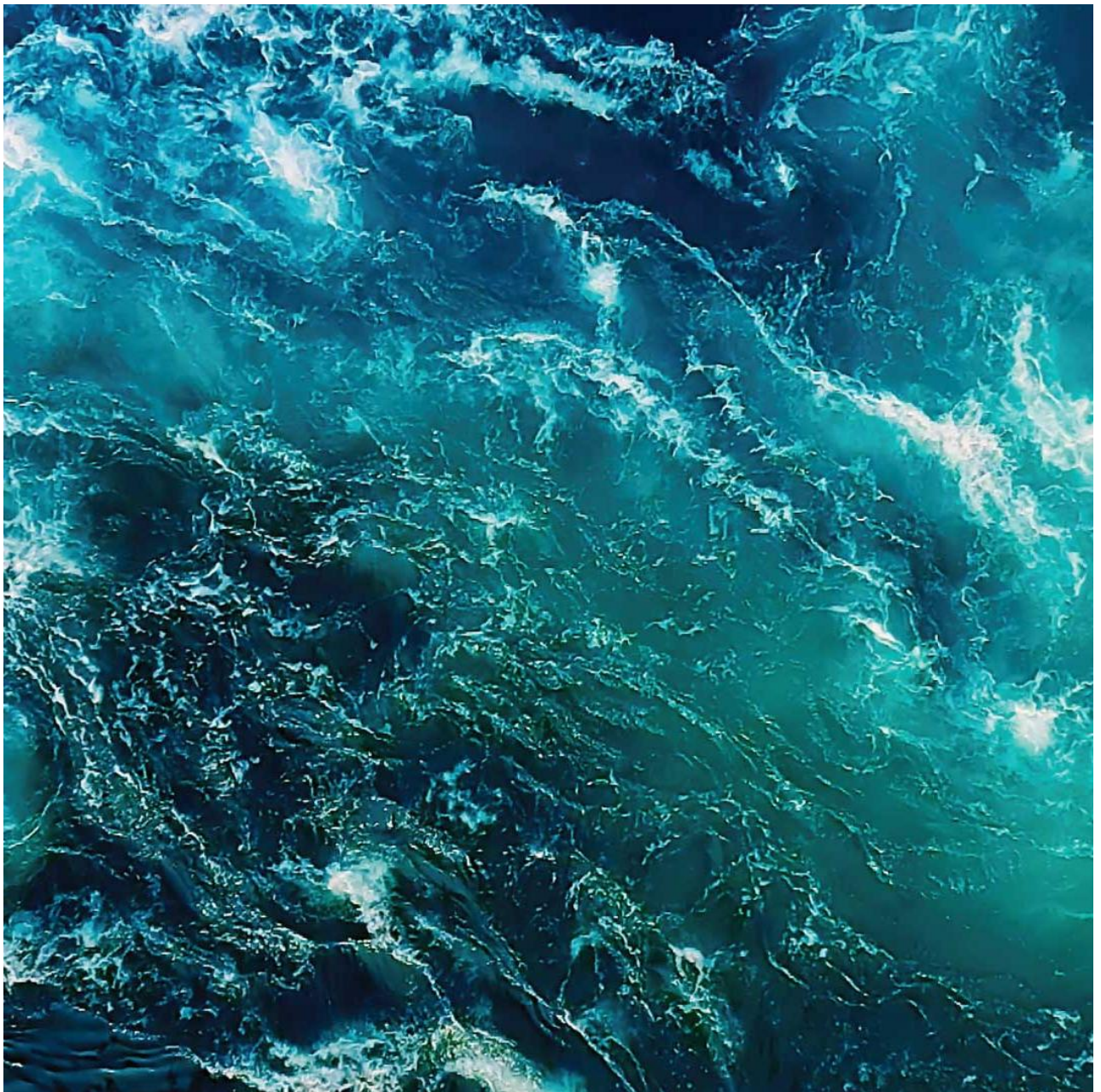


C-survey at Steinanes, 2026

Arnarlax ehf

Akvaplan-niva AS Report: 2026 67410.01



Arnarlax ehf. C-Survey at Steinanes, 2026.

Author(s)	Hans-Petter Mannvik, Snorri Gunnarsson
Date	24.06 2026
Report no.	2026 67410.01
No of pages	45
Distribution	Through customer only

Customer

Arnarlax ehf	
Contact person	Kristian Leander Gillebo Sormo
Address	Strandgata 1, 465 Bíldudalur, Iceland

Summary

The results from the monitoring at the farming site Steinanes in April 2026 showed that the sediment was somewhat loaded with organic carbon and the copper level in the sediment at C1 was somewhat elevated (46 mg/kg) and is categorized into environmental limit II or "low values". EMB concentration in the sediment at C4 was 320 ng/kg and thus exceeds the defined concentration of 272 ng/kg for stations outside the mixing zone. Accordingly, the station is not fulfilling the "good status standard". The bottom sediments grain size was moderately coarse to fine with a pelite ratio ranging from 27.6 to 89.7 %. The redox measurements (pH/Eh) gave point 0 acc. Appendix D in NS 9410:2016 for all the sampling stations. The oxygen saturation in April was good in the whole water column with 98 % in the bottom water.

Moderately load effect was recorded in the fauna at all stations (nEQR between 0.4 and 0.6). The diversity H' varied from 2.54 to 3.04. 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 most dominant species at C1, but not at the other stations.

The results from the present survey in April 2026 compared to previous C survey at the Steinanes in August 2025 (Mannvik & Gunnarsson, 2026) showed that the diversity index H' was similar and below 3 (2.5-2.9) at the stations except at C1 where it has increased from 2.74 to 3.04. A pollution indicator species was found among the top ten at C1 in both surveys, but with fewer individuals in the present survey. The faunal conditions at C1 and C3 are still moderately affected and have changed from good to moderately affected at the other stations.

Approval



Project leader

 Digitally signed by
Kamila Szttybor
Date: 2026.06.24
13:18:33 +02'00'

Quality control

© 2026 Akvaplan-niva AS. This report may only be reproduced in its entirety. Copying of partial content (texts, figures, table, conclusions, etc.) or other methods of publication is only permitted after obtaining written consent from Akvaplan-niva AS.

TABLE OF CONTENTS

TABLE OF CONTENTS.....	3
PREFACE	5
1 DATA SUMMARY	6
2 INTRODUCTION	7
2.1 Background and aim of the study.....	7
2.2 Site operation and feed use	7
2.3 Previous surveys	8
3 MATERIALS AND METHODS.....	9
3.1 Survey program	9
Placement of stations and local conditions	9
3.2 Hydrography and oxygen.....	10
3.3 Soft bottom sampling and analyses	10
3.3.1 Fieldwork.....	10
3.3.2 Total organic material (TOM).....	11
3.3.3 Total nitrogen (TN)	11
3.3.4 Total organic carbon (TOC) and grain size.....	11
3.3.5 Metal analysis - copper (Cu).....	11
3.3.6 Emamectin benzoate (EMB).....	11
3.3.7 Phosphorus (P)	11
3.3.8 Redox- and pH measurements	12
3.4 Soft bottom fauna investigation	12
3.4.1 About effect of organic material on bottom fauna	12
3.4.2 Sampling and fixation	12
3.4.3 Quantitative bottom fauna analysis.....	12
4 RESULTS	14
4.1 Hydrography and oxygen.....	14
4.2 Sediment	14
4.2.1 TOC, TOM, TN, C/N, grain size and pH/Eh	14
4.2.2 Copper.....	15
4.2.3 Emamectin benzoate.....	15
4.2.4 Phosphorus	15
4.3 Soft-bottom fauna	16
4.3.1 Faunal indices	16
4.3.2 NS 9410 Evaluation of the bottom fauna at station C1 (local impact zone).	17
Geometric classes.....	17
4.3.3 Cluster analyses.....	18
4.3.4 Species composition.....	18

5	SUMMARY.....	20
5.1	Comparison with previous survey.....	20
6	REFERENCES.....	21
7	APPENDIX (IN NORWEGIAN).....	23
7.1	Stasjonsbeskrivelser	23
7.2	Bunndyrsindekser og artslister	24
7.3	Klassifisering av faunaindekser Island	28
7.4	Statistical results Steinanes, 2026	29
7.5	Species lists	30
7.6	Analytical report	35

Preface

Akvaplan-niva carried out a type C (NS 9410:2016) environmental survey at the Steinanes site. It includes pH/redox measurements (Eh), hydrography, geochemical analyses, and analyses of the bottom fauna from six 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.
Kamila Szybor	Akvaplan-niva	QA report, professional assessments, and interpretations.
Rune Palerud	Akvaplan-niva	Identification of bottom fauna (Crustaceans). Statistics.
Jesper Hansen	Akvaplan-niva	Identification of bottom fauna (Varia and Mollusca).
Andrey Sikorski	Akvaplan-niva	Identification of bottom fauna (Polychaeta).
Anne Tårånd Aasen	Akvaplan-niva	Hydrographical vertical profiles
Kristine H Sperre	Akvaplan-niva	Coordination of sorting of bottom fauna.
Lisa Torske	Akvaplan-niva	Coordination of geo-chemical analyses.

Akvaplan-niva would like to thank Arnarlax ehf and Kristian Leander Gillebo Sormo 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: Analyses of emamectin benzoate, hydrographical measurements and mapping of bottom topography (Olex).

1 Data Summary

Client information			
Report title:	C-Survey at Steinanes, 2026.		
Report nr.	2026 67410.01	Site:	Steinanes
Municipality:	Vesturbyggð	Map Coordinates (construction):	65°40,388 N 23°28,231 V
MTB permitted (estim. max biomass next generation):	6.500 ton	Operations manager:	Kristian Leander Gillebo Sormo
Client:	Arnarlax ehf		

Biomass/production status at time of survey (10.04.2026)			
Fish group:	Salmon	Biomass on examination (t):	0
Feed input (t):	0	Tonnes of produced fish:	0
Type/time of survey			
Maximum biomass (t):		Follow up study:	
Fallow (resting period):	X	New location:	

Results from the C study /NS 9410 (2016) – Main results from soft bottom fauna			
Faunal index nEQR (Miljødirektoratet 2025)		Diversity index H' (Shannon-Wiener)	
Fauna C1 (impact zone)	0.543	Fauna C1 (impact zone)	3.04
Fauna C2	0.495	Fauna C2	2.59
Fauna C2alt	0.517	Fauna C2	2.69
Fauna C3	0.506	Fauna C3	2.54
Fauna C4 (deep area)	0.540	Fauna C4 (deep area)	2.75
Fauna C5	0.506	Fauna C5	2.73
Date fieldwork:	(10.04.2026)	Date of report:	24.06 2026
Notes to other results (sediment, pH/Eh, oxygen)		nTOC from 40.9 to 47.1 Copper 46 mg/kg at C1 Eh positive at all stations O ₂ -conditions were good throughout the water column.	

2 Introduction

2.1 Background and aim of the study

On behalf of Arnarlax ehf, Akvaplan-niva completed a survey (type C) for a fish farming site at Steinanes (Figure 1). The survey fulfils the requirements of an environmental study with reference to Chapter 5.0 in NS 9410:2016 which follows the methodology for C- study. The survey also fulfils the requirements for bottom surveys according to ISO 12878 and the requirements for environmental bottom surveys (according to Vöktunaráætlun). 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 (national water type G/H 1-3; see chapter 7.1), 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 guidelines from Miljødirektoratet (2025).

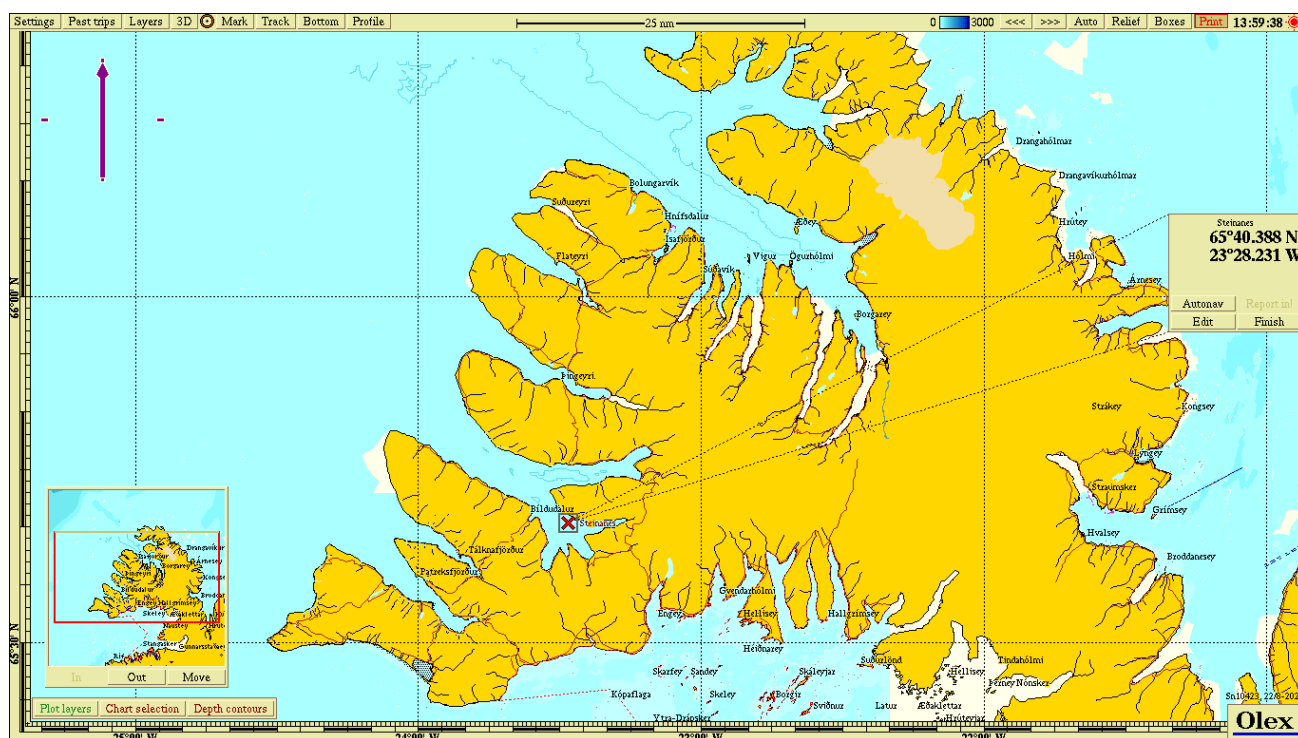


Figure 1 Overview of the Westfjord Iceland with the farming site Steinanes (red cross). The map coordinates for the midpoint of the farming site are given to the right.

2.2 Site operation and feed use

The Steinanes site is located in Arnarfjörður Iceland about 5.5 km north-east from Bíldudalur. The cages are lined in a southwest direction from land (227 degrees). The depth under cages ranges from about 62 m closer to land up to about 92 further into the fjord. The shallower area of the farm is at

the northernmost part. The fish farm at the site is a one-frame mooring system, with a total of 14 cages, each with 160 m circumference. Thirteen of the total fourteen cages (cages nr. 2-3 and 5-14) were used during farming of previous generation.

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 estimated maximal standing biomass for the next generation is 6.500 tonnes, used as MTB here (Kristian Leander Gillebo, pers reference).

2.3 Previous surveys

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

Table 1: Previous C-surveys at Steinanes.

Survey date	Report reference (author, year)	Production (tonnes)
10.04 2026	APN 67410.01 (Mannvik and Gunnarsson, 2026)	0
28.08 2025	APN 66876.01 (Mannvik and Gunnarsson, 2026)	6.725
27.06 2023	APN 65074.01 (Mannvik and Gunnarsson, 2023)	0
12.10 2021	APN 63543.02 (Sztybor and Eriksen, 2022)	9.806
10.06 2020	APN 62254.01 (Velvin and Gunnarsson, 2020)	0
25.09 2018	APN 60256.01 (Mannvik and Gunnarsson, 2019)	8.964
27.06 2017	APN 8951.02 (Mannvik and Eriksen, 2018)	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*.
- Miljødirektoratet (2025). *Veileder for klassifisering av miljøtilstand i kyst- og ferskvann*.

Table 2: Survey program for the C-survey at Steinanes, 2026. TOC = total organic carbon. GSA = grain size analysis sediment. TOM = total organic material. TN = total nitrogen. Cu = Copper. P = phosphorous. EMB = emamectin benzoate. pH/Eh = acidity and redox potential.

Station	Type analyses/parameters
C1 (local impact zone)	Quantitative analyses of bottom fauna. TOC. GSA, TOM. TN. Cu. P. pH/Eh.
C2 (transition zone outer)	Quantitative analyses of bottom fauna. TOC. GSA, TOM. TN. P. pH/Eh.
C2alt (transition zone outer)	Quantitative analyses of bottom fauna. TOC. GSA, TOM. TN. P. pH/Eh.
C3 (transition zone)	Quantitative analyses of bottom fauna. TOC. GSA, TOM. TN. P. EMB. pH/Eh.
C4 (transition zone, deep area)	Quantitative analyses of bottom fauna. TOC. GSA, TOM. TN. P. Hydrography/O ₂ . pH/Eh.
C5 (transition zone)	Quantitative analyses of bottom fauna. TOC. GSA, TOM. TN. P. pH/Eh.

Field work was completed on 10.04.2026.

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 6.500 tonnes (used as MTB here). According to the standard six sampling stations should be examined. Due to relatively strong counter current in SE direction a station C2 alt was placed 500 m from the fish farm in line with direction of the counter current. 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 measured at 60 m depth (Hermansen, 2020).

Table 3: Depth, distance between the nearest frame of the fish farm and sampling stations and coordinates for C-stations at Steinanes, 2026.

Station	Depth, m	Distance from frame, m	Position	
			N	W
C1	85	25	65°40.739	23°28.496
C2	86	500	65°40.550	23°28.960
C2alt	81	500	65°40.114	23°27.798
C3	86	210	65°40.441	23°28.687
C4	86	355	65°40.500	23°28.819
C5	91	65	65°40.227	23°28.545

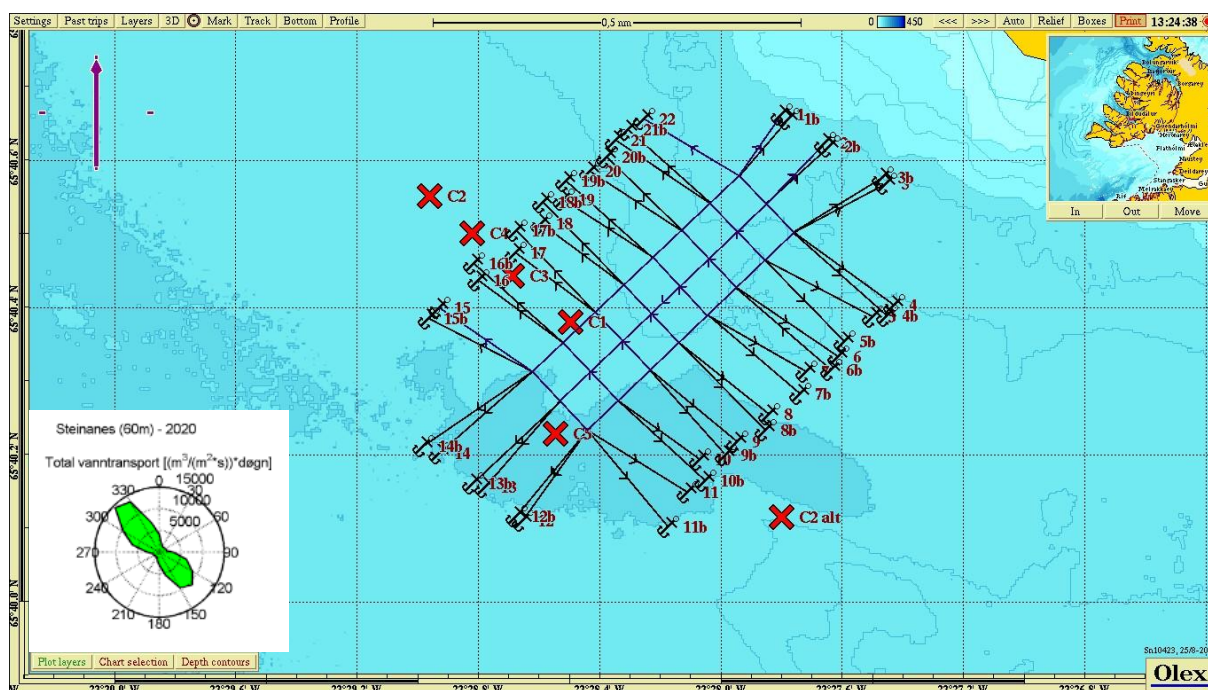


Figure 2. Map showing the sampling stations for the C-survey at Steinanes, 2026. Current measurements used were from 60 m depth (Hermansen, 2020).

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. Effort was made to collect samples with an undisturbed surface. However, due to soft bottom conditions (mud) three of the sediment grabs were full (stations C2, C3 and C5) despite effort to slow

down the descending speed of the grab the last 10 m. 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 freeze drying, the amount of total nitrogen (TN) was quantified by electrochemical determination using Akvaplan-niva internal method that is based on NS-EN 16168:2012.

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 each fraction on a dry weight basis (Bale & Kenny, 2005).

After freeze drying, the content of total organic carbon (TOC) was determined by NDIR-detection in accordance with NS EN 17505:2022. 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 Emamectin benzoate (EMB)

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 (SEPA, 2022 & 2023).

3.3.7 Phosphorus (P)

Following a pre-treatment, the samples were quantified according to ČSN 720116-1 (720116) where phosphorus pentaoxide, P₂O₅ forms a phosphorusmolybden-vanadium complex. 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.

3.3.8 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, and 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. During field work effort was made to collect grab samples where the grab was completely closed and the surface undisturbed. However, due to soft bottom conditions (mud) six of the sediment replicates for fauna analysis were full grab (stations C1-1, C2-2, C3-1, C4-1, and both replicates at C5) despite effort to slow down the descending speed of the grab the last 10 m. 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 (ES_{100}) – expected number of species pr. 100 individuals
- Pielou's evenness index (J)
- Sensitivities index (Ømfintlighet) (ISI_{2018}), unsuitable at low individual/species number
- Sensitivity index (NSI_{2018})
- 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 classes
- Cluster analyses
- The ten most dominant taxa per station (top-ten)

For the classification of fauna see Appendix 7.3.

4 Results

4.1 Hydrography and oxygen

The hydrographical profile for the deep station C4 in April 2026 is presented in Figure 3.

Temperature was between 1 and 2 °C in the entire water column. Oxygen saturation was good with 100 % in the upper layer and 98 % in the bottom layer.

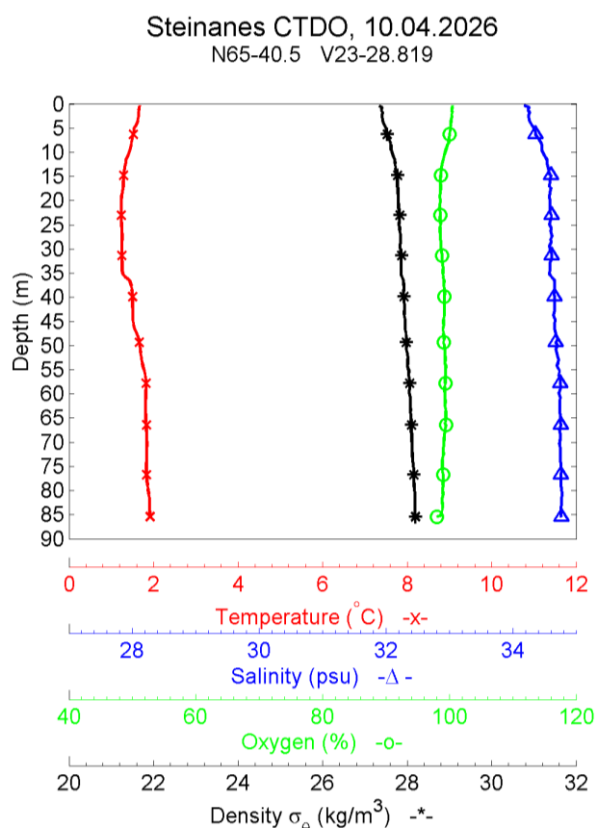


Figure 3. Vertical profiles. Temperature, salinity, density, and oxygen at C4 at Steinanes, 2026.

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 5.0 to 14.2 %. TN-levels were low (2.9 – 3,9 mg/g) as was the C/N-ratio. TOC was rather high at all stations and nTOC varied from 40.9 to 47.1. The bottom sediments grain size was moderately coarse to fine with a pelite ratio ranging from 27.6 to 89.7 %.

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. Steinanes, 2026.

St.	Sediment description	TOM	TOC	nTOC	TN	C/N	Pelite	pH/Eh
C1	Olive green mud/silt/gravel and some shell fractions.	8.6	33	42.4	3.4	9.7	45.8	7.6/258
C2	Olive green mud.	14.2	40	41.7	3.6	11.2	89.7	7.8/262
C2alt	Olive green mud/gravel and some shell fractions.	5.0	30	42.8	2.9	10.2	27.6	7.8/286
C3	Olive green mud.	13.9	38	41.2	3.7	10.5	84.6	7.6/257
C4	Olive green mud.	13.4	44	47.1	3.9	11.1	80.5	7.7/254
C5	Olive green mud.	12.2	39	40.9	3.1	12.6	86.8	7.8/254

4.2.2 Copper

Levels of copper in bottom sediment at C1 are shown in Table 5. The level of copper was 46 mg/kg or low (limit II) 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. Steinanes, 2026.

St.	Cu
C1	46

4.2.3 Emamectin benzoate

Concentration of emamectin benzoate in sediment at C3 is presented in Table 6. Station C3 is located 210 m from the cage edge and is thus placed outside the mixing zone (SEPA 2022).

EMB concentration was 320 ng/kg and thus exceeds the defined concentration of 272 ng/kg for stations outside the mixing zone. Accordingly, the station is not fulfilling the "good status standard".

Table 6. Emamectin benzoate in the sediment at C3, ng/kg. Steinanes, 2026.

St.	Emamectin benzoate
C3	320

4.2.4 Phosphorus

Levels of phosphorus in bottom sediments at Steinanes are shown in Table 7. The level of phosphorus varied from 1200 mg/kg (C2alt) to 1800 mg/kg (C1).

Table 7. Phosphorus (P), mg/kg DS. Steinanes, 2026.

St.	P
C1	1800
C2	1400
C2alt	1200
C3	1400
C4	1600
C5	1400

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 8.

The number of individuals varied from 278 (C2alt) to 754 (C1) and number of species from 22 (C2 and C5) to 35 (C1). The diversity H' varied from 2.54 to 3.04. At all stations the overall index of nEQR was lower than 0.6. The nEQR values indicate moderate faunal condition at the stations. The AMBI-value varied from 3.298 to 3.476.

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 0.57 to 0.68 which indicates a somewhat uneven distribution.

Table 8. Number of species and individuals pr. 0,2 m². H' = Shannon-Wiener's diversity index. ES_{100} = Hurlberts diversity index. $NQI1$ = overall index (diversity and sensitivity). ISI_{2018} = sensitivity index. NSI = sensitivity index. J = Pielous evenness index. $AMBI$ = AZTI marine biotic index (part of $NQI1$). $nEQR$ = normalized EQR. C-stations at Steinanes, 2026.

St.	C1	C2	C2alt	C3	C4	C5
Ant. ind.	754	293	278	635	363	325
Ant. arter	35	22	23	30	27	22
H'	3,04	2,59	2,69	2,54	2,75	2,73
ES_{100}	15,3	14,6	17,1	14,1	16,4	15,5
$NQI1$	0,602	0,566	0,576	0,581	0,593	0,583
ISI_{2018}	5,49	5,39	5,49	5,63	5,88	5,27
NSI	18,03	16,16	15,91	16,65	16,68	16,23
$nEQR$	0,543	0,495	0,517	0,506	0,540	0,506
$AMBI$	3.298	3.476	3.424	3.395	3.324	3.307
Pielou J	0.64	0.63	0.68	0.57	0.63	0.65

*) Colour marking according to Norwegian national water type G/H 1-3 (Miljødirektoratet, 2025).

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 9).

Table 9. Classification of the environmental status of the soft bottom fauna at station C1 at the Steinanes, 2026.

Station	Site name	Num. species	Dominating taxa	Environmental condition-NS 9410
C1	Steinanes	35	Prionospio steenstrupi – 26 %	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.

All curves started relatively low (≤ 12 species) and stretched out similarly towards higher classes (class 8). These did not give any clear indications of fauna condition.

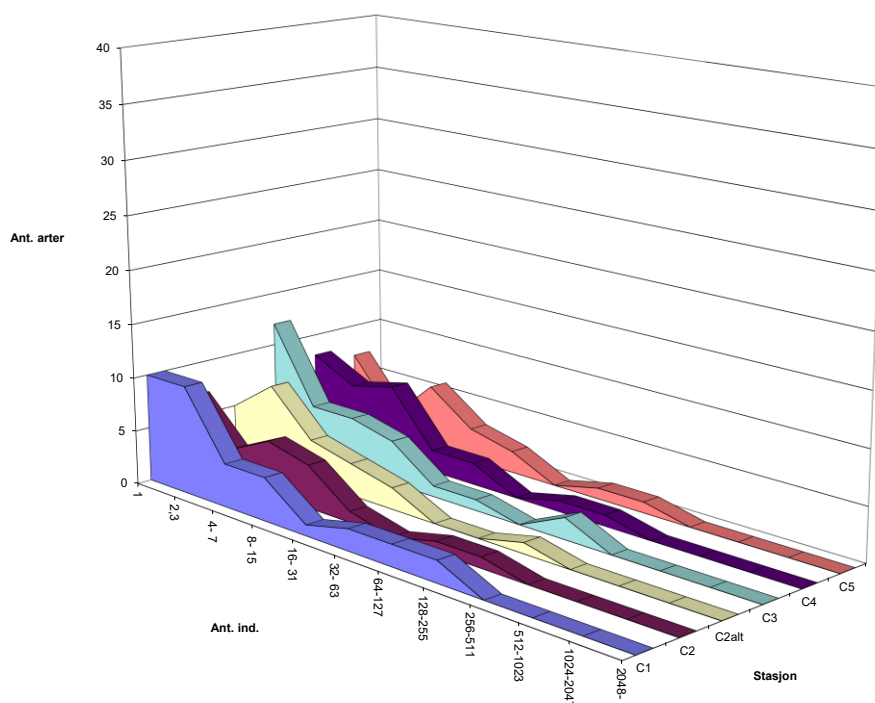


Figure 4. The soft bottom fauna shown as number of species against number of individuals pr. species in geometric classes. Steinanes, 2026.

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 most of the stations was more than 71 % similar and C1 was 62 % similar with the other stations.

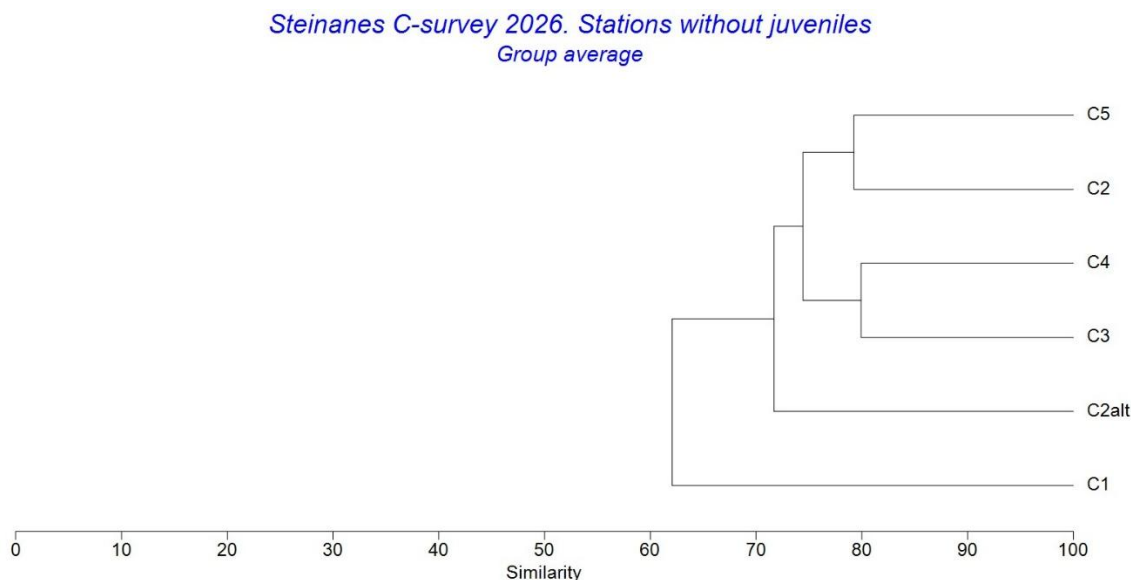


Figure 5. Cluster diagram for the soft bottom fauna at the C-stations at Steinanes, 2026.

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 10.

In Borgersen *et al.* (2020) 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 all stations was dominated by the opportunistic polychaete *Prionospio steenstrupi* with between 26 and 50 % of the individuals. The other most dominant species at the stations were mainly tolerant and opportunistic species.

The pollution indicator species *Capitella capitata* was among the most dominant at C1.

Table 10. Number of individuals, cumulative percentage, and ecological group* for the ten most dominant species at the C stations. Steinanes, 2026.

C1	EG	Ant. ind.	Kum.
Prionospio steenstrupi	IV	196	26 %
Thyasira sarsii	IV	177	49 %
Heteromastus filiformis	IV	109	64 %
Ampharete borealis	IV	74	74 %
Chaetozone sp.	III	46	80 %
Ennucula tenuis	III	40	85 %
Cistenides hyperborea	III	21	88 %
Galathowenia oculata	III	12	89 %
Ophelina acuminata	III	12	91 %
Capitella capitata	V	10	92 %
C2alt	EG	Ant. ind.	Kum.
Prionospio steenstrupi	IV	139	50 %
Thyasira sarsii	IV	29	60 %
Ampharete borealis	IV	19	67 %
Praxillella gracilis	III	15	73 %
Chaetozone sp.	III	14	78 %
Lumbrineris sp.	III	12	82 %
Ennucula tenuis	III	7	85 %
Leucon sp.	Ik	7	87 %
Cistenides hyperborea	III	6	89 %
Nuculana pernula	I	6	91 %
C4	EG	Ant. ind.	Kum.
Prionospio steenstrupi	IV	139	38 %
Thyasira sarsii	IV	111	69 %
Chaetozone sp.	III	20	74 %
Ampharete borealis	IV	16	79 %
Ennucula tenuis	III	13	82 %
Yoldia hyperborea	Ik	8	85 %
Galathowenia oculata	III	7	87 %
Praxillella gracilis	III	6	88 %
Laphania boeckii	II	5	90 %
Leucon sp.	Ik	5	91 %
C2	EG	Ant. ind.	Kum.
Prionospio steenstrupi	IV	128	44 %
Thyasira sarsii	IV	73	69 %
Chaetozone sp.	III	16	74 %
Ampharete borealis	IV	13	78 %
Ophelina acuminata	III	12	83 %
Ennucula tenuis	III	8	85 %
Praxillella gracilis	III	8	88 %
Galathowenia oculata	III	5	90 %
Leucon sp.	Ik	4	91 %
Macoma calcarea	III	4	92 %
C3	EG	Ant. ind.	Kum.
Prionospio steenstrupi	IV	243	38 %
Thyasira sarsii	IV	225	73 %
Chaetozone sp.	III	39	79 %
Ennucula tenuis	III	26	83 %
Galathowenia oculata	III	14	86 %
Ampharete borealis	IV	13	88 %
Heteromastus filiformis	IV	13	90 %
Yoldia hyperborea	Ik	10	91 %
Macoma calcarea	III	7	92 %
Leucon sp.	Ik	6	93 %
C5	EG	Ant. ind.	Kum.
Prionospio steenstrupi	IV	146	45 %
Thyasira sarsii	IV	73	67 %
Ennucula tenuis	III	19	73 %
Chaetozone sp.	III	16	78 %
Ampharete borealis	IV	11	82 %
Yoldia hyperborea	Ik	9	84 %
Galathowenia oculata	III	8	87 %
Leucon sp.	Ik	7	89 %
Lumbrineris sp.	III	6	91 %
Nephtys ciliata	III	5	92 %

*Ecological groups: EG I = sensitive species. EG II = neutral species. EG III = tolerant species. EG IV = opportunistic species. EG V = pollution indicator species. From Borgersen et al., 2020. Ik = ecological group unknown.

5 Summary

The results from the monitoring at the farming site Steinanes in April 2026 showed that the sediment was somewhat loaded with organic carbon and the copper level in the sediment at C1 was somewhat elevated (46 mg/kg) and is categorized into environmental limit II or "low values". EMB concentration in the sediment at C4 was 320 ng/kg and thus exceeds the defined concentration of 272 ng/kg for stations outside the mixing zone. Accordingly, the station is not fulfilling the "good status standard". The bottom sediments grain size was moderately coarse to fine with a pelite ratio ranging from 27.6 to 89.7 %.

The redox measurements (pH/Eh) gave point 0 acc. Appendix D in NS 9410:2016 for all the sampling stations. The oxygen saturation in April was good in the whole water column with 98 % in the bottom water.

Moderately load effect was recorded in the fauna at all stations (nEQR between 0.4 and 0.6). The diversity H' varied from 2.54 to 3.04. 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 most dominant species at C1, but not at the other stations.

5.1 Comparison with previous survey

The results from the present survey in April 2026 compared to previous C survey at the Steinanes in August 2025 (Mannvik & Gunnarsson, 2026) showed that the diversity index H' was similar and below 3 (2.5-2.9) at the stations except at C1 where it has increased from 2.74 to 3.04. A pollution indicator species was found among the top ten at C1 in both surveys, but with fewer individuals in the present survey. The faunal conditions at C1 and C3 are still moderately affected and have changed from good to moderately affected at the other stations.

6 References

- Aure, J., Dahl, E., Green, N., Magnusson, J., Moy, F., Pedersen, A., Rygg, B. og Walday, M., 1993. Langtidsovervåking av trofiutviklingen i kystvannet langs Sør-Norge. Årsrapport 1990 og samlerapport 1990-91. Statlig program for forurensningsovervåking. *Rapport 510/93*.
- Bale, A.J. & A.J. Kenny, 2005. Sediment analysis and seabed characterisation. In: Eleftheriou, A.; McIntyre, A.D. "Methods for the study of marine benthos". 3rd edition. Blackwell Science. Oxford, UK. ISBN 0-632-05488-3. pp. 43-86.
- Borgersen, G., M. Hektoen, F. Melsom & C. Todt, 2020. Uttesting av sensitivitetsindeksene ISI2018 og NSI2018 og en revidert artsliste med sensitivitetsverdier for bløtbunnfauna. NIVA-rapport 7494-2020.
- Hermansen, S, 2020. Steinanes current measurements 5, 15 and 60 m. APN-rapport 62191.04.
- ISO 12878:2012 Environmental monitoring of the impacts from marine finfish farms on soft bottom
- ISO 12878:2012 Environmental monitoring of the impacts from marine finfish farms on soft bottom
- 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 macrofauna.
- Mannvik, H.-P. and Eriksen, S., 2018. Arnarlax. ASC- og C-undersøkelse Steinanes, 2017. APN-rapport 8951.02.
- Mannvik, H.-P. and Gunnarsson, S., 2019. Arnarlax. ASC- og C-undersøkelse Steinanes 2018. APN-rapport 60526.01.
- Mannvik, H.-P. and Gunnarsson, S., 2023. Arnarlax ehf. C-survey at Steinanes (fallow period), 2023. APN-rapport 65074.C01.
- Mannvik, H.-P. & S. Gunnarsson, 2026. C-survey at Steinanes, 2025. APN-report 66876.01.
- Miljødirektoratet (2025,06.10). Veilederen for klassifisering av miljøtilstand i kyst- og ferskvann. *[Veileder for klassifisering av miljøtilstand i kyst- og ferskvann.](#)*
- NS 9410, 2016. Norsk standard for miljøovervåking av bunnpåvirkning fra marine akvakulturanlegg.
- NS-EN 16168:2012. Sludge, treated biowaste and soil — Determination of total nitrogen using dry combustion method.
- NS-EN 17505:2023. Soil and waste characterization - Temperature dependent differentiation of total carbon (TOC400, ROC, TIC900).
- Personal reference, Kristian Leander Gillebo Sormo (Seawater manager), 2026.
- Regulation on prevention of water pollution nr. 796/1999.
- SANTE/2020/12830, Rev.1, Guidance Document on Pesticide Methods for Risk Assessment and Post-approval Control and Monitoring Purposes, 24.02.2021.

SEPA, 2022. Marine finfish farm regulation. Seabed mixing zone limit. Compliance assessment methodology.

SEPA, 2023. Environmental Standards. Protecting the seabed.

<https://www.sepa.org.uk/regulations/water/aquaculture/environmental-standards/> . Accessed 15.09.2023

Sztybor, K. and Gunnarsson, S., 2022. Arnarlax ASC- and C- survey Steinanes, 2021. APN-report 63543.02.

Velvin, R. and Gunnarsson, S., 2020. Arnarlax C- survey (fallow period) Steinanes, 2020. APN-report 62254.01.

7 Appendix (in Norwegian)

7.1 Stasjonsbeskrivelser

Prosjekt: 67410, Steinanes.

Feltarbeid: Snorri Gunnarsson

Stasjon	C1	C2	C2ALT	C3	C4	C5
Dato	10.04.2026	10.04.2026	10.04.2026	10.04.2026	10.04.2026	10.04.2026
Pos. WGS84	65°40,379/23°28,496	65°40,550/23°28,960	65°40,114/23°27,798	65°40,441/23°28,687	65°40,500/23°28,819	65°40,227/23°28,545
Dyp	85	86	81	86	86	91
Avstand	25	500	500	210	355	65
CTDO					X	
Antall bomskudd	2/2/2	1/0/0	1/2/1	0/0/0	0/1/1	0/0/0
Prevedypde (cm)	0/16/4	1/0/0	1/2/1	0/1/0	0/1/1	0/0/0
Forstyrret overflate	Repl 1	Repl 2;3	Nei	repl 1;3	Repl 1	Repl 1;2;3
pH	7,64	7,75	7,79	7,64	7,72	7,79
Eh	258	262	286	257	254	254
Bunndyr 1	X	X	X	X	X	X
Bunndyr 2	X	X	X	X	X	X
Korn	X	X	X	X	X	X
TOM	X	X	X	X	X	X
TOC	X	X	X	X	X	X
TN	X	X	X	X	X	X
Cu	X					
TP	X	X	X	X	X	X
EMB				X		
Bilde før sikting	X					
Bilde etter sikting						
Kommentarer/ beskrivelse av prøve	Olive green mud/silt/gravel and shome shell fractions. Disturbed surface due to full grab despite effort to slow down grab for replicate 1	Olive green mud. Disturbed surface due to full grab despite effort to slow down grab for replicates 2 and 3	Olive green mud/gravel and shome shell fractions.	Olive green mud. Disturbed surface due to full grab despite effort to slow down grab for replicate 2	Olive green mud. Disturbed surface due to full grab despite effort to slow down grab for replicate 1	Olive green mud. Disturbed surface due to full grab despite effort to slow down grab for replicates 1, 2 and 3

7.2 Bunndyrsindekser og artslister

Diversitetsmål

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 (Clusteranalyse)

Variasjoner i faunaens fordelingsmønster over området beskrives ved å sammenligne faunasamfunnet på hver stasjon. Til dette brukes multivariate klassifikasjons- og ordinasjons-analyser.

Analysene i denne undersøkelsen ble utført ved hjelp av programpakken PRIMER. 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 kvadratrot-transformert. 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.

For å sammenligne prøvene 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).

Sensitivitet og tetthet

NSI (Norwegian Sensitivity Index; Rygg og Norling 2013) er utviklet med basis i norske faunadata og innført i 2012 og oppdatert i 2018 (Borgersen *m. fl.*, 2019). Hver art av i alt 583 arter er tilordnet en sensitivitetsverdi). En prøves NSI-verdi beregnes ved gjennomsnittet av sensitivitetsverdiene av alle individene i prøven. Formelen for utregning er gitt ved:

$$NSI = \sum_i^s \left[\frac{N_i * NSI_i}{N_{NSI}} \right]$$

ISI₂₀₁₈ (Indicator Species Index; Rygg og Norling 2013) en sensitivitetsindeks. Grunnlaget for beregningen av ISI (Rygg 2002) ble utvidet og artsnomenklaturen standardisert i 2012 og oppdatert i 2018 (Borgersen *m. fl.*, 2019). Hver art er tilordnet en ømfintlighetsverdi. ISI er en kvalitativ indeks som tar hensyn til hvilke arter som er til stede, men ikke individtallet av dem. En prøves ISI-verdi beregnes ved gjennomsnittet av sensitivitetsverdiene av artene i prøven hvor ISI_i er ISI₂₀₁₈ verdien for arten i og S_{ISI} er antall arter tilordnet sensitivitetsverdier.

$$ISI = \sum_i^s \left[\frac{ISI_i}{S_{ISI}} \right]$$

AMBI (Azti Marine Biotic Index; Borja *m.fl.* 2000) er en sensitivitetsindeks (egentlig en toleranseindeks) der artene tilordnes en toleranseklasse (økologisk gruppe, EG). EG I = sensitive arter, EG II = "indifferente" arter, EG III = tolerante arter, EG IV = opportunistiske arter, EG V = forurensningsindikerende arter. I Norge brukes AMBI bare i kombinasjonsindeksen NQI1 og har derfor ingen egen klassifisering. AMBI er en kvantitativ indeks som tar hensyn til individtallet av artene.

AMBI = (0 * EG I) + (1,5 * EG II) + (3 * EG III) + (4,5 * EG IV) + (6 * EG V) hvor EGI er andelen av individer som tilhører gruppe I, etc. Tallene angir toleranseverdiene.

Formelen for beregning av en prøves AMBI-verdi er gitt ved:

$$AMBI = \sum_i^s \left[\frac{N_i * AMBI_i}{N_{AMBI}} \right]$$

Sammensatt indeks

NQI1 (Norwegian Quality Index; Rygg 2006) inneholder indikatorer som omfatter sensitivitet (AMBI), og artsmangfold (S = antall, N = antall individer) i en prøve. NQI1 er interkalibrert mellom alle land som tilhører NEAGIG. NQI1 er gitt ved formelen:

$$NQI1 = \left[0,5 * \left(1 - \frac{AMBI}{7} \right) + 0,5 * \left(\frac{\left[\frac{\ln(S)}{\ln(\ln(N))} \right]}{2,7} \right) * \left(\frac{N}{N+5} \right) \right]$$

I prøver som har veldig lave individtall (færre enn seks), kan ikke NQI1 brukes. Det er i slike tilfeller mulig å bruke N+2 i stedet for N i formelen for å unngå uriktige indeksverdier (Rygg et al. 2011).

References

- Borgersen, G., M. Hektoen, F. Melsom & C. Todt, 2020. Uttesting av sensitivitetsindeksene ISI2018 og NSI2018 og en revidert artsliste med sensitivitetsverdier for bløtbunnfauna. NIVA-rapport 7494-2020.
- Borgersen, H. C. Trannum, H. Gundersen & J. Vedal, 2019. Oppdatering av bløtbunnartenes sensitivitetsverdier. NIVA-rapport 7366-2019.
- Borja, A., J. Franco, V. Pérez, 2000. A marine biotic index to establish the ecological quality of soft bottom benthos within European estuarine and coastal environments. *Marine Pollution Bulletin*, 40(12): 1100-1114

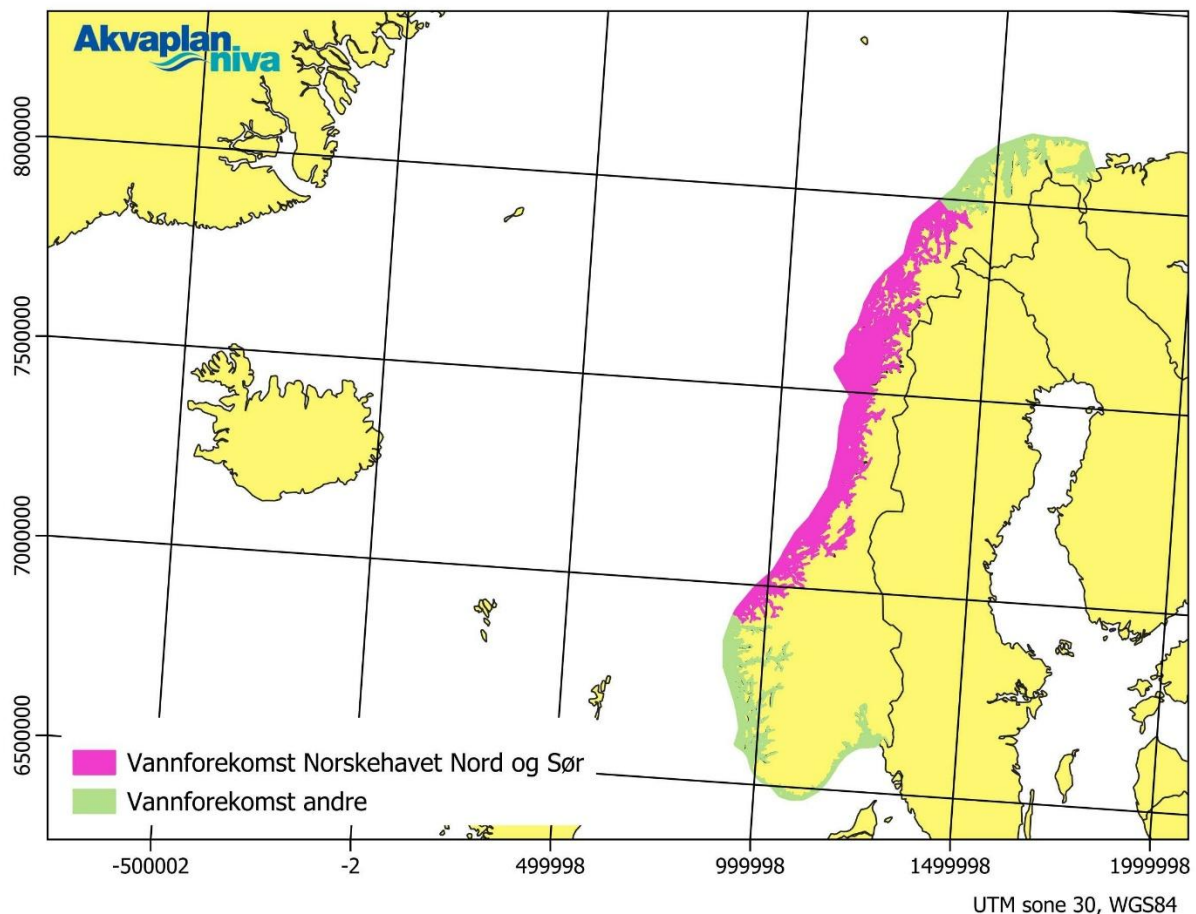
- Bray, R.T. & J.T. Curtis, 1957. An ordination of the upland forest communities of southern Wisconsin. *Ecol. Monogr.*, 27:325-349.
- Hurlbert, S.N., 1971. The non-concept of the species diversity: A critique and alternative parameters. *Ecology* 52:577-586.
- Pielou, E. C., 1966. Species-diversity and pattern-diversity in the study of ecological succession. *Journal of Theoretical Biology* 10, 370-383.
- Rygg, B. & K. Norling, 2013. Norwegian Sensitive Index (NSI) for marine macro invertebrates, and an update of Indicator Species Index (ISI). NIVA report SNO 6475-2013. 48 p.
- Rygg, B. 2006. Developing indices for quality-status classification of marine soft-bottom fauna in Norway. NIVA-rapport 5208-2006. 33 s.
- Rygg, B., 2002. Indicator species index for assessing benthic ecological quality in marine water of Norway. NIVA report SNO 4548-2002. 32 p.
- Shannon, C.E. & W. Weaver, 1949. *The Mathematical Theory of Communication*. Univ Illinois Press, Urbana 117 s

7.3 Klassifisering av faunaindekser Island

Det er valgt å legge inn klassifisering av faunaindekser ved å bruke grenseverdier for Norskehavet Nord (vanntype G 1-3) og Norskehavet Sør (vanntype H 1-3).

Økologisk tilstandsklassifisering basert på observert verdi av indeks (Veileder fra Miljødirektoratet (2025), **vanntype G/H 1-3**).

Indeks	I Svært god "Very good"	II God "Good"	III Moderat "Moderate"	IV Dårlig "Poor"	V Svært dårlig "Bad"
NQI1	0,9-0,72	0,72-0,63	0,63-0,49	0,49-0,31	0,31-0
H'	5,5 - 3,7	3,7 - 2,9	2,9 - 1,8	1,8 - 0,9	0,9 - 0
ES ₁₀₀	46 - 23	23 - 16	16-9	9-5	5 - 0
ISI ₂₀₁₈	10,2 - 6,6	6,6 - 6	6 - 4,9	4,9 - 3,6	3,6 - 0
NSI ₂₀₁₈	34 - 29	29 - 23	23 - 17	17 - 11	11 - 0
nEQR	1,0 – 0,8	0,8 – 0,6	0,6 – 0,4	0,4 – 0,2	0,2 – 0,0



Kart som viser Island og Norge med vannforekomstene Norskehavet Nord og Norskehavet Sør.

7.4 Statistical results Steinanes, 2026

Benthos indices per replicate

st.nr.	tot.	C1_01	C1_02	C2_01	C2_02	C2alt_01	C2alt_02	C3_01	C3_02	C4_01	C4_02	C5_01	C5_02
no. ind.	2648	462	292	136	157	243	35	255	380	147	216	192	133
no. spe.	53	26	27	14	20	23	11	19	26	19	22	18	18
Shannon-Wiener:		2,8	3,3	2,3	2,9	2,9	2,5	2,6	2,5	2,8	2,7	2,6	2,9
Pielou		0,59	0,70	0,59	0,68	0,64	0,72	0,62	0,53	0,65	0,61	0,61	0,69
ES100		13	17	12	17	17		14	14	17	16	15	16
SN		1,80	1,90	1,66	1,85	1,84	1,89	1,72	1,83	1,83	1,84	1,74	1,82
ISI-2018		5,18	5,79	5,20	5,58	5,95	5,04	5,16	6,09	5,98	5,79	5,17	5,37
AMBI		3,426	3,170	3,596	3,356	3,335	3,514	3,341	3,450	3,398	3,250	3,422	3,192
NQI1		0,58	0,62	0,54	0,59	0,60	0,56	0,57	0,59	0,59	0,60	0,57	0,60
NSI-2018		17,2	18,9	15,6	16,7	16,1	15,7	16,7	16,6	16,5	16,9	15,5	16,9

Geometrical classes

int.	cla.	C1	C2	C2alt	C3	C4	C5
1	1	10	7	5	12	8	7
2,3	2	10	3	8	5	6	2
4- 7	3	4	5	4	5	7	6
8- 15	4	4	4	3	4	2	3
16- 31	5	1	1	2	1	2	2
32- 63	6	2	0	0	1	0	0
64-127	7	2	1	0	0	1	1
128-255	8	2	1	1	2	1	1
256-511	9	0	0	0	0	0	0
512-1023	10	0	0	0	0	0	0
1024-2047	11	0	0	0	0	0	0
2048-	12	0	0	0	0	0	0

7.5 Species lists

Artsliste pr stasjon

Steinanes C-survey 2026

Rekke	Klasse	Orden	Art/Taxa	Replikat:	01	02	-	Sum
Stasjonsnr.:	C1							
NEMERTINI								
			Nemertea indet.		3	1	-	4
PRIAPULIDA								
			Priapulus caudatus			1	-	1
ANNELIDA								
	Polychaeta							
		Orbiniida	Leitoscoloplos mammosus			2	-	2
		Spionida	Chaetozone sp.		39	7	-	46
			Laonice cirrata		1		-	1
			Prionospio steenstrupi		161	35	-	196
			Spio armata			1	-	1
			Spio limicola			2	-	2
		Capitellida	Capitella capitata			10	-	10
			Heteromastus filiformis		34	75	-	109
			Mediomastus fragilis		1		-	1
			Praxillella gracilis		1	1	-	2
		Opheliida	Ophelina acuminata		1	11	-	12
			Scalibregma inflatum			2	-	2
		Phyllodocida	Eteone flava/longa		3	2	-	5
			Gattyana cirrhosa		1		-	1
			Harmothoe sp.		1		-	1
			Nephtys ciliata		1	1	-	2
			Pholoe assimilis		1	1	-	2
			Pholoe baltica		1		-	1
		Amphinomida	Paramphinode jeffreysii		1	1	-	2
		Eunicida	Lumbrineris sp.			2	-	2
			Schistomeringos sp.		2	1	-	3
		Oweniida	Galathowenia oculata		8	4	-	12
		Terebellida	Ampharete borealis		14	60	-	74
			Cistenides hyperborea		18	3	-	21
			Laphania boeckii		2	2	-	4
			Melinna cristata			1	-	1
		Sabellida	Euchone papillosa			8	-	8
MOLLUSCA								
	Caudofoveata							
			Caudofoveata indet.		1		-	1
	Bivalvia							
		Nuculoida	Ennucula tenuis		22	18	-	40
			Yoldia hyperborea		3		-	3
		Veneroida	Macoma calcarea		3	1	-	4
			Thyasira gouldii		1		-	1
			Thyasira sarsii		138	39	-	177
ECHINODERMATA								
	Asteroidea							
			Asteroidea indet. juv.		1		-	1

Rekke	Klasse	Orden	Art/Taxa	Replikat:	01	02	-	Sum
				Maksverdi:	161	75		196
				Antall arter/taxa:	27	27		36
				Sum antall individ:				755

Stasjonsnr.: C2
NEMERTINI

ANNELIDA	Polychaeta	Spionida	Nemertea indet.	1	-		1
			Chaetozone sp.	3	13	-	16
		Capitellida	Prionospio steenstrupi	66	62	-	128
			Heteromastus filiformis		3	-	3
		Opheliida	Praxillella gracilis	2	6	-	8
			Ophelina acuminata	10	2	-	12
		Phyllodocida	Eteone barbata	1		-	1
			Eteone flava/longa		1	-	1
			Nephtys ciliata	1	3	-	4
		Eunicida	Lumbrineris sp.	1	1	-	2
		Oweniida	Galathowenia oculata		5	-	5
		Terebellida	Ampharete borealis	4	9	-	13
			Cistenides hyperborea		1	-	1
			Laphania boeckii	1	1	-	2
CRUSTACEA	Malacostraca	Cumacea	Leucon sp.	3	1	-	4
		Amphipoda	Dulichidae indet.		1	-	1
			Gammaridea indet.		1	-	1
MOLLUSCA	Bivalvia	Nuculoida	Ennucula tenuis	3	5	-	8
			Nuculana pernula		1	-	1
			Yoldia hyperborea		4	-	4
		Veneroida	Macoma calcarea	2	2	-	4
			Thyasira sarsii	38	35	-	73
Maksverdi:			66	62		128	
Antall arter/taxa:			14	20		22	
Sum antall individ:						293	

Stasjonsnr.: C2alt
ANNELIDA

Polychaeta	Spionida	Chaetozone sp.		13	1	-		14
		Prionospio steenstrupi		121	18	-		139
	Capitellida	Heteromastus filiformis		2	1	-		3
		Praxillella gracilis		11	4	-		15
	Opheliida	Ophelina acuminata		3	-			3
	Phyllodocida	Eteone flava/longa		1	1	-		2
		Harmothoe sp.		1	-			1
		Nephtys ciliata		2	-			2
		Pholoe inornata		1	-			1

Rekke	Klasse	Orden	Art/Taxa	Replikat:	01	02	-	Sum	
CRUSTACEA	Malacostraca	Eunicida	Lumbrineris sp.		11	1	-	12	
			Schistomeringos sp.		1	-	1		
		Terebellida	Ampharete borealis		17	2	-	19	
			Ampharete finmarchica		2	-	2		
			Cistenides hyperborea		5	1	-	6	
		Sabellida	Euchone papillosa		3	-	3		
MOLLUSCA	Bivalvia	Cumacea	Leucon sp.		6	1	-	7	
		Amphipoda	Phoxocephalus holbolli		2	-	2		
		Isopoda	Asellota indet.		1	-	1		
		Nuculoida	Ennucula tenuis		5	2	-	7	
			Nuculana pernula		6	-	6		
			Yoldia hyperborea		2	-	2		
		Veneroida	Macoma calcarea		1	-	1		
			Thyasira sarsii		26	3	-	29	
Maksverdi:				121	18		139		
Antall arter/taxa:				23	11		23		
Sum antall individ:							278		
Stasjonsnr.: C3									
NEMERTINI									
ANNELIDA	Polychaeta		Nemertea indet.			2	-	2	
		Spionida	Chaetozone sp.		14	25	-	39	
			Prionospio steenstrupi		98	145	-	243	
			Spio limicola			1	-	1	
		Capitellida	Heteromastus filiformis		7	6	-	13	
		Opheliida	Ophelina acuminata		1	2	-	3	
		Phyllodocida	Bylgides sarsi			1	-	1	
			Eteone flava/longa		1	2	-	3	
			Harmothoe sp.			1	-	1	
CRUSTACEA	Malacostraca	Cumacea	Nephtys ciliata		3	2	-	5	
			Nephtys incisa		1	-	1		
			Pholoe baltica		1	-	1		
			Pholoe inornata		1	-	1		
			Eunicida	Lumbrineris sp.			1	-	1
				Parougia nigridentata			1	-	1
				Schistomeringos sp.			4	-	4
			Oweniida	Galathowenia oculata		8	6	-	14
			Terebellida	Ampharete borealis		8	5	-	13
				Ampharete finmarchica			1	-	1
	Ampharete petersenae			1	-	1			
	Cistenides hyperborea		3	2	-	5			
	Laphania boeckii			2	-	2			
	Melinna cristata		1	-	1				

Rekke	Klasse	Orden	Art/Taxa	Replikat:	01	02	-	Sum
MOLLUSCA	Prosobranchia	Neogastropoda	Buccinum finmarkianum			1	-	1
	Bivalvia	Nuculoida	Ennucula tenuis		13	13	-	26
			Nuculana pernula		2	1	-	3
			Yoldia hyperborea		3	7	-	10
		Mytiloida	Mytilus edulis juv.			4	-	4
		Veneroida	Macoma calcarea		4	3	-	7
			Thyasira sarsii		82	143	-	225
			Maksverdi:		98	145		243
			Antall arter/taxa:		19	27		31
			Sum antall individ:					639

Stasjonsnr.: C4

NEMERTINI

ANNELIDA	Polychaeta	Spionida	Nemertea indet.			1	-	1
			Chaetozone sp.		9	11	-	20
			Prionospio steenstrupi		60	79	-	139
		Capitellida	Heteromastus filiformis		3	1	-	4
			Praxillella gracilis		2	4	-	6
		Opheliida	Ophelina acuminata		2		-	2
		Phyllodocida	Bylgides sarsi		1	1	-	2
			Eteone barbata			1	-	1
			Eteone flava/longa		3	1	-	4
			Harmothoe sp.			2	-	2
			Nephtys ciliata		2		-	2
			Pholoe inornata			1	-	1
		Eunicida	Lumbrineris sp.		2		-	2
			Schistomeringos sp.		1	1	-	2
		Oweniida	Galathowenia oculata		2	5	-	7
		Terebellida	Ampharete borealis		8	8	-	16
			Ampharete finmarchica			1	-	1
			Cistenides hyperborea		1		-	1
			Laphania boeckii		2	3	-	5
			Melinna cristata		1		-	1
CRUSTACEA	Malacostraca	Cumacea	Eudorella sp.			1	-	1
			Leucon sp.		2	3	-	5
		Amphipoda	Phoxocephalus holbolli			1	-	1
MOLLUSCA	Bivalvia	Nuculoida	Ennucula tenuis		3	10	-	13
			Yoldia hyperborea		3	5	-	8
		Veneroida	Macoma calcarea			5	-	5
			Thyasira sarsii		40	71	-	111

Rekke	Klasse	Orden	Art/Taxa	Replikat:	01	02	-	Sum
				Maksverdi:	60	79		139
				Antall arter/taxa:	19	22		27
				Sum antall individ:				363
Stasjonsnr.: C5								
NEMERTINI								
			Nemertea indet.			1	-	1
ANNELIDA								
	Polychaeta							
		Spionida						
			Chaetozone sp.		8	8	-	16
			Prionospio steenstrupi		96	50	-	146
		Capitellida						
			Heteromastus filiformis		2	1	-	3
			Praxillella gracilis		3	1	-	4
		Opheliida						
			Ophelina acuminata		1	2	-	3
		Phyllodocida						
			Goniada maculata		1		-	1
			Nephtys ciliata		1	4	-	5
		Eunicida						
			Lumbrineris sp.		4	2	-	6
			Schistomeringos sp.			1	-	1
		Oweniida						
			Galathowenia oculata		3	5	-	8
		Terebellida						
			Ampharete borealis		6	5	-	11
			Cistenides hyperborea		2	2	-	4
			Laphania boeckii			1	-	1
			Melinna cristata		4		-	4
CRUSTACEA								
	Malacostraca							
		Cumacea						
			Leucon sp.		4	3	-	7
MOLLUSCA								
	Prosobranchia							
		Neogastropoda						
			Curtitoma trevelliiana		1		-	1
	Bivalvia							
		Nuculoida						
			Ennucula tenuis		11	8	-	19
			Nuculana pernula		1		-	1
			Yoldia hyperborea		5	4	-	9
		Veneroida						
			Axinopsida orbiculata			1	-	1
			Thyasira sarsii		39	34	-	73
				Maksverdi:	96	50		146
				Antall arter/taxa:	18	18		22
				Sum antall individ:				325

7.6 Analytical report



ANALYSERAPPORT



Kunde:	Arnarlax	Rapport nr.:	P260061
Kundemerkning:	Steinanes	Rapportdato:	2026-05-22
Kontaktperson:		Ankomst dato:	2026-04-17
Prosjektnr.:	67410		

Lab-id. P260061-01

Objekt	Prøvestasjon/ID	ASC-stasjon	FU-stasjon	Prosjektnr. og prosjektnavn	Notering	Mottatt lab
Sediment	C1			67410 - Steinanes C and B survey 2026		2026-04-17

Analyseresultat						
Parameter	Resultat	Enhet	Analysedato start	Analysedato slutt	Standard	Måleusikkerhet
TOC	33	mg/g TS	2026-05-12	2026-05-13	Intern metode (NS-EN 17505:2023)	±4.9
TNb	3.4	mg/g TS	2026-05-12	2026-05-13	Intern metode (NS-EN 16168:2012)	±0.60
nTOC ^a	42.4		2026-05-21	2026-05-21	Beregning etter Aure m.fl., 1993	
C/N - forhold	9.7		2026-05-18	2026-05-18	Beregning TOC:TN	
TOM	8.6	% TS	2026-04-23	2026-04-29	Vekttap ved forbrenning. Intern metode basert på NS 4764 (1980)	±0.5
Vekt% ≥2 mm	17.1	wt% TS	2026-04-23	2026-05-21	Intern metode (Bale/Kenny 2005)	±2.1
Vekt% 1 mm - <2 mm	3.7	wt% TS	2026-04-23	2026-05-21	Intern metode (Bale/Kenny 2005)	±0.2
Vekt% 0.500 mm - <1 mm	1.9	wt% TS	2026-04-23	2026-05-21	Intern metode (Bale/Kenny 2005)	±0.0
Vekt% 0.250 mm - <0.500 mm	4.7	wt% TS	2026-04-23	2026-05-21	Intern metode (Bale/Kenny 2005)	±0.2
Vekt% 0.125 mm - <0.250 mm	14.0	wt% TS	2026-04-23	2026-05-21	Intern metode (Bale/Kenny 2005)	±0.6
Vekt% 0.063 mm - <0.125 mm	12.8	wt% TS	2026-04-23	2026-05-21	Intern metode (Bale/Kenny 2005)	±0.7
Vekt% <0.063 mm	45.8	wt% TS	2026-04-23	2026-05-21	Intern metode (Bale/Kenny 2005)	±5.5
Pelitt	45.8	wt% TS	2026-04-23	2026-05-21	Fraksjonen <0.063 mm	±5.5
Sand	37.1	wt% TS	2026-04-23	2026-05-21	Summering av fraksjonene mellom 0.063 mm opptil 2 mm	±1.5
Grus	17.1	wt% TS	2026-04-23	2026-05-21	Fraksjonen ≥2 mm	±2.1

^a Aure, J., Dahl, E., Green, N., Magnusson, J., Moy, F., Pedersen, A., Rygg, B. & Walday, M., 1993. Langtidsovervåking av trofikutviklingen i kystvannet langs Sør-Norge. Årsrapport 1990.

* = Ikke akkreditert resultat

Akvaplan-niva
Fransenteret
Postboks 6606 Stakkevollan
9296 Tromsø

kjemi@akvaplan.niva.no
www.akvaplan.niva.no

tel: +47 77 75 03 00
NO 937 375 158 MVA

Analysereporten er digitalt undertegnet av:
Lisa Torske

lit@akvaplan.niva.no

Side 1 av 7

ANALYSERAPPORT

Kunde:	Arnarlax	Rapport nr.:	P260061
Kundemerking:	Steinanes	Rapportdato:	2026-05-22
Kontaktperson:		Ankomst dato:	2026-04-17
Prosjektnr.:	67410		

Lab-id. P260061-04

Objekt	Prøvestasjon/ID	ASC-stasjon	FU-stasjon	Prosjektnr. og prosjektnavn	Notering	Mottatt lab
Sediment	C2			67410 - Steinanes C and B survey 2026		2026-04-17

Analyseresultat						
Parameter	Resultat	Enhet	Analysedato start	Analysedato slutt	Standard	Måleusikkerhet
TOC	40	mg/g TS	2026-05-12	2026-05-13	Intern metode (NS-EN 17505:2023)	±6.0
TNb	3.6	mg/g TS	2026-05-12	2026-05-13	Intern metode (NS-EN 16168:2012)	±0.64
nTOC ^a	41.7		2026-05-21	2026-05-21	Beregning etter Aure m.fl., 1993	
C/N - forhold	11.2		2026-05-18	2026-05-18	Beregning TOC:TN	
TOM	14.2	% TS	2026-04-23	2026-04-29	Vekttap ved forbrenning. Intern metode basert på NS 4764 (1980)	±0.5
Vekt% ≥2 mm	2.8	wt% TS	2026-04-23	2026-05-21	Intern metode (Bale/Kenny 2005)	±0.3
Vekt% 1 mm - <2 mm	3.3	wt% TS	2026-04-23	2026-05-21	Intern metode (Bale/Kenny 2005)	±0.2
Vekt% 0.500 mm - <1 mm	1.7	wt% TS	2026-04-23	2026-05-21	Intern metode (Bale/Kenny 2005)	±0.0
Vekt% 0.250 mm - <0.500 mm	0.7	wt% TS	2026-04-23	2026-05-21	Intern metode (Bale/Kenny 2005)	±0.0
Vekt% 0.125 mm - <0.250 mm	0.6	wt% TS	2026-04-23	2026-05-21	Intern metode (Bale/Kenny 2005)	±0.0
Vekt% 0.063 mm - <0.125 mm	1.2	wt% TS	2026-04-23	2026-05-21	Intern metode (Bale/Kenny 2005)	±0.1
Vekt% <0.063 mm	89.7	wt% TS	2026-04-23	2026-05-21	Intern metode (Bale/Kenny 2005)	±10.8
Pelitt	89.7	wt% TS	2026-04-23	2026-05-21	Fraksjonen <0.063 mm	±10.8
Sand	7.5	wt% TS	2026-04-23	2026-05-21	Summering av fraksjonene mellom 0.063 mm opptil 2 mm	±0.3
Grus	2.8	wt% TS	2026-04-23	2026-05-21	Fraksjonen ≥2 mm	±0.3

^a Aure, J., Dahl, E., Green, N., Magnusson, J., Moy, F., Pedersen, A., Rygg, B. & Walday, M., 1993. Langtidsovervåking av trofutviklingen i kystvannet langs Sør-Norge. Årsrapport 1990.

* = Ikke akkreditert resultat

Akvaplan-niva
Fransenteret
Postboks 6606 Stakkevollan
9296 Tromsø

kjemi@akvaplan.niva.no
www.akvaplan.niva.no

tel: +47 77 75 03 00
NO 937 375 158 MVA

Analysereporten er digitalt undertegnet av:
Lisa Torske

lit@akvaplan.niva.no

Side 2 av 7

ANALYSERAPPORT

Kunde:	Arnarlax	Rapport nr.:	P260061
Kundemerking:	Steinanes	Rapportdato	2026-05-22
Kontaktperson:		Ankomst dato:	2026-04-17
Prosjektnr.:	67410		

Lab-id. P260061-07

Objekt	Prøvestasjon/ID	ASC-stasjon	FU-stasjon	Prosjektnr. og prosjektnavn	Notering	Mottatt lab
Sediment	C3			67410 - Steinanes C and B survey 2026		2026-04-17

Analyseresultat						
Parameter	Resultat	Enhet	Analysedato start	Analysedato slutt	Standard	Måleusikkerhet
TOC	38	mg/g TS	2026-05-12	2026-05-13	Intern metode (NS-EN 17505:2023)	±5.8
TNb	3.7	mg/g TS	2026-05-12	2026-05-13	Intern metode (NS-EN 16168:2012)	±0.66
nTOC ^a	41.2		2026-05-21	2026-05-21	Beregning etter Aure m.fl., 1993	
C/N - forhold	*10.5		2026-05-18	2026-05-18	Beregning TOC:TN	
TOM	13.9	% TS	2026-04-23	2026-04-29	Vekttap ved forbrenning. Intern metode basert på NS 4764 (1980)	±0.5
Vekt% ≥2 mm	2.2	wt% TS	2026-04-23	2026-05-21	Intern metode (Bale/Kenny 2005)	±0.3
Vekt% 1 mm - <2 mm	4.8	wt% TS	2026-04-23	2026-05-21	Intern metode (Bale/Kenny 2005)	±0.2
Vekt% 0.500 mm - <1 mm	4.3	wt% TS	2026-04-23	2026-05-21	Intern metode (Bale/Kenny 2005)	±0.1
Vekt% 0.250 mm - <0.500 mm	2.2	wt% TS	2026-04-23	2026-05-21	Intern metode (Bale/Kenny 2005)	±0.1
Vekt% 0.125 mm - <0.250 mm	0.7	wt% TS	2026-04-23	2026-05-21	Intern metode (Bale/Kenny 2005)	±0.0
Vekt% 0.063 mm - <0.125 mm	1.3	wt% TS	2026-04-23	2026-05-21	Intern metode (Bale/Kenny 2005)	±0.1
Vekt% <0.063 mm	84.6	wt% TS	2026-04-23	2026-05-21	Intern metode (Bale/Kenny 2005)	±10.1
Pelitt	*84.6	wt% TS	2026-04-23	2026-05-21	Fraksjonen <0.063 mm	±10.1
Sand	*13.3	wt% TS	2026-04-23	2026-05-21	Summering av fraksjonene mellom 0.063 mm opptil 2 mm	±0.5
Grus	*2.2	wt% TS	2026-04-23	2026-05-21	Fraksjonen ≥2 mm	±0.3
Emamectinbenzoat ^b	*320	ng/kg TS	2026-05-11	2026-05-11	Intern metode LC-MS/MS	±80

^a Aure, J., Dahl, E., Green, N., Magnusson, J., Moy, F., Pedersen, A., Rygg, B & Walday, M., 1993. Langtidsovervåking av trofikutviklingen i kystvannet langs Sør-Norge. Årsrapport 1990.

^b Prøvingen er utført av eksternt laboratorium, NIVA Norsk institutt for vannforskning.

* = Ikke akkreditert resultat

Akvaplan-niva
Fransenteret
Postboks 6606 Stakkevollan
9296 Tromsø

kjemi@akvaplan.niva.no
www.akvaplan.niva.no

tel: +47 77 75 03 00
NO 937 375 158 MVA

Analysereporten er digitalt undertegnet av:
Lisa Torske

lit@akvaplan.niva.no

Side 3 av 7

ANALYSERAPPORT

Kunde:	Arnarlax	Rapport nr.:	P260061
Kundemerkning:	Steinanes	Rapportdato:	2026-05-22
Kontaktperson:		Ankomst dato:	2026-04-17
Prosjektnr.:	67410		

Lab-id. P260061-10

Objekt	Prøvestasjon/ID	ASC-stasjon	FU-stasjon	Prosjektnr. og prosjektnavn	Notering	Mottatt lab
Sediment	C4			67410 - Steinanes C and B survey 2026		2026-04-17

Analyseresultat						
Parameter	Resultat	Enhet	Analysedato start	Analysedato slutt	Standard	Måleusikkerhet
TOC	44	mg/g TS	2026-05-12	2026-05-13	Intern metode (NS-EN 17505:2023)	±6.5
TNb	3.9	mg/g TS	2026-05-12	2026-05-13	Intern metode (NS-EN 16168:2012)	±0.70
nTOC ^a	47.1		2026-05-21	2026-05-21	Beregning etter Aure m.fl., 1993	
C/N - forhold	11.1		2026-05-18	2026-05-18	Beregning TOC:TN	
TOM	13.4	% TS	2026-04-23	2026-04-29	Vekttap ved forbrenning. Intern metode basert på NS 4764 (1980)	±0.5
Vekt% ≥2 mm	1.9	wt% TS	2026-04-23	2026-05-21	Intern metode (Bale/Kenny 2005)	±0.2
Vekt% 1 mm - <2 mm	3.3	wt% TS	2026-04-23	2026-05-21	Intern metode (Bale/Kenny 2005)	±0.2
Vekt% 0.500 mm - <1 mm	4.7	wt% TS	2026-04-23	2026-05-21	Intern metode (Bale/Kenny 2005)	±0.1
Vekt% 0.250 mm - <0.500 mm	4.4	wt% TS	2026-04-23	2026-05-21	Intern metode (Bale/Kenny 2005)	±0.1
Vekt% 0.125 mm - <0.250 mm	2.0	wt% TS	2026-04-23	2026-05-21	Intern metode (Bale/Kenny 2005)	±0.1
Vekt% 0.063 mm - <0.125 mm	3.2	wt% TS	2026-04-23	2026-05-21	Intern metode (Bale/Kenny 2005)	±0.2
Vekt% <0.063 mm	80.5	wt% TS	2026-04-23	2026-05-21	Intern metode (Bale/Kenny 2005)	±9.7
Pelitt	80.5	wt% TS	2026-04-23	2026-05-21	Fraksjonen <0.063 mm	±9.7
Sand	17.6	wt% TS	2026-04-23	2026-05-21	Summering av fraksjonene mellom 0.063 mm opptil 2 mm	±0.7
Grus	1.9	wt% TS	2026-04-23	2026-05-21	Fraksjonen ≥2 mm	±0.2

^a Aure, J., Dahl, E., Green, N., Magnusson, J., Moy, F., Pedersen, A., Rygg, B. & Walday, M., 1993. Langtidsovervåking av trofutviklingen i kystvannet langs Sør-Norge. Årsrapport 1990.

* = Ikke akkreditert resultat

Akvaplan-niva
Fransenteret
Postboks 6606 Stakkevollan
9296 Tromsø

kjemi@akvaplan.niva.no
www.akvaplan.niva.no

tel: +47 77 75 03 00
NO 937 375 158 MVA

Analysereporten er digitalt undertegnet av:
Lisa Torske

lit@akvaplan.niva.no

Side 4 av 7

ANALYSERAPPORT

Kunde:	Arnarlax	Rapport nr.:	P260061
Kundemerkning:	Steinanes	Rapportdato:	2026-05-22
Kontaktperson:		Ankomst dato:	2026-04-17
Prosjektnr.:	67410		

Lab-id. P260061-13

Objekt	Prøvestasjon/ID	ASC-stasjon	FU-stasjon	Prosjektnr. og prosjektnavn	Notering	Mottatt lab
Sediment	C5			67410 - Steinanes C and B survey 2026		2026-04-17

Analyseresultat						
Parameter	Resultat	Enhet	Analysedato start	Analysedato slutt	Standard	Måleusikkerhet
TOC	39	mg/g TS	2026-05-12	2026-05-13	Intern metode (NS-EN 17505:2023)	±5.8
TNb	3.1	mg/g TS	2026-05-12	2026-05-13	Intern metode (NS-EN 16168:2012)	±0.55
nTOC ^a	40.9		2026-05-21	2026-05-21	Beregning etter Aure m.fl., 1993	
C/N - forhold	12.6		2026-05-18	2026-05-18	Beregning TOC:TN	
TOM	12.2	% TS	2026-04-23	2026-04-29	Vekttap ved forbrenning. Intern metode basert på NS 4764 (1980)	±0.5
Vekt% ≥2 mm	2.8	wt% TS	2026-04-23	2026-05-21	Intern metode (Bale/Kenny 2005)	±0.3
Vekt% 1 mm - <2 mm	4.2	wt% TS	2026-04-23	2026-05-21	Intern metode (Bale/Kenny 2005)	±0.2
Vekt% 0.500 mm - <1 mm	2.3	wt% TS	2026-04-23	2026-05-21	Intern metode (Bale/Kenny 2005)	±0.1
Vekt% 0.250 mm - <0.500 mm	1.0	wt% TS	2026-04-23	2026-05-21	Intern metode (Bale/Kenny 2005)	±0.0
Vekt% 0.125 mm - <0.250 mm	0.7	wt% TS	2026-04-23	2026-05-21	Intern metode (Bale/Kenny 2005)	±0.0
Vekt% 0.063 mm - <0.125 mm	2.2	wt% TS	2026-04-23	2026-05-21	Intern metode (Bale/Kenny 2005)	±0.1
Vekt% <0.063 mm	86.8	wt% TS	2026-04-23	2026-05-21	Intern metode (Bale/Kenny 2005)	±10.4
Pelitt	86.8	wt% TS	2026-04-23	2026-05-21	Fraksjonen <0.063 mm	±10.4
Sand	10.4	wt% TS	2026-04-23	2026-05-21	Summering av fraksjonene mellom 0.063 mm opptil 2 mm	±0.4
Grus	2.8	wt% TS	2026-04-23	2026-05-21	Fraksjonen ≥2 mm	±0.3

^a Aure, J., Dahl, E., Green, N., Magnusson, J., Moy, F., Pedersen, A., Rygg, B. & Walday, M., 1993. Langtidsovervåking av trofutviklingen i kystvannet langs Sør-Norge. Årsrapport 1990.

* = Ikke akkreditert resultat

Akvaplan-niva
Fransenteret
Postboks 6606 Stakkevollan
9296 Tromsø

kjemi@akvaplan.niva.no
www.akvaplan.niva.no

tel: +47 77 75 03 00
NO 937 375 158 MVA

Analysereporten er digitalt undertegnet av:
Lisa Torske

lit@akvaplan.niva.no

Side 5 av 7

ANALYSERAPPORT

Kunde:	Arnarlax	Rapport nr.:	P260061
Kundemerking:	Steinanes	Rapportdato:	2026-05-22
Kontaktperson:		Ankomst dato:	2026-04-17
Prosjektnr.:	67410		

Lab-id. P260061-16

Objekt	Prøvestasjon/ID	ASC-stasjon	FU-stasjon	Prosjektnr. og prosjektnavn	Notering	Mottatt lab
Sediment	C2alt			67410 - Steinanes C and B survey 2026		2026-04-17

Analyseresultat						
Parameter	Resultat	Enhet	Analysedato start	Analysedato slutt	Standard	Måleusikkerhet
TOC	30	mg/g TS	2026-05-12	2026-05-13	Intern metode (NS-EN 17505:2023)	±4.5
TNb	2.9	mg/g TS	2026-05-12	2026-05-13	Intern metode (NS-EN 16168:2012)	±0.52
nTOC ^a	42.8		2026-05-21	2026-05-21	Beregning etter Aure m.fl., 1993	
C/N - forhold	10.2		2026-05-18	2026-05-18	Beregning TOC:TN	
TOM	5.0	% TS	2026-04-23	2026-04-29	Vekttap ved forbrenning. Intern metode basert på NS 4764 (1980)	±0.5
Vekt% ≥2 mm	45.5	wt% TS	2026-04-23	2026-05-21	Intern metode (Bale/Kenny 2005)	±5.6
Vekt% 1 mm - <2 mm	9.7	wt% TS	2026-04-23	2026-05-21	Intern metode (Bale/Kenny 2005)	±0.5
Vekt% 0.500 mm - <1 mm	5.2	wt% TS	2026-04-23	2026-05-21	Intern metode (Bale/Kenny 2005)	±0.1
Vekt% 0.250 mm - <0.500 mm	4.4	wt% TS	2026-04-23	2026-05-21	Intern metode (Bale/Kenny 2005)	±0.1
Vekt% 0.125 mm - <0.250 mm	4.3	wt% TS	2026-04-23	2026-05-21	Intern metode (Bale/Kenny 2005)	±0.2
Vekt% 0.063 mm - <0.125 mm	3.3	wt% TS	2026-04-23	2026-05-21	Intern metode (Bale/Kenny 2005)	±0.2
Vekt% <0.063 mm	27.6	wt% TS	2026-04-23	2026-05-21	Intern metode (Bale/Kenny 2005)	±3.3
Pelitt	27.6	wt% TS	2026-04-23	2026-05-21	Fraksjonen <0.063 mm	±3.3
Sand	26.9	wt% TS	2026-04-23	2026-05-21	Summering av fraksjonene mellom 0.063 mm opptil 2 mm	±1.1
Grus	45.5	wt% TS	2026-04-23	2026-05-21	Fraksjonen ≥2 mm	±5.6

^a Aure, J., Dahl, E., Green, N., Magnusson, J., Moy, F., Pedersen, A., Rygg, B. & Walday, M., 1993. Langtidsovervåking av trofutviklingen i kystvannet langs Sør-Norge. Årsrapport 1990.

* = Ikke akkreditert resultat

Akvaplan-niva
Fransenteret
Postboks 6606 Stakkevollan
9296 Tromsø

kjemi@akvaplan.niva.no
www.akvaplan.niva.no

tel: +47 77 75 03 00
NO 937 375 158 MVA

Analysereporten er digitalt undertegnet av:
Lisa Torske

lit@akvaplan.niva.no

Side 6 av 7

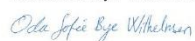
ANALYSERAPPORT

Kunde:	Arnarlax	Rapport nr.:	P260061
Kundemerking:	Steinanes	Rapportdato	2026-05-22
Kontaktperson:		Ankomst dato:	2026-04-17
Prosjektnr.:	67410		

Analyseansvarlig:

Oda Sofie Bye Wilhelmsen

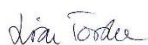
Signatur:



Lisa Torske

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 (måleusikkerhet, metodeprinsipp etc.) fås ved henvendelse til Akvaplan-Niva AS

* = Ikke akkreditert resultat

Akvaplan-niva
Framsenteret
Postboks 6606 Stakkevollan
9296 Tromsø

kjemi@akvaplan.niva.no
www.akvaplan.niva.no

tel: +47 77 75 03 00
NO 937 375 158 MVA

Analysereporten er digitalt undertegnet av:
Lisa Torske

lit@akvaplan.niva.no

Side 7 av 7



ANALYSERAPPORT

Ordrenummer	: NO2609947	Side	: 1 av 4
Kunde	: Akvaplan Niva AS	Prosjekt	: ---
Kontakt	: Oda S. Bye Wilhelmsen	Prosjektnummer	: 67410 - Steinanes C and B survey 2026
Adresse	: Framsenteret 9296 Tromsø Norge	Prøvetaker	: Kunde
Epost	: obw@akvaplan.niva.no	Sted	: ---
Telefon	: ---	Dato prøvemottak	: 2026-04-30 09:18
COC nummer	: NO202600005690	Analysedato	: 2026-04-30
Tilbuds- nummer	: OF221729	Dokumentdato	: 2026-05-08 14:54
		Antall prøver mottatt	: 6
		Antall prøver til analyse	: 6

Om rapporten

Detaljer og anmerkninger om analysemetoder er gitt på slutten av rapporten.

Denne rapporten overstyrer tidligere rapport(er) med samme ordrenummer. Resultater gjelder innleverte prøver slik de var ved innleveringstidspunktet. Alle resultater i denne rapporten har blitt kontrollert og godkjent for utsendelse.

Denne rapporten får kun gjengis i sin helhet, om ikke utførende laboratorium på forhånd har skriftlig godkjent annet. Resultater gjelder bare de analyserte prøvene.

Hvis prøvetakingstidspunktet ikke er angitt, prøvetakingstidspunktet vil bli default 00:00 på prøvetakingsdatoen. Hvis datoen ikke er angitt, blir default dato satt til dato for prøvemottak angitt i klammer uten tidspunkt.

Underskrivere	Posisjon
Torgeir Rødsand	DAGLIG LEDER

Laboratorium	: ALS Laboratory Group Norway AS	Nettside	: www.alsglobal.no
Adresse	: Drammensveien 264 0283 Oslo Norge	Epost	: info.on@alsglobal.com
		Telefon	: ---

Dokumentdato : 2026-05-08 14:54
Side : 2 av 4
Ordrenummer : NO2609947
Kunde : Akvaplan Niva AS



Analyseresultater

Submatriks: **SEDIMENT**

Kundes prøvenavn

P260061-01 C1
Cu + Tot-P

Prøvenummer lab

NO2609947001

Kundes prøvetakingsdato

2026-04-22 14:12

Parameter	Resultat	MU	Enhet	LOR	Analysedato	Metode	Utf. lab	Acc. Key
Tørrstoff								
Tørrstoff ved 105 grader	39.3	----	%	-	2026-04-30	S-8MET (5583)	DK	a ulev
Totale elementer/metaller								
As (Arsen)	22	± 6.60	mg/kg TS	0.5	2026-04-30	S-8MET (5583)	DK	a ulev
Cd (Kadmium)	0.36	± 0.11	mg/kg TS	0.02	2026-04-30	S-8MET (5583)	DK	a ulev
Cr (Krom)	26	± 7.80	mg/kg TS	1	2026-04-30	S-8MET (5583)	DK	a ulev
Cu (Kopper)	46	± 13.80	mg/kg TS	1	2026-04-30	S-8MET (5583)	DK	a ulev
Hg (Kvikksølv)	0.036	± 0.10	mg/kg TS	0.01	2026-04-30	S-8MET (5583)	DK	a ulev
Ni (Nikkel)	19	± 5.70	mg/kg TS	0.5	2026-04-30	S-8MET (5583)	DK	a ulev
Pb (Bly)	6.5	± 5.00	mg/kg TS	1	2026-04-30	S-8MET (5583)	DK	a ulev
Zn (Sink)	89	± 26.70	mg/kg TS	3	2026-04-30	S-8MET (5583)	DK	a ulev
P (Fosfor)	1800	± 270.00	mg/kg TS	50	2026-04-30	S-P (7902.19)	DK	a ulev

Submatriks: **SEDIMENT**

Kundes prøvenavn

P260061-04 C2
Tot-P

Prøvenummer lab

NO2609947002

Kundes prøvetakingsdato

2026-04-22 14:12

Parameter	Resultat	MU	Enhet	LOR	Analysedato	Metode	Utf. lab	Acc. Key
Totale elementer/metaller								
P (Fosfor)	1400	± 210.00	mg/kg TS	50	2026-04-30	S-P (7902.19)	DK	a ulev
Fysikalsk								
Tørrstoff ved 105 grader	28.8	----	%	0.1	2026-05-08	S-DRY (7905.03)	DK	a ulev

Submatriks: **SEDIMENT**

Kundes prøvenavn

P260061-07 C3
Tot-P

Prøvenummer lab

NO2609947003

Kundes prøvetakingsdato

2026-04-28 14:12

Parameter	Resultat	MU	Enhet	LOR	Analysedato	Metode	Utf. lab	Acc. Key
Totale elementer/metaller								
P (Fosfor)	1400	± 210.00	mg/kg TS	50	2026-04-30	S-P (7902.19)	DK	a ulev
Fysikalsk								
Tørrstoff ved 105 grader	35.9	----	%	0.1	2026-05-08	S-DRY (7905.03)	DK	a ulev

Dokumentdato : 2026-05-08 14:54
Side : 3 av 4
Ordrenummer : NO2609947
Kunde : Akvaplan Niva AS



Submatriks: SEDIMENT				Kundes prøvenavn		P260061-10 C4		
				Provenummer lab		Tot-P		
				Kundes prøvetakingsdato		NO2609947004		
						2026-04-28 14:12		
Parameter	Resultat	MU	Enhet	LOR	Analysedato	Metode	Utf. lab	Acc.Key
Totale elementer/metaller								
P (Fosfor)	1600	± 240.00	mg/kg TS	50	2026-04-30	S-P (7902.19)	DK	a ulev
Fysikalsk								
Tørrestoff ved 105 grader	33.1	----	%	0.1	2026-05-08	S-DRY (7905.03)	DK	a ulev

Submatriks: SEDIMENT				Kundes prøvenavn		P260061-13 C5		
				Provenummer lab		Tot-P		
				Kundes prøvetakingsdato		NO2609947005		
						2026-04-28 14:12		
Parameter	Resultat	MU	Enhet	LOR	Analysedato	Metode	Utf. lab	Acc.Key
Totale elementer/metaller								
P (Fosfor)	1400	± 210.00	mg/kg TS	50	2026-04-30	S-P (7902.19)	DK	a ulev
Fysikalsk								
Tørrestoff ved 105 grader	34.1	----	%	0.1	2026-05-08	S-DRY (7905.03)	DK	a ulev

Submatriks: SEDIMENT				Kundes prøvenavn		P260061-16 C2alt		
				Provenummer lab		Tot-P		
				Kundes prøvetakingsdato		NO2609947006		
						2026-04-28 14:12		
Parameter	Resultat	MU	Enhet	LOR	Analysedato	Metode	Utf. lab	Acc.Key
Totale elementer/metaller								
P (Fosfor)	1200	± 180.00	mg/kg TS	50	2026-04-30	S-P (7902.19)	DK	a ulev
Fysikalsk								
Tørrestoff ved 105 grader	39.7	----	%	0.1	2026-05-08	S-DRY (7905.03)	DK	a ulev

Dette er slutten av analyseresultatdelen av analysesertifikatet

Kort oppsummering av metoder

Analysemetoder	Metodebeskrivelser
S-8MET (5583)	T u n g m e t a l l e r i j o r d v e d I C P . Metode: DS/EN ISO 15587-2+DS/EN ISO 22036 (Hg ved DS DS/EN ISO 15587-2+DS/EN 16175-1). PCB: In-house metode + DS/EN ISO 18475, mod.
S-DRY (7905.03)	Metode: DS 204, tørket ved 105°C. Målesikkerhet: 15%.
S-P (7902.19)	Fosfor (total) i jordl. Metode: DS/EN ISO 15587-2 + DS/EN ISO 22036. MU: 15%



Noter: LOR = Rapporteringsgrenser representerer standard rapporteringsgrenser for de respektive parameterne for hver metode. Merk at rapporteringsgrensen kan bli påvirket av f.eks nødvendig fortynning grunnet matriksinterferens eller ved for lite prøvemateriale
MU = Måleusikkerhet
a = A etter utøvende laboratorium angir akkreditert analyse gjort av ALS Laboratory Norway AS
a ulev = A ulev etter utøvende laboratorium angir akkreditert analyse gjort av underleverandør
* = Stjerne før resultat angir ikke-akkreditert analyse.
HT* = Holding Time Breach - Resultatet er rapportert uakkreditert siden tidssensitiv periode for denne analysen, i henhold til metodestandard, har blitt overskredet. Dette kan påvirke analyseresultatet.
NAU = Ikke autorisert (! påvente av resultat)
< betyr mindre enn
> betyr mer enn
n.a. – ikke aktuelt
n.d. – Ikke påvist

Måleusikkerhet:

Måleusikkerhet skal være tilgjengelig for akkrediterte metoder. For visse analyser der dette ikke oppgis i rapporten, vil dette oppgis ved henvendelse til laboratoriet.

Måleusikkerheten angis som en utvidet måleusikkerhet (etter definisjon i "Evaluation of measurement data - Guide to the expression of uncertainty in measurement", JCGM 100:2008 Corrected version 2010) beregnet med en dekningsfaktor på 2 noe som gir et konfidensintervall på om lag 95%.

Måleusikkerhet fra underleverandører angis som en utvidet usikkerhet beregnet med dekningsfaktor 2. For ytterligere informasjon, kontakt laboratoriet.

Utførende lab

	Utførende lab
DK	Analysene er utført av: ALS Denmark A/S, Bakkegårdsvej 406A Humlebæk