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Final report on environmental effects of the second Hampton Roads bridge-tunnel construction to Virginia Department of Highways : effects on benthic communities

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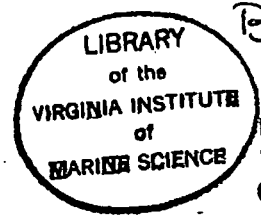
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FINAL REPORT ON
ENVIRONMENTAL EFFECTS OF THE
SECOND HAMPTON ROADS BRIDGE-TUNNEL CONSTRUCTION

TO

THE VIRGINIA DEPARTMENT OF HIGHWAYS

EFFECTS ON BENTHIC COMMUNITIES

by

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Introduction

Benthic (bottom-dwelling) organisms are the marine organisms potentially most directly affected by activities related to construction of the bridges and tunnels. In addition to the permanent displacement of benthos from bottoms claimed by the construction of islands, alterations to the benthos may occur from activities related to laying tunnels, fill acquisition from subaqueous borrow pits, and general construction activities.

Diverse assortments of organisms, most unfamiliar to most laymen, constitute benthic communities. These communities play integral roles in the functioning of estuarine ecosystems. Benthic invertebrates are the predominant food source for many estuarine fishes, including the young of many sport and commercial species, and many motile invertebrates, such as the blue crab. The bottom community as a whole is important in the consumption of organic matter and in the cycling of essential nutrients. The composition and stability of bottom sediments, which may be altered by bridge-tunnel construction, profoundly affect the role of the community in providing these functions.

A sampling program was undertaken from July 1973 to June 1974, to assess the effects of construction of the second Hampton Roads Bridge-Tunnel on the benthic communities in the vicinity. Macrobenthic animals (defined as

those retained by a 1.0 mm mesh sieve) were quantitatively sampled along three transects perpendicular to the new tunnel and in and around the fill "borrow areas" nearby on Willoughby Bank and Sewell's Point Spit. The effects of construction practices on the benthic communities was assessed through interpretation of faunal composition, sediment characteristics, and bottom profiles.

Methods

The benthic fauna at total of 27 different stations was sampled in one or more of three periods during 1973 and 1974. The location of the stations, water depth and dates on which they were sampled are listed in Table 1.

Bottom organisms were sampled along three transects perpendicular to the second tunnel during July 1973 (Fig. 1). The northernmost transect of these "Channel Stations" crossed tube section 8 which had recently been laid, and consisted of one station (N3) at or immediately adjacent to the tube, and two stations bayward and two riverward, approximately 100 and 500 yards from the tunnel. The central transect crossed the site of tube sections 13 and 14, the trench for which had not yet been dredged. This transect included a station on the tunnel path and stations 200 and 500 yards riverward and 100 and 400 yards bayward. The southernmost transect was located on the

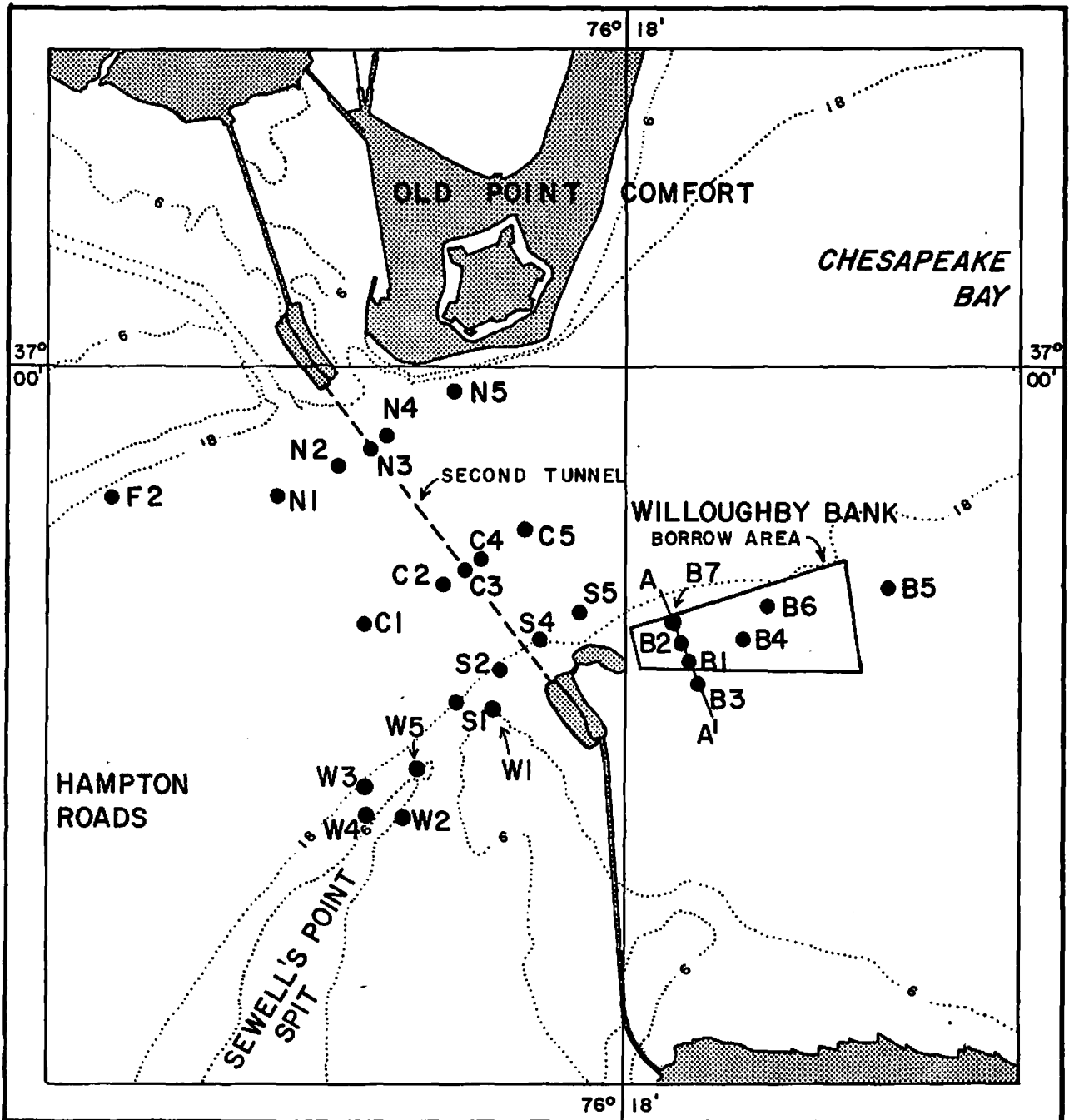


Figure 1. Location of benthic sampling stations.

Table 1. Location and water depth (mean low water) at stations sampled during July, November, 1973 and June 1974.

Station	Depth (Feet)	Location		Sampled July 1973	Sampled November 1973	Sampled June 1974
CHANNEL STATIONS						
N1	48	36°59.7'N	76°19.2'W	X		
N2	65	36°59.7'N	76°19.0'W	X	X	
N3	69	36°59.8'N	76°18.8'W	X	X	
N4	63	36°59.8'N	76°18.8'W	X	X	
N5	63	36°59.9'N	76°18.6'W	X		
C1	53	36°59.3'N	76°18.9'W	X		
C2	56	36°59.4'N	76°18.7'W	X		
C3	63	36°59.4'N	76°18.6'W	X		
C4	62	36°59.5'N	76°18.5'W	X	X	
C5	70	36°59.6'N	76°18.3'W	X		
S1	22	39°59.1'N	76°18.6'W	X		
S2	20	36°59.2'N	76°18.4'W	X		
S4	22	36°59.2'N	76°18.3'W	X		
S5	28	36°59.3'N	76°18.2'W	X		
F2	24	36°59.6'N	76°19.8'W	X		
BORROW AREA STATIONS						
B1	20	36°59.2'N	76°17.8'W	X	X	X
B2	12	36°59.2'N	76°17.8'W	X	X	X
B3	11	36°59.1'N	76°17.8'W	X	X	X
B4	18	36°59.2'N	76°17.6'W	X	X	X
B5	7	36°59.4'N	76°17.1'W	X	X	X
B6	23	36°59.3'N	76°17.5'W		X	X
B7	30	36°59.2'N	76°17.8'W			X
SEWELL'S POINT SPIT STATIONS						
W1	26	36°59.0'N	76°18.4'W			X
W2	10	36°58.7'N	76°18.8'W			X
W3	28	36°58.8'N	76°18.7'W			X
W4	16	36°58.7'N	76°18.9'W			X
W5	26	36°58.9'N	76°19.0'W			X

shoulder of the channel, crossing tunnel tube 19. Construction activities precluded sampling over the tunnel, but stations 100 and 400 yards riverward and bayward were occupied. Finally, another station (F2) located off Hampton Bar which had been regularly sampled during an earlier study (Boesch, 1971, 1973) was resampled.

Preliminary conclusions, discussed later in this report, indicated little advantage in complete resampling of the channel stations, therefore only a selected few (Stations N3, N4, N5, and C4) were resampled in November, 1973.

The second area of investigation was the "borrow area" on Willoughby Bank, east of Fort Wool (Fig. 1). Here five stations were sampled in July, six in November, 1973 and seven in June, 1974. Stations B1, B2, B4, B6 and B7 were located in the borrow area, B3 was located just inshore of the borrow area and B5 was located east of it, on the crest of Willoughby Bank. Station B2 was located on a large mound of material dredged from the tunnel's excavations and deposited in the borrow pit and Station B7 was located in a deep hole (ca. 30 ft.) dredged in the spring of 1974.

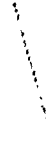
A third series of samples was taken in June 1974 in and around a second "borrow area" west of Fort Wool at the tip of Sewell's Point Spit (Fig. 1). They were from two stations in the dredged area (W1 and W5), two on deeper bottoms (W3 and W4) and one on the crest of the bar west of the dredged area (W2).

At each station, duplicate samples were taken with a Smith-McIntyre spring loaded bottom sampler which bites an area of 0.1m^2 . A small portion of the sediment contained in one of the grab samples was retained for sediment particle size analysis. The remaining sediment and the contents of the other grab sample were washed through a 1 mm mesh sieve. The material retained on the sieve was preserved and the animals carefully picked from the debris later in the laboratory. All animals were identified and enumerated.

The processes of careful sieving, sorting and identification are extremely laborious and severely limit practical sampling effort. Several of the samples from the borrow areas required 2 to 4 days each for analysis.

The data were interpreted in terms of the species composition of the collections and the relative abundances of the species. Several general measures of the structure of the communities were also employed. [By community structure we imply the abundance and relative importances of species in the community]. The simplest of these measures are the number of species and the number of individuals collected in the sample. An index of species diversity was also employed which expresses the uncertainty involved in predicting the identity of an individual randomly chosen from the collection. This "informational diversity index" is computed as

$$H' = - \sum_i p_i \log_2 p_i,$$



where p_i is the proportion of the number of individuals belonging to the i th species in the collection. Informational diversity has two components, species richness, or the number of species in the collection, and species evenness, or the degree with which the individuals are distributed evenly amongst the species. In order to compensate for disparity in the number of animals taken in collections, the species richness was expressed as $S-1/\ln N$, where S is the number of species and N the number of individuals in the collection. Evenness was expressed by the ratio of H' to the value of H' , had all the species present been equally abundant, i.e.

$$J' = H'/H'_{\max}$$

For a more detailed discussion of these measures see Boesch (1973).

Small aliquots of surface sediment were removed from one sample at each station. Sediment particle-size distribution was determined by sieving and pipette analysis following the procedures of Folk (1961), after disaggregation in 4% sodium hexametaphosphate solution.

To further assess the impact of the fill removal at Willoughby Bank and Sewell's Point Spit, an extensive series of bottom profile transects was made with a Raytheon DE719 recording fathometer. Visual inspection of the bottom with

a closed circuit underwater television camera supplemented the faunal and bathymetric investigation.

Results and Discussion

The 84 grab samples collected in July and November, 1973 and June 1974 yielded organisms separable into 179 forms (Appendix 1), 165 of which were identified to species. At least 173 species were represented in the collections, at least 162 of which are non-colonial forms, compared to 168 non-colonial species found by Boesch (1973) in a more extensive survey of Hampton Roads benthos. Higher taxa with the most species were polychaete worms (47 species), amphipod crustaceans (29), bivalve molluscs (21) and gastropod molluscs (21). Complete data on species composition and abundance are included in Appendix 2.

Data on particle-size composition of sediments are summarized in Table 2. The June 1974 sediment samples have not yet been analyzed. Median particle-diameter is expressed in phi units (- log diameter in mm). A sorting coefficient, a measure of the degree to which particles are of the same size, is computed as

$$S_{\phi} = \frac{\phi_{80} - \phi_{20}}{2},$$

where ϕ_{80} and ϕ_{20} are those diameters (in phi units) than

Table 2. Sediment median particle-diameter in millimeters and phi units, sorting coefficient, percent sand, silt, clay and shell-gravel and sediment classification for each of the July and November 1973 stations.

	Station	Md ϕ	S ϕ	% Shell & Gravel	% Sand	% Silt	% Clay	Classif.
JULY	N1	2.4	1.85	3.96	70.16	11.64	14.71	Clayey sand
	N2	2.9	1.70	1.16	75.05	13.58	13.20	Silty sand
	N3	2.8	*	3.95	48.53	24.62	22.88	Sand-silt-clay
	N4	1.6	0.50	0.16	91.76	3.49	4.58	Sand (medium)
	N5	2.2	0.40	0	93.49	1.87	4.63	Sand (fine)
	C1	1.5	0.45	T	92.93	4.82	2.23	Sand (medium)
	C2	1.5	0.65	T	87.51	5.90	6.58	Sand (medium)
	C3	0.7	0.50	0.16	96.21	2.31	1.31	Sand (coarse)
	C4	1.2	0.50	1.88	92.43	3.0	2.68	Sand (medium)
	C5	2.8	*	1.28	56.38	21.09	21.23	Sand-silt-clay
	S1	1.6	0.35	0.08	98.61	0.03	1.27	Sand (medium)
	S2	2.2	1.20	0.19	81.20	13.73	4.87	Sand (fine)
	S4	1.4	0.40	0.38	96.91	1.58	1.11	Sand (medium)
	S5	1.9	1.45	1.21	80.47	14.43	3.87	Sand (medium)
	B1	2.6	1.15	0.11	80.51	11.78	7.58	Sand (fine)
	B2	2.9	1.65	1.49	72.98	12.39	13.12	Clayey sand
	B3	2.3	1.55	3.03	74.25	12.61	10.10	Sand (fine)
	B4	2.4	0.60	0.12	86.31	8.30	5.25	Sand (fine)
	B5	1.8	0.90	1.12	85.49	9.84	3.54	Sand (medium)
	F2	3.0	0.25	T	80.76	9.95	9.12	Sand (fine)
NOVEMBER	N2	2.3	1.15	T	80.42	10.29	9.25	Sand (fine)
	N3	1.5	0.85	0.09	88.01	8.71	3.18	Sand (medium)
	N4	1.6	0.60	0.72	90.55	7.02	1.70	Sand (medium)
	C4	1.6	0.65	1.76	86.93	8.28	3.02	Sand (medium)
	B1	2.8	0.95	1.85	76.59	9.55	12.00	Sand (fine)
	B2	3.0	1.50	0.08	69.70	17.18	13.02	Silty-sand
	B3	1.9	0.80	6.99	83.63	3.32	6.04	Sand (med.-fine)
	B4	2.5	1.85	0.12	64.29	18.58	16.99	Silty-clay
	B5	1.5	0.65	0.44	96.73	0.94	1.87	Sand (medium)
	B6	7.8	*	0.02	10.12	42.86	46.98	Silty-clay

* Not computable because >20% finer than 8 ϕ
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which 80 and 20% of the sediment mass, respectively, is coarser. The sediments are further classified according to Shepard's (1954) nomenclature.

Tunnel Area Investigations

During the July 1973 sampling, the northernmost transect was planned to cross a recently completed section of the tunnel in order to ascertain effects with distance away from the dredging activities. Samples at Station N3, located at the tunnel site, contained mixed sediment and gravel used as special fill in tunnel construction. The dominant organism at that station was the opportunistic bivalve Mulinia lateralis. Specimens were mostly less than 8 mm long, indicating recent recruitment to the recently disturbed bottom. Specimens of other abundant species were likewise small. Station N2 (ca. 130 yards riverward) also was inhabited by Mulinia of a comparable size. The biota at Station N1 contained many epifaunal forms which inhabit the surface of shell material or live on hydroids growing on the shell. Bayward the sediments became progressively more sandy. At N4, the bivalve Tellina agilis had a dense population of small individuals and epifaunal species were also important. At Station N5 (ca. 525 yards from the tunnel) shifting, well sorted sands limited the fauna to a few forms capable of surviving in those unstable conditions (e.g. the isopod Chiridotea nigrescens).

Fig. 2 and Table 3 show that no obvious trend in informational species diversity existed and that species richness increased riverward. We interpret this as a response to increased sediment stability and habitat complexity. Therefore, the factor most controlling community structure along Transect N is sediment stability, and thus probably bottom water velocity, and not the activities of tunnel construction. From the composition of the biota at Station N3 it also seems that recolonization of disturbed bottom was rapid.

Samples taken in November at Stations N2, N3 and N4, showed no unusual changes in abundances of constituent species or in species diversity. The main change was the elimination of Mulinia and Boesch (1973, 1974) has shown that great population "crashes" of this bivalve are commonplace. Otherwise, Tellina and the polychaete worm Glycera dibranchiata remained abundant and the oligochaete worm Peloscolex gabriellae increased in abundance from July to November.

The central transect crossed a section of the tunnel path which had not yet been dredged in July, 1973. The bottom at this point was composed of shifting sands inhabited by only a very few species, the most abundant of which, the isopod Chiridotea nigrescens, is apparently adapted for existence in such a very dynamic habitat. The bottom at the two riverward stations was apparently also somewhat dynamic; because burrowing polychaetes, elsewhere ubiquitous and

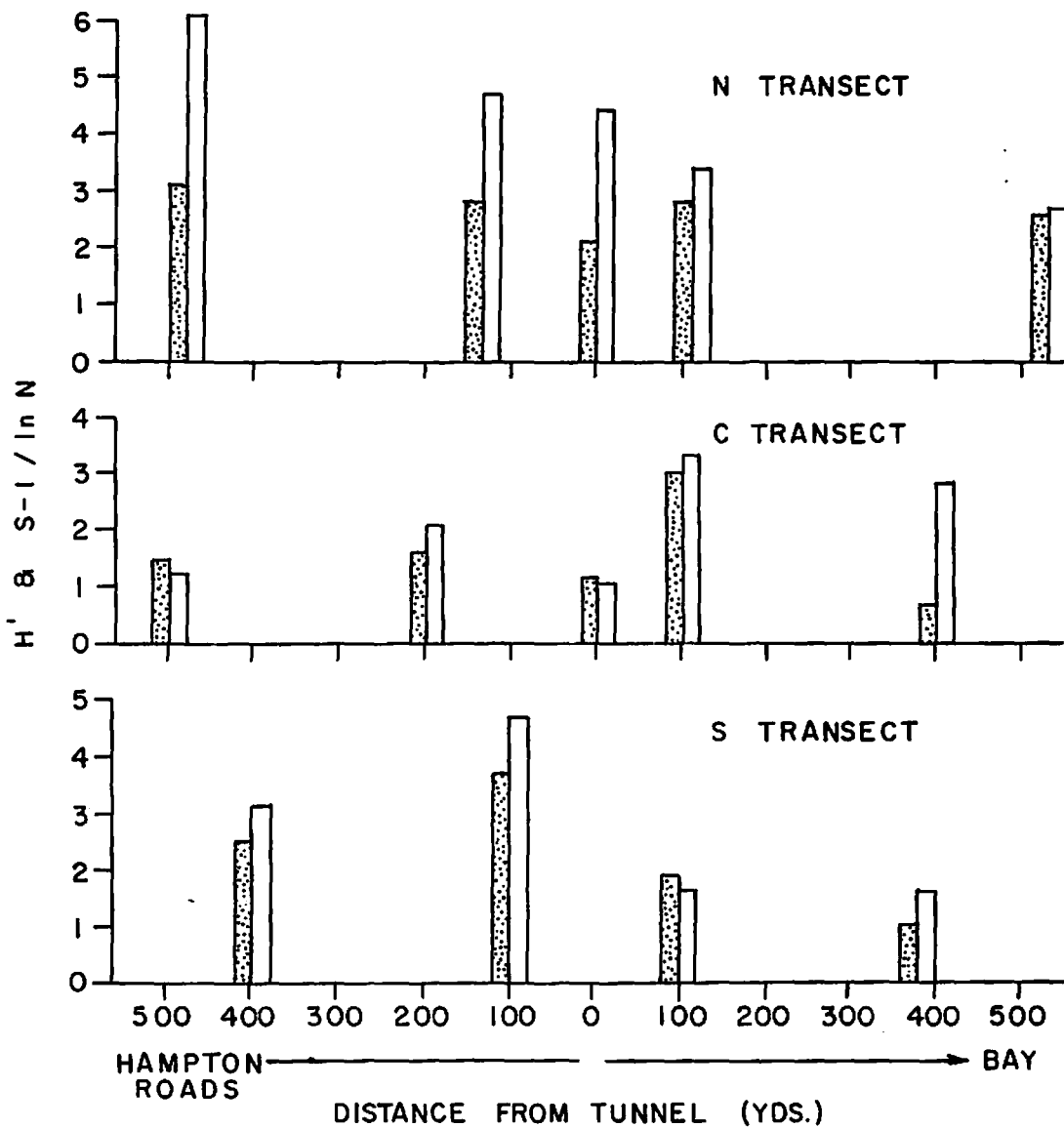


Figure 2. Values of informational diversity (H' ; stippled bars and species richness ($S-1/\ln N$; unstippled bars) for the July collections along the three transects perpendicular to the new tunnel.

Table 3. Numbers of species and individuals (0.2m²), informational diversity (H'), species richness (S-1/lnN) and species evenness (J') for collections from channel stations, July and November, 1973.

Station	Number of species	Number of individuals	H' (bits/indiv.)	S-1/lnN	J'
JULY, 1973					
N1	42	798	3.09	6.14	0.57
N2	25	169	2.84	4.68	0.61
N3	28	454	2.09	4.41	0.43
N4	22	440	2.78	3.45	0.62
N5	12	65	2.58	2.64	0.72
C1	7	153	1.46	1.19	0.52
C2	11	128	1.60	2.06	0.46
C3	4	18	1.10	1.04	0.55
C4	18	175	2.05	3.29	0.49
C5	22	1,568	0.62	2.85	0.14
S1	16	129	2.46	3.09	0.62
S2	24	127	3.72	4.75	0.81
S4	8	68	1.87	1.66	0.62
S5	9	152	1.17	1.59	0.37
F2	29	158	4.19	5.53	0.86
NOVEMBER, 1973					
N2	26	103	3.61	5.39	0.77
N3	18	55	3.46	4.24	0.83
N4	12	111	2.04	2.34	0.57
C4	12	67	2.33	2.62	0.65

abundant, were not well represented. These two stations were characterized by three small bivalves Tellina agilis, Mulinia lateralis, and Nucula proxima. Sediments at Station C4 were also relatively sandy and fauna was relatively similar to C1 and C2. The bottom at Station C5 was composed of sand overlaid with a mixture of silt, clay and fine sand. Again Tellina was abundant as was Peloscolex gabriellae, but the overwhelming dominant was Mulinia, with a density of over 7000/m².

As along Transect N diversity was generally low (Fig. 2, Table 3) and was apparently controlled by sediment stability. Because of the natural instability of the bottom in this area, we have concluded that any effects of tunnel construction would be hard to detect and probably of little lasting consequence.

The November sampling at C4 indicated great similarity to that in July, except for a substantial reduction in the density of Tellina and the aforementioned absence of Mulinia.

The southernmost transect was located on the channel slope along Fort Wool and the south portal island. Bottom sediments along the entire transect were composed of well sorted medium and fine sands (Table 2) and the faunal composition reflected sediment instability (e.g. Chiridotea and Tellina were generally abundant). However, the two stations riverward from the tunnel were also characterized

by substantial epifauna, including the "sea grape" Molgula manhattensis, the "honeycomb worm" Sabellaria vulgaris, and the amphipods Caprella penantis (the skeleton "shrimp") and Unciola irrorata. As a consequence the informational diversity and species richness at Stations S1 and S2 were elevated above the low levels at S4 and S5 (Fig. 2; Table 3).

Again, sediment instability and habitat complexity seem to be the controlling factors and no effects of tunnel construction could be identified as quite high diversity was experienced at B2, 100 yards from ongoing activities.

In summary, benthic communities in the channel between Fort Wool and Old Point Comfort are depauperate and considerably less diverse and rich than communities in environments similar in terms of salinity and temperature elsewhere in Hampton Roads and in the Chesapeake Bay area (Boesch 1972, 1973). This is apparently due to considerable instability of the bottom sediments which tends to obscure any effects of tunnel construction. The collections at Station N3 indicate that the bottom directly disturbed by dredging activities has been repopulated quickly.

Willoughby Bank "Borrow Area" Investigations

Sampling was conducted in and around the "borrow area" to determine the extent of colonization on the sediment newly exposed by excavation or newly deposited in the area from tunnel excavation. Dredging had commenced in the area

in January 1971 and was terminated in August 1971 so that roughly two years had passed before sampling commenced in July 1973. However, substantial quantities of material were deposited in the borrow area intermittantly during the period September 1972 to October 1973. It is thus virtually impossible to determine the exact "age" of the exposed bottom, although it is our feeling that most of the bottoms we sampled (except at Station B7) had been continuously exposed since early 1973 or before.

Dredging in the borrow area recommenced during the spring of 1974 and was finally terminated in late April. This dredging apparently did not disturb areas which had been previously sampled but did result in several new depressions in the excavation (Fig. 3).

The basic sampling strategy was to sample several deep, relatively old bottoms in the borrow pit (B1, B4 and, from November, B6), a relatively new bottom on a mound of spoil (B2), a new bottom in a deep excavation exposed during spring 1974 (June, 1974, B7), and control stations just inshore of the pit (B3) and on the crest of Willoughby Bank just east of the borrow area (B5) in order to give a picture of the bottom communities displaced by the borrow area.

As can be seen from Table 4, the borrow area stations were generally characterized by much greater numbers of species and individuals than the tunnel area stations. This

Table 4. Number of species and individuals ($0.2m^2$), informational diversity (H'), species richness ($S-1/\ln N$) and species evenness (J') for collections from the Willoughby Bank "borrow area", July and November, 1973 and June, 1974.

Station	Number of species	Number of individuals	H' (bits/indiv.)	$S-1/\ln N$	J'
JULY, 1973					
B1	30	601	2.73	4.43	0.56
B2	37	1,441	3.73	4.95	0.72
B3	55	2,460	3.54	6.92	0.61
B4	35	1,168	2.63	4.81	0.51
B5	13	62	2.95	2.91	0.80
NOVEMBER, 1973					
B1	34	263	3.06	5.92	0.60
B2	43	596	3.52	6.57	0.65
B3	48	848	3.10	7.12	0.56
B4	28	261	3.00	4.85	0.62
B5	11	89	2.29	2.23	0.66
B6	20	31	3.95	5.53	0.91
JUNE, 1974					
B1	30	308	3.38	5.06	0.69
B2	26	211	3.64	4.67	0.77
B3	47	1,409	2.97	5.93	0.54
B4	36	511	2.66	5.61	0.52
B5	20	324	2.12	3.29	0.49
B6	27	337	3.30	4.47	0.69
B7	17	76	3.23	3.69	0.79

is partially attributable to the large and diverse populations of epifaunal species in the borrow pit and at the inshore station B3. In particular the sea squirt, Molgula manhattensis, the honeycomb worm, Sabellaria vulgaris, the barnacle, Balanus improvisus, the blue mussel, Mytilus edulis and the hydroid Sertularia argentea covered exposed shell material. Living on these larger epifaunal organisms was a diverse assemblage of amphipod crustaceans, notably the skeleton "shrimp" Caprella penantis, but also including Unciola irrorata, Unciola serrata, Elasmopus levis, Gammarus mucronatus, Melita nitida, Corophium simile, C. acherusicum and Stenothoe minuta. The primary hard substrate on the natural bottom at B3 was Recent oyster and clam shell, however in the borrow area Miocene shell contained in the tunnel excavations offered sites for epifaunal attachment. This fossil shell material was relatively sparse at stations B1 and B4 but very abundant in the spoil mound at B2. However, exposed shell became less abundant at B2 from July to November and from November to June, probably due to wave erosion. This was apparent in the sedimentary analysis (Table 2) as well as by visible inspection and resulted in a great reduction in epifauna.

Community structure measures indicate greatest numbers of species, abundance and species richness at the control station B3 during each of the sampling periods (Table 4).

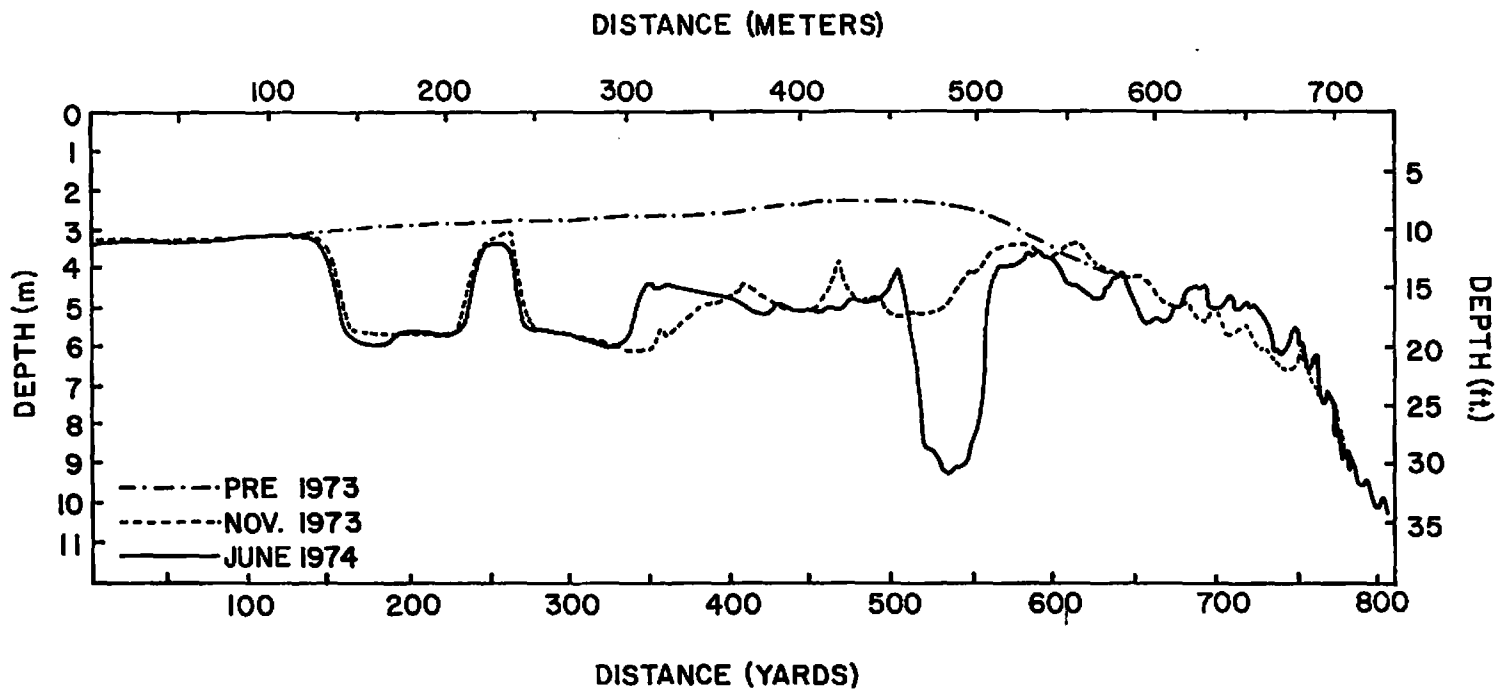


Figure 3. Bathymetric profiles of transect AA'.

To further analyze these differences, the assemblages at the four stations positioned along Transect AA' (Figs. 1 and 3), i.e., Stations B3, B1, B2 and B7 are more thoroughly considered.

When those species whose presence depends on exposed hard substrates (i.e., the "primarily epifaunal" species) are excluded from the analysis, it becomes apparent that the infaunal assemblage at B3 was considerably richer, in terms of numbers of species and the richness index, and much more diverse than those at the stations in the dredged area (Fig. 4). However, the abundance of infauna was not greater than at B1 and B2. Extremely high densities of epifauna occurred at B3, especially in July 1973 and June 1974, but not very many more epifaunal species were represented than at Station B2. The inclusion of the very large numbers of a few epifaunal species in the analysis had the effect of lowering the informational diversity of the whole assemblage at B3.

At Station B1, fossil shell was relatively scarce and the richness and abundance of epifauna relatively low. At Station B2, a rich and abundant epifaunal assemblage had developed on the exposed fossil shell by July 1973, including a large population of blue mussels, Mytilus edulis. However, subsequent sampling showed a progressive reduction in epifauna concomitant with an apparent loss of exposed

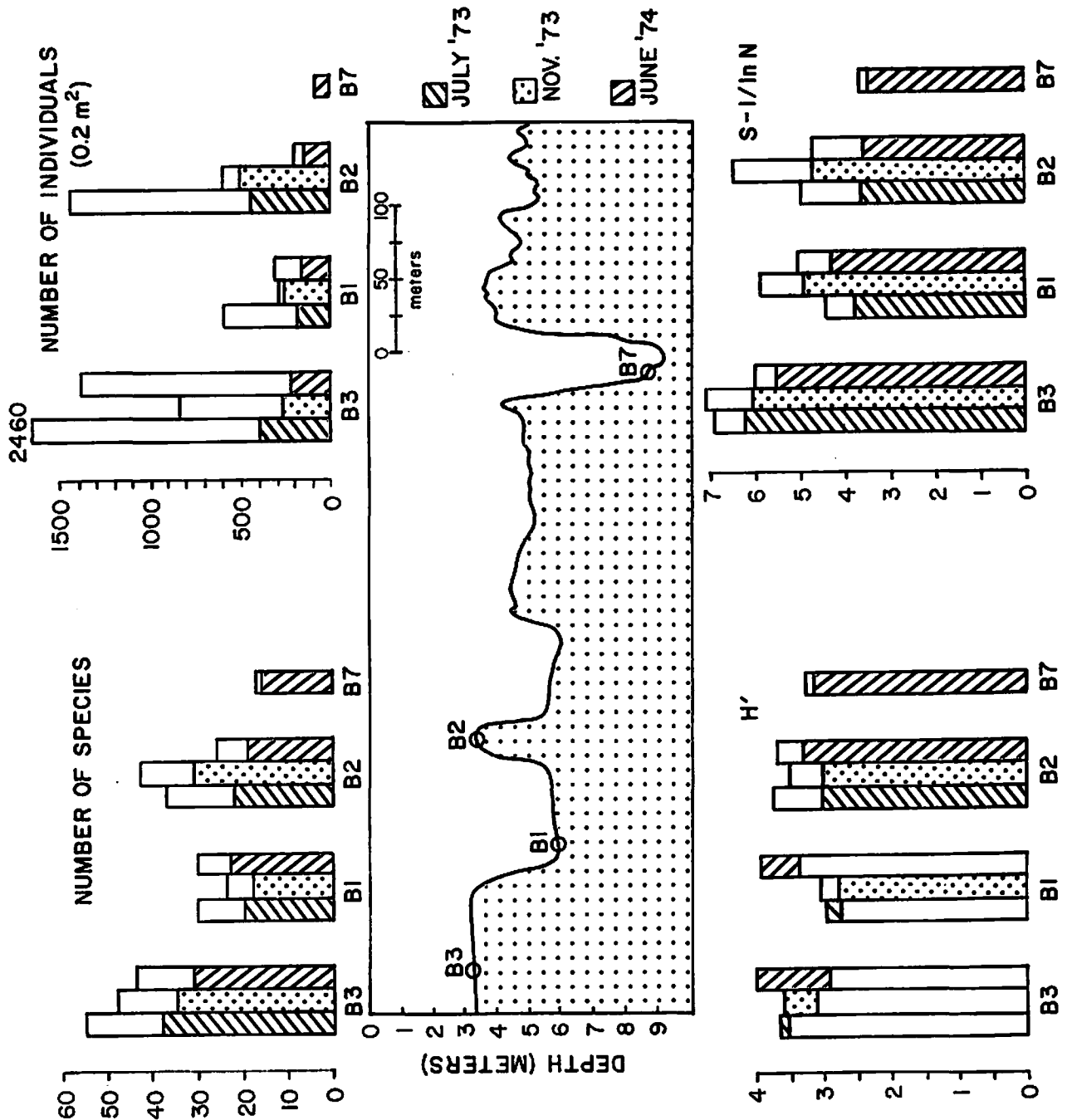


Figure 4. Number of species and individuals, informational diversity (H') and species richness ($S-1/\ln N$) at four stations on transect AA'. Shaded bars indicate values without epifauna, unshaded bars are values for the whole assemblage.

shell due to erosion of the mound of spoil at which this station was located (Fig. 3). The benthic fauna at Station B7 was depauperate in numbers of both species and individuals when it was sampled in June, 1974. Only a few months had passed since the bottom there had been dredged and few species had colonized the new bottom, the dominant ones being the opportunistic species Glycera dibranchiata (polychaete), Mulinia lateralis (bivalve) and Streblospio benedicti (polychaete).

Of the dominant infaunal species, most (including the oligochaete Peloscolex gabriellae, the polychaetes Glycera dibranchiata, Nereis succinea, Clymenella torquata and Pectinaria gouldii, the molluscs Acteocina canaliculata, Lyonsia hyalina, Tellina agilis, and the phoronid worm Phoronis psammophila) showed no clear patterns of preference for either Station B3 or Station B1 and B2. However, three dominant infaunal species, the amphipod Ampelisca vadorum and the polychaetes Pseudeurythoe paucibranchiata and Heteromastus filiformis, were clearly more abundant at B3 than either at B1 or B2 (Fig. 5). Only one infaunal dominant, the bivalve Mulinia lateralis, was more abundant at both B1 and B2 than at B3 (Fig. 5). Mulinia is a well known opportunistic species, which can colonize and exploit disturbed environments (Boesch, 1973, 1974; Grassle and Grassle, 1974). One infaunal species, the bivalve Barnea truncata,

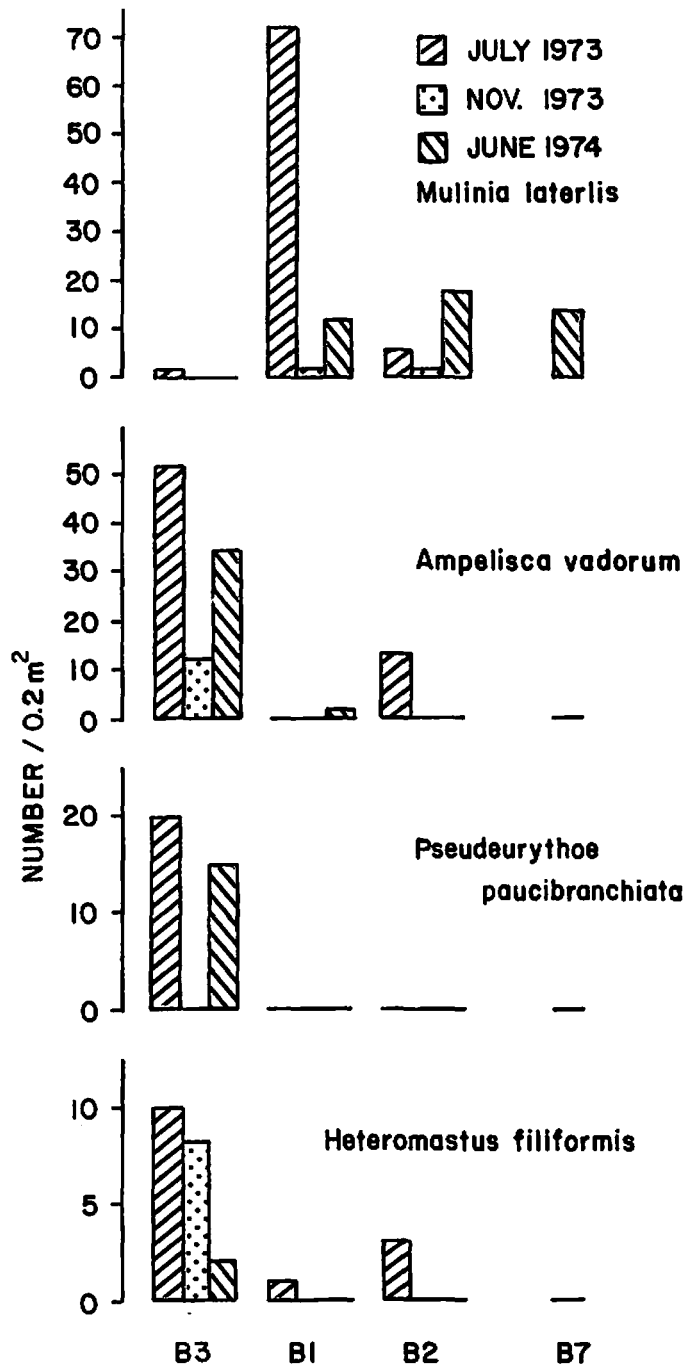


Figure 5. Population densities of three infaunal species at the four stations on transect AA'.

was very abundant at B2 in July and November, 1973 but was not abundant elsewhere. Barnea normally burrows into clay banks and other semi-consolidated sediments (Wass, 1972) and was found in chunks of the compacted fossil sediment of the spoil mound at B2.

Of the other stations in the Willoughby Bank borrow area series, Station B4 was very much like B1 and B2 in its faunal composition and community structure. A progressive reduction of epifauna due to the reduction in the amount of exposed shell material was also apparent.

Station B5 was very poor in species and density of organisms. This is attributable to sediment instability due to the dissipation of wave energy on this shallow, exposed bar crest. Many of the characteristic species at this site, such as the bivalve Gemma gemma, the minute tanaid Tanaissus lilljeborgi and haustoriid and phoxocephalid amphipods, were only infrequently found elsewhere. Others, e.g. Tellina and Chiridotea, were also abundant in the current swept sands in the channel, another hydrodynamically stressed environment.

Considerable difference in the sediments and fauna at Station B6 were noted from November 1973 to June 1974. This is probably due to the imprecision of station relocation more than to real changes. In November the sediments were predominantly silts and clays and the fauna extremely depauperate, while in June, sediments were mostly sands and an assemblage of relatively low infaunal diversity, qualitatively similar to those at B1, B2 and B7, was found.

The data presented here indicate that the Willoughby Bank borrow area has been colonized within two years by a fauna similar to that just inshore of the borrow area, except that the development of the infaunal community has lagged. This delay may have been caused by community interactions or microhabitat differences, but the low organic content of the exposed relict sediment in the borrow pit has probably been a factor in the slow rate of colonization by deposit feeding infaunal species, particularly those that feed on subsurface sediments.

Displaced has been the highly specialized bar crest assemblage characteristic of Station B5. This is a community of low diversity and productivity, but the bar may be otherwise hydrodynamically and sedimentologically important to adjacent communities.

The long-term impact of the borrow area excavation cannot yet be ascertained. Visual observations indicate strong currents flow through the pit, thus preventing possible stagnation. Measurements of dissolved oxygen taken in June, 1974, bear this out, for no substantial depletion of oxygen in the bottom waters existed. Bottom circulation in the pit is probably aided by the fact that the pit is more or less cut into the side of Willoughby Bank such that only the western one-third of the pit is separated from the channel by a shoal such as indicated in Fig. 3.

The long range impact will also depend on the rate and quality of sedimentation in the pit. We observed at Station B1 during the June 1974 sampling a thin veneer of finer sediment overlaying the relict sediments which covered most of the floor of the excavation. However, it does not appear likely that the pit will rapidly "silt in". It is presumed that an important source of sediment would be sand transported westward along the crest of Willoughby Bank, but bottom profiling across the eastern edge of the pit revealed no evidence of rapid infilling from that source. The nature of the benthic communities which will inhabit the borrow area in the future depends in large measure on the sediments which will be deposited in the pit.

Sewell's Point Spit "Borrow Area" Investigations

Sampling was conducted in and around the "borrow area" located to the west of the south portal island, on either side of the Willoughby Bay access channel and including the tip of the bar known as Sewell's Point Spit. Dredging in this area had gone on intermittantly from 1971 to June 1974, thus, as with the Willoughby Bank "borrow area", it is impossible to determine the exact "age" of the exposed bottom.

Again, those assemblages from within dredged areas at Stations W1 and W5 were less rich than those outside of the dredged area (W3 and W4) and the assemblage at the crest of the bar (W2) was of low diversity and density as was that on

Table 5. Number of species and individuals (0.2m), informational diversity (H'), species richness (S-1/lnN) and species evenness (J') for collections from the Sewell's Point Spit "borrow area", June 1974.

Station	Number of species	Number of individuals	H' (bits/indiv.)	S-1/lnN	J'
W1	19	132	2.91	3.89	0.68
W2	11	92	1.87	2.21	0.54
W3	43	1,858	2.64	5.58	0.49
W4	27	360	2.86	4.42	0.60
W5	16	106	2.48	3.23	0.62

the crest of Willoughby Bank (Station B5). Also Mulinia lateralis, potentially indicative of disruptions to the community, was more abundant at W1 and W5 than elsewhere.

Comparison of the fauna at W1 and W5 with that at W4, which because of its relative unimportance of epifauna and depth and sediment regime similar to the predredging conditions at W1 and W5 serves as a more appropriate control than W3, brings out further differences. The most striking of these is the much greater abundance of worms building vertical tubes, i.e. Phoronis psammophila, Spiochaetopterus oculatus, Scolelepis squamata and Clymenella torquata, at W4 than at either W1 or W5.

Conclusions regarding the long term effects of spoil acquisition on benthic communities in the Sewell's Point Spit borrow area must likewise be speculative. Again, the controlling factor will be the nature and rate of sedimentation.

Summary and Conclusions

1. The composition of benthic communities in the channel between Fort Wool and Old Point Comfort is controlled primarily by sediment instability and habitat complexity. In such a rigorous environment, no effects attributable to the construction of the tunnel could be detected, except in the immediate path of the tunnel excavation.

2. Whether substantial effects on bottom communities will occur from construction activities for other estuarine tunnel crossings depends on the stability of bottom sediments and other physical factors. Generally speaking, the more rigorous or stressful the natural conditions, the less will be the lasting effect (Boesch, 1974). The proposed third Hampton Roads bridge-tunnel crossing (Interstate Highway 664) would include a tunnel crossing the channel south of Newport News Point. Here as well swift currents sweep the channel and anything but local disruptions of the benthos appears improbable. In any case, there seem no design or methodological alternatives to those employed in the laying of the Second Hampton Roads Bridge-Tunnel which would significantly lessen the impact on the benthos in the channel.

3. In contrast, substantial and relatively long term alterations to benthic communities have occurred as a result of sand fill acquisition from two shallow bars, Willoughby

Bank and Sewell's Point Spit. In addition to the displacement of natural communities, recolonization of dredged bottoms by infauna has lagged.

4. No evidence exists for stagnation of water within the excavations or of rapid silting by fine sediments. This is, at least in part, attributable to the relatively open communication of these excavations with channel waters and the high current velocities in the area.

5. The long term effects of such borrow pits on benthic communities will be principally determined by the rate and quality of sedimentation in the excavations, which remain largely unknown. Similarly, effects on adjacent communities due to alteration of the normal hydrodynamic and sedimentological processes associated with such "bars" are possible but are unknown.

6. Because of the very real potential for serious and lasting environmental impacts of subaqueous borrow pits on the "bars" of Hampton Roads and environs, we recommend that (a) strong consideration be given to obtaining necessary suitable fill material from sources other than shoal water borrow pits, such as channel maintenance dredging and deeper bottoms at the mouth of Chesapeake Bay and on the continental shelf; (b) limits be placed on the depth below the natural bottom to which excavation may be carried such that the creation of deep isolated holes does not occur;

and (c) studies be carried out to determine the long range impact of excavation of Willoughby Bank, Sewell's Point Spit and Hampton Bar, to inventory the sources of suitable sand fill material in the Chesapeake Bay area and to assess the relative environmental impacts of alternate sources of supply.

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APPENDIX 1. Macrobenthic species collected and the stations at which they occurred.

Species	Stations Where Collected		
	July 73	November 73	June 74
Porifera			
<u>Craniella laminaris</u>	B5		B5, B6
Unident. sponge			B1, W1, W3, W5
Cnidaria			
Hydrozoa			
<u>Obelia geniculata</u>	N4	N2	
<u>Sertularia argentea</u>	N1, N4, C1, C2, C5, S2, B1, B2, B3, B4	N2, C4, B1, B2, B3, B4	B1, B4, B6, B7, W1, W3, W5
Anthozoa			
<u>Diadumene leucolena</u>	S2, B2, B3	B2, N3	
<u>Edwardsia elegans</u>	C2		
<u>Paranthus rapiformis</u>	C4, S2, B2		
Platyhelminthes			
<u>Stylochus ellipticus</u>			B2, B3, B4
Rhynchocoela			
<u>Cerebratulus lacteus</u>	N4, F2		B4, B7
Nemertean (unident.)	C5, B4	B1, B3	B3, B4, B6, W1 B7
<u>Tubulanus pellucidus</u>			
Ectoprocta			
<u>Aeverrillia armata</u>	B3		B4, B6
<u>Alcyonidium polyoum</u>	B4		
<u>Alcyonidium verrilli</u>		N2, N3, B1, B4, B6	B4, B6
<u>Bowerbankia gracilis</u>	N4	N4	B2, B4, B7, W1, W4
<u>Bowerbankia imbricata</u>	B3		
<u>Bugula turrita</u>			

APPENDIX 1 (Continued)

Species	Stations Where Collected		
	July 73	November 73	June 74
Ectoprocta (Continued)			
<u>Electra crustulenta</u>	C2,B3,B4		
<u>Electra hastingsae</u>			B4,B6
Phoronida			
<u>Phoronis muelleri</u>		B3	
<u>Phoronis psammophila</u>	S2,F2	B1,B2,B3	B1,B2,B3,B4, W1,W4
<u>Phoronis sp.</u>		B1	
Annelida			
Archiannelida			B5
Polychaeta			
<u>Ancistrosyllis hartmanae</u>	N2,S2,B3	B3,C4	B3,C4
<u>Arabella iricolor</u>		N3	B3,W3,W4
<u>Aricidea jeffreysii</u>	B4		
<u>Asabellides oculata</u>	N3,C5,B3		
<u>Brania clavata</u>			B2,B3,W3,W4
<u>Clymenella torquata</u>	N1,N2,B1,B3	B2,B3,B4	B1,B3,B4,W1, W3,W4
<u>Clymenella zonalis</u>	F2		
<u>Diopatra cuprea</u>		B4,N2	B6
<u>Dispia uncinata</u>			B7
<u>Drilonereis filum</u>	C2,C4,F2		
<u>Eteone heteropoda</u>	N3,B2,B3	B3,B4	B3,W3,W4
<u>Glycera americana</u>	N1	B6	
<u>Glycera dibranchiata</u>	N2,N3,N4,N5, C1,C2,C3,C4, C5,S1,S2,S5, F2,B1,B2,B3, B5	B1,B2,B3, B4,B5,C4, N2,N3,N4	B1,B2,B3,B4, B5,B6,B7,W1, W2,W3,W4,W5
<u>Glycera sp.</u>	N2		

APPENDIX 1 (Continued)

Species	Stations Where Collected		
	July 73	November 73	June 74
Annelida (Continued)			
Polychaeta (Continued)			
<u>Glycinde solitaria</u>	N3,C4,C5,F2, B1,B4	B1,B2,B3,B4, C4,N2,N3	B1,B3,B4,W4
<u>Heteromastus filiformis</u>	N2,N3,S1,B1, B2,B3	B1,B3	B3,W1
<u>Hydroides dianthus</u>	B3	B2,B3	B2
<u>Lumbrineris tenuis</u>		B6,C4,N3	
<u>Maldanopsis elongata</u>	N1		B7
<u>Marphysa sanguinea</u>		B6	B3
<u>Nephtys magellanica</u>	N1		
<u>Nereis succinea</u>	N1,N3,S1,S2, F2,B1,B2,B3, B4,B5	B1,B2,B3,B6, N2	B1,B3,B4,B7, W3
<u>Notocirrus spiniferus</u>	N1,S2,B3		
<u>Owenia fusiformis</u>		B4	
<u>Paleanotus heteroseta</u>	N2		B3
<u>Paraprionospio pinnata</u>	B3	B1,B4	B1,W1
<u>Pectinaria gouldii</u>	N1,N2,N3,N4, C4,C5,F2,B1, B2,B3,N5	B1,B2,B4	B1,B2,B4,W1
<u>Phyllodoce arenae</u>	N1,B1		
<u>Phyllodoce mucosa</u>	N1		
<u>Polycirrus eximius</u>		B3	B3
<u>Polydora ligni</u>	B1,B3		B3,W3
<u>Polydora websteri</u>		B2,B3	
<u>Polydora sp.</u>		B6,N2	
<u>Prionospio cirrifera</u>	N3		
<u>Pseudeurythoe paucibranchiata</u>	N1,N2,C5,B3	N4	B3,B4,B5

APPENDIX 1 (Continued)

Species	Stations Where Collected		
	July 73	November 73	June 74
Annelida (Continued)			
Polychaeta (Continued)			
<u>Sabella microphthalma</u>	B1, B3	B2, B3	B3, W3, W5
<u>Sabellaria vulgaris</u>	N1, N3, N4, S1, S2, B1, B2, B3, B4	B2, B3, B4, C4, N2, N3	B1, B2, B3, B4, B5, B6, W2, W3, W4 B7
<u>Scoelelepis bousfieldi</u>			W4 B7
<u>Scoelelepis squamata</u>	S5		W4
<u>Scoelelepis sp.</u>			B1
<u>Scoloplos fragilis</u>	N3, B1, C4		
<u>Scoloplos robustus</u>	S1, S2, F2	B4, B6, C4, N4	B2, B4, B5, W1, W3
<u>Spio setosa</u>	N5, F2		B4, B5, B6
<u>Spiochaetopterus oculatus</u>		B2, B3, B4	B1, B2, B4, B5, W3, W4
<u>Spiophanes bombyx</u>	S2, B3		B2, B3, B5, B7, W2, W4
<u>Streblospio benedicti</u>	N1, B3		B1, B2, B3, B4, B7, W4
<u>Tharyx setigera</u>		B3, B4	B1, B3
Oligochaeta			
<u>Pelosclex gabriellae</u>	N1, N2, N3, N4, C1, C4, C5, S1, F2, B2, B3	B1, B2, B3, B4, B5, C4, N2, N3, N4	B1, B2, B3, B4, B6, W3, W4
Mollusca			
Bivalvia			
<u>Anadara transversa</u>	S2, F2	B1, B3, N2, N3, N2, N4	B4
<u>Anadara ovalis</u>			
<u>Barnea truncata</u>	N1, B2, B3	B1, B2, B6	B4, B6
<u>Cyrtopleura costata</u>	B1, B2		

APPENDIX (Continued)

Species	Stations Where Collected		
	July 73	November 73	June 74
Mollusca (Continued)			
Bivalvia (Continued)			
<u>Ensis directus</u>	N1,N2,N3,N4, N5,C1,C2,C4, C5,S1,F2,B2, B3,B4		B1,B3,B5,B7, W3
<u>Gemma gemma</u>	B1,B2,B4,B5	B2,B3,B5	B2,B3,B4,B5, B6,W1,W2,W3, W4,W5 B3,W4
<u>Lucina multilineata</u>			
<u>Lyonsia hyalina</u>	N1,N3,N4,C2, C5,S2,B1,B2, B3,B4	B1,B2,B3	B1,B2,B3,B4, B5,B6,B7,W1, W3,W5 B4,W1
<u>Macoma tenta</u>	N3,B1		B4,W1
<u>Mercenaria mercenaria</u>		B1,B2,B4	B4,W4
<u>Mulinia lateralis</u>	N1,N2,N3,N4, N5,C1,C2,C3, C4,C5,S2,S4, S5,F2,B1,B3, B4,B5	B1,B2,B4	B1,B2,B3,B4, B5,B6,B7,W1, W2,W3,W4,W5
<u>Mya arenaria</u>	N1,N3,N4,C1, C4,S1,S2,S5, B2,B3,B4	B2	B2,B3,B6,B7, W3
<u>Mysella bidentata</u>	B1		B1,B4,W3
<u>Mytilus edulis</u>	N1,B2,B3,B4		B3,W5
<u>Nucula proxima</u>	N1,N2,N3,N4, N5,C1,C2,S2, S5,B3	B2,B3,N2, N3,N4	W3
<u>Pandora trilineata</u>			B5
<u>Petricola pholadiformis</u>	N1,B3,B4	B2	B6

APPENDIX 1 (Continued)

Species	Stations Where Collected		
	July 73	November 73	June 74
Mollusca (Continued)			
Bivalvia (Continued)			
<u>Spisula solidissima</u>	N5, C4, C5, S5	N2	B2, B5, B6, B7
<u>Tellina agilis</u>	N2, N3, N4, N5, C1, C2, C4, C5, S1, S2, S4, S5, F2, B1, B2, B3, B5	B1, B2, B3, B4, B5, C4, N2, N3, N4	B1, B2, B3, B4, B6, B7, W1, W3, W4, W5
<u>Yoldia limatula</u>	N1, N2, N3, C5		
Unident. Bivalves			W3
Gastropoda			
<u>Acteon punctostriatus</u>	N3, C5, B3, B4		
<u>Acteocina canaliculata</u>	N1, N2, N3, C5, S1, F2, B3, B4 B1, B3, B4	B1, B2, B3, B4, B5, N2, N4	B1, B2, B4, W1, W2, W3, W4
<u>Busycon carica</u>			
<u>Cerithiopsis greeni</u>		C4	
<u>Crepidula convexa</u>	N2, S2, B2, B3	B2, B3, B6	W3, W4
<u>Diodora sp.</u>	B3		
<u>Doridella obscura</u>	B4		B1, B2, B4, B6, W3, W5
<u>Epitonium multistriatum</u>	F2		
<u>Epitonium rupicolum</u>	B3	B2, B3, B6, C4	
<u>Eupleura caudata</u>	B3	B1, B2, B3, B4, N2 B1	W3
<u>Mangelia cerina</u>			
<u>Mitrella lunata</u>	N1, C4, C5, B3	B2, B3, B6, N3	B1, B3, W3
<u>Nassarius trivittatus</u>		B1, B2, B3, B4	
<u>Nassarius vibex</u>	F2	B3	B6, W3
<u>Odostomia bisuturalis</u>			W4
<u>Odostomia dux</u>		B2, B3, B4, N2	

APPENDIX 1 (Continued)

Species	Stations Where Collected		
	July 73	November 73	June 74
Mollusca (Continued)			
Gastropoda (Continued)			
<u>Odostomia impressa</u>	B2		B3
<u>Polinices duplicatus</u>	C5	N2	B3, B6
<u>Seila adamsi</u>		N3	
<u>Turbonilla interrupta</u>	N1	B1, B3, B4	B1, W4
<u>Urosalpinx cinerea</u>	B2		W3
Merostomata			
<u>Limulus polyphemus</u>	S4		
Pycnogonida			
<u>Callipallene brevirostris</u>		B3, B4	
<u>Tanystylum obiculare</u>		B3	
Crustacea			
Cirripedia			
<u>Balanus improvisus</u>	N4, N5, C5, S2, S4, B2, B3		B2, B3, B6, B7, W1, W3, W5
Ostracoda			
<u>Sarsiella zostericola</u>	B2		W5
Mysidacea			
<u>Neomysis americana</u>	N1, N2, N3, C2, C4	B1, B2, B5, B6	
Cumacea			
Cumacea (unident.)	B5		
<u>Cyclaspis varians</u>	N1		
<u>Diastylis polita</u>	F2		
<u>Leptocuma minor</u>			B5
<u>Leucon americanus</u>	N2, N3, C5		B1, W1, W5
<u>Oxyurostylis smithi</u>	N2, C2, F2, B4, B5		B6, B7, W4, W5

APPENDIX 1 (Continued)

Species	Stations Where Collected		
	July 73	November 73	June 74
Crustacea (Continued)			
Tanaidacea			
<u>Tanaissus lilljeborgi</u>	B5	B5	B5
Isopoda			
<u>Chiridotea nigrescens</u>	N5, C3, C4, S2, S4, S5, B5	B5, C4, N4	B2, B5, B6
<u>Edotea triloba</u>	N1, N2, N3, N4, C4, C5, S1, F2, B1, B2, B3, B4	B1, B2, B3, B6, C4	B1, B4, B6, W1, W3, W4, W5
<u>Erichsonella filiformis</u>	B1, B2, B3, B4	B1, B3, B4	B4
Amphipoda			
<u>Acanthohaustorius intermedius</u>	S2, S4	B5	W2, W3
<u>Ampelisca abdita</u>	N2		
<u>Ampelisca vadorum</u>	N1, N3, F2, B2, B3, B4	B3, B6	B1, B3, B4, W3, W5
<u>Ampelisca verrilli</u>	B4	B3, B4	W1
<u>Batea catharinensis</u>	N4, S1, B2, B3, B4		
<u>Bathyporeia parkeri</u>			W2
<u>Caprella equilibra</u>			W4
<u>Caprella penantis</u>	N1, N3, N4, C5, S1, S2, S4, F2, B1, B2, B3, B4	B1, B2, B3, B4	B1, B2, B3, B4, B5, B6, W1, W3, W5
<u>Cerapus tubularis</u>	N2	B1, B2	
<u>Corophium acherusicum</u>	N1, N4, S1, S2, F2, B1, B2, B3, B4	B1, B2, B3, N3	B1, B3, B4, W3
<u>Corophium simile</u>	B1, B3		B3
<u>Corophium tuberculatum</u>	N2, F2	B6, N2, N3	B2

APPENDIX 1 (Continued)

Species	Stations Where Collected		
	July 73	November 73	June 74
Crustacea (Continued)			
Amphipoda (Continued)			
<u>Elasmopus levis</u>	N4, B1, B2, B3, B4	B1	
<u>Erichthonius brasiliensis</u>	N1, N4, B4	B1, B2, N2	B1
<u>Gammarus mucronatus</u>	N1, F2, B1, B3 B4		B1, W3
<u>Idunella</u> sp.	N1		
<u>Listriella clymenellae</u>			W5
<u>Melita nitida</u>	B2, B3, B4		B3, W3
<u>Monoculodes edwardsi</u>		N2	
<u>Oedicerotid</u> (unident.)			W2
<u>Paracaprella tenuis</u>	N1	B2, B3, N2	B4, W3
<u>Parahaustorius holmesi</u>		B5	
<u>Parametopella cypris</u>		N2	
<u>Paraphoxus spinosus</u>	B2, B4	B3	B2, B3
<u>Pleusymtes glaber</u>		N2	W3
<u>Stenothoe minuta</u>	B1, B2, B3, B4	B2, N2	
<u>Trichophoxus epistomus</u>	B5		B6, W2
<u>Unciola irrorata</u>	N1, N4, N5, C4, S1, S2, B2, B3, B4	B1, B2, B3, B6, N2, N3	
<u>Unciola serrata</u>		N3	B1, B3, B4, W3, W4
Decapoda			
<u>Callinassa atlantica</u>	N1		
<u>Callinectes sapidus</u>	C2, B3	B4, B6	
<u>Crangon septemspinosa</u>	N1, N3, N4, N5, C3, F2, B1, B4		
<u>Euceramus praelongus</u>	N1		

APPENDIX 1 (Continued)

Species	Stations Where Collected		
	July 73	November 73	June 74
Crustacea (Continued)			
Decapoda (Continued)			
<u>Libinia dubia</u>		N2	
<u>Neopanope sayi</u>		N3	W3
<u>Ovalipes ocellatus</u>	B5		
<u>Pagurus longicarpus</u>	N1,N2,N4,N5, C4,C5,F2,B2, B3	B1,B2,B4,N4	B6
<u>Pagurus pollicaris</u>		N3	
<u>Palaemonetes pugio</u>		B6	
<u>Panopeus herbstii</u>	B2	B6,N2	
<u>Pinnixa</u> sp.	N1		
<u>Pinnixa cylindrica</u>		B3	
<u>Pinnixa sayana</u>	B3		
Xanthidae sp. (unid.)		B1,B2,B3	
Echinodermata			
<u>Micropholis atra</u>		B1,B2,B4	B4
Urochordata			
<u>Bostrichobranthus pilularis</u>			B2,B3,B5,B6
<u>Molgula manhattensis</u>	N1,N3,N4,S1, S2,F2,B1,B2, B3,B4,B5	B2,B3	B6,W2,W3
Cephalochordata			
<u>Branchiostoma caribaeum</u>		B5	
Pisces			
<u>Gobiosoma bosci</u>	B3	B3,B6	B3,W3
<u>Trinectes maculatus</u>		B1	

STATION N1, July 1973

Species	Sample 1	Sample 2	Total (0.2m ²)	Percentage
* <u>Sabellaria vulgaris</u>	3	267	270	33.83
<u>Ampelisca vadorum</u>	3	224	227	28.45
* <u>Unciola irrorata</u>	1	62	63	7.89
* <u>Corophium acherusicum</u>	22	22	44	5.51
* <u>Mytilus edulis</u>	38	1	39	4.89
* <u>Caprella penantis</u>	22		22	2.76
<u>Pectinaria gouldii</u>	17	4	21	2.63
<u>Ensis directus</u>	6	12	18	2.26
<u>Mya arenaria</u>	6	8	14	1.75
<u>Nereis succinea</u>	1	5	6	0.75
<u>Barnea truncata</u>		6	6	0.75
<u>Pseudeurythoe paucibranchiata</u>		6	6	0.75
<u>Edotea triloba</u>	5		5	0.63
<u>Acteocina canaliculata</u>	4		4	0.50
<u>Nucula proxima</u>	2	2	4	0.50
<u>Mulinia lateralis</u>	3	1	4	0.50
* <u>Paracaprella tenuis</u>	4		4	0.50
<u>Mitrella lunata</u>	2	1	3	0.38
* <u>Ericthonius brasiliensis</u>	2	1	3	0.38
<u>Crangon septemspinosa</u>	2	1	3	0.38
<u>Peloscolex gabriellae</u>	3		3	0.38
<u>Callianassa sp.</u>		3	3	0.38
<u>Pinnixa sp.</u>		3	3	0.38
<u>Pagurus longicarpus</u>		3	3	0.38
<u>Lyonsia hyalina</u>		2	2	0.25
<u>Petricola pholadiformis</u>		2	2	0.25
<u>Phyllodoce mucosa</u>	1		1	0.13
<u>Clymenella torquata</u>	1		1	0.13
<u>Maldanopsis elongata</u>	1		1	0.13
<u>Yoldia limatula</u>	1		1	0.13
<u>Turbonilla interrupta</u>	1		1	0.13

STATION N1, July 1973 (Continued)

Species	Sample 1	Sample 2	Total (0.2m ²)	Percentage
<u>Cyclaspis varians</u>	1		1	0.13
<u>Notocirrus spiniferus</u>		1	1	0.13
<u>Glycera americana</u>		1	1	0.13
<u>Nephtys magellanica</u>		1	1	0.13
<u>Phyllodoce arenae</u>		1	1	0.13
<u>Streblospio benedicti</u>		1	1	0.13
<u>Euceramus praelongus</u>		1	1	0.13
<u>Neomysis americana</u>		1	1	0.13
* <u>Gammarus mucronatus</u>		1	1	0.13
<u>Idunella n. sp.</u>		1	1	0.13
* <u>Molgula manhattensis</u>		1	1	0.13
<u>Sertularia argentea</u>	P	P		
Total individuals (non-colonial)	152	646	798	100
Total species (non-colonial)	25	31	42	

STATION N2, July 1973

Species	Sample 1	Sample 2	Total (0.2m ²)	Percentage
<u>Mulinia lateralis</u>	53	33	86	50.89
<u>Glycera dibranchiata</u>	8	12	20	11.83
<u>Tellina agilis</u>	3	7	10	5.92
<u>Ensis directus</u>	4	5	9	5.33
<u>Leucon americanus</u>	4	4	8	4.73
<u>Pectinaria gouldii</u>	3	5	8	4.73
<u>Peloscolex gabriellae</u>		4	4	2.37
<u>Neomysis americana</u>	3	1	4	2.37
<u>Yoldia limatula</u>	1	1	2	1.18
<u>Oxyurostylis smithi</u>		2	2	1.18
<u>Ampelisca abdita</u>		2	2	1.18
<u>Paleanotus heteroseta</u>	1		1	0.59
<u>Pagurus longicarpus</u>	1		1	0.59
<u>Nucula proxima</u>		1	1	0.59
<u>Lyonsia limatula</u>		1	1	0.59
* <u>Crepidula convexa</u>		1	1	0.59
<u>Acteocina canaliculata</u>		1	1	0.59
<u>Edotea triloba</u>		1	1	0.59
<u>Cerapus tubularis</u>		1	1	0.59
* <u>Corophium tuberculatum</u>		1	1	0.59
<u>Clymenella torquata</u>		1	1	0.59
<u>Glycera sp.</u>		1	1	0.59
<u>Pseudeurythoe paucibranchiata</u>		1	1	0.59
<u>Ancistrosyllis hartmanae</u>		1	1	0.59
<u>Heteromastus filiformis</u>		1	1	0.59
Total individuals	81	88	169	
Total species	10	23	25	

STATION N2, November 1973

Species	Sample 1	Sample 2	Total (0.2m ²)	Percentage
<u>Tellina agilis</u>	20	3	23	22.33
<u>Peloscolex spp.</u>	14	7	21	20.38
<u>Glycera dibranchiata</u>	11	7	18	17.47
<u>Acteocina canaliculata</u>	5	1	6	5.82
<u>Anadara transversa</u>	4		4	3.88
* <u>Corophium tuberculatum</u>	3		3	2.91
* <u>Paracaprella tenuis</u>	3		3	2.91
* <u>Unciola irrorata</u>	3		3	2.91
<u>Diopatra cuprea</u>	1	1	2	1.94
<u>Nucula proxima</u>	2		2	1.94
<u>Panopeus herbstii</u>	2		2	1.94
* <u>Sabellaria vulgaris</u>	1	1	2	1.94
<u>Anadara ovalis</u>	1		1	.97
* <u>Erichthonius brasiliensis</u>	1		1	.97
<u>Eupleura caudata</u>	1		1	.97
<u>Glycinde solitaria</u>	1		1	.97
<u>Libinia dubia</u>	1		1	.97
<u>Monoculodes edwardsi</u>	1		1	.97
<u>Nereis succinea</u>	1		1	.97
<u>Odostomia dux</u>			1	.97
* <u>Parametopella cypris</u>	1		1	.97
* <u>Pleusymtes glaber</u>	1		1	.97
<u>Polydora sp.</u>	1		1	.97
<u>Polinices duplicatus</u>	1		1	.97
<u>Spisula solidissima</u>	1		1	.97
* <u>Stenothoe minuta</u>	1		1	.97
<u>Sertularia argentea</u>	P	P		
<u>Obelia bicuspidata</u>	P			
<u>Alcyonidium verrilli</u>	P			
Total individuals (non-colonial)	82	21	103	
Total species (non-colonial)	25	7	26	

STATION N3, July 1973

Species	Sample 1	Sample 2	Total (0.2m ²)	Percentage
<u>Mulinia lateralis</u>	16	295	311	68.50
<u>Pectinaria gouldii</u>	1	42	43	9.47
<u>Lyonsia hyalina</u>		13	13	2.86
<u>Scoloplos fragilis</u>	1	10	11	2.42
<u>Tellina agilis</u>	2	8	10	2.20
<u>Asabellides oculata</u>		10	10	2.20
<u>Edotea triloba</u>	2	6	8	1.76
<u>Glycera dibranchiata</u>	2	4	6	1.32
<u>Neomysis americana</u>	6		6	1.32
<u>Leucon americanus</u>	5		5	1.10
* <u>Caprella penantis</u>		3	3	0.66
<u>Nereis succinea</u>		3	3	0.66
* <u>Molgula manhattensis</u>		3	3	0.66
<u>Nucula proxima</u>		3	3	0.66
<u>Macoma tenta</u>		3	3	0.66
<u>Yoldia limatula</u>		2	2	0.44
<u>Mya arenaria</u>		2	2	0.44
<u>Acteon punctostriatus</u>		2	2	0.44
<u>Crangon septemspinosa</u>		1	1	0.22
<u>Ampelisca vadorum</u>		1	1	0.22
<u>Glycinde solitaria</u>		1	1	0.22
<u>Eteone heteropoda</u>		1	1	0.22
<u>Peloscolex gabriellae</u>		1	1	0.22
<u>Prionospio cirrifera</u>		1	1	0.22
<u>Sabellaria vulgaris</u>		1	1	0.22
<u>Heteromastus filiformis</u>		1	1	0.22
<u>Ensis directus</u>		1	1	0.22
<u>Acteocina canaliculata</u>		1	1	0.22
Total individuals	35	419	454	100
Total species	8	26	28	

STATION N3, November 1973

Species	Sample 1	Sample 2	Total (0.2m ²)	Percentage
<u>Peloscolex</u> spp.	3	10	13	23.63
<u>Tellina</u> <u>agilis</u>	7	4	11	20.00
* <u>Sabellaria</u> <u>vulgaris</u>	8		8	14.54
* <u>Corophium</u> <u>acherusicum</u>		3	3	5.45
<u>Glycera</u> <u>dibranchiata</u>		3	3	5.45
* <u>Corophium</u> <u>tuberculatum</u>		2	2	3.63
<u>Glycinde</u> <u>solitaria</u>		2	2	3.63
<u>Nucula</u> <u>proxima</u>	2		2	3.63
<u>Anadara</u> <u>transversa</u>	1	1	2	3.63
<u>Arabella</u> <u>iricolor</u>	1		1	1.81
<u>Lumbrineris</u> <u>tenuis</u>		1	1	1.81
<u>Mitrella</u> <u>lunata</u>	1		1	1.81
<u>Neopanope</u> <u>sayi</u>		1	1	1.81
* <u>Diadumene</u> <u>leucolena</u>	1		1	1.81
<u>Pagurus</u> <u>pollicaris</u>		1	1	1.81
<u>Seila</u> <u>adamsi</u>	1		1	1.81
* <u>Unciola</u> <u>irrorata</u>		1	1	1.81
* <u>Unciola</u> <u>serrata</u>		1	1	1.81
<u>Alcyonidium</u> <u>verrilli</u>	P			
Total individuals (non-colonial)	25	30	55	100%
Total species (non-colonial)	9	12	18	

STATION N4, July 1973

Species	Sample 1	Sample 2	Total (0.2m ²)	Percentage
<u>Tellina agilis</u>	74	61	135	30.68
* <u>Caprella penantis</u>	122	1	123	27.95
* <u>Sabellaria vulgaris</u>	75	1	76	17.27
<u>Glycera dibranchiata</u>	12	8	20	4.56
<u>Nucula proxima</u>	3	17	20	4.56
<u>Peloscolex gabriellae</u>	16		16	3.64
<u>Mulinia lateralis</u>		13	13	2.95
<u>Ensis directus</u>	11	1	12	2.73
<u>Lyonsia hyalina</u>	2	2	4	0.91
* <u>Ericthonius brasiliensis</u>	2	2	4	0.91
<u>Pagurus longicarpus</u>	4		4	0.91
<u>Pectinaria gouldii</u>	1	1	2	0.45
<u>Edotea triloba</u>	2		2	0.45
* <u>Molgula manhattensis</u>	1		1	0.23
* <u>Balanus improvisus</u>	1		1	0.23
<u>Crangon septemspinosa</u>	1		1	0.23
<u>Unciola irrorata</u>	1		1	0.23
* <u>Batea catharinensis</u>	1		1	0.23
* <u>Elasmopus levis</u>	1		1	0.23
<u>Corophium acherusicum</u>	1		1	0.23
<u>Cerebratulus lacteus</u>	1		1	0.23
<u>Mya arenaria</u>		1	1	0.23
<u>Sertularia argentea</u>	P	P		
<u>Bowerbankia gracilis</u>	P			
<u>Obelia geniculata</u>	P			
Total individuals (non-colonial)	332	108	440	100
Total species (non-colonial)	20	11	22	

STATION N4, November 1973

Species	Sample 1	Sample 2	Total (0.2m ²)	Percentage
<u>Tellina agilis</u>	20	37	57	51.81
<u>Peloscolex spp.</u>	23	10	33	30.00
<u>Glycera dibranchiata</u>	2	3	5	4.54
<u>Acteocina canaliculata</u>	1	3	4	3.63
<u>Chiridotea nigrescens</u>	1	2	3	2.72
<u>Nucula proxima</u>	2	1	3	2.72
<u>Anadara ovalis</u>		1	1	.90
<u>Clymenella torquata</u>		1	1	.90
<u>Mulinia lateralis</u>		1	1	.90
<u>Pagurus longicarpus</u>	1		1	.90
<u>Pseudeurythoe paucibranchiata</u>	1		1	.90
<u>Scoloplos robustus</u>		1	1	.90
<u>Bowerbankia gracilis</u>		P		
Total individuals (non-colonial)	51	60	111	100%
Total species (non-colonial)	8	10	12	

STATION N5, July 1973

Species	Sample 1	Sample 2	Total (0.2m ²)	Percentage
<u>Chiridotea nigrescens</u>		23	23	38.38
<u>Tellina agilis</u>	9	9	18	27.69
<u>Unciola irrorata</u>		10	10	15.38
<u>Pagurus longicarpus</u>	2	1	3	4.62
<u>Spisula solidissima</u>		3	3	4.62
<u>Glycera dibranchiata</u>		2	2	3.08
<u>Nucula proxima</u>	1		1	1.54
<u>Pectinaria gouldii</u>	1		1	1.54
<u>Spio setosa</u>	1		1	1.54
<u>Mulinia lateralis</u>		1	1	1.54
<u>Crangon septemspinosa</u>		1	1	1.54
* <u>Balanus improvisus</u>		1	1	1.54
Total individuals	14	51	65	100
Total species	5	9	12	

STATION C1, July 1973

<u>Species</u>	<u>Sample 1</u>	<u>Sample 2</u>	<u>Total (0.2m²)</u>	<u>Percentage</u>
<u>Tellina agilis</u>	56	47	103	67.32
<u>Mulinia lateralis</u>	13	17	30	19.61
<u>Nucula proxima</u>	6	5	11	7.19
<u>Glycera dibranchiata</u>	2	2	4	2.61
<u>Peloscolex gabriellae</u>	3		3	1.96
<u>Mya arenaria</u>	1		1	0.65
<u>Ensis directus</u>		1	1	0.65
<u>Sertularia argentea</u>		P		
<u>Bugula turrata</u>		P		
Total individuals (non-colonial)	81	72	153	
Total species (non-colonial)	6	5	7	

STATION C2, July 1973

<u>Species</u>	<u>Sample 1</u>	<u>Sample 2</u>	<u>Total (0.2m²)</u>	<u>Percentage</u>
<u>Tellina agilis</u>	47	25	72	56.25
<u>Mulinia lateralis</u>	18	26	44	34.38
<u>Nucula proxima</u>	2	1	3	2.34
<u>Glycera dibranchiata</u>		2	2	1.56
<u>Neomysis americana</u>	1		1	0.78
<u>Oxyurostylis smithi</u>	1		1	0.78
<u>Callinectes sapidus</u> (zoea)	1		1	0.78
<u>Drilonereis filum</u>		1	1	0.78
<u>Edwardsia elegans</u>		1	1	0.78
<u>Lyonsia hyalina</u>		1	1	0.78
<u>Ensis directus</u>		1	1	0.78
<u>Sertularia argentea</u>		P		
<u>Electra crustulenta</u>		P		
Total individuals (non-colonial)	70	58	128	100
Total species (non-colonial)	6	8	11	

STATION C3, July 1973

<u>Species</u>	<u>Sample 1</u>	<u>Sample 2</u>	<u>Total (0.2m²)</u>	<u>Percentage</u>
<u>Chiridotea nigrescens</u>	11	3	14	77.77
<u>Mulinia lateralis</u>	1	1	2	11.11
<u>Glycera dibranchiata</u>	1		1	5.55
<u>Crangon septemspinosus</u>		1	1	5.55
Total individuals	13	5	18	100
Total species	3	3	4	

STATION C4, July 1973

<u>Species</u>	<u>Sample 1</u>	<u>Sample 2</u>	<u>Total (0.2m²)</u>	<u>Percentage</u>
<u>Tellina agilis</u>	44	71	115	65.71
<u>Peloscolex gabriellae</u>	5	16	21	12.00
* <u>Unciola irrorata</u>	7		7	4.00
<u>Mulinia lateralis</u>	2	4	6	3.43
<u>Glycera dibranchiata</u>	4	1	5	2.86
<u>Edotea triloba</u>	3		3	1.71
<u>Paranthus rapiformis</u>	3		3	1.71
<u>Chiridotea nigrescens</u>		3	3	1.71
<u>Drilonereis filum</u>	1	1	2	1.43
<u>Pectinaria gouldii</u>	2		2	1.43
<u>Neomysis americana</u>	1		1	0.57
<u>Pagurus longicarpus</u>	1		1	0.57
<u>Ensis directus</u>	1		1	0.57
<u>Mya arenaria</u>	1		1	0.57
<u>Glycinde solitaria</u>	1		1	0.57
<u>Spisula solidissima</u>		1	1	0.57
<u>Mitrella lunata</u>		1	1	0.57
<u>Scoloplos fragilis</u>		1	1	0.57
Total individuals	76	99	175	
Total species	14	9	18	

STATION C4, November 1973

Species	Sample 1	Sample 2	Total (0.2m ²)	Percentage
<u>Peloscolex</u> spp.	6	22	28	41.79
<u>Tellina</u> <u>agilis</u>	7	14	21	31.34
<u>Glycera</u> <u>dibranchiata</u>		7	7	10.44
<u>Ancistrosyllis</u> <u>hartmanae</u>		2	2	2.98
* <u>Sabellaria</u> <u>vulgaris</u>		2	2	2.98
<u>Cerithiopsis</u> <u>greeni</u>		1	1	1.49
<u>Chiridotea</u> <u>nigrescens</u>		1	1	1.49
<u>Edotea</u> <u>triloba</u>		1	1	1.49
<u>Epitonium</u> <u>rupicolum</u>		1	1	1.49
<u>Glycinde</u> <u>solitaria</u>		1	1	1.49
<u>Lumbrineris</u> <u>tenuis</u>		1	1	1.49
<u>Scoloplos</u> <u>robustus</u>	1		1	1.49
<u>Sertularia</u> <u>argentea</u>	P			
Total individuals (non-colonial)	14	53	67	
Total species (non-colonial)	13	11	12	

STATION C5, July 1973

Species	Sample 1	Sample 2	Total (0.2m ²)	Percentage
<u>Mulinia lateralis</u>	69	1382	1451	92.54
<u>Tellina agilis</u>	32	5	37	2.36
<u>Peloscolex gabriellae</u>	3	27	30	1.91
<u>Pectinaria gouldii</u>	2	9	11	0.70
<u>Mitrella lunata</u>	3	2	5	0.32
<u>Glycera dibranchiata</u>	1	3	4	0.26
<u>Leucon americanus</u>		4	4	0.26
<u>Ensis directus</u>	2	2	4	0.26
<u>Edotea triloba</u>	2	1	3	0.19
<u>Glycinde solitaria</u>		3	3	0.19
<u>Acteocina canaliculata</u>		3	3	0.19
* <u>Caprella penantis</u>	2		2	0.13
<u>Lyonsia hyalina</u>		2	2	0.13
<u>Acteon punctostriatus</u>	1		1	0.06
<u>Spisula solidissima</u>	1		1	0.06
<u>Pagurus longicarpus</u>		1	1	0.06
<u>Pseudeurythoe paucibranchiata</u>		1	1	0.06
<u>Asabellides oculata</u>		1	1	0.06
<u>Nemertean (unident.)</u>		1	1	0.06
* <u>Balanus improvisus</u>		1	1	0.06
<u>Polinices duplicata</u>		1	1	0.06
<u>Yoldia limatula</u>		1	1	0.06
<u>Sertularia argentea</u>	P			
Total individuals (non-colonial)	118	1450	1568	
Total species (non-colonial)	11	19	22	

STATION S1, July 1973

Species	Sample 1	Sample 2	Total (0.2m ²)	Percentage
* <u>Caprella penantis</u>	63	6	69	53.49
<u>Glycera dibranchiata</u>	10	6	16	12.40
<u>Molgula manhattensis</u>	5	6	11	8.53
<u>Tellina agilis</u>	5	5	10	7.75
<u>Mya arenaria</u>	6		6	4.65
<u>Acteocina canaliculata</u>	1	3	4	3.10
* <u>Corophium acherusicum</u>	1	2	3	2.33
* <u>Unciola irrorata</u>	2		2	1.55
<u>Edotea triloba</u>	1		1	0.76
<u>Heteromastus filiformis</u>	1		1	0.76
<u>Peloscolex gabriellae</u>	1		1	0.76
<u>Ensis directus</u>	1		1	0.76
* <u>Batea catharinensis</u>		1	1	0.76
<u>Nereis succinea</u>		1	1	0.76
* <u>Sabellaria vulgaris</u>		1	1	0.76
<u>Scoloplos robustus</u>		1	1	0.76
Total individuals	97	32	129	100
Total species	12	10	16	

STATION S2, July 1973

Species	Sample 1	Sample 2	Total (0.2m ²)	Percentage
<u>Tellina agilis</u>	21	15	36	28.35
* <u>Unciola irrorata</u>	8	6	14	11.02
<u>Glycera dibranchiata</u>	6	4	10	7.87
* <u>Sabellaria vulgaris</u>	8	1	9	7.09
<u>Mya arenaria</u>	6	2	8	6.30
* <u>Molgula manhattensis</u>	4	3	7	5.51
<u>Nereis succinea</u>	6	1	7	5.51
<u>Nucula proxima</u>	4	2	6	4.72
<u>Mulinia lateralis</u>	2	2	4	3.15
<u>Lyonsia hyalina</u>	3	1	4	3.15
<u>Ancistrosyllis hartmanae</u>	2	2	4	3.15
* <u>Balanus improvisus</u>	2	1	3	2.36
<u>Corophium acherusicum</u>	2		2	1.57
<u>Spiophanes bombyx</u>	2		2	1.57
<u>Acanthohaustorius intermedius</u>		2	2	1.57
* <u>Caprella penantis</u>	1		1	0.79
<u>Chiridotea nigrescens</u>	1		1	0.79
* <u>Diadumene leucolena</u>	1		1	0.79
<u>Crepidula convexa</u>	1		1	0.79
<u>Anadara transversa</u>	1		1	0.79
<u>Notocirrus spiniferus</u>	1		1	0.79
<u>Phoronis psammophila</u>	1		1	0.79
<u>Paranthus rapiformis</u>		1	1	0.79
<u>Scoloplos robustus</u>		1	1	0.79
<u>Sertularia argentea</u>	P			
Total individuals (non-colonial)	83	44	127	
Total species (non-colonial)	21	15	24	

STATION S4, July 1973

Species	Sample 1	Sample 2	Total (0.2m ²)	Percentage
<u>Tellina agilis</u>			30	44.12
<u>Chiridotea nigrescens</u>			26	38.24
<u>Glycera dibranchiata</u>			6	8.82
<u>Mulinia lateralis</u>			2	2.94
* <u>Caprella penantis</u>			1	1.47
* <u>Balanus improvisus</u>			1	1.47
<u>Acanthohaustorius intermedius</u>			1	1.47
<u>Limulus polyphemus</u>			1	1.47
Total individuals			68	100
Total species			8	

STATION S5, July 1973

Species	Sample 1	Sample 2	Total (0.2m ²)	Percentage
<u>Chiridotea nigrescens</u>	92	32	124	81.58
<u>Nucula proxima</u>	4	6	10	6.58
<u>Tellina agilis</u>	3	2	5	3.29
<u>Spisula solidissima</u>	2	2	4	2.63
<u>Glycera dibranchiata</u>	1	2	3	1.97
<u>Mulinia lateralis</u>	1	1	2	1.32
<u>Scolelepis squamata</u>	2		2	1.32
<u>Mya arenaria</u>		1	1	0.66
<u>Polychaete (unident.)</u>		1	1	0.66
Total individuals	105	47	152	100
Total species	7	8	9	

STATION F2, July 1973

Species	Sample 1	Sample 2	Total (0.2m ²)	Percentage
<u>Glycera dibranchiata</u>	14	8	22	13.92
<u>Acteocina canaliculata</u>	5	15	20	12.66
<u>Ampelisca vadorum</u>	5	12	17	10.76
<u>Phoronis psammophila</u>	3	11	14	8.86
* <u>Corophium tuberculatum</u>	11		11	6.96
<u>Tellina agilis</u>	5	4	9	5.70
<u>Scoloplos robustus</u>	6	2	8	5.06
<u>Mulinia lateralis</u>	1	5	6	3.80
* <u>Molgula manhattensis</u>	2	4	6	3.80
<u>Spio setosa</u>	4	1	5	3.16
* <u>Caprella penantis</u>	4		4	2.53
<u>Pectinaria gouldii</u>	2	2	4	2.53
<u>Peloscolex gabriellae</u>	1	3	4	2.53
<u>Nassarius vibex</u>	2	1	3	1.90
<u>Clymenella zonalis</u>	1	2	3	1.90
<u>Glycinde solitaria</u>	1	2	3	1.90
<u>Oxyurostylis smithi</u>		3	3	1.90
<u>Anadara transversa</u>	1	1	2	1.27
<u>Crangon septemspinosa</u>	2		2	1.27
<u>Edotea triloba</u>	2		2	1.27
<u>Nereis succinea</u>	2		2	1.27
* <u>Corophium acherusicum</u>	1		1	0.63
* <u>Gammarus mucronatus</u>	1		1	0.63
<u>Cerebratulus lacteus</u>	1		1	0.63
<u>Drilonereis filum</u>	1		1	0.63
<u>Ensis directus</u>		1	1	0.63
<u>Epitonium multistriatum</u>		1	1	0.63
<u>Pagurus longicarpus</u>		1	1	0.63
<u>Diastylis polita</u>		1	1	0.63
Total individuals	78	80	158	100
Total species	24	20	29	

STATION B1, July 1973

Species	Sample 1	Sample 2	Total (0.2m ²)	Percentage
* <u>Caprella penantis</u>	286	1	287	47.58
* <u>Molgula manhattensis</u>	91		91	15.14
<u>Mulinia lateralis</u>	40	33	73	12.14
* <u>Elasmopus levis</u>	43		43	7.15
<u>Nereis succinea</u>	16	1	17	2.82
<u>Glycera dibranchiata</u>	8	4	12	1.99
<u>Lyonsia hyalina</u>	11	1	12	1.99
<u>Tellina agilis</u>	2	9	11	1.83
* <u>Erichsonella filiformis</u>	8		8	1.33
* <u>Gammarus mucronatus</u>	8		8	1.33
<u>Glycinde solitaria</u>	1	4	5	0.83
<u>Busycon carica</u>	3	1	4	0.66
* <u>Corophium acherusicum</u>	3		3	0.49
* <u>Corophium simile</u>	3		3	0.49
<u>Cyrtopleura costata</u>	3		3	0.49
<u>Mysella bidentata</u>	1	1	2	0.33
<u>Edotea triloba</u>	2		2	0.33
<u>Crangon septemspinosa</u>	2		2	0.33
<u>Scoloplos fragilis</u>		2	2	0.33
<u>Macoma tenta</u>		2	2	0.33
<u>Pectinaria gouldii</u>		2	2	0.33
* <u>Stenothoe minuta</u>	1		1	0.16
<u>Gemma gemma</u>	1		1	0.16
* <u>Sabella microphthalma</u>	1		1	0.16
<u>Phyllodoce arenae</u>	1		1	0.16
<u>Clymenella torquata</u>	1		1	0.16
* <u>Sabellaria vulgaris</u>	1		1	0.16
<u>Polydora ligni</u>	1		1	0.16
<u>Listriella clymenellae</u>		1	1	0.16
<u>Heteromastus filiformis</u>		1	1	0.16
<u>Sertularia argentea</u>	P	P		
Total individuals (non-colonial)	538	63	601	100
Total species (non-colonial)	25	14	30	

STATION B1, November 1973

Species	Sample 1	Sample 2	Total (0.2m ²)	Percentage
<u>Acteocina canaliculata</u>	45	77	122	46.38
<u>Peloscolex spp.</u>	35	8	43	16.34
<u>Paraprionospio pinnata</u>	12	9	21	7.98
<u>Glycinde solitaria</u>	7	5	12	4.56
* <u>Erichsonella filiformis</u>	4	2	6	2.28
<u>Glycera dibranchiata</u>	4	2	6	2.28
<u>Pectinaria gouldii</u>	2	4	6	2.28
<u>Tellina agilis</u>	3	2	5	1.90
* <u>Unciola irrorata</u>	5		5	1.90
* <u>Caprella penantis</u>	3		3	1.14
<u>Heteromastus filiformis</u>	1	2	3	1.14
<u>Nassarius trivittatus</u>	2	1	3	1.14
* <u>Erichthonius brasiliensis</u>	2		2	.76
<u>Pagurus longicarpus</u>	1	1	2	.76
<u>Phoronis psammophila</u>		2	2	.76
<u>Nereis succinea</u>	2		2	.76
<u>Micropholis atra</u>	2		2	.76
<u>Anadara transversa</u>	1	1	2	.76
<u>Cerapus tubularis</u>	1		1	.38
* <u>Corophium acherusicum</u>	1		1	.38
<u>Edotea triloba</u>		1	1	.38
<u>Barnea truncata</u>	1		1	.38
<u>Eupleura caudata</u>	1		1	.38
* <u>Elasmopus levis</u>	1		1	.38
<u>Neomysis americana</u>	1		1	.38
<u>Mangelia cerina</u>	1		1	.38
<u>Mulina lateralis</u>	1		1	.38
<u>Lyonsia hyalina</u>	1		1	.38
<u>Nemertean (unid.)</u>	1		1	.38
<u>Phoronis sp. (unid.)</u>	1		1	.38
<u>Xanthidae (unid.)</u>	1		1	.38

STATION B1, November 1973 (Continued)

<u>Species</u>	<u>Sample 1</u>	<u>Sample 2</u>	<u>Total (0.2m²)</u>	<u>Percentage</u>
<u>Mercenaria mercenaria</u>		1	1	.38
<u>Turbonilla interrupta</u>		1	1	.38
<u>Trinectes maculatus</u>		1	1	.38
<u>Sertularia argentea</u>	P	P		
<u>Schizotricha tenella</u>	P	P		
<u>Alcyonidium verrilli</u>	P			
Total individuals (non-colonial)	143	120	263	100%
Total species (non-colonial)	29	17	34	

STATION B1, June 1974

Species	Sample 1	Sample 2	Total (0.2m ²)	Percentage
* <u>Caprella penantis</u>	2	130	132	42.85
<u>Acteocina canaliculata</u>	13	13	26	8.44
<u>Clymenella torquata</u>	6	16	22	7.14
<u>Tharyx setigera</u>	6	8	14	4.54
<u>Streblospio benedicti</u>	4	10	14	4.54
<u>Glycera dibranchiata</u>	7	5	12	3.89
<u>Mulinia lateralis</u>	6	5	11	3.57
<u>Paraprionospio pinnata</u>	7	3	10	3.24
<u>Peloscolex gabriellae</u>	5	5	10	3.24
<u>Myseilla bidentata</u>	3	5	8	2.59
<u>Edotea triloba</u>	-	6	6	1.94
* <u>Sabellaria vulgaris</u>	1	5	6	1.94
<u>Tellina agilis</u>	1	4	5	1.62
<u>Turbonilla interrupta</u>	1	3	4	1.29
<u>Glycinde solitaria</u>	1	3	4	1.29
<u>Spiochaetopterus oculatus</u>	2	1	3	0.97
<u>Ampelisca vadorum</u>	1	1	2	0.64
* <u>Unciola serrata</u>	-	2	2	0.64
<u>Ensis directus</u>	1	1	2	0.64
<u>Pectinaria gouldii</u>	1	1	2	0.64
<u>Phoronis psammophila</u>	2	-	2	0.64
<u>Mitrella lunata</u>	-	2	2	0.64
* <u>Doridella obscura</u>	-	2	2	0.64
* <u>Erichthonius brasiliensis</u>	-	1	1	0.32
* <u>Gammarus mucronatus</u>	-	1	1	0.32
* <u>Corophium acherusicum</u>	-	1	1	0.32
<u>Leucon americanus</u>	-	1	1	0.32
<u>Nereis succinea</u>	1	-	1	0.32
<u>Scolelepis sp.</u>	1	-	1	0.32
<u>Lyonsia hyalina</u>	-	1	1	0.32

STATION B1, June 1974 (Continued)

Species	Sample 1	Sample 2	Total (0.2m ²)	Percentage
Unid. sponge		P		
<u>Sertularia argentea</u>		P		
Total individuals (non-colonial)	72	236	308	
Total species (non-colonial)	21	27	30	

STATION B2, July 1973

Species	Sample 1	Sample 2	Total (0.2m ²)	Percentage
* <u>Molgula manhattensis</u>	130	222	352	24.42
* <u>Caprella penantis</u>	133	98	231	16.03
<u>Barnea truncata</u>	19	142	161	11.17
* <u>Mytilus edulis</u>	84	5	89	6.18
<u>Nereis succinea</u>	47	33	80	5.55
* <u>Balanus improvisus</u>	70	3	73	5.07
* <u>Unciola irrorata</u>	13	55	68	4.72
<u>Mya arenaria</u>	29	28	57	3.96
* <u>Sabellaria vulgaris</u>	23	27	50	3.47
* <u>Elasmopus levis</u>	24	17	41	2.85
<u>Glycera dibranchiata</u>	11	26	37	2.57
* <u>Corophium acherusicum</u>	12	23	35	2.43
* <u>Batea catharinensis</u>	4	26	30	2.08
<u>Lyonsia hyalina</u>	10	19	29	2.01
* <u>Melita nitida</u>	12	11	23	1.60
<u>Tellina agilis</u>	7	7	14	0.97
<u>Edotea triloba</u>	6	7	13	0.90
<u>Ampelisca vadorum</u>	6	7	13	0.90
<u>Cyrtopleura costata</u>	5	2	7	0.49
<u>Peloscolex gabriellae</u>		7	7	0.49
<u>Mulinia lateralis</u>	4	2	6	0.42
* <u>Stenothoe minuta</u>	5	1	6	0.42
<u>Paraphoxus spinosus</u>	2	1	3	0.21
<u>Heteromastus filiformis</u>	3		3	0.21
<u>Ensis directus</u>	1		1	0.07
* <u>Erichsonella filiformis</u>	1		1	0.07
* <u>Diadumene leucolena</u>	1		1	0.07
<u>Panopeus herbstii</u>	1		1	0.07
<u>Pectinaria gouldii</u>	1		1	0.07
* <u>Crepidula convexa</u>		1	1	0.07
<u>Odostomia impressa</u>		1	1	0.07
<u>Gemma gemma</u>		1	1	0.07

STATION B2, July 1973 (Continued)

<u>Species</u>	<u>Sample 1</u>	<u>Sample 2</u>	<u>Total (0.2m²)</u>	<u>Percentage</u>
<u>Urosalpinx cinerea</u>		1	1	0.07
<u>Pagurus longicarpus</u>		1	1	0.07
<u>Eteone heteropoda</u>		1	1	0.07
<u>Sarsiella zostericola</u>		1	1	0.07
<u>Paranthus rapiformis</u>		1	1	0.07
<u>Sertularia argentea</u>	P	P		
<u>Electra crustulenta</u>		P		
Total individuals (non-colonial)	664	777	1441	100
Total species (non-colonial)	28	31	37	

STATION B2, November 1973

Species	Sample 1	Sample 2	Total (0.2m ²)	Percentage
<u>Barnea truncata</u>	62	94	156	26.17
<u>Peloscolex spp.</u>	52	74	126	21.14
<u>Acteocina canaliculata</u>	46	40	86	14.42
<u>Tellina agilis</u>	12	24	36	6.04
* <u>Unciola irrorata</u>	7	24	31	5.20
* <u>Diadumene leucolena</u>	10	18	28	4.69
<u>Nereis succinea</u>	7	19	26	4.36
<u>Glycera dibranchiata</u>	10	8	18	3.02
* <u>Sabellaria vulgaris</u>	2	7	9	1.51
<u>Glycinde solitaria</u>	2	6	8	1.34
* <u>Paracaprella tenuis</u>	3	4	7	1.17
* <u>Caprella penantis</u>	3	2	5	.83
<u>Nassarius trivittatus</u>	4	1	5	.83
<u>Epitonium rupicolum</u>	2	2	4	.67
<u>Pectinaria gouldii</u>	3	1	4	.67
* <u>Sabella microphthalma</u>	1	3	4	.67
<u>Eupleura caudata</u>	2	1	3	.50
<u>Micropholis atra</u>	1	2	3	.50
<u>Spiochaetopterus oculatus</u>		3	3	.50
* <u>Erichthonius brasiliensis</u>	3		3	.50
* <u>Corophium acherusicum</u>	1	1	2	.33
<u>Edotea triloba</u>		2	2	.33
<u>Gemma gemma</u>	1	1	2	.33
<u>Lyonsia hyalina</u>	1	1	2	.33
<u>Pagurus longicarpus</u>	1	1	2	.33
<u>Petricola pholadiformis</u>		2	2	.33
<u>Phoronis psammophila</u>	1	1	2	.33
<u>Mercenaria mercenaria</u>	1	1	2	.33
<u>Cerapus tubularis</u>	1		1	.16
* <u>Crepidula convexa</u>		1	1	.16
<u>Clymenella torquata</u>	1		1	.16

STATION B2, November 1973 (Continued)

Species	Sample 1	Sample 2	Total (0.2m ²)	Percentage
* <u>Hydroides dianthus</u>	1		1	.16
<u>Mitrella lunata</u>	1		1	.16
<u>Mulina lateralis</u>	1		1	.16
<u>Mya arenaria</u>		1	1	.16
<u>Neomysis americana</u>	1		1	.16
* <u>Molgula manhattensis</u>		1	1	.16
<u>Odostomia dux</u>		1	1	.16
* <u>Polydora websteri</u>		1	1	.16
<u>Nucula proxima</u>	1		1	.16
<u>Stenothoe minuta</u>		1	1	.16
<u>Xanthidae</u>	1		1	.16
Isopod (unid.)	1		1	.16
<u>Schizotricha tenella</u>	P	P		
<u>Sertularia argentea</u>	P	P		
Total individuals (non-colonial)	247	348	596	
Total species (non-colonial)	34	33	43	

STATION B2, June 1974

Species	Sample 1	Sample 2	Total (0.2m ²)	Percentage
<u>Phoronis psammophila</u>	26	19	45	21.32
* <u>Sabellaria vulgaris</u>	19	23	42	19.90
<u>Glycera dibranchiata</u>	15	9	24	11.37
<u>Mulinia lateralis</u>	15	2	17	8.05
<u>Peloscolex gabriellae</u>	11	3	14	6.63
<u>Tellina agilis</u>	10	3	13	6.16
* <u>Balanus improvisus</u>	1	8	9	4.26
<u>Bostrichobranchus pilularis</u>	-	7	7	3.31
<u>Lyonsia hyalina</u>	-	6	6	2.84
<u>Streblospio benedicti</u>	2	3	5	2.36
<u>Mya arenaria</u>	2	2	4	1.89
<u>Scoloplos robustus</u>	-	4	4	1.89
* <u>Caprella penantis</u>	1	2	3	1.42
<u>Spiochaetopterus oculatus</u>	3	-	3	1.42
* <u>Corophium tuberculatum</u>	-	2	2	0.94
<u>Spiophanes bombyx</u>	1	1	2	0.94
* <u>Hydroides dianthus</u>	-	2	2	0.94
<u>Chiridotea nigrescens</u>	1	-	1	0.47
<u>Paraphoxus spinosus</u>	-	1	1	0.47
<u>Brania clavata</u>	1	-	1	0.47
* <u>Doridella obscura</u>	1	-	1	0.47
<u>Spisula solidissima</u>	-	1	1	0.47
<u>Gemma gemma</u>	-	1	1	0.47
<u>Acteocina canaliculata</u>	-	1	1	0.47
* <u>Stylochus ellipticus</u>	-	1	1	0.47
<u>Pectinaria gouldii</u>	-	1	1	0.47
<u>Bowerbankia gracilis</u>		P		
Total individuals (non-colonial)	109	102	211	
Total species (non-colonial)	15	22	26	

STATION B3, July 1973

Species	Sample 1	Sample 2	Total (0.2m ²)	Percentage
* <u>Molgula manhattensis</u>	251	339	590	23.98
* <u>Caprella penantis</u>	269	281	550	22.36
* <u>Sabellaria vulgaris</u>	160	190	350	14.23
* <u>Unciola irrorata</u>	112	111	223	9.07
<u>Nereis succinea</u>	64	63	127	5.16
* <u>Balanus improvisus</u>	46	57	103	4.19
* <u>Gammarus mucronatus</u>	35	38	73	2.97
* <u>Elasmopus levis</u>	33	29	62	2.52
<u>Ampelisca vadorum</u>	26	26	52	2.11
* <u>Corophium simile</u>	18	19	37	1.50
* <u>Corophium acherusicum</u>	10	12	22	0.89
<u>Pseudeurythoe paucibranchiata</u>	17	4	21	0.85
<u>Lyonsia hyalina</u>	12	8	20	0.81
* <u>Batea catharinensis</u>	15	3	18	0.73
* <u>Crepidula convexa</u>	14	3	17	0.69
<u>Glycera dibranchiata</u>	13	4	17	0.69
* <u>Melita nitida</u>	1	12	13	0.53
* <u>Diadumene leucolena</u>	7	5	12	0.49
<u>Mya arenaria</u>	3	8	11	0.45
* <u>Mytilus edulis</u>	3	8	11	0.45
* <u>Sabella microphthalma</u>	5	6	11	0.45
<u>Heteromastus filiformis</u>	6	4	10	0.41
<u>Tellina agilis</u>	7	2	9	0.37
* <u>Erichsonella filiformis</u>	9		9	0.37
<u>Acteocina canaliculata</u>	4	4	8	0.33
<u>Edotea triloba</u>	5	3	8	0.33
<u>Pectinaria gouldii</u>	4	4	8	0.33
<u>Acteon punctostriatus</u>	2	4	6	0.24
<u>Busycon carica</u>	1	4	5	0.20
<u>Gobiosoma bosci</u>	2	3	5	0.20
<u>Streblospio benedicti</u>	4	1	5	0.20
<u>Mitrella lunata</u>	1	3	4	0.16

STATION B3, July 1973 (Continued)

Species	Sample 1	Sample 2	Total (0.2m ²)	Percentage
<u>Epitonium rupicolum</u>	4		4	0.16
<u>Asabellides oculata</u>	4		4	0.16
* <u>Hydroides dianthus</u>	4		4	0.16
<u>Polydora ligni</u>	2	1	3	0.08
<u>Barnea truncata</u>	3		3	0.08
<u>Clymenella torquata</u>	3		3	0.08
<u>Pinnixa sayana</u>		3	3	0.08
<u>Pagurus longicarpus</u>	1	1	2	0.08
<u>Glycinde solitaria</u>	1	1	2	0.08
<u>Petricola pholadiformis</u>		2	2	0.08
<u>Ensis directus</u>	1		1	0.04
<u>Mulinia lateralis</u>	1		1	0.04
<u>Stenothoe minuta</u>	1		1	0.04
<u>Notocirrus spiniferus</u>	1		1	0.04
<u>Eteone heteropoda</u>	1		1	0.04
<u>Paraprionospio pinnata</u>	1		1	0.04
<u>Spiophanes bombyx</u>	1		1	0.04
<u>Nucula proxima</u>		1	1	0.04
<u>Eupleura caudata</u>		1	1	0.04
* <u>Diodora sp.</u>		1	1	0.04
<u>Callinectes sapidus</u>		1	1	0.04
<u>Ancistrosyllis hartmanae</u>		1	1	0.04
<u>Peloscolex gabriellae</u>		1	1	0.04
<u>Sertularia argentea</u>	P	P		
<u>Bowerbankia imbricata</u>	P	P		
<u>Aevertillia armata</u>	P			
<u>Electra crustulenta</u>	P	P		
Total individuals (non-colonial)	1,188	1272	2460	100
Total species (non-colonial)	47	42	55	

STATION B3, November 1973

Species	Sample 1	Sample 2	Total (0.2m ²)	Percentage
* <u>Sabellaria vulgaris</u>	293	80	373	43.93
* <u>Unciola irrorata</u>	115	27	142	16.72
<u>Peloscolex</u> spp.	57	27	84	9.89
<u>Acteocina canaliculata</u>	17	26	43	5.06
<u>Nereis succinea</u>	27	7	34	4.00
* <u>Molgula manhattensis</u>	22	1	23	2.70
<u>Glycera dibranchiata</u>	8	7	15	1.76
<u>Tellina agilis</u>	4	10	14	1.64
<u>Ampelisca vadorum</u>	12		12	1.41
<u>Glycinde solitaria</u>	5	5	10	1.17
* <u>Corophium acherusicum</u>	8	1	9	1.06
<u>Heteromastus filiformis</u>	6	2	8	.94
<u>Paraphoxus spinosus</u>	6	2	8	.94
<u>Polycirrus eximus</u>	4	2	6	.70
* <u>Sabella microphthalma</u>	2	4	6	.70
* <u>Paracaprella tenuis</u>	3	2	5	.58
<u>Odostomia dux</u>	3	1	4	.47
* <u>Callipallene brevirostris</u>	3	1	4	.47
* <u>Caprella penantis</u>		4	4	.47
<u>Turbonilla interrupta</u>		4	4	.47
<u>Spiochaetopterus oculatus</u>	2	2	4	.47
* <u>Crepidula convexa</u>	1	2	3	.35
<u>Nucula proxima</u>	2	1	3	.35
<u>Phoronis psammophila</u>		3	3	.35
<u>Eupleura caudata</u>	2		2	.23
<u>Mitrella lunata</u>	2		2	.23
<u>Nassarius vibex</u>	2		2	.23
<u>Ampelisca verrilli</u>		1	1	.11
<u>Anadara transversa</u>	1		1	.11
<u>Ancistrosyllis hartmanae</u>	1		1	.11
* <u>Crepidula convexa</u>		1	1	.11

STATION B3, November 1973 (Continued)

Species	Sample 1	Sample 2	Total (0.2m ²)	Percentage
<u>Clymenella torquata</u>		1	1	.11
<u>Edotea triloba</u>	1		1	.11
<u>Epitonium rupicolum</u>		1	1	.11
<u>Erichsonella filiformis</u>		1	1	.11
<u>Eteone heteropoda</u>	1		1	.11
<u>Gemma gemma</u>	1		1	.11
<u>Gobiosoma sp.</u>		1	1	.11
* <u>Hydroides dianthus</u>	1		1	.11
<u>Lyonsia hyalina</u>	1		1	.11
<u>Nassarius trivittatus</u>	1		1	.11
<u>Nemertean (unid.)</u>		1	1	.11
<u>Phoronis muelleri</u>	1		1	.11
<u>Pinnixa cylindrica</u>	1		1	.11
* <u>Polydora websteri</u>		1	1	.11
* <u>Tanystylum orbiculare</u>	1		1	.11
<u>Tharyx setigera</u>	1		1	.11
<u>Xanthidae</u>	1		1	.11
<u>Sertularia argentea</u>	P	P		
<u>Schizotricha tenella</u>	P			
Total individuals (non-colonial)	619	229	848	100%
Total species (non-colonial)	37	31	48	

STATION B3, June 1974

Species	Sample 1	Sample 2	Total (0.2m ²)	Percentage
* <u>Sabellaria vulgaris</u>	381	130	511	36.27
* <u>Corophium acherusicum</u>	199	69	268	19.02
* <u>Caprella penantis</u>	211	23	234	16.61
* <u>Unciola serrata</u>	114	29	143	10.15
<u>Ampelisca vadorum</u>	18	16	34	1.70
<u>Lyonsia hyalina</u>	27	7	34	1.70
<u>Peloscolex gabriellae</u>	12	18	30	2.13
<u>Glycera dibranchiata</u>	14	6	20	1.42
<u>Streblospio benedicti</u>	19	-	19	1.35
<u>Phoronis psammophila</u>	2	13	15	1.06
<u>Pseudeurythoe paucibranchiata</u>	4	9	13	0.92
<u>Tharyx setigera</u>	4	6	10	0.71
<u>Paraphoxus spinosus</u>	8	1	9	0.64
<u>Clymenella torquata</u>	1	6	7	0.50
<u>Nereis succinea</u>	5	-	5	0.35
* <u>Sabella microphthalma</u>	3	2	5	0.35
* <u>Melita nitida</u>	4	-	4	0.28
<u>Ensis directus</u>	1	3	4	0.28
* <u>Balanus improvisus</u>	3	-	3	0.21
<u>Tellina agilis</u>	1	2	3	0.21
<u>Brania clavata</u>	2	1	3	0.21
<u>Spiophanes bombyx</u>	2	1	3	0.21
<u>Bostrichobranchus pilularis</u>	1	2	3	0.21
<u>Mya arenaria</u>	1	2	3	0.21
<u>Arabella iricolor</u>	2	1	3	0.21
<u>Heteromastus filiformis</u>	-	2	2	0.14
<u>Marphysa sanguinea</u>	1	1	2	0.14
* <u>Polydora ligni</u>	2	-	2	0.14
* <u>Polycirrus eximus</u>	2	-	2	0.14
* <u>Corophium simile</u>	1	-	1	0.07
<u>Mitrella lunata</u>	1	-	1	0.07
<u>Lucina multilineata</u>	1	-	1	0.07

STATION B3, June 1974 (Continued)

Species	Sample 1	Sample 2	Total (0.2m ²)	Percentage
<u>Odostomia impressa</u>	1	-	1	0.07
<u>Glycinde solitaria</u>	1	-	1	0.07
<u>Mulinia lateralis</u>	-	1	1	0.07
* <u>Stylochus ellipticus</u>	-	1	1	0.07
<u>Paleanotus heteroseta</u>	-	1	1	0.07
<u>Polinices duplicatus</u>	1	-	1	0.07
* <u>Gobiosoma bosci</u>	1	-	1	0.07
<u>Gemma gemma</u>	1	-	1	0.07
* <u>Mytilus edulis</u>	1	-	1	0.07
<u>Ancistrosyllis hartmanae</u>	1	-	1	0.07
<u>Eteone heteropoda</u>	1	-	1	0.07
<u>Nemertean (unident.)</u>	1	-	1	0.07
Total individuals (non-colonial)	1,056	353	1,409	
Total species (non-colonial)	39	25	44	

STATION B4, July 1973

Species	Sample 1	Sample 2	Total (0.2m ²)	Percentage
* <u>Caprella penantis</u>	547	102	649	55.56
* <u>Molgula manhattensis</u>	137	1	138	11.82
* <u>Mytilus edulis</u>	84		84	7.19
* <u>Elasmopus levis</u>	54	2	56	4.79
<u>Nereis succinea</u>	31	1	32	2.74
* <u>Corophium acherusicum</u>	21	10	31	2.65
* <u>Gammarus mucronatus</u>	26		26	2.23
* <u>Stenothoe minuta</u>	21	3	24	2.05
<u>Mulinia lateralis</u>	19	1	20	1.71
<u>Lyonsia hyalina</u>	18		18	1.54
<u>Mya arenaria</u>	12		12	1.03
* <u>Unciola irrorata</u>	10	1	11	0.94
* <u>Doridella obscura</u>	10	1	11	0.94
* <u>Melita nitida</u>	8		8	0.68
<u>Gemma gemma</u>	3	2	5	0.43
* <u>Erichsonella filiformis</u>	5		5	0.43
<u>Edotea triloba</u>	4	1	5	0.43
* <u>Sabellaria vulgaris</u>	5		5	0.43
<u>Ampelisca verrilli</u>		5	5	0.43
<u>Petricola pholadiformis</u>	3		3	0.26
<u>Ampelisca vadorum</u>	3		3	0.26
<u>Paraphoxus spinosus</u>		3	3	0.26
<u>Nemerteans (unid.)</u>		2	2	0.17
<u>Ensis directus</u>	1		1	0.09
<u>Busycon carica</u>	1		1	0.09
<u>Macoma balthica</u>	1		1	0.09
<u>Acteon punctostriatus</u>	1		1	0.09
<u>Crangon septemspinosus</u>	1		1	0.09
<u>Batea catharinensis</u>	1		1	0.09
* <u>Erichthonius brasiliensis</u>	1		1	0.09
<u>Phyllodoce arenae</u>	1		1	0.09
<u>Aricidea jeffreysii</u>	1		1	0.09

STATION B4, July 1973 (Continued)

<u>Species</u>	<u>Sample 1</u>	<u>Sample 2</u>	<u>Total (0.2m²)</u>	<u>Percentage</u>
<u>Acteocina canaliculata</u>		1	1	0.09
<u>Oxyurostylis smithi</u>		1	1	0.09
<u>Glycinde solitaria</u>		1	1	0.09
<u>Sertularia argentea</u>	P	P		
<u>Electra crustulenta</u>	P	P		
<u>Alcyonidium polyoum</u>	P			
Total individuals (non-colonial)	1,030	138	1168	100
Total species (non-colonial)	29	17	35	

STATION B4, November 1973

Species	Sample 1	Sample 2	Total (0.2m ²)	Percentage
<u>Acteocina canaliculata</u>	51	28	79	30.26
<u>Paraprionospio pinnata</u>	17	44	61	23.37
<u>Peloscolex spp.</u>	16	40	56	21.45
<u>Glycera dibranchiata</u>	4	6	10	3.83
<u>Glycinde solitaria</u>	5	4	9	3.44
<u>Tellina agilis</u>	5	4	9	3.44
<u>Spiochaetopterus oculatus</u>	4	1	5	1.91
<u>Micropholis atra</u>		3	3	1.14
<u>Polychaeta (unid.)</u>		3	3	1.14
<u>Pectinaria gouldii</u>	1	2	3	1.14
<u>Diopatra cuprea</u>		2	2	.76
* <u>Erichsonella filiformis</u>		2	2	.76
<u>Mercenaria mercenaria</u>		2	2	.76
<u>Turbonilla interrupta</u>	1	1	2	.76
<u>Scoloplos robustus</u>		2	2	.76
<u>Callinectes sapidus</u>		1	1	.38
* <u>Callipallene brevirostris</u>		1	1	.38
* <u>Caprella penantis</u>		1	1	.38
<u>Caridea (unid.)</u>		1	1	.38
<u>Eteone heteropoda</u>		1	1	.38
<u>Eupleura caudata</u>	1		1	.38
<u>Ampelisca verrilli</u>		1	1	.38
<u>Nassarius trivittatus</u>	1		1	.38
<u>Odostomia dux</u>	1		1	.38
<u>Owenia fusiformis</u>		1	1	.38
<u>Pagurus longicarpus</u>		1	1	.38
* <u>Sabellaria vulgaris</u>		1	1	.38
<u>Tharyx setigera</u>		1	1	.38
<u>Sertularia argentea</u>		P		
<u>Alcyonidium verrilli</u>		P		
Total individuals (non-colonial)	107	154	261	100%
Total species (non-colonial)	12	25	28	

STATION B4, June 1974

Species	Sample 1	Sample 2	Total (0.2m ²)	Percentage
* <u>Caprella penantis</u>	253	53	306	59.88
<u>Clymenella torquata</u>	23	15	38	7.43
* <u>Sabellaria vulgaris</u>	19	3	22	4.30
<u>Tellina agilis</u>	12	9	21	4.10
<u>Mysella bidentata</u>	10	10	20	3.91
<u>Glycera dibranchiata</u>	7	6	13	2.54
<u>Lyonsia hyalina</u>	8	4	12	2.34
* <u>Doridella obscura</u>	6	2	8	1.56
<u>Phoronis psammophila</u>	2	5	7	1.36
* <u>Corophium acherusicum</u>	5	-	5	0.97
* <u>Erichsonella filiformis</u>	4	1	5	0.97
<u>Acteocina canaliculata</u>	4	1	5	0.97
<u>Barnea truncata</u>	3	2	5	0.97
<u>Streblospio benedicti</u>	5	-	5	0.97
* <u>Stylochus ellipticus</u>	4	-	4	0.78
<u>Pseudeurythoe paucibranchiata</u>	-	4	4	0.78
<u>Mulinia lateralis</u>	3	-	3	0.58
<u>Pectinaria gouldii</u>	3	-	3	0.58
<u>Peloscolex gabriellae</u>	1	2	3	0.58
* <u>Paracaprella tenuis</u>	2	-	2	0.39
<u>Edotea triloba</u>	2	-	2	0.39
<u>Macoma tenta</u>	2	-	2	0.39
<u>Glycinde solitaria</u>	1	1	2	0.39
Nemertean (unident.)	2	-	2	0.39
<u>Ampelisca vadorum</u>	1	-	1	0.19
* <u>Unciola serrata</u>	1	-	1	0.19
<u>Ancistrosyllis hartmanae</u>	1	-	1	0.19
* <u>Anadara transversa</u>	1	-	1	0.19
<u>Gemma gemma</u>	1	-	1	0.19
<u>Micropholis atra</u>	1	-	1	0.19
<u>Nereis succinea</u>	1	-	1	0.19

STATION B4, June 1974 (Continued)

Species	Sample 1	Sample 2	Total (0.2m ²)	Percentage
<u>Scoloplos robustus</u>	1	-	1	0.19
<u>Mercenaria mercenaria</u>	-	1	1	0.19
<u>Spiochaetopterus oculatus</u>	-	1	1	0.19
<u>Spio setosa</u>	-	1	1	0.19
<u>Cerebratulus lacteus</u>	-	1	1	0.19
<u>Alcyonidium verrilli</u>	P			
<u>Electra hastingsae</u>	P	P		
<u>Sertularia argentea</u>	P	P		
<u>Aeverrillia armata</u>	P			
<u>Bowerbankia gracilis</u>		P		
Total individuals (non-colonial)	389	122	511	
Total species (non-colonial)	31	19	36	

STATION B5, July 1973

Species	Sample 1	Sample 2	Total (0.2m ²)	Percentage
<u>Gemma gemma</u>	8	9	17	66.12
<u>Chiridotea nigrescens</u>	11	4	15	24.19
<u>Tellina agilis</u>	6	4	10	16.13
<u>Craniella laminaris</u>	4	1	5	8.06
<u>Tanaissus lilljeborgi</u>	3		3	4.84
* <u>Molgula manhattensis</u>	3		3	4.84
<u>Mulinia lateralis</u>		2	2	3.23
<u>Glycera dibranchiata</u>		2	2	3.23
<u>Trichophoxus epistomus</u>	1		1	1.61
<u>Oxyurostylis smithi</u>	1		1	1.61
Cumacean (unident.)	1		1	1.61
<u>Nereis succinea</u>		1	1	1.61
<u>Ovalipes ocellatus</u>		1	1	1.61
Total individuals (non-colonial)	38	24	62	100
Total species (non-colonial)	9	8	13	

STATION B5, November 1973

Species	Sample 1	Sample 2	Total (0.2m ²)	Percentage
<u>Gemma gemma</u>	21	23	44	49.43
<u>Chiridotea nigrescens</u>	4	14	18	20.22
<u>Tellina agilis</u>	4	6	10	11.23
<u>Acteocina canaliculata</u>	6		6	6.74
<u>Peloscolex spp.</u>	1	2	3	3.37
<u>Parahaustorius holmesi</u>		2	2	2.24
<u>Acanthohaustorius intermedius</u>		2	2	2.24
<u>Branchiostoma caribaeum</u>		1	1	1.12
<u>Glycera dibranchiata</u>		1	1	1.12
<u>Neomysis americana</u>	1		1	1.12
<u>Tanaissus lilljeborgi</u>		1	1	1.12
Total individuals (non-colonial)	37	52	89	
Total species (non-colonial)	6	9	11	

STATION B5, June 1974

Species	Sample 1	Sample 2	Total (0.2m ²)	Percentage
<u>Archiannelid (unident.)</u>	67	142	209	64.51
<u>Gemma gemma</u>	12	20	32	9.88
<u>Craniella laminaris</u>	6	16	22	6.79
<u>Tanaissus lilljeborgi</u>	6	5	11	3.40
<u>Lyonsia hyalina</u>		11	11	3.40
<u>Glycera dibranchiata</u>	4	3	7	2.16
<u>Bostrichobranchus pilularis</u>	1	6	7	2.16
<u>Mulinia lateralis</u>	2	3	5	1.54
<u>Spisula solidissima</u>	1	3	4	1.23
<u>Spio setosa</u>	1	2	3	0.93
<u>Scoloplos robustus</u>	2	-	2	0.62
<u>Chiridotea nigrescens</u>	-	2	2	0.62
<u>Spiophanes bombyx</u>	-	2	2	0.62
* <u>Sabellaria vulgaris</u>	1	-	1	0.31
<u>Ensis directus</u>	1	-	1	0.31
* <u>Caprella penantis</u>	-	1	1	0.31
<u>Leptocuma minor</u>	-	1	1	0.31
<u>Spiochaetopterus oculatus</u>	-	1	1	0.31
<u>Pseudeurythoe paucibranchiata</u>	-	1	1	0.31
<u>Pandora trilineata</u>	-	1	1	0.31
Total individuals (non-colonial)	104	220	324	
Total species (non-colonial)	12	17	20	

STATION B6, November 1973

Species	Sample 1	Sample 2	Total (0.2m ²)	Percentage
* <u>Corophium tuberculatum</u>	1	4	5	16.12
<u>Nereis succinea</u>		5	5	16.12
<u>Panopeus herbstii</u>	1	3	4	12.90
<u>Ampelisca vadorum</u>	1		1	3.22
<u>Barnea truncata</u>	1		1	3.22
<u>Callinectes sapidus</u>	1		1	3.22
* <u>Crepidula convexa</u>		1	1	3.22
<u>Edotea triloba</u>		1	1	3.22
<u>Epitonium rupicolum</u>		1	1	3.22
<u>Gobiosoma bosci</u>		1	1	3.22
<u>Glycera americana</u>		1	1	3.22
<u>Lumbrineris tenuis</u>		1	1	3.22
<u>Marphysa sanguinea</u>		1	1	3.22
<u>Mitrella lunata</u>		1	1	3.22
<u>Neomysis americana</u>		1	1	3.22
<u>Nereis succinea</u>		1	1	3.22
<u>Palaemonetes pugio</u>		1	1	3.22
<u>Polydora sp.</u>		1	1	3.22
<u>Scoloplos robustus</u>		1	1	3.22
<u>Unciola irrorata</u>		1	1	3.22
<u>Alcyonidium verrilli</u>		P		
Total individuals (non-colonial)	5	26	31	
Total species (non-colonial)	15	17	20	

STATION B6, June 1974

Species	Sample 1	Sample 2	Total (0.2m ²)	Percentage
* <u>Caprella penantis</u>	123	--	123	36.49
<u>Lyonsia hyalina</u>	21	19	40	11.86
<u>Mulinia lateralis</u>	13	16	29	8.60
<u>Mya arenaria</u>	16	10	26	7.71
<u>Tellina agilis</u>	11	10	21	6.23
<u>Glycera dibranchiata</u>	9	12	21	6.23
<u>Spisula solidissima</u>	9	6	15	4.45
* <u>Sabellaria vulgaris</u>	4	9	13	3.85
* <u>Balanus improvisus</u>	7	5	12	3.56
<u>Gemma gemma</u>	4	4	8	2.37
* <u>Doridella obscura</u>	4	-	4	1.18
<u>Petricola pholadiformis</u>	3	-	3	0.89
<u>Peloscolex gabriellae</u>	2	1	3	0.89
* <u>Molgula manhattensis</u>	3	-	3	0.89
<u>Barnea truncata</u>	2	-	2	0.59
<u>Spio setosa</u>	1	1	2	0.59
Nemertean (unident.)	1	1	2	0.59
<u>Pagurus longicarpus</u>	1	-	1	0.29
<u>Chiridotea nigrescens</u>	1	-	1	0.29
<u>Oxyurostylis smithi</u>	1	-	1	0.29
<u>Edotea triloba</u>	1	-	1	0.29
<u>Craniella laminaris</u>	1	-	1	0.29
<u>Trichophoxus epistomus</u>	-	1	1	0.29
<u>Nassarius vibex</u>	1	-	1	0.29
<u>Diopatra cuprea</u>	1	-	1	0.29
<u>Polinices duplicatus</u>	-	1	1	0.29
<u>Bostrichobranchus pilularis</u>	-	1	1	0.29
<u>Sertularia argentea</u>	P			
<u>Aeverrillia armata</u>	P			

STATION B6, June 1974 (Continued)

<u>Species</u>	<u>Sample 1</u>	<u>Sample 2</u>	<u>Total (0.2m²)</u>	<u>Percentage</u>
<u>Electra hastingsae</u>	P			
<u>Alcyonidium verrilli</u>		P		
Total individuals (non-colonial)	240	97	337	
Total species (non-colonial)	24	15	27	

STATION B7, June 1974

Species	Sample 1	Sample 2	Total (0.2m ²)	Percentage
<u>Glycera dibranchiata</u>	4	18	22	28.94
<u>Mulinia lateralis</u>	1	13	14	18.42
<u>Streblospio benedicti</u>	2	8	10	13.15
<u>Ensis directus</u>	-	7	7	9.21
<u>Tellina agilis</u>	1	4	5	6.57
<u>Lyonsia hyalina</u>	-	3	3	3.94
* <u>Balanus improvisus</u>	-	3	3	3.94
<u>Spisula solidissima</u>	-	2	2	2.63
<u>Scoleteopsis bousfieldi</u>	-	2	2	2.63
<u>Nereis succinea</u>	1	-	1	1.31
<u>Mya arenaria</u>	-	1	1	1.31
<u>Spiophanes bombyx</u>	-	1	1	1.31
<u>Dispio uncinata</u>	-	1	1	1.31
<u>Maldanopsis elongata</u>	-	1	1	1.31
<u>Cerebratulus lacteus</u>	-	1	1	1.31
<u>Tubulanus pellucidus</u>	-	1	1	1.31
<u>Oxyurostylis smithi</u>	-	1	1	1.31
<u>Bowerbankia gracilis</u>		P		
<u>Sertularia argentea</u>		P		
Total individuals (non-colonial)	9	67	76	
Total species (non-colonial)	5	16	17	

STATION W1, June 1974

Species	Sample 1	Sample 2	Total (0.2m ²)	Percentage
<u>Acteocina canaliculata</u>	18	37	55	41.66
<u>Mulinia lateralis</u>	9	15	24	18.18
<u>Heteromastus filiformis</u>	8	6	14	10.60
<u>Glycera dibranchiata</u>	3	4	7	5.30
<u>Scoloplos robustus</u>	4	2	6	4.54
<u>Lyonsia hyalina</u>	3	1	4	3.03
<u>Macoma tenta</u>	3	1	4	3.03
<u>Gemma gemma</u>	3	-	3	2.27
<u>Paraprionospio pinnata</u>	3	-	3	2.27
<u>Pectinaria gouldii</u>	2	-	2	1.51
Nemertean (unident.)	1	1	2	1.51
<u>Phoronis psammophila</u>	1	-	1	0.75
<u>Ampelisca verrilli</u>	1	-	1	0.75
<u>Tellina versicolor</u>	-	1	1	0.75
<u>Clymenella torquata</u>	-	1	1	0.75
* <u>Balanus improvisus</u>	-	1	1	0.75
<u>Edotea triloba</u>	-	1	1	0.75
* <u>Caprella penantis</u>	-	1	1	0.75
<u>Leucon americanus</u>	-	1	1	0.75
<u>Bowerbankia gracilis</u>	P			
<u>Sertularia argentea</u>	P			
Unid. sponge	P			
Total individuals (non-colonial)	59	73	132	
Total species (non-colonial)	13	14	19	

STATION W2, June 1974

Species	Sample 1	Sample 2	Total (0.2m ²)	Percentage
<u>Acanthohaustorius intermedius</u>	26	34	60	65.21
* <u>Sabellaria vulgaris</u>	--	11	11	11.95
<u>Glycera dibranchiata</u>	2	6	8	8.69
<u>Mulinia lateralis</u>	3	-	3	3.26
<u>Gemma gemma</u>	2	1	3	3.26
<u>Spiophanes bombyx</u>	-	2	2	2.17
<u>Acteocina canaliculata</u>	1	-	1	1.08
<u>Oedicerotid (unident.)</u>	1	-	1	1.08
* <u>Molgula manhattensis</u>	1	-	1	1.08
<u>Trichophoxus epistomus</u>	-	1	1	1.08
<u>Bathyporeia parkeri</u>	-	1	1	1.08
Total individuals (non-colonial)	36	56	92	
Total species (non-colonial)	7	7	11	

STATION W3, June 1974

Species	Sample 1	Sample 2	Total (0.2m ²)	Percentage
* <u>Sabellaria vulgaris</u>	300	515	815	43.88
* <u>Caprella penantis</u>	45	408	453	24.39
* <u>Corophium acherusicum</u>	51	81	132	7.10
* <u>Balanus improvisus</u>	102	20	122	6.56
* <u>Unciola serrata</u>	--	119	119	6.40
* <u>Molgula manhattensis</u>	9	44	53	2.85
* <u>Paracaprella tenuis</u>	--	33	33	1.77
* <u>Polydora ligni</u>	--	30	30	1.61
<u>Mya arenaria</u>	4	4	8	0.43
* <u>Melita nitida</u>	1	7	8	0.43
<u>Mulinia lateralis</u>	5	1	6	0.32
<u>Nereis succinea</u>	--	6	6	0.32
<u>Peloscolex gabriellae</u>	--	6	6	0.32
<u>Glycera dibranchiata</u>	4	1	5	0.26
<u>Acteocina canaliculata</u>	4	-	4	0.21
<u>Gemma gemma</u>	2	2	4	0.21
<u>Tellina agilis</u>	-3	1	4	0.21
<u>Arabella iricolor</u>	2	2	4	0.21
* <u>Gammarus mucronatus</u>	-	4	4	0.21
* <u>Doridella obscura</u>	-	4	4	0.21
<u>Nucula proxima</u>	1	2	3	0.16
<u>Clymenella torquata</u>	1	2	3	0.16
<u>Lyonsia hyalina</u>	-	3	3	0.16
<u>Mitrella lunata</u>	-	3	3	0.16
<u>Ampelisca vadorum</u>	-	3	3	0.16
<u>Ensis directus</u>	2	-	2	0.10
<u>Acanthohaustorius intermedius</u>	1	1	2	0.10
* <u>Sabella microphthalma</u>	-	2	2	0.10
<u>Scoloplos robustus</u>	-	1	2	0.10
<u>Mysella bidentata</u>	-	2	2	0.10
<u>Nassarius vibex</u>	1	-	1	0.05
<u>Eupleura caudata</u>	1	-	1	0.05

STATION W3, June 1974 (Continued)

Species	Sample 1	Sample 2	Total (0.2m ²)	Percentage
<u>Urosalpinx cinerea</u>	1	-	1	0.05
<u>Neopanope sayi</u>	1	-	1	0.05
<u>Neomysis americana</u>	1	-	1	0.05
* <u>Pleusymtes glaber</u>	1	-	1	0.05
<u>Spiochaetopterus oculatus</u>	1	-	1	0.05
<u>Crepidula convexa</u>	-	1	1	0.05
<u>Unid. bivalves</u>	-	1	1	0.05
<u>Eteone heteropoda</u>	-	1	1	0.05
<u>Brania clavata</u>	-	1	1	0.05
* <u>Gobiosoma bosci</u>	-	1	1	0.05
<u>Edotea triloba</u>	-	1	1	0.05
<u>Sertularia argentea</u>	P			
<u>Unid. sponge</u>	P			
Total individuals (non-colonial)	544	1,313	1,858	
Total species (non-colonial)	24	34	43	

STATION W4, June 1974

Species	Sample 1	Sample 2	Total (0.2m ²)	Percentage
<u>Phoronis psammophila</u>	34	128	162	45.00
<u>Acteocina canaliculata</u>	69	5	74	20.56
<u>Spiochaetopterus oculatus</u>	8	12	20	5.56
<u>Glycera dibranchiata</u>	11	6	17	4.72
<u>Scoelelepis squamata</u>	13	2	15	4.17
<u>Clymenella torquata</u>	4	6	10	2.78
<u>Streblospio benedicti</u>	5	5	10	2.78
<u>Mulinia lateralis</u>	6	3	9	2.50
* <u>Sabellaria vulgaris</u>	5	3	8	2.22
<u>Peloscolex gabriellae</u>	5	1	6	1.67
<u>Spiophanes bombyx</u>	4	1	5	1.39
<u>Odostomia bisuturalis</u>	4	-	4	1.11
<u>Glycinde solitaria</u>	-	3	3	0.83
<u>Oxyurostylis smithi</u>	2	-	2	0.56
<u>Mercenaria mercenaria</u>	2	-	2	0.56
<u>Tellina agilis</u>	1	1	2	0.56
* <u>Caprella equilibra</u>	1	-	1	0.28
* <u>Unciola serrata</u>	1	-	1	0.28
<u>Edotea triloba</u>	1	-	1	0.28
<u>Listriella clymenellae</u>	-	1	1	0.28
<u>Gemma gemma</u>	1	-	1	0.28
* <u>Crepidula convexa</u>	1	-	1	0.28
<u>Eteone heteropoda</u>	1	-	1	0.28
<u>Turbonilla interrupta</u>	-	1	1	0.28
<u>Lucina multilineata</u>	-	1	1	0.28
<u>Arabella iricolor</u>	-	1	1	0.28
<u>Brania clavata</u>	-	1	1	0.28
<u>Bowerbankia gracilis</u>	-	P	-	
Total individuals (non-colonial)	179	181	360	
Total species (non-colonial)	21	18	27	

STATION W5, June 1974

Species	Sample 1	Sample 2	Total (0.2m ²)	Percentage
* <u>Caprella penantis</u>	40	3	43	40.57
<u>Mulinia lateralis</u>	14	22	36	33.96
<u>Edotea triloba</u>	4	-	4	3.77
<u>Oxyurostylis smithi</u>	1	2	3	2.83
<u>Ampelisca vadorum</u>	2	1	3	2.83
* <u>Balanus improvisus</u>	-	3	3	2.83
<u>Ensis directus</u>	-	3	3	2.83
<u>Leucon americanus</u>	2	-	2	1.89
<u>Tellina agilis</u>	1	1	2	1.89
* <u>Doridella obscura</u>	1	-	1	0.94
<u>Lyonsia hyalina</u>	1	-	1	0.94
<u>Gemma gemma</u>	1	-	1	0.94
<u>Glycera dibranchiata</u>	1	-	1	0.94
* <u>Sabella microphthalma</u>	1	-	1	0.94
* <u>Mytilus edulis</u>	-	1	1	0.94
<u>Sarsiella zostericola</u>	-	1	1	0.94
Unid. sponge	P			
<u>Sertularia argentea</u>	P			
Total individuals (non-colonial)	69	37	106	
Total species (non-colonial)	12	9	16	