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Final report on environmental effect of subaqueous sand fill acquisition on the benthic communities of Hampton Bar, James River, Virginia

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Final Report on

Environmental Effect of Subaqueous Sand Fill Acquisition on the Benthic Communities of Hampton Bar, James River, Virginia

to

Newport News Shipbuilding and Drydock Company

by

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Introduction

The Newport News Shipbuilding and Drydock Company was granted permission to obtain sand fill from the east end of Hampton Bar in Hampton Roads, Virginia for the expansion of their waterfront facilities. A clamshell dredge operated from February to July 1974 and removed a total of 597,055 cu yds of material before breaking down. In August 1974 a hydraulic dredge took over the operation and by February 1975 had removed 899,386 cu yds for total removal of 1,495,410 cu yds.

In order to assess the environmental effects of this project a program of sampling benthic organisms was undertaken from February 1974 to January 1976. Benthic animals are those dwelling in (infauna) or on (epifauna) the bottom and are the marine organisms most directly affected by the activities of dredging. It was felt that any effects would be most apparent in the benthic communities. Unfortunately the diverse assortment of organisms making up these communities are unfamiliar to most laymen. Benthic communities play integral roles in the functioning of estuarine ecosystems. They provide the predominant food source for many estuarine fishes, including the young of many sport and commercial species, and even other motile invertebrates such as the blue crab (Virnstein 1977).

The effects of the dredging were assessed through interpretation of faunal composition and sediment characteristics.

Materials and Methods

Samples of macrobenthos were obtained from 13 stations on two transects. One transect of 7 stations was parallel to the long axes of Hampton Bar, the other transect was perpendicular to the bar in the area of the excavation. One control station (12) was located west of the excavation in 5.4 m of water (Fig. 1). Two $0.1m^2$ Smith-McIntyre grab samples were taken at each station February 1974, January 1975 and January 1976. Station 13 was added in 1975 to maintain shallow bar stations that were being lost to dredging.

After removal of a small sediment sample the contents of each grab was sieved through a 0.5 mm screen, preserved with 5-10% buffered formalin, and stained with a vital stain (phloxine B). Later, the samples were microscopically examined and the animals present sorted into major taxonomic groups and placed in 70% ethanol for later identification and enumeration.

Species diversity was measured by the commonly used index of Shannon (Pielou 1975), which expresses the information content per individual. The index denotes the

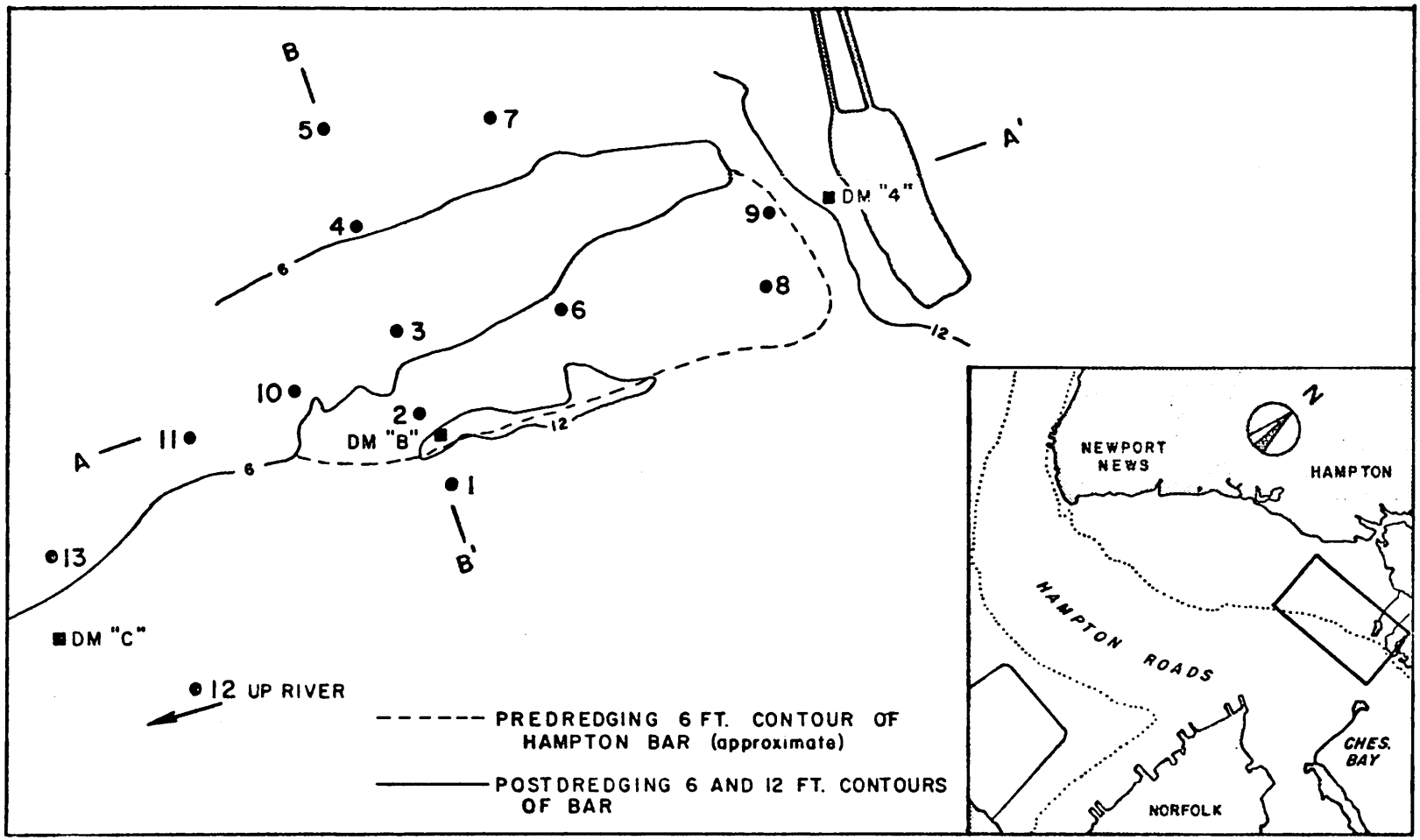

Figure 1. Location of benthic sampling stations.

uncertainty in predicting the specific identity of a randomly chosen individual from a multispecies assemblage. The more species there are, and the more evenly they are represented, the higher this uncertainty. The index is given by:

$$H' = -\sum_{i=1}^{S} p_i \log_2 p_i$$

where s = number of species in a sample and p_i = proportion of the i-th species in the sample. Species diversity, particularly as expressed by the Shannon measure, is widely used in impact assessments and may correlate well with environmental stress (Wilhm and Dorris 1968; Armstrong et al. 1971; Boesch 1972). More adverse and stressful environmental conditions often exhibit lower species diversity although this response is often not so simple (Jacobs 1975, Goodman 1975).

As considered above, species diversity is a composite of two components: species richness, the number of species in a community, and evenness, how the individuals are distributed among the species. We used two measures of species richness: the number of species per unit area (in this case $0.2m^2$) or areal richness, and the other a measure standardized on the basis of the size of the sample in terms of numbers of individuals:

$$SR = (S-1)/\ln N,$$

where S = number of species and N = number of individuals in a sample. Evenness was expressed as:

$$J' = H'/\log_2 S \quad \text{(Pielou 1975)}.$$

Numerical classification was used in order to detect and express changes in species composition at stations through time. A similarity measure, the Bray-Curtis (or Czekanowski) coefficient (Goodall 1973) was calculated:

$$S_{jk} = 1 - \frac{\sum_i |x_{ji} - x_{ki}|}{\sum_i (x_{ji} + x_{ki})}$$

where S_{jk} is the similarity between collections at stations j and k. x_{ji} is the abundance of the i-th species at station j and x_{ki} the abundance of the i-th species at station k. In order to dampen the sensitivity of the Bray-Curtis index to the numerically dominant species, all absolute abundances were log transformed as:

$$y = \ln (x + 1).$$

The relationships between the distribution patterns of pairs of species were studied by computing the Bray-Curtis index as given above, allowing instead the S_{jk} to represent the similarity between species j and k and the x_{ji} to represent the transformed abundance of species j at the i-th station. The entities, be they stations or

species, can then be clustered based on the resulting resemblance matrices using various strategies that express relationships in the form of a dendrogram. The dendrogram graphically depicts the interrelationships of the samples (normal analysis) or species (inverse analysis) from a collection in a hierarchial fashion. The clusters or groups produced by the clustering algorithm do not have an objective existence but are rather a property of the numerical process and data set (Williams 1971). Cluster creation and interpretation must consider the above factors. Even though the technique is objective, its application and interpretation can be rather subjective. The flexible sorting strategy was chosen because of its mathematical properties and proven usefulness in ecology (Boesch 1973, Clifford and Stephenson 1975). The cluster intensity coefficient β was set at -0.25, which effects moderately intense clustering.

Percent sand, silt and clay was determined by sieving and pipette analysis following procedures of Folk (1968). Sediment descriptions refers to the Udden-Wentworth classification (Pettijohn 1957).

Results

Sediments

Hampton Bar is a persistent and stable feature of Hampton Roads. A dynamic equilibrium exists between wind generated waves that tend to erode the bar and the net import of sand that nourishes it from the north side of Hampton Roads. Fine sand is the predominant fraction on the crest of the bar (with less than 20% silts and clays). The percentage of silt and clay material increases with increasing depth (Table 1).

The average percent sand on the crest of the bar (represented by stations 2, 3, 6, 10, 11 and 13 before dredging and 3, 11 and 13 after) was 91.1 with a standard deviation of 6.5%. To the north of the crest (stations 4, 5 and 7) a slightly lower percentage of sand, 80.4, occurred with a standard deviation of 8.4%. The deeper stations located off the bar (1 and 12) had an average percent sand of 83.0 with a standard deviation of 8.8%.

During February 1974 an area excavated earlier (represented by stations 8 and 9) still had a high percentage of sand (64.0) indicating the generally sandy nature of sediments underlying the bar down at least to 10 m. By January 1975 stations 2 and 6 had been dredged to a depth of 7 m, with an average sand percent of 71.0. The large percentage of fine material (silt and clay: 68%)

found at station 8 and 9 in January was most likely due to settling of fines from the dredging operation. By January 1976 the percent of fines at stations 8 and 9 had decreased to 49%. Nine months later (September 1976) the fines still constituted 50% of the sediment fraction in the area of stations 8 and 9. In January 1976 station 10, which was dredged in early 1975, also exhibited a decline in percent sand to 55%. When in mid-February 1975 dredging was completed, dredging had encompassed three stations (2, 6, 10) on the crest of Hampton Bar. Stations 8 and 9 were located in a part of the excavation which had been dredged prior to the start of this study. The average percent sand of these five stations (2, 6, 8, 9 and 10) after dredging (January 1976) was 57.8 with a standard deviation of 17.4%. In summer 1976 the proportion of sand at the dredged stations remained essentially the same, 58% with a standard deviation of 8.8%.

It appears that the excavation served as a trap for fine sediments, however slumping and the wave transport of sand kept the pit from becoming predominantly mud. Bottom profiles in January and September 1976 indicate the excavation is slowly changing shape and filling in (Fig. 2). Large amounts of decaying organic matter, in the form of fleshy bryozoans (Alcyonidium) and hydroids (mainly Sertularia), accumulated in the pit making surface sediments black and sulfide smelling. In contrast surface sediments at the undisturbed deeper stations

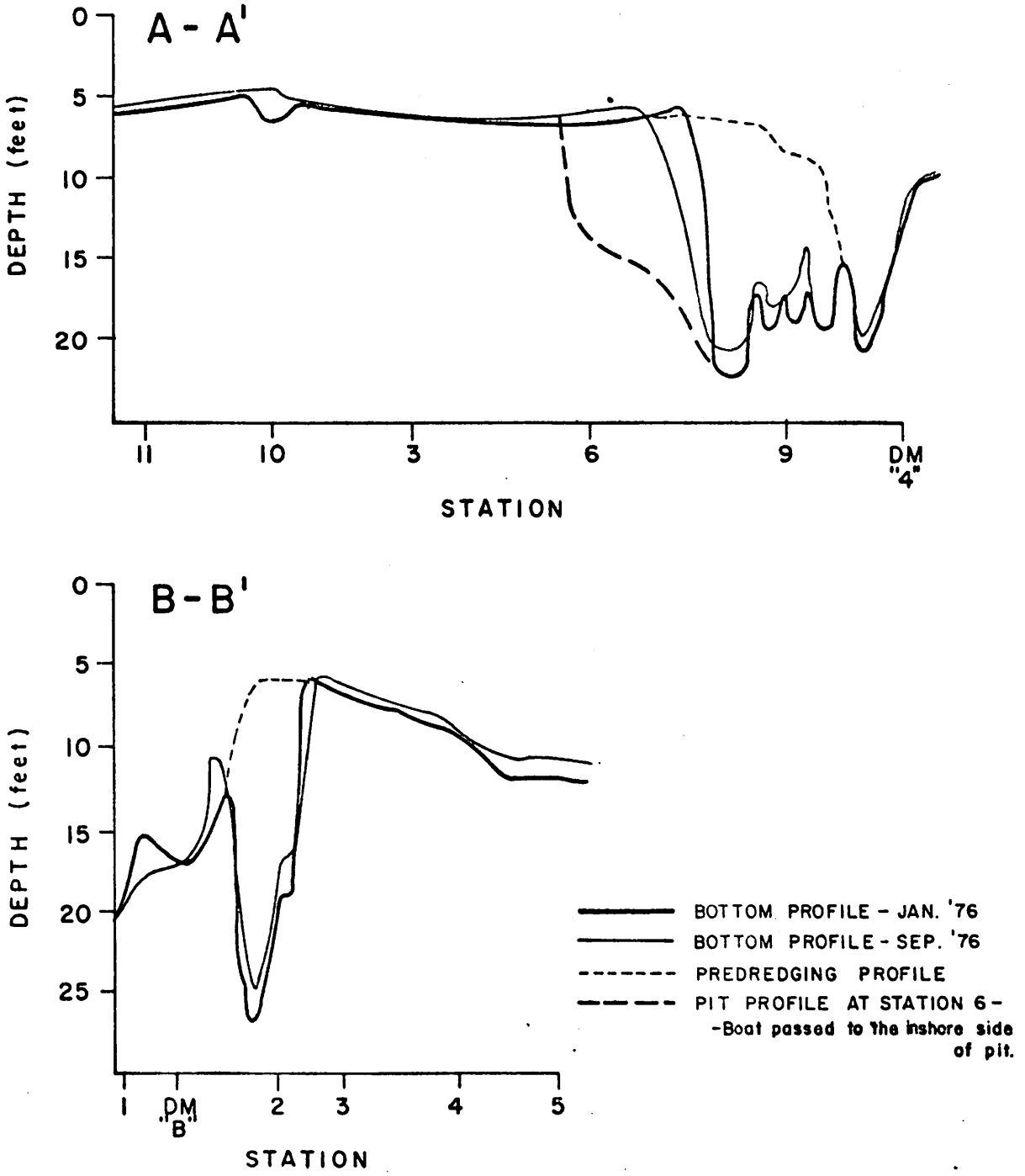

Figure 2. Profiles of the excavation in January and September 1976.

(1 and 12) were lighter and did not smell strongly of sulfide.

Fauna

From the 24 grab samples taken in February 1974 1,212 macrobenthic individuals representing 67 recognizable taxa were recovered; the 26 grab samples from January 1975 contained 3,436 individuals in 76 taxa and the 26 grab samples from January 1976 contained 5,145 individuals in 94 taxa (Appendix A and B). In total, the 76 grab samples yielded 9,793 individuals and 132 taxa (Appendix C). The increase in individuals and species with time is principally due to a profusion of epifaunal species. In 1974, 16 epifaunal species occurred with 21 in 1975 and 34 in the 1976 collection for a total of 47 epifaunal species (Table 2). The distribution of epifaunal species in 1974 was fairly even between the deeper undredged stations and dredged pit with the crest of the bar having the least epifauna. In 1975 there was an increase of epifauna at the deeper undredged station with the dredged stations and crest of the bar having a lower occurrence of epifauna. In 1976, about one year after suspension of dredging, the greatest abundance of epifauna was at the deeper undredged and dredged stations with the crest of the bar having low abundances. The average occurrence of epifauna was as follows:

	(Number of Epifaunal Species/0.2m^2)		
	Bar Crest	Deep Undredged	Dredged
February 1974	1.3	3.0	3.5
January 1975	2.8	7.2	2.0
February 1976	2.2	11.5	11.0

The most common epifaunal species were the amphipods, Caprella penantis, Paracaprella tenuis, Unciola irrorata, Elasmopus levis, and Melita appendiculata. These were found most commonly associated with hydroids. Other numerically abundant epifaunal species were found in association with shells or other hard substrate. These were the polychaetes Sabella microphthalma, Polydora ligni and Sabellaria vulgaris, the molluscs Crepidula convexa, and Doridella obscura, the barnacles Balanus improvisus, the amphipod Corophium acherusicum and the isopod Edotea triloba.

Community Structure

Diversity, richness and evenness all tended to increase from 1974 to 1976 (Table 3). This seemed to have been due to the increase in epifauna. Highest diversity occurred at deeper undredged bottoms and in the portion of the pit that was three years old, where there were high concentrations of epifaunal species (Table 3). Diversity calculated without the epifaunal species was lower than with epifauna and did not show

concordant increase from 1974 to 1976. Only stations 1, 2, 6, 10, 11 and 12 increased in diversity from 1974 to 1976. The stations dredged during the course of the study (2, 6, 10) all exhibited an increase in diversity after being dredged (Table 3) due mainly to the general increase in abundance of infaunal species that occurred at the deeper stations and not an influx of new infaunal species. In 1974 a total of 51 infaunal species was collected. In 1975 and 1976 there was a total of 55 and 60 infaunal species, respectively. Some of the commoner species that tended to occur in the deeper (>3.0 m) areas around Hampton Bar in 1976 were:

Phoronis psammophila
Paraprionospio pinnata
Scoloplos robustus
Glycinde solitaria
Clymenella torquata
Nereis succinea
Peloscolex gabriellae
Acteocina canaliculata
Oxyurostylis smithi

The mean size of most infaunal species was smaller in the dredged pit when compared to undredged areas. This was most noticeable among the polychaete species Clymenella torquata, Heteromastus filiformis, Streblospio benedicti and Paraprionospio pinnata and the bivalve species Tellina versicolor, Anadara transversa and Mercenaria mercenaria. The size comparisons of polychaetes was relative because of their soft bodies. The following are the mean shell lengths for the bivalves in mm:

	Species	dredged areas	undredged areas
1974	Tellina versicolor	4.3	6.2
1975	Tellina versicolor	2.6	5.4
	Anadara transversa	2.6	5.5
	Mercenaria mercenaria	3.1	18.1
1976	Tellina versicolor	2.0	4.5

Classification Results

The normal analysis at the eight group level produced interpretable results (Fig. 3). The factors corresponding to the groupings were primarily occurrence of epifauna, sediment characteristics, depth and time after dredging. Figure 2 shows the station groups and the factors that best characterize them. The inverse analysis, with elimination of species that occurred at less than 10% of the stations for all three sampling periods, was interpreted at the 12 group level (Fig. 4). The main factors reflected in the groupings were whether the species were epifaunal or infaunal, abundant or scarce and to a lesser extent depth and sediment preference. Figure 4 shows the species groups and their best characterization. Because of the large number of species (97) and factors, both known and unknown, that affect their distributions it is difficult to determine the factors underlying the similarity of distribution of some of the groups.

When both the normal and inverse analyses are combined into a coincidence table (Boesch 1973) the

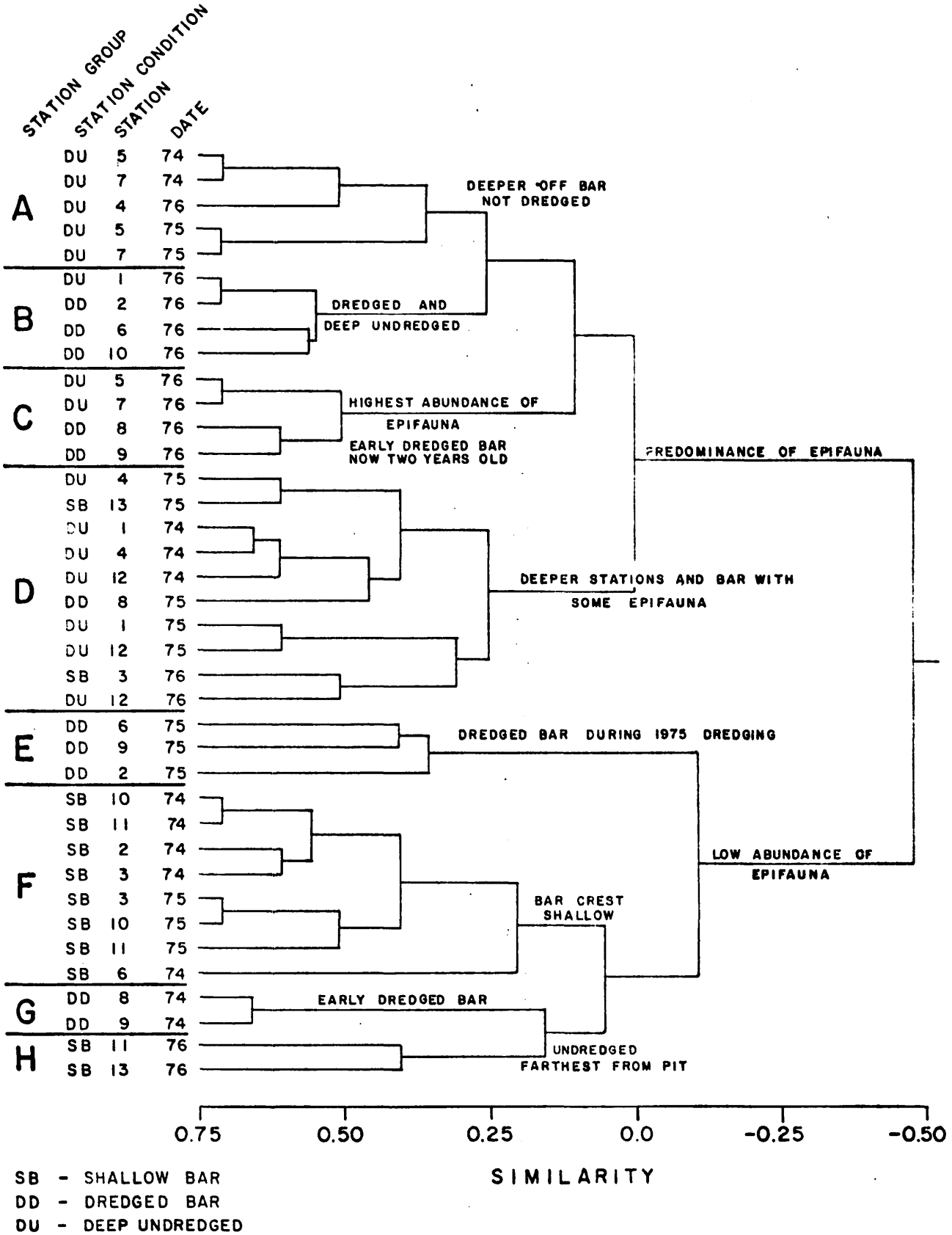

Figure 3. Cluster analysis of the stations.

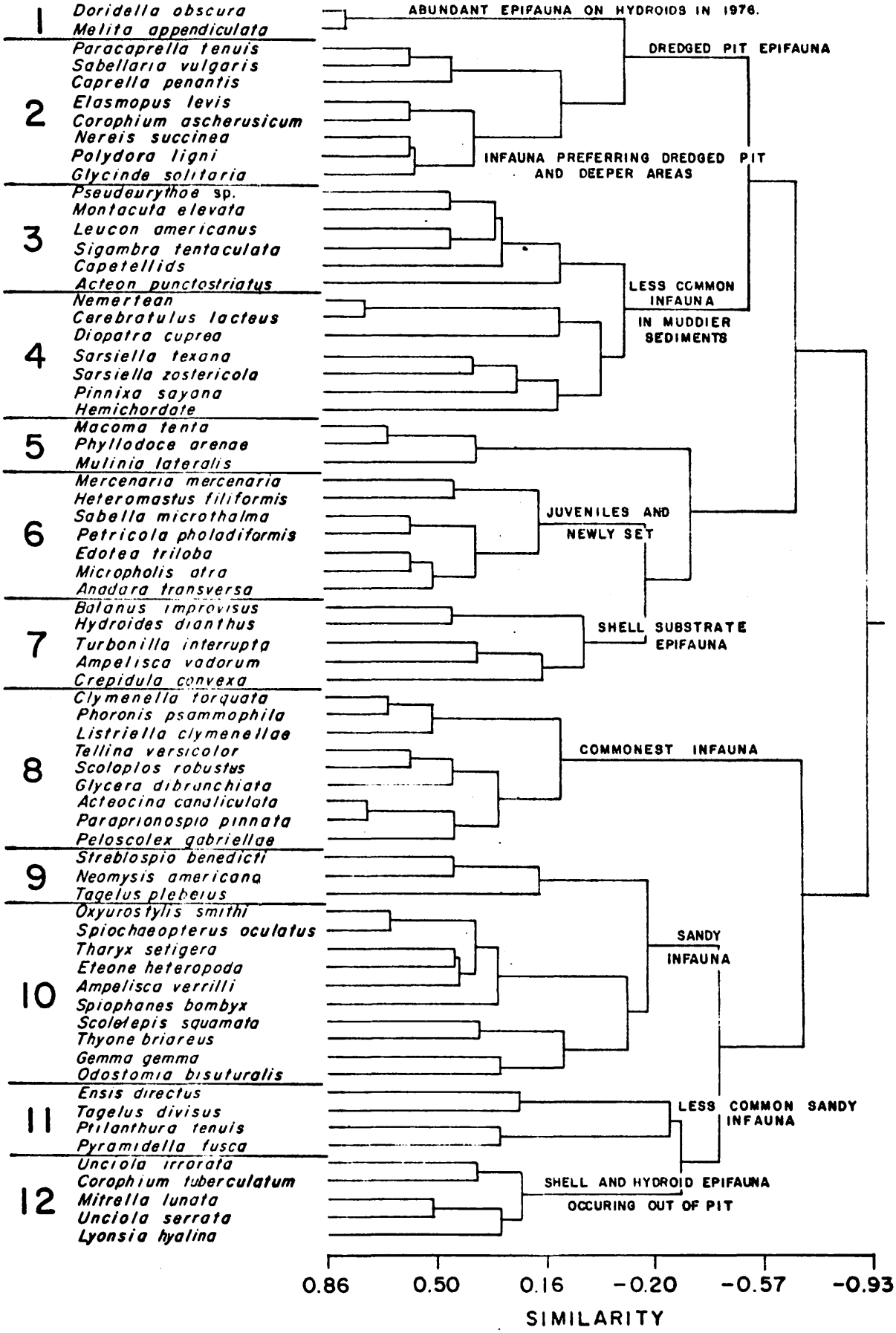

Figure 4. Cluster analysis of the species.

patterns of distribution of species groups at stations groups are elucidated. From examination of Figure 5 it can be seen that species group 1 was concentrated at station groups B and C and species group 8 was abundant at all station groups, and so forth.

The higher constancy (0.7 to 1.0) of species groups at station groups indicates that the species and environmental characteristics of the stations are interacting to favor the occurrence of the species. Species group 2, consisting of mainly epifauna associated with hydroids, tended to occur most at station group C, which was the oldest portion of the excavation, and deeper areas to the north of Hampton Bar. Circulation and sedimentation patterns caused the collection of unattached hydroids which are seasonally abundant. It can also be seen in Figure 4 that species group 2 had its lowest density at station groups E, F and H. In 1975 little hydroid material was found at stations 2, 6 and 9 (station group E) so there were low densities of species in group 2. Station groups F and H, which included stations on the undredged crest of Hampton Bar, also had low densities of species in group 2 because wave energy keeps the hydroids from settling on the crest. Species groups 3 and 4 represent the less common infaunal species that preferred the deeper muddier bottoms of stations in group B. Species group 6 is interesting because it is made up juvenile and newly

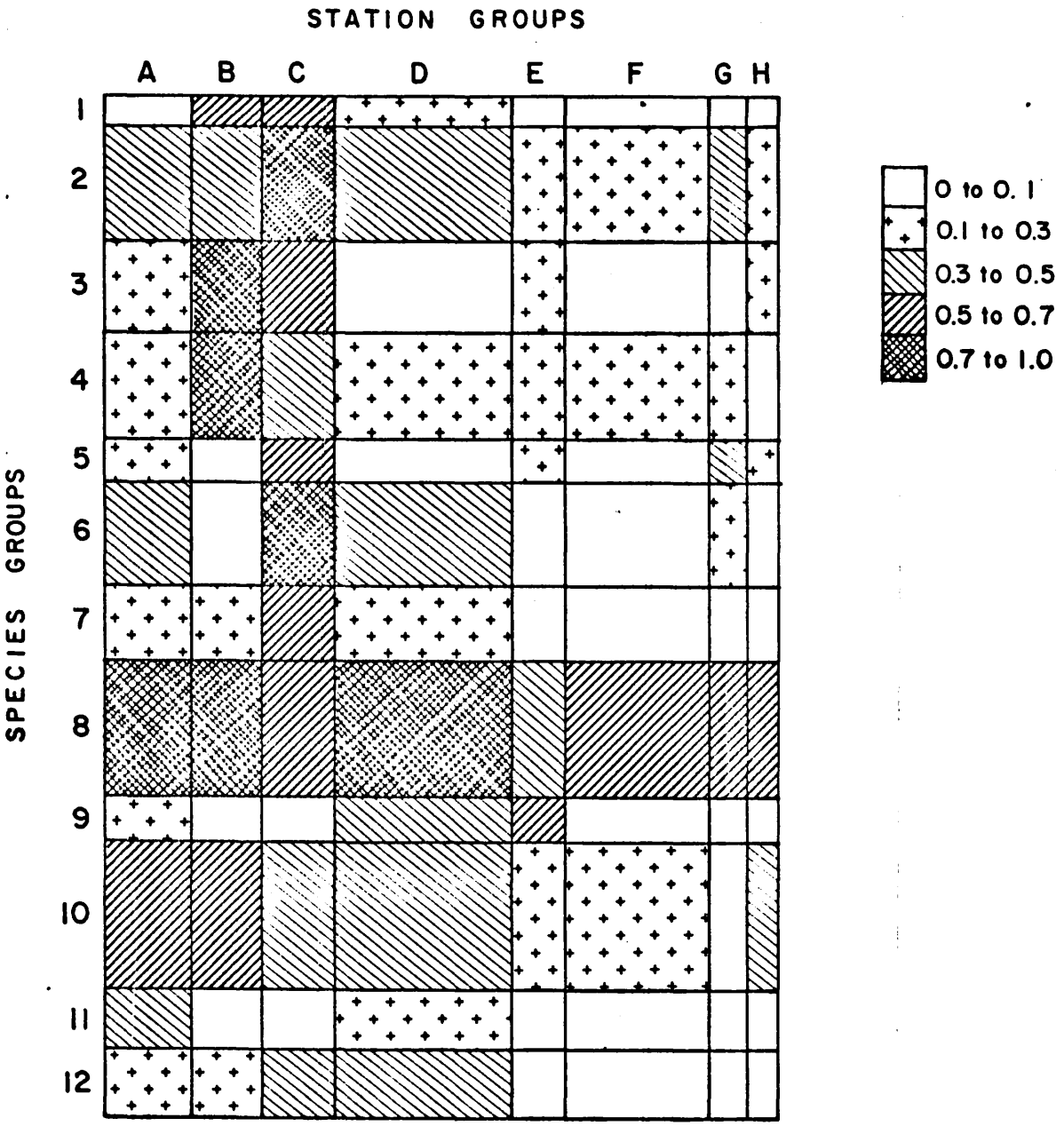

Figure 5. Coincidence table of both station and species cluster analyses.

set individuals that had highest density at stations in group C and to a lesser extent at those in groups A and D. The stations composing these station groups are mostly all undredged deeper stations except for stations 8 and 9, which are located in the older portion of the pit, and 3 which is in on the bar. The implication is that these species (species group 6) were more successful recruiting into the undredged deeper areas and the old portion of the pit than the bar crest, represented by station groups F and H, and newly dredged areas, groups B and E. Species group 8 contains the most abundant and common infaunal species. These species tended to occur at all the stations during all sampling periods.

Discussion

The removal of approximately 1.5 million cubic yards of material from Hampton Bar created a large deep pit 2300 m (2500 yds.) long, 460 to 640 m (500 to 700 yds.) wide and up to 10 m (32 ft.) deep at the east end of the bar. This excavation will undoubtedly be a long lived feature of Hampton Roads although it is filling in slowly with muddy sands. One and one half years after the cessation of dredging there were still spots deeper than 8 m (26 ft.). The east end of the pit, which is deepest, had the finest sediments.

Changes in depth and sediment type resulting from dredging have resulted in large changes in the inhabiting fauna. The crest of Hampton Bar supports a benthic community of low density and diversity characteristic of dynamic sand bottoms. Infauna dominated in collections on the bar crest and included molluscs (Acteocina canaliculata and Tellina versicolor) and polychaetes (Glycera dibranchiata and Scoloplos robustus). Recent studies have suggested that although the benthos of shallow sand bottoms in the Chesapeake Bay is sparse, the populations turn over rapidly and are heavily exploited by predators of resource value, such as blue crabs and fishes (Virnstein 1977).

At the end of dredging activities in January 1975, dredged bottoms had only slightly finer sediments than the bar itself, except for the easternmost portion (stations 8 and 9) which had been dredged much earlier. The benthos of these recently dredged bottoms was of low density and diversity and was dominated by opportunistic infaunal species more typical of muddy bottoms. Some of these species evidently colonized as adults.

By January 1976, denser infaunal communities had established in the excavated area, consisting mainly of euryhaline opportunists (Boesch 1977), including Acteocina, Paraprionospio pinnata, Leucon americanus and Glycinde solitaria. Dense aggregations of epifauna were also

found. This epifauna did not develop on the dredged bottoms per se, but resulted from the collection of drifting hydroids and bryozoans, broken loose from their attachments elsewhere. The hydroids and bryozoans had carried in or attracted the abundant epibiotic amphipods and polychaetes.

In terms of sediment type and mobility, the benthic environment of the dredged bottom became more like the deeper muddy sand bottoms channelward and shoreward of Hampton Bar rather than the previous bar crest. Thus, comparisons of the post-dredging communities in the excavated area are more appropriately made with those at stations 1, 4, 5, 7 and 12. The principal differences between these faunal assemblages and those found in the excavation were 1) the relative paucity of tube building infauna, particularly Clymenella torquata and Phoronis psammophila, in the excavation and 2) the transient nature of the epifauna in the excavation.

Because of the rapid growth rate of most benthic invertebrates in the Chesapeake Bay region it is unlikely that the qualitative differences in the infauna and the size differences in certain populations in 1976 could be due solely to insufficient time for community development. It is more probable that the environmental conditions in the excavation preclude parity of community structure with

undredged bottoms of similar depth and sediment characteristics. Likewise, the scarceness of hard substrates (e.g. shells and cobbles) in the excavation does not allow development of diverse primary epifauna, consisting of polychaetes (Sabella, Sabellaria and Hydroides) and tunicates (Molgula) as well as hydroids and bryozoans, found elsewhere.

It is difficult to predict the long term fate of the benthos of the excavated area. The June 1976 sampling showed increasing prominence of silts and clays in the sediments suggesting further accumulation of fine suspended sediments. However, the biological samples have not been analyzed. Furthermore, it is difficult to assess the resource value of the newly excavated environment, versus that which it displaced, or undredged bottom at comparable depths. This stems in part from a lack of information on the benthic habitat utilization by species of direct economic importance. We have a strong impression that the excavation habit is of relatively little resource value and may deleteriously affect neighboring habitats through oxygen depletion and resuspension of the fine bottom sediments accumulated in the pit.

Summary

1. The removal of 1.5 million cubic yards produced a large pit that will be a long-lived feature of Hampton Roads.

2. The excavation is acting as a trap for fine sediments (silts and clays) and epifaunal growths (Alcyonidium and Sertularia mainly). Sediments in the pit have a stronger sulfide smell than undredged areas of similar depth and granulometry.

3. Epifaunal species are an important feature of deeper bottoms (>3 m). However, the epifaunal species found in the pit were associated with hydroids and represent transient and seasonal occurrences. The epifaunal species associated with shells and harder substrates are persistent members of the benthic communities whose presence is not dependent on the drift of hydroids.

4. Infaunal species recolonized the excavation, but over one year after the cessation of dredging, several important species had not established comparable populations and their average size was smaller than in comparable undredged areas. This indicates that environmental factors in the excavation are retarding the development of mature communities.

Conclusions and Recommendations

The benthic communities on and around Hampton Bar are characteristic of stable sandy environments and very similar to those found by Boesch (1971, 1973). Substantial alterations to benthic communities have occurred as a result of sand fill acquisition from Hampton Bar. Recolonization of the pit has occurred but communities in the pit remain different from the surrounding natural communities. The benthos of the pit consisted of reduced densities of opportunistic infauna and transient epifauna associated with drifting hydroids and bryozoans. Alterations of sedimentary patterns and modification of the hydrodynamic regime may continue to be responsible for maintaining the differences in benthic communities. The pit acts as a trap for finer sediments and the reduced circulation in the excavation, inferred from accumulating fine sediment and drifting epifauna, may allow oxygen concentrations to be depleted. This may stress the benthos, particularly during the summer when oxygen concentration is the lowest and oxygen demand the highest.

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.

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 and enforced 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 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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Table 1. Sediment characteristics and depth at the 13 benthic stations.

	Date		% Sand	% Silt	% Clay	Depth (m)
1	2/74		72	21	7	6.1
	1/75		79	12	9	6.1
	1/76		78	14	8	6.4
	6/76		78	17	5	7.0
2	2/74		87	9	4	0.9
	1/75	dredged	80	8	12	7.0
	1/76		69	22	9	6.7
	6/76		53	41	6	6.7
3	2/74		72	21	7	1.4
	1/75		90	4	6	1.5
	1/76		99	0.5	0.5	1.5
	6/76		96	1	4	1.5
4	2/74		87	8	5	1.5
	1/75		94	3	3	1.5
	1/76		91	5	4	2.1
	6/76		94	3	3	2.3
5	2/74		70	24	6	3.0
	1/75		76	13	11	3.0
	1/76		83	12	5	3.1
	6/76		82	14	4	4.2
6	2/74		89	6	5	1.2
	1/75	dredged	62	12	26	7.3
	1/76		50	36	14	7.6
	6/76		57	38	5	6.4
7	2/74		70	22	8	2.6
	1/75		82	9	9	2.6
	1/76		79	17	4	3.1
8	2/74	dredged	70	24	6	9.1
	1/75		35	31	34	7.6
	1/76		51	35	14	8.4
9	2/74	dredged	58	29	13	10.0
	1/75		25	40	35	5.4
	1/76		51	34	15	6.1
	6/76		50	45	5	5.4

Table 1 (continued)

	Date		% Sand	% Silt	% Clay	Depth (m)
10	2/74		80	17	3	1.1
	1/75	dredged	96	1	3	1.5
	1/76		55	30	15	8.2
	6/76		70	25	5	6.4
11	2/74		92	6	2	
	1/75		96	1	3	
	1/76		100	0	0	
	6/76		95	2	3	
12	2/74		82	17	1	5.4
	1/75		89	4	6	5.4
	1/76		92	5	3	5.2
	6/76		87	10	3	6.8
13	1/75		95	1	4	0.9
	1/76		96	2	2	1.5
	6/76		96	1	3	1.5

Table 2. Epifaunal species that occurred at the benthic stations located on and around Hampton Bar during the course of the study.

Species	1974	1975	1976
Leech		8	5,4,9
Diadumene leucolena			7,9
Stylochus ellipticus			8
Euplana gracilis		4	7
Polydora ligni		4,5,7, 12,13	1,5,6,7,8,9, 10,12
Hydroides dianthus			4,5,7,9
Sabella microphthalma	5	7,12	5,7,8,9
Sabellaria vulgaris			6,7,8,9,5
Mytilus edulis			9
Montacuta elevata		7	1,6,8,9,12
Crepidula convexa	3	3,5	1,7
Eupleura caudata	12		5,8
Mitrella lunata		1,11,12	5,6,7,9,12
Doridella obscura			1,2,3,6,7,9
Okenia cupella			5,9
Balanus improvisus	3		5,7,10
Neomysis americana		1,4,6, 8,9	
Mysidopsis bigelowi		12	
Idotea balthica			9
Edotea triloba	4,12	1,4,7, 8,13	4,5,7,6,9
Chiridotea caeca	11		
Chiridotea nigrescens		10,11	
Ampithoe longimana			9
Cymadusa compta	8		
Batea catharinensis		10	
Corophium acherusicum	5,8	3	1,5,7,8,9,12
Corophium tuberculatum	12	4,12	9
Erichthonius rubicornis		12	
Unciola irrorata	1,5,7,1,2	1,7,12	
Unciola serrata		5,7,12	5,6,9
Elasmopus levis	2		1,3,4,5,6,7, 8,9
Gammarus mucronatus			9
Melita appendiculata			3,6,7,8,9
Stenothoe minuta			8,9
Caprella penantis	8,12	1,6,7, 12	4,7,8,9,12

Table 2 (continued)

Species	1974	1975	1976
Paracaprella tenuis	9,12	1,2,7,9, 12,13	3,5,4,6,7,8,9, 12
Palaemonetes vulgaris			9
Pagurus longicarpus	4		6
Callinectes sapidus			8,9,12
Ovalipes ocellatus		11	
Hexapanopeus angustifrons			8
Neopanope sayi		8,12	
Panopeus herbstii		1	
Crangon semptemspinosa	8		
Pinnixa sayana	3,5,6, 9		1,6,8,10
Molgula manhattensis			9,7,8
Xanthidae	8		9

Table 3. Community structure measurements with and without epifaunal species for the benthic stations located on and around Hampton Bar. All measurements are based on an area of 0.2 m^2.

	With Epifauna			Without Epifauna		
	Number of Individuals					
Station	1974	1975	1976	1974	1975	1976
1	143	284	341	142	232	326
2	37	14	431	35	12	430
3	59	74	96	55	73	88
4	165	202	300	163	183	235
5	194	687	722	185	679	530
6	15	25	179	13	22	155
7	181	867	625	180	844	321
8	93	386	353	87	382	276
9	75	24	1687	72	12	343
10	42	53	148	42	50	139
11	28	57	82	27	52	82
12	180	607	145	170	291	100
13		156	36		151	36
	Number of Species					
1	18	32	35	17	24	28
2	9	8	30	8	7	29
3	16	14	23	13	13	19
4	21	28	27	19	23	22
5	27	28	48	23	25	33
6	6	12	36	5	10	26
7	20	36	47	19	26	31
8	20	24	41	15	20	23
9	14	9	50	12	7	24
10	9	11	23	9	9	21
11	8	14	17	7	10	17
12	23	38	26	16	26	19
13		21	9		18	9

Table 3 (continued)

Station	With Epifauna			Without Epifauna		
	Diversity (H')					
	1974	1975	1976	1974	1975	1976
1	2.56	3.32	3.67	2.51	2.80	3.45
2	2.40	2.84	3.37	2.21	2.63	3.36
3	2.88	2.56	3.36	2.59	2.49	3.06
4	2.43	3.88	3.37	2.35	3.65	3.08
5	3.14	2.36	3.47	2.93	2.28	2.50
6	2.04	3.38	3.82	1.70	3.12	3.29
7	3.02	2.39	4.46	2.99	2.19	3.81
8	3.42	1.93	4.16	3.13	1.84	3.36
9	2.89	2.75	3.47	2.72	2.52	2.85
10	2.42	2.96	3.49	2.42	2.75	3.33
11	2.35	3.25	3.34	2.21	2.91	3.34
12	2.35	4.03	3.91	2.01	3.23	3.38
13		3.26	2.33		3.11	2.33
	Evenness (J')					
1	0.61	0.66	0.72	.61	.61	.72
2	0.76	0.95	0.69	.74	.94	.69
3	0.72	0.67	0.74	.70	.67	.72
4	0.55	0.81	0.71	.55	.81	.69
5	0.66	0.49	0.62	.65	.49	.50
6	0.79	0.94	0.74	.73	.94	.70
7	0.70	0.46	0.80	.70	.47	.77
8	0.79	0.42	0.78	.80	.43	.74
9	0.76	0.87	0.62	.76	.90	.62
10	0.76	0.86	0.77	.76	.87	.76
11	0.78	0.85	0.82	.79	.88	.82
12	0.52	0.77	0.83	.50	.69	.80
13		0.74	0.74		.75	.74

Table 3 (continued)

	With Epifauna			Without Epifauna		
	Richness (S-1/lnN)					
Station	1974	1975	1976	1974	1975	1976
1	3.43	5.49	5.83	3.23	4.22	4.67
2	2.22	2.65	4.78	1.97	2.41	4.62
3	3.68	3.02	4.82	2.99	2.80	4.02
4	3.92	5.09	4.56	3.53	4.22	3.85
5	4.94	4.13	7.14	4.21	3.68	5.10
6	1.85	3.42	6.74	1.56	2.91	4.96
7	3.65	5.17	7.30	3.47	3.71	5.20
8	4.19	3.86	6.82	3.13	3.20	3.91
9	3.01	2.52	6.59	2.57	2.41	3.94
10	2.14	2.52	4.40	2.14	2.04	4.05
11	2.10	3.22	3.63	1.82	2.28	3.63
12	4.24	5.77	5.02	2.92	4.41	3.91
13		3.96	2.23		3.39	2.23

Appendix A

	February 1974	January 1975	January 1976
CNIDARIA			
Anthozoa			
Diadeumene leucolena			7,9
PLATYHELMINTHES			
Turbellaria			
Stylocus ellipticus			8
Euplana gracilis		4	7
RHYNCHOCOELA			
Nemertean (large)		1,5,8,11,12	1,2,5,8,9
Carinomella lactea		1,3,5,7,8,10,11,12	1,2,5,6,8,9,10
PHORONIDEA			
Phoronis psammophila	1,3,4,5,7,8,12	1,5,7,8,11,12	1,2,3,4,5,6,7, 8,12,13
ANNELIDA			
Polychaeta			
Pseudeurythoe sp.		7	1,2,5,6,9,11,12
Drilonereis longa		1	7,11
Drilonereis filum		4	
Heteromastus filiformis		4,5,8	5,7
Notomastus sp.	5		
Chaetopterus variopedatus		10	
Spiochaetopterus oculatus	5,12	4,5,7,12	1,2,3,4,5,6,9,10
Paleanotus heteroseta			6
Tharyx setigera		1,2,3,4,9,12,13	1,2,3,4,5,6,7
Marphysa sanguinea	1	1	7,8
Glycera americana	7	5	
Glycera dibranchiata	1,2,3,4,5,6,7, 8,9,10,11,12	1,2,3,4,6,7,8,10, 11,12,13	1,2,3,4,5,6,7,9, 10,11,12

Appendix A (continued)

	February 1974	January 1975	January 1976
Glycinde solitaria	1,3,4,5,7,8,9,10	3,4,10,12	1,2,3,4,5,6,7,8,9,10,11,12,13
Clymenella torquata	1,5,7	1,4,5,7,8,12,13	1,2,3,4,5,6,7,10,11,12
Nepthys sp.	9		
Nereis succinea	1,3,4,5,8,9	1,6,7,12	3,5,6,7,8,9,12
Diopatra cuprea	8	8	8,9,10
Scoloplos robustus	2,3,5,8,9,10,11,12	3,4,7,8,9,10,11,12,13	1,2,3,5,6,7,8,9,10,11,13
Pectinaria gouldii		1,12	8
Eteone lactea			13
Eteone heteropoda		1,4,5,7,12	2,4,5,6,7,9,10,11
Paranaitis speciosa			5,9,11
Phyllodoce arenae	7		4,5
Phyllodoce mucosa		5,7	9
Ancistrosyllis jonesi			8
Sigambra tentaculata			2,6,8,9,10
Sabellaria vulgaris			5,6,7,8,9
Sabella microphthalma	5	7,12	5,7,8,9
Hydroides dianthus			4,5,7,9
Stenelais limicola		7	
Polydora ligni		4,5,7,12,13	1,5,6,7,8,9,10,12
Paraprionospio pinnata	1,2,3,4,5,7,8,9,10,12	5,6,7,8,11,13	1,2,4,5,6,7,8,9,10,11,12
Scolecolepides viridis	2		
Scolelepis squamata	2,6	3,4,5,7,10,13	1,11
Spiophanes bombyx	6	4,13	1,3,4,5,10,11
Streblospio benedicti		1,3,4,5,6,7,8,9,12,13	7
Unid. spionid	3,4		
Syllidae			8,12
Syllis cornuta			2
Oligochaeta			
Peloscolex gabriellae	1,4,5,12	1,2,3,4,5,6,7,8,11,12,13	1,2,3,6,7,8,12,13

Appendix A (continued)

	February 1974	January 1975	January 1976
Hirudinea		8	4,5,9
MOLLUSCA			
Pelecypoda			
Nucula proxima	4,12	12	
Anadara transversa	5,8,12	1,8,9,12	5,7,8,9
Anadara ovalis	8		
Mytilus edulis			9
Lucina multilineata			7
Montacuta elevata		7	1,6,8,9,12
Mercenaria mercenaria		1,5,8,12	3,5,7,12
Gemma gemma	2,3,4,5,9,11	3,4	3,11,12,13
Petricola pholadiformis			5,7,8,9
Mulinia lateralis	8	6,13	4,5,9,11
Tellina agilis		1,3,4,5,6,7,8,9,10	1,2,3,4,5,7,9, 11,12,13
Macoma balthica	1		
Macoma tenta	7,8		5,9,10
Tagelus plebeius		2,4,8	2,3
Tagelus divisus	5,7,10		
Ensis directus	1,4,10,11	6,8,12,13	
Mya arenaria		1	1,11
Lyonsia hyalina		1,7,12,13	1,5,12
Gastropoda			
Crepidula convexa	3	3,5	1,7
Natica pusilla	4		
Eupleura caudata	12		5,8
Mitrella lunata		1,11,12	5,6,7,9,12
Mangelia cerina	12		
Odostomia bisuturalis	3,4,5,7,12	1,3,4,5,7	3,4,8,12
Odostomia impressa	12		
Pyramidella fusca		5,7,8,12	6

Appendix A (continued)

	February 1974	January 1975	January 1976
Turbonilla interrupta	1,5,7,12		2,3,4,5,7,12
Turbonilla stricta		1	
Acteon punctostriatus	4		1,2,4,8,12
Acteocina canaliculata	1,2,3,4,5,6,7, 8,9,10,11,12	1,2,3,4,5,6,7,8,9, 10,11,12,13	1,2,3,4,5,6,7,8, 9,10,11,12
Doridella obscura			1,2,3,6,7,9
Okenia cupella			5,9
ARTHROPODA			
Crustacea			
Ostracoda			
Parasterope sp.			1,2,10
Sarsiella texana		4,7	1,2
Sarsiella zostericola			1,2,5,6,7,10
Cirripedia			
Balanus improvisus	3		5,7,10
Malacostraca			
Neomysis americana		1,4,6,8,9	
Mysidopsis bigelowi		12	
Cumacea			
Leucon americanus		2,6,9	1,2,4,5,6,7,8, 9,10
Oxyurostylis smithi	3,4,5,6,7,12	4,5,7,12,13	1,2,3,4,5,6,7,8, 10,12
Isopoda			
Idotea balthica			9
Edotea triloba	4,12	1,4,7,8,13	4,5,7,8,9
Chiridotea caeca	11		
Chiridotea nigrescens		10,11	
Ptilanthura tenuis	1,5	5,7	4
Amphipoda			
Ampelisca vadorum	5		2,3,5,6,7

Appendix A (continued)

	February 1974	January 1975	January 1976
Ampelisca verrilli	1,4,5,7,10	4,5,8,12,13	
Ampithoe longimana			9
Cymadusa compta	8		
Batea catharinensis		10	
Corophium acherusicum	5,8	3	1,5,7,8,9,12
Corophium tuberculatum	12	4,12	9
Erichthonius rubicornis		12	
Unciola irrorata	1,5,7,12	1,7,12	
Unciola serrata		5,7,12	5,6,9
Elasmopus levis	2		1,3,4,5,6,7,8,9
Gammarus mucronatus			9
Melita appendiculata			3,6,7,8,9
Listriella clymenellae	3,5,7	1,5,7	1,2,4,6,7,10,12,13
Stenothoe minuta			8,9
Caprella penantis	8,12	1,6,7,12	4,7,8,9,12
Paracaprella tenuis	9,12	1,2,7,9,12,13	3,4,5,6,7,8,9,12
Decapoda			
Paleomontes vulgaris			9
Ogyrides limicola	9		
Crangon septemspinosa	8		
Upogebia affinis	7		
Euceramus praelongus		12	9
Pagurus longicarpus	4		6
Callinectes sapidus			8,9,12
Ovalipes ocellatus		11	
Hexapanopeus angustifrons			8
Neopanope sayi		8,12	
Panopeus herbstii		1	
Pinnixia sayana	3,5,6,9		1,6,8,10
Xanthidae	8		9

Appendix A (concluded)

	February 1974	January 1975	January 1976
ECHINODERMATA			
Holothuroidea			
Thyone briareus	4,10,11	2,3,4,5,7,10,11, 12,13	2,7
Ophiuroidea			
Micropholis atra	1,7,8,9	1,5,7,8	4,5,7,8,9
HEMICHORDATA	1,8,9,12	4,5,13	1,6,10
CHORDATA			
Tunicata			
Ascidiacea			
Molgula manhattensis			5,7,8
Vertebrata			
Teleostomi			
Gobiosoma sp.		7	

Appendix B

Abundance and percentages of species taken during the study of Hampton Bar

STATION 1 FEBRUARY 1974

Species	Abundance	Percent	Cumulative Percent
Acteocina canaliculata	78	54.5	54.5
Glycera dibranchiata	13	9.1	63.6
Paraprionospio pinnata	13	9.1	72.7
Turbonilla interrupta	9	6.3	79.0
Phoronis psammophila	6	4.2	83.2
Peloscolex gabriellae	5	3.5	86.7
Glycinde solitaria	3	2.1	88.8
Tellina versicolor	3	2.1	90.9
Ensis directus	3	2.1	93.0
Macoma balthica	2	1.4	94.4
Nereis succinea	1	0.7	95.1
Clymenella torquata	1	0.7	95.8
Ptilanthura tenuis	1	0.7	96.5
Ampelisca verrilli	1	0.7	97.2
Unciola irrorata	1	0.7	97.9
Micropholis atra	1	0.7	98.6
Unidentified hemichordate	1	0.7	99.3
Tharyx setigera	1	0.7	100.0
	143		

STATION 2 FEBRUARY 1974

Acteocina canaliculata	18	48.6	48.6
Glycera dibranchiata	6	16.2	64.8
Scolelepis squamata	3	8.1	72.9
Tellina versicolor	3	8.1	81.0
Paraprionospio pinnata	2	5.4	86.4
Elasmopus levis	2	5.4	91.8
Scoloplos robustus	1	2.7	94.5
Scolecolepides viridis	1	2.7	97.2
Gemma gemma	1	2.7	99.9
	37		

STATION 3 FEBRUARY 1974

Species	Abundance	Percent	Cumulative Percent
Acteocina canaliculata	26	44.1	44.1
Tellina versicolor	8	13.6	57.7
Glycera dibranchiata	6	10.2	67.9
Scoloplos robustus	5	8.5	76.4
Phoronis psammophila	2	3.4	79.8
Balanus sp.	2	3.4	83.2
Nereis succinea	1	1.7	84.9
Glycinde solitaria	1	1.7	86.6
Paraprionospio pinnata	1	1.7	88.3
Crepidula convexa	1	1.7	90.0
Odostomia bisuturalis	1	1.7	91.7
Gemma gemma	1	1.7	93.4
Oxyurostylis smithi	1	1.7	95.1
Listriella clymenellae	1	1.7	96.8
Pinnixa sayana	1	1.7	98.5
Unidentified spionid	1	1.7	100.2
	59		

STATION 4 FEBRUARY 1974

Acteocina canaliculata	96	58.5	58.5
Paraprionospio pinnata	23	14.0	72.5
Glycera dibranchiata	8	4.9	77.4
Tellina versicolor	6	3.7	81.1
Odostomia bisuturalis	5	3.0	84.1
Peloscolex gabriellae	4	2.4	86.5
Unidentified spionid	4	2.4	88.9
Oxyurostylis smithi	3	1.8	90.7
Gemma gemma	2	1.2	91.9
Tagelus divisus	2	1.2	93.1
Ensis directus	2	1.2	94.3
Nereis succinea	1	0.6	94.9
Glycinde solitaria	1	0.6	95.5
Acteon punctostriatus	1	0.6	96.1
Nucula proxima	1	0.6	96.7
Edotea triloba	1	0.6	97.3
Ampelisca verrilli	1	0.6	97.9

Appendix B (continued)

STATION 4 (continued)

Species	Abundance	Percent	Cumulative Percent
Pagurus longicarpus	1	0.6	98.5
Phoronis psammophila	1	0.6	99.1
Thyone briareus	1	0.6	99.7
	164		

STATION 5 FEBRUARY 1974

Paraprionospio pinnata	60	30.9	30.9
Phoronis psammophila	53	27.3	58.2
Acteocina canaliculata	21	10.8	69.0
Clymenella torquata	11	5.7	74.7
Ampelisca vadorum	10	5.2	79.9
Crepidula convexa	5	2.6	82.5
Listriella clymenellae	5	2.6	85.1
Nereis succinea	3	1.5	86.6
Glycera dibranchiata	3	1.5	88.1
Glycinde solitaria	3	1.5	89.6
Turbonilla interrupta	2	1.0	90.6
Odostomia bisuturalis	2	1.0	91.6
Corophium acherusicum	2	1.0	92.6
Scoloplos robustus	1	0.5	93.1
Sabella microphthalma	1	0.5	93.6
Spiochaetopterus oculatus	1	0.5	94.1
Peloscolex gabriellae	1	0.5	94.6
Anadara transversa	1	0.5	95.1
Gemma gemma	1	0.5	95.6
Tellina versicolor	1	0.5	96.1
Tagelus divisus	1	0.5	96.6
Oxyurostylis smithi	1	0.5	97.1
Ptilanthura tenuis	1	0.5	97.6
Ampelisca verrilli	1	0.5	98.1
Unciola irrorata	1	0.5	98.6
Pinnixa sayana	1	0.5	99.1
Notomastus sp.	1	0.5	99.6
	194		

Appendix B (continued)

STATION 6 FEBRUARY 1974

Species	Abundance	Percent	Cumulative Percent
Glycera dibranchiata	8	53.3	53.3
Acteocina canaliculata	2	13.3	66.6
Pinnixa sayana	2	13.3	79.9
Scolelepis squamata	1	6.7	86.6
Spiophanes bombyx	1	6.7	93.3
Oxyurostylis smithi	1	6.7	100.0
	15		

STATION 7 FEBRUARY 1974

Phoronis psammophila	58	32.0	32.0
Paraprionospio pinnata	34	18.8	50.8
Acteocina canaliculata	24	13.3	64.1
Clymenella torquata	21	11.6	75.7
Glycera dibranchiata	14	7.7	83.4
Listriella clymenellae	7	3.9	87.3
Odostomia bisuturalis	5	2.8	90.1
Glycinde solitaria	3	1.7	91.8
Ampelisca verrilli	3	1.7	93.5
Turbonilla interrupta	2	1.1	94.6
Phyllodoce arenae	1	0.6	95.2
Glycera americana	1	0.6	95.8
Macoma tenta	1	0.6	96.4
Tellina versicolor	1	0.6	97.0
Tagelus divisus	1	0.6	97.6
Oxyurostylis smithi	1	0.6	98.2
Unciola irrorata	1	0.6	98.8
Micropholis atra	1	0.6	99.4
Upogebia affinis	1	0.6	100.0
Unidentified bivalve	1	0.6	100.6
	181		

STATION 8 FEBRUARY 1974

Species	Abundance	Percent	Cumulative Percent
Paraprionospio pinnata	25	26.9	26.9
Unidentified hemichordate	20	21.5	48.4
Glycinde solitaria	9	9.7	58.1
Acteocina canaliculata	7	7.5	65.6
Nereis succinea	4	4.3	69.9
Glycera dibranchiata	4	4.3	74.2
Tellina versicolor	4	4.3	78.5
Scoloplos robustus	3	3.2	81.7
Anadara transversa	3	3.2	84.9
Diopatra cuprea	2	2.2	87.1
Caprella penantis	2	2.2	89.3
Micropholis atra	2	2.2	91.5
Macoma tenta	1	1.1	92.6
Mulinia lateralis	1	1.1	93.7
Corophium acherusicum	1	1.1	94.8
Xanthidae	1	1.1	95.9
Phoronis psammophila	1	1.1	97.0
Anadara ovalis	1	1.1	98.1
Cymadusa compta	1	1.1	99.2
Crangon septemspinosa	1	1.1	100.3
	93		

STATION 9 FEBRUARY 1974

Paraprionospio pinnata	19	25.3	25.0
Unidentified hemichordate	18	24.0	49.0
Nereis succinea	12	16.0	65.0
Acteocina canaliculata	12	16.0	81.0
Glycinde solitaria	3	4.0	85.0
Scoloplos robustus	2	2.7	87.7
Paracaprella tenuis	2	2.7	90.4
Glycera dibranchiata	1	1.3	91.7
Gemma gemma	1	1.3	93.0
Tellina versicolor	1	1.3	94.3
Pinnixa sayana	1	1.3	95.6
Micropholis atra	1	1.3	96.9
Nephtys sp.	1	1.3	98.2
Ogyrides limicola	1	1.3	99.5
	75		

Appendix B (continued)

STATION 10 FEBRUARY 1974

Species	Abundance	Percent	Cumulative Percent
Acteocina canaliculata	18	42.9	42.9
Glycera dibranchiata	10	23.8	66.7
Scoloplos robustus	4	9.5	76.2
Paraprionospio pinnata	3	7.1	83.3
Ampelisca verrilli	2	4.8	88.1
Thyone briareus	2	4.8	92.9
Tagelus divisus	1	2.4	95.3
Ensis directus	1	2.4	97.7
Glycinde solitaria	1	2.4	100.1
	42		

STATION 11 FEBRUARY 1974

Acteocina canaliculata	10	35.7	35.7
Glycera dibranchiata	8	28.6	64.3
Scoloplos robustus	5	17.9	82.2
Gemma gemma	1	3.6	85.8
Tellina versicolor	1	3.6	89.4
Ensis directus	1	3.6	93.0
Thyone briareus	1	3.6	96.6
Chiridotea caeca	1	3.6	100.2
	28		

STATION 12 FEBRUARY 1974

Acteocina canaliculata	111	61.7	61.7
Glycera dibranchiata	17	9.4	71.1
Tellina versicolor	15	8.3	79.4
Turbonilla interrupta	5	2.8	82.2
Paracaprella tenuis	4	2.2	84.4
Phoronis psammophila	4	2.2	86.6
Paraprionospio pinnata	3	1.7	87.6
Odostomia impressa	3	1.7	89.3

STATION 12 (continued)

Species	Abundance	Percent	Cumulative Percent
Spiochaetopterus oculatus	2	1.1	90.4
Peloscolex gabriellae	2	1.1	91.5
Odostomia bisuturalis	2	1.1	92.6
Eupleura caudata	1	0.6	93.2
Nucula proxima	1	0.6	93.8
Anadara transversa	1	0.6	94.4
Oxyurostylis smithi	1	0.6	95.0
Edotea triloba	1	0.6	95.6
Corophium tuberculatum	1	0.6	96.2
Unciola irrorata	1	0.6	96.8
Caprella penantis	1	0.6	97.4
Scoleplos robustus	1	0.6	98.0
Mangelia cerina	1	0.6	98.6
Symphurus plagiusa	1	0.6	99.2
Unidentified hemichordate	1	0.6	99.6
	180		

STATION 1 JANUARY 1975

Sabellaria vulgaris	98	34.5	34.5
Peloscolex gabriellae	56	19.7	54.2
Paracaprella tenuis	33	11.6	65.8
Acteocina canaliculata	20	7.0	72.8
Micropholis atra	9	3.2	76.0
Glycera dibranchiata	8	2.8	78.8
Nemertean unident.	6	2.1	80.9
Phoronis psammophila	6	2.1	83.0
Unciola irrorata	5	1.8	84.8
Caprella penantis	5	1.8	86.6
Cerebratulus lacteus	4	1.4	88.0
Anadara transversa	4	1.4	89.4
Panopeus herbstii	4	1.4	90.8
Clymenella torquata	3	1.1	91.9
Drilonereis longa	2	0.7	92.6
Streblospio benedicti	2	0.7	93.3
Mercenaria mercenaria	2	0.7	94.0
Edotea triloba	2	0.7	94.7

Appendix B (continued)

STATION 1 (continued)

Species	Abundance	Percent	Cumulative Percent
Listriella clymenellae	2	0.7	15.4
Marphysa sanguinea	1	0.4	95.8
Tharyx setigera	1	0.4	96.2
Pectinaria gouldii	1	0.4	96.6
Mitrella lunata	1	0.4	97.0
Odostomia bisuturalis	1	0.4	97.4
Tellina versicolor	1	0.4	97.8
Mya arenaria	1	0.4	98.2
Lyonsia hyalina	1	0.4	98.6
Eteone heteropoda	1	0.4	99.0
Nereis succinea	1	0.4	99.4
Neomysis americana	1	0.4	99.6
Turbonilla stricta	1	0.4	99.9
Pinnixa sayana	1	0.4	100.0
	284		

STATION 2 JANUARY 1975

Tharyx setigera	3	21.4	21.4
Leucon americanus	3	21.4	42.8
Paracaprella tenuis	2	14.3	57.1
Thyone briareus	2	14.3	71.4
Glycera dibranchiata	1	7.1	78.5
Peloscolex gabriellae	1	7.1	85.6
Acteocina canaliculata	1	7.1	92.7
Tagelus plebeius	1	7.1	99.8
	14		

STATION 3 JANUARY 1975

Acteocina canaliculata	39	52.7	52.7
Scoloplos robustus	8	10.8	63.5
Glycera dibranchiata	6	8.1	71.6

Appendix B (continued)

STATION 3 (continued)

Species	Abundance	Percent	Cumulative Percent
Thyone briareus	5	6.8	78.4
Gemma gemma	3	4.1	82.5
Tharyx setigera	2	2.7	85.2
Glycinde solitaria	2	2.7	87.9
Scolelepis squamata	2	2.7	90.6
Tellina versicolor	2	2.7	93.3
Streblospio benedicti	1	1.4	94.7
Peloscolex gabriellae	1	1.4	96.1
Odostomia bisuturalis	1	1.4	97.5
Nemertean unident.	1	1.4	98.9
Corophium ascherusicum	1	1.4	100.3
	74		

STATION 4 January 1975

Acteocina canaliculata	53	26.2	26.2
Clymenella torquata	19	9.4	35.6
Glycera dibranchiata	15	7.4	43.0
Tharyx setigera	14	6.9	49.9
Polydora ligni	14	6.9	56.8
Streblospio benedicti	13	6.4	63.2
Peloscolex gabriellae	13	6.4	69.6
Glycinde solitaria	10	5.0	74.6
Tagelus plebeius	6	3.0	77.6
Spiophanes bombyx	5	2.5	80.1
Eteone heteropoda	4	2.0	82.1
Heteromastus filiformis	4	2.0	84.1
Odostomia bisuturalis	4	2.0	86.1
Tellina versicolor	4	2.0	88.1
Ampelisca verrilli	4	2.0	90.1
Thyone briareus	4	2.0	92.1
Oxyurostylis smithi	3	1.5	93.6
Scolelepis squamata	2	1.0	94.6
Neomysis americana	2	1.0	95.6
Spiochaetopterus oculatus	1	0.5	96.1
Euplana gracilaria	1	0.5	96.6

Appendix B (continued)

STATION 4 (continued)

Species	Abundance	Percent	Cumulative Percent
Drilonereis filum	1	0.5	97.1
Scoloplos robustus	1	0.5	97.6
Gemma gemma	1	0.5	98.1
Sarsiella texana	1	0.5	98.6
Edotea triloba	1	0.5	99.1
Corophium tuberculatum	1	0.5	99.6
Hemichordate	1	0.5	100.1
	202		

STATION 5 January 1975

Phoronis psammophila	401	58.4	58.4
Acteocina canaliculata	81	11.8	70.2
Paraprionospio pinnata	55	8.0	78.2
Peloscolex gabriellae	50	7.3	85.5
Clymenella torquata	22	3.2	88.7
Nemertean unident.	13	1.9	90.6
Scolelepis squamata	8	1.2	91.8
Spiochaetopterus oculatus	8	1.2	93.0
Streblospio benedicti	7	1.0	94.0
Polydora ligni	6	0.9	94.9
Listriella clymenellae	6	0.9	95.8
Phyllodoce mucosa	3	0.4	96.2
Eteone heteropoda	3	0.4	96.6
Pyramidella fusca	3	0.4	97.0
Odostomia bisuturalis	3	0.4	97.4
Hemichordata	3	0.4	97.8
Cerebratulus lacteus	2	0.3	98.1
Ampelisca verrilli	2	0.3	98.4
Thyone briareus	2	0.3	98.7
Glycera americana	1	0.2	98.9
Heteromastus filiformis	1	0.2	99.1
Mercenaria mercenaria	1	0.2	99.3
Tellina versicolor	1	0.2	99.5
Oxyurostylis smithi	1	0.2	99.7
Ptilanthura tenuis	1	0.2	99.9

Appendix B (continued)

STATION 5 (continued)

Species	Abundance	Percent	Cumulative Percent
Unciola serrata	1	0.2	100.1
Pinnixa sayana	1	0.2	100.3
Micropholis atra	1	0.2	100.5
	687		

STATION 6 JANUARY 1975

Streblospio benedicti	4	16.0	16.0
Leucon americanus	4	16.0	32.0
Glycera dibranchiata	3	12.0	44.0
Paraprionospio pinnata	3	12.0	56.0
Peloscolex gabriellae	2	8.0	64.0
Tellina versicolor	2	8.0	72.0
Neomysis americana	2	8.0	80.0
Nereis succinea	1	4.0	84.0
Ensis directus	1	4.0	88.0
Acteocina canaliculata	1	4.0	92.0
Caprella penantis	1	4.0	96.0
Mulinia lateralis	1	4.0	100.0
	25		

STATION 7 JANUARY 1975

Phoronis psammophila	470	54.2	54.2
Peloscolex gabriellae	149	17.2	71.4
Acteocina canaliculata	88	10.2	81.6
Paraprionospio pinnata	42	4.8	86.5
Clymenella torquata	39	4.5	91.0
Scoloplos robustus	12	1.4	92.4
Nemertean unident.	6	0.7	93.1
Montacuta elevata	5	0.6	93.7
Unciola serrata	5	0.6	94.3

STATION 7 (continued)

Species	Abundance	Percent	Cumulative Percent
Glycera dibranchiata	4	0.5	94.8
Streblospio benedicti	4	0.5	95.3
Pyramidella fusca	4	0.5	95.8
Scolelepis squamata	3	0.3	96.1
Listriella clymenellae	3	0.3	96.4
Caprella penantis	3	0.3	96.7
Paracaprella tenuis	3	0.3	97.0
Micropholis atra	3	0.3	97.3
Sabella microphthalma	2	0.2	97.5
Eteone heteropoda	2	0.2	97.7
Ptilanthura tenuis	2	0.2	97.8
Thyone briareus	2	0.2	98.1
Tellina versicolor	2	0.2	98.3
Phyllodoce mucosa	1	0.1	98.4
Nereis succinea	1	0.1	98.5
Polydora ligni	1	0.1	98.6
Pseudeurythoe sp.	1	0.1	98.7
Spiochaetopterus oculatus	1	0.1	98.8
Odostomia bisuturalis	1	0.1	98.9
Lyonsia hyalina	1	0.1	99.0
Sarsiella texana	1	0.1	99.1
Oxyurostylis smithi	1	0.1	99.2
Edotea triloba	1	0.1	99.3
Unciola irrorata	1	0.1	99.4
Pinnixa sayana	1	0.1	99.5
Montacuta elevata	1	0.1	99.6
Gobiosoma sp.	1	0.1	99.7
	867		

STATION 8 JANUARY 1975

Acteocina canaliculata	200	51.8	51.8
Peloscolex gabriellae	135	35.0	86.8
Paraprionospio pinnata	10	2.6	89.4
Glycera dibranchiata	6	1.6	91.0
Mercenaria mercenaria	5	1.3	92.3

STATION 8 (continued)

Species	Abundance	Percent	Cumulative Percent
Scoloplos robustus	4	1.0	93.3
Anadara transversa	4	1.0	94.3
Phoronis psammophila	4	1.0	95.3
Heteromastus filiformis	2	0.5	95.8
Tellina versicolor	2	0.5	96.3
Clymenella torquata	1	0.3	96.6
Streblospio benedicti	1	0.3	96.9
Diopatra cuprea	1	0.3	97.2
Hirudinea	1	0.3	97.5
Tagelus plebeius	1	0.3	97.8
Ensis directus	1	0.3	98.1
Cerebratulus lacteus	1	0.3	98.4
Nemertean unident.	1	0.3	98.7
Neomysis americana	1	0.3	99.0
Edotea triloba	1	0.3	99.3
Ampelisca verrilli	1	0.3	99.6
Neopanope texana	1	0.3	99.9
Micropholis atra	1	0.3	100.0
Pyramidella fusca	1	0.3	100.2
	386		

STATION 9 JANUARY 1975

Neomysis americana	7	29.2	29.2
Paracaprella tenuis	5	20.8	50.0
Streblospio benedicti	4	16.7	66.7
Scoloplos robustus	3	12.5	79.2
Tharyx setigera	1	4.2	83.4
Acteocina canaliculata	1	4.2	87.6
Anadara transversa	1	4.2	91.8
Tellina versicolor	1	4.2	96.0
Leucon americanus	1	4.2	100.2
	24		

STATION 10 JANUARY 1975

Species	Abundance	Percent	Cumulative Percent
Glycera dibranchiata	12	22.6	22.6
Scoloplos robustus	11	20.8	43.4
Thyone briareus	9	17.0	60.4
Scolelepis squamata	6	11.3	71.7
Acteocina canaliculata	6	11.3	83.0
Tellina versicolor	2	3.8	86.8
Glycinde solitaria	2	3.8	90.6
Chiridotea nigrescens	2	3.8	94.4
Nemertean unident.	1	1.9	96.3
Batea catharinensis	1	1.9	98.2
Chaetopterus variopedatus	1	1.9	100.1
	53		

STATION 11 JANUARY 1975

Scoloplos robustus	11	22.8	22.8
Thyone briareus	12	21.1	43.9
Tellina versicolor	7	12.3	56.2
Phoronis psammophila	5	8.8	65.0
Glycera dibranchiata	4	7.0	72.0
Peloscolex gabriellae	4	7.0	79.0
Paraprionospio pinnata	3	5.3	84.3
Acteocina canaliculata	2	3.5	87.8
Chiridotea nigrescens	2	3.5	91.3
Mitrella lunata	1	1.8	93.1
Nemertean unident.	1	1.8	94.9
Cerebratulus lacteus	1	1.8	96.7
Pinnixa sayana	1	1.8	98.5
Ovalipes ocellatus	1	1.8	100.3
	57		

Appendix B (continued)

STATION 12 JANUARY 1975

Species	Abundance	Percent	Cumulative Percent
Peloscolex gabriellae	95	15.7	15.7
Paracaprella tenuis	67	11.0	26.7
Caprella penantis	65	10.7	37.4
Acteocina canaliculata	58	9.6	47.0
Sabellaria vulgaris	54	8.9	55.9
Unciola irrorata	44	7.2	63.1
Ampelisca verrilli	42	6.9	70.0
Unciola serrata	33	5.4	75.4
Polydora ligni	30	4.9	80.3
Glycera dibranchiata	19	3.1	83.4
Glycinde solitaria	12	2.0	85.4
Mitrella lunata	9	1.5	86.9
Corophium tuberculatum	9	1.5	88.4
Tharyx setigera	8	1.3	89.7
Clymenella torquata	8	1.3	91.0
Nereis succinea	6	1.0	92.0
Eteone heteropoda	5	0.8	92.8
Anadara transversa	5	0.8	93.6
Nemertean unident.	4	0.7	94.3
Spiochaetopterus oculatus	4	0.7	95.0
Tellina versicolor	4	0.7	95.0
Ensis directus	3	0.5	95.5
Lyonsia hyalina	3	0.5	96.0
Streblospio benedicti	2	0.3	96.3
Nucula proxima	2	0.3	96.6
Neopanope texana	2	0.3	96.9
Phoronis psammophila	2	0.3	97.2
Mercenaria mercenaria	2	0.3	95.5
Pectinaria gouldii	1	0.2	97.7
Sabella microphthalma	1	0.2	97.9
Pyramidella fusca	1	0.2	98.1
Cerebratulus lacteus	1	0.2	98.3
Oxyurostylis smithi	1	0.2	98.5
Euceramus praelongus	1	0.2	98.7
Scoloplos robustus	1	0.2	98.9
Mysidopsis bigelowi	1	0.2	99.1
Erichthonius rubicornis	1	0.2	99.3
Thyone briareus	1	0.2	99.5
	607		

Appendix B (continued)

STATION 13 JANUARY 1975

Species	Abundance	Percent	Cumulative Percent
Acteocina canaliculata	53	34.0	34.0
Peloscolex gabriellae	26	16.7	50.7
Glycera dibranchiata	14	9.0	59.7
Tellina versicolor	12	7.7	67.4
Thyone briareus	10	6.4	73.8
Scoloplos robustus	8	5.1	78.9
Paraprionospio pinnata	7	4.5	83.4
Streblospio benedicti	5	3.2	86.6
Ensis directus	3	1.9	88.5
Polydora ligni	3	1.9	90.4
Tharyx setigera	2	1.3	91.7
Clymenella torquata	2	1.3	93.0
Spiophanes bombyx	2	1.3	94.3
Mulinia lateralis	2	1.3	95.6
Scolelepis squamata	1	0.7	96.3
Lyonsia hyalina	1	0.7	97.0
Ampelisca verrilli	1	0.7	97.7
Paracaprella tenuis	1	0.7	98.4
Hemichordate	1	0.7	99.1
Oxyurostylis smithi	1	0.7	99.8
Edotea triloba	1	0.7	100.5
	156		

STATION 1 JANUARY 1976

Acteocina canaliculata	79	23.2	23.2
Paraprionospio pinnata	71	20.8	44.0
Phoronis psammophila	43	12.6	56.6
Glycinde solitaria	37	10.9	67.5
Spiochaetopterus oculatus	10	2.9	70.4
Glycera dibranchiata	9	2.6	73.0
Sarsiella zostericola	9	2.6	75.6
Peloscolex gabriellae	8	2.3	77.9
Mya arenaria	8	2.3	80.2
Oxyurostylis smithi	8	2.3	82.5
Tellina versicolor	7	2.1	84.6

Appendix B (continued)

STATION 1 (continued)

Species	Abundance	Percent	Cumulative Percent
Leucon americanus	7	2.1	86.7
Sarsiella texana	5	1.5	88.2
Pinnixa sayana	5	1.5	89.7
Polydora ligni	4	1.2	90.9
Clymenella torquata	3	0.9	91.8
Tharyx setigera	3	0.9	92.7
Ampelisca verrilli	3	0.9	93.6
Listriella clymenellae	3	0.9	94.5
Pseudeurythoe sp.	2	0.6	95.1
Parasterope sp.	2	0.6	95.7
Corophium acherusicum	2	0.6	96.3
Cerebratulus lacteus	1	0.3	96.6
Nemertean unident.	1	0.3	96.9
Capatellids	1	0.3	97.2
Scolelepis squamata	1	0.3	97.5
Spiophanes bombyx	1	0.3	97.8
Scoloplos robustus	1	0.3	98.1
Crepidula convexa	1	0.3	98.4
Acteon punctostriatus	1	0.3	98.7
Doridella obscura	1	0.3	99.0
Montacuta elevata	1	0.3	99.3
Lyonsia hyalina	1	0.3	99.6
Elasmopus levis	1	0.3	99.9
Hemichordate	1	0.3	100.2
	341		

STATION 2 JANUARY 1976

Acteocina canaliculata	122	28.3	28.3
Leucon americanus	79	18.3	46.6
Paraprionospio pinnata	74	17.2	63.8
Glycinde solitaria	40	9.3	73.1
Phoronis psammophila	18	4.2	77.3
Capitellids	11	2.6	79.9
Clymenella torquata	11	2.6	82.5

Appendix B (continued)

STATION 2 (continued)

Species	Abundance	Percent	Cumulative Percent
Spiochaetopterus oculatus	7	1.6	84.1
Oxyurostylis smithi	7	1.6	85.7
Listriella clymenellae	7	1.6	87.3
Parasterope sp.	6	1.4	88.7
Sarsiella texana	5	1.2	89.9
Tharyx setigera	5	1.2	91.1
Pseudeurythoe sp.	4	0.9	92.0
Tellina versicolor	4	0.9	92.9
Cerebratulus lacteus	3	0.7	93.6
Nemertean unident.	3	0.7	94.3
Sigambra tentaculata	3	0.7	95.0
Syllis cornuta	3	0.7	95.7
Scoloplos robustus	3	0.7	96.4
Peloscolex gabriellae	3	0.7	97.1
Turbonilla interrupta	3	0.7	97.8
Acteon punctostriatus	2	0.5	98.3
Thyone briareus	2	0.5	98.8
Eteone heteropoda	1	0.2	99.0
Glycera dibranchiata	1	0.2	99.2
Doridella obscura	1	0.2	99.4
Tagelus plebeius	1	0.2	99.6
Sarsiella zostericola	1	0.2	99.8
Ampelisca vadorum	1	0.2	100.0
	431		

STATION 3 JANUARY 1976

Acteocina canaliculata	34	35.4	35.4
Scoloplos robustus	16	16.7	52.1
Glycinde solitaria	8	8.3	60.4
Peloscolex gabriellae	7	7.3	67.7
Tellina versicolor	4	4.2	71.9
Elasmopus levis	4	4.2	76.1
Clymenella torquata	3	3.1	79.2
Tharyx setigera	2	2.1	81.3
Oxyurostylis smithi	2	2.1	83.4

STATION 3 (continued)

Species	Abundance	Percent	Cumulative Percent
Paracaprella tenuis	2	2.1	85.5
Phoronis psammophila	2	2.1	87.6
Nereis succinea	1	1.0	88.6
Glycera dibranchiata	1	1.0	89.6
Spiophanes bombyx	1	1.0	90.6
Spiochaetopterus oculatus	1	1.0	91.6
Odostomia bisuturalis	1	1.0	92.6
Turbonilla interrupta	1	1.0	93.6
Doridella obscura	1	1.0	94.6
Mercenaria mercenaria	1	1.0	95.6
Gemma gemma	1	1.0	96.6
Tagelus plebeius	1	1.0	97.6
Melita appendiculata	1	1.0	98.6
Ampelisca vadorum	1	1.0	99.6
	96		

STATION 4 JANUARY 1976

Phoronis psammophila	106	35.3	35.3
Caprella penantis	54	18.0	53.3
Acteocina canaliculata	23	7.7	61.0
Paraprionospio pinnata	16	5.3	66.3
Spiophanes bombyx	16	5.3	71.6
Glycinde solitaria	14	4.7	76.3
Glycera dibranchiata	10	3.3	79.6
Clymenella torquata	7	2.3	81.9
Listriella clymenellae	7	2.3	84.2
Paracaprella tenuis	6	2.0	86.2
Tellina versicolor	5	1.7	87.9
Spiochaetopterus oculatus	4	1.3	89.2
Oxyurostylis smithi	4	1.3	90.5
Ampelisca verrilli	4	1.3	91.8
Eteone heteropoda	3	1.0	92.8
Ptilanthura tenuis	3	1.0	93.8
Elasmopus levis	3	1.0	94.8
Tharyx setigera	2	0.7	95.7

Appendix B (continued)

STATION 4 (continued)

Species	Abundance	Percent	Cumulative Percent
Acteon punctostriatus	2	0.7	96.2
Odostomia bisuturalis	2	0.7	96.9
Turbonilla interrupta	2	0.7	97.6
Leucon americanus	2	0.7	98.3
Phyllodoce arenae	1	0.3	98.6
Hydroides dianthus	1	0.3	98.9
Mulinia lateralis	1	0.3	99.2
Edotea triloba	1	0.3	99.5
Micropholis atra	1	0.3	99.8
	300		

STATION 5 JANUARY 1976

Phoronis psammophila	302	41.8	41.8
Nereis succinea	64	8.9	50.7
Glycinde solitaria	56	7.8	58.5
Polydora ligni	50	6.9	65.4
Elasmopus levis	41	5.7	71.1
Molgula manhattensis	30	4.2	75.3
Hydroides dianthus	26	3.6	78.9
Clymenella torquata	19	2.6	81.5
Acteocina canaliculata	16	2.2	83.7
Hirudinea	12	1.7	85.4
Tharyx setigera	9	1.2	86.6
Eteone heteropoda	6	0.8	87.4
Paraprionospio pinnata	6	0.8	88.2
Oxyurostylis smithi	6	0.8	89.0
Glycera dibranchiata	5	0.7	89.7
Sabellaria vulgaris	5	0.7	90.4
Okenia cupella	5	0.7	91.1
Corophium acherusicum	5	0.7	91.8
Paracaprella tenuis	5	0.7	92.5
Heteromastus filiformis	4	0.6	93.1
Spiophanes bombyx	4	0.6	93.7
Balanus improvisus	4	0.6	94.3

Appendix B (continued)

STATION 5 (continued)

Species	Abundance	Percent	Cumulative Percent
Nemertean (small)	3	0.4	94.7
Mitrella lunata	3	0.4	95.1
Tellina versicolor	3	0.4	95.5
Cerebratulus lacteus	2	0.3	95.8
Phyllodoce arenae	2	0.3	96.1
Spiochaetopterus oculatus	2	0.3	96.4
Sabella microphthalma	2	0.3	96.7
Turbonilla interrupta	2	0.3	97.0
Mercenaria mercenaria	2	0.3	97.3
Petricola pholadiformis	2	0.3	97.6
Macoma tenta	2	0.3	97.9
Edotea triloba	2	0.3	98.2
Ampelisca vadorum	2	0.3	98.5
Paranaitis speciosa	1	0.1	98.6
Pseudeurythoe sp.	1	0.1	98.7
Scoloplos robustus	1	0.1	98.8
Epitonium multistriatum	1	0.1	98.9
Eupleura caudata	1	0.1	99.0
Anadara transversa	1	0.1	99.1
Mulinia lateralis	1	0.1	99.2
Lyonsia hyalina	1	0.1	99.3
Sarsiella zostericola	1	0.1	99.4
Leucon americanus	1	0.1	99.5
Ampelisca verrilli	1	0.1	99.6
Unciola serrata	1	0.1	99.7
Micropholis atra	1	0.1	99.8
	722		

STATION 6 JANUARY 1976

Paraprionospio pinnata	63	35.2	35.2
Acteocina canaliculata	18	10.1	45.3
Pseudeurythoe sp.	15	8.4	53.7
Capitellids	9	5.0	58.7
Glycinde solitaria	8	4.5	63.2
Leucon americanus	6	3.4	66.6

STATION 6 (continued)

Species	Abundance	Percent	Cumulative Percent
Clymenella torquata	5	2.8	69.4
Polydora ligni	5	2.8	72.2
Montacuta elevata	5	2.8	75.0
Sigambra tentaculata	4	2.2	77.2
Paracaprella tenuis	4	2.2	79.4
Nemertean unident.	3	1.7	81.1
Ampelisca vadorum	3	1.7	82.8
Elasmopus levis	3	1.7	84.5
Phoronis psammophila	3	1.7	86.2
Spiochaetopterus oculatus	2	1.1	87.3
Unciola serrata	2	1.1	88.4
Listriella clymenellae	2	1.1	89.5
Hemichordata	2	1.1	90.6
Paleanotus heteroseta	1	0.6	91.2
Eteone heteropoda	1	0.6	91.8
Nereis succinea	1	0.6	92.4
Glycera dibranchiata	1	0.6	93.0
Sabellaria vulgaris	1	0.6	93.6
Scoloplos robustus	1	0.6	94.2
Tharyx setigera	1	0.6	94.8
Peloscolex gabriellae	1	0.6	95.4
Mitrella lunata	1	0.6	96.0
Pyramidella fusca	1	0.6	96.6
Doridella obscura	1	0.6	97.2
Sarsiella zostericola	1	0.6	97.8
Oxyurostylis smithi	1	0.6	98.4
Ampelisca verrilli	1	0.6	99.0
Melita appendiculata	1	0.6	99.6
Pagurus longicarpus	1	0.6	100.2
Pinnixa sayana	1	0.6	100.8
	179		

STATION 7 JANUARY 1976

Polydora ligni	75	12.0	12.0
Nereis succinea	69	11.0	23.0
Hydroides dianthus	65	10.4	33.4

STATION 7 (continued)

Species	Abundance	Percent	Cumulative Percent
Glycinde solitaria	48	7.7	41.1
Sabellaria vulgaris	47	7.5	48.6
Clymenella torquata	41	6.5	55.1
Molgula manhattensis	29	4.6	59.7
Paracaprella tenuis	28	4.5	64.2
Acteocina canaliculata	25	4.0	68.2
Listriella clymenellae	25	4.0	72.2
Corophium acherusicum	18	2.9	75.1
Elasmopus levis	17	2.7	77.8
Phoronis psammophila	17	2.7	80.5
Paraprionospio pinnata	15	2.4	82.9
Peloscolex gabriellae	10	1.6	84.5
Eteone heteropoda	9	1.4	85.9
Scoloplos robustus	8	1.3	87.2
Anadara transversa	7	1.1	88.3
Tellina versicolor	7	1.1	89.4
Glycera dibranchiata	6	1.0	90.4
Balanus improvisus	6	1.0	91.4
Diadumene leucolena	4	0.6	92.0
Ampelisca vadorum	4	0.6	92.6
Marphysa sanguinea	4	0.6	93.2
Sabella microphthalma	4	0.6	93.8
Euplana gracilis	3	0.5	94.3
Drilonereis longa	3	0.5	94.8
Turbonilla interrupta	3	0.5	95.3
Doridella obscura	3	0.5	95.8
Thyone briareus	3	0.5	96.3
Capitellids	2	0.3	96.6
Tharyx setigera	2	0.3	96.9
Mercenaria mercenaria	2	0.3	97.2
Edotea triloba	2	0.3	97.5
Micropholis atra	2	0.3	97.8
Heteromastus filiformis	1	0.2	98.0
Streblospio benedicti	1	0.2	98.2
Crepidula convexa	1	0.2	98.4
Mitrella lunata	1	0.2	98.6
Petricola pholadiformis	1	0.2	98.8
Sarsiella zostericola	1	0.2	99.0
Leucon americanus	1	0.2	99.2
Oxyurostylis smithi	1	0.2	99.4
Ampelisca verrilli	1	0.2	99.6
Melita appendiculata	1	0.2	99.8
Lucina multilineata	1	0.2	
Caprella penantis	1	0.2	
	626		

Appendix B (continued)

STATION 8 JANUARY 1976

Species	Abundance	Percent	Cumulative Percent
Acteocina canaliculata	72	20.4	20.4
Paraprionospio pinnata	37	10.5	30.9
Leucon americanus	37	10.5	41.4
Nereis succinea	30	8.5	49.9
Glycinde solitaria	26	7.4	57.3
Micropholis atra	19	5.4	62.7
Polydora ligni	18	5.1	67.8
Montacuta elevata	13	3.7	71.5
Scoloplos robustus	9	2.5	74.0
Anadara transversa	9	2.5	76.5
Petricola pholadiformis	9	2.5	79.0
Odostomia bisuturalis	8	2.3	81.3
Peloscolex gabriellae	6	1.7	83.0
Corophium acherusicum	6	1.7	84.7
Elasmopus levis	6	1.7	86.4
Sabellaria vulgaris	6	1.7	88.1
Paracaprella tenuis	5	1.4	89.5
Edotea triloba	4	1.1	90.6
Caprella penantis	4	1.1	91.7
Diopatra cuprea	3	0.8	92.5
Melita appendiculata	3	0.8	93.3
Eupleura caudata	2	0.6	93.9
Hexapaneopus angustifrons	2	0.6	94.5
Pinnixa sayana	2	0.6	95.1
Cerebratulus lacteus	1	0.3	95.4
Nemertean unident.	1	0.3	95.7
Stylochus ellipticus	1	0.3	96.0
Ancistrosyllis jonesi	1	0.3	96.3
Sigambra tentaculata	1	0.3	96.6
Syllidae	1	0.3	96.9
Capitellids	1	0.3	97.2
Marphysa sanguinea	1	0.3	97.5
Pectinaria gouldii	1	0.3	97.8
Sabella microphthalma	1	0.3	98.1
Acteon punctostriatus	1	0.3	98.4
Oxyurostylis smithi	1	0.3	98.7
Stenothoe minuta	1	0.3	99.0
Callinectes sapidus	1	0.3	99.3
Neopanope sayi	1	0.3	99.6
Phoronis psammophila	1	0.3	99.9
Molgula manhattensis	1	0.3	100.2
	353		

Appendix B (continued)

STATION 9 JANUARY 1976

Species	Abundance	Percent	Cumulative Percent
Polydora ligni	561	33.3	33.3
Melita appendiculata	213	12.6	45.9
Doridella obscura	176	10.5	56.4
Nereis succinea	149	8.8	65.2
Elasmopus levis	141	8.4	73.6
Paraprionospio pinnata	61	3.6	77.2
Paracaprella tenuis	58	3.4	80.6
Gammarus mucronatus	58	3.4	84.0
Corophium acherusicum	58	3.4	87.4
Glycinde solitaria	34	2.0	89.4
Acteocina canaliculata	31	1.8	91.2
Unciola serrata	19	1.1	92.3
Sigambra tentaculata	10	0.6	92.9
Paleomonetes vulgaris	8	0.5	93.4
Eteone heteropoda	7	0.4	93.8
Paranaitis speciosa	7	0.4	94.2
Scoloplos robustus	7	0.4	94.6
Mitrella lunata	7	0.4	95.0
Montacuta elevata	6	0.3	95.3
Tellina versicolor	6	0.3	95.6
Stenothoe minuta	6	0.3	95.9
Sabella microphthalma	5	0.3	96.2
Leucon americanus	5	0.3	96.5
Pseudeurythoe sp.	4	0.2	96.7
Hirudinea	4	0.2	96.9
Edotea triloba	4	0.2	97.1
Idotea baltica	4	0.2	97.3
Caprella penantis	4	0.2	97.5
Anadara transversa	3	0.2	97.7
Petricola pholadiformis	3	0.2	97.9
Heteromastus filiformis	3	0.2	98.1
Diadumene leucolena	2	0.1	98.2
Glycera dibranchiata	2	0.1	98.3
Macoma tenta	2	0.1	98.4
Xanthidae	2	0.1	98.5
Micropholis atra	2	0.1	98.6
Nemertean unident.	1	0.1	98.7
Cerebratulus lacteus	1	0.1	98.8
Phyllodoce mucosa	1	0.1	98.9
Spiochaetopterus oculatus	1	0.1	99.0

Appendix B (continued)

STATION 9 (continued)

Species	Abundance	Percent	Cumulative Percent
Sabellaria vulgaris	1	0.1	99.1
Diopatra cuprea	1	0.1	99.2
Hydroides dianthus	1	0.1	99.3
Mytilus edulis	1	0.1	99.4
Okenia cupella	1	0.1	99.5
Mulinia lateralis	1	0.1	99.6
Corophium tuberculatum	1	0.1	99.7
Euceramus praelongus	1	0.1	99.8
Callinectes sapidus	1	0.1	99.9
	1684		

STATION 10 JANUARY 1976

Paraprionospio pinnata	41	27.7	27.7
Glycinde solitaria	25	16.9	44.6
Leucon americanus	14	9.5	54.1
Sigambra tentaculata	12	8.1	62.2
Acteocina canaliculata	12	8.1	70.3
Polydora ligni	8	5.4	75.7
Spiochaetopterus oculatus	6	4.1	79.8
Listriella clymenellae	6	4.1	83.9
Cerebratulus lacteus	4	2.7	86.6
Scoloplos robustus	3	2.0	88.6
Glycera dibranchiata	2	1.4	90.0
Diopatra cuprea	2	1.4	91.4
Sarsiella zostericola	2	1.4	92.8
Oxyurostylis smithi	2	1.4	94.2
Nemertean unident.	1	0.7	94.9
Eteone heteropoda	1	0.7	95.6
Clymenella torquata	1	0.7	96.3
Spiophanes bombyx	1	0.7	97.0
Macoma tenta	1	0.7	97.7
Parasterope sp.	1	0.7	98.4
Balanus improvisus	1	0.7	99.1
Pinnixa sayana	1	0.7	99.8
Hemichordate	1	0.7	100.5
	148		

Appendix B (continued)

STATION 11 JANUARY 1976

Species	Abundance	Percent	Cumulative Percent
Scolelepis squamata	21	25.6	25.6
Gemma gemma	14	17.1	42.7
Scoloplos robustus	12	14.6	57.3
Glycinde solitaria	7	8.5	65.8
Pseudeurythoe sp.	6	7.3	73.1
Glycera dibranchiata	4	4.9	78.0
Acteocina canaliculata	3	3.7	81.7
Tellina versicolor	3	3.7	85.4
Eteone heteropoda	2	2.4	87.8
Paranaitis speciosa	2	2.4	90.2
Spiophanes bombyx	2	2.4	92.6
Clymenella torquata	1	1.2	93.8
Paraprionospio pinnata	1	1.2	95.0
Drilonereis longa	1	1.2	96.2
Mulinia lateralis	1	1.2	97.4
Mya arenaria	1	1.2	98.6
Ampelisca verrilli	1	1.2	99.8
	82		

STATION 12 JANUARY 1976

Clymenella torquata	21	14.5	14.5
Peloscolex gabriellae	20	13.8	28.3
Corophium acherusicum	17	11.7	40.0
Acteocina canaliculata	15	10.3	50.3
Paracaprella tenuis	13	9.0	59.3
Listriella clymenellae	12	8.3	67.6
Glycinde solitaria	8	5.5	73.1
Montacuta elevata	8	5.5	78.6
Turbonilla interrupta	6	4.1	82.7
Glycera dibranchiata	4	2.8	85.5
Mitrella lunata	3	2.1	87.6
Nereis succinea	2	1.4	89.0
Odostomia bisuturalis	2	1.4	90.4
Caprella penantis	2	1.4	91.8

STATION 12 (continued)

Species	Abundance	Percent	Cumulative Percent
Phoronis psammophila	2	1.4	93.2
Syllidae	1	0.7	93.9
Polydora ligni	1	0.7	94.6
Paraprionospio pinnata	1	0.7	95.3
Pseudeurythoe sp.	1	0.7	96.0
Mercenaria mercenaria	1	0.7	96.7
Gemma gemma	1	0.7	97.4
Tellina versicolor	1	0.7	98.1
Lyonsia hyalina	1	0.7	98.8
Oxyurostylis smithi	1	0.7	99.5
Callinectes sapidus	1	0.7	100.2
	145		

STATION 13 JANUARY 1976

Scoloplos robustus	19	52.8	52.8
Eteone lactea	4	11.1	63.9
Glycinde solitaria	3	8.3	72.2
Gemma gemma	3	8.3	80.5
Capitellids	2	5.6	86.1
Tellina versicolor	2	5.6	91.7
Peloscolex gabriellae	1	2.8	94.5
Listriella clymenellae	1	2.8	97.3
Phoronis psammophila	1	2.8	100.1
	36		

Appendix C

Hampton Bar Species List

Phylum: Cnidaria
  Class: Anthozoa
    Order: Actiniaria
      Family: Diadumenidae
              Diadumene leucolena (Verrill, 1866)

Phylum: Platyhelminthes
  Class: Turbellaria
    Order: Polycladida
      Family: Stylochidae
              Stylochus ellipticus (Girard, 1850)
      Family: Leptoplanidae
              Euplana gracilis (Girard)

Phylum: Rhynchocoela
  Class: Anopla
    Order: Heteronemertini
      Family: Lineidae
              Cerebratulus lacteus
              Carinomella lactea
              Unidentified Nemertean

Phylum: Phoronidea:
              Phoronis psammophila Cori, 1889

Phylum: Annelida
  Class: Polychaeta
    Order: Archiannelida
      Family: Amphinomidae
              Pseudeurythoe sp.
      Family: Arabellidae
              Drilonereis longa Webster, 1879
              Drilonereis filum (Claparede, 1868)
      Family: Capitellidae
              Heteromastus filiformis (Claparede, 1864)
              Notomastus sp.
      Family: Chaetopteridae
              Chaetopterus variopedatus (Renier, 1804)
              Spiochaetopterus oculatus (Gitay, 1969)
      Family: Chrysopetalidae
              Paleanotus heteroseta Hartman, 1945

Family: Cirratulidae
Tharyx setigera Hartman, 1945
Family: Eunicidae
Marphysa sanguinea (Montagu, 1815)
Family: Glyceridae
Glycera americana Leidy, 1855
Glycera dibranchiata Ehlers, 1868
Family: Goniadidae
Glycinde solitaria (Webster, 1879)
Family: Maldanidae
Clymenella torquata (Leidy, 1855)
Family: Nephtyidae
Nephtys sp.
Family: Nereidae
Nereis succinea (Frey and Leuckart, 1847)
Family: Onuphidae
Diopatra cuprea (Bosc, 1802)
Family: Orbiniidae
Scoloplos robustus (Verrill, 1873)
Family: Pectinariidae
Pectinaria gouldii (Verrill, 1873)
Family: Phyllodocidae
Eteone lactea Claparede, 1868
Eteone heteropoda Hartman, 1951
Paranaitis speciosa (Webster, 1870)
Phyllodoce arenae Webster, 1879
Phyllodoce mucosa Oersted, 1843
Family: Pilargidae
Ancistrosyllis jonesi Pettibone, 1966
Sigambra tentaculata (Treadwell, 1941)
Family: Sabellariidae
Sabellaria vulgaris Verrill, 1873
Family: Sabellidae
Sabella microphthalma Verrill, 1873
Family: Serpulidae
Hydroides dianthus (Verrill, 1873)
Family: Sigalionidae
Stenelais limicola (Ehlers, 1864)
Family: Spionidae
Polydora ligni Webster, 1879
Paraprionospio pinnata (Ehlers, 1901)
Scolecolepides viridis (Verrill, 1873)
Scolelepis squamata (O. F. Muller, 1789)
Spiophanes bombyx (Claparede, 1870)
Streblospio benedicti Webster, 1879
Family: Syllidae
Syllis cornuta Rathke, 1843

Class: Oligochaeta
Family: Tubificidae
Peloscolex gabriellae Marcus, 1950

Class: Hirudinea
Unidentified leech

Phylum: Mollusca
Class: Pelecypoda
Order: Nuculacea
Family: Nuculidae
Nucula proxima Say, 1822
Order: Arcacea
Family: Arcidae
Anadara transversa (Say, 1822)
Anadara ovalis (Bruguiere, 1792)
Order: Mytilacea
Family: Mytilidae
Mytilus edulis Linnaeus, 1785
Order: Lucinacea
Family: Lucinidae
Lucina multilineata Tuomey and Holmes, 1857
Order: Erycinacea
Family: Montacutidae
Montacuta elevata (Stimpson, 1851)
Order: Veneracea
Family: Veneridae
Mercenaria mercenaria (Linnaeus, 1758)
Gemma gemma (Totten, 1834)
Family: Petricolidae
Petricola pholadiformis (Lamarck, 1818)
Order: Mactracea
Family: Mactridae
Mulinia lateralis (Say, 1822)
Order: Tellinacea
Family: Tellinidae
Tellina versicolor DeKay
Macoma balthica L., 1758
Macoma tenta Say, 1834
Family: Sanguinolariidae
Tagelus plebeius (Solander, 1786)
Tagelus divisus (Spengler, 1794)
Order: Solenacea
Family: Solenidae
Ensis directus Conrad, 1843
Order: Myacea
Family: Myacidae
Mya arenaria (Linnaeus, 1758)
Order: Pandoracea
Family: Lyonsiidae
Lyonsia hyalina Conrad, 1831

Class: Gastropoda
Order: Mesogastropoda
Family: Calyptraeidae
Crepidula convexa Say, 1822

Class: Gastropoda (continued)
Family: Naticidae
Natica pusilla (Say, 1822)
Order: Neogastropoda
Family: Muricidae
Eupleura caudata (Say, 1822)
Family: Columbellidae
Mitrella lunata (Say, 1826)
Family: Turridae
Mangelia cerina Kurtz and Stimpson, 1851
Order: Pyramidellacea
Family: Pyramidellidae
Odostomia bisuturalis Say, 1821
Odostomia impressa Say, 1822
Pyramidella fusca (C. B. Adams, 1839)
Turbonilla interrupta Totten, 1835
Turbonilla stricta Verrill, 1874
Order: Cephalaspidea
Family: Acteonidae
Acteon punctostriatus C. B. Adams, 1840
Family: Retusidae
Acteocina canaliculata (Say, 1822)
Order: Nudibranchia
Family: Corambidae
Doridella obscura Verrill, 1870
Okenia cupella (Vogel and Schultz, 1970)

Phylum: Arthropoda
Class: Crustacea
Subclass: Ostracoda
Order: Myodocopa
Family: Cylindroleberididae
Parasterope sp.
Family: Sarsiellidae
Sarsiella texana Kornicker and Wise, 1962
Sarsiella zostericola Cushman, 1906

Subclass: Cirripedia
Order: Thoracica
Family: Balanidae
Balanus improvisus Darwin, 1854

Subclass: Malacostraca
Order: Mysidacea
Family: Mysidae
Neomysis americana (S. I. Smith, 1873)
Mysidopsis bigelowi Tattersall, 1926
Order: Cumacea
Family: Leuconidae
Leucon americanus Zimmer, 1943

Class: Crustacea (continued)
Family: Diastylidae
Oxyurostylis smithi Calman, 1912
Order: Isopoda
Family: Idoteidae
Idotea balthica (Pallis, 1772)
Edotea triloba (Say, 1818)
Chiridotea caeca (Say, 1818)
Chiridotea nigrescens (Wigley)
Family: Anthuridae
Ptilanthura tenuis (Harger)

Order: Amphipoda
Family: Ampeliscidae
Ampelisca vadorum Mills, 1963
Ampelisca verrilli Mills, 1967
Family: Ampithoidae
Ampithoe longimana Smith, 1873
Cymadusa compta (Smith, 1873)
Family: Bateidae
Batea catharinensis Muller, 1865
Family: Corophiidae
Corophium acherusicum Costa, 1857
Corophium tuberculatum Shoemaker, 1934
Erichthonius rubicornis Dana, 1855
Unciola irrorata Say, 1818
Unciola serrata Shoemaker, 1945
Family: Gammaridae
Elasmopus levis Smith, 1873
Gammarus mucronatus Say, 1818
Melita appendiculata (Say, 1818)
Family: Liljeborgiidae
Listriella clymenellae Mills, 1962
Family: Stenothoidae
Stenothoe minuta Holmes, 1903

Suborder: Caprellidea
Family: Caprellidae
Caprella penantis Leach, 1814
Paracaprella tenuis Mayer, 1903

Order: Decapoda
Section: Caridea
Family: Palaemonidae
Paleomonetes vulgaris (Say, 1818)
Family: Ogyridae
Ogyrides limicola Williams, 1955
Family: Crangonidae
Crangon semptemspinosa (Say, 1918)
Section: Macrura
Family: Upogebiidae
Upogebia affinis (Say, 1818)

Order: Decapoda (continued)
Section: Anomura
Family: Porcellanidae
Euceramus praelongus Stimpson, 1860
Family: Paguridae
Pagurus longicarpus Say, 1817
Family: Portunidae
Callinectes sapidus Rathbun, 1896
Ovalipes ocellatus (Herbst, 1799)
Family: Xanthidae
Hexapaneopus angustifrons (Benedict and Rathbun, 1891)
Neopanope Sayi (Smith, 1869)
Panopeus herbstii H. Milne-Edwards, 1834
Family: Pinnotheridae
Pinnixa sayana Stimpson, 1860

Phylum: Echinodermata
Class: Holothuroidea
Order: Dendrochirota
Family: Cucumariidae
Thyone briareus (Le Sueur, 1824)

Class: Ophiuroidea
Order: Ophiurae
Family: Amphiuridae
Micropholis atra

Phylum: Hemichordata

Phylum: Chordata
Subphylum: Tunicata
Class: Ascidiacea
Order: Phlebobeanchia
Family: Molgulidae
Molgula manhattensis (DeKay, 1843)

Subphylum: Vertebrata
Class: Teleostomi
Order: Heterosomata
Family: Cynoglossidae
Symphurus plagiusa (Linnaeus)

Order: Atheriniformes
Family: Gobiidae
Gobiosoma sp.