BENTHIC FAUNA IN THE PECHORA SEA

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Quantitative samples of benthic fauna were collected at 15 stations for analysis of species distribution and faunal composition. Multivariate statistics indicate that the sampling stations cover a heterogeneous area with different types of community composition, as might be expected, since the Pechora Sea encompasses a wide range of depths and oceanographic conditions. However, some distinct station groupings were evident, which are considered to represent different faunal community types. Around the Island of Kolguyev, the fauna was dominated by sub-surface detritivorous Polychaeta. On the coast of Novaya Zemlya, the Chernaya Fjord contained an opportunistic faunal composition. The deep area immediately south of Novaya Zemlya was characterised by high numbers of large, surface deposit feeding Polychaeta. The Kara Strait area showed some spatial variation in faunal characteristics, but generally contained high numbers of surface deposit feeding Polychaeta and Crustacea, as well as encrusting suspensivores on stones. The stations sampled between Kolguyev and the Pechora Bay contained large amounts of macrofaunal Foraminifera and detritivorous Polychaeta, while the fauna sampled in the Pechora Bay was typical of northern, low salinity environments. Canonical correspondence analyses indicate that water depth and sediment type play a major role in structuring the benthic fauna. The distribution of community types described in this investigation largely follow those outlined in previous Russian investigations, despite the use of different analytical strategies. This investigation provides the background for an intercomparison of methodologies in faunal analyses.

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INTRODUCTION

The Pechora Sea has been the subject of many Russian benthic faunal investigations, from the end of the 1800s to the present (reviewed by DENISENKO & al. 1995). Current analyses of biogeography regard the Pechora Sea as a transitional zone between Boreal and Arctic fauna (ANTIPOVA & al. 1989). Climatic variations, resulting in changes in the relative influences of the different water masses in the Pechora Sea are thought to result in variations in the distribution and biomass of some benthic species (GALKIN 1980). However, this does not profoundly influence the overall biomass (DENISENKO & DENISENKO 1995). The benthic fauna in the Pechora Sea is documented to be mainly dominated by suspension feeding bivalves, and in some areas also by motile surface deposit feeding Bivalvia, Polychaeta and Echinodermata (KUZNETZOV 1970). The areas south of Novaya Zemlya and around the Kara Strait are amongst those with the highest biomass (ANTIPOVA 1975; DENISENKO & al. 1997).

Since co-operation and exchange of information between Russian and other international scientific institutes has increased in recent years, the question of intercomparability of data has arisen. Faunal analyses in Arctic areas have been carried out by Russian scientists for many decades (reviewed by GALKIN 1979), generally describing ‘biocenoses’, or community types, using both biotic and abiotic data (MÖBIUS 1877). In most other countries, the benthic analyses have evolved from Petersen’s concept of the faunal community, using species abundance and diversity (PETERSEN 1914). The former analyses use biomass as the main criterion for describing dominant species, while the latter investigations usually rely on numerical abundance. Our survey carried out in 1992 aimed to initiate a programme of intercomparison and standardisation of methodologies, with parallel biological samples taken independently by both the Norwegian and Russian teams, using their own sample collection and processing techniques.

As part of a Norwegian-Russian expedition to the Pechora Sea in the south-eastern part of the Barents Sea in July 1992, samples of benthic fauna were collected for analysis of species distribution and faunal

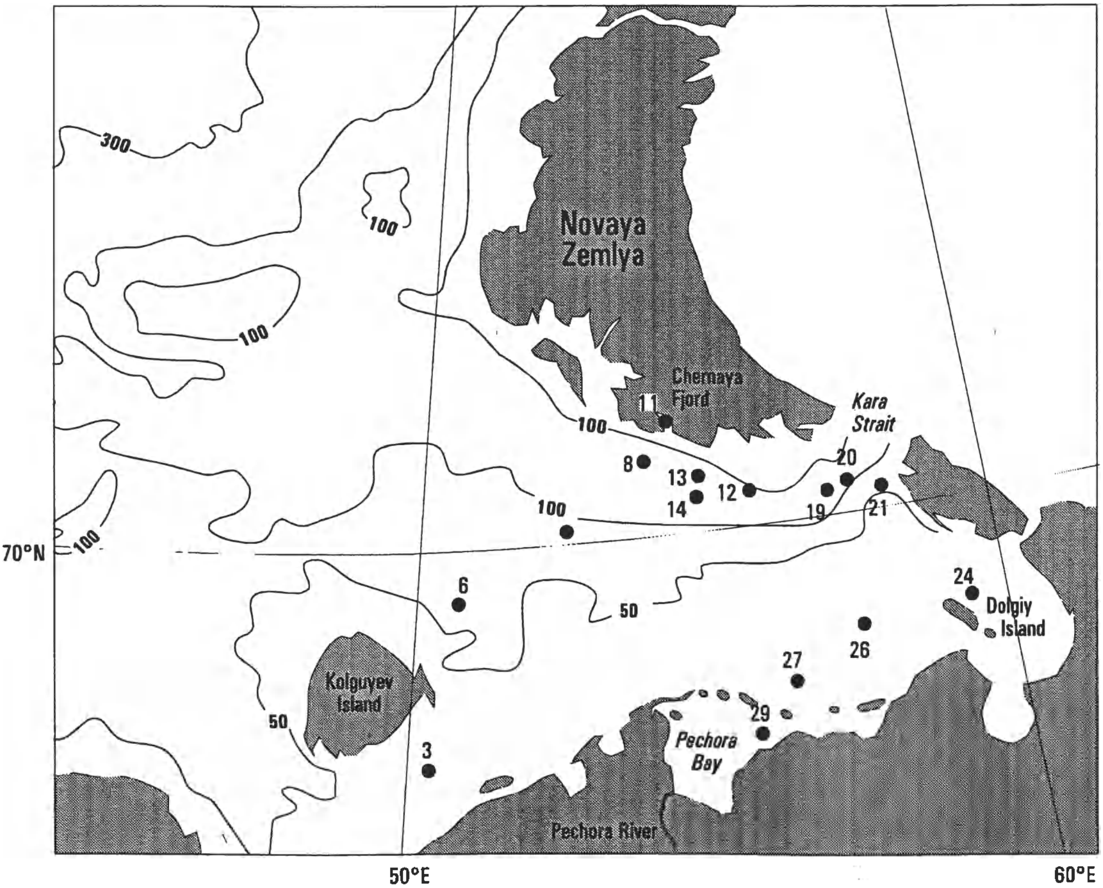

Fig. 1. Location of stations sampled for analysis of benthic fauna in the Pechora Sea. Bathymetry in meters (adapted from LORING & al. 1995).

composition. Sediment samples were also taken for contaminant analysis, including heavy metals, pesticides, other organic hydrocarbons and radionuclides. The information gathered is incorporated into the Arctic Monitoring and Assessment Programme (AMAP) database. The data on contaminants in sediment have been reported in LORING & al. (1995) and SMITH & al. (1995).

The present paper primarily aims to further current understanding of the nature of the benthic fauna in selected areas of the Pechora Sea. The results of this investigation using a van Veen grab (VAN VEEN 1933) will also serve as the background for future inter-comparison of results with those from the Russian survey, using an Ocean grab (LISITSIN & UDINTSEV 1955).

Study area

The Pechora Sea is bordered by the Russian mainland to the south, the Islands Vaygach to the east, Novaya Zemlya to the north and Kolguyev to the west (Fig. 1). Almost the entire Pechora Sea area is ice-covered from November until late June, although coastal polynyas are semi-permanent features in many areas. The extent of sea-ice cover can vary considerably from year to year, according to the inter-annual dynamics of inflowing Atlantic water as well as air temperature and wind characteristics (MIDTTUN & LOENG 1987; MATISHOV & al. 1993). This inter-annual variation may significantly affect physical and biological processes at the sediment-water interface (WASSMANN & SLAGSTAD 1991).

The Pechora Sea acts as a mixing area for different water masses: Atlantic water, water from the Kara and White Seas, as well as coastal run-off. The water column is strongly stratified in the deep northern parts of the Pechora Sea. The bottom water (below 150 m) is made up of well oxygenated Atlantic water with salinities of 34.5-34.95 and temperatures between –1.0 and –1.5 °C (MATISHOV 1992). Through the northern part of the Kara Strait, the narrow Litke Current flows in a westerly direction along the coast of Novaya Zemlya

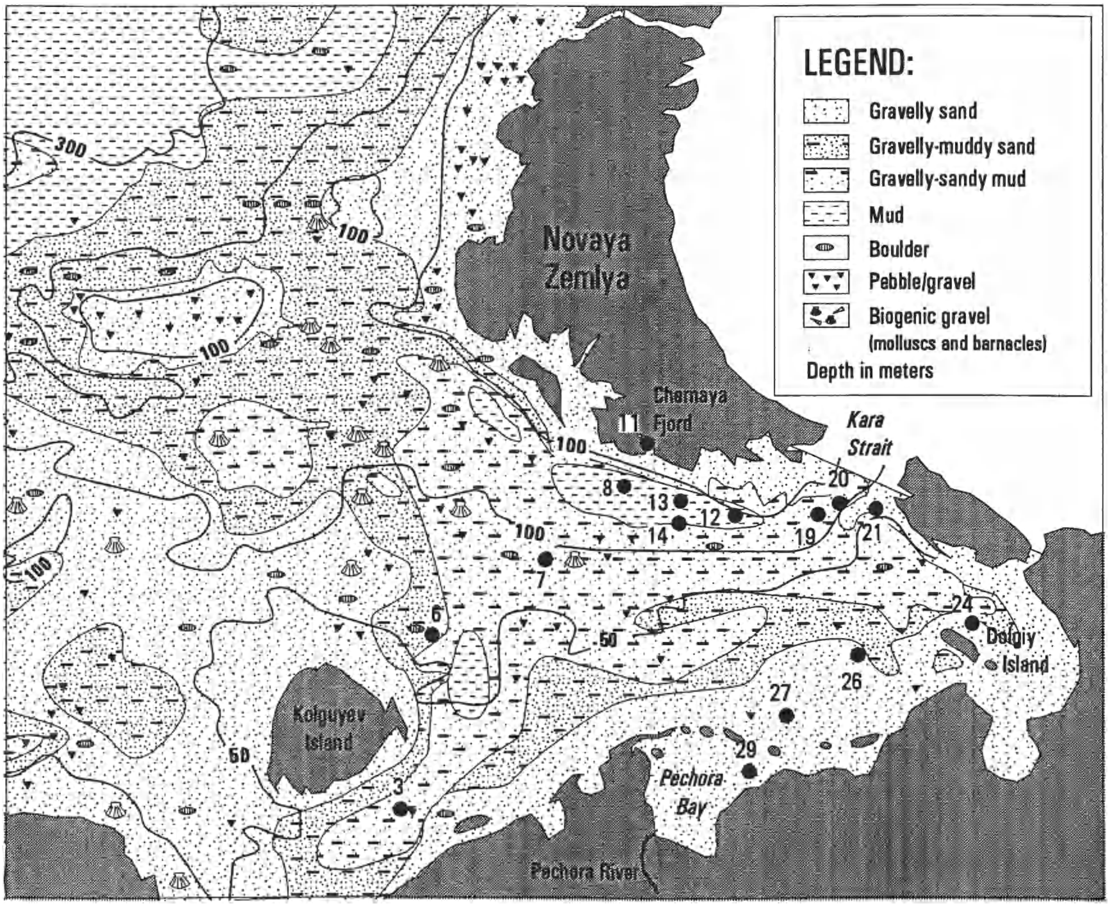

Fig. 2. Distribution of principal sediment types in the Pechora Sea, showing the sampling stations from this study (based on data from Klenova 1960 and Vinogradova & Litvin 1960).

(Pavlov & Phirman 1995). The central part of the Pechora Sea is influenced by the Kolguyev-Pechora current, which is primarily of Atlantic origin, and is characterised by a salinity of around 34 and temperatures between 0.5 and 2 °C. This current flows in an easterly direction and, mixed with southern Pechora Sea water, enters the Kara Sea through the southern part of the Kara Strait (Phirman & al. 1995). The southern part of the Pechora Sea receives a large, seasonally variable coastal run-off, mainly from the White Sea and the Pechora River (Zenkewich 1963). In summer and autumn, the southern Pechora Sea is dominated by relatively warm, low-salinity water (5-8 °C, 18-26 ‰), which largely flows eastwards and into the Kara Sea, through the strait south-east of Vaygach, or northwards along the western coast of Vaygach (Matishov 1992; Matishov & al. 1993; Phirman & al. 1995).

The Pechora Bay is strongly affected by the approximately 1 800 km long Pechora River, which annually discharges around 130 km^3 of freshwater into the Pechora Sea, with an estimated annual sediment load of 6.1×10^6 tonnes (Milliman & Syvitski 1992). The transported fine-grained riverine sediments are either trapped in the Pechora Bay or transported by offshore currents to be deposited slowly in the deeper parts of the Barents Sea (Zenkewich 1927). The salinity of the Pechora Bay water varies between 8 and 18 and the summer temperatures are generally between 9 and 12 °C. Chernaya Fjord, located on the southern coast of Novaya Zemlya, is 10-12 km long and 3-5 km wide. The sill depth at the mouth of the fjord is approximately 15 m and the maximum basin depth is 80 m. The basin water is of Atlantic origin with a salinity of around 35.0 and a temperature close to –1 °C (Matishov & al. 1993).

The heterogeneous surface sediments in the Pechora Sea are shown in Fig. 2. The southern parts are characterised by sandy sediments, while mixed sediments dominate the Kara Strait area. The deep area south of

Novaya Zemlya is characterised by very fine mud, while the muddy sediments in the central and northern parts contain an admixture of sand and gravel. Underlying the surface sediments in the Pechora Sea is dense glacio-marine blue-grey clay, particularly in the central, western, northern and north-eastern parts. Table 1 shows the basic physical characteristics of the surface sediments at the stations sampled.

MATERIALS AND METHODS

Sampling and laboratory procedures

Sampling was carried out from the research vessel R/V *Dalnie Zelentsie*, MMBI, at 15 stations (Fig. 1). Five replicates were taken at each station. Station positioning was carried out using the ship's radar, supported by GPS (Global Positioning System). A 0.1 m^2 lead weighted van Veen grab with hinged, lockable, rubber-covered inspection flaps of 0.5 mm mesh was used. Samples showing inadequate or uneven penetration, or a disturbed sediment/water interface were rejected. The samples were gently washed through a circular 1 mm diameter round-mesh screen immersed in running sea water, and fixed in 15-20 % borax-buffered formalin. For glacio-marine clay sediments, the fine surface sediment was first gently washed from the clay, which was then processed separately. Samples were rinsed in the laboratory using 1 mm round mesh sieves immersed in running fresh-water to remove formalin. Animals were sorted from the sediment into phyla and subsequently identified to species or lowest taxonomic level possible. A reference collection was kept of all species identified.

Numerical analyses

The replicate sample data were compiled and then summed for each taxon to give faunal densities for each station (0.5 m^2). The community analyses were based on a 2-way station by species data base. Samples within the dissimilarity matrices generated by the Bray-Curtis index (Chekanowsky 1909; Bray & Curtis 1957) were grouped together on the basis of their resemblances, using the unweighted pair-group average method (Rohlf 1989). Multi-dimensional scaling (MDS) ordination was used to scale the dissimilarity of n samples in two-dimensional space, placing the most similar objects closest together. A preliminary Principal Co-ordinate (PCoA) ordination using double-centred eigenvector calculations and a Principal Component Analysis (PCA) was carried out to achieve an optimised and more effective MDS outcome (Rohlf 1989).

Canonical correspondence analysis (CCA) was used to assess the relationship between species abundance and the physical and chemical characteristics of the sediment. The principles of CCA are explained in Fieler & al. 1994. Considered geometrically, each species can be thought of as a point in the multidimensional space defined by the stations, and each species is given a weight, or 'mass' proportional to the overall abundance of the species (Greenacre 1984, 1993). Similarly, each station represents a point in the multidimensional space defined by the species and receives a mass proportional to the number of individuals counted at that station. Dispersion is defined as the weighted sum-of-squared distances of the species points (or, equivalently, of the station points) to their average. This dispersion is termed inertia, which is a measure of variance. Species with most inertia explained by the first two or three axes are considered to be most influenced in their distribution by the selected environmental variables. Using one of the environmental variables as a co-variable removes all inertia attributed to that variable. Examination of the remaining inertia gives information on the relationship between species distribution and the other environmental variables.

Based on a preliminary PCA, the following parameters were designated as environmental variables and chosen for CCA: depth, % fine sediment (< 63 µm), total organic carbon (TOC), total nitrogen (TN), the radioactive isotopes ^{239}Pu, ^{240}Pu and ^{134}Cs, as well as the metals Mn, Fe, Cd, Cr, Pb, Ni, V, Zn, Al

Table 1. Background characteristics of the surface sediments sampled: water depth, sediment type, grain size (< 63 µm, % by weight), % total organic carbon (TOC), % total nitrogen (TN) and TOC/TN ratios (data from Loring & al. 1995).

Stn	Depth	Position		Surface sediment type	%	%	%	TOC
	(m)	Latitude	Longitude		< 63 µm	TOC	TN	/TN
3	53	68°34.20'N	49°59.06'E	very sandy mud, greyish	51	0.67	< 0.10	-
6	88	69°38.36'N	50°45.18'E	very sandy mud, greyish	57	0.81	0.12	6.8
7	76	70°08.83'N	53°24.28'E	muddy sand, greyish	12	0.19	< 0.10	-
8	193	70°30.98'N	54°38.56'E	sandy mud, brownish	84	1.92	0.29	6.6
11	68	70°42.44'N	54°38.49'E	sandy mud, brownish	79	1.65	0.23	7.2
12	188	70°17.00'N	55°36.40'E	muddy sand, brownish	81	2.01	0.28	7.2
13	207	70°24.28'N	55°07.43'E	sandy mud, brownish	91	2.00	0.29	6.9
14	172	70°13.86'N	55°02.49'E	sandy mud, brownish	86	1.70	0.24	7.1
19	83	70°10.36'N	57°12.51'E	muddy sand, brownish	26	0.45	< 0.10	-
20	126	70°16.56'N	57°32.58'E	very sandy mud, brownish	40	0.78	0.13	6.0
21	85	70°11.69'N	58°08.68'E	muddy sand, brownish	9	0.38	< 0.10	-
24	16	69°21.08'N	58°56.58'E	very sandy mud, greyish	5	0.10	< 0.10	-
26	17	69°14.66'N	57°09.00'E	sand, greyish	2	< 0.10	< 0.10	-
27	8	69°00.21'N	56°01.35'E	sand, brownish	2	< 0.10	< 0.10	-
29	11	68°35.31'N	55°13.49'E	sandy mud, greyish	75	0.96	< 0.10	-

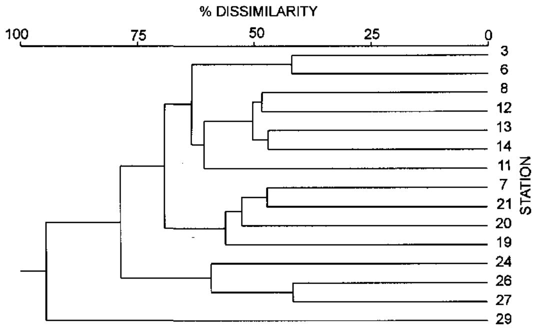

Fig. 3. Cluster diagram, showing the grouping of stations, based on percent dissimilarity of summary faunal data.

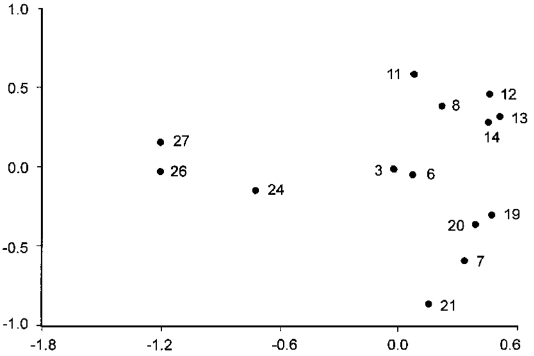

Fig. 4. Two-dimensional MDS scaling plot, showing the interrelationships between the sampling stations, using summary faunal data. The brackish Station 29 is omitted. Both axes represent scaled dispersion.

and Li. The radioactive isotopes and metals are recommended as essential for environmental monitoring (AMAP 1993). The selected log-transformed environmental variables, together with the untransformed faunal data were directly entered into the CCA, and those linear combinations of environmental variables that maximise the dispersion of the species scores (i.e. those which explain most of the species variables) were selected on the basis of multiple regression analyses ('forward selection'). The CANOCO software package was used (TER BRAAK 1987-1992). The results from the ordinations were plotted using the software package CANODRAW (SMILAUR 1992).

RESULTS AND DISCUSSION

Station groupings

Cluster grouping showed between 30 and 50 % dissimilarity between individual replicates, indicating a high degree of variability in the benthic fauna across the sampling area, with the exception of the Pechora Bay samples, which showed lower dissimilarities. Despite this, replicates generally clustered according to sampling station. Fig. 3 shows the cluster groupings at the station level. MDS analyses also showed a relatively high degree of dissimilarity between individual replicates, but these mostly grouped according to station.

Fig. 4 shows the two-dimensional MDS plot obtained using summary station data. The brackish Station 29 was sufficiently unique in its faunal composition to warrant its removal from the MDS analyses, to avoid obscuring the spatial arrangement of the other stations. Goodness of fit (stress) analyses (ROHLF 1989) showed an excellent agreement between the Bray-Curtis indices and the MDS ordinations. Based on these analyses, combined with an evaluation of the biological, physical, and chemical characteristics, the sampling stations were divided into seven main groups, each of which showed at least 60 % dissimilarity from each other. These groups are considered to represent discrete faunal associations, and are herewith referred to as Faunal Associations A-G (Table 2).

Number of individuals, taxa and faunal diversity indices.

A total of 16 phyla, 17 classes and 53 taxonomic orders were recorded. The best represented phyla, in terms of numbers of individuals, were the Annelida, Bryozoa, Crustacea, Echinodermata, Mollusca, and Sarcomastigophora (a single species of macrobenthic Foraminifera). The numbers of individuals and taxa recorded from each of the sampling stations are shown in Table 3. A full species list is given in the Appendix.

Fig. 5 shows the mean numbers of taxa and individu-

Table 2. Grouping of stations into areas.

Faunal association	Location	Stations included	Mean depth (m)
A	Proximity to Kolguyev Island	3, 6	54
B	Chernaya Fjord, Novaya Zemlya	11	79
C	Deep area south of Novaya Zemlya	8, 12, 13, 14	190
D	Northern Pechora Sea and Kara Strait	7, 19, 20, 21	91.5
E	Dolgiy Island	24	16
F	South-eastern Pechora Sea	26, 27	12.5
G	Pechora Bay	29	11

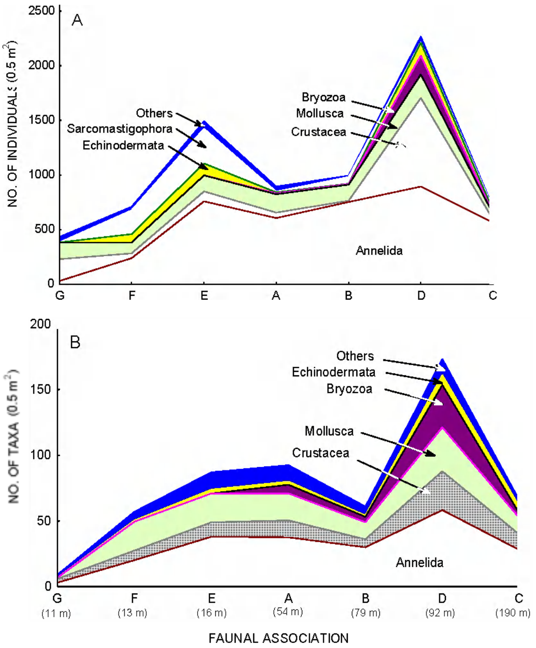

Fig. 5. Graphic representation of the distribution of A: individuals and B: taxa between the faunal associations found in the Pechora Sea, 1992. The associations are arranged in order of increasing depth, from the shallow estuarine Faunal Association G in the Pechora Bay to Association C in the deep area south of Novaya Zemlya. The category 'others' includes Brachiopoda, Chelicerata, Chordata, Cnidaria, Echiurida, Nematoda, Nemertini, Priapulida and Sipunculida.

als of the major taxonomic groups recorded at the faunal associations, arranged in order of increasing depth. The brackish Faunal Association G contained relatively low numbers of both taxa and individuals, while Faunal Associations F (South Pechora Sea coast) and E (Dolgiy Island) contained large numbers of individuals of Sarcomastigophora. In Faunal Associations A (Kolguyev), B (Chernaya Fjord) and particularly C (deep area south of Novaya Zemlya), the Annelida comprised less than half the recorded number of taxa, but a much greater proportion of the recorded number of individuals, suggesting the presence of a few numerically over-abundant taxa within the Polychaeta. The relatively high numbers of taxa and individuals in Faunal Association D possibly reflects the mixed bottom sediment type present, with its large variety of biological niches, as well as the high current velocity turbulence in the Kara Strait, which is thought to result in highly productive waters.

The Shannon-Wiener (H') diversity index was highest at Faunal Association D (Northern Pechora Sea and Kara Strait), with individual station values ranging from 4.54 to 5.84 (Table 2) and lowest at the brackish Faunal Association G (Pechora Bay), with a value of 2.2. This variation in faunal diversity across the sampling area is thought to reflect natural variations in community structures, as a result of the heterogeneous bottom conditions. Since some taxonomic groups were more easily identified to species level than others, such diversity indices should be interpreted with care (see Wu 1982), but do provide a useful across-field comparison.

Dominant species

Table 4 lists the five numerically dominant taxa within the Faunal Associations, as well as the estimated number of individuals per m² and the percentage contribution of each species to the population sampled. The dominant species were ranked according to the number of times the species were amongst the five numerically dominant taxa. Thus, species present in high numbers at only one or a few sampling stations within the faunal association are ranked lower than those which are dominant at all the stations, albeit in lower numbers. This avoids placing emphasis on species which are not representative of the faunal assemblage as a whole.

Faunal Association A (Kolguyev) was dominated by the tube-dwelling sub-surface detritivore *Maldane sarsi* (Polychaeta). The next dominant *Chaetozone setosa* (Polychaeta), also a burrower, is a selective surface deposit feeder, using long palps to collect particles at or

Table 3. Numbers of individuals and taxa recorded from the stations sampled, together with the abundance ratio (A/S - no. individuals / no. species present) and the Shannon-Wiener (H') diversity index.

Faunal association	St. no.	no. individs. $A_{0.5}$*	no. taxa $S_{0.5}$*	$A_{0.5}/S_{0.5}$	Shannon-Wiener H' index
A	3	943	80	12	4.63
	6	843	103	8	5.16
B	11	1657	61	27	4.18
C	8	375	64	6	4.56
	12	737	67	11	3.10
	13	968	57	17	3.61
	14	731	74	10	4.38
D	7	1381	159	9	5.84
	19	1134	99	11	4.88
	20	1070	140	8	5.40
	21	3413	197	17	5.39
E	24	1475	91	16	4.54
F	26	747	70	11	5.09
	27	794	45	18	2.48
G	29	434	11	39	2.19

* Sum of five 0.1 m² replicates

just below the sediment surface. The third dominant taxon *Lumbrineris* spp. (Polychaeta), is an active carnivore and scavenger, equipped with strong jaws. *Pectinaria hyperborea* (Polychaeta) inhabits a hard conical tube constructed of sand grains, and adopts a head-down position, moving through the flocculent surface sediment. *Nuculoma tenuis* (Bivalvia) was also dominant in this faunal association, inhabiting the fine, flocculent surface sediment layers.

Faunal Association B (Chernaya Fjord) contained large numbers of *Chaetozone setosa* and *Thyasira* sp. (Bivalvia), both of which dwell in the flocculent sediment surface layers. *Maldane sarsi* and *Spiochaetopterus typicus* (Polychaeta), the latter secreting a horny tube and feeding from deposited or near bottom suspended material (Barnes 1963; Kuznetsov 1970), were also present in large numbers, buried deep within the underlying glacio-marine clay. *Nuculoma tenuis* was also among the dominant species. There was a notable lack of Echinodermata in this faunal assemblage, which were represented by only a single individual of *Ophiacantha bidentata*. Interestingly, investigations around Svalbard also showed a numerical as well as biomass dominance of *Chaetozone setosa*, *Maldane sarsi*, and *Spiochaetopterus typicus* (Leybson 1939; Kendall & Aschan 1993; Holte & al. 1996).

Table 4. Listing of the five most abundant taxa sampled at the five station groups (A-E) sampled in the Pechora Sea, 1992. No. indicates the calculated number of individuals per m^2 at the faunal association, while % shows the percentage of all individuals recorded from the faunal association represented by the species.

Faunal Association	Rank	Species	Order/Class	No.*	%**
A	1	*Maldane sarsi*	Polychaeta	370	20.72
	2	*Chaetozone setosa*	Polychaeta	80	4.48
	2	*Lumbrineris* spp.	Polychaeta	80	4.48
	4	*Pectinaria hyperborea*	Polychaeta	161	9.01
	4	*Nuculoma tenuis*	Bivalvia	77	4.31
B	1	*Chaetozone setosa*	Polychaeta	750	22.63
	2	*Maldane sarsi*	Polychaeta	346	10.44
	3	*Thyasira* spp.	Bivalvia	296	8.93
	4	*Spiochaetopterus typicus*	Polychaeta	226	6.82
	5	*Hyperammina subnodosa*	Foraminifera	210	6.34
C	1	*Spiochaetopterus typicus*	Polychaeta	452	32.15
	2	*Lumbrineris* spp.	Polychaeta	211	15.01
	3	*Maldane sarsi*	Polychaeta	96	6.83
	4	*Terebellides stroemi*	Polychaeta	43	3.06
	5	*Paraonis gracilis*	Polychaeta	59	4.20
D	1	Cirratulidae indet.	Polychaeta	142	4.06
	2	*Ophiura robusta*	Ophiuroidea	88	2.52
	2	*Spiochaetopterus typicus*	Polychaeta	318	9.09
	4	*Chaetozone setosa*	Polychaeta	96	2.74
	5	*Byblis gaimardi*	Amphipoda	336	9.60
E	1	*Hyperammina subnodosa*	Foraminifera	632	21.69
	2	*Myriochele fragilis*	Polychaeta	512	17.57
	3	Euclymeninae indet.	Polychaeta	222	7.62
	4	*Stegophiura nodosa*	Ophiuroidea	168	5.77
	5	*Owenia fusiformis*	Polychaeta	130	4.46
F	1	*Stegophiura nodosa*	Ophiuroidea	164	10.64
	2	*Ophelia limacina*	Polychaeta	90	5.84
	2	*Hyperammina subnodosa*	Foraminifera	539	34.98
	4	*Leitoscoloplos* sp.	Polychaeta	65	4.22
	5	*Myriochele fragilis*	Polychaeta	58	3.76
G	1	*Pontoporeia femorata*	Amphipoda	330	38.02
	2	*Macoma balthica*	Bivalvia	302	34.79
	3	*Halicryptus spinulosus*	Priapulida	82	9.45
	4	*Diastylis rathkei*	Cumacea	58	6.68
	5	*Marenzelleria* sp.	Polychaeta	54	6.22

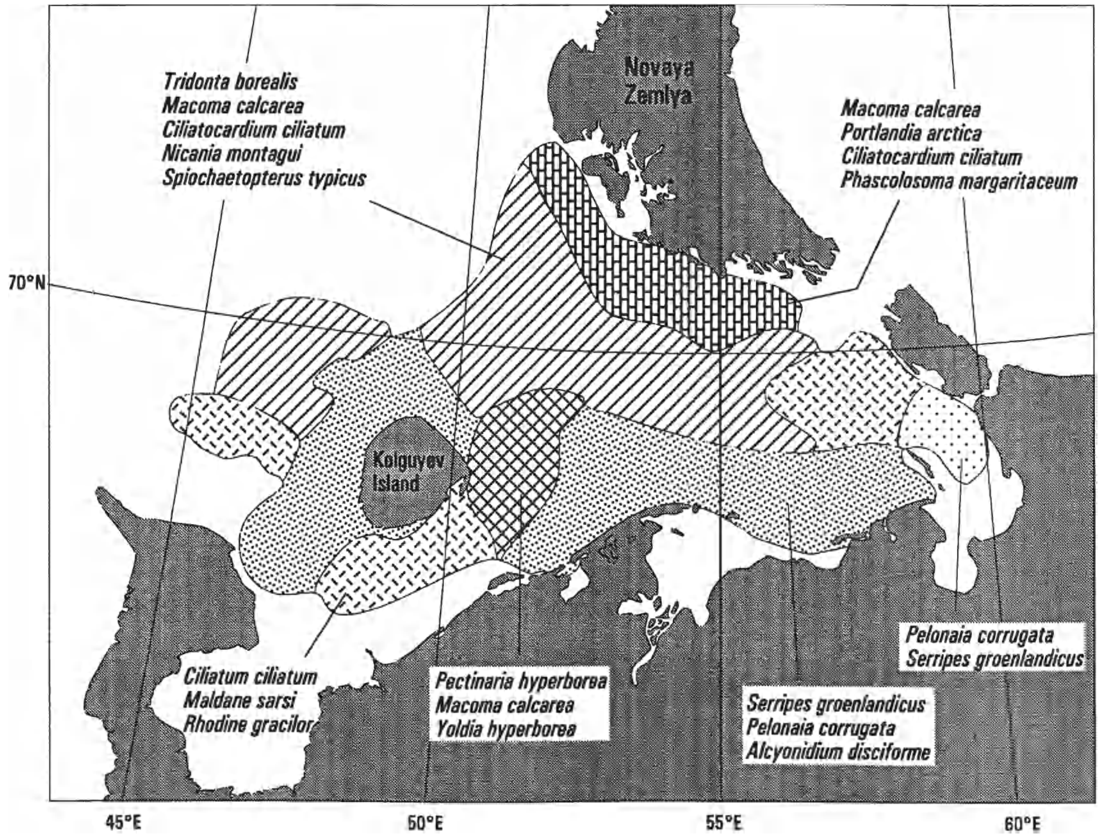

Fig. 6. Benthic biocenoses, or communities in the Pechora Sea (adapted from Zenkewich 1927).

The deep-water Faunal Association C (Southern Novaya Zemlya) was dominated by *Spiochaetopterus typicus*, *Lumbrineris* spp., *Maldane sarsi*, *Terebellides stroemi* (Polychaeta) and *Paraonis gracilis* (Polychaeta). The dominance of the carnivorous *Lumbrineris* spp. in both faunal assemblages B and C indicates a certain similarity in conditions. *Terebellides stroemi* inhabits a vertically oriented burrow, selectively feeding from surface deposits by means of numerous tentacles, while the feeding mode of the much smaller *Paraonis gracilis*, which buries horizontally in the flocculent surface layers, is somewhat obscure (Fauchald & Jumars 1979).

Faunal Association D contained a large number of the encrusting *Balanus* sp. (Crustacea). The majority of the individuals were small and mainly concentrated in a single replicate, indicating a patchy distribution of newly settled individuals not representative of adult populations in the area. The taxon was therefore excluded from the statistical analyses. The burrowing surface deposit feeding family Cirratulidae (Polychaeta) was also abundant. These were small individuals, of several genera including *Aphelochaeta*, and were not further identified due to taxonomic difficulties. *Ophiura robusta* (Echinodermata) is common in the Arctic (D'yakonov 1954) and actively moves over hard substratum, feeding on deposited organic material (Kuznetzov 1970). In common with other stations in the Pechora Sea where there is underlying glacio-marine clay, *Spiochaetopterus typicus* is present in high numbers. *Chaetozone setosa* and *Byblis gaimardi* (Crustacea) were also dominant within this faunal association, the latter thought to be at least partially reliant upon suspension feeding.

The fauna in shallow sandy sediments sampled in Faunal Association E (Dolgiy Island) was dominated by the macrobenthic *Hyperammina subnodosa* (Foraminifera), but the precise role of these animals in the community is still unclear. *Myriochele fragilis* (Polychaeta) and *Owenia fusiformis* (Polychaeta), both of the family Owenidae, were also present in high numbers, the latter species being known to utilise both surface deposit and suspension feeding. Unidentified members of the tube-building family Euclymeninae

(Polychaeta) were also abundant. It should be noted that *Stegophiura nodosa,* which was present in large numbers, is the only taxon of Echinodermata represented within this faunal association.

Faunal Association F (South-eastern Pechora Sea), also a sandy area, was dominated by *Stegophiura nodosa*, which was also common within Faunal Association G. *Hyperammina subnodosa* was present in high numbers, but only at one of the two stations within the faunal association. *Ophelia borealis* (Polychaeta), a non-selective surface deposit feeder inhabiting sandy sediments (Hartmann-Schroeder 1971), was also common in this area, together with *Leitoscoloplos* sp. (Polychaeta), also thought to be a non-selective deposit feeder and active burrower. The precise feeding strategy of *Myriochele fragilis* is unclear, but it is suggested that these worms selectively feed from near-surface sedimentary material (Fauchald & Jumars 1979).

Faunal Association G (Pechora Bay) contained a fauna typical of low salinity environments, low in both numbers of individuals and taxa. *Pontoporeia femorata* (Crustacea) is well documented from Arctic estuaries (Lindström 1992), as is *Macoma balthica* (Mollusca) (Zenkewich 1927). *Halycryptus spinulosus* (Priapulida) was also abundant at this faunal association. In common with benthic investigations in the Rivers Ob and Yenisey (Cochrane & al. 1997), *Diastylis rathkei* (Crustacea) and *Marenzelleria* sp. (Polychaeta) were also among the five most abundant taxa sampled in the Pechora Bay. This faunal assemblage is very reminiscent of that found in the Baltic Sea and the Gulf of Finland (Andersin & al. 1978; Andersin & Sandler 1991).

Six different faunal community types, or biocenoses, have previously been identified in the Pechora Sea (Zenkewich 1927; Brotskaya & Zenkewich 1939). Fig. 6 shows the distribution of these biocenoses and the dominant species. It should again be noted that, while Zenkewich described biocenoses using species biomass as the main criterion, the present investigation uses numerical abundance to describe faunal associations. Although the small number of stations sampled in the present investigation is not sufficient to represent the Pechora Sea benthic fauna as a whole, the faunal assemblages described here show similarities with the distribution of the previously described biocenoses, or faunal community types. East of Kolguyev, the dominant fauna included *Pectinaria hyperborea*, in both this 1992 investigation and that carried out in 1927. The deep area towards the south of Novaya Zemlya comprised a separate faunal group in both investigations, both of which document a dominance of *Maldane sarsi*. Both studies document an abundance of *Spiochaetopterus typicus* in the area extending from the northern part of the Pechora Sea and westwards towards the Kara Strait. The fauna east of Dolgiy Island is considered different to that west of the island in both studies, although the dominant species differ between the two investigations, possibly due to the different methodologies used.

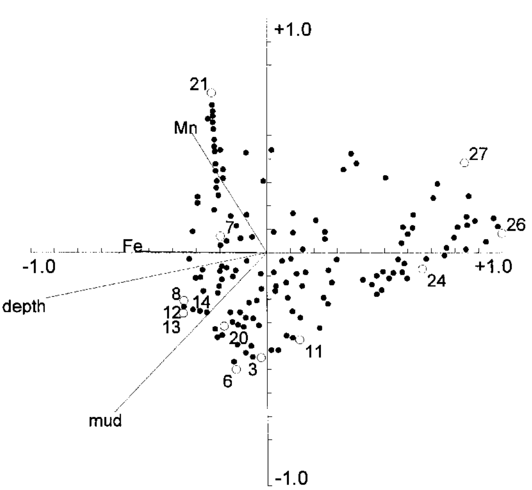

Fig. 7. Canonical correspondence analysis showing the combined plot obtained using all species and station data, together with the four significant environmental variables. 33.6 % of the total inertia in species distribution, and 64.8 % of the relationship between species distribution and environmental variables were explained by axes 1 and 2.

Thus, despite the differences in analytical methodologies and the passage of almost 70 years between the present investigation and that of Zenkewich (1927), the general trends recorded in the benthic fauna are similar. This is not unexpected, as the faunal communities appear to be strongly influenced by physical characteristics in the area. It is encouraging that, despite large differences in methodologies, the faunal trends identified in this survey are in general agreement with those previously described. In the sequel to this article, it will be possible to make firmer comparisons, as the analyses are based on identical sampling stations and times.

Abiotic factors influencing benthic community structure.

To test the relationship between biological and physical characteristics, various correspondence analyses were carried out on the species data and selected environmental parameters. Oceanographic data was not used, as information was only available for summer conditions. As for MDS, the brackish Station 29 was removed from the analyses.

PCA was first carried out to identify closely correlated environmental variables. As might be expected,

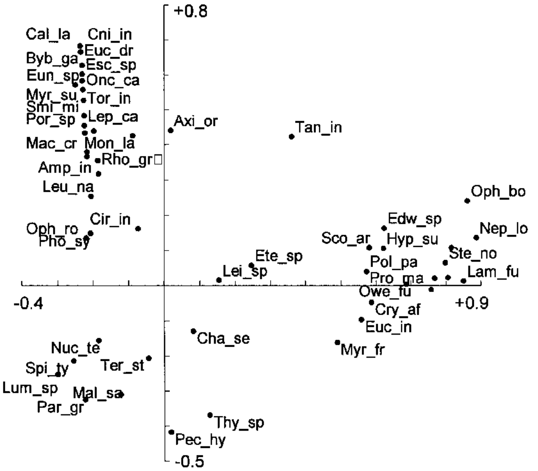

Fig. 8. Detail of CCA combined plot, showing species with more than 50 % inertia explained by the first two axes, together with the five numerically most abundant species at each of the faunal associations. See text for abbreviations.

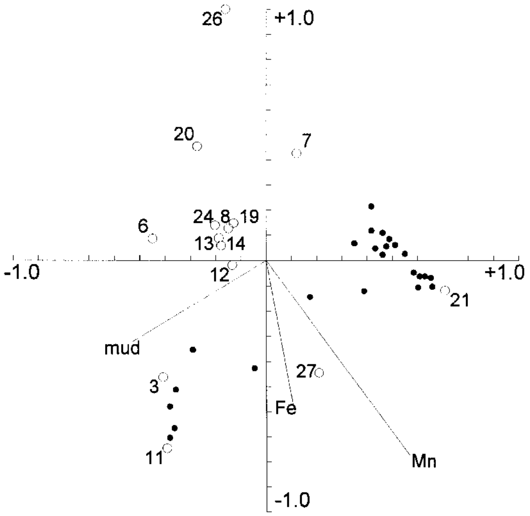

Fig. 9. Combined CCA plot with depth as a co-variable, showing stations (open circles) together with species with more than 50 % inertia explained by the first two axes (solid circles). Inertia and species-environment relationship as Fig. 6.

mud (defined as sediment granules less than 63 µm in diameter) was closely correlated with TOC, as well as the metals Cd, Cr, Pb, Ni, Zn, Al, and Li. Thus, in the subsequent analyses, the term 'mud' represents all these variables. TN was closely correlated with iron content, thus these two variables are represented under the heading Fe. Depth and Mn are independent variables. Fe was best accounted for on Axes 1 and 3, and will not be considered further on Axis 2.

CCA was carried out using the full species matrix, combined with depth, 'mud', Mn and Fe (Fig. 7). Almost 52 % of the species data is explained by the first four axes. This plot separated the shallow sandy Stations 24, 26, and 27 on the first axes, as being inversely correlated with both depth and mud. On the second axis, Station 21 was separated as before, but was also correlated with a high Mn content. Stations 8, 12, 13, and 14 were correlated with both depth and mud, while Stations 3, 6, and 20 showed an intermediate relation to mud. Species with more than 50 % inertia explained by axes 1 and 2, and most strongly associated with Stations 24, 26, and 27 include *Ophelina borealis* and S*tegophiura nodosa* (Fig. 8). These species are therefore inversely correlated with muddy sediments and water depth. *Maldane sarsi* showed an affinity for muddy sediments and also, to some extent, depth. The species most strongly and uniquely associated with Station 21 include members of the encrusting suspensivorous Bryozoa. Using depth as a co-variable gave the same significant environmental variables as without a co-variable. The inertia, or variance, of Mn was not accounted for by Axes 1 and 2 to the same extent as the other variables, so care should be taken when interpreting the contribution of Mn in community composition.

Since sediment granulometry, and therefore also metallic content, may be to a certain degree depth-related, care should be taken to avoid 'false associations' between variables. However, certain patterns were evident when removing depth as a variable for the CCA's (Fig. 9). Only Stations 21 and 11 had strongly associated species, and Station 21 still appeared inversely correlated with muddy sediment. Stations 8, 12, 13, 14, 19, and 24 are clumped together, without any closely associated species, while the remainder of the stations occupied scattered positions along the second axis. This grouping of stations of differing granulometric composition indicates that mud content is not the major or sole influential factor. Examination of the third axis (not shown) removed Stations 19 and 24 from this group, leaving Stations 8, 12, 13, and 14 in a discrete group, precisely those stations which form Faunal Association C. On the third axis, Stations 8, 12, 13, and 14 were associated with iron, and therefore also nitrogen-rich sediments, but otherwise the cause of this grouping is not entirely clear. Of the environmental variables analysed, Stations 24, 26, and 27 along the southern coast of the Pechora Sea appeared to be most influenced by water depth.

In conclusion, the CCA's indicate that depth and, to a lesser extent, sediment grain size profoundly influence the structure of the benthic communities, although

Stations 11 and 21 appeared to be influenced by other factors. This is likely to reflect the peculiarities of these sites, the former occupying the inner part of a sill fjord, while the latter is located in a rocky area with a high current velocity. This is also indicated by the species associated with these stations, with opportunistic species such as *Thyasira sarsi* and *Capitella capitata* (Polychaeta), which are often associated with a certain degree of environmental stress (Pearson & Rosenberg 1978; Pearson & al 1982, 1983; Pearson & al. 1995), strongly associated with Station 11 (Association B), and a variety of suspensivores strongly associated with Station 21.

By analogy with the known habitats of other Lucinacea (Dando & al. 1985), *Thyasira sarsi* may inhabit the redox interface between oxic and anoxic sedimentary conditions, utilising symbiotic sulphate reducing bacteria. In Chernaya Fjord, this is likely to reflect a low bottom water exchange rate, due to the shallow sill at the mouth of the fjord. The stations in the deep area south of Novaya Zemlya (Association C) appeared strongly inter-related, mainly by depth, but possibly also by a combination of other variables. Within Faunal Association D (Northern Pechora Sea & Kara Strait), there was considerable variation in both dominant and strongly associated species between the individual stations, which is likely to be due to heterogeneous sedimentary conditions. This may not be fully evident from the sediment surface granulometry data presented in Table 1, as these samples were taken for contaminant analyses and excluded larger stones or rocks. Qualitative assessment of the samples noted the presence of large stones covered by encrusting organisms, with interstitial fine sediment, inhabited by the smaller, soft-bodied animals. This uneven substratum is likely to give rise to a patchy faunal distribution.The specimens of *Maldane sarsi* and *Spiochaetopterus typicus* found in this study were often buried deep within the glacio-marine clay which is present over large parts of the study area, thus the distribution of these species may be related to sedimentary conditions. The strong influence of bottom topography and sediment composition on benthic community structure in Arctic areas is a well documented phenomenon (see Grebmeier & al. 1989).

Thus it is suggested that the benthic fauna in the Pechora Sea is strongly influenced by abiotic factors, such as depth, water masses, temperature, salinity, current speed, and sediment granulometry. Since there is little evidence of significant levels of metal or organic micro-contaminants in the sediments sampled (Loring & al. 1995), it is suggested that natural physical conditions in the area most influence the benthic community structure.

Taxonomic difficulties and literature availability

Some difficulties were experienced in species identification of the Pechora Sea material. The taxonomic knowledge of certain species, or even families is at best incomplete, and several new or little known species may be present. For example, the *Lumbrineris* (Polychaeta: Lumbrineridae) specimens collected did not entirely conform to the widely available species descriptions. A fitting description exists of a species not subsequently reported, highlighting the need to research the lesser-known literature. Also, examination of feature variability in this taxon suggests that the diagnostic characters should be revised (E. Oug, pers. commn). Similarly, the specimens of *Chone* (Polychaeta: Sabellidae) found in this study also warrant further taxonomic study. Much of the taxonomic literature of relevance to the Pechora Sea is published in Russian, and has until recently been difficult to access for non-Russian readers. Some concern has arisen that 'double descriptions' may have occurred, as a result of Russian and other taxonomists working in isolation of each other. Such gaps in knowledge may in time be filled through continued co-operation between taxonomists. It is hoped that the full species list presented in the Appendix will provide a basis for such discussions.

ABBREVIATIONS

Amp_in: Ampharetidae indet., Axi_or: *Axinopsida orbiculata*, Byb_ga: *Byblis gaimardi*, Cal_la: *Callopora lata*, Cha_se: *Chaetozone setosa*, Cir_in: Cirratulidae indet., Cni_in: Cnidaria indet., Cry_cl: *Cryptonatica affinis*, Edw_sp: *Edwardsia* sp., Esc_sp: *Escharella* sp., Ete_sp: *Eteone* sp. Euc_dr: *Euclymene droebachiensis*, Euc_in: Euclymeninae indet., Eun_sp: *Eunoe* sp., Hyp_su: *Hyperammina subnodosa*, Lam_fu: *Lamprops fuscatus*, Nuc_te: *Nuculoma tenuis*, Lei_sp: *Leitoscoloplos* sp., Lep_ca: *Lepeta caeca*, Leu_na: *Leucon nasica*, Lum_sp: *Lumbrineris* spp., Mac_ca: *Macoma calcarea*, Mal_sa: *Maldane sarsi*, Mon_la: *Monoculodes latimanus*, Myr_su: *Myriapora subgracilis*, Myr_fr: *Myriochele fragilis*, Nep_lo: *Nephtys longosetosa*, Onc_ca: *Oncousoecia canadensis*, Oph_li: *Ophelia borealis*, Oph_ro: *Ophiura robusta*, Owe_fu: *Owenia fusiformis*, Par_gr: *Paradoneis gracilis*, Pec_hy: *Pectinaria hyperborea*, Pho_sy: *Pholoe synopthalmica*, Pol_pa: *Polynices pallida*, Por_sp: *Porella* sp., Pro_ma: *Proclea malmgreni*, Rho_gr: *Rhodine gracilior*, Sco_ar: *Scoloplos armiger*, Smi_mu: *Smittina minuscula*, Spi_ty: *Spiochaetopterus typicus*, Ste_no: *Stegophiura nodosa*, Tan_in: Tanaidacea indet., Ter_st: *Terebellides stroemi*, Thy_sp: *Thyasira* sp., Tor_in: Tornidae indet.

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REFERENCES

AMAP 1993. The Monitoring Programme for the Arctic Monitoring and Assessment Programme (AMAP). – *AMAP report* 93:3. Oslo, Norway.

Andersin, A.B. & H. Sandler 1991. Macrobenthic fauna and oxygen deficiency in the Gulf of Finland. – *Memoranda Societas pro Fauna et Flora Fennica* 67:3-10.

Andersin, A.B., J. Lassig, L. Parkkonen & H. Sandler 1978. The decline of macrofauna in the deeper parts of the Baltic proper and the Gulf of Finland. – *Kieler Meeresforschung* 4:23-52.

Antipova, T.V. 1975. Distribution of benthos biomass in the Barents Sea. – *PINRO Proceedings, Murmansk* 35:121-124. (in Russian)

Antipova, T.V., N.V. Denisenko, V.N. Semenov 1989. Distribution of benthic species and problems of biogeographic regionalisation of North Seas. – Pp. 146-157 in: Scarlato, O.A. & G.G. Matishov (eds). *Life and environment of the Polar Seas*. Leningrad. *Nauka*. (in Russian)

Barnes, R.D. 1963. *Invertebrate Zoology*. – W.B. Saunders Company. Pp. 499-503.

Braak, C.F.J. ter 1987-1992. *CANOCO - a Fortran program for Canonical Community Ordination*. – Microcomputer Power, Ithaca, New York:95 pp.

Bray, J.R. & J.T. Curtis 1957. An ordination of the upland forest communities of southern Wisconsin. – *Ecological Monographs* 27:325-349.

Brotzkaya, V.A. & L.A. Zenchewitch 1939. Quantitative estimation of the bottom fauna of the Barents Sea. – *Proceedings of VNIRO* 4:3-150.

Cochrane, S.J., L. Kjeldstrup, R. Palerud & S. Dahle 1997. Preliminary studies of benthic faunal communities in the estuaries of Ob and Yenisey (extended abstract). – Pp. 64-65 in: Volkov, V., G.J. Koshleva, V. Smoljanitski & T. Vinje (eds). *Natural conditions of the Kara and the Barents Seas. Proceedings of the Russian-Norwegian Workshop-95*. Norwegian Polar Institute Report Series 97.

Czekanowski, J. 1909. Zur differential Diagnose der Neandertalgruppe. – *Korrespondenzblatt der Deutsche Gesellschaft für Anthropologie* 40:44-47.

D'yakonov, A.M. 1954. Ophiuroids of the USSR Seas. – *Zoological Institute of the Academy of Sciences of the USSR* 55:1-123.

Dando, P.R., A.J. Southward, N.B. Twerlliger & R.C. Twerlliger 1985. Sulphur oxidising bacteria and haemoglobin in gills of the bivalve mollusc *Myrtea spinifera*. – *Marine Ecology Progress Series* 23:85-98.

Denisenko, S.G. & N.V. Denisenko 1995. The south-eastern part of the Barents Sea: Possibility of investigations for long-term changes of the bottom fauna under climatic fluctuations. – Pp. 28-29 in: Matishov, G., K.Galaktionov, A.Chinarina, S.G. Denisenko, N.V. Denisenko, V.Zenzerov (eds). *Modern state and perspective of ecosystem studies of the Barents, Kara and Laptev Seas*. Murmansk. (in Russian)

Denisenko, S.G., N.V. Denisenko, E.A. Frolova, N.A. Anisimova, H. Sandler & S. Dahle 1997. Modern state of the benthic fauna and benthic community structure in the Pechora Sea. – In: Volkov, V., G.J. Koshleva, V. Smoljanitski & T. Vinje (eds). *Natural conditions of the Kara and the Barents Seas. Proceedings of the Russian-Norwegian Workshop-95*. Norwegian Polar Institute Report Series 97.

Denisenko, S.G., N.V. Denisenko & S. Dahle 1995. Baseline Russian investigations of the bottom fauna in the southeastern part of the Barents Sea. – Pp. 293-302 in: Skjoldal, H.R., C. Hopkins, K.E. Erikstad &H.P. Leinaas (eds). *Ecology of Fjords and Coastal Waters*, Elsevier Science B.V.

Fauchald, K. & P.A. Jumars 1979. The diet of worms: a study of polychaete feeding guilds. – *Oceangraphy and Marine Biology Annual Review* 17:193-284.

Fieler, R., M.J. Greenacre & T.H. Pearson 1994. *Evaluation and development of statistical methods*. – Akvaplan-niva report no. 92.347.01.03, 71pp + appendix.

Galkin, Y.I. 1979. The history of bottom fauna research in the Barents Sea. – Pp. 112-127 in: Kuznetsov, A.P. (ed.). *Ecology of the sea shelf benthic fauna and flora*. Institute of Oceanology, USSR Academy of Science. Moscow..

Galkin, Y.I. 1980. The history of the bottom fauna study in the Barents Sea. – Pp. 112-127 in: Kusnetsov, A.P. (ed.). *Ecology of the bottom fauna population at the shelf zone*. Shirshov Institute of Oceanology of the Academy of Science of the USSR, Moscow. (in Russian)

Grebmeier, J.M., H.M. Feder & C.P. McRoy 1989. Pelagic-benthic coupling on the shelf of the northern Bering and Chukchi Seas. II. Benthic community structure. – *Marine Ecology Progress Series* 51:253-268.

Greenacre, M.J. 1984. *Theory and applications of correspondence analysis*. – Academic Press, London. 364 pp.

— 1993. *Correspondence analysis in practice*. – Academic Press, London. 192pp.

Hartmann-Schroeder, G. 1971. Annelida, Börstenwörmer, Polychaeta. – *Tierwelt Deutschlands* 58:594 pp.

Holte, B., S. Dahle, B. Gulliksen, & K. Næs 1996. Some macrofaunal effects of local pollution and glacier-induced sedimentation, with indicative chemical analyses, in the sediments of two Arctic fjords. – *Polar Biology* 16:549-557.

Jongman, R.H.G., C.J.F. ter Braak & O.F.R. van Tongeren 1987. *Data analysis in community and landscape ecology.* – Pudoc, Wageningen. 299pp.

Kendall, M.A. & M. Aschan 1993. Latitudinal gradients in the structure of macrobenthic communities: a comparison of arctic, temperate and tropical sites. – *Journal of Experimental Marine Biology and Ecology* 172:157-169.

Klenova, M.V. 1960. *Geology of the Barents Sea.* – Akademika Nauk SSR, Moscow. 355pp.

Kuznetsov, A.P. 1970. Patterns of distributions of bottom invertebrates trophic groups in the Barents Sea. – *Proceedings of the Oceanographic Institute,* 88:5-80. (in Russian)

Leybson 1939. Quantitative analyses of the benthic fauna from the Notovsky Bay, W. Murman. – *Proceedings of VINRO* 4:128-192. (in Russian)

Lindström, M. 1992. The migration behaviour of the amphipod *Pontoporeia affinis* Lindström. – *Walter and Andrée de Nottbeck Foundation scientific reports* 7:1-18.

Lisitsin, A.I. & G.B. Udintsev 1955. A new type of grab. – *Trudy Vsesoyuznogo gidrobiologicheskogo obshchestva* 6:217-222. (in Russian)

Loring, D.H., K. Næs, S. Dahle, G.G. Matishov & G. Illin 1995. Arsenic, trace metals and organic microcontaminants in sediments from the Pechora Sea, Russia. – *Marine Geology* 128:153-167.

Matishov, G.G. 1992. An international ecological expedition in the Pechora Sea, Novaya Zemlya, Vaygach, Kolguyev and Dolgiy Islands. July 1992. – *MMBI report, Russian Academy of Sciences, Apatity, Russia.* 39 pp.

Matishov, G.G., G. Illin & D.G. Matishov 1993. Oceanographic situation in the Pechora Sea in summer. – *MMBI report, Russian Academy of Sciences, Apatity, Russia*: 30 pp.

Midttun, L. & H. Loeng 1987. Climatic variations in the Barents Sea. – Pp. 13-27 in: Loeng, H. (ed.). *The effect of Oceanographic conditions on distribution and population dynamics of commercial fish stocks in the Barents Sea. - Proceedings of the third Soviet-Norwegian Symposium, Murmansk, 26-28 May, 1986.* Institute of Marine Research, Bergen.

Milliman, J.D. & J.P.M. Syvitski 1992. Geomorphic/tectonic control of sediment discharge to the oceans: The importance of small mountainous rivers. – *Journal of Geology* 100:525-544.

Möbius, K. 1877. *Die Auster und die Austerwirtschaft.* – Berlin. 59pp.

Pavlov, V.K. & S. Phirman 1995. Hydrographic structure and variability of the Kara Sea: Implications for pollutant distribution. – *Deep Sea Research* 42(6):1369-1390.

Pearson, T.H., J. Blackstock & J.A. Duncan 1995. Productivity of organically enrichred ecosystems. – *SEAS Ltd report* No. SR100. Oban, Scotland. Part 1. 48pp.

Pearson, T.H., G. Duncan & J. Nuttal 1982. The Loch Eil Project: population fluctuations in the macrobenthos. – *Journal of experimental Marine Biology and Ecology* 56:305-321.

Pearson, T.H., J.S. Gray & P.J. Johanessen 1983. Objective selection of sensitive species indicative of pollution-induced change in benthic communities. 2. Data analyses. – *Marine Ecology Progress Series* 12:237-255.

Pearson, T.H. & R. Rosenberg 1978. Macrobenthic succession in relation to organic enrichment and pollution of the marine environment. – *Oceanography and Marine Biology Annual Review* 16:229-331.

Petersen, C.G.J. 1914. Valuation of the sea II. The animal communities of the sea bottom and their importance for marine zoogeography. – *Report of the Danish Biological Station* 21:1-44.

Pfirman, S., J.W. Kögeler & B. Anselme 1995. Coastal environments of the Western Kara and Eastern Barents Seas. – *Deep Sea Research* 42(6):1391-1412.

Rohlf, F.J. 1989. *NTSYS-pc. - Numerical Taxonomy and Multivariate Analysis System.* – Exeter Publishing Ltd, New York.

Smilaur, P. 1992. *CANODRAW - a companion program to CANOCO for publication-quality graphical input.* – Microcomputer Power, Ithaca, New York. 33 pp.

Smith, J.N., K.M. Ellis, K. Næs, S. Dahle & D. Matishov 1995. Sedimentation and mixing rates of fallout radionuclides in Barents Sea sediments off Novaya Zemlya.– *Deep Sea Reerarch* 42(6):1476-1493.

Veen, J. van 1933. Onderzoek naar het zandtransport von rivieren. – *De Ingenieur* 48:151-159.

Vinogradova, P.S. & V.N. Litvin 1960. Studies of bottom relief and sediments in the Barents and Norwegian Seas. – *Poljaryi Naucuno-Issledovatelskij Institute* 101-110.

Wassmann, P. & D. Slagstad 1991. Annual dynamics of carbon flux in the Barents Sea: preliminary results. – *Norsk Geologisk Tidsskrift* 71:231-234.

Wu, R.S.S. 1982. Effects of taxonomic uncertainty on species diversity indices. – *Marine Environmental Research* 6:215-225.

Zenkewich, L.A. 1927. Quantitative estimation of the bottom fauna of the Pechora region of the Barents Sea and the White Sea. – *Proceedings of the Floating Marine Scientific Institute* 2:3-64.

— 1963. *The Biology of the Seas of the USSR.* – Academy of Science of the USSR, Moscow, Russia. 739 pp.

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Appendix. Species list of benthic fauna sampled in the Pechora Sea, 1992.

	3	6	7	8	11	12	13	14	19	20	21	24	26	27	29	sum
SARCOMASTIGOPHORA																
Astorhizidae																
Hyperammina subnodosa Brady, 1884	-	15	-	37	105	32	-	-	-	9	-	316	28	511	-	1053
PORIFERA																
Porifera indet.	1	1	-	-	-	-	-	2	-	-	-	-	-	-	-	4
CNIDARIA																
Cnidaria indet.	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	1
HYDROZOA																
Hydrozoa indet.	9	14	20	3	-	2	-	3	14	10	3	1	2	-	-	81
Monobranchia parasiticum Mereschkowsky, 1877	5	6	-	-	-	-	-	-	-	-	-	-	-	-	-	11
ANTHOZOA																
Anthozoa indet.	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	2
Actiniaria indet.	-	1	-	-	-	-	-	3	-	1	-	-	-	-	-	5
Capnella glomerata (Verill, 1869)	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-	3
Cerianthus lloydii Gosse, 1859	2	7	4	-	-	-	1	2	15	-	3	-	-	-	-	34
Cerianthus sp.	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	2
Edwardsia sp.	1	-	-	-	-	-	-	-	-	-	7	19	10	10	-	47
Edwardsiidae indet.	2	6	5	-	-	-	-	-	10	14	1	3	3	-	-	44
NEMERTINI																
Nemertini indet.	5	5	1	4	7	-	2	5	10	3	5	5	9	8	10	78
NEMATODA																
Nematoda indet.	-	-	2	2	-	-	-	-	-	-	1	23	4	-	-	32
SIPUNCULIDA																
Sipunculida indet.	4	1	-	-	2	-	-	-	-	2	2	-	-	-	-	11
Phascolion strombus (Montagu, 1804)	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-	3
Golfingia margaritacea (M. Sars, 1851)	-	9	7	-	2	-	-	-	9	1	1	-	-	-	-	28
Golfingia sp.	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	1
PRIAPULIDA																
Priapulida indet.	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	1
Halicryptus spinulosus Siebold, 1849	-	-	-	-	-	-	-	-	-	1	-	-	-	-	41	42
Priapulus caudatus Lamarck, 1816	5	4	-	3	3	3	-	1	-	-	2	1	-	-	-	22
ECHIURA																
Echiurida indet.	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	2
Echiurus echiurus Pallas, 1780	1	-	-	-	-	-	-	-	-	-	3	1	-	-	-	5
ANNELIDA																
Polychaeta																
Polynoidae																
Polynoidae indet.	3	7	20	1	2	-	-	-	3	19	-	-	-	-	-	54
Eunoe sp.	-	-	-	-	-	2	-	-	-	-	14	-	-	-	-	16
Gattyana sp.	1	3	-	-	-	-	-	-	-	1	4	-	-	-	1	10

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Harmothoe sp.	-	3	-	-	-	-	-	-	-	-	3	1	-	-	1	8
Nemidia torelli Malmgren, 1866	3	5	-	-	-	-	-	-	3	1	-	-	-	-	-	12
Pholoe synopthalmica Claparède, 1868	-	-	16	2	8	6	17	9	15	33	69	1	-	-	-	176
Phyllodocidae																
Phyllodocidae indet.	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Eteone sp.	5	-	6	1	22	-	4	-	3	5	23	10	20	8	-	106
Phyllodoce groenlandica F.P. Örsted, 1842	4	1	1	-	-	-	1	-	8	3	3	8	8	-	-	37
Hesionidae																
Kefersteinia cirrata (Keferstein, 1862)	-	-	-	-	-	-	1	-	-	-	1	-	-	-	-	2
Nereimyra punctata (O.F. Müller, 1776)	-	-	-	-	103	-	-	-	-	-	-	-	-	-	-	103
Syllidae																
Autolytus sp.	-	-	-	-	-	1	-	-	-	-	1	-	-	-	-	2
Eusyllis blomstrandi Malmgren, 1867	-	-	1	1	-	1	-	-	-	1	-	-	-	-	-	4
Langerhansia cornuta (Rathke, 1843)	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	1
Nereidae																
Hediste diversicolor O.F. Müller, 1776	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	1
Nereis zonata Malmgren, 1867	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	2
Glyceridae																
Glycera capitata Oersted, 1843	-	-	-	-	-	-	-	-	-	5	-	-	-	-	-	5
Glycera lapidum Quatrefages, 1865	-	-	14	-	-	-	-	-	-	6	17	-	-	-	-	37
Nephtyidae																
Micronephtys minuta (Théel, 1879)	-	-	-	-	-	-	-	-	-	-	2	-	3	-	-	5
Nephtys ciliata (Müller, 1776)	2	1	-	-	-	-	-	-	-	1	-	-	-	-	-	4
Nephtys longosetosa Örsted, 1842	-	-	-	-	-	-	-	-	-	-	-	8	20	11	-	39
Nephtys pente Rainer, 1984	-	-	-	-	-	-	-	1	-	-	-	-	-	-	1	
Sphaerodoridae																
Sphaerodorum sp.	-	-	-	-	-	1	-	1	-	2	1	-	-	-	-	5
Lumbrineridae																
Lumbrineris spp.	27	53	21	65	-	31	199	127	25	4	8	-	-	-	-	560
Onuphidae																
Nothria conchylega (M. Sars, 1835)	-	-	-	-	-	-	-	-	-	8	2	-	-	-	-	10
Dorvellidae																
Parougia sp.	-	-	-	-	-	-	-	-	-	65	1	1	-	-	-	67
Protodorvillea kefersteini (McIntosh, 1869)	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	1
Orbinidae																
Leitoscoloplos sp.	50	24	12	13	-	1	15	5	-	17	56	30	31	34	-	288
Orbinia cuvieri (Audouin & M.-Edwards, 1833)	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	3
Scoloplos armiger (O.F. Müller, 1776)	-	-	2	-	-	-	-	-	-	-	3	8	8	-	-	21
Paraonidae																
Paraonidae indet.	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	1
Aricidea sp.	2	-	3	3	33	1	14	-	-	3	7	-	-	1	-	68

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Paraonis gracilis (Tauber, 1879)	24	95	18	6	3	16	80	15	4	9	3	-	-	-	-	273
Paradoneis lyra (Southern, 1914)	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	3
Cossuridae																
Cossura sp.	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	2
Apistobranchidae																
Apistobranchus tullbergi (Théel, 1879)	-	1	1	-	-	-	-	-	-	1	-	-	-	-	-	3
Apistobranchus sp.	15	2	-	3	-	1	-	2	-	-	7	-	1	3	-	34
Spionidae																
Spionidae indet.	-	-	-	-	-	-	-	-	-	1	2	-	-	-	-	3
Laonice cirrata (M. Sars, 1851)	1	-	-	2	-	1	-	-	1	-	-	-	-	-	-	5
Marenzelleria sp.	-	-	-	-	-	-	-	2	-	-	-	-	17	5	27	51
Polydora caeca/flava	-	-	-	-	-	3	-	-	-	2	-	-	-	-	-	5
Polydora socialis (Schmarda, 1861)	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	1
Polydora sp.	-	-	-	-	72	-	24	2	1	-	48	-	2	-	-	149
Spio decoratus Bobretzky, 1871	4	-	-	2	-	1	-	-	1	35	-	-	-	-	45	
Spio sp.	-	-	6	-	-	-	-	-	-	-	-	-	-	-	-	6
Chaetopteridae																
Spiochaetopterus typicus M. Sars, 1856	1	32	206	70	113	407	288	139	193	236	2	-	-	-	-	1687
Cirratulidae																
Cirratulidae indet.	11	9	35	7	97	5	6	11	26	20	203	36	-	4	-	470
Chaetozone setosa Malmgren, 1867	49	31	55	5	375	2	16	-	5	10	122	52	20	14	-	756
Cirratulus sp.	-	2	-	-	2	-	-	1	-	-	-	-	-	-	-	5
Capitellidae																
Capitella capitata (O. Fabricius, 1780)	-	1	1	-	25	-	-	1	3	-	11	2	-	5	-	49
Heteromastus filiformis (Claparède, 1864)	4	8	-	5	1	-	-	11	5	28	2	-	-	-	67	
Mediomastus sp.	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	1
Notomastus sp.	-	-	10	-	-	-	-	-	-	2	1	-	-	-	-	13
Maldanidae																
Maldanidae indet.	1	3	10	1	12	-	-	-	-	-	-	6	-	-	-	33
Euclymeninae indet.	9	7	1	-	-	-	-	-	-	-	3	111	4	-	-	135
Axiothella sp.	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Clymenura sp.	5	1	19	-	-	-	-	-	10	-	20	7	24	-	-	86
Euclymene droebachiensis (M. Sars in G.O. Sars, 1872)	-	-	-	-	-	-	-	-	1	-	50	-	-	-	-	51
Lumbriclymene cylindricaudata Sars, 1872	-	-	-	-	-	4	-	-	-	-	1	-	-	-	-	5
Maldane sarsi Malmgren, 1865	184	136	58	21	173	47	61	62	170	15	8	-	-	-	-	935
Nicomache sp.	-	-	3	-	-	-	-	-	18	1	13	-	-	-	-	35
Praxillella praetermissa (Malmgren, 1865)	16	1	-	-	-	-	-	-	-	-	-	-	-	-	-	17
Praxillella sp.	-	-	-	-	-	1	-	-	-	-	-	4	6	1	-	12
Praxillura longissima Arwidsson, 1907	-	-	7	-	-	-	-	-	1	-	-	-	-	-	-	8
Rhodine gracilior Tauber, 1879	70	2	40	-	-	1	-	-	4	-	221	-	-	-	-	338
Opheliidae																

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Ophelia borealis (Rathke, 1843)	-	-	-	-	-	-	-	-	-	-	4	4	44	46	-	98
Ophelina acuminata Oersted, 1843	1	-	-	-	-	-	-	-	-	-	1	-	-	-	-	2
Travisia forbesii Johnston, 1840	-	-	-	-	-	-	-	-	-	-	-	16	6	1	-	23
Scalibregmidae																
Scalibregma inflatum Rathke, 1843	7	8	7	11	23	1	4	2	-	5	1	4	-	-	-	73
Owenidae																
Galathowenia oculata (Zachs, 1923)	13	55	30	2	-	2	4	11	8	3	19	258	47	4	-	455
Myriochele danielsseni Hansen, 1879	-	2	-	3	2	-	-	-	-	-	-	-	-	-	-	7
Myriochele heeri Malmgren, 1867	-	-	-	-	-	24	94	82	-	-	-	-	-	-	-	200
Owenia fusiformis delle Chiaje, 1841	-	-	-	-	-	-	-	11	1	-	4	65	54	3	-	138
Flabelligeridae																
Flabelligeridae indet.	-	-	1	-	-	-	-	-	-	1	-	-	-	-	-	2
Brada sp.	-	1	-	-	2	1	1	-	1	1	-	19	-	-	-	26
Diplocirrus hirsutus (Hansen, 1879)	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	1
Pherusa sp.	1	-	-	-	2	-	-	-	-	-	-	6	-	-	-	9
Pectinariidae																
Pectinaria hyperborea (Malmgren, 1866)	150	11	-	2	3	-	1	1	-	1	-	15	-	-	-	184
Ampharetidae																
Ampharetidae indet.	-	-	1	-	-	-	-	1	-	5	4	1	1	-	-	13
Ampharete acutifrons (Grube, 1860)	1	1	-	1	-	-	-	-	-	2	-	1	-	-	-	6
Ampharete baltica Eliason, 1955	-	3	-	-	-	-	4	2	-	-	1	30	3	-	-	43
Ampharete finmarchica (M. Sars, 1866)	-	2	6	4	-	3	3	9	-	1	-	-	2	-	-	30
Ampharete goesi (Malmgren, 1966)	-	-	5	-	-	-	-	-	-	2	1	-	-	-	-	8
Ampharete lindstroemi Malmgren ,1867	-	-	-	-	-	-	-	-	-	-	5	-	-	-	-	5
Ampharete sp.	-	-	-	-	-	-	3	-	-	5	-	-	-	-	-	8
Amphicteis sundevalli Malmgren, 1866	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	2
Anobothrus gracilis (Malmgren, 1866)	-	4	48	-	-	-	-	1	3	13	23	1	-	-	-	93
Artacama proboscidea Malmgren, 1866	5	-	-	-	-	-	-	1	-	-	-	-	-	-	-	6
Lysippe labiata Malmgren, 1866	-	3	56	4	2	2	4	10	6	20	32	-	-	-	-	139
Melinna cristata (M. Sars, 1851)	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	1
Sabellides borealis M. Sars, 1856	-	-	-	-	5	-	-	-	-	-	-	1	-	-	-	6
Terebellidae																
Terebellidae indet.	-	-	2	-	3	-	-	-	1	1	1	3	-	-	-	12
Amaeana trilobata (M. Sars, 1863)	-	-	-	-	-	-	-	-	-	-	7	-	-	-	-	7
Amphitrite cirrata O.F. Müller, 1771	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	1
Lanassa venusta (Malm, 1874)	-	-	1	-	-	-	-	-	-	-	1	-	-	-	-	2
Laphania boecki Malmgren, 1866	-	-	19	-	-	-	3	-	1	7	3	-	-	-	-	33
Leaena ebranchiata M. Sars, 1865	-	1	3	2	2	-	-	-	-	3	5	-	-	-	-	16
Lysilla loveni Malmgren, 1865	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	1
Neoamphitrite affinis (Malmgren, 1866)	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	2
Nicolea zostericola Ørsted in Grube, 1860	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	1

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Paramphitrite tetrabranchia Holthe, 1976	-	-	1	-	-	-	-	-	-	-	2	-	-	-	-	3
Pista cristata O.F. Müller, 1776	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	1
Polycirrus sp.	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	1
Proclea malmgreni (Ssolowiew, 1899)	2	2	-	-	-	-	-	-	-	-	-	4	15	4	-	27
Thelepus cincinnatus (O. Fabricius, 1780)	-	-	-	-	-	-	-	-	-	7	-	-	-	-	-	7
Trichobranchidae																
Terebellides stroemi M. Sars, 1835	4	7	18	16	43	6	28	35	4	16	6	36	-	-	-	219
Sabellidae																
Sabellidae indet.	-	-	3	2	3	-	-	-	-	-	-	1	-	-	-	9
Chone duneri Malmgren, 1867	-	-	-	-	23	-	-	-	-	-	48	2	-	-	-	73
Chone filicaudata Southern, 1914	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	1
Chone infundibuliformis Krøyer, 1856	-	-	1	-	-	-	-	1	1	-	1	-	-	-	-	4
Chone paucibranchiata (Krøyer, 1856)	-	-	-	-	-	-	-	-	-	-	4	-	-	-	-	4
Chone sp.	1	1	2	-	-	-	-	2	5	3	-	-	-	-	-	14
Branchiomma sp.	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	1
Euchone analis (Krøyer, 1856)	-	-	2	-	-	-	4	-	-	1	-	-	-	1	-	8
Euchone elegans Verrill, 1873	-	-	-	-	-	-	-	-	-	-	13	-	-	-	-	13
Euchone papillosa M. Sars, 1851	-	-	-	-	93	1	-	3	-	-	-	1	-	-	-	98
Euchone sp.	-	-	-	1	-	1	-	3	-	-	-	-	2	-	-	7
Jasmineira caudata Langerhans, 1880	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	1
Sabella sp.	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	1
OLIGOCHAETA																
Oligochaeta indet.	-	-	-	-	-	-	-	-	-	-	3	-	22	-	-	25
CHELICERATA																
PYCNOGONIDA																
Pycnogonida indet.	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Pantopoda indet.	-	-	-	-	-	-	-	-	-	1	-	-	1	-	-	2
CRUSTACEA																
OSTRACODA																
Ostracoda indet.	-	1	1	-	-	-	5	3	1	31	40	-	-	-	-	82
Cypridinidae																
Philomedes globusus (Lilljeborg, 1853)	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	2
COPEPODA																
Calanoida indet.	-	1	1	1	2	4	1	-	3	-	9	-	-	-	-	21
CIRRIPEDIA																
Balanidae																
Balanus balanus (Linnaeus, 1758)	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	3
Balanus crenatus Bruguière, 1789	-	-	41	-	-	-	-	-	13	1	4	-	-	-	-	59
MALACOSTRACA																
Cumacaea																
Cumacea indet.	-	-	-	2	-	-	-	-	1	6	-	-	-	-	-	9

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Leuconidae																
Eudorella emarginata (Krøyer, 1846)	10	2	1	-	-	-	-	-	3	9	6	-	-	-	-	31
Eudorella truncatula Bate, 1856	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	2
Leucon nasica (Krøyer, 1841)	3	2	2	-	-	-	2	-	1	1	14	-	-	-	-	25
Nannastacidae																
Campylaspis sp.	-	-	-	-	-	-	-	-	-	-	-	7	5	5	-	17
Lampropidae																
Lamprops fuscatus G.O. Sars, 1865	-	-	-	-	-	-	-	-	-	-	-	13	16	-	-	29
Diastylidae																
Brachydiastylis resima (Krøyer, 1846)	4	6	1	1	-	-	1	1	-	28	29	8	-	-	-	79
Diastylis goodsiri (Bell, 1855)	-	-	-	1	7	1	1	7	-	-	-	-	-	-	-	17
Diastylis rathkei (Krøyer, 1841)	2	2	-	-	-	-	-	-	-	-	-	17	4	-	29	54
Diastylis scorpioides (Lepechin, 1780)	-	-	6	-	-	-	1	-	10	4	-	-	-	-	-	21
Diastylis sp.	-	-	3	-	-	-	-	3	-	-	1	-	-	-	-	7
Tanaidacea																
Tanaidacea indet.	-	-	-	-	-	-	-	-	-	-	11	-	8	3	-	22
Apsenidae																
Spyraphus anomalus G.O. Sars, 1869	-	-	-	-	-	-	-	-	55	3	-	-	-	-	-	58
Amphipoda																
Amphipoda indet.	-	2	9	-	-	-	-	-	5	1	19	-	-	1	-	37
Acanthonotozomatidae																
Acanthonotozoma sp.	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	2
Ampeliscidae																
Ampelisca eschrichti Krøyer, 1842	1	-	-	1	-	-	1	-	3	-	-	-	-	-	-	6
Ampelisca macrocephala Liljeborg, 1852	1	-	1	-	-	1	-	-	-	-	-	2	-	-	-	5
Byblis gaimardi (Krøyer, 1846)	9	3	15	-	-	1	-	2	9	5	644	-	-	-	-	688
Haploops tubicola Liljeborg, 1855	24	10	-	8	3	-	10	5	89	8	4	-	-	-	-	161
Amphithoidae																
Amphithoe sp.	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	2
Arctolembos arcticus (Hansen, 1887)	-	2	-	-	-	-	-	-	3	-	4	-	-	-	-	9
Unciola leucopis (Krøyer, 1845)	-	-	2	-	-	-	-	-	5	9	20	-	-	-	-	36
Atylidae																
Atylus smitti (Goës, 1866)	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	1
Calliopiidae																
Calliopiidae indet.	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	1
Halirages fulvocincta (M. Sars, 1858)	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	1
Corophiidae																
Corophium crassicorne Bruzelius, 1859	-	-	-	-	-	-	-	-	-	-	-	1	26	3	-	30
Eusiridae																
Rhachotropis aculeata (Lepechin, 1780)	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	1
Isaeidae																

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Isaeidae indet.	-	-	-	-	-	-	-	-	-	-	72	-	-	-	-	72
Photis reinhardi Krøyer, 1842	-	-	-	-	-	2	-	-	3	3	1	39	-	-	-	48
Photis sp.	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	1
Protomedeia fasciata Krøyer, 1842	-	-	-	-	-	-	-	-	-	-	384	-	-	-	-	384
Protomedeia grandimana Brüggen, 1905	4	-	5	-	-	-	-	-	-	-	1	-	-	-	-	10
Ischyroceridae																
Ischyroceridae indet.	-	-	-	-	-	-	-	-	-	-	23	-	-	-	-	23
Ischyrocerus sp.	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	2
Lysianassidae																
Lysianassidae indet.	1	-	2	1	-	-	-	-	4	2	5	1	3	-	-	19
Anonyx nugax (Phipps, 1774)	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	1
Anonyx sp.	-	-	-	-	-	-	3	1	-	1	1	-	-	-	-	6
Melitidae																
Melita dentata (Krøyer, 1842)	-	-	6	-	-	-	-	-	-	1	21	-	-	-	-	28
Melphidippidae																
Melphidippa sp.	-	-	-	-	-	3	3	-	-	-	-	-	-	-	-	6
Oedicerotidae																
Oedicerotidae indet.	-	-	-	-	-	2	-	-	111	-	-	-	-	-	-	113
Aceroides latipes G.O. Sars, 1866	-	-	-	-	-	2	-	-	-	-	1	-	-	-	-	3
Arrhis phyllonyx (M. Sars, 1858)	1	-	-	1	5	1	1	2	-	-	-	-	-	-	-	11
Monoculodes latimanus (Goës, 1866)	-	-	3	-	-	-	-	-	-	-	8	2	-	-	-	13
Monoculodes tuberculatus Boeck, 1871	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	2
Monoculodes sp.	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	2
Westwoodilla caecula (Bate, 1856)	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	1
Phoxocephalidae																
Harpinia propinqua G.O. Sars, 1891	-	-	-	-	-	-	-	-	-	-	20	-	-	-	-	20
Harpinia serrata G.O. Sars, 1879	-	-	5	-	-	-	-	-	16	2	2	-	-	-	-	25
Phoxocephalus holbolli (Krøyer, 1842)	-	-	2	-	-	-	-	-	-	-	6	-	-	-	-	8
Pleustidae																
Pleusymtes pulchella (G.O. Sars, 1876)	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	2
Podoceridae																
Podoceridae indet.	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	1
Dyopedos bispinis (Gurjanova, 1930)	-	-	-	-	-	-	-	-	-	-	3	1	2	-	-	6
Pontoporeiidae																
Monoporeia affinis (Lindström, 1855)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7	7
Pontoporeia femorata Krøyer, 1842	-	3	-	-	2	-	6	13	-	-	-	-	-	-	165	189
Priscillina armata (Boeck, 1861)	-	-	-	-	-	-	-	-	-	-	-	-	9	1	-	10
Stegocephalidae																
Stegocephalus inflatus Krøyer, 1842	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	1
Stenothoidae																
Stenothoidae indet.	-	-	-	-	-	-	-	-	-	-	23	-	-	-	-	23

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Synopiidae																
Syrrhoe crenulata Goës, 1866	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	2
Tiron spiniferus (Stimpson, 1853)	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	3
Hyperiidae																
Parathemisto sp.	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	1
Isopoda																
Isopoda indet.	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Gnathidae																
Gnathia sp.	-	-	-	-	-	1	-	8	11	1	-	-	-	-	-	21
Parasellinae																
Munna sp.	-	-	-	-	-	-	-	-	1	-	16	-	-	-	-	17
Pleurogonium inerme G.O. Sars, 1883	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	2
Decapoda																
Crangonidae																
Brachyura indet.	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Sabinea septemcarinatus (Sabine, 1824)	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	1
Paguridae																
Paguridae indet.	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	1
Pagurus pubescens Krøyer, 1838	-	1	3	-	-	-	-	1	-	-	1	-	-	-	-	6
MOLLUSCA																
CAUDOFOVEATA																
Caudofoveata indet.	4	4	-	-	-	-	-	-	-	-	-	1	-	-	-	9
Chaetodermidae																
Chaetoderma sp. Lovén, 1845	4	-	-	-	2	-	-	-	-	-	-	-	-	-	-	6
POLYPLACOPHORA																
Ischinochitonidae																
Ischnochiton albus (Linnaeus, 1767)	-	-	-	-	-	-	-	-	-	-	5	-	-	-	-	5
GASTROPODA																
Gastropoda indet.	-	-	-	1	-	-	-	-	1	-	-	-	-	-	-	2
Prosobranchia indet.	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Lepetidae																
Lepeta caeca (Müller, 1776)	-	-	8	-	-	-	-	-	9	3	49	-	-	-	-	69
Trochidae																
Margarites costalis (Gould, 1841)	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	1
Margarites striatus (Leach, 1819)	-	-	-	-	-	-	-	-	-	-	-	-	15	4	-	19
Margarites olivacea (Brown, 1827)	-	-	-	3	-	-	-	2	-	-	-	-	-	-	-	5
Solariella obscura (Couthoy, 1838)	-	3	8	-	-	-	-	-	-	-	1	5	-	-	-	17
Solariella varicosa (Mighels & Adams, 1842)	-	-	6	-	-	-	-	-	11	-	-	-	-	-	-	17
Solariella sp.	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Turbinidae																
Moelleria costulata (Möller, 1842)	-	-	1	-	-	-	-	-	-	4	4	-	1	-	-	10

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Rissoidae																
Alvania cruenta Odhner, 1915	-	-	-	-	-	2	-	2	-	-	-	-	-	-	-	4
Tornidae																
Tornidae indet.	-	-	1	-	-	-	-	-	-	-	3	-	-	-	-	4
Trichotropidae																
Trichotropis borealis Broderip & Sowerby, 1829	-	-	1	-	-	-	-	-	-	1	-	-	-	-	-	2
Lamellariidae																
Velutina undata Brown, 1838	-	-	-	-	-	-	-	-	-	1	-	1	-	-	-	2
Naticidae																
Naticidae indet.	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1
Amauropsis islandica (Gmelin, 1791)	-	-	-	-	-	-	-	-	-	-	-	-	3	1	-	4
Cryptonatica affinis (Gmelin, 1791)	-	-	-	-	-	-	-	-	-	2	-	6	2	1	-	11
Polinices nanus (Möller, 1842)	-	-	1	-	-	-	-	-	-	-	1	-	3	-	-	5
Polinices pallidus (Broderip & Sowerby, 1829)	-	-	-	-	-	-	-	-	-	2	1	4	4	1	-	12
Buccinidae																
Buccinum glaciale Linnaeus, 1766	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	1
Turrisipho fenestratus (Turton, 1834)	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	1
Cancellariidae																
Admete couthouyi (Jay, 1839)	-	-	2	-	-	-	-	-	1	-	-	-	-	-	-	3
Turridae																
Curtitoma trevelliana (Turton, 1834)	-	-	1	1	-	-	-	-	-	-	-	-	-	-	-	2
Obesotoma simplex (Middendorff, 1849)	-	-	-	-	-	-	-	-	-	-	-	-	6	-	-	6
Obesotoma woodiana (Möller, 1842)	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	1
Oenopota impressa (Mörch, 1869)	-	-	2	1	-	-	-	-	6	-	2	-	-	-	-	11
Oenopota pyramidalis (Ström, 1788)	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	1
Oenopota harpularia (Couthouy, 1838)	-	1	-	-	-	-	-	-	1	-	-	1	-	-	-	3
Oenopota rugulata (Moller in Troschel, 1866)	-	-	6	-	-	-	-	-	1	-	-	-	-	-	-	7
Oenopota violacea (Mighels & Adams, 1842)	-	-	5	-	-	-	-	-	-	-	7	-	-	-	-	12
Opisthobranchia																
Opisthobranchia indet.	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Turbonillidae																
Menestho truncatula Odhner, 1915	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-	3
Diaphanidae																
Diaphana minuta Brown, 1827	-	-	-	2	17	-	1	1	-	-	-	-	2	1	-	24
Retusidae																
Retusa obtusa (Montagu, 1803)	-	-	-	-	18	1	-	-	-	-	-	-	-	-	-	19
Retusa sp. Brown, 1827	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Philine finmarchica M. Sars, 1858	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	1
Philine quadrata (S. Wood, 1839)	-	-	-	-	-	-	-	-	-	1	-	-	5	-	-	6
Scaphandridae																
Cylichna alba (Brown, 1827)	1	-	1	2	2	3	2	3	-	1	1	1	11	5	-	33

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Cylichna occulta (Mighels, 1842)	1	1	1	3	-	-	-	2	-	-	-	1	1	-	-	10
Cylichna sp.	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	2
BIVALVIA																
Bivalvia indet.	6	9	1	-	-	1	-	2	1	-	-	-	10	1	-	32
Nuculidae																
Nuculoma tenuis (Montagu, 1808)	24	53	80	3	8	39	-	33	28	23	20	-	2	3	-	315
Nuculanidae																
Nuculana pernula (Müller, 1779)	3	14	3	8	12	4	3	15	14	5	5	-	-	-	-	85
Nuculana sp. Link, 1807	-	-	2	-	-	-	1	-	-	-	-	-	-	-	-	3
Yoldia hyperborea Torell, 1856	40	9	-	2	-	1	-	-	-	-	-	-	-	-	-	52
Yoldiella frigida (Torell, 1859)	-	-	-	-	8	1	-	-	-	-	-	-	-	-	-	9
Yoldiella lenticula (Möller, 1842)	-	-	-	3	7	2	1	11	-	-	-	-	-	-	-	24
Nuculanidae indet.	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	1
Mytilidae																
Mytilidae indet.	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	2
Crenella decussata (Montagu, 1808)	-	-	-	-	-	-	-	-	-	-	6	-	19	1	-	26
Dacrydium vitreum (Holbøll in Möller, 1842)	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	1
Musculus corrugatus (Stimpson, 1851)	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	1
Musculus niger (J.E. Gray, 1824)	2	-	4	-	-	-	-	-	4	-	1	-	-	-	-	11
Musculus sp.	1	-	3	-	-	-	-	1	-	-	2	-	-	-	-	7
Mytilus edulis Linnaeus, 1758	-	-	-	-	-	-	-	-	-	-	-	-	3	1	-	4
Arcidae																
Bathyarca glacialis (J.E. Gray, 1824)	-	-	-	-	8	-	-	-	-	-	-	-	-	-	-	8
Pectinidae																
Pectinidae indet.	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	1
Thyasiraidae																
Thyasiridae indet.	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	1
Axinopsida orbiculata (G.O. Sars, 1878)	-	-	1	-	-	-	-	-	-	-	3	-	1	-	-	5
Thyasira equalis (Verrill & Bush, 1898)	-	9	-	-	-	-	-	-	-	2	-	-	-	-	-	11
Thyasira gouldi (Philippi, 1846)	-	-	9	-	-	10	6	-	1	2	1	-	-	-	-	29
Thyasira sarsii (Philippi, 1846)	-	-	4	-	-	1	-	-	-	-	-	-	-	-	-	5
Thyasira sp.	15	17	1	2	148	-	-	-	-	-	-	12	-	-	-	195
Lasaeidae																
Montacuta maltzani (Verkrüzen, 1876)	-	-	-	1	-	-	-	-	-	1	-	-	1	15	-	18
Montacuta spitzbergensis Knipovitsch, 1901	11	7	-	-	-	-	1	-	5	2	1	1	-	-	-	28
Montacuta sp.	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Astartidae																
Astartidae indet.	1	-	1	-	2	-	-	-	3	-	-	-	-	1	-	7
Astarte sulcata (da Costa, 1778)	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	2
Ciliatocardium ciliatum (O. Fabricius, 1780)	-	4	2	-	-	2	-	-	9	1	-	3	-	-	-	21
Serripes groenlandicus (Bruguière, 1789)	-	-	-	-	-	-	-	-	-	-	-	22	5	3	-	30

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Tridonta borealis Schumacher, 1817	-	8	33	1	-	-	-	-	8	2	1	2	-	-	-	55
Tridonta elliptica (Brown, 1827)	-	-	34	-	-	-	-	-	3	10	2	-	-	-	-	49
Tridonta montagui (Dillwyn, 1817)	-	10	19	2	10	-	-	-	8	21	10	6	-	-	-	86
Cardiacea																
Cardiacea indet.	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9
Tellinidae																
Macoma balthica (Linnaeus, 1758)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	151	151
Macoma calcarea (Gmelin, 1791)	21	9	16	3	2	2	-	1	-	34	32	-	8	8	-	135
Macoma crassula (Deshayes, 1855)	-	-	6	-	-	-	-	-	1	3	8	15	-	-	-	33
Macoma loveni Jensen, 1904	-	-	-	-	-	-	-	-	3	-	-	-	-	-	-	3
Macoma sp.	17	10	-	-	-	-	-	-	-	-	-	1	-	-	-	28
Arcticidae																
Arctica islandica (Linnaeus, 1767)	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	1
Liocyma fluctuosa (Gould, 1841)	-	-	-	-	-	-	-	-	-	-	-	7	5	1	-	13
Pillucina sp.	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	2
Myidae																
Mya truncata Linnaeus, 1758	-	-	7	-	-	-	-	-	3	5	17	19	-	-	-	51
Hiatellidae																
Hiatella arctica (Linnaeus, 1758)	-	-	9	-	-	-	-	1	3	10	2	1	-	-	-	26
Panomya arctica (Lamarck, 1818)	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	1
Thraciidae																
Thracia myopsis (Möller, 1842)	-	-	4	-	-	-	-	-	3	-	1	-	2	1	-	11
Lyonsiidae																
Lyonsia arenosa (Möller, 1842)	-	1	-	-	-	-	-	1	3	-	1	1	-	-	-	7
Pandoridae																
Pandora glacialis (Leach, 1819)	-	-	-	-	-	-	-	-	1	-	-	6	-	-	-	7
BRACHIOPODA																
Hemithiris psittacea Gmelin, 1792	-	-	-	-	-	-	-	-	-	1	9	-	-	-	-	10
BRYOZOA																
Stenolaemata																
Cyclostomata indet.	-	-	6	-	-	-	-	-	-	-	9	-	-	-	-	15
Crisiidae																
Crisia eburnea (Linnaeus, 1758)	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	1
Crisiella producta (Smitt, 1865)	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-	3
Diastoporidae																
Diplosolen sp.	-	-	1	-	-	-	-	-	-	-	2	-	-	-	-	3
Lichenoporidae																
Lichenopora crassiuscula (Smitt1867)	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	1
Lichenopora verrucaria (O. Fabricius, 1780)	-	-	6	-	-	-	-	-	-	2	7	-	-	-	-	15
Lichenopora sp.	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Tubuliporidae																

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Oncousoecia canadensis (Osburn, 1933)	-	-	-	-	-	-	-	-	-	1	7	-	-	-	-	8
Oncousoecia diastoporides (Norman, 1869)	-	-	-	-	-	-	-	-	-	5	1	-	-	-	-	6
Tubulipora sp.	-	-	-	1	2	-	-	-	-	-	-	-	-	-	-	3
GYMNOLAEMATA																
Scrupariidae																
Eucratea loricata (Linnaeus, 1758)	-	2	-	2	-	1	1	2	1	-	-	1	2	-	1	13
Membraniporidae																
Amphiblestrum auritum (Hincks1877)	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Callopora lata (Kluge1907)	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	3
Callopora lineata (Linnaeus, 1767)	-	-	2	-	-	-	-	-	1	-	-	-	-	-	-	3
Callopora smitti Kluge, 1946	-	1	-	-	-	-	-	-	-	-	1	-	-	-	-	2
Doryporella spatulifera (Smitt, 1868)	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	1
Electra arctica (Borg, 1931)	-	-	12	-	-	-	-	-	-	1	105	-	-	-	1	121
Electra crustulenta (Pallas, 1766)	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	3
Tegella arctica (d'Orbigny, 1851)	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	1
Tegella armifera (Hincks, 1880)	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	1
Tegella armifesoides (Kluge, 1955)	-	1	-	-	-	-	-	-	-	-	1	-	-	-	-	2
Tegella nigrans (Hincks, 1882)	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Tegella sp.	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	1
Cribrilinidae																
Cribrilina annuata (O. Fabricius, 1780)	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	1
Cribrilina spitzbergensis (Norman1903)	-	-	-	-	-	-	-	-	-	-	5	-	-	-	-	5
Scrupocellariidae																
Scrupocellaria scabra (van Beneden, 1848)	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	1
Semibugula birulai (Kluge1929)	-	-	-	-	-	-	-	-	-	-	-	5	-	-	-	5
*Tricellaria gracilis (*van Beneden1848)	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Tricellaria peachi (Busk, 1851)	1	-	-	-	-	-	-	-	3	-	-	-	-	-	-	4
Bicellariidae																
Bugula fastigiata (Dalyell1847)	-	2	-	-	-	-	1	-	-	-	-	2	-	-	-	5
Dendrobeania elongata (Nordgaard, 1906)	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	1
Dendrobeania levinseni (Kluge1929)	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	1
Kinetoskias arborescens Danielssen, 1868	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-	3
Smittinidae																
Arctonula artica (M. Sars, 1851)	-	1	-	-	2	-	-	-	-	-	-	-	-	-	-	3
Hippothoidae																
Hippothoa divaricata Lamouroux, 1821	-	-	6	-	-	-	-	-	-	2	86	-	-	-	-	94
Hippothoa expansa Dowson, 1859	-	-	5	-	-	-	-	-	-	-	2	-	-	-	-	7
Microporellidae																
Microporella ciliata (Pallas, 1766)	-	-	5	-	-	-	-	-	-	-	49	-	-	-	-	54
Escharellidae																
Escharella ventricosa (Hassall, 1842)	-	1	-	-	-	-	-	-	-	1	2	-	-	-	-	4

Appendix (continued)	3	6	7	8	11	12	13	14	19	20	21	24	26	27	29	sum
Escharella sp.	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	1
Escharelloides spinulifera (Hincks, 1889)	-	-	1	-	-	-	-	-	-	1	18	-	-	-	-	20
Smittinidae																
Smittinidae indet.	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	2
Cystisella saccata (Busk1856)	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	3
Pachyegis groenlandica (Norman, 1894)	-	-	2	-	-	-	-	-	-	-	6	-	-	-	-	8
Pachyegis producta (Norman, 1903)	-	-	4	-	-	-	-	-	-	-	11	-	-	-	-	15
Palmicellaria skenei (Ellis & Solander, 1786)	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	1
Porella acutirostris Smitt, 1868	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	1
Porella compressa (J. Sowerby1806)	-	-	-	-	-	-	-	-	-	1	5	-	-	-	-	6
Porella fragilis Levinsen, 1914	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	1
Porella minuta (Norman, 1868)	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	2
Porella obesa (Waters, 1900)	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	1
Porella sp.	-	-	-	-	-	-	-	-	-	1	3	-	-	-	-	4
Porelloides laevis (Fleming, 1828)	-	-	6	-	-	-	-	-	-	-	6	-	-	-	-	12
Porelloides struma (Norman, 1868)	-	-	1	-	-	-	-	-	-	1	2	-	-	-	-	4
Smittina minuscula (Smitt, 1868)	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	1
Smittina rigida Lorenz, 1886	-	-	2	-	-	-	-	-	-	1	4	-	-	-	-	7
Schizoporellidae																
Buffonellaria biaperta (Michelin, 1841)	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	1
Hippodiplosia harmsworthi (Waters, 1900)	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	2
Hippodiplosia propinqua (Smitt, 1868)	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	2
Hippodiplosia sp.	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	2
Porella obessa (Waters1900)	-	-	-	-	-	-	-	-	-	-	6	-	-	-	-	6
Schizoporella biaperta (Michelin, 1906)	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	1
Schizoporella bispinosa (Nordgaard1906)	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	1
Schizoporella crustacea (Smitt, 1868)	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	1
Schizoporella pachystega (Kluge, 1929)	-	-	6	-	-	-	-	-	-	-	21	-	-	-	-	27
Schizoporella smitti Kluge, 1962	-	-	1	-	-	-	-	-	-	-	3	-	-	-	-	4
Schizoporella sp.	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	1
Celleporidae																
Cellepora pumicosa (Pallas, 1766)	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	1
Celleporina incrassata (Lamarck, 1788)	-	-	-	-	-	-	-	-	-	2	4	-	-	-	-	6
Celleporina ventricosa (Lorenz, 1886)	-	-	15	-	-	-	-	-	-	-	15	-	-	-	-	30
Stomachetosellidae																
Stomachaetosella cruenta (Busk, 1854)	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	1
Stomachaetosella limbata (Lorenz, 1886)	-	-	-	-	-	-	-	-	-	-	13	-	-	-	-	13
Stomachaetosella magniporata (Nordgaard, 1906)	-	-	1	-	-	-	-	-	-	-	1	-	-	-	-	2
Stomachaetosella producta (Packard, 1863)	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	1
Stomachaetosella sinuosa (Busk, 1860)	-	-	3	-	-	-	-	-	-	2	11	-	-	-	-	16
Rhamphostomellidae																

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Escharopsis lobata (Smitt, 1868)	-	-	1	-	-	-	-	-	-	1	1	-	-	-	-	3
Ragionula rosacea (Busk, 1856)	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	3
Rhamphostomella hincksi (Nordgaard, 1898)	-	-	2	-	-	-	-	-	-	1	-	-	-	-	-	3
Rhamphostomella sp.	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	1
Myrioxoidae																
Myriapora subgracilis (dOrbigni, 1852)	-	-	7	-	-	-	-	-	4	-	39	-	-	-	-	50
Hipponellidae																
Hippoporella hippopus (Smitt, 1868)	-	-	6	-	-	-	-	-	-	-	10	-	-	-	-	16
Lepraliella contigua (Smitt, 1868)	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	1
Smittinidae																
Porella concinna (Busk, 1854)	-	-	11	-	-	-	-	-	-	3	18	-	-	-	-	32
Smittina mucronata (Smitt, 1856)	-	-	-	-	-	-	-	-	-	1	4	-	-	-	-	5
Hippodinidae																
Cheiloporina sincera (Smitt, 1868)	-	-	-	-	5	-	-	-	-	-	-	-	-	-	-	5
Escharina alderi (Busk, 1856)	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-	3
Alcyonidiidae																
Alcyonidium disciforme Smitt, 1872	-	-	-	-	-	-	-	-	-	-	-	5	3	4	-	12
Alcyonidium gelatinosum (Linnaeus, 1761)	-	-	-	-	-	3	-	1	-	-	-	-	-	-	-	4
Alcyonidium proboscideum (Kluge, 1962)	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	1
ECHINODERMATA																
Asteroidea																
Goniopectinidae																
Ctenodiscus crispatus (Retzius, 1805)	-	-	-	9	-	1	3	13	-	2	-	-	-	-	-	28
Asteriidae																
Asterias rubens Linnaeus, 1758	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	1
Ophiuroidea																
Ophiuroidea indet.	-	-	-	1	-	1	-	2	-	-	-	-	-	-	-	4
Ophiactidae																
Ophiopholis aculeata (Linnaeus, 1767)	-	-	-	-	-	-	-	-	-	8	1	-	-	-	-	9
Amphiuridae																
Amphiura sundevalli (Müller & Troschel, 1842)	-	2	2	-	-	-	-	1	4	24	8	-	-	-	-	41
Ophiacanthidae																
Ophiacantha bidentata (Retzius, 1805)	-	-	1	1	2	4	10	1	16	33	1	-	-	-	-	69
Ophiocten sericeum (Forbes, 1952)	-	-	-	7	-	20	9	10	-	12	-	-	-	-	-	58
Ophiuridae																
Ophiura robusta (Ayres, 1851)	-	1	14	-	-	-	-	-	19	68	74	-	-	-	-	176
Ophiura sarsii Lütken, 1858	-	2	-	-	-	1	-	-	-	4	-	-	-	-	-	7
Stegophiura nodosa (Lütken, 1854)	4	6	-	-	-	-	-	-	5	-	-	84	113	51	-	263
Echinoidea																
Stronglyocentridae																
Strongylocentrotus pallidus (Sars, 1871)	-	-	3	-	-	-	-	-	-	3	2	-	-	-	-	8

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Strongylocentrotus sp. Brandt, 1835	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	1
Holothuroidea																
Psolidae																
Psolus phantapus (Strussenfelt, 1765)	-	-	-	-	-	-	-	-	-	-	4	-	-	-	-	4
Psolus sp. Oken, 1815	-	-	-	-	-	-	-	-	3	1	-	-	-	-	-	4
Cucumariidae																
Pentamera caleigera (Stimpson, 1854)	-	-	-	-	-	-	-	1	-	-	-	11	-	-	-	12
Myriotrochidae																
Myriotrochus rinkii Steenstrup, 1852	-	-	-	-	-	-	-	-	-	-	-	15	-	-	-	15
Eupyrgidae																
Eupyrgus scaber Lütken, 1857	-	-	-	-	-	2	6	-	-	1	-	-	-	-	-	9
CHORDATA																
Chordata indet.	1	-	-	-	3	-	-	-	-	-	-	1	-	-	-	5
Ascidiacea																
Ascidiacea indet.	-	-	1	-	-	-	-	-	4	1	-	-	-	-	-	6
Styelidae																
Cnemidocarpa rhyzopus (Redikorzev, 1907)	-	-	-	-	-	-	-	-	-	-	-	9	-	1	-	10
Pelonaia corrugata (Forbes & Goodsir, 1841)	-	1	-	-	-	-	-	-	-	-	-	1	20	-	-	22
Pyuridae																
Boltenia echinata (Linnaeus, 1767)	1	-	1	-	-	-	-	-	-	-	-	2	-	-	-	4
Molgulidae																
Eugyra glutinans (Möller, 1842)	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	1