



Long-term monitoring of environmental quality in Norwegian coastal waters.

Joint Assessment and Monitoring Programme (JAMP).

CONTAMINANT AND EFFECTS DATA FOR
SEDIMENTS, SHELLFISH AND FISH 1981-2006

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**JOINT ASSESSMENT AND MONITORING PROGRAMME (JAMP)
CONTAMINANT and EFFECTS DATA FOR SEDIMENTS,
SHELLFISH and FISH
1981-2006**

Foreword

This report presents the Norwegian data for contaminants in sediment and organisms, as well as the results from biological effects methods compiled 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 2006 investigations are directed to particular JAMP issues relating to contaminants and implemented by SIME. JAMP replaced Joint Monitoring Programme (JMP) in 1995 and has been an integral part of OSPAR's Coordinated Environmental Monitoring Programme (CEMP) since 1998.

The Norwegian JAMP was carried out by the Norwegian Institute for Water Research (NIVA) by contract from the Norwegian Pollution Control Authority (SFT, NIVA contract 80106, 25106, 26106, and 27106).

The Norwegian contribution to the JAMP was initiated by SFT in 1981 as part of the national monitoring programme. Three main areas have been investigated: the Oslofjord and adjacent areas (Hvaler-Singlefjord area and Langesundsfjord, 1981-), Sør fjord/Hardangerfjord (1983-84, 1987-) and Orkdalsfjord area (1984-89, 1991-93, 1995-96, 2004-05).

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.

Reader's guide. *Due to the size of this report (approximately 2000 pp.) it is impractical to produce as a hard copy in its entirety. Following the SIME meeting in Edinburgh, 11-13 February, 2008, the full report in PDF-format can be downloaded from either of two websites: the SFT's website and using SFT's TA-number at http://www.sft.no/publikasjonerforside_10990.aspx or from NIVA's website at <http://www.niva.no/symfoni/infportal/portenglish.nsf> and doing a search on the "løpenr", which is the NIVA-report number for this report.*

Thanks are due to my colleagues at NIVA, and the following institutes that have contributed to JAMP since its start in 1981:

*Eurofins [DK]
Institute for Nutrition, Fisheries Directorate
FORCE Institutes, Div. for Isotope Technique and Analysis [DK]
GALAB Laboratories GmbH [D]
Institute for Energy Technology
Institute of Marine Research (IMR)
Nordic Analytical Center
Norwegian Institute for Air Research
Swedish Environmental Research Institute
Fondation for Scientific and Industrial Research at the Norwegian Institute of Technology - SINTEF (a
division, previously: Center for Industrial Research SI)
Norwegian Veterinary Institute
Water Quality Institute [DK]*

Oslo, 22 May 2008

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Project manager*

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NB: Full content of Appendices E-L are located via links identified under each appendix

1. Background and aims

The Oslo and Paris commissions were established in the seventies with the aim to protect the marine environment against anthropogenic contamination. The Oslo commission focuses on problems relating to dumping at sea in the Northeast Atlantic and Baltic areas. The Paris commission focuses on discharges from land based sources. Together, the commission (Oslo and Paris Commission - OSPAR), govern the "Joint Assessment and Monitoring Programme" (JAMP). JAMP commenced in 1995 as a continuation of the "Joint Monitoring Programme" (JMP). Since 1998, parts of JAMP have formed and integral part of OSPAR's Coordinated Environmental Monitoring Programme (CEMP). JAMP receives guidance from the "International Council for the Exploration of the Sea" (ICES). Norway and other European countries, which are members of OSPAR have committed themselves to protection of the marine environment of the North East Atlantic for preventing and eliminating pollution, protecting human health and ensuring sound and healthy marine ecosystems (OSPAR 1998).

The Norwegian contribution to JAMP focuses on two JAMP areas: Oslofjord-area (including the Hvaler area, Singlefjord and Langesundsfjord) and the Sør fjord/Hardangerfjord area. Orkdalsfjord, a third JAMP area, has only been investigated once since 1996. During 1990-95 Norway has also included other areas, mostly remote from point sources of pollution, along the coast from the Swedish border in the South to the Russian border in the North. This was in connection with the Norwegian contribution to the investigation of the North Sea (*North Sea Task Force (NSTF) Monitoring Master Plan (MMP)*) in 1990 when JAMP expanded to cover the area from Oslofjorden og Bergen. The programme has since also included areas farther north. In 1992 and 1994 contaminants in marine sediments were investigated from Bergen to Varangerfjorden.

An overview of the analytical methods (1981-2007) has been presented (Green *et al.* 2008b). The results have previously been presented for 1981-1983 (only Oslofjord; Enger *et al.* 1984, 1985), 1984-1985 (Green 1988), 1986 (Green 1987, SFT 1987), 1987 (SFT 1988), 1988 (Green 1989; SFT 1989), 1989 (Green 1991a, SFT 1990), 1990 (Green 1992, JMG 1994), 1991 (Green 1993a), 1992 (Green 1994, Green & Knutzen 1994), 1993 (Green 1995a), 1994 (Green 1995b), 1995 (Green 1997a), 1996 (Green 1997b), 1997 (Green *et al.* 1999), 1998 (Green *et al.* 2000), 1999 (Green *et al.*, 2001a), 2000 (Green *et al.*, 2002a), 2001 (Green, *et al.*, 2003), 2002 (Green, *et al.*, 2004a), 2003 (Green, *et al.*, 2004b), 2004 (Green, *et al.*, 2005), 2005 (Green, *et al.*, 2007), and 2006 (Green, *et al.*, 2008a). The results have been incorporated in European JMG regional assessments of sediment (JMG 1993) and biota (ICES 1988, JMG 1992) and temporal trends in biota (ICES 1989; 1991; ASMO 1994, OSPAR 2005). An overview of the analytical methods (1981-2000) has been presented (Green 1993b; Green *et al.* 2001b). The raw data has been presented for sediment 1986-1997 (Green & Klungsøyr 1994; Green & Rønningen 1995, Green *et al.* 2002b), biota 1981-1992 (Green & Rønningen 1994), 1993-1997 (Green & Severinsen 1999a, b), 1998-2001 (Green *et al.* 2002c, d) and summary statistics 1981-2001 (Green *et al.* 2002e). The results for 1981-1992 have been assessed by Green *et al.* (1995). The results for 1981-1999 have been assessed by Green *et al.* (2001c). An evaluation of "background" levels of contaminants in biota based on JMP data has been done by Knutzen & Green (1995, 2001) and Green & Knutzen (2003). Application of pollution and reference indices using the blue mussel and coordinated with JAMP has also been assessed (Green & Knutzen 2001). Results from biological effects methods 1997-2001 have been assessed as well (Ruus *et al.* 2003). The results have also been incorporated in OSPAR assessments (e.g. OSPAR 2005.).

2. Sampling

The JAMP stations monitored 1981-2006 by Norway are spread from the Swedish border to Varangerfjorden (Appendix D. , Appendix C. and Appendix D.).

The sampling of biota follows as closely as possible the OSPAR guidelines (1997, see also www.ospar.org/eng/ > *measures* > *list of other agreements*). These have replaced relevant portions of earlier guidelines (ICES 1986, 1992 including revisions up to 1999).

The results presented are for the total fraction of the **sediment** (<2000µm) and are not normalised because agreement on this issue within OSPAR has not been reached.

For historical reasons three sizes of **mussels** (*Mytilus edulis*) have been sampled from most of the stations. The size classes were: 2-3, 3-4 and 4-5cm. In 1992 a stricter ICES approach was applied for new stations (north of the Bømlø area). For these stations 3 pooled samples of 20 individuals each are collected (ICES 1992) in the size range of 3-4 or 4-5 cm. These samples were depurated. Samples collected for SFT pollution index (station codes prefixed with "I") were not.

Cod (*Gadus morhua*) and one flatfish species are sampled; 25 individuals of each species. If possible, the same species collected in previous years at the selected stations are to be collected in 1999. The order of preference for flatfish species is: **dab** (*Limanda limanda*), **flounder** (*Platichthys flesus*), **plaice** (*Pleuronectes platessa*) and **lemon sole** (*Microstomus kitt*). If possible, the fish samples are sampled with five individuals within each of the five length classes roughly geometrically distributed, viz.:

size-class	cod	flatfish
1	370-420mm	300-320mm
2	420-475mm	320-340mm
3	475-540mm	340-365mm
4	540-615mm	365-390mm
5	615-700mm	390-420mm

3. Analyses

OSPAR agreed that the concentration of at least cadmium, mercury, lead and polychlorinated hydrocarbons should be monitored in sediment (OSPAR 2007). The Norwegian JAMP has included many other contaminants as well, many of which are relevant to the CEMP. A complete list of variables and abbreviations is given in Appendix A.

An overview of the contaminants and associated analytical method codes, as well as a brief description of the analytical methods is given by Shi *et al.* (2007a). Nearly all the metal analyses and most of the organic analyses were performed at the Norwegian Institute for Water Research (NIVA), however the following institutes have contributed with analyses:

- Eurofins [DK]
- Institute for Nutrition, Fisheries Directorate
- FORCE Institutes, Div. for Isotope Technique and Analysis [DK]
- GALAB Laboratories GmbH [D]
- Institute for Energy Technology
- Institute of Marine Research (IMR)
- Nordic Analytical Center
- Norwegian Institute for Air Research
- Swedish Environmental Research Institute
- Fondation for Scientific and Industrial Research at the Norwegian Institute of Technology - SINTEF (a division, previously: Center for Industrial Research SI)
- Norwegian Veterinary Institute
- Water Quality Institute [DK]

The analytical laboratories involved for each analyses are noted in the “Raw data” tables of the appendices, i.e. Appendix E. (sediment), Appendix G. (shellfish), Appendix H. (fish), and Appendix I. (biological effects methods).

The **mussels** are analysed for all contaminants. The shell length of each mussel is measured. On a bulk basis the total shell weight, total soft tissue weight, dry weight and %

For **fish**, two types of tissue are analysed. The fish fillet is analysed for mercury and PCB content and the liver for all mentioned contaminants except mercury. In addition, the age, sex and pathological state for each individual is determined. Other measurements include: fish weight and length, weight of liver, liver dry weight and fat content (% total extractable fat), the fillet dry weight and its % fat content.

The results of the analyses are presented in Appendix E. to Appendix L.

4. Comment on quality assurance and detection limit

Analytical labs have been routinely involved in international and national intercalibration exercises for quality assurance (QA), including QUASIMEME since 1994 (cf. Green *et al.*2008a). In addition the laboratories have (more regularly in recent years) analysed standard reference material in connection with analyses of the samples used in monitoring. The results of intercalibration exercises and analyses of the standard reference material are discussed in part in the annual National Comments (cf. Green *et al.*2008a).

The detection limits are approximations based on 3 times the standard deviation of the 'blank' or near zero concentration of a solution. Day-to-day variations in the analytical instrument may lead to minor variation in detection limits.

5. Comment on presentation of results

An overview of the samples collected is shown in Appendix B. and Appendix E. . Special attention should be paid to notes and comments preceding each set of tables in the Appendices.

The data is stored in MS ACCESS 2003. The tables are generated using MS ACCESS 2003 and MS EXCEL 2003.

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Appendix A. Abbreviations

Abbreviation ¹	English	Norwegian	Param. group
ELEMENTS			
Al	aluminium	<i>aluminium</i>	I-MET
As	arsenic	<i>arsen</i>	I-MET
Cd	cadmium	<i>kadmium</i>	I-MET
Co	cobalt	<i>kobolt</i>	I-MET
Cr	chromium	<i>krom</i>	I-MET
Cu	copper	<i>kobber</i>	I-MET
Fe	iron	<i>jern</i>	I-MET
Hg	mercury	<i>kvikksølv</i>	I-MET
Li	lithium	<i>litium</i>	I-MET
Mn	manganese	<i>mangan</i>	I-MET
Ni	nickel	<i>nikkel</i>	I-MET
Pb	lead	<i>bly</i>	I-MET
Pb210	lead-210	<i>bly-210</i>	I-RNC
Se	selenium	<i>selen</i>	I-MET
Ti	titanium	<i>titan</i>	I-MET
Zn	zinc	<i>sink</i>	I-MET
METAL COMPOUNDS			
TBT	tributyltin	<i>tributyltinn</i>	O-MET
MBTIN	monobutyltin	<i>monobutyltinn</i>	O-MET
DBTIN	dibutyltin	<i>dibutyltinn</i>	O-MET
TBTIN	tributyltin	<i>tributyltinn</i>	O-MET
MPTIN	monophenyltin	<i>monofenyltinn</i>	O-MET
DPTIN	diphenyltin	<i>difenyltinn</i>	O-MET
TPTIN	triphenyltin	<i>trifenyltinn</i>	O-MET
PAHs			
PAH	polycyclic aromatic hydrocarbons	<i>polysykliske aromatiske hydrokarboner</i>	
ACNE ³			
ACNE	acenaphthene	<i>acenaften</i>	PAH
ACNLE	acenaphthylene	<i>acenaftalen</i>	PAH
ANT	anthracene	<i>antracen</i>	PAH
BAA	benzo[a]anthracene	<i>benzo[a]antracen</i>	PAH
BAP	benzo[a]pyrene	<i>benzo[a]pyren</i>	PAH
BBF	benzo[b]fluoranthene	<i>benzo[b]fluoranten</i>	PAH
BBJKF	benzo[b,j,k]fluoranthene	<i>benzo[b,j,k]fluoranten</i>	PAH
BBJKF	benzo[b+j,k]fluoranthene	<i>benzo[b+j,k]fluoranten</i>	PAH
BBKF	benzo[b+k]fluoranthene	<i>benzo[b+k]fluoranten</i>	PAH
BEP	benzo[e]pyrene	<i>benzo[e]pyren</i>	PAH
BGHIP	benzo[ghi]perylene	<i>benzo[ghi]perylen</i>	PAH
BIPN	biphenyl	<i>bifenyl</i>	PAH
BJKF	benzo[j,k]fluoranthene	<i>benzo[j,k]fluorantren</i>	PAH
BKF	benzo[k]fluoranthene	<i>benzo[k]fluorantren</i>	PAH
CHR	chrysene	<i>chrysen</i>	PAH
CHRTR	chrysene+triphenylene	<i>chrysen+trifenylen</i>	PAH
COR	coronene	<i>coronen</i>	PAH
DBAHA	dibenz[a,h]anthracene	<i>dibenz[a,h]antracen</i>	PAH
DBA3A	dibenz[a,c/a,h]anthracene	<i>dibenz[a,c/a,h]antracen</i>	PAH
DBP	dibenzopyrenes	<i>dibenzopyren</i>	PAH
DBT	dibenzothiophene	<i>dibenzotiofen</i>	PAH
DBTC1	C ₁ -dibenzothiophenes	<i>C₁-dibenzotiofen</i>	PAH
DBTC2	C ₂ -dibenzothiophenes	<i>C₂-dibenzotiofen</i>	PAH
DBTC3	C ₃ -dibenzothiophenes	<i>C₃-dibenzotiofen</i>	PAH
FLE	fluorene	<i>fluoren</i>	PAH
FLU	fluoranthene	<i>fluoranten</i>	PAH
ICDP	indeno[1,2,3-cd]pyrene	<i>indeno[1,2,3-cd]pyren</i>	PAH
NAP	naphthalene	<i>naftalen</i>	PAH
NAPC1	C ₁ -naphthalenes	<i>C₁-naftalen</i>	PAH
NAPC2	C ₂ -naphthalenes	<i>C₂-naftalen</i>	PAH
NAPC3	C ₃ -naphthalenes	<i>C₃-naftalen</i>	PAH
NAP1M	1-methylnaphthalene	<i>1-metylnaftalen</i>	PAH
NAP2M	2-methylnaphthalene	<i>2-metylnaftalen</i>	PAH
NAPD2	1,6-dimethylnaphthalene	<i>1,6-dimetylnaftalen</i>	PAH

NAPD3 ²	1,5-dimethylnaphthalene	<i>1,5-dimetylnaftalen</i>	PAH
NAPDI ²	2,6-dimethylnaphthalene	<i>2,6-dimetylnaftalen</i>	PAH
NAPT2 ²	2,3,6-trimethylnaphthalene	<i>2,3,6-trimetylnaftalen</i>	PAH
NAPT3 ²	1,2,4-trimethylnaphthalene	<i>1,2,4-trimetylnaftalen</i>	PAH
NAPT4 ²	1,2,3-trimethylnaphthalene	<i>1,2,3-trimetylnaftalen</i>	PAH
NAPTM ²	2,3,5-trimethylnaphthalene	<i>2,3,5-trimetylnaftalen</i>	PAH
NPD	Collective term for naphthalenes, phenanthrenes and dibenzothiophenes	<i>Sammebetegnelse for naftalen, fenantren og dibenzotiofens</i>	PAH
PA ³	phenanthrene	<i>fenantren</i>	PAH
PAC1	C ₁ -phenanthrenes	<i>C₁-fenantren</i>	PAH
PAC2	C ₂ -phenanthrenes	<i>C₂-fenantren</i>	PAH
PAC3	C ₃ -phenanthrenes	<i>C₃-fenantren</i>	PAH
PAM1	1-methylphenanthrene	<i>1-metylfenantren</i>	PAH
PAM2	2-methylphenanthrene	<i>2-metylfenantren</i>	PAH
PADM1	3,6-dimethylphenanthrene	<i>3,6-dimetylfenantren</i>	PAH
PADM2	9,10-dimethylphenanthrene	<i>9,10-dimetylfenantren</i>	PAH
PER	perylene	<i>perylen</i>	PAH
PYR ³	pyrene	<i>pyren</i>	PAH
DI-Σn	sum of "n" dicyclic "PAH"s (footnote 2)	<i>sum "n" disykliske "PAH" (fotnote 2)</i>	
P-Σn / P_S	sum "n" PAH (DI-Σn not included, footnote 3)	<i>sum "n" PAH (DI-Σn ikke inkludert, fotnot 3)</i>	
PK-Σn / PK_S	sum carcinogen PAHs (footnote 4)	<i>sum kreftfremkallende PAH (fotnote 4)</i>	
PAHΣΣ	DI-Σn + P-Σn etc.	<i>DI-Σn + P-Σn mm..</i>	
SPAH	"total" PAH, specific compounds not quantified (outdated analytical method)	<i>"total" PAH, spesifik forbindelser ikke kvantifisert (foreldret metode)</i>	
BAP_P	% BAP of PAHΣΣ	<i>% BAP av PAHΣΣ</i>	
BAPPP	% BAP of P-Σn	<i>% BAP av P-Σn</i>	
BPK_P	% BAP of PK-Σn	<i>% BAP av PK-Σn</i>	
PKn_P	% PK-Σn of PAHΣΣ	<i>% PK-Σn av PAHΣΣ</i>	
PKnPP	% PK-Σn of P-Σn	<i>% PK-Σn av P-Σn</i>	
PCBs			
PCB	polychlorinated biphenyls	<i>polyklorete bifenyler</i>	
CB	individual chlorobiphenyls (CB)	<i>enkelte klorobifenyl</i>	
CB28	CB28 (IUPAC)	<i>CB28 (IUPAC)</i>	OC-CB
CB31	CB31 (IUPAC)	<i>CB31 (IUPAC)</i>	OC-CB
CB44	CB44 (IUPAC)	<i>CB44 (IUPAC)</i>	OC-CB
CB52	CB52 (IUPAC)	<i>CB52 (IUPAC)</i>	OC-CB
CB77 ⁵	CB77 (IUPAC)	<i>CB77 (IUPAC)</i>	OC-CB
CB81 ⁵	CB81 (IUPAC)	<i>CB81 (IUPAC)</i>	OC-CB
CB95	CB95 (IUPAC)	<i>CB95 (IUPAC)</i>	OC-CB
CB101	CB101 (IUPAC)	<i>CB101 (IUPAC)</i>	OC-CB
CB105	CB105 (IUPAC)	<i>CB105 (IUPAC)</i>	OC-CB
CB110	CB110 (IUPAC)	<i>CB110 (IUPAC)</i>	OC-CB
CB118	CB118 (IUPAC)	<i>CB118 (IUPAC)</i>	OC-CB
CB126 ⁵	CB126 (IUPAC)	<i>CB126 (IUPAC)</i>	OC-CB
CB128	CB128 (IUPAC)	<i>CB128 (IUPAC)</i>	OC-CB
CB138	CB138 (IUPAC)	<i>CB138 (IUPAC)</i>	OC-CB
CB149	CB149 (IUPAC)	<i>CB149 (IUPAC)</i>	OC-CB
CB153	CB153 (IUPAC)	<i>CB153 (IUPAC)</i>	OC-CB
CB156	CB156 (IUPAC)	<i>CB156 (IUPAC)</i>	OC-CB
CB169 ⁵	CB169 (IUPAC)	<i>CB169 (IUPAC)</i>	OC-CB
CB170	CB170 (IUPAC)	<i>CB170 (IUPAC)</i>	OC-CB
CB180	CB180 (IUPAC)	<i>CB180 (IUPAC)</i>	OC-CB
CB194	CB194 (IUPAC)	<i>CB194 (IUPAC)</i>	OC-CB
CB209	CB209 (IUPAC)	<i>CB209 (IUPAC)</i>	OC-CB
CB-Σ7	CB: 28+52+101+118+138+153+180	<i>CB: 28+52+101+118+138+153+180</i>	
CB-ΣΣ	sum of CBs, includes CB-Σ7	<i>sum Cber, inkluderer CB-Σ7</i>	
TECBW	Sum of CB-toxicity equivalents after WHO model, see TEQ	<i>Sum CB- toksitets ekvivalenter etter WHO modell, se TEQ</i>	
TECBS	Sum of CB-toxicity equivalents after SAFE model, see TEQ	<i>Sum CB-toksitets ekvivalenter etter SAFE modell, se TEQ</i>	

DIOXINS			
TCDD	2, 3, 7, 8-tetrachloro-dibenzo dioxin	2, 3, 7, 8-tetrakloro-dibenzo dioksin	OC-DX
CDDST	Sum of tetrachloro-dibenzo dioxins	Sum tetrakloro-dibenzo dioksiner	
CDD1N	1, 2, 3, 7, 8-pentachloro-dibenzo dioxin	1, 2, 3, 7, 8-pentakloro-dibenzo dioksin	OC-DX
CDDSN	Sum of pentachloro-dibenzo dioxins	Sum pentakloro-dibenzo dioksiner	
CDD4X	1, 2, 3, 4, 7, 8-hexachloro-dibenzo dioxin	1, 2, 3, 4, 7, 8-heksakloro-dibenzo dioksin	OC-DX
CDD6X	1, 2, 3, 6, 7, 8-hexachloro-dibenzo dioxin	1, 2, 3, 6, 7, 8-heksakloro-dibenzo dioksin	OC-DX
CDD9X	1, 2, 3, 7, 8, 9-hexachloro-dibenzo dioxin	1, 2, 3, 7, 8, 9-heksakloro-dibenzo dioksin	OC-DX
CDDSX	Sum of hexachloro-dibenzo dioxins	Sum heksakloro-dibenzo dioksiner	
CDD6P	1, 2, 3, 4, 6, 7, 8-heptachloro-dibenzo dioxin	1, 2, 3, 4, 6, 7, 8-heptakloro-dibenzo dioksin	OC-DX
CDDSP	Sum of heptachloro-dibenzo dioxins	Sum heptakloro-dibenzo dioksiner	
CDDO	Octachloro-dibenzo dioxin	Oktakloro-dibenzo dioksin	OC-DX
PCDD	Sum of polychlorinated dibenzo-p-dioxins	Sum polyklorinaterte-dibenzo-p-dioksiner	
CDF2T	2, 3, 7, 8-tetrachloro-dibenzofuran	2, 3, 7, 8-tetrakloro-dibenzofuran	OC-DX
CDFST	Sum of tetrachloro-dibenzofurans	Sum tetrakloro-dibenzofuraner	
CDFDN	1, 2, 3, 7, 8/1, 2, 3, 4, 8-pentachloro-dibenzofuran	1, 2, 3, 7, 8/1, 2, 3, 4, 8-pentakloro-dibenzofuran	OC-DX
CDF2N	2, 3, 4, 7, 8-pentachloro-dibenzofuran	2, 3, 4, 7, 8-pentakloro-dibenzofuran	OC-DX
CDFSN	Sum of pentachloro-dibenzofurans	Sum pentakloro-dibenzofuraner	
CDFDX	1, 2, 3, 4, 7, 8/1, 2, 3, 4, 7, 9-hexachloro-dibenzofuran	1, 2, 3, 4, 7, 8/1, 2, 3, 4, 7, 9-heksakloro-dibenzofuran	OC-DX
CDF6X	1, 2, 3, 6, 7, 8-hexachloro-dibenzofuran	1, 2, 3, 6, 7, 8-heksakloro-dibenzofuran	OC-DX
CDF9X	1, 2, 3, 7, 8, 9-hexachloro-dibenzofuran	1, 2, 3, 7, 8, 9-heksakloro-dibenzofuran	OC-DX
CDF4X	2, 3, 4, 6, 7, 8-hexachloro-dibenzofuran	2, 3, 4, 6, 7, 8-heksakloro-dibenzofuran	OC-DX
CDFSX	Sum of hexachloro-dibenzofurans	Sum heksakloro-dibenzofuraner	
CDF6P	1, 2, 3, 4, 6, 7, 8-heptachloro-dibenzofuran	1, 2, 3, 4, 6, 7, 8-heptakloro-dibenzofuran	OC-DX
CDF9P	1, 2, 3, 4, 7, 8, 9-heptachloro-dibenzofuran	1, 2, 3, 4, 7, 8, 9-heptakloro-dibenzofuran	OC-DX
CDFSP	Sum of heptachloro-dibenzofurans	Sum heptakloro-dibenzofuraner	OC-DX
CDFO	Octachloro-dibenzofurans	Octakloro-dibenzofuran	OC-DX
PCDF	Sum of polychlorinated dibenzofurans	Sum polyklorinated dibenzo-furaner	
CDDFS	Sum of PCDD and PCDF	Sum PCDD og PCDF	
TCDNN	Sum of TCDD-toxicity equivalents after Nordic model, see TEQ	Sum TCDD- toksitets ekvivalenter etter Nordisk modell, se TEQ	
TCDDI	Sum of TCDD-toxicity equivalents after international model, see TEQ	Sum TCDD-toksitets ekvivalenter etter internasjonale modell, se TEQ	
PESTICIDES			
ALD	aldrin	aldrin	OC-DN
DIELD	dieldrin	dieldrin	OC-DN
ENDA	endrin	endrin	OC-DN
CCDAN	cis-chlordane (=α-chlordane)	cis-klordan (=α-klordan)	OC-DN
TC DAN	trans-chlordane (=γ-chlordane)	trans-klordan (=γ-klordan)	OC-DN
OCDAN	oxy-chlordane	oksy-klordan	OC-DN
TNONC	trans-nonachlor	trans-nonaklor	OC-DN
TC DAN	trans-chlordane	trans-klordan	OC-DN
OCS	octachlorostyrene	oktaklorstyren	OC-CL
QCB	pentachlorobenzene	pentaklorbenzen	OC-CL
DDD	dichlorodiphenyldichloroethane	diklordifenyldikloretan	OC-DD
	1,1-dichloro-2,2-bis-(4-chlorophenyl)ethane	1,1-dikloro-2,2-bis-(4-klorofenyl)etan	

DDE	dichlorodipenyldichloroethylene (principle metabolite of DDT) 1,1-dichloro-2,2-bis-(4-chlorophenyl)ethylene*	<i>diklordifenyldikloretylen (hovedmetabolitt av DDT)</i> <i>1,1-dikloro-2,2-bis-(4-klorofenyl)etylen</i>	OC-DD
DDT	dichlorodipenyltrichloroethane 1,1,1-trichloro-2,2-bis-(4-chlorophenyl)ethane	<i>diklordifenyiltrikloreten</i> <i>1,1,1-trikloro-2,2-bis-(4-klorofenyl)etan</i>	OC-DD
DDEOP	o,p'-DDE	<i>o,p'-DDE</i>	OC-DD
DDEPP	p,p'-DDE	<i>p,p'-DDE</i>	OC-DD
DDTOP	o,p'-DDT	<i>o,p'-DDT</i>	OC-DD
DDTPP	p,p'-DDT	<i>p,p'-DDT</i>	OC-DD
TDEPP	p,p'-DDD	<i>p,p'-DDD</i>	OC-DD
DDTEP	p,p'-DDE + p,p'-DDT	<i>p,p'-DDE + p,p'-DDT</i>	OC-DD
DD-nΣ	sum of DDT and metabolites, n = number of compounds	<i>sum DDT og metabolitter,</i> <i>n = antall forbindelser</i>	OC-DD
HCB	hexachlorobenzene	<i>heksaklorbenzen</i>	OC-CL
HCHG	Lindane γ HCH = gamma hexachlorocyclohexane (γ BHC = gamma benzenehexachloride, outdated synonym)	<i>Lindan</i> <i>γ HCH = gamma</i> <i>heksaklorsykloheksan</i> <i>(γ BHC = gamma benzenheksaklorid,</i> <i>foreldret betegnelse)</i>	OC-HC
HCHA	α HCH = alpha HCH	<i>α HCH = alpha HCH</i>	OC-HC
HCHB	β HCH = beta HCH	<i>β HCH = beta HCH</i>	OC-HC
HC-nΣ	sum of HCHs, n = count	<i>sum av HCHs, n = antall</i>	
EOCI	extractable organically bound chlorine	<i>ekstraherbart organisk bundet klor</i>	OC-CL
EPOCI	extractable persistent organically bound chlorine	<i>ekstraherbart persistent organisk</i> <i>bundet klor</i>	OC-CL
PBDEs			
PBDE	polybrominated diphenyl ethers	<i>polybromerte difenyletere</i>	OC-BB
BDE	brominated diphenyl ethers		OC-BB
BDE-28	2,4,4'-tribromodiphenyl ether	<i>2,4,4'-tribromdifenyleter</i>	OC-BB
BDE-47	2,2',4,4'-tetrabromodiphenyl ether	<i>2,2',4,4'-tetrabromdifenyleter</i>	OC-BB
BDE-49*	2,2',4,5'- tetrabromodiphenyl ether	<i>2,2',4,5'- tetrabromdifenyleter</i>	OC-BB
BDE-66*	2,3',4',6- tetrabromodiphenyl ether	<i>2,3',4',6- tetrabromdifenyleter</i>	OC-BB
BDE-71*	2,3',4',6- tetrabromodiphenyl ether	<i>2,3',4',6- tetrabromdifenyleter</i>	OC-BB
BDE-77	3,3',4,4'-tetrabromodiphenyl ether	<i>3,3',4,4'-tetrabromdifenyleter</i>	OC-BB
BDE-85	2,2',3,4,4'-pentabromodiphenyl ether	<i>2,2',3,4,4'-pentabromdifenyleter</i>	OC-BB
BDE-99	2,2',4,4',5-pentabromodiphenyl ether	<i>2,2',4,4',5-pentabromdifenyleter</i>	OC-BB
BDE-100	2,2',4,4',6-pentabromodiphenyl ether	<i>2,2',4,4',6-pentabromdifenyleter</i>	OC-BB
BDE-119	2,3',4,4',6-pentabromodiphenyl ether	<i>2,3',4,4',6-pentabromdifenyleter</i>	OC-BB
BDE-138	2,2',3,4,4',5'-hexabromodiphenyl ether	<i>2,2',3,4,4',5'-heksabromdifenyleter</i>	OC-BB
BDE-153	2,2',4,4',5,5'-hexabromodiphenyl ether	<i>2,2',4,4',5,5'-heksabromdifenyleter</i>	OC-BB
BDE-154	2,2',4,4',5,6'-hexabromodiphenyl ether	<i>2,2',4,4',5,6'-heksabromdifenyleter</i>	OC-BB
BDE-183	2,2',3,4,4',5',6- heptabromodiphenyl ether	<i>2,2',3,4,4',5',6-heptabromdifenyleter</i>	OC-BB
BDE-205	2,2',3,3',4,4',5,5',6'- nonabromodiphenyl ether	<i>2,2',3,3',4,4',5,5',6'-</i> <i>nonabromdifenyleter</i>	OC-BB
BDE-209	Decabromodiphenyl ether	<i>Dekabromdifenyleter</i>	OC-BB
PFAS	perfluorinated alkylated substances	perfluoralkylertestoffer	
PFBS	perfluorobutane sulfonate	perfluorbutan sulfonat	PFAS
PFHxA	perfluorohexanoic acid	perfluorhexansyre	PFAS
PFHpA	perfluoroheptanoic acid	perfluorheptansyre	PFAS
PFOA	perfluorooctanoic acid	perfluoroktansyre	PFAS
PFNA	perfluorononanoic acid	perfluornonansyre	PFAS
PFOS	perfluorooctanoic sulfonate	perfluoroktansulfonat	PFAS

NTOT	total organic nitrogen	<i>total organisk nitrogen</i>	I-NUT
CTOT	total organic carbon	<i>total organisk karbon</i>	O-MAJ
CORG	organic carbon	<i>organisk karbon</i>	O-MAJ
GSAMT	grain size	<i>kornfordeling</i>	P-PHY
MOCON	moisture content	<i>vanninnhold</i>	P-PHY
INSTITUTES			
EFDH	Eurofins [DK]	<i>Eurofins [DK]</i>	
FIER	Institute for Nutrition, Fisheries Directorate	<i>Fiskeridirektoratets Ernæringsinstitutt</i>	
FORC	FORCE Institutes, Div. for Isotope Technique and Analysis [DK]	<i>FORCE Institutterne, Div. for Isotopteknik og Analyse [DK]</i>	
GALG	GALAB Laboratories GmbH [D]	<i>GALAB Laboratories GmbH [D]</i>	
IFEN	Institute for Energy Technology	<i>Institutt for energiteknikk</i>	
IMRN	Institute of Marine Research (IMR)	<i>Havforskningsinstituttet</i>	
NACE	Nordic Analytical Center	<i>Nordisk Analyse Center</i>	
NILU	Norwegian Institute for Air Research	<i>Norsk institutt for luftforskning</i>	
NIVA	Norwegian Institute for Water Research	<i>Norsk institutt for vannforskning</i>	
SERI	Swedish Environmental Research Institute	<i>Institutionen för vatten- och luftvårdsforskning</i>	
SIIF	Fondation for Scientific and Industrial Research at the Norwegian Institute of Technology - SINTEF (a division, previously: Center for Industrial Research SI)	<i>Stiftelsen for industriell og teknisk forskning ved Norges tekniske høyskole- SINTEF (en avdeling, tidligere: Senter for industriforskning SI)</i>	
VETN	Norwegian Veterinary Institute	<i>Veterinærinstituttet</i>	
VKID	Water Quality Institute [DK]	<i>Vannkvalitetsinstitutt [DK]</i>	

- 1) After: ICES Environmental Data Reporting Formats. International Council for the Exploration of the Sea. July 1996 and supplementary codes related to non-ortho and mono-ortho PCBs and "dioxins" (ICES pers. comm.)
 - 2) Indicates "PAH" compounds that are dicyclic and not truly PAHs typically identified during the analyses of PAH, include naphthalenes and "biphenyls".
 - 3) Indicates the sum of tri- to hexacyclic PAH compounds named in EPA protocol 8310 minus naphthalene (dicyclic), so that the SFT classification system can be applied
 - 4) Indicates PAH compounds potentially cancerogenic for humans according to IARC (1987, updated 14. August 2007 at <http://monographs.iarc.fr/ENG/Classification/crthgr01.php>), i.e., categories 1, 2A, and 2B (are, possibly and probably carcinogenic). NB.: the update includes Chrysene as cancerogenic and hence, KPAH with Chrysene should not be used in SFT's classification system for this sum-variable (Molvær *et al.* 1997).
 - 5) Indicates non ortho- co-planer PCB compounds i.e., those that lack Cl in positions 1, 1', 5, and 5'
- *) The Pesticide Index, second edition. The Royal Society of Chemistry, 1991.

Other abbreviations *andre forkortelser*

	English	Norwegian
TEQ	"Toxicity equivalency factors" for the most toxic compounds within the following groups:	" <i>Toxisitetskvivalentfaktorer</i> " for de giftigste forbindelsene innen følgende grupper.
	<ul style="list-style-type: none"> 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 <i>et al.</i>, 1998) ² non-ortho and mono-ortho substituted chlorobiphenyls after WHO model (Ahlborg <i>et al.</i>, 1994) ³ or Safe (1994, cf. NILU pers. comm.) 	<ul style="list-style-type: none"> <i>polykloreerte dibenzo-p-dioksiner og dibenzofuraner (PCDD/PCDF)</i>. <i>Ekvivalentberegning etter nordisk modell (Ahlborg 1989) ¹ eller etter internasjonal modell (Int./EPA, cf. Van den Berg et al. 1998) ²</i> <i>non-orto og mono-orto substituerte klorobifenylar etter WHO modell (Ahlborg et al., 1994) ³ eller Safe (1994, cf. NILU pers. medd.)</i>
ppm	parts per million, mg/kg	<i>deler pr. milliondeler, mg/kg</i>
ppb	parts per billion, µg/kg	<i>deler pr. milliarddeler, µg/kg</i>
ppp	parts per trillion, ng/kg	<i>deler pr. tusen-milliarddeler, ng/kg</i>
d.w.	dry weight basis	<i>tørrvekt basis</i>
w.w.	wet weight or fresh weight basis	<i>våtvakt eller friskvekt basis</i>

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 B. Overview of localities and sample count for sediment 1981-2006

Nominel station positions are shown on maps in Appendix D.

jmpco: JAMP area code (J99 = unclassified)
jmpst: station code
stnam: station name
nom_lon: Longitude (nominel)
nom_lat: Latitude (nominel)

STATIONS AND SAMPLE COUNT FOR SEDIMENT

jmpco	jmpst	stnam	lat	lon	1986	1987	1990	1992	1994	1996	1997	2004	2006
J26	30S	Steilene	59° 49.1	10° 33.8	8		34			5			
J26	35S	Mølen-Moss	59° 28.96	10° 31.74	6					5			
J26	35S	Mølen-Moss	59° 30	10° 35.7	2		3						
J26	36S	Færder area	59° 0.4	10° 41.6	2		40						
J26	36S	Færder area	59° 1.55	10° 32.99	6								
J26	36S	Færder area	59° 2.5	10° 46.6						56			
J99	77S	Arendal area	58° 24.2	9° 1.8			43				29		
J99	15S	Lista area	58° 1	6° 34.3			32				5		
J63	52S	Tyssedal	60° 6.9	6° 32.9			3				5		
J63	52S	Tyssedal	60° 6.92	6° 32.6								3	
J63	56S	Kvalnes	60° 13.7	6° 35.6			29				5		
J63	56S	Kvalnes	60° 13.72	6° 35.6								3	
J63	57S	Krossanes	60° 23.1	6° 40.7			3				5		3
J62	63S	Ranaskjær	60° 23.34	6° 26.7									3
J62	63S	Ranaskjær	60° 23.6	6° 27.1			3				5		
J62	67S	Strandebarm area	60° 13.12	6° 4.6									3
J62	67S	Strandebarm area	60° 13.5	6° 5.1			28				28		
J62	69S	Kvinnheradsfjorden	60° 1.3	5° 56.1			3				5		3
J99	22S	Bømlo area	59° 25.9	4° 50.2			29				5		3
J99	24S	Sotra	60° 15.1	4° 33.3			3						3
J65	82S	Flakk	63° 27.5	10° 11.8		8							3
J65	89S	Thamshavn	63° 19.7	9° 52.5									3
J65	89S	Thamshavn	63° 19.8	9° 52.5		4		3					
J65	84S	Trossavika	63° 21.7	9° 57.4		8		3					3
J65	90S	Outer Orkdalsfjord	63° 27.3	10° 2.6									3
J65	90S	Outer Orkdalsfjord	63° 27.4	10° 2.6		8		30					
J99	27S	Stadlandet (east)	62° 9.3	5° 21.3				30					3
J99	93S	Raudøya (northeast)	64° 22.7	10° 27.8				30					3
J99	95S	Rodø (east)	66° 41.8	13° 10									3
J99	95S	Rodø (east)	66° 41.8	13° 9.9				31					
J99	98S	Skrova (south)	68° 7	14° 41				30				3	
J99	99S	Lundøy (north)	68° 5.8	15° 10.1				30				3	
J99	41S	Vågsfjorden	68° 56.025	17° 5.024									2
J99	41S	Vågsfjorden	68° 56.25	17° 5.24					34				1
J99	42S	Malangen	69° 30.038	18° 6.077									3
J99	42S	Malangen	69° 30.38	18° 6.77					3				
J99	43S	Kvænangen	70° 3.031	21° 7.094									3
J99	43S	Kvænangen	70° 3.31	21° 7.94					34				
J99	44S	Sørøysund	70° 25.091	22° 31.083									3
J99	44S	Sørøysund	70° 25.91	22° 31.83					3				
J99	45S	Revsbotn	70° 42.086	24° 26.065									3
J99	45S	Revsbotn	70° 42.86	24° 26.65					34				
J99	46S	Porsangerfjorden	70° 52.093	26° 11.089									3
J99	46S	Porsangerfjorden	70° 52.93	26° 11.89					28				
J99	47S	Laksfjord	70° 54.096	26° 55.011									3
J99	47S	Laksfjord	70° 54.96	26° 55.11					3				
J99	48S	Tanafjord	70° 52.054	28° 38.053									3
J99	48S	Tanafjord	70° 52.54	28° 38.53					33				
J99	49S	Syltefjord	70° 33.094	30° 19.091									3
J99	49S	Syltefjord	70° 33.94	30° 19.91					3				
J99	10S	Varangerfjorden	69° 56.01	30° 6.07									3
J99	10S	Varangerfjorden	69° 56.07	30° 6.7					29				

Appendix C. Overview of localities and sample count for biota 1981-2006

Nominal station positions are shown on maps in Appendix D.

jmpco: JAMP area code (J99 = unclassified)
jmpst: station code
stnam: station name
nom_lon: Longitude (nominal)
nom_lat: Latitude (nominal)
speci: species code (English, Norwegian (Latin))
MYTI EDU - blue mussel, blåskjell (*Mytilus edulis*)
NUCE LAP - dogwhelk, purpursnegl (*Nucella lapillus*)
BROS BRO - tusk, brosme (*Brosme brosme*)
CHIM MON - rat fish, havmus (*Chimaera monstrosa*)
GADU MOR - Atlantic cod, torsk (*Gadus morhua*)
LEPI WHI - megrim, glassvar (*Lepidorhombus whiff-iaonis*)
LIMA LIM - dab, sandflyndre (*Limanda limanda*)
MICR KIT - lemon sole, lomre (*Microstomus kitt*)
MOLV MOL - ling, lange (*Molva molva*)
PAND BOR - shrimp, reker (*Pandalus borealis*)
PLAT FLE - flounder, skrubbe (*Platichthys flesus*)
PLEU PLA - plaice, rødspette (*Pleuronectes platessa*)
tissu: tissue:
SB - soft body
LI - liver
MU - fillet
TM - tail muscle

STATIONS AND SAMPLE COUNT FOR BIOTA

jmpco	jmpst	stnam	nomlat	nomlon	speci	tissu	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006		
J26	01A	Sponvika	59° 5.31	11° 13.57	MYTI EDU	SB		3			3					3																		
J26	02A	Fugleskjær	59° 6.9	10° 59	MYTI EDU	SB		3			3					3																		
J26	03A	Tisler	58° 58.8	10° 57.5	MYTI EDU	SB		2			3					3																		
J26	301	Akershuskaia	59° 54.32	10° 44.18	MYTI EDU	SB																2												
J26	302	Ormøya	59° 52.69	10° 45.46	MYTI EDU	SB																2												
J26	303	Malmøya	59° 51.78	10° 45.95	MYTI EDU	SB																1												
J26	304	Gåsøya	59° 51.08	10° 35.32	MYTI EDU	SB																3												
J26	305	Lysaker	59° 54.36	10° 38.6	MYTI EDU	SB																2												
J26	306	Håøya	59° 42.8	10° 33.31	MYTI EDU	SB																3												
J26	30A	Gressholmen	59° 52.89	10° 42.71	MYTI EDU	SB																												
J26	30B	Oslo City area	59° 47.96	10° 33.6	GADU MOR	BI																												
J26	30B	Oslo City area	59° 47.96	10° 33.6	GADU MOR	BL																												
J26	30B	Oslo City area	59° 47.96	10° 33.6	GADU MOR	LI																												
J26	30B	Oslo City area	59° 47.96	10° 33.6	GADU MOR	MU																												
J26	30C	Oslo City area	59° 49	10° 33	PAND BOR	TM																												
J26	30F	Oslo City area	59° 47	10° 34	PLEU PLA	LI																												
J26	30F	Oslo City area	59° 47	10° 34	PLEU PLA	MU																												
J26	30J	Spro	59° 47.96	10° 33.6	PAND BOR	TM																												
J26	30K	Storegrunn	59° 47.96	10° 33.6	PAND BOR	TM																												
J26	30X	West of Nesodden	59° 48.5	10° 36	GADU MOR	LI																												
J26	30X	West of Nesodden	59° 48.5	10° 36	GADU MOR	MU																												
J26	31A	Solbergstrand	59° 37.13	10° 38.99	MYTI EDU	SB	2																											
J26	31B	Solbergstrand	59° 36.9	10° 38.4	GADU MOR	LI	10	27																										
J26	31B	Solbergstrand	59° 36.9	10° 38.4	GADU MOR	MU	10	27																										
J26	31F	Solbergstrand	59° 36.9	10° 38.4	PLAT FLE	LI	8																											
J26	31F	Solbergstrand	59° 36.9	10° 38.4	PLAT FLE	MU	8																											
J26	31C	Solbergstrand	59° 36.9	10° 38.4	PAND BOR	TM				1																								
J26	32A	Rødtangen	59° 31.5	10° 25.6	MYTI EDU	SB	1	3																										
J26	33F	Sande (east side)	59° 31.7	10° 21	PLAT FLE	LI			25		3																							
J26	33F	Sande (east side)	59° 31.7	10° 21	PLAT FLE	MU			25		1	1	1	1	1	5	5	5	5	5	5	5	10	10	8	5	5	5	5	5	5	5	5	
J26	33C	Sande	59° 31.7	10° 21	PAND BOR	TM																												
J26	33X	Sande (west side)	59° 31.7	10° 20.4	PLAT FLE	LI																												
J26	33X	Sande (west side)	59° 31.7	10° 20.4	PLAT FLE	MU																												
J26	35A	Mølen	59° 29.29	10° 29.88	MYTI EDU	SB	1	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	
J26	35C	Mølen-Moss	59° 28.96	10° 31.74	PAND BOR	TM		1							1																			
J26	35C	Mølen-Moss	59° 28.96	10° 31.74	PAND BOR	XX									1																			
J26	36A	Færder	59° 1.63	10° 31.53	MYTI EDU	SB	1		5	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	
J26	36G	Færder	59° 1.63	10° 31.53	NUCE LAP	SB																												
J26	36B	Færder area	59° 2.43	10° 26.15	GADU MOR	BI																												
J26	36B	Færder area	59° 2.43	10° 26.15	GADU MOR	BL																												
J26	36B	Færder area	59° 2.43	10° 26.15	GADU MOR	LI	10	27	23	24	14	25	25	25	25	24	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	
J26	36B	Færder area	59° 2.43	10° 26.15	GADU MOR	MU	10	27	23	24	14	25	25	26	26	29	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	
J26	36F	Færder area	59° 4	10° 23	LIMA LIM	BI																												
J26	36F	Færder area	59° 4	10° 23	LIMA LIM	BL																												
J26	36F	Færder area	59° 4	10° 23	LIMA LIM	LI																												
J26	36F	Færder area	59° 4	10° 23	LIMA LIM	MU																												
J26	73A	Lyngholmen	59° 2.68	10° 17.72	MYTI EDU	SB																												
J26	74A	Langholmene	58° 57.3	9° 52.1	MYTI EDU	SB																												
J26	71A	Bjørkøya (Risøyodden)	59° 1.4	9° 45.22	MYTI EDU	SB	1	3	3	3	2	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	
J26	71G	Fugløyskjær	58° 58.85	9° 48.46	NUCE LAP	SB																												

JAMP contaminants and effects data 1981-2006 – Norway (SFT report TA 2369/2008)

jmpc	impst	stnam	nomlat	nomlon	speci	tissu	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
J99	76A	Risøy	58° 43.85	9° 16.32	MYTI EDU	SB										3	3	3	3			3	3	3	3	3	3	3	3	3	3	
J99	76A	Risøy	58° 43.85	9° 16.32	NUCE LAP	SB																										
J99	76G	Risøy	58° 43.68	9° 16.53	NUCE LAP	SB																				1						
J99	77A	Nordstrand	58° 31.42	8° 56.51	MYTI EDU	SB										3	3															
J99	77B	Borøy area	58° 33	9° 1	GADU MOR	LI										14	25															
J99	77B	Borøy area	58° 33	9° 1	GADU MOR	MU										17	30															
J99	77F	Borøy area	58° 33	9° 1	LIMA LIM	LI											3															
J99	77C	Borøy area	58° 29	9° 10	PAND BOR	TM										2																
J99	79A	Gjerdsvoldsøyen (east)	58° 24.8	8° 44.5	MYTI EDU	SB										3	3															
J99	13A	Langøesund	57° 59.87	7° 34.6	MYTI EDU	SB										1	4															
J99	131G	Lastad	58° 3.33	7° 42.52	NUCE LAP	SB																				1	1	1	1	2	2	
J99	14A	Aavigen	58° 1.96	7° 12.97	MYTI EDU	SB										3	4															
J99	15A	Gåsøy (Ullerø)	58° 2.87	6° 53.72	MYTI EDU	SB										4	4															
J99	15G	Gåsøy (Ullerø)	58° 2.98	6° 53.74	NUCE LAP	SB																										
J99	15B	Ullerø area	58° 3	6° 43	GADU MOR	BI																										
J99	15B	Ullerø area	58° 3	6° 43	GADU MOR	BL																										
J99	15B	Ullerø area	58° 3	6° 43	GADU MOR	LI																										
J99	15B	Ullerø area	58° 3	6° 43	GADU MOR	MU																										
J99	15F	Ullerø area	58° 3	6° 43	LIMA LIM	BI																										
J99	15F	Ullerø area	58° 3	6° 43	LIMA LIM	BL																										
J99	15F	Ullerø area	58° 3	6° 43	LIMA LIM	LI																										
J99	15F	Ullerø area	58° 3	6° 43	LIMA LIM	MU																										
J99	15F	Ullerø area	58° 3	6° 43	PLEU PLA	LI																										
J99	15F	Ullerø area	58° 3	6° 43	PLEU PLA	MU																										
J99	15F	Ullerø area	58° 3	6° 43	MICR KIT	LI																										
J99	15F	Ullerø area	58° 3	6° 43	MICR KIT	MU																										
J63	51A	Byrkjenes	60° 5.03	6° 33.03	MYTI EDU	SB										3	3															
J63	52A	Eitrheimsneset	60° 5.8	6° 31.97	MYTI EDU	SB																										
J63	53B	Inner Sørfjord	60° 10	6° 34	GADU MOR	BI																										
J63	53B	Inner Sørfjord	60° 10	6° 34	GADU MOR	BL																										
J63	53B	Inner Sørfjord	60° 10	6° 34	GADU MOR	LI																										
J63	53B	Inner Sørfjord	60° 10	6° 34	GADU MOR	MU																										
J63	53F	Inner Sørfjord	60° 10	6° 34	PLAT FLE	BI																										
J63	53F	Inner Sørfjord	60° 10	6° 34	PLAT FLE	BL																										
J63	53F	Inner Sørfjord	60° 10	6° 34	PLAT FLE	LI																										
J63	53F	Inner Sørfjord	60° 10	6° 34	PLAT FLE	MU																										
J63	53F	Inner Sørfjord	60° 10	6° 34	GLYP CYN	LI																										
J63	53F	Inner Sørfjord	60° 10	6° 34	GLYP CYN	MU																										
J63	53B	Inner Sørfjord	60° 10	6° 34	SALM TRU	LI																										
J63	53B	Inner Sørfjord	60° 10	6° 34	SALM TRU	MU																										
J63	53D	Digraneset	60° 11	6° 34.5	BROS BRO	LI																										
J63	53D	Digraneset	60° 11	6° 34.5	BROS BRO	MU																										
J63	53D	Digraneset	60° 11	6° 34.5	MOLV MOL	LI																										
J63	53D	Digraneset	60° 11	6° 34.5	MOLV MOL	MU																										
J63	53D	Digraneset	60° 11	6° 34.5	CHIM MON	LI																										
J63	53D	Digraneset	60° 11	6° 34.5	CHIM MON	MU																										
J63	56A	Kvalnes	60° 13.23	6° 36.12	MYTI EDU	SB																										
J63	56A1	Kvalnes (north)	60° 13.51	6° 36.26	MYTI EDU	SB																										
J63	56A2	Kjeken	60° 20.33	6° 39.27	MYTI EDU	SB																										
J63	56A3	Sekse	60° 15.68	6° 37.4	MYTI EDU	SB																										
J63	56A4	Rosstadnes	60° 17.22	6° 37.43	MYTI EDU	SB																										
J63	56A5	Lofthus (south)	60° 19.35	6° 39.12	MYTI EDU	SB																										
J63	56D	Kvalnes	60° 15	6° 36	BROS BRO	LI																										
J63	56D	Kvalnes	60° 15	6° 36	BROS BRO	MU																										

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jmpc_o	impst	stnam	nomlat	nomlon	speci	tissu	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006		
J63	56D	Kvalnes	60° 15	6° 36	MOLV MOL	LI																			1									
J63	56D	Kvalnes	60° 15	6° 36	MOLV MOL	MU																			1									
J63	56D	Kvalnes	60° 15	6° 36	CHIM MON	LI																			1									
J63	56D	Kvalnes	60° 15	6° 36	CHIM MON	MU																			1									
J63	57A	Krossanes	60° 22.35	6° 41.34	MYTI EDU	SB							3	3	3	3	3	3	3	3	3	3	3	6	3	3	3	3	3	3				
J63	57A1	Urdheim	60° 22.35	6° 40.69	MYTI EDU	SB																		3										
J63	57A2	Ernes	60° 21.19	6° 39.74	MYTI EDU	SB																				2								
J62	63A	Ranaskjær	60° 25.25	6° 25.32	MYTI EDU	SB																					2							
J62	65A	Vikingsneset	60° 14.54	6° 9.16	MYTI EDU	SB																		3	3	3	3	3	3	3	3			
J62	67B	Strandebarm area	60° 16	6° 2	GADU MOR	BI																			25	24	25	15	25					
J62	67B	Strandebarm area	60° 16	6° 2	GADU MOR	BL																				25	25	13	24					
J62	67B	Strandebarm area	60° 16	6° 2	GADU MOR	LI																			22	1	22	16	19	8	12	18	25	35
J62	67B	Strandebarm area	60° 16	6° 2	GADU MOR	MU																			22	1	23	16	24	9	14	22	30	40
J62	67F	Strandebarm area	60° 16	6° 2	PLAT FLE	BI																				25	22	25						
J62	67F	Strandebarm area	60° 16	6° 2	PLAT FLE	BL																				25	23	23						
J62	67F	Strandebarm area	60° 16	6° 2	PLAT FLE	LI																		3	4	30	28	30	5	5	5	5	5	
J62	67F	Strandebarm area	60° 16	6° 2	PLAT FLE	MU																		3	4	5	5	5	5	5	5	5		
J62	67F	Strandebarm area	60° 16	6° 2	LIMA LIM	LI																			5									
J62	67F	Strandebarm area	60° 16	6° 2	LIMA LIM	MU																			5									
J62	67F	Strandebarm area	60° 16	6° 2	LEPI WHI	LI																												
J62	67F	Strandebarm area	60° 16	6° 2	LEPI WHI	MU				19															1	1	30	5	5	3	5	5	5	5
J62	69A	Lille Terøy	59° 58.91	5° 45.15	MYTI EDU	SB				19																								
J99	22A	Espevær (west)	59° 35.05	5° 8.63	MYTI EDU	SB																												
J99	224G	Heggjelen	59° 24.96	5° 13.9	NUCE LAP	SB																												
J99	22G	Espevær vest	59° 35.02	5° 8.67	NUCE LAP	SB																												
J99	220G	Smørstakk	59° 15.15	5° 21.11	NUCE LAP	SB																												
J99	22C	Bømløfjord	59° 34	5° 11	PAND BOR	TM																												
J99	221A	Stangeland	59° 16.62	5° 19.7	MYTI EDU	SB																												
J99	221G	Stangeland	59° 16.21	5° 19.8	NUCE LAP	SB																												
J99	21F	Åkrafjord	59° 45	6° 7	PLAT FLE	BI																												
J99	21F	Åkrafjord	59° 45	6° 7	PLAT FLE	BL																												
J99	21F	Åkrafjord	59° 45	6° 7	PLAT FLE	LI																												
J99	21F	Åkrafjord	59° 45	6° 7	PLAT FLE	MU																												
J99	21F	Åkrafjord	59° 45	6° 7	LIMA LIM	LI																												
J99	22F	Borøyfjorden	59° 42.6	5° 19.8	LIMA LIM	LI																												
J99	21F	Åkrafjord	59° 45	6° 7	LIMA LIM	MU																												
J99	22F	Borøyfjorden	59° 42.6	5° 19.8	LIMA LIM	MU																												
J99	22F	Borøyfjorden	59° 42.6	5° 19.8	PLEU PLA	LI																												
J99	22F	Borøyfjorden	59° 42.6	5° 19.8	PLEU PLA	MU																												
J99	21F	Åkrafjord	59° 45	6° 7	LEPI WHI	LI																												
J99	21F	Åkrafjord	59° 45	6° 7	LEPI WHI	MU																												
J99	22F	Borøyfjorden	59° 42.6	5° 19.8	MICR KIT	LI																												
J99	22F	Borøyfjorden	59° 42.6	5° 19.8	MICR KIT	MU																												
J99	21D	Åkrafjord	59° 48	6° 11	BROS BRO	LI																												
J99	21D	Åkrafjord	59° 48	6° 11	BROS BRO	MU																												
J99	21D	Åkrafjord	59° 48	6° 11	MOLV MOL	LI																												
J99	21D	Åkrafjord	59° 48	6° 11	MOLV MOL	MU																												
J99	21D	Åkrafjord	59° 48	6° 11	CHIM MON	LI																												
J99	21D	Åkrafjord	59° 48	6° 11	CHIM MON	MU																												
J99	222A	Kopervik harbour	59° 16.98	5° 18.94	MYTI EDU	SB																												
J99	226X	Karmsund bridge (east)	59° 22.68	5° 17.91	MYTI EDU	SB																												
J99	226G	Karmsund bridge (east)	59° 22.68	5° 17.91	NUCE LAP	SB																												
J99	226H	Karmsund bridge (west)	59° 22.66	5° 17.55	NUCE LAP	SB																												
J99	227A1	Melandholmen	59° 19.56	5° 19.05	MYTI EDU	SB																												

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Impco	Impst	stnam	nomlat	nomlon	speci	tissu	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006			
J99	227A2	Høgevarde	59° 19.56	5° 19.05	MYTI EDU	SB																			3	3	3	3	1	2	2				
J99	227G1	Melandholmen	59° 20.24	5° 18.75	NUCE LAP	SB																	1	1	1	1	1	1							
J99	227G2	Flatskjær	59° 20.24	5° 18.75	NUCE LAP	SB																						1	1	2	2				
J99	23A	Austvik	59° 52.22	5° 6.47	MYTI EDU	SB											3	3											3	3					
J99	23B	Karihavet area	59° 54	5° 8	GADU MOR	BI																			22	23	24	23	25	25	25	25	24	25	25
J99	23B	Karihavet area	59° 54	5° 8	GADU MOR	BL																			25	25	25	24	25	25	25	25			
J99	23B	Karihavet area	59° 54	5° 8	GADU MOR	LI																			25	25	25	25	25	25	25	25	25	25	
J99	23B	Karihavet area	59° 54	5° 8	GADU MOR	MU																			30	30	30	30	30	30	30	30	30	30	30
J99	23F	Karihavet area	59° 54	5° 8	PLAT FLE	LI																			1										
J99	23F	Karihavet area	59° 54	5° 8	PLAT FLE	MU																			1										
J99	23F	Karihavet area	59° 54	5° 8	PLEU PLA	LI																			3										
J99	23F	Karihavet area	59° 54	5° 8	PLEU PLA	MU																			3										
J99	23F	Karihavet area	59° 54	5° 8	MICR KIT	LI																			1	4									
J99	23F	Karihavet area	59° 54	5° 8	MICR KIT	MU																			1	4									
J99	24A	Vardøy	60° 10.27	5° 0.62	MYTI EDU	SB																								3	3				
J99	24G	Vardøy	60° 10.27	5° 0.62	NUCE LAP	SB																									1				
J65	80A	Østmarknes	63° 27.44	10° 26.97	MYTI EDU	SB																													
J65	81A	Biologisk Stasjon	63° 26.5	10° 20.95	MYTI EDU	SB																													
J65	82A	Flakk	63° 27.02	10° 12.38	MYTI EDU	SB																													
J99	82G	Flakk	63° 27.04	10° 12.15	NUCE LAP	SB																													
J65	83A	Frøsetskjær	63° 25.69	10° 6.4	MYTI EDU	SB																													
J65	84A	Tråsávika	63° 20.79	9° 57.43	MYTI EDU	SB																													
J99	84G	Tråsávika	63° 20.79	9° 57.43	NUCE LAP	SB																													
J65	84B	Tråsávika	63° 20.92	9° 57.68	GADU MOR	LI																													
J65	84B	Tråsávika	63° 20.92	9° 57.68	GADU MOR	MU																													
J65	84F	Tråsávika	63° 20.92	9° 57.68	MICR KIT	LI																													
J65	84F	Tråsávika	63° 20.92	9° 57.68	MICR KIT	MU																													
J65	84B	Tråsávika	63° 20.92	9° 57.68	MELA AEG	LI																													
J65	84B	Tråsávika	63° 20.92	9° 57.68	MELA AEG	MU																													
J65	84B	Tråsávika	63° 20.92	9° 57.68	MERL MNG	LI																													
J65	84B	Tråsávika	63° 20.92	9° 57.68	MERL MNG	MU																													
J65	84B	Tråsávika	63° 20.92	9° 57.68	POLL POL	LI																													
J65	84B	Tråsávika	63° 20.92	9° 57.68	POLL POL	MU																													
J65	84B	Tråsávika	63° 20.92	9° 57.68	POLL VIR	LI																													
J65	84B	Tråsávika	63° 20.92	9° 57.68	POLL VIR	MU																													
J65	85A	Geitstrand	63° 21.84	9° 55.65	MYTI EDU	SB																													
J65	86A	Geitnes	63° 26.57	9° 58.66	MYTI EDU	SB																													
J65	87A	Ingdalsbuk	63° 27.71	9° 54.43	MYTI EDU	SB																													
J99	87G	Ingdalsbuk	63° 27.71	9° 54.43	NUCE LAP	SB																													
J65	88A	Rødberg	63° 29.2	10° 0	MYTI EDU	SB																													
J99	25A	Hinnøy	61° 22.17	4° 52.74	MYTI EDU	SB																													
J99	25G	Hinnøy	61° 22.17	4° 52.74	NUCE LAP	SB																													
J99	26A	Hamnen	61° 52.56	5° 13.3	MYTI EDU	SB																													
J99	26G	Hamnen	61° 52.52	5° 13.3	NUCE LAP	SB																													
J99	27A	Grinden	62° 12.11	5° 25.27	MYTI EDU	SB																													
J99	27G	Røydeskjær	62° 11	5° 44.42	NUCE LAP	SB																													
J99	27H	Storholmen	62° 11.38	5° 23.59	NUCE LAP	SB																													
J99	28A	Eiksundet	62° 15.1	5° 51.84	MYTI EDU	SB																													
J99	28G	Grønevikholmen (Eiksundet)	62° 14.8	5° 53	NUCE LAP	SB																													
J99	28H	Øveråneset (Hareid)	62° 21.69	6° 4.67	NUCE LAP	SB																													
J99	91A	Nerdvika	63° 21.16	8° 9.43	MYTI EDU	SB																													
J99	92A1	Krokholmen	64° 3.21	10° 1.79	MYTI EDU	SB																													
J99	92A2	Nygården	64° 3.21	10° 1.79	MYTI EDU	SB																													
J99	92B	Stokken area	64° 10.28	9° 53.24	GADU MOR	LI																													

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jmpc	impst	stnam	nomlat	nomlon	speci	tissu	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
J99	92B	Stokken area	64° 10.28	9° 53.24	GADU MOR	MU													30	29	30	30							30	30		
J99	92F	Stokken area	64° 10.28	9° 53.24	LIMA LIM	LI															1											
J99	92F	Stokken area	64° 10.28	9° 53.24	LIMA LIM	MU															1											
J99	92F	Stokken area	64° 10.28	9° 53.24	PLEU PLA	LI															1									5		
J99	92F	Stokken area	64° 10.28	9° 53.24	PLEU PLA	MU															1									5		
J99	93A	Sætervik	64° 23.68	10° 29	MYTI EDU	SB																							3	3		
J99	93G	Sætervika (Stadsvikskjæret)	64° 23.69	10° 30	NUCE LAP	SB																										
J99	94A	Landfast	65° 38.62	12° 0.36	MYTI EDU	SB																										
J99	94G	Steinskjær (Landfast)	65° 38.44	11° 59.89	NUCE LAP	SB																										
J99	95A	Sleipnesodden (south)	66° 42.61	13° 15.17	MYTI EDU	SB																										
J99	95G	Sleipnesodden (south)	66° 42.4	13° 14.3	NUCE LAP	SB																										
J99	96A	Breiviken	66° 17.77	12° 50.02	MYTI EDU	SB																										
J99	97A	Klokkholmen	67° 39.88	14° 44.57	MYTI EDU	SB																										
J99	97G	Varnesodden	67° 48.08	14° 45.02	NUCE LAP	SB																										
J99	97H	Småfloholmene	67° 53.45	14° 49.1	NUCE LAP	SB																										
J99	98A1	Ytj-Skarvsundet	68° 9.45	14° 39.2	MYTI EDU	SB																										
J99	98A2	Husvaagen area	68° 15.46	14° 39.83	MYTI EDU	SB																										
J99	98A3	Vatterfjord	68° 15.46	14° 39.83	MYTI EDU	SB																										
J99	98G	Svolvær området	68° 14.92	14° 39.8	NUCE LAP	SB																										
J99	98B2	Austnesfjorden	68° 14.8	14° 48.2	GADU MOR	BI																										
J99	98B2	Austnesfjorden	68° 14.8	14° 48.2	GADU MOR	BL																										
J99	98B1	Bjørnerøya (east)	68° 14.8	14° 48.2	GADU MOR	LI																										
J99	98B2	Austnesfjorden	68° 14.8	14° 48.2	GADU MOR	LI																										
J99	98B1	Bjørnerøya (east)	68° 14.8	14° 48.2	GADU MOR	MU																										
J99	98B2	Austnesfjorden	68° 14.8	14° 48.2	GADU MOR	MU																										
J99	98F1	Bjørnerøya (east)	68° 13.13	14° 48.48	LIMA LIM	LI																										
J99	98F1	Bjørnerøya (east)	68° 13.13	14° 48.48	LIMA LIM	MU																										
J99	98F2	Husholmen	68° 13.13	14° 48.48	PLEU PLA	BI																										
J99	98F2	Husholmen	68° 13.13	14° 48.48	PLEU PLA	BL																										
J99	98F1	Bjørnerøya (east)	68° 13.13	14° 48.48	PLEU PLA	LI																										
J99	98F2	Husholmen	68° 13.13	14° 48.48	PLEU PLA	LI																										
J99	98F1	Bjørnerøya (east)	68° 13.13	14° 48.48	PLEU PLA	MU																										
J99	98F2	Husholmen	68° 13.13	14° 48.48	PLEU PLA	MU																										
J99	98F1	Bjørnerøya (east)	68° 13.13	14° 48.48	MICR KIT	LI																										
J99	98F1	Bjørnerøya (east)	68° 13.13	14° 48.48	MICR KIT	MU																										
J99	98F1	Bjørnerøya (east)	68° 13.13	14° 48.48	GLYP CYN	LI																										
J99	98F1	Bjørnerøya (east)	68° 13.13	14° 48.48	GLYP CYN	MU																										
J99	98X	Skrova harbour	68° 9.91	14° 39.53	MYTI EDU	SB																										
J99	99A	Brunvær	68° 0.3	15° 5.6	MYTI EDU	SB																										
J99	41A	Fensneset (Grytøya)	68° 56.1	16° 38.47	MYTI EDU	SB																										
J99	41G	Harstad (Trondenes)	68° 49.3	16° 33.92	NUCE LAP	SB																										
J99	41G1	Feneset	68° 56.1	16° 38.46	NUCE LAP	SB																										
J99	42A	Tennskjær (Malangen)	69° 28.65	18° 18.12	MYTI EDU	SB																										
J99	42G	Finnsnes	69° 13.55	17° 58.5	NUCE LAP	SB																										
J99	43A	Lyngneset (Langfjord)	70° 6.03	20° 32.79	MYTI EDU	SB																										
J99	43G1	Lyngneset (Langfjord)	70° 6.04	20° 32.79	NUCE LAP	SB																										
J99	43B1	Leisundet	70° 13.56	21° 23.81	GADU MOR	LI																										
J99	43B1	Leisundet	70° 13.56	21° 23.81	GADU MOR	MU																										
J99	43F1	Leisundet	70° 13.43	21° 23.84	PLEU PLA	LI																										
J99	43F1	Leisundet	70° 13.43	21° 23.84	PLEU PLA	MU																										
J99	43B	Kvænangen (Olderfjord)	70° 13.56	21° 23.81	GADU MOR	LI																										
J99	43B	Kvænangen (Olderfjord)	70° 13.56	21° 23.81	GADU MOR	MU																										
J99	43G	Skjervøy	70° 2.17	20° 59.76	NUCE LAP	SB																										
J99	43F	Kvænangen (Olderfjord)	70° 13.43	21° 23.84	LIMA LIM	LI																										

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Impco	Impst	stnam	nomlat	nomlon	speci	tissu	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006			
J99	43F	Kvænanngen (Olderfjord)	70° 13.43	21° 23.84	LIMA LIM	MU																3													
J99	43F	Kvænanngen (Olderfjord)	70° 13.43	21° 23.84	MICR KIT	LI																1													
J99	43F	Kvænanngen (Olderfjord)	70° 13.43	21° 23.84	MICR KIT	MU																1													
J99	44A	Elenheimsundet	70° 30.97	22° 14.76	MYTI EDU	SB														3	3	4	3								3				
J99	44G	Alta	69° 59.4	23° 18.35	NUCE LAP	SB																			1										
J99	44G1	Elenheimsundet	70° 30.97	22° 14.73	NUCE LAP	SB																										2			
J99	45A	Sauhamneset	70° 45.82	24° 19.2	MYTI EDU	SB														3	3											3			
J99	45G	Sauhamneset	70° 45.82	24° 19.2	NUCE LAP	SB																			1								2		
J99	45B	Hammerfest area	70° 46	24° 6.5	GADU MOR	LI														24	25														
J99	45B1	Revsbotn	70° 46	24° 6.5	GADU MOR	LI																											25		
J99	45B	Hammerfest area	70° 46	24° 6.5	GADU MOR	MU														29	30														
J99	45B1	Revsbotn	70° 46	24° 6.5	GADU MOR	MU																											30		
J99	45F	Hammerfest area	70° 40	24° 40	PLEU PLA	LI																											5		
J99	45F	Hammerfest area	70° 40	24° 40	PLEU PLA	MU																											5		
J99	46A	Smínes (Altesula)	70° 58.37	25° 48.1	MYTI EDU	SB														3	3	5											3		
J99	46H	Honningsvåg	70° 59.11	25° 57.96	MYTI EDU	SB																												3	
J99	46H	Honningsvåg	70° 59.11	25° 57.96	NUCE LAP	SB																			1									2	
J99	47A	Kifjordneset	70° 52.87	27° 22.19	MYTI EDU	SB														3	3													2	
J99	47G	Kifjordneset	70° 52.87	27° 22.19	NUCE LAP	SB																				1									2
J99	48A	Trollfjorden (Tanafjord)	70° 41.61	28° 33.28	MYTI EDU	SB														3	3	3												3	
J99	48G	Mehamn	71° 2.55	27° 50.35	NUCE LAP	SB																				1									
J99	48G1	Trollfjorden (Tanafjord)	70° 41.61	28° 33.28	NUCE LAP	SB																												2	
J99	49G	Syltefjorden	70° 33.01	30° 5.17	NUCE LAP	SB																												2	
J99	49A	Nordfjorden (Syltefjord)	70° 33.01	30° 5.17	MYTI EDU	SB														3	3													2	
J99	10A1	Skagodden	70° 6.21	30° 15.75	MYTI EDU	SB														3	3													3	
J99	10A2	Skallneset	70° 6.21	30° 15.75	MYTI EDU	SB																4	3	3	3	3	3	3	3	3	3	3	3	3	
J99	10G3	Vardø	70° 22.65	31° 6.5	NUCE LAP	SB																												2	
J99	10G4	Vadsø	70° 4.48	29° 42.9	NUCE LAP	SB																												2	
J99	10B	Varangerfjorden	69° 56	29° 40	GADU MOR	BI																				22	21								
J99	10B	Varangerfjorden	69° 56	29° 40	GADU MOR	BL																				25	25								
J99	10B	Varangerfjorden	69° 56	29° 40	GADU MOR	LI														21	25	25	23	25	25	25	25	25	25	25	25	10			
J99	10B	Varangerfjorden	69° 56	29° 40	GADU MOR	MU														25	30	30	27	30	30	30	30	30	30	30	30	12			
J99	10B	Varangerfjorden	69° 56	29° 40	BROS BRO	LI														1															
J99	10B	Varangerfjorden	69° 56	29° 40	BROS BRO	MU														1															
J99	10F	Skogerøy	69° 55	29° 51	PLEU PLA	BI																					15	25							
J99	10F	Skogerøy	69° 55	29° 51	PLEU PLA	BL																				11	24								
J99	10F	Skogerøy	69° 55	29° 51	PLEU PLA	LI																5				4	18	30	5	4	4	5			
J99	10F	Skogerøy	69° 55	29° 51	PLEU PLA	MU																5				4	3	5	5	4	4	5			
J99	11A1	Sildkrokneset (south)	69° 47.11	30° 11.1	MYTI EDU	SB														3	3														
J99	11A2	Sildkrokneset (north)	69° 47.11	30° 11.1	MYTI EDU	SB																	4	3											
J99	11G	Brashavn	69° 53.92	29° 44.65	NUCE LAP	SB																						1	1	2	2	2			
J99	11X	Brashavn	69° 53.92	29° 44.65	MYTI EDU	SB																													
J26	I001	Sponvikskansen	59° 5.41	11° 12.61	MYTI EDU	SB																	3	3	3	3	3	3	3	3	3	3	3	3	
J26	I011	Kråkenebbet	59° 6.05	11° 17.33	MYTI EDU	SB																													
J26	I021	Kjøke (south)	59° 7.79	10° 57.11	MYTI EDU	SB																													
J26	I022	West Damholmen	59° 6.11	11° 2.69	MYTI EDU	SB																													
J26	I023	Singlekalven (south)	59° 5.7	11° 8.2	MYTI EDU	SB																													
J26	I024	Kirkøy (north west)	59° 4.8	10° 59.18	MYTI EDU	SB																													
J26	I301	Akershuskaia	59° 54.32	10° 44.18	MYTI EDU	SB																													
J26	I304	Gåsøya	59° 51.08	10° 35.34	MYTI EDU	SB																													
J26	I306	Håøya	59° 42.8	10° 33.31	MYTI EDU	SB																													
J26	I307	Ramtonholmen	59° 44.67	10° 31.37	MYTI EDU	SB																													
J99	I711	Steinholmen	59° 3.11	9° 40.62	MYTI EDU	SB																													
J99	I712	Gjemesholmen	59° 2.72	9° 42.41	MYTI EDU	SB																													

Appendix D. Map of stations











Nominal station positions 1981-2006

Appendix D. (cont.) Map of stations

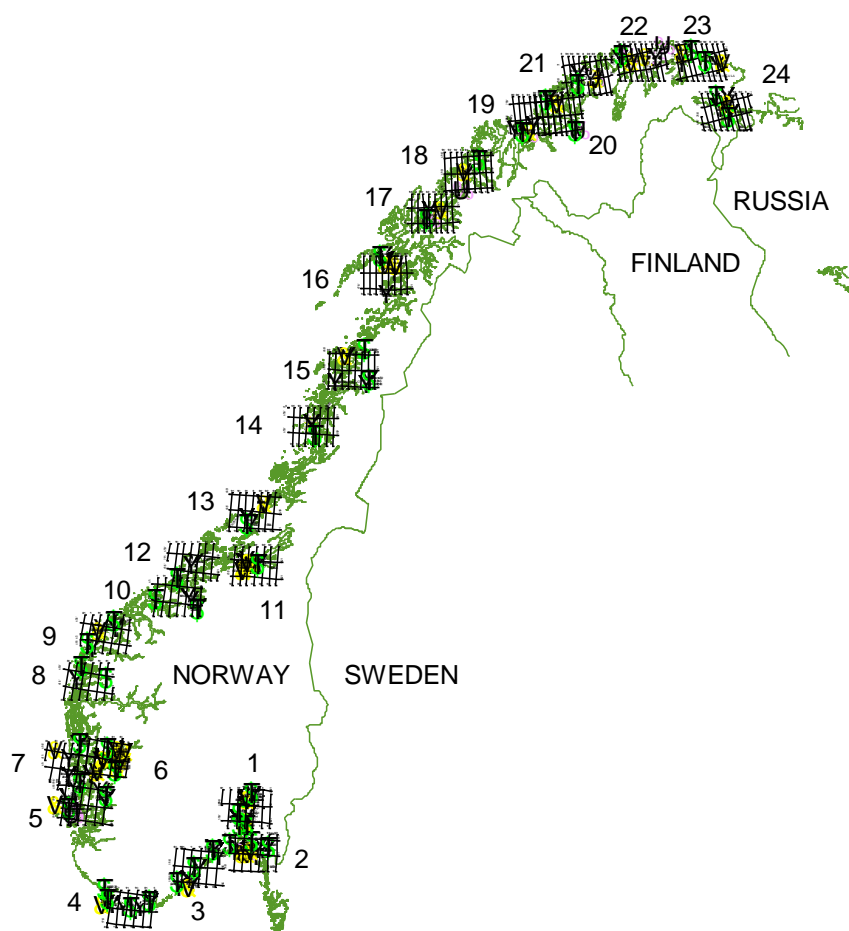
NOTES

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

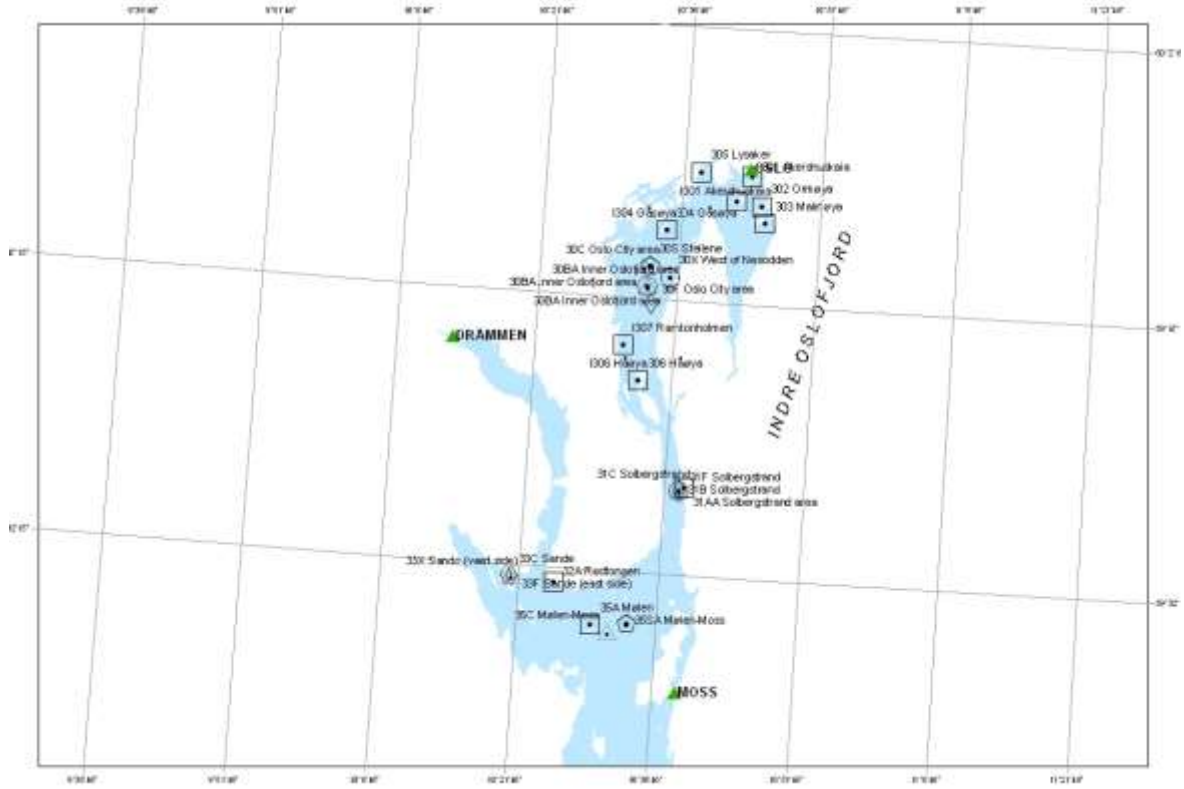
The following symbols and codes apply:

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

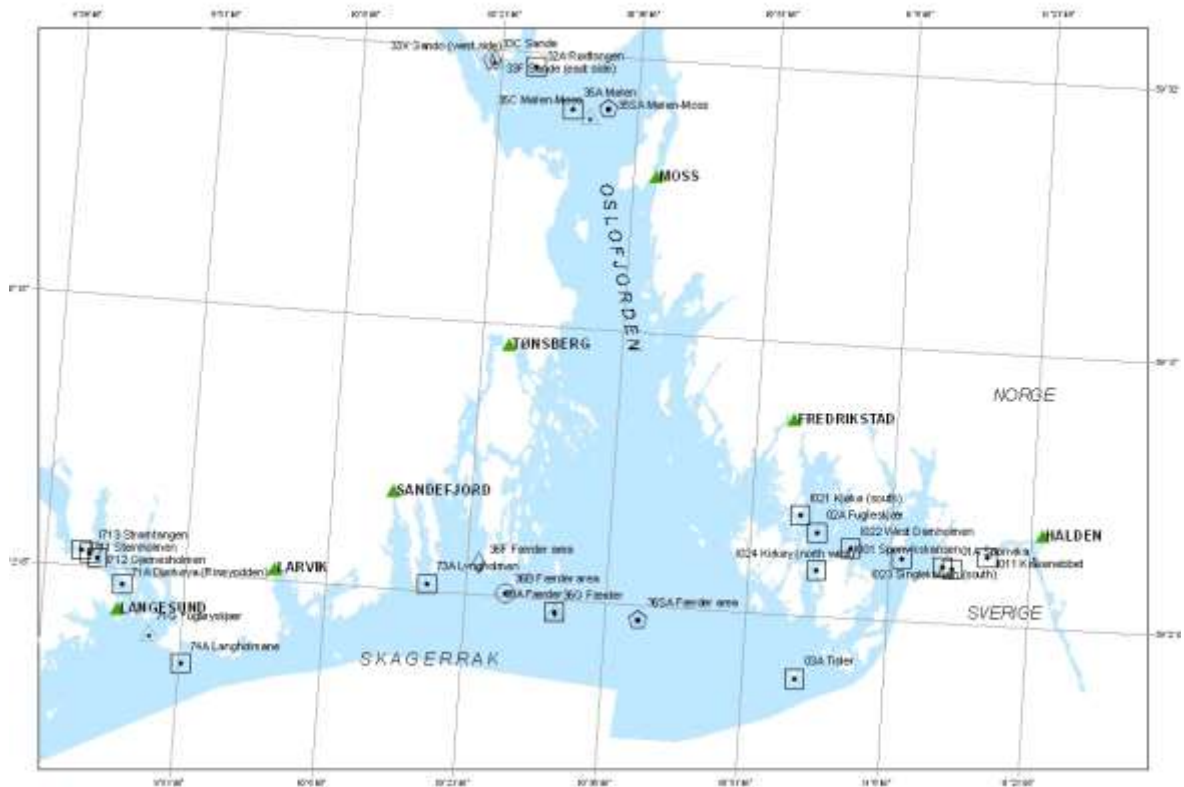
1) Supplementary station used in SFT bluemussel pollution (I) or reference (R) index



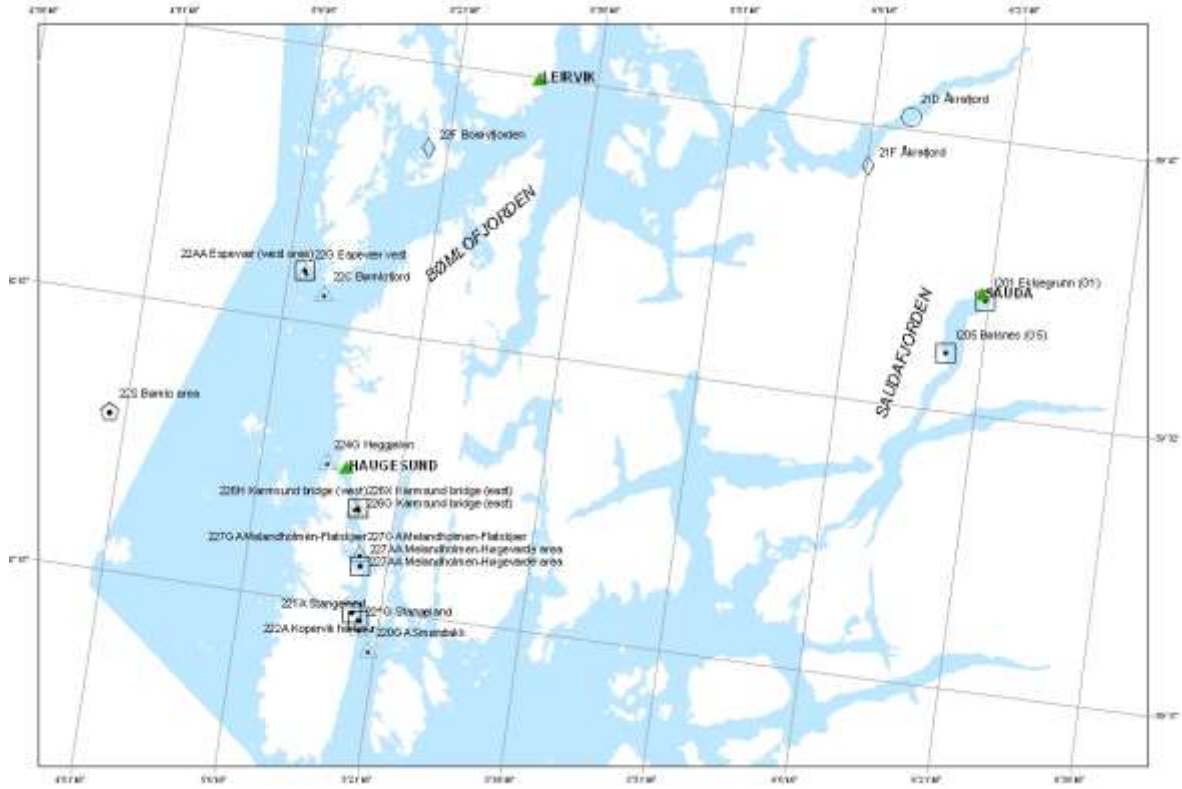
JAMP stations Norway. Numbers indicate map reference that follow.
Note: distance between two lines of latitude is 15 nautical miles (= 27.8 km).



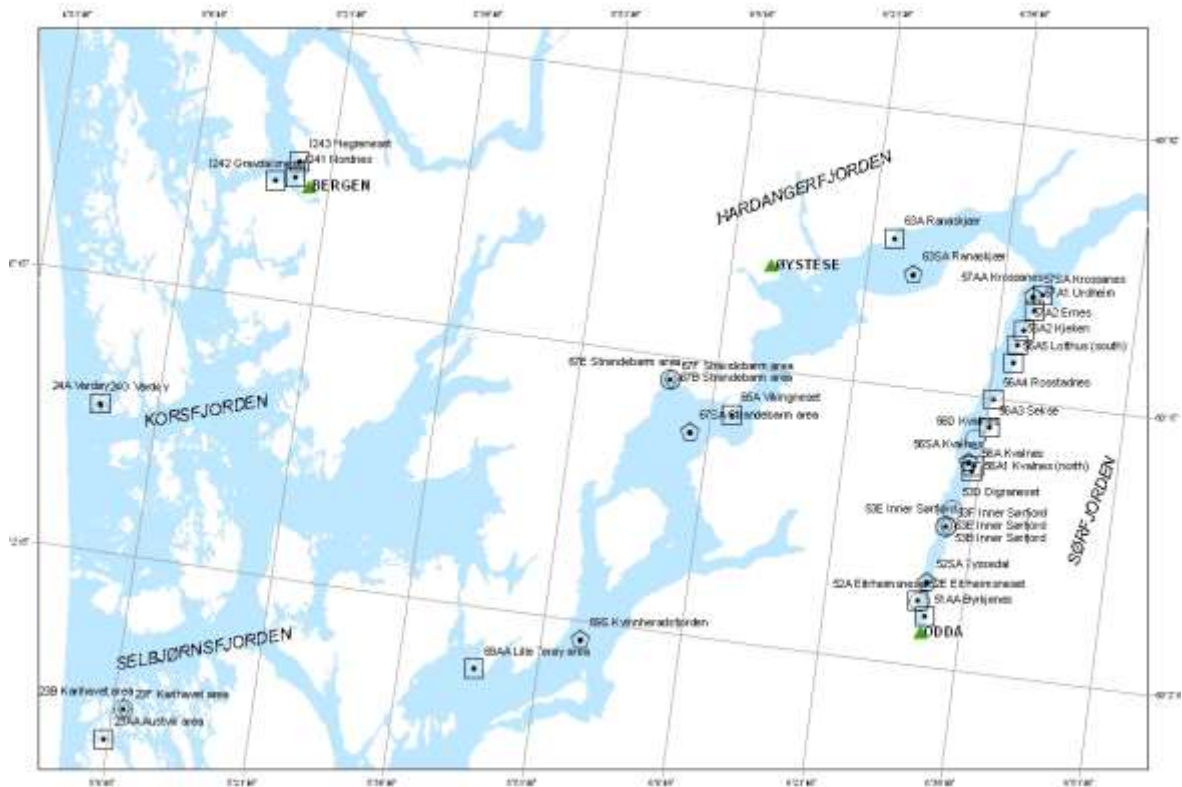
MAP 1



MAP 2



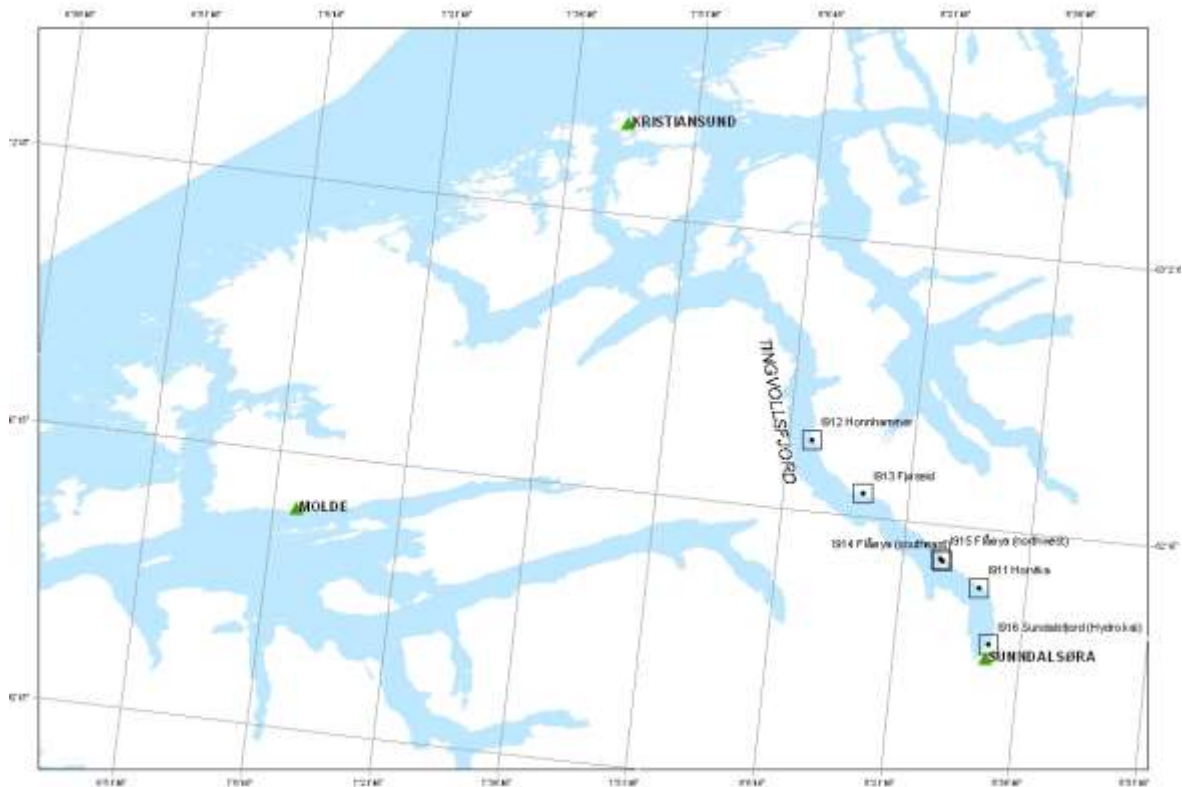
MAP 5



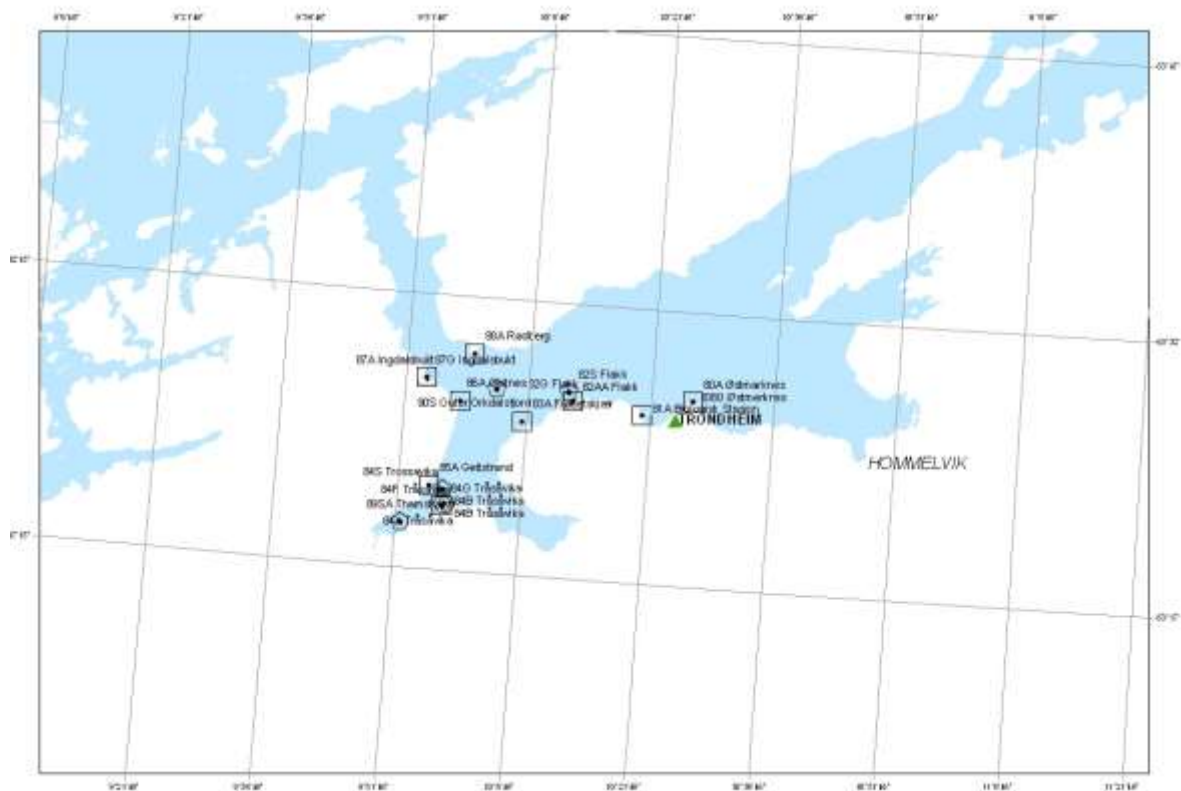
MAP 6



MAP 9



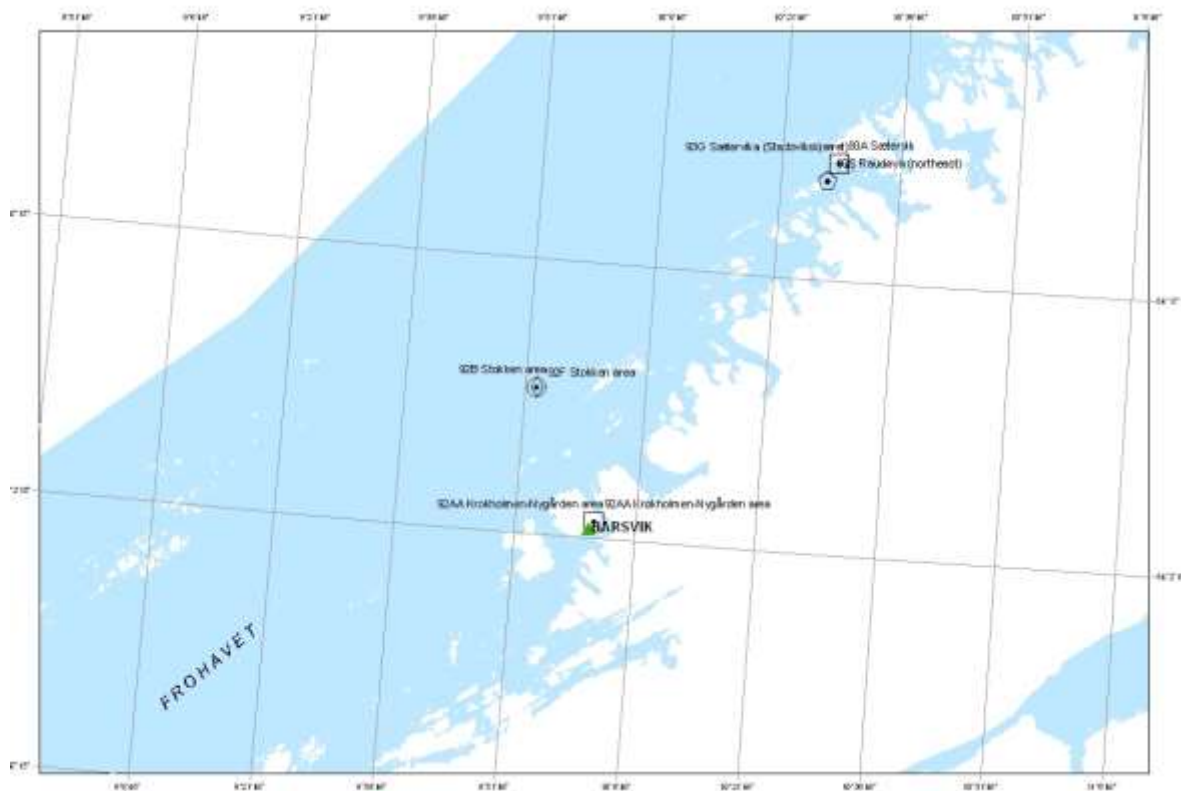
MAP 10



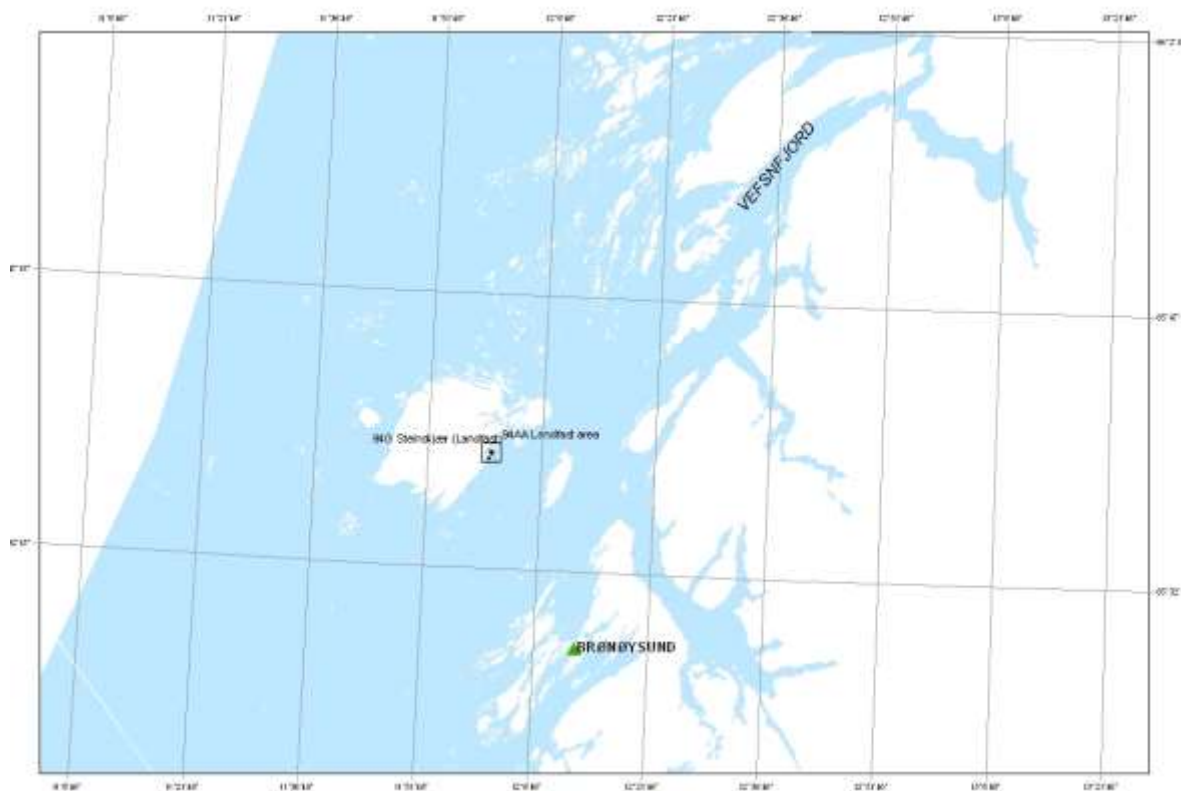
MAP 11



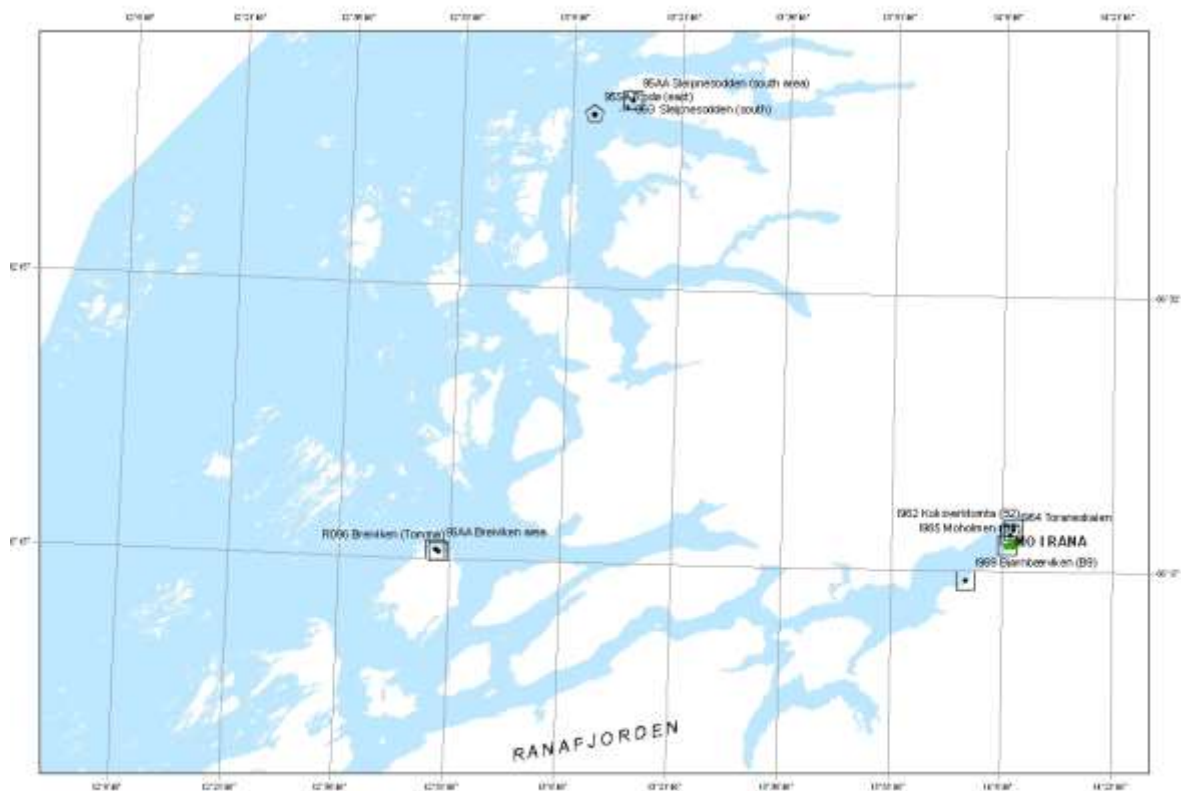
MAP 12



MAP 13



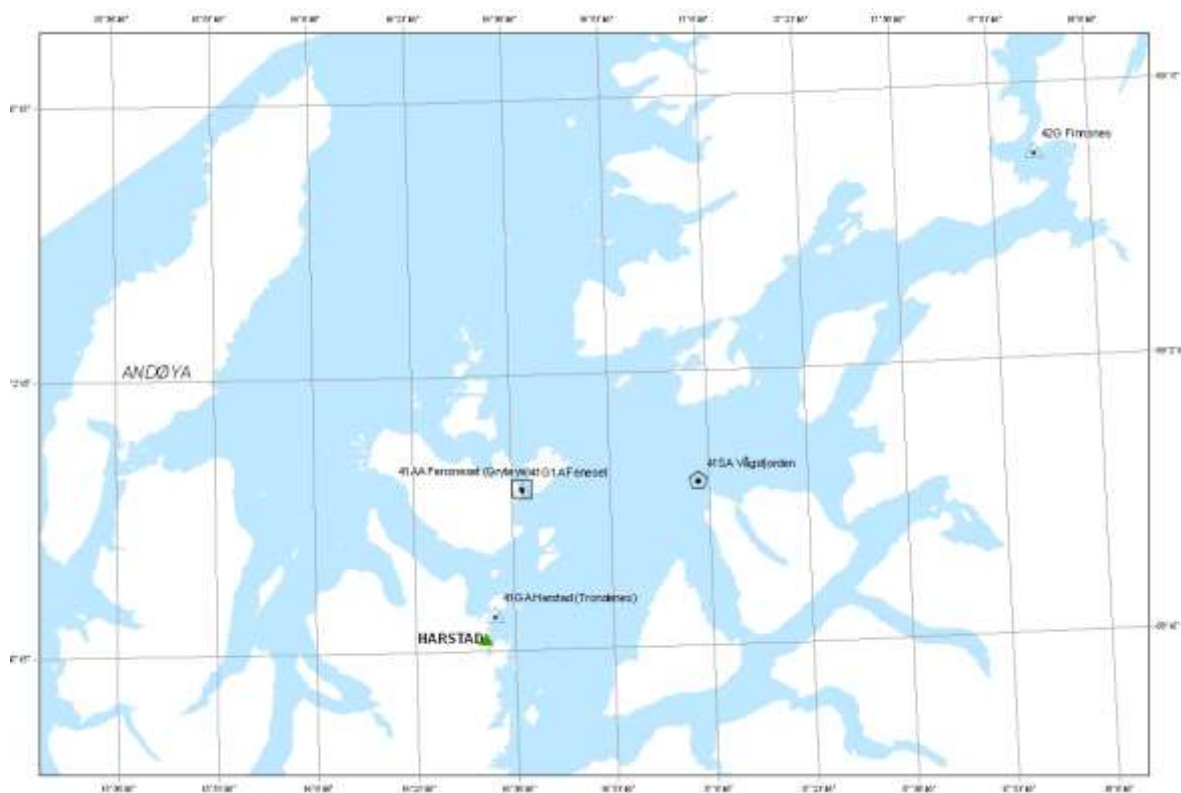
MAP 14



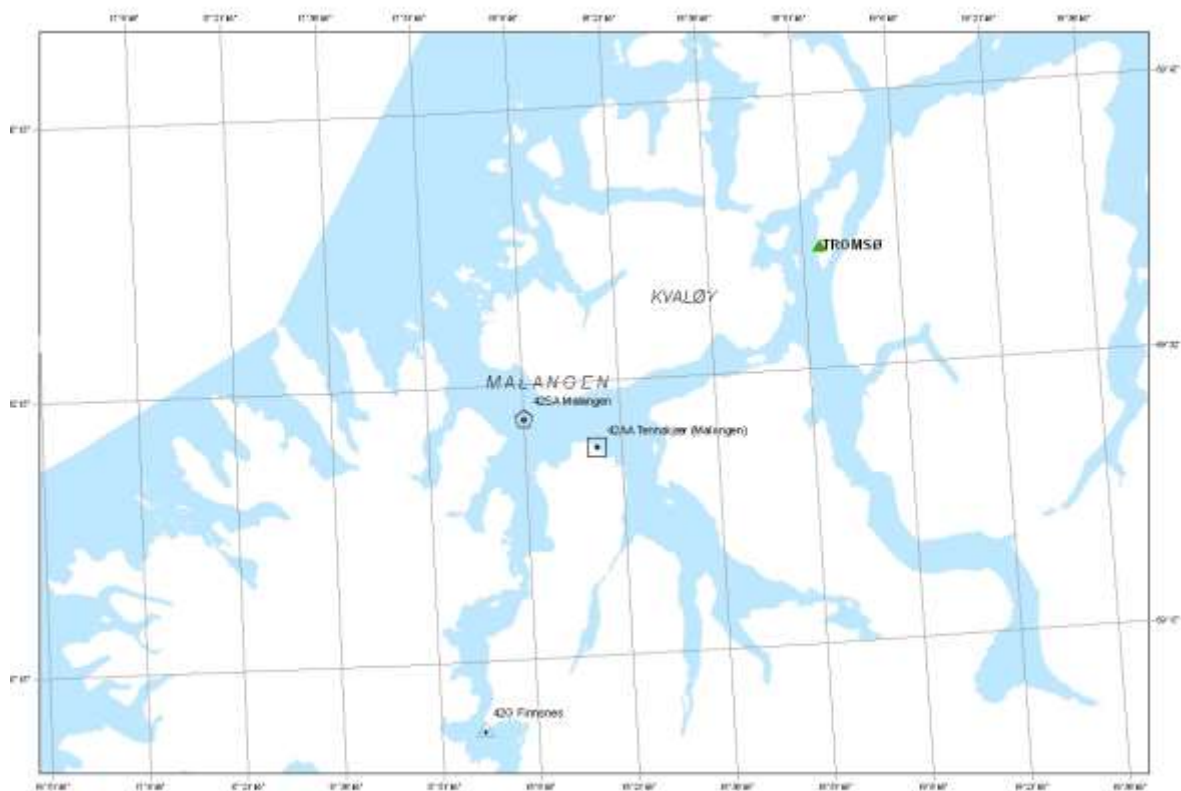
MAP 15



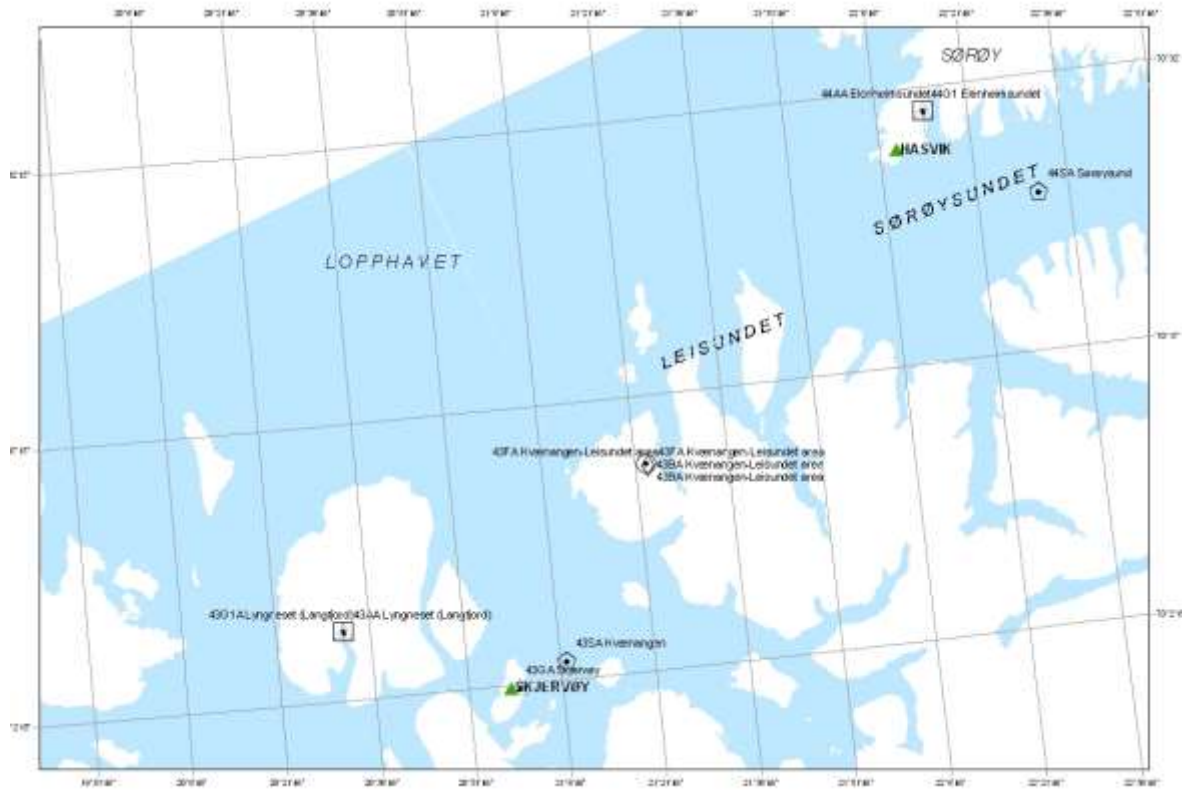
MAP 16



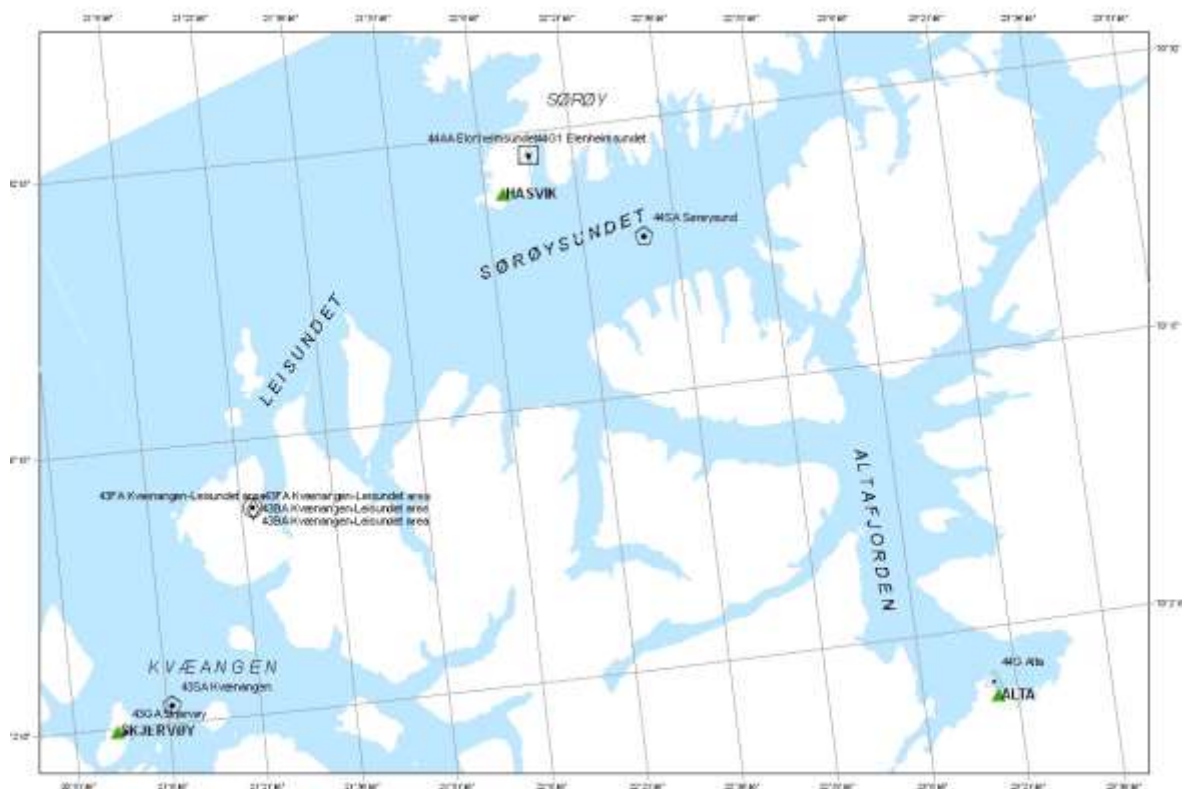
MAP 17



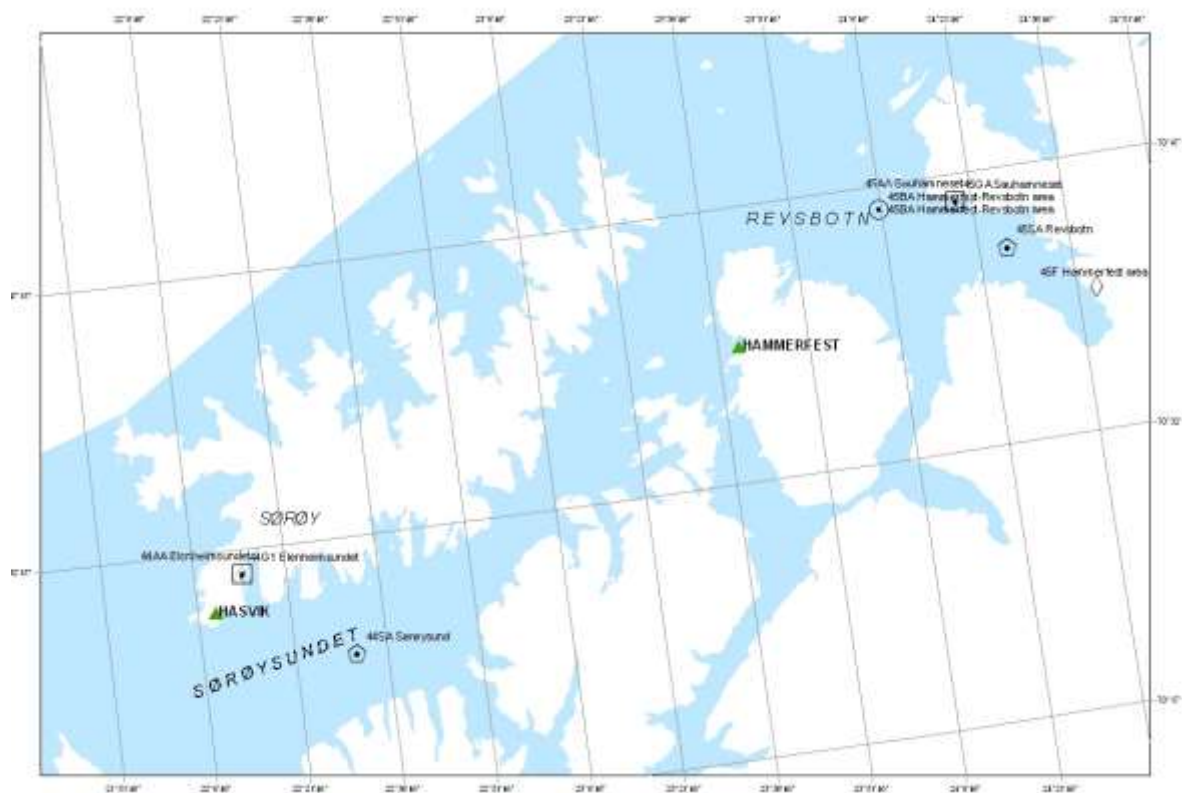
MAP 18



MAP 19



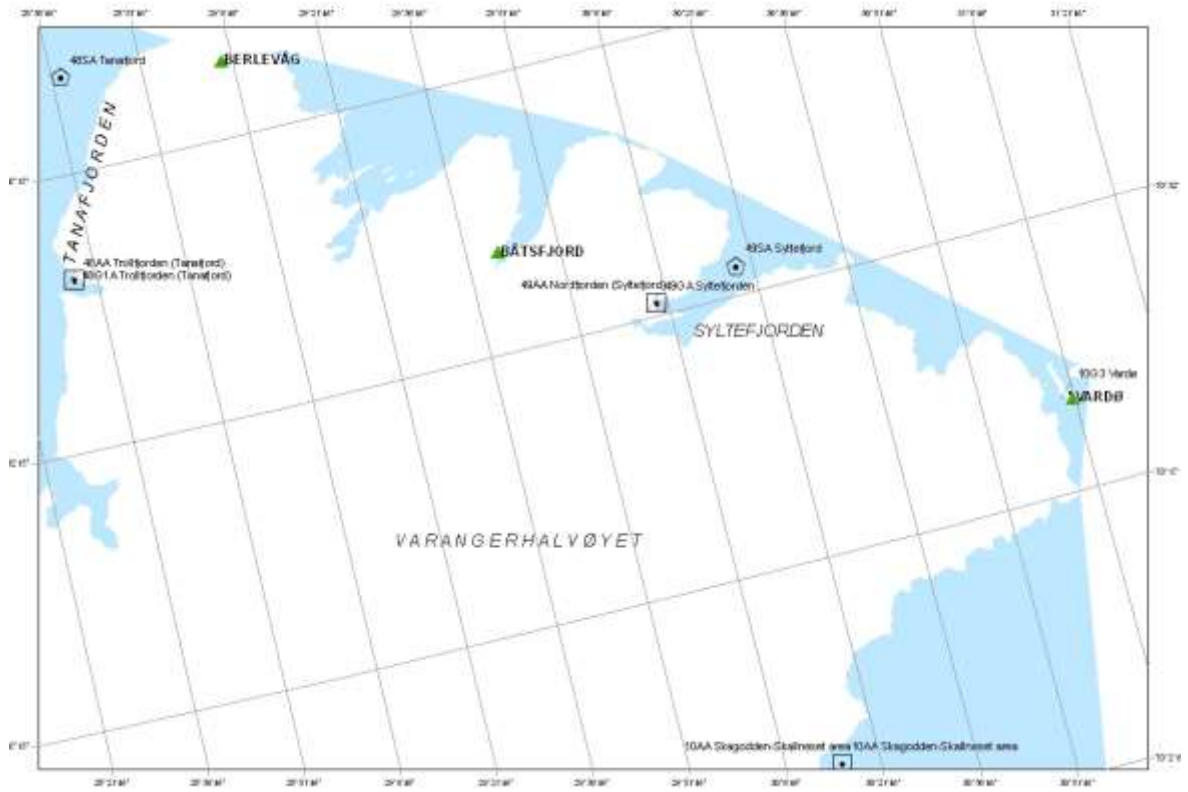
MAP 20



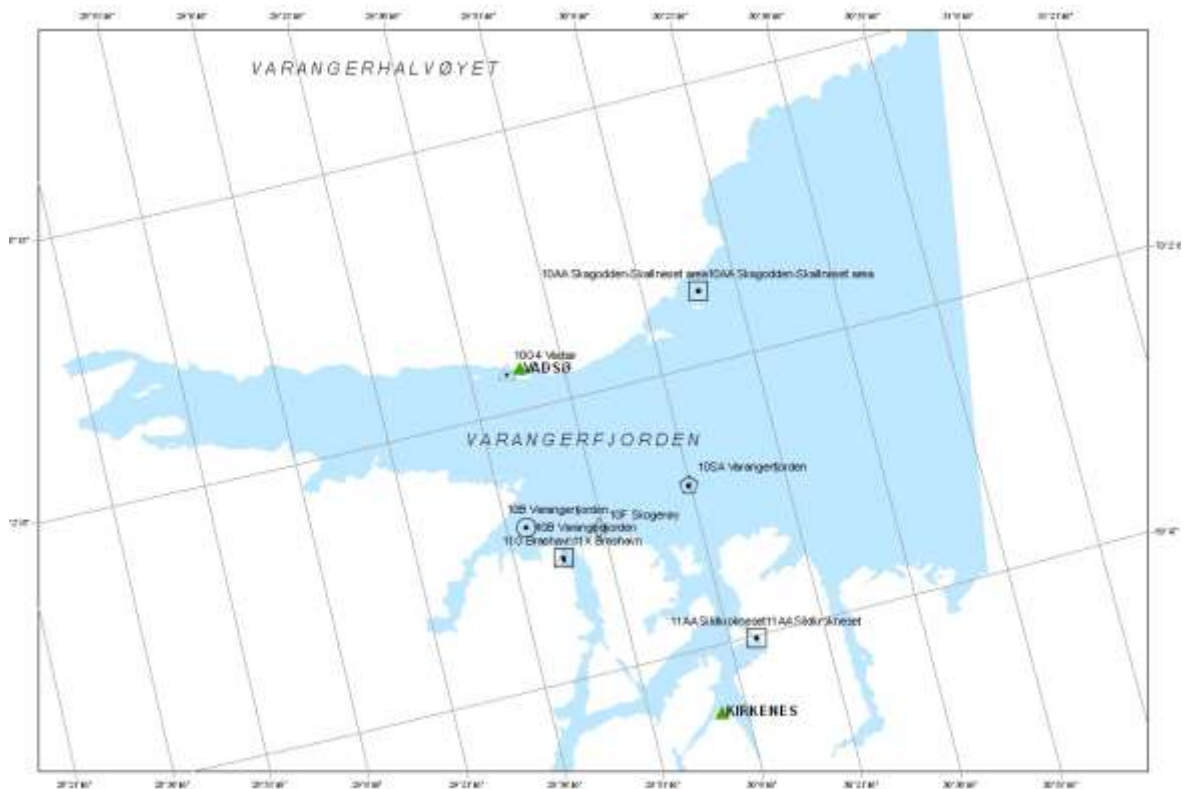
MAP 21



MAP 22



MAP 23



MAP 24

Appendix E. SEDIMENT 1986-2006 RAW DATA

NOTES

This appendix presents mean concentrations of the contaminants found in sediment. All data are on a dry weight basis. Three units of measure are used: **ppt** (parts per thousand), **ppm** (parts per million, mg/kg), and **ppb** (parts per billion, µg/kg). The numeric values shown have been printed with a fixed number of digits and do not necessarily indicate analytical precision. Refer also to the comments preceding the table.

The sample area code refers to the official JAMP designation and for some areas this may be undefined (J99).

- Sample area** Geographically beginning with those stations near the Swedish border and continuing around the coast to the Russian border (cf., maps (Appendix D.). The sample area code refers to the official JAMP designation and for some areas this may be undefined (J99).
- Locality** Station name and position. The data are sorted geographically along the coast from the Swedish border in the south to the Russian border in the north (cf., maps (Appendix D.) and Appendix B.)
- Type** refers to sample method: where GC=gravity corer (used by NIVA).
- Diameter** refers to inner diameter (mm) of GC

The abbreviations for analytical laboratory and variable name are explained in Appendix A. An overview of variables, analysis code, detection limits and data count has been described Green *et al.* (2008b).

[Appendix_E_Sediment_1986-2006_raw_data](#) (86 pp)

Appendix F. SEDIMENT 1986-2006 MEAN CONCENTRATIONS

NOTES

This appendix presents mean concentrations of the contaminants found in sediment. All data are on a dry weight basis and include count, mean and standard deviation for parallel samples, if relevant. Three units of measure are used: **ppt** (parts per thousand), **ppm** (parts per million, mg/kg), and **ppb** (parts per billion, µg/kg). The numeric values shown have been printed with a fixed number of digits and do not necessarily indicate analytical precision. Refer also to the comments preceding the table.

The sample area code refers to the official JAMP designation and for some areas this may be undefined (J99).

Sample area Geographically beginning with those stations near the Swedish border and continuing around the coast to the Russian border (cf., maps, Appendix D.). The sample area code refers to the official JAMP designation and for some areas this may be undefined (J99).

Locality Station name and position. The data are sorted geographically along the coast from the Swedish border in the south to the Russian border in the north (cf., maps (Appendix D.) and Appendix B.).

Type refers to sample method: where GC=gravity corer (used by NIVA).

Diameter refers to inner diameter (mm) of GC

The abbreviations for analytical laboratory and variable name are explained in Appendix A. An overview of variables, analysis code, detection limits and data count has been described Green *et al.*(2008b).

Appendix_F_Sediment_1986-2006_mean_concentrations1 (188pp)

Appendix G. SHELLFISH 2002-2006 RAW DATA

NOTES

This appendix presents concentrations of the contaminants found in shellfish. All data are on a original basis; that is, the basis on which the sample was analysed. Three units of measure are used: **ppm** (parts per million, mg/kg), **ppb** (parts per billion, µg/kg) and **ppp** (parts per trillion, ng/kg). The numeric values shown have been printed with a fixed number of digits and do not necessarily indicate analytical precision. Refer also to the comments preceding the table.

The data is sorted in the order of:

Species	Alphabetically by ICES code.
Tissue	Softbody, tail muscle.
Sample area	Geographically beginning with those stations near the Swedish border and continuing around the coast to the Russian border (cf., maps (Appendix D. , and order shown in Appendix C.). The sample area code refers to the official JAMP designation and for some areas this may be undefined (J99).

Note that the results from bulked samples and individuals are treated separately.

The abbreviations for analytical laboratory and variable name are explained in Appendix A. An overview of variables, analysis code, detection limits and data count has been described Green *et al.*(2008b).

Appendix_G_Shellfish_2002-2006_raw_data. (437 pp)

Appendix H. FISH 2002-2006 RAW DATA

NOTES

This appendix presents concentrations of the contaminants found in shellfish. All data are on a original basis; that is, the basis on which the sample was analysed. Three units of measure are used: **ppm** (parts per million, mg/kg), **ppb** (parts per billion, µg/kg) and **ppp** (parts per trillion, ng/kg). The numeric values shown have been printed with a fixed number of digits and do not necessarily indicate analytical precision. Refer also to the comments preceding the table.

The data is sorted in the order of:

Species	Alphabetically by ICES code; Latin, English and Norwegian name follow.
Tissue	Softbody, tail muscle
Sample area	Geographically beginning with those stations near the Swedish border and continuing around the coast to the Russian border (cf., maps (Appendix D. , and order shown in Appendix C.). The sample area code refers to the official JAMP designation and for some areas this may be undefined (J99).

Note that the results from bulked samples and individuals are treated separately.

The abbreviations for analytical laboratory and variable name are explained in Appendix A. An overview of variables, analysis code, detection limits and data count has been described Green *et al.*(2008b).

Appendix_H_Fish_2002-2006_raw_data (508 pp)

Appendix I.

BIOLOGICAL EFFECTS RESULTS 2002-2006

RAW DATA

NOTES

This appendix presents concentrations of the contaminants found in shellfish. All data are on a original basis; that is, the basis on which the sample was analysed. Three units of measure are used: **ppm** (parts per million, mg/kg), **ppb** (parts per billion, µg/kg) and **ppp** (parts per trillion, ng/kg). The numeric values shown have been printed with a fixed number of digits and do not necessarily indicate analytical precision. Refer also to the comments preceding the table.

The data is sorted in the order of:

Species	Alphabetically by ICES code; Latin, English and Norwegian name follow.
Tissue	Softbody, tail muscle
Sample area	Geographically beginning with those stations near the Swedish border and continuing around the coast to the Russian border (cf., maps (Appendix D. , and order shown in Appendix C.). The sample area code refers to the official JAMP designation and for some areas this may be undefined (J99).

Note that the results from bulked samples and individuals are treated separately.

The abbreviations for analytical laboratory and variable name are explained in Appendix A. An overview of variables, analysis code, detection limits and data count has been described Green *et al.*(2008b).

[Appendix I_Biological_effects_results_2002-2006_raw_data](#) (106 pp)

Appendix J. SHELLFISH 1981-2006 MEAN CONCENTRATIONS

This appendix presents mean concentrations of the contaminants found in shellfish. All data are on a wet weight basis. Three units of measure are used: **ppm** (parts per million, mg/kg), **ppb** (parts per billion, µg/kg) and **ppp** (parts per trillion, ng/kg). The numeric values shown have been printed with a fixed number of digits and do not necessarily indicate analytical precision. Refer also to the comments preceding the table.

The data is sorted in the order of:

Species	Alphabetically by ICES code; Latin, English and Norwegian name follow.
Tissue	Softbody, tail muscle.
Sample area	Geographically beginning with those stations near the Swedish border and continuing around the coast to the Russian border (cf., maps (Appendix D. , and order shown in Appendix C.). The sample area code refers to the official JAMP designation and for some areas this may be undefined (J99).

Note that the results from bulked samples and individuals are treated separately.

The abbreviations for analytical laboratory and variable name are explained in Appendix A. An overview of variables, analysis code, detection limits and data count has been described Green *et al.*(2008b).

Appendix_J_Shellfish_1981_2006_mean_concentrations (249 pp)

Appendix K. FISH 1981-2006 MEAN CONCENTRATIONS

This appendix presents mean concentrations of the contaminants found in shellfish. All data are on a wet weight basis. Three units of measure are used: **ppm** (parts per million, mg/kg), **ppb** (parts per billion, µg/kg) and **ppp** (parts per trillion, ng/kg). The numeric values shown have been printed with a fixed number of digits and do not necessarily indicate analytical precision. Refer also to the comments preceding the table.

The data is sorted in the order of:

Species	Alphabetically by ICES code; Latin, English and Norwegian name follow.
Tissue	Softbody, tail muscle.
Sample area	Geographically beginning with those stations near the Swedish border and continuing around the coast to the Russian border (cf., maps (Appendix D. , and order shown in Appendix C.). The sample area code refers to the official JAMP designation and for some areas this may be undefined (J99).

Note that the results from bulked samples and individuals are treated separately.

The abbreviations for analytical laboratory and variable name are explained in Appendix A. An overview of variables, analysis code, detection limits and data count has been described Green *et al.*(2008b).

Appendix_K_Fish_1981-2006_mean_concentrations (219 pp)

Appendix L.

BIOLOGICAL EFFECTS RESULTS 1997-2006

MEAN CONCENTRATIONS

This appendix presents mean concentrations of the contaminants found in shellfish. All data are on a wet weight basis. Three units of measure are used: **ppm** (parts per million, mg/kg), **ppb** (parts per billion, µg/kg) and **ppp** (parts per trillion, ng/kg). The numeric values shown have been printed with a fixed number of digits and do not necessarily indicate analytical precision. Refer also to the comments preceding the table.

The data is sorted in the order of:

Species	Alphabetically by ICES code; Latin, English and Norwegian name follow.
Tissue	Softbody, tail muscle.
Sample area	Geographically beginning with those stations near the Swedish border and continuing around the coast to the Russian border (cf., maps (Appendix D. and order shown in Appendix C.). The sample area code refers to the official JAMP designation and for some areas this may be undefined (J99).

Note that the results from bulked samples and individuals are treated separately.

The abbreviations for analytical laboratory and variable name are explained in Appendix A. An overview of variables, analysis code, detection limits and data count has been described Green *et al.*(2008b).

[Appendix_L_Biological_effects_results_1997-2006_mean concentrations_shellfish](#) (121 pp)

[Appendix_L_Biological_effects_results_1997-2006_mean concentrations_fish](#) (110 pp)



**Long-term monitoring of environmental quality in
Norwegian coastal waters**

Joint Assessment and Monitoring Programme (JAMP)

Norwegian Pollution Control Authority (SFT)
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Author(s) Ling Shi Norman Green Åse Kristine Rogne			
Title Joint Assessment and Monitoring Programme (JAMP) Contaminant and effects data for sediments, shellfish and fish 1981-2006			
Summary This report is a compilation of data on contaminant concentrations in sediment and organisms, as well as results from biological effects methods used in the Norwegian contribution to the Joint Assessment and Monitoring Programme (JAMP). It concerns mainly selected metals, organochlorines and polycyclic aromatic hydrocarbons that were collected during the period 1981-2006			
4 <i>emneord</i> <i>Miljøgifter</i> <i>Biologisk effekter</i> <i>Marin</i> <i>Norge</i>		4 subject words Contaminants Biological effects Marine Norway	

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Statlig program for forurensningsovervåking omfatter
overvåking av forurensningsforholdene i luft og nedbør,
skog, vassdrag, fjorder og havområder.

Overvåkingsprogrammet dekker langsiktige undersøkelser av:

- overgjødsling
- forsuring (sur nedbør)
- ozon (ved bakken og i stratosfæren)
- klimagasser
- miljøgifter

Overvåkingsprogrammet skal gi informasjon om
tilstanden og utviklingen av forurensningssituasjonen, og
påvise eventuell uheldig utvikling på et tidlig tidspunkt.
Programmet skal dekke myndighetenes
informasjonsbehov om forurensningsforholdene, registrere
virkningen av iverksatte tiltak for å redusere
forurensningen, og danne grunnlag for vurdering av nye
tiltak. SFT er ansvarlig for gjennomføringen av
overvåkingsprogrammet.

TA-2369/2008

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