no	-?	?	7
10B	GADU MOR	LI	w.wt														3	3	4	3	8	4.2	3	no	--	no	14
30B	GADU MOR	MU	w.wt										0.08	0.05	0.1		0.06	0.04	0.05	0.05	0.07	0.06	0.05	no	--	no	11
36B	GADU MOR	MU	w.wt										0.15	0.1	0.1	0.1	0.08	0.19	0.09	0.06	0.1	0.06	0.03	no	--	no	13
15B	GADU MOR	MU	w.wt										0.09	0.06	0.1		0.04	0.06	0.09	0.06	0.09	0.06	0.05	no	--	no	12
53B	GADU MOR	MU	w.wt										0.12	0.02	0.1	0.1		0.03	0.081	0.05	0.07	0.06	0.05	no	--	no	19
67B	GADU MOR	MU	w.wt										0.11	0.07	0.1		0.045	0.22	0.16	0.06	0.09	0.06	0.04	no	--	no	17
23B	GADU MOR	MU	w.wt										0.11	0.09	0.1	0.1	0.03	0.06	0.08	0.07	0.07	0.06	0.03	no	--	no	14
92B	GADU MOR	MU	w.wt														0.03	0.03	0.05					no	-?	?	10
98B	GADU MOR	MU	w.wt												0.1	0.1	0.05	0.03	0.03	0.1	0.04	0.05	0.05	no	--	no	15
10B	GADU MOR	MU	w.wt														0.03	0.15	0.03	0.1	0.04	0.03	0.04	no	--	no	20

Annual median concentration of HCHG (ppb)

																								ANALYSIS			
St	Species	Tissue	Base	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	OC	TRND	SM+3	POWER
33B	PLAT FLE	LI	w.wt										2	0.5	5	2	2	1	1.9	1.8	1.1	0.69	1.9	no	--	no	20
53B	PLAT FLE	LI	w.wt										3	2	5	2		1.4	2	3	2	2.4	0.94	no	--	no	15
67B	PLAT FLE	LI	w.wt																2		6.2	3.3	3.1	no	-?	?	17
36F	LIMA LIM	LI	w.wt										8.9	3	5	1	4	3	8	5	2	3.8	4	no	--	no	18
15F	LIMA LIM	LI	w.wt											3		4	3.5	3	5.1	5.6	4.1	3.2		no	--	no	10
22F	LIMA LIM	LI	w.wt										6.9	3	5		1	1						no	D?	?	14
30F	PLEU PLA	LI	w.wt												5		1	1						no	-?	?	15
22F	PLEU PLA	LI	w.wt																0.9	0.7	0.6			no	-?	?	<=5
98F	PLEU PLA	LI	w.wt													1				0.95	2	1.3	0.71	no	-?	?	15
10F	PLEU PLA	LI	w.wt																	0.8		1.1	1.3	no	U?	?	<=5
67B	LEPI WHI	LI	w.wt										3	2	5	2	2	1	3.7	3	4.6	1.1	2.8	m	--	m	18

Annual median concentration of HCB (ppb)

																								ANALYSIS			
St	Species	Tissue	Base	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	OC	TRND	SM+3	POWER
30A	MYTI EDU	SB	d.wt				1.2	0.88	2.1	0.92	1.1	0.87	0.35	0.59	0.95	0.54	0.27	0.24	0.25	0.27	0.3		0.36	no	D-	no	14
31A	MYTI EDU	SB	d.wt			13	1.4	3.8	1.9	0.93	0.89	0.36	0.32	0.61	0.55	0.45	0.24	0.31	0.22	0.26	0.21		0.23	no	D-	no	16
35A	MYTI EDU	SB	d.wt			13	0.95	3.3	0.79	0.98	1.1	0.47	0.42	0.58	0.58	0.51	0.23	0.28	0.22	0.52	0.2	0.34	0.36	no	D-	no	18
36A	MYTI EDU	SB	d.wt			15	0.95	3.8	2.9	2.4	0.96	0.43	0.33	0.55	0.39	0.53	0.24	0.33	0.28	0.31	0.15		0.25	no	D-	no	19
71A	MYTI EDU	SB	d.wt			15	10	91	11	210	1.8	150	8.5	6.9	4.1	3.9	1.5	2.1	4.5	2	1.8	3.1	1.8	3.7	--	3.4	>25
71A	*MYTI EDU*	*SB*	*d.wt*										*8.5*	*6.9*	*4.1*	*3.9*	*1.5*	*2.1*	*4.5*	*2*	*1.8*	*3.1*	*1.8*	*3.7*	*D-*	*3.4*	*14*
76A	MYTI EDU	SB	d.wt										0.38	0.57	0.5	0.79			0.25	0.29	0.4	0.26	0.22	no	--	no	13
15A	MYTI EDU	SB	d.wt										0.2			0.49	0.25	0.22	0.29	0.25	0.16	0.22	0.18	no	--	no	13
51A	MYTI EDU	SB	d.wt															0.61	0.33	0.31	0.4	0.4	0.38	no	--	no	11
52A	MYTI EDU	SB	d.wt									0.85	0.38		0.81	0.81	0.28	0.32	0.26	0.33	0.21	0.33	0.2	no	--	no	14
56A	MYTI EDU	SB	d.wt								0.2	0.79	0.41	0.79	0.93	1	0.31	0.38	0.31	0.44	0.35	0.7	0.18	no	--	no	16
57A	MYTI EDU	SB	d.wt									0.77		0.76	0.72	0.79	0.36	0.3	0.26	0.43	0.58	0.63	0.26	no	--	no	13
63A	MYTI EDU	SB	d.wt									1		0.97	0.74	0.63	0.32	0.33	0.33	0.41	0.45	0.51	0.23	no	D-	no	11
65A	MYTI EDU	SB	d.wt								0.2	0.43	0.52	0.86	0.62	0.67	0.28	0.3	0.29	0.34	0.38	0.52	0.15	no	--	no	14
69A	MYTI EDU	SB	d.wt												0.53	0.53	0.29	0.25	0.29	0.5	0.48	0.36	0.21	no	--	no	13
22A	MYTI EDU	SB	d.wt										0.26	0.61	0.56	0.44	0.25	0.25	0.3	0.31	0.17	0.32	0.2	no	--	no	13
82A	MYTI EDU	SB	d.wt				2.3	11	0.66	0.62	0.8	0.53												1.1	--	no	24
84A	MYTI EDU	SB	d.wt				3.4	8.8	3.3	2	1.2	0.48		0.51	0.63	0.53		0.25	0.21					no	D-	no	15
92A	MYTI EDU	SB	d.wt												0.68	0.42	0.24	0.23	0.23	0.25				no	D-	no	12
98A	MYTI EDU	SB	d.wt												0.62	0.57				0.34	0.31	0.43	0.29	no	D-	no	9
98X	MYTI EDU	SB	d.wt														0.56	0.32	0.26					no	-?	?	8
41A	MYTI EDU	SB	d.wt														0.29	0.26	0.29	0.3				no	-?	?	6
43A	MYTI EDU	SB	d.wt														0.32	0.34		0.45				no	-?	?	<=5
44A	MYTI EDU	SB	d.wt															0.27	0.29	0.33				no	-?	?	<=5
46A	MYTI EDU	SB	d.wt														0.26	0.29	0.27					no	-?	?	6
48A	MYTI EDU	SB	d.wt														0.28	0.29	0.24					no	-?	?	7
10A	MYTI EDU	SB	d.wt														0.29	0.27	0.25	0.31		0.28	0.28	no	--	no	6
11A	MYTI EDU	SB	d.wt														0.35	0.43	0.34	0.46				no	-?	?	8
11X	MYTI EDU	SB	d.wt																	0.34	0.21	0.25	0.24	no	-?	?	10

Annual median concentration of HCB (ppb)

																								ANALYSIS		
St	Species	Tissue	Base	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	OC	TRND	SM+3	POWER
I022	MYTI EDU	SB	d.wt															0.42	0.48	0.97	0.31	0.78	0.45	no	--	1.6	15
I023	MYTI EDU	SB	d.wt															0.48	0.42	0.43	0.26	0.62	0.35	no	--	1.2	12
I024	MYTI EDU	SB	d.wt															0.49	0.6	1.2	0.43	0.66	0.56	1.1	--	1.6	14
30A	MYTI EDU	SB	d.wt				1.2	0.88	2.1	0.92	1.1	0.87	0.35	0.59	0.95	0.54	0.27	0.24	0.25	0.27	0.3		0.36	no	D-	no	14
I301	MYTI EDU	SB	d.wt															0.29	0.28	0.7	0.82	1.6	0.51	1.0	--	no	17
I304	MYTI EDU	SB	d.wt															0.34	0.28	0.72	0.49		0.29	no	-?	?	15
I306	MYTI EDU	SB	d.wt															0.3	0.31	0.77	0.25		0.3	no	-?	?	16
I307	MYTI EDU	SB	d.wt															0.27	0.32	0.67	0.17		0.33	no	-?	?	17
71A	MYTI EDU	SB	d.wt			15	10	91	11	210	1.8	150	8.5	6.9	4.1	3.9	1.5	2.1	4.5	2	1.8	3.1	1.8	3.7	--	3.4	>25
I711	MYTI EDU	SB	d.wt															4.5	5.5	0.57	4.5	7	2.6	5.1	--	1.8	25
I712	MYTI EDU	SB	d.wt															3.4	16	7.9	4.8	5	3.3	6.6	--	2.7	18
I131	MYTI EDU	SB	d.wt															0.32	0.3	0.27	0.2	0.58	0.29	no	--	1.1	14
I132	MYTI EDU	SB	d.wt															53	90	40	44	1.9	4.7	9.5	D-	no	25
I133	MYTI EDU	SB	d.wt															18	43	8.1	28	1.7	6.2	12.4	--	no	25
51A	MYTI EDU	SB	d.wt															0.61	0.33	0.31	0.4	0.4	0.38	no	--	no	11
52A	MYTI EDU	SB	d.wt									0.85	0.38		0.81	0.81	0.28	0.32	0.26	0.33	0.21	0.33	0.2	no	--	no	14
I241	MYTI EDU	SB	d.wt															1.3	0.71	0.69	0.75	0.7	0.62	1.2	--	no	9
I242	MYTI EDU	SB	d.wt															1.2	0.92	0.56	0.6	0.65	0.55	1.1	D-	no	9
I243	MYTI EDU	SB	d.wt															1	0.66	0.52	1.2	0.66	0.67	1.3	--	no	13

Annual median concentration of HCB (ppb)

																								ANALYSIS			
St	Species	Tissue	Base	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	OC	TRND	SM+3	POWER
30B	GADU MOR	LI	w.wt										10	17	7.5	16	11	11	12	7	5.3	5.1	9.1	no	--	no	13
36B	GADU MOR	LI	w.wt										7	9	9	10	9	5	9	6	4.4	6.5	5.4	no	--	no	11
15B	GADU MOR	LI	w.wt										5	20	10	14	14	9	11	13	11	11	6.2	no	--	no	14
53B	GADU MOR	LI	w.wt										10	10	16	7		5	7	7	5	4.7	12	no	--	no	14
67B	GADU MOR	LI	w.wt										14	8	7.9	8	8.5	10	8	15	9.9	4.6	5.6	no	--	no	12
23B	GADU MOR	LI	w.wt										6	9.5	12	9	8	6	10	6	8.4	7.8	7.6	no	--	no	11
92B	GADU MOR	LI	w.wt													17	11	14	13					no	-?	?	9
98B	GADU MOR	LI	w.wt												20	9.9	12	18	35	20	16	13	3.1	no	--	no	16
43B	GADU MOR	LI	w.wt														15	16	13					no	-?	?	8
10B	GADU MOR	LI	w.wt														13	11	16	17	17	25	9	no	--	no	13
30B	GADU MOR	MU	w.wt										0.09	0.09	0.1	0.1	0.04	0.03	0.05	0.05	0.06	0.06	0.06	no	--	no	12
36B	GADU MOR	MU	w.wt										0.11	0.07	0.1	0.1	0.04	0.05	0.06	0.06	0.05	0.06	0.04	no	--	no	11
15B	GADU MOR	MU	w.wt										0.11	0.11	0.1	0.1	0.06	0.07	0.08	0.075	0.1	0.06	0.1	no	--	no	10
53B	GADU MOR	MU	w.wt										0.1	0.03	0.1	0.1		0.03	0.065	0.06	0.05	0.05	0.09	no	--	no	17
67B	GADU MOR	MU	w.wt										0.1	0.085	0.1	0.1	0.075	0.06	0.05	0.07	0.06	0.05	0.05	no	D-	no	8
23B	GADU MOR	MU	w.wt										0.08	0.08	0.1	0.1	0.04	0.06	0.06	0.06	0.06	0.06	0.06	no	--	no	11
92B	GADU MOR	MU	w.wt													0.1	0.07	0.05	0.09					no	-?	?	13
98B	GADU MOR	MU	w.wt												0.2	0.2	0.07	0.1	0.11	0.1	0.1	0.08	0.1	no	--	no	12
43B	GADU MOR	MU	w.wt														0.09	0.13	0.06					no	-?	?	15
10B	GADU MOR	MU	w.wt														0.16	0.11	0.09	0.2	0.17	0.26	0.09	no	--	no	15

Annual median concentration of HCB (ppb)

St	Species	Tissue	Base	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	ANALYSIS OC	TRND	SM+3	POWER
33B	PLAT FLE	LI	w.wt										1	0.5	5	2	1	1	0.6	0.8	0.59	0.54	1.6	no	--	no	20
53B	PLAT FLE	LI	w.wt										6	4.5	5	2		1	2	3	1.8	2.5	2.4	no	--	no	14
67B	PLAT FLE	LI	w.wt																3		6.4	3.6	4.2	no	-?	?	13
36F	LIMA LIM	LI	w.wt										5.5	3	5	2	3	2	2.3	3	1.1	2.5	3	no	--	no	14
15F	LIMA LIM	LI	w.wt											4		4	4	2	3	3.2	3	3.6		no	--	no	10
22F	LIMA LIM	LI	w.wt										6	3	5		1	1.4						no	-?	?	15
30F	PLEU PLA	LI	w.wt												5		2	2						no	-?	?	11
22F	PLEU PLA	LI	w.wt																0.5	0.9	0.3			no	-?	?	19
98F	PLEU PLA	LI	w.wt													1		1		1.7	1	2.5	1.3	no	--	no	13
10F	PLEU PLA	LI	w.wt																	6.1		8.8	6.4	1.3	-?	?	11
67B	LEPI WHI	LI	w.wt										9	4	5	4	5	2	4.6	4	5	2.8	4.8	m	--	m	13

Annual median concentration of BAP (ppb)

																									ANALYSIS		
St	Species	Tissue	Base	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	OC	TRND	SM+3	POWER
30A	MYTI EDU	SB	d.wt												3			3	4	5	4	3	3	no	--	no	9
I301	MYTI EDU	SB	d.wt															4	20	20	6	10	3	no	--	no	23
I304	MYTI EDU	SB	d.wt															3	3	3	3	3	3	no	--	no	6
I306	MYTI EDU	SB	d.wt															3	3	3	3	3	3	no	--	no	<=5
I307	MYTI EDU	SB	d.wt															3	3	3	3	3	3	no	--	no	6
I131	MYTI EDU	SB	d.wt															3	3	3	4	5	2	no	--	no	12
I132	MYTI EDU	SB	d.wt															70	90	20	20	300	10	2.2	--	17.5	>25
I133	MYTI EDU	SB	d.wt															80	10	50	20		8	1.7	-?	?	20
I201	MYTI EDU	SB	d.wt															90	200	700	10	80	50	9.5	--	24.2	>25
I205	MYTI EDU	SB	d.wt															7		20	60	8	6	1.1	-?	?	>25
I912	MYTI EDU	SB	d.wt															7		9	5	20	100	26.9	-?	?	25
I962	MYTI EDU	SB	d.wt															200	30		90			17.4	-?	?	>25
I969	MYTI EDU	SB	d.wt															10	10	20	8	10	20	3.4	--	5.8	13

Annual median concentration of PK_S (ppb)

																									ANALYSIS		
St	Species	Tissue	Base	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	OC	TRND	SM+3	POWER
30A	MYTI EDU	SB	d.wt												38			28	130	46	40	22	19	no	--	no	18
I301	MYTI EDU	SB	d.wt															130	960	200	110	180	43	no	--	no	24
I304	MYTI EDU	SB	d.wt															21	77	14	38	38	9.1	no	--	no	22
I306	MYTI EDU	SB	d.wt															22	170	35	33	32	8.9	no	--	no	23
I307	MYTI EDU	SB	d.wt															18	110	20	29	48	13	no	--	no	22
I131	MYTI EDU	SB	d.wt															71	51	35	63	60	41	no	--	no	11
I132	MYTI EDU	SB	d.wt															760	860	280	590	2700	260	5.2	--	10.5	24
I133	MYTI EDU	SB	d.wt															1900	330	650	290		160	3.2	-?	?	18
I201	MYTI EDU	SB	d.wt															770	1600	8000	280	1000	940	18.8	--	41.1	>25
I205	MYTI EDU	SB	d.wt															120		470	1400	200	200	3.9	-?	?	>25
I912	MYTI EDU	SB	d.wt															240		340	210	210	1600	31.8	-?	?	22
I962	MYTI EDU	SB	d.wt															2400	480		680			13.6	-?	?	24
I969	MYTI EDU	SB	d.wt															220	170	230	140	290	200	4.0	--	6.5	11

Annual median concentration of PAHSS (ppb)

																								ANALYSIS		
St	Species	Tissue	Base	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	OC	TRND	SM+3	POWER
30A	MYTI EDU	SB	d.wt												200			200	600	600	300	300	200	no	--	no	14
I301	MYTI EDU	SB	d.wt															700	3000	2000	900	1000	600	2.5	--	1.5	19
I304	MYTI EDU	SB	d.wt															100	300	200	300	400	90	no	--	no	19
I306	MYTI EDU	SB	d.wt															100	500	200	200	300	90	no	--	no	20
I307	MYTI EDU	SB	d.wt															80	300	200	200	500	90	no	--	no	20
I131	MYTI EDU	SB	d.wt															200	300	200	300	400	300	1.3	U-	1.6	8
I132	MYTI EDU	SB	d.wt															3000	3000	1000	2000	7000	1000	5.6	--	11.1	20
I133	MYTI EDU	SB	d.wt															6000	2000	2000	1000		1000	4.6	-?	?	14
I201	MYTI EDU	SB	d.wt															3000	5000	20000	900	4000	3000	10.3	--	23.2	>25
I205	MYTI EDU	SB	d.wt															600		2000	4000	900	700	2.6	-?	?	22
I912	MYTI EDU	SB	d.wt															1000		2000	1000	2000	8000	30.7	-?	?	19
I962	MYTI EDU	SB	d.wt															6000	2000		2000			7.5	-?	?	20
I969	MYTI EDU	SB	d.wt															1000	1000	800	600	900	1000	4.7	--	8.0	11

Appendix I.
Geographical distribution of contaminants in biota 1999-2000

Sorted by contaminant and species:

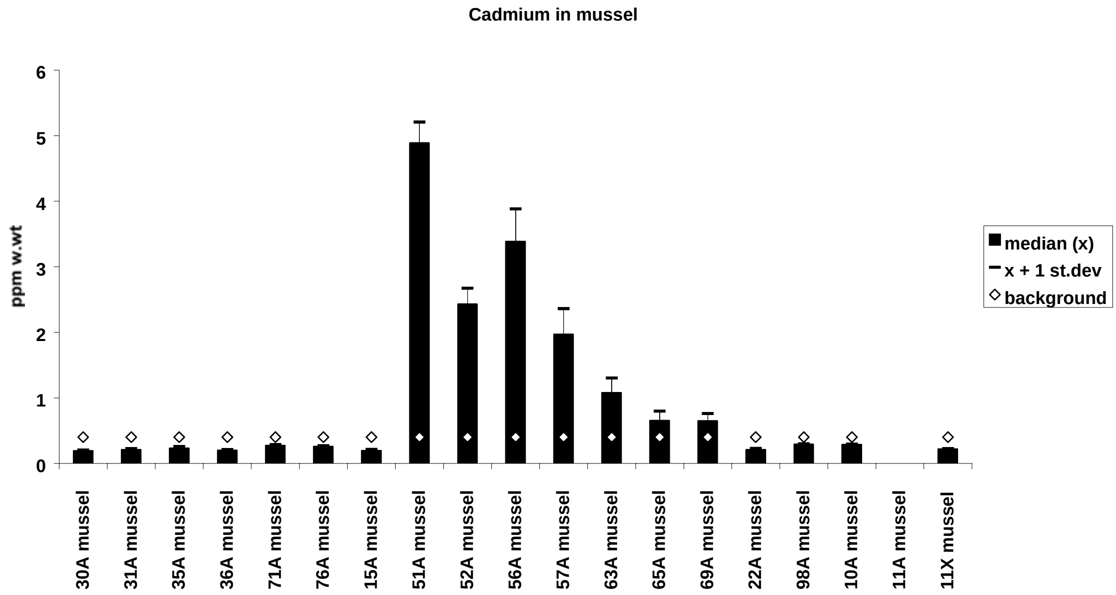
Cadmium (Cd)
Mercury (Hg)
Lead (Pb)
Sum of 7 CBs (CB-28, -52, 101, -118, -138, -153 and -180)
DDEPP (ppDDE)
HCB

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. .

Appendix I.
Geographical distribution of contaminants in biota 1999-2000 (cont.)

A



B

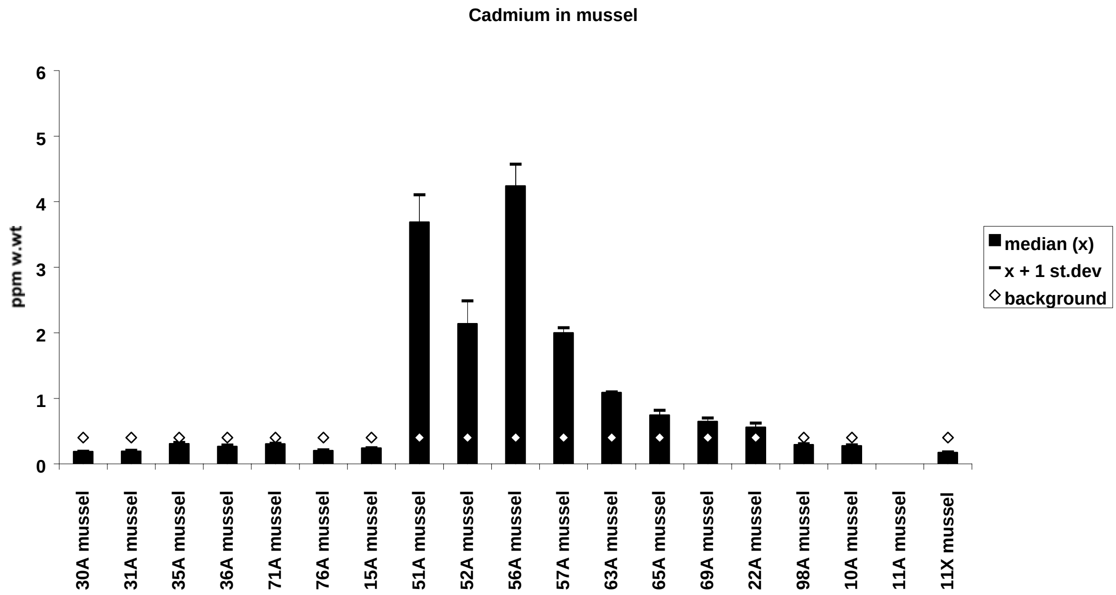
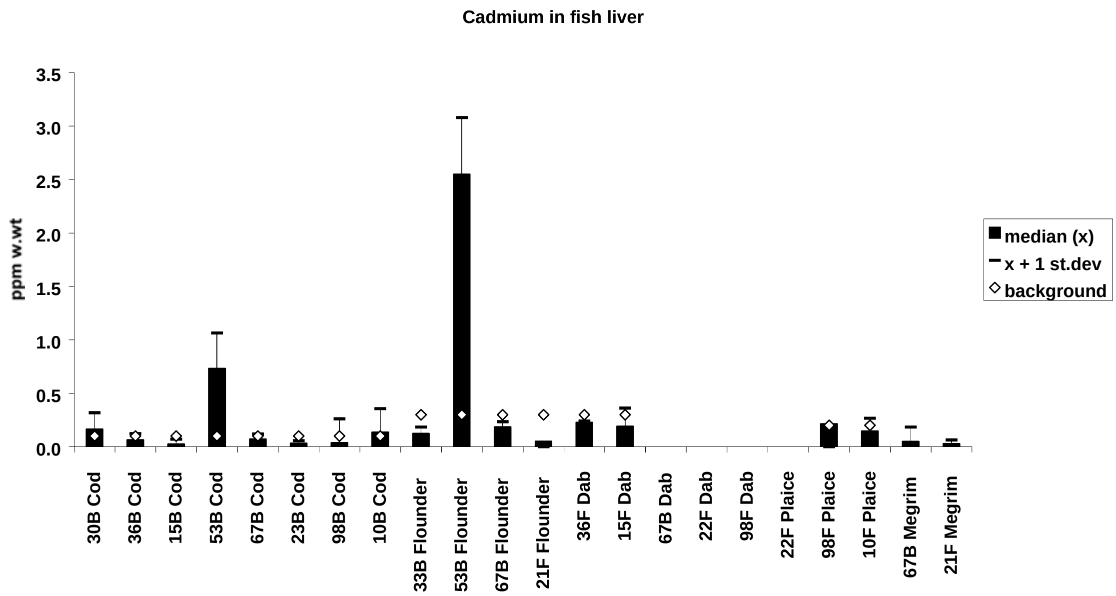


Figure 19. Median, standard deviation and provisional "high background" concentration for cadmium in mussels (*Mytilus edulis*) 1998 (**A**) and 2000 (**B**), ppm wet weight (see maps in Appendix F.).

A



B

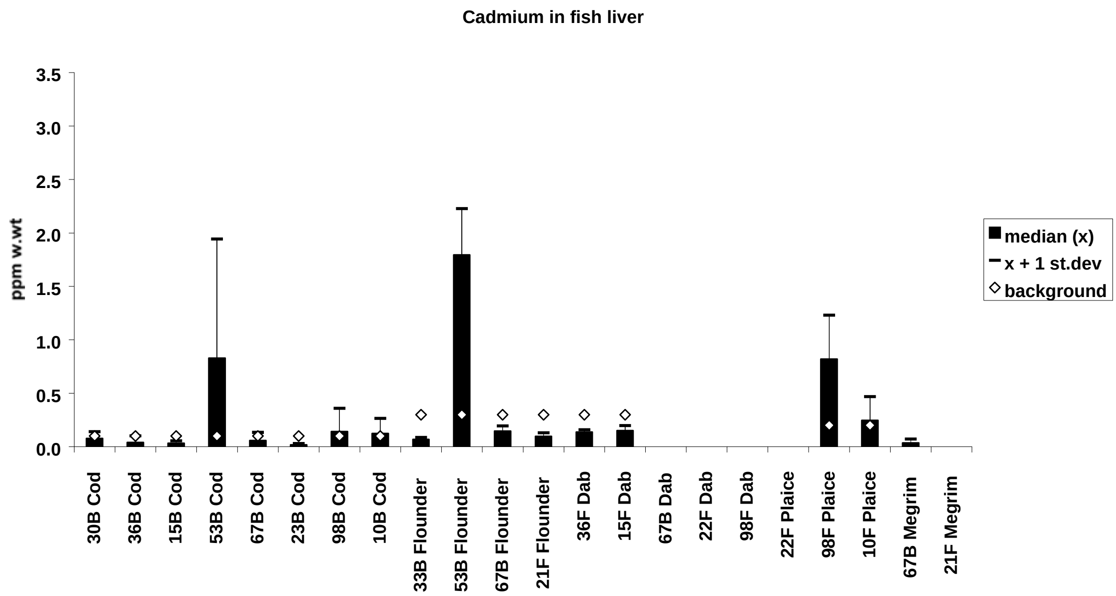
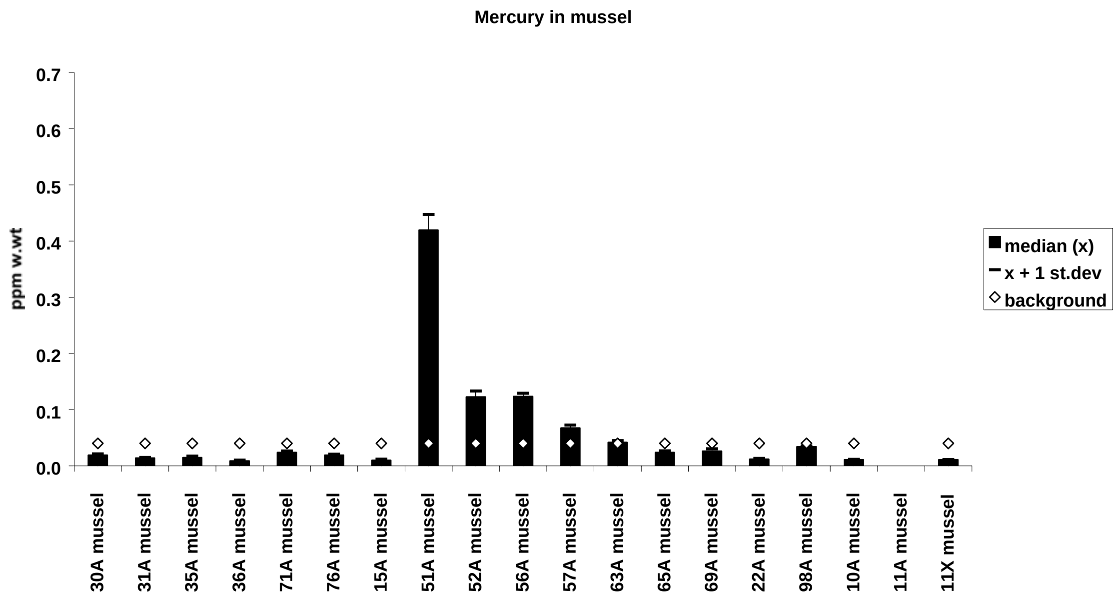


Figure 20. Median, standard deviation and provisional "high background" concentration for cadmium in fish liver 1998 (**A**) and 2000 (**B**), ppm wet weight (see maps in Appendix F.).

A



B

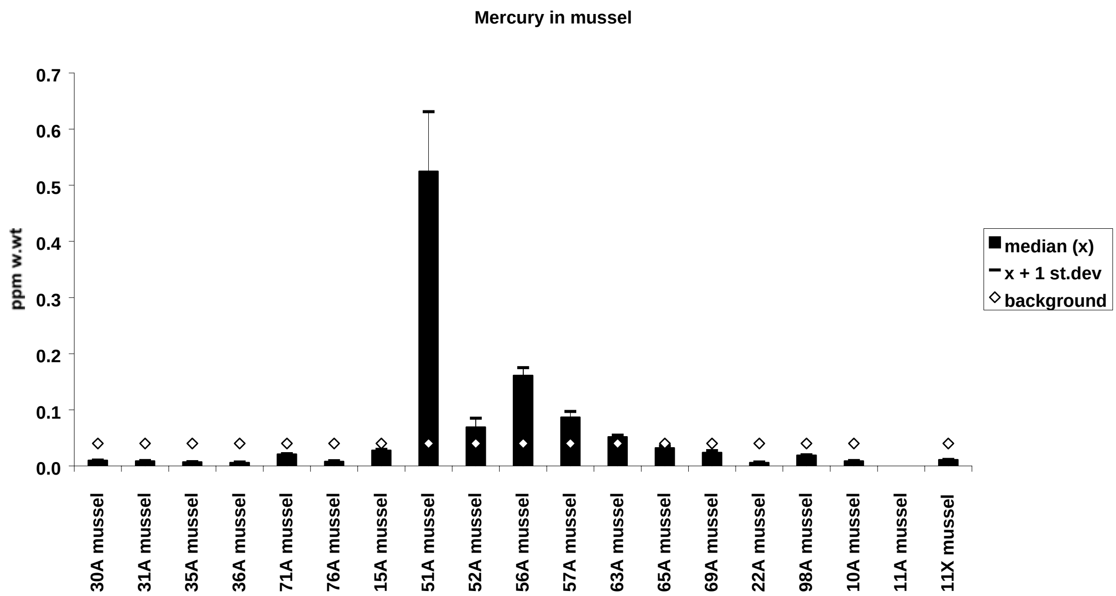
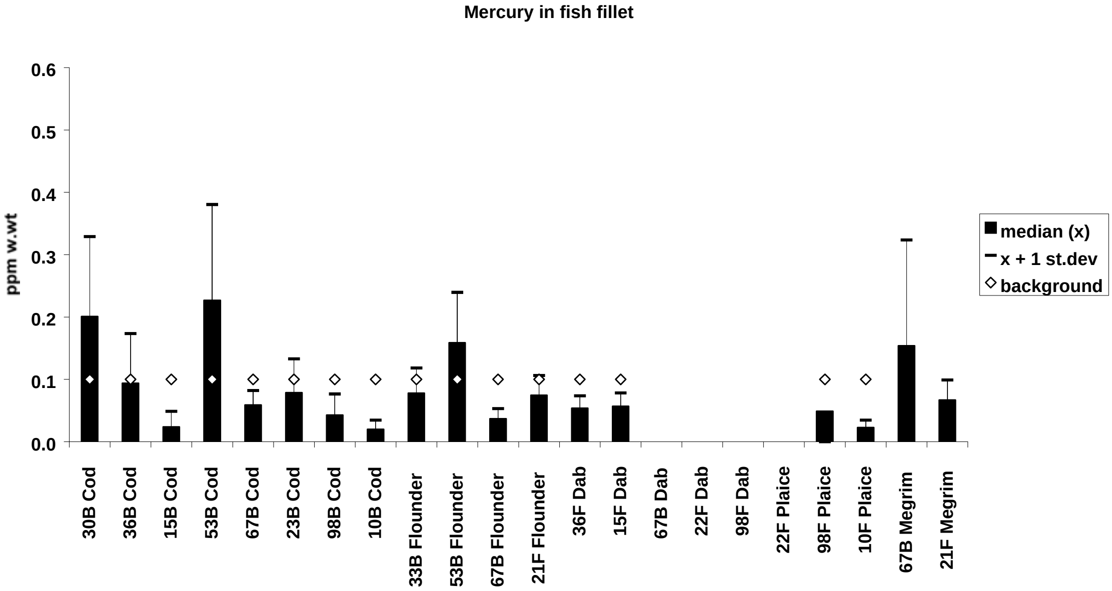


Figure 21. Median, standard deviation and provisional "high background" concentration for mercury in mussels (*Mytilus edulis*) 1998 (**A**) and 2000 (**B**), ppm wet weight (see maps in Appendix F.).

A



B

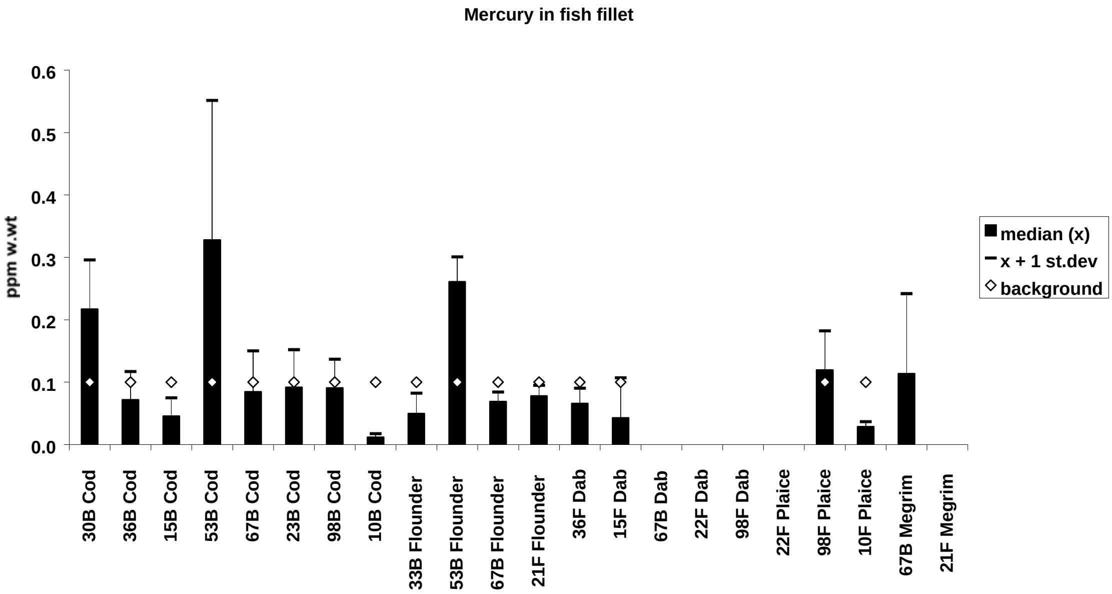
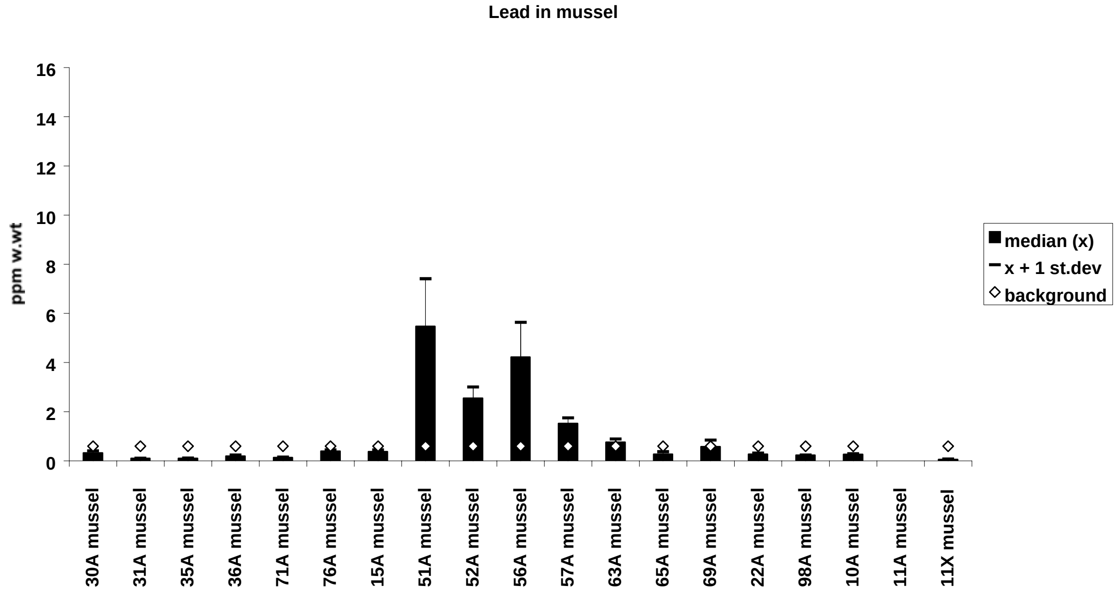


Figure 22. Median, standard deviation and provisional "high background" concentration for mercury in fish fillet 1998 (**A**) and 2000 (**B**), ppm wet weight (see maps in Appendix F.).

A



B

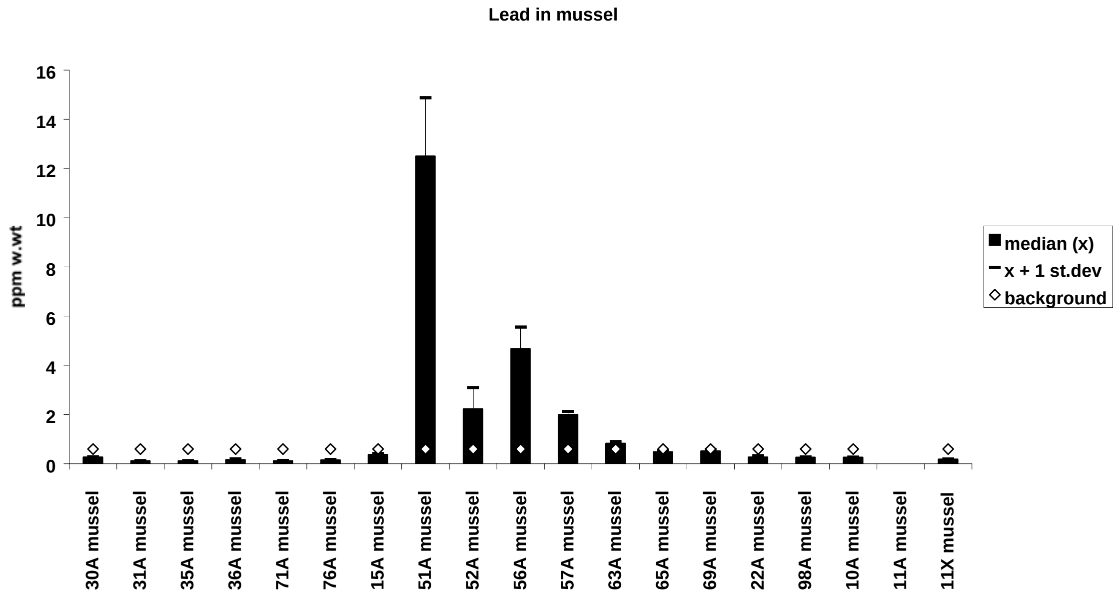
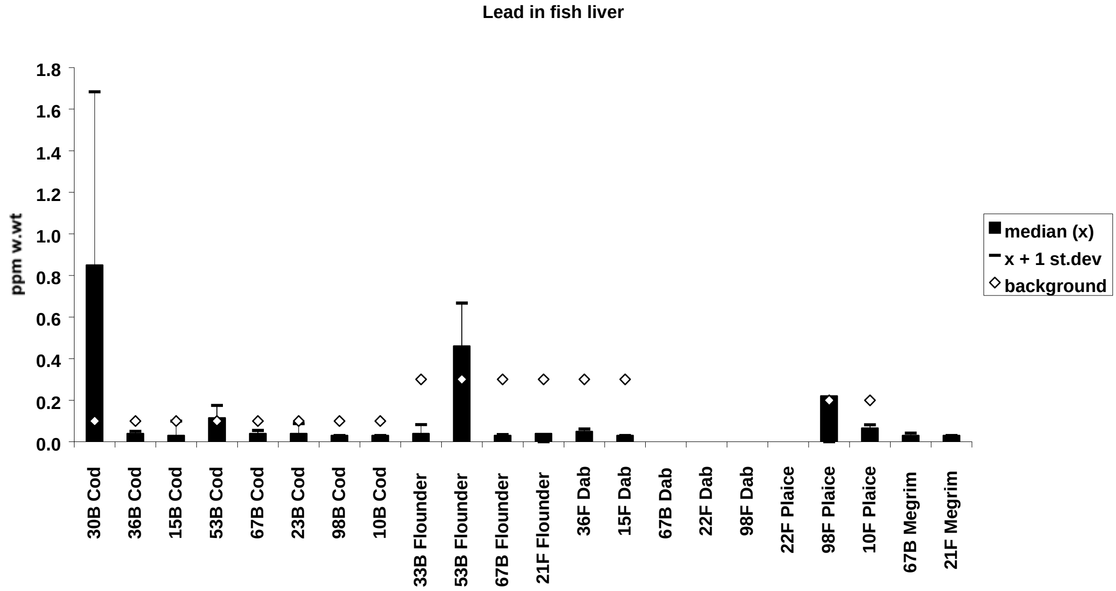


Figure 23. Median, standard deviation and provisional "high background" concentration for lead in mussels (*Mytilus edulis*) 1998 (**A**) and 2000 (**B**), ppm wet weight (see maps in Appendix F.).

A



B

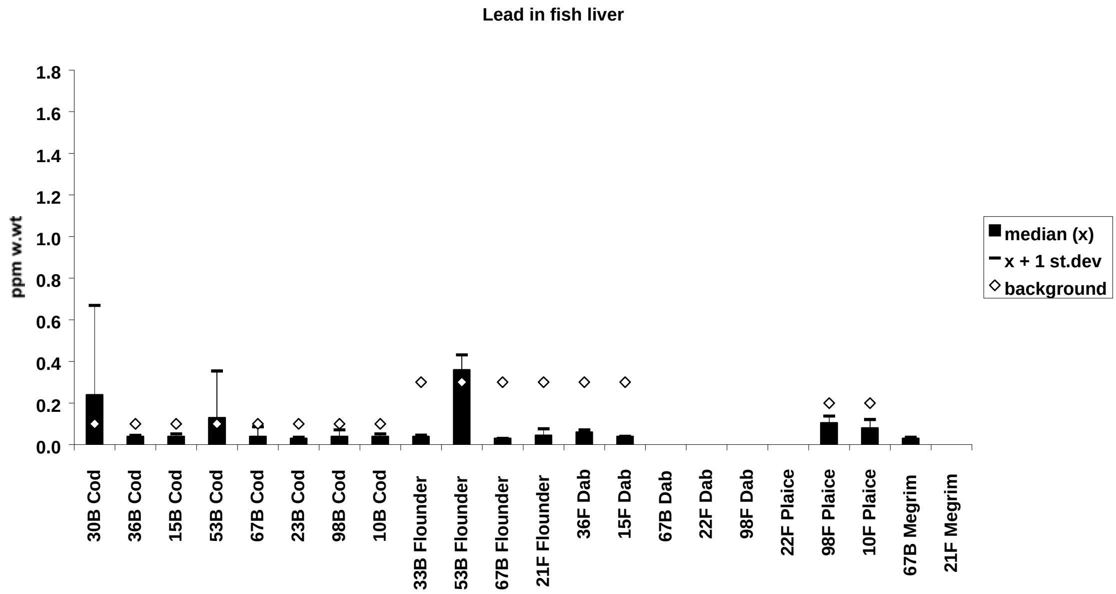
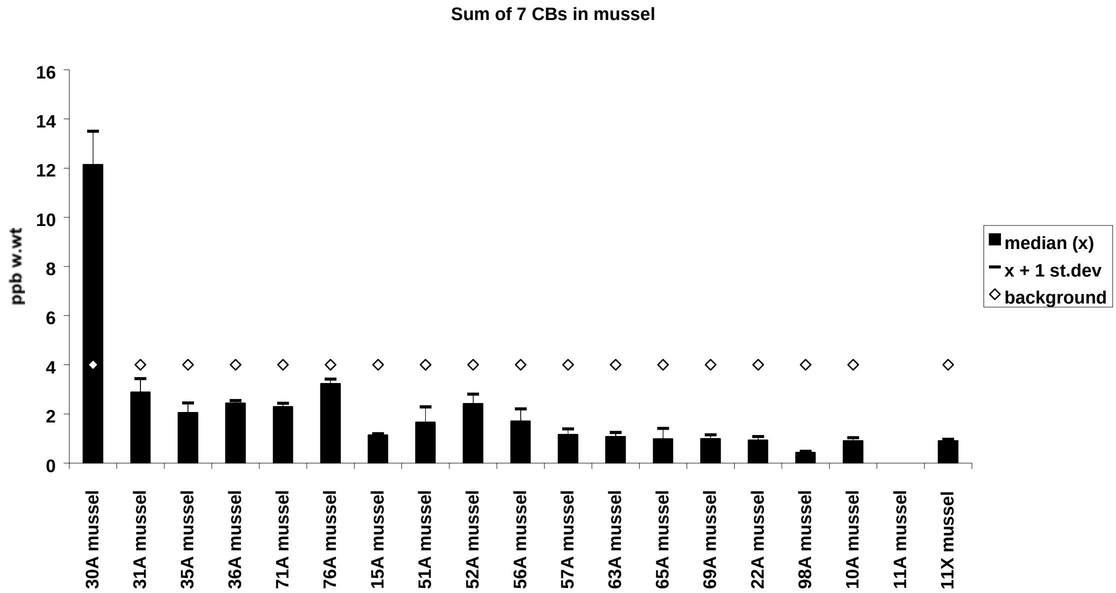


Figure 24. Median, standard deviation and provisional "high background" concentration for lead in fish liver 1998 (**A**) and 2000 (**B**), ppm wet weight (see maps in Appendix F.).

A



B

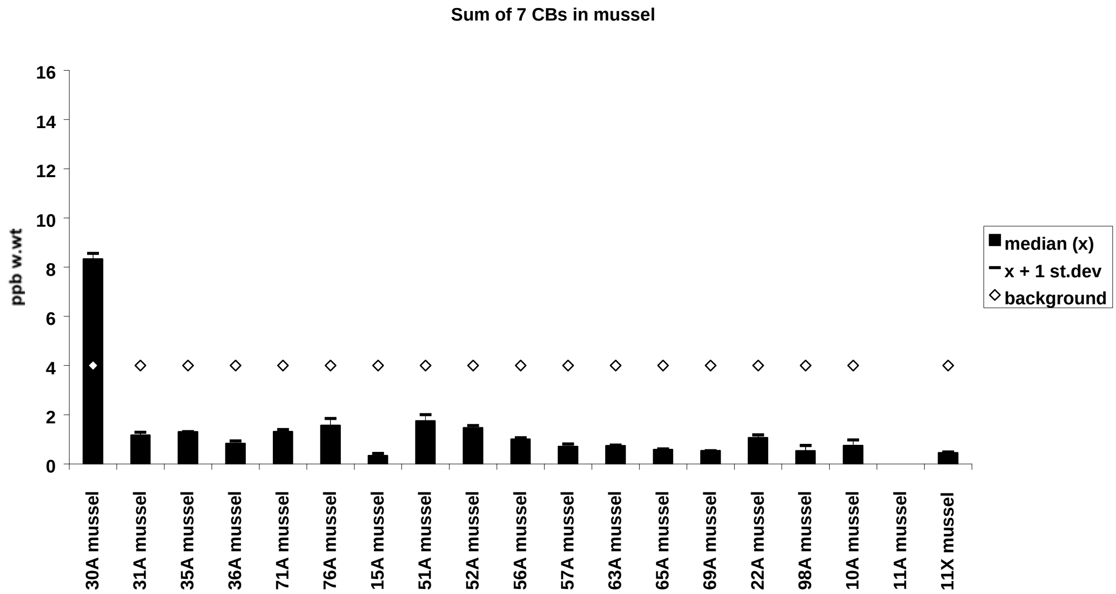
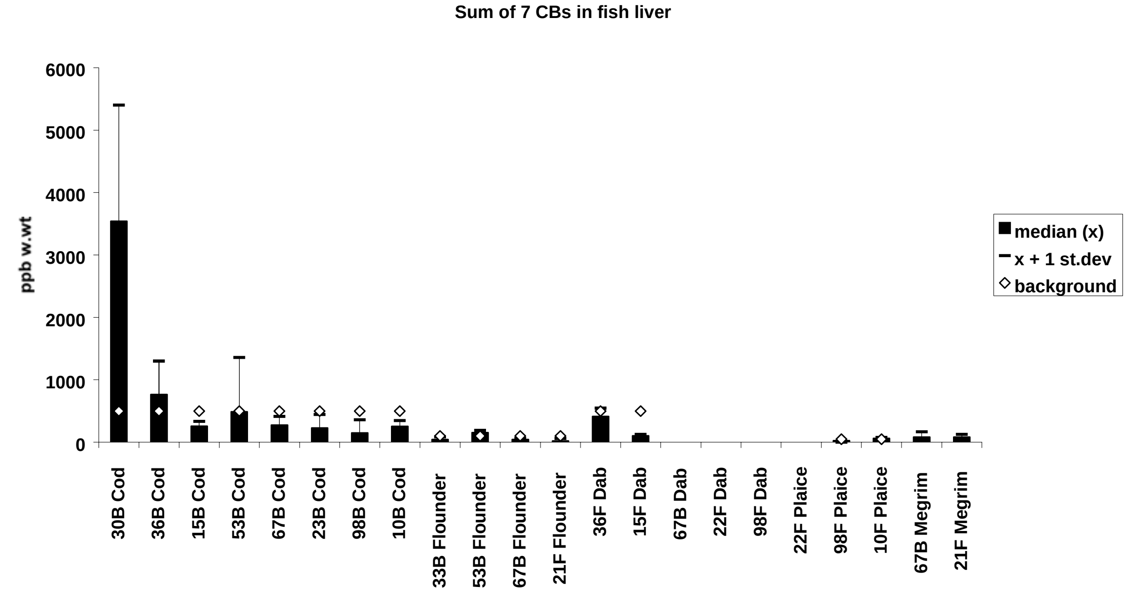


Figure 25. Median, standard deviation and provisional "high background" concentration for sum of 7 PCBs (CB-28, -52, 101, -118, -138, -153 and -180) in mussels (*Mytilus edulis*) 1998 (**A**) and 2000 (**B**), ppb wet weight (see maps in Appendix F.).

A



B

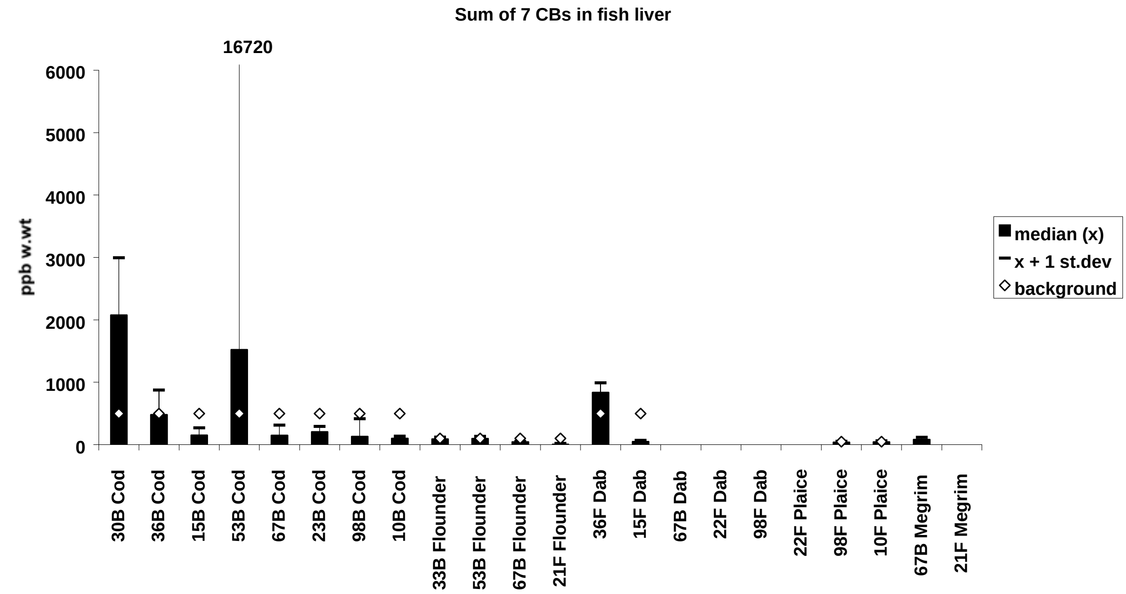
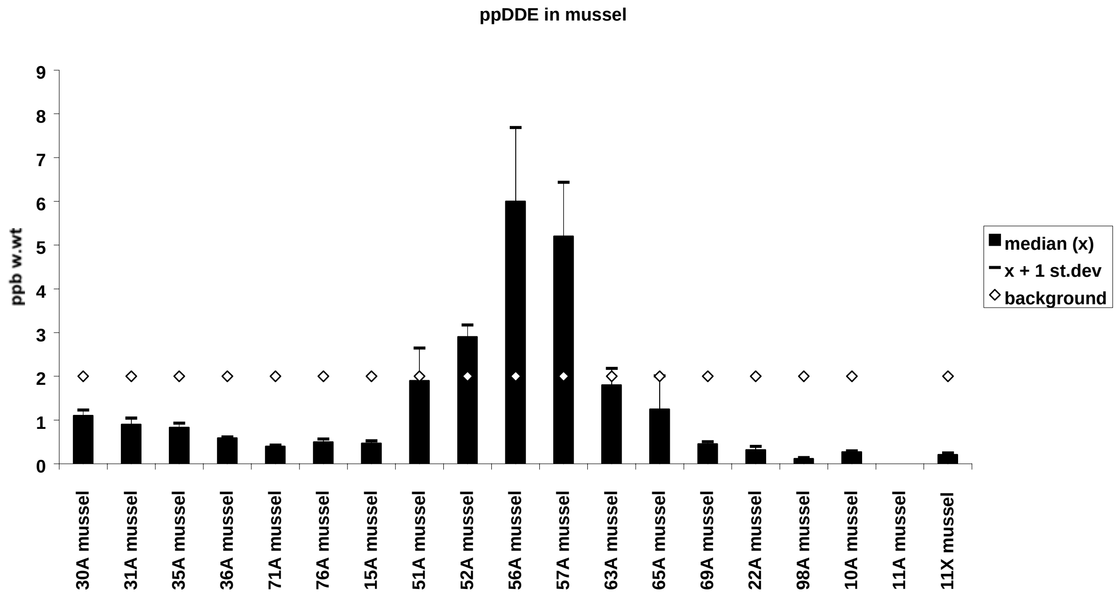


Figure 26. Median, standard deviation and provisional "high background" concentration for sum of 7 PCBs (CB-28, -52, 101, -118, -138, -153 and -180) in fish liver 1998 (**A**) and 2000 (**B**), ppb wet weight (see maps in Appendix F.).

A



B

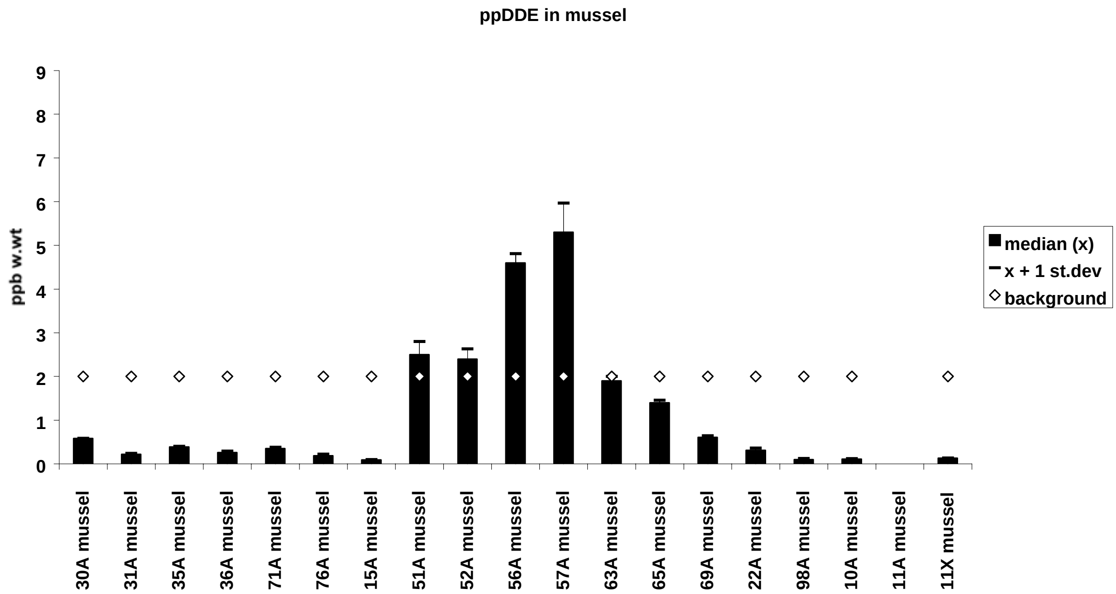
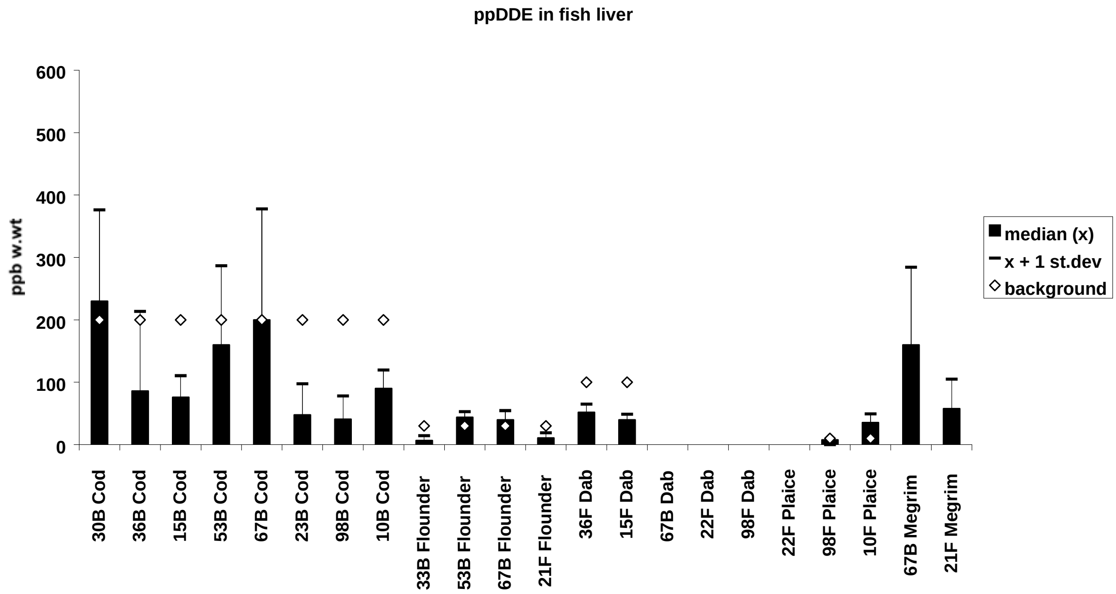


Figure 27. Median, standard deviation and provisional "high background" concentration for ppDDE (DDEPP) in mussels (*Mytilus edulis*) 1998 (**A**) and 2000 (**B**), ppb wet weight (see maps in Appendix F.). (See also footnote in Table 5.)

A



B

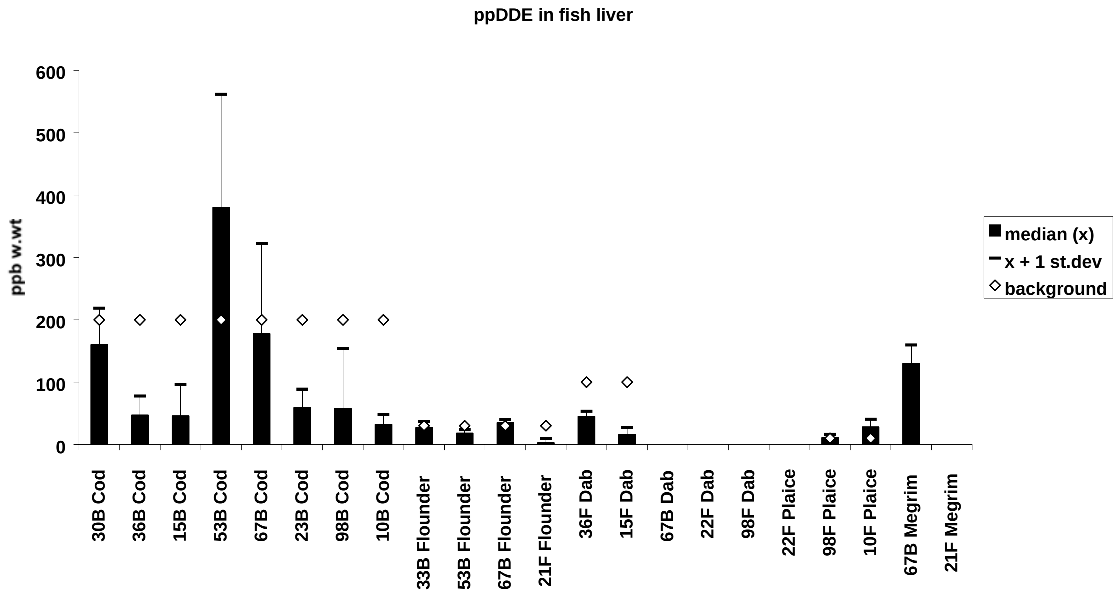
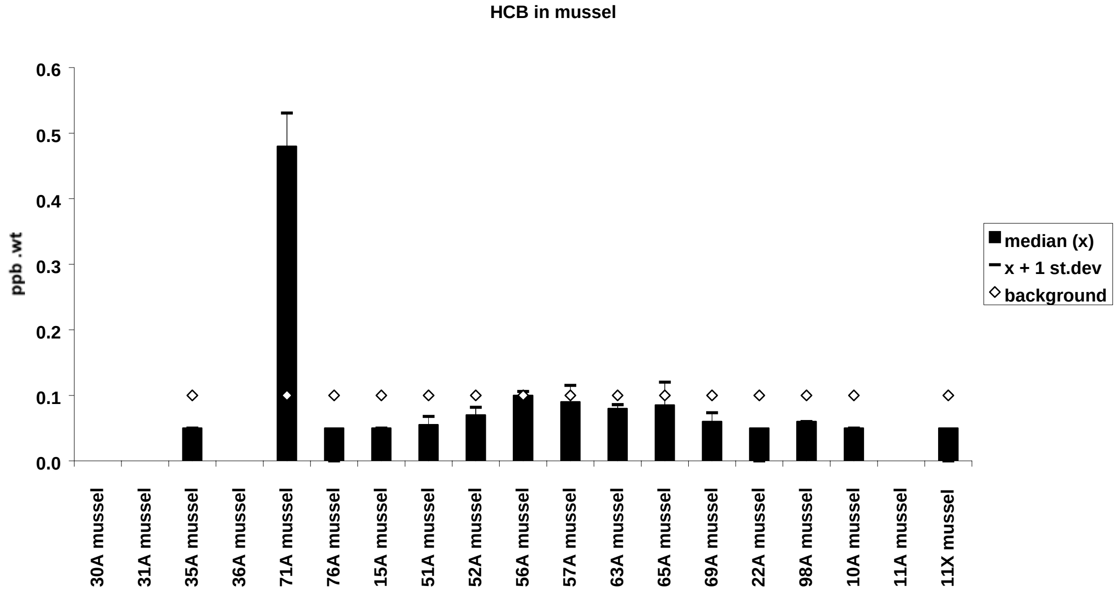


Figure 28. Median, standard deviation and provisional "high background" concentration for ppDDE (DDEPP) in fish liver 1998 (**A**) and 2000 (**B**), ppb wet weight (see maps in Appendix F.). (See also footnote in Table 5.)

A



B

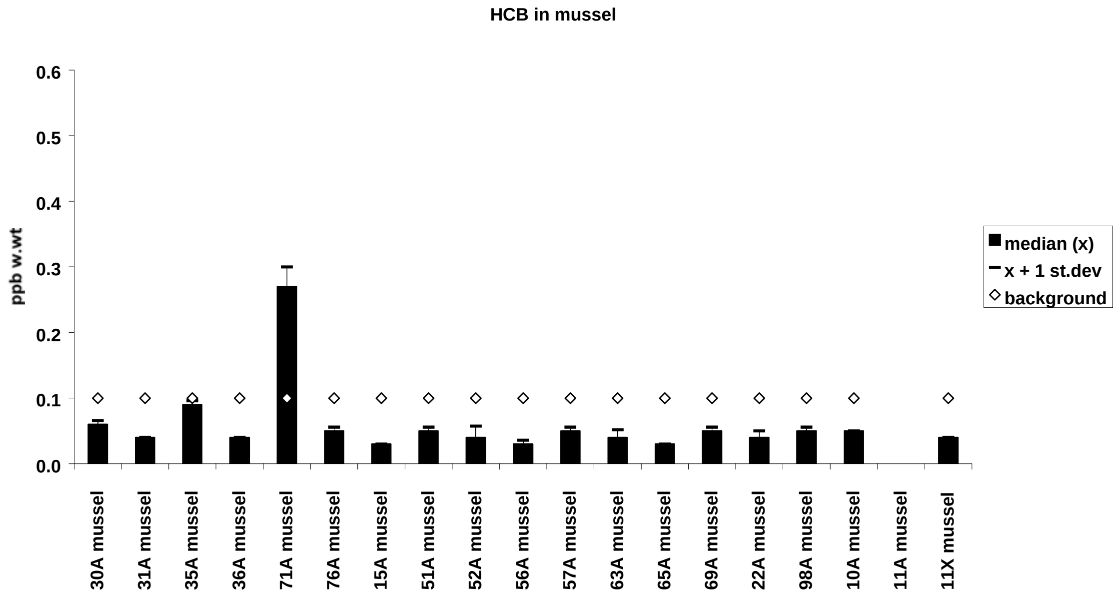
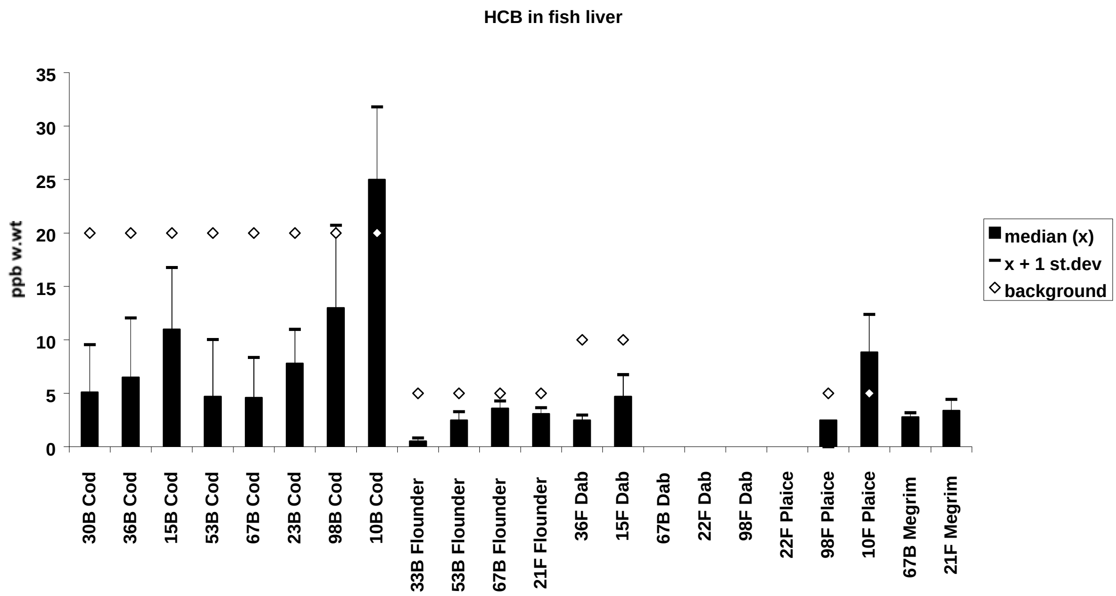


Figure 29. Median, standard deviation and provisional "high background" concentration for HCB in mussels (*Mytilus edulis*) 1998 (**A**) and 2000 (**B**), ppb wet weight (see maps in Appendix F.).

A



B

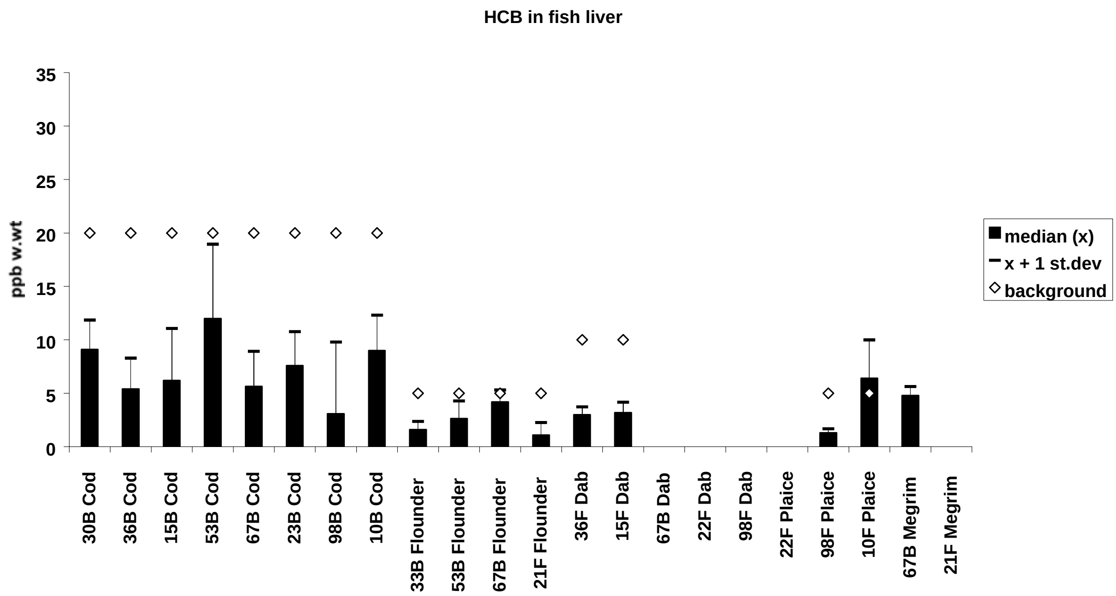


Figure 30. Median, standard deviation and provisional "high background" concentration for HCB in fish liver 1998 (**A**) and 2000 (**B**), ppb wet weight (see maps in Appendix F.).

Appendix J.
Results from INDEX determinations 1995-2000

Introduction

The Norwegian Pollution Control Authority (SFT) has requested that a small group of indices be established to assess the quality of the environment with respect to contaminants. The target medium for both indices may vary depending on the purpose, however sediment, cod and mussels are considered to be the most likely choices. Blue mussels were selected for this investigation (Appendix J. 1 and Appendix J. 2).

Two indices are calculated. One index is based on the contaminant concentrations in the blue mussel collected annually from 9 of the more contaminated fjords in Norway (Walday *et al*. 1995), herein designated “Pollution Index”. This index was initiated in 1995. Initially there were 11 fjords but sampling from Orkdalsfjord and Iddefjord was discontinued in 1997. It was practical to organise sampling within JAMP. Some JAMP results could be used to calculate the index value.

In addition, a “Reference Index” was initiated in 1995 based on annual contaminant concentrations in the blue mussel. The mussels were collect at JAMP stations along the entire coast where there is presumably low levels of contamination. The importance of “reference” stations for monitoring of contaminants has been discussed earlier (cf. Green 1987). One of the main reasons for this work is to establish points of reference for contaminated fjords. Initially 8 areas were involved but since 1998 only 5 have been sampled.

Calculation of the index

Sampling strategy and a detailed discussion of calculation of the Pollution Index has been given earlier (cf. Walday *et al.* 1995) and only a brief summary will be given here. The relevant contaminants for each of the Pollution Index fjords are summarised in Appendix J. 2 and 3. Their selection is based on earlier investigations. Two to five stations were sampled from each area. Three parallels of 20 individuals from 3-5 cm are collected from each station. Each sample was analysed for the contaminants according to the scheme in Appendix J. 3. "Dioxins" were only investigated in 1995-96.

One to three stations were sampled from selected areas for the determination of the Reference Index. Each station included three parallels which were analysed for the usual JAMP contaminants (cf. analysis code A, Appendix J. 3). Some samples were also analysed for PAHs and dioxins.

The strategy for sampling mussels differed depending on whether the mussels were to be used for the Index or for JAMP and Index in that stations that were exclusively to be used for Index calculations allowed a slightly greater size range (3-5 cm) compared to JAMP and that the mussels were frozen directly and not depurated.

The maximum median for each contaminant for all the stations in an area was determined. These concentrations were classified according to SFT's classification system for contaminants in the marine environment (Appendix J. 4). The highest class found for any contaminant measured in an area determined the index value for that area.

The SFT 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 CB-28, -52, -101, -118, -138, -153, and -180 (CBΣΣe) 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 the calculation of sum-PAH included the dicyclic PAHs. For this report PAH_Σ was calculated for previous years and hence, the classification may vary a class from what has been previously reported. "Dioxins" were assessed based on toxicity equivalency factors (TEQ) according to a Nordic model (Ahlborg 1989) which differs insignificantly from the recently revised WHO-model (van den Berg *et al.* 1998). Note that EPOCl is considered a relevant contaminant for one area but is not included in the part of the classification system based on levels in mussels. Likewise, there are contaminants which are included in the classification system but have not been measured in any area (e.g., tributyltin (TBT), arsenic, fluoride, nickel, silver).

The maximum class found for any contaminant determined the Class (I-V) of the area. The average Class for all the contaminated sub areas and all the reference localities determined the Pollution or Reference Index, respectively. The lowest Index value is 1 and means that all median values were in Class I ("Good"). The highest Index value is 5 and means that at least one median value from each of the areas was in Class V ("Very bad").

Conclusion from application of the indices

To compare the 2000 results with previous years the calculations were done on a common basis with respect to areas and contaminants. Nine fjord areas were used to calculate the Pollution Index for 1998-2000 compared to eight for 1995-1997. No special considerations were made when one but not all the stations within an area were sampled. This occurred six times for the Pollution Index (st. I205 Bølsnes from Saudafjord 1996, st.I911 Horvika in the Sunndalsfjord 1997 and 1998, st. I021 in the Hvaler area 1999, and st.I962 in the Inner Ranfjord 1999 and 2000). Because insufficient amount of mussels were not found at station I911 Horvika 1997-1998, a new station (I913 Fjøseid) was introduced in 1999 between st.I911 and I912 Honnhammer about 15km farther out the fjord. The Pollution Index for 2000 is 2.9 compared to 3.1 in 1999 (Table 8, Appendix J. 5). A value between 3 and 4 would be termed by the SFT system as “Bad” and between 2- and 3 "Poor".

Only 5 fjords/areas were monitored for the Reference Index for 1998-2000 compared to 7 for 1997 and 8 for 1995-1996 (Table 9, Appendix J. 6). However, only four of these provided a common basis (cf., Table 9). 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. This occurred five times in these four areas for the Reference Index (Varangerfjord st.48A 1997-2000 and st.11A 1998-2000). The value for 2000 is 1.4 and was in the same range as the results for 1995-1999 (1.3-1.5). A value between 1 and 2 would be termed by the SFT system as “Fair”.

Table 8. Maximum environmental classification for fjords selected for Pollution INDEX. (See text and Appendix J. 5).

Index Area [1)]	1995	1996	1997 [2)]	1998	1999	2000
Hvaler/Singlefjord	2	2	2	3	2	2
Iddefjord	-	-	-	-	-	-
Inner Oslofjord	3	3	4	2	3	2
Frierfjord, Grenlandsfjords	3	4	3	3	3	3
Inner Kristiansandsfjord	5	5	5	5	5	4
Saudafjord	4	5	5	3	4	3
Sørfjord	5	4	3	3	4	4
Byfjorden, Bergen [3)]	3	3	3	2	2	2
Sunndalsfjord	3	3	3 [4)]	2	3	4
Orkdalsfjord	-	-	-	-	-	-
Inner Ranfjord	5	3	3 [5)]	4	2	2
AVERAGE (Pollution INDEX)	**3.7**	**3.6**	**3.4**	**3.0**	**3.1**	**2.9**

[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

Table 9. Maximum environmental classification for fjords selected for Reference INDEX. (See text and Appendix J. 6).

Index Area	1995	1996	1997	1998	1999	2000
Mid and outer Oslofjord [1)]	2	2	2	1	1	1
Lista	1	1	1	1	2	2
Bømlo-Sotra	1	1	1	1	1	2
Outer Ranfjord, Helgeland [2)]	(1)	(1)	-	-	-	-
Lofoten [3)]	(2)	(2)	(1)	(2)	(2)	(1)
Finnsnes-Skjervøy [2)]	(2)	(1)	(1)	-	-	-
Hammerfest-Honningsvåg [2)]	(2)	(3) [4)]	(2)	-	-	-
Varanger Peninsula	1	2	1	2	1	1
AVERAGE (Reference INDEX)	**1.3**	**1.5**	**1.3**	**1.3**	**1.3**	**1.4**

[1)] Inclusion of results for arsenic, nickel and silver in 1996 (see Appendix J. 6) 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

Appendix J. 1.
INDEX - Stations and programme 1995-2000

Appendix J. 1. INDEX station positions and sampling overview for blue mussels 1995-2000, where P = “Pollution Index” and R = “Reference Index” (contaminated and assumed “background” stations, respectively). Mussels were sampled from rock surfaces unless otherwise noted. See Walday *et al.* (1995) for discussion of station selection and analyses.

Station		Locality name	North latitude	East longitude	ICES position	INDEX type P/R	notes
HVALER/SINGLEFJORDEN, east of outer OSLOFJORD							
	I021	Kjøkø, south	59°07.8'	10°57.1'	47G13	P	
	I024	Kirkø, north west	59°04.9'	10°59.2'	47G09	P	
	I022	West Damholmen	59°06.2'	10°57.9'	47G09	P	
	I023	Kirkø, north west	59°05.7'	11°08.2'	47G09	P	
IDDEFJORD, east of outer OSLOFJORD							
	I001	Sponvikskansen	59°05.4'	11°12.5'	47G09	P	
	I011	Kråkenebbet	59°06.1'	11°17.3'	47G09	P	
INNER OSLOFJORD							
JAMP	30A	Gressholmen	59°52.5'	10°43.0'	48G07	P	
	I301	Akershuskaia	59°54.2'	10°45.5'	48G07	P	
	I304	Gåsøya	59°51.0'	10°35.5'	48G04	P	
	I307	Ramtonholmen	59°44.7'	10°31.4'	48G05	P	
	I306	Håøya	59°24.7'	10°33.4'	48G04	P	
MID and OUTER OSLOFJORD							
JAMP	31A	Solbergstrand	59°36.9'	10°39.4'	48G06	R	
JAMP	35A	Mølen	59°29.2'	10°30.1'	47G04	R	
JAMP	36A	Færder	59°01.6'	10°31.7'	47G06	R	
FRIERFJORD AREA, west of outer Oslofjord							
	I711	Steinholmen	59°31.7'	09°40.7'	48F99	P	
	I712	Gjermundsholmen	59°21.7'	09°42.6'	47F99	P	
JAMP	71A	Bjørkøya (Risøyodden)	59°01.4'	09°45.4'	47F99	P	
INNER KRISTIANSANDSFJORD							
	I132	Fiskåtangen	57°07.7'	07°59.2'	43F79	P	
	I133	Odderø, west	57°07.9'	08°00.3'	43F83	P	
LISTA AREA							
JAMP	15A	Gåsøy (Ullerø area)	58°03.1'	06°53.3'	45F69	R	
	I131	Lastad	58°03.3'	07°42.4'	45F79	R	7
SAUDAFJORD							
	I201	Ekkjegrunn (G1)	59°38.7'	06°21.4'	48F66	P	
**	I205	Bølsnes (G5)	59°35.5'	06°18.3'	48F63	P	
BØMLO AREA							
JAMP	22A	Espevær, west	59°35.2'	05°58.5'	48F59	R	C, 1
SØRFJORD							
*	51A	Byrkjenes	60°05.1'	06°33.1'	49F66	P	
JAMP	52A	Eitrheimsneset	60°05.8'	06°32.2'	49F66	P	3

Appendix J. 1 (cont'd)

Station		Locality name	North latitude	East longitude	ICES position	INDEX type P/R	notes
BYFJORDEN, Bergen							
	I242	Valheimneset	60°23.7'	05°16.1'	49F51	P	
	I241	Nordnes	60°24.1'	05°18.2'	49F51	P	
	I243	Hagreneset	60°24.9'	05°18.3'	49F51	P	
SUNNDALSFJORDen							
	I912	Honnhammer	62°51.2'	08°09.7'	54F81	P	
	I911	Horvika	62°44.1'	08°31.4'	54F85	P	
	I913	Fjøseid	62°49.0'	08°16.48'	54F85	P	
[TRONDHEIM AREA - not related to INDEX investigation**]**							
*	80A	Østmerknes	63°27.5'	10°27.5'	56G04	P	
ORKDALSFJORD AREA, supplementary area (cf. Walday *et al*. 1995)							
JAMP	82A	Flakk	63°27.1'	10°12.6'	56G01	P	
JAMP	84A	Trossavika	63°20.8'	09°57.8'	55F97	P	
JAMP	87A	Ingdalsbukt	63°27.8'	09°54.8'	55F97	P	
INNER RANFJORD							
	I969	Bjørnbærviken (B9)	66°16.8'	14°02.1'	61G42	P	
	I962	Koksverkkaien (B2)	66°19.4'	14°08.0'	61G42	P	3
OUTER RANFJORD, Helgeland area							
*	96A	Breiviken	66°17.6'	12°50.5'	61G28	R	1
LOFOTEN AREA							
JAMP	98A	Husvågen (1997)	68°15.4'	14°40.6'	65G46	R	5
JAMP	98A	Husvågen (1998)	68°16.9'	14°40.1'	65G46	R	
FINNSNES-SKJERVØY AREA							
JAMP	41A	Fensneset, Grytøya	68°56.9'	16°38.5'	66G64	R	3
HAMMERFEST-HONNINGSVÅG AREA							
JAMP	44A	Elenheimsundet	70°30.8'	22°14.8'	70H23	R	1, 6
JAMP	46A	Smineset in Altesula	70°58.4'	25°48.1'	70H57	R	3, 6
VARANGER PENINSULA AREA							
JAMP	48A	Trollfjorden i Tanafjord	70°41.6'	28°33.3'	70H85	R	
JAMP	10A	Skagoodden	70°04.2'	30°09.8'	69J03	R	2
JAMP	11A	Sildkroneset, Bøkfjorden	69°47.0'	30°11.1'	68J02	R	

notes:

* - JAMP station but not sampled in accordance to JAMP guidelines, see Annex text.
** - Sufficient mussel-sample not found in 1996.
1 - mussels collected from buoy and/or buoy anchor lines
2 - mussels collected from sand/gravel bottom
3 - mussels collected from iron/cement pilings
4 - mussels collected from metal navigation buoys
5 - mussels collected from floating dock
6 - mussels collected from wooden docks
7 - mussels collected from tire on jetty

Appendix J. 2.
INDEX - Sampling and analyses for 1995-2000

Appendix J. 2. Blue mussel samples planned or used in INDEX 1995-2000, where P = "Pollution Index" and R = "Reference Index" (contaminated and assumed "background" stations, respectively). + indicates JAMP 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 J. 3. See Walday *et al.* (1995) for discussion of selection of stations and analyses.

	STATION	INDEX	ANALYSIS CODE										
JAMP st.			+	A	B	C	D	E	F	G	H	I	J
	HVALER/SINGLEFJORD AREA												
021	Kjøkø, south	P	.	3	.	.	.	.	.	.	.	.	.
024	Kirøy, north west	P	.	3	.	.	.	.	.	.	.	.	.
022	West Damholmen	P	.	3	.	.	.	.	.	.	.	.	.
023	Singlekalven, south	P	.	3	.	.	.	.	.	.	.	.	.
	IDDEFJORD												
01A	Sponvikskansen	P	.	.	3	.	.	.	.	.	.	.	.
011	Kråkenebbet	P	.	.	3	.	.	.	.	.	.	.	.
	OSLOFJORD, inner												
30A	Gressholmen	P	+	.	.	.	.	.	.	.	3	.	1
301	Akershuskaia	P	.	.	.	3	.	.	.	.	.	.	.
304	Gåsøya	P	.	.	.	3	.	.	.	.	.	.	.
307	Ramtonholmen	P	.	.	.	3	.	.	.	.	.	.	.
306	Håøya	P	.	.	.	3	.	.	.	.	.	.	.
	OSLOFJORD, mid and outer												
31A	Solbergstrand	R	+	.	.	.	.	.	.	.	.	.	1
35A	Mølen	R	+	.	.	.	.	.	.	.	.	.	.
36A	Færder	R	+	.	.	.	.	.	.	.	.	.	2*
	FRIERFJORD AREA, west of outer Oslofjord												
711	Steinholmen	P	.	.	.	.	3	.	.	.	.	.	1
712	Gjermundsholmen	P	.	.	.	.	3	.	.	.	.	.	1
71A	Bjørkøya	P	+	.	.	.	.	.	.	.	.	.	1
	INNER KRISTRIANSANDSFJORD												
132	Fiskåtangen	P	.	.	.	.	.	3	.	.	.	.	1
133	Odderø, west	P	.	.	.	.	.	3	.	.	.	.	1
	LISTA AREA												
15A	Gåsøya	R	+	.	.	.	.	.	.	.	.	.	1
131	Lastad	R	.	.	.	3.	.	.	.	.	.	.	.
	SAUDAFJORD												
201	Ekkjegrunn (G1)	P	.	.	.	.	.	.	3	.	.	.	.
205	Bølsnes (G5)	P	.	.	.	.	.	.	3	.	.	.	.
	BØMLO-SOTRA AREA												
22A	Espevær, west	R	+	.	.	.	.	.	.	.	.	.	2*
	SØRFJORD												
51A	Byrkjeneset	P	.	3	.	.	.	.	.	.	.	.	.
52A	Eirtrheimsneset	P	+	.	.	.	.	.	.	.	.	.	.

*) indicates Toxaphene included

Appendix J. 2 (cont'd)

JAMP st.	STATION	INDEX					ANALYSIS CODE +	A	B	C	D	E	F	G	H	I	J
	BYFJORDEN, BERGEN																
242	Valheimsneset	P	.	.	.	.	.	.	.	.	.	.	.	3	.	.	.
241	Nordnes	P	.	.	.	.	.	.	.	.	.	.	.	3	.	.	.
243	Hagreneset	P	.	.	.	.	.	.	.	.	.	.	.	3	.	.	.
	SUNNDALSFJORD																
912	Honnhammer	P	.	.	.	.	.	.	.	.	.	.	.	.	3	.	.
913	Fjøseid	P	.	.	.	.	.	.	.	.	.	.	.	.	3	.	.
	[TRONDHEIM AREA - not related to index investigation]																
80A	Østmarknes	-	.	.	.	.	.	.	.	.	.	.	.	.	.	3	.
	ORKDALSFJORD AREA (not suggested in Walday *et al.* 1995)																
82A	Flakk	P	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.
84A	Trossavika	P	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.
87A	Ingdalsbukta	P	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.
	INNER RANFJORD																
962	Koksverkkaien (B2)	P	.	.	.	.	.	.	.	.	.	.	.	.	.	0	.
969	Bjørnbærvikenn (B9)	P	.	.	.	.	.	.	.	.	.	.	.	.	.	3	.
	OUTER RANFJORD, HELGELAND AREA																
96A	Breivika, Tomma	R	.	.	.	.	.	3	.	.	.	.	.	.	.	.	.
	LOFOTEN AREA																
98A	Husvågen	R	.	.	.	.	+	.	.	.	.	.	.	.	.	.	1
	FINNSNES-SKJERVØY AREA																
41A	Fensneset, Grytøya	R	.	.	.	.	+	.	.	.	.	.	.	.	3	.	1
	HAMMERFEST-HONNINGSVÅG AREA																
44A	Elenheimsundet	R	.	.	.	.	+	.	.	.	.	.	.	.	3	.	2*
46A	Smineset in Altesula	R	.	.	.	.	+	.	.	.	.	.	.	.	3	.	1*
	VARANGER PENINSULA AREA																
48A	Trollfjorden i Tanafjord	R	.	.	.	.	+	.	.	.	.	.	.	.	3	.	.
10A	Skagoodden	R	.	.	.	.	+	.	.	.	.	.	.	.	3	.	1
11A	Sildkroneset	R	.	.	.	.	+	.	.	.	.	.	.	.	.	.	1

*) indicates Toxaphene included

Appendix J. 3.
INDEX - Key to analysis codes and sample counts

(Used in Appendix J. 2.)

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
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

[1]) Concerns MUSSEL 1 size group (3-5 cm), 3 parallel samples each a bulk of 20 individuals (see text)
[2]) Concerns MUSSEL discontinued since 1996
[3]) Concerns MUSSEL discontinued since 1995

Appendix J. 4.
INDEX - SFT 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
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 B. for definitions.

Appendix J. 5.
INDEX - Summary table “Pollution index” 1995-2000

Max(median). Statistics for all areas: (n = Index-station measured, N = Station programmed for index)

Average of Max E.C is 3.7

Index areaname (Pollution area) 1995	n	N	As ppm d.wt	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_S ppb w.wt	BAP ppb w.wt	DDTSS ppb w.wt	HCB ppb w.wt	HCHSS ppb w.wt	CBSSe ppb w.wt	TCDDN ppp w.wt	Max E.C I:V
Hvaler/Singlefjorden	4	4	i	1.06	i	1.73	i	i	0.2	i	i	i	i	i	0.93	0.1	0.53	6.73	i	II
Iddefjord	1	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	i	1.33	i	i	0.1	i	i	i	<132.90	0.8	1.95	<0.05	0.41	20.6	i	III
Frierfjorden	3	3	i	i	i	i	i	i	i	i	i	i	i	i	0.85	0.6	0.27	4.74	i	III
Inner Kristiandsfjord	2	2	i	i	i	i	i	i	i	i	i	i	1088.5	15	0.65	9.6	0.76	5.08	i	V
Saudafjord	2	2	i	4.77	i	0.82	i	i	i	i	i	i	<428.80	15	i	i	i	i	i	IV
Sørfjord	2	2	i	149	i	36.8	i	i	1.5	i	i	i	i	i	6.01	0.1	0.28	2.67	i	V
Byfjorden	3	3	i	i	i	i	i	i	i	i	i	i	i	i	3.76	0.2	0.74	19	i	III
Sunndalsfjord	2	2	i	i	i	i	i	i	i	i	i	i	809.8	8	i	i	i	i	i	III
Orkdalsfjord area	3	3	i	i	i	i	i	i	i	i	i	i	i	i	i	i	i	i	i	miss
Inner Ranfjord	2	2	i	4.44	i	0.75	i	i	i	i	i	i	785.7	31	i	i	i	i	i	V

I	20
II	10
III	9
IV	4
V	3

Max(median). Statistics for all areas: (n = Index-station measured, N = Station programmed for index)

Average of Max E.C is 3.6

Index areaname (Pollution area) **1996**	n	N	As ppm d.wt	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_S ppb w.wt	BAP ppb w.wt	DDTSS ppb w.wt	HCB ppb w.wt	HCHSS ppb w.wt	CBSSe ppb w.wt	TCDDN ppp w.wt	Max E.C I:V
Hvaler/Singlefjorden	4	4	i	2.29	i	2.26	i	i	0.4	i	i	i	i	i	<0.56	0.1	0.27	4.83	i	II
Iddefjord	1	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	i	0.82	i	i	0.1	i	i	i	<644.80	3.3	1.08	<0.05	0.3	20.86	i	III
Frierfjorden	3	3	i	i	i	i	i	i	i	i	i	i	i	i	0.26	2.2	0.19	4.18	i	IV
Inner Kristiandsfjord	2	2	i	i	i	i	i	i	i	i	i	i	<542.40	17	0.61	18	1.32	6.64	i	V
Saudafjord	1	2	i	4.39	i	0.86	i	i	i	i	i	i	891.4	35	i	i	i	i	i	V
Sørfjord	2	2	i	60.3	i	25.3	i	i	0.9	i	i	i	i	i	4.08	<0.05	0.6	1.92	i	IV
Byfjorden	3	3	i	i	i	i	i	i	i	i	i	i	i	i	7.8	0.2	1.03	30.72	i	III
Sunndalsfjord	2	2	i	i	i	i	i	i	i	i	i	i	<290.00	3.8	i	i	i	i	i	III
Orkdalsfjord area	3	3	i	i	i	i	i	i	i	i	i	i	i	i	i	i	i	i	i	miss
Inner Ranfjord	2	2	i	5.34	i	0.61	i	i	i	i	i	i	301.9	6.2	i	i	i	i	i	III

I	16
II	12
III	12
IV	4
V	2

Max(median). Statistics for all areas: (n = Index-station measured, N = Station programmed for index)

Average of Max E.C is 3.4

Index areaname (Pollution area) **1997**	n	N	As ppm d.wt	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_S ppb w.wt	BAP ppb w.wt	DDTSS ppb w.wt	HCB ppb w.wt	HCHSS ppb w.wt	CBSSe ppb w.wt	TCDDN ppp w.wt	Max E.C I:V
Hvaler/Singlefjorden	4	4	i	1.65	i	2.48	i	i	0.5	i	i	i	i	i	1.14	0.1	0.42	5.61	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	i	0.86	i	i	0.1	i	i	i	<409.10	3.5	12.08	0.1	0.79	33.81	i	IV
Frierfjorden	3	3	i	i	i	i	i	i	i	i	i	i	i	i	0.65	0.8	0.26	<2.68	i	III
Inner Kristiandsfjord	2	2	i	i	i	i	i	i	i	i	i	i	356	9.1	1.22	7.6	0.81	<6.00	i	V
Saudafjord	2	2	i	6.96	i	1.37	i	i	i	i	i	i	2726.5	108	i	i	i	i	i	V
Sørfjord	2	2	i	20.6	i	13.4	i	i	0.3	i	i	i	i	i	5.07	<0.05	0.29	<2.71	i	III
Byfjorden	3	3	i	i	i	i	i	i	i	i	i	i	i	i	2.94	0.1	0.4	24.54	i	III
Sunndalsfjord	1	2	i	i	i	i	i	i	i	i	i	i	<238.90	1.4	i	i	i	i	i	III
Orkdalsfjord area	0	3	i	i	i	i	i	i	i	i	i	i	i	i	i	i	i	i	i	miss
Inner Ranfjord	2	2	i	3.55	i	0.64	i	i	i	i	i	i	<132.90	3.1	i	i	i	i	i	III

I	17
II	13
III	12
IV	2
V	2

Max(median). Statistics for all areas: (n = Index-station measured, N = Station programmed for index)

Average of Max E.C is 3.0

Index areaname (Pollution area) **1998**	n	N	As ppm d.wt	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_S ppb w.wt	BAP ppb w.wt	DDTSS ppb w.wt	HCB ppb w.wt	HCHSS ppb w.wt	CBSSe ppb w.wt	TCDDN ppp w.wt	Max E.C I:V
Hvaler/Singlefjorden	4	4	i	2.12	i	3.31	i	i	0.9	i	i	i	i	i	1.13	0.1	<0.23	<4.42	i	III
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	i	1.27	i	i	0.1	i	i	i	<149.20	1	2.34	0.1	0.59	13.75	i	II
Frierfjorden	3	3	i	i	i	i	i	i	i	i	i	i	i	i	<0.63	0.7	0.41	3.18	i	III
Inner Kristiandsfjord	2	2	i	i	i	i	i	i	i	i	i	i	<279.00	3.8	0.53	7.2	<0.65	<5.09	i	V
Saudafjord	2	2	i	4.67	i	0.93	i	i	i	i	i	i	<550.50	9.8	i	i	i	i	i	III
Sørfjord	2	2	i	29.6	i	10.3	i	i	0.6	i	i	i	i	i	w	0.1	0.51	2.04	i	III
Byfjorden	3	3	i	i	i	i	i	i	i	i	i	i	i	i	<2.83	0.2	0.79	10.87	i	II
Sunndalsfjord	1	2	i	i	i	i	i	i	i	i	i	i	<180.00	1	i	i	i	i	i	II
Orkdalsfjord area	0	3	i	i	i	i	i	i	i	i	i	i	i	i	i	i	i	i	i	miss
Inner Ranfjord	2	2	i	2.99	i	0.61	i	i	i	i	i	i	257.5	12	i	i	i	i	i	IV

I	19
II	14
III	10
IV	1
V	1

Max(median). Statistics for alle areas: (n = Index-station measured, N = Station programmed for index)

Average of Max E.C is 3.1

Index areaname (Pollution area) 1999	n	N	As ppm d.wt	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_S ppb w.wt	BAP ppb w.wt	DDTSS ppb w.wt	HCB ppb w.wt	HCHSS ppb w.wt	CBSSe ppb w.wt	TCDDN ppp w.wt	Max E.C I:V
Hvaler/Singlefjorden	3	4	i	1.94	i	2.45	i	i	0.42	i	i	i	i	i	<1.15	0.09	<0.26	3.27	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	i	1.29	i	i	0.11	i	i	i	223.9	2.1	2.2	0.25	<0.34	20.01	i	III
Frierfjorden	3	3	i	i	i	i	i	i	i	i	i	i	i	i	0.76	0.6	<0.28	<2.64	i	III
Inner Kristiandsfjord	2	2	i	i	i	i	i	i	i	i	i	i	<1172.40	48	0.73	0.3	0.29	<4.10	i	V
Saudafjord	2	2	i	5.97	i	1.49	i	i	i	i	i	i	622.8	14	i	i	i	i	i	IV
Sørfjord	2	2	i	37.14	i	34.71	i	i	2.89	i	i	i	i	i	6.21	0.07	0.35	<2.42	i	IV
Byfjorden	3	3	i	i	i	i	i	i	i	i	i	i	i	i	4.5	0.12	0.28	13.88	i	II
Sunndalsfjord	2	3	i	i	i	i	i	i	i	i	i	i	384.2	3	i	i	i	i	i	III
Orkdalsfjord area	0	3	i	i	i	i	i	i	i	i	i	i	i	i	i	i	i	i	i	miss
Inner Ranfjord	1	2	i	5.13	i	0.59	i	i	i	i	i	i	<173.60	1.95	i	i	i	i	i	II

I	19
II	13
III	10
IV	3
V	1

Max(median). Statistics for alle areas: (n = Index-station measured, N = Station programmed for index)

Average of Max E.C is 2.9

Index areaname (Pollution area) 2000	n	N	As ppm d.wt	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_S ppb w.wt	BAP ppb w.wt	DDTSS ppb w.wt	HCB ppb w.wt	HCHSS ppb w.wt	CBSSe ppb w.wt	TCDDN ppp w.wt	Max E.C I:V
Hvaler/Singlefjorden	4	4	i	1.05	i	1.83	i	i	0.36	i	i	i	i	i	<0.93	0.09	<0.32	<2.77	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	i	1.13	i	i	0.06	i	i	i	<118.80	0.5	3.2	0.1	<0.31	11.45	i	II
Frierfjorden	3	3	i	i	i	i	i	i	i	i	i	i	i	i	0.56	0.43	0.21	<2.15	i	III
Inner Kristiandsfjord	2	2	i	i	i	i	i	i	i	i	i	i	<246.60	1.8	0.33	1.1	<0.26	1.9	i	IV
Saudafjord	2	2	i	7.09	i	1.99	i	i	i	i	i	i	<383.00	7.2	i	i	i	i	i	III
Sørfjord	2	2	i	91.67	i	27.33	i	i	3.86	i	i	i	i	i	4.27	0.05	0.29	<1.75	i	IV
Byfjorden	3	3	i	i	i	i	i	i	i	i	i	i	i	i	2.85	0.12	<0.26	9.88	i	II
Sunndalsfjord	2	3	i	i	i	i	i	i	i	i	i	i	1287.8	23	i	i	i	i	i	IV
Orkdalsfjord area	0	3	i	i	i	i	i	i	i	i	i	i	i	i	i	i	i	i	i	miss
Inner Ranfjord	1	2	i	3	i	0.83	i	i	i	i	i	i	<192.50	2.8	i	i	i	i	i	II

I	23
II	13
III	5
IV	5
V	0

Appendix J. 6.
INDEX - Summary table “Reference Index”
1995-2000

Max(median). Statistics for all areas: (n = Index-station measured, N = Station programmed for index)

Average of Max E.C is 1.5

Index areaname (Reference area) **1995**	n	N	As ppm d.wt	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_S ppb w.wt	BAP ppb w.wt	DDTSS ppb w.wt	HCB ppb w.wt	HCHSS ppb w.wt	CBSSe ppb w.wt	TCDDN ppp w.wt	Max E.C I:V
Mid and outer Oslofjord	3	3	w	1.68	w	1.32	i	w	0.1	w	i	w	w	w	<0.95	0.1	0.4	7.86	i	II
Lista area	2	2	w	0.52	w	1.44	i	w	0.1	w	i	w	<31.60	0.5	<0.34	<0.05	0.38	<1.28	i	I
Bømlo-Sotra area	1	1	w	1.18	w	1.41	i	w	0.1	w	i	w	w	w	<0.46	<0.05	0.31	<1.38	i	I
Outer Ranfjord, Helgeland area	1	2	w	1.12	w	0.96	i	w	0.1	w	i	w	<37.70	<0.50	0.21	<0.05	0.38	<0.90	i	I
Lofoten area	1	2	w	3.12	w	0.69	i	w	0.3	w	i	w	w	w	4.42	0.1	0.15	12.31	i	II
Finnsnes- Skjervøy area	1	1	w	0.9	w	2.95	i	w	0.1	w	i	w	w	w	<0.18	<0.05	0.16	<0.81	i	II
Hammerfest- Honningsvåg area	2	2	w	2.57	w	2.74	i	w	0.1	w	i	w	<129.90	0.7	<0.23	<0.05	<0.15	<1.34	i	II
Varanger peninsula area	3	3	w	2.78	w	1.71	i	w	0.2	w	i	w	<6.90	<0.50	<0.36	<0.05	0.16	<0.88	i	I

I	56
II	8
III	0
IV	0
V	0

Max(median). Statistics for all areas: (n = Index-station measured, N = Station programmed for index)

Average of Max E.C is 1.6

Index areaname (Reference area) **1996**	n	N	As ppm d.wt	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_S ppb w.wt	BAP ppb w.wt	DDTSS ppb w.wt	HCB ppb w.wt	HCHSS ppb w.wt	CBSSe ppb w.wt	TCDDN ppp w.wt	Max E.C I:V
Mid and outer Oslofjord	3	3	7	2.04	w	1.6	i	0.5	0	0.9	i	0.1	w	w	<0.25	<0.05	0.25	13.95	i	II
Lista area	2	2	w	0.67	w	1.22	i	w	0.1	w	i	w	<44.60	<0.50	<0.20	<0.05	0.29	<2.14	i	I
Bømlo-Sotra area	1	1	w	1.51	w	1.14	i	w	0.1	w	i	w	w	w	<0.11	<0.05	<0.14	<0.78	i	I
Outer Ranfjord, Helgeland area	1	2	w	0.9	w	0.78	i	w	0.1	w	i	w	w	w	<0.12	<0.05	0.21	<0.62	i	I
Lofoten area	1	2	w	4.11	w	0.78	i	w	0.3	w	i	w	w	w	<1.15	<0.05	<0.13	8.9	i	II
Finnsnes- Skjervøy area	1	1	w	0.79	w	1.63	i	w	0.1	w	i	w	<24.25	<0.50	<0.05	<0.05	<0.05	<0.40	i	I
Hammerfest-Honningsvåg area	2	2	w	1.66	w	2.72	i	w	0.1	w	i	w	<212.50	0.8	<0.11	<0.05	<0.11	<1.59	i	III
Varanger peninsula area	3	3	w	0.74	w	2.34	i	w	0.1	w	i	w	<21.30	<0.50	<0.14	<0.05	0.14	<0.98	i	II

I	61
II	6
III	1
IV	0
V	0

Max(median). Statistics for all areas: (n = Index-station measured, N = Station programmed for index)

Average of Max E.C is 1.3

Index areaname (Reference area) **1997**	n	N	As ppm d.wt	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_S ppb w.wt	BAP ppb w.wt	DDTSS ppb w.wt	HCB ppb w.wt	HCHSS ppb w.wt	CBSSe ppb w.wt	TCDDN ppp w.wt	Max E.C I:V
Mid and outer Oslofjord	3	3	w	2.17	w	1.84	i	w	0.1	w	i	w	w	w	2.75	0.1	1.16	4.9	i	II
Lista area	2	2	w	1.12	w	1.14	i	w	0.1	w	i	w	<36.70	<0.50	0.58	<0.05	0.53	2.43	i	I
Bømlo-Sotra area	1	1	w	1.37	w	1.01	i	w	0.1	w	i	w	w	w	<0.39	<0.05	0.26	<0.73	i	I
Outer Ranfjord, Helgeland area	0	2	w	w	w	w	i	w	w	w	i	w	w	w	w	w	w	w	i	miss
Lofoten area	1	2	w	1.54	w	0.85	i	w	0.1	w	i	w	w	w	0.61	<0.05	0.14	<1.57	i	I
Finnsnes- Skjervøy area	1	1	w	0.65	w	1.88	i	w	0.1	w	i	w	w	w	<0.15	<0.05	0.12	<0.40	i	I
Hammerfest-Honningsvåg area	1	2	w	1.15	w	1.51	i	w	0.1	w	i	w	w	w	0.27	<0.05	0.18	<4.49	i	II
Varanger peninsula area	2	3	w	0.81	w	1.59	i	w	0.2	w	i	w	w	w	0.33	0.1	0.13	<1.07	i	I

I	46
II	5
III	0
IV	0
V	0

Max(median). Statistics for all areas: (n = Index-station measured, N = Station programmed for index)

Average of Max E.C is 1.4

Index areaname (Reference area) **1998**	n	N	As ppm d.wt	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_S ppb w.wt	BAP ppb w.wt	DDTSS ppb w.wt	HCB ppb w.wt	HCHSS ppb w.wt	CBSSe ppb w.wt	TCDDN ppp w.wt	Max E.C I:V
Mid and outer Oslofjord	3	3	w	1.57	w	1.14	i	w	0.1	w	i	w	w	w	<1.30	<0.03	<0.52	<2.01	i	I
Lista area	2	2	w	1.28	w	1.31	i	w	0.1	w	i	w	<42.70	<0.50	0.6	<0.03	<0.53	3.58	i	I
Bømlo-Sotra area	1	1	w	1.21	w	0.85	i	w	0.1	w	i	w	w	w	<1.61	<0.03	<0.51	<2.05	i	I
Outer Ranfjord, Helgeland area	0	2	w	w	w	w	i	w	w	w	i	w	w	w	w	w	w	w	i	miss
Lofoten area	1	2	w	2.36	w	1.58	i	w	0.2	w	i	w	w	w	<2.28	<0.05	<0.20	<1.21	i	II
Finnsnes- Skjervøy area	0	1	w	w	w	w	i	w	w	w	i	w	w	w	w	w	w	w	i	miss
Hammerfest-Honningsvåg area	0	2	w	w	w	w	i	w	w	w	i	w	w	w	w	w	w	w	i	miss
Varanger peninsula area	1	3	w	2.34	w	2.32	i	w	0.1	w	i	w	w	w	w	w	w	w	i	II

I	31
II	2
III	0
IV	0
V	0

Max(median). Statistics for all areas: (n = Index-station measured, N = Station programmed for index)

Average of Max E.C is 1.4

Index areaname (Reference area) **1999**	n	N	As ppm d.wt	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_S ppb w.wt	BAP ppb w.wt	DDTSS ppb w.wt	HCB ppb w.wt	HCHSS ppb w.wt	CBSSe ppb w.wt	TCDDN ppp w.wt	Max E.C I:V
Mid and outer Oslofjord	3	3	w	1	w	1.53	i	w	0.1	w	i	w	w	w	1.83	<0.05	<0.44	2.88	i	I
Lista area	2	2	w	1.66	w	1.18	i	w	0.1	w	i	w	<68.05	1	<0.67	0.1	<0.40	<2.49	i	II
Bømlo-Sotra area	1	1	w	1.7	w	1.32	i	w	0.1	w	i	w	w	w	<0.54	<0.05	<0.23	<0.93	i	I
Outer Ranfjord, Helgeland area	0	2	w	w	w	w	i	w	w	w	i	w	w	w	w	w	w	w	i	miss
Lofoten area	1	2	w	1.59	w	2.17	i	w	0.3	w	i	w	w	w	<0.52	<0.06	<0.20	<0.43	i	II
Finnsnes- Skjervøy area	0	1	w	w	w	w	i	w	w	w	i	w	w	w	w	w	w	w	i	miss
Hammerfest-Honningsvåg area	0	2	w	w	w	w	i	w	w	w	i	w	w	w	w	w	w	w	i	miss
Varanger peninsula area	1	3	w	1.57	w	1.61	i	w	0.1	w	i	w	w	w	<0.47	<0.05	<0.30	<0.90	i	I

I	33
II	4
III	0
IV	0
V	0

Max(median). Statistics for alle areas: (n = Index-station measured, N = Station programmed for index)

Average of Max E.C is 1.4

Index areaname (Reference area) **2000**	n	N	As ppm d.wt	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_S ppb w.wt	BAP ppb w.wt	DDTSS ppb w.wt	HCB ppb w.wt	HCHSS ppb w.wt	CBSSe ppb w.wt	TCDDN ppp w.wt	Max E.C I:V
Mid and outer Oslofjord	3	3	w	0.94	w	1.65	i	w	0.05	w	i	w	w	w	0.77	0.09	0.41	<1.31	i	I
Lista area	2	2	w	2.2	w	1.98	i	w	0.16	w	i	w	<66.40	<0.50	<0.36	0.06	<0.32	<2.20	i	II
Bømlo-Sotra area	1	1	w	1.3	w	2.69	i	w	0.03	w	i	w	w	w	0.51	0.04	0.29	<1.07	i	II
Outer Ranfjord, Helgeland area	0	2	w	w	w	w	i	w	w	w	i	w	w	w	w	w	w	w	i	miss
Lofoten area	1	2	w	1.49	w	1.68	i	w	0.11	w	i	w	w	w	<0.20	<0.05	<0.19	<0.53	i	I
Finnsnes- Skjervøy area	0	1	w	w	w	w	i	w	w	w	i	w	w	w	w	w	w	w	i	miss
Hammerfest-Honningsvåg area	0	2	w	w	w	w	i	w	w	w	i	w	w	w	w	w	w	w	i	miss
Varanger peninsula area	1	3	w	1.44	w	1.53	i	w	0.05	w	i	w	w	w	<0.18	<0.05	<0.16	<0.75	i	I

I	35
II	2
III	0
IV	0
V	0

Appendix K.
Biological effects methods summary results 1997-2000

Table 10. Summary statistics for biological effects parameters measured in cod (*Gadus morhua*), 1997-2000. (Small adjustments were made for previous years due to reanalyses, see also footnote.)

Station:	30B	36B	15B	23B	53B	67B	98B	10B
1997								
count	16	21	25	22	25	25		
Weight, median	**0.8**	**1.1**	**1.4**	**1.3**	**1.2**	**1.1**		
Weight, st.dev.	0.3	0.4	0.5	0.3	0.3	0.5		
biliverdin mg/L, median	**--**	**966.7**	**628.0**	**674.4**	**410.0**	**663.4**		
biliverdin mg/L, st.dev.	--	806.1	173.1	363.0	395.9	286.8		
microsomal protein (mg/mL), median	**3.9**	**8.5**	**5.3**	**6.1**	**6.6**	**6.4**		
microsomal protein (mg/mL), st.dev. [1)]	4.4	6.7	6.9	6.7	6.6	6.4		
cytosol protein (mg/mL), median	**8.5**	**16.8**	**13.3**	**14.4**	**17.9**	**17.4**		
cytosol protein (mg/mL), st.dev. [1)]	4.7	8.6	7.0	7.3	8.3	9.3		
OH-pyrene/380 nm, median	**--**	**22.5**	**265.1**	**15.8**	**113.3**	**71.1**		
OH-pyrene/380 nm, st.dev.	--	12.9	1073	12.5	72.6	29.5		
ALA-D (µg pbg/min/mg protein), median	**2.4**	**3.6**	**4.5**	**4.2**	**2.0**	**1.9**		
ALA-D (µg pbg/min/mg protein), st.dev.	1.6	1.2	1.7	1.3	1.6	2.0		
EROD (pmol/min/mg protein), median	**68.8**	**110.0**	**44.5**	**94.1**	**429.6**	**103.4**		
EROD (pmol/min/mg protein), st.dev.	38.8	53.4	61.6	27.4	376.7	51.9		
MT (µg/mg protein), median	**1.3**	**0.9**	**2.1**	**1.1**	**0.4**	**1.5**		
MT (µg/mg protein), st.dev.	1.7	0.8	3.3	2.8	1.5	1.3		
1998								
count	30	27	25	25	30	30		
Weight, median	**1.0**	**0.6**	**1.1**	**1.2**	**1.1**	**0.5**		
Weight, st.dev.	0.1	0.2	0.3	0.5	0.4	0.5		
380 nm, median	**15.2**	**26.1**	**23.4**	**42.0**	**16.9**	**18.4**		
380 nm, st.dev.	9.5	15.0	11.4	25.2	8.5	11.3		
microsomal protein (mg/mL), median	**3.6**	**1.6**	**3.2**	**2.7**	**2.8**	**1.2**		
microsomal protein (mg/mL), st.dev. [1)]	4.1	2.4	4.6	5.5	4.7	3.6		
cytosol protein (mg/mL), median	**10.2**	**5.3**	**10.4**	**8.0**	**9.1**	**3.1**		
cytosol protein (mg/mL), st.dev. [1)]	4.9	2.3	4.8	5.4	5.4	3.7		
OH-pyrene/380 nm, median	**115.4**	**42.7**	**3770**	**12.7**	**83.0**	**20.5**		
OH-pyrene/380 nm, st.dev.	33.6	16.9	3625	26.8	172.1	11.5		
ALA-D (µg pbg/min/mg protein), median	**1.9**	**3.3**	**2.9**	**3.0**	**1.2**	**3.4**		
ALA-D (µg pbg/min/mg protein), st.dev.	0.8	2.2	2.8	1.4	1.0	2.9		
EROD (pmol/min/mg protein), median	**33.0**	**10.6**	**14.8**	**20.2**	**39.7**	**60.8**		
EROD (pmol/min/mg protein), st.dev.	32.8	18.3	25.2	20.8	31.9	44.0		
MT (µg/mg protein), median	**1.3**	**1.2**	**1.4**	**2.5**	**1.6**	**1.7**		
MT (µg/mg protein), st.dev.	0.6	0.8	1.8	1.6	1.0	1.2		

[1)] Error in previously reported values.

Table 11. (Cont.)

Station:	30B	36B	15B	23B	53B	67B	98B	10B
1999								
count	**24**	**25**	**25**	**25**	**25**	**25**		
Weight, median	**1.0**	**0.9**	**1.0**	**1.0**	**0.9**	**1.0**		
Weight, st.dev.	0.1	0.1	0.1	0.1	0.1	0.1		
380 nm, median	**21.5**	**27.7**	**24.5**	**46.5**	**38.9**	**30.8**		
380 nm, st.dev. [1)]	14.7	17.3	13.6	17.5	45.1	13.9		
microsomal protein (mg/mL), median	**3.9**	**2.4**	**2.3**	**2.6**	**3.1**	**3.1**		
microsomal protein (mg/mL), st.dev. [1)]	3.4	2.4	2.6	2.9	2.8	2.8		
cytosol protein (mg/mL), median	**9.5**	**6.5**	**5.3**	**7.6**	**7.7**	**7.3**		
cytosol protein (mg/mL), st.dev. [1)]	3.7	2.4	2.4	2.3	3.1	2.5		
OH-pyrene/380 nm, median	**129.7**	**28.9**	**252.9**	**11.2**	**58.6**	**16.5**		
OH-pyrene/380 nm, st.dev. [1)]	45.5	18.5	15819	9.5	24.9	10.4		
ALA-D (µg pbg/min/mg protein), median	**3.1**	**2.8**	**3.3**	**4.4**	**2.8**	**4.1**		
ALA-D (µg pbg/min/mg protein), st.dev.	0.6	1.7	1.5	1.0	0.8	1.1		
EROD (pmol/min/mg protein), median	**76.3**	**106.4**	**277.0**	**99.6**	**90.1**	**144.3**		
EROD (pmol/min/mg protein), st.dev.	227.2	73.7	271.5	53.7	72.8	209.9		
MT (µg/mg protein), median	**n/r**	**n/r**	**n/r**	**n/r**	**n/r**	**n/r**		
MT (µg/mg protein), st.dev.								
2000								
count	**25**	**23**		**25**	**25**	**15**	**15**	**25**
Weight, median								
Weight, st.dev.								
380 nm, median	**14.2**	**41.1**		**23.3**	**37.2**	**30.6**	**12.6**	**18.1**
380 nm, st.dev.	6.1	20.0		14.6	29.0	12.1	7.3	23.3
microsomal protein (mg/mL), median	**2.9**	**2.8**		**2.1**	**2.3**	**2.5**	**3.1**	**1.6**
microsomal protein (mg/mL), st.dev.	3.2	3.7		3.03.9	3.9	37	3.8	2.4
cytosol protein (mg/mL), median	**7.8**	**9.7**		**7.1**	**9.3**	**8.6**	**7.9**	**5.8**
cytosol protein (mg/mL), st.dev.	3.7	4.0		2.9	4.2	3.6	4.2	2.2
OH-pyrene/380 nm, median	**12.3**	**5.1**		**4.2**	**9.2**	**1.6**	**1.6**	**0.3**
OH-pyrene/380 nm, st.dev.	7.1	2.1		2.0	5.4	0.5	0.8	0.2
ALA-D (µg pbg/min/mg protein), median	**1.8**	**2.6**		**2.4**	**1.5**	**2.7**	**2.3**	**2.3**
ALA-D (µg pbg/min/mg protein), st.dev.	0.5	0.3		0.4	0.5	0.6	0.3	0.5
EROD (pmol/min/mg protein), median	**259.5**	**64.9**		**73.5**	**133.3**	**125.2**	**2.3**	**102.6**
EROD (pmol/min/mg protein), st.dev.	110.2	276.7		275.6	74.8	97.1	17.8	54.1
MT (µg/mg protein), median	**8.0**	**11.6**		**14.3**	**11.7**	**16.3**	**9.3**	**5.9**
MT (µg/mg protein), st.dev.	2.0	5.7		4.0	3.4	6.9	0.8	1.6

[1]) Error in previously reported values.

Table 12. Summary statistics for biological effects parameters measured in dab, 1999-2000 (*Limanda limanda*, st.36F, 15F and 218F (21F)) and flounder (*Platichthys flesus*, 53F and 67F) 2000. (Small adjustments were made for previous years due to reanalyses, see also footnote.)

Station:	36F	15F	218F	53F	67F	98F	10F
1999							
count	**21**	**25**	**12**	**25**	**25**		
Weight, median	**0.9**	**0.8**	**1.0**	**1.0**	**1.0**		
Weight, st.dev.	0.2	0.2	0.2	0.1	0.1		
380 nm, median	**10.5**	**6.9**	**26.8**	**28.5**	**15.8**		
380 nm, st.dev.	8.4	8.6	25.6	30.2	15.5		
microsomal protein (mg/mL), median	**3.1**	**3.3**	**3.2**	**4.7**	**3.5**		
microsomal protein (mg/mL), st.dev. [1]	2.6	2.2	2.3	2.3	2.2		
cytosol protein (mg/mL), median	**7.3**	**7.1**	**7.4**	**8.5**	**7.0**		
cytosol protein (mg/mL), st.dev. [1]	2.9	2.4	2.5	3.2	2.1		
OH-pyrene/380 nm, median	**48.8**	**333.8**	**50.0**	**74.6**	**41.0**		
OH-pyrene/380 nm, st.dev.	45.1	2968	35.0	51.7	23.9		
ALA-D (µg pbg/min/mg protein), median	**2.1**	**3.1**	**3.4**	**2.7**	**3.8**		
ALA-D (µg pbg/min/mg protein), st.dev.	1.2	1.4	0.8	0.9	1.3		
EROD (pmol/min/mg protein), median	**619.5**	**565.0**	**26.0**	**24.6**	**16.1**		
EROD (pmol/min/mg protein), st.dev.	4312	2816	26.1	31.0	35.8		
MT (µg/mg protein), median	**13.7**	**11.0**	**18.3**	**15.0**	**34.1**		
MT (µg/mg protein), st.dev.	10.8	7.9	9.3	6.7	15.3		
2000							
count	**9**		**24**	**11**	**23**	**18**	**15**
Weight, median							
Weight, st.dev.							
380 nm, median	**26.3**			**31.9**	**36.6**	**15.8**	**14.5**
380 nm, st.dev.	24.0			65.7	23.4	10.5	9.0
microsomal protein (mg/mL), median	**2.4**		**3.1**	**3.6**	**2.9**	**3.4**	**3.5**
microsomal protein (mg/mL), st.dev.	2.5		2.9	3.2	3.4	3.8	3.4
cytosol protein (mg/mL), median	**5.6**		**8.7**	**8.8**	**9.0**	**10.6**	**9.6**
cytosol protein (mg/mL), st.dev.	2.6		2.7	4.4	3.7	4.4	3.9
OH-pyrene/380 nm, median	**4.3**			**9.7**	**1.7**	**1.3**	**0.3**
OH-pyrene/380 nm, st.dev.	4.6			13.6	0.8	5.9	0.1
ALA-D (µg pbg/min/mg protein), median	**2.1**		**2.3**	**1.1**	**2.1**	**1.8**	**2.2**
ALA-D (µg pbg/min/mg protein), st.dev.	0.5		0.8	08	0.7	0.8	0.6
EROD (pmol/min/mg protein), median	**349.2**		**19.9**	**6.2**	**7.3**	**121.3**	**214.0**
EROD (pmol/min/mg protein), st.dev.	1339		74.4	36.9	6.8	380.5	155.6
MT (µg/mg protein), median	**9.8**		**12.9**	**8.3**	**27.3**	**13.7**	**6.4**
MT (µg/mg protein), st.dev.	3.7		4.1	5.6	6.6	4.1	1.8

[1]) Error in previously reported values.

Appendix L.
Effects and concentrations of organotin 2000

Table 13. Imposex (VDSI, RPSI) and levels of TBT (µg Sn/kg d.w.) in dogwhelks (*Nucella lapillus*) in Haugesund (st. 224G, 226G, 226X, 227G), outer Oslofjord (36G) and northern Norway (41G-48G), in 2000. SH = avg. shell height in mm. (cf. Appendix F. , Maps 2, 5, 17-22).

St.	Area	SH	VDSI	RPSI	TBT	n
224G	Heggjelen	28.26	4.3	0.55	49	22
226G	Karmsund bridge (west)	31.37	4.3	0.75	131	10
226X	Karmsund bridge (east)	28.59	4.6	1.51	86	27
227G	Melandholmen	28.24	4.5	0.59	159	28
41G	Harstad	24.84	4	0.12	39	27
42G	Finnsnes	26.54	4.2	0.17	37	24
43G	Skjervøy	26.18	4	0.16	81	35
44G	Alta	28.62	3.1	0.04	39	31
45G	Saughamn. ytre	25.80	0.1	0	7	35
46G	Honningsvåg	26.58	4.3	0.21	46	18
47G	Kifjordneset	20.91	0	0	4	30
48G	Mehamn	24.49	4.3	0.47	100	18
36G	Færder	30.89	4	0.13	39	23

Table 14. Levels of TBT (µg Sn/kg d.w.) in bulk samples (n=50) of mussels (*Mytilus edulis*) at five stations in Southern Norway; Oslofjord (st.30A, 36A) and Haugesund area (st.226X, 227A, 221A) in 2000. Sh.length = avg. shell length in mm. Class condition for TBT (formula based) on a dry weight basis in the Norwegian classification system for environmental quality. (cf. **Table 6**) (cf. Appendix F. , Maps 2 and 5).

St.	Area	Sh. length	TBT	TBT* (ppm)	Class
30A	Gressholmen	26	630	1.5	markedly polluted
30A	Gressholmen	36	383	0.9	markedly polluted
30A	Gressholmen	44	371	0.9	markedly polluted
36A	Færder	36	35	0.1	moderately polluted
36A	Færder	45	34	0.1	moderately polluted
226X	Karmsund bridge (east)	??	228	0.6	markedly polluted
227A	Melandholmen	??	154	0.4	moderately polluted
221A	Stangeland	??	720	1.8	markedly polluted
221A	Stangeland	??	747	1.8	markedly polluted
221A	Stangeland	??	742	1.8	markedly polluted

*) TBT ppb dw converted to formulation basis ppm dw by a factor of 2.44/1000.