SAM e-Rapport

Seksjon for anvendt miljøforskning – marin
Uni-Research

Alteration no. 2 to:
e-Rapport nr. 23- 2013

Recipient survey in relation to the exception of secondary treatment of sewage emissions in Fjell municipality

Stian Ervik Kvalø
Ragni Torvanger
Kristin Hatlen
Per Johannessen

Vedlegg SF-SAM-505.1	**ENDRINGSRAPPORT**	Seksjon for anvendt miljøforskning *Side av*

SEKSJON FOR ANVENDT MILJØFORSKNING (SAM)
Thormøhlensgate 55, 5008 Bergen
Telefon: 55 58 47 79 Telefaks: 55 58 45 25

Test 157

ENDRINGSRAPPORT

Rapportens navn: Alteration no. 2 to 23-2013 ***Recipientsurvey in relation to the exception of secondary treatment of sewage emissions in Fjell municipality***
Prosjekt nr.: 806275
Oppdragsgiver (navn og adresse): Bergen kommune, Vann og avløpsetaten, Fjøsangerveien 68, 5086 Bergen
Prøvetakingssted (område): Fjords outside Litlesotra
Dato for prøvetaking: sep 2011-oct 2012
Ansvarlig for prøvetaking (firma): Uni Research AS seksjon SAM-Marin
Avvik/endringer til opprinnelig rapport: Alterations/Changes to original report: Alteration 1: Two tables (table 2.1 page 9 and table 2.2 page 10) concerning coordinates for sampling and sampling information with regards to grab sampling has been added. Alteration 2: In the references section in the previous report it had been referred to two outdated standards(NS 9423 and NS 9424), these have been removed from the reference list. Alteration 3: Tables 3.7.2 and 3.7.3 on page 30 has been updated with English rather than Norwegian text. Alteration 4: On the map on page 8, the letter S in Station Knar S had not been included in the previous report, it has now been included.

Dato: 26/6 2013	**Signatur**

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Avvik/endringer til opprinnelig rapport: Alterations/Changes to original report: Alteration 1: A section regarding deviations to sampling was inserted at page 15. Alteration 2: Table 3.1.3 at page 17 concerning environmental toxins in *Fucus vesiculosus* has been replaced with a table giving the toxins as dry weight rather than the original wet weight. This changed the classification for lead at BasvL going from background to moderate and the classification for copper and lead at station Knar N going from background to good conditions. The text has also been changed accordingly. Alteration 3: Data from 2011 regarding nutritional salt was added to the appendix at page 84. Alteration 4: Data from 2011 regarding CTD measurements was added to the appendix at page 76.
Dato: 2013.06.12 — **Signatur**

Vedlegg SF-SAM-506.04 **Utforming av sammendrag SAM e-rapport** SAM-Marin

uni Research **SAM-Marin**

SAM-Marin
Thormøhlensgt. 55, 5008 Bergen, Norway
Tlf: 55 58 43 41 Fax 55 58 45 25

Internet: www.uni.no
E-post: Sam-marin@uni.no
Foretaksreg. nr. 985 827 117 MVA

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Oppdragsgiver: Bergen kommune	Tilgjengelighet: Åpen

Abstract: This reports presents the results from the recipientsurvey in relation to the exception of secondary treatment of sewage emissions in Fjell municipality. In general conditions were good in the recipient and it is concluded that it will be able to handle larger emissions in the future.

Keywords: Marine recipient, hydrography, nutrients,bacteria, chlorophyll a, sediment, littoral, benthos.	Emneord: Marin resipient, hydrografi, næringssalter, bakterier, klorofyll a, sediment, littoral, benhos.

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Prosjektet / undersøkelsen:	26/6. 13	Stian E. Kvalø

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Følgende er utført akkreditert:

Prøvetaking til Sediment, bunnfauna **analyser, samlet av:** Stian Ervik Kvalø, Frøydis Lygre, Tom Alvestad og PerJohannessen

Litoralundersøkelse utført av: Tom Alvestad, Stian Ervik Kvalø, Erling Heggøy

Sortering av sediment utført av: Ragna Tveiten, Natalia Korableva, Nargis Islam, Ragni Torvanger, Lise Rikstad, Kine A. Solberg, Ingrida Petrauskaite

Identifikasjon av marin fauna utført av: Tom Alvestad, Frøydis Lygre, Per Johannessen

Rapportering utført av: Stian Ervik Kvalø, Ragni Torvanger, Kristin Hatlen og Per Johannessen

Glødetapsanalyser utført av: Helge Grønning, Lillian Elvik, Ragni Torvanger(under opplæring)

Kornfordelingsanalyser utført av: Helge Grønning, Lillian Elvik, Ragni Torvanger(under opplæring)

Ikke akkreditert:

LEVERANDØRER

Toktfartøy: M/S Solvik og Scallop

Kjemiske analyser utført av: Eurofins Norsk Miljøanalyse AS **akkrediteringsnummer** Test 003

Akkreditert: Næringssalter, Klorofyll a, Bakterier, PAH16, PCB7,TBT, Metaller.

Ikke akkreditert: -

Andre: -

Contents

1. INTRODUCTION

The 2011-2012 surveys include the parameters hydrography-, bacteria-, nutrients-, chlorophyll a-, environmental toxins and benthos samples were examined at stations Våg 8, Basv, Knar S og Knar N (Figure 1.1) in accordance with TA 1890/2005. Littoral surveys with grid analyses were conducted at four new stations Knar NL, Knar SL, Basv L og Våg 8L. In addition semiquantitative analyses were made in the same area (Knar NLS, Knar SLS, Basv LS og Våg 8LS). The background for this survey is that they will be part of an application to not have to perform secondary treatment of sewage.

At present sewage treatment includes a 20 % reduction in SS and < 10 % BOF.
The plan is to establish one mutual primarytreatment sewage plant with an anticipated 16 000 pe in 2020, 22 000 pe in 2030 and 29 000 pe in 2050. Primarytreatment includes a 50 % reduction in SS and 20 % BOF.
The location of the facility is not yet decided but it will most likely be between Knarrevik sør and Basvika.

The surveys are conducted in accordance with TA-1890/2005.

SAM-Marine, at the department Uni environment in the research company Uni Research is accredited by Norsk akkreditering for sampling, taxonomic analyses of soft bottom fauna, geological analyses of loss on ignition and particulate distribution of sediments, littoral surveys and professional advice and interpretations under accreditation number TEST 157 and follows standing Norwegian and international standards for fieldwork (NS 9420- NS 9435; NS-EN ISO 5667; 16665; 17000; 17025 and 19493).

2. MATERIALS AND METHODS

2.1 SAMPLING AREA

Figure 2.1 gives an overwiev of sampling stations at sea.

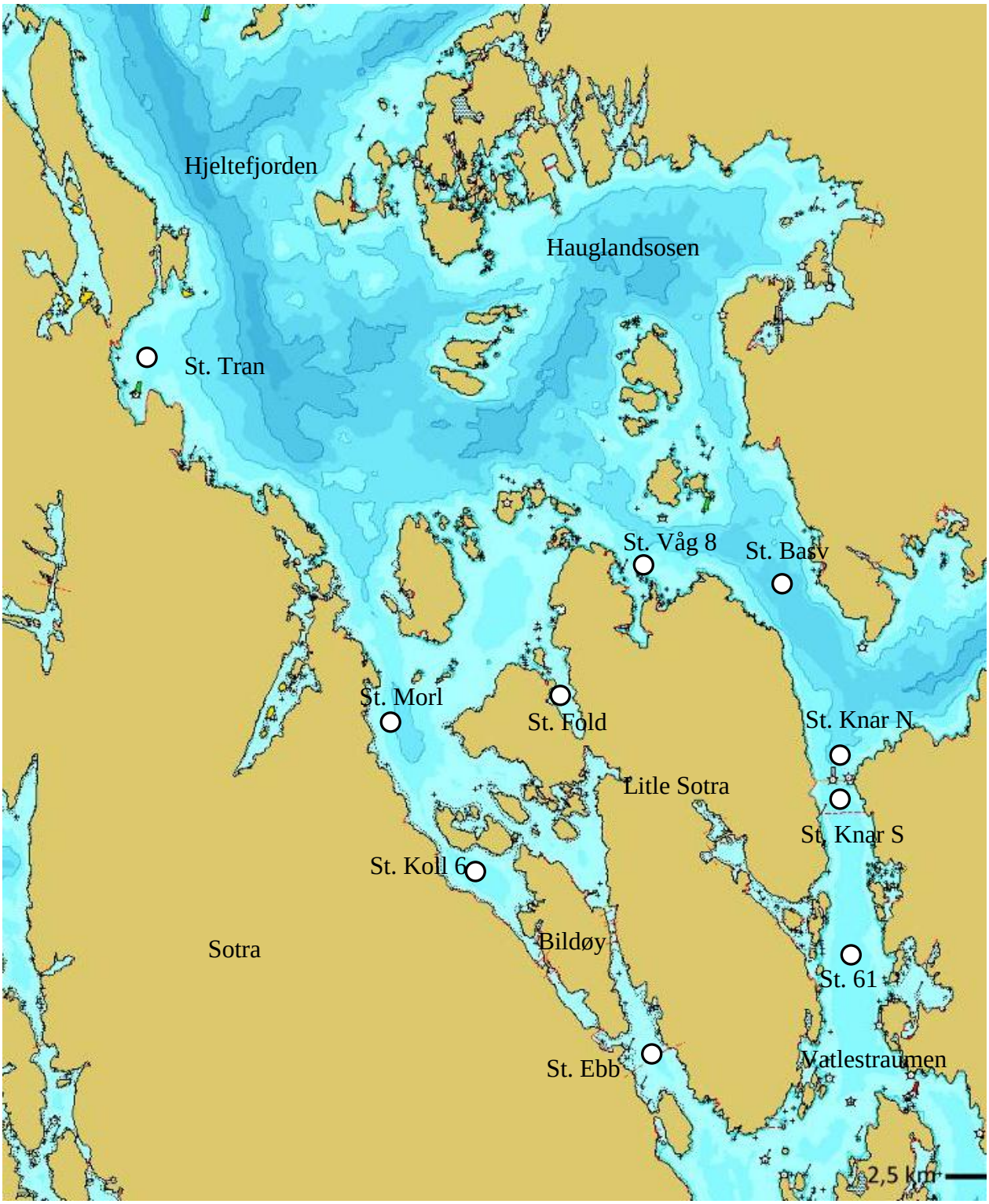


Figure 2.1 *Map of area 8 with samplingstations. Mapsource: Olex.*

Sampling positions (Table 2.1) were registered by means of GPS on vessel or handheld GPS. The positions were originally registered in WGS84, longtitude and latitude, and is presented both as WGS84 and EUREF89, UTM 32V. The difference between WGS84 and EUREF89 is approximately 30 cm (Strand and Øvstedal, 2003), which is deemed acceptable in relation to the necessary degree of accuracy with regards to sampling at sea. Table 2.2 contains information with regards to grab samples.

Table 2.1 Sampling stations with coordinates

Area	Station	Location	N WGS84 Ø		Ø EUREF89 N		Dybde (m)
Area 8	Våg 8	Vågen	60°23,909'N	05°07,220'Ø	286298	6701642	97
Sea	Knar N	Knarrevik nord	60°22,597'N	05°10,025'Ø	288378	6699444	134
	Knar S	Knarrevik sør	60°22,192'N	05°10,094'Ø	288744	6698748	82
	Basv	Basvik	60°23,759'N	05°08,969'Ø	288038	6701136	172
Area 8	Knar NL	Knarrevik nord	60°22,460'N	05°09,650'Ø	288365	6699268	
Littoral	Knar NLS	Knarrevik nord	60°22,523'N	05°09,578'Ø	288305	6699389	
	Knar SL	Knarrevik sør	60°22,011'N	05°09,778'Ø	288434	6698429	
	Knar SLS	Knarrevik sør	60°22,003'N	05°09,775'Ø	288430	6698414	
	Våg 8 L	Vågen	60°23,848'N	05°06,978'Ø	286064	6701985	
	Våg 8 LS	Vågen	60°23,842'N	05°06,976'Ø	286061	6701975	
	Basv L	Basvik	60°23,411'N	05°08,970'Ø	287844	6701067	
	Basv LS	Basvik	60°23,403'N	05°08,992'Ø	287863	6701051	

Table 2.2 Information with regards to grab stations. A 0,1 m^2 van Veen grab was used. Full grab contains 16,5 l.

** not authorized due to small amount of sample.*

Station Date	Place and pos. (EUREF89 UTM 32V)	Depth (m)	Grab number	Sample volume (l)	Other information
St. Knar N	Knarrevik N	134	1	8	Grab 1 to biology and geology, grab
27.04.2012	EU-Ø 288378		2	7,5	2-5 to biology.
	EU-N 6699444		3	7,5	Grab 6-8 to chemisty
			4	4,6	Coarse sand, sand and rocks.
			5	7,5	
			6	3,7	
			7	3,7	
			8	5,5	
St. Knar S	Knarrevik S	82	1	6	Grab 1 to biology and geology, grab
27.04.2012	EU-Ø 288744		2	2,8*	2-5 to biology.
	EU-N 6698748		3	6,5	Grab 6-8 to chemistry
			4	5,5	Sand and gravel.
			5	3,7	
			6	3,7	
			7	4,6	
			8	6,5	
St. Våg 8	Vågen	97	1	7,7	Grab 1 to biology and geology, grab
26.04.2012	EU-Ø 286298		2	7,5	2-5 to biology.
	EU-N 6701642		3	3,7	Grab 6-8 to chemistry.
			4	6,5	Shellsand.
			5	7,5	
			6	5,5	
			7	2,8*	
			8	10,8	
St. Basv	Basvika	172	1	8	Grab 1 to biology and geology, grab
26.04.2012	EU-Ø 288038		2	4,6	2-5 to biology.
	EU-N 6701136		3	7,5	Grab 6-8 to chemistry
			4	6,5	Sand and gravel.
			5	7,5	
			6	3,7	
			7	16,5	
			8	9,7	

2.2 NUTRIENTS

The salts nitrate (NO_3^-) and nitrite (NO_2^-), total concentration of nitrogen (Tot N), orthophosphate (often referred to as phosphate, PO_4^{3-}), total concentration of phosphorous (Tot P) and ammonia (NH_4^+) were analyzed at the stations in area 8 (Fjell/Lillesotra). Results are presented in µg/l.

Sampling was conducted at the surface and at 2, 5, 10, 20, 30, 50, 75 and 100 meters depth in April, June, September and October. Additional sampling was conducted down to depths of 20 meters in June, august and September as well. Samples were taken with Niskin and Rutner water samplers. The water was analyzes at Eurofins Environment Testing Norway AS (akkrediteringsnummer TEST 003), and done in accordance with NS EN ISO 13395 (total nitrogen, nitrogen bound in nitrate/nitrite), SFA (total phosphorous) and NS EN ISO 15681 2. ed/mod (phosphate).

The Norwegian Climate and Pollution Agency (KLIF) has given a classification system in order to determine the condition of the water in relation to contents of the previous mentioned salts, based on surface water determined as the upper ten meters of the water column. This classification system is divided into summer- (June-August) and winter levels (December-February) (Molvær et al. 1997). Table 2.3 shows the classification limits of the various salts and their respective conditions.
Some of the dataset from 2012 lies outside of the summer- and winter levels and one should keep this in mind when evaluating the results in relation to conditions given by KLIF.

Table 2.3. *KLIFs classifications of conditions for nutritional salts and secchi depth in the surface layer as well as oxygen in the bottom water with a salinity above 20 ‰ .I is very good, V is very poor. (Molvær et al., 1997).*

		Classes				
		I	II	III	IV	V
	Parameters	**Very good**	**Good**	**Less good**	**Poor**	**Very poor**
Surface	Total phosphor (µg P/l)	<12	12-16	16-29	29-60	>60
Summer	Fosfate-phosphor(µg P/l)	<4	4-7	7-16	16-50	>50
(Jun.-Aug.)	Total nitrogen (µg N/l)	<250	250-330	330-500	500-800	>800
	Nitrate-nitrogen,(µg N/l)	<12	12-23	23-65	65-250	>250
	Ammonium (µg N/l)	<19	19-50	50-200	200-325	>325
	Secchi depth (m)	>7,5	7,5-6	6-4,5	4,5-2,5	<2,5
Surface	Total phosphor (µg P/l)	<21	21-25	25-42	42-60	>60
Winter	Fosfate-phosphor (µg P/l)	<16	16-21	21-34	34-50	>50
(Des.-Feb.)	Total nitrogen (µg N/l)	<295	295-380	380-560	560-800	>800
	Nitrat-nitrogen (µg N/l)	<90	90-125	125-225	225-350	>350
	Ammonium (µg N/l)	<33	33-75	75-155	155-325	>325

2.3 CHLOROPHYLL-A AND SECCHI-DEPTH (TRANSPARENCY)

Chlorophyll a, was measured *in situ* with a fluorescence sensor on the CTD, data presented are the 90 percentile data from the sampling period. Classification of conditions with regards to chlorophyll a concentration is given in table 2.4.

Table 2.4. *KLIFs classifications of conditions for chlorophyll a in relation to the reference value given from Vanndirektivet. Classification is valid for the North Sea and the Norwegian (Direktoratsgruppa Vanndirektivet, 2009). I- very good, V- poor.*

Chlorophyll a (µg/l)	Classes				
	I	II	III	IV	V
North Sea/ Norwegain Sea	**Very good**	**Good**	**Moderate**	**Poor**	**Very poor**
Exposed	<3,0	3-6	6-8	8-14	>14
Moderately exposed	<2,5	2,5-5	5-8	8-16	>16
Secluded	<2,5	2,5-5	5-8	8-16	>16
Affected by fresh water	<2,6	2,6-4	4-6	6-12	>12

Secchi depth was measured, and is described as the depth from which one loses sight of the secchi disc, seen from the surface. The secchi disc is a white circular disc with a diameter of 25 cm.

2.4 BACTERIA

The presence of coliform bacteria and enterococcus in water reflects the content of fecal matter from warm-blooded animals and humans. These bacteria do not reproduce in seawater but will after emission stay present in the water for a short period of time.

It has been standard to use one species of coliform bacteria *Escherichia coli* (*E. coli*), as an indicator of fresh faeces. The method used in this study also shows the total amount of all coliform bacteria as well. The method for the detection of coliform bacteria is IDEXX-Colilert, and the results are presented in MPN (most probable number) per 100 ml of water. As the method requires the dilution of saltwater with a factor of 10, the least measurable quantity will be 10 mpn.

The most common form of enterococcus is *Enterococcus faecalis* (*E. faecalis*). *Enterococcus* will survive for a longer period in water than the coliform bacteria and will thus be able to show emissions further back in time and at a longer distance from the point of emission.

The Norwegian Climate and pollution agency has given classifications for the presence of coliform bacteria and *Enterococcus*. These are presented in Table 2.5.

Table 2.5. *Environmental cliassification and suitability for bathing/recreation for thermotolerant coliform bacteria (TKB) and Enterococcus in coastal waters (from Molvær et al., 1997).*

Parameter	**Classes**				
	I **Very good**	**II** **Good**	**III** **Less good**	**IV** **Poor**	**V** **Very poor**
TKB (per 100 ml)	<10	10-100	100-300	300-1000	>1000
Parameter	**Classes for suitability (bathing and recreation)**				
	1 **Suitable**	**2** **Quite suitable**	**3** **Less suitable**	**4** **Not suitable**	
TKB (per 100 ml) Ent. (per 100 ml)	<100 <30	<100 <30	100-1000 30-300	>1000 >300	

2.5 MEASURMENTS OF OXYGEN

The concentration of oxygen in the water was measured both with an oxygen sensor attached to the CTD as well as with Winkler's method. The data from the sensor gives continuous data from all depths whereas the Winkler method provides data from chosen depths. For the classification of the water at the seabed the Winkler method is used. The Norwegian Climate and pollution agency has given classifications for the oxygen concentration in water at the seabed and these are presented in table 2.6.

Table 2.6. *KLIFs classification for concentration of oxygen in bottomwater at salinity above 20 ‰ (fra Molvær et al., 1997).*

		Classes				
		I **Very good**	**II** **Good**	**III** **Moderate**	**IV** **Poor**	**V** **Very poor**
Bottom water	Oxygen (ml O_2/l)	>4,5	4,5-3,5	3,5-2,5	2,5-1,5	<1,5
	Oxygen saturation (%)	>65	65-50	50-35	35-20	<20

2.6 SEA BED SURVEYS

Seabed samples were obtained from the stations presented in tables presented in the results of each area.

2.6.1 Sediment surveys

From each seabed station one sample was taken to decide the distribution of particles of different size and to assess the amount of organic matter in the sample. To assess the particle distribution, each sample was dissolved in water and sent through a 0,063 mm sieve. The particles larger than 0,063 mm were dried and sent through a series of sieves to be grouped into different sizes. Particles less than 0,063 mm were grouped in different sizes by pipette analysis. The organic content, loss on ignition, is determined by the loss of weight of a sample between drying (105 °C in approx. 20 hours) and burning (550 °C for 2 hours) (Norwegian standard NS 4764-1980).

2.6.2 Benthos samples

Sampling was performed with a van Veen grab. The Grab is a quantitative tool, taking samples of a fixed area of soft seabed; in this case the area is 0.1 m². The depth at which the grab will penetrate the sediment is determined by how coarse the sediment is and the weight of the grab itself. To have a measurement as to how deep this penetration is the volume of each sample is measured. It is preferred that a sample is taken to at least 5 cm in the sediment, meaning the grab should contain at least 3 liters. The sediment is then washed trough two sieves, the firs one has a hole diameter of 0,5 mm whereas the other one has a hole diameter of 0,1 mm (Hovgaard, 1973). The samples consisting of the material left in the 0.1 mm sieve is considered quantitative for animals larger than 1 mm. The samples are conserved in 4 % neutralized formalin. The animals are sorted from the rests of the sediment in the laboratory and conserved.

The sampling is performed authorized in accordance with the standard NS-EN 16665:2005 (Directions for quantitative sampling and sample treatment of benthic fauna)

The complete list of species is given in appendix 12. The list comprises the entire material as well as plankton which are caught by the grab on its way down. During the data processing this is taken into account, so that the analyses only take into account species that live on top of or buried in the sediment. Sampling and species determination is performed in accordance with authorized methods (Authorization number Test 157)

Direktotatsgruppa Vanndirektivet has given guidelines to assess the environmental quality of marine areas (Direktoratsgruppa Vanndirektivet, 2009 Veileder 01:2009 Klassifisering av miljøtilstand i vann). These guidelines are given in table 2.7.

Table 2.7. *Indexes for classification of benthos fauna. I- very good, V- very poor.(Direktoratsgruppa Vanndirektivet, 2009).*

Indicative parameter	**Reference-value**	**Økologiske tilstandsklasser basert på observert verdi av indikativ parameter (nye verdier, 2008)**				
		Very good	**God**	**Moderate**	**Poor**	**Very poor**
NQI1	0,78	>0,72	0,63-0,72	0,49-0,63	0,31-0,49	<0,31
NQI2	0,73	>0,65	0,54-0,65	0,38-0,54	0,20-0,38	<0,20
H'	4,4	>3,8	3,0-3,8	1,9-3,0	0,9-1,9	<0,9

2.7 LITTORAL SURVEYS

2.7.1 Grid analysis

This method implies that the amount of all macroscopic plants and animals (>1mm) within the grid is registered (NS-EN ISO 19493:2007). The survey is conducted at low tide while the grids are out of the water. Every grid is sectioned into 25 smaller squares which are examined for amount of moveable organism or degree of coverage. If it is not possible to determine a species in situ, the species is sampled to be determined by microscope in the laboratory. Plants and animals that are directly attached to the substrate are measured as a degree of coverage (% of the grid's surface covered by that species). Mobile animals and

larger animals attached to the substrate are measured as amount of individuals per grid. The size of each grid is 0.5 x 0.5 m and the placements of these are marked with bolts attached to the substrate. Photographs are taken of all grids.
This is a method which is quantitative and gives an exact number of the species present.

2.7.2 Semi quantitative littoral survey

A semi quantitative littoral survey measures the presence of all algae and animals larger than 1 mm within 8 meters of shoreline. (NS-EN ISO 19493:2007). In this report the presence of algae and animals is divided into three scales 1: dispersed, 2 common, 3 dominating. The stations were placed where suitable; meaning that one is able to have at least 8 meters of shoreline and that it is not too steep to perform registration of species. Photos were taken of the station and surrounding area, photo documentation is kept at SAM-Marin. The method corresponds with the mulitmetric index in Vannforskriften.

2.7.3 Mathematical analysis

Computation of data for plants and animals was calculated as an average of each level. Multivariate methods were used to give an indication of how the species composition is distributed in-between levels and stations. We have used the recommendations of Field et al. (1982) by using the Bray-Curtis index as a measurement of similarity.

2.8 ENVIRONMENTAL CHEMISTRY

Samples were taken by grab for analysis for TBT, PCB_7, PAH_{16}, and metals. The analyses were performed at Eurofins Norsk Miljøanalyse AS (Authorization number: Test 003). Analysis of lead (Pb), chromium (Cr), cadmium (Cd), copper (Cu), nickel (Ni) and zinc (Zn) were performed in accordance with NS-EN ISO 17294-2. Mercury (Hg) was analyzed in accordance with NS 12846 dry matter in accordance with NS 4764. Analyses of polychlorinated biphenyls (PCB7) were performed in accordance with NS-EN 12766-2 and polyaromatic hydrocarbons (PAH_{16}) in accordance with NS 9815. Table 2.8 gives classifications of environmental toxins in sediment.

Table 2.8 *Classification of environmental toxins included in this survey (Veileder for klassifisering av miljøgifter in vann and sediment (TA 2229/2007)). I- Background, V- very poor.*

	I	II	III	IV	V
	Bakgrunn	**God**	**Moderat**	**Dårlig**	**Svært dårlig**
Metaller					
Arsen (mg As/kg)	<20	20 - 52	52 - 76	76 - 580	>580
Bly (mg Pb/kg)	<30	30 - 83	83 - 100	100 - 720	>720
Kadmium (mg Cd/kg)	<0.25	0.25 - 2.6	2.6 - 15	15 - 140	>140
Kobber (mg Cu/kg)	<35	35 - 51	51 - 55	55 - 220	>220
Krom (mg Cr/kg)	<70	70 - 560	560 - 5900	5900 - 59000	>59000
Kvikksølv (mg Hg/kg)	<0.15	0.15 - 0.63	0.63 - 0.86	0.86 - 1.6	>1.6
Nikkel (mg Ni/kg)	<30	30 - 46	46 - 120	120 - 840	>840
Sink (mg Zn/kg)	<150	150 - 360	360 - 590	590 - 4500	>4500
PAH					
Naftalen (µg/kg)	<2	2- 290	290 - 1000	1000 - 2000	>2000
Acenaftylen (µg/kg)	<1.6	1.6 - 33	33 - 85	85 - 850	>850
Acenaften (µg/kg)	<4.8	2.4 - 160	160 - 360	360 - 3600	>3600
Fluoren (µg/kg)	<6.8	6.8 - 260	260 - 510	510 - 5100	>5100
Fenantren (µg/kg)	<6.8	6.8 - 500	500 - 1200	1200 - 2300	>2300
Antracen (µg/kg)	<1.2	1.2 - 31	31 - 100	100 - 1000	>1000
Fluoranthen (µg/kg)	<8	8 - 170	170 - 1300	1300 - 2600	>2600
Pyren (µg/kg)	<5.2	5.2 - 280	280 - 2800	2800 - 5600	>5600
Benzo[a]antracen (µg/kg)	<3.6	3.6 - 60	60 - 90	90 - 900	>900
Chrysen (µg/kg)	<4.4	4.4 - 280	280 - 280	280 - 560	>560
Benzo[b]fluoranten (µg/kg)	<46	46 - 240	240 - 490	490 - 4900	>4900
Benzo[k]fluoranten (µg/kg)		<210	210 - 480	480 - 4800	>4800
Benzo(a)pyren (µg/kg)	<6	6 - 420	420 - 830	830 - 4200	>4200
Indeno[123cd]pyren (µg/kg)	<20	20 - 47	47 - 70	70 - 700	>700
Dibenzo[ah]antracen (µg/kg)	<12	12 - 590	590 - 1200	1200 - 12000	>12000
Benzo[ghi]perylen (µg/kg)	<18	18 - 21	21 - 31	31 - 310	>310
PAH16 [1)] (µg/kg)	<300	300 - 2000	2000 - 6000	6000 - 20000	> 20000
Andre organiske					
PCB7 [2)] (µg/kg)	<5	5 - 17	17 - 190	190 - 1900	>1900
PCDD/F [3)] (TEQ) (µg/kg)	<0.01	0.01 - 0.03	0.03 - 0.10	0.10 -0.50	>0.50
ΣDDT [4)] (µg/kg)	<0.5	0.5 - 20	20 - 490	490 - 4900	>4900
Grenseverdier for TBT					
TBT [12)] (µg/kg) - effektbasert	<1	<0.002	0.002-0.016	0.016-0.032	>0.032
TBT [12)] (µg/kg) - forvaltningsmessig	<1	1-5	5 - 20	20 - 100	>100

2.9 CURRENT MEASURMENTS

The direction and speed of the current in the area was measured using a current meter of the type NortekDoppler AQNr2, 400 kHz.

Deviations from the sampling programme:

Deviation 1: The current at station Knar N was only measured during winter. The current was at that time so strong that the Aqua Doppler was standing at a tilt in the water coloumn. As the currents were that strong it was decided that no further measurements of the current at this location were necessary.

Deviation 2: Oxygenmeasurements from CTD 7/6 and 13/6 are missing due to malfunctioning oxygensensor on the CTD. The oxygensensor was replaced.These measurement were to be taken down to 20 metres depth. Given the time of year, the location and previous measurements of oxygen in the area, it is safe to assume that thre were good oxygen conditions at the sampling periods. At the same dates ammonia content of the seawater was not analysed due to an internal misunderstanding.

Deviation 3: Samples of sediment for analysis of environmental toxins was not taken at the same time as the analyses for benthos. This will not effect the results.

Deviation 4: Due to an internal misunderstanding nutritional salts and bacteria was not measured at station Knar S in april. The missing reults can however be obtained to some degree from the adjacent stations as all those stations had close to similar results with regards to oxygen , salts and bacteria.

3. RESULTS

3.1 ENVIRONMENTAL CHEMISTRY

Table 3.1.1 and 3.1.2 shows the contents of metals and environmental toxins from stations Våg 8, Basv, Knar S and Knar N. For complete analysis reports see Appendices 1 and 2.

Some fairly large standard deviations in-between grab samples were registered, which implies a patchy distribution of metals/toxins in the sediment. All stations showed Background- to Good levels with regards to all metals analyzed with the exception of TBT at station Basv, Knar N and Knar S, Mercury at station Knar N and copper at station Knar N. All stations had good conditions with regards to PCB with the exception of station Basv (moderate). Stations Basv, Knar N and Knar S were moderately polluted by PAH while station Våg 8 had good conditions.

Table 3.1.1: *Metals in sediment. Numbers in table presented as average of three grabs with standard deviation (SD)*

Station	Basv	SD	Knar N	SD	Knar S	SD	Våg 8	SD
Lead (Pb) (mg/kg TS)	55,00	16,00	46,33	5,51	30,00	3,00	24,33	6,35
Copper (Cu) (mg/kg TS)	23,67	7,77	820,00	1108,56	9,77	2,36	7,03	1,62
Chromium (Cr) (mg/kg TS)	20,00	5,57	8,53	2,17	4,80	1,05	7,93	1,72
Mercury (Hg) (mg/kg TS)	0,31	0,09	1,35	2,21	0,07	0,02	0,06	0,02
Nickel (Ni) (mg/kg TS)	12,33	5,13	8,27	2,65	10,00	1,83	5,87	0,68
Zink (Zn) (mg/kg TS)	105,33	32,33	270,00	121,24	42,33	5,51	49,67	15,50
Tributyltinn (TBT) (µg/kg TS)	40,00	38,18	17,40	20,65	76,03	108,02	<1	<1
Cadmium (Cd) (mg/kg TS)	0,09	0,03	0,11	0,01	0,08	0,01	0,07	0,02
Total dry matter (%)	55,67	5,03	67,00	1,00	63,67	4,04	58,33	3,51

At station BasvL the biota (*Fucus vesiculosus*) showed moderate contents of lead, otherwise condiditions were good with regards to metal content (Table 3.1.3). There is no specific classification system for PCB, PAH, TBT in *F. vesiculosus*. Levels of PCB and TBT were below the limit of detection. The values of PAH can be seen as quite low compared to previous studies (Knutzen & Sortland 1982).

Table 3.1.2: *Toxins in sediment. Numbers in table presented as average of three grabs with standard deviation (SD)*

Station	Basv	SD	Knar N	SD	Knar S	SD	Våg 8	SD
	Mean	*SD*	*Mean*	*SD*	*Mean*	*SD*	*Mean*	*SD*
PCB 101 (µg/kg TS)	3,47	2,83	3,00	3,21	1,30	0,69	0,87	0,29
PCB 118 (µg/kg TS)	1,57	1,50	1,45	0,30	1,33	0,76	0,83	0,35
PCB 138 (µg/kg TS)	5,57	5,79	1,97	0,35	1,17	0,31	1,23	0,38
PCB 153 (µg/kg TS)	5,73	6,17	1,90	0,36	1,11	0,29	1,23	0,38
PCB 180 (µg/kg TS)	3,60	4,44	0,83	0,32	0,55	0,17	0,50	0,21
PCB 28 (µg/kg TS)	0,30	0,43	0,70	0,14	0,05	0,00	0,05	0,00
PCB 52 (µg/kg TS)	1,70	0,72	0,95	0,31	0,93	0,40	0,80	0,26
Sum 7 PCB (µg/kg TS)	21,97	21,15	10,67	4,13	6,40	2,61	5,47	1,53
Acenaften (µg/kg TS)	50,30	27,70	48,00	62,35	21,10	5,65	9,41	5,09
Acenaftylen (µg/kg TS)	17,50	0,79	19,73	11,51	11,20	3,07	3,38	0,53
Antracen (µg/kg TS)	129,60	94,10	189,63	259,32	59,70	30,39	14,57	8,46
Benzo(a)antracen (µg/kg TS)	498,00	316,02	425,00	470,62	232,33	122,87	53,10	16,30
Benzo[a]pyren (µg/kg TS)	500,67	326,30	381,33	406,12	203,33	93,71	41,17	19,58
Benzo[b]fluoranten (µg/kg TS)	457,67	297,67	352,67	317,22	197,00	80,29	50,13	18,39
Benzo[g,h,i]perylen (µg/kg TS)	390,67	234,87	294,00	181,93	170,33	42,10	69,47	23,62
Benzo[k]fluoranten (µg/kg TS)	207,47	128,29	165,77	152,04	93,03	36,33	24,87	10,17
Dibenzo[a,h]antracen (µg/kg TS)	69,07	45,60	50,60	39,18	29,93	8,90	9,91	3,85
Fenantren (µg/kg TS)	445,67	290,70	212,50	174,66	277,00	90,35	45,30	28,29
Fluoranten (µg/kg TS)	664,50	449,01	372,00	247,49	496,33	231,65	82,67	38,83
Fluoren (µg/kg TS)	59,80	27,07	73,30	89,25	32,37	12,63	10,29	4,89
Indeno[1,2,3-cd]pyren (µg/kg TS)	370,67	200,24	263,67	187,35	164,70	58,65	62,00	22,40
Krysen (µg/kg TS)	405,00	263,57	355,17	372,06	188,33	83,51	43,53	13,36
Naftalen (µg/kg TS)	44,40	8,25	49,00	20,12	37,90	9,69	19,63	9,42
Pyren (µg/kg TS)	393,53	549,39	266,00	140,01	386,00	184,75	71,73	32,11
Sum PAH(16) EPA (µg/kg TS)	5273,33	3463,30	5526,67	6062,30	2725,00	1463,71	611,33	244,04

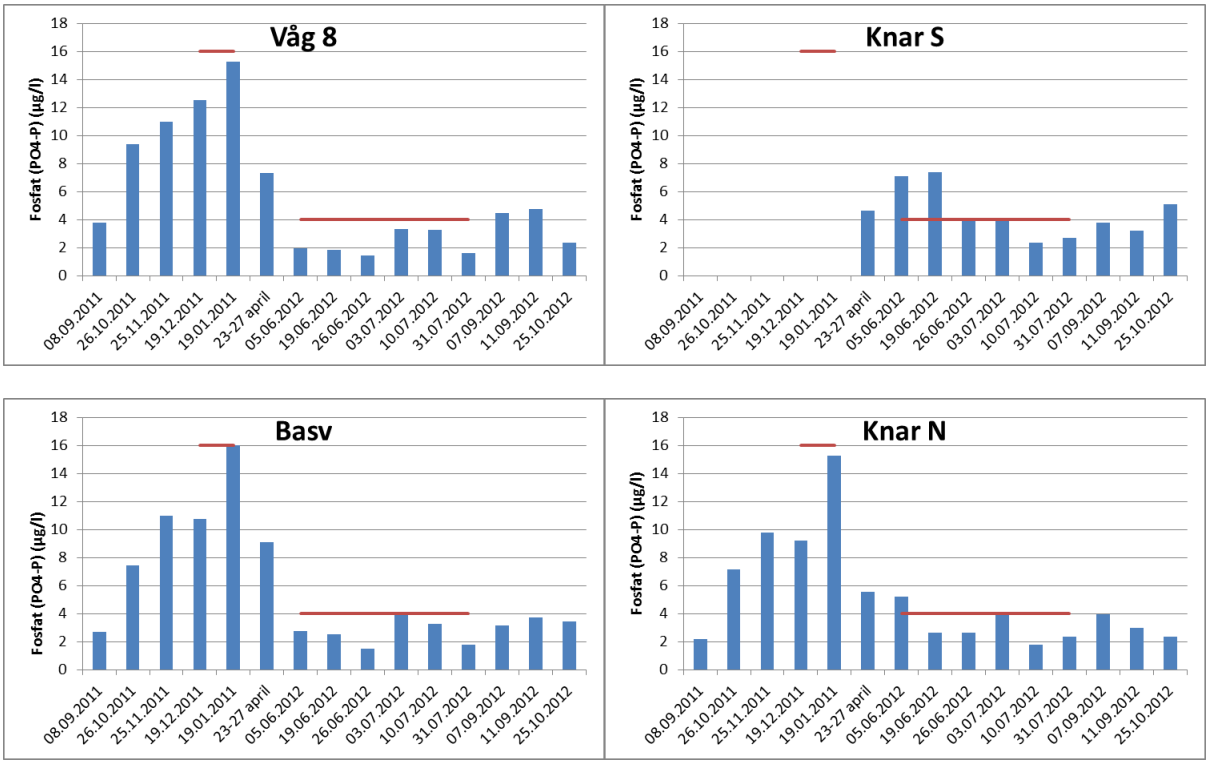
Table 3.1.3: *Metal levels as dry weight in Fucus vesiculosus . Numbers presented as average of three analyses with standard deviation (SD) (*value below detection limit)*

Parameter	BasvL		Knar NL		Knar SL		Våg 8L	
Copper (Cu) (mg/kg)	3,40	1,13	5,78	0,83	3,74	0,25	2,76	0,29
Zink (Zn) (mg/kg)	129,29	39,33	142,51	9,36	136,47	18,18	76,99	4,30
Lead (Pb) (mg/kg)	3,43	1,34	1,47	0,34	0,72	0,07	0,70	0,06
Cadmium (Cd) (mg/kg)	0,71	0,22	0,92	0,14	0,97	0,22	0,64	0,06
Mercury(Hg) (mg/kg)	0,028	0,001	0,037	0,004	<0,005 *	0,000	<0,005 *	0,000
Chromium (Cr) (mg/kg)	<0,1 *	0,00	<0,1 *	0,00	<0,1 *	0,00	<0,1 *	0,00
Dry matter (%)	21,07	3,23	18,50	0,61	20,50	0,20	22,97	0,55

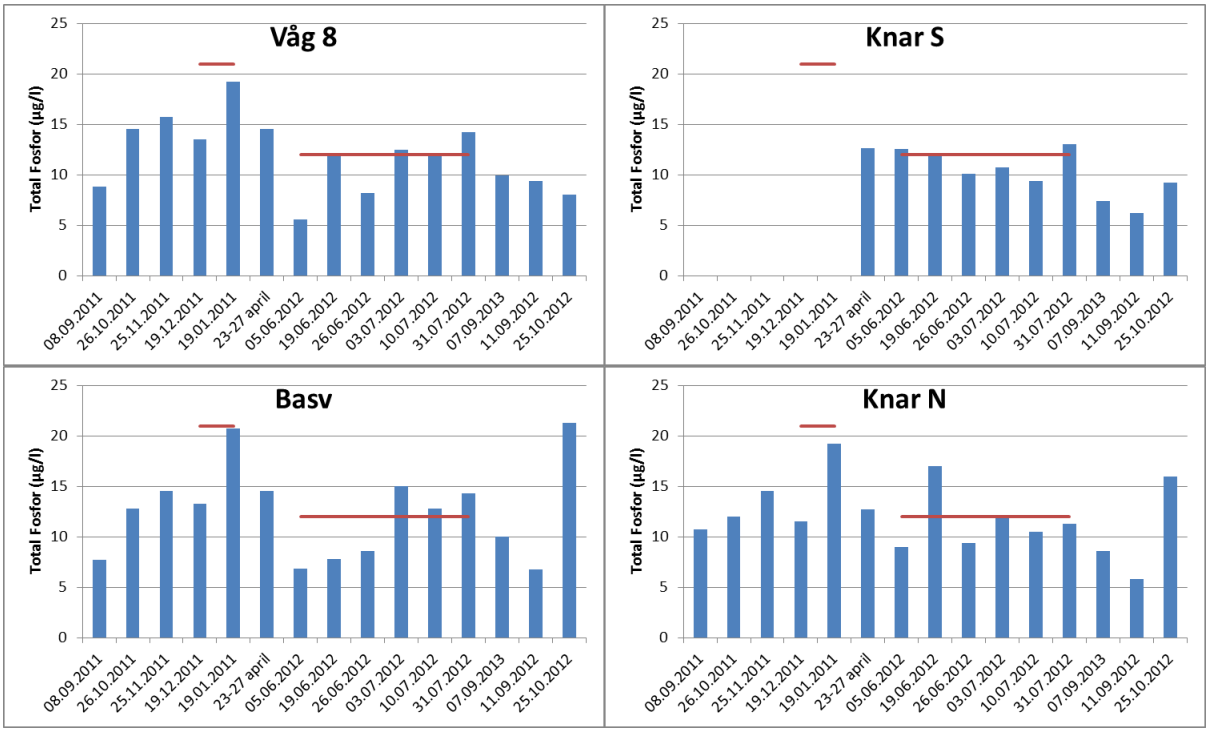
3.2 NUTRIENTS

The content of nutrients in the upper meters at the stations Våg 8, Basv, Knar N and Knar S are presented in figure 3.2.1 – 3.2.5. The level of phosphate was within the best conditions in all samples from all stations during winter. In summer the measurements were very good (TK1) at Våg 8 and Basv. Full dataset presented in Appendix 3.

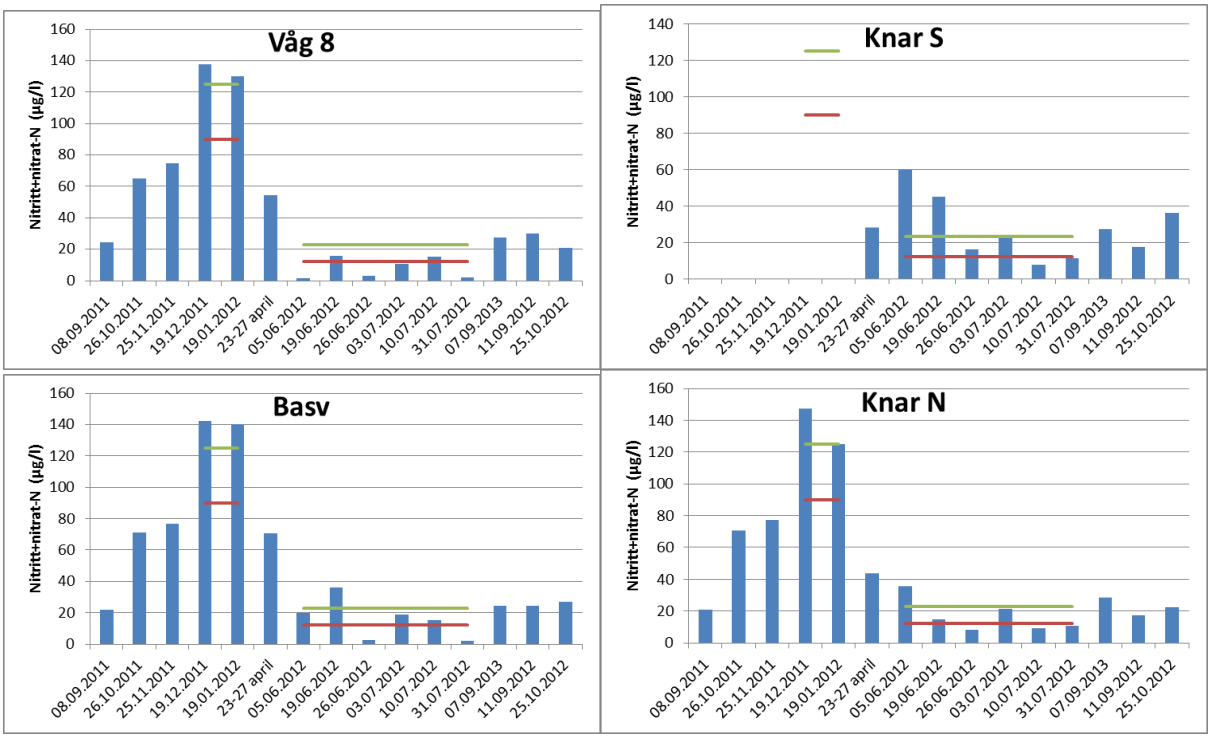
The station Knar S was within class II for two of the summer measurements and Knar N were in class II for one of the measurements. Otherwise all samples at Knar N and Knar S were in class I. The winter measurements of phosphor were within class I at all stations, while the summer measurements were within class I and II. All winter measurements of Nitrate were within class II and III, while the summer measurements were between class I and III for Knar S, Basv and Knar N and between class I and II Våg 8. The measurements of total Nitrogen and Ammonium were in class I in both summer and winter. In general the results of the nutrient measurements are similar to the comparable measurements of 2012.



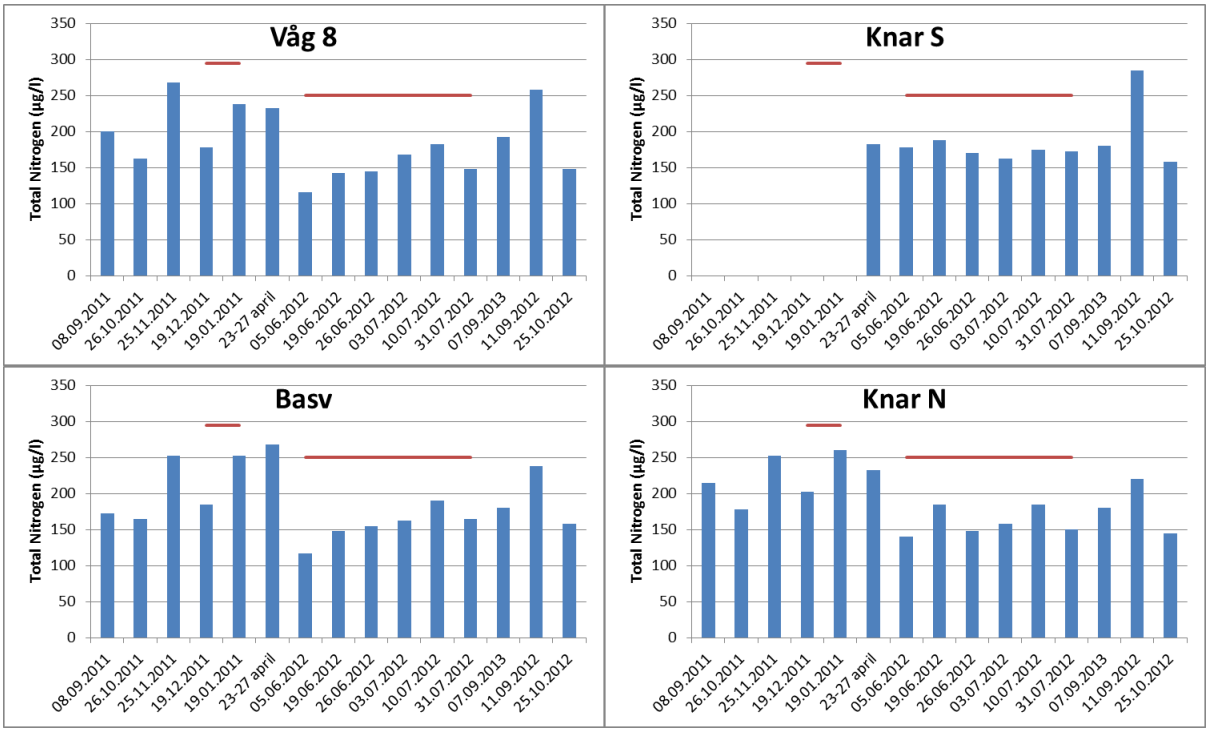
Figur 3.2.1: *Concentration of phosphate at stations Våg 8, Basv, Knar N og Knar S in the period oct 2011 til oct 2012. Red line represents the* the difference between *TK I and TK II during winter (dec-feb) and summer (jun-aug).*



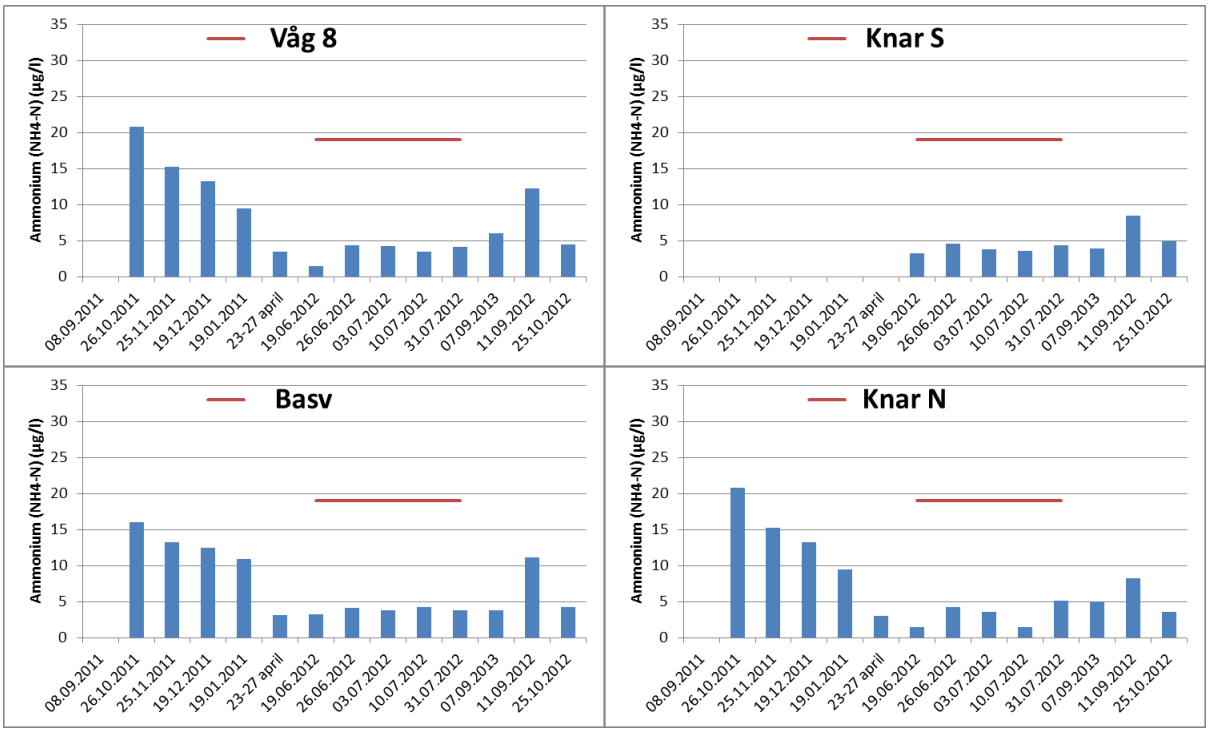
***Figur 3.2.2**: Concentration of phosphorous at stations Våg 8, Basv, Knar N and Knar S in the period oct 2011 til oct 2012. Red line representsbest conditions (TK I) during winter (dec-feb) and summer (jun-aug).*



***Figur 3.2.3:** Concentration of phosphorous at stations Våg 8, Basv, Knar N and Knar S in the period oct 2011 til oct 2012. Red lineand green line representsbest and second bestconditions (TK I and TK II) during winter (dec-feb) and summer (jun-aug).*



***Figur 3.2.4**: Concentration of total Nitrogen at stations Våg 8, Basv, Knar N and Knar S in the period oct 2011 til oct 2012. Red line representsbest conditions (TK I) during winter (dec-feb) and summer (jun-aug).*



***Figur 3.2.5**: Concentration of total Ammonium at stations Våg 8, Basv, Knar N and Knar S in the period oct 2011 til oct 2012. Red line representsbest conditions (TK I) during winter (dec-feb) and summer (jun-aug).*

3.3 CLOROPHYLL A AND SECCHI DEPTH (TRANSPARENCY)

Concentrations of microalgae in the water column is measured through chlorophyll a measurements and presented in table 3.3.1. Measurements from April to September are evaluated, as this period is within the growth season. Table 2.2 (section 2.2) presents Vanndirektivets criteria for classification of conditions.

In the period April-September in 2012, the conditions were Very Good (class I) at station Våg 8, Knar S and Knar N and Good (class II) at station Basv. These stations were evaluated through Vanndirektivets classes for stations affected by freshwater. A fluorescense meter connected to the CTD gave an indication of the concentration of chlorophyll through the water column. These data are presented in Appendix 3.

Table 3.3.1 *Concentration presented as the 90 % percentile of chlorophyll a in µg/l from the upper 10 meters of the water column. Data from CTD probe.*

Chlorophyll a (F µg/l)			
Våg 8	Basv	Knar S	Knar N
2,38	2,69	1,80	1,95

I – Very good	II - God	III – Moderate	IV – Poor	V – Very poor

3.4 BACTERIA

The occurrence of thermo tolerant coliform bacteria in the water samples reflects the content of feces from humans and other warm blooded animals. In area 8 bacteria samples were obtained from three stations (Våg 8, Knar N and Basv) in 2011 and 4 stations (Våg 8, Knar N, Knar S and Basv) in 2012.

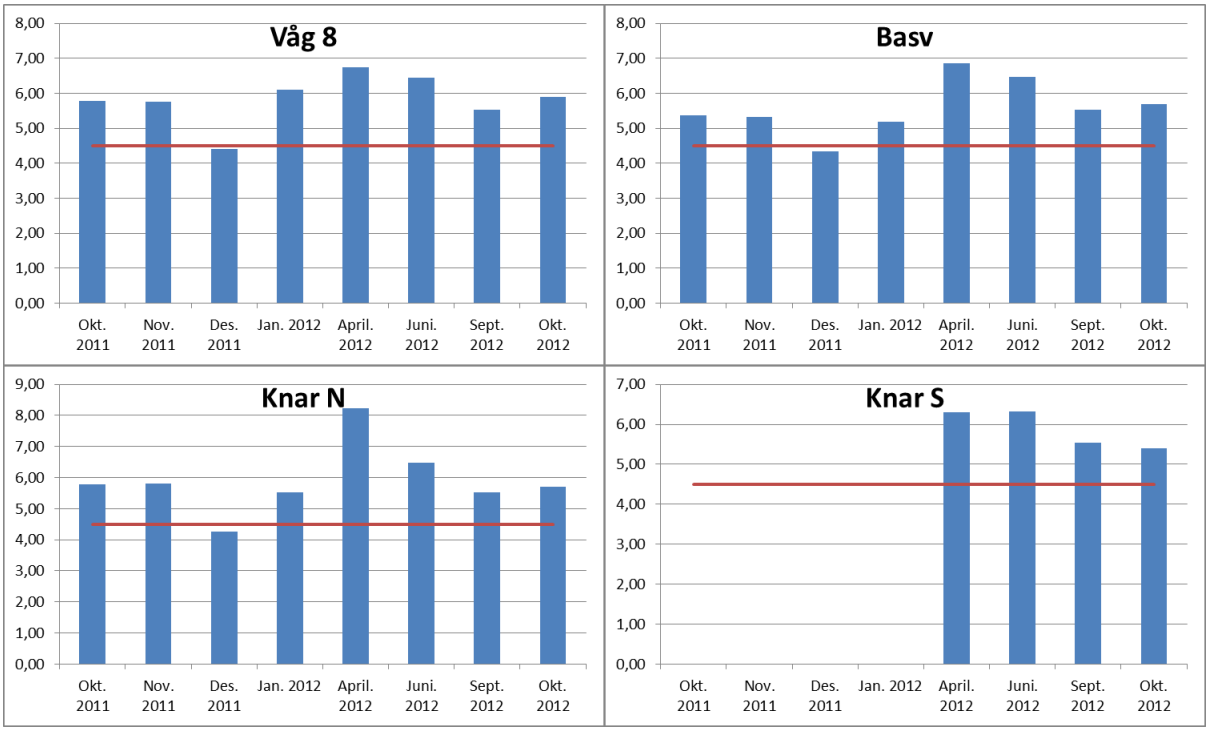
Through the period of sampling low values were generally measured for all three types of samples (Table 3.4.1). Except from the measurement in January of *Enterococcus* in Basvik and the measurement in December of coliform bacteria at Våg 8, all values are below the guiding limit and within the best conditions (“Very Good”). The concentration was highest in December and January 2011, lower in summer and increasing into the autumn.

Table 3.4.1: *Content of bacteria in the surface layer. Numbers are average of two samples.*

	E. coli (mpn/100 ml)				Coliform (mpn/100 ml)				*Enterococcus* (cfu/100 ml)			
	Våg 8	Basv	Knar N	Knar S	Våg 8	Basv	Knar N	Knar S	Våg 8	Basv	Knar N	Knar S
25.11.2011	<10	25,5	25		15	52	63		4,5	12,5	5	
19.12.2011	41	31	52		110	63	86		21	21	16	
19.01.2011	36	31	30,5		46,5	81	47		17,5	44	20,5	
23-27 April	< 10	< 10	< 10		< 10	< 10	< 10		< 1	< 1	< 1	
05.06.2012	< 10	< 10	< 10	<10	7,5	<10	<10	<10	< 1	< 1	< 1	<1
13.06.2012	< 10	< 10	< 10	< 10	<10	<10	7,5	< 10	< 1	< 1	1,25	3,25
19.06.2012	< 10	< 10	< 10	< 10	<10	<10	7,5	< 10	<1	<1	1,5	<1
26.06.2012	< 10	< 10	< 10	<10	<10	<10	<10	<10	<1	<1	<1	<1
03.07.2012	< 10	< 10	< 10	17,5	<10	<10	7,5	7,5	2,5	5,5	7	8,5
10.07.2012	<10	<10	<10	<10	<10	<10	<10	<10	<1	<1	2	2
31.07.2012	<10	<10	20	<10	<10	<10	25	7,5	<1	<1	1,25	1,75
07.09.2013	40	< 10	20	45	70	15	45	60	10,5	1	5	8
11.09.2012	12,5	<10	35	40	70	30	50	70	9	6	18,5	13
24.10.2012	<10	30	7,5	50	20	40	15	60	5	6,5	3,5	8,5

3.5 OXYGEN

The content of oxygen at the bottom were within the best class in all samples, except from measurments in December 2011 (class II) at Våg 8, Basv and Knar N (Figure 3.5.1). However the results were close to the lower limit of class I and it should be considered that wintertime is the period with the least amount of oxygen in the bottomwater.



Figur 3.5.1: *Concentration oxygen in bottom water at stations Våg 8, Basv, Knar N and Knar S in the period oct 2011 to oct 2012.*

3.6 SEA BED SURVEYS

3.6.1 Sediment

The organic content (measured as loss on ignition), distribution of particles and content of organic carbon is given in table 3.6.1 and 3.6.2. Station Basv and Knar S had relatively similar distribution and particles with most sand and gravel. Station Våg 8 differed most with a larger fraction of sand than that for the other stations. It was not possible to determine the particle distribution for station Knar N as there was too little material for parts of the method, which in turn can be interpreted as containing larger particles. The content of organic carbon (TOC) was very poor at station Basv, less good for station Våg 8 and good for station Knar S. It was not possible to calculate the normalized TOC for station Knar N as this analysis requires a fraction of silt/clay which was not the case here. Still one can see that the content of organic carbon still is high compared to the other stations. The method for the normalizing of TOC, however, is not adapted to be used in the areas where the sampling has been done. The loss on ignition will be a more accurate method for assessing the content of organic matter and this is low for all stations, which can be expected when taken into account the current conditions on the stations.

Table 3.6.1: *Depth, organic content (% loi: loss on ignition) and particle distribution in sediment from Våg 8, Basv, Knar S and Knar N.*

Station	Depth (m)	Organic content (% l.o.i.)	Clay (%)	Silt (%)	Clay+Silt (%)	Sand (%)	Gravel (%)
Basv	172	5,63	6,17	6,85	13,02	46,68	40,31
Knar N	134	4,73	-	-	-	-	-
Knar S	82	6,19	3,86	3,71	7,56	41,27	51,17
Våg 8	97	4,33	4,42	4,35	8,76	71,51	19,73

Table 3.6.2: *Content of total organic carbon and normalized TOC for Våg 8, Basv, Knar S and Knar N.*

Station	Total organic carbon g/kg	Normalized TOC mg/g	TK
Basv	32,67	48,3	**V**
Knar N	30	-	**-**
Knar S	23,33	40,0	**II**
Våg 8	12,33	28,8	**III**

3.6.2 Benthos

At station Våg 8, at 97 m depth, 2188 specimens from 102 species were found. The Shannon-Wiener diversity index value were 3,03 and the evenness was 0,56, placing the station in class I (Good).The polychaete species *Spiophanes wigley* was present with most specimens (1268 specimens, 58 %), before the group *Oligochaeta* indet (123specimens, 6 %) and *Lumbrineridae* indet (84 specimens, 4 %). The indexes describing biodiversity and sensitivity (NQI1 and NQI2) give the station class I (Very Good) and II (Good).

At station Basv, at 172 m depth, 8744 specimens from 111 species were found. The most numerous species here was the crustacean *Verruca stroemi* (7261 specimens, 83 %), followed by the mollusk *Modiolula phaseolina* (227 specimens, 2,6 %) and *the group Oligochaeta* indet (210 specimens, 2,4 %). The large number of one species, gave a Shannon-Wiener diversity index of 1,57 and an evenness of 0,26, which placed the station in class IV (Bad). In this case the classification with regards to H' is erroneous since the dominating species (a barnacle) is not associated with pollution. The indexes describing biodiversity and sensitivity (NQI1 and NQI2) give the station classes I (Very good) and II (Good).

At station Knar N, at 134 m depth in the middle part of Byfjorden, 1059 specimens from 112 species was found. This gave a Shannon-Wiener diversity index value of 4,9, and therefore the best class (Very Good), and an evenness of 0,87. There were most specimens of *Aphelochaeta* sp. (78 specimens, 7 %), *Paraonis* sp. (66 specimens, 6 %) was second most abundant and *Spiophanes wigleyi* (60 specimens, 6 %) were third. The indexes describing biodiversity and sensitivity (NQI1 and NQI2) give the station classes I (Very Good).

At station Knar S, at 82 m depth, 2507indivuduals and 115 species were found. The Shannon-Wiener diversity index of the station was 3,93 (class I, Very Good) and the evenness was 0,58. Most individuals were of the species *Modiolula phaseolina.* (1202 specimens, 48 %), followed by *Verruca stroemi.* (109 specimens, 4 %) and *Chaetozone* sp (84 specimens, 3 %). The indexes describing biodiversity and sensitivity (NQI1 and NQI2) give the station classes I (Very Good).

Table 3.6.3: *Overview of number of Species, number of specimens, evenness,sensitivity- and diversity index for Våg 8, Basv, Knar N and Knar S.*

				Diversity				Evenness	
Station	**Sample**	**Species**	**Specimens**	**H'**	**NQI1**	**NQI2**	**AMBI**	**J**	**H'-max**
Våg 8	**1**	42	464	2,91	0,67	0,53	2,94	0,54	5,39
Våg 8	**2**	68	581	2,91	0,73	0,55	2,64	0,48	6,09
Våg 8	**3**	20	134	2,80	0,64	0,54	2,74	0,65	4,32
Våg 8	**4**	58	620	2,77	0,70	0,53	2,86	0,47	5,86
Våg 8	**5**	59	389	3,77	0,75	0,64	2,40	0,64	5,88
	Sum	102	2188	3,19				0,48	6,67
	Average	49	438	3,03	0,70	0,56	2,76	0,56	5,51
Basv	**1**	68	1898	1,55	0,76	0,72	2,45	0,25	6,09
Basv	**2**	38	1163	1,02	0,76	0,72	2,05	0,19	5,25
Basv	**3**	72	2426	1,40	0,81	0,78	1,76	0,23	6,17
Basv	**4**	71	2453	1,41	0,78	0,77	2,14	0,23	6,15
Basv	**5**	69	804	2,45	0,81	0,79	1,99	0,40	6,11
	Sum	111	8744	1,55				0,23	6,79
	Average	64	1749	1,57	0,86	0,61	0,34	0,26	5,95
Knar S	**1**	75	383	4,24	0,87	0,78	0,99	0,68	6,23
Knar S	**2**	52	250	4,19	0,83	0,77	1,37	0,73	5,70
Knar S	**3**	64	324	4,33	0,85	0,78	1,10	0,72	6,00
Knar S	**4**	74	648	3,79	0,86	0,74	0,91	0,61	6,21
Knar S	**5**	73	902	3,09	0,88	0,72	0,44	0,50	6,19
	Sum	115	2507	3,98				0,58	6,85
	Average	68	501	3,93	0,86	0,76	0,89	0,65	6,07
Knar N	**1**	37	112	4,86	0,76	0,76	2,09	0,93	5,21
Knar N	**2**	42	151	4,59	0,74	0,71	2,39	0,85	5,39
Knar N	**3**	50	239	5,05	0,78	0,78	1,98	0,89	5,64
Knar N	**4**	60	247	4,91	0,72	0,69	3,08	0,83	5,91
Knar N	**5**	70	310	5,20	0,78	0,77	2,24	0,85	6,13
	Sum	112	1059	5,58				0,82	6,81
	Average	52	212	4,92	0,76	0,74	2,37	0,87	5,66

I – Very good	II - Good	III – Moderate	IV – Poor	V – Very poor

3.7 LITTORAL

3.7.1 Littoral surveys

In area 8 grid analyses were made at stations Knar NL (north of the Sotrabidge), Knar SL (south of the Sotrabridge), Basv L (Smikkevika) and Våg 8L (north in Onglavika) (Figure 3.7.1). In addition semiquantitative analyses were performed at stations Knar NLS, Knar SLS, Basv LS and Våg 8S in close proximity to the grid analysis stations. All stations are new and examined in accordance with TA/1890.

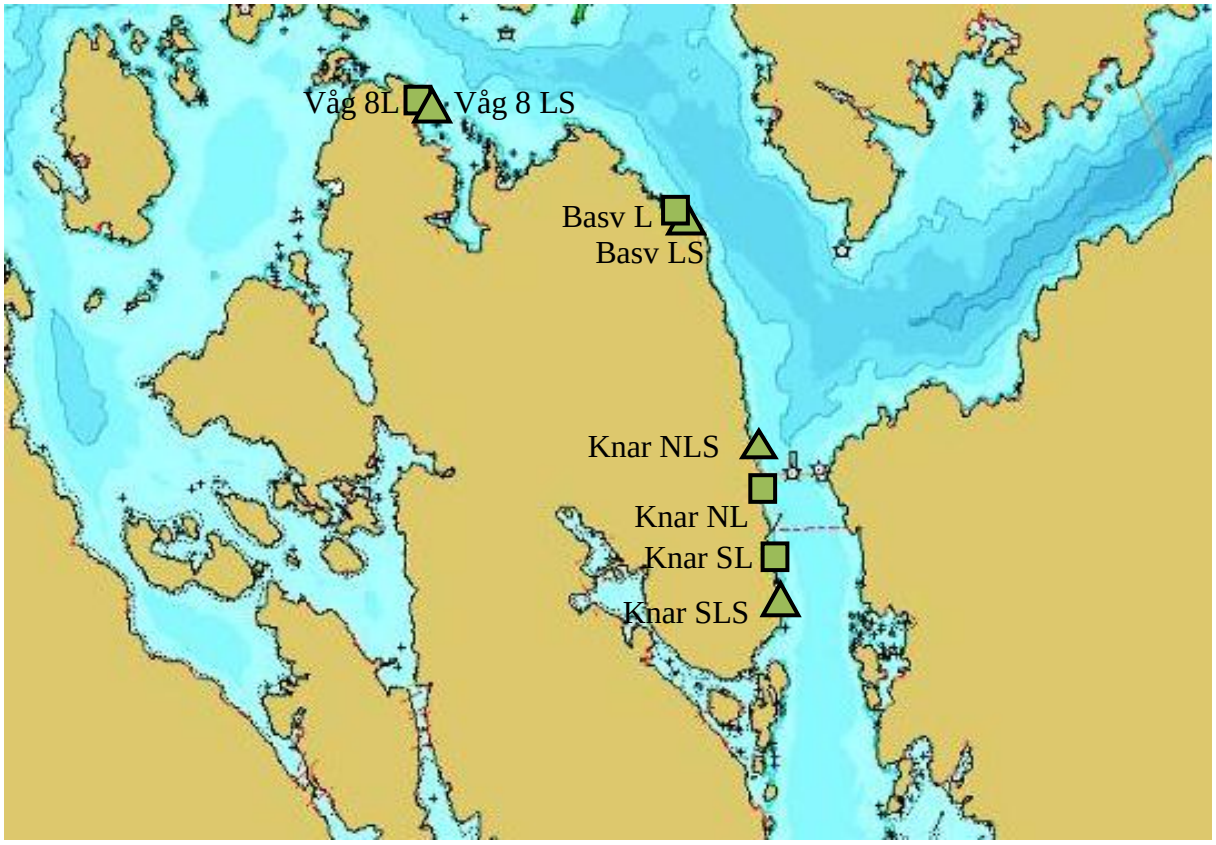


Figure 3.7.1. *Map scetch of area 8 with littoralsurvey sites indicated. Grid analysis stations (green square) and stations for semi quantitative analyses (green triangle). Map source: Olex.*

Figure 3.7.2 shows a good distribution of the different species of algae, along with many species of animals at all stations. Most species were found at station Våg 8L. The litoral zone at station Våg 8L was for the most part covered with ved *Fucus vesiculosus* and *F. serratus*, with some bluegreen algaea and a lot of barnacles. The dense vegetation is both substrate and provides cover for small mobile animals and smaller species of algae. Fewest species were found north and south of the Sotrabridge (Knar SL and Knar NL), due to strong currents and wave exposion. This is seen as a biologic community existing of blue mussels, barnacles and

fewer large brown algae. At station Knar NL there was also found *Ulva lactuca*. At station Basv L the litoral zone was covered with barnacles and blue mussels with some bluegreen algae and minor amounts of green, red and brown algae, which is typical for a station affected by strong currents.

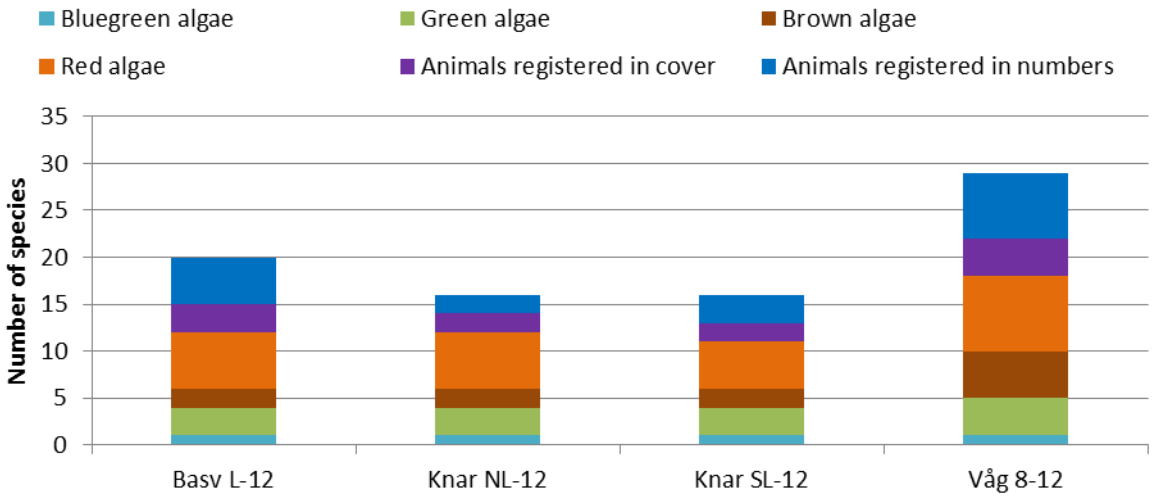


Figure 3.7.2: number of species divided into types of algae along with immobile and mobile animals registered at the stations surveyed.

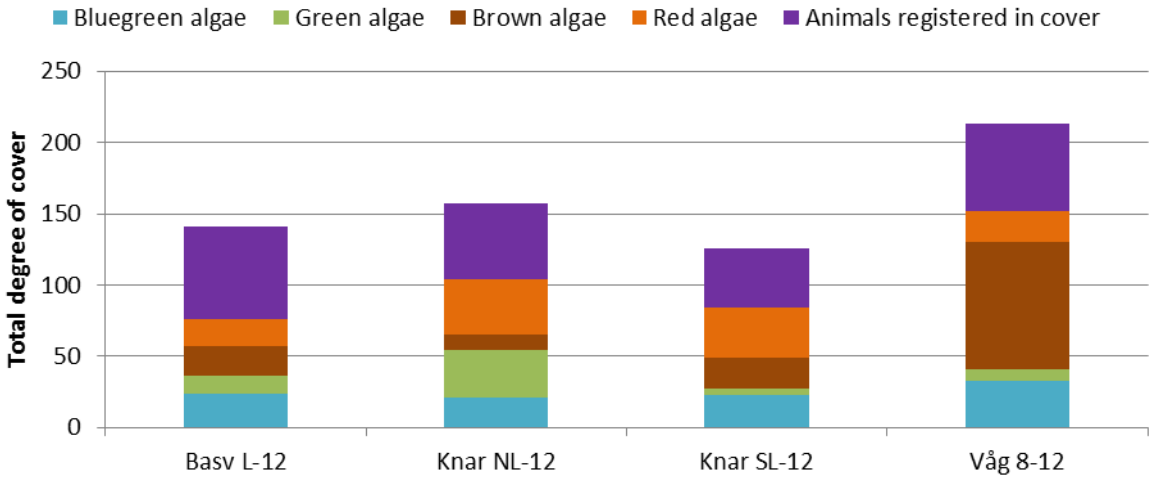


Figure 3.7.3: Total coverage, divided into red-, brown-, green algae, blue greenalgae and animals registered aspercentage of coverage from the grids in 2012.

In the multivariate analyses the species present at a station and their distribution is compared. The Analyses shows that stations Basv L-12 and Knar SL-12 are the most similar due to diversity and the number of species present. Station Våg 8L-12 differs the most from the other stations. This is most likely due to the dense algae coverage.

The semiquantitative surveys are presented in Appendix 9 and showed the same results as the grid analyses, with dense algae coverage at station Våg 8L, a fair amount of algae north and

south of the Sotrabridge, along with sea lettuce at the north side. At station Basv LS there was found lots of *Fucus vesiculosus, Ulva intestinalis* and *Laminaria digitata*, which indicates a local area with less current than that of the adjacent grid station.

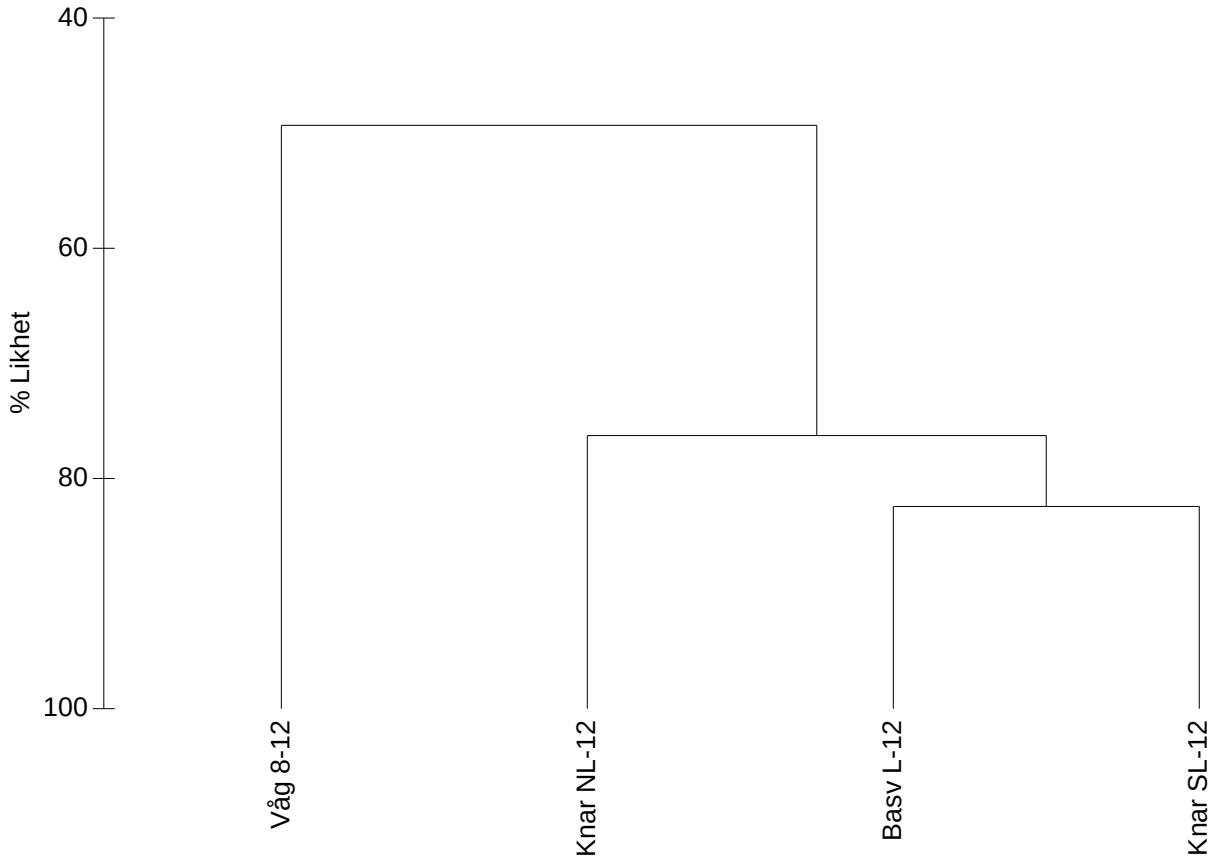


Figure 3.7.4. *Community analysis where the species composition at the surveyed stations are compared. Analysis based on Bray-Curtis index of 98 species. Algae and animals registered as % coverage are angletransformed while animals registered in numbers are root transformed.*

3.8 MEASUREMENTS OF CURRENTS

The current was occasionally strong at all stations. At Knar S the current was strong in the northern direction, at Basv the current pointed towards south east, while at Våg 8 the current went in a south western direction. Complementary data regarding the currents are available in appendix 13.

4. SUMMARY

In 2011- 2012 sampling was conducted at 4 stations north and south of Lillesotra in Fjell: Våg 8, Basv, Knar N and Knar S, following TA-1890, version 3.

Measurements of nutrients in the water column indicated similar conditions at all stations, with somewhat higher values of Nitrate/Nitrite during summer.

None of the stations investigated had chlorophyll values indicating eutrophication, hence all were classified as I (Very Good) and II (Good).

With the exception of *Enterococcus* in Basvik in January and coliform bacteria at Våg 8 in December, concentrations of bacteria were below the limit of water suitable for bathing and recreation.

The content of oxygen in the bottom water were high and within the class I (Very Good) and II (Good) at all stations measured.

Metals and TBT were detected in the sediment of all stations apart from Våg 8. These valuaes are however not related to normal sewage and are most likely related to industry and marinas. The sediment at Knar N had high values of copper. The sediment at Basv was Moderately Polluted (class III) with PCB, while the other stations were within class II (Good). Våg 8 contained the least amount of PAH in the sediments (class II, Good), while the other stations were regarded as Moderatly Polluted, TK III.

The conditions regarding normalized TOC were varying from Very Bad at Basv to Moderate at Våg 8 and good at Knar S. The loss of ignition values however, which is better suited in the area investigated, indicated a low content of organic material in the sediment at all stations.

Analyses indicated a Very Good distribution of benthic fauna at Knar S and Knar N (class I), Good at Våg 8 (class II), while results range from very good (class I) to poor (class IV) at Basv.

Quantitative and semi-quantitative analyses of the littoral was conducted west and north on Lillesotra. The station furthest north (Våg 8) was the most species rich and had the largest cover of animals and plants. A lot of algae give cover for other algae and animals at this

station. The least amount of species was found on north and south of Sotrabrua (bridge). This was expected due to a stronger current in the area.

The strong currents in the area are most likely effective in diluting sewage emissions.

Knar S and Knar N are quite similar to Station 61, further south in Vatlestraumen and it is expected that the recipient will tolerate a greater amount of discharge after primary treatment in the future.

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Norsk Standard NS-EN ISO 17025. Generelle krav til prøvings- og kalibreringslaboratoriers kompetanse (ISO/IEC 17025:2005) *Standard Norge.*

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APPENDIX

APPENDIX 1: ANALYSIS OF ENVIRONMENTAL CHEMISTRY IN SEDIMENT

Eurofins Environment Testing Norway AS (Bergen)
F. reg. 965 141 618 MVA
Box 75
NO-5841 Bergen

Tlf: +47 94 50 42 42
Fax:
bergen@eurofins.no

Uni Research AS
HiB, Seksjon for anvendt miljøforskning (SAM)
5006 BERGEN
Attn: Uni Miljø

AR-12-MX-002615-01
EUNOBE-00004498

Prøvemottak: 19.09.2012
Temperatur:
Analyseperiode: 19.09.2012-15.10.2012
Referanse: 806275 ref: 62/12

ANALYSERAPPORT

Tegnforklaring:
* (Ikke omfattet av akkrediteringen)
< :Mindre enn, > :Større enn, nd :Ikke påvist, MPN :Most Probable Number, cfu :Colony Forming Units, MU :Uncertainty of Measurement, LOQ :Kvantifiseringsgrense

Opplysninger om måleusikkerhet fås ved henvendelse til laboratoriet.
 Side 1 av 14

AR-12-MX-002615-01
EUNOBE-00004498

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Prøvenr.:	**441-2012-0919-096**	Prøvetakingsdato:	03.09.2012
Prøvetype:	Sedimenter	Prøvetaker:	Oppdragsgiver
Prøvemerking:	Våg 8, 97 m, hugg 1	Analysestartdato:	19.09.2012

Analyse	Resultat:	Enhet:	MU	Metode:	LOQ:	Grenseverdi
b) Total tørrstoff	58	%	12%	NS 4764	0.02	
a)* Totalt tørrstoff						
Total tørrstoff	56.9	% (v/v)		EN 14346	0.1	
b) Kadmium (Cd)	0.045	mg/kg TS	40%	NS EN ISO 17294-2	0.01	
b) Bly (Pb)	17	mg/kg TS	20%	NS EN ISO 11885	0.7	
b) Kobber (Cu)	7.3	mg/kg TS	40%	NS EN ISO 11885	2	
b) Krom (Cr)	6.0	mg/kg TS	20%	NS EN ISO 11885	0.3	
b) Kvikksølv (Hg)	0.045	mg/kg TS	20%	NS-EN ISO 12846	0.001	
b) Nikkel (Ni)	5.1	mg/kg TS	40%	NS EN ISO 11885	1	
b) Sink (Zn)	34	mg/kg TS	40%	NS EN ISO 11885	15	
b) Tributyltinn (TBT)	<1	µg/kg TS	40%	Intern metode	1	
PAH 16						
Naftalen	30.5	µg/kg TS		NS 9815	0.1	
Acenaftylen	3.92	µg/kg TS		NS 9815	0.1	
Acenaften	12.3	µg/kg TS		NS 9815	0.1	
Fluoren	12.0	µg/kg TS		NS 9815	0.1	
Fenantren	57.9	µg/kg TS		NS 9815	0.1	
Antracen	19.2	µg/kg TS		NS 9815	0.1	
Fluoranten	111	µg/kg TS		NS 9815	0.1	
Pyren	97.9	µg/kg TS		NS 9815	0.1	
Benzo(a)antracen	54.6	µg/kg TS		NS 9815	0.1	
Krysen	44.1	µg/kg TS		NS 9815	0.1	
Benzo[b]fluoranten	55.7	µg/kg TS		NS 9815	0.1	
Benzo[k]fluoranten	28.0	µg/kg TS		NS 9815	0.1	
Benzo[a]pyren	50.2	µg/kg TS		NS 9815	0.1	
Indeno[1,2,3-cd]pyren	70.0	µg/kg TS		NS 9815	0.1	
Dibenzo[a,h]antracen	11.0	µg/kg TS		NS 9815	0.1	
Benzo[g,h,i]perylen	79.4	µg/kg TS		NS 9815	0.1	
Sum PAH(16) EPA	738	µg/kg TS		NS 9815	0.2	
PCB 7						
PCB 101	0.70	µg/kg TS		NS-EN 12766-2	0.1	
PCB 118	1.20	µg/kg TS		NS-EN 12766-2	0.1	
PCB 138	1.50	µg/kg TS		NS-EN 12766-2	0.1	
PCB 153	1.50	µg/kg TS		NS-EN 12766-2	0.1	
PCB 180	0.71	µg/kg TS		NS-EN 12766-2	0.1	
PCB 28	<0.1	µg/kg TS		NS-EN 12766-2	0.1	
PCB 52	0.70	µg/kg TS		NS-EN 12766-2	0.1	
Sum 7 PCB	6.30	µg/kg TS		NS-EN 12766-2	1	
a) Totalt organisk karbon (TOC)	13	mg/g tv		EN 13137	0.1	

Tegnforklaring:
* (Ikke omfattet av akkrediteringen)
< :Mindre enn, > :Større enn, nd :Ikke påvist, MPN :Most Probable Number, cfu :Colony Forming Units, MU :Uncertainty of Measurement, LOQ :Kvantifiseringsgrense

Opplysninger om måleusikkerhet fås ved henvendelse til laboratoriet.
Rapporten må ikke gjengis, unntatt i sin helhet, uten laboratoriets skriftlige godkjennelse. Resultatene gjelder kun for de(n) undersøkte prøven(e).

AR-12-MX-002615-01
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Prøvenr.:	**441-2012-0919-097**	Prøvetakingsdato:	03.09.2012
Prøvetype:	Sedimenter	Prøvetaker:	Oppdragsgiver
Prøvemerking:	Våg 8, 97 m, hugg 2	Analysestartdato:	19.09.2012

Analyse	Resultat:	Enhet:	MU	Metode:	LOQ:	Grenseverdi
b) Total tørrstoff	62	%	12%	NS 4764	0.02	
a)* Totalt tørrstoff						
Total tørrstoff	62.8	% (v/v)		EN 14346	0.1	
b) Kadmium (Cd)	0.071	mg/kg TS	40%	NS EN ISO 17294-2	0.01	
b) Bly (Pb)	28	mg/kg TS	20%	NS EN ISO 11885	0.7	
b) Kobber (Cu)	5.3	mg/kg TS	40%	NS EN ISO 11885	2	
b) Krom (Cr)	8.5	mg/kg TS	20%	NS EN ISO 11885	0.3	
b) Kvikksølv (Hg)	0.056	mg/kg TS	20%	NS-EN ISO 12846	0.001	
b) Nikkel (Ni)	6.4	mg/kg TS	40%	NS EN ISO 11885	1	
b) Sink (Zn)	65	mg/kg TS	40%	NS EN ISO 11885	15	
b) Tributyltinn (TBT)	<1	µg/kg TS	40%	Intern metode	1	
PAH 16						
Naftalen	13.9	µg/kg TS		NS 9815	0.1	
Acenaftylen	2.86	µg/kg TS		NS 9815	0.1	
Acenaften	3.54	µg/kg TS		NS 9815	0.1	
Fluoren	4.78	µg/kg TS		NS 9815	0.1	
Fenantren	12.9	µg/kg TS		NS 9815	0.1	
Antracen	4.81	µg/kg TS		NS 9815	0.1	
Fluoranten	38.4	µg/kg TS		NS 9815	0.1	
Pyren	35.9	µg/kg TS		NS 9815	0.1	
Benzo(a)antracen	36.1	µg/kg TS		NS 9815	0.1	
Krysen	29.9	µg/kg TS		NS 9815	0.1	
Benzo[b]fluoranten	29.6	µg/kg TS		NS 9815	0.1	
Benzo[k]fluoranten	13.5	µg/kg TS		NS 9815	0.1	
Benzo[a]pyren	18.7	µg/kg TS		NS 9815	0.1	
Indeno[1,2,3-cd]pyren	36.7	µg/kg TS		NS 9815	0.1	
Dibenzo[a,h]antracen	5.63	µg/kg TS		NS 9815	0.1	
Benzo[g,h,i]perylen	42.5	µg/kg TS		NS 9815	0.1	
Sum PAH(16) EPA	330	µg/kg TS		NS 9815	0.2	
PCB 7						
PCB 101	0.70	µg/kg TS		NS-EN 12766-2	0.1	
PCB 118	0.50	µg/kg TS		NS-EN 12766-2	0.1	
PCB 138	0.80	µg/kg TS		NS-EN 12766-2	0.1	
PCB 153	0.80	µg/kg TS		NS-EN 12766-2	0.1	
PCB 180	0.30	µg/kg TS		NS-EN 12766-2	0.1	
PCB 28	<0.1	µg/kg TS		NS-EN 12766-2	0.1	
PCB 52	0.60	µg/kg TS		NS-EN 12766-2	0.1	
Sum 7 PCB	3.70	µg/kg TS		NS-EN 12766-2	1	
a) Totalt organisk karbon (TOC)	11	mg/g tv		EN 13137	0.1	

Tegnforklaring:
* (Ikke omfattet av akkrediteringen)
< :Mindre enn, > :Større enn, nd :Ikke påvist, MPN :Most Probable Number, cfu :Colony Forming Units, MU :Uncertainty of Measurement, LOQ :Kvantifiseringsgrense

Opplysninger om måleusikkerhet fås ved henvendelse til laboratoriet.
 Resultatene gjelder kun for de(n) undersøkte prøven(e). Side 3 av 14

AR-12-MX-002615-01
EUNOBE-00004498

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Prøvenr.:	**441-2012-0919-098**	Prøvetakingsdato:	03.09.2012
Prøvetype:	Sedimenter	Prøvetaker:	Oppdragsgiver
Prøvemerking:	Våg 8, 97 m, hugg 3	Analysestartdato:	19.09.2012

Analyse	Resultat:	Enhet:	MU	Metode:	LOQ:	Grenseverdi
b) Total tørrstoff	55	%	12%	NS 4764	0.02	
a)* Totalt tørrstoff						
Total tørrstoff	63.2	% (v/v)		EN 14346	0.1	
b) Kadmium (Cd)	0.084	mg/kg TS	40%	NS EN ISO 17294-2	0.01	
b) Bly (Pb)	28	mg/kg TS	20%	NS EN ISO 11885	0.7	
b) Kobber (Cu)	8.5	mg/kg TS	40%	NS EN ISO 11885	2	
b) Krom (Cr)	9.3	mg/kg TS	20%	NS EN ISO 11885	0.3	
b) Kvikksølv (Hg)	0.088	mg/kg TS	20%	NS-EN ISO 12846	0.001	
b) Nikkel (Ni)	6.1	mg/kg TS	40%	NS EN ISO 11885	1	
b) Sink (Zn)	50	mg/kg TS	40%	NS EN ISO 11885	15	
b) Tributyltinn (TBT)	<1	µg/kg TS	40%	Intern metode	1	
PAH 16						
Naftalen	14.5	µg/kg TS		NS 9815	0.1	
Acenaftylen	3.37	µg/kg TS		NS 9815	0.1	
Acenaften	12.4	µg/kg TS		NS 9815	0.1	
Fluoren	14.1	µg/kg TS		NS 9815	0.1	
Fenantren	65.1	µg/kg TS		NS 9815	0.1	
Antracen	19.7	µg/kg TS		NS 9815	0.1	
Fluoranten	98.6	µg/kg TS		NS 9815	0.1	
Pyren	81.4	µg/kg TS		NS 9815	0.1	
Benzo(a)antracen	68.6	µg/kg TS		NS 9815	0.1	
Krysen	56.6	µg/kg TS		NS 9815	0.1	
Benzo[b]fluoranten	65.1	µg/kg TS		NS 9815	0.1	
Benzo[k]fluoranten	33.1	µg/kg TS		NS 9815	0.1	
Benzo[a]pyren	54.6	µg/kg TS		NS 9815	0.1	
Indeno[1,2,3-cd]pyren	79.3	µg/kg TS		NS 9815	0.1	
Dibenzo[a,h]antracen	13.1	µg/kg TS		NS 9815	0.1	
Benzo[g,h,i]perylen	86.5	µg/kg TS		NS 9815	0.1	
Sum PAH(16) EPA	766	µg/kg TS		NS 9815	0.2	
PCB 7						
PCB 101	1.20	µg/kg TS		NS-EN 12766-2	0.1	
PCB 118	0.80	µg/kg TS		NS-EN 12766-2	0.1	
PCB 138	1.40	µg/kg TS		NS-EN 12766-2	0.1	
PCB 153	1.40	µg/kg TS		NS-EN 12766-2	0.1	
PCB 180	0.50	µg/kg TS		NS-EN 12766-2	0.1	
PCB 28	<0.1	µg/kg TS		NS-EN 12766-2	0.1	
PCB 52	1.10	µg/kg TS		NS-EN 12766-2	0.1	
Sum 7 PCB	6.40	µg/kg TS		NS-EN 12766-2	1	
a) Totalt organisk karbon (TOC)	13	mg/g tv		EN 13137	0.1	

Tegnforklaring:
* (Ikke omfattet av akkrediteringen)
< :Mindre enn, > :Større enn, nd :Ikke påvist, MPN :Most Probable Number, cfu :Colony Forming Units, MU :Uncertainty of Measurement, LOQ :Kvantifiseringsgrense

AR-12-MX-002615-01
EUNOBE-00004498

eurofins

Prøvenr.:	**441-2012-0919-099**	Prøvetakingsdato:	03.09.2012
Prøvetype:	Sedimenter	Prøvetaker:	Oppdragsgiver
Prøvemerking:	Basv, 172 m, hugg 1	Analysestartdato:	19.09.2012

Analyse	Resultat:	Enhet:	MU	Metode:	LOQ:	Grenseverdi
b) Total tørrstoff	61	%	12%	NS 4764	0.02	
a)* Totalt tørrstoff						
Total tørrstoff	60.6	% (v/v)		EN 14346	0.1	
b) Kadmium (Cd)	0.063	mg/kg TS	40%	NS EN ISO 17294-2	0.01	
b) Bly (Pb)	39	mg/kg TS	20%	NS EN ISO 11885	0.7	
b) Kobber (Cu)	15	mg/kg TS	40%	NS EN ISO 11885	2	
b) Krom (Cr)	15	mg/kg TS	20%	NS EN ISO 11885	0.3	
b) Kvikksølv (Hg)	0.209	mg/kg TS	20%	NS-EN ISO 12846	0.001	
b) Nikkel (Ni)	8.0	mg/kg TS	40%	NS EN ISO 11885	1	
b) Sink (Zn)	76	mg/kg TS	40%	NS EN ISO 11885	15	
b) Tributyltinn (TBT)	13	µg/kg TS	40%	Intern metode	1	
PAH 16						
Naftalen	35.3	µg/kg TS		NS 9815	0.1	
Acenaftylen	17.2	µg/kg TS		NS 9815	0.1	
Acenaften	20.7	µg/kg TS		NS 9815	0.1	
Fluoren	31.4	µg/kg TS		NS 9815	0.1	
Fenantren	144	µg/kg TS		NS 9815	0.1	
Antracen	35.8	µg/kg TS		NS 9815	0.1	
Fluoranten	347	µg/kg TS		NS 9815	0.1	
Pyren	5.05	µg/kg TS		NS 9815	0.1	
Benzo(a)antracen	180	µg/kg TS		NS 9815	0.1	
Krysen	145	µg/kg TS		NS 9815	0.1	
Benzo[b]fluoranten	166	µg/kg TS		NS 9815	0.1	
Benzo[k]fluoranten	69.4	µg/kg TS		NS 9815	0.1	
Benzo[a]pyren	162	µg/kg TS		NS 9815	0.1	
Indeno[1,2,3-cd]pyren	151	µg/kg TS		NS 9815	0.1	
Dibenzo[a,h]antracen	23.8	µg/kg TS		NS 9815	0.1	
Benzo[g,h,i]perylen	145	µg/kg TS		NS 9815	0.1	
Sum PAH(16) EPA	1680	µg/kg TS		NS 9815	0.2	
PCB 7						
PCB 101	1.10	µg/kg TS		NS-EN 12766-2	0.1	
PCB 118	0.60	µg/kg TS		NS-EN 12766-2	0.1	
PCB 138	1.50	µg/kg TS		NS-EN 12766-2	0.1	
PCB 153	1.40	µg/kg TS		NS-EN 12766-2	0.1	
PCB 180	0.60	µg/kg TS		NS-EN 12766-2	0.1	
PCB 28	<0.1	µg/kg TS		NS-EN 12766-2	0.1	
PCB 52	0.90	µg/kg TS		NS-EN 12766-2	0.1	
Sum 7 PCB	6.20	µg/kg TS		NS-EN 12766-2	1	
a) Totalt organisk karbon (TOC)	22	mg/g tv		EN 13137	0.1	

Tegnforklaring:
* (Ikke omfattet av akkrediteringen)
< :Mindre enn, > :Større enn, nd :Ikke påvist, MPN :Most Probable Number, cfu :Colony Forming Units, MU :Uncertainty of Measurement, LOQ :Kvantifiseringsgrense

AR-12-MX-002615-01
EUNOBE-00004498

eurofins

Prøvenr.:	**441-2012-0919-100**	Prøvetakingsdato:	03.09.2012
Prøvetype:	Sedimenter	Prøvetaker:	Oppdragsgiver
Prøvemerking:	Basv, 172 m, hugg 2	Analysestartdato:	19.09.2012

Analyse	Resultat:	Enhet:	MU	Metode:	LOQ:	Grenseverdi
b) Total tørrstoff	51	%	12%	NS 4764	0.02	
a)* Totalt tørrstoff						
Total tørrstoff	56.8	% (v/v)		EN 14346	0.1	
b) Kadmium (Cd)	0.12	mg/kg TS	20%	NS EN ISO 17294-2	0.01	
b) Bly (Pb)	71	mg/kg TS	20%	NS EN ISO 11885	0.7	
b) Kobber (Cu)	30	mg/kg TS	40%	NS EN ISO 11885	2	
b) Krom (Cr)	26	mg/kg TS	20%	NS EN ISO 11885	0.3	
b) Kvikksølv (Hg)	0.391	mg/kg TS	20%	NS-EN ISO 12846	0.001	
b) Nikkel (Ni)	18	mg/kg TS	40%	NS EN ISO 11885	1	
b) Sink (Zn)	140	mg/kg TS	40%	NS EN ISO 11885	15	
b) Tributyltinn (TBT)	67	µg/kg TS	40%	Intern metode	1	
PAH 16						
Naftalen	51.4	µg/kg TS		NS 9815	0.1	
Acenaftylen	16.9	µg/kg TS		NS 9815	0.1	
Acenaften	75.6	µg/kg TS		NS 9815	0.1	
Fluoren	85.3	µg/kg TS		NS 9815	0.1	
Fenantren	724	µg/kg TS		NS 9815	0.1	
Antracen	224	µg/kg TS		NS 9815	0.1	
Fluoranten	1580	µg/kg TS		NS 9815	0.1	
Pyren	1190	µg/kg TS		NS 9815	0.1	
Benzo(a)antracen	812	µg/kg TS		NS 9815	0.1	
Krysen	672	µg/kg TS		NS 9815	0.1	
Benzo[b]fluoranten	761	µg/kg TS		NS 9815	0.1	
Benzo[k]fluoranten	323	µg/kg TS		NS 9815	0.1	
Benzo[a]pyren	813	µg/kg TS		NS 9815	0.1	
Indeno[1,2,3-cd]pyren	543	µg/kg TS		NS 9815	0.1	
Dibenzo[a,h]antracen	115	µg/kg TS		NS 9815	0.1	
Benzo[g,h,i]perylen	613	µg/kg TS		NS 9815	0.1	
Sum PAH(16) EPA	8590	µg/kg TS		NS 9815	0.2	
PCB 7						
PCB 101	2.70	µg/kg TS		NS-EN 12766-2	0.1	
PCB 118	0.80	µg/kg TS		NS-EN 12766-2	0.1	
PCB 138	3.00	µg/kg TS		NS-EN 12766-2	0.1	
PCB 153	3.00	µg/kg TS		NS-EN 12766-2	0.1	
PCB 180	1.50	µg/kg TS		NS-EN 12766-2	0.1	
PCB 28	0.80	µg/kg TS		NS-EN 12766-2	0.1	
PCB 52	1.90	µg/kg TS		NS-EN 12766-2	0.1	
Sum 7 PCB	13.7	µg/kg TS		NS-EN 12766-2	1	
a) Totalt organisk karbon (TOC)	42	mg/g tv		EN 13137	0.1	

Tegnforklaring:
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Opplysninger om måleusikkerhet fås ved henvendelse til laboratoriet.
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AR-12-MX-002615-01
EUNOBE-00004498

eurofins

Prøvenr.:	**441-2012-0919-101**	Prøvetakingsdato:	03.09.2012
Prøvetype:	Sedimenter	Prøvetaker:	Oppdragsgiver
Prøvemerking:	Basv, 172 m, hugg 3	Analysestartdato:	19.09.2012

Analyse	Resultat:	Enhet:	MU	Metode:	LOQ:	Grenseverdi
b) Total tørrstoff	55	%	12%	NS 4764	0.02	
a)* Totalt tørrstoff						
Total tørrstoff	57.5	% (v/v)		EN 14346	0.1	
b) Kadmium (Cd)	0.084	mg/kg TS	40%	NS EN ISO 17294-2	0.01	
b) Bly (Pb)	55	mg/kg TS	20%	NS EN ISO 11885	0.7	
b) Kobber (Cu)	26	mg/kg TS	40%	NS EN ISO 11885	2	
b) Krom (Cr)	19	mg/kg TS	20%	NS EN ISO 11885	0.3	
b) Kvikksølv (Hg)	0.337	mg/kg TS	20%	NS-EN ISO 12846	0.001	
b) Nikkel (Ni)	11	mg/kg TS	40%	NS EN ISO 11885	1	
b) Sink (Zn)	100	mg/kg TS	40%	NS EN ISO 11885	15	
b) Tributyltinn (TBT)	<1	µg/kg TS	40%	Intern metode	1	
PAH 16						
Naftalen	46.5	µg/kg TS		NS 9815	0.1	
Acenaftylen	18.4	µg/kg TS		NS 9815	0.1	
Acenaften	54.6	µg/kg TS		NS 9815	0.1	
Fluoren	62.7	µg/kg TS		NS 9815	0.1	
Fenantren	469	µg/kg TS		NS 9815	0.1	
Antracen	129	µg/kg TS		NS 9815	0.1	
Fluoranten	982	µg/kg TS		NS 9815	0.1	
Pyren	782	µg/kg TS		NS 9815	0.1	
Benzo(a)antracen	502	µg/kg TS		NS 9815	0.1	
Krysen	398	µg/kg TS		NS 9815	0.1	
Benzo[b]fluoranten	446	µg/kg TS		NS 9815	0.1	
Benzo[k]fluoranten	230	µg/kg TS		NS 9815	0.1	
Benzo[a]pyren	527	µg/kg TS		NS 9815	0.1	
Indeno[1,2,3-cd]pyren	418	µg/kg TS		NS 9815	0.1	
Dibenzo[a,h]antracen	68.4	µg/kg TS		NS 9815	0.1	
Benzo[g,h,i]perylen	414	µg/kg TS		NS 9815	0.1	
Sum PAH(16) EPA	5550	µg/kg TS		NS 9815	0.2	
PCB 7						
PCB 101	6.60	µg/kg TS		NS-EN 12766-2	0.1	
PCB 118	3.30	µg/kg TS		NS-EN 12766-2	0.1	
PCB 138	12.2	µg/kg TS		NS-EN 12766-2	0.1	
PCB 153	12.8	µg/kg TS		NS-EN 12766-2	0.1	
PCB 180	8.70	µg/kg TS		NS-EN 12766-2	0.1	
PCB 28	<0.1	µg/kg TS		NS-EN 12766-2	0.1	
PCB 52	2.30	µg/kg TS		NS-EN 12766-2	0.1	
Sum 7 PCB	46.0	µg/kg TS		NS-EN 12766-2	1	
a) Totalt organisk karbon (TOC)	34	mg/g tv		EN 13137	0.1	

Tegnforklaring:
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Opplysninger om måleusikkerhet fås ved henvendelse til laboratoriet.
 Resultatene gjelder kun for de(n) undersøkte prøven(e).

AR-12-MX-002615-01
EUNOBE-00004498

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Prøvenr.:	**441-2012-0919-102**	Prøvetakingsdato:	03.09.2012
Prøvetype:	Sedimenter	Prøvetaker:	Oppdragsgiver
Prøvemerking:	Knar S, 82 m, hugg 1	Analysestartdato:	19.09.2012

Analyse	Resultat:	Enhet:	MU	Metode:	LOQ:	Grenseverdi
b) Total tørrstoff	68	%	12%	NS 4764	0.02	
a)* Totalt tørrstoff						
Total tørrstoff	61.5	% (v/v)		EN 14346	0.1	
b) Kadmium (Cd)	0.089	mg/kg TS	20%	NS EN ISO 17294-2	0.01	
b) Bly (Pb)	27	mg/kg TS	20%	NS EN ISO 11885	0.7	
b) Kobber (Cu)	7.3	mg/kg TS	40%	NS EN ISO 11885	2	
b) Krom (Cr)	3.7	mg/kg TS	40%	NS EN ISO 11885	0.3	
b) Kvikksølv (Hg)	0.047	mg/kg TS	20%	NS-EN ISO 12846	0.001	
b) Nikkel (Ni)	12	mg/kg TS	40%	NS EN ISO 11885	1	
b) Sink (Zn)	37	mg/kg TS	40%	NS EN ISO 11885	15	
b) Tributyltinn (TBT)	200	µg/kg TS	40%	Intern metode	1	
PAH 16						
Naftalen	29.5	µg/kg TS		NS 9815	0.1	
Acenaftylen	8.95	µg/kg TS		NS 9815	0.1	
Acenaften	16.5	µg/kg TS		NS 9815	0.1	
Fluoren	28.0	µg/kg TS		NS 9815	0.1	
Fenantren	256	µg/kg TS		NS 9815	0.1	
Antracen	46.9	µg/kg TS		NS 9815	0.1	
Fluoranten	426	µg/kg TS		NS 9815	0.1	
Pyren	331	µg/kg TS		NS 9815	0.1	
Benzo(a)antracen	178	µg/kg TS		NS 9815	0.1	
Krysen	151	µg/kg TS		NS 9815	0.1	
Benzo[b]fluoranten	184	µg/kg TS		NS 9815	0.1	
Benzo[k]fluoranten	89.5	µg/kg TS		NS 9815	0.1	
Benzo[a]pyren	190	µg/kg TS		NS 9815	0.1	
Indeno[1,2,3-cd]pyren	195	µg/kg TS		NS 9815	0.1	
Dibenzo[a,h]antracen	28.9	µg/kg TS		NS 9815	0.1	
Benzo[g,h,i]perylen	190	µg/kg TS		NS 9815	0.1	
Sum PAH(16) EPA	2350	µg/kg TS		NS 9815	0.2	
PCB 7						
PCB 101	0.90	µg/kg TS		NS-EN 12766-2	0.1	
PCB 118	1.00	µg/kg TS		NS-EN 12766-2	0.1	
PCB 138	1.10	µg/kg TS		NS-EN 12766-2	0.1	
PCB 153	0.90	µg/kg TS		NS-EN 12766-2	0.1	
PCB 180	0.50	µg/kg TS		NS-EN 12766-2	0.1	
PCB 28	<0.1	µg/kg TS		NS-EN 12766-2	0.1	
PCB 52	0.70	µg/kg TS		NS-EN 12766-2	0.1	
Sum 7 PCB	5.10	µg/kg TS		NS-EN 12766-2	1	
a) Totalt organisk karbon (TOC)	14	mg/g tv		EN 13137	0.1	

Tegnforklaring:
* (Ikke omfattet av akkrediteringen)
< :Mindre enn, > :Større enn, nd :Ikke påvist, MPN :Most Probable Number, cfu :Colony Forming Units, MU :Uncertainty of Measurement, LOQ :Kvantifiseringsgrense

AR-12-MX-002615-01
EUNOBE-00004498

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Prøvenr.:	**441-2012-0919-103**	Prøvetakingsdato:	03.09.2012
Prøvetype:	Sedimenter	Prøvetaker:	Oppdragsgiver
Prøvemerking:	Knar S, 82 m, hugg 2	Analysestartdato:	19.09.2012

Analyse	Resultat:	Enhet:	MU	Metode:	LOQ:	Grenseverdi
b) Total tørrstoff	60	%	12%	NS 4764	0.02	
a)* Totalt tørrstoff						
Total tørrstoff	64.8	% (v/v)		EN 14346	0.1	
b) Kadmium (Cd)	0.085	mg/kg TS	20%	NS EN ISO 17294-2	0.01	
b) Bly (Pb)	30	mg/kg TS	20%	NS EN ISO 11885	0.7	
b) Kobber (Cu)	12	mg/kg TS	40%	NS EN ISO 11885	2	
b) Krom (Cr)	5.8	mg/kg TS	20%	NS EN ISO 11885	0.3	
b) Kvikksølv (Hg)	0.084	mg/kg TS	20%	NS-EN ISO 12846	0.001	
b) Nikkel (Ni)	8.4	mg/kg TS	40%	NS EN ISO 11885	1	
b) Sink (Zn)	48	mg/kg TS	40%	NS EN ISO 11885	15	
b) Tributyltinn (TBT)	26	µg/kg TS	40%	Intern metode	1	
PAH 16						
Naftalen	48.5	µg/kg TS		NS 9815	0.1	
Acenaftylen	9.96	µg/kg TS		NS 9815	0.1	
Acenaften	19.4	µg/kg TS		NS 9815	0.1	
Fluoren	22.5	µg/kg TS		NS 9815	0.1	
Fenantren	199	µg/kg TS		NS 9815	0.1	
Antracen	37.8	µg/kg TS		NS 9815	0.1	
Fluoranten	308	µg/kg TS		NS 9815	0.1	
Pyren	235	µg/kg TS		NS 9815	0.1	
Benzo(a)antracen	146	µg/kg TS		NS 9815	0.1	
Krysen	130	µg/kg TS		NS 9815	0.1	
Benzo[b]fluoranten	124	µg/kg TS		NS 9815	0.1	
Benzo[k]fluoranten	58.6	µg/kg TS		NS 9815	0.1	
Benzo[a]pyren	117	µg/kg TS		NS 9815	0.1	
Indeno[1,2,3-cd]pyren	97.1	µg/kg TS		NS 9815	0.1	
Dibenzo[a,h]antracen	21.6	µg/kg TS		NS 9815	0.1	
Benzo[g,h,i]perylen	122	µg/kg TS		NS 9815	0.1	
Sum PAH(16) EPA	1690	µg/kg TS		NS 9815	0.2	
PCB 7						
PCB 101	0.90	µg/kg TS		NS-EN 12766-2	0.1	
PCB 118	0.80	µg/kg TS		NS-EN 12766-2	0.1	
PCB 138	0.90	µg/kg TS		NS-EN 12766-2	0.1	
PCB 153	1.00	µg/kg TS		NS-EN 12766-2	0.1	
PCB 180	0.40	µg/kg TS		NS-EN 12766-2	0.1	
PCB 28	<0.1	µg/kg TS		NS-EN 12766-2	0.1	
PCB 52	0.70	µg/kg TS		NS-EN 12766-2	0.1	
Sum 7 PCB	4.70	µg/kg TS		NS-EN 12766-2	1	
a) Totalt organisk karbon (TOC)	36	mg/g tv		EN 13137	0.1	

Tegnforklaring:
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Opplysninger om måleusikkerhet fås ved henvendelse til laboratoriet.
 Resultatene gjelder kun for de(n) undersøkte prøven(e).

AR-12-MX-002615-01
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Prøvenr.:	**441-2012-0919-104**	Prøvetakingsdato:	03.09.2012
Prøvetype:	Sedimenter	Prøvetaker:	Oppdragsgiver
Prøvemerking:	Knar S, 82 m, hugg 3	Analysestartdato:	19.09.2012

Analyse	Resultat:	Enhet:	MU	Metode:	LOQ:	Grenseverdi
b) Total tørrstoff	63	%	12%	NS 4764	0.02	
a)* Totalt tørrstoff						
Total tørrstoff	63.7	% (v/v)		EN 14346	0.1	
b) Kadmium (Cd)	0.072	mg/kg TS	40%	NS EN ISO 17294-2	0.01	
b) Bly (Pb)	33	mg/kg TS	20%	NS EN ISO 11885	0.7	
b) Kobber (Cu)	10	mg/kg TS	40%	NS EN ISO 11885	2	
b) Krom (Cr)	4.9	mg/kg TS	20%	NS EN ISO 11885	0.3	
b) Kvikksølv (Hg)	0.074	mg/kg TS	20%	NS-EN ISO 12846	0.001	
b) Nikkel (Ni)	9.6	mg/kg TS	40%	NS EN ISO 11885	1	
b) Sink (Zn)	42	mg/kg TS	40%	NS EN ISO 11885	15	
b) Tributyltinn (TBT)	2.1	µg/kg TS	40%	Intern metode	1	
PAH 16						
Naftalen	35.7	µg/kg TS		NS 9815	0.1	
Acenaftylen	14.7	µg/kg TS		NS 9815	0.1	
Acenaften	27.4	µg/kg TS		NS 9815	0.1	
Fluoren	46.6	µg/kg TS		NS 9815	0.1	
Fenantren	376	µg/kg TS		NS 9815	0.1	
Antracen	94.4	µg/kg TS		NS 9815	0.1	
Fluoranten	755	µg/kg TS		NS 9815	0.1	
Pyren	592	µg/kg TS		NS 9815	0.1	
Benzo(a)antracen	373	µg/kg TS		NS 9815	0.1	
Krysen	284	µg/kg TS		NS 9815	0.1	
Benzo[b]fluoranten	283	µg/kg TS		NS 9815	0.1	
Benzo[k]fluoranten	131	µg/kg TS		NS 9815	0.1	
Benzo[a]pyren	303	µg/kg TS		NS 9815	0.1	
Indeno[1,2,3-cd]pyren	202	µg/kg TS		NS 9815	0.1	
Dibenzo[a,h]antracen	39.3	µg/kg TS		NS 9815	0.1	
Benzo[g,h,i]perylen	199	µg/kg TS		NS 9815	0.1	
Sum PAH(16) EPA	3760	µg/kg TS		NS 9815	0.2	
PCB 7						
PCB 101	2.10	µg/kg TS		NS-EN 12766-2	0.1	
PCB 118	2.20	µg/kg TS		NS-EN 12766-2	0.1	
PCB 138	1.50	µg/kg TS		NS-EN 12766-2	0.1	
PCB 153	1.44	µg/kg TS		NS-EN 12766-2	0.1	
PCB 180	0.74	µg/kg TS		NS-EN 12766-2	0.1	
PCB 28	<0.1	µg/kg TS		NS-EN 12766-2	0.1	
PCB 52	1.40	µg/kg TS		NS-EN 12766-2	0.1	
Sum 7 PCB	9.40	µg/kg TS		NS-EN 12766-2	1	
a) Totalt organisk karbon (TOC)	20	mg/g tv		EN 13137	0.1	

Tegnforklaring:
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AR-12-MX-002615-01
EUNOBE-00004498

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Prøvenr.:	**441-2012-0919-105**	Prøvetakingsdato:	03.09.2012
Prøvetype:	Sedimenter	Prøvetaker:	Oppdragsgiver
Prøvemerking:	Knar N, 134 m, hugg 1	Analysestartdato:	19.09.2012

Analyse	Resultat:	Enhet:	MU	Metode:	LOQ:	Grenseverdi
b) Total tørrstoff	68	%	12%	NS 4764	0.02	
a)* Totalt tørrstoff						
Total tørrstoff	74	% (v/v)		EN 14346	0.1	
b) Kadmium (Cd)	0.12	mg/kg TS	20%	NS EN ISO 17294-2	0.01	
b) Bly (Pb)	40	mg/kg TS	20%	NS EN ISO 11885	0.7	
b) Kobber (Cu)	190	mg/kg TS	20%	NS EN ISO 11885	2	
b) Krom (Cr)	7.7	mg/kg TS	20%	NS EN ISO 11885	0.3	
b) Kvikksølv (Hg)	0.084	mg/kg TS	20%	NS-EN ISO 12846	0.001	
b) Nikkel (Ni)	5.7	mg/kg TS	40%	NS EN ISO 11885	1	
b) Sink (Zn)	290	mg/kg TS	20%	NS EN ISO 11885	15	
b) Tributyltinn (TBT)	<1	µg/kg TS	40%	Intern metode	1	
PAH 16						
Naftalen	38.4	µg/kg TS		NS 9815	0.1	
Acenaftylen	12.4	µg/kg TS		NS 9815	0.1	
Acenaften	11.8	µg/kg TS		NS 9815	0.1	
Fluoren	14.5	µg/kg TS		NS 9815	0.1	
Fenantren	89.0	µg/kg TS		NS 9815	0.1	
Antracen	34.5	µg/kg TS		NS 9815	0.1	
Fluoranten	197	µg/kg TS		NS 9815	0.1	
Pyren	167	µg/kg TS		NS 9815	0.1	
Benzo(a)antracen	120	µg/kg TS		NS 9815	0.1	
Krysen	99.5	µg/kg TS		NS 9815	0.1	
Benzo[b]fluoranten	147	µg/kg TS		NS 9815	0.1	
Benzo[k]fluoranten	68.9	µg/kg TS		NS 9815	0.1	
Benzo[a]pyren	133	µg/kg TS		NS 9815	0.1	
Indeno[1,2,3-cd]pyren	156	µg/kg TS		NS 9815	0.1	
Dibenzo[a,h]antracen	26.3	µg/kg TS		NS 9815	0.1	
Benzo[g,h,i]perylen	194	µg/kg TS		NS 9815	0.1	
Sum PAH(16) EPA	1510	µg/kg TS		NS 9815	0.2	
PCB 7						
PCB 101	1.00	µg/kg TS		NS-EN 12766-2	0.1	
PCB 118	1.30	µg/kg TS		NS-EN 12766-2	0.1	
PCB 138	2.30	µg/kg TS		NS-EN 12766-2	0.1	
PCB 153	2.30	µg/kg TS		NS-EN 12766-2	0.1	
PCB 180	1.20	µg/kg TS		NS-EN 12766-2	0.1	
PCB 28	<0.1	µg/kg TS		NS-EN 12766-2	0.1	
PCB 52	0.70	µg/kg TS		NS-EN 12766-2	0.1	
Sum 7 PCB	8.80	µg/kg TS		NS-EN 12766-2	1	
a) Totalt organisk karbon (TOC)	11	mg/g tv		EN 13137	0.1	

Tegnforklaring:
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Opplysninger om måleusikkerhet fås ved henvendelse til laboratoriet.
Rapporten må ikke gjengis, unntatt i sin helhet, uten laboratoriets skriftlige godkjennelse. Resultatene gjelder kun for de(n) undersøkte prøven(e).

AR-12-MX-002615-01
EUNOBE-00004498

eurofins

Prøvenr.:	**441-2012-0919-106**	Prøvetakingsdato:	03.09.2012
Prøvetype:	Sedimenter	Prøvetaker:	Oppdragsgiver
Prøvemerking:	Knar N, 134 m, hugg 2	Analysestartdato:	19.09.2012

Analyse	Resultat:	Enhet:	MU	Metode:	LOQ:	Grenseverdi
b) Total tørrstoff	67	%	12%	NS 4764	0.02	
a)* Totalt tørrstoff						
Total tørrstoff	76.9	% (v/v)		EN 14346	0.1	
b) Kadmium (Cd)	0.11	mg/kg TS	20%	NS EN ISO 17294-2	0.01	
b) Bly (Pb)	49	mg/kg TS	20%	NS EN ISO 11885	0.7	
b) Kobber (Cu)	2100	mg/kg TS	20%	NS EN ISO 11885	2	
b) Krom (Cr)	6.9	mg/kg TS	20%	NS EN ISO 11885	0.3	
b) Kvikksølv (Hg)	3.900	mg/kg TS	20%	NS-EN ISO 12846	0.001	
b) Nikkel (Ni)	8.1	mg/kg TS	40%	NS EN ISO 11885	1	
b) Sink (Zn)	380	mg/kg TS	20%	NS EN ISO 11885	15	
b) Tributyltinn (TBT)	32	µg/kg TS	40%	Intern metode	1	
PAH 16						
Naftalen	36.4	µg/kg TS		NS 9815	0.1	
Acenaftylen	13.8	µg/kg TS		NS 9815	0.1	
Acenaften	12.2	µg/kg TS		NS 9815	0.1	
Fluoren	29.4	µg/kg TS		NS 9815	0.1	
Fenantren	336	µg/kg TS		NS 9815	0.1	
Antracen	45.4	µg/kg TS		NS 9815	0.1	
Fluoranten	547	µg/kg TS		NS 9815	0.1	
Pyren	365	µg/kg TS		NS 9815	0.1	
Benzo(a)antracen	188	µg/kg TS		NS 9815	0.1	
Krysen	184	µg/kg TS		NS 9815	0.1	
Benzo[b]fluoranten	193	µg/kg TS		NS 9815	0.1	
Benzo[k]fluoranten	87.4	µg/kg TS		NS 9815	0.1	
Benzo[a]pyren	161	µg/kg TS		NS 9815	0.1	
Indeno[1,2,3-cd]pyren	155	µg/kg TS		NS 9815	0.1	
Dibenzo[a,h]antracen	29.7	µg/kg TS		NS 9815	0.1	
Benzo[g,h,i]perylen	184	µg/kg TS		NS 9815	0.1	
Sum PAH(16) EPA	2570	µg/kg TS		NS 9815	0.2	
PCB 7						
PCB 101	1.30	µg/kg TS		NS-EN 12766-2	0.1	
PCB 118	1.25	µg/kg TS		NS-EN 12766-2	0.1	
PCB 138	1.60	µg/kg TS		NS-EN 12766-2	0.1	
PCB 153	1.60	µg/kg TS		NS-EN 12766-2	0.1	
PCB 180	0.60	µg/kg TS		NS-EN 12766-2	0.1	
PCB 28	0.60	µg/kg TS		NS-EN 12766-2	0.1	
PCB 52	0.84	µg/kg TS		NS-EN 12766-2	0.1	
Sum 7 PCB	7.80	µg/kg TS		NS-EN 12766-2	1	
a) Totalt organisk karbon (TOC)	27	mg/g tv		EN 13137	0.1	

Tegnforklaring:
* (Ikke omfattet av akkrediteringen)
< :Mindre enn, > :Større enn, nd :Ikke påvist, MPN :Most Probable Number, cfu :Colony Forming Units, MU :Uncertainty of Measurement, LOQ :Kvantifiseringsgrense

Opplysninger om måleusikkerhet fås ved henvendelse til laboratoriet.
 Resultatene gjelder kun for de(n) undersøkte prøven(e).

AR-12-MX-002615-01
EUNOBE-00004498

eurofins

Prøvenr.:	**441-2012-0919-107**	Prøvetakingsdato:	03.09.2012
Prøvetype:	Sedimenter	Prøvetaker:	Oppdragsgiver
Prøvemerking:	Knar N, 134 m, hugg 3	Analysestartdato:	19.09.2012

Analyse	Resultat:	Enhet:	MU	Metode:	LOQ:	Grenseverdi
b) Total tørrstoff	66	%	12%	NS 4764	0.02	
a)* Totalt tørrstoff						
Total tørrstoff	69.8	% (v/v)		EN 14346	0.1	
b) Kadmium (Cd)	0.11	mg/kg TS	20%	NS EN ISO 17294-2	0.01	
b) Bly (Pb)	50	mg/kg TS	20%	NS EN ISO 11885	0.7	
b) Kobber (Cu)	170	mg/kg TS	20%	NS EN ISO 11885	2	
b) Krom (Cr)	11	mg/kg TS	20%	NS EN ISO 11885	0.3	
b) Kvikksølv (Hg)	0.065	mg/kg TS	20%	NS-EN ISO 12846	0.001	
b) Nikkel (Ni)	11	mg/kg TS	40%	NS EN ISO 11885	1	
b) Sink (Zn)	140	mg/kg TS	40%	NS EN ISO 11885	15	
b) Tributyltinn (TBT)	2.8	µg/kg TS	40%	Intern metode	1	
PAH 16						
Naftalen	72.2	µg/kg TS		NS 9815	0.1	
Acenaftylen	33.0	µg/kg TS		NS 9815	0.1	
Acenaften	120	µg/kg TS		NS 9815	0.1	
Fluoren	176	µg/kg TS		NS 9815	0.1	
Fenantren	2350	µg/kg TS		NS 9815	0.1	
Antracen	489	µg/kg TS		NS 9815	0.1	
Fluoranten	2500	µg/kg TS		NS 9815	0.1	
Pyren	2040	µg/kg TS		NS 9815	0.1	
Benzo(a)antracen	967	µg/kg TS		NS 9815	0.1	
Krysen	782	µg/kg TS		NS 9815	0.1	
Benzo[b]fluoranten	718	µg/kg TS		NS 9815	0.1	
Benzo[k]fluoranten	341	µg/kg TS		NS 9815	0.1	
Benzo[a]pyren	850	µg/kg TS		NS 9815	0.1	
Indeno[1,2,3-cd]pyren	480	µg/kg TS		NS 9815	0.1	
Dibenzo[a,h]antracen	95.8	µg/kg TS		NS 9815	0.1	
Benzo[g,h,i]perylen	504	µg/kg TS		NS 9815	0.1	
Sum PAH(16) EPA	12500	µg/kg TS		NS 9815	0.2	
PCB 7						
PCB 101	6.70	µg/kg TS		NS-EN 12766-2	0.1	
PCB 118	1.80	µg/kg TS		NS-EN 12766-2	0.1	
PCB 138	2.00	µg/kg TS		NS-EN 12766-2	0.1	
PCB 153	1.80	µg/kg TS		NS-EN 12766-2	0.1	
PCB 180	0.70	µg/kg TS		NS-EN 12766-2	0.1	
PCB 28	0.80	µg/kg TS		NS-EN 12766-2	0.1	
PCB 52	1.30	µg/kg TS		NS-EN 12766-2	0.1	
Sum 7 PCB	15.4	µg/kg TS		NS-EN 12766-2	1	
a) Totalt organisk karbon (TOC)	52	mg/g tv		EN 13137	0.1	

Tegnforklaring:
* (Ikke omfattet av akkrediteringen)
< :Mindre enn, > :Større enn, nd :Ikke påvist, MPN :Most Probable Number, cfu :Colony Forming Units, MU :Uncertainty of Measurement, LOQ :Kvantifiseringsgrense

Opplysninger om måleusikkerhet fås ved henvendelse til laboratoriet.
 Resultatene gjelder kun for de(n) undersøkte prøven(e).

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Utførende laboratorium/ Underleverandør:

a)* Eurofins Umwelt Ost GmbH (Freiberg), OT Tuttendorf, Gewerbepark "Schwarze Kiefern", D-09633, Halsbrücke
a) DIN EN ISO/IEC 17025:2005 D-PL-14081-01-00, Eurofins Umwelt Ost GmbH (Freiberg), OT Tuttendorf, Gewerbepark "Schwarze Kiefern", D-09633, Halsbrücke
b) NS/EN ISO/IEC 17025:2005 NA TEST 003, Eurofins Environment Testing Norway AS (Moss), Møllebakken 50, NO-1538, Moss

Bergen 15.10.2012

Tommie Christensen
Avd.leder, Kundesenter

Tegnforklaring:
* (Ikke omfattet av akkrediteringen)
< :Mindre enn, > :Større enn, nd :Ikke påvist, MPN :Most Probable Number, cfu :Colony Forming Units, MU :Uncertainty of Measurement, LOQ :Kvantifiseringsgrense

Opplysninger om måleusikkerhet fås ved henvendelse til laboratoriet.

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APPENDIX 2: ENVIRONMENTAL CHEMISTRY IN *FUCUS VESICULOSUS*

Eurofins Environment Testing Norway AS (Bergen)
F. reg. 965 141 618 MVA
Box 75
NO-5841 Bergen

Tlf: +47 94 50 42 42
Fax:

Uni Research AS
HiB, Seksjon for anvendt miljøforskning (SAM)
5006 BERGEN
Attn: Uni Miljø

AR-13-MX-000077-01
EUNOBE-00005170

Prøvemottak: 23.11.2012
Temperatur:
Analyseperiode: 23.11.2012-10.01.2013
Referanse: 806275 / 80/12
Biotaprøver

ANALYSERAPPORT

Tegnforklaring:
* (Ikke omfattet av akkrediteringen
< :Mindre enn, > :Større enn, nd :Ikke påvist, MPN :Most Probable Number, cfu :Colony Forming Units, MU :Uncertainty of Measurement, LOQ :Kvantifiseringsgrense

Opplysninger om måleusikkerhet fås ved henvendelse til laboratoriet.
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EUNOBE-00005170

eurofins

Prøvenr.:	441-2012-1126-042	Prøvetakingsdato:	22.11.2012
Prøvetype:	Tang	Prøvetaker:	Oppdragsgiver
Prøvemerking:	Våg 8L, Hugg 1	Analysestartdato:	23.11.2012

Analyse	Resultat:	Enhet:	MU	Metode:	LOQ:	Grenseverdi
b) Fettinnhold	ND	%		Internal method		
b) PCB ~ 6 ICES						
b) PCB 28	< 0.10	ng/g		Internal method	0.07	
b) PCB 52	< 0.10	ng/g		Internal method	0.07	
b) PCB 101	< 0.10	ng/g		Internal method	0.07	
b) PCB 138	< 0.10	ng/g		Internal method	0.07	
b) PCB 153	< 0.10	ng/g		Internal method	0.07	
b) PCB 180	< 0.10	ng/g		Internal method	0.07	
b)* Tinnorganiske forbindelser (8)						
b)* Monobutyltinn (MBT)	< 0.823	µg/kg		AIR OC 129	1	
b)* Monobutyltinn (MBT) - Sn	< 0.555	µg/kg		AIR OC 129		
b)* Dibutyltinn (DBT)	< 0.823	µg/kg		AIR OC 129	1	
b)* Dibutyltinn-Sn (DBT-Sn)	< 0.419	µg/kg		AIR OC 129		
b)* Tributyltinn (TBT)	< 0.823	µg/kg		AIR OC 129	1	
b)* Tributyltinn (TBT) - Sn	< 0.337	µg/kg		AIR OC 129		
b)* Tetrabutyltinn (TetraBT)	< 0.823	µg/kg		AIR OC 129	1	
b)* Tetrabutyltinn (TTBT) - Sn	< 0.281	µg/kg		AIR OC 129		
b)* Monooktyltinn (MOT)	< 0.823	µg/kg		AIR OC 129	1	
b)* Monooktyltinn (MOT) - Sn	< 0.421	µg/kg		AIR OC 129		
b)* Dioktyltinn (DOT)	< 0.823	µg/kg		AIR OC 129	1	
b)* Dioktyltinn-Sn (DOT-Sn)	< 0.283	µg/kg		AIR OC 129		
b)* Trifenyltinn (TPhT)	< 0.823	µg/kg		AIR OC 129	1	
b)* Trifenyltinn (TPhT) - Sn	< 0.279	µg/kg		AIR OC 129		
b)* Trisykloheksyltinn (TCHT)	< 1.65	µg/kg		AIR OC 129	2	
b)* Trisykloheksyltinn (TCHT) - Sn	< 0.531	µg/kg		AIR OC 129		
c)* Chromium (ICP-MS, food)						
c)* Krom (Cr)	<0.1	mg/kg		EN ISO 17294-2-E29	0.1	
c)* Kadmium (Cd)	0.15	mg/kg		EN 15763:2009	0.01	
b)* knusing/nedmaling av prøver						
b)* homogenized quantity	blank value/Imported			Internal method		
c)* Kobber (Cu)	0.6	mg/kg		EN ISO 11885, mod.	0.1	
c)* Kvikksølv, Hg (ICP-MS)						
c)* Kvikksølv (Hg)	<0.005	mg/kg		EN 15763:2009	0.005	
c)* Lead(ICP-MS, food)						
c)* Bly (Pb)	0.17	mg/kg		EN 15763:2009	0.05	
b) PAH (16)						
b) Acenaften	< 0.47	ng/g		Internal method		
b) Acenaftylen	< 0.242	ng/g		Internal method		
b) Antracen	0.24	ng/g		Internal method		
b) Benz(a)antracen	< 0.22	ng/g		Internal method		
b) Benzo[a]pyren	< 0.10	ng/g		Internal method		
b) Benzo[b/j]fluoranten	< 0.26	ng/g		Internal method		

Tegnforklaring:
* (Ikke omfattet av akkrediteringen
< :Mindre enn, > :Større enn, nd :Ikke påvist, MPN :Most Probable Number, cfu :Colony Forming Units, MU :Uncertainty of Measurement, LOQ :Kvantifiseringsgrense

Opplysninger om måleusikkerhet fås ved henvendelse til laboratoriet.

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b)	Benzo[ghi]perylen	< 0.12	ng/g	Internal method	
b)	Benzo[k]fluoranten	< 0.10	ng/g	Internal method	
b)	Dibenz(a,h)antracen	< 0.10	ng/g	Internal method	
b)	Fenantren	4.94	ng/g	Internal method	
b)	Fluoranten	1.37	ng/g	Internal method	
b)	Fluoren	< 1.29	ng/g	Internal method	
b)	Indeno[1,2,3-cd]pyren	< 0.10	ng/g	Internal method	
b)	Krysen	< 0.16	ng/g	Internal method	
b)	Naftalen	< 84.8	ng/g	Internal method	
b)	Pyren	< 1.68	ng/g	Internal method	
b)	Sum 16 EPA-PAH eksl. LOQ	6.55	ng/g	Internal method	
b)	Sum 16 EPA-PAH inkl. LOQ	96.2	ng/g	Internal method	
b)	**PCB ~ 6 ICES**				
b)	Sum 6 DIN-PCB eksl. LOQ	ND	ng/g	Internal method	0.4
b)	Sum 6 DIN-PCB inkl. LOQ	0.62	ng/g	Internal method	0.4
c)	Prøvepreparering/oppslutting	blank value/Imported		§64 LFGB L 00.00-19/1	
c)*	Sink (Zn)	18	mg/kg	EN ISO 11885, mod.	0.5
a)	Tørrstoff	22.6	%	§64 LFGB L 06.00-3, mod.	0.5

Merknader:
Fett er ikke utført pga for liten prøvemengde.

Tegnforklaring:
* (Ikke omfattet av akkrediteringen
< :Mindre enn, > :Større enn, nd :Ikke påvist, MPN :Most Probable Number, cfu :Colony Forming Units, MU :Uncertainty of Measurement, LOQ :Kvantifiseringsgrense

AR-13-MX-000077-01
EUNOBE-00005170

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Prøvenr.:	441-2012-1126-043	Prøvetakingsdato:	22.11.2012
Prøvetype:	Tang	Prøvetaker:	Oppdragsgiver
Prøvemerking:	Våg 8L, Hugg 2	Analysestartdato:	23.11.2012

Analyse	Resultat:	Enhet:	MU	Metode:	LOQ:	Grenseverdi
b) Fettinnhold	ND	%		Internal method		
b) PCB ~ 6 ICES						
b) PCB 28	< 0.09	ng/g		Internal method	0.07	
b) PCB 52	< 0.09	ng/g		Internal method	0.07	
b) PCB 101	< 0.09	ng/g		Internal method	0.07	
b) PCB 138	< 0.09	ng/g		Internal method	0.07	
b) PCB 153	< 0.09	ng/g		Internal method	0.07	
b) PCB 180	< 0.09	ng/g		Internal method	0.07	
b)* Tinnorganiske forbindelser (8)						
b)* Monobutyltinn (MBT)	< 0.920	µg/kg		AIR OC 129	1	
b)* Monobutyltinn (MBT) - Sn	< 0.621	µg/kg		AIR OC 129		
b)* Dibutyltinn (DBT)	< 0.920	µg/kg		AIR OC 129	1	
b)* Dibutyltinn-Sn (DBT-Sn)	< 0.469	µg/kg		AIR OC 129		
b)* Tributyltinn (TBT)	< 0.920	µg/kg		AIR OC 129	1	
b)* Tributyltinn (TBT) - Sn	< 0.377	µg/kg		AIR OC 129		
b)* Tetrabutyltinn (TetraBT)	< 0.920	µg/kg		AIR OC 129	1	
b)* Tetrabutyltinn (TTBT) - Sn	< 0.315	µg/kg		AIR OC 129		
b)* Monooktyltinn (MOT)	< 0.920	µg/kg		AIR OC 129	1	
b)* Monooktyltinn (MOT) - Sn	< 0.471	µg/kg		AIR OC 129		
b)* Dioktyltinn (DOT)	< 0.920	µg/kg		AIR OC 129	1	
b)* Dioktyltinn-Sn (DOT-Sn)	< 0.317	µg/kg		AIR OC 129		
b)* Trifenyltinn (TPhT)	< 0.920	µg/kg		AIR OC 129	1	
b)* Trifenyltinn (TPhT) - Sn	< 0.312	µg/kg		AIR OC 129		
b)* Trisykloheksyltinn (TCHT)	< 1.84	µg/kg		AIR OC 129	2	
b)* Trisykloheksyltinn (TCHT) - Sn	< 0.594	µg/kg		AIR OC 129		
c)* Chromium (ICP-MS, food)						
c)* Krom (Cr)	<0.1	mg/kg		EN ISO 17294-2-E29	0.1	
c)* Kadmium (Cd)	0.16	mg/kg		EN 15763:2009	0.01	
b)* knusing/nedmaling av prøver						
b)* homogenized quantity	blank value/Imported			Internal method		
c)* Kobber (Cu)	0.6	mg/kg		EN ISO 11885, mod.	0.1	
c)* Kvikksølv, Hg (ICP-MS)						
c)* Kvikksølv (Hg)	<0.005	mg/kg		EN 15763:2009	0.005	
c)* Lead(ICP-MS, food)						
c)* Bly (Pb)	0.15	mg/kg		EN 15763:2009	0.05	
b) PAH (16)						
b) Acenaften	< 0.46	ng/g		Internal method		
b) Acenaftylen	< 0.24	ng/g		Internal method		
b) Antracen	0.24	ng/g		Internal method		
b) Benz(a)antracen	< 0.22	ng/g		Internal method		
b) Benzo[a]pyren	< 0.10	ng/g		Internal method		
b) Benzo[b/j]fluoranten	< 0.26	ng/g		Internal method		

Tegnforklaring:
* (Ikke omfattet av akkrediteringen
< :Mindre enn, > :Større enn, nd :Ikke påvist, MPN :Most Probable Number, cfu :Colony Forming Units, MU :Uncertainty of Measurement, LOQ :Kvantifiseringsgrense

Opplysninger om måleusikkerhet fås ved henvendelse til laboratoriet.
 Resultatene gjelder kun for de(n) undersøkte prøven(e).

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b)	Benzo[ghi]perylen	< 0.12	ng/g	Internal method	
b)	Benzo[k]fluoranten	< 0.10	ng/g	Internal method	
b)	Dibenz(a,h)antracen	< 0.10	ng/g	Internal method	
b)	Fenantren	< 4.34	ng/g	Internal method	
b)	Fluoranten	< 1.09	ng/g	Internal method	
b)	Fluoren	< 1.28	ng/g	Internal method	
b)	Indeno[1,2,3-cd]pyren	< 0.10	ng/g	Internal method	
b)	Krysen	< 0.16	ng/g	Internal method	
b)	Naftalen	< 8.37	ng/g	Internal method	
b)	Pyren	< 1.66	ng/g	Internal method	
b)	Sum 16 EPA-PAH eksl. LOQ	0.24	ng/g	Internal method	
b)	Sum 16 EPA-PAH inkl. LOQ	18.9	ng/g	Internal method	
b)	**PCB ~ 6 ICES**				
b)	Sum 6 DIN-PCB eksl. LOQ	ND	ng/g	Internal method	0.4
b)	Sum 6 DIN-PCB inkl. LOQ	0.54	ng/g	Internal method	0.4
c)	Prøvepreparering/oppslutting	blank value/Imported		§64 LFGB L 00.00-19/1	
c)*	Sink (Zn)	17	mg/kg	EN ISO 11885, mod.	0.5
a)	Tørrstoff	23.6	%	§64 LFGB L 06.00-3, mod.	0.5

Merknader:
Fett er ikke utført pga for liten prøvemengde.

Tegnforklaring:
* (Ikke omfattet av akkrediteringen
< :Mindre enn, > :Større enn, nd :Ikke påvist, MPN :Most Probable Number, cfu :Colony Forming Units, MU :Uncertainty of Measurement, LOQ :Kvantifiseringsgrense

Opplysninger om måleusikkerhet fås ved henvendelse til laboratoriet.
 Resultatene gjelder kun for de(n) undersøkte prøven(e). Side 5 av 25

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EUNOBE-00005170

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Prøvenr.:	441-2012-1126-044	Prøvetakingsdato:	22.11.2012
Prøvetype:	Tang	Prøvetaker:	Oppdragsgiver
Prøvemerking:	Våg 8L, Hugg 3	Analysestartdato:	23.11.2012

Analyse	Resultat:	Enhet:	MU	Metode:	LOQ:	Grenseverdi
b) Fettinnhold	ND	%		Internal method		
b) PCB ~ 6 ICES						
b) PCB 28	< 0.08	ng/g		Internal method	0.07	
b) PCB 52	< 0.08	ng/g		Internal method	0.07	
b) PCB 101	< 0.08	ng/g		Internal method	0.07	
b) PCB 138	< 0.08	ng/g		Internal method	0.07	
b) PCB 153	< 0.08	ng/g		Internal method	0.07	
b) PCB 180	< 0.08	ng/g		Internal method	0.07	
b) Tinnorganiske forbindelser (8)						
b) Dibutyltinn (DBT)	-	µg/kg		Internal method	1	
b)* Tinnorganiske forbindelser (8)						
b)* Monobutyltinn (MBT)	< 0.827	µg/kg		AIR OC 129	1	
b)* Monobutyltinn (MBT) - Sn	< 0.559	µg/kg		AIR OC 129		
b)* Dibutyltinn (DBT)	< 0.827	µg/kg		AIR OC 129	1	
b)* Dibutyltinn-Sn (DBT-Sn)	< 0.422	µg/kg		AIR OC 129		
b)* Tributyltinn (TBT)	< 0.827	µg/kg		AIR OC 129	1	
b)* Tributyltinn (TBT) - Sn	< 0.339	µg/kg		AIR OC 129		
b)* Tetrabutyltinn (TetraBT)	< 0.827	µg/kg		AIR OC 129	1	
b)* Tetrabutyltinn (TTBT) - Sn	< 0.283	µg/kg		AIR OC 129		
b)* Monooktyltinn (MOT)	< 0.827	µg/kg		AIR OC 129	1	
b)* Monooktyltinn (MOT) - Sn	< 0.423	µg/kg		AIR OC 129		
b)* Dioktyltinn (DOT)	< 0.827	µg/kg		AIR OC 129	1	
b)* Dioktyltinn-Sn (DOT-Sn)	< 0.285	µg/kg		AIR OC 129		
b)* Trifenyltinn (TPhT)	< 0.827	µg/kg		AIR OC 129	1	
b)* Trifenyltinn (TPhT) - Sn	< 0.281	µg/kg		AIR OC 129		
b)* Trisykloheksyltinn (TCHT)	< 1.65	µg/kg		AIR OC 129	2	
b)* Trisykloheksyltinn (TCHT) - Sn	< 0.534	µg/kg		AIR OC 129		
c)* Chromium (ICP-MS, food)						
c)* Krom (Cr)	<0.1	mg/kg		EN ISO 17294-2-E29	0.1	
c)* Kadmium (Cd)	0.13	mg/kg		EN 15763:2009	0.01	
b)* knusing/nedmaling av prøver						
b)* homogenized quantity	blank value/Imported			Internal method		
c)* Kobber (Cu)	0.7	mg/kg		EN ISO 11885, mod.	0.1	
c)* Kvikksølv, Hg (ICP-MS)						
c)* Kvikksølv (Hg)	<0.005	mg/kg		EN 15763:2009	0.005	
c)* Lead(ICP-MS, food)						
c)* Bly (Pb)	0.16	mg/kg		EN 15763:2009	0.05	
b) PAH (16)						
b) Acenaften	< 0.47	ng/g		Internal method		
b) Acenaftylen	< 0.24	ng/g		Internal method		
b) Antracen	0.22	ng/g		Internal method		
b) Benz(a)antracen	< 0.22	ng/g		Internal method		

Tegnforklaring:
* (Ikke omfattet av akkrediteringen
< :Mindre enn, > :Større enn, nd :Ikke påvist, MPN :Most Probable Number, cfu :Colony Forming Units, MU :Uncertainty of Measurement, LOQ :Kvantifiseringsgrense

Opplysninger om måleusikkerhet fås ved henvendelse til laboratoriet.

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b)	Benzo[a]pyren	< 0.10	ng/g	Internal method	
b)	Benzo[b/j]fluoranten	< 0.27	ng/g	Internal method	
b)	Benzo[ghi]perylen	< 0.12	ng/g	Internal method	
b)	Benzo[k]fluoranten	< 0.10	ng/g	Internal method	
b)	Dibenz(a,h)antracen	< 0.10	ng/g	Internal method	
b)	Fenantren	5.14	ng/g	Internal method	
b)	Fluoranten	< 1.11	ng/g	Internal method	
b)	Fluoren	< 1.30	ng/g	Internal method	
b)	Indeno[1,2,3-cd]pyren	< 0.10	ng/g	Internal method	
b)	Krysen	< 0.16	ng/g	Internal method	
b)	Naftalen	< 8.52	ng/g	Internal method	
b)	Pyren	< 1.69	ng/g	Internal method	
b)	Sum 16 EPA-PAH eksl. LOQ	5.36	ng/g	Internal method	
b)	Sum 16 EPA-PAH inkl. LOQ	19.9	ng/g	Internal method	
b)	**PCB ~ 6 ICES**				
b)	Sum 6 DIN-PCB eksl. LOQ	ND	ng/g	Internal method	0.4
b)	Sum 6 DIN-PCB inkl. LOQ	0.51	ng/g	Internal method	0.4
c)	Prøvepreparering/oppslutting	blank value/Imported		§64 LFGB L 00.00-19/1	
c)*	Sink (Zn)	18	mg/kg	EN ISO 11885, mod.	0.5
a)	Tørrstoff	22.7	%	§64 LFGB L 06.00-3, mod.	0.5

Merknader:
Fett er ikke utført pga for liten prøvemengde.

Tegnforklaring:
* (Ikke omfattet av akkrediteringen
< :Mindre enn, > :Større enn, nd :Ikke påvist, MPN :Most Probable Number, cfu :Colony Forming Units, MU :Uncertainty of Measurement, LOQ :Kvantifiseringsgrense

Opplysninger om måleusikkerhet fås ved henvendelse til laboratoriet.

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eurofins

Prøvenr.:	441-2012-1126-045	Prøvetakingsdato:	22.11.2012
Prøvetype:	Tang	Prøvetaker:	Oppdragsgiver
Prøvemerking:	Knar NL, Hugg 1	Analysestartdato:	23.11.2012

Analyse	Resultat:	Enhet:	MU	Metode:	LOQ:	Grenseverdi
b) Fettinnhold	ND	%		Internal method		
b) PCB ~ 6 ICES						
b) PCB 28	< 0.1	ng/g		Internal method	0.07	
b) PCB 52	< 0.1	ng/g		Internal method	0.07	
b) PCB 101	< 0.1	ng/g		Internal method	0.07	
b) PCB 138	< 0.1	ng/g		Internal method	0.07	
b) PCB 153	< 0.1	ng/g		Internal method	0.07	
b) PCB 180	< 0.1	ng/g		Internal method	0.07	
b)* Tinnorganiske forbindelser (8)						
b)* Monobutyltinn (MBT)	< 0.840	µg/kg		AIR OC 129	1	
b)* Monobutyltinn (MBT) - Sn	< 0.567	µg/kg		AIR OC 129		
b)* Dibutyltinn (DBT)	< 0.840	µg/kg		AIR OC 129	1	
b)* Dibutyltinn-Sn (DBT-Sn)	< 0.428	µg/kg		AIR OC 129		
b)* Tributyltinn (TBT)	< 0.840	µg/kg		AIR OC 129	1	
b)* Tributyltinn (TBT) - Sn	< 0.344	µg/kg		AIR OC 129		
b)* Tetrabutyltinn (TetraBT)	< 0.840	µg/kg		AIR OC 129	1	
b)* Tetrabutyltinn (TTBT) - Sn	< 0.287	µg/kg		AIR OC 129		
b)* Monooktyltinn (MOT)	< 0.840	µg/kg		AIR OC 129	1	
b)* Monooktyltinn (MOT) - Sn	< 0.430	µg/kg		AIR OC 129		
b)* Dioktyltinn (DOT)	< 0.840	µg/kg		AIR OC 129	1	
b)* Dioktyltinn-Sn (DOT-Sn)	< 0.289	µg/kg		AIR OC 129		
b)* Trifenyltinn (TPhT)	< 0.840	µg/kg		AIR OC 129	1	
b)* Trifenyltinn (TPhT) - Sn	< 0.285	µg/kg		AIR OC 129		
b)* Trisykloheksyltinn (TCHT)	< 1.68	µg/kg		AIR OC 129	2	
b)* Trisykloheksyltinn (TCHT) - Sn	< 0.541	µg/kg		AIR OC 129		
c)* Chromium (ICP-MS, food)						
c)* Krom (Cr)	<0.1	mg/kg		EN ISO 17294-2-E29	0.1	
c)* Kadmium (Cd)	0.19	mg/kg		EN 15763:2009	0.01	
b)* knusing/nedmaling av prøver						
b)* homogenized quantity	blank value/Imported			Internal method		
c)* Kobber (Cu)	1.2	mg/kg		EN ISO 11885, mod.	0.1	
c)* Kvikksølv, Hg (ICP-MS)						
c)* Kvikksølv (Hg)	<0.005	mg/kg		EN 15763:2009	0.005	
c)* Lead(ICP-MS, food)						
c)* Bly (Pb)	0.33	mg/kg		EN 15763:2009	0.05	
b) PAH (16)						
b) Acenaften	< 0.47	ng/g		Internal method		
b) Acenaftylen	< 0.24	ng/g		Internal method		
b) Antracen	0.13	ng/g		Internal method		
b) Benz(a)antracen	< 0.22	ng/g		Internal method		
b) Benzo[a]pyren	< 0.10	ng/g		Internal method		
b) Benzo[b/j]fluoranten	< 0.27	ng/g		Internal method		

Tegnforklaring:
* (Ikke omfattet av akkrediteringen
< :Mindre enn, > :Større enn, nd :Ikke påvist, MPN :Most Probable Number, cfu :Colony Forming Units, MU :Uncertainty of Measurement, LOQ :Kvantifiseringsgrense

Opplysninger om måleusikkerhet fås ved henvendelse til laboratoriet.
 Resultatene gjelder kun for de(n) undersøkte prøven(e).

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b)	Benzo[ghi]perylen	< 0.12	ng/g	Internal method	
b)	Benzo[k]fluoranten	< 0.10	ng/g	Internal method	
b)	Dibenz(a,h)antracen	< 0.10	ng/g	Internal method	
b)	Fenantren	< 4.42	ng/g	Internal method	
b)	Fluoranten	< 1.11	ng/g	Internal method	
b)	Fluoren	< 1.30	ng/g	Internal method	
b)	Indeno[1,2,3-cd]pyren	< 0.10	ng/g	Internal method	
b)	Krysen	< 0.16	ng/g	Internal method	
b)	Naftalen	< 8.52	ng/g	Internal method	
b)	Pyren	< 1.69	ng/g	Internal method	
b)	Sum 16 EPA-PAH eksl. LOQ	0.13	ng/g	Internal method	
b)	Sum 16 EPA-PAH inkl. LOQ	19.1	ng/g	Internal method	
b)	**PCB ~ 6 ICES**				
b)	Sum 6 DIN-PCB eksl. LOQ	ND	ng/g	Internal method	0.4
b)	Sum 6 DIN-PCB inkl. LOQ	0.58	ng/g	Internal method	0.4
c)	Prøvepreparering/oppslutting	blank value/Imported		§64 LFGB L 00.00-19/1	
c)*	Sink (Zn)	27	mg/kg	EN ISO 11885, mod.	0.5
a)	Tørrstoff	17.8	%	§64 LFGB L 06.00-3, mod.	0.5

Merknader:
Fett er ikke utført pga for liten prøvemengde.

Tegnforklaring:
* (Ikke omfattet av akkrediteringen
< :Mindre enn, > :Større enn, nd :Ikke påvist, MPN :Most Probable Number, cfu :Colony Forming Units, MU :Uncertainty of Measurement, LOQ :Kvantifiseringsgrense

Opplysninger om måleusikkerhet fås ved henvendelse til laboratoriet.
Rapporten må ikke gjengis, unntatt i sin helhet, uten laboratoriets skriftlige godkjennelse. Resultatene gjelder kun for de(n) undersøkte prøven(e).

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Prøvenr.:	441-2012-1126-046	Prøvetakingsdato:	22.11.2012
Prøvetype:	Tang	Prøvetaker:	Oppdragsgiver
Prøvemerking:	Knar NL, Hugg 2	Analysestartdato:	23.11.2012

Analyse	Resultat:	Enhet:	MU	Metode:	LOQ:	Grenseverdi
b) Fettinnhold	ND	%		Internal method		
b) PCB ~ 6 ICES						
b) PCB 28	< 0.09	ng/g		Internal method	0.07	
b) PCB 52	< 0.09	ng/g		Internal method	0.07	
b) PCB 101	< 0.09	ng/g		Internal method	0.07	
b) PCB 138	< 0.09	ng/g		Internal method	0.07	
b) PCB 153	< 0.09	ng/g		Internal method	0.07	
b) PCB 180	< 0.09	ng/g		Internal method	0.07	
b)* Tinnorganiske forbindelser (8)						
b)* Monobutyltinn (MBT)	< 0.931	µg/kg		AIR OC 129	1	
b)* Monobutyltinn (MBT) - Sn	< 0.629	µg/kg		AIR OC 129		
b)* Dibutyltinn (DBT)	< 0.931	µg/kg		AIR OC 129	1	
b)* Dibutyltinn-Sn (DBT-Sn)	< 0.475	µg/kg		AIR OC 129		
b)* Tributyltinn (TBT)	< 0.931	µg/kg		AIR OC 129	1	
b)* Tributyltinn (TBT) - Sn	< 0.381	µg/kg		AIR OC 129		
b)* Tetrabutyltinn (TetraBT)	< 0.931	µg/kg		AIR OC 129	1	
b)* Tetrabutyltinn (TTBT) - Sn	< 0.318	µg/kg		AIR OC 129		
b)* Monooktyltinn (MOT)	< 0.931	µg/kg		AIR OC 129	1	
b)* Monooktyltinn (MOT) - Sn	< 0.477	µg/kg		AIR OC 129		
b)* Dioktyltinn (DOT)	< 0.931	µg/kg		AIR OC 129	1	
b)* Dioktyltinn-Sn (DOT-Sn)	< 0.320	µg/kg		AIR OC 129		
b)* Trifenyltinn (TPhT)	< 0.931	µg/kg		AIR OC 129	1	
b)* Trifenyltinn (TPhT) - Sn	< 0.316	µg/kg		AIR OC 129		
b)* Trisykloheksyltinn (TCHT)	< 1.86	µg/kg		AIR OC 129	2	
b)* Trisykloheksyltinn (TCHT) - Sn	< 0.600	µg/kg		AIR OC 129		
c)* Chromium (ICP-MS, food)						
c)* Krom (Cr)	<0.1	mg/kg		EN ISO 17294-2-E29	0.1	
c)* Kadmium (Cd)	0.17	mg/kg		EN 15763:2009	0.01	
b)* knusing/nedmaling av prøver						
b)* homogenized quantity	blank value/Imported			Internal method		
c)* Kobber (Cu)	1	mg/kg		EN ISO 11885, mod.	0.1	
c)* Kvikksølv, Hg (ICP-MS)						
c)* Kvikksølv (Hg)	0.007	mg/kg		EN 15763:2009	0.005	
c)* Lead(ICP-MS, food)						
c)* Bly (Pb)	0.25	mg/kg		EN 15763:2009	0.05	
b) PAH (16)						
b) Acenaften	< 0.5	ng/g		Internal method		
b) Acenaftylen	< 0.2	ng/g		Internal method		
b) Antracen	0.2	ng/g		Internal method		
b) Benz(a)antracen	< 0.23	ng/g		Internal method		
b) Benzo[a]pyren	< 0.10	ng/g		Internal method		
b) Benzo[b/j]fluoranten	< 0.27	ng/g		Internal method		

Tegnforklaring:
* (Ikke omfattet av akkrediteringen
< :Mindre enn, > :Større enn, nd :Ikke påvist, MPN :Most Probable Number, cfu :Colony Forming Units, MU :Uncertainty of Measurement, LOQ :Kvantifiseringsgrense

Opplysninger om måleusikkerhet fås ved henvendelse til laboratoriet.

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b)	Benzo[ghi]perylen	< 0.12	ng/g	Internal method	
b)	Benzo[k]fluoranten	< 0.10	ng/g	Internal method	
b)	Dibenz(a,h)antracen	< 0.10	ng/g	Internal method	
b)	Fenantren	4.5	ng/g	Internal method	
b)	Fluoranten	< 1.1	ng/g	Internal method	
b)	Fluoren	< 1.3	ng/g	Internal method	
b)	Indeno[1,2,3-cd]pyren	< 0.10	ng/g	Internal method	
b)	Krysen	< 0.16	ng/g	Internal method	
b)	Naftalen	< 8.54	ng/g	Internal method	
b)	Pyren	< 1.7	ng/g	Internal method	
b)	Sum 16 EPA-PAH eksl. LOQ	4.67	ng/g	Internal method	
b)	Sum 16 EPA-PAH inkl. LOQ	19.2	ng/g	Internal method	
b)	**PCB ~ 6 ICES**				
b)	Sum 6 DIN-PCB eksl. LOQ	ND	ng/g	Internal method	0.4
b)	Sum 6 DIN-PCB inkl. LOQ	0.52	ng/g	Internal method	0.4
c)	Prøvepreparering/oppslutting	blank value/Imported		§64 LFGB L 00.00-19/1	
c)*	Sink (Zn)	25	mg/kg	EN ISO 11885, mod.	0.5
a)	Tørrstoff	18.8	%	§64 LFGB L 06.00-3, mod.	0.5

Merknader:
Fett er ikke utført pga for liten prøvemengde.

Tegnforklaring:
* (Ikke omfattet av akkrediteringen
< :Mindre enn, > :Større enn, nd :Ikke påvist, MPN :Most Probable Number, cfu :Colony Forming Units, MU :Uncertainty of Measurement, LOQ :Kvantifiseringsgrense

Opplysninger om måleusikkerhet fås ved henvendelse til laboratoriet.

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Prøvenr.:	441-2012-1126-047	Prøvetakingsdato:	22.11.2012
Prøvetype:	Tang	Prøvetaker:	Oppdragsgiver
Prøvemerking:	Knar NL, Hugg 3	Analysestartdato:	23.11.2012

Analyse	Resultat:	Enhet:	MU	Metode:	LOQ:	Grenseverdi
b) Fettinnhold	ND	%		Internal method		
b) PCB ~ 6 ICES						
b) PCB 28	< 0.09	ng/g		Internal method	0.07	
b) PCB 52	< 0.09	ng/g		Internal method	0.07	
b) PCB 101	< 0.09	ng/g		Internal method	0.07	
b) PCB 138	< 0.09	ng/g		Internal method	0.07	
b) PCB 153	< 0.09	ng/g		Internal method	0.07	
b) PCB 180	< 0.09	ng/g		Internal method	0.07	
b)* Tinnorganiske forbindelser (8)						
b)* Monobutyltinn (MBT)	< 0.797	µg/kg		AIR OC 129	1	
b)* Monobutyltinn (MBT) - Sn	< 0.538	µg/kg		AIR OC 129		
b)* Dibutyltinn (DBT)	< 0.797	µg/kg		AIR OC 129	1	
b)* Dibutyltinn-Sn (DBT-Sn)	< 0.406	µg/kg		AIR OC 129		
b)* Tributyltinn (TBT)	< 0.797	µg/kg		AIR OC 129	1	
b)* Tributyltinn (TBT) - Sn	< 0.326	µg/kg		AIR OC 129		
b)* Tetrabutyltinn (TetraBT)	< 0.797	µg/kg		AIR OC 129	1	
b)* Tetrabutyltinn (TTBT) - Sn	< 0.272	µg/kg		AIR OC 129		
b)* Monooktyltinn (MOT)	< 0.797	µg/kg		AIR OC 129	1	
b)* Monooktyltinn (MOT) - Sn	< 0.408	µg/kg		AIR OC 129		
b)* Dioktyltinn (DOT)	< 0.797	µg/kg		AIR OC 129	1	
b)* Dioktyltinn-Sn (DOT-Sn)	< 0.274	µg/kg		AIR OC 129		
b)* Trifenyltinn (TPhT)	< 0.797	µg/kg		AIR OC 129	1	
b)* Trifenyltinn (TPhT) - Sn	< 0.270	µg/kg		AIR OC 129		
b)* Trisykloheksyltinn (TCHT)	< 1.59	µg/kg		AIR OC 129	2	
b)* Trisykloheksyltinn (TCHT) - Sn	< 0.514	µg/kg		AIR OC 129		
c)* Chromium (ICP-MS, food)						
c)* Krom (Cr)	<0.1	mg/kg		EN ISO 17294-2-E29	0.1	
c)* Kadmium (Cd)	0.15	mg/kg		EN 15763:2009	0.01	
b)* knusing/nedmaling av prøver						
b)* homogenized quantity	blank value/Imported			Internal method		
c)* Kobber (Cu)	1	mg/kg		EN ISO 11885, mod.	0.1	
c)* Kvikksølv, Hg (ICP-MS)						
c)* Kvikksølv (Hg)	<0.005	mg/kg		EN 15763:2009	0.005	
c)* Lead(ICP-MS, food)						
c)* Bly (Pb)	0.23	mg/kg		EN 15763:2009	0.05	
b) PAH (16)						
b) Acenaften	< 0.47	ng/g		Internal method		
b) Acenaftylen	< 0.24	ng/g		Internal method		
b) Antracen	0.16	ng/g		Internal method		
b) Benz(a)antracen	< 0.23	ng/g		Internal method		
b) Benzo[a]pyren	< 0.10	ng/g		Internal method		
b) Benzo[b/j]fluoranten	< 0.27	ng/g		Internal method		

Tegnforklaring:
* (Ikke omfattet av akkrediteringen
< :Mindre enn, > :Større enn, nd :Ikke påvist, MPN :Most Probable Number, cfu :Colony Forming Units, MU :Uncertainty of Measurement, LOQ :Kvantifiseringsgrense

Opplysninger om måleusikkerhet fås ved henvendelse til laboratoriet.
 Resultatene gjelder kun for de(n) undersøkte prøven(e).

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b)	Benzo[ghi]perylen	< 0.12	ng/g	Internal method	
b)	Benzo[k]fluoranten	< 0.10	ng/g	Internal method	
b)	Dibenz(a,h)antracen	< 0.10	ng/g	Internal method	
b)	Fenantren	< 4.43	ng/g	Internal method	
b)	Fluoranten	< 1.11	ng/g	Internal method	
b)	Fluoren	< 1.30	ng/g	Internal method	
b)	Indeno[1,2,3-cd]pyren	< 0.10	ng/g	Internal method	
b)	Krysen	< 0.16	ng/g	Internal method	
b)	Naftalen	< 8.54	ng/g	Internal method	
b)	Pyren	< 1.70	ng/g	Internal method	
b)	Sum 16 EPA-PAH eksl. LOQ	0.16	ng/g	Internal method	
b)	Sum 16 EPA-PAH inkl. LOQ	19.1	ng/g	Internal method	
b)	**PCB ~ 6 ICES**				
b)	Sum 6 DIN-PCB eksl. LOQ	ND	ng/g	Internal method	0.4
b)	Sum 6 DIN-PCB inkl. LOQ	0.53	ng/g	Internal method	0.4
c)	Prøvepreparering/oppslutting	blank value/Imported		§64 LFGB L 00.00-19/1	
c)*	Sink (Zn)	27	mg/kg	EN ISO 11885, mod.	0.5
a)	Tørrstoff	18.9	%	§64 LFGB L 06.00-3, mod.	0.5

Merknader:
Fett er ikke utført pga for liten prøvemengde.

Tegnforklaring:
* (Ikke omfattet av akkrediteringen
< :Mindre enn, > :Større enn, nd :Ikke påvist, MPN :Most Probable Number, cfu :Colony Forming Units, MU :Uncertainty of Measurement, LOQ :Kvantifiseringsgrense

Opplysninger om måleusikkerhet fås ved henvendelse til laboratoriet.

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Prøvenr.:	441-2012-1126-048	Prøvetakingsdato:	22.11.2012
Prøvetype:	Tang	Prøvetaker:	Oppdragsgiver
Prøvemerking:	Knar SL, Hugg 1	Analysestartdato:	23.11.2012

Analyse	Resultat:	Enhet:	MU	Metode:	LOQ:	Grenseverdi
b) Fettinnhold	ND	%		Internal method		
b) PCB ~ 6 ICES						
b) PCB 28	< 0.1	ng/g		Internal method	0.07	
b) PCB 52	< 0.1	ng/g		Internal method	0.07	
b) PCB 101	< 0.1	ng/g		Internal method	0.07	
b) PCB 138	< 0.1	ng/g		Internal method	0.07	
b) PCB 153	< 0.1	ng/g		Internal method	0.07	
b) PCB 180	< 0.1	ng/g		Internal method	0.07	
b)* Tinnorganiske forbindelser (8)						
b)* Monobutyltinn (MBT)	< 0.791	µg/kg		AIR OC 129	1	
b)* Monobutyltinn (MBT) - Sn	< 0.534	µg/kg		AIR OC 129		
b)* Dibutyltinn (DBT)	< 0.791	µg/kg		AIR OC 129	1	
b)* Dibutyltinn-Sn (DBT-Sn)	< 0.403	µg/kg		AIR OC 129		
b)* Tributyltinn (TBT)	< 0.791	µg/kg		AIR OC 129	1	
b)* Tributyltinn (TBT) - Sn	< 0.324	µg/kg		AIR OC 129		
b)* Tetrabutyltinn (TetraBT)	< 0.791	µg/kg		AIR OC 129	1	
b)* Tetrabutyltinn (TTBT) - Sn	< 0.270	µg/kg		AIR OC 129		
b)* Monooktyltinn (MOT)	< 0.791	µg/kg		AIR OC 129	1	
b)* Monooktyltinn (MOT) - Sn	< 0.405	µg/kg		AIR OC 129		
b)* Dioktyltinn (DOT)	< 0.791	µg/kg		AIR OC 129	1	
b)* Dioktyltinn-Sn (DOT-Sn)	< 0.272	µg/kg		AIR OC 129		
b)* Trifenyltinn (TPhT)	< 0.791	µg/kg		AIR OC 129	1	
b)* Trifenyltinn (TPhT) - Sn	< 0.268	µg/kg		AIR OC 129		
b)* Trisykloheksyltinn (TCHT)	< 1.58	µg/kg		AIR OC 129	2	
b)* Trisykloheksyltinn (TCHT) - Sn	< 0.510	µg/kg		AIR OC 129		
c)* Chromium (ICP-MS, food)						
c)* Krom (Cr)	<0.1	mg/kg		EN ISO 17294-2-E29	0.1	
c)* Kadmium (Cd)	0.24	mg/kg		EN 15763:2009	0.01	
b)* knusing/nedmaling av prøver						
b)* homogenized quantity	blank value/Imported			Internal method		
c)* Kobber (Cu)	0.8	mg/kg		EN ISO 11885, mod.	0.1	
c)* Kvikksølv, Hg (ICP-MS)						
c)* Kvikksølv (Hg)	<0.005	mg/kg		EN 15763:2009	0.005	
c)* Lead(ICP-MS, food)						
c)* Bly (Pb)	0.15	mg/kg		EN 15763:2009	0.05	
b) PAH (16)						
b) Acenaften	< 0.47	ng/g		Internal method		
b) Acenaftylen	< 0.24	ng/g		Internal method		
b) Antracen	0.15	ng/g		Internal method		
b) Benz(a)antracen	< 0.22	ng/g		Internal method		
b) Benzo[a]pyren	< 0.10	ng/g		Internal method		
b) Benzo[b/j]fluoranten	< 0.27	ng/g		Internal method		

Tegnforklaring:
* (Ikke omfattet av akkrediteringen
< :Mindre enn, > :Større enn, nd :Ikke påvist, MPN :Most Probable Number, cfu :Colony Forming Units, MU :Uncertainty of Measurement, LOQ :Kvantifiseringsgrense

Opplysninger om måleusikkerhet fås ved henvendelse til laboratoriet.
Rapporten må ikke gjengis, unntatt i sin helhet, uten laboratoriets skriftlige godkjennelse. Resultatene gjelder kun for de(n) undersøkte prøven(e).

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b)	Benzo[ghi]perylen	< 0.12	ng/g	Internal method	
b)	Benzo[k]fluoranten	< 0.10	ng/g	Internal method	
b)	Dibenz(a,h)antracen	< 0.10	ng/g	Internal method	
b)	Fenantren	< 4.41	ng/g	Internal method	
b)	Fluoranten	< 1.11	ng/g	Internal method	
b)	Fluoren	< 1.30	ng/g	Internal method	
b)	Indeno[1,2,3-cd]pyren	< 0.10	ng/g	Internal method	
b)	Krysen	< 0.16	ng/g	Internal method	
b)	Naftalen	< 8.49	ng/g	Internal method	
b)	Pyren	< 1.69	ng/g	Internal method	
b)	Sum 16 EPA-PAH eksl. LOQ	0.15	ng/g	Internal method	
b)	Sum 16 EPA-PAH inkl. LOQ	19.0	ng/g	Internal method	
b)	**PCB ~ 6 ICES**				
b)	Sum 6 DIN-PCB eksl. LOQ	ND	ng/g	Internal method	0.4
b)	Sum 6 DIN-PCB inkl. LOQ	0.60	ng/g	Internal method	0.4
c)	Prøvepreparering/oppslutting	blank value/Imported		§64 LFGB L 00.00-19/1	
c)*	Sink (Zn)	28	mg/kg	EN ISO 11885, mod.	0.5
a)	Tørrstoff	20.5	%	§64 LFGB L 06.00-3, mod.	0.5

Merknader:
Fett er ikke utført pga for liten prøvemengde.

Tegnforklaring:
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< :Mindre enn, > :Større enn, nd :Ikke påvist, MPN :Most Probable Number, cfu :Colony Forming Units, MU :Uncertainty of Measurement, LOQ :Kvantifiseringsgrense

Opplysninger om måleusikkerhet fås ved henvendelse til laboratoriet.
Rapporten må ikke gjengis, unntatt i sin helhet, uten laboratoriets skriftlige godkjennelse. Resultatene gjelder kun for de(n) undersøkte prøven(e).

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eurofins

Prøvenr.:	441-2012-1126-049	Prøvetakingsdato:	22.11.2012
Prøvetype:	Tang	Prøvetaker:	Oppdragsgiver
Prøvemerking:	Knar SL, Hugg 2	Analysestartdato:	23.11.2012

Analyse	Resultat:	Enhet:	MU	Metode:	LOQ:	Grenseverdi
b) Fettinnhold	ND	%		Internal method		
b) PCB ~ 6 ICES						
b) PCB 28	< 0.1	ng/g		Internal method	0.07	
b) PCB 52	< 0.1	ng/g		Internal method	0.07	
b) PCB 101	< 0.1	ng/g		Internal method	0.07	
b) PCB 138	< 0.1	ng/g		Internal method	0.07	
b) PCB 153	< 0.1	ng/g		Internal method	0.07	
b) PCB 180	< 0.1	ng/g		Internal method	0.07	
b)* Tinnorganiske forbindelser (8)						
b)* Monobutyltinn (MBT)	< 0.850	µg/kg		AIR OC 129	1	
b)* Monobutyltinn (MBT) - Sn	< 0.574	µg/kg		AIR OC 129		
b)* Dibutyltinn (DBT)	< 0.850	µg/kg		AIR OC 129	1	
b)* Dibutyltinn-Sn (DBT-Sn)	< 0.433	µg/kg		AIR OC 129		
b)* Tributyltinn (TBT)	< 0.850	µg/kg		AIR OC 129	1	
b)* Tributyltinn (TBT) - Sn	< 0.348	µg/kg		AIR OC 129		
b)* Tetrabutyltinn (TetraBT)	< 0.850	µg/kg		AIR OC 129	1	
b)* Tetrabutyltinn (TTBT) - Sn	< 0.290	µg/kg		AIR OC 129		
b)* Monooktyltinn (MOT)	< 0.850	µg/kg		AIR OC 129	1	
b)* Monooktyltinn (MOT) - Sn	< 0.435	µg/kg		AIR OC 129		
b)* Dioktyltinn (DOT)	< 0.850	µg/kg		AIR OC 129	1	
b)* Dioktyltinn-Sn (DOT-Sn)	< 0.292	µg/kg		AIR OC 129		
b)* Trifenyltinn (TPhT)	< 0.850	µg/kg		AIR OC 129	1	
b)* Trifenyltinn (TPhT) - Sn	< 0.288	µg/kg		AIR OC 129		
b)* Trisykloheksyltinn (TCHT)	< 1.70	µg/kg		AIR OC 129	2	
b)* Trisykloheksyltinn (TCHT) - Sn	< 0.548	µg/kg		AIR OC 129		
c)* Chromium (ICP-MS, food)						
c)* Krom (Cr)	<0.1	mg/kg		EN ISO 17294-2-E29	0.1	
c)* Kadmium (Cd)	0.15	mg/kg		EN 15763:2009	0.01	
b)* knusing/nedmaling av prøver						
b)* homogenized quantity	blank value/Imported			Internal method		
c)* Kobber (Cu)	0.7	mg/kg		EN ISO 11885, mod.	0.1	
c)* Kvikksølv, Hg (ICP-MS)						
c)* Kvikksølv (Hg)	<0.005	mg/kg		EN 15763:2009	0.005	
c)* Lead(ICP-MS, food)						
c)* Bly (Pb)	0.13	mg/kg		EN 15763:2009	0.05	
b) PAH (16)						
b) Acenaften	0.44	ng/g		Internal method		
b) Acenaftylen	< 0.14	ng/g		Internal method		
b) Antracen	0.20	ng/g		Internal method		
b) Benz(a)antracen	< 0.16	ng/g		Internal method		
b) Benzo[a]pyren	< 0.10	ng/g		Internal method		
b) Benzo[b/j]fluoranten	< 0.13	ng/g		Internal method		

Tegnforklaring:
* (Ikke omfattet av akkrediteringen
< :Mindre enn, > :Større enn, nd :Ikke påvist, MPN :Most Probable Number, cfu :Colony Forming Units, MU :Uncertainty of Measurement, LOQ :Kvantifiseringsgrense

Opplysninger om måleusikkerhet fås ved henvendelse til laboratoriet.
 Resultatene gjelder kun for de(n) undersøkte prøven(e).

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b)	Benzo[ghi]perylen	< 0.10	ng/g	Internal method	
b)	Benzo[k]fluoranten	< 0.10	ng/g	Internal method	
b)	Dibenz(a,h)antracen	< 0.10	ng/g	Internal method	
b)	Fenantren	5.62	ng/g	Internal method	
b)	Fluoranten	0.84	ng/g	Internal method	
b)	Fluoren	1.42	ng/g	Internal method	
b)	Indeno[1,2,3-cd]pyren	< 0.10	ng/g	Internal method	
b)	Krysen	< 0.10	ng/g	Internal method	
b)	Naftalen	< 7.14	ng/g	Internal method	
b)	Pyren	< 0.61	ng/g	Internal method	
b)	Sum 16 EPA-PAH eksl. LOQ	8.52	ng/g	Internal method	
b)	Sum 16 EPA-PAH inkl. LOQ	17.3	ng/g	Internal method	
b)	**PCB ~ 6 ICES**				
b)	Sum 6 DIN-PCB eksl. LOQ	ND	ng/g	Internal method	0.4
b)	Sum 6 DIN-PCB inkl. LOQ	0.60	ng/g	Internal method	0.4
c)	Prøvepreparering/oppslutting	blank value/Imported		§64 LFGB L 00.00-19/1	
c)*	Sink (Zn)	24	mg/kg	EN ISO 11885, mod.	0.5
a)	Tørrstoff	20.3	%	§64 LFGB L 06.00-3, mod.	0.5

Merknader:
Fett er ikke utført pga for liten prøvemengde.

Tegnforklaring:
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< :Mindre enn, > :Større enn, nd :Ikke påvist, MPN :Most Probable Number, cfu :Colony Forming Units, MU :Uncertainty of Measurement, LOQ :Kvantifiseringsgrense

Opplysninger om måleusikkerhet fås ved henvendelse til laboratoriet.

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eurofins

Prøvenr.:	441-2012-1126-050	Prøvetakingsdato:	22.11.2012
Prøvetype:	Tang	Prøvetaker:	Oppdragsgiver
Prøvemerking:	Knar SL, Hugg 3	Analysestartdato:	23.11.2012

Analyse	Resultat:	Enhet:	MU	Metode:	LOQ:	Grenseverdi
b) Fettinnhold	ND	%		Internal method		
b) PCB ~ 6 ICES						
b) PCB 28	< 0.1	ng/g		Internal method	0.07	
b) PCB 52	< 0.1	ng/g		Internal method	0.07	
b) PCB 101	< 0.1	ng/g		Internal method	0.07	
b) PCB 138	< 0.1	ng/g		Internal method	0.07	
b) PCB 153	< 0.1	ng/g		Internal method	0.07	
b) PCB 180	< 0.1	ng/g		Internal method	0.07	
b)* Tinnorganiske forbindelser (8)						
b)* Monobutyltinn (MBT)	< 0.838	µg/kg		AIR OC 129	1	
b)* Monobutyltinn (MBT) - Sn	< 0.566	µg/kg		AIR OC 129		
b)* Dibutyltinn (DBT)	< 0.838	µg/kg		AIR OC 129	1	
b)* Dibutyltinn-Sn (DBT-Sn)	< 0.427	µg/kg		AIR OC 129		
b)* Tributyltinn (TBT)	< 0.838	µg/kg		AIR OC 129	1	
b)* Tributyltinn (TBT) - Sn	< 0.343	µg/kg		AIR OC 129		
b)* Tetrabutyltinn (TetraBT)	< 0.838	µg/kg		AIR OC 129	1	
b)* Tetrabutyltinn (TTBT) - Sn	< 0.287	µg/kg		AIR OC 129		
b)* Monooktyltinn (MOT)	< 0.838	µg/kg		AIR OC 129	1	
b)* Monooktyltinn (MOT) - Sn	< 0.429	µg/kg		AIR OC 129		
b)* Dioktyltinn (DOT)	< 0.838	µg/kg		AIR OC 129	1	
b)* Dioktyltinn-Sn (DOT-Sn)	< 0.288	µg/kg		AIR OC 129		
b)* Trifenyltinn (TPhT)	< 0.838	µg/kg		AIR OC 129	1	
b)* Trifenyltinn (TPhT) - Sn	< 0.284	µg/kg		AIR OC 129		
b)* Trisykloheksyltinn (TCHT)	< 1.68	µg/kg		AIR OC 129	2	
b)* Trisykloheksyltinn (TCHT) - Sn	< 0.541	µg/kg		AIR OC 129		
c)* Chromium (ICP-MS, food)						
c)* Krom (Cr)	<0.1	mg/kg		EN ISO 17294-2-E29	0.1	
c)* Kadmium (Cd)	0.21	mg/kg		EN 15763:2009	0.01	
b)* knusing/nedmaling av prøver						
b)* homogenized quantity	blank value/Imported			Internal method		
c)* Kobber (Cu)	0.8	mg/kg		EN ISO 11885, mod.	0.1	
c)* Kvikksølv, Hg (ICP-MS)						
c)* Kvikksølv (Hg)	<0.005	mg/kg		EN 15763:2009	0.005	
c)* Lead(ICP-MS, food)						
c)* Bly (Pb)	0.16	mg/kg		EN 15763:2009	0.05	
b) PAH (16)						
b) Acenaften	0.51	ng/g		Internal method		
b) Acenaftylen	0.20	ng/g		Internal method		
b) Antracen	0.22	ng/g		Internal method		
b) Benz(a)antracen	< 0.16	ng/g		Internal method		
b) Benzo[a]pyren	< 0.10	ng/g		Internal method		
b) Benzo[b/j]fluoranten	< 0.13	ng/g		Internal method		

Tegnforklaring:
* (Ikke omfattet av akkrediteringen
< :Mindre enn, > :Større enn, nd :Ikke påvist, MPN :Most Probable Number, cfu :Colony Forming Units, MU :Uncertainty of Measurement, LOQ :Kvantifiseringsgrense

Opplysninger om måleusikkerhet fås ved henvendelse til laboratoriet.
Rapporten må ikke gjengis, unntatt i sin helhet, uten laboratoriets skriftlige godkjennelse. Resultatene gjelder kun for de(n) undersøkte prøven(e). Side 18 av 25

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b)	Benzo[ghi]perylen	< 0.10	ng/g	Internal method	
b)	Benzo[k]fluoranten	< 0.10	ng/g	Internal method	
b)	Dibenz(a,h)antracen	< 0.10	ng/g	Internal method	
b)	Fenantren	4.69	ng/g	Internal method	
b)	Fluoranten	< 0.52	ng/g	Internal method	
b)	Fluoren	1.39	ng/g	Internal method	
b)	Indeno[1,2,3-cd]pyren	< 0.10	ng/g	Internal method	
b)	Krysen	< 0.10	ng/g	Internal method	
b)	Naftalen	< 7.19	ng/g	Internal method	
b)	Pyren	< 0.61	ng/g	Internal method	
b)	Sum 16 EPA-PAH eksl. LOQ	7.01	ng/g	Internal method	
b)	Sum 16 EPA-PAH inkl. LOQ	16.2	ng/g	Internal method	
b)	**PCB ~ 6 ICES**				
b)	Sum 6 DIN-PCB eksl. LOQ	ND	ng/g	Internal method	0.4
b)	Sum 6 DIN-PCB inkl. LOQ	0.59	ng/g	Internal method	0.4
c)	Prøvepreparering/oppslutting	blank value/Imported		§64 LFGB L 00.00-19/1	
c)*	Sink (Zn)	32	mg/kg	EN ISO 11885, mod.	0.5
a)	Tørrstoff	20.7	%	§64 LFGB L 06.00-3, mod.	0.5

Merknader:
Fett er ikke utført pga for liten prøvemengde.

Tegnforklaring:
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< :Mindre enn, > :Større enn, nd :Ikke påvist, MPN :Most Probable Number, cfu :Colony Forming Units, MU :Uncertainty of Measurement, LOQ :Kvantifiseringsgrense

Opplysninger om måleusikkerhet fås ved henvendelse til laboratoriet.
 Resultatene gjelder kun for de(n) undersøkte prøven(e).

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eurofins

Prøvenr.:	441-2012-1126-051	Prøvetakingsdato:	22.11.2012
Prøvetype:	Tang	Prøvetaker:	Oppdragsgiver
Prøvemerking:	Basv L, Hugg 1	Analysestartdato:	23.11.2012

Analyse	Resultat:	Enhet:	MU	Metode:	LOQ:	Grenseverdi
b) Fettinnhold	ND	%		Internal method		
b) PCB ~ 6 ICES						
b) PCB 28	< 0.08	ng/g		Internal method	0.07	
b) PCB 52	< 0.08	ng/g		Internal method	0.07	
b) PCB 101	< 0.08	ng/g		Internal method	0.07	
b) PCB 138	< 0.08	ng/g		Internal method	0.07	
b) PCB 153	< 0.08	ng/g		Internal method	0.07	
b) PCB 180	< 0.08	ng/g		Internal method	0.07	
b)* Tinnorganiske forbindelser (8)						
b)* Monobutyltinn (MBT)	< 0.829	µg/kg		AIR OC 129	1	
b)* Monobutyltinn (MBT) - Sn	< 0.560	µg/kg		AIR OC 129		
b)* Dibutyltinn (DBT)	< 0.829	µg/kg		AIR OC 129	1	
b)* Dibutyltinn-Sn (DBT-Sn)	< 0.423	µg/kg		AIR OC 129		
b)* Tributyltinn (TBT)	< 0.829	µg/kg		AIR OC 129	1	
b)* Tributyltinn (TBT) - Sn	< 0.339	µg/kg		AIR OC 129		
b)* Tetrabutyltinn (TetraBT)	< 0.829	µg/kg		AIR OC 129	1	
b)* Tetrabutyltinn (TTBT) - Sn	< 0.283	µg/kg		AIR OC 129		
b)* Monooktyltinn (MOT)	< 0.829	µg/kg		AIR OC 129	1	
b)* Monooktyltinn (MOT) - Sn	< 0.424	µg/kg		AIR OC 129		
b)* Dioktyltinn (DOT)	< 0.829	µg/kg		AIR OC 129	1	
b)* Dioktyltinn-Sn (DOT-Sn)	< 0.285	µg/kg		AIR OC 129		
b)* Trifenyltinn (TPhT)	< 0.829	µg/kg		AIR OC 129	1	
b)* Trifenyltinn (TPhT) - Sn	< 0.281	µg/kg		AIR OC 129		
b)* Trisykloheksyltinn (TCHT)	< 1.66	µg/kg		AIR OC 129	2	
b)* Trisykloheksyltinn (TCHT) - Sn	< 0.535	µg/kg		AIR OC 129		
c)* Chromium (ICP-MS, food)						
c)* Krom (Cr)	<0.1	mg/kg		EN ISO 17294-2-E29	0.1	
c)* Kadmium (Cd)	0.11	mg/kg		EN 15763:2009	0.01	
b)* knusing/nedmaling av prøver						
b)* homogenized quantity	blank value/Imported			Internal method		
c)* Kobber (Cu)	0.5	mg/kg		EN ISO 11885, mod.	0.1	
c)* Kvikksølv, Hg (ICP-MS)						
c)* Kvikksølv (Hg)	<0.005	mg/kg		EN 15763:2009	0.005	
c)* Lead(ICP-MS, food)						
c)* Bly (Pb)	0.46	mg/kg		EN 15763:2009	0.05	
b) PAH (16)						
b) Acenaften	< 0.38	ng/g		Internal method		
b) Acenaftylen	< 0.14	ng/g		Internal method		
b) Antracen	0.17	ng/g		Internal method		
b) Benz(a)antracen	< 0.16	ng/g		Internal method		
b) Benzo[a]pyren	< 0.10	ng/g		Internal method		
b) Benzo[b/j]fluoranten	0.21	ng/g		Internal method		

Tegnforklaring:
* (Ikke omfattet av akkrediteringen
< :Mindre enn, > :Større enn, nd :Ikke påvist, MPN :Most Probable Number, cfu :Colony Forming Units, MU :Uncertainty of Measurement, LOQ :Kvantifiseringsgrense

Opplysninger om måleusikkerhet fås ved henvendelse til laboratoriet.
 Resultatene gjelder kun for de(n) undersøkte prøven(e).

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b)	Benzo[ghi]perylen	< 0.10	ng/g	Internal method		
b)	Benzo[k]fluoranten	< 0.10	ng/g	Internal method		
b)	Dibenz(a,h)antracen	< 0.10	ng/g	Internal method		
b)	Fenantren	4.16	ng/g	Internal method		
b)	Fluoranten	1.11	ng/g	Internal method		
b)	Fluoren	1.04	ng/g	Internal method		
b)	Indeno[1,2,3-cd]pyren	< 0.10	ng/g	Internal method		
b)	Krysen	0.14	ng/g	Internal method		
b)	Naftalen	< 7.07	ng/g	Internal method		
b)	Pyren	< 0.60	ng/g	Internal method		
b)	Sum 16 EPA-PAH eksl. LOQ	6.82	ng/g	Internal method		
b)	Sum 16 EPA-PAH inkl. LOQ	15.7	ng/g	Internal method		
b)	**PCB ~ 6 ICES**					
b)	Sum 6 DIN-PCB eksl. LOQ	ND	ng/g	Internal method	0.4	
b)	Sum 6 DIN-PCB inkl. LOQ	0.47	ng/g	Internal method	0.4	
c)	Prøvepreparering/oppslutting	blank value/Imported		§64 LFGB L 00.00-19/1		
c)*	Sink (Zn)	20	mg/kg	EN ISO 11885, mod.	0.5	
a)	Tørrstoff	23.8	%	§64 LFGB L 06.00-3, mod.	0.5	

Merknader:
Fett er ikke utført pga for liten prøvemengde.

Tegnforklaring:
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< :Mindre enn, > :Større enn, nd :Ikke påvist, MPN :Most Probable Number, cfu :Colony Forming Units, MU :Uncertainty of Measurement, LOQ :Kvantifiseringsgrense

Opplysninger om måleusikkerhet fås ved henvendelse til laboratoriet.
 Resultatene gjelder kun for de(n) undersøkte prøven(e).

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eurofins

Prøvenr.:	441-2012-1126-052	Prøvetakingsdato:	22.11.2012
Prøvetype:	Tang	Prøvetaker:	Oppdragsgiver
Prøvemerking:	Basv L, Hugg 2	Analysestartdato:	23.11.2012

Analyse	Resultat:	Enhet:	MU	Metode:	LOQ:	Grenseverdi
b) Fettinnhold	ND	%		Internal method		
b) PCB ~ 6 ICES						
b) PCB 28	< 0.08	ng/g		Internal method	0.07	
b) PCB 52	< 0.08	ng/g		Internal method	0.07	
b) PCB 101	< 0.08	ng/g		Internal method	0.07	
b) PCB 138	< 0.08	ng/g		Internal method	0.07	
b) PCB 153	< 0.08	ng/g		Internal method	0.07	
b) PCB 180	< 0.08	ng/g		Internal method	0.07	
b)* Tinnorganiske forbindelser (8)						
b)* Monobutyltinn (MBT)	< 0.724	µg/kg		AIR OC 129	1	
b)* Monobutyltinn (MBT) - Sn	< 0.489	µg/kg		AIR OC 129		
b)* Dibutyltinn (DBT)	< 0.724	µg/kg		AIR OC 129	1	
b)* Dibutyltinn-Sn (DBT-Sn)	< 0.369	µg/kg		AIR OC 129		
b)* Tributyltinn (TBT)	< 0.724	µg/kg		AIR OC 129	1	
b)* Tributyltinn (TBT) - Sn	< 0.296	µg/kg		AIR OC 129		
b)* Tetrabutyltinn (TetraBT)	< 0.724	µg/kg		AIR OC 129	1	
b)* Tetrabutyltinn (TTBT) - Sn	< 0.248	µg/kg		AIR OC 129		
b)* Monooktyltinn (MOT)	< 0.724	µg/kg		AIR OC 129	1	
b)* Monooktyltinn (MOT) - Sn	< 0.370	µg/kg		AIR OC 129		
b)* Dioktyltinn (DOT)	< 0.724	µg/kg		AIR OC 129	1	
b)* Dioktyltinn-Sn (DOT-Sn)	< 0.249	µg/kg		AIR OC 129		
b)* Trifenyltinn (TPhT)	< 0.724	µg/kg		AIR OC 129	1	
b)* Trifenyltinn (TPhT) - Sn	< 0.245	µg/kg		AIR OC 129		
b)* Trisykloheksyltinn (TCHT)	< 1.45	µg/kg		AIR OC 129	2	
b)* Trisykloheksyltinn (TCHT) - Sn	< 0.467	µg/kg		AIR OC 129		
c)* Chromium (ICP-MS, food)						
c)* Krom (Cr)	<0.1	mg/kg		EN ISO 17294-2-E29	0.1	
c)* Kadmium (Cd)	0.19	mg/kg		EN 15763:2009	0.01	
b)* knusing/nedmaling av prøver						
b)* homogenized quantity	blank value/Imported			Internal method		
c)* Kobber (Cu)	0.9	mg/kg		EN ISO 11885, mod.	0.1	
c)* Kvikksølv, Hg (ICP-MS)						
c)* Kvikksølv (Hg)	0.006	mg/kg		EN 15763:2009	0.005	
c)* Lead(ICP-MS, food)						
c)* Bly (Pb)	0.84	mg/kg		EN 15763:2009	0.05	
b) PAH (16)						
b) Acenaften	1.43	ng/g		Internal method		
b) Acenaftylen	0.17	ng/g		Internal method		
b) Antracen	0.42	ng/g		Internal method		
b) Benz(a)antracen	< 0.16	ng/g		Internal method		
b) Benzo[a]pyren	< 0.10	ng/g		Internal method		
b) Benzo[b/j]fluoranten	0.15	ng/g		Internal method		

Tegnforklaring:
* (Ikke omfattet av akkrediteringen
< :Mindre enn, > :Større enn, nd :Ikke påvist, MPN :Most Probable Number, cfu :Colony Forming Units, MU :Uncertainty of Measurement, LOQ :Kvantifiseringsgrense

Opplysninger om måleusikkerhet fås ved henvendelse til laboratoriet.

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b)	Benzo[ghi]perylen	< 0.10	ng/g	Internal method	
b)	Benzo[k]fluoranten	< 0.10	ng/g	Internal method	
b)	Dibenz(a,h)antracen	< 0.10	ng/g	Internal method	
b)	Fenantren	7.62	ng/g	Internal method	
b)	Fluoranten	1.48	ng/g	Internal method	
b)	Fluoren	2.99	ng/g	Internal method	
b)	Indeno[1,2,3-cd]pyren	< 0.10	ng/g	Internal method	
b)	Krysen	0.12	ng/g	Internal method	
b)	Naftalen	< 7.17	ng/g	Internal method	
b)	Pyren	0.74	ng/g	Internal method	
b)	Sum 16 EPA-PAH eksl. LOQ	15.1	ng/g	Internal method	
b)	Sum 16 EPA-PAH inkl. LOQ	22.9	ng/g	Internal method	
b)	**PCB ~ 6 ICES**				
b)	Sum 6 DIN-PCB eksl. LOQ	ND	ng/g	Internal method	0.4
b)	Sum 6 DIN-PCB inkl. LOQ	0.48	ng/g	Internal method	0.4
c)	Prøvepreparering/oppslutting	blank value/Imported		§64 LFGB L 00.00-19/1	
c)*	Sink (Zn)	34	mg/kg	EN ISO 11885, mod.	0.5
a)	Tørrstoff	21.9	%	§64 LFGB L 06.00-3, mod.	0.5

Merknader:
Fett er ikke utført pga for liten prøvemengde.

Tegnforklaring:
* (Ikke omfattet av akkrediteringen
< :Mindre enn, > :Større enn, nd :Ikke påvist, MPN :Most Probable Number, cfu :Colony Forming Units, MU :Uncertainty of Measurement, LOQ :Kvantifiseringsgrense

Opplysninger om måleusikkerhet fås ved henvendelse til laboratoriet.
 Resultatene gjelder kun for de(n) undersøkte prøven(e).

AR-13-MX-000077-01
EUNOBE-00005170

eurofins

Prøvenr.:	441-2012-1126-053	Prøvetakingsdato:	22.11.2012
Prøvetype:	Tang	Prøvetaker:	Oppdragsgiver
Prøvemerking:	Basv L, Hugg 3	Analysestartdato:	23.11.2012

Analyse	Resultat:	Enhet:	MU	Metode:	LOQ:	Grenseverdi
b) Fettinnhold	ND	%		Internal method		
b) PCB ~ 6 ICES						
b) PCB 28	< 0.1	ng/g		Internal method	0.07	
b) PCB 52	< 0.1	ng/g		Internal method	0.07	
b) PCB 101	< 0.1	ng/g		Internal method	0.07	
b) PCB 138	< 0.1	ng/g		Internal method	0.07	
b) PCB 153	< 0.1	ng/g		Internal method	0.07	
b) PCB 180	< 0.1	ng/g		Internal method	0.07	
b)* Tinnorganiske forbindelser (8)						
b)* Monobutyltinn (MBT)	< 0.782	µg/kg		AIR OC 129	1	
b)* Monobutyltinn (MBT) - Sn	< 0.528	µg/kg		AIR OC 129		
b)* Dibutyltinn (DBT)	< 0.782	µg/kg		AIR OC 129	1	
b)* Dibutyltinn-Sn (DBT-Sn)	< 0.399	µg/kg		AIR OC 129		
b)* Tributyltinn (TBT)	< 0.782	µg/kg		AIR OC 129	1	
b)* Tributyltinn (TBT) - Sn	< 0.320	µg/kg		AIR OC 129		
b)* Tetrabutyltinn (TetraBT)	< 0.782	µg/kg		AIR OC 129	1	
b)* Tetrabutyltinn (TTBT) - Sn	< 0.267	µg/kg		AIR OC 129		
b)* Monooktyltinn (MOT)	< 0.782	µg/kg		AIR OC 129	1	
b)* Monooktyltinn (MOT) - Sn	< 0.400	µg/kg		AIR OC 129		
b)* Dioktyltinn (DOT)	< 0.782	µg/kg		AIR OC 129	1	
b)* Dioktyltinn-Sn (DOT-Sn)	< 0.269	µg/kg		AIR OC 129		
b)* Trifenyltinn (TPhT)	< 0.782	µg/kg		AIR OC 129	1	
b)* Trifenyltinn (TPhT) - Sn	< 0.265	µg/kg		AIR OC 129		
b)* Trisykloheksyltinn (TCHT)	< 1.56	µg/kg		AIR OC 129	2	
b)* Trisykloheksyltinn (TCHT) - Sn	< 0.504	µg/kg		AIR OC 129		
c)* Chromium (ICP-MS, food)						
c)* Krom (Cr)	<0.1	mg/kg		EN ISO 17294-2-E29	0.1	
c)* Kadmium (Cd)	0.14	mg/kg		EN 15763:2009	0.01	
b)* knusing/nedmaling av prøver						
b)* homogenized quantity	blank value/Imported			Internal method		
c)* Kobber (Cu)	0.7	mg/kg		EN ISO 11885, mod.	0.1	
c)* Kvikksølv, Hg (ICP-MS)						
c)* Kvikksølv (Hg)	0.005	mg/kg		EN 15763:2009	0.005	
c)* Lead(ICP-MS, food)						
c)* Bly (Pb)	0.79	mg/kg		EN 15763:2009	0.05	
b) PAH (16)						
b) Acenaften	1.04	ng/g		Internal method		
b) Acenaftylen	0.16	ng/g		Internal method		
b) Antracen	0.27	ng/g		Internal method		
b) Benz(a)antracen	< 0.16	ng/g		Internal method		
b) Benzo[a]pyren	< 0.10	ng/g		Internal method		
b) Benzo[b/j]fluoranten	0.23	ng/g		Internal method		

Tegnforklaring:
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Opplysninger om måleusikkerhet fås ved henvendelse til laboratoriet.
 Resultatene gjelder kun for de(n) undersøkte prøven(e).

AR-13-MX-000077-01
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b)	Benzo[ghi]perylen	< 0.10	ng/g	Internal method	
b)	Benzo[k]fluoranten	< 0.10	ng/g	Internal method	
b)	Dibenz(a,h)antracen	< 0.10	ng/g	Internal method	
b)	Fenantren	5.05	ng/g	Internal method	
b)	Fluoranten	1.43	ng/g	Internal method	
b)	Fluoren	1.95	ng/g	Internal method	
b)	Indeno[1,2,3-cd]pyren	< 0.10	ng/g	Internal method	
b)	Krysen	0.17	ng/g	Internal method	
b)	Naftalen	< 7.18	ng/g	Internal method	
b)	Pyren	< 0.61	ng/g	Internal method	
b)	Sum 16 EPA-PAH eksl. LOQ	10.3	ng/g	Internal method	
b)	Sum 16 EPA-PAH inkl. LOQ	18.7	ng/g	Internal method	
b)	**PCB ~ 6 ICES**				
b)	Sum 6 DIN-PCB eksl. LOQ	ND	ng/g	Internal method	0.4
b)	Sum 6 DIN-PCB inkl. LOQ	0.57	ng/g	Internal method	0.4
c)	Prøvepreparering/oppslutting	blank value/Imported		§64 LFGB L 00.00-19/1	
c)*	Sink (Zn)	26	mg/kg	EN ISO 11885, mod.	0.5
a)	Tørrstoff	17.5	%	§64 LFGB L 06.00-3, mod.	0.5

Merknader:
Fett er ikke utført pga for liten prøvemengde.

Utførende laboratorium/ Underleverandør:
a) DIN EN ISO/IEC 17025:2005 D-PL-14251-01-00, Eurofins Analytik GmbH, Wiertz-Eggert-Jörissen, Neuländer Kamp 1, D-21079, Hamburg
b)* Eurofins GfA Lab Service Gmbh (Hamburg), Neuländer Kamp 1, D-21079, Hamburg
b) DIN EN ISO/IEC 17025:2005 D-PL-14629-01-00, Eurofins GfA Lab Service Gmbh (Hamburg), Neuländer Kamp 1, D-21079, Hamburg
c)* Eurofins WEJ Contaminants GmbH (Hamburg), Neuländer Kamp 1, D-21079, Hamburg
c) DIN EN ISO/IEC 17025:2005 D-PL-14602-01-00, Eurofins WEJ Contaminants GmbH (Hamburg), Neuländer Kamp 1, D-21079, Hamburg

Bergen 10.01.2013

Tommie Christensen
Avd.leder, Kundesenter

Tegnforklaring:
* (Ikke omfattet av akkrediteringen
< :Mindre enn, > :Større enn, nd :Ikke påvist, MPN :Most Probable Number, cfu :Colony Forming Units, MU :Uncertainty of Measurement, LOQ :Kvantifiseringsgrense

Opplysninger om måleusikkerhet fås ved henvendelse til laboratoriet.
Rapporten må ikke gjengis, unntatt i sin helhet, uten laboratoriets skriftlige godkjennelse. Resultatene gjelder kun for de(n) undersøkte prøven(e).

APPENDIX 3. CTD MEASUREMENTS

St. Våg 8 (2012)

Dyp (m)	Sal. ‰				Temp (° C)				O_2 %				O_2 mg/l				F (µg/l)				Tetthet (σt)			
	apr	jun	sep	okt	apr	jun	sep	okt	apr	jun	sep	okt	apr	jun	sep	okt	apr	jun	sep	okt	apr	jun	sep	okt
1	31,4	29,9	30,0	28,7	8,5	12,5	13,4	9,7	93,5	101,5	85,0	161,2	8,0	8,1	6,7	13,8	1,3	0,4	2,3	4,3	24,4	22,5	22,4	22,1
2	31,8	29,8	30,0	28,6	8,4	12,4	13,4	10,1	96,8	101,6	84,6	162,7	8,2	8,1	6,6	13,8	1,7	0,4	2,6	4,7	24,7	22,5	22,4	21,9
5	33,1	29,9	30,0	29,1	8,2	12,4	13,4	10,2	97,2	102,6	84,9	163,0	8,2	8,2	6,7	13,7	1,5	0,9	2,5	4,0	25,7	22,6	22,5	22,3
10	33,6	30,6	30,1	29,6	8,2	11,9	13,4	10,5	95,6	105,9	84,8	164,0	8,1	8,5	6,6	13,7	1,3	1,5	2,4	3,4	26,2	23,3	22,5	22,7
15	33,7	31,4	30,1	31,0	8,2	11,4	13,4	11,3	92,8	109,5	83,7	161,5	7,8	8,8	6,6	13,1	1,3	1,7	2,6	1,1	26,3	23,9	22,6	23,6
20	33,9	31,8	30,2	31,4	8,3	11,1	13,4	11,7	90,8	110,4	84,1	148,3	7,6	8,9	6,6	11,9	0,9	1,5	1,4	0,7	26,5	24,3	22,7	24,0
50	34,4	34,3	33,6	33,0	8,2	8,7	9,5	12,1	83,0	92,2	77,0	144,6	7,0	7,8	6,4	11,4	0,4	0,3	0,1	0,1	27,0	26,8	26,2	25,2
80	34,7	34,9	34,5	34,3	8,1	8,0	8,4	9,2	81,8	86,8	77,7	131,1	6,9	7,4	6,6	10,9	0,2	0,1	0,1	0,1	27,4	27,6	27,2	26,9
90		34,9				8,0				87,4				7,5				0,1				27,6		

Våg 8
19.06.2012

Dyp	Sal.	Temp	Ox %	mg/l	F (µg/l)	Density
1	25,2	12,7	88,4	7,3	0,3	18,9
2	27,1	12,2	90,3	7,5	0,4	20,4
5	30,1	11,6	108,4	8,9	0,5	22,9
10	32,6	9,9	117,9	9,9	2,0	25,2
15	33,3	9,2	115,2	9,8	1,7	25,9
20	33,7	8,9	108,7	9,3	1,4	26,2

Våg 8
03.07.2012

Dyp	Sal.	Temp	Ox %	mg/l	F (µg/l)	Density
1	31,1	12,4	94,3	8,3	1,6	23,5
2	31,6	12,3	97,5	8,6	2,0	23,9
5	32,0	12,1	102,0	9,0	2,1	24,3
10	32,2	11,6	102,4	9,1	1,7	24,5
15	32,2	11,6	102,6	9,1	1,8	24,6
20	32,4	11,3	102,3	9,1	1,3	24,7

Våg 8
10.07.2012

Depth(u)	Sal.	Temp	Ox %	mg/l	F (µg/l)	Density
1	24,8	16,0	109,7	8,3	1,3	17,9
2	25,6	15,6	108,9	8,3	1,6	18,6
5	29,8	13,7	103,9	8,0	1,6	22,2
10	30,6	13,2	99,8	7,7	1,9	23,0
15	30,8	13,1	99,8	7,7	1,6	23,2
20	31,7	12,2	96,5	7,6	1,4	24,1

Våg 8
31.07.2012

Dyp	Sal.	Temp	Ox %	mg/l	F (µg/l)	Density
1	25,9	14,8	370,4	29,0	1,0	19,0
2	26,8	14,7	370,4	28,9	0,9	19,7
5	29,0	14,3	370,4	28,8	1,6	21,5
10	30,0	13,4	370,4	29,1	1,6	22,5
15	30,3	13,2	335,0	26,4	1,9	22,8
20	30,6	12,9	328,7	26,0	1,3	23,1

Våg 8
11.09.2012

Dyp	Sal.	Temp	Ox %	mg/l	F (µg/l)	Density
1	27,8	13,3	111,6	8,8	2,4	20,8
2	28,0	13,3	108,8	8,6	1,9	20,9
5	29,3	13,4	106,8	8,3	2,2	21,9
10	30,1	13,2	108,7	8,5	1,0	22,6
15	30,2	13,2	107,5	8,4	0,6	22,7
20	30,5	13,0	107,3	8,4	0,4	23,0

St. Basv (2012)

Dyp (m)	Sal. ‰				Temp (° C)				O_2 %				O_2 mg/l				F (µg/l)				Tetthet (σt)			
	apr	jun	sep	okt	apr	jun	sep	okt	apr	jun	sep	okt	apr	jun	sep	okt	apr	jun	sep	okt	apr	jun	sep	okt
1	29,7	30,0	29,9	28,8	8,5	12,3	13,3	10,1	104,8	101,1	69,9	188,2	8,9	8,1	5,5	15,9	0,9	0,4	2,7	3,8	23,0	22,6	22,4	22,1
2	30,2	30,0	29,9	28,8	8,4	12,3	13,4	10,1	104,6	100,9	85,8	168,4	8,8	8,1	6,7	14,2	1,3	0,5	2,9	4,7	23,4	22,7	22,3	22,1
5	33,2	30,2	29,9	29,2	8,1	12,1	13,4	10,3	99,5	101,6	85,2	166,2	8,3	8,2	6,7	13,9	1,5	0,9	2,9	4,3	25,8	22,8	22,4	22,4
10	33,5	30,7	30,0	29,9	8,2	11,8	13,4	10,8	96,4	104,8	85,2	169,9	8,0	8,5	6,7	14,0	1,4	1,4	2,8	3,3	26,1	23,3	22,5	22,9
15	34,0	31,5	30,1	30,4	8,3	11,1	13,4	11,1	92,4	106,1	85,0	170,7	7,6	8,6	6,7	14,0	0,7	1,0	2,7	2,2	26,5	24,1	22,6	23,3
20	34,1	31,7	30,4	31,3	8,3	11,0	13,3	11,4	89,1	105,9	84,5	171,8	7,4	8,6	6,6	13,9	0,8	1,0	1,5	0,9	26,6	24,3	22,9	23,9
50	34,4	34,3	33,7	33,2	8,2	8,7	9,3	11,7	84,6	92,9	76,0	185,2	7,0	7,9	6,4	14,7	0,4	0,3	0,1	0,1	27,0	26,8	26,3	25,5
100	34,8	34,9	34,8	34,6	8,1	8,0	8,1	8,5	81,8	86,3	77,5	130,0	6,8	7,4	6,6	11,0	0,3	0,1	0,1	0,1	27,6	27,7	27,6	27,3
125	34,9	34,9	34,9	34,8	8,1	8,0	8,0	8,3	82,9	88,3	77,9	127,1	6,8	7,6	6,7	10,8	0,2	0,1	0,1	0,1	27,8	27,8	27,8	27,6
150		35,0				8,0				88,4				7,6				0,1				27,9		

19.06.2012						
Dyp	Sal.	Temp	Ox %	mg/l	F (µg/l)	Density
1	21,6	12,8	89,9	7,6	0,7	16,0
2	27,7	12,0	91,7	7,6	0,7	20,9
5	30,3	11,4	110,2	9,1	0,7	23,0
10	32,9	9,6	115,0	9,7	1,9	25,4
15	33,6	9,0	111,9	9,5	1,7	26,1
20	33,9	8,7	104,1	8,9	1,2	26,4

03.07.2012						
Sdyp	Sal.	Temp	Ox %	mg/l	F (µg/l)	Density
1	31,6	12,2	96,1	8,4	0,8	23,9
2	31,7	12,1	98,3	8,6	1,0	24,0
5	32,0	12,2	100,5	8,8	1,9	24,2
10	32,2	11,8	102,4	9,0	1,5	24,5
15	32,3	11,6	100,3	8,9	1,6	24,7
20	32,4	11,3	101,3	9,0	1,5	24,8

10.07.2012						
Dyp	Sal.	Temp	Ox %	mg/l	F (µg/l)	Density
1	27,9	14,6	105,1	8,1	1,8	20,6
2	28,4	14,4	104,7	8,1	1,8	21,0
5	28,9	14,2	103,5	8,0	1,7	21,5
10	30,5	13,2	100,8	7,9	1,7	22,9
15	31,4	12,4	97,0	7,7	1,2	23,8
20	31,9	12,0	94,8	7,5	1,0	24,3

31.07.2012						
Dyp	Sal.	Temp	Ox %	mg/l	F (µg/l)	Density
1	26,1	14,6	358,2	28,3	1,4	19,2
2	27,4	14,4	192,2	15,1	1,5	20,3
5	29,3	13,9	188,3	14,8	2,0	21,9
10	29,8	13,5	182,4	14,4	2,7	22,3
15	30,3	13,1	176,2	14,0	1,9	22,8
20	30,8	12,5	174,8	14,0	1,0	23,3

11.09.2012						
Depth(u)	Sal.	Temp	Ox %	mg/l	F (µg/l)	Density
1	28,2	13,5	114,0	9,0	2,0	21,0
2	29,0	13,6	113,0	8,8	1,5	21,6
5	29,7	13,6	111,4	8,6	1,4	22,2
10	29,9	13,4	110,7	8,6	0,9	22,4
15	30,2	13,2	109,7	8,6	0,8	22,7
20	30,4	13,1	108,4	8,5	0,6	22,9

St. Knar S (2012)

Dyp (m)	Sal. ‰				Temp (° C)				O_2 %				O_2 mg/l				F (µg/l)				Tetthet (σt)			
	apr	jun	sep	okt	apr	jun	sep	okt	apr	jun	sep	okt	apr	jun	sep	okt	apr	jun	sep	okt	apr	jun	sep	okt
1	29,4	28,5	30,0	29,5	8,7	12,3	13,7	10,8	97,2	99,7	95,7	94,9	8,4	8,0	7,4	8,0	1,3	0,7	1,8	2,6	22,8	21,5	22,4	22,5
2	30,7	29,7	30,2	29,6	8,5	12,0	13,7	10,8	99,6	98,8	95,4	94,6	8,6	8,0	7,4	8,0	1,7	0,7	1,6	2,5	23,8	22,5	22,5	22,6
5	32,6	30,4	30,2	29,6	8,2	11,8	13,7	10,9	104,2	100,7	95,5	94,0	8,9	8,1	7,4	7,9	1,7	1,0	1,4	2,7	25,4	23,1	22,6	22,6
10	32,8	31,3	30,3	30,5	8,1	11,5	13,5	11,2	104,2	102,6	95,4	93,2	8,9	8,3	7,4	7,7	1,1	1,0	1,3	1,8	25,6	23,9	22,7	23,3
15	33,4	31,6	30,5	31,0	8,1	11,4	13,5	11,2	102,8	104,3	94,8	90,4	8,8	8,4	7,4	7,5	1,3	1,0	1,1	1,4	26,1	24,2	22,9	23,7
20	33,7	32,3	30,7	31,1	8,1	10,8	13,0	11,3	99,3	104,7	93,6	88,9	8,5	8,5	7,3	7,3	1,4	0,9	1,1	1,2	26,3	24,8	23,1	23,8
50	34,6	34,5	33,7	32,7	8,2	8,5	9,3	11,0	86,5	89,4	86,1	81,3	7,3	7,6	7,2	6,7	0,3	0,2	0,2	0,3	27,2	27,0	26,3	25,2
60	34,8	34,9	34,4	33,0	8,2	8,1	8,5	10,9	85,9	83,6	86,2	80,0	7,3	7,1	7,3	6,6	0,2	0,1	0,1	0,2	27,3	27,4	27,0	25,5
70		34,9	34,7	33,5		8,0	8,2	10,4		83,2	86,5	78,9		7,1	7,4	6,5		0,2	0,1	0,1		27,5	27,4	26,0
80				34,3				9,0				74,4				6,3				0,1				26,9

	19.06.2012						03.07.2012							10.07.2012						
Dyp	Sal.	Temp	Ox %	mg/l	F (µg/l)	Density	Dyp	Sal.	Temp	Ox %	mg/l	F (µg/l)	Density	Dyp	Sal.	Temp	Ox %	mg/l	F (µg/l)	Density
1	27,8	11,2	95,4	8,1	0,9	21,1	1	32,0	12,5	87,6	7,6	0,9	24,1	1	30,4	14,4	97,2	7,5	1,2	22,5
2	29,3	10,7	107,8	9,2	1,7	22,4	2	32,1	12,4	96,1	8,4	1,0	24,2	2	30,5	14,3	100,0	7,7	1,1	22,7
5	31,8	10,0	109,3	9,3	2,1	24,5	5	32,2	12,2	100,0	8,7	0,9	24,4	5	30,8	14,2	103,2	8,0	1,2	22,9
10	32,5	9,4	109,9	9,5	1,7	25,1	10	32,2	12,2	100,5	8,8	1,0	24,4	10	30,9	13,8	103,6	8,0	1,3	23,1
15	33,1	9,0	107,9	9,3	1,3	25,7	15	32,2	12,2	101,4	8,9	0,9	24,5	15	31,2	13,3	103,4	8,1	1,4	23,5
20	33,5	8,9	106,4	9,2	1,2	26,0	20	32,3	12,1	101,6	8,9	0,9	24,5	20	31,4	12,7	100,0	7,9	1,2	23,8

	31.07.2012						11.09.2012					
Dyp	Sal.	Temp	Ox %	mg/l	F (µg/l)	Density	Dyp	Sal.	Temp	Ox %	mg/l	F (µg/l)	Density
1	26,4	14,2	100,5	8,1	1,3	19,5	1	28,8	13,5	109,2	8,6	1,8	21,5
2	28,1	14,1	100,1	8,0	1,4	20,9	2	28,8	13,5	109,5	8,6	2,1	21,5
5	29,5	14,1	97,5	7,7	1,0	22,0	5	29,2	13,6	109,1	8,5	1,6	21,8
10	30,0	13,8	95,9	7,6	1,0	22,4	10	29,5	13,6	109,1	8,5	1,3	22,1
15	30,2	13,7	95,1	7,5	1,0	22,6	15	29,9	13,5	108,2	8,5	1,0	22,4
20	30,8	12,8	92,6	7,5	0,9	23,3							

St. Knar N (2012)

Dyp (m)	Sal. ‰				Temp (° C)				O_2 %				O_2 mg/l				F (µg/l)				Tetthet (σt)			
	apr	jun	sep	okt	apr	jun	sep	okt	apr	jun	sep	okt	apr	jun	sep	okt	apr	jun	sep	okt	apr	jun	sep	okt
1	28,5	28,4	27,5	26,3	8,7	12,2	13,4	9,7	83,3	100,1	95,6	172,9	7,3	8,1	7,6	14,9	1,1	0,5	2,2	4,5	22,1	21,5	20,6	20,2
2	30,3	29,5	28,0	26,7	8,4	12,1	13,4	9,8	89,1	99,9	96,9	173,8	7,8	8,0	7,7	15,0	1,5	0,6	2,0	4,8	23,5	22,3	20,9	20,5
5	31,9	30,3	29,3	28,3	8,2	11,8	13,4	10,2	94,6	99,6	97,1	174,2	8,2	8,0	7,6	14,7	1,6	0,9	1,6	4,6	24,8	23,0	21,9	21,7
10	33,7	30,9	29,6	29,4	8,2	11,6	13,4	10,7	94,6	102,7	96,3	173,4	8,1	8,3	7,5	14,4	1,1	1,2	1,6	2,4	26,2	23,5	22,2	22,5
15	34,2	31,0	30,2	30,5	8,2	11,6	13,6	11,1	90,5	105,4	95,1	170,0	7,7	8,5	7,4	13,9	0,7	1,2	1,5	1,6	26,7	23,6	22,6	23,4
20	34,3	31,9	30,7	31,5	8,2	11,2	13,1	11,4	88,6	106,6	93,8	164,7	7,6	8,6	7,4	13,3	0,5	0,9	1,3	0,8	26,8	24,4	23,1	24,1
50	34,7	34,8	34,2	33,1	8,2	8,2	8,7	11,2	81,9	86,0	87,1	150,8	7,0	7,3	7,4	12,1	0,3	0,1	0,1	0,1	27,2	27,3	26,8	25,5
100	34,9	35,0	34,8	34,7	8,1	8,0	8,1	8,4	81,6	89,1	88,6	129,0	7,0	7,6	7,6	10,9	0,2	0,1	0,1	0,1	27,6	27,7	27,5	27,4
125	34,9	35,0	34,8	34,8	8,1	8,0	8,1	8,2	82,6	89,6	88,8	126,7	7,0	7,6	7,6	10,7	0,2	0,1	0,1	0,1	27,8	27,8	27,7	27,7

	19.06.2012							03.07.2012							10.07.2012						
Dyp	Sal.	Temp	Ox %	mg/l	F (µg/l)	Density	Dyp	Sal.	Temp	Ox %	mg/l	F (µg/l)	Density	Dyp	Sal.	Temp	Ox %	mg/l	F (µg/l)	Density
1	20,8	12,3	92,1	7,9	1,0	15,6	1	29,0	12,8	89,8	7,9	1,0	21,8	1	25,9	14,9	98,8	7,6	1,4	19,0
2	27,9	11,2	103,6	8,7	0,9	21,2	2	31,0	12,5	99,9	8,7	0,9	23,4	2	28,6	14,2	100,6	7,8	1,7	21,2
5	31,2	10,7	110,6	9,2	1,1	23,9	5	31,7	12,1	99,7	8,8	1,1	24,0	5	29,7	14,4	104,0	7,9	1,5	22,1
10	32,1	10,0	116,5	9,8	2,5	24,7	10	32,0	12,1	99,6	8,7	1,2	24,3	10	30,9	14,0	104,3	8,0	1,4	23,0
15	33,0	9,2	113,7	9,7	1,6	25,6	15	32,1	12,2	100,2	8,8	1,0	24,4	15	31,3	13,0	101,7	7,9	1,2	23,6
20	34,0	8,6	103,5	8,9	0,9	26,5	20	32,4	11,8	99,8	8,8	1,1	24,7	20	31,8	12,3	98,5	7,8	0,9	24,1

	31.07.2012						11.09.2012						
Dyp	Sal.	Temp	Ox %	mg/l	F (µg/l)	Density	Dyp	Sal.	Temp	Ox %	mg/l	F (µg/l)	Density
1	25,1	14,4	197,9	15,8	1,8	18,5	1	29,2	14,0	111,1	8,6	2,0	21,7
2	26,7	14,1	205,8	16,3	1,6	19,7	2	29,2	14,0	108,0	8,4	1,9	21,7
5	27,7	14,0	197,0	15,6	1,6	20,6	5	29,5	13,9	109,5	8,5	1,8	22,0
10	29,8	13,4	159,5	12,6	1,5	22,4	10	29,6	13,7	110,8	8,6	1,6	22,1
15	30,9	12,5	142,2	11,4	1,1	23,4	15	30,1	13,3	108,7	8,5	0,9	22,6
20	31,1	12,4	134,7	10,8	0,8	23,6							

St. Våg 8 (2011-2012)

Dyp (m)	Sal. ‰					Temp (° C)					O_2 %					O_2 mg/l					Tetthet (σ_t)				
	sep.	okt.	nov.	des.	jan.	sep.	okt.	nov.	des.	jan.	sep.	okt.	nov.	des.	jan.	sep.	okt.	nov.	des.	jan.	sep.	okt.	nov.	des.	jan.
1	36,4	28,5	32,3	12,5	32,3	14,5	10,7	10,5	6,8	7,8	92,7	84,6	88,6	76,8	104,5	7,7	7,2	7,1	6,6	9,1	21,9	21,8	24,8	9,8	25,2
2	36,5	28,5	32,3	27,2	32,4	14,5	10,8	10,5	6,9	7,9	92,7	86,5	90,6	85,6	104,8	7,7	7,3	7,3	6,7	9,1	21,9	21,8	24,8	21,3	25,3
5	36,6	30,0	32,4	29,1	32,5	14,4	11,2	10,5	7,3	8,0	92,8	84,5	91,8	85,6	102,7	7,7	7,0	7,4	6,5	8,9	22,1	22,9	24,8	22,7	25,3
10	36,7	31,6	32,4	30,6	32,8	14,4	11,6	10,5	8,2	8,3	92,6	82,0	91,7	85,1	104,4	7,7	6,7	7,4	6,3	8,9	22,2	24,0	24,9	23,9	25,6
15	36,7	32,5	32,4	31,4	33,0	14,4	11,8	10,6	8,6	8,4	93,4	81,1	91,4	84,6	104,5	7,7	6,5	7,4	6,2	8,9	22,3	24,7	24,9	24,4	25,7
20	36,8	32,9	32,5	32,5	33,3	14,2	12,0	10,6	9,2	8,6	92,9	80,5	91,4	84,8	104,5	7,7	6,4	7,3	6,1	8,8	22,4	25,1	25,0	25,2	25,9
50	35,9	33,4	33,4	33,7	34,0	9,9	12,0	11,2	9,3	8,4	84,2	80,9	91,6	88,2	107,2	7,5	6,5	7,2	6,3	9,1	25,5	25,4	25,7	26,3	26,7
70	35,7		34,1		34,4	9,0		10,0		8,7	80,3		85,2		103,7	7,3		6,9		8,7	26,2		26,6		27,0

St. Basv (2011-2012))

Dyp (m)	Sal. ‰					Temp (° C)					O_2 %					O_2 mg/l					Tetthet (σ_t)				
	sep.	okt.	nov.	des.	jan.	sep.	okt.	nov.	des.	jan.	sep.	okt.	nov.	des.	jan.	sep.	okt.	nov.	des.	jan.	sep.	okt.	nov.	des.	jan.
1	34,4	28,3	32,3	24,9	31,6	14,5	11,0	10,4	6,2	7,7	99,5	87,7	92,8	85,1	101,4	8,4	7,4	7,6	8,1	8,8	20,4	21,6	24,8	19,6	24,6
2	34,7	29,9	32,3	27,1	32,1	14,5	11,3	10,4	6,9	7,9	99,4	86,1	95,2	85,9	102,8	8,4	7,1	7,8	7,9	8,9	20,6	22,7	24,8	21,2	25,0
5	36,4	31,3	32,5	28,8	32,4	14,4	11,5	10,6	7,4	8,2	98,3	83,8	94,2	85,6	103,8	8,2	6,8	7,7	7,7	8,9	21,9	23,8	24,9	22,5	25,2
10	36,7	32,9	32,5	30,9	33,1	14,3	11,8	10,6	8,2	8,8	93,7	81,9	92,1	85,0	103,6	7,8	6,6	7,5	7,4	8,7	22,2	25,0	25,0	24,1	25,7
15	36,7	33,1	32,6	32,0	33,7	14,3	11,9	10,6	9,2	9,3	94,1	81,1	91,7	84,9	101,8	7,8	6,5	7,5	7,2	8,4	22,3	25,2	25,0	24,8	26,1
20	36,8	33,1	32,6	33,0	33,8	14,2	11,9	10,6	9,4	8,8	94,3	79,8	90,0	83,6	101,7	7,9	6,4	7,3	7,0	8,5	22,5	25,2	25,1	25,6	26,3
50	36,1	34,0	33,6	33,7	34,1	10,6	11,4	10,7	9,3	8,5	86,8	79,3	90,6	86,8	105,3	7,7	6,4	7,3	7,3	8,9	25,0	26,1	26,0	26,3	26,7
100	35,6	34,7	34,5	34,6	34,6	7,8	8,1	8,6	9,2	8,9	77,0	67,5	78,4	78,8	99,1	7,2	5,8	6,6	6,6	8,2	27,3	27,5	27,3	27,2	27,3
125			34,8	34,8	34,8			8,1	8,4	8,5			77,8	72,5	87,9			6,6	6,2	7,4			27,6	27,7	27,7

St. Knar (2011-2012)

Dyp (m)	Sal. ‰					Temp (° C)					O_2 %					O_2 mg/l					Tetthet (σ_t)				
	sep.	okt.	nov.	des.	jan.	sep.	okt.	nov.	des.	jan.	sep.	okt.	nov.	des.	jan.	sep.	okt.	nov.	des.	jan.	sep.	okt.	nov.	des.	jan.
1	34,6	19,6	32,2	19,4	31,8	14,5	9,3	10,4	4,7	7,5	97,4	91,0	95,7	85,5	103,6	8,2	8,4	7,9	8,8	9,1	20,6	15,0	24,7	15,4	24,8
2	35,0	19,7	32,2	21,7	32,0	14,5	9,3	10,4	5,5	7,6	97,5	87,4	88,8	86,2	103,6	8,2	8,0	7,3	8,5	9,1	20,8	15,1	24,7	17,1	25,0
5	35,9	27,9	32,3	27,8	32,3	14,6	10,8	10,4	7,5	8,0	98,3	87,3	87,0	87,5	104,5	8,2	7,4	7,1	7,9	9,1	21,4	21,4	24,8	21,7	25,2
10	36,3	29,8	32,4	31,5	32,6	14,7	11,4	10,5	8,7	8,3	97,2	82,5	88,9	86,7	103,8	8,1	6,8	7,3	7,5	9,0	21,6	22,7	24,9	24,5	25,4
15	36,6	31,1	32,8	31,8	32,9	14,6	11,5	10,7	8,9	8,5	97,1	81,8	88,0	85,7	103,1	8,1	6,7	7,1	7,3	8,8	21,9	23,7	25,1	24,7	25,6
20	36,6	32,4	32,9	32,5	33,3	14,5	11,6	10,8	9,1	8,9	97,0	80,2	88,5	85,3	102,7	8,1	6,5	7,2	7,2	8,7	22,0	24,7	25,3	25,3	25,9
50	35,8	33,8	33,6	33,7	34,0	9,7	11,3	10,7	9,4	8,5	83,3	78,2	86,0	84,5	106,5	7,6	6,3	6,9	7,1	9,1	25,6	26,0	25,9	26,2	26,7
100			34,4	34,6	34,5			9,0	9,2	8,9			81,8	80,4	103,6			6,8	6,7	8,7			27,1	27,2	27,2
150				34,8	34,7				8,5	8,8				71,6	93,5				6,1	7,8				27,6	27,5

APPENDIX 4: SALTS

Våg 8 (2012)

Dyp (m)	NO3 (µg/l)									
	23.04	05.06	19.06	26.06	03.07	10.07	31.07	07.09	11.09	25.10
0	16	<1	<1	<1	12	8,8	<1	29	30	19
2	12	<1	<1	2,7	12	6,5	<1	27	28	22
5	80	<1	<1	2,6	8,4	19	<1	27	28	21
10	110	1,8	16	3,3	11	27	2,2	27	34	22
20	120	8	73	12	15	46	<1	34	39	50
30	140			23				48		42
50	150			150				170		47
75	150			170				210		130
90				25				26		27

Dyp (m)	PO43- (µg/l)									
	23.04	05.06	19.06	26.06	03.07	10.07	31.07	07.09	11.09	25.10
0	1,2	1,6	1,2	<1	3,2	<1	2,3	4,2	4,4	2,4
2	2	1,7	1,7	1,6	4,3	2	1,2	4,3	3,9	2,6
5	11	2	<1	1,4	2,9	3,2	1,4	4,2	4,9	2,4
10	15	2,6	2,6	1,3	2,9	4,5	1,5	5,1	5,7	2
20	17	3,3	11	2,9	3,7	7,4	1,1	4,8	8,8	9,1
30	21			4,8				6,7		7,7
50	22			22				19		7,6
75	22			25				24		20
90				25				26		27

Dyp (m)	TOT-P (µg/l)									
	23.04	05.06	19.06	26.06	03.07	10.07	31.07	07.09	11.09	25.10
0	8	3,6	5,9	6,8	12	12	12	9,8	9,5	7,6
2	9,1	7,3	27	7,8	17	12	11	10	9,2	8,5
5	19	5,7	6,2	8,4	11	12	11	10	9,9	8
10	22	5,5	8,7	9,8	10	12	23	10	8,9	8
20	21	5,8	17	7,5	13	15	11	9,7	12	12
30	24			9				11		10
50	25			26				23		11
75	24			29				28		25
90				29				27		39

Dyp (m)	TOT-N (µg/l)									
	23.04	05.06	19.06	26.06	03.07	10.07	31.07	07.09	11.09	25.10
0	190	130	130	120	180	200	150	220	250	130
2	230	94	150	150	170	180	130	190	260	160
5	280	130	160	140	160	170	140	170	300	150
10	230	110	130	170	160	180	170	190	220	150
20	260	110	210	150	160	180	180	160	280	160
30	380			150				160		130
50	290			240				240		150
75	280			300				280		170
90				290				330		260

Dyp (m)	NH4-N (µg/l)								
	23.04	19.06	26.06	03.07	10.07	31.07	07.09	11.09	25.10
0	3,4	<3	3,4	3,2	<3	3,5	8,6	12	4,8
2	<3	<3	4,4	3,2	<3	3,6	5,1	11	5,4
5	<3	<3	5	3,8	<3	3,8	5,2	11	3,1
10	<3	<3	4,6	6,9	3,5	5,4	5,3	15	4,6
20	3,4	17	5,1	4,3	5,2	4,1	7	29	21
30	9,9		7,4				11		12
50	3,9		4,3				<3		5,1
75	<3		4,2				<3	<3	
90			4,2				<3	<3	

Basv2012

Dyp (m)	NO3 (µg/l)									
	23.04	05.06	19.06	26.06	03.07	10.07	31.07	07.09	11.09	25.10
0	31	<1	<1	<1	20	8,2	<1	26	23	21
2	68	<1	<1	3,1	18	8,1	2,6	23	24	23
5	84	5,3	<1	2,7	15	14	<1	23	23	25
10	100	34	36	2,6	22	31	1,5	25	27	39
20	140	140	120	3,8	19	43	23	36	33	53
30	140			44				63		45
50	140			140				160		39
75	150			170				220		110
100	160			170				240		170

Dyp (m)	PO43- (µg/l)									
	23.04	05.06	19.06	26.06	03.07	10.07	31.07	07.09	11.09	25.10
0	3,6	1,5	<1	1,5	3,9	1	<1	2,9	3	2,6
2	8,7	2,1	1	1,1	3,7	4,7	<1	3,3	3,3	2,8
5	11	3	1,1	1,2	4	2,3	1,1	3	4,1	3,8
10	13	4,5	5,5	2,1	4,9	5	2,5	3,4	4,5	4,6
20	19	17	15	1,9	3,9	7,3	4,6	5,1	6	7,5
30	20			7,7				7		7,4
50	20			22				19		7,1
75	22			28				25		17
100	22			27				27		27

Dyp (m)	TOT-P (µg/l)									
	23.04	05.06	19.06	26.06	03.07	10.07	31.07	07.09	11.09	25.10
0	10	4,3	4,7	7,8	16	11	10	10	6,8	18
2	15	4,3	5,7	7,8	14	14	10	10	6,4	17
5	16	9,6	6,8	7,8	15	13	9,1	9,9	7	31
10	17	9,2	14	11	15	13	28	10	6,9	19
20	20	20	20	9	12	14	12	10	9,4	19
30	21			14				11		18
50	24			25				22		17
75	25			29				29		28
100	25			29				31		38

Dyp (m)	TOT-N (µg/l)									
	23.04	05.06	19.06	26.06	03.07	10.07	31.07	07.09	11.09	25.10
0	210	96	170	190	170	210	150	160	230	150
2	260	93	140	120	160	170	170	190	260	150
5	290	140	120	150	150	200	180	190	250	180
10	310	140	160	160	170	180	160	180	210	150
20	260	240	240	160	160	190	130	170	250	170
30	270			170				200		130
50	300			230				280		130
75	320			270				300		220
100	300			290				290		260

Dyp (m)	NH4-N (µg/l)								
	23.04	19.06	26.06	03.07	10.07	31.07	07.09	11.09	25.10
0	<3	<3	4,7	3,3	<3	<3	<3	12	3,9
2	3,1	<3	3,5	<3	<3	<3	<3	9,3	4,3
5	3,3	<3	4	3,3	<3	3,1	<3	11	4,3
10	3,1	3,2	4,1	4,8	4,2	4,5	3,8	12	4,6
20	<3	4,7	4,9	5	5,3	8,9	7,6	15	6,1
30	<3		5,4				6,9		12
50	4,2		7,6				3		13
75	9,5		4,9				<3		4
100	3,4		4,7				<3		<3

Knar N 2012

Dyp (m)	NO3 (µg/l)									
	23.04	05.06	19.06	26.06	03.07	10.07	31.07	07.09	11.09	25.10
0	7,2	2,4	<1	2,1	14	6,1	3,3	22	14	13
2	36	23	12	10	20	10	9,2	29	15	17
5	47	25	14	12	25	8,1	10	31	20	20
10	84	91	18	8	27	12	20	32	21	39
20	140	120	130	35	31	31	48	46	31	53
30	150			110				86		52
50	160			160				160		66
75	160			180				170		90
100	160			160				180		180

Dyp (m)	PO43- (µg/l)									
	23.04	05.06	19.06	26.06	03.07	10.07	31.07	07.09	11.09	25.10
0	1,2	1,6	1,1	1,4	2,5	<1	1,3	2,7	2,5	1,4
2	4,2	3,9	3,5	2,8	3,5	1,6	1,9	4	2,7	1,6
5	5,9	4,3	2,4	3,4	5	1,5	2,5	4,6	3,4	1,9
10	11	11	3,5	2,9	4,9	2,2	3,6	4,4	3,4	4,6
20	20	14	16	6,4	5,9	5,1	7,9	6,5	5,1	7,9
30	21			17				13		7,9
50	22			26				23		11
75	23			30				25		14
100	22			25				27		28

Dyp (m)	TOT-P (µg/l)									
	23.04	05.06	19.06	26.06	03.07	10.07	31.07	07.09	11.09	25.10
0	<2	5	6,2	7,2	12	10	10	7,9	5,5	15
2	14	8,4	41	8,1	10	11	11	9,7	5,6	16
5	11	8,5	9,9	13	14	10	11	8,5	6,1	16
10	13	14	11	9,1	12	11	13	8,1	5,9	17
20	23	19	24	11	13	15	15	9,8	7,4	19
30	43			20				15		19
50	24			28				24		21
75	23			30				25		25
100	22			28				28		39

Dyp (m)	TOT-N (µg/l)									
	23.04	05.06	19.06	26.06	03.07	10.07	31.07	07.09	11.09	25.10
0	210	120	200	110	160	190	150	160	210	160
2	260	130	190	150	150	180	160	220	240	140
5	250	140	190	160	150	190	140	160	230	140
10	210	170	160	170	170	180	150	180	200	140
20	270	180	270	140	190	180	150	180	260	140
30	280			220				190		140
50	270			260				270		160
75	330			340				290		180
100	290			250				290		270

Dyp (m)	NH4-N (µg/l)								
	23.04	19.06	26.06	03.07	10.07	31.07	07.09	11.09	25.10
0	<3	<3	3,9	<3	<3	3,6	4,7	7,3	3,9
2	<3	<3	4	3,6	<3	7,8	5,6	7,4	3,3
5	3	<3	4,6	3,6	<3	4,3	5,4	9,5	3
10	<3	<3	4,2	3,4	<3	4,9	4,5	8,9	4,2
20	<3	3	4,6	4,2	4,6	6,4	4,8	12	6,4
30	<3		5,5				5,4		7
50	<3		3,7				<3		5,1
75	<3		4,7				<3		3,2
100	3,1		3,9				<3		<3

Knar S 2012

Dyp (m)	NO3 (µg/l)									
	23.04	05.06	19.06	26.06	03.07	10.07	31.07	07.09	11.09	25.10
0	8	2,3	1,4	2,8	21	6,8	4,2	25	12	34
2	13	32	32	9,8	22	6,9	11	26	14	34
5	42	86	62	21	25	7,5	11	27	20	33
10	49	120	84	30	25	9,5	19	31	23	43
20	92	150	110	37	32	24	37	61	35	53
30	120			75				60		67
50	130			160				140		80
75	160			170				180		150

Dyp (m)	PO43- (µg/l)									
	23.04	05.06	19.06	26.06	03.07	10.07	31.07	07.09	11.09	25.10
0	1,7	1	<1	2,1	3,3	2,1	2,1	3,3	1,9	5,3
2	2,4	1,4	4	3,7	3,8	2,2	2,9	3,8	3,6	4,7
5	6,9	11	7,1	4	4,5	2,5	2,5	3,9	3,2	4,6
10	7,5	15	11	5,9	4,2	2,7	3,2	4,1	4,1	5,8
20	13	18	13	7,1	5,8	5,3	6	8,5	6,3	7,6
30	17			12				8,5		10
50	19			25				20		13
75	23			26				27		26

Dyp (m)	TOT-N (µg/l)									
	23.04	05.06	19.06	26.06	03.07	10.07	31.07	07.09	11.09	25.10
0	160	93	190	130	140	150	150	200	220	170
2	140	110	170	200	170	180	190	150	390	150
5	270	340	200	190	180	170	160	170	230	170
10	160	170	190	160	160	200	190	200	300	140
20	290	250	250	170	250	180	180	300	240	150
30	280			180				240		170
50	320			250				400		180
75	280			260				390		220

Dyp (m)	NH4-N (µg/l)								
	23.04	19.06	26.06	03.07	10.07	31.07	07.09	11.09	25.10
0	*	<3	4	3,9	<3	5,1	3,6	7,4	4,4
2	*	<3	4,8	4,1	3,9	4,1	3,7	8,1	5,3
5	*	3	4,9	3,3	3	4,3	3,6	8,9	4,6
10	*	3,4	4,7	3,8	3,7	3,8	4,8	9,4	5,2
20	*	3	9,4	4,2	4,9	4,6	5,9	12	5,2
30	*		5,9				5,5		5,2
50	*		4,7				4		4,9
75	*		5,3				<3		<3

St. Våg 8, Vågen (2011)

Dyp (m)	NO3 (µg/l)				PO43- (µg/l)				TOT-P (µg/l)				TOT-N (µg/l)				NH4-N (µg/l)		
	sep.11	okt.11	nov. 11	des. 11	sep.11	okt.11	nov. 11	des. 11	sep.11	okt.11	nov. 11	des. 11	sep.11	okt.11	nov. 11	des. 11	okt.11	nov. 11	des. 11
0	24	66	77	150	4,9	9,8	11	13	12	16	14	14	270	150	290	190	21	37	21
2	24	64	73	140	3,1	8,2	11	12	6,7	14	14	13	200	170	240	190	21	15	9,9
5	24	64	76	130	3,2	9,8	10	13	3,6	14	22	13	170	180	280	180	21	13	9
10	25	66	73	130	3,8	9,6	12	12	13	14	13	14	160	150	260	150	21	16	11
20	29	59	73	120	3,9	11	12	11	12	15	13	14	180	140	250	220	33	17	15
30	28	55			4,6	10			11	14			190	160			34		
50	120				18				24				240						
75	150				22				27				190						

St. Basv, 2011

Dyp (m)	NO3 (µg/l)				PO43- (µg/l)				TOT-P (µg/l)				TOT-N (µg/l)				NH4-N (µg/l)		
	sep.11	okt.11	nov. 11	des. 11	sep.11	okt.11	nov. 11	des. 11	sep.11	okt.11	nov. 11	des. 11	sep.11	okt.11	nov. 11	des. 11	okt.11	nov. 11	des. 11
0	21	76	77	170	3,8	5,4	12	10	11	11	15	10	240	190	280	190	20	10	12
2	21	72	76	140	1,8	7	10	11	8,4	13	14	13	170	170	230	190	19	18	12
5	21	70	78	130	1,9	8,1	11	11	6,6	13	14	15	140	160	260	180	14	14	16
10	25	66	77	130	3,2	9,2	11	11	4,8	14	15	15	140	140	240	180	11	11	10
20	26	60	76	120	3,8	9	11	15	5,5	13	15	16	140	170	230	260	24	12	11
30	27	57			5,6	9,4			12	13			140	150			17		
50	73	60			12	9,5			19	14			220	150			16		
75	150	100			23	18			29	22			250	190			16		
100	180	160			30	29			35	33			290	230			16		

St. Knar, 2011

Dyp (m)	NO3 (µg/l)				PO43- (µg/l)				TOT-P (µg/l)				TOT-N (µg/l)				NH4-N (µg/l)		
	sep.11	okt.11	nov. 11	des. 11	sep.11	okt.11	nov. 11	des. 11	sep.11	okt.11	nov. 11	des. 11	sep.11	okt.11	nov. 11	des. 11	okt.11	nov. 11	des. 11
0	22	75	81	180	3	5,5	10	7,5	15	10	17	9,1	270	210	290	230	26	21	13
2	20	71	77	150	1,4	7	9,8	9,3	<2	12	14	11	200	150	250	230	21	12	13
5	22	70	76	140	2,1	8	9,7	9,1	13	13	14	12	200	180	240	180	18	15	17
10	20	66	76	120	2,3	8,2	9,7	11	13	13	13	14	190	170	230	170	18	13	9,8
20	21	65	76	120	2,7	9,5	10	11	12	14	12	15	190	140	240	200	18	11	9,1
30	35	61			5,1	9,4			12	14			170	150			15		
50	92	65			15	11			24	15			240	150			14		

APPENDIX 5: SPECIES LIST (BENTHOS)

Vedlegg SF-SAM-505.5 **BENTHOS ARTSLISTE** SAM-Marin

uni Research

SAM-Marin
Thormøhlensgate 55, 5008 Bergen
Telefon: 55 58 43 41 Telefaks: 55 58 45 25

Test 157

Oppdragsgiver (navn og adresse): Bergen kommune, Vann og avløpsetaten, Fjøsangerveien 68, 5086 Bergen
Prosjekt nr.: 806275
Prøvetakingssted (område): Byfjord
Dato for prøvetaking: Fra april til oktober 2012
Ansvarlig for prøvetaking (firma): Uni Research - SAM Marin
Avvik/forhold med mulig påvirkning på resultatet: -
Artene er identifisert av: Per Johannessen, Tom Alvestad og Frøydis Lygre

	Akkreditert	I henhold til standard	Evt. akkrediteringsnummer	Ikke akkreditert
Prøvetaking	☒	ISO-5667-19	Test 157	☐
Sortering	☒	ISO-5667-19	Test 157	☐
Identifisering	☒	ISO-5667-19	Test 157	☐

Opplysninger om merker i artslisten:
For hver stasjon er nr. på grabbhuggene angitt, og under hvert nummer de dyrene som ble funnet i prøvene.

- + i tabellen angir at det var dyr til stede i prøven, men at de ikke er kvantifisert.
- / i tabellen betyr en deling i voksne og unge individer (eksempel 4/2 betyr 4 voksne og 2 unge).
- cf. mellom slekts- og artsnavn betyr at slektsbestemmelsen er sikker, men at artsbestemmelsen er usikker.
- * ved arter eller grupper av arter angir arter eller grupper av arter som ikke er med i eventuelle analyser.
- * ved huggnummer angir at det er knyttet avvik til prøven

Andre opplysninger:
Tabellen starter på neste side og består av:6 sider.

Signatur: Tom Alvestad
Godkjent taksonom

Godkjent av: KH Gyldig fra: 15.02.2012 Side 1 av 1

s. 1/6	Stasjon	Knar S	Knar S	Knar S	Knar S	Knar S	Knar N	Knar N	Knar N	Knar N	Knar N
	Dato	27.04.2012	27.04.2012	27.04.2012	27.04.2012	27.04.2012	27.04.2012	27.04.2012	27.04.2012	27.04.2012	27.04.2012
	Art	1	2	3	4	5	1	2	3	4	5
*	PORIFERA indet.				+					+	+
*	HYDROZOA										
*	Hydrozoa indet.	+	+	+	+	+	+		+	+	+
*	ANTHOZOA										
	Cerianthus lloydii						1	1			
	Gonactinia prolifera				1						1
	Edwardsia sp.	4	1	1	5	7					
	Actinidae indet.	4	1	1	5	7		1			
*	PLATYHELMINTES indet.	4	3		2	5			1		
*	NEMERTINI indet.	4		3	3	4		1	+	5	2
*	NEMATODA indet.	5	ca.10	ca.10	8	7	ca.10	ca.20	ca.20	6	6
	POLYCHAETA										
	Paramphinome jeffreysii				2				2	1	7
	Aphrodita aculeata									0/1	
	Polynoidae indet.			2		3	3	2	3	1	1
	Leucia nivea						1	1		2	2
	Acanthicolepis asperrima		2	1	1						
	Malmgrenia mcintoshi						2/1	2		1	
	Harmothoe mariannae									1	1
	Pholoe baltica	2	1	1	2	3	4	1	9	5	8
	Sige oliveri									1	
	Notophyllum foliosum					1					
	Phyllodoce groenlandica	1									
	Eumida sp.		1		1						
	Eumida sanguinea										0/4
	Eulalia bilineata			1							
	Eulalia mustela	1	1	1/1	0/1	2/3		1	1		
	Mystides caeca				1						
	Kefersteinia cirrata	5	1	5	18	3	12	7	8	12	2
	Nereimyra punctata	2	2	2	8	9				2	1/1
	Ophiodromus flexuosus										0/2
	Lacydonia sp.					1					1
	Syllidae indet.	3	3	1	6	7	2	2	4		7
	Ehlersia cornuta					2				1	
	Exogone sp.	3		2	3	2			1	2	3
	Nereis pelagica	1	2	1/2	0/3	1/1					
	Sphaerodorum flavum		0/1			0/2	0/2	0/1	0/1		
	Glycera lapidum	2/8	1/2	1/9	3/6	1/11	0/4	2/7	4/12	2/16	1/6
	Nothria conchylega				0/1						
	Eunice pennata	9/1	13/4	10/2	14/1	16/8	9/1	1/1	4	1	11/1
	Lumbrineridae indet.	7	4	4	8	1	4	3	6	8	7
	Dorvillea sp.		1			1			2		
	Protodorvillea kefersteini			1	1		3	1			
	Schistomeringos sp.				1			1			
	Orbiniidae indet.		1				1	1			
	Aonides paucibranchiata									1	
	Laonice bahusiensis	0/1	2/1	0/2	1	1/1	1		1		
	Malacoceros sp.						1	2		1	
	Prionospio cirrifera	7		2	4		1		1	4	1
	Spiophanes wigleyi	0/1		0/3	0/1		5/4	9/6	6/4	9/6	5/6
	Apistobranchus tenuis				1						
	Spiophanes kroyeri	0/2		1				1	4/1	4/1	4/4
	Chaetopterus norvegicus	1/1	1	1/2	1/2	2/6					
	Aricidea catherinae				1						5
	Paraonis sp.	4	1	5	6	3	6	8	17	15	20
	Aphelochaeta sp.	4	2	2	7	2	4	4	8	31	31
	Chaetozone sp.	20	6	15	26	17		9	17	17	14
	Cirratulus cirratus					0/3	0/2			0/1	0/1
	Macrochaeta sp.	3		1	1	1		1			
	Flabelligera affinis						1				
	Lipobranchus jeffreysii						3/1	6/6	3/3	1/13	2
	Aschlerocheilus sp.	1			1	3		2	1	5	3
	Axiokebuita sp.	7	6	9	16	17	5	3	14	4	1
	Capitella capitata									20	1
	Mediomastus fragilis	1								5	2
	Notomastus latericeus	3/3	2	5/5	3/8	1/8	1/2	3/1	2	3/2	9/2
	Notoproctus oculatus	1		2		4					
	Maldanidae indet.		1	1	2	4		1	1		
	Galathowenia oculata	1		1							1
	Sabellides octocirrata	0/1		1/1	0/1	0/2	1/1	3	0/1		
	Anobothrus sp.	1			2	1			1	2	4
	Lysippides fragilis						1			0/1	
	Amphicteis gunneri	0/2	0/2		0/1	0/1	1				1/2
	Amythasides macroglossus	1			2	2		1	2	3	5
	Sosanopsis wireni					1				0/1	0/1
	Melinna albicincta							3		1/1	2/1
	Melinna elisabethae										1

s. 2/6	Stasjon	Knar S	Knar S	Knar S	Knar S	Knar S	Knar N	Knar N	Knar N	Knar N	Knar N
	Dato	27.04.2012	27.04.2012	27.04.2012	27.04.2012	27.04.2012	27.04.2012	27.04.2012	27.04.2012	27.04.2012	27.04.2012
	Art	1	2	3	4	5	1	2	3	4	5
	Terebellidae indet.							1		1	
	Amphitrite cirrata						1		1/1		1
	Eupolymnia nebulosa	1			1/1						
	Eupolymnia nesidensis	1		0/1				1/1			0/1
	Lanice conchilega								1	0/1	1
	Nicolea venustula						0/1			1	9/4
	Thelepus cincinnatus		0/1	1	0/1	0/1					0/1
	Polycirrus norvegicus	1/4	1		0/4	0/2			0/4	5/3	2/15
	Hauchiella tribullata		1	1	0/1		1	18/5	9/6	3/1	1
	Trichobranchidae indet.	1	1	1	3	2					1
	Trichobranchus gracialis	0/1	0/1		0/3		1			0/1	3
	Terebellides stroemi			1	1						
	Sabellidae indet.			2	1	2					1
	Jasmineira sp.	2		1	2	1					
	Euchone sp.	1	1	1	2						2
	Placostegus tridentatus	2/1	4/1		4/5	5/10					0/1
	OLIGOCHAETA indet.	2	14	9	11	4	6	12	13	1	
	ECHIURA										
	Bonellia viridis						1	1	1	0/1	2
	SIPUNCULA										
	Sipuncula indet.	2	2	2	1	2		2	4	1	1
	Phascolion strombus									1	
	Onchnesoma steenstrupi					0/1					
	CRUSTACEA										
*	Calanus finmarchicus	1	3	1	2	3			5	4	2
	Verruca stroemi	2/3	3/50	0/8	4/35	1/3					
*	Ostracoda indet.							1			
*	Philomedes globosus										2
*	Tanaidacea indet.							1			
*	Natatolana borealis	1/1				0/1					
*	Janira maculosa	0/1			0/1	2/1					
*	Ampelisca spinipes		3	2	1						
*	Ampelisca sp.	7	1	2	1						
*	Atylus vedlomensis	1					1	2	1		1
*	Liljeborgia fissicornis						1	1			
	Liljeborgia pallida										1
*	Lysianassidae indet.			1	1					1	
*	Orchomene sp.	2		1	1	3					
*	Tmetonyx cicada										1
*	Tmetonyx sp.			1							
*	Cheirocratus sp.										1
*	Oedicerotidae indet.				1						1
	Normanion sp.						1				
	Paraphoxus oculatus										1
	Stegocephaloides sp.	2									
*	Eualus pusiolus	0/1	0/1		2						
*	Munida sarsi			0/1							
*	Munida tenuimana									0/1	0/1
*	Pagurus bernhardus							0/1			
*	Pagurus sp.					0/1	0/1				
*	Hyas coarctatus				0/1						
*	PYCNOGONIDA indet.		2	1		1					
	MOLLUSCA										
	Caudofoveata indet.										1
	Solenogastres indet.					4		1			
	Leptochiton alveolus										1
	Leptochiton asellus	2/2	0/1	1/2	1/3	0/4			1/2		
	Leptochiton cancellatus			1/1	1/2	2/5					
	Acanthochitona fascicularis					3/1					
	Anatoma crispata	1							1/2	1	
	Emarginula fissura			1/1		0/1					1
	Puncturella noachina	3		0/1					1	0/1	1
	Iothia fulva			0/2		1/1					0/1
	Clelandella miliaris	1		1	1	2/2					
	Skenea trochoides	3				4					
	Alvania cimicoides	1				2					
	Euspira montagui	0/1									
	Eulima bilineata	1									
	Trophonopsis barvicensis	1									
	Nudibranchia indet.		2		3	1					
	Nucula nucleus	6/1	0/1		5	2/1			3/3	1	16
	Asperarca nodulosa	7/1	2/1	4/3	5/4	24/4					
	Modiolula phaseolina	98/64	22/37	52/65	197/115	232/320		0/1	0/9		8/21
	Limatula gwyni				2	4		1	0/3		
	Limatula subauriculata	1	1	0/1		2					
	Notolimea crassa	1		1		1			0/1	1	
	Chlamys varia	1	1	1	0/1						

s. 3/6	Stasjon	Knar S	Knar S	Knar S	Knar S	Knar S	Knar N	Knar N	Knar N	Knar N	Knar N
	Dato	27.04.2012	27.04.2012	27.04.2012	27.04.2012	27.04.2012	27.04.2012	27.04.2012	27.04.2012	27.04.2012	27.04.2012
	Art	1	2	3	4	5	1	2	3	4	5
	Similipecten similis	0/1					1	1			
	Heteranomia squamula	0/1				0/2					
	Thyasira biplicata										2
	Thyasira obsoleta				2						
	Thyasira sarsii									0/1	
	Mendicula ferruginosa	4		6	4/1	1		1			4
	Astarte montagui			0/1					0/5		
	Astarte sulcata	5/4	3	9/6	11/3	7/9	7		1/8	1	
	Parvicardium pinnulatum	0/1				1					
	Timoclea ovata					0/1					
	Hiatella sp.	0/1			2	0/1					1
	Saxicavella jeffreysi								1/2		1
	Thracia villosiuscula								0/1		
	Novocrania anomala	5	1/1	1/3	4/1	5/7				0/2	0/1
	Terebratulina sp.	0/1	0/1		1/1						
	Macandrevia cranium	2/1	0/1						1		
*	BRYOZOA										
*	Bryozoa indet.	+	+	+		+					
*	Bryozoa skorpeformet	+	+	+	+	++	+		+		
*	Bryozoa grenet				+			+	+	+	+
	ECHINODERMATA										
*	Ophiuroidea indet.							+			
	Ophiactis balli	1				1					1
	Ophiopholis aculeata	0/1	1/1	0/1	0/4	2/8				0/1	
	Amphipholis squamata	2/6	4/7	5/9	1/2	9/6	1/2		2/3	0/3	1
	Ophiocomina nigra	0/1									
	Ophiura albida	0/1	0/2		0/1						
	Ophiura robusta	1/2	9/1	1/4	0/1		0/1		0/3	0/1	
	Echinus acutus									0/1	
	Strongylocentrotus droebachiensis			0/1						0/1	
	Echinocyamus pusillus									1	
	Spatangoida indet									0/1	
	Brisaster fragilis										1
	HOLOTUROIDEA										
	Synaptidae indet.				3						2
	ENTEROPNEUSTA indet.		2	1	3	+			1	1	2
*	CHAETOGNATHA indet.								1		
	ASCIDIACEA										
	Ascidiacea indet.	1	2	1	4	4					
	Pyura tessellata			0/1		4/5			1		
*	PISCES egg.		1			3	2	2	7	1	5
*	VARIA		+	+		+			+	+	

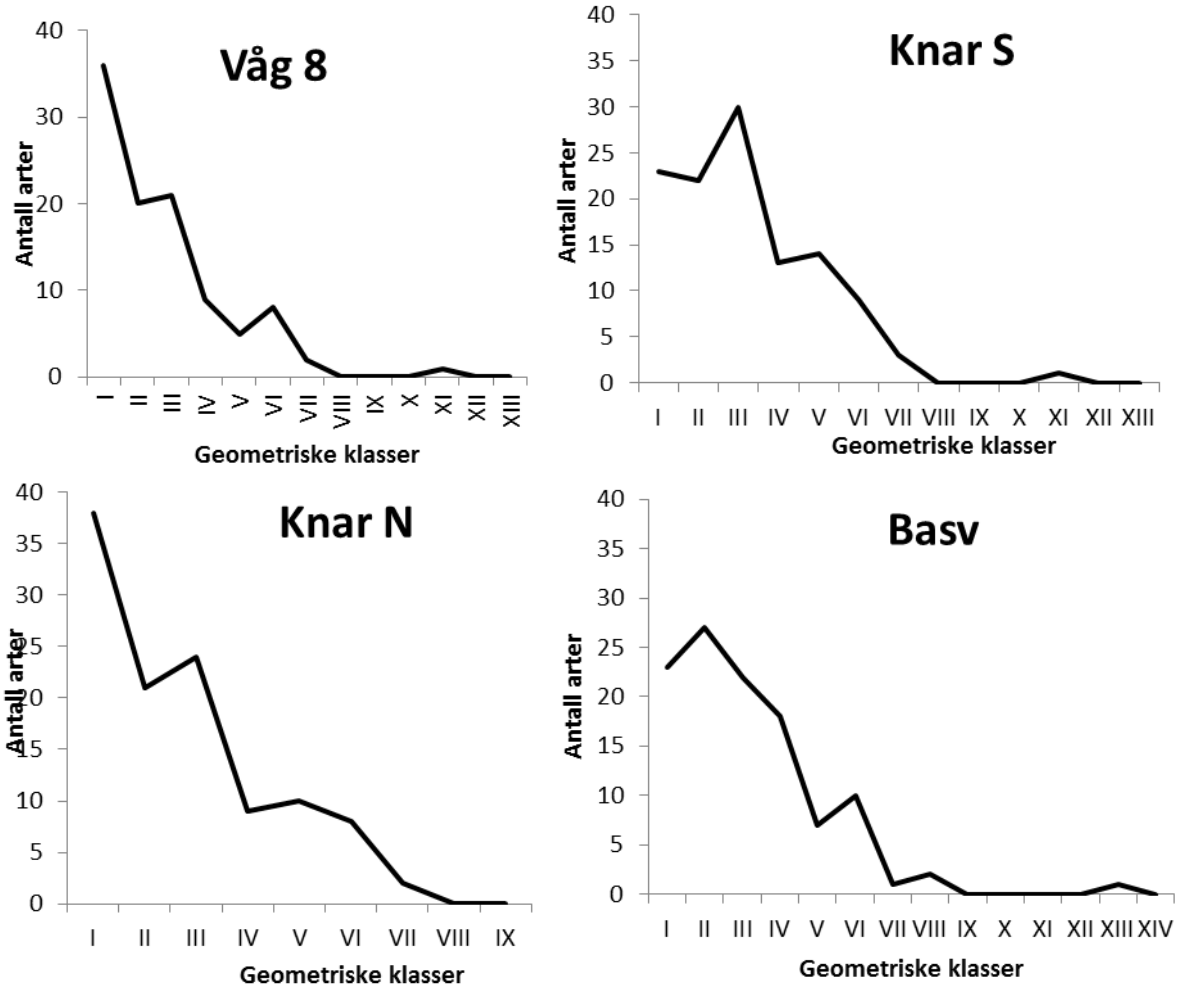
	Stasjon	Våg 8	Våg 8	Våg 8	Våg 8	Våg 8	Basv	Basv	Basv	Basv	Basv
	Dato	26.04.2012	26.04.2012	26.04.2012	26.04.2012	26.04.2012	26.04.2012	26.04.2012	26.04.2012	26.04.2012	26.04.2012
	Art	1	2	3	4	5	1	2	3	4	5
*	PORIFERA indet.	+					+	+	+	+	+
*	Cliona sp.				+						
*	HYDROZOA										
*	Hydrozoa indet.						+	+	+		+
*	ANTHOZOA										
	Limnactinia laevis										1
*	PLATYHELMINTES indet.						3	1		4	2
*	NEMERTINI indet.	2	3	2	3	2		2	1	1	1
*	NEMATODA indet.	ca.30	ca.30	ca.10	ca.20	ca.30	ca.20	9	ca.30	ca.31	ca.20
	POLYCHAETA										
	Paramphinome jeffreysii		1				1		4	2	3
	Pareurythoe borealis								1		1
	Euphrosine cirrata	1				2			2/3		2
	Aphrodita aculeata	0/2	0/1			0/1					
	Laetmonice filicornis					1					
	Polynoidae indet.		1				2				
	Acanthicolepis asperrima								1		
	Malmgrenia mcintoshi				1		1	1			2
	Gattyana cirrosa				0/1						
	Harmothoe mariannae										1
	Pholoe baltica	9	7	3	5	9	3		5	1	5
	Paranaitis wahlbergi	1									
	Phyllodoce groenlandica	1			1						
	Eumida sp.									1	
	Eumida sanguinea		1	0/1							
	Eulalia mustela		1		1	1			2	1/1	1/1
	Eulalia viridis				1						
	Eulalia sp.				1						
	Mystides caeca		1			1					

s. 4/6	Stasjon	Våg 8	Våg 8	Våg 8	Våg 8	Våg 8	Basv	Basv	Basv	Basv	Basv
	Dato	26.04.2012	26.04.2012	26.04.2012	26.04.2012	26.04.2012	26.04.2012	26.04.2012	26.04.2012	26.04.2012	26.04.2012
	Art	1	2	3	4	5	1	2	3	4	5
	Kefersteinia cirrata	7	9		9	4	2	2	1	1	1
	Lacydonia sp.		2								
	Glyphohesione klatti		1								
	Syllidae indet.				1	1	1		2	5	14
	Exogone sp.	3				1	2			4	4
	Sphaerodorum flavum	1			0/1	2			0/1		0/1
	Glycera lapidum	2/5	2/4	1/1	4/8	0/8	1/7	0/1	2/9	1/8	2/8
	Nothria conchylega					2	1/1	6	3	4	
	Eunice pennata						21/1	6/3	12/2	14/4	9
	Lumbrineridae indet.	20	18	11	20	15	4	5	4	4	3
	Drilonereis filum					1					
	Dorvillea sp.										1
	Protodorvillea kefersteini	1	3				2	1	6	1	
	Schistomeringos sp.		2								
	Orbiniidae indet.					1	1	1	6		1
	Aonides paucibranchiata		1								
	Laonice bahusiensis	0/5	0/2		0/2	0/3	1/1		1	1	0/2
	Malacoceros sp.				1	3	1		2		
	Polydora sp.									1	
	Pseudopolydora pulchra		1								
	Prionospio cirrifera	1			3				2	1	2
	Spiophanes wigleyi	216/48	321/49	60/10	314/74	129/47	3/8	2/3	3/2	1/5	
	Apistobranchus tenuis		1								1
	Spiophanes kroyeri		1		1	1	1	1		1/2	0/1
	Ariciden catherinae		1	2		3	1		5	3	2
	Ariciidea sp.							1			
	Levinsenia gracilis	1							1		1
	Paraonis sp.	4	3		3	1	2		6	9	6
	Aphelochaeta sp.	5	10	7	9	10	7	1	2	8	14
	Chaetozone sp.	13	15	3	8	10	11	4	13	15	8
	Cirratulus cirratus				1						3
	Macrochaeta clavicornis	1									
	Macrochaeta sp.									2	2
	Lipobranchus jeffreysii	0/1	0/2				0/1		0/2	1	2
	Scalibregma inflatum						1				
	Aschlerocheilus sp.						1	1	2	3	
	Axiokebuita sp.					1	8		16	10	10
	Mediomastus fragilis		1								
	Notomastus latericeus	5/5	11/1	2	3/4	5	3/1	1/1	3	1/1	3
	Lumbriclymene cylindricaudata									2	
	Notoproctus oculatus				7					1	
	Maldanidae indet.	2	2	1	4	4	1				
	Galathowenia oculata						2		1	2	
	Sabellides octocirrata	9/1	4/1	2	12/5	9/2	2	1/1	3	2	1
	Anobothrus sp.	2	1		4	2	15	6	2	14	2
	Lysippides fragilis	2/5	5/2	3	3	12/6					
	Amphicteis gunneri		1/1		0/1	1/1	6/3	2/2	6/5	13/1	1
	Amythasides macroglossus	6	8	7	11	18	11	8	15	15	3
	Sosanopsis wireni		0/1		1	1	1	0/1			
	Melinna albicincta						2/2	2	2	0/1	
	Terebellidae indet.									1	
	Amphitrite cirrata	1	1/1		3/1	3/1					
	Eupolymnia nebulosa		2			1			1		1
	Eupolymnia nesidensis						1		2	1	
	Pista lornensis		0/1				1				
	Lanice conchilega	0/1			1	0/1					
	Thelepus cincinnatus		4/2		1/2	0/7					
	Polycirrus medusa						0/2	1			0/1
	Polycirrus norvegicus		0/1				1/1	0/1		2	0/1
	Hauchiella tribullata	2	2/1	3	0/1	4					
	Trichobranchidae indet.						1		1		2
	Trichobranchus gracilis				0/1		0/1	1/1	2	0/2	
	Terebellides stroemi							0/1	0/1	0/2	0/1
	Sabellidae indet.	3	7	3	6						
	Sabella pavonina					1					
	Jasmineira sp.		1								
	Euchone sp.	3	2	1	2		3				
	Hydroides norvegica										1
	Pomatoceros triqueter						0/2				
	OLIGOCHAETA indet.	41	10	10	43	19	67	19	48	55	21
*	HIRUDINEA indet.				1						
	Bonellia viridis		0/1							0/1	
	SIPUNCULA										
	Sipuncula indet.	2	1	1	1	1	3	1	1	6	2
	Phascolion strombus				0/1					0/1	
	Onchnesoma steenstrupi						2/1	2	3	4	
	Nephasoma cf. minutum						1		1	21	1

s. 5/6	Stasjon	Våg 8	Våg 8	Våg 8	Våg 8	Våg 8	Basv	Basv	Basv	Basv	Basv
	Dato	26.04.2012	26.04.2012	26.04.2012	26.04.2012	26.04.2012	26.04.2012	26.04.2012	26.04.2012	26.04.2012	26.04.2012
	Art	1	2	3	4	5	1	2	3	4	5
	CRUSTACEA										
*	Calanus finmarchicus		3	1	2	3			5	2	1
	Verruca stroemi						1236/318	804/224	1683/362	1726/347	452/109
*	Apseudes spinosus	2	1	1							
*	Natatolana borealis	1	1/1		0/1	0/1					
*	Janira maculosa						1/1	1/2	1/2	1	2
*	Caprellidae indet.		1		3						
*	Ampelisca spinipes	1	2		4	1					
*	Ampelisca sp.	7	6	1	16	3					
*	Byblis sp.							2			
*	Haploops setosa					2					
	Amphilochoides sp				1						
*	Atylus vedlomensis	2	1	1	3	5					
	Liljeborgia pallida		1		1	1	1		1		
*	Lysianassidae indet.					1					
*	Tmetonyx sp.						2	1			
*	Cheirocratus sp.	2					3		1	4	1
	Eriopisa elongata						1		5	1	
	Normanion sp.									1	2
	Paraphoxus oculatus					1					
*	Decapoda indet.										0/2
*	Munida sarsi								0/1		
*	Munida tenuimana						0/2	0/1	0/3	0/1	0/1
*	Paguridae indet.	0/1			0/1						
	MOLLUSCA										
	Caudofoveata indet.										1
	Leptochiton asellus						0/3		1/1		4/1
	Leptochiton cancellatus		2/3		0/1		5/2		6/2	6/2	1/1
	Anatoma crispata		1/1			2/1			2	1	
	Puncturella noachina						2		1/1	1	1
	Clelandella miliaris									1	
	Alvania cimicoides						0/1				
	Euspira montagui			1		1			1	0/1	1
	Eulima bilineata						0/1		1/1		
	Cylichna alba					1					
	Nudibranchia indet.						1				
	Nucula nucleus		1						1		
	Asperarca nodulosa								1	1	1
	Modiolula phaseolina		0/1		1/1	0/2	21/26	12/15	22/60	18/19	19/15
	Limatula subauriculata	2	2/1		0/2	1	0/1	0/1	2	1/2	1
	Notolimea crassa	0/1	1		0/1	0/1	1		1	1	
	Aequipecten opercularis								2		1
	Similipecten similis		1						1	0/1	
	Heteranomia squamula						0/3		0/1	0/3	0/1
	Thyasira obsoleta		1			2	3		4/1	0/1	1
	Thyasira sarsii										4/1
	Axinulus croulinensis						1			1	
	Mendicula ferruginosa		1/1			1/1	4	1	3	13	1
	Tellimya tenella									2	1
	Astarte montagui										0/1
	Astarte sulcata					1	2/1	2/1	0/5	8/5	6/2
	Timoclea ovata	1	1		1/1	3			2	1	
	Hiatella sp.						0/1				0/1
	Cuspidaria obesa							0/1			
	Antalis entalis				1						
	Novocrania anomala						1/16	1/3	4/5	1/6	0/3
	Macandrevia cranium								2	1	
*	BRYOZOA										
*	Bryozoa skorpeformet		+				++	++	++	++	++
*	Bryozoa grenet						+		+	+	+
	ECHINODERMATA										
	Ophiopholis aculeata						0/1		0/1	0/5	0/1
	Amphipholis squamata		1/1		0/2	1	1/8	2/3	2/9	4/4	2/9
	Amphiura securigera					0/1					
	Ophiocten affinis	1/9	0/3		0/1	1/4					
	Ophiura albida		0/2		1				0/2		
	Ophiura robusta								2/1		0/2
	Echinus acutus	0/1	0/3		0/1	0/1					
	Strongylocentrotus droebachiensis		0/1								
	Echinocyamus pusillus				2	1					
	Spatangoida indet	0/5	0/3		0/5	0/3					
	Spatangus purpureus				1	1				1	1
	HOLOTUROIDEA										
	Pseudothyone raphanus		1								
	Thyonidium drummondi		6								
	Synaptidae indet.	4	1		3		+				
	ENTEROPNEUSTA indet.	1	2	1	3		2	1	1	3	1

s. 6/6	Stasjon	Våg 8	Våg 8	Våg 8	Våg 8	Våg 8	Basv	Basv	Basv	Basv	Basv
	Dato	26.04.2012	26.04.2012	26.04.2012	26.04.2012	26.04.2012	26.04.2012	26.04.2012	26.04.2012	26.04.2012	26.04.2012
	Art	1	2	3	4	5	1	2	3	4	5
*	CHAETOGNATHA indet.		1								
	ASCIDIACEA										
	Ascidiacea indet.	1	1		2			1	3		
*	PISCES egg.			2		2		2	3		10
*	VARIA		+					+		+	+

APPENDIX 6: GEOMETRICAL CLASSES (BENTHOS)



*Geometrisk fordeling. Fordeling av arter i geometriske klasser for bunnstasjonene i **Område 8** for 2012 (uthevet linje) sammenlignet med historiske data.*

APPENDIX 7: TOP TEN SPECIES LIST (BENTHOS)

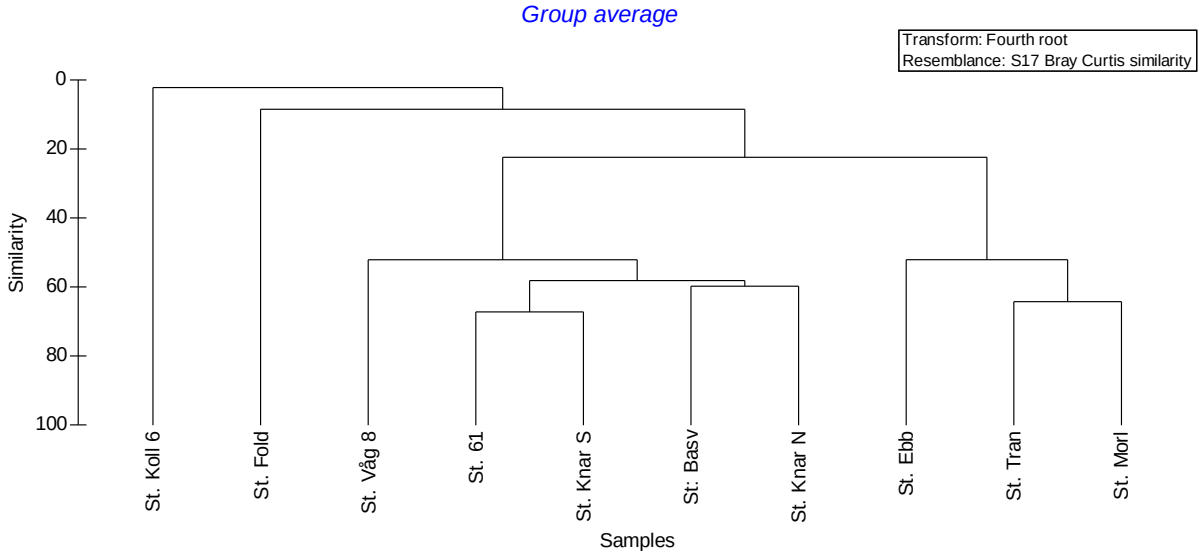
Knar S Art	Antall individer	%	Kum. %
Modiolula phaseolina	1202	48	48
Verruca stroemi	109	4	52
Chaetozone sp.	84	3	56
Eunice pennata	78	3	59
Astarte sulcata	57	2	61
Axiokebuita sp.	55	2	63
Asperarca nodulosa	55	2	65
Amphipholis squamata	51	2	67
Glycera lapidum	44	2	69
Oligochaeta indet.	40	2	71

Knar N Art	Antall individer	%	Kum. %
Aphelochaeta sp.	78	7	7
Paraonis sp.	66	6	14
Spiophanes wigleyi	60	6	19
Chaetozone sp.	57	5	25
Glycera lapidum	54	5	30
Hauchiella tribullata	44	4	34
Kefersteinia cirrata	41	4	38
Modiolula phaseolina	39	4	41
Lipobranchus jeffreysii	38	4	45
Oligochaeta indet.	32	3	48

Basv Art	Antall individer	%	Kum. %
Verruca stroemi	7261	83,0	83,0
Modiolula phaseolina	227	2,6	86
Oligochaeta indet.	210	2,4	88
Eunice pennata	72	0,8	89
Amythasides macroglossus	52	0,6	89
Chaetozone sp.	51	0,6	90
Axiokebuita sp.	44	0,5	91
Amphipholis squamata	44	0,5	91
Novocrania anomala	40	0,5	92
Glycera lapidum	39	0,4	92
Anobothrus sp.	39	0,4	92
Amphicteis gunneri	39	0,4	93

Våg 8 Art	Antall individer	%	Kum. %
Spiophanes wigleyi	1268	58	58
Oligochaeta indet.	123	6	64
Lumbrineridae indet.	84	4	67
Amythasides macroglossus	50	2	70
Chaetozone sp.	49	2	72
Sabellides octocirrata	45	2	74
Aphelochaeta sp.	41	2	76
Lysippides fragilis	38	2	78
Notomastus latericeus	36	2	79
Glycera lapidum	35	2	81

APPENDIX 8: CLUSTER ANALYSIS



*Likhet mellom stasjoner som uttrykt gjennom en clusteranalyse av artslistene fra stasjonene i **Område 8** i 2012.*

APPENDIX 9: SEMIQUANTITATIVE LITTORAL STUDIES

Vedlegg SF-SAM-505.3 **ARTSLISTE SEMIKVANTITATIV LITORALUNDERSØKELSE** SAM-Marin

uni Research

SAM-Marin
Thormøhlensgate 55, 5008 Bergen
Telefon: 55 58 43 41 Telefaks: 55 58 45 25

Test 157

Oppdragsgiver (navn og adresse): Bergen kommune, Vann og avløpsetaten, Fjøsangerveien 68, 5086 Bergen
Prosjekt nr.: 806275
Prøvetakingssted (område):Byfjord
Dato for prøvetaking:4/6-22/8 2012
Ansvarlig for prøvetaking (firma):Uni Research SAM Marin
Avvik/forhold med mulig påvirkning på resultatet: -
Artene identifisert av:Tom Alvestad og Stian Ervik Kvaløy

Metode: Materialet er framskaffet i henhold til akkreditering gitt av Norsk Akkreditering til prøvetaking og taksonomisk analyse under akkrediteringsnummer Test 157. Undersøkelsen følger NS-EN ISO 19493:2007 og interne standard forskrifter.

Opplysninger om merker i artslisten:
På hver stasjon er 8 meter strandlinje målt opp. Mengden av hver art blir gitt ut fra det nivå i fjæresonen hvor den har størst utbredelse.

cf foran et artsnavn betyr at artsbestemmelsen er usikker.

* ved art angir at det er knyttet avvik til prøven.

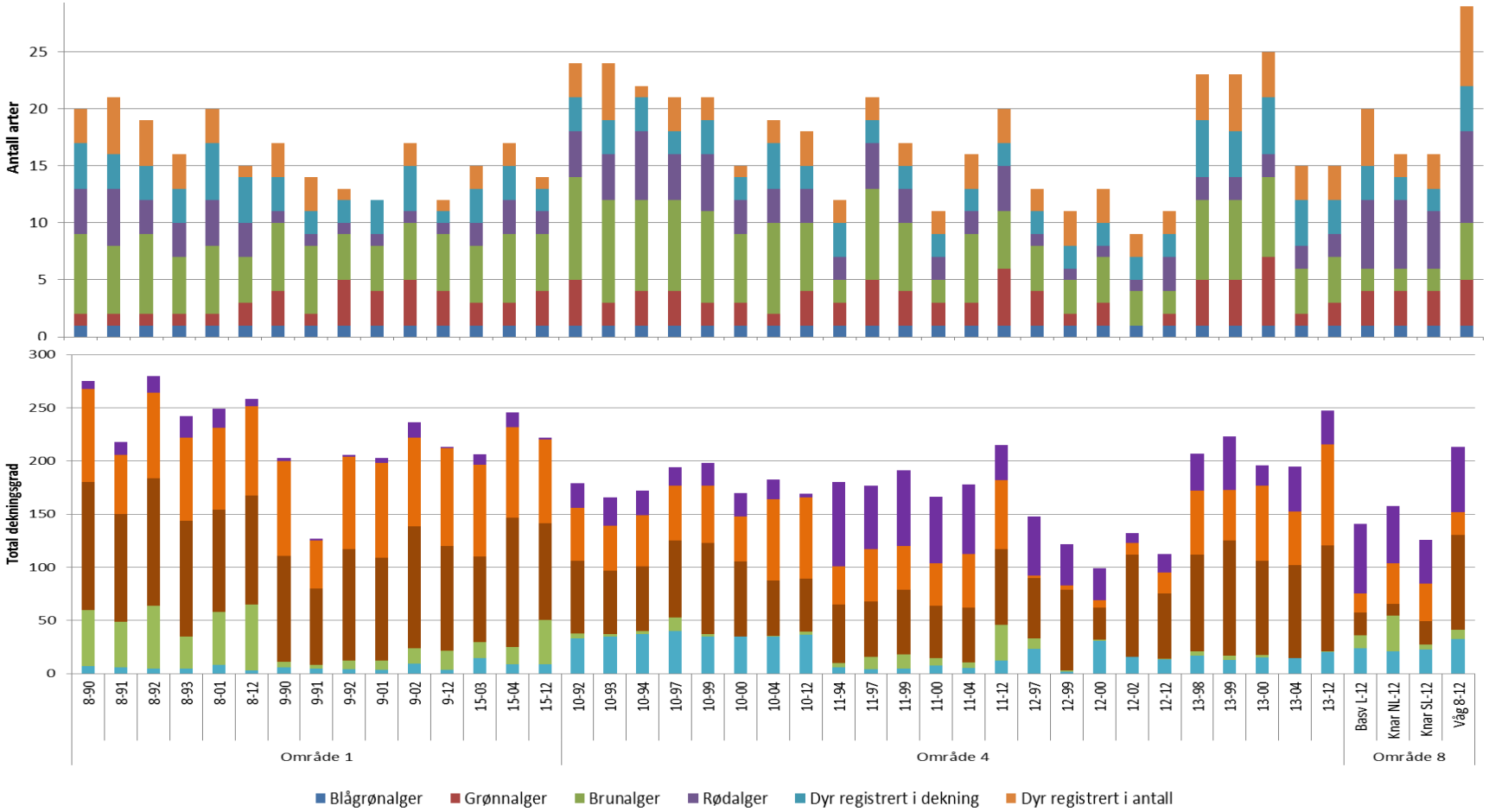
Andre opplysninger:
Tabellen starter på neste side og består av 1 sider.

Signatur: Tom Alvestad
Godkjent taksonom

Godkjent av: KH Gyldig fra: 22.03.2011 Side 1 av 1

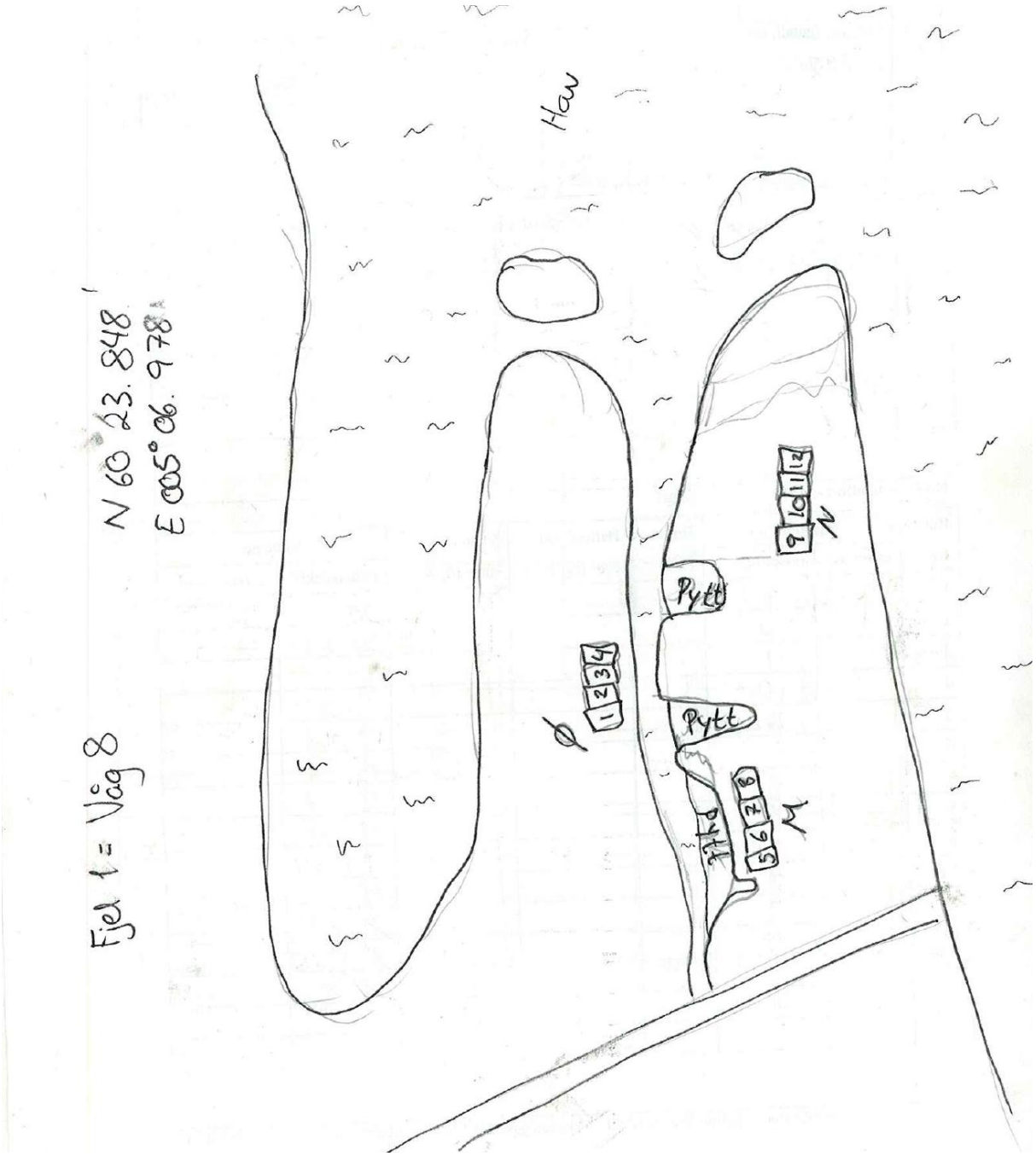
Arter	Knar SL	Basv L	Knar NL	Våg 8L
Calothrix sp.	3	5		5
Verrucaria sp.	2	4	5	5
Porphyra sp.	1	1	5	2
Pelvetia sp.	1	1		4
Fucus vesiculosus	3	4	2	5
Ascophyllum nodosum				4
Ectocarpus sp.		1		
Palmaria palmata				5
Ceramium sp.		1	1	2
Cladophora rupestris	1	1	1	
Hildenbrandia sp.	3	3	1	2
Fucus serratus				4
Laminaria digitata		5		
Phymatolithon lenormandii		1		
Dumontia sp.				
Mastocarpus sp.				
Cladophora sp.				
Cladophora rupestris				
Amphipoda indet.				
Littorina obtusata				
Echinus eculentus				
Corbula gibba				
Asterias rubens				
Psammechinus miliaris				
Porifera				
Ulva sp.	3	5	4	
Grønt belegg	2			
Chondrus crispus	1	1		
Påvekst		2		
Chorda filum		1		
Ulva sp.			2	
Bryozoa			2	
Bryozoa på tare		2		
Semibalanus balanoides	4	4	3	5
Patella sp.	2	1	1	2
Nucella sp.		1		1
Littorina littorea	1	1		1
Mytilus edulis				4
Egg				
Cyanea capillata		1		1

APPENDIX 10: SPECIES AND DISTRIBUTION (LITORAL)

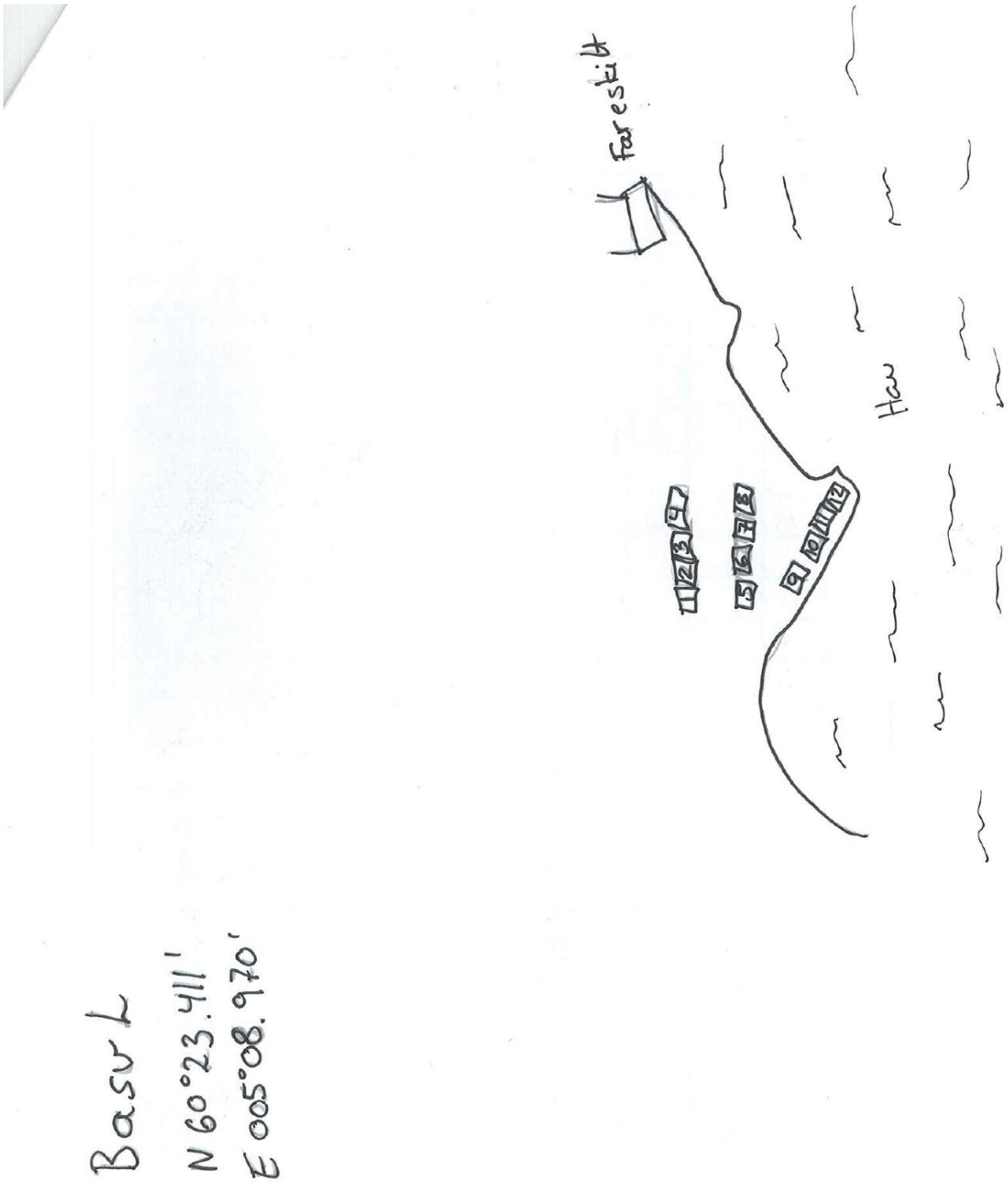


Figur: Oversikt over antall arter og total dekningsgrad av alger og dyr registrert i prosentvis dekning av rutene utover i fjorden (område 1 innerst og område 8 ytterst).

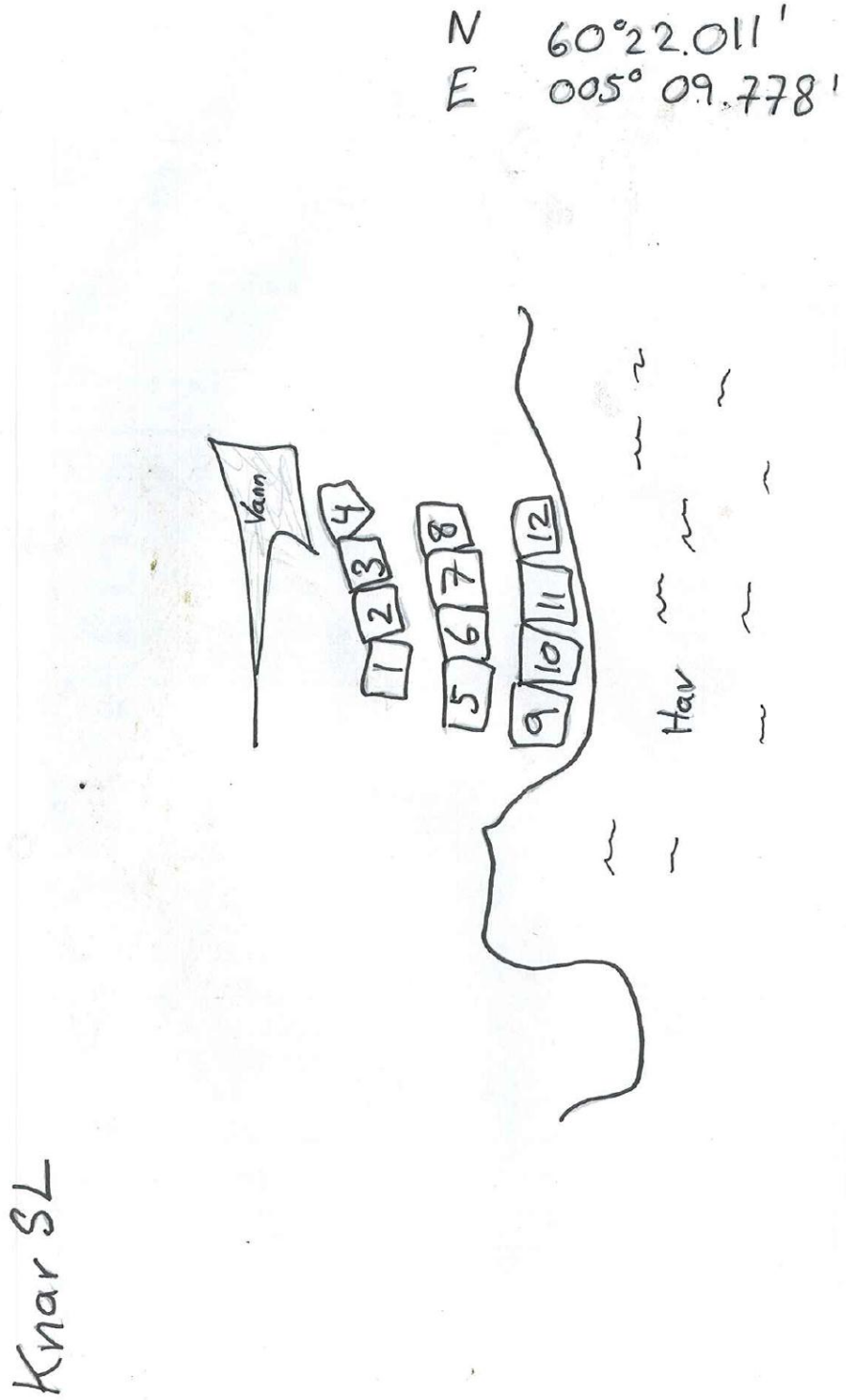
APPENDIX 11: STATION SCETCHES



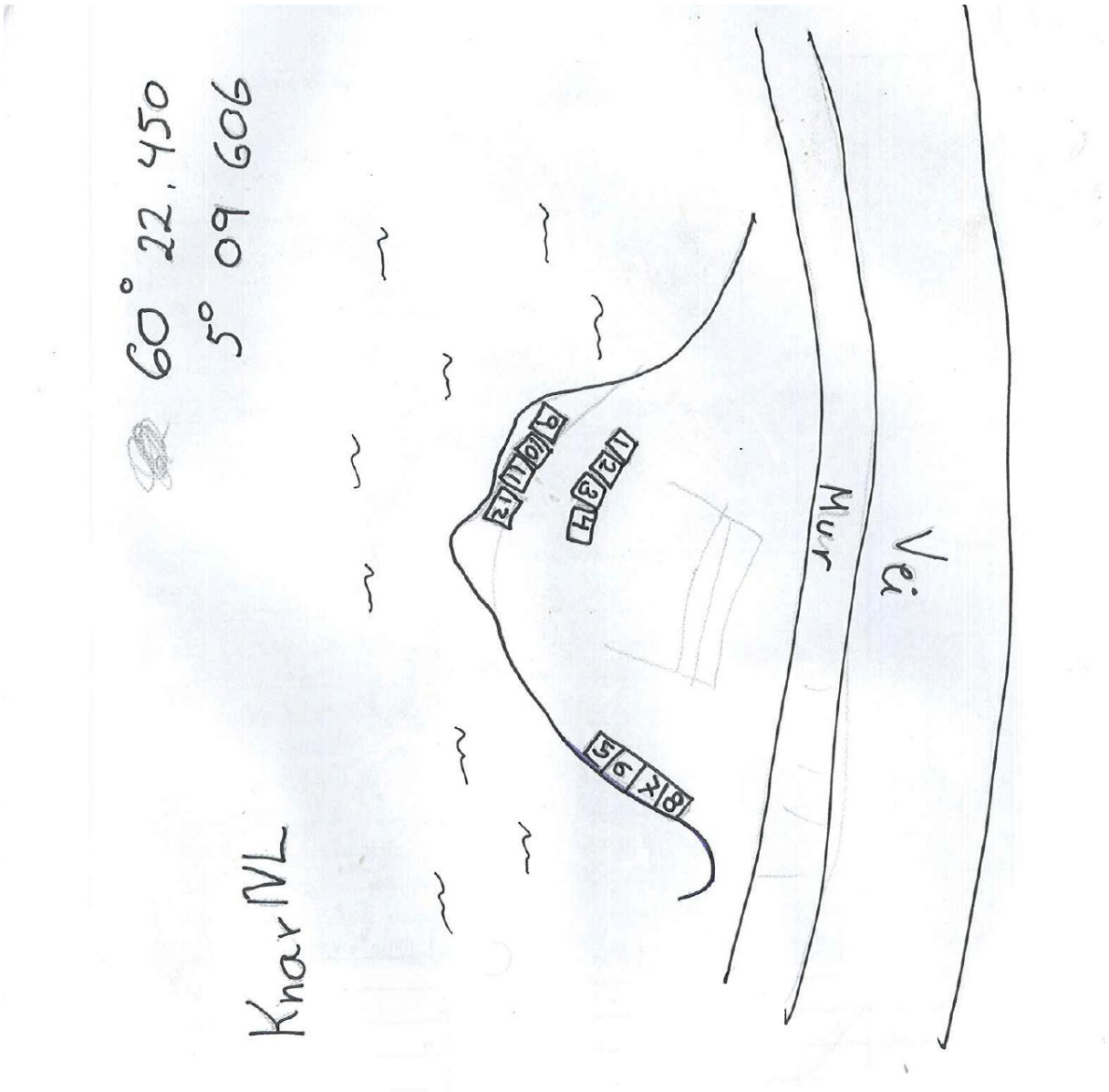
Stasjonsskisse for Våg 8 i område 8.



Stasjonsskisse for BasvL



Stasjonsskisse for Knar SL



Stasjonsskisse for Knar NL

APPENDIX 12: SPECIES LIST (GRID ANALYSIS)

Vedlegg, SF-SAM-505.3 **LITORALARTSLISTE** SAM-Marin

uni Research

SAM-Marin
Thormøhlensgate 55, 5008 Bergen
Telefon: 55 58 43 41 Telefaks: 55 58 45 25

Test 157

Oppdragsgiver (navn og adresse): Bergen kommune, Vann og avløpsetaten, Fjøsangerveien 68, 5080 Bergen
Prosjekt nr.: 806275
Prøvetakingssted (område): Byfjord
Dato for prøvetaking: 4/6-22/8 2012
Ansvarlig for prøvetaking (firma): Uni Research - SAM Marin
Avvik/forhold med mulig påvirkning på resultatet: -
Artene er identifisert av: Tom Alvestad og Stian Ervik Kvalø

Metode: Materialet er framskaffet i henhold til akkreditering gitt av Norsk Akkreditering til prøvetaking og taksonomisk analyse under akkrediteringsnummer Test 157. Undersøkelsen følger NS-EN ISO 19493:2007 og interne standard forskrifter.

Opplysninger om merker i artslisten:
For hver stasjon er rutenes nivå og nummer oppgitt. Under hvert rutenummer er alger og fastsittende dyr med høyt individantall angitt i % dekningsgrad. Fritt bevegelige dyr og fastsittende dyr med lavt individantall er registrert i antall individer pr. prøverute.

cf. foran et artsnavn betyr at artsbestemmelsen er usikker.

* ved art angir arten ikke er med i eventuelle analyser.

* ved rutenummer angir at det er knyttet avvik til prøven

Andre opplysninger:
Tabellen starter på neste side og består av 4 sider.

Artslisten skal ikke kopieres i ufullstendig form, uten skriftlig godkjennelse fra SAM.

Signatur: Tom Alvestad
Godkjent taksonom

Godkjent av: KH Gyldig fra: 22.3.2011 Side 1 av 1

Byfjords-		Stasjon / dato:	Basv L	21.08.2012										
undersøkelsen		Nivå:	Øvre				Midtre				Nedre			
2012		Rute:	1	2	3	4	5	6	7	8	9	10	11	12
		Kl.:		20:30	20:33	20:35	20:09	20:14	20:17	20:20	19:38	19:42	19:50	19:53
utv		Observatør:	SK/T	SK/T	SK/T	SK/T	SK/T	SK/T	SK/T	SK/T	SK/T	SK/T	SK/T	SK/T
		Rodalger												
	77	Chondrus crispus				+	+	2	+	1	4	8	5	5
	78	Corallina officinalis									+			
	79	Dumontia contorta												
	80	Hildenbrandia rubra	3	4	9	8				+	+	+	+	+
	82	Mastocarpus stellatus			+		+			1				
	83	Membranoptera alata												
	85	Palmaria palmata									+			+
	89	Phymatolithon lenormandii					+				+	+	+	+
*	93	Porphyra sp.	1	1	1	1			+	+				
	95	Rhodomela confervoides												
*	202	Polysiphonia sp.												
	277	Osmundea sp.												
*	281	Ceramium sp.					+	+	+	+	4	7	17	12
		Ahnfeltia plicata										+		
		Brunalger												
	2	Ascophyllum nodosum												
		Asperococcus sp.												
2	7	Ectocarpales indet.	+		+	+	+		+	+				
18	11	Elachista fucicola												
	12	Fucus serratus												
	15	Fucus vesiculosus	3	+	6	12	11	8	16	6				
4	17	Laminaria digitata												
*	27	Ralfsia sp.												
	29	Spongonema tomentosum												
*	251	Fucus sp. (kim)												
18	256	Elachista sp.												
		Grønnalger												
25	30	Blidingia minima												
11	33	Chaetomorpha sp.												
	37	Cladophora rupestris					4	4	2	1	11	7	3	2
		Cladophora rupestris død												
1	39	Cladophora sp.												
6	53	Spongomorpha aeruginosa												
	61	Ulva lactuca					+	+	1	1	+			
		Ulva sp.			+	+							+	+
*		Ulva sp. Død												
3	290	Enteromorpha sp.												
		Dyr i dekning												
*	108	Balanus sp.												
21	114	Coryne pusilla												
21	115	Dynamena pumila												
22	117	Electra pilosa												
22	118	Flustrellidra hispida												
	120	Halichondria panicea												
22	124	Membranipora membranacea												
	126	Mytilus edulis					5 ruter	3 ruter	2 ruter	2 ruter	15 ruter	15 ruter	18 ruter	8 ruter
	129	Semibalanus balanoides	3	2	3	1	20	22	23	23	8	8	4	8
	158	Hiatella arctica												1
*	211	Mytilus edulis (juv)												
*	212	Porifera indet.												
24	215	Bryozoa indet (grenet)												
22	216	Bryozoa indet. (skorpeformet)												
21	269	Dynamena sp.												
		Dyr i antall												
*	139	Amphipoda indet.												
	145	Asterias rubens												
	146	Balanus balanus												
	149	Carcinus maenas							1					
*		Galathea intermedia												1
*	159	Hirudinea indet. (i antall)												
*	166	Idotea sp.									1			
	174	Littorina littorea					3	2	8	4	3			1
	175	Littorina obtusata												
*	177	Littorina sp.												
	184	Nucella lapillus					3	4				1		1
13	190	Patella vulgata												
*	220	Hydrozoa indet.												
	266	Patella sp.	3				4	5	5	6	3	2	1	2
12	267	Actinaria indet.									1		2	8
*	284	Hiatella sp.												1
	286	Littorina sp. juv												
		Blågrønnalger												
*	97	Bryophyta indet.												
15	105	Verrucaria mucosa	19	14	11	13	+	+	+	+	+	+	+	2
15	228	Calothrix sp.	+	5	2	3								
		Annet												
*	230	Bart fjell	0	0	0	0	0	0	0	0	0	0	0	0
*	232	Byssusтråder												
*	235	Fjærepytt												
*	242	Uten tangdekke	22	24	19	13	14	17	9	19	25	25	25	25
*	257	Mudder m/grus og stein												

Byfjords-		Stasjon / dato:	Knar NL	22.08.2012										
undersøkelsen		Nivå:	Øvre				Midtre				Nedre			
2012		Rute:	1	2	3	4	5	6	7	8	9	10	11	12
		Kl.:	09:34		09:26				10:25	10:30		09:03	09:10	09:17
utv		Observatør:	TA/SK	TA/SK	TA/SK	TA/SK	TA/SK	TA/SK	TA/SK	TA/SK	TA/SK	TA/SK	TA/SK	TA/SK
		Rødalger												
	77	Chondrus crispus	+		+		2	4	+	+	6	2	6	1
	78	Corallina officinalis					+					+		
	79	Dumontia contorta												
	80	Hildenbrandia rubra	12	11	7	7	+	+	7	10	+		+	+
	82	Mastocarpus stellatus					9	1	3	3	1	6	7	7
	83	Membranoptera alata												
	85	Palmaria palmata											+	
	89	Phymatolithon lenormandii					+	+				+		
*	93	Porphyra sp.	4	3	2	1				+				
	95	Rhodomela confervoides												
*	202	Polysiphonia sp.												
	277	Osmundea sp.												
*	281	Ceramium sp.									3	4	4	3
		Ahnfeltia plicata												
		Brunalger												
	2	Ascophyllum nodosum												
		Asperococcus sp.												
2	7	Ectocarpales indet.	+				+	+	+	+				+
18	11	Elachista fucicola												
	12	Fucus serratus												
	15	Fucus vesiculosus	2		7	+	5	5	5	6				+
4	17	Laminaria digitata												
*	27	Ralfsia sp.												
	29	Spongonema tomentosum												
*	251	Fucus sp. (kim)												
18	256	Elachista sp.												
		Grønnalger												
25	30	Blidingia minima												
11	33	Chaetomorpha sp.												
	37	Cladophora rupestris					+	+	+	+			+	+
		Cladophora rupestris død												
1	39	Cladophora sp.												
6	53	Spongomorpha aeruginosa												
	61	Ulva lactuca					+	+	+	2	12	3	3	2
		Ulva sp.					7	10	13	14	2	12	10	9
*		Ulva sp. Død												
3	290	Enteromorpha sp.												
		Dyr i dekning												
*	108	Balanus sp.												
21	114	Coryne pusilla												
21	115	Dynamena pumila												
22	117	Electra pilosa												
22	118	Flustrellidra hispida												
	120	Halichondria panicea												
22	124	Membranipora membranacea												
	126	Mytilus edulis	4				5 ruter	+	+	+	20 ruter	17 ruter	20 ruter	20 ruter
	129	Semibalanus balanoides	+	+	+	+	20	21	12	8	3	3	2	4
	158	Hiatella arctica												
*	211	Mytilus edulis (juv)												
*	212	Porifera indet.												
24	215	Bryozoa indet (grenet)												
22	216	Bryozoa indet. (skorpeformet)												
21	269	Dynamena sp.												
		Dyr i antall												
*	139	Amphipoda indet.	1	1	7		1	2	1	1	1	3	2	1
	145	Asterias rubens												
	146	Balanus balanus												
	149	Carcinus maenas												
*		Galathea intermedia												
*	159	Hirudinea indet. (i antall)			8									
*	166	Idotea sp.			3			2	2	1			1	1
	174	Littorina littorea	2		2									
	175	Littorina obtusata												
*	177	Littorina sp.												
	184	Nucella lapillus												
13	190	Patella vulgata												
*	220	Hydrozoa indet.												
	266	Patella sp.					1	1	1					
12	267	Actinaria indet.												
*	284	Hiatella sp.												
	286	Littorina sp. juv												
		Blågrønnalger												
*	97	Bryophyta indet.												
15	105	Verrucaria mucosa	12	11	8	16	+	+			+			
15	228	Calothrix sp.	1	3	10	1								
		Annet												
*	230	Bart fjell	0	0	0	0	0	0	0	0	0	0	0	0
*	232	Byssustråder												
*	235	Fjærepytt												
*	242	Uten tangdekke	23	25	18	24	20	20	20	19	25	25	25	24
*	257	Mudder m/grus og stein												

Byfjords-		Stasjon / dato:	Knar SL	21.08.2012										
undersøkelsen		Nivå:	Øvre				Midtre				Nedre			
2012		Rute:	1	2	3	4	5	6	7	8	9	10	11	12
		Kl.:	09:15			09:30	08:35		08:45		07:43	07:55		
utv		Observatør:	TA	TA	TA	TA	TA	TA	TA	TA	TA	TA	TA	TA
		Rødalger												
	77	Chondrus crispus					+	+			13	22	13	
	78	Corallina officinalis												
	79	Dumontia contorta												
	80	Hildenbrandia rubra	6	12	3	3	4	6	7	5	2	1	2	+
	82	Mastocarpus stellatus					+					+	4	+
	83	Membranoptera alata										+	+	
	85	Palmaria palmata									+	+	+	+
	89	Phymatolithon lenormandii												
*	93	Porphyra sp.	+	+	+		+	+						
	95	Rhodomela confervoides												
*	202	Polysiphonia sp.												
	277	Osmundea sp.												
*	281	Ceramium sp.									1	+		
		Ahnfeltia plicata									+			
		Brunalger												
	2	Ascophyllum nodosum												
		Asperococcus sp.												
2	7	Ectocarpales indet.					+	1	+	3	+	8	7	2
18	11	Elachista fucicola												
	12	Fucus serratus												
	15	Fucus vesiculosus			+		8	7	1	13	2	1	1	10
4	17	Laminaria digitata												
*	27	Ralfsia sp.												
	29	Spongonema tomentosum												
*	251	Fucus sp. (kim)												
18	256	Elachista sp.												
		Grønnalger												
25	30	Blidingia minima												
11	33	Chaetomorpha sp.												
	37	Cladophora rupestris						+			+	+		
		Cladophora rupestris død												
1	39	Cladophora sp.												
6	53	Spongomorpha aeruginosa												
	61	Ulva lactuca							+		4	2	5	2
		Ulva sp.							+	+				
*		Ulva sp. Død												
3	290	Enteromorpha sp.												
		Dyr i dekning												
*	108	Balanus sp.												
21	114	Coryne pusilla												
21	115	Dynamena pumila												
22	117	Electra pilosa												
22	118	Flustrellidra hispida												
	120	Halichondria panicea												
22	124	Membranipora membranacea												
	126	Mytilus edulis					1 ruter	3 ruter		2 ruter	15 ruter	18 ruter	11 ruter	13 ruter
	129	Semibalanus balanoides	+	+	+	+	10	4	10	8	8	6	7	7
	158	Hiatella arctica												
*	211	Mytilus edulis (juv)												
*	212	Porifera indet.												
24	215	Bryozoa indet (grenet)												
22	216	Bryozoa indet. (skorpeformet)												
21	269	Dynamena sp.												
		Dyr i antall												
*	139	Amphipoda indet.						3		6				
	145	Asterias rubens												
	146	Balanus balanus												
	149	Carcinus maenas								1				
*		Galathea intermedia												
*	159	Hirudinea indet. (i antall)							1					
*	166	Idotea sp.				1		3	1	1				1
	174	Littorina littorea	6	2					1	1		4		
	175	Littorina obtusata												
*	177	Littorina sp.												
	184	Nucella lapillus												
13	190	Patella vulgata		2			4	12		9	2			2
*	220	Hydrozoa indet.												
	266	Patella sp.												
12	267	Actinaria indet.												
*	284	Hiatella sp.												
	286	Littorina sp. juv												
		Blågrønnalger												
*	97	Bryophyta indet.	10	+	22	22								
15	105	Verrucaria mucosa	9	10	+	+	11	13	6	8				
15	228	Calothrix sp.		2	+	4			2	2				
		Annet												
*	230	Bart fjell	0	0	0	0	0	0	0	0	0	0	+	
*	232	Byssustråder												
*	235	Fjærepytt												
*	242	Uten tangdekke	25	25	24	25	17	18	24		23	24		15
*	257	Mudder m/grus og stein												

Byfjords-		Stasjon / dato:	Fjel 1	04.07.2012										
undersøkelsen		Nivå:	Øvre				Midre				Nedre			
2012		Rute:	1	2	3	4	5	6	7	8	9	10	11	12
		Kl.:	20:05	20:09	20:12	20:15	19:34	19:43	19:50	20:00	18:33	18:50	19:03	19:14
utv		Observatør:	TA	TA	TA	TA	TA	TA	TA	TA	TA	TA	TA	TA
		Rødalger												
	77	Chondrus crispus												
	78	Corallina officinalis									+	+		
	79	Dumontia contorta										+	+	
	80	Hildenbrandia rubra	3	3	2	+	3	1	1		1	2	1	+
	82	Mastocarpus stellatus									3	1	3	
	83	Membranoptera alata										+	+	+
	85	Palmaria palmata									1	2	3	+
	89	Phymatolithon lenormandii									10	4	7	10
*	93	Porphyra sp.				+								
	95	Rhodomela confervoides												
*	202	Polysiphonia sp.									1	1	2	1
	277	Osmundea sp.									1			
*	281	Ceramium sp.												4
		Ahnfeltia plicata												
		Brunalger												
	2	Ascophyllum nodosum												
		Asperococcus sp.												
2	7	Ectocarpales indet.	1	4	3	2	1	3	4	2	1	1	+	+
18	11	Elachista fucicola					5	5	4	5	4	3	3	2
	12	Fucus serratus									22	15	17	10
	15	Fucus vesiculosus	17	20	16	10	25	17	20	20				
4	17	Laminaria digitata											3	2
*	27	Ralfsia sp.					+	+	+	+	+	+	+	+
	29	Spongonema tomentosum												
*	251	Fucus sp. (kim)												
18	256	Elachista sp.												
		Grønnalger												
25	30	Blidingia minima												
11	33	Chaetomorpha sp.												
	37	Cladophora rupestris						+		1	4	2	3	5
		Cladophora rupestris død												
1	39	Cladophora sp.							+	+	1	1	1	1
6	53	Spongomorpha aeruginosa												
	61	Ulva lactuca									+	1	+	
		Ulva sp.			+	+			+	+		+	+	2
*		Ulva sp. Død												
3	290	Enteromorpha sp.												
		Dyr i dekning												
*	108	Balanus sp.												
21	114	Coryne pusilla					1		+					
21	115	Dynamena pumila												
22	117	Electra pilosa										+	+	+
22	118	Flustrellidra hispida					1	+			2	1	+	1
	120	Halichondria panicea										+		
22	124	Membranipora membranacea												+
	126	Mytilus edulis												
	129	Semibalanus balanoides	15	17	20	22	2	6	13	21	15	20	10	12
	158	Hiatella arctica												
*	211	Mytilus edulis (juv)												+
*	212	Porifera indet.												
24	215	Bryozoa indet (grenet)												
22	216	Bryozoa indet. (skorpeformet)												
21	269	Dynamena sp.					1				1	+	+	
		Dyr i antall												
*	139	Amphipoda indet.												
	145	Asterias rubens									1			
	146	Balanus balanus												
	149	Carcinus maenas												
*		Galathea intermedia												
*	159	Hirudinea indet. (i antall)												
*	166	Idotea sp.					1				1		1	
	174	Littorina littorea		1	2	1	1			1				
	175	Littorina obtusata											1	
*	177	Littorina sp.												
	184	Nucella lapillus		2		1	6	14			2			1
13	190	Patella vulgata									8	3	5	6
*	220	Hydrozoa indet.												
	266	Patella sp.	3	5	4	9	22	12	16	12				
12	267	Actinaria indet.									5	7	1	2
*	284	Hiatella sp.												
	286	Littorina sp. juv												
		Blågrønnalger												
*	97	Bryophyta indet.												
15	105	Verrucaria mucosa	3	4	3	3	20	17	12	4	10	7	10	+
15	228	Calothrix sp.	3	+	+									
		Annet												
*	230	Bart fjell		0	0	0	0	2	0	0	4			
*	232	Byssustråder												
*	235	Fjærepytt												
*	242	Uten tangdekke	8	5	9	15	0	8	5	5	3	10	8	13
*	257	Mudder m/grus og stein												

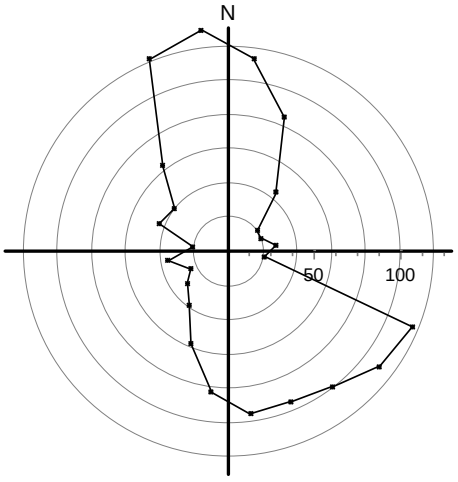
APPENDIX 13: MEASUREMENTS OF CURRENTS

Current measurements at station Knar S

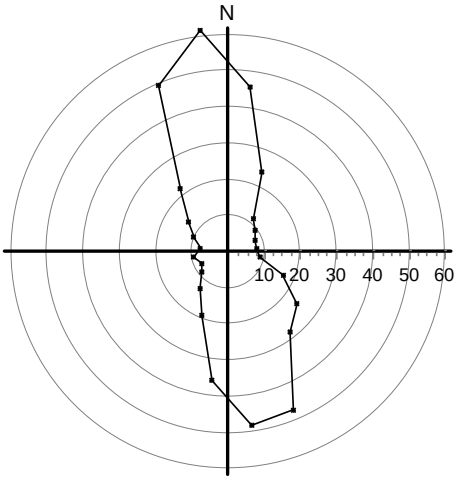
Short assessment

The current at this station is so strong that the measurement device is tilted for long periods.The current is very strong in a northern direction (330-15)º with a strong reflux in a southern direction (150-165)º.

Surface current at 10 metres (29.06.12-03.09.12)

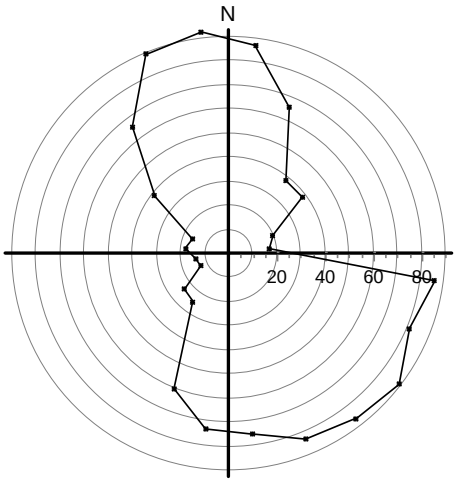


Maximum velocity (cm/s)
per 15 deg sector

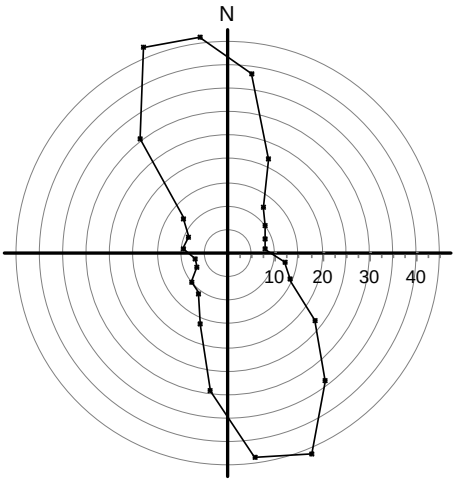


Mean velocity (cm/s)
per 15 deg sector

Current at 36 meters (29.06.12-03.09.12).

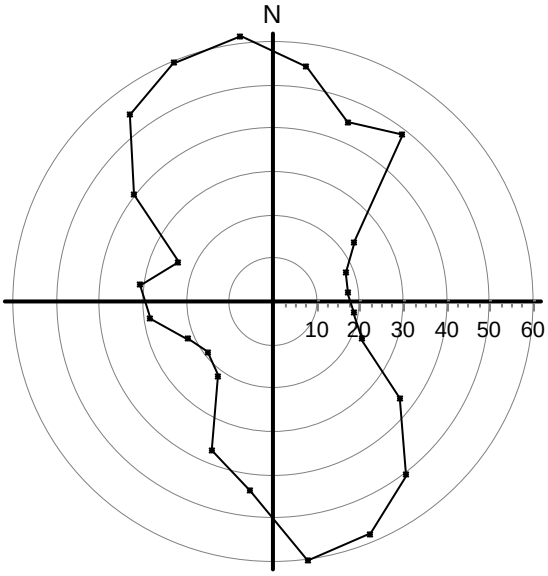


Maximum velocity (cm/s)
per 15 deg sector

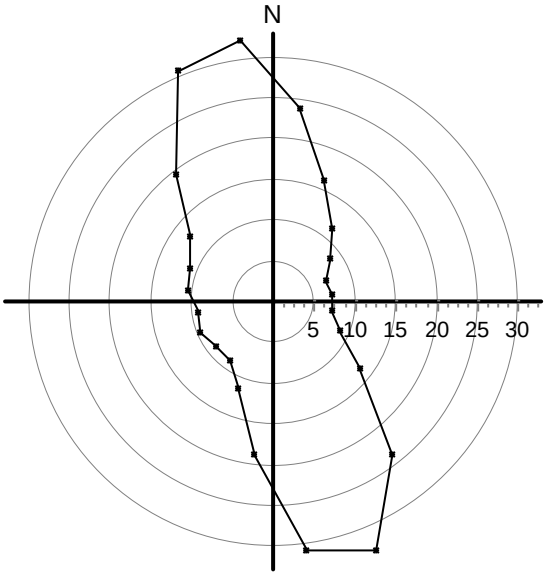


Mean velocity (cm/s)
per 15 deg sector

Bottom current at 60 metres (29.06.12-03.09.12).



Maximum velocity (cm/s)
per 15 deg sector



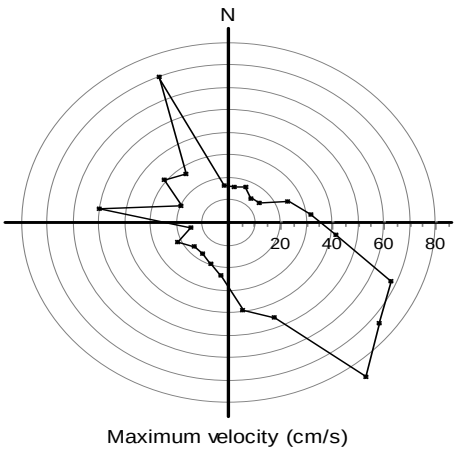
Mean velocity (cm/s)
per 15 deg sector

Strømmålinger ved stasjon Basv

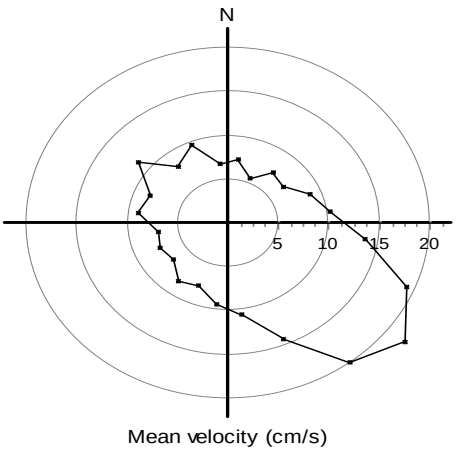
Short assesment

In this series of measurements (29.06.12-03.09.12) the maximal current velocity is at 10 metres depth 86.4 cm/sec, 53.8 cm/sek at 33 metres and 30.8 cm/sek på 55 metres. Average current velocity is 16.2, 10.0 og 6.7 cm/sec respectively. The watermasses in the entire water coloumn is moving in a south-eastern direction(90-150) º with a reflux current in the opposite direction. The reflux current is weak at the surface but increases with increasing depth.

Surface current at 10 metres (29.06.12-03.09.12).

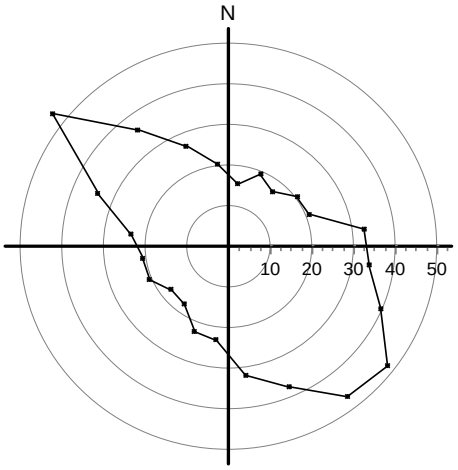


Maximum velocity (cm/s)
per 15 deg sector

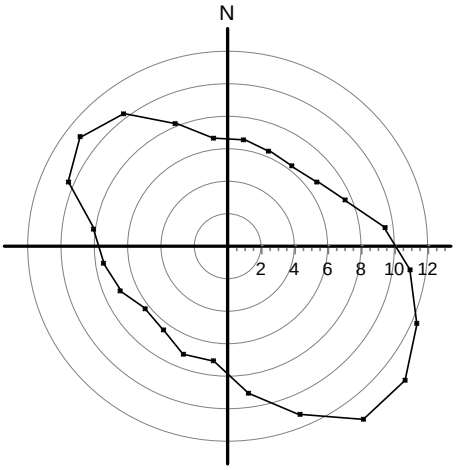


Mean velocity (cm/s)
per 15 deg sector

Current at 33 metres (29.06.12-03.09.12).

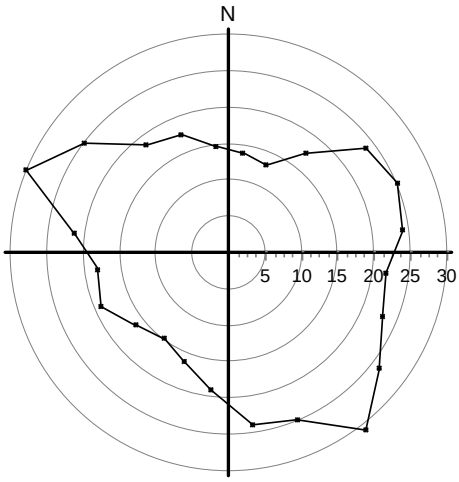


Maximum velocity (cm/s)
per 15 deg sector

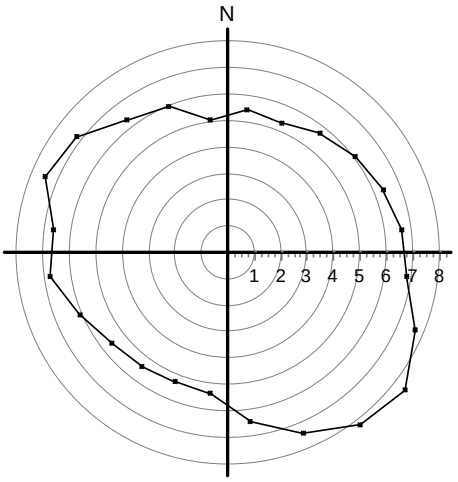


Mean velocity (cm/s)
per 15 deg sector

Bottom current at 55 metres (29.06.12-03.09.12).



Maximum velocity (cm/s)
per 15 deg sector

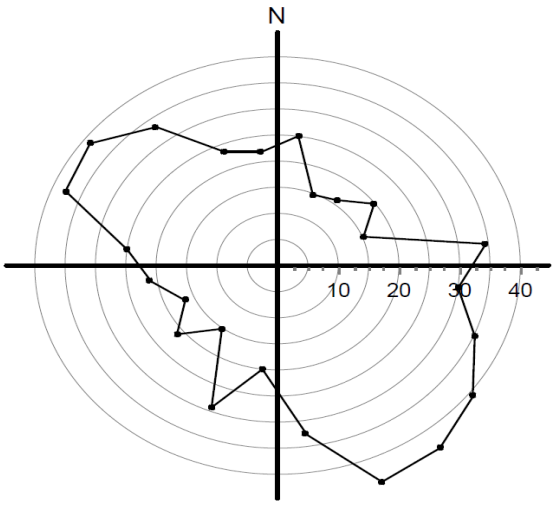


Mean velocity (cm/s)
per 15 deg sector

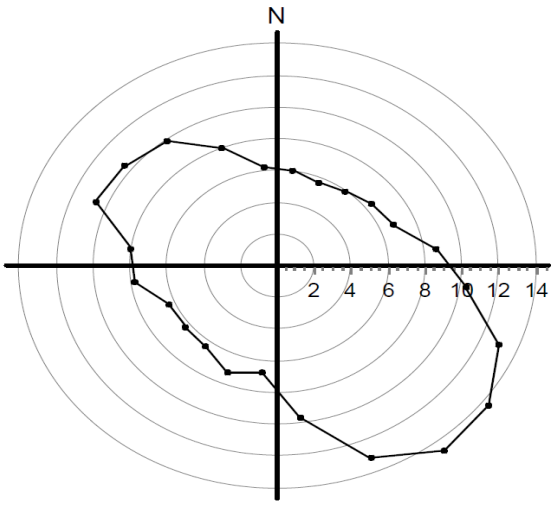
Short assessment

In this series of measurements (29.11.11-03-01.12) the maximal velocity of the current is at 13 metres 44.6 cm/sec, 38.8 cm/sec at 29 metres and 32.3 cm/sec at 45 metres. Average current velocity is 10.6, 8,8 og 7.6 cm/sec respectively. The water in the entire water column at this station is moving in a southeastern direction with a weak reflux current in the northwestern direction.

Surfacecurrent at 13 metres (29.11.11-03-01.12).

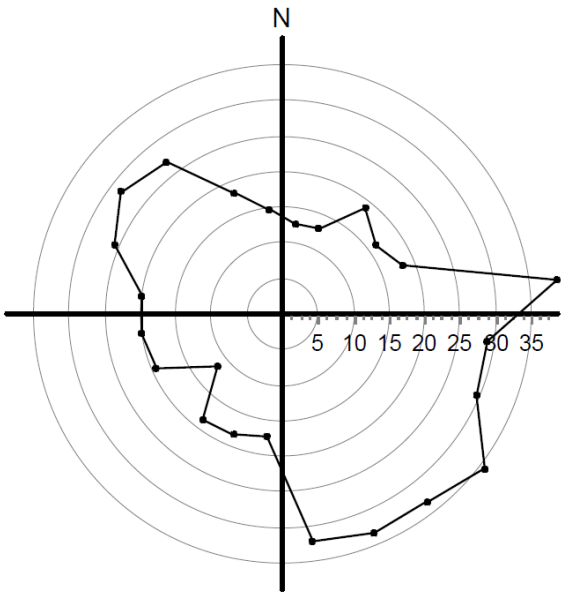


Maximum velocity (cm/s)
per 15 deg sector

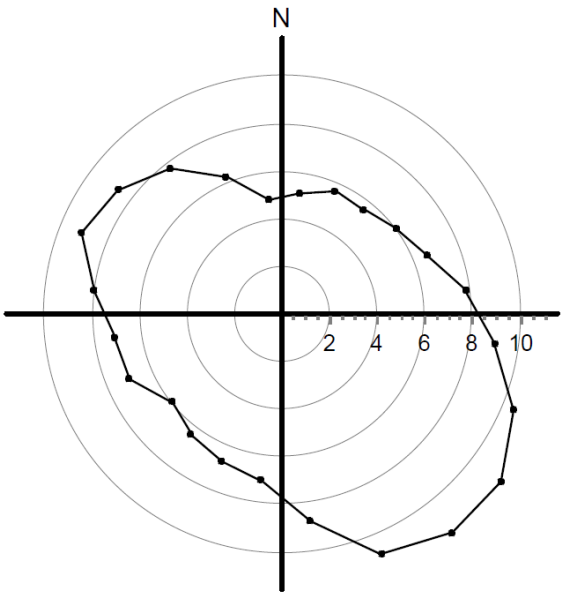


Mean velocity (cm/s)
per 15 deg sector

Current at 29 metres (29.11.11-03-01.12).

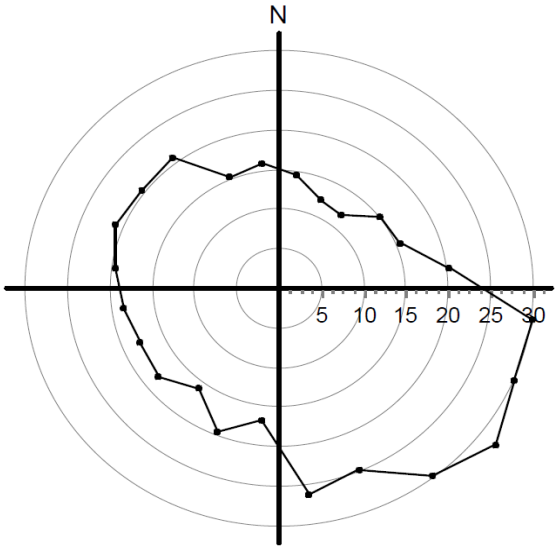


Maximum velocity (cm/s)
per 15 deg sector

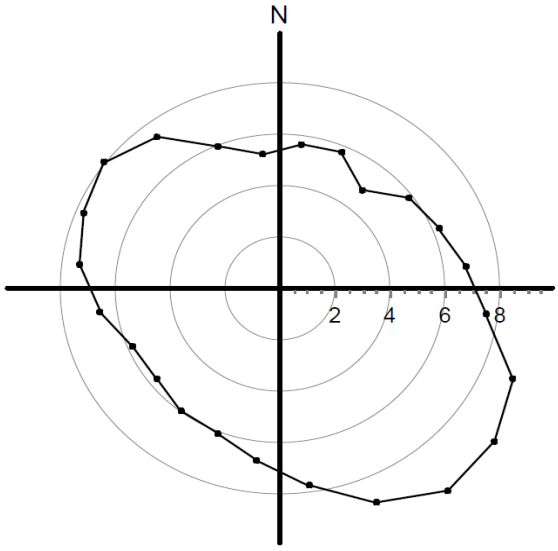


Mean velocity (cm/s)
per 15 deg sector

Bottomcurrent at 45 metres (29.11.11-03-01.12).



Maximum velocity (cm/s)
per 15 deg sector



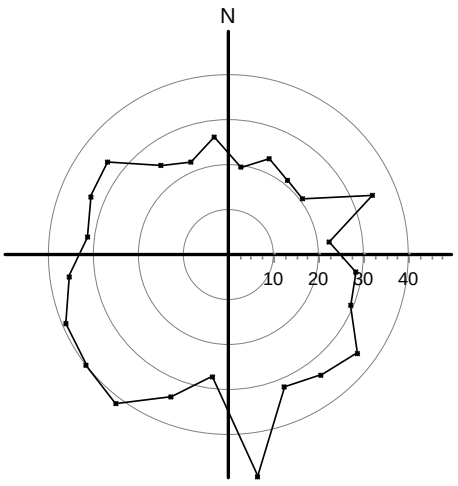
Mean velocity (cm/s)
per 15 deg sector

Current measurements at station våg 8

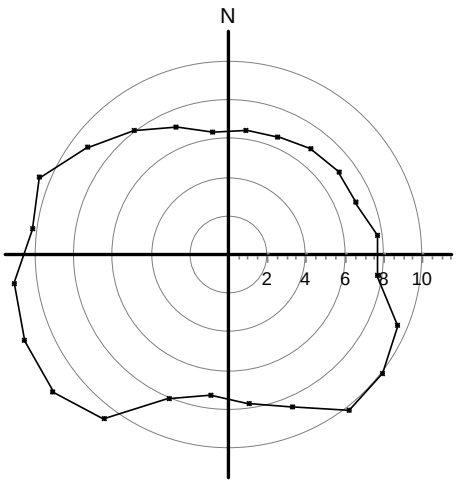
Short assessment

In this series of measurements (29.06.12-03.09.12) the maximal current velocity at 15 metres is 49.8 cm/sec, 38.4 cm/sec at 36 metres and 33.6 cm/sec at 66 metres. Average current is 9.1, 8.8, and 6.5 cm/sec respectively. The water in the surface of this location is moving in a southwestern/western direction(225-300)º. The water exchange is low at the bottom.

Surface current at 15 metres (29.06.12-03.09.12).

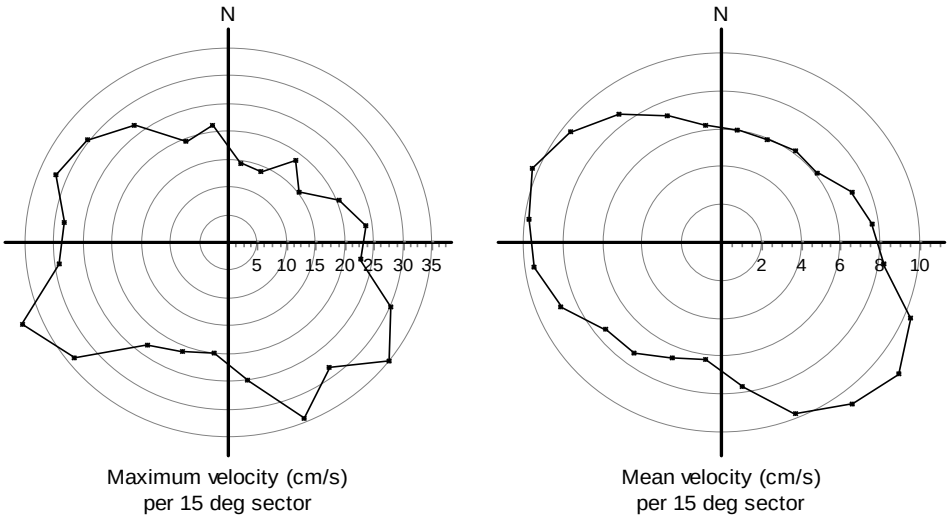


Maximum velocity (cm/s)
per 15 deg sector

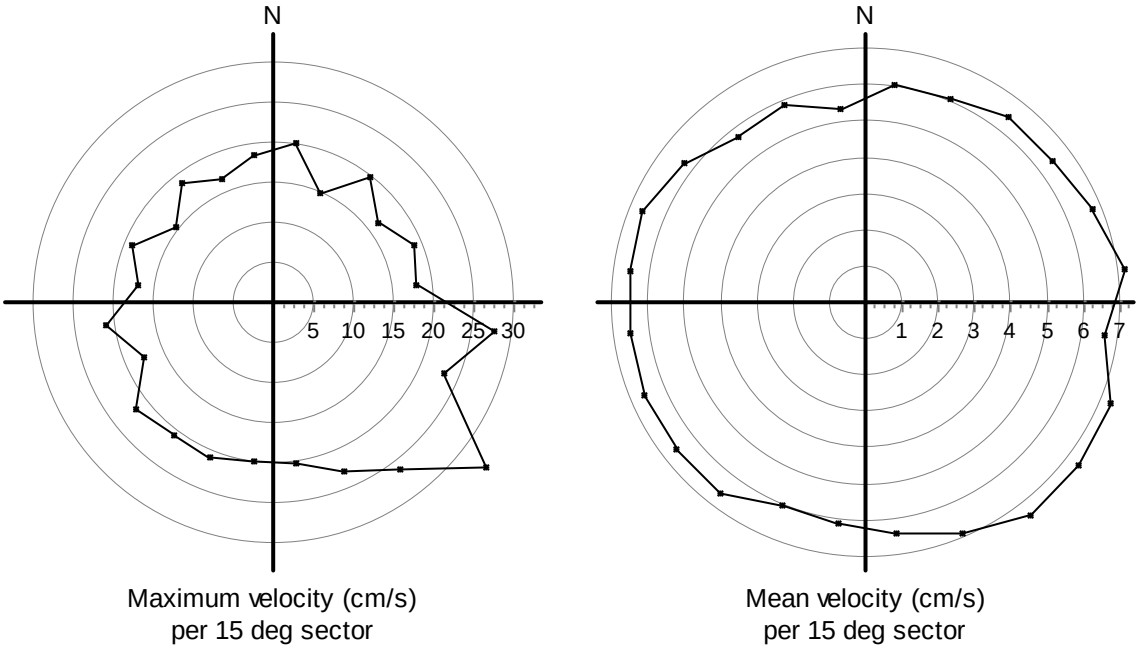


Mean velocity (cm/s)
per 15 deg sector

Current at 36 metres (29.06.12-03.09.12).



Bottomcurrent at 66 metres (29.06.12-03.09.12).

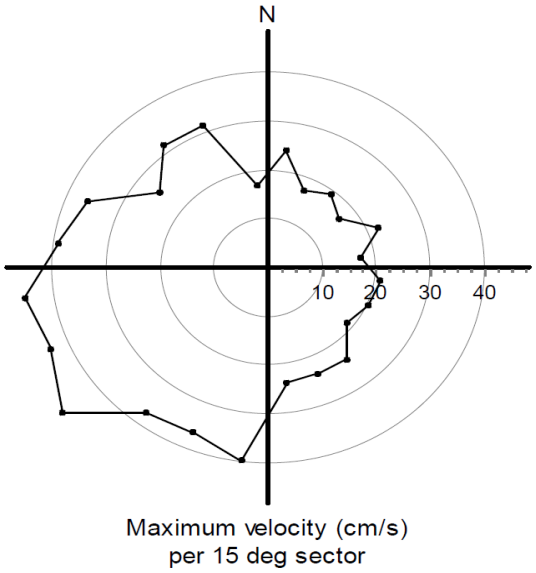


Short assessment

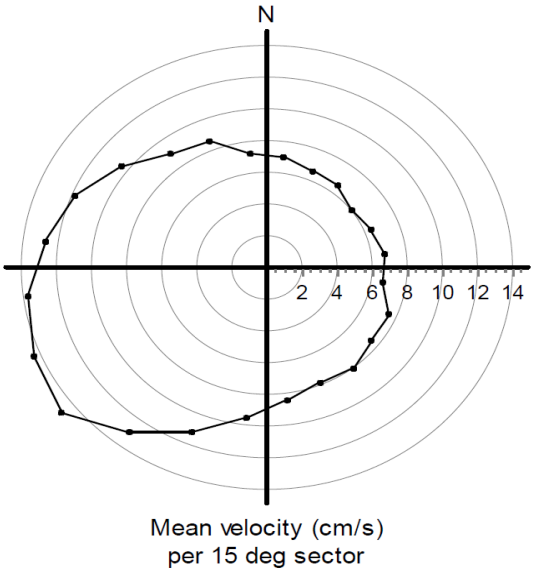
In this series of measurements (29.11.11-03.01.12) the maximum current velocity at 17 metres is 48.4 cm/sec, 34.5 cm/sec at 52 metres and 37.6 cm/sec at 86 metres. Average current is 11.2, 6.6. and 7.3 cm/sec respectively. The water at the surface layer at this station is moving in a west-

southwestern direction (210-300)º and is one-directional (high restcurrent). The water exchange is low at the bottom.

Surfacecurrent at 17 metres (29.11.11-03.01.12).

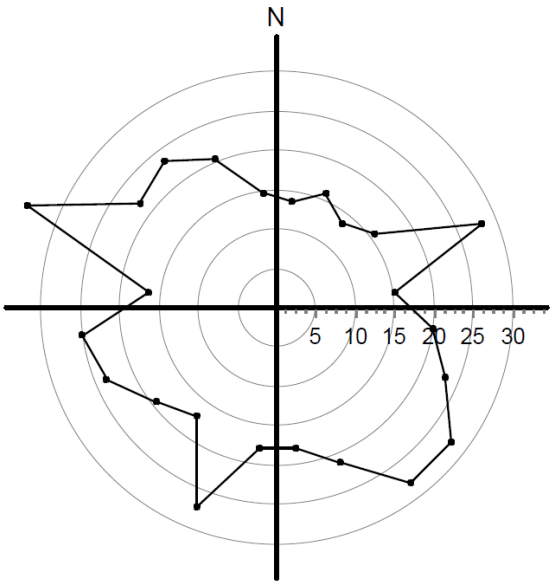


Maximum velocity (cm/s)
per 15 deg sector

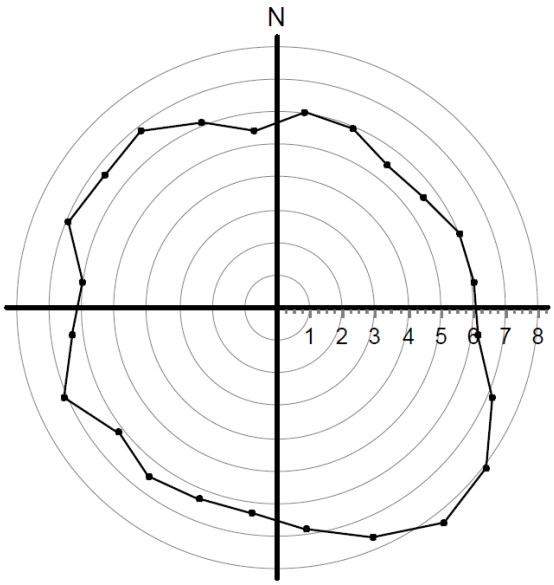


Mean velocity (cm/s)
per 15 deg sector

Current at 52 metres (29.11.11-03.01.12).

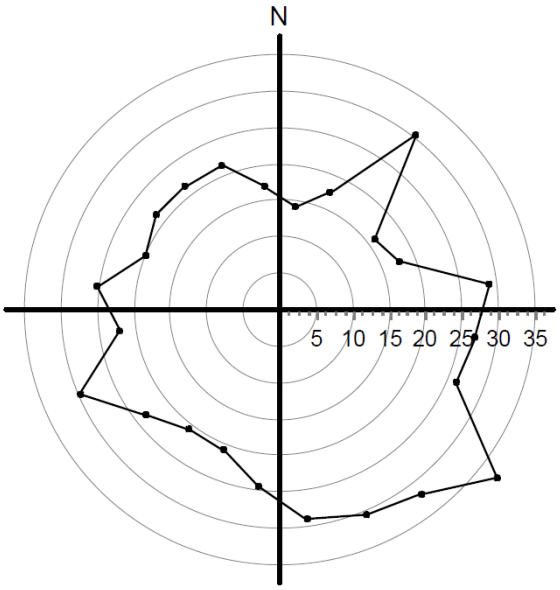


Maximum velocity (cm/s)
per 15 deg sector

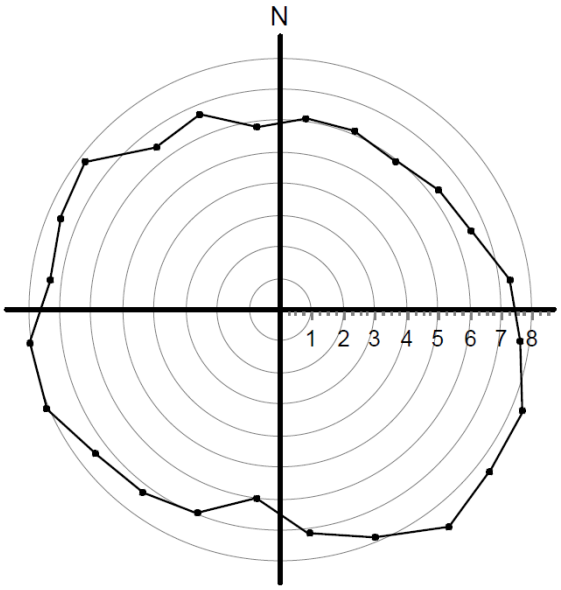


Mean velocity (cm/s)
per 15 deg sector

Bunnstrøm 86 meters dyp (29.11.11-03.01.12).



Maximum velocity (cm/s)
per 15 deg sector



Mean velocity (cm/s)
per 15 deg sector