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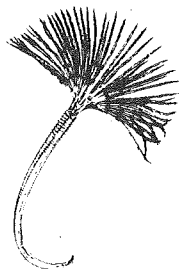
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MACROBENTHIC ORGANISMS ON THE SCOTIAN SHELF
CSS "HUDSON" MISSION 94-032
MINERAL AGGREGATE SURVEY
NOVEMBER 15 - 25, 1994

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**MACROBENTHIC ORGANISMS ON THE SCOTIAN SHELF
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NOVEMBER 15 - 25, 1994**

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**Report to: G. Fader
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INTRODUCTION

On November 15-25, 1994, the Canadian Survey Ship "HUDSON" sailed to the Scotian Shelf to conduct an assessment of the aggregate resource potential of selected areas of the Scotian Shelf (Hudson 94-032 Mineral Aggregate Assessment Survey). The cruise was sponsored by the Canada-Nova Scotia Cooperation Agreement on Mineral Development, commonly known as the MDA-3. It was led by G. Fader of the Atlantic Geoscience Centre of the Geological Survey of Canada. Staff from St. Mary's University, Halifax, N.S. also participated as sponsors in the assessment of the potential effects of marine mining. Contractors also participated in the cruise.

Specific locations that were surveyed include the Western Gully, a series of relict sand ridges known as The Slipper, Middle, Artimon and Banquereau Banks, and Chedabucto Bay. In order to investigate the bedforms and aggregate potential, a large body of information was collected in the form of seabed photographs, sidescan sonar records, seismic records and vibrocorers. As well, a benthic grab sampler known as an IKU sampler was deployed to collect large-volume (approx 100L), sediment samples. The IKU samples were subsampled for analysis by various geological and biological specialists. From the geological perspective detailed granulometric analyses were conducted, and foraminiferal investigations commenced. From the biological perspective, samples were taken for both meiofauna and macrofauna analysis. What follows is a report on the analysis of the macrofauna of sub-samples from 39 of the grabs.

METHODS

Sub-samples (20 X 20 X 10 cm) covering an area of 400 cm² and a volume of approximately 400 cc of sediment were taken from the IKU grab for macrofaunal analysis. Once the sub-sample was recovered, it was preserved in a solution of 10% buffered formaldehyde in seawater. The sediment was then sieved on a 0.5 mm mesh sieve and those animals retained on the sieve were considered components of the macrobenthos. The animals were sorted to major phyla and preserved in 70% alcohol. They were brought back to the laboratory where they were identified to the lowest taxonomic level possible (mainly to species) and

counted. The results of this analysis are given in Table 1. The data were examined for distribution and abundance of organisms on the continental shelf in general, and on each specific bank in particular. In addition, density, diversity, and dominance of the fauna were calculated to determine if one phylum was more abundant than another on the different banks. A description of the different biological communities and the sediments with which they were associated was made.

To determine the density of organisms per m^2 , the number of animals recovered in each sample was multiplied by 25. To determine the diversity, the data were analyzed using the Shannon and Weiner Diversity Index, H' , an information statistic (Shannon and Weaver 1949). Dominance was a simple assessment of the data to determine if one phylum or species was more abundant or better represented than any other. The results of these analysis are given in Table 2.

Table 3 gives a summary of the sediment grain size encountered at each station. This information provides the basis for the description and subjective evaluation of each station. The interaction or association of the macrobenthic community with the sediment on which it was found is described in so far as the biology of some of the organisms was available.

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RESULTS

TABLE 2. DENSITY, DIVERSITY, DOMINANCE OF MACROBENTHOS AT EACH STATION
 A = no. of species per sample; B = no. of individuals per sample
 C = density of animals/m²; D = diversity (H'); E = % dominance

STN	A	B	C	D	E	STN	A	B	C	D	E
1	7	7	175	1.7	57		28	7	7	175	1.7
4	4	7	175	0.8	50		29	5	9	225	1.2
6	5	6	150	1.2	33		30	4	38	950	0.4
9	9	10	250	1.9	40		31	16	22	300	2.4
10	9	17	425	1.7	70		32	4	14	350	1.3
11	17	40	1000	2.2	37		34	2	7	175	0
12	5	5	125	1.3	60		35	6	19	475	1.3
13	7	7	175	1.7	E		36	3	5	125	0
15	5	5	125	1.3	E		37	5	13	325	1.0
17	16	99	2475	1.3	80		38	8	45	1125	1.0
18	4	8	200	1.3	E		39	7	19	475	1.6
19	10	52	1300	1.2	70		40	14	38	950	2.2
20	8	11	275	1.8	36		41	22	91	2275	2.0
21	16	63	1575	2.0	51		42	19	51	1275	2.6
22	5	6	150	1.2	60		43	4	8	240	1.2
23	11	23	575	2.0	39		44	16	31	775	2.5
24	6	7	175	1.5	86		46	17	32	925	2.5
25	7	9	225	1.6	55		47	29	76	1900	2.7
26	14	35	875	2.1	54		48	10	14	350	2.0
27	4	7	175	1.3	86						

TABLE 3. SEDIMENT TYPE PER STATION

STN	GRAIN SIZE	STN	GRAIN SIZE	STN	GRAIN SIZE
1	fine	21	medium, & pebbles	37	med to coarse
2	fine	22	medium	38	fine to coarse
4	fine	23	fine to medium with shell	39	fine to medium
6	fine to med	24	medium with shell	40	sandy gravel
9	med to coarse	25	coarse	41	sandy gravel
10	fine to med	26	gravelly sand	43	gravel
11	fine with shells	27	medium sand	44	gravel
12	fine with shells	28	medium sand & gravel	46	gravel
13	fine to medium	29	silty gravelly sand	47	gravel
15	fine to med, some shell	30	coarse sand & gravel	50	sandy mud
16	sand & gravel	31	med sand & gravel		
17	medium to coarse sand, gravel	32	coarse sand with gravel		
18	med to coarse sand	34	medium sand & gravel		
19	gravelly sand	35	fine to coarse		
20	gravelly sand	36	med to coarse sand & shell		

WESTERN GULLY (THE SLIPPER)

STATION 1 The Slipper (lat 43 43.8343 long 62 02.5580)

This station was 87 m deep, the sediment was fine-grained sand with an occasional shell fragment and numerous *Spiochaetopterus* tubes. The dominant macrofaunal animals at this station were annelids. There were four different species. As there were only 7 species in all, diversity appeared low, however, as the animals were distributed evenly amongst these species the diversity index, H' , was 1.7. Density at this station was low (175 animals/m²). 57% of the invertebrates were polychaete worms (annelids).

STATION 4 The Slipper (lat 43 40.5924 long 62 03.7022)

This station was 84.7 m deep and the substrate was fine-grained dense sand. The density of animals was low, 175 animals/m², and, with only 7 species collected, so was the diversity ($H' = 0.8$). Four of the different species collected an isopod crustacean, two molluscs - a gastropod and a scaphopod and an onuphid polychaete were all surface dwellers. Though a large number of *Spiochaetopterus* tubes were collected, no living specimens of this species were found.

STATION 6 The Slipper (lat 43 38.9891 long 62 04.4751)

This station was taken from a water depth of 83 m and the substrate was a similar fine-grained dense sand found at the previous two stations. Again the empty tubes of *Spiochaetopterus* were abundant and occasional molluscs were seen on the surface. The few animals collected were evenly distributed among the major phyla. Density was very low, only 150 animals/m², and diversity was also low ($H' = 1.2$)

WESTERN GULLY

STATION 9 (lat 43 33.3580 long 62 13.6243)

This station was 83.4 m deep. The sediment was slightly different from the above locations and consisted of medium coarse-grained sand with a few more large shell fragments. The *Spiochaetopterus* tubes seen on The Slipper were still present on the surface at this station and were in the sediments. The density of animals was low with only 250 individuals/m². The dominant fauna were the Annelids. The species encountered were those characteristic of, and able to burrow in the medium to coarse-grained sand, e.g. Lumbrinids, scabibrugmatids and ophelids. Diversity was slightly higher at this station ($H' = 1.9$) than on The Slipper.

STATION 10 (lat 44 24.6660 long 60 36.7293)

This station was taken from 50 m water depth; the sediment was fine to medium-grained sand, with an anoxic horizon. The density of organisms was a little higher than previously encountered with 425 animals/m². The dominant taxon at this station was the phylum Crustacea and included hermit crabs in gastropod shells along with a variety of amphipods. Diversity was higher at this station ($H' = 1.7$) than at stations found on The Slipper.

STATION 11 (lat 44 24.5990 long 60 33.3324)

This station was 45 m deep and the surface of the gravelly-muddy sediment was covered with empty (dead) bivalve shells. The combination of the larger gravelly clasts with shell debris and the muddy interstices provides a greater variety of niches and this is reflected in a larger number of species (17) with a more diverse community ($H' = 2.2$). Seven different polychaete species were collected at this station. They ranged from mud dwellers to surface dwellers. Several mollusc and crustacean species were also collected and because of the available substrate, anemones were found attached to some of the larger clasts. Surf clams, *Spisula solidissima*, and the northern quahog, *Mercaenaria mercenaria*, both commercially important species, were collected but in lower numbers than the worms. In general, the density of animals, mainly annelids, is higher at this station (1000 individuals/m²) than at others.

STATION 12 (lat 44 24.5345 long 60 33.3699)

This sample was taken in 42 m of water where the sediment was a mixture of fine sand and broken shells. The number of species was low (only 6) and the density was low (150 ind/m²) as was diversity ($H' = 1.3$). Approximately 60% of the animals collected were annelids. In general, the species collected were those usually found on the surface such as annelids of the families Polynoidae and Nephthyidae, echinoderms such as sand dollars, and sea anemones.

STATION 13 (lat 44 24.5130 long 60 30.8974)

This sample came from 31 m water depth and the sediment was fine to medium-grained sand, it was hard packed and the most obvious invertebrates on the surface were sand dollars, *Echinarachnius parma*, a burrowing anemone of the genus *Edwardsia* and an attached anemone of the genus *Metridium*. The fauna was not dense (175 individuals/m²) and the species were evenly distributed among the major phyla giving a diversity of $H' = 1.7$.

This sample came from 54.48 m water depth where the substrate was a combination of gravelly sand and sandy gravel. This more diverse substrate seems to be the preferred habitat of brittle stars and sea urchins as 70% of the macrobenthos collected at this site were representatives of the same two species of echinoderms seen at STATION 17. Bivalve molluscs and chitons were found at this site along with a representative of two of the more robust tube building annelids. As at STATION 17, the larger clasts were heavily encrusted with the coralline alga *Lithothamnium* sp. The occasional anemone and sponge were also collected. Macrobenthic density was high (1300 ind./m²) and

STATION 19 (lat 44 28.1292 long 60 18.1494)

The depth at this station was 46.2 m, the sediment consisted of a medium to coarse-grained sand with less than 1% gravel. It was one of two stations where no annelids were encountered. It contained crustaceans, echinoderms and the sand lance. Diversity is moderate ($H' = 1.3$) and somewhat misleading considering the low number of species (4). Like other sites with similar grain size, diversity is low because of the lack of niches possibly through the impenetrability of the dense sand.

STATION 18 (lat 44 28.1464 long 60 20.3688)

This station was taken in 52 m of water, the sediment was medium to coarse-grained sand with gravel. One obvious biological feature of the larger clasts was their heavy encrustation by the red coralline alga, *Lithothamnium* sp. For the most part, the phylum Echinodermata dominated the macrofauna. A very dense patch (1650 ind./m²) of the brittle star, *Ophiorhiza sarsi*, was encountered along with a patch of young sea urchins, *Strongylocentrotus drobachiensis*. The density of organisms was much higher at this station (2,475 ind./m²) than at any other station. This high density was mainly due to the large patch of echinoderms. Several relatively large species of annelids characteristic of medium to coarse-grained sand with gravel were also collected at this site. Even though a relatively large number of species was encountered at this site, diversity ($H' = 1.3$) was not very high because of the large numbers of the two species of echinoderms which accounted for about 66% of the fauna.

STATION 17 (lat 44 28.1866 long 60 21.0292)

This grab came from 40 m water depth and the sediment was fine to medium-grained packed sand (no shell debris evident). As in Station 13, sand dollars were on the surface. Sand dwelling (burrowing) polychaetes, of the family Opheliidae were collected at this station as were Anemones. The density of animals was low (125 ind./m²) and no one taxa dominated the fauna.

STATION 15 (lat 44 28.2818 long 60 24.6697)

diversity was low ($H' = 1.2$) due to the large number of brittle stars (825 ind./m²).

STATION 20 (lat 44 24.2381 long 60 15.3579)

This sample came from 69.28 m water depth. The sediment was a

combination of fine to coarse-grained gravelly sand and gravel. There was more sand than gravel and the fauna reflected this change in grain size.

Annelids represented more than 1/3 of the animals collected. Brittle stars, while still present, were not nearly so abundant as was found in the gravelly sand substrate. Overall, the density of animals was low (275 ind./m²) but the diversity ($H' = 1.8$) was towards the high end. The higher diversity was probably due to the larger number of species with no one species occurring in disproportionately large numbers.

STATION 21 (lat 44 24.2310 long 60 14.2902)

This sample came from 70.53 m water depth where the sediment was fine to coarse-grained sand with a small amount of gravel and shell fragments.

Echinoderms were the dominant animals but a large number of species (14) were collected in this sample giving a rather high diversity ($H' = 2.0$). The

density of animals (1575 ind./m²) at this station was higher than the average (614 ind./m²) for all the stations, and higher than most other stations taken on Middle Bank where the average is 645 ind./m². In fact it was one of only 6 stations with densities greater than 1000 ind./m². Two brittle stars *Ophiura sarsi* and *Ophiopholis aculeata* accounted for about 50% of all macrobenthic animals collected here.

STATION 22 (lat 44 37.7971 long 60 31.5476)

At a water depth of 26 m, this station was the shallowest sampled for

macrobenthos. The low number of species (5) and low density (150 ind./m²)

was more related to the medium grain size of the sand than the depth. The species which were recovered i.e. annelids, sand dollars and quahogs were all characteristic of this habitat.

STATION 23 (44 29.4298 long 60 36.8757)

This sample was taken from 42 m water depth in a medium-grained sand

where sand dollars were evident on the surface. The station looked similar to the preceding station but had more shell fragments. Five different species of polychaetes accounted for the higher diversity ($H' = 2$) of this station, while the large number of amphipods resulted in a moderate density of animals (575 ind./m²). Two small gastropods and a substrate-boring bivalve, *Cytodaria siliqua* accounted for additional diversity.

STATION 24 (lat 44 28.4233 long 60 29.8595)
 This station was taken at 28 m water depth again from a medium-grained sand with a few sand dollars on the surface. The annelids were the most diverse fauna at this station. In contrast to the species collected at the previous two stations, which were represented more by surface dwelling species, the species collected at this station included burrowers, e.g. representatives of the family Opheliidae, and tube builders, representatives of the family Spionidae. Based on these observations, this station looked a little different from the others. Overall there were few species (6) and density of animals in the community was low (175 ind./m²).

STATION 25 (lat 44 32.7436 long 60 25.9728)
 Like many of the other stations on Middle Bank, where the sites were relatively shallow, this sample came from a depth of 27 m. The coarse angular sand was inhabited by a low number of species (7) and a low density (225 ind./m²). Diversity was moderate ($H' = 1.6$). The animals collected at this site were generally annelids and crustaceans.

STATION 26 (lat 44 37.6616 long 60 23.3563)
 Nearing the edge of Middle Bank the last sample from this bank was taken at 41.6 m water depth where the sediment was poorly-sorted, gravelly sand. The larger gravel clasts were considerably encrusted by the red coralline alga *Lithothamnium* sp. The small Iceland Scallop, *Chlamys islandicus*, and, both burrowing and attached anemones were found at this station, all in low numbers. The dominant organisms were the echinoderms, as was found at other stations with similar sediment such as STATIONS 17, 19 20 and 21. A dense patch of the brittle star, *Ophiuroides*, contributed to the higher than average density (875 ind./m²) of animals at this station. The large number of annelid species contributed to the higher than average diversity ($H' = 2.1$). This station was one of the 11 stations with more than 14 species.

STATION 27 (lat 44 31.2963 long 59 35.5630)
 This sample came from a depth of 39.1 m, where the sediment was a medium-grained sand with a large amount of empty clam shell. The fauna includes surface dwellers such as annelids of the families Polynoidae and Nephthyidae and a crustacean, and sand dwelling (burrowing) annelids of the family Opheliidae. Though there were many empty shells, there were no live molluscs. The medium sand doesn't seem to be inhabited by many animals. Both the number of species (4) and the number of individuals (175 ind./m²) are low.

BANQUEREAU

This station came from a depth of 32 m where quartz sand with a very few pebbles and shells was encountered. The featureless sediment was inhabited by very few animals. The sub-sample contained only 4 species with an extrapolated density of 350 ind./m².

STATION 32 (lat 44 27.1850 long 57 55.9770)

This station was of medium grained-sand with a little gravel and broken shell debris. One large boulder was captured in the grab and on close examination was found to be densely colonized with young barnacles, over 10/cm². The number of barnacles have not been incorporated in the data analysis. Without these the diversity was among the highest encountered ($H' = 2.4$). The diversity was mainly due to 4 species of annelids and 5 species of crustaceans. Though the diversity was high, density (not counting the barnacles) was low (300 ind./m²).

STATION 31 (lat 44 31.4740 long 59 13.1850)

This sample came from 64 m water depth and was a coarse-grained sand with gravel sediment. The macrofauna was dominated by the sand lance *Ammodytes americanus*. Very few invertebrates were collected. At 625 individuals/m², this concentration of sand lances was the most dense to be recovered. It also accounted for the low diversity ($H' = 0.4$) at this station as most of the animals (92%) were of this one species.

STATION 30 (lat 44 33.9310 long 59 19.5920)

This station from 48 m water depth was taken in a sediment of poorly sorted, silty, gravelly sand and part of the sample was lost as the jaws of the grab did not close completely. It was thought that the sample had been taken in an iceberg furrow. The most numerous taxa represented were the crustacea. Burrowing molluscs also were found along with clumps of whale egg cases. In general, both density and diversity were low (225 ind./m² and $H' = 1.2$ respectively).

STATION 29 (lat 44 38.2090 long 59 27.9060)

This sample was taken at a depth of 48 m in a sediment similar to the previous one, a medium-grained sand with a large number of empty shells and fragments of dead sand dollars. The number of species is low (7), and with only one individual per species, there was a low density (175 ind./m²). The species collected were distributed among all the major invertebrate phyla and the diversity was relatively high ($H' = 1.7$).

STATION 28 (lat 44 34.8210 long 59 34.3360)

Though most of the samples from Banquereau Bank contained sand lances, there were some exceptions, Station 39 being one of them. Worm-like creatures

STATION 39 (lat 44 52.9020 Long 57 38.9910)

This sample was taken from a depth of 34 m with sediment similar to the preceding sample. Here another dense patch of *Ammodytes americanus* was encountered with approximately 800 individuals/m². There were annelids at this station as well, but the annelid species were wandering not burrowing species. Though there were 8 different species collected at this station the high number of sand lance accounted for the low diversity ($H' = 0.98$)

STATION 38 (lat 44 47.8980 Long 57 35.0180)

This sample came from a depth of 31 m, and as noted previously for samples on Banquereau, the medium to coarse-grained quartz sand was a light, bluish grey colour. Only two major taxa were represented at this station, annelids and vertebrates, and not many individuals. Diversity ($H' = 0.98$) and density (325 individuals/m²) were both relatively low.

STATION 37 (lat 44 40.9700 Long 57 39.9850)

This sample was from a depth of 33 m in a sediment of poorly sorted medium to coarse-grained sand with an occasional boulder. There were very few species at this station (only 3) and density was low as well (125 ind/m²). The most abundant single species was the sand lance *Ammodytes americanus* which occurred in a density of 75 ind/m². As noted at station 30 where there were 875 ind./m², these animals can occur in far denser patches.

STATION 36 (lat 44 31.1320 Long 57 51.9590)

At 36.2 m the sediment was of fine to coarse-grained sand. Six species in all were collected at this site, three of which were polychaetes. Crustaceans were well represented as well, and one burrowing amphipod accounted for almost 40% of all individuals captured. Diversity ($H' = 1.3$) was similar to that of about 25% of the grabs i.e. which range between 1.2 and 1.4.

STATION 35 (lat 44 31.1320 Long 57 51.9590)

This station was 36.2 m deep and the sediment was of poorly sorted medium-grained sand. It was the only station with no other fauna except molluscs. Though large numbers of the surf clam, *Spisula solidissima* and one species of gastropod were collected, the whole grab contained more than 20 specimens of surf clam. Diversity was not calculated as the species numbers were so low (2) and number of individuals of one species much higher than the other.

STATION 34 (lat 44 26.6380 Long 58 06.3380)

All of the stations in Chedabucto Bay showed a great deal of similarity. The depth from which grabs were taken ranged from 29-37 m. The sediment was sandy gravel with some rather large clasts, a substrate which provides a wide variety of niches for macrofauna. The animals collected from the six stations analyzed included a variety of echinoderms, amphipods (both burrowing and wandering) along with molluscs, including scavenging gastropod species, burrowing bivalves and attached chitons. The annelid fauna was also diverse and included animals such as the stationary sabellids, and terebellids, burrowing orbiniids, lumbrinerids and, tube-building oweniids and maldanids. Attached forms of other phyla colonized the larger clasts e.g. soft corals, sponges, anemones, tunicates and colonies of bryozoans, all fauna which

STATIONS 42 (lat 45 24.0790 long 61 13.6000), 43 (lat 45 24.0250 long 61 13.4170), 44 (lat 45 24.0460 long 61 13.4950), 46 (long 45 24.0290 long 61 13.5870), 47 (lat 45 24.0090 long 61 13.5190) and 48 (lat 45 22.3690 long 61 23.3740)

CHEDABUCTO BAY

STATION 41 (lat 45 09.5807 long 58 03.9651)
This sample was taken from a water depth of 61 m where the sediment was fine to coarse-grained sandy gravel. As was noted when the grab was brought on board, it was inhabited by a numerous and diverse macrofauna. With 22 species identified, Station 41 had the highest number of species per station encountered during the survey. Both the diversity ($H' = 2$) and density (2275 ind./m²) were also among the highest encountered during this investigation.

STATIONS 40 (lat 44 09.73 long 58 03.9110)
The sample from this station came from a water depth of 60 m where the sediment was of poorly-sorted sandy gravel. It was inhabited by a variety of molluscs, crustaceans, brittle stars, and attached forms such as bryozoans. In all, 14 species were identified. The larger number of species produced a relatively high diversity ($H' = 2.2$) and as each species was represented by several individuals, the density of individuals at this station (950 ind./m²) was relatively high.

ARTIMON BANK

than at other stations on this bank, but density of animals was low (475 segmented flatworm). Diversity at this station ($H' = 1.6$) was a little higher wandering (Nephtyidae) annelids, and a surface dwelling Turbellarian (a non-sediment at this station was inhabited by both burrowing (Ophelids) and were the most diverse and the most numerically abundant taxa at this station. ind./m²).

On Middle Bank, Stations 10-26, there was an average of 9.3 species per sample, with the diversity index ranging from $H' = 1.2$ to 2.2. The density of animals had a rather wide range, from 150 - 2475 almost the lowest to the highest; the average for this bank, 645 ind./m² was not statistically different from the average for all stations e.g. 614 ind./m². It was on this bank that the highest densities of echinoderms was encountered. This taxa numerically dominated the macrofauna in 5 of the 14 samples analyzed, and accounted for some of the very high densities such as those seen in stations with gravel i.e. STATIONS 17, 19, 21, 25 and 26. Annelids dominated the fauna

There was only one sample in Western Gully analyzed that was not taken on the large sand ridge called The Slipper. Here the benthic community of the medium to coarse-grained sand substrate had an equal number of annelids and crustaceans as in each case, 4 of the 9 species of invertebrates collected belonged to these two phyla. This diversity of annelids and crustaceans contributed to the relatively high ($H' = 1.9$) diversity found at this site.

In overview, one hundred and forty seven species in all were found during this survey. Each bank (or region) surveyed was inhabited by a characteristic fauna. The fauna collected was determined for the most part by the substrate, with more species found on the gravelly sand with cobbles and shell fragments than on the fine to medium-grained sand. For example, the sandy gravel with some rather large clasts characteristic of Chedabucto Bay had more species (an average of 15.8 species per grab compared with 9.5 species per sample overall), greater diversity (H' was generally greater than 2) and higher density of animals (904.16 ind./m²) than the fine-grained sand found on The Slipper (Stations 1-7) where the dominant taxa in this area were mainly burrowing annelids had a low diversity of macrobenthos and low densities of organisms (diversity (H') ranged between 0.8 and 1.7 and average density of animals was 166 individuals/m²).

DISCUSSION

Indicate that the clasts are not disturbed very much by frequent overturning etc. One other biological feature of the larger clasts of the sediments of Chedabucto Bay was the ever-present and colourful red, coralline, encrusting alga, *Lithothamnium* sp. This group of stations from Chedabucto Bay had relatively more species than other stations (an average of 15.8 species per grab), greater diversity (H' was generally greater than 2) and density was in most cases higher than the average as the average density for Chedabucto Bay was 904.16 compared with the overall average of 614 individuals/m².

of STATIONS 11, 12, 20, 22 and 24, where increased niches were created by such characteristics as the presence of shell fragments.

On Banquereau, diversity was for the most part in the low range, ($H' = 0.4$ to 2.2) and density of animals was lower than average. The average density of animals on Banquereau was 406.25 individuals/m². Sand lances were more abundant on Banquereau than on the other banks.

Chedabucto Bay was different than the other regions sampled as the sedimentary regime was not as sandy as that found on the banks. In fact, the substrate - sandy gravel with some rather large clasts - is in general a substrate which provides a wide variety of niches for macrofauna. As a consequence, this group of stations from Chedabucto Bay had relatively more species than other stations (an average of 15.8 species per grab compared with 9.5 species per sample overall), greater diversity (H' was generally greater than 2) and density of animals was, in most cases, higher than the average, as the average density for Chedabucto Bay was 904.16 compared with the average overall density of 614 ind./m². The attached fauna found on many of the larger clasts contributed to the greater diversity found throughout the bay. A lack of firm substrate on the sandy banks along with the higher wave energy prevents colonization by attached fauna as there is nothing to which to attach.

LITERATURE CITED

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INVERTEBRATES FROM HUDSON CRUISE 94-032 TO THE SCOTIAN SHELF 1994

ST 22 ST 23 ST 24 ST 25 ST 26 ST 27 ST 28 ST 29 ST 30 ST 31 ST 32 ST 33 ST 34 ST 35

SPECIES	ST 22	ST 23	ST 24	ST 25	ST 26	ST 27	ST 28	ST 29	ST 30	ST 31	ST 32	ST 33	ST 34	ST 35
BRYOZOAN														
PORIFERA														
COELENTERATA - ACTINARIA														
Metridium sp.														
Edwardsia sp.														
Stomphia sp.														
Telia sp.														
ANNELIDA - POLYCHAETA														
Ampharete arctica														
Artidea catharinae														
Autolytus sp.														
Axonice flexuosa														
Chone infundibuliformis														
Eteone longa														
Euchone analis														
Euzonus fabeliferous														
Exogone hebes														
Fabelligera affinis														
Gattyana cirrosa														
Glycera capitata														
Goniada maculata														
Harmothoe imbricata														
Laonice citrata														
Lumbrineris acuta														
Lumbrineris sp. no.														
Maldane sarsi														
Maldanidae														
Myxocolia infundibulum														
Neomphitrite affinis														
Nephtys buccera														
Nephtys discors														
Nephtys sp.														
Nereis greyi														
Nicomache lumbricaleis														
Ninoe nigripes														
Nothia conchylega														
Notomastus laterceus														
Ophelia limacina														
Ophelina acuminata														
Orbinia ornata														
Owenia fusiformis														
Pectinaria granulata														
Pectinaria hyperborea														
Pherusa plumosa														
Phoxoe longa														
Phylodoce arenae														
Phylodoce groenlandica														
Phylodoce maculata														
Pista cristata														
Polycirrus sp.														
Potamilla neglecta														
Praxillella praetemissa														
Praxillella gracilis														
Pronospio steensstrupi														

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Rhodine sp.									
Sabellidae									
Scalibregma inflatum									
Scotecolepides viridis									
Scotoplos armiger									
Sponidae									
Spiophanes bombyx									
Terebellidae									
Tharyx sp.									
Thelepus cirrhmatus									
Travsea forbesi									
ANNELIDA - OLIGOCHAETA									
Matræ oligochaete									
NON-ANNELID WORMS									
NEMATODA									
NEMERTEA 'A'									
NEMERTEA 'B'									
SIPUNCULID 'A'									
SIPUNCULID 'B'									
TURBELLARIA Leptopiana sp.									
CRUSTACEA-AMPHIPODA									
Aeginella spinosa									
Aronyx hillborgi									
Ampelisca macrocephala									
Ampelisca radorum									
Amphiporeia sp.									
Caprella A									
Caprella B									
Corophium A									
Corophium B									
Erichthonius brasiliensis									
Harpinia sp.									
Hippomedon serratus									
Leptocheirus pinguis									
L. plumulosa									
Melita dentata									
Fontoporeia affinis									
Friscilla armata									
Psammonyx nobilis									
Unciola morata									
CRUSTACEA - MYSIDACEA									
Erythropops sp.									
Ostracoda									
CRUSTACEA - CUMACEA									
Cumacean indet.									
Diastylis quadrispinosa									
Diastylis sculpita									
Eudorella sp.									
Petalosarsia declivis									
CRUSTACEA - ISOPODA									
Chittidotea turtsi									
Cirriana polita									
CRUSTACEA - DECAPODA									
Pagurus arcuatus									
Cranion septemspinoso									
Hyas arenaceus									
CRUSTACEA - CIRRIPEIDIA - Balanus									
MOLLUSCA - BIVALVES									

prs

1

1

1

8

6

2

1

3

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8

1

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1

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2

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Anomia aculeata									
Astarte cf. borealis									
Cerastoderma pinnulatum									
Chlamys islandica									
Clinocardium ciliatum									
Columbella lineata									
Crenella glandula									
Cyrtodonta siliqua									2
Hiatella arctica									
Hiattella arctica									
Mercenaria mercenaria									1
Mesodesma arctatum									
Nuculana tenuisulcata									
Pitar norrhvana									
Spisula solidissima									
Tagelus plebius									
Tellina sp.									1
Thyasira insignis									
MOLLUSCA - CHITONS									
Ischnochiton alba									2
MOLLUSCA - GASTROPODA									
Acmæa festudinalis									
Calliostoma occidentale									
Colus pubescens									2
Colus pygmaeus									
Colus stimpsoni									
Margarites costalis									
Natica clausa									
Nepitæna decemcostata									1
Polinices triseriata									
P. immaculata									
Buccinum undatum									
Turritella aculea									
Lora sp.									
Retusa obtusa									
Cylichna gouldi									1
SOLENOGASTROPOD									
Crysallophrisson miltidulum									2
SCAPHOPODA									
Dentalium entale									
ECHINODERMATA - HOLOTHUROIDEA									
Cucumaria frondosa									
Psolus phantopus									
Psolus sp.									
ECHINODERMATA - OPHUROIDEA									
Ophura sarsi									11
Ophuroid INDET.									
Ophiopsis elegans									
Ophiopholis aculeata									4
STELLARIDS JUV.									
ECHINODERMATA - ECHINOIDEA									
Echinarachnius parma									1
Strongylocentrotus drobachiensis									4
CHORDATA									
UROCHORDATA - TUNICATES									
Ascidia callosa									
Indetermined									
VERTebrATA									
Ammodytes americanus									
Ammodytes dubius									4
Invertebrate egg cases									35
pres.									

