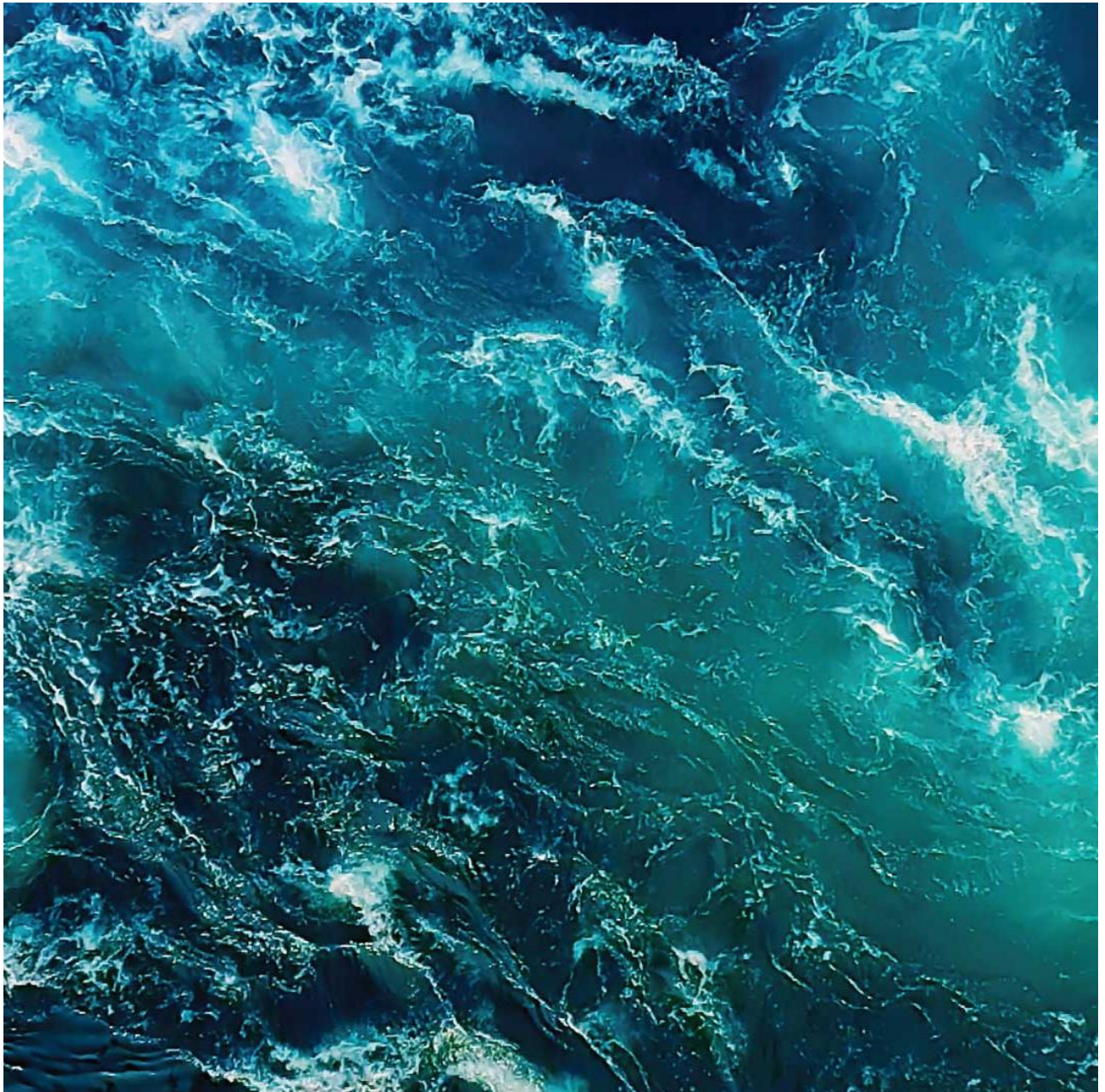


C-survey at Kvíindisdalur, 2023

Arctic Sea Farm ehf

Akvaplan-niva AS Report: 2023 65058.02



Arctic Sea Farm ehf. C-Survey at Kvígindisdalur, 2023.

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Summary

The results from the monitoring at the farming site Kvígindisdalur in June 2023 showed that the sediment was somewhat loaded with organic carbon and the copper level in the sediment at C1 was somewhat elevated (45.8 mg/kg) and is categorized into environmental limit II or "low values". The level of emamectinbenzoat in the sediment at C4 was 130 ng/kg, which is " Good status in the mixing zone " according to the SEPA standard.

No load effect was recorded in the fauna and faunal index nEQR which showed good conditions and no impact at any of the stations (> 0.6). The diversity index H' was just below 3 at C5 and above 3 at the other stations and ranged from 2.96 to 5.01. The NS 9410:2016-assessment of the community in the local impact zone (C1) showed environmental condition 1 (Very good). A pollution indicator species was found among the top ten species at C1, but not at the other stations.

The redox measurements (pH/Eh) gave point 0 acc. Appendix D in NS 9410:2016 for all the sampling stations. The oxygen saturation in June was good in the whole water column with 89 % in the bottom water.

Approval


Project leader

Quality control

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Preface

Akvaplan-niva carried out a type C (NS 9410:2016) environmental survey at the Kvígingisdalur site. It includes pH/redox measurements (Eh), hydrography, geochemical analyses, and analyses of the bottom fauna from five stations at the fish farming site. The following personnel contributed:

Snorri Gunnarsson	Akvaplan-niva	Field work, report, project leader.
Hans-Petter Mannvik	Akvaplan-niva	Identification of bottom fauna (Echinodermata). Report, professional assessments, and interpretations.
Roger Velvin	Akvaplan-niva	Identification of bottom fauna (Various taxa). QA report. Professional assessments, and interpretations
Rune Palerud	Akvaplan-niva	Identification of bottom fauna (Crustaceans). Statistics.
Jesper Hansen	Akvaplan-niva	Identification of bottom fauna (Mollusca).
Charlotte P. Ugelstad	Akvaplan-niva	Identification of bottom fauna (Polychaeta).
Vegard Holen	Akvaplan-niva	Hydrographical vertical profiles
Kristine H Sperre	Akvaplan-niva	Coordination of sorting of bottom fauna.
Ingar H. Wasbotten	Akvaplan-niva	Coordination of geo-chemical analyses.

Akvaplan-niva would like to thank Arctic Sea Farm ehf and Maria E. Chiarandini for good cooperation.

Accreditation information:

The survey was carried out by Akvaplan-niva AS with ALS Laboratory Group (Czech Republic) as a sub-contractor.



Akvaplan-niva AS is accredited under NS-EN ISO/IEC 17025 by Norwegian Accreditation for field sampling of sediments and fauna, analyses of TOC, TOM, TN, particle size and macrofauna, and for professional evaluations and interpretations. Our Accreditation number is TEST 079.

Czech Accreditation
Institute (Lab nr 1163)

ALS Laboratory Group is accredited by the Czech Accreditation
Institute (Lab nr 1163) for copper analyses.

Non-accredited services: Hydrographical measurements and mapping of bottom topography (Olex).


Kópavogur, 18.09 2023

Snorri Gunnarsson (Project Manager)

1 Data Summary

Client information			
Report title:	C-Survey at Kvígindisdalur, 2023.		
Report nr.	2023 65058.02	Site:	Kvígindisdalur
Municipality:		Map Coordinates (construction):	65°34,665 N 24°02,222 V
MTB permitted:	MTB\$	Operations manager:	Ísak Óskarsson
Client:	Arctic Sea Farm ehf		

Biomass/production status at time of survey (20.06.2023)			
Fish group:	Salmon	Biomass on examination:	4.551 t
Feed input:	6.104 t	Produced amount of fish:	5.102 t
Type/time of survey			
Maximum biomass:	X	Follow up study:	
Fallow (resting period):		New location:	

Results from the C study /NS 9410 (2016) – Main results from soft bottom fauna			
Faunal index nEQR (Veileder 02:2018)		Diversity index H' (Shannon-Wiener)	
Fauna C1 (impact zone)	0,620	Fauna C1 (impact zone)	4,04
Fauna C2	0,810	Fauna C2	5,01
Fauna C3	0,676	Fauna C3	3,69
Fauna C4 (deep area)	0,640	Fauna C4 (deep area)	3,12
Fauna C5	0,626	Fauna C5	2,96
Date fieldwork:	20.06.2023	Date of report:	15.09.2023
Notes to other results (sediment, pH/Eh, oxygen)			nTOC from 23.6 – 51.2 mg/g. Copper 45.8 mg/kg at C1 Eh positive at all stations O ₂ -conditions were good throughout the water column.
Responsible for field work:	Signature: SGU	Project manager Snorri Gunnarsson	Signature 

2 Introduction

2.1 Background and aim of the study

On behalf of Arctic Sea Farm ehf, Akvaplan-niva completed a survey (type C) for a fish farming site at Kvígingisdalur (Figure 1). The survey fulfils the requirements of the Icelandic authorities for bottom surveys according to ISO 12878 and the requirements for environmental bottom surveys (according to Vöktunaráætlun). An environmental study was simultaneously undertaken, with reference to Chapter 5.0 in NS 9410:2016 which follows the methodology for C- study. A survey (type C) is aimed at studying the environmental conditions of the bottom sediments along a transect sector from the fish farm that extends from the local, to the intermediate and to the regional impact zones. The main emphasis is on the study of the soft bottom fauna which is conducted according to standards ISO 5567-19:2004 and ISO 16665:2014. The obligatory parameters that are included in the survey are described in NS 9410:2016.

A classification or threshold values for this type of survey have not been developed by Icelandic officials so it is not possible to strictly apply the classification based on Norwegian threshold values to Icelandic conditions. We do however report the results with these same indexes with reference to Norwegian threshold values, but it should be emphasized that some of these (such as NSI) are developed according to Norwegian conditions. For further descriptions of these indexes see details in Appendix 1 and Miljødirektoratets Veileder 02:2018.

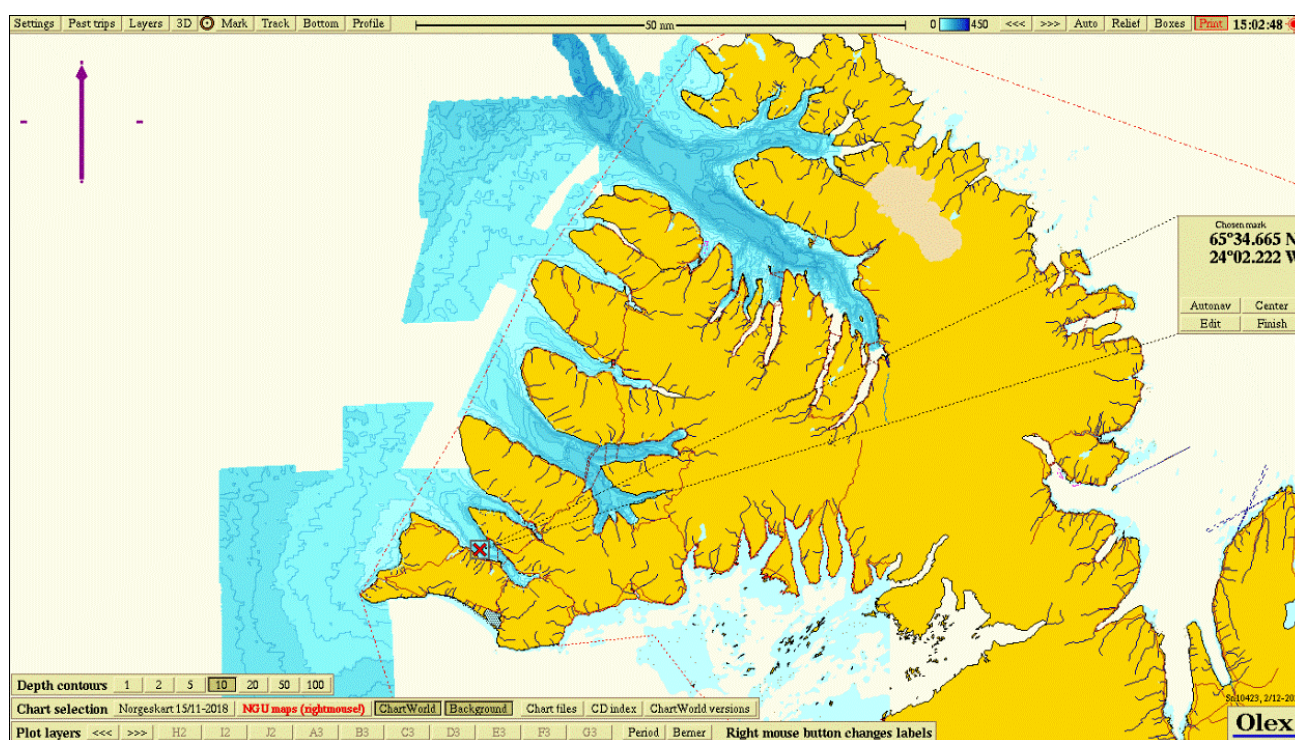


Figure 1 Overview of Patreksfjörður with the farming site Kvígingisdalur (red cross). The map coordinates for the midpoint of the farming site are given to the right.

2.2 Site operation and feed use

The plant is a two-frame mooring with a total of ten 160 metre circumference cages in a 2 x 5 configuration. During the last production cycle all 10 cages of were used. This is the second-generation farmed fish at the site. The majority of smolts were put into sea in September – October

2021 (mean weight 111-160 g) (Personal reference Óskar Ísaksson, 2023). At the date of the survey the standing biomass was 4.551 ton (mean weight about 4.6 kg). The previous generation farmed at the site was started with putting out smolts in the period from summer 2019 and farmed until April 2021.

In Iceland, the MTB (maximum allowed biomass) limit is not given a site level as in Norway. The MTB limit determines how much live fish the holder of the permit can have standing in the sea at any one time. In Iceland the allowed production is regulated at two levels, site level and company level. For this site the standing biomass for the at the day of the survey is 4.551 tonnes, used as MTB here (Personal reference Óskar Ísaksson, 2023).

2.3 Previous surveys

An overview of previous C-surveys carried out at Kvígingisdalur is shown in Table 1.

Table 1: Previous C-surveys at Kvígingisdalur.

Survey date	Report reference (author, year)	Production (tonnes)
03.02 2019	APN 61207.01 (Velvin and Gunnarsson, 2019)	0
10.11 2020	APN 62579.01 (Mannvik and Gunnarsson, 2021)	4.366
02.09 2022	APN 63430.01 (Sztybor and Gunnarsson, 2022)	0

3 Materials and methods

3.1 Survey program

The choice of study parameters, placement of sampling stations and other criteria for the study is based on descriptions in NS 9410 (C-surveys). An overview of the planned professional program is given in Table 2.

Akvaplan-niva is accredited for field work, analyses of samples and for the professional evaluation of results in accordance with applicable standards and guidelines ("Veiledere"). For implementation and follow through, the following standards and quality assurance systems were used:

- ISO 5667-19:2004: *Guidance on sampling of marine sediments*.
- ISO 16665:2014. *Water quality – Guidelines for quantitative sampling and sample processing of marine soft-bottom macro fauna*.
- NS 9410:2016. *Miljøovervåking av bunnpåvirkning fra marine oppdrettsanlegg*.
- Internal procedures. *Quality Manual for Akvaplan-niva*.
- Veileder 02:2018 (rev. 2020). *Klassifisering av miljøtilstand i vann*. Norsk klassifiseringssystem for vann i henhold til Vannforskriften. Veileder fra Direktoratgruppen.

Table 2: Survey program for the C-survey at Kvígindisdalur, 2023. TOC = total organic carbon. GSA = grain size analysis sediment. TOM = total organic material. TN = total nitrogen. Cu = Copper. pH/Eh = acidity and redox potential.

Station	Type analyses/parameters
C1 (local impact zone)	Quantitative analyses of bottom fauna. TOC. GSA, TOM. TN. Cu. pH/Eh.
C2 (transition zone outer)	Quantitative analyses of bottom fauna. TOC. GSA, TOM. TN. pH/Eh.
C3 (transition zone)	Quantitative analyses of bottom fauna. TOC. GSA, TOM. TN. pH/Eh.
C4 (transition zone)	Quantitative analyses of bottom fauna. TOC. GSA, TOM. TN. Hydrography/O ₂ . pH/Eh. Emamectinbenzoat.
C5 (transition zone)	Quantitative analyses of bottom fauna. TOC. GSA, TOM. TN. pH/Eh.

Field work was completed on 20.06.2023.

Placement of stations and local conditions

The number of stations was calculated with reference to the sites estimated maximal standing biomass for the first generation which is 4.551 tonnes (used as MTB here). According to the standard five sampling stations should be examined. Depth and position of the stations are given in Table 3 and shown in Figure 2. The stations were placed in the direction of the main oceanic current direction at 51 m depth (Holen, 2022).

Table 3: Depth, distance between the nearest frame of the fish farm and sampling stations and coordinates for C-stations at Kvígingindisdalur, 2023.

Station	Depth, m	Distance from frame, m	Position	
			N	W
C1	57	25	65°34.618	24°01.791
C2	57	500	65°34.466	24°01.098
C3	57	160	65°34.609	24°01.617
C4	57	200	65°34.561	24°01.552
C5	57	250	65°34.534	24°01.484

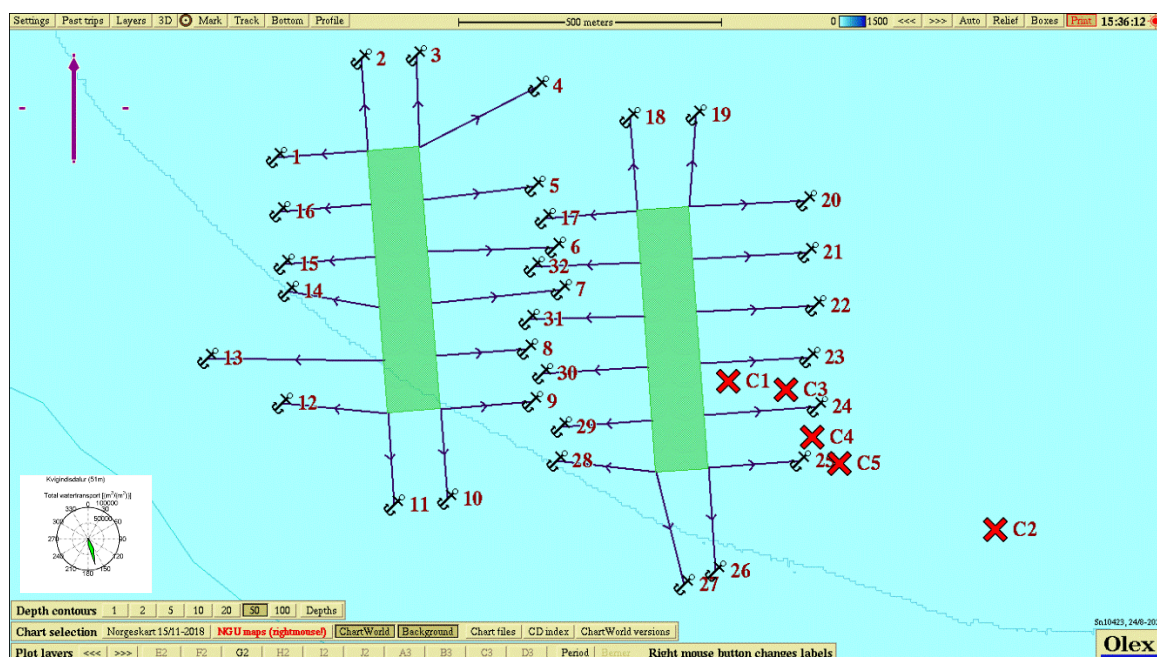


Figure 2. Map showing the sampling stations for the C-survey at Kvígingindisdalur, 2023. Current measurements used were from 51 m depth (Holen, 2022).

3.2 Hydrography and oxygen

At station C4, hydrographic measurements, salinity, temperature, density, and oxygen saturation were taken for vertical surface to bottom profiles using a Sensordata CTDO 204 probe.

3.3 Soft bottom sampling and analyses

3.3.1 Fieldwork

Sediment samples were collected with a 0.1 m² bottom grab (van Veen). The sample material was collected through inspection openings. Samples for TOC, TN and Cu were taken from the top 1 cm layer of the sediment and for TOM and grain size analyses from the top 5 cm using a hollow pipe. Only samples with an undisturbed surface were used. The samples were frozen prior to further processing in the laboratory.

3.3.2 Total organic material (TOM)

The amount of TOM in sediment was determined by weight loss after combustion at 495 °C. The percent weight loss was calculated. The reproducibility of the TOM analyses is checked during the analyses by using a standard sediment that contains TOM with a known level. Standard calcium carbonate was burned together with the samples as a control of the amount of carbonate that was not burned in the analyses process.

3.3.3 Total nitrogen (TN)

After drying the samples at 40°C, the amount of total nitrogen (TN) was quantified by electrochemical determination using Akvaplan niva internal method that is based on NS-EN 12260:2003 (Vannundersøkelse – Bestemmelse av bundet nitrogen (TNb) etter oksidasjon til nitrogenoksider).

3.3.4 Total organic carbon (TOC) and grain size

The proportion of fine material, the fraction less than 63 µm, was determined gravimetrically after wet sieving of the samples. The results are presented as proportion of fine material on a dry weight basis.

After drying the samples at 40 °C, the content of total organic carbon (TOC) was determined by NDIR-detection in accordance with DIN19539:2016 (Investigation of solids – Temperature-dependent differentiation of total carbon (TOC₄₀₀, ROC, TIC₉₀₀)). To classify the environmental conditions based on the content of TOC, the measured concentrations are normalized for the proportion of fine substance (nTOC) using the equation: $nTOC = TOC + 18(1 - F)$, where TOC and F represent a measured TOC value and the proportion of fine substance (%) in the sample (Aure *et al.*, 1993).

3.3.5 Metal analysis - copper (Cu)

The samples for metal analysis were freeze-dried before being placed in a microwave oven in a sealed Teflon container with concentrated ultrapure nitric acid and hydrogen peroxide. The concentration of copper (Cu) was determined by means of ICP-SFMS. The levels of copper are classified in accordance with Icelandic regulation 769:1999.

3.3.6 Emamectinbenzoat

The sediments were lyophilized prior to solvent extraction. The actual quantification was determined by high-resolution liquid chromatography coupled to tandem mass spectroscopy (HPLC-MS/MS). The LOD and LOQ are determined in accordance with the guidelines of the EU's reference laboratories for pesticide analyses, SANTE/2020/12830, 24/02/2021. The results are evaluated according to the Scottish Environmental Protection Agency (SEPA) standards.

3.3.7 Redox- and pH measurements

At all the stations, a quantitative chemical examination of the sediment was carried out. Acidity (pH) and redox potential (Eh) were measured using electrodes and the YSI Professional Plus instrument. In accordance with the manual of the instrument, 200 mV was added to the measured ORP (the Oxidation Reduction Potential) value.

3.4 Soft bottom fauna investigation

3.4.1 About effect of organic material on bottom fauna

The emission of organic material from fish farms can contribute to the deterioration of conditions for many of the organisms living in the bottom sediment. Negative effects in the bottom fauna can best be assessed through quantitative bottom fauna analyses. Many soft bottom species have low mobility, the fauna composition will largely reflect the local environmental conditions. Changes in the bottom fauna communities are a good indication of unwanted organic loads. Under natural conditions, the communities typically consist of many species. High number of species (diversity) is, amongst other things, that is dependent on favourable conditions for the fauna. However, moderate increases in organic load can stimulate the fauna and result in an increased number of species found. Larger organic loads can result in less favourable conditions where opportunistic species increase their individual numbers, while the species not suited are knocked out resulting in a reduced diversity of species. Changes in species diversity near emission points of feed and faecal matter can, to a large degree, be attributed to changes in organic content (from the feed and faecal matter) in the sediment.

3.4.2 Sampling and fixation

All the bottom fauna samples were taken with a 0.1 m² van Veen grab. Only grab samples where the grab was completely closed and the surface undisturbed were approved. The contents were washed through a 1 mm sieve and the remaining material fixed with 4 % formalin with Bengal Rose dye added and then neutralized with borax. In the laboratory, the animals were sorted from the remaining sediment.

3.4.3 Quantitative bottom fauna analysis

At all stations, two samples (replicates) were collected in accordance with guidelines in NS 9410 (2016). After sorting the sample material was processed quantitatively. The bottom fauna was identified to the lowest taxonomic level possible and quantified by specialists (taxonomists). The quantitative lists of species were statistically analysed. See Appendix 1 for description of analysis methods. The following statistical methods were used to describe community structure and to assess the similarity between different communities:

- Shannon-Wiener diversity index (H')
- Hurlberts diversity index (ES₁₀₀) – expected number of species pr. 100 individuals
- Pielou's evenness index (J)
- Sensitivities index (Ømfintlighet) (ISI₂₀₁₂), unsuitable at low individual/species number
- Sensitivity index (NSI)
- Composite index for diversity of species and sensitivity (NQI1)
- Sensitivities index which is included in NQI1 (AMBI)
- Normalized EQR (nEQR)
- Number of species plotted against the number of individuals in geometric arts classes
- Cluster analyses
- The ten most dominant taxa per station (top-ten)

4 Results

4.1 Hydrography and oxygen

The hydrographical profile for the deep station C4 in June 2023 is presented in Figure 3.

Temperature was around 8 °C from the surface to 45 m depth and dropped to around 6 °C from there to the bottom. Oxygen saturation was 120 % in the upper layer and 89 % in the bottom layer.

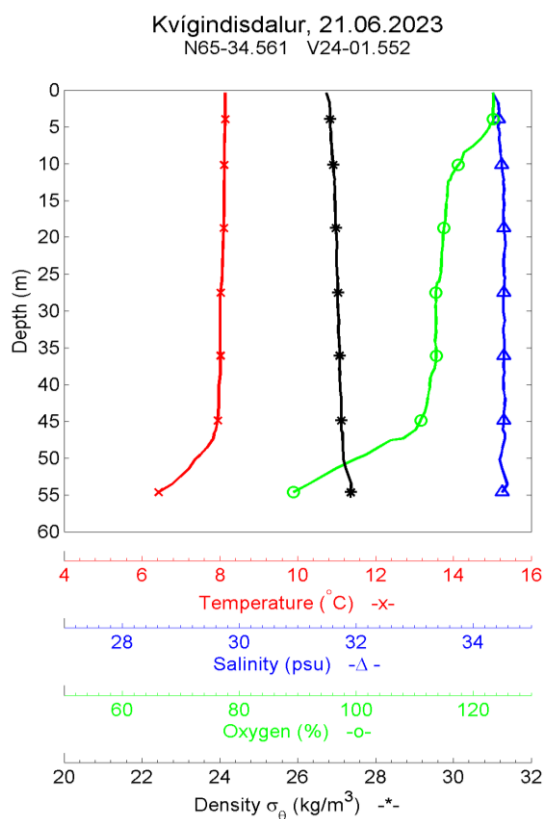


Figure 3. Vertical profiles. Temperature, salinity, density, and oxygen at C4 at Kvígingisdalur, 2023.

4.2 Sediment

4.2.1 TOC, TOM, TN, C/N, grain size and pH/Eh

Levels of total organic material (TOM), total organic carbon (TOC), total nitrogen (TN), C/N-relationship, grain size distribution in sediment (pelite) and pH/Eh in the sediment are presented in Table 4.

TOM-levels varied from 4.3 to 12.9 %. TN-levels were relatively low (2.1 – 5.0 mg/g) as was the C/N-ratio. TOC was rather high at all stations and nTOC varied from 23.6 to 51.2 mg/g TS. The bottom sediments grain size was moderately coarse to fine with a pelite ratio ranging from 18.7 to 82.5 %.

Redox measurements (pH/Eh) gave a point of 0 for all the sampling stations according to Appendix D in NS 9410:2016.

Table 4. Sediment description, TOM (%), TOC (mg/g), TN (mg/g), C/N, grain size distribution (pelite ratio % <0,063 mm) and pH/Eh. Kvíndisdalur, 2023.

St.	Sediment description	TOM	TOC	nTOC	TN	C/N	Pelite	pH/Eh
C1	Olive gray, muddy	11.8*	45	51.2	4.0	11.2	63.1	7.5/238
C2	Olive grey, muddy with some broken shells/sand	4.3*	8.9	23.6	2.1	4.2	18.7	7.8/310
C3	Olive grey, muddy with some mixture of sand	8.7*	26	34.5	4.6	5.5	50.8	7.6/245
C4	Olive gray, muddy	12.7*	34	36.7	4.6	7.3	82.5	7.8/338
C5	Olive gray, muddy	12.9	35	39.0	5.0*	7.0	78.8	7.8/259

*Not accredited results.

4.2.2 Copper

Levels of copper in bottom sediment at C1 is shown in Table 5. The level was 45.8 mg/kg which is categorized as "limit II" or "low values" according to environmental limits in Icelandic regulation nr. 796/199 (Regulation on prevention of water pollution nr. 796/1999).

Table 5. Copper (Cu), mg/kg DS. Kvíndisdalur, 2023.

St.	Cu
C1	45.8

4.2.3 Emamectinbenzoat

Level of emamectinbenzoat in the sediment at C4 is presented in Table 6. The level was 130 ng/kg, which is "Good status in the mixing zone" according to the SEPA standard.

Table 6. Emamectinbenzoat in the sediment at C4, ng/kg DS. Kvíndisdalur, 2023.

St.	Emamectinbenzoat
C4	130*

*Not accredited result.

4.3 Soft-bottom fauna

4.3.1 Faunal indices

Results from the quantitative soft bottom faunal analyses at the C-stations are presented in Table 7.

The number of individuals varied from 226 (C1) to 2215 (C3) and number of species from 35 (C1) to 86 (C2). The diversity H' varied from 2.96 to 5.01. At all stations, the overall index of nEQR was higher than 0.6. The nEQR values indicate good conditions and no disturbance of the communities.

J (Pielous evenness index) is a measure of how equally individuals are divided between species and will vary between 0 and 1. A station with low value has a "crooked" individual distribution between the species, indicating a disturbed bottom fauna community. The index varied from 0.61 to 0.87 which indicates a somewhat uneven distribution at three of the stations.

Table 7. Number of species and individuals pr. 0,2 m². H' = Shannon-Wiener's diversity index. ES100 = Hurlberts diversity index. NQI1 = overall index (diversity and sensitivity). ISI2012 = sensitivity index. NSI = sensitivity index. J = Pielous evenness index. AMBI = AZTI marine biotic index (part of NQI1). nEQR = normalized EQR (excl. DI). C-stations at Kvígingisdalur, 2023.

St.	No. of individuals.	No. of species	H'	ES ₁₀₀	NQI1	ISI ₂₀₁₂	NSI	nEQR	AMBI	J
C1	226	35	4.04	24	0.667	6.65	19.72	0.620	2.825	0.87
C2	728	86	5.01	37	0.817	9.86	24.01	0.810	1.491	0.85
C3	2215	61	3.69	22	0.742	8.20	21.52	0.676	1.794	0.66
C4	709	40	3.12	18	0.715	7.58	21.97	0.640	1.885	0.64
C5	962	38	2.96	16	0.725	7.46	21.83	0.626	1.615	0.61

4.3.2 NS 9410 Evaluation of the bottom fauna at station C1 (local impact zone).

According to NS 9410 the classification of the environmental status in the local impact zone can also be evaluated based on the number of species and their dominance in the bottom faunal community (see Chapter 8.6.2 in NS 9410:2016).

The soft bottom communities were classified to environmental condition 1 "Very good". The criteria for condition 1 are that there are at least 20 species/0.2 m² and that none of these are in numbers exceeding 65 % of the individuals (Table 8).

Table 8. Classification of the environmental status of the soft bottom fauna at station C1 at the Kvígingisdalur site 2023.

Station	Site name	Num. species	Dominating taxa	Environmental condition-NS 9410
C1	Kvígingisdalur	35	Scalibregma inflatum – 16 %	1 – Very good

Geometric classes

Figure 4 shows the number of species plotted against the number of individuals, where the number of individuals is divided into geometric classes. For an explanation of the concept of geometric classes is given in Appendix 1.

Most of the curves started relatively low (≤ 15 species) and stretched out in varying degrees towards higher classes. At C2 the curve started above 20 and stretched out shortly towards higher classes. None of these give any clear indications of fauna condition.

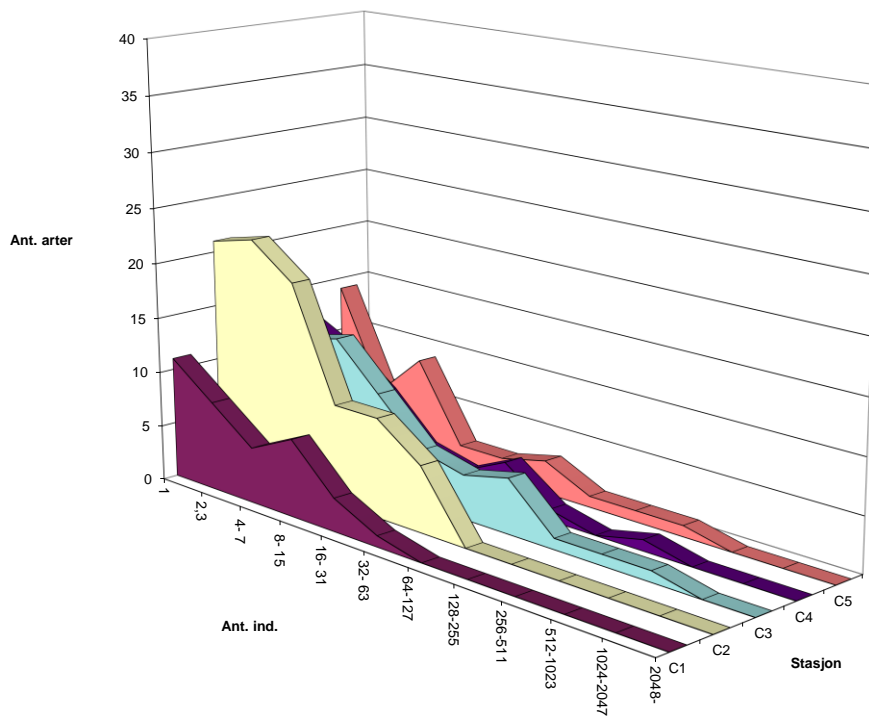


Figure 4. The soft bottom fauna shown as number of species against number of individuals pr. species in geometric classes. Kvígingisdalur, 2023.

4.3.3 Cluster analyses

To investigate the similarity of the faunal composition between the sampling stations, the multivariate technique cluster analysis was used. The results of this are presented in dendrogram in Figure 5.

The fauna composition at C4 and C5 was 73 % similar and the other stations less than 48 % similar to the two mentioned stations.

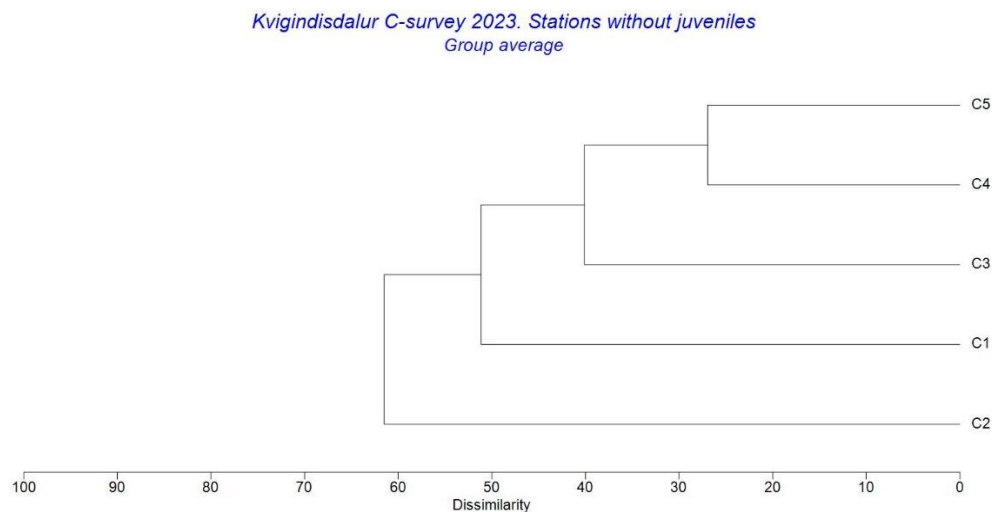


Figure 5. Cluster diagram for the soft bottom fauna at the C- sampling stations at Kvígingisdalur, 2023.

4.3.4 Species composition

The main features of the species composition are shown in the form of a top ten species list from each station in Table 9.

In Rygg and Norling (2013) the species are divided into five ecological groups (EG) based on the value of the sensitivity index. These groups run from sensitive species (EG I) to pollution indicators (EG V).

The fauna at C1 was dominated by the tolerant polychaete *Scalibregma inflatum* with 16 % of the individuals. The other most dominating species at this station was neutral, tolerant, and opportunistic species together with the pollution indicator species *Capitella capitata* (polychaete).

The fauna at C2 was dominated by the sensitive polychaete *Nothria conchylega* with 9 % of the individuals. The other most dominating species at this station was neutral, tolerant, and opportunistic species.

The fauna at C3 was dominated by the tolerant polychaete *Galathowenia oculata* with 28 % of the individuals. The other most dominating species at this station was neutral, tolerant, and opportunistic species.

The fauna at C4 and C5 was dominated by the neutral mussel *Ennucula tenuis* with 43 and 35 %, respectively, of the individuals. The other most dominating species at these stations were neutral, tolerant, and opportunistic species.

Table 9. Number of individuals, cumulative percentage, and ecological group* for the ten most dominant species at the C stations. Kvígingisdalur, 2023.

C1	EG	Ant. ind.	Kum.
Scalibregma inflatum	III	37	16 %
Leucon sp.	Ik	23	27 %
Eteone flava/longa	Ik	21	36 %
Heteromastus filiformis	IV	19	44 %
Capitella capitata	V	13	50 %
Ennucula tenuis	II	13	56 %
Parougia eliasoni	Ik	11	61 %
Prionospio steenstrupi	II	11	65 %
Scoloplos armiger	III	9	69 %
Galathowenia oculata	III	8	73 %
C3	EG	Ant. ind.	Kum.
Galathowenia oculata	III	619	28 %
Ennucula tenuis	II	490	50 %
Praxillella praetermissa	II	145	57 %
Euchone incolor	Ik	119	62 %
Axinopsida orbiculata	Ik	101	66 %
Scoloplos armiger	III	96	71 %
Nuculana pernula	II	91	75 %
Lagis koreni	IV	77	78 %
Pholoe assimilis	III	48	81 %
Yoldia hyperborea	Ik	41	82 %
C5	EG	Ant. ind.	Kum.
Ennucula tenuis	II	336	35 %
Galathowenia oculata	III	244	60 %
Axinopsida orbiculata	Ik	121	73 %
Thyasira sarsii	IV	46	78 %
Nuculana pernula	II	43	82 %
Euchone incolor	Ik	36	86 %
Prionospio steenstrupi	II	19	88 %
Yoldia hyperborea	Ik	16	90 %
Leucon sp.	Ik	15	91 %
Eteone flava/longa	Ik	9	92 %

C2	EG	Ant. ind.	Kum.
Nothria conchylega	I	63	9 %
Scoloplos armiger	III	55	16 %
Praxillella praetermissa	II	43	22 %
Galathowenia oculata	III	42	28 %
Parvicardium pinnulatum	Ik	39	33 %
Pholoe assimilis	III	38	38 %
Petaloproctus tenuis	Ik	27	42 %
Spio armata	Ik	23	45 %
Nicomache lumbricalis	II	22	48 %
Macoma calcarea	IV	20	51 %
C4	EG	Ant. ind.	Kum.
Ennucula tenuis	II	304	43 %
Galathowenia oculata	III	99	57 %
Thyasira sarsii	IV	53	64 %
Sternaspis scutata	Ik	45	71 %
Prionospio steenstrupi	II	37	76 %
Nuculana pernula	II	34	81 %
Leucon sp.	Ik	22	84 %
Parougia eliasoni	Ik	16	86 %
Axinopsida orbiculata	Ik	11	88 %
Euchone incolor	Ik	11	89 %

*Ecological groups: EG I = sensitive species. EG II = neutral species. EG III = tolerant species. EG IV = opportunistic species. EG V = pollution indicator species. From Rygg and Norling, 2013. Ik = unidentified group.

5 Summary and Conclusions

5.1 Summary

The results from the environmental monitoring (type C) at Kvígindisdalur 2023, can be summarised as follows:

- The hydrography measurements showed good oxygen conditions throughout the water column with 89 % saturation in the bottom layer in June 2023.
- TOC was rather high at all stations and nTOC varied from 23.6 to 51.2 mg/g TS. TOM-levels varied from 4.3 to 12.9 %. TN-levels were low (2.1 – 5.0 mg/g) as was the C/N-ratio. The copper level in the sediment at C1 was elevated (45.8 mg/kg) and is categorized into environmental limit II or "low values" according to environmental limits in Icelandic regulation nr. 796/199 (Regulation on prevention of water pollution nr. 796/1999). The level of emamectinbenzoat in the sediment at C4 was 130 ng/kg, which is " Good status in the mixing zone " according to the SEPA standard. The bottom sediments grain size was moderately coarse to fine with a pelite ratio ranging from 18.7 to 82.5 %. The redox measurements (pH/Eh) gave point 0 acc. Appendix D in NS 9410:2016 for all the stations.
- The number of individuals varied from 226 to 2215 and number of species from 35 to 86. The diversity H' varied from 2.96 to 5.01. At all stations, the overall index of nEQR was higher than 0.6. The nEQR values indicates good conditions and no disturbance of the communities.

5.2 Conclusions

The results from the monitoring at the farming site Kvígindisdalur in June 2023 showed that the sediment was somewhat loaded with organic carbon and the copper level in the sediment at C1 was somewhat elevated (45.8 mg/kg) and is categorized into environmental limit II or "low values". The level of emamectinbenzoat in the sediment at C4 was 130 ng/kg, which is " Good status in the mixing zone " according to the SEPA standard.

No load effect was recorded in the fauna and faunal index nEQR which showed good conditions and no impact at any of the stations (> 0.6). The diversity index H' was just below 3 at C5 and above 3 at the other stations and ranged from 2.96 to 5.01. The NS 9410:2016-assessment of the community in the local impact zone (C1) showed environmental condition 1 (Very good). A pollution indicator species was found among the top ten species at C1, but not at the other stations.

The redox measurements (pH/Eh) gave point 0 acc. Appendix D in NS 9410:2016 for all the sampling stations. The oxygen saturation in June was good in the whole water column with 89 % in the bottom water.

The results from the current survey at max biomass compared to the previous study at fallow period in September 2021 (Szybor & Gunnarsson, 2022) indicate overall improvements in the bottom fauna in all parts of the studied transect sector from the fish farm. The pollution indicator species *Capitella capitata* was dominating species at stations C1 and C3 at fallow period in 2021 but is now only found at station C1 (ranking nr. 5 among the top-10 species). Also in the current survey the diversity index is higher at all stations compared to previous survey at fallow period.

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7 Appendix (in Norwegian)

7.1 Statistiske metoder

Diversitet

Diversitet er et begrep som uttrykker mangfoldet i dyre- og plantesamfunnet på en lokalitet. Det finnes en rekke ulike mål for diversitet. Noen tar mest hensyn til artsrikheten (mål for artsrikheten), andre legger mer vekt på individfordelingen mellom artene (mål for jevnhet og dominans). Ulike mål uttrykker derved forskjellige sider ved dyresamfunnet. Diversitetsmål er "klassiske" i forurensningsundersøkelser fordi miljøforstyrrelser typisk påvirker samfunnets sammensetning. Svakheten ved diversitetsmålene er at de ikke alltid fanger opp endringer i samfunnsstrukturen. Dersom en art blir erstattet med like mange individer av en ny art, vil ikke det gjøre noe utslag på diversitetsindeksene.

Shannon-Wieners indeks (Shannon & Weaver, 1949) er gitt ved formelen:

$$H' = - \sum_{i=1}^s \frac{n_i}{N} \log_2 \left(\frac{n_i}{N} \right)$$

der n_i = antall individer av art i i prøven
 N = total antall individer
 s = antall arter

Indeksen tar hensyn både til antall arter og mengdefordelingen mellom artene, men det synes som indekseen er mest følsom for individfordelingen. En lav verdi indikerer et artsfattig samfunn og/eller et samfunn som er dominert av en eller få arter. En høy verdi indikerer et artsrikt samfunn.

Pielous mål for jevnhet (Pielou, 1966)

har følgende formel, der symbolene er som i Shannon-Wieners indeks

$$J = \frac{H'}{\log_2 s}$$

Hurlberts diversitetskurver

Grafisk kan diversiteten uttrykkes i form av antall arter som funksjon av antall individer. Med utgangspunkt i total antall arter og individer i en prøve søker man å beregne hvor mange arter man ville vente å finne i delprøver med færre individer. Diversitetsmålet blir derved uavhengig av prøvestørrelsen og gjør at lokaliteter med ulik individtetthet kan sammenlignes direkte. Hurlbert (1971) har gitt en metode for å beregne slike diversitetskurver basert på sannsynlighetsberegning.

ES_n er forventet antall arter i en delprøve på n tilfeldig valgte individer fra en prøve som inneholder total N individer og s arter og har følgende formel:

$$ES_n = \sum_{i=1}^s \left[1 - \frac{\binom{N-N_i}{n}}{\binom{N}{n}} \right]$$

der N = total antall individ i prøven
 N_i = antall individ av art i

n = antall individ i en gitt delprøve (av de N)

s = total antall arter i prøven

Plott av antall arter i forhold til antall individer

Artene deles inn i grupper/klasser etter hvor mange individer som er registrert i en prøve. Det vanlige er å sette klasse I = 1 individ pr. art, klasse II = 2-3 individer, klasse III = 4-7 individer, klasse IV = 8-15 individer, osv., slik at de nedre klassegrensene danner en følge av ledd på formen 2^x , $x=0,1,2, \dots$. En slik følge kalles en geometrisk følge, derfor kalles klassene for geometriske klasser. Hvis antall arter innenfor hver klasse plottes mot klasseverdien på en lineær skala, vil det fremkomme en kurve som uttrykker individfordelingen mellom artene i samfunnet. Det har vist seg at i prøver fra upåvirkede samfunn vil det være mange arter med lavt individantall og få arter med høyt individantall, slik at vi får en entoppet, asymmetrisk kurve med lang "hale" mot høye klasseverdier. Denne kurven vil være godt tilpasset en log-normal fordelingskurve.

Ved moderat forurensing forsvinner en del av de individfattige artene, mens noen som blir begunstiget, øker i antall. Slik flater kurven ut, og strekker seg mot høyere klasser eller den får ekstra topper. Under slike forhold mister kurven enhver likhet med den statistiske log-normalfordelingen. Derfor kan avvik fra log-normalfordelingen tolkes som et resultat av en påvirkning/forurensing. Det har vist seg at denne metoden tidlig gir utslag ved miljøforstyrrelse. Ved sterk forurensning blir det bare noen få, men ofte svært tallrike arter tilbake. Log-normalfordelingskurven vil da ofte gjenoppstå, men med en lavere topp og spredt over flere klasser enn for uforstyrrede samfunn.

Faunaens fordelingsmønster

Variasjoner i faunaens fordelingsmønster over området beskrives ved å sammenligne tettheten av artene på hver stasjon. Til dette brukes multivariate klassifikasjons- og ordinasjons-analyser (Cluster og MDS).

Analysene i denne undersøkelsen ble utført ved hjelp av programpakken PRIMER v5. Inngangsdata er individantall pr. art, pr. prøve. Prøvene kan være replikater eller stasjoner. Det tas ikke hensyn til hvilke arter som opptrer. Forut for klassifikasjons- og ordinasjonsanalysene ble artslistene dobbelt kvadratrotransformert. Dette ble gjort for å redusere avviket mellom høye og lave tetthetsverdier og dermed redusere eventuelle effekter av tallmessig dominans hos noen få arter i datasettet.

Clusteranalyse

Analysen undersøker faunalikheten mellom prøver. For å sammenligne to prøver ble Bray-Curtis ulikhetsindeks benyttet (Bray & Curtis, 1957):

$$d_{ij} = \frac{\sum_{k=1}^n |X_{ki} - X_{kj}|}{\sum_{k=1}^n (X_{ki} + X_{kj})}$$

der n = antall arter sammenlignet

X_{ki} = antall individ av art k i prøve nr. i

X_{kj} = antall individ av art k i prøve nr. j

Indeksen avtar med økende likhet. Vi får verdien 1 hvis prøvene er helt ulike, dvs. ikke har noen felles arter. Identiske arts- og individtall vil gi verdien 0. Prøver blir gruppert sammen etter graden av likhet ved å bruke "group-average linkage". Forholdsvis like prøver danner en gruppe (cluster). Resultatet presenteres i et tredigram (dendrogram).

Ømfintlighet (AMBI, ISI og NSI)

Ømfintligheten bestemmes ved indeksene ISI og AMBI. Beregning av ISI er beskrevet av Rygg (2002). Sensitivitetsindeksen AMBI (Azti Marin Biotic Index) tilordner en ømfintlighetsklasse (økologisk gruppe, EG): EG-1: sensitive arter, EG-II: indifferente arter, EG-III: tolerante arter, EG-IV: opportunistiske arter, EG-V: forurensningsindikerende arter. Sammensetningen av makrovertebratsamfunnet i form av andelen av økologiske grupper indikerer omfanget av en forurensningspåvirkning.

NSI er en sensitivitetsindeks som ligner AMBI, men er utviklet med basis i norske faunadata og ved bruk av en objektiv statistisk metode. En prøves NSI verdi beregnes ved gjennomsnittet av sensitivitetsverdiene av alle individene i prøven.

Sammensatte indekser (NQI1 og NQI2)

Sammensatte indekser NQI1 og NQI2 bestemmes både ut fra artsmangfold og ømfintlighet. NQI1 er brukt i NEAGIG (den nordøst-atlantiske interkalibreringen). De fleste land bruker nå sammensatte indekser av samme type som NQI1 og NQI2.

NQI1 indeksen er beskrevet ved hjelp av formelen:

$$\text{NQI1 (Norwegian quality status, version 1)} = [0.5^* (1-\text{AMBI}/7) + 0.5^*(\text{SN}/2.7)^* (N/(N+5))]$$

Diversitetsindeksen $\text{SN} = \ln S / \ln(\ln N)$, hvor S er antall arter og N er antall individer i prøven

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7.2 Statistical results Kvígingisdalur, 2023

Benthos indices per replicate

st.nr.		C1_01	C1_02	C2_01	C2_02	C3_01	C3_02	C4_01	C4_02	C5_01	C5_02
no. ind.		116	110	506	222	1605	610	381	328	511	451
no. spe.		28	23	77	46	56	42	28	31	33	26
Shannon-Wiener:		4,2	3,9	5,3	4,7	3,6	3,7	3,0	3,2	3,0	2,9
Pielou		0,88	0,85	0,85	0,85	0,63	0,69	0,62	0,65	0,59	0,62
ES100		27	22	40	33	21	23	18	18	16	15
SN		2,14	2,03	2,38	2,27	2,01	2,01	1,87	1,95	1,91	1,80
ISI-2012		6,89	6,41	9,77	9,95	8,42	7,98	7,67	7,49	8,03	6,89
AMBI		3,125	2,525	1,741	1,241	1,681	1,906	1,836	1,933	1,575	1,654
NQI1		0,66	0,68	0,81	0,82	0,75	0,73	0,71	0,72	0,74	0,71
NSI		18,6	20,9	23,5	24,5	21,9	21,1	22,3	21,6	22,0	21,6
DI		0,014	0,009	0,654	0,296	1,155	0,735	0,531	0,466	0,658	0,604

Geometrical classes

int.	C1	C2	C3	C4	C5
1	11	21	10	12	14
2,3	8	22	12	10	5
4-7	5	19	13	7	9
8-15	7	9	9	3	2
16-31	3	9	5	2	2
32-63	1	6	4	4	3
64-127	0	0	5	1	1
128-255	0	0	1	0	1
256-511	0	0	1	1	1
512-1023	0	0	1	0	0
1024-2047	0	0	0	0	0
2048-	0	0	0	0	0

7.3 Species lists

Artsliste pr stasjon

Kvígindisdalur ASC-C-survey 2023

Rekke	Klasse	Orden	Art/Taxa	Replikat:	01	02	-	Sum		
Stasjonsnr.: ASC1										
SIPUNCULIDA										
ANNELIDA	Polychaeta	Orbiniida	Golfingiidae indet.			1	-	1		
			Aricidea sp.	3	1	-	4			
			Leitoscoloplos mammosus	1		-	1			
			Scoloplos armiger	1	1	-	2			
			Cossurida	Cossura sp.	2		-	2		
				Spionida	Chaetozone setosa	2	2	-	4	
			Prionospio steenstrupi		30	28	-	58		
			Spio armata			1	-	1		
			Spio limicola		4	3	-	7		
			Capitellida	Capitella capitata	1		-	1		
				Maldane sarsi	2		-	2		
				Praxillella praetermissa	6	8	-	14		
			Phyllodocida	Eteone flava/longa	1	1	-	2		
				Nephtys ciliata	3	3	-	6		
				Nephtys sp. juv.	1	1	-	2		
				Pholoe assimilis	2	4	-	6		
				Pholoe baltica	1	2	-	3		
			Eunicida	Parougia eliasoni	3	2	-	5		
			Sternaspida	Sternaspis scutata	3	9	-	12		
			Oweniida	Galathowenia oculata	51	123	-	174		
				Myriochele malmgreni/olgae	1	3	-	4		
				Owenia sp.		6	-	6		
			Terebellida	Lagis koreni	4	3	-	7		
				Melinna cristata	2	1	-	3		
				Polycirrus sp.	2	2	-	4		
				Terebellides sp.		1	-	1		
				Zatsepinia rittichae	1		-	1		
			Sabellida	Euchone incolor	33	2	-	35		
			CRUSTACEA	Malacostraca	Cumacea	Leucon sp.	12	22	-	34
			Amphipoda			Bathymedon obtusifrons	1		-	1
						Lysianassidae indet.	1	2	-	3
			Decapoda			Paguridae indet.	1		-	1
			MOLLUSCA			Prosobranchia	Neogastropoda	Curtitoma trevelliiana	1	
Opisthobranchia	Cephalaspidea	Retusa obtusa	2		-			2		
		Bivalvia	Nuculoida	Ennucula tenuis	262	141	-	403		
	Nuculana pernula	16		13	-	29				

Rekke	Klasse	Orden	Art/Taxa	Replikat:	01	02	-	Sum
		Veneroidea	Yoldia hyperborea		7	12	-	19
			Abra nitida		1	1	-	2
			Arctica islandica		1	-	-	1
			Axinopsida orbiculata		8	11	-	19
			Macoma calcarea		1	1	-	2
			Thyasira sarsii		16	21	-	37
ECHINODERMATA								
	Asteroidea							
		Paxillosida						
			Ctenodiscus crispatus			1	-	1
	Ophiuroidea							
		Ophiurida						
			Ophiocten affinis		2	-	-	2
				Maksverdi:	262	141		403
				Antall arter/taxa:	39	33		44
				Sum antall individ:				925

Stasjonsnr.: C1
PLATYHELMINTHES

			Platyhelminthes indet.			1	-	1
PRIAPULIDA								
			Priapulus caudatus		3	-	-	3
ECHIURIDA								
			Echiurus echiurus		3	1	-	4
ANNELIDA								
	Polychaeta							
		Orbiniida						
			Levinsenia gracilis		1	-	-	1
			Scoloplos armiger		3	6	-	9
		Spionida						
			Chaetozone setosa		2	-	-	2
			Laonice cirrata		1	-	-	1
			Malacoceros vulgaris		1	-	-	1
			Prionospio steenstrupi		7	4	-	11
			Spio limicola		3	5	-	8
		Capitellida						
			Capitella capitata		13	-	-	13
			Heteromastus filiformis		9	10	-	19
			Mediomastus fragilis			1	-	1
		Opheliida						
			Scalibregma inflatum		17	20	-	37
		Phyllodocida						
			Bylgides groenlandicus		1	-	-	1
			Eteone flava/longa		11	10	-	21
			Microphthalmus sczelkowi			1	-	1
			Nephtys ciliata		1	-	-	1
			Pholoe assimilis			2	-	2
			Pholoe baltica		2	1	-	3
			Polynoidae indet.		4	1	-	5
			Syllis hyalina		1	-	-	1
		Eunicida						
			Parougia eliasoni		3	8	-	11
		Oweniida						
			Galathowenia oculata		5	3	-	8
		Terebellida						
			Lagis koreni		3	1	-	4
		Sabellida						
			Euchone incolor			1	-	1
CRUSTACEA								
	Malacostraca							
		Cumacea						
			Leucon sp.		12	11	-	23
		Amphipoda						

Rekke	Klasse	Orden	Art/Taxa	Replikat:	01	02	-	Sum
			Bathymedon obtusifrons		1	1	-	2
			Lysianassidae indet.		2	-	-	2
			Oedicerotidae indet.		2	-	-	2
			Protomeдея fasciata		2	-	-	2
MOLLUSCA	Bivalvia	Nuculoida	Ennucula tenuis			13	-	13
			Yoldia hyperborea		1	4	-	5
		Veneroida	Macoma calcarea			1	-	1
			Thyasira sarsii		2	4	-	6
			Maksverdi:		17	20		37
			Antall arter/taxa:		28	23		35
			Sum antall individ:					226

Stasjonsnr.: C2

CNIDARIA

Rekke	Klasse	Orden	Art/Taxa	Replikat:	01	02	-	Sum
		Anthozoa	Edwardsia sp.		3	2	-	5
NEMERTINI			Nemertea indet.		4	-	-	4
SIPUNCULIDA			Phascolion strombus		3	1	-	4
ANNELIDA	Polychaeta	Orbiniida	Levinsenia gracilis		6	-	-	6
			Scoloplos armiger		43	12	-	55
		Spionida	Aphelochaeta sp.		1	-	-	1
			Apistobranchnus tenuis		1	-	-	1
			Chaetozone setosa		3	-	-	3
			Cirratulus cirratus		16	-	-	16
			Dipolydora coeca		2	-	-	2
			Laonice cirrata		6	3	-	9
			Malacoceros vulgaris		1	-	-	1
			Spio armata		19	4	-	23
			Spio decorata		1	5	-	6
			Spio limicola		3	-	-	3
		Capitellida	Mediomastus fragilis		16	-	-	16
			Nicomache lumbricalis		22	-	-	22
			Petaloproctus tenuis		26	1	-	27
			Praxillella praetermissa		21	22	-	43
			Rhodine gracilior		13	-	-	13
		Phyllodocida	Eteone flava/longa		4	-	-	4
			Eunereis longissima		11	-	-	11
			Gattyana cirrhosa		1	-	-	1
			Goniada maculata		7	2	-	9
			Nephtys ciliata		2	-	-	2
			Nereimyra punctata		16	-	-	16
			Pholoe assimilis		29	9	-	38
			Pholoe baltica		5	2	-	7
			Polynoidae indet.		4	1	-	5
			Syllis hyalina		6	1	-	7
		Eunicida	Nothria conchylega		43	20	-	63
			Parougia eliasoni		2	-	-	2
			Scoletoma fragilis		2	-	-	2
		Oweniida	Galathowenia oculata		32	10	-	42
			Owenia sp.			2	-	2
		Flabelligerida						

Rekke	Klasse	Orden	Art/Taxa	Replikat:	01	02	-	Sum
		Terebellida	Bradabyssa villosa		1	-		1
			Ampharete finmarchica		1	-		1
			Amphitrite cirrata		1	-		1
			Cistenides hyperborea			3	-	3
			Eupolyornia nesidensis		1	-		1
			Lagis koreni		1	6	-	7
			Lanassa venusta		1	-		1
			Laphania boeckii		4	-		4
			Terebellidae indet.		1	-		1
			Terebellides sp.		7	-		7
		Sabellida	Euchone papillosa			2	-	2
			Euchone sp.		1	1	-	2
			Pseudopotamilla reniformis			1	-	1
CRUSTACEA		Ostracoda	Ostracoda indet.		4	3	-	7
		Malacostraca						
		Cumacea	Brachydiastylis resima		2	1	-	3
			Leucon sp.		12	5	-	17
		Tanaidacea	Tanaidacea indet.		1	-		1
		Amphipoda	Haploops sp.		1	-		1
			Harpinia pectinata		1	-		1
			Lysianassidae indet.		4	-		4
			Oedicerotidae indet.		3	-		3
			Protomeдея fasciata			2	-	2
		Isopoda	Munna sp.		1	-		1
			Pleurogonium spinosissimum		1	-		1
		Decapoda	Paguridae indet.		1	1	-	2
MOLLUSCA		Caudofoveata	Caudofoveata indet.		2	2	-	4
		Polyplacophora						
		Lepidopleurida	Leptochiton asellus		3	1	-	4
		Ischnochitonidae	Stenosemus albus		6	1	-	7
		Prosobranchia						
		Archaeogastropoda	Lepeta caeca		8	10	-	18
			Moelleria costulata		1	-		1
		Mesogastropoda	Ariadnaria borealis		1	-		1
		Opisthobranchia						
		Cephalaspidea	Retusa obtusa			3	-	3
		Bivalvia						
		Nuculoida	Ennucula tenuis		10	5	-	15
			Nuculana minuta		1	2	-	3
			Nuculana pernula		1	8	-	9
		Mytiloida	Crenella decussata		1	7	-	8
		Veneroida	Arctica islandica		1	1	-	2
			Astarte borealis			1	-	1
			Astarte elliptica		3	-		3
			Astarte montagui		4	2	-	6
			Axinopsida orbiculata		5	-		5
			Macoma calcarea		11	9	-	20
			Parvicardium pinnulatum		6	33	-	39
			Thyasira gouldii		8	1	-	9
		Pholadomyoida	Lyonsia norwegica			1	-	1
			Thracia myopsis		4	9	-	13

Rekke	Klasse	Orden	Art/Taxa	Replikat:	01	02	-	Sum
ECHINODERMATA								
	Ophiuroidea	Ophiurida	Amphipholis squamata		2	1	-	3
			Ophiocten affinis		1		-	1
			Ophiura albida		1	1	-	2
	Holothuroidea	Dendrochirotida	Psolus phantapus		2		-	2
			Psolus sp. juv.		2	2	-	4
			Thyone fusus			2	-	2
			Holothuroidea indet. juv.		1		-	1
			Maksverdi:		43	33		63
			Antall arter/taxa:		79	47		88
			Sum antall individ:					733

Stasjonsnr.: C3

ECHIURIDA

SIPUNCULIDA								
			Echiurus echiurus		2	5	-	7
ANNELIDA								
	Polychaeta	Orbiniida	Phascolion strombus		1	1	-	2
			Aricidea sp.		3		-	3
			Levinsenia gracilis		3		-	3
			Scoloplos armiger		67	29	-	96
		Spionida	Chaetozone setosa		9	5	-	14
			Laonice cirrata		2	1	-	3
			Prionospio steenstrupi		7	22	-	29
			Spio armata		3		-	3
			Spio decorata		2	5	-	7
			Spio limicola		5	5	-	10
		Capitellida	Maldane sarsi		20	2	-	22
			Mediomastus fragilis		12	3	-	15
			Praxillella praetermissa		129	16	-	145
		Opheliida	Scalibregma inflatum		4	1	-	5
		Phyllodocida	Eteone flava/longa		6	14	-	20
			Goniada maculata		4		-	4
			Microphthalmus szcelkowi		2	1	-	3
			Nephtys ciliata		6	6	-	12
			Nephtys paradoxa			1	-	1
			Pholoe assimilis		35	13	-	48
			Pholoe baltica		15	1	-	16
			Polynoidae indet.		1	7	-	8
			Syllis cornuta			3	-	3
		Eunicida	Parougia eliasoni		1	4	-	5
			Scoletoma fragilis		1	1	-	2
		Sternaspida	Sternaspis scutata		2	2	-	4
		Oweniida	Galathowenia oculata		437	182	-	619
			Owenia sp.		11		-	11
		Flabelligerida	Bradabyssa villosa		2		-	2
			Saphobranchia longisetosa		1		-	1
		Terebellida	Lagis koreni		53	24	-	77
			Laphania boeckii		5		-	5
			Terebellidae indet.		1		-	1

Rekke	Klasse	Orden	Art/Taxa	Replikat:	01	02	-	Sum
		Sabellida						
			Euchone incolor		108	11	-	119
			Euchone papillosa			1	-	1
			Euchone sp.		1		-	1
CRUSTACEA	Malacostraca							
		Cumacea						
			Leptostylis sp.			1	-	1
			Leucon sp.		2	17	-	19
		Amphipoda						
			Bathymedon obtusifrons		1	3	-	4
			Byblis gaimardii			8	-	8
			Caprellidae indet.		1		-	1
			Lysianassidae indet.		3		-	3
			Protomeдея fasciata		3	1	-	4
		Isopoda						
			Pleurogonium spinosissimum		1	1	-	2
MOLLUSCA								
	Caudofoveata							
			Caudofoveata indet.		4		-	4
	Opisthobranchia							
		Cephalaspidea						
			Laona finmarchica		1		-	1
			Retusa obtusa		5	1	-	6
	Bivalvia							
		Nuculoidea						
			Ennucula tenuis		362	128	-	490
			Nuculana pernula		83	8	-	91
			Yoldia hyperborea		29	12	-	41
		Mytiloidea						
			Crenella decussata		3		-	3
		Veneroidea						
			Abra nitida		15		-	15
			Arctica islandica		5	2	-	7
			Axinopsida orbiculata		72	29	-	101
			Ciliatocardium ciliatum		1		-	1
			Macoma calcarea		9	4	-	13
			Thyasira gouldii		30	2	-	32
			Thyasira sarsii		8	27	-	35
		Myoidea						
			Mya sp. juv.		3		-	3
		Pholadomyoidea						
			Thracia myopsis		5		-	5
ECHINODERMATA								
	Ophiuroidea							
		Ophiurida						
			Ophiocten affinis		1		-	1
				Maksverdi:	437	182		619
				Antall arter/taxa:	57	42		62
				Sum antall individ:				2218

Stasjonsnr.: C4

NEMERTINI

ECHIURIDA			Nemertea indet.		2		-	2
ANNELIDA	Polychaeta		Echiurus echiurus		1	2	-	3
		Orbiniida						
			Aricidea sp.		3	1	-	4
			Scoloplos armiger		1		-	1
		Cossurida						
			Cossura sp.		3	3	-	6
		Spionida						
			Chaetozone setosa			3	-	3

Rekke	Klasse	Orden	Art/Taxa	Replikat:	01	02	-	Sum
			Prionospio steenstrupi		17	20	-	37
			Spio decorata			2	-	2
			Spio limicola		5		-	5
			Spiophanes kroyeri		1		-	1
		Capitellida	Mediomastus fragilis		6	1	-	7
			Praxillella praetermissa		2	2	-	4
		Opheliida	Ophelina acuminata			1	-	1
		Phyllodocida	Eteone flava/longa			1	-	1
			Microphthalmus szcelkowi			1	-	1
			Nephtys ciliata		2	2	-	4
			Pholoe baltica		2		-	2
			Polynoidae indet.		2		-	2
			Syllis cornuta			1	-	1
			Syllis hyalina			1	-	1
		Eunicida	Parougia eliasoni		5	11	-	16
		Sternaspida	Sternaspis scutata		27	18	-	45
		Oweniida	Galathowenia oculata		48	51	-	99
			Myriochele malmgreni/olgae		1	1	-	2
		Terebellida	Lagis koreni			1	-	1
			Melinna cristata		1		-	1
			Polycirrus sp.		1		-	1
		Sabellida	Euchone incolor		10	1	-	11
			Euchone papillosa			2	-	2
CRUSTACEA								
	Malacostraca							
		Cumacea	Leucon sp.		13	9	-	22
		Amphipoda	Lysianassidae indet.			1	-	1
MOLLUSCA								
	Opisthobranchia							
		Cephalaspidea	Retusa obtusa			2	-	2
	Bivalvia							
		Nuculoidea	Ennucula tenuis		180	124	-	304
			Nuculana pernula		16	18	-	34
			Yoldia hyperborea		5	4	-	9
		Veneroidea	Abra nitida		3	1	-	4
			Axinopsida orbiculata		3	8	-	11
			Thyasira sarsii		19	34	-	53
ECHINODERMATA								
	Asteroidea							
		Paxillosida	Ctenodiscus crispatus		2		-	2
	Ophiuroidea							
		Ophiurida	Ophiocten affinis			1	-	1
				Maksverdi:	180	124		304
				Antall arter/taxa:	28	31		40
				Sum antall individ:				709
Stasjonsnr.: C5								
NEMERTINI								
			Nemertea indet.			1	-	1
ECHIURIDA								
			Echiurus echiurus		1		-	1

Rekke	Klasse	Orden	Art/Taxa	Replikat:	01	02	-	Sum
ANNELIDA								
	Polychaeta							
		Orbiniida						
			Aricidea sp.		1		-	1
		Cossurida						
			Cossura sp.		3	3	-	6
		Spionida						
			Chaetozone setosa		1	3	-	4
			Prionospio steenstrupi		9	10	-	19
			Spio limicola		3	4	-	7
		Capitellida						
			Maldane sarsi		1		-	1
			Mediomastus fragilis		3		-	3
			Praxillella praetermissa		4	2	-	6
		Phyllodocida						
			Eteone flava/longa		3	6	-	9
			Nephtys ciliata		2	1	-	3
			Pholoe assimilis		1	1	-	2
			Pholoe baltica		2	5	-	7
			Polynoidae indet.		2	3	-	5
		Eunicida						
			Parougia eliasoni		1		-	1
		Sternaspida						
			Sternaspis scutata			1	-	1
		Oweniida						
			Galathowenia oculata		120	124	-	244
			Owenia sp.		4		-	4
		Terebellida						
			Lagis koreni		1	4	-	5
			Laphania boeckii		1		-	1
			Polycirrus sp.		1		-	1
			Terebellides sp.		1		-	1
		Sabellida						
			Euchone incolor		26	10	-	36
CRUSTACEA								
	Malacostraca							
		Cumacea						
			Leucon sp.		8	7	-	15
		Amphipoda						
			Lysianassidae indet.		1		-	1
MOLLUSCA								
	Prosobranchia							
		Neogastropoda						
			Curtitoma trevilliania			1	-	1
	Opisthobranchia							
		Cephalaspidea						
			Retusa obtusa		4	2	-	6
	Bivalvia							
		Nuculoidea						
			Ennucula tenuis		194	142	-	336
			Nuculana pernula		27	16	-	43
			Yoldia hyperborea		8	8	-	16
		Veneroidea						
			Abra nitida			1	-	1
			Axinopsida orbiculata		49	72	-	121
			Macoma calcarea		2	1	-	3
			Thyasira sarsii		24	22	-	46
		Pholadomyoidea						
			Thracia myopsis		2		-	2
ECHINODERMATA								
	Ophiuroidea							
		Ophiurida						
			Ophiocten affinis			1	-	1
			Ophiura albida		1		-	1
				Maksverdi:	194	142		336
				Antall arter/taxa:	33	26		38
				Sum antall individ:				962

Rekke Klasse Orden Art/Taxa

Replikat: 01 02 - Sum

7.4 Analytical report



ANALYSERAPPORT

Kunde: Arctic Sea Farm / Arctic Fish
Kundemerking: Kvigindisdalur ASC C
Kontaktperson:
Prosjektnr.: 65058

Rapport nr.: P230114
Rapportdato: 2023-09-06
Ankomst dato: 2023-06-30

Lab-id. P230114-01

Objekt	Kundens ID	Prosjektnr. og prosjektnavn	Notering	Mottatt lab
Sediment	C1	65058 - Kvigindisdalur ASC C og B undersøkelse max biomass June 2023		2023-06-19

Analyseresultat						
Parameter	Resultat	Enhet	Analyse dato start	Analyse dato slutt	Standard	Måleusikkerhet
TOC	45	mg/g TS	2023-07-04	2023-07-06	Intern metode (DIN EN 17505:2022)	±4.5
TNb	4.0	mg/g TS	2023-07-04	2023-07-06	Intern metode (NS-EN 16168:2012)	±1.2
nTOC	51.2	mg/g TS	2023-07-12	2023-07-12	Veileder 02:2018	
C/N - forhold	11.2		2023-07-12	2023-07-12		
TOM	*11.8	% TS	2023-06-30	2023-07-06	Intern metode	±0.4
Vekt% 2 mm	0.6	wt% TS	2023-06-30	2023-07-06	Intern metode (Bale/Kenny 2005)	±0.0
Vekt% 1 mm	0.4	wt% TS	2023-06-30	2023-07-06	Intern metode (Bale/Kenny 2005)	±0.0
Vekt% 0.500 mm	1.4	wt% TS	2023-06-30	2023-07-06	Intern metode (Bale/Kenny 2005)	±0.0
Vekt% 0.250 mm	5.2	wt% TS	2023-06-30	2023-07-06	Intern metode (Bale/Kenny 2005)	±0.0
Vekt% 0.125 mm	8.8	wt% TS	2023-06-30	2023-07-06	Intern metode (Bale/Kenny 2005)	±0.1
Vekt% 0.063 mm	20.4	wt% TS	2023-06-30	2023-07-06	Intern metode (Bale/Kenny 2005)	±0.1
Vekt% < 0.063 mm	63.1	wt% TS	2023-06-30	2023-07-06	Intern metode (Bale/Kenny 2005)	±3.2
Pelitt	63.1	wt% TS	2023-06-30	2023-07-06	Intern metode (Bale/Kenny 2005)	±3.2
Sand	36.3	wt% TS	2023-06-30	2023-07-06	Intern metode (Bale/Kenny 2005)	±0.2
Grus	0.6	wt% TS	2023-06-30	2023-07-06	Intern metode (Bale/Kenny 2005)	±0.0
Kobber (Cu) ^a	45.8	mg/kg TS	2023-07-14	2023-07-14	Intern metode	

^a Prøvingen er utført av eksternt laboratorium, ALS Laboratory Group

* = Ikke akkreditert resultat

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Side 1 av 7

Kunde: Arctic Sea Farm / Arctic Fish
 Kundemerking: Kvigindisdalur ASC C
 Kontaktperson:
 Prosjektnr.: 65058

Rapport nr.: P230114
 Rapportdato: 2023-09-06
 Ankomst dato: 2023-06-30

Lab-id. P230114-02

Objekt	Kundens ID	Prosjektnr. og prosjektnavn	Notering	Mottatt lab
Sediment	C2/ASC2/Cu ref3	65058 - Kvigindisdalur ASC C og B	Mye skjellrester i sedimentene	2023-06-19
undersøkelse max biomass June 2023				

Analyseresultat						
Parameter	Resultat	Enhet	Analysedato start	Analysedato slutt	Standard	Måleusikkerhet
TOC	8.9	mg/g TS	2023-07-04	2023-07-06	Intern metode (DIN EN 17505:2022)	±0.89
TNb	2.1	mg/g TS	2023-07-04	2023-07-06	Intern metode (NS-EN 16168:2012)	±0.6
nTOC	23.6	mg/g TS	2023-07-12	2023-07-12	Veileder 02:2018	
C/N - forhold	4.2		2023-07-12	2023-07-12		
TOM	*4.3	% TS	2023-06-30	2023-07-06	Intern metode	±0.4
Vekt% 2 mm	29.8	wt% TS	2023-06-30	2023-07-06	Intern metode (Bale/Kenny 2005)	±0.5
Vekt% 1 mm	4.9	wt% TS	2023-06-30	2023-07-06	Intern metode (Bale/Kenny 2005)	±0.0
Vekt% 0.500 mm	2.7	wt% TS	2023-06-30	2023-07-06	Intern metode (Bale/Kenny 2005)	±0.0
Vekt% 0.250 mm	6.2	wt% TS	2023-06-30	2023-07-06	Intern metode (Bale/Kenny 2005)	±0.0
Vekt% 0.125 mm	13.0	wt% TS	2023-06-30	2023-07-06	Intern metode (Bale/Kenny 2005)	±0.1
Vekt% 0.063 mm	24.8	wt% TS	2023-06-30	2023-07-06	Intern metode (Bale/Kenny 2005)	±0.1
Vekt% < 0.063 mm	18.7	wt% TS	2023-06-30	2023-07-06	Intern metode (Bale/Kenny 2005)	±0.9
Pelitt	18.7	wt% TS	2023-06-30	2023-07-06	Intern metode (Bale/Kenny 2005)	±0.9
Sand	51.5	wt% TS	2023-06-30	2023-07-06	Intern metode (Bale/Kenny 2005)	±0.3
Grus	29.8	wt% TS	2023-06-30	2023-07-06	Intern metode (Bale/Kenny 2005)	±0.5
Kobber (Cu) ^a	14.0 16.0	mg/kg TS	2023-07-14	2023-07-14	Intern metode	

^a Prøvingen er utført av eksternt laboratorium, ALS Laboratory Group

* = Ikke akkreditert resultat

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Side 2 av 7

ANALYSERAPPORT

Kunde: Arctic Sea Farm / Arctic Fish
 Kundemerking: Kvigindisdalur ASC C
 Kontaktperson:
 Prosjektnr.: 65058

Rapport nr.: P230114
 Rapportdato: 2023-09-06
 Ankomst dato: 2023-06-30

Lab-id. P230114-03

Objekt	Kundens ID	Prosjektnr. og prosjektnavn	Notering	Mottatt lab
Sediment	C3/ASC3	65058 - Kvigindisdalur ASC C og B	undersøkelse max biomass June 2023	2023-06-19

Analyseresultat						
Parameter	Resultat	Enhet	Analyse dato start	Analysedato slutt	Standard	Måleusikkerhet
TOC	26	mg/g TS	2023-07-04	2023-07-06	Intern metode (DIN EN 17505:2022)	±2.6
TNb	4.6	mg/g TS	2023-07-04	2023-07-06	Intern metode (NS-EN 16168:2012)	±1.4
nTOC	34.5	mg/g TS	2023-07-12	2023-07-12	Veileder 02:2018	
C/N - forhold	5.5		2023-07-12	2023-07-12		
TOM	*8.7	% TS	2023-06-30	2023-07-06	Intern metode	±0.4
Vekt% 2 mm	0.7	wt% TS	2023-06-30	2023-07-06	Intern metode (Bale/Kenny 2005)	±0.0
Vekt% 1 mm	0.3	wt% TS	2023-06-30	2023-07-06	Intern metode (Bale/Kenny 2005)	±0.0
Vekt% 0.500 mm	0.9	wt% TS	2023-06-30	2023-07-06	Intern metode (Bale/Kenny 2005)	±0.0
Vekt% 0.250 mm	3.6	wt% TS	2023-06-30	2023-07-06	Intern metode (Bale/Kenny 2005)	±0.0
Vekt% 0.125 mm	10.4	wt% TS	2023-06-30	2023-07-06	Intern metode (Bale/Kenny 2005)	±0.1
Vekt% 0.063 mm	33.3	wt% TS	2023-06-30	2023-07-06	Intern metode (Bale/Kenny 2005)	±0.1
Vekt% < 0.063 mm	50.8	wt% TS	2023-06-30	2023-07-06	Intern metode (Bale/Kenny 2005)	±2.5
Pelitt	50.8	wt% TS	2023-06-30	2023-07-06	Intern metode (Bale/Kenny 2005)	±2.5
Sand	48.4	wt% TS	2023-06-30	2023-07-06	Intern metode (Bale/Kenny 2005)	±0.3
Grus	0.7	wt% TS	2023-06-30	2023-07-06	Intern metode (Bale/Kenny 2005)	±0.0

* = Ikke akkreditert resultat

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Kunde: Arctic Sea Farm / Arctic Fish
 Kundemerking: Kvigindisdalur ASC C
 Kontaktperson:
 Prosjektnr.: 65058

Rapport nr.: P230114
 Rapportdato: 2023-09-06
 Ankomst dato: 2023-06-30

Lab-id. P230114-04

Objekt	Kundens ID	Prosjektnr. og prosjektnavn	Notering	Mottatt lab
Sediment	C4/ASC4	65058 - Kvigindisdalur ASC C og B	undersøkelse max biomass June 2023	2023-06-19

Analyseresultat						
Parameter	Resultat	Enhet	Analysedato start	Analysedato slutt	Standard	Måleusikkerhet
TOC	34	mg/g TS	2023-07-04	2023-07-06	Intern metode (DIN EN 17505:2022)	±3.4
TNb	4.6	mg/g TS	2023-07-04	2023-07-06	Intern metode (NS-EN 16168:2012)	±1.4
nTOC	36.7	mg/g TS	2023-07-12	2023-07-12	Veileder 02:2018	
C/N - forhold	7.3		2023-07-12	2023-07-12		
TOM	+12.7	% TS	2023-06-30	2023-07-06	Intern metode	±0.4
Vekt% 2 mm	2.4	wt% TS	2023-06-30	2023-07-06	Intern metode (Bale/Kenny 2005)	±0.0
Vekt% 1 mm	1.5	wt% TS	2023-06-30	2023-07-06	Intern metode (Bale/Kenny 2005)	±0.0
Vekt% 0.500 mm	1.9	wt% TS	2023-06-30	2023-07-06	Intern metode (Bale/Kenny 2005)	±0.0
Vekt% 0.250 mm	1.7	wt% TS	2023-06-30	2023-07-06	Intern metode (Bale/Kenny 2005)	±0.0
Vekt% 0.125 mm	2.9	wt% TS	2023-06-30	2023-07-06	Intern metode (Bale/Kenny 2005)	±0.0
Vekt% 0.063 mm	7.1	wt% TS	2023-06-30	2023-07-06	Intern metode (Bale/Kenny 2005)	±0.0
Vekt% < 0.063 mm	82.5	wt% TS	2023-06-30	2023-07-06	Intern metode (Bale/Kenny 2005)	±4.1
Pelitt	82.5	wt% TS	2023-06-30	2023-07-06	Intern metode (Bale/Kenny 2005)	±4.1
Sand	15.1	wt% TS	2023-06-30	2023-07-06	Intern metode (Bale/Kenny 2005)	±0.1
Grus	2.4	wt% TS	2023-06-30	2023-07-06	Intern metode (Bale/Kenny 2005)	±0.0
Kobber (Cu) ^a	34.2 35.4	mg/kg TS	2023-07-14	2023-07-14	Intern metode	
Emamectinbenzoat ^b	+130	ng/kg TS	2023-09-05	2023-09-05	Intern metode	

^a Prøvingen er utført av eksternt laboratorium, ALS Laboratory Group

^b Prøvingen er utført av eksternt laboratorium, NIVA

* = Ikke akkreditert resultat

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ANALYSERAPPORT

Kunde: Arctic Sea Farm / Arctic Fish
 Kundemerking: Kvigindisdalur ASC C
 Kontaktperson:
 Prosjektnr.: 65058

Rapport nr.: P230114
 Rapportdato: 2023-09-06
 Ankomst dato: 2023-06-30

Lab-id. P230114-05

Objekt	Kundens ID	Prosjektnr. og prosjektnavn	Notering	Mottatt lab
Sediment	C5/ASC5	65058 - Kvigindisdalur ASC C og B undersøkelse max biomass June 2023	Akkreditert måleområdet for TNb er opp til 5 mg/g TS	2023-06-19

Analyseresultat						
Parameter	Resultat	Enhet	Analysedato start	Analysedato slutt	Standard	Måleusikkerhet
TOC	35	mg/g TS	2023-07-04	2023-07-06	Intern metode (DIN EN 17505:2022)	±3.5
TNb	+5.0	mg/g TS	2023-07-04	2023-07-06	Intern metode (NS-EN 16168:2012)	±1.5
nTOC	39.0	mg/g TS	2023-07-12	2023-07-12	Veileder 02:2018	
C/N - forhold	7.0		2023-07-12	2023-07-12		
TOM	+12.9	% TS	2023-06-30	2023-07-06	Intern metode	±0.4
Vekt% 2 mm	0.5	wt% TS	2023-06-30	2023-07-06	Intern metode (Bale/Kenny 2005)	±0.0
Vekt% 1 mm	0.9	wt% TS	2023-06-30	2023-07-06	Intern metode (Bale/Kenny 2005)	±0.0
Vekt% 0.500 mm	1.3	wt% TS	2023-06-30	2023-07-06	Intern metode (Bale/Kenny 2005)	±0.0
Vekt% 0.250 mm	2.1	wt% TS	2023-06-30	2023-07-06	Intern metode (Bale/Kenny 2005)	±0.0
Vekt% 0.125 mm	4.6	wt% TS	2023-06-30	2023-07-06	Intern metode (Bale/Kenny 2005)	±0.0
Vekt% 0.063 mm	12.0	wt% TS	2023-06-30	2023-07-06	Intern metode (Bale/Kenny 2005)	±0.0
Vekt% < 0.063 mm	78.8	wt% TS	2023-06-30	2023-07-06	Intern metode (Bale/Kenny 2005)	±3.9
Pelitt	78.8	wt% TS	2023-06-30	2023-07-06	Intern metode (Bale/Kenny 2005)	±3.9
Sand	20.8	wt% TS	2023-06-30	2023-07-06	Intern metode (Bale/Kenny 2005)	±0.1
Grus	0.5	wt% TS	2023-06-30	2023-07-06	Intern metode (Bale/Kenny 2005)	±0.0
Kobber (Cu) ^a	35.6 52.0	mg/kg TS	2023-07-31	2023-07-31	Intern metode	

^a Prøvingen er utført av eksternt laboratorium, ALS Laboratory Group

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ANALYSERAPPORT

Kunde: Arctic Sea Farm / Arctic Fish
 Kundemerking: Kvigindisdalur ASC C
 Kontaktperson:
 Prosjektnr.: 65058

Rapport nr.: P230114
 Rapportdato: 2023-09-06
 Ankomst dato: 2023-06-30

Lab-id. P230114-06

Objekt	Kundens ID	Prosjektnr. og prosjektnavn	Notering	Mottatt lab
Sediment	ASC1	65058 - Kvigindisdalur ASC C og B undersøkelse max biomass June 2023	Akkreditert måleområdet for TNb er opp til 5 mg/g TS	2023-06-19

Analyseresultat						
Parameter	Resultat	Enhet	Analyse dato start	Analyse dato slutt	Standard	Måleusikkerhet
TOC	26	mg/g TS	2023-07-04	2023-07-06	Intern metode (DIN EN 17505:2022)	±2.6
TNb	+5.3	mg/g TS	2023-07-04	2023-07-06	Intern metode (NS-EN 16168:2012)	±1.6
nTOC	30.7	mg/g TS	2023-07-12	2023-07-12	Veileder 02:2018	
C/N - forhold	4.9		2023-07-12	2023-07-12		
TOM	+11.1	% TS	2023-06-30	2023-07-06	Intern metode	±0.4
Vekt% 2 mm	1.1	wt% TS	2023-06-30	2023-07-06	Intern metode (Bale/Kenny 2005)	±0.0
Vekt% 1 mm	0.7	wt% TS	2023-06-30	2023-07-06	Intern metode (Bale/Kenny 2005)	±0.0
Vekt% 0.500 mm	1.3	wt% TS	2023-06-30	2023-07-06	Intern metode (Bale/Kenny 2005)	±0.0
Vekt% 0.250 mm	2.7	wt% TS	2023-06-30	2023-07-06	Intern metode (Bale/Kenny 2005)	±0.0
Vekt% 0.125 mm	5.6	wt% TS	2023-06-30	2023-07-06	Intern metode (Bale/Kenny 2005)	±0.0
Vekt% 0.063 mm	15.6	wt% TS	2023-06-30	2023-07-06	Intern metode (Bale/Kenny 2005)	±0.1
Vekt% < 0.063 mm	73.0	wt% TS	2023-06-30	2023-07-06	Intern metode (Bale/Kenny 2005)	±3.6
Pelitt	73.0	wt% TS	2023-06-30	2023-07-06	Intern metode (Bale/Kenny 2005)	±3.6
Sand	25.9	wt% TS	2023-06-30	2023-07-06	Intern metode (Bale/Kenny 2005)	±0.2
Grus	1.1	wt% TS	2023-06-30	2023-07-06	Intern metode (Bale/Kenny 2005)	±0.0

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Kunde: Arctic Sea Farm / Arctic Fish
 Kundemerking: Kvigindisdalur ASC C
 Kontaktperson:
 Prosjektnr.: 65058

Rapport nr.: P230114
 Rapportdato: 2023-09-06
 Ankomst dato: 2023-06-30

Lab-id. P230114-07

Objekt	Kundens ID	Prosjektnr. og prosjektnavn	Notering	Mottatt lab
Sediment	Cu ref 1	65058 - Kvigindisdalur ASC C og B	undersøkelse max biomass June 2023	2023-06-19

Analyseresultat							
Parameter	Resultat		Enhet	Analysedato start	Analysedato slutt	Standard	Målesikkerhet
Kobber (Cu) ^a	19.8	19.1	mg/kg TS	2023-07-14	2023-07-14	Intern metode	

^a Prøvingen er utført av eksternt laboratorium, ALS Laboratory Group

Lab-id. P230114-08

Objekt	Kundens ID	Prosjektnr. og prosjektnavn	Notering	Mottatt lab
Sediment	Cu ref 2	65058 - Kvigindisdalur ASC C og B	undersøkelse max biomass June 2023	2023-06-19

Analyseresultat							
Parameter	Resultat		Enhet	Analysedato start	Analysedato slutt	Standard	Målesikkerhet
Kobber (Cu) ^a	10.9	11.0	mg/kg TS	2023-07-14	2023-07-14	Intern metode	

^a Prøvingen er utført av eksternt laboratorium, ALS Laboratory Group

Analyseansvarlig:

Ingar H. Wasbotten



Signatur:

Oda Sofie Bye Wilhelmsen

Underskriftsberettiget:



Signatur:

Analysene gjelder bare for de prøver som er testet. De oppgitte analyseresultat omfatter ikke feil som måtte følge av prøvetagningen, inhomogenitet eller andre forhold som kan ha påvirket prøven før den ble mottatt av laboratoriet. Rapporten får kun kopieres i sin helhet og uten noen form for endringer. En eventuell klage skal leveres laboratoriet senest en måned etter mottak av analyseresultat. Nærmere informasjon om analysemetodene (målesikkerhet, metodeprinsipp etc.) fås ved henvendelse til Akvaplan-Niva AS

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