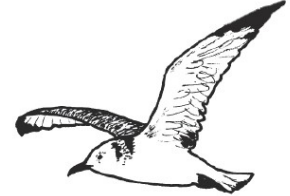


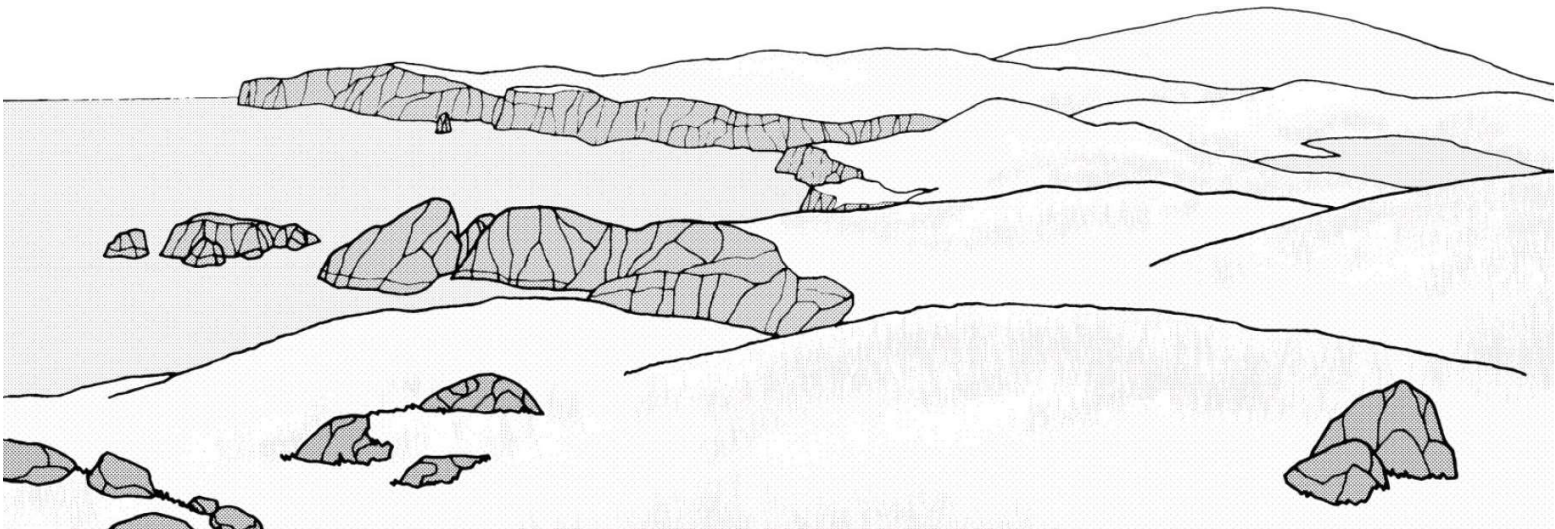


SOTEAG



**Macrobenthic monitoring
in Sullom Voe
2024**

*A report to the Shetland Oil Terminal
Environmental Advisory Group
by
SGS United Kingdom Limited*



Sullom Voe Macrobenthic Monitoring Report 2024

Final Report produced by Eco Marine Consultants Ltd for SGS UK Ltd
on behalf of the Shetland Oil Terminal Environmental Advisory Group
(SOTEAG)

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Eco Marine Consultants Limited (Eco Marine) was commissioned by SGS on behalf of Shetland Oil Terminal Environmental Advisory Group (SOTEAG) to undertake a benthic survey in Sullom Voe and the surrounding areas to determine the status of the infaunal communities and seafloor sediments in June 2024 as part of an ongoing monitoring programme. Macrobenthic surveys have been conducted by various contractors at regular intervals since 1978 and under the current scope since 2002. Eco Marine conducted the surveys in 2018, 2021, and 2024.

This report presents the findings of the study and includes infaunal and sediment data collected from the Sullom Voe area as part of the survey conducted between 16th-20th June 2024. Subtidal samples were collected using a Day grab aboard the '*Sullom Shearwater*' and a handheld core was used at intertidal stations. The main findings of this report are:

- The total abundance of macrobenthic fauna sampled during 2024 increased slightly when compared to the value recorded at comparable stations during the last survey in 2021, though it remained low in the context of the data collected since 2002. Mean species diversity decreased slightly across stations in 2024, resulting in the overall lowest recorded value for the monitoring programme to date.
- Some of the most commonly encountered and abundant fauna recorded during 2024 were the phoronid *Phoronis* spp., the bivalve *Thyasira flexuosa*, and the annelid *Prionospio fallax*. These species have regularly been recorded in previous surveys.
- A few protected species were recorded in the 2024 faunal samples, including the OSPAR-listed ocean quahog *Arctica islandica*, the Priority Marine Feature horse mussel *Modiolus modiolus*, and the IUCN Red-listed edible sea urchin *Echinus esculentus*. Additionally, some rare and non-native species were recorded, such as the nationally rare sea slug *Calliopaea bellula* and northern hatchet shell *Thyasira gouldii*, and the alien but widely spread soft-shell clam *Mya arenaria*.
- In terms of sediment composition, the proportion of sand and gravel decreased while gravel increased slightly in 2024 when compared to 2018 and 2021 across the survey array. However, variability in sediment composition across recent years has been minor and likely reflects the natural variability and spatial patchiness previously observed in the Sullom Voe dataset.
- In 2024 the dominant biotope was '*Mysella [Kurtiella] bidentata* and *Thyasira* spp. in circalittoral muddy mixed sediment', as has been found in previous years. This was due to the considerable abundance of *K. bidentata* and *Thyasira flexuosa* and prevalence of mixed sediments across the survey array. Other biotopes present included '*Lagis koreni* and *Phaxas pellucidus* in circalittoral sandy mud', '*Modiolus modiolus* beds on open coast circalittoral mixed sediment', 'Circalittoral muddy sand', '*Mediomastus fragilis*, *Lumbrineris* spp. and venerid bivalves in circalittoral coarse sand or gravel' and '*Ophiothrix fragilis* and/or *Ophiocomina nigra* brittlestar beds on sublittoral mixed sediment'.
- Statistical analyses found that the variables which drive faunal community structure and distribution across the survey array in 2024 were related to organic content and sediment fraction proportions.
- Overall, the macrobenthic communities sampled throughout Sullom Voe in 2024 have largely remained characteristic of the assemblages recorded during historical monitoring of the area, despite the low diversity recorded.

Contents

1. Introduction	1
1.1. Site Description	1
1.2. Aims and Objectives.....	2
2. Methods.....	3
2.1. Sampling protocol	3
2.2. Infaunal Analyses	5
2.3. Abiotic Analyses	6
2.4. Statistical Analyses.....	7
3. Results.....	9
3.1. Univariate Analysis.....	9
3.1.1. Faunal Abundance at Sullom Voe and Orka Voe	9
3.1.2. Faunal Diversity at Sullom Voe and Orka Voe	12
3.1.3. Faunal Community Composition at Sullom Voe and Orka Voe	15
3.1.4. Rare and Non-Native Species of Interest.....	17
3.1.5. Sediment Distribution.....	21
3.2. Multivariate Data analysis	24
3.2.1. Faunal Groups Across Sullom Voe and Orka Voe	25
3.2.2. Relating Environmental Parameters to Biological Data.....	31
4. Conclusions	33
5. References	35
6. Appendices.....	37

1. Introduction

Eco Marine Consultants Limited (Eco Marine) was commissioned by SGS on behalf of Shetland Oil Terminal Environmental Advisory Group (SOTEAG) to undertake a benthic survey in Sullom Voe and surrounding areas to determine the status of the infaunal communities and seafloor sediments in June 2024.

The Sullom Voe and neighbouring Orka Voe area is subject to numerous anthropogenic activities, most notably through the Sullom Voe oil complex operated by Enquest. The oil complex currently receives oil by pipeline from the oilfields in the East Shetland Basin and the Deep waters West of Shetland, which is then exported from Sullom Voe by tanker and shipped worldwide. Therefore, the area is closely monitored so that any impacts on local benthic communities and sediments are identified.

Benthic monitoring has been carried out typically biennially in the coastal region of Sullom Voe and neighbouring Orka Voe since 2002, though the area has been subject to investigation since 1978 due to the unique marine life found in the area. The typical biennial benthic survey of Sullom Voe and the surrounding areas which was originally scheduled for June 2020 had to be rescheduled for June 2021 due to the COVID-19 pandemic. The subsequent survey was then scheduled for June 2024 to allow for a continuation of the plan for the original survey timings. This report outlines the findings of the 2024 survey and pays special attention to temporal changes observed in macrofaunal communities since monitoring commenced under the current programme design in 2002.

1.1. Site Description

Sullom Voe is the largest voe in Shetland at approximately 16 miles in length and up to five miles in width. Water depth varies between 20 and 35m for much of its length except at the head and inner basin where at points it reaches depths of over 50m. Sullom Voe is a highly diverse marine environment that was designated as a Special Area of Conservation (SAC) under the EC Habitats Directive (92/43/EEC) in 2005 for the Annex I habitats 'Large shallow inlets and bays (primary feature)', 'Coastal lagoons', and 'Reefs'. The Sullom Voe SAC is the most northerly site in the UK to be selected as a representative of 'Large shallow inlets and bays', and the only Scottish example of a ria, known locally as a 'voe', which is defined as a large coastal inlet formed by the submergence of a river valley. The boreal-arctic species-rich communities of Sullom Voe are restricted only to Shetland voes and are not represented elsewhere in the SAC network, making them a unique feature.

Previous monitoring of Sullom Voe and Orka Voe (an inlet to the northeast of Sullom Voe) has revealed that the intertidal sediments of the site are confined to lagoons near the mouth of the voes and are predominately colonised by a diverse faunal community including bivalves, annelids, and holothurian species. Additionally, a range of bivalves, annelids, and amphipods have also been found in the organically enriched shell-sand, gravel, and muddy sediments. The sublittoral sediments of Sullom Voe are typically characterised by poorly mixed, muddy sediments and are colonised by the horse mussel *Modiolus modiolus*, the sea-pen *Virgularia mirabilis*, and diverse burrowing communities (MESL, 2016).

The rich faunal communities present at Sullom Voe have been attributed to the variety of sediment types present which provide an array of habitats as well as a plentiful nutrient supply, possibly derived

from eroding peat. Hoppe (1965) notes the widespread occurrence of submerged peat (now a UK Post-2010 Biodiversity Framework priority habitat) in many areas of Shetland, including Sullom Voe.

Areas of interest within the Sullom Voe area are Garth's Voe, Houb of Scatsta, and Orka Voe. Situated locally to the Shetland Oil Terminal is Garth's Voe, an intertidal area with elevated potential to be exposed to anthropogenic pressures. In 1974, Garth's Voe was reported as having occasionally exposed sandy sediments overlying a dense layer of submerged peat, with fauna dominated by bivalve, ophiuroid, and holothurian species all of which are characteristic of fairly fine sandy mud (Pearson, 1974). The Houb of Scatsta is a shallow intertidal area located next to the Scatsta airport to the south of Sullom Voe oil terminal; in this area mussel beds have been previously observed. Orka Voe is a subtidal area located in the outer reaches of Sullom Voe and is a more exposed voe subjected to pressures resulting from the landfall of major oil and gas pipelines coming in from the north. Gluss Voe is an intertidal area located near to Bardister to the west of Gluss Isle, and to the northwest of Sullom Voe oil terminal in which sediments have historically been dominated by coarse sand and gravel.

1.2. Aims and Objectives

The overarching aim of the 2024 benthic survey was to determine the current condition of the infaunal communities and sediments present at Sullom Voe and in the surrounding areas. Additionally, this report has assessed the status of benthic fauna and sediments by examining data collected in 2024 alongside historical data to determine ecological and environmental changes over time.

The project objectives were therefore as follows:

- To undertake a subtidal survey of Sullom Voe, Garth's Voe, and Orka Voe in line with the historic methodology;
- To undertake an intertidal survey of Gluss Voe and Houb of Scatsta in line with the historic methodology;
- To undertake analysis of the 2024 data against the historical data to contextualise any trends in infauna, sediments, and contaminants over time; and
- To provide a technical report complete with maps of the infaunal communities, sediments, and biotopes present at the study site.

To achieve these aims and objectives Eco Marine conducted a survey alongside SGS in the vicinity of Sullom Voe in June 2024. The results from the survey are presented in this document.

2. Methods

2.1. Sampling protocol

All field work for the 2024 subtidal sampling was carried out between the 17th and the 20th of June 2024 on-board the vessel *Sullom Shearwater*. A total of 24 sample stations were targeted in triplicate, corresponding to the locations of the historic sampling points. Intertidal stations at Gluss Voe and Houb of Scatsta were accessed on foot on the 16th June 2024; three sediment samples were collected at each intertidal site. The location and distribution of stations can be seen in Figure 1. In previous years, samples have been difficult to obtain or could not be collected from Stations SV36 and OV1B due to rocky substrate in the vicinity of these stations which made it impossible to collect any or enough sediment for analysis. Therefore, these stations were not targeted in 2024 as the SOTEAG committee agreed to remove SV36B and OV1B from the scope of the survey following non-yielding grabs at the relocated stations in 2018-2021.

Quantitative subtidal samples for faunal analysis were obtained using a Day grab, which collected 0.1m² of sediment to a depth of approximately 10cm. Three replicate biological samples were taken at 23 of the 24 macrofaunal target stations, from which infaunal, sediment, and contaminant analysis samples were obtained where possible. A final viable sample could not be collected from Station SV34 due to operational issues, resulting in only two samples being taken at this station.

Following deployment, the grab was brought aboard the survey vessel, checked for capacity and the sample was discharged into a collection box. A photograph of each untouched sample in the grab was taken as evidence of collection. A photograph of each faunal sample following sieving was also taken for future reference. Detailed field notes were recorded including, as a minimum, the station coordinates, time of sampling, depth, sample volume, and weather. Where a 5L minimum size sample could not be recovered on the first attempt (due to seabed conditions in areas of high scour and bedrock), a further two attempts were made. If a sample greater than 5L could not be obtained following three attempts, the largest of the collected samples was kept for qualitative faunal analysis. No pooling of samples was undertaken.

Sub-samples of approximately 0.5L were taken for sediment particle size analysis (PSA) from each grab sample and carefully labelled. The remainder of the sample was placed on a 1mm-mesh stainless-steel sieve and gently eluted with seawater to remove excess fine sediments. The sample was then transferred into a secure and labelled container and preserved in buffered formalin. All samples were retained for subsequent analysis of the benthic infauna in the laboratory.

At each station, sub-samples for contaminant analysis (hydrocarbon and organic content) were collected from the top 2cm of the three samples retained for faunal analysis. PSA and contaminant samples were also taken at six soft shore sites at Gluss Voe and the Houb of Scatsca, which were accessed by foot. No sediment samples for macrofaunal analysis were collected at Gluss Voe or the Houb of Scatsca in line with the project specification.

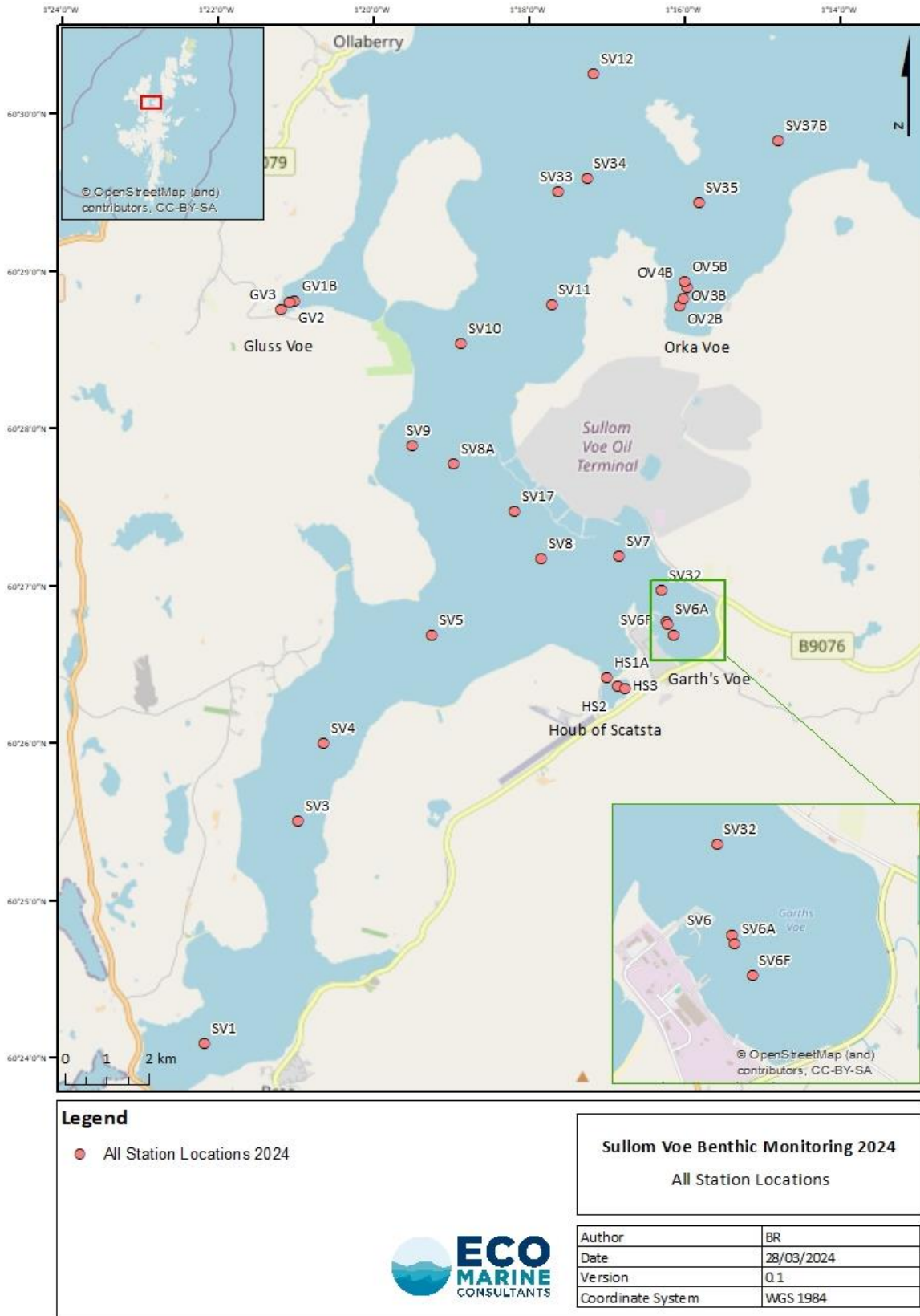


Figure 1. The location and distribution of target macrofaunal and sediment particle size analysis stations at Sullom Voe in 2024.

Historically, when samples of less than 5L of sediment were collected, PSA and the full range of contaminants samples were not retained to maximise the amount of sediment available for faunal analysis. Samples for PSA were collected at all stations in 2024. Total aliphatic hydrocarbon and total organic carbon samples were retained from all subtidal and intertidal stations. Polycyclic aromatic hydrocarbons (PAH), naphthalene, phenanthrene, and dibenzothiophenes (NPD) samples were also taken at all relevant stations encompassed within the scope of the survey, which includes Stations SV1, SV4, SV6, SV6F, SV7, SV17, SV34, and OV5B.

Prior to the commencement of the 2016 benthic survey, seven of the macrofaunal station locations that had been historically sampled were relocated due to their proximity to potential features of conflict, including an oil pipeline. Each of these stations was relocated so that they were a minimum of 200m from any potentially sensitive infrastructure. Samples were collected from these relocated stations in 2018, 2021, and 2024 and are identified by the suffix of 'B' after the original location codes used in previous surveys, for example, OV1 is referred to as OV1B (Figure 1).

2.2. Infaunal Analyses

To ensure continuity of the data, the methodology for the processing of benthic faunal samples was not altered from previous years. Additionally, highly trained Senior Taxonomists with experience in processing Sullom Voe samples and had full access to the Sullom Voe reference collection undertook the faunal analysis. On arrival at the analytical laboratory facilities the samples were checked against the field notes (Appendix 1) in accordance with standard operating procedures and signed against the list of samples collected. The excess formalin from each sample was poured through a 1mm-mesh sieve and collected for licensed disposal. Each sample was gently eluted with tap water through a 1mm-mesh sieve to extract the low-density components (crustaceans and polychaetes) and combined with the floating material initially separated from the formalin in the sample. The larger macrofauna were removed from the eluted material and preserved for analysis. This stage in the initial sorting process was carried out in the open air to reduce the effects of residual formalin used to fix the sample in the field.

The sediments were sorted under a stereomicroscope with the aim of extracting the fauna. The entire sample of separated fauna was then preserved in industrial methylated spirit (IMS) for subsequent analysis. Each of the extracted samples was sorted into major faunal groups before being analysed by experienced taxonomists, who sign a log sheet on completion of the analysis of each individual sample.

Organisms were identified to the highest possible taxonomic resolution (species level where possible). Colonial organisms (e.g., hydroids and bryozoans) and attached epifaunal taxa were recorded qualitatively. Examples of taxa not previously identified in samples collected as part of this monitoring programme survey were preserved separately and added to the ongoing reference collection.

Taxonomic identification was checked against strict QA measures throughout the process. Species identification was recorded in a standard format using species codes from Howson and Picton (1997). Eco Marine is a leading participant in the National Marine Biological Analytical Quality Control (NMBAQC) scheme and adheres to NMBAQC processing and identification guidelines. Following this, the data were entered into the Eco Marine database in a standardised format. Subsequently all taxon names were then checked against the World Register of Marine Species (WoRMS) database to ensure that the most up-to-date names were used. Species identification was recorded in a standard format

using WoRMS Aphia identification codes assigned to each name. All species names from the faunal data were run through the WoRMS database prior to temporal faunal analysis to ensure that no false diversity records would occur. The full species abundance matrix for the 2024 survey is presented in Appendix 2 along with the total faunal abundance and diversity at each station in Appendix 3.

2.3. Abiotic Analyses

The sediment samples were subjected to particle size analysis (PSA) managed by SGS. PSA samples were obtained from all sample stations.

The sediment samples for PSA analysis were sieved at $\frac{1}{2}$ phi¹ intervals over a particle size range of 64mm-0.063mm on the Wentworth Scale. The full PSA results are given in Appendix 5 while PSA values are summarised in Appendix 6 into higher groupings of % mud (<0.063mm), % sand (0.063-2mm) and % gravel (>2mm), for ease of broad-scale substrate assessment. The latter data were used for the description and classification of sediments.

To describe the substrate types recorded across the study area, sediment samples have been classified according to Folk (1954). The Folk classification thresholds are illustrated in Figure 2, and the categories assigned to each station are presented in Appendix 6.

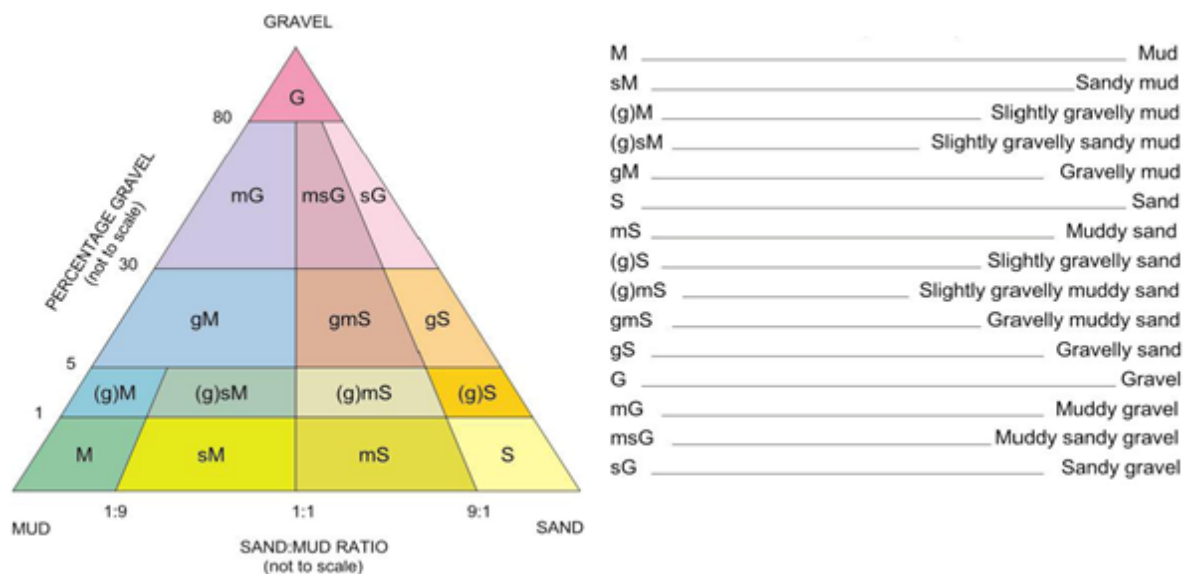


Figure 2. The Folk classification system used to define the sediments collected at Sullom Voe in 2024.

Sub-samples were also collected from each grab sample for chemical contaminant analyses which were completed by SGS. All benthic samples were tested for percentage total organic content, mean total aliphatics, and unresolved complex mixtures of hydrocarbons (UCM) % total aliphatic hydrocarbons. Samples from SV1, SV6, SV6F, SV7, SV17, SV34, and OV5B were also tested for total naphthalenes, total phenanthrenes, total dibenzothiophene, sum of naphthalenes, phenanthrenes and dibenzothiophenes (Σ NPD), total fluoranthenes/pyrenes, total benzantracenes/chrysenes, total benzofluorathenes/ benzopyrenes, total m/z276 and total 206 ring aromatic hydrocarbons.

¹ Phi = $-\log_2 D/D_0$ (D is the diameter of the particle, D_0 is a reference diameter, equal to 1mm).

2.4. Statistical Analyses

Basic faunal abundance and diversity data were available for each survey conducted from 2002-2024, though species matrices were not available to Eco Marine for the years 2002-2010. As such, overall abundance, and diversity trends since 2002 have been examined, though a station-by-station breakdown and multivariate analyses was only possible for the survey years 2012, 2014, 2016, 2018, 2021, and 2024. Following the methods adopted in previous years, faunal data from each replicate were pooled prior to any analyses being conducted so that each station was represented by the contents of the three processed grab samples. This removed the need to average station data from the last six survey years where station by station abundance and diversity values were available to Eco Marine.

Data since 2002 has been examined using univariate analysis while data from the last six survey years (2012, 2014, 2016, 2018, 2021, and 2024) were interrogated using multivariate analysis, for the reasons specified above. As samples were not collected from Stations SV36B and SV37B in 2021 and SV37B and OV1B in 2024, data for these samples have been removed from historical datasets for the purpose of comparative macrofaunal analysis of the timeseries dataset in 2024 to ensure that only like for like data are utilised.

The dominant biotopes for each station were identified using sediment and faunal abundance data. Where possible, biotopes were identified to Level 6 but where a biotope did not fit or there was not enough information available, biotopes were only taken as far as confidently possible. As in previous reports, biotopes were recorded in the MNCR format (Connor *et al.*, 2004). The biotope(s) assigned to each station are summarised in Appendix 4.

The principal tool used to undertake the suite of multivariate analysis on the biotic and abiotic datasets was PRIMER v6. The following techniques were applied to a between-sample similarity matrix constructed using Bray-Curtis similarities (Bray and Curtis, 1957) that were derived from suitably transformed (square-root) abundance values and with group-average sorting. Multi-dimensional scaling (MDS) ordination was used to represent, in two dimensions, the similarities between survey years based on their faunal composition. Following this, an analysis of similarity (ANOSIM) test was carried out using abundance data to assess the differences in the infaunal communities between years. In addition to the ANOSIM test, a Kruskal-Wallis rank sum test (as data were non-parametric) was conducted using RStudio statistical software to determine any significant differences in the abundance and diversity data between the four most recent survey years.

These techniques were then followed by conducting a similarity percentage (SIMPER) routine which allowed for a comparison of the faunal communities between years to be made. Species responsible for the dissimilarity between each pair of years were then listed in decreasing order of importance in the discrimination. This routine also provides information on which species are responsible for the within-group similarities and their contribution to the internal similarity of the group.

To classify faunal groups, hierarchical clustering analysis and a similarity profile permutation (SIMPROF) test was conducted. Cluster analysis aims to find “natural groupings” such that samples within a group are more similar to each other than samples in different groups. The results of hierarchical clustering are represented by a tree diagram or dendrogram, with the x-axis representing the full set of samples and the y-axis representing the similarity level at which the groups are

considered to have fused. A SIMPROF looks for statistically significant evidence of genuine clusters in samples. Tests are performed at every node of a completed dendrogram, testing whether the group that has been subdivided has 'significant' internal structure. A second SIMPER routine was then conducted to provide information on which species are responsible for the within-group similarities.

Data for the abiotic (environmental) variables were interrogated in Primer alongside the biotic (faunal abundance) dataset for stations where both faunal samples and the full suite of contaminant samples were collected. From this, draftsman's plots (pairwise scatter plots) were generated to check if the samples were evenly distributed across the range of each variable. Skewed distributions were identified, and an appropriate square root transformation was applied to those variables, as skewed distributions must be transformed to justifiably use Euclidean distance as a similarity measure on normalised environmental variables. Draftsman's plots were also used to look for linear or curvilinear relationships, as such variables are effectively the same rather than independent. No variables were highly correlated enough to justify exclusion from the data set.

A BEST BIOENV routine in PRIMER was also used to relate physicochemical and environmental variables to the biological data. This analysis is based on the premise that if a suite of environmental variables is structuring the biological community, then samples with similar values for these variables would be expected to have similar species compositions. Therefore, an ordination based on these abiotic variables should closely resemble the ordination of samples based on the biota. Selecting different combinations of the full set of environmental variables should allow the determination of an 'optimal' match of the separate biotic and abiotic ordinations. The exclusion of a key determinant will degrade the match, as will the inclusion of environmental variables that differ markedly between the samples but have no effect on community composition (Clarke and Ainsworth, 1993).

Following the appropriate abiotic transformations, a BEST procedure was conducted using the BIOENV routine, selecting Spearman correlation (Rho value) and the Bray-Curtis resemblance matrix of square root transformed biotic abundance data. Sequential tests were carried out, increasing the maximum number of variables each time until the Rho value plateaued. The BIOENV results were then subjected to a significance test by randomly permutating one set of sample labels relative to the others and running through the BIOENV procedure to generate the best match, or Rho value. This procedure was conducted repeatedly (999 times) to generate a histogram of Rho values which represented the null hypothesis case (i.e., that there was no relationship between the biotic and abiotic data). The real value of Rho was then compared to this and if it was larger than any of them the null hypothesis was rejected.

3. Results

3.1. Univariate Analysis

3.1.1. Faunal Abundance at Sullom Voe and Orka Voe

In 2024, the total number of individuals recorded was 35,863 from all stations. Note that for the purposes of any time-series analysis presented in this report, values from all survey years (2002-2024) have been adjusted to remove data from non-analogous stations between years, as no data was available for stations SV36B and SV37B in 2021 and from SV36B and OV1B in 2024.

Faunal abundance has been variable since the current Sullom Voe monitoring programme commenced in 2002; values have ranged from 31,267 individual specimens in 2002 to a peak of 73,726 individuals in 2006 (Figure 3). Faunal abundance was slightly higher in 2024 when compared to the comparable stations surveyed in the previous monitoring year of 2021. However, faunal abundance remained low in terms of the entire monitoring programme as it was the fourth lowest value observed since monitoring under the current scope began in 2002.

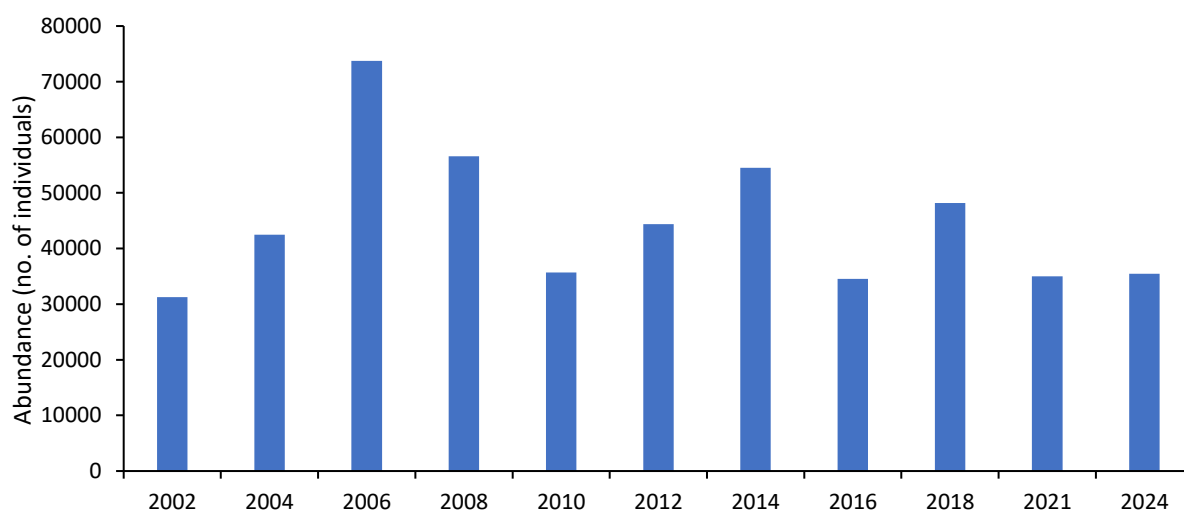


Figure 3. Total faunal abundance across all stations at Sullom Voe per survey year 2002-2024. Data for Stations SV36B, SV37B, OV1B have been removed for all years.

Faunal abundance per station for 2012-2024 is illustrated in Figure 4; station by station data was not available for 2002-2010 as only summary data was provided. It should be noted that samples from the 'B' stations from 2016 onwards were collected from slightly different locations from those collected at OV1-5 in 2002-2014 and should as such be observed with a degree of caution.

Notable variances in species abundance between years can be observed at individual stations. Many stations, such as SV4, SV11, and SV12, have recorded similar abundance values between years, while others, such as SV5, SV6A, and SV32, show larger disparities. In 2012, a notably high abundance was recorded at Station SV5 which was largely due to the presence of the horseshoe worm species *Phoronis muelleri* individuals. The *P. muelleri* population persisted at this station in 2014, however the high abundance in this year was contributed to by the barnacle *Balanus crenatus*, a species which was also recorded in notable numbers at station SV7 and SV17. Abundance was also notably high at SV6A in 2018; this could be in part attributed to high abundances of individuals from the phylum Nematoda and the annelid *Tubificoides benedii*.

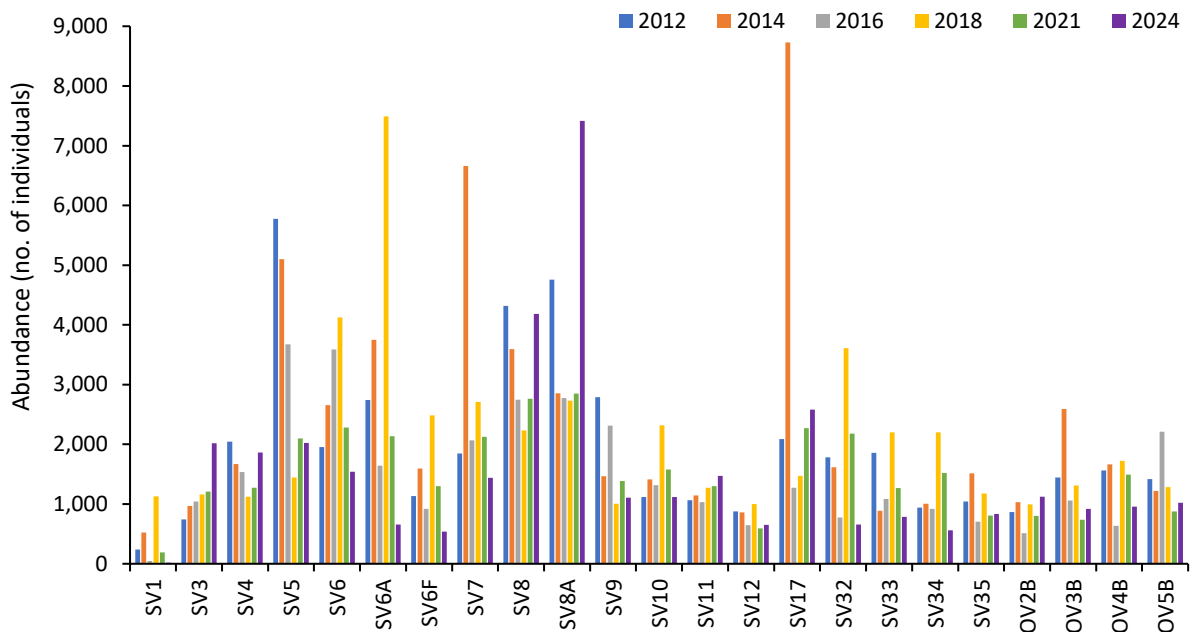


Figure 4. Total faunal abundance per station at Sullom Voe in 2012-2024.

In 2024, the third highest abundance in the last six survey years was recorded at Station SV8A, which can be largely attributed to the presence of a high number of *Phoronis* spp. individuals (7,413 specimens). This was the highest value recorded at a station in 2024 and represented the new record high for the station in the last six survey years. Station SV8A is located adjacent to the Sullom Voe Oil Terminal, an area of historically high abundances. The lowest abundance in 2024 was recorded at the southernmost station, SV1, with a total of 17 individuals. Abundance values have been low here throughout the recent monitoring period, however, this value represents the lowest abundance recorded at this station throughout the monitoring programme.

Overall, abundance per station in 2024 varied greatly, with four stations recording their respective highest values for the past six survey years (SV3, SV8A, SV11, and OV2B), while nine stations recorded their respective lowest values observed in the same time period (SV1, SV6, SV6A, SV6F, SV7, SV10, SV32, SV33, SV34). These stations are widely dispersed across the survey area and so the decrease in abundance can largely be attributed to natural variation in communities; with the exception of SV6, SV6A, SV6F, and SV32 which recorded record lows, in terms of the last six survey years, and are all located within Garth's Voe. The remaining ten stations were in keeping with that previously recorded at each location when compared to previous years.

Figure 5 illustrates the geographical change in abundance values at each station between the three most recent survey years. As was observed in 2018 and 2021, in 2024 faunal abundance remained consistently highest in the mid-channel near to the Sullom Voe Oil Terminal. Abundance values in 2024 at the Orka Voe stations and the most southerly Sullom Voe station were slightly reduced compared to those of 2018 but remained comparable to those observed in 2021. Figure 5 also illustrates the reduced values observed at stations positioned in Garth's Voe compared to the previous two survey years as previously mentioned. Values across the rest of the array observed slight increases and decreases compared to previous years, however remained broadly comparable. The variances observed reflect a pattern likely due to natural variation in the benthic faunal communities between survey years, which has been observed throughout the duration of the monitoring period.

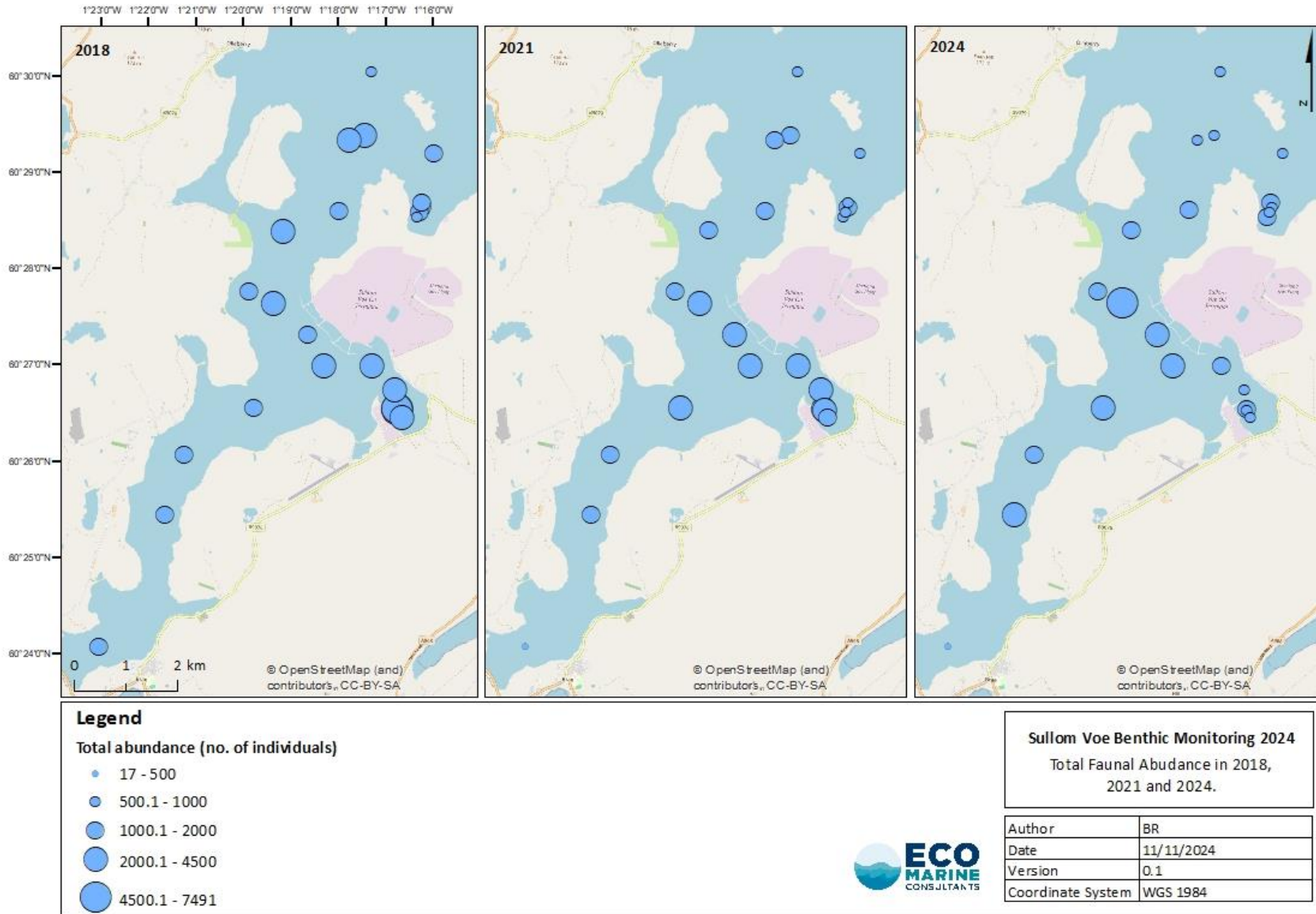


Figure 5. Total abundance of individual specimens identified in samples collected from the Sullom Voe survey area in 2018, 2021, and 2024.

3.1.2. Faunal Diversity at Sullom Voe and Orka Voe

In 2024, a total of 555 taxa (including juveniles and egg records) were recorded across the survey area. Note that the following values from all survey years (2002-2024) have been adjusted to remove data from non-analogous stations between years, as no data was available for stations SV36B and SV37B in 2021 and from SV36B and OV1B in 2024. At comparable stations, the total taxa recorded in 2024 showed a decrease since the previous survey 2021, though remained within the bounds of variation established throughout the monitoring programme. Mean faunal diversity per station has decreased slightly with each survey since 2014, a trend which continued into 2024; 101 taxa were observed at each station in 2024 compared to 111 in 2021, and 116 in 2018 (Figure 6). The highest mean diversity per station recorded within the monitoring programme was observed in 2004 with 128 taxa per station, while the value established for 2024 represents the new lowest mean diversity for a survey year to date.

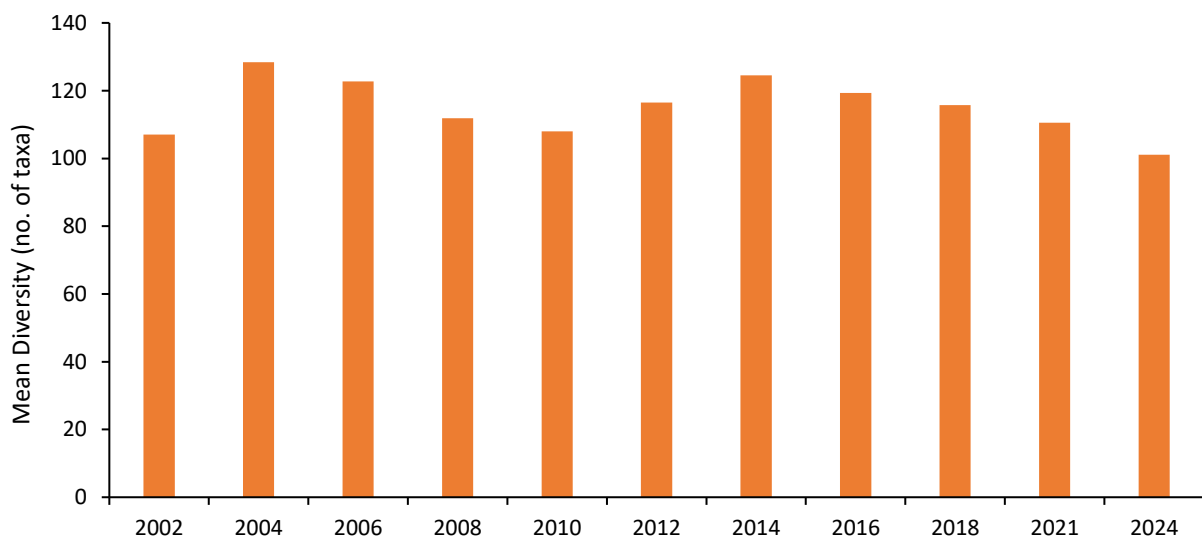


Figure 6. Mean species diversity at Sullom Voe per station for survey years 2002-2024. Data for Stations SV36B, SV37B, OV1B have been removed for all years.

Total species diversity per station for recent survey years is illustrated in Figure 7. As with the faunal abundance data, it should be noted that samples from the 'B' stations from 2016 onward were collected from slightly different locations from those collected at OV1-5 in 2002-2014 and should as such be appraised with a degree of caution.

From Figures 6 and 7 it is evident that there is a lower degree of variation in diversity between years than when compared to faunal abundance. However, some stations have shown notable variances between years, particularly those located within Orka Voe. Diversity was especially high in 2024 at Stations SV6, SV11, and OV2B when compared to previous years. Stations SV11 and OV2B also recorded high abundance values, however, SV6 recorded low abundance values despite the increase in diversity. Conversely, diversity in recent years has decreased at stations SV1, SV3, SV6A, SV6F, SV7, SV8A, SV10, SV12, SV17, SV34, OV4B, and OV5B with the lowest value recorded in the past 6 years being recorded at these stations in 2024. These stations are widely dispersed across the survey area and so the increases and decreases in diversity could be attributed to natural variation in communities. Stations SV3 and SV8A recorded high abundances despite the low diversity values; in both cases this appears to be due to the increased dominance of a low number of species, particularly *Phoronis* spp. at SV3 and SV8A and additionally the annelid *Prionospio fallax* at SV3.

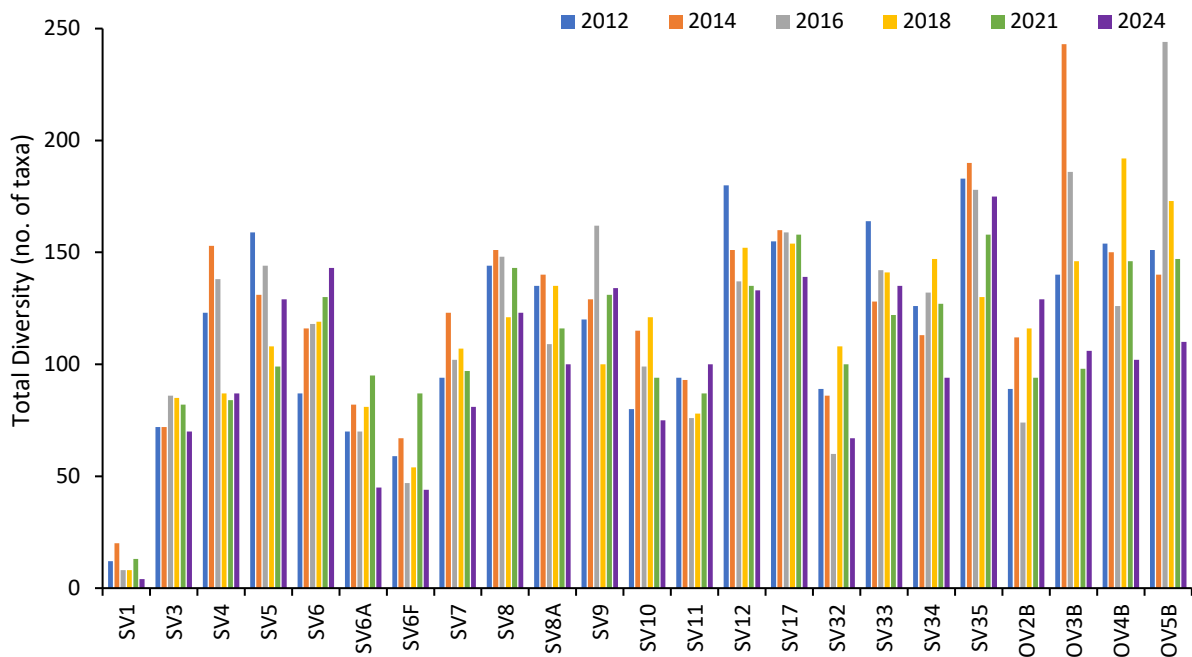


Figure 7. Total species diversity per station at Sullom Voe in 2012-2024.

Figure 8 illustrates geographical changes in species diversity over the past three survey years. It is evident that diversity in 2024 has remained largely similar across the site compared to 2018 and 2021, with a few exceptions. Samples collected from the inner area of Orka Voe (OV2B and OV3B) in 2024 showed a decrease in diversity between 2018 and 2021, however observations returned to largely elevated values in 2024. In 2024, the Garth's Voe area stations (SV6, SV6A, SV6F, and SV32) largely observed a decrease in diversity across most sample locations since 2018 and 2021, with the exception of SV6. Stations adjacent to the Sullom Voe Oil Terminal (SV7, SV8, SV8A, SV17) observed minor decreases in 2024 compared to previous years, whilst the nearest southern station in the main channel (SV5) and nearest eastern station (SV9) observed an increase since 2018 and 2021 respectively. Though minor changes were observed in the northern portion of the array (SV10, SV11, SV12, SV33, SV34), values have largely remained comparable in recent years.

In recent years, diversity has observed a steady slight decrease from year to year. This has not been mirrored by abundance, which has historically shown more variation over the duration of the monitoring period than diversity, and has instead observed both increases and decreases from year to year in the same time period. Abundance and diversity values have generally remained largely comparable to those observed in previous years, with the exception of the new lowest diversity value for the monitoring programme being observed in 2024, though only by a minor margin. This comparability of abundance values and currently minor reduction in diversity suggests that general populations in 2024, while subject to natural variability, have remained relatively healthy and are largely represented by the same species seen throughout the monitoring programme.

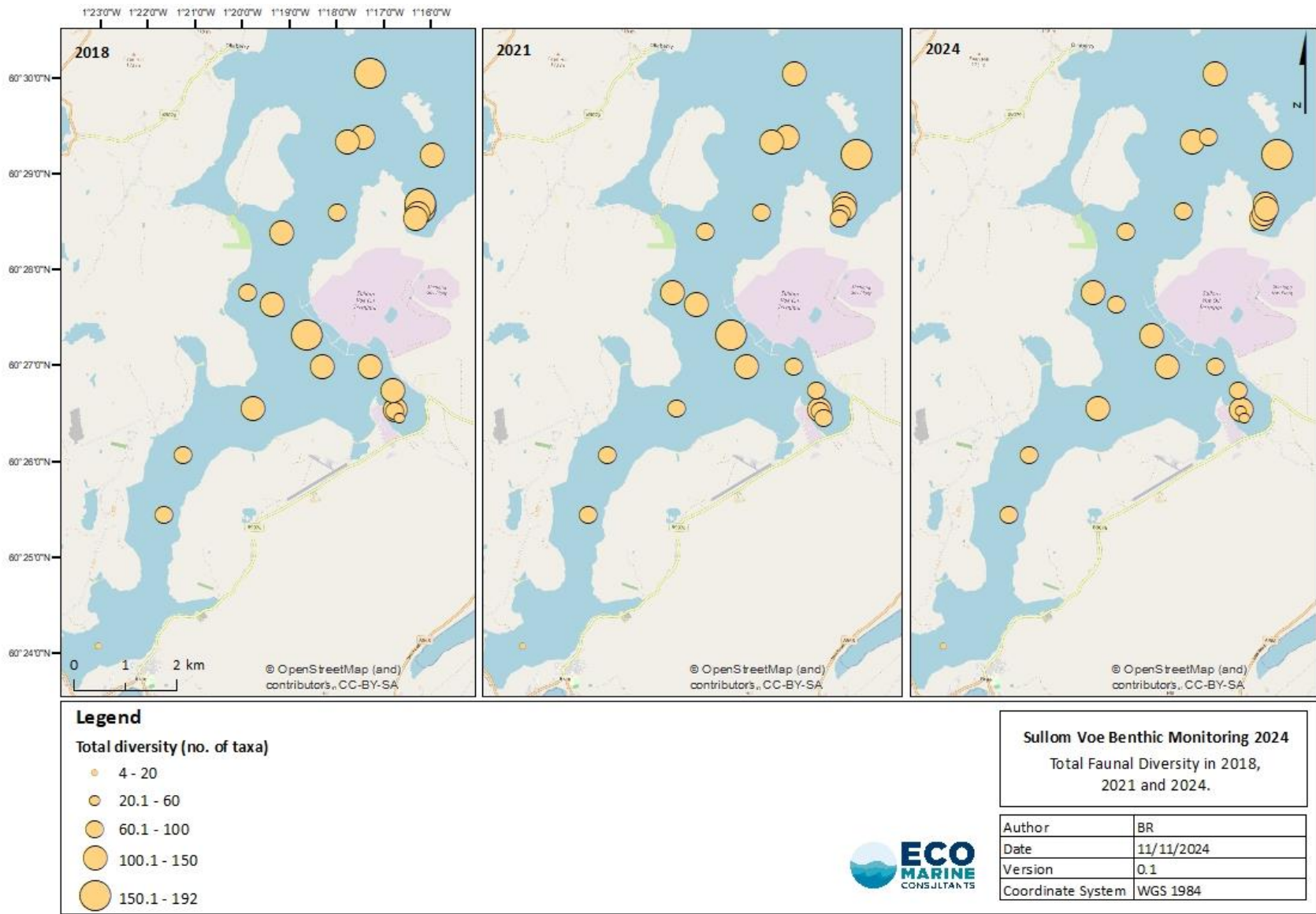


Figure 8. Total diversity of individual taxa per station at Sullom Voe in 2018, 2021, and 2024.

3.1.3. Faunal Community Composition at Sullom Voe and Orka Voe

Across recent years, the top ten most abundant taxa at comparable stations have remained relatively consistent. Many taxa have remained similar between surveys (Figure 9); however, some shifts have occurred. High abundances of individual taxa from year to year indicate a stability in the benthic environment and faunal community at Sullom Voe.

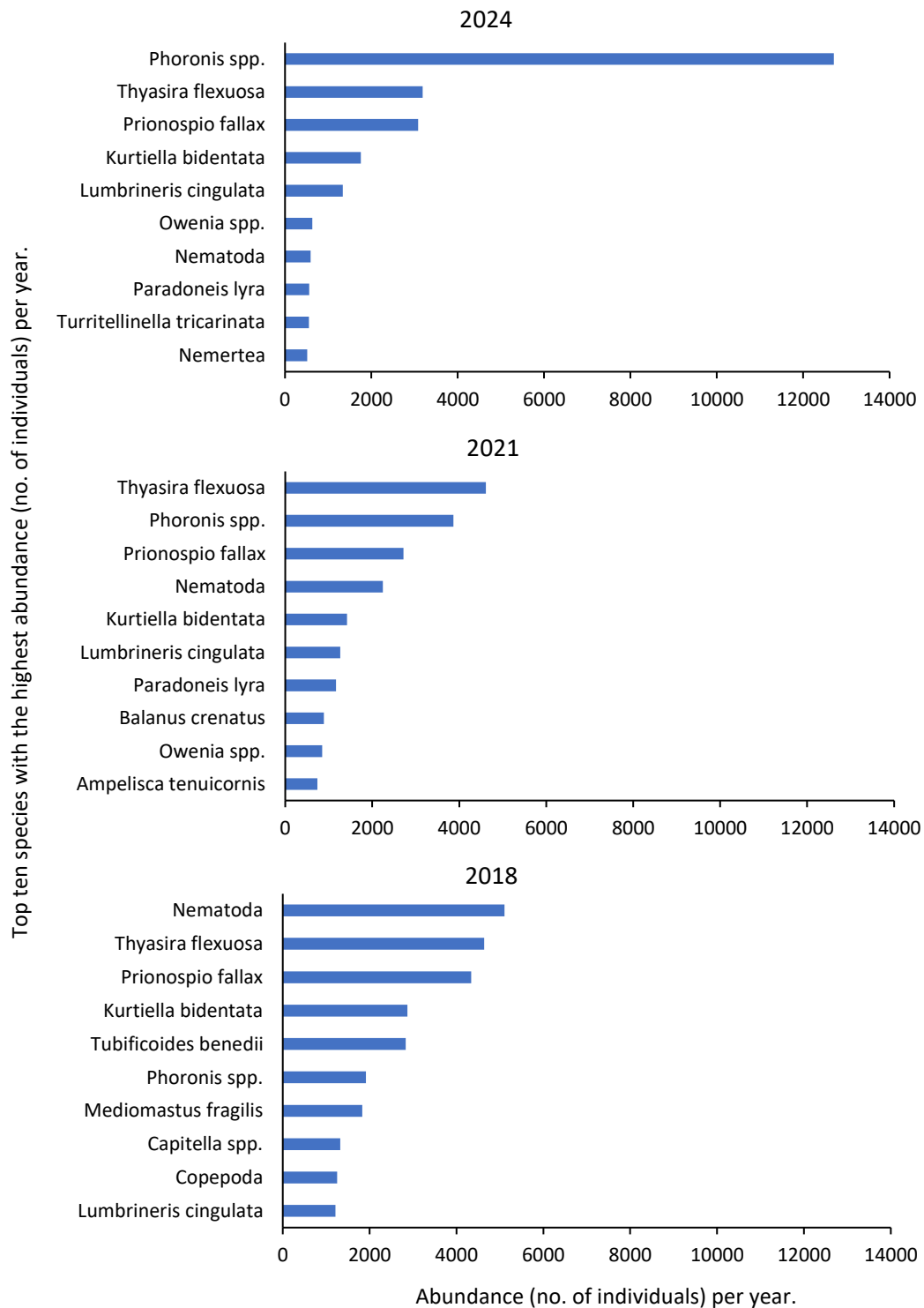


Figure 9. The ten most abundant species in the past three surveys at Sullom Voe.

The ten most abundant taxa in 2024 represented 70% of the total faunal community. *Phoronis* spp. was the most abundant taxa in 2024, by a wide margin; an increase from being the second most abundant taxa in 2021 and the sixth in 2018. *Phoronis* spp. was recorded at 21 of the 24 targeted stations and was observed to be in particularly high abundance at stations SV8 and SV8A at which 2,849 and 5,858 individuals were observed, respectively.

The bivalve *Thyasira flexuosa* has consistently been listed in the top two most abundant species in the last three surveys. *P. fallax* has consistently featured as the third most abundant taxa between 2018 and 2024 and the bivalve *Kurtiella bidentata* has remained within the top five, though it has fluctuated between fourth and fifth place. The ability of these taxa to maintain these positions highlights their long-term dominance in the benthic community in the Sullom Voe area. *T. flexuosa* saw a decrease in 2024 from the relatively stable abundances observed in 2018 and 2021 (from 4,637 individuals in 2018 and 4,614 in 2021 to 3,187 in 2024); while *P. fallax* and *K. bidentata* have fluctuated from year to year, with decreases in abundance observed between 2018 to 2021 being followed by increases in 2024.

The annelid *Lumbrineris cingulata* has remained consistent in its abundance between years since 2018, though shifts in other taxa have meant it has moved further up the top ten list. The annelid *Paradoneis lyra* also remained consistent in terms of abundance between 2018 and 2021, though the taxon observed a decrease in 2024.

Owenia spp. and Nematoda have each recorded sequential decreases over the past three survey years. Due to high abundances of other taxa in 2018, *Owenia* spp. did not feature in the top ten taxa for that year; even though its abundance in 2018, 958 individuals, was elevated compared to 2021 and 2024, with 851 and 635 individuals respectively.

Both the gastropod *Turritellinella tricarinata* and Nemertea were not featured in the top ten taxa of 2018 or 2021 but made an appearance in 2024. *T. tricarinata* was first recorded in 2021 (from records between 2012 and 2024) with an abundance of 311 individuals, which increased in 2024 to 553 individuals, at comparable stations. Nemertea have been regularly recorded throughout the monitoring period; abundances observed in 2024 (511 individuals) were elevated compared to 2021 (416 individuals), however they were reduced compared to 2018 (673 individuals).

B. crenatus was not present in the top ten taxa of 2024 but had been featured in 2018 and 2021; the species was still recorded during the 2024 survey, however, abundance dropped to 55 individuals from the 888 observed in 2021 and 449 in 2018 at comparable stations. High records of barnacle taxa (including *B. crenatus*) are typically associated with the recovery of boulders and cobbles within grab samples as barnacles (Cirripedia) rely on hard surfaces for anchor points. In 2024, very few large cobbles were recovered at stations where *B. crenatus* has previously been recorded in high abundance, giving a likely explanation for the change.

The amphipod *Ampelisca tenuicornis* was likewise not featured in the top ten taxa of 2024, after appearing in 2021. Though *A. tenuicornis* has always been recorded regularly, abundances were notably elevated in 2021. In 2024, 214 individuals were recorded compared to a total of 736 individuals that were observed in 2021. However, the 2024 value remained comparable to the 270 individuals recorded in 2018 and those observed earlier in the monitoring programme.

3.1.4. Rare and Non-Native Species of Interest

A number of protected, rare, and non-native species were recorded in the 2024 faunal samples. These include:

- The OSPAR-listed ocean quahog *Arctica islandica*;
- The Priority Marine Feature horse mussel *Modiolus modiolus*;
- The IUCN Red-listed edible sea urchin *Echinus esculentus*;
- The nationally rare sea slug *Calliopaea bellula*;
- The nationally rare northern hatchet shell *Thyasira gouldii*; and
- The alien soft-shell clam *Mya arenaria*.

The distribution of these species in 2024 is shown in Figure 10 and 11. In addition, the nationally scarce amphipod *Harpinia laevis* and the cryptogenic isopod *Limnoria lignorum* were also recorded in 2024.

The nationally rare bryozoan *Cylindroporella tubulosa* which was recorded in 2021 was not observed in 2024. The nationally scarce orange-footed sea cucumber *Cucumaria frondose* and the nationally scarce purple sea urchin *Paracentrotus lividus* were recorded in 2018, however were absent from samples collected at Sullom Voe in 2021 and 2024.

A. islandica was sampled in low abundances at five stations in 2024 (Figure 10). A total of six individuals were recorded in 2024; one adult individual was recorded along with five juveniles. This is a decrease compared to the 16 total individuals recorded in 2021, and 23 in 2018. *A. islandica* is an OSPAR-listed species known for its slow growth rate and long lifespan and is distributed throughout the UK including the Shetlands. Though abundance was lower, the overall distribution of the species in 2024 was similar to that recorded during previous monitoring surveys of Sullom Voe.

In 2024, 33 *M. modiolus* individuals were recorded across six stations (Figure 10). This is a notable increase in abundance as individuals were absent from the 2021 survey, and five individuals were recorded in the 2018 survey which was the previous highest abundance recorded in a Sullom Voe survey. *M. modiolus* centred habitats are listed under Annex I of the Habitats Directive, are a Priority Marine Feature, a UK BAP habitat, and an OSPAR threatened and declining habitat. *M. modiolus* are a relatively slow growing species which form extensive beds that can support a range of other species. *M. modiolus* significantly modify seabed habitats, increasing habitat complexity and therefore increase local biodiversity (Tyler-Walters, 2007).

In 2024, a single *E. esculentus* was observed at Station OV3B which is positioned within Orka Voe (Figure 11). *E. esculentus* is listed as 'near threatened' on the global IUCN red-list but is relatively abundant in the northeast Atlantic (Tyler-Walters, 2008). A single *E. esculentus* was also observed in 2016 at Station SV36B and in 2018 at Station SV8A. Additionally, individuals of this species were observed by Eco Marine field surveyors beneath the waterline on the harbour wall at Garth's Voe.

One individual of *C. bellula* was observed in 2024 at Station SV10 in the northern portion of the main channel (Figure 11). Records of *C. bellula* in Britain are rare, with only 14 observations to date, though it has also been recorded elsewhere across Europe (NBN, 2024). *C. bellula* had not been observed at Sullom Voe prior to 2018 and was not observed in 2021. In 2018, *C. bellula* was recorded at SV36B, one of the stations where samples for faunal analysis could not be collected in 2021 and 2024.

The nationally rare *T. gouldii* was recorded during the Sullom Voe monitoring survey for the first time (according to records from 2012 to 2024) in 2024. Three individuals were observed at Station SV35 in the northern reaches of the survey array off of Calbeck Ness (Figure 11). *T. gouldii* is a circum-arctic species which extends sporadically into sheltered sea lochs and inlets around Shetland and Scotland. Presence in Scottish waters forms the extreme southern end of the geographic range (Jackson, 2007).

A total of 11 *M. arenaria* individuals were recorded across seven stations in 2024 (Figure 10). This is a notable decrease from the 70 individuals recorded in 2021; however, it is in line with previous records such as the eight individuals recorded in 2018 and two in 2016. This bivalve is an introduced alien species that is found on all British and many European coastlines, including the Shetlands (Oliver *et al.*, 2010), though it is not a recent introduction. It occupies a wide geographical range in the northern hemisphere and with the aid of man was reintroduced to the North Sea 400-700 years ago after dying out in the area during glaciation in the Pleistocene era (Strasser, 1999). It has expanded its range by different modes which include natural range expansion, intentional aquaculture, unintentional ballast water discharges and as a by-product of oyster aquaculture (Strasser, 1999).

One individual of the nationally scarce *H. laevis* was recorded in 2024 at Station OV4B, the outer most station within Orka Voe. This species was last recorded within the Sullom Voe dataset in 2014. Two *L. lignorum* individuals were recorded at Station SV6 which is situated within Garth's Voe. These are the first records of this taxon for the Sullom Voe programme. Some experts consider *L. lignorum* to be native to the Pacific coast of America and others consider it native to Britain, however, most treat the species origin as cryptogenic (Shalaeva, 2012).

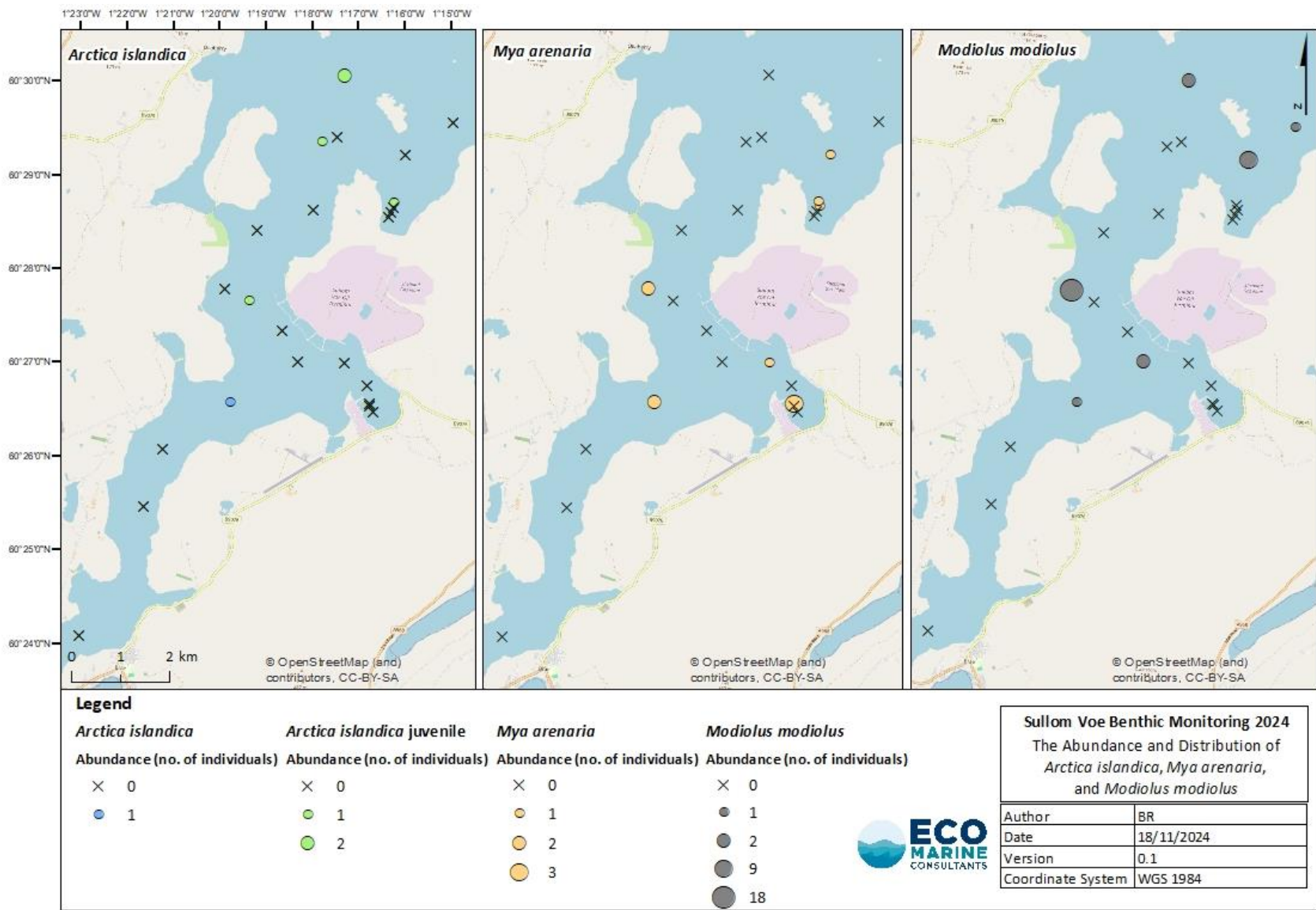


Figure 10. The abundance distribution of *Arctica islandica*, *Mya arenaria*, and *Modiolus modiolus* as determined during the 2024 survey of Sullom Voe.

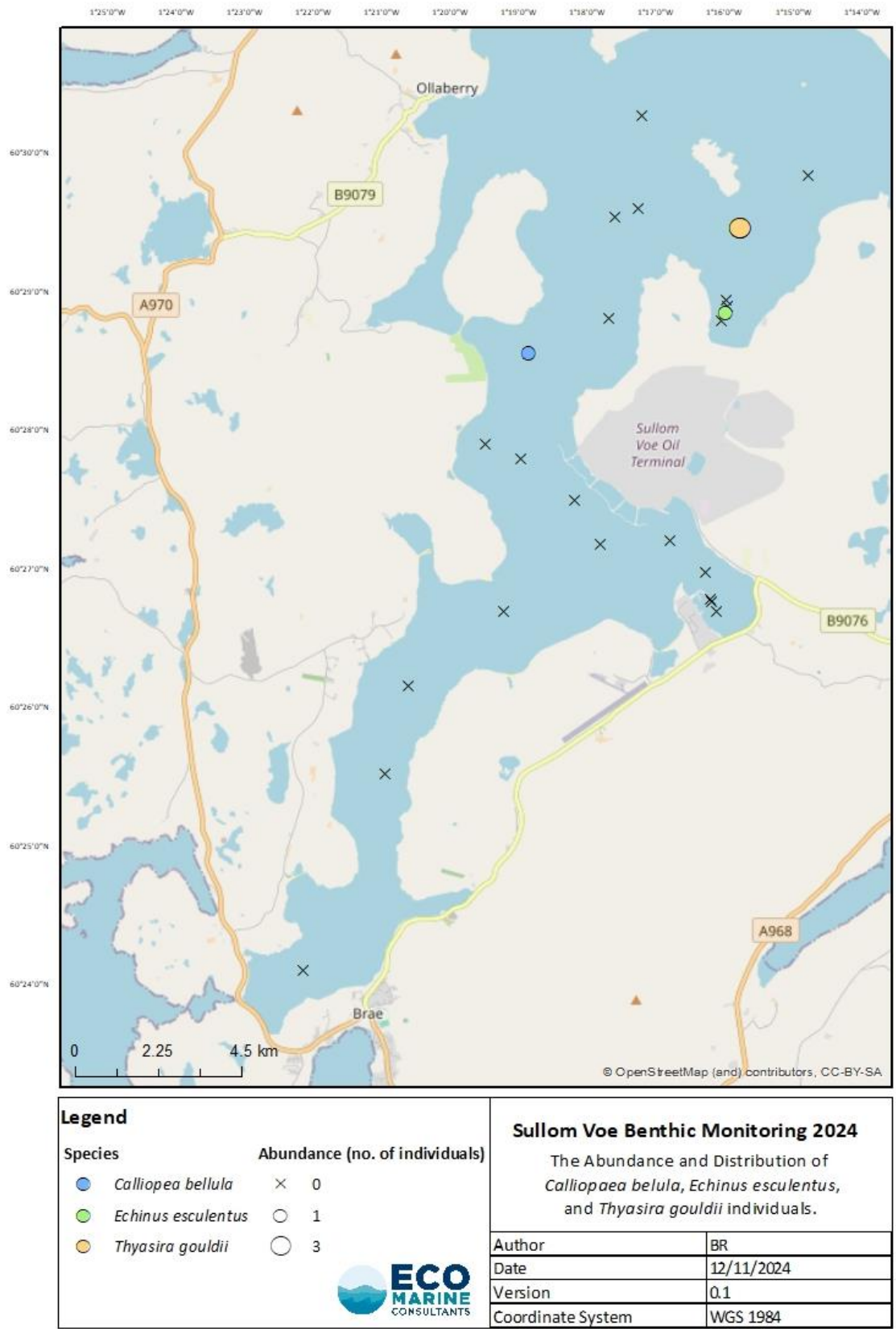


Figure 11. The abundance distribution of the singularly occurring rare and threatened species *Calliopea bellula*, *Echinus esculentus*, and *Thyasira gouldii*, as determined during the 2024 survey of Sullom Voe.

3.1.5. Sediment Distribution

As has been observed in previous years, the sediment composition of Sullom Voe in 2024 was generally dominated by sand and mud although several stations also contained substantial fractions of gravel (Figure 12). To further describe the substrate types recorded across the study area, sediment samples have been categorised according to the Folk classification system (Folk, 1954). The spatial distribution of these Folk classifications is shown in Figure 13.

A total of eight Folk categories were identified during the 2024 survey, a decrease from the 11 categories observed in 2021 and 2018. The categories identified in 2024 were: slightly gravelly muddy Sand ((g)mS), slightly gravelly sandy Mud ((g)sM), gravelly Mud (gM), gravelly muddy Sand (gmS), gravelly Sand (gS), muddy Sand (mS), muddy sandy Gravel (msG), and sandy Gravel (sG). The predominant Folk category recorded in 2024 was gravelly muddy Sand (gmS) which was recorded at nine stations and demonstrates the importance of mixed sediments across Sullom Voe.

In recent years some slight variations in the dominant sediment fractions have been observed across Sullom Voe (Figure 12). The proportion of sand and gravel recorded decreased slightly in 2024 when compared to 2021 and 2018 across the whole of the survey array. Station SV1 saw an increase in proportions of mud between 2018 and 2021; in 2024 values remained consistent with those observed in 2021. Conversely, at Station SV17, located adjacent to the Sullom Voe Oil Terminal, gravel saw a noteworthy increase of 31% between 2021 and 2024 while the proportion of sand and mud both decreased.

Notable changes in sediment composition also occurred in Orka Voe, where each station recorded an increase in the proportion of mud; Stations OV2B, OV3B, and OV4B recorded subsequent decreases in sand and gravel, however, OV5B saw an additional increase in the proportion of sand along with a decrease in gravel. It has been acknowledged that the seabed is highly patchy in this area and much of the substrate is composed of bedrock, boulders, and mixed sediment with pockets of sand and mud. Therefore, changes from year to year may be a result of this patchiness rather than changes in the sediments present.

Stations located within Gluss Voe recorded increases in both mud and sand proportions resulting in a decrease in gravel. However, in keeping with historic records, sediments at Gluss Voe contained a much higher proportion of gravel compared to most other stations in 2024.

Despite some variations in sediment proportions at individual stations, the percentage of sediment fractions in the samples largely remained within the window of natural variability observed over recent survey years.

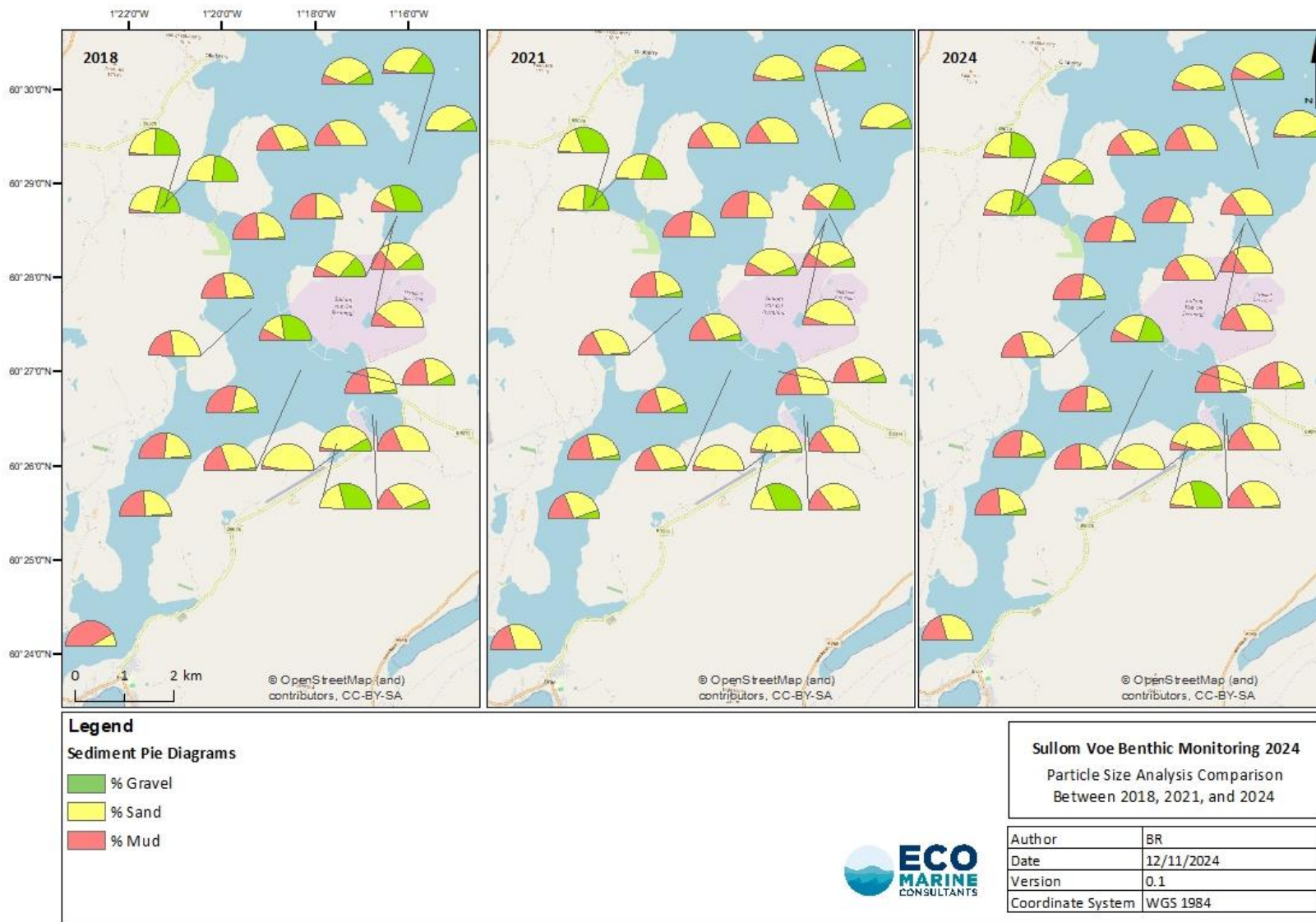
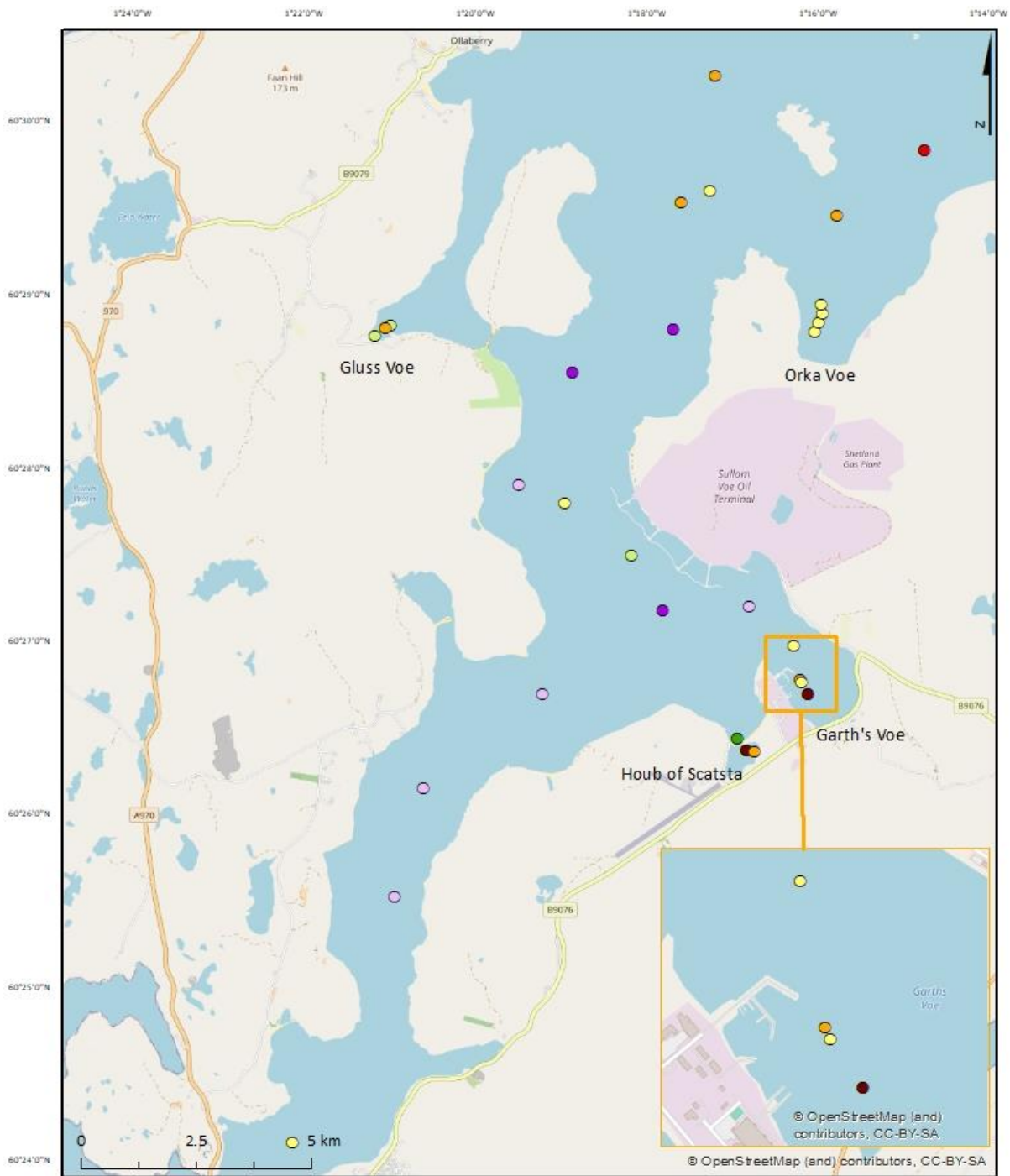


Figure 12. The relative proportions of gravel, sand, and mud as a percentage contribution to sediment in PSA samples collected at Sullom Voe in 2018, 2021, and 2024. Pie diagrams represent approximate locations of sampling stations only.



Legend		Sullom Voe Benthic Monitoring 2024 Folk Classification of Sediments									
Folk Catagory											
● sG	● mS	<table border="1"> <tr> <td>Author</td> <td>BR</td> </tr> <tr> <td>Date</td> <td>12/11/2024</td> </tr> <tr> <td>Version</td> <td>0.1</td> </tr> <tr> <td>Coordinate System</td> <td>WGS 1984</td> </tr> </table>		Author	BR	Date	12/11/2024	Version	0.1	Coordinate System	WGS 1984
Author	BR										
Date	12/11/2024										
Version	0.1										
Coordinate System	WGS 1984										
● msG	● gS										
● (g)sM	● gmS										
● gM	● (g)mS										



Figure 13. Folk classifications of sediment PSA samples collected at Sullom Voe during the 2024 survey.

3.2. Multivariate Data analysis

Multivariate analysis has been used to scrutinise abundance data over time in greater detail. This analysis examines the full faunal community data from comparable stations in each year and uses groupings of samples to identify patterns and differences.

An ANOSIM test carried out on the 2012-2024 abundance data from comparable stations revealed a high degree of overlap between the community composition of Sullom Voe as a whole between all years ($R = 0.304$, significance level = 0.1%). This indicates that although some change has occurred likely due to natural variation in a dynamic environment, the faunal communities present remain similar. This is further illustrated by the MDS in Figure 14 in which abundance datapoints by station between survey years show a substantial degree of overlap, with the exception of a single outlier in each year which was consistently Station SV1.

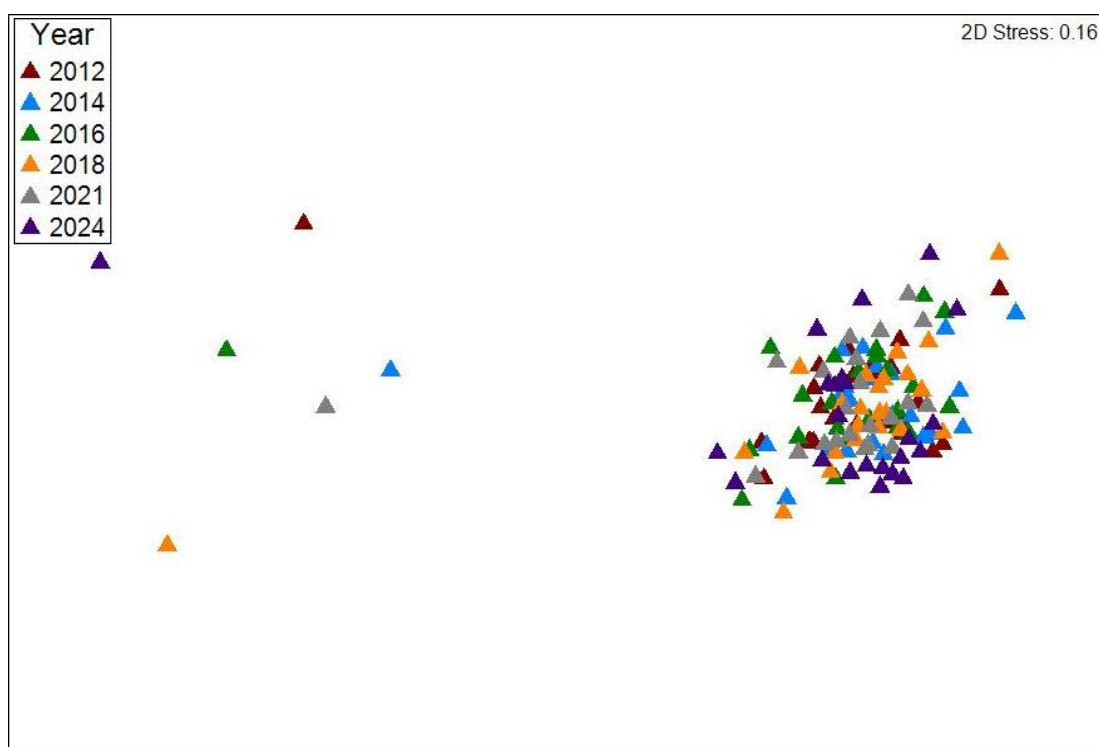


Figure 14. Two-dimensional representation of MDS ordination using 2012-2024 pooled abundance data from Sullom Voe, grouped according to survey year (based on Bray-Curtis similarity, square root transformation).

The results of additional pairwise tests are shown in Table 1, which illustrate that there was a consistently statistically significant moderate to high degree of overlap between datasets from all survey years.

When data from earlier in the monitoring programme was compared to the 2024 dataset, the degree of similarity in faunal communities became reduced. The faunal communities at Sullom Voe in 2024 were most dissimilar to the earlier 2012 and 2014 datasets, as would be expected due to small shifts between years resulting in cumulative larger differences. A SIMPER test revealed that the differences in faunal communities between 2012 and 2024 were largely driven by a reduction in the presence of *Phoronis* spp. and *T. flexuosa* and an increase in *P. fallax* in 2024. Differences between the 2014 and 2024 dataset were largely driven by an increase in *Phoronis* spp. as well as a decrease in the barnacle *B. crenatus* and *T. flexuosa* in 2024. As previously discussed in Section 3.1.3, *B. crenatus* colonies most

commonly form on cobbles and large rocks and as such, the low presence of cobbles in 2024 at stations where *B. crenatus* has previously been recorded in high numbers will have had a considerable bearing on the final count.

Table 1. Outputs of the pairwise ANOSIM test conducted using faunal abundance data from the surveys undertaken at Sullom Voe in 2012, 2014, 2016, 2018, 2021, and 2024 at comparable stations. Please note that significance is taken at the 5% mark ($p = 0.05$). Where R is approaching 1, samples are highly different; where R is approaching 0, samples are highly similar.

Years	R value	Significance level (%)
2012, 2024	0.487	0.1
2014, 2024	0.472	0.1
2016, 2024	0.415	0.1
2018, 2024	0.365	0.1
2021, 2024	0.189	0.1
2012, 2021	0.395	0.1
2014, 2021	0.375	0.1
2016, 2021	0.296	0.1
2018, 2021	0.221	0.1
2012, 2018	0.252	0.1
2014, 2018	0.265	0.1
2016, 2018	0.140	0.1
2012, 2016	0.275	0.1
2014, 2016	0.224	0.1
2012, 2014	0.213	0.1

Two Kruskal-Wallis rank sum tests were additionally conducted in support of the ANOSIM test. The examinations of abundance and diversity revealed that there was no significant difference in abundance or diversity across stations between survey years since 2012 (abundance: chi-squared = 9.50, p-value = 0.09 where $p < 0.05$; diversity = chi-squared = 3.94, p-value = 0.56 where $p < 0.05$).

3.2.1. Faunal Groups Across Sullom Voe and Orka Voe

A SIMPROF routine determined 14 statistically distinct faunal assemblages within the 2024 dataset, and the pattern observed in the corresponding MDS ordination was similar to that seen in previous years. However, SIMPROF groups were considered too numerous and often represented communities at a single station which was deemed unhelpful in producing plots to illustrate the geographic spread of similar communities. As such, a manual cut-off of 40% similarity on a cluster dendrogram run using faunal abundance data was used to create fewer, more meaningful groups. The species composition of each group was identified through a SIMPER analysis. The five faunal groups derived from the 40% cut-off were similar to those identified during previous monitoring and help provide a clearer indication of the geographical distribution of the faunal assemblages. The cluster dendrogram and MDS plot used to define groups is shown in Figures 15 and 16, and a spatial plot of the groups is shown in Figure 17.

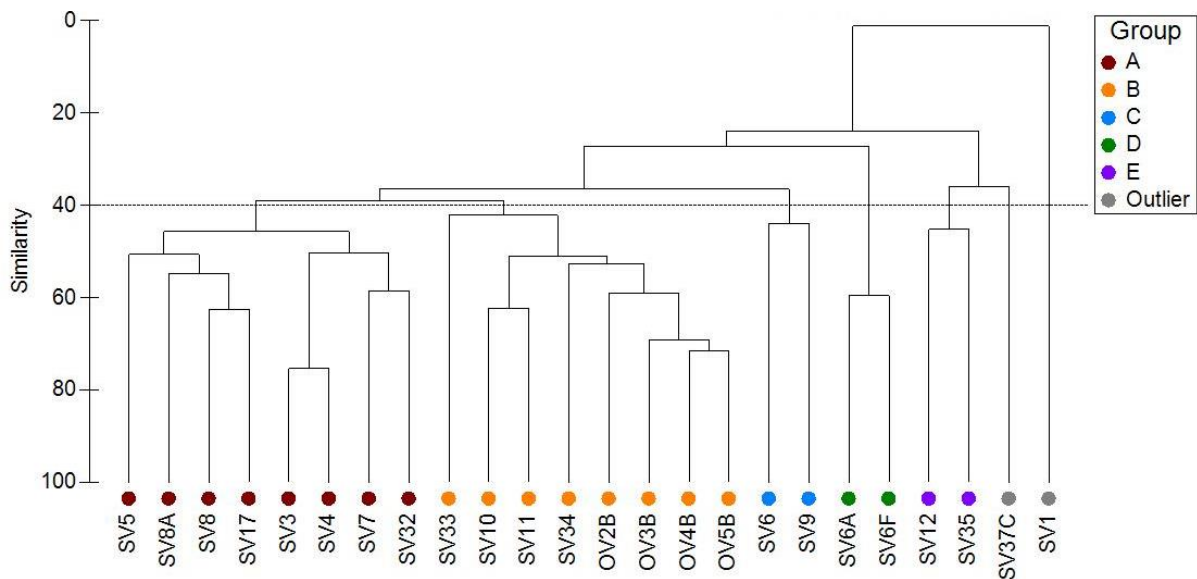


Figure 15. Cluster dendrogram representation of 2024 pooled abundance data from Sullom Voe, grouped according to similarities in faunal communities at a 40% cut-off (based on Bray-Curtis similarity and square root transformation).

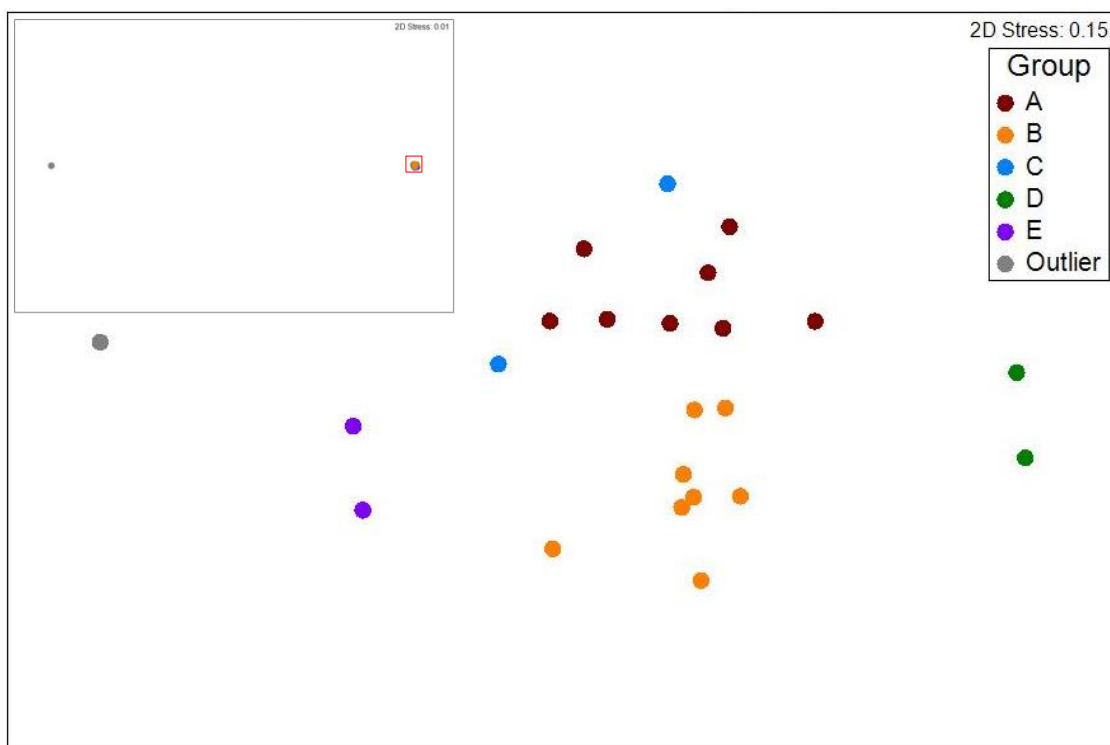
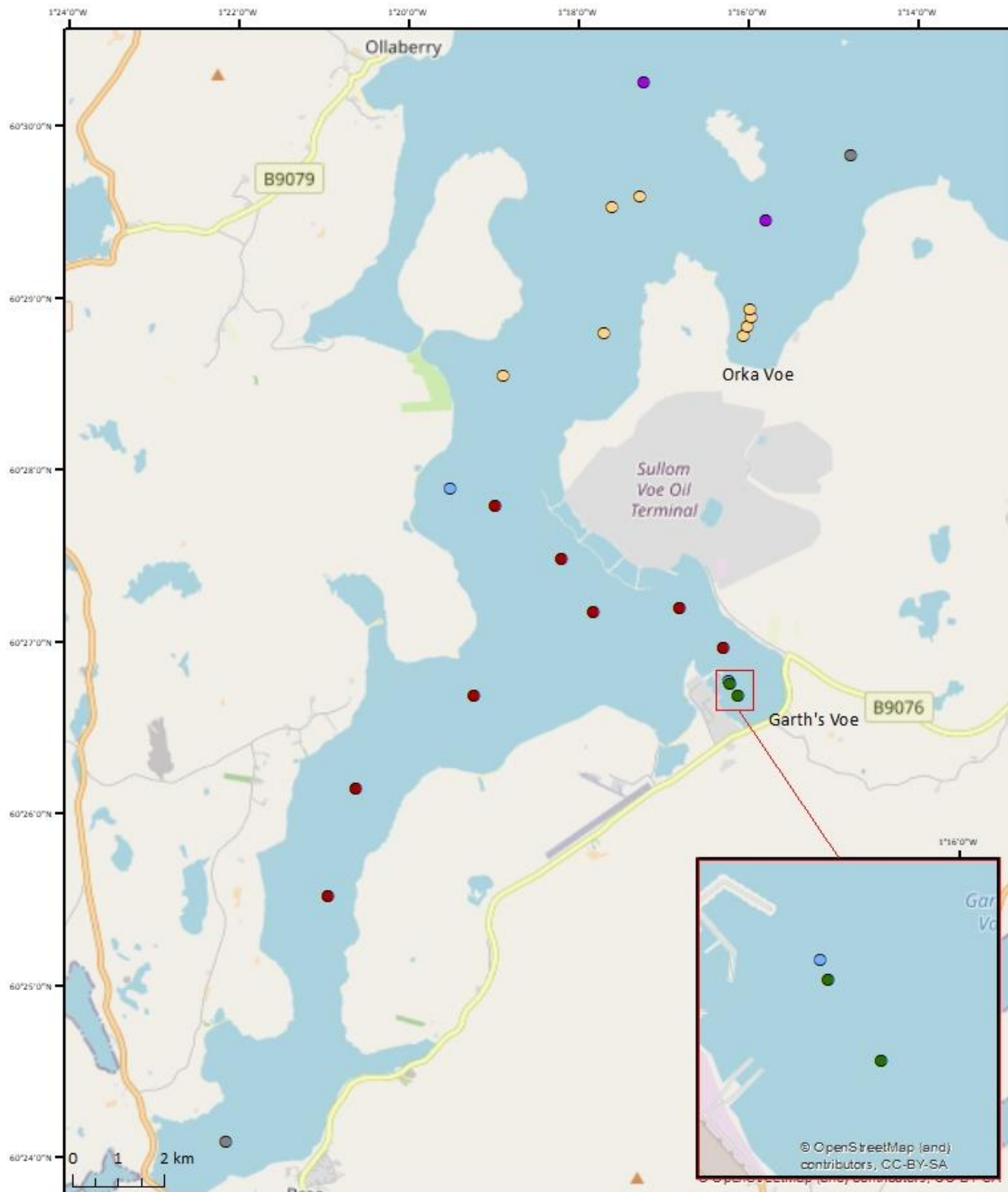


Figure 16. Two-dimensional representation of MDS ordination using 2024 pooled abundance data from Sullom Voe, grouped according to faunal group (based on Bray-Curtis similarity, square root transformation). The main plot shown is a sub-sample, as indicated by the red box on the inset plot, which excludes one outlying station (SV1).




Legend Faunal Group ● A ● B ● C ● D ● E ● Outlier	Sullom Voe Benthic Monitoring 2024 Faunal Group Distribution	
	Author	BR
	Date	12/11/2024
	Version	0.1
	Coordinate System	WGS 1984
		

Figure 17. The distribution of faunal groups identified from samples collected at Sullom Voe in 2024.

Biotope classifications have also been assigned to stations within faunal groups. It should be noted that appropriate biotopes could not be fitted to all stations and for some, more than one biotope appeared to fit though often at differing hierarchical levels. Additionally, none of the biotopes designated represented a perfect description for the biological communities and physical conditions recorded at each station. Rather, they act as good descriptors for better understanding the general habitat types present across stations.

The biotopes that were assigned to the stations in 2024 have been recorded at Sullom Voe in recent years, with the exception of '*Modiolus modiolus* beds on open coast circalittoral mixed sediment' (SS.SBR.SMus.ModMx) and '*Ophiothrix fragilis* and/or *Ophiocolina nigra* brittlestar beds on sublittoral mixed sediment' (SS.SMx.CMx.OphMx). It is noted that presence of *M. modiolus* at certain stations cannot confirm the presence of established beds, though beds are known to exist within the area (MESL, 2016). The OSPAR Commission (2009) define a bed as having 30% coverage or more; it has therefore could be assumed that stations which had moderate to high abundances of *M. modiolus* would meet this criterion. Due to *M. modiolus*' high abundance in 2024 at certain stations and their propensity to modify seabed habitats it was concluded that they should be represented in the biotopes when present. The dominating species present across Sullom Voe have for the most part remained consistent, suggesting that faunal communities on a broad scale have not demonstrated any large degree of change which is reflected in the similarity in several of the faunal groups produced using the SIMPROF routine.

Descriptions of each faunal group identified in the 2024 Sullom Voe faunal data are given below, along with biotope classifications where appropriate.

Faunal Group A – Stations SV3, SV4, SV5, SV7, SV8, SV8A, SV17, and SV32

The average similarity between faunal assemblages at the eight stations encompassed by Faunal Group A was 49.71%. All of these stations were located in the southern main channel and adjacent to the Sullom Voe Oil Terminal and were geographically distinct from the other stations. The samples collected at these sites were dominated by *Phoronis* spp., *P. fallax*, and *T. flexuosa*. Folk sediment classification and biotopes at these sites were characterised by mainly 'gravelly Mud' (gM), as well as 'slightly gravelly sandy Mud' ((g)sM), 'slightly gravelly muddy Sand' ((g)mS), and 'muddy sandy Gravel' (msG), highlighting the prevalence of mixed sediment in this region.

The faunal communities and environmental conditions at the stations in this group are most consistent with those found in the biotope '*Kurtiella bidentata* and *Thyasira* spp. in circalittoral muddy mixed sediment' (SS.SMx.CMx.KurThyMx). The general physical and biological conditions present at the stations in Group A fit this biotope description well, and key species such as the bivalves *T. flexuosa* and *K. bidentata*, the Phoronid *Phoronis* spp., and the annelids *P. fallax* and *Mediomastus fragilis* are present in high abundance. However, it does not account for the high abundance of Sessilia (acorn barnacles) and *T. tricarinata* at a number of stations.

Faunal Group B – Stations SV10, SV11, SV33, SV34, OV2B, OV3B, OV4B, and OV5B

The average similarity between faunal assemblages at the eight stations categorised in Faunal Group B was 52.34%. All stations within Group B were in the deeper central channel to the north of Sullom Voe Oil Terminal and Orka Voe. The faunal assemblages at the stations in Group B were dominated by *T. flexuosa*, *K. bidentata*, and *L. cingulata*. Folk classification and biotopes at these stations were

mainly 'slightly gravelly muddy Sand' ((g)mS), as well as 'slightly gravelly sandy Mud' ((g)sM), and gravelly muddy Sand (gmS).

The faunal communities and environmental conditions at the stations in this group are also most consistent with those found in the biotope '*Kurtiella bidentata* and *Thyasira* spp. in circalittoral muddy mixed sediment' (SS.SMx.CMx.KurThyMx). This biotope was designated for Faunal Group B due to the high presence of key species such as *T. flexuosa*, *K. bidentata* and *P. fallax*. In addition, it is noted in the '*Kurtiella bidentata* and *Thyasira* spp. in circalittoral muddy mixed sediment' biotope description that in some sheltered areas, organic enrichment of this biotope increases the occurrence of species such as *Lumbrineris* spp. in the area. The stations within this faunal group are located within the northern main channel and the sheltered bay of Orka Voe, therefore this description may give reason to the otherwise unaccounted for high abundance of *L. cingulata* at these stations. However, the consistent presence of species such as *T. tricarinata* at each station cannot be accounted for by this biotope.

Faunal Group C – Stations SV6 and SV9

The average similarity between faunal assemblages at the two stations encompassed by Faunal Group C was 43.90%. The stations in Group C were geographically relatively dispersed compared to other groups, with SV6 being located within Garth's Voe and SV9 being within the main channel east of the Sullom Voe Oil Terminal. The faunal communities at the stations in this group were dominated by *T. flexuosa*, *Nematoda*, and *P. fallax* and the sediment classifications were 'gravelly muddy Sand' (gmS) and 'gravelly Mud' (gM).

The species and environmental conditions identified as characteristic of most of the stations in this group were most consistent with those found in the biotopes '*Kurtiella bidentata* and *Thyasira* spp. in circalittoral muddy mixed sediment' (SS.SMx.CMx.KurThyMx) and '*Modiolus modiolus* beds on open coast circalittoral mixed sediment' (SS.SBR.SMus.ModMx). Both stations show high abundances of the key species from the biotope '*Kurtiella bidentata* and *Thyasira* spp. in circalittoral muddy mixed sediment'. In addition, Station SV9 recorded a relatively high abundance of *M. modiolus* in 2024 (Figure 10), which were present in two of the three grabs taken, along with other key taxa of the '*Modiolus modiolus* beds on open coast circalittoral mixed sediment' biotope such as Ascidiacea and Ophiuroidea. However, these biotopes do not account for the elevated presence of the terebellid *Melinna palmata* at Station SV6 (though other terebellid worm species are listed for the biotope), or the annelid *Micromaldane ornithochaeta* at Station SV9.

Faunal Group D – Stations SV6A and SV6F

The average similarity between faunal assemblages at the two stations encompassed by Faunal Group D was 59.59%. Both stations allocated to this faunal group were positioned within Garth's Voe. The faunal assemblages at the stations in Group D were dominated by *T. benedii*, *Nematoda*, and *P. fallax*. Folk classifications at these stations were 'slightly gravelly muddy Sand' ((g)mS), and 'muddy Sand' (mS).

The species and sediments identified as characteristic of most of the stations in this group are most consistent with those found in the biotopes '*Kurtiella bidentata* and *Thyasira* spp. in circalittoral muddy mixed sediment' (SS.SMx.CMx.KurThyMx) and 'Circalittoral muddy sand' (SS.SSa.CMuSa), which are likely present in a mosaic due to the geographical proximity of the stations. A mosaic has been proposed due to the lack of the key species *K. bidentata* and *Thyasira* spp. at Station SV6A. The

finer sediments present at SV6F are thought to have allowed for the presence of key species such as the burrowing bivalves *K. bidentata* and *Thyasira* spp. which were not present at SV6A at which coarser sediments were present.

It is noted in the '*Kurtiella bidentata* and *Thyasira* spp. in circalittoral muddy mixed sediment' biotope description that in some sheltered areas, organic enrichment of this biotope increases the occurrence of species such as *Scoloplos* sp., *Tubificoides* spp., and *M. fragilis*. The stations within this faunal group are situated directly adjacent to a harbour, and so this description may give reason to the otherwise unaccounted for high abundance of *T. benedii*, *M. fragilis*, and *Scoloplos armiger* at these stations. Some low abundance species are not accounted for by these biotope designations, however each of the dominant species appears within the biotope descriptions.

Faunal Group E – Stations SV12 and SV35

The average similarity between faunal assemblages at the two stations encompassed by Faunal Group E was 45.24%. Both stations allocated to this faunal group were in the northern reaches of the array, around Little Roe Island. The faunal assemblages at the stations in Group E were dominated by *L. cingulata*, and the annelids *Polycirrus* spp. and *Chaetozone zetlandica*. Folk classifications at these stations were both 'gravelly muddy Sand' (gmS).

It is thought that the characteristics of this faunal group were most consistent with a mosaic of the biotopes '*Modiolus modiolus* beds on open coast circalittoral mixed sediment' (SS.SBR.SMus.ModMx) and '*Mediomastus fragilis*, *Lumbrineris* spp. and venerid bivalves in circalittoral coarse sand or gravel' (SS.SCS.CCS.MedLumVen). The presence of *M. modiolus* at both stations is a defining feature for the biotope designation of this faunal group. However, due to *M. modiolus* only being present in a single grab from each station, it is thought that a mosaic of the two biotopes is present. The biotope '*Mediomastus fragilis*, *Lumbrineris* spp. and venerid bivalves in circalittoral coarse sand or gravel' was designated due to the matching sediment profile and the dominance of *L. cingulata*, *Polycirrus* spp., and *M. fragilis* across the stations. However, these biotopes did not account for the abundance of the annelid family Apistobanchus and the Tanaidacea *Tanaopsis graciloides* which were present at relatively high abundances.

Outliers – Stations SV1 and SV37

Two stations were identified as outliers which did not group with any other stations. These sites were widely distributed, with SV1 being the most southerly station and SV37 being one of the most northerly stations within the array. Each of these stations was also spatially isolated and abundance was low compared to other stations. Folk classifications were 'slightly gravelly muddy Sand' ((g)mS) at SV1 and 'gravelly Sand' at SV37.

The faunal community at the outlying station SV1 was represented by the biotope '*Lagis koreni* and *Phaxas pellucidus* in circalittoral sandy mud' (SS.SMu.CSaMu.LkorPpel). This biotope was designated due to the dominance of *L. koreni* in the faunal community and the similarity of substrata. However, it does not account for the low abundances of *Capitella* spp., Nematoda, and the terebellid *Amphictene auricoma* present at this station.

The faunal community at the outlying station SV37 was represented by the biotope '*Ophiothrix fragilis* and/or *Ophiocolina nigra* brittlestar beds on sublittoral mixed sediment' (SS.SMx.CMx.OphMx). This biotope was designated due to the substrate description and the presence of *Ophiothrix fragilis* and

Ophiocomina nigra in the sample along with other key species such as *Spirobranchus triqueter* and *Ophiopholis aculeata*. Many other abundant species are not accounted for by this biotope due to the description focus on epifauna rather than infauna. However, it is noted in the biotope description that the underlying sediments also contain a diverse infauna.

3.2.2. Relating Environmental Parameters to Biological Data

To ascertain whether particular environmental variables were influential on biotic community structure at Sullom and Orka Voe, multivariate analyses were conducted using data from stations for which there was a full complement of both biotic and abiotic data (SV1, SV4, SV6, SV6F, SV7, SV17, SV34, and OV5B).

Draftsman’s plot examinations indicated that data for the variables ‘% gravel’, ‘Mean Total Aliphatics’ and ‘Total Naphthalene’s’ were not well distributed statistically. Therefore, these variables were subjected to individual square root transformations which would allow the data to be distributed more evenly and make analysis more accurate. The remainder of the abiotic variables remained untransformed as the data were more evenly distributed.

A BEST procedure was then conducted using the BIOENV routine; the results of which are presented below in Table 2.

Table 2. Results of the BEST tests conducted using Primer for the 2024 Sullom Voe faunal abundance and abiotic data. Note that a Rho value of 1 would indicate that the biotic and abiotic patterns were identical, and a rho of 0 that there is no relation between them.

Number of variables	BEST variable combinations	Rho
1	% Total Organic Content	0.757
2	% Gravel, % Total Organic Content	0.760
3	% Gravel, % Sand, % Total Organic Content	0.762

The BEST results indicate that percentage total organic content (%TOC) was the single abiotic variable which correlated the most with variation in the faunal assemblage patterns (Rho value = 0.757). This is in keeping with the findings from 2018 and 2021, though the Rho value was higher in 2024 than in 2021 which suggests a stronger correlation. However, this single variable alone does not provide a complete match to the ordination of the biotic data. The optimum match between the biotic and abiotic matrices was derived from a subset of three variables, %TOC, percentage gravel, and percentage sand, with a Rho correlation value of 0.762. When the number of variables above this was increased, the value of Rho plateaued, indicating that no greater level of correlation could be achieved by adding further variables to the analysis.

The BIOENV results were then subjected to a significance test which generates a histogram of the null distribution. For the 2024 data, the real value of Rho was 0.762 which lay comfortably to the right of the generated histogram and therefore the null distribution; the null hypothesis could therefore be rejected at a significance level of 3%, implying there is a significant relationship between biotic and abiotic data.

These results largely align with previous years which also showed %TOC and sediment fractions to be some of the key structuring drivers behind biological community patterns. In 2021, percentage sand

and mud rather than gravel were the sediment fractions that had the most apparent effects on the infauna at each station. Particle size has been observed to be variable across recent years, with notable differences in the contribution of gravel to the sediment composition at some stations in 2024. This may account for changes in the most influential environmental parameters between years. The strong correlation between sediment composition and faunal communities is consistent with the extensive range of literature that documents this relationship (e.g. Pearson *et al.*, 1994; Ellingsen, 2002; Cooper *et al.*, 2011). Studies have shown that higher proportions of gravel and high levels of organic detritus are linked to variations in community composition in muddy sand and gravel areas, analogous to those common in the study area (Pearson *et al.*, 1994).

The variation in abiotic factors possibly helps to explain some of the faunal group outliers identified in Section 3.2.1. Station SV1 was the most dissimilar when compared to all other stations based upon its low faunal abundance and unique species composition. It is also the most southerly station and so is geographically isolated. From the abiotic data it can be seen that SV1 has the highest %TOC by a notable margin as well as a high percentage of sand in its composition on average. SV37 was the only other outlier identified; according to the abiotic data %TOC at SV37 was on the lower end of the range recorded across stations in 2024 and it had the highest percentage of sand in its sediment composition which could explain the disparity in the species composition.

4. Conclusions

The overarching aim of this project was to determine any changes in the benthic faunal communities and habitats present at Sullom Voe since monitoring under the current programme commenced in 2002 with a particular focus on trends from 2012 onwards. The following conclusions can be drawn from the 2024 investigation outlined in this report:

- The total abundance of macrobenthic organisms sampled during 2024 increased slightly when compared to the value recorded in the previous survey in 2021, though it remained low in the context of the monitoring programme. Multivariate analysis revealed a high degree of overlap between the community composition of Sullom Voe as a whole between all years surveyed in 2012-2024 and that there was no significant difference in abundance across stations since 2012.
- Mean diversity has decreased slightly with each survey since 2014, a trend that continued in 2024 resulting in the lowest recorded value for the monitoring programme to date. However, due to the reduced variation between years seen in species diversity compared to abundance, the 2024 value was only reduced by a small margin.
- Some of the most commonly encountered and abundant fauna recorded during 2024 were the phoronid *Phoronis* spp., the bivalve *Thyasira flexuosa*, and the annelid *Prionospio fallax*; these species have also regularly been recorded in previous surveys. Statistical testing found that the faunal assemblages sampled in 2024 were in line with the findings of the historical monitoring of Sullom Voe.
- A few protected species were recorded in the 2024 faunal samples, including the OSPAR-listed ocean quahog *Arctica islandica*, the Priority Marine Feature horse mussel *Modiolus modiolus*, and the IUCN Red-listed edible sea urchin *Echinus esculentus*. Additionally, some rare and non-native species were recorded, such as the nationally rare sea slug *Calliopaea bellula* and northern hatchet shell *Thyasira gouldii*, and the alien soft-shell clam *Mya arenaria* (though *M. arenaria* is considered well established across the North Sea and has been for hundreds of years).
- The proportion of sand and gravel decreased while gravel increased slightly in 2024 when compared to 2018 and 2021 across the survey array. However, variability in sediment composition across recent years has been minor and likely reflects the natural variability and spatial patchiness previously observed in the dataset over the duration of the monitoring period.
- SIMPROF statistical analysis found 14 statistically distinct faunal assemblages. However, to provide a clearer indication of the geographical distribution of more general faunal community assemblages, five faunal groups were then identified at a broader level using a 40% similarity cut-off. Faunal communities tended to be geographically assembled highlighting the importance of localised environmental conditions.
- In 2024 the dominant biotope was '*Mysella* [*Kurtiella*] *bidentata* and *Thyasira* spp. in circalittoral muddy mixed sediment', as has been found in previous years. This was due to the considerable abundance of *K. bidentata* and *Thyasira flexuosa* and prevalence of mixed sediments across the survey array. Other biotopes present included '*Lagis koreni* and *Phaxas pellucidus* in circalittoral sandy mud', '*Modiolus modiolus* beds on open coast circalittoral mixed sediment', 'Circalittoral muddy sand', '*Mediomastus fragilis*, *Lumbrineris* spp. and

venerid bivalves in circalittoral coarse sand or gravel' and '*Ophiothrix fragilis* and/or *Ophiocomina nigra* brittlestar beds on sublittoral mixed sediment'. Note that no biotopes were considered a perfect fit for the Sullom Voe faunal dataset.

- Statistical analyses found that the variables which drive faunal community structure and distribution across the survey array in 2024 were related to organic content and sediment fraction proportions. The three abiotic variables giving the best correlation to faunal community structure were % total organic content, % gravel, and % sand. This represented fewer variables than were found in previous surveys but the variables themselves are in keeping historically as sediment composition and organic content have regularly been identified to be influential drivers behind the biological community patterns. The percentage of total organic content proved to be the most correlated with patterns in the faunal dataset when only a single variable was considered.
- Overall, the macrobenthic communities sampled throughout Sullom Voe in 2024 have largely remained characteristic of the assemblages recorded during historical monitoring of the area despite the low diversity recorded on average.

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6. Appendices

Appendix 1 – Summary of field notes and station positions for the 2024 survey of Sullom Voe.

Appendix 2 – Table summarising the abundance of macrofauna identified in samples collected during the 2024 survey of Sullom Voe.

Appendix 3 – Table summarising the faunal abundance and diversity of each sample collected during the 2024 survey of Sullom Voe.

Appendix 4 – Table summarising the biotopes identified at each station during the 2024 survey of Sullom Voe.

Appendix 5 – Table summarising the sediment particle size analysis (PSA) undertaken for samples collected during the 2024 survey of Sullom Voe.

Appendix 6 – Table summarising the percentage of major sediment fractions and Folk categories of PSA samples collected during the 2024 survey of Sullom Voe.

Appendix 1. Summarising the field notes and positions for the stations sampled during the Sullom Voe survey in 2024. Navigational positions are recorded in WGS1984.

Date	Time	Station	Replicate	Depth (m)	Fix	Latitude	Longitude	Weather	Sample Volume (L)	PSA Volume (L)	Folk	Attempts	Bucket Size (L)	Notes
17/06/2024	11:12	SV17	A	27.4	150	60°27.488N	001°18.206W	F1-2	7-8	0.25	G	1	2 x 2.5	
17/06/2024	11:32	SV17	B	28	177	60°27.489N	001°18.179W	F1-2	7-8	0.25	G	1	2 x 2.5	
17/06/2024	11:45	SV17	C	27.6	221	60°27.483N	001°18.174W	F1-2	0	0	N/A	1	N/A	
17/06/2024	11:53	SV17	D	28.2	236	60°27.489N	001°18.176W	F1-2	0	0	N/A	1	N/A	
17/06/2024	12:01	SV17	E	27.5	237	60°27.485N	001°18.185W	F1-2	7-8	0.25	G	1	1 x 2.5	
17/06/2024	13:01	SV35	A	17.8	254	60°29.454N	001°15.799W	F1-2	8-9	0.2	mS	1	1 x 2.5	
17/06/2024	13:10	SV35	B	18.5	266	60°29.445N	001°15.782W	F1-2	8-9	0.2	mS	1	1 x 2.5	
17/06/2024	13:22	SV35	C	18.9	267	60°29.451N	001°15.771W	F1-2	0	0	N/A	1	N/A	Seaweed misfire
17/06/2024	13:29	SV35	D	17.4	268	60°29.453N	001°15.808W	F1-2	0	0	N/A	1	N/A	Seaweed misfire
17/06/2024	13:38	SV35	E	17.2	303	60°29.461N	001°15.813W	F1-2	7-8	0.2	mS	1	1 x 2.5	
17/06/2024	13:59	SV37C	A	36.2	307	60°29.829N	001°14.806W	F2-3	6-7	0.3	S	1	1 x 2.5	
17/06/2024	14:15	SV37C	B	36	316	60°29.829N	001°14.756W	F2-3	0	0	N/A	1	N/A	Brittle star misfire
17/06/2024	14:19	SV37C	C	35.7	317	60°29.833N	001°14.802W	F2-3	0	0	N/A	1	N/A	Stone misfire
17/06/2024	14:27	SV37C	D	35.5	318	60°29.833N	001°14.799W	F2-3	4-5	0.25	S	1	1 x 2.5	
17/06/2024	14:36	SV37C	E	36.1	319	60°29.830N	001°14.780W	F2-3	4-5	0.25	S	1	1 x 1	
17/06/2024	15:11	SV10	A	31.1	320	60°28.540N	001°18.900W	F2-3	8-9	0.3	mS	1	1 x 1	
17/06/2024	15:20	SV10	B	33.8	321	60°28.540N	001°18.845W	F2-3	8-9	0.3	mS	1	1 x 1	
17/06/2024	15:22	SV10	C	31.6	322	60°28.543N	001°18.879W	F2-3	8-9	0.3	mS	1	1 x 1	
17/06/2024	15:41	SV9	A	14.6	323	60°27.892N	001°19.516W	F2-3	8-9	0.3	mS	1	1 x 1	
17/06/2024	15:51	SV9	B	15.4	324	60°27.910N	001°19.489W	F2-3	8-9	0.3	mS	1	1 x 1	
17/06/2024	16:00	SV9	C	15	325	60°27.906N	001°19.504W	F2-3	8-9	0.3	mS	1	1 x 1	
18/06/2024	08:50	SV32	A	11.4	326	60°26.970N	001°16.299W	F3-4	10	0.3	sM	1	1 x 1	
18/06/2024	08:59	SV32	B	11.5	327	60°26.976N	001°16.305W	F3-4	10	0.3	sM	1	1 x 1	
18/06/2024	09:05	SV32	C	11.4	328	60°26.973N	001°16.292W	F3-4	10	0.3	sM	1	1 x 1	
18/06/2024	09:16	SV7	A	19.6	329	60°27.202N	001°16.823W	F3-4	10	0.3	mS	1	1 x 2.5	
18/06/2024	09:26	SV7	B	19.7	330	60°27.205N	001°16.836W	F3-4	10	0.3	mS	1	1 x 2.5	
18/06/2024	09:33	SV7	C	19.8	331	60°27.195N	001°16.833W	F3-4	10	0.3	mS	1	1 x 2.5	
18/06/2024	10:35	OV2B	A	15.1	332	60°28.786N	001°16.048W	F6-7	<5	0	N/A	1	1 x 1	Strong gusts and swell in Orca Voe. Grab swinging. Stopped work. Low Yield.
18/06/2024	11:22	SV8	A	23.4	333	60°27.171N	001°17.829W	F6-7	7-8	0.2	sM	1.0	1 x 2.5	
18/06/2024	11:31	SV8	B	23.3	334	60°27.174N	001°17.813W	F6-7	7-8	0.2	sM	1.0	1 x 2.5	
18/06/2024	11:39	SV8	C	23.3	335	60°27.178N	001°17.837W	F6-7	7-8	0.2	sM	1	1 x 2.5	
18/06/2024	11:57	SV5	A	24.9	336	60°26.692N	001°19.245W	F3-4	9	0.2	sM	1	1 x 2.5	Rain
18/06/2024	12:10	SV5	B	24.8	337	60°26.639N	001°19.250W	F3-4	8-9	0.2	sM	1	1 x 2.5	Rain
18/06/2024	12:17	SV5	C	24.6	338	60°26.696N	001°19.257W	F3-4	8	0.2	sM	1	1 x 2.5	Rain
18/06/2024	13:14	SV4	A	26.5	339	60°25.998N	001°20.608W	F4-5	8	0.3	sM	1	1 x 2.5	
18/06/2024	13:22	SV4	B	27	340	60°26.018N	001°20.620W	F4-5	8	0.3	sM	1	1 x 2.5 + 1 x 1	
18/06/2024	13:30	SV4	C	28.4	341	60°26.014N	001°20.613W	F4-5	8	0.3	sM	1	1 x 2.5	
18/06/2024	13:43	SV3	A	24	343	60°25.521N	001°20.934W	F4-5	9-10	0.3	sM	1	1 x 1	
18/06/2024	13:57	SV3	B	24.1	344	60°25.523N	001°20.950W	F4-5	9-10	0.3	sM	1	1 x 1	
18/06/2024	14:12	SV3	C	23.3	345	60°25.527N	001°20.956W	F4-5	10	0.3	sM	1	1 x 1	
18/06/2024	15:03	SV6	A	7.7	346	60°26.774N	001°16.224W	F4-5	9-10	0.25	M	1	1 x 2.5	
18/06/2024	15:10	SV6	B	9.2	348	60°26.786N	001°16.243W	F4-5	9-10	0.25	M	1	1 x 2.5	
18/06/2024	15:17	SV6	C	7.7	349	60°26.775N	001°16.231W	F4-5	09-Jan	0.25	M	1	1 x 2.5	
18/06/2024	15:25	SV6A	A	6.8	350	60°26.756N	001°16.212W	F4-5	10-Jan	0.25	M	1	1 x 2.5	
18/06/2024	15:33	SV6A	B	6.4	351	60°26.765N	001°16.212W	F4-5	10	0.25	M	1	1 x 2.5	
18/06/2024	15:42	SV6A	C	6.6	352	60°26.761N	001°16.194W	F4-5	10	0.25	M	1	1 x 2.5	
18/06/2024	15:50	SV6F	A	4.7	353	60°26.695N	001°16.124W	F4-5	10	0.25	M	1	1 x 1	
18/06/2024	15:59	SV6F	B	4.6	354	60°26.697N	001°16.116W	F4-5	10	0.25	M	1	1 x 1	
18/06/2024	16:06	SV6F	C	4.8	355	60°26.702N	001°16.122W	F4-5	10	0.25	M	1	1 x 1	
19/06/2024	09:24	SV11	A	39.3	356	60°28.800N	001°17.700W	F4-5	8-9	0.2	gS	1	1 x 1	
19/06/2024	09:34	SV11	B	39.4	357	60°28.777N	001°17.755W	F4-5	9-10	0.2	gS	1	1 x 1	
19/06/2024	09:44	SV11	C	39.6	358	60°28.801N	001°17.701W	F4-5	9-10	0.2	gS	1	1 x 1	
19/06/2024	10:12	OV2B	A	15.3	359	60°28.780N	001°16.058W	F4-5	<5	0.05	gS	N/A	N/A	Low Yield.
19/06/2024	10:18	OV2B	B	15.3	360	60°28.784N	001°16.004W	F4-5	<5	0.05	gS	N/A	N/A	Low Yield.
19/06/2024	10:25	OV2B	C	17.9	361	60°28.776N	001°16.027W	F4-5	4-5	0.2	gS	1	1 x 1	
19/06/2024	10:32	OV2B	D	19.9	363	60°28.773N	001°15.972W	F4-5	4-5	0.2	gS	1	1 x 1	

Date	Time	Station	Replicate	Depth (m)	Fix	Latitude	Longitude	Weather	Sample Volume (L)	PSA Volume (L)	Folk	Attempts	Bucket Size (L)	Notes
19/06/2024	10:41	OV2B	E	20.1	364	60°28.789N	001°15.966W	F4-5	4-5	0.2	gS	1	1 x 1	
19/06/2024	10:49	OV3B	A	21.2	365	60°28.846N	001°15.934W	F5-6	5	0.15	gS	1	1 x 1	
19/06/2024	11:02	OV3B	B	21.1	366	60°28.847N	001°15.931W	F5-6	5	0.15	gS	1	1 x 1	
19/06/2024	11:08	OV3B	C	20.9	367	60°28.934N	001°15.837W	F5-6	5	0.15	gS	1	1 x 1	
19/06/2024	11:45	OV4B	A	21.3	368	60°28.878N	001°15.894W	F5	5	0.15	gS	1	1 x 1	
19/06/2024	11:57	OV4B	B	21.1	369	60°28.878N	001°15.926W	F5	5	0.15	gS	1	1 x 1	
19/06/2024	12:04	OV4B	C	21.3	370	60°28.875N	001°15.912W	F5	5-6	0.15	gS	1	1 x 1	
19/06/2024	11:45	OV5B	A	21.5	371	60°28.930N	001°15.892W	F5-6	5	0.15	sG	1	1 x 1	
19/06/2024	11:57	OV5B	B	20.6	372	60°28.946N	001°15.923W	F5-6	5	0.15	sG	1	1 x 1	
19/06/2024	12:04	OV5B	C	20.9	373	60°28.932N	001°15.917W	F5-6	3-4	0.15	sG	1	1 x 1	Not Collected low yield.
19/06/2024	12:10	OV5B	D	21.1	374	60°28.941N	001°15.901W	F5-6	4-5	0.15	sG	1	1 x 1	
19/06/2024	12:47	SV12	A	51	375	60°30.239N	001°17.181W	F6-7	5	0.2	S	1	1 x 1	Strong gusts and swell - not safe to continue to sample.
19/06/2024	13:26	SV8A	A	26.5	376	60°27.783N	001°18.959W	F6-7	7-8	0.25	sM	1	1 x 1	
19/06/2024	13:35	SV8A	B	26.7	377	60°27.800N	001°18.942W	F6-7	7-8	0.25	sM	1	1 x 1	Winch Cable damaged. Unable to complete sampling.
20/06/2024	10:13	SV1	A	45	378	60°24.094N	001°22.152W	F5-6	10	0.3	M	1	1 x 1	Strong Sulphurous Odour
20/06/2024	10:22	SV1	B	45	380	60°24.094N	001°22.174W	F5-6	10	0.3	M	1	1 x 1	Strong Sulphurous Odour. Not used.
20/06/2024	10:32	SV1	C	46	381	60°24.103N	001°22.158W	F5-6	10	0.3	M	1	1 x 1	Strong Sulphurous Odour
20/06/2024	10:43	SV1	D	45	382	60°24.094N	001°22.174W	F5-6	10	0.3	M	1	1 x 1	Strong Sulphurous Odour
20/06/2024	11:25	SV8A	C	27.4	384	60°27.800N	001°18.952W	F4-5	7-8	0.25	sM	1	1 x 2.5	
20/06/2024	11:56	SV12	B	51.3	385	60°30.254N	001°17.223W	F3-4	0	0	N/A	1	N/A	Misfire stones.
20/06/2024	12:02	SV12	C	50.5	388	60°30.252N	001°17.196W	F3-4	2-4	0	N/A	1	N/A	Low Yield.
20/06/2024	12:10	SV12	D	50.2	389	60°30.259N	001°17.153W	F3-4	2-3	0	N/A	1	N/A	Low Yield.
20/06/2024	12:17	SV12	E	50.4	390	60°30.253N	001°17.277W	F3-4	5	0.15	sG	1	1 x 2.5	
20/06/2024	12:24	SV12	F	51.8	391	60°30.241N	001°17.214W	F3-4	5	0.15	sG	1	1 x 2.5	
20/06/2024	12:40	SV33	A	52.2	392	60°29.527N	001°17.590W	F3-4	5	0.1	mS	1	1 x 1	
20/06/2024	12:49	SV33	B	52.1	393	60°29.525N	001°17.590W	F3-4	5-6	0.1	mS	1	1 x 2.5	
20/06/2024	12:59	SV33	C	52.2	394	60°29.525N	001°17.583W	F3-4	6-7	0.1	mS	1	1 x 2.5	
20/06/2024	13:09	SV34	A	50.8	395	60°29.593N	001°17.301W	F3-4	6-7	0.15	mS	1	1 x 1	
20/06/2024	13:20	SV34	B	50.7	396	60°29.559N	001°17.252W	F3-4	6-7	0.15	mS	1	1 x 1	

Appendix 2. Table containing the full faunal abundance within the samples collected using the Day Grab during the 2024 Sullom Voe survey.

Taxon Name	SV1	SV3	SV4	SV5	SV6	SV6A	SV6F	SV7	SV8	SV8A	SV9	SV10	SV11	SV12	SV17	SV32	SV33	SV34	SV35	SV37C	OV2B	OV3B	OV4B	OV5B
Animalia eggs	0	0	0	3	1	1	1	2	1	1	3	0	0	0	0	1	1	0	1	2	0	0	0	0
Animalia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Folliculinidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	2	0	0	1
Lagotia viridis	0	0	0	2	2	0	0	0	1	1	0	0	0	3	2	1	3	0	3	3	0	0	0	0
Astrorhizidae	0	0	0	1	0	0	0	0	5	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0
Porifera	0	0	0	1	0	0	0	1	1	0	0	1	0	0	1	1	0	0	3	1	1	0	0	0
Cliona	0	0	0	1	0	1	0	1	2	0	0	0	0	2	3	0	3	0	1	3	0	0	0	0
Alcyonium digitatum	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0
Leuckartiara octona	0	3	3	0	0	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	1	0	1	0
Euphysa aurata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	3
Lucernaria quadricornis	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Anthoathecata	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eudendrium	0	0	0	0	0	0	0	0	1	0	0	0	0	3	0	0	2	0	1	1	0	0	0	0
Halecium	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0
Hydractinia	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Pedicellina	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	1
Bougainvilliidae	0	0	0	2	0	0	0	3	0	1	1	0	0	1	0	3	1	0	0	0	0	0	0	0
Sertulariidae	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Abietinaria abietina	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	2	0	0	0	0
Plumulariidae	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Kirchenpaueria pinnata	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0
Nemertesia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Nemertesia ramosa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Campanulariidae	0	0	0	1	0	0	0	0	0	0	0	0	0	3	0	0	2	0	1	2	0	0	0	0
Rhizocaulus verticillatus	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0
Virgularia mirabilis	0	1	2	1	0	0	0	8	1	4	1	14	8	0	3	16	0	1	0	0	2	6	7	8
Synarachnactis lloydii	0	1	1	1	0	0	0	0	2	2	0	0	0	0	3	0	0	0	1	0	0	0	0	0
Actiniaria	0	0	0	0	0	0	0	0	0	0	0	2	0	0	1	0	0	0	0	0	3	2	0	0
Calliactis palliata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Peachia cylindrica	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Edwardsiidae	0	8	8	35	9	1	0	5	30	32	13	11	2	3	15	1	2	0	8	0	2	19	25	15
Caryophyllia smithii	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Platyhelminthes	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nemertea	0	59	41	32	33	34	10	13	48	20	43	19	32	11	41	14	9	5	18	4	11	3	5	6
Cerebratulus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0
Nematoda	1	0	1	4	60	136	196	5	5	0	119	2	4	5	20	9	8	0	1	11	1	0	1	3
Priapulus caudatus	0	0	0	0	1	0	0	0	1	0	0	2	0	0	0	0	0	0	0	0	2	0	0	0
Loxosomella	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	0

Taxon Name	SV1	SV3	SV4	SV5	SV6	SV6A	SV6F	SV7	SV8	SV8A	SV9	SV10	SV11	SV12	SV17	SV32	SV33	SV34	SV35	SV37C	OV2B	OV3B	OV4B	OV5B
Barentsia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Chaetognatha	0	0	0	0	1	0	0	0	1	0	1	0	0	1	2	0	0	0	0	0	0	0	0	0
Sipuncula juv	0	0	0	1	0	0	0	0	1	0	6	0	0	0	5	0	1	0	1	0	0	0	0	0
Golfingia vulgaris	0	0	0	2	1	0	0	0	0	0	0	0	0	0	2	0	0	0	1	0	0	0	0	0
Golfingia elongata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Nephasoma minutum	0	0	0	0	0	0	0	0	3	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0
Phascolion strombus	0	72	47	115	6	1	0	17	45	29	0	36	29	0	4	5	0	0	1	0	0	2	1	0
Onchnesoma steenstrupii	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Aspidosiphon muelleri	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0
Aphroditidae juv	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	2	0	0
Aphrodita aculeata	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Polynoidae	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0
Gattyana cirrhosa	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0
Harmothoe	0	0	0	1	3	0	0	0	0	0	1	0	2	1	1	0	5	0	2	0	1	0	0	0
Harmothoe glabra	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	3	3
Harmothoe imbricata	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Harmothoe impar	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	4	0	0	0
Harmothoe antilopes	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Malmgrenia juv	0	0	0	0	2	0	0	0	0	0	0	0	0	1	1	0	0	0	1	0	0	0	0	0
Malmgrenia arenicolae	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	1	0	0	0	0
Malmgrenia darbouxi	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Pholoe baltica (sensu Petersen)	0	0	0	2	1	2	2	2	2	0	3	1	3	1	2	2	0	6	11	0	8	2	7	4
Pholoe inornata (sensu Petersen)	0	0	2	4	12	1	0	1	6	2	7	2	4	5	3	0	3	0	1	0	0	0	1	0
Sigalionidae juv	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	4	4	3	1
Sthenelais limicola	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	2	3	0	1
Eteone longa agg	0	0	1	0	10	1	1	0	0	5	4	0	0	0	0	0	0	0	0	0	3	3	0	0
Hypereteone foliosa	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pseudomystides limbata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0
Pseudomystides spinachia	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0
Phyllodoce groenlandica	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Phyllodoce mucosa	0	0	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	1	0	0
Phyllodoce rosea	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0
Phyllodoce longipes	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0
Eulalia mustela	0	0	0	0	0	0	0	0	0	0	2	0	0	1	0	0	0	0	1	2	0	0	0	0
Eumida	0	1	0	0	0	0	0	0	0	0	0	0	0	0	3	0	2	0	0	2	0	0	0	0
Eumida bahusiensis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	0	0	2	1	3	1
Eumida sanguinea agg	0	0	0	3	2	0	0	1	2	2	0	1	1	8	2	0	7	6	4	1	0	1	0	0
Pisione remota	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0
Hesionura elongata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Glycera juv	0	0	0	0	0	3	0	7	1	2	2	0	0	8	6	0	4	0	1	6	0	0	0	0
Glycera alba	0	7	10	2	5	0	4	1	13	7	8	6	0	6	3	4	9	1	6	0	6	2	1	3

Taxon Name	SV1	SV3	SV4	SV5	SV6	SV6A	SV6F	SV7	SV8	SV8A	SV9	SV10	SV11	SV12	SV17	SV32	SV33	SV34	SV35	SV37C	OV2B	OV3B	OV4B	OV5B
Nothria conchylega	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Notocirrus scoticus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	1	0	0	0	0	0	0
Lumbrineris cingulata agg	0	3	4	16	15	0	3	19	29	58	49	91	80	225	106	5	189	77	52	1	114	34	66	104
Abyssoninoe hibernica	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Ophryotrocha	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	1	0	0	0	1	0	0	0
Parougia caeca	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0
Schistomeringos neglecta	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0
Drilonereis filum	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Dorvillea erucaeformis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Protodorvillea kefersteini	0	0	0	0	2	0	0	0	0	0	0	0	0	0	1	0	0	0	1	3	0	0	0	0
Scoloplos armiger	0	1	1	1	14	44	10	0	0	0	0	0	0	0	0	18	0	0	11	0	12	1	0	0
Aricidea cerrutii	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Aricidea wassi	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Aricidea minuta	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Aricidea catherinae	0	0	0	0	0	0	0	0	0	0	0	2	0	2	0	0	0	0	1	0	2	1	0	0
Levinsenia gracilis	0	0	0	3	0	0	0	0	1	7	4	11	8	0	1	0	0	0	0	0	3	2	0	0
Paraonis fulgens	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0
Paradoneis eliasoni	0	0	1	0	0	0	0	0	0	0	0	0	8	0	0	0	0	0	0	0	0	0	0	0
Paradoneis lyra	0	16	24	23	0	0	0	3	110	15	36	14	16	9	214	20	10	4	7	0	4	6	9	20
Paradoneis andreae	0	0	0	0	11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Apistobranthus	0	0	0	0	5	1	0	0	0	0	0	2	2	4	0	0	5	2	34	0	4	6	11	16
Poecilochaetus serpens	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	1	2
Spionidae larvae	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Aonides paucibranchiata	0	0	0	0	1	0	0	0	0	0	4	0	0	1	8	0	0	1	10	5	0	0	0	0
Laonice bahusiensis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Laonice irinae	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	1	0	0	0	0	0	0	0
Malacoceros	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Polydora #1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dipolydora coeca agg	0	0	5	0	0	0	0	0	0	0	0	0	1	0	1	0	0	1	0	0	1	0	0	0
Dipolydora caulleryi	0	0	0	1	20	1	0	0	0	1	3	0	0	1	6	0	0	0	0	2	0	1	0	0
Dipolydora flava	0	0	0	3	2	0	0	2	13	15	5	0	0	2	7	0	1	1	1	4	0	2	1	4
Prionospio cirrifera	0	0	0	0	0	0	1	0	7	0	3	2	17	0	2	0	1	0	0	0	0	1	1	1
Prionospio fallax	0	873	461	31	115	32	18	249	122	408	59	159	71	5	65	231	11	18	0	0	11	45	47	51
Aurospio banyulensis	0	0	0	0	0	0	0	0	2	0	6	0	0	1	6	0	0	0	4	2	0	0	3	0
Pseudopolydora nordica	0	0	0	0	2	0	0	0	0	0	13	1	0	0	32	1	2	0	0	0	1	0	0	0
Pseudopolydora paucibranchiata	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pseudopolydora pulchra	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	2	2	1	0	3	1	0	0
Scoelepis korsuni	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	3	1	0	0	0	0
Scoelepis tridentata	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Pygospio elegans	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Spio armata	0	0	0	0	5	0	0	0	0	0	1	0	0	0	1	0	0	0	0	2	0	0	0	0

Taxon Name	SV1	SV3	SV4	SV5	SV6	SV6A	SV6F	SV7	SV8	SV8A	SV9	SV10	SV11	SV12	SV17	SV32	SV33	SV34	SV35	SV37C	OV2B	OV3B	OV4B	OV5B
<i>Spio decorata</i>	0	0	1	0	9	0	2	0	0	0	6	0	0	0	1	1	0	0	5	0	0	0	0	0
<i>Spio symphyta</i>	0	0	0	1	4	1	1	0	2	1	1	0	0	9	6	2	3	3	6	0	5	10	8	6
<i>Spio martinensis</i>	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<i>Spiophanes bombyx</i>	0	0	0	0	0	0	0	0	0	0	0	0	2	2	0	0	4	2	0	0	3	3	4	7
<i>Spiophanes kroyeri</i>	0	0	0	0	0	0	0	0	0	0	1	1	4	2	0	0	11	3	2	0	1	4	2	2
<i>Magelona alleni</i>	0	14	18	6	1	0	0	1	37	18	0	5	1	1	8	0	6	1	1	0	2	2	5	6
<i>Aphelochaeta (Type A)</i>	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<i>Caulleriella alata</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0
<i>Chaetozone christiei</i>	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<i>Chaetozone setosa</i>	0	17	10	9	32	1	5	4	0	4	1	2	0	1	0	6	6	4	0	0	2	6	4	6
<i>Chaetozone zetlandica</i>	0	0	1	0	2	1	0	0	1	0	0	0	0	13	0	0	2	0	29	0	0	0	0	0
<i>Cirratulus juv</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0	0	2	0	1	0	0	0	0	0
<i>Cirratulus caudatus</i>	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	4	0	0	1	2	1	3
<i>Cirriformia juv</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	1
<i>Cirriformia tentaculata</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
<i>Dodecaceria</i>	0	2	3	0	0	0	0	0	2	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0
<i>Tharyx killariensis</i>	0	0	0	4	2	0	1	0	4	0	1	1	0	0	2	0	2	2	1	0	5	0	0	0
<i>Diplocirrus glaucus</i>	0	0	0	1	0	0	0	0	1	0	0	0	6	0	0	1	10	5	1	0	5	14	14	12
<i>Pherusa plumosa</i>	0	1	0	8	8	0	0	0	0	1	8	0	0	0	1	0	0	0	0	0	0	0	0	0
<i>Macrochaeta</i>	0	0	3	2	0	0	2	0	0	0	10	0	0	0	1	1	0	0	1	0	0	0	0	0
<i>Capitella</i>	6	0	0	0	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0	0	0
<i>Mediomastus fragilis</i>	0	92	49	31	154	18	26	9	3	0	36	4	4	2	4	9	4	0	35	0	13	2	1	3
<i>Notomastus</i>	0	6	7	3	21	5	9	9	4	1	13	9	5	36	22	13	65	15	10	9	9	4	10	7
<i>Microclymene tricirrata</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	0	0	6	0	2	7
<i>Leiochone</i>	0	0	0	0	2	0	0	0	0	0	7	0	1	0	1	0	3	0	5	0	0	0	0	0
<i>Euclymene lombricoides</i>	0	0	0	0	0	0	0	0	0	0	1	0	2	1	2	0	0	0	0	0	0	2	1	1
<i>Euclymene oerstedii</i>	0	0	0	0	0	0	0	0	0	0	2	0	0	0	2	0	11	0	27	0	0	0	0	0
<i>Euclymene (Type A)</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	2
<i>Praxillella affinis</i>	0	0	0	0	0	0	0	0	0	0	4	0	1	0	0	0	8	5	0	0	1	0	3	0
<i>Rhodine gracilior</i>	0	0	0	9	7	0	0	22	1	0	0	0	0	0	9	2	4	2	0	0	11	0	0	0
<i>Peresiella clymenoides</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	1	0	0
<i>Micromaldane ornithochaeta</i>	0	0	0	0	0	0	0	0	0	0	35	0	0	0	0	0	1	0	0	0	0	0	0	0
<i>Ophelina acuminata</i>	0	2	0	1	2	0	0	0	0	0	0	0	0	0	0	3	0	0	1	0	0	0	0	0
<i>Scalibregma celticum</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	5	1	0	0	0	0
<i>Scalibregma inflatum</i>	0	0	1	3	9	6	6	0	6	3	14	11	0	13	1	8	0	0	16	1	10	6	6	6
<i>Galathowenia oculata</i>	0	6	7	17	48	32	6	24	25	36	1	13	17	0	33	13	2	11	0	0	48	28	32	14
<i>Myriochele</i>	0	1	2	0	1	0	0	0	1	63	0	0	0	0	8	0	1	0	0	0	0	0	0	0
<i>Owenia</i>	0	5	11	17	5	0	0	8	83	302	7	8	48	5	62	3	25	11	2	1	7	8	12	5
<i>Polygordius</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	2	0	0	0	0
<i>Pectinariidae juv</i>	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<i>Amphictene auricoma</i>	1	1	1	0	0	0	0	0	0	0	0	0	0	0	2	0	2	0	0	0	0	0	0	0

Taxon Name	SV1	SV3	SV4	SV5	SV6	SV6A	SV6F	SV7	SV8	SV8A	SV9	SV10	SV11	SV12	SV17	SV32	SV33	SV34	SV35	SV37C	OV2B	OV3B	OV4B	OV5B
Lagis koreni	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0
Melinna palmata	0	6	4	1	65	5	0	31	0	2	0	3	0	0	3	40	0	0	0	0	4	2	1	0
Ampharete lindstroemi	0	0	0	0	17	0	0	0	0	0	1	0	1	0	2	1	4	0	0	0	0	0	0	0
Ampharete falcata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Anobothrus gracilis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	1	0	0	0	0	0
Sosane sulcata	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Terebellides	0	7	8	2	10	1	0	18	13	3	24	8	19	0	8	1	3	3	0	0	18	7	6	3
Trichobranchus	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Trichobranchus roseus	0	0	0	1	0	0	0	4	0	0	0	1	7	0	0	1	1	0	0	0	0	0	1	0
Terebellidae juv	0	0	0	3	3	0	0	0	0	0	0	0	0	1	3	0	0	0	0	1	0	0	0	0
Eupolymnia nesidensis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Lanice conchilega	0	0	0	1	0	0	0	0	1	1	0	0	0	0	9	0	0	1	0	2	0	2	0	0
Pista	0	0	0	0	1	0	0	0	6	0	0	0	0	0	3	0	0	0	1	0	0	0	0	0
Pista mirabilis	0	0	0	0	1	0	0	1	0	0	0	0	0	0	3	0	0	0	2	3	0	0	0	0
Pista mediterranea	0	1	1	2	0	0	0	0	10	1	0	0	1	0	0	0	0	0	0	0	2	0	1	0
Amphitritides gracilis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Parathelepus collaris	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0
Thelepus setosus	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Amaeana trilobata	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lysilla loveni	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1
Polycirrus	0	0	2	4	0	0	0	1	2	3	1	9	28	53	21	0	32	8	51	3	1	1	3	1
Streblosoma intestinale	0	0	0	0	0	0	0	0	0	1	0	0	0	0	3	0	6	3	0	0	0	0	0	0
Sabellidae	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0
Parasabella cambrensis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Sabella pavonina	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Chone duneri	0	0	0	0	5	1	0	0	0	1	0	0	5	1	0	0	0	0	0	3	0	0	0	0
Dialychone dunerificta	0	0	0	0	0	0	0	0	0	0	10	0	0	0	0	1	0	3	18	14	0	2	1	7
Dialychone collaris	0	0	0	0	0	0	0	1	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Chone kroyerii	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0
Chone filicaudata	0	0	0	0	1	0	0	0	0	0	10	0	0	2	2	0	0	0	1	0	0	0	0	0
Euchone anceps	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0
Euchone pararosea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0
Jasmineira	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	2	0	0
Jasmineira elegans	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Jasmineira caudata	0	0	0	0	0	0	0	0	4	2	4	0	1	2	6	0	0	0	6	2	1	0	1	6
Serpulidae	0	0	0	2	0	0	0	0	1	0	0	0	0	9	2	0	0	0	3	20	0	0	0	0
Hydroides norvegica	0	0	0	4	0	0	0	0	3	0	0	0	0	18	5	0	4	0	11	9	2	0	0	0
Spirobranchus	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Spirobranchus lamarcki	0	0	0	29	3	0	0	0	10	0	0	0	0	1	2	2	0	0	5	2	2	0	0	0
Spirobranchus triqueter	0	0	0	7	0	0	0	0	0	0	0	0	0	0	2	0	0	0	32	26	0	0	0	0
Serpula vermicularis	0	0	0	0	0	0	0	0	0	0	0	0	0	7	2	0	0	0	0	2	0	0	0	0

Taxon Name	SV1	SV3	SV4	SV5	SV6	SV6A	SV6F	SV7	SV8	SV8A	SV9	SV10	SV11	SV12	SV17	SV32	SV33	SV34	SV35	SV37C	OV2B	OV3B	OV4B	OV5B
Ampelisca diadema	0	1	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	1	0	0	1
Ampelisca spinipes	0	1	0	0	0	0	0	0	0	0	1	0	0	1	14	0	0	0	5	4	0	0	0	0
Ampelisca tenuicornis	0	0	0	2	3	12	19	2	5	4	0	2	0	1	12	4	27	9	12	0	13	33	28	26
Ampelisca typica	0	0	0	0	0	0	1	0	0	0	2	0	0	0	1	0	0	0	0	0	0	0	0	0
Cheirocratus female	0	0	2	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	4	0	0	0
Cheirocratus robustus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Cheirocratus intermedius	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Othomaera othonis	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	2	0	0	2	0	0	0	0
Melita palmata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Animoceradocus semiserratus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0
Gammaropsis nitida	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0
Megamphopus cornutus	0	0	0	0	0	0	0	0	0	0	2	0	0	1	0	0	0	0	0	0	1	0	0	0
Photis longicaudata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	13	0	2	0	0	4	0	3
Aoridae female	0	0	1	0	4	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Leptocheirus hirsutimanus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	4	0	0	0	0
Leptocheirus pectinatus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	3	3
Corophiidae	0	0	0	0	18	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Crassicorophium crassicorne	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Caprella	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Pariambus typicus	0	0	0	0	0	2	1	0	0	0	0	1	0	0	0	0	0	0	1	0	2	3	0	7
Phtisica marina	0	0	0	0	0	0	0	0	0	0	2	1	0	0	0	0	31	7	0	0	0	0	0	0
Pseudoprotella phasma	0	0	0	47	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Isopoda	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Limnoria lignorum	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eurydice pulchra	0	0	0	0	0	0	0	0	0	1	0	0	0	0	3	0	0	0	0	1	0	0	0	0
Gnathiidae juv/female	0	0	0	0	0	1	0	2	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Gnathia oxyuraea	0	0	0	0	0	0	0	1	0	2	0	1	1	0	0	0	0	0	0	0	0	0	0	0
Astacilla longicornis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Araphura brevimanus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	3
Akanthophoreus gracilis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1
Pseudoparatanais batei	0	0	0	0	0	0	0	0	0	0	15	0	0	0	0	0	0	0	1	0	0	0	0	0
Tanaopsis graciloides	0	3	4	20	32	0	0	15	27	11	27	3	7	1	6	6	4	12	16	0	32	9	12	21
Vaunthompsonia cristata	0	0	0	0	1	0	0	0	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0
Iphinoe serrata	0	0	0	0	0	0	0	0	1	6	0	4	22	0	2	0	3	3	0	0	1	2	0	1
Eudorella truncatula	0	0	1	0	2	0	0	5	1	3	1	2	2	0	0	3	0	0	0	0	3	0	4	10
Diastylis laevis	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Diastylis rugosa	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0
Diastylis tumida	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Nannastacus unguiculatus	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Campylaspis legendrei	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Caridea	0	0	0	2	1	0	0	0	4	0	3	0	0	0	0	0	0	0	2	0	0	0	0	0

Taxon Name	SV1	SV3	SV4	SV5	SV6	SV6A	SV6F	SV7	SV8	SV8A	SV9	SV10	SV11	SV12	SV17	SV32	SV33	SV34	SV35	SV37C	OV2B	OV3B	OV4B	OV5B
Caridea juv	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Hippolytidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	1	0	0	0	0
Eualus cranchii	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Crangonidae	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Crangon crangon	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pandalus montagui	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Philocheras bispinosus	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Paguridae juv	0	0	0	2	0	0	0	2	1	3	0	0	0	0	0	0	4	0	0	0	2	0	0	1
Pagurus bernhardus	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pagurus cuanensis	0	0	1	8	1	0	0	0	1	12	0	0	0	0	1	2	0	0	0	0	0	0	1	0
Pagurus forbesii	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pagurus prideaux	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Anapagurus chiroacanthus	0	1	1	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Anapagurus hyndmanni	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Galatheidae juv	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	1	0	0
Galathea nexa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Galathea intermedia	0	0	0	2	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	2	0	0	0
Pisidia longicornis	0	0	0	0	18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Macropodia	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Brachyura juv	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1
Polybiidae juv	0	0	0	0	3	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	1	0	0	0
Polybius pusillus	0	0	0	1	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Polybius depurator	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Atelecyclus rotundatus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Chaetoderma nitidulum	0	0	0	0	0	0	0	0	2	2	0	3	1	0	1	0	1	0	0	0	0	0	1	1
Leptochiton asellus	0	0	0	15	2	0	0	1	12	0	0	0	0	4	30	0	2	0	15	8	1	0	0	0
Callochiton septemvalvis	0	2	11	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Acanthochitona crinita	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Gastropoda	0	1	0	1	0	0	0	1	1	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0
Lottiidae juv	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0
Neogastropoda	0	0	0	0	2	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0
Littorina juv	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Steromphala tumida	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0
Steromphala umbilicalis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0
Steromphala cineraria	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Turritellinella tricarinata	0	26	19	35	0	0	0	159	47	7	1	123	70	1	7	17	3	2	1	0	3	8	11	13
Lacuninae juv	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	7	0	0	0	0	0
Hyalia vitrea	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rissoa parva	0	0	0	0	4	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Pusillina sarsii	0	0	0	0	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Alvania punctura	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0

Taxon Name	SV1	SV3	SV4	SV5	SV6	SV6A	SV6F	SV7	SV8	SV8A	SV9	SV10	SV11	SV12	SV17	SV32	SV33	SV34	SV35	SV37C	OV2B	OV3B	OV4B	OV5B
Fabulina fabula	0	0	0	0	2	0	0	0	0	2	0	1	0	0	0	0	0	0	1	0	6	2	2	3
Moerella donacina	0	0	0	0	0	0	0	0	0	0	7	0	0	0	0	0	0	0	0	0	0	0	0	0
Asbjornsenia pygmaea	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	4	0	0	0	0
Gari juv	0	0	1	0	0	0	0	0	2	0	2	0	0	2	0	0	0	0	1	1	0	0	0	0
Gari tellinella	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0
Gari fervensis	0	0	0	0	0	0	0	0	0	1	0	2	0	1	0	0	0	2	1	0	0	1	0	1
Abra juv	0	0	0	0	1	0	1	6	0	0	0	0	0	0	0	1	2	0	0	0	0	0	0	0
Abra alba	0	0	0	2	16	0	0	1	0	0	1	0	0	0	1	3	0	0	0	0	0	0	0	0
Abra nitida	0	0	1	0	0	2	2	1	0	2	0	3	1	0	0	1	0	1	0	0	9	14	8	2
Abra prismatica	0	0	0	0	0	1	5	0	0	0	0	0	0	0	0	0	1	0	0	0	1	2	2	11
Arctica islandica juv	0	0	0	0	0	0	0	0	0	1	0	0	0	2	0	0	1	0	0	0	0	0	0	1
Arctica islandica	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Veneridae juv	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0
Venus casina	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Clausinella fasciata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	2	5	0	0	0	0
Chamelea striatula	0	9	17	1	5	3	2	13	2	6	0	3	1	0	1	11	1	3	0	0	8	11	6	5
Timoclea ovata	0	0	2	4	1	1	0	0	7	0	1	0	0	0	12	0	0	0	3	0	0	2	0	0
Politapes rhomboides	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11	0	0	0	0	0
Dosinia juv	0	0	0	0	0	0	0	0	5	0	1	0	0	5	9	0	1	4	12	0	1	7	11	7
Dosinia exoleta	0	2	1	1	0	0	0	0	2	4	1	0	5	0	10	0	7	3	7	0	0	0	2	0
Mysia undata	0	0	0	1	0	0	0	0	1	1	0	1	3	0	0	0	1	2	0	0	1	1	2	0
Myidae juv	0	0	0	0	4	0	0	0	0	0	1	0	0	0	1	0	0	0	1	0	0	0	0	0
Mya arenaria	0	0	0	2	3	0	0	1	0	0	2	0	0	0	0	0	0	0	1	0	0	0	1	1
Mya truncata	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Varicorbula gibba	0	7	8	2	0	0	0	4	1	1	0	0	3	0	3	0	1	0	0	0	1	0	2	0
Hiatella arctica	0	1	2	8	0	0	0	3	4	0	0	0	3	2	1	0	0	0	2	2	0	0	0	0
Thracioidea juv	0	0	0	0	5	0	0	3	2	2	2	3	0	0	1	0	2	0	8	1	0	1	4	0
Thracia convexa	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Thracia phaseolina	0	0	0	0	0	0	0	0	0	0	0	2	6	1	0	0	0	0	10	0	5	7	7	11
Thracia villosiuscula	0	0	0	0	1	0	0	0	0	0	0	0	6	0	0	0	0	0	1	0	0	0	0	0
Cochlodesma praetenu	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0
Lyonsia norwegica	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Tubulipora	0	0	0	0	1	0	0	0	0	0	0	0	0	2	2	0	1	0	2	3	1	0	0	0
Disporella hispida	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	3	0	0	0	0
Lagenipora lepralioides	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Alcyonidium diaphanum	0	0	0	3	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Nolella	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0
Aetea anguina	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Aetea truncata	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	3	0	0	0	0	0
Scruparia chelata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0
Electra pilosa	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0

Taxon Name	SV1	SV3	SV4	SV5	SV6	SV6A	SV6F	SV7	SV8	SV8A	SV9	SV10	SV11	SV12	SV17	SV32	SV33	SV34	SV35	SV37C	OV2B	OV3B	OV4B	OV5B
Conopeum reticulum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0
Membranipora membranacea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Pyripora catenularia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0
Callopora	0	0	0	3	1	0	0	0	1	0	0	0	0	3	1	0	2	0	0	2	0	0	0	0
Callopora dumerilii	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	1	0	0	0	0
Alderina imbellis	0	0	0	0	0	0	0	0	0	0	0	0	0	3	2	0	0	0	0	0	0	0	0	0
Amphiblestrum auritum	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Beania mirabilis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Cribrilina punctata	0	1	0	0	1	0	0	0	0	0	0	0	0	3	0	0	0	0	3	1	1	0	1	0
Tegella unicornis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Celleporella hyalina	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0
Cellepora pumicosa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0
Chorizopora brongniartii	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	3	1	0	0	0	0
Escharoides coccinea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Escharella immersa	0	0	0	1	0	0	0	0	1	0	0	0	0	2	2	0	0	0	2	3	0	0	0	0
Escharella ventricosa	0	0	0	2	0	0	0	0	1	0	0	0	0	3	3	0	2	0	0	1	0	0	0	0
Scrupocellaria scruposa	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	2	1	0	0	0	0
Neolagenipora collaris	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0
Porella concinna	0	0	0	3	0	0	0	0	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0
Hippothoa divaricata	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	3	0	0	0	0
Hippothoa flagellum	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	2	0	0	0	0
Hippoporina pertusa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Schizomavella auriculata	0	0	0	0	0	0	0	0	1	0	0	0	0	3	0	0	0	0	1	3	0	0	0	0
Microporella ciliata	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	2	3	1	0	1	0
Fenestulina malusii	0	0	0	2	0	0	0	0	1	0	0	0	0	2	0	0	2	0	1	3	1	0	0	1
Phoronis	0	589	739	631	97	10	0	299	2849	5858	2	32	109	3	1400	70	7	4	1	0	3	1	4	3
Astropecten irregularis	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Ophiothrix fragilis	0	0	0	6	4	0	0	2	0	0	0	0	0	0	0	0	1	0	1	3	0	0	0	0
Ophiocomina nigra	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0
Amphiuridae juv	0	0	0	0	2	0	0	0	2	1	1	0	0	0	0	0	0	0	0	5	0	0	0	0
Amphiura filiformis	0	1	5	1	0	0	0	2	1	9	1	14	32	1	1	0	20	25	0	0	6	35	24	9
Amphiura securigera	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0
Amphiura chiajei	0	0	0	0	2	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Amphipholis squamata	0	0	0	0	2	0	0	0	1	0	12	0	0	0	2	0	0	0	12	1	2	0	0	0
Ophiuridae juv	0	0	0	0	0	0	0	0	0	0	0	0	3	1	0	0	0	1	0	0	1	1	0	0
Ophiura albida	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0
Ophiura ophiura	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ophiopholis aculeata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0
Echinoidea juv	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0
Psammechinus miliaris	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Echinocyamus pusillus	0	0	0	0	0	0	0	0	1	0	2	0	0	3	4	0	1	3	3	3	0	0	5	2

Appendix 3. Table containing the total (pooled) faunal abundance and diversity within the macrofaunal samples collected during the 2024 survey of Sullom Voe.

Sample	Abundance	Diversity
SV1	17	4
SV3	2020	70
SV4	1863	87
SV5	2022	129
SV6	1543	143
SV6A	656	45
SV6F	539	44
SV7	1439	81
SV8	4184	123
SV8A	7413	100
SV9	1109	134
SV10	1115	75
SV11	1474	100
SV12	649	133
SV17	2580	139
SV32	656	67
SV33	785	135
SV34	561	94
SV35	831	175
SV37C	388	129
OV2B	1122	129
OV3B	921	106
OV4B	957	102
OV5B	1019	110

Appendix 4. Table containing the biotope designations for each of the Sullom Voe stations in 2024. Please note that for some stations more than one biotope appeared to fit.

Sample	Biotope
SV1	SS.SMu.CSaMu.LkorPpel <i>Lagis koreni</i> and <i>Phaxas pellucidus</i> in circalittoral sandy mud
SV3	SS.SMx.CMx.KurThyMx <i>Kurtiella bidentata</i> and <i>Thyasira</i> spp. in circalittoral muddy mixed sediment
SV4	SS.SMx.CMx.KurThyMx <i>Kurtiella bidentata</i> and <i>Thyasira</i> spp. in circalittoral muddy mixed sediment
SV5	SS.SMx.CMx.KurThyMx <i>Kurtiella bidentata</i> and <i>Thyasira</i> spp. in circalittoral muddy mixed sediment
SV6	SS.SMx.CMx.KurThyMx <i>Kurtiella bidentata</i> and <i>Thyasira</i> spp. in circalittoral muddy mixed sediment
SV6A	SS.SSa.CMuSa Circalittoral muddy sand
SV6F	SS.SMx.CMx.KurThyMx <i>Kurtiella bidentata</i> and <i>Thyasira</i> spp. in circalittoral muddy mixed sediment
SV7	SS.SMx.CMx.KurThyMx <i>Kurtiella bidentata</i> and <i>Thyasira</i> spp. in circalittoral muddy mixed sediment
SV8	SS.SMx.CMx.KurThyMx <i>Kurtiella bidentata</i> and <i>Thyasira</i> spp. in circalittoral muddy mixed sediment
SV8A	SS.SMx.CMx.KurThyMx <i>Kurtiella bidentata</i> and <i>Thyasira</i> spp. in circalittoral muddy mixed sediment
SV9	SS.SBR.SMus.ModMx <i>Modiolus modiolus</i> beds on open coast circalittoral mixed sediment and SS.SMx.CMx.KurThyMx <i>Kurtiella bidentata</i> and <i>Thyasira</i> spp. in circalittoral muddy mixed sediment
SV10	SS.SMx.CMx.KurThyMx <i>Kurtiella bidentata</i> and <i>Thyasira</i> spp. in circalittoral muddy mixed sediment
SV11	SS.SMx.CMx.KurThyMx <i>Kurtiella bidentata</i> and <i>Thyasira</i> spp. in circalittoral muddy mixed sediment
SV12	SS.SBR.SMus.ModMx <i>Modiolus modiolus</i> beds on open coast circalittoral mixed sediment and SS.SCS.CCS.MedLumVen <i>Mediomastus fragilis</i> , <i>Lumbrineris</i> spp. and venerid bivalves in circalittoral coarse sand or gravel
SV17	SS.SMx.CMx.KurThyMx <i>Kurtiella bidentata</i> and <i>Thyasira</i> spp. in circalittoral muddy mixed sediment
SV32	SS.SMx.CMx.KurThyMx <i>Kurtiella bidentata</i> and <i>Thyasira</i> spp. in circalittoral muddy mixed sediment
SV33	SS.SMx.CMx.KurThyMx <i>Kurtiella bidentata</i> and <i>Thyasira</i> spp. in circalittoral muddy mixed sediment
SV34	SS.SMx.CMx.KurThyMx <i>Kurtiella bidentata</i> and <i>Thyasira</i> spp. in circalittoral muddy mixed sediment
SV35	SS.SBR.SMus.ModMx <i>Modiolus modiolus</i> beds on open coast circalittoral mixed sediment and SS.SCS.CCS.MedLumVen <i>Mediomastus fragilis</i> , <i>Lumbrineris</i> spp. and venerid bivalves in circalittoral coarse sand or gravel
SV37C	SS.SMx.CMx.OphMx <i>Ophiothrix fragilis</i> and/or <i>Ophiocolina nigra</i> brittlestar beds on sublittoral mixed sediment
OV2B	SS.SMx.CMx.KurThyMx <i>Kurtiella bidentata</i> and <i>Thyasira</i> spp. in circalittoral muddy mixed sediment
OV3B	SS.SMx.CMx.KurThyMx <i>Kurtiella bidentata</i> and <i>Thyasira</i> spp. in circalittoral muddy mixed sediment
OV4B	SS.SMx.CMx.KurThyMx <i>Kurtiella bidentata</i> and <i>Thyasira</i> spp. in circalittoral muddy mixed sediment
OV5B	SS.SMx.CMx.KurThyMx <i>Kurtiella bidentata</i> and <i>Thyasira</i> spp. in circalittoral muddy mixed sediment

Appendix 5. Table summarising the findings of the particle size analysis (PSA) for samples collected at each of the stations during the survey of Sullom Voe in 2024.

Sieve Aperture (µm)	SV1	SV3	SV4	SV5	SV6	SV6A	SV6F	SV7	SV8	SV8A	SV9
63000.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
45000.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
31500.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
22400.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
16000.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.542	0.000	0.000	0.000
11200.000	0.000	0.715	1.753	1.480	0.225	0.335	0.000	0.000	0.000	0.098	0.081
8000.000	0.000	0.469	0.091	0.583	0.220	0.541	0.000	0.621	0.259	0.865	1.227
5600.000	0.019	0.935	0.354	0.590	0.729	0.485	0.000	1.117	0.127	1.298	0.567
4000.000	0.033	0.880	1.759	0.285	0.979	0.337	0.000	1.289	0.440	0.356	0.991
2800.000	0.103	1.781	1.498	1.490	1.816	0.562	0.000	2.061	1.042	0.637	1.372
2000.000	0.117	2.277	1.598	2.144	2.550	0.536	0.000	2.170	1.749	0.646	1.378
1400.000	0.254	3.709	2.383	4.063	4.028	0.587	1.181	3.210	1.092	0.860	1.823
1000.000	0.296	5.294	3.280	4.068	1.442	0.608	2.617	2.368	3.732	1.591	2.262
707.000	0.047	3.052	0.000	2.737	2.436	2.944	2.371	1.408	5.155	2.875	2.396
500.000	2.925	1.564	0.025	0.956	2.853	5.682	5.050	0.535	3.270	1.531	1.478
353.600	8.996	2.081	1.336	1.573	5.070	7.959	7.225	1.969	3.930	4.788	2.389
250.000	10.395	2.031	1.335	2.323	5.313	7.394	6.728	2.738	4.192	4.441	1.788
176.800	10.129	3.534	3.243	3.151	7.194	8.546	8.457	4.768	5.126	7.703	3.096
125.000	9.126	6.197	6.755	6.096	9.558	10.424	10.825	7.651	7.179	10.527	6.256
88.390	8.530	8.400	9.452	8.166	9.983	10.748	11.234	9.302	6.859	11.314	8.273
62.500	8.881	9.778	11.122	8.765	8.976	9.895	10.086	9.184	7.067	9.714	9.492
44.190	9.174	9.268	10.101	8.251	7.685	8.392	8.359	8.197	6.984	7.015	9.074
31.250	8.556	7.887	8.390	7.340	6.358	6.766	6.790	7.232	6.719	5.161	8.350
22.097	7.017	7.087	7.718	7.161	5.511	5.242	5.489	6.873	6.952	4.590	8.141
15.625	4.996	5.989	6.766	6.627	4.628	3.708	4.080	6.315	6.508	4.370	7.188
11.049	3.394	4.788	5.716	5.780	3.683	2.616	2.950	5.355	5.733	4.215	6.054
7.813	2.304	3.661	4.574	4.751	2.761	1.817	2.091	4.228	4.710	3.928	4.855
5.524	1.582	2.734	3.472	3.748	1.991	1.246	1.456	3.225	3.655	3.408	3.723
3.906	0.995	1.817	2.298	2.580	1.270	0.775	0.907	2.166	2.466	2.499	2.500
2.762	0.589	1.088	1.352	1.551	0.734	0.455	0.521	1.287	1.459	1.545	1.485
1.953	0.337	0.605	0.734	0.830	0.402	0.266	0.293	0.688	0.777	0.831	0.802
1.381	0.218	0.380	0.455	0.488	0.256	0.183	0.197	0.407	0.464	0.499	0.488
0.977	0.176	0.315	0.381	0.388	0.216	0.158	0.174	0.326	0.376	0.416	0.399
0.691	0.163	0.308	0.377	0.378	0.212	0.153	0.172	0.321	0.368	0.417	0.389
0.488	0.153	0.305	0.375	0.374	0.208	0.147	0.169	0.321	0.364	0.418	0.383
0.345	0.139	0.287	0.353	0.351	0.194	0.135	0.157	0.304	0.340	0.394	0.356
0.244	0.120	0.255	0.312	0.309	0.170	0.118	0.138	0.270	0.299	0.348	0.312
0.173	0.095	0.208	0.254	0.248	0.138	0.095	0.112	0.219	0.241	0.280	0.251
0.122	0.073	0.162	0.198	0.192	0.107	0.074	0.087	0.170	0.187	0.217	0.194
0.086	0.047	0.106	0.129	0.124	0.070	0.048	0.057	0.110	0.121	0.140	0.125
Pan	0.023	0.051	0.063	0.059	0.034	0.024	0.028	0.052	0.058	0.065	0.060

Sieve Aperture (μm)	SV10	SV11	SV12	SV17	SV32	SV33	SV34	SV35	SV37C	OV2B	OV3B
63000.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
45000.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
31500.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
22400.000	0.000	0.000	0.000	15.285	0.000	4.633	0.000	0.000	0.000	0.000	0.000
16000.000	0.000	0.000	0.000	2.142	0.000	0.724	0.000	2.265	0.000	0.000	0.000
11200.000	0.229	0.114	1.071	5.977	0.118	1.110	0.000	0.000	0.000	0.000	0.000
8000.000	0.265	0.000	0.681	2.617	0.529	0.671	0.000	0.000	0.000	0.399	0.693
5600.000	0.609	0.342	0.684	0.969	0.163	1.089	0.000	0.358	0.062	0.093	0.000
4000.000	0.146	0.119	0.432	2.022	0.259	0.260	0.026	1.301	0.547	0.170	0.053
2800.000	0.308	0.233	1.093	3.878	0.567	0.432	0.247	4.776	3.198	0.356	0.042
2000.000	0.569	0.313	2.360	6.765	0.543	0.274	0.196	6.333	5.758	0.474	0.086
1400.000	0.779	0.354	4.129	15.600	0.496	0.432	0.311	7.005	11.015	0.892	0.262
1000.000	1.092	0.463	4.948	16.420	0.426	0.688	0.558	8.117	14.858	1.241	0.671
707.000	0.000	0.000	5.213	2.632	2.288	0.000	0.574	4.579	13.579	0.000	1.745
500.000	0.027	0.000	7.420	2.100	1.209	0.582	2.183	6.951	16.271	0.528	3.172
353.600	0.888	0.000	10.482	1.603	5.035	3.029	4.584	9.650	14.115	3.284	5.036
250.000	1.268	0.068	13.806	1.175	5.620	4.161	4.362	10.538	8.697	5.590	4.252
176.800	4.093	2.993	15.129	1.190	7.028	9.792	8.562	10.441	4.864	11.323	8.908
125.000	8.962	8.365	11.583	1.513	9.571	15.673	14.156	7.181	2.417	16.485	16.162
88.390	11.753	12.088	5.999	1.679	10.728	14.762	14.915	3.622	0.603	15.261	16.143
62.500	11.006	12.841	2.833	2.058	10.015	9.738	11.158	2.259	0.352	9.947	10.554
44.190	8.973	10.173	1.817	2.206	8.737	5.974	7.639	1.670	0.422	6.078	6.363
31.250	7.357	8.190	1.538	2.169	7.510	4.085	5.502	1.421	0.364	4.304	4.513
22.097	7.031	7.866	1.512	2.178	6.898	3.420	4.757	1.530	0.485	3.895	3.952
15.625	6.936	7.314	1.459	1.907	5.923	3.058	4.307	1.661	0.423	3.855	3.612
11.049	6.484	6.846	1.355	1.583	4.796	3.080	3.833	1.775	0.417	3.749	3.322
7.813	5.618	6.013	1.163	1.269	3.674	2.992	3.254	1.675	0.383	3.305	2.838
5.524	4.746	4.860	0.947	0.975	2.689	2.640	2.624	1.424	0.308	2.667	2.258
3.906	3.477	3.364	0.686	0.655	1.722	1.972	1.827	1.031	0.221	1.845	1.554
2.762	2.143	2.021	0.452	0.389	0.983	1.264	1.102	0.648	0.138	1.110	0.943
1.953	1.117	1.084	0.273	0.210	0.520	0.711	0.602	0.361	0.083	0.597	0.525
1.381	0.633	0.650	0.173	0.129	0.318	0.433	0.384	0.219	0.068	0.363	0.336
0.977	0.514	0.530	0.132	0.108	0.265	0.351	0.340	0.179	0.069	0.309	0.292
0.691	0.526	0.521	0.120	0.108	0.261	0.348	0.351	0.178	0.065	0.319	0.298
0.488	0.540	0.516	0.115	0.108	0.255	0.351	0.358	0.182	0.057	0.330	0.304
0.345	0.518	0.482	0.107	0.103	0.236	0.336	0.342	0.176	0.048	0.321	0.292
0.244	0.461	0.423	0.095	0.092	0.205	0.303	0.308	0.159	0.038	0.292	0.264
0.173	0.373	0.340	0.077	0.075	0.164	0.248	0.252	0.132	0.029	0.242	0.217
0.122	0.289	0.263	0.060	0.059	0.126	0.195	0.197	0.104	0.022	0.191	0.171
0.086	0.185	0.170	0.039	0.038	0.081	0.127	0.128	0.068	0.014	0.125	0.112
Pan	0.086	0.082	0.019	0.019	0.039	0.060	0.060	0.032	0.008	0.061	0.053

Sieve Aperture (μm)	OV4B	OV5B	GV1C	GV2	GV3	HS1B	HS2	HS3
63000.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
45000.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
31500.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
22400.000	0.000	0.000	0.000	0.000	2.584	3.960	0.000	0.000
16000.000	0.000	0.000	0.894	0.000	0.000	6.213	0.000	3.165
11200.000	0.000	0.000	5.366	3.182	3.956	14.269	0.000	0.000
8000.000	0.198	0.000	7.513	4.223	5.168	9.765	0.000	0.125
5600.000	0.039	0.000	9.693	4.419	3.486	7.021	0.000	0.625
4000.000	0.002	0.000	8.621	3.390	9.163	4.700	0.000	0.362
2800.000	0.104	0.054	8.767	3.264	10.156	5.039	0.000	0.460
2000.000	0.149	0.169	6.756	3.487	9.054	6.576	0.000	0.471
1400.000	0.362	0.784	7.441	4.751	9.407	9.288	0.781	0.693
1000.000	0.954	2.236	6.550	7.116	7.413	9.748	1.564	1.089
707.000	2.194	2.133	5.690	6.419	2.723	3.038	3.539	2.389
500.000	4.464	4.775	6.728	7.066	4.188	4.846	7.295	7.426
353.600	5.539	6.215	5.844	6.923	5.292	5.029	11.718	15.582
250.000	4.643	5.150	4.280	7.726	5.247	2.984	15.438	21.565
176.800	8.989	9.272	3.351	9.300	4.517	1.290	17.513	19.170
125.000	15.597	15.454	2.677	8.196	3.618	0.916	15.595	10.591
88.390	15.477	14.952	1.966	5.106	2.994	0.871	9.948	4.159
62.500	9.774	9.081	1.556	3.384	2.646	0.795	5.272	2.424
44.190	5.825	5.345	1.390	2.828	2.314	0.757	3.046	2.249
31.250	4.217	4.093	1.219	2.318	1.858	0.713	2.152	1.965
22.097	3.866	3.877	0.994	1.823	1.355	0.616	1.665	1.568
15.625	3.770	3.660	0.747	1.352	0.928	0.472	1.305	1.184
11.049	3.439	3.269	0.547	1.001	0.623	0.337	0.960	0.839
7.813	2.847	2.683	0.393	0.728	0.407	0.234	0.649	0.562
5.524	2.251	2.057	0.280	0.523	0.265	0.163	0.427	0.374
3.906	1.552	1.367	0.183	0.343	0.158	0.103	0.256	0.230
2.762	0.930	0.802	0.115	0.218	0.092	0.061	0.150	0.139
1.953	0.498	0.440	0.074	0.143	0.057	0.036	0.096	0.089
1.381	0.309	0.289	0.056	0.112	0.045	0.025	0.079	0.070
0.977	0.274	0.262	0.051	0.105	0.044	0.021	0.081	0.067
0.691	0.291	0.274	0.049	0.104	0.044	0.021	0.084	0.068
0.488	0.305	0.280	0.048	0.101	0.044	0.021	0.085	0.067
0.345	0.298	0.269	0.044	0.094	0.041	0.019	0.080	0.063
0.244	0.272	0.243	0.039	0.083	0.037	0.017	0.072	0.056
0.173	0.225	0.201	0.031	0.067	0.030	0.014	0.059	0.045
0.122	0.177	0.158	0.024	0.052	0.023	0.011	0.046	0.036
0.086	0.115	0.104	0.016	0.034	0.015	0.007	0.030	0.023
Pan	0.054	0.050	0.007	0.016	0.008	0.003	0.015	0.011

Appendix 6. Table summarising the percentage fractions of gravel ($\geq 2\text{mm}$), sand ($< 2\text{mm}-0.063\text{mm}$) and silt ($< 0.063\text{mm}$) at each of the stations, along with assigned Folk categories during the 2024 survey of Sullom Voe.

Sample	% Gravel	% Sand	% Mud	Folk
SV1	0.3	59.6	40.1	(g)mS: Slightly Gravelly Muddy Sand
SV4	7.1	38.9	54.0	gM: Gravelly Mud
SV3	7.1	45.6	47.3	gM: Gravelly Mud
SV5	6.6	41.9	51.5	gM: Gravelly Mud
SV6	6.5	56.9	36.6	gmS: Gravelly Muddy Sand
SV6A	2.8	64.8	32.4	(g)mS: Slightly Gravelly Muddy Sand
SV6F	0.0	65.8	34.2	mS: Muddy Sand
SV7	8.8	43.1	48.1	gM: Gravelly Mud
SV8	3.6	47.6	48.8	(g)sM: Slightly Gravelly Sandy Mud
SV8A	3.9	55.3	40.8	(g)mS: Slightly Gravelly Muddy Sand
SV9	5.6	39.3	55.1	gM: Gravelly Mud
SV10	2.1	39.9	58.0	(g)sM: Slightly Gravelly Sandy Mud
SV11	1.1	37.2	61.7	(g)sM: Slightly Gravelly Sandy Mud
SV12	6.3	81.5	12.1	gmS: Gravelly Muddy Sand
SV17	39.7	46.0	14.4	msG: Muddy Sandy Gravel
SV32	2.2	52.4	45.4	(g)mS: Slightly Gravelly Muddy Sand
SV33	9.2	58.9	31.9	gmS: Gravelly Muddy Sand
SV34	0.5	61.4	38.2	(g)mS: Slightly Gravelly Muddy Sand
SV35	15.0	70.3	14.6	gmS: Gravelly Muddy Sand
SV37C	9.6	86.8	3.7	gS: Gravelly Sand
OV2B	1.5	64.5	34.0	(g)mS: Slightly Gravelly Muddy Sand
OV3B	0.9	66.9	32.2	(g)mS: Slightly Gravelly Muddy Sand
OV4B	0.5	68.0	31.5	(g)mS: Slightly Gravelly Muddy Sand
OV5B	0.2	70.1	29.7	(g)mS: Slightly Gravelly Muddy Sand
GV1C	47.6	46.1	6.3	msG: Muddy Sandy Gravel
GV2	22.0	66.0	12.0	gmS: Gravelly Muddy Sand
GV3	43.6	48.0	8.4	msG: Muddy Sandy Gravel
HS1B	57.5	38.8	3.6	sG: Sandy Gravel
HS2	0.0	88.7	11.3	mS: Muddy Sand
HS3	5.2	85.1	9.7	gmS: Gravelly Muddy Sand