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MASSACHUSETTS BAY OUT-FALL MONITORING PROGRAM

Soft Bottom Benthic Biology & Sedimentology 1992 Baseline Conditions in Massachusetts & Cape Cod Bays

Massachusetts Water Resources Authority

Environmental Quality Department

Technical Report No. 93-10

Final Report

for

MASSACHUSETTS BAY
OUTFALL MONITORING PROGRAM

Soft-Bottom Benthic Biology and Sedimentology
1992 Baseline Conditions
in Massachusetts and Cape Cod Bays

prepared for

MASSACHUSETTS WATER RESOURCES AUTHORITY
Environmental Quality Department
100 First Avenue
Charlestown Navy Yard
Boston, MA 02129
(617) 242-6000

prepared by

James A. Blake
Brigitte Hilbig
Donald C. Rhoads

SCIENCE APPLICATIONS INTERNATIONAL CORPORATION
89 Water Street
Woods Hole, MA 02543
(508) 540-7882

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1.0 INTRODUCTION

1.1 Background of the MWRA Monitoring Program

The Massachusetts Water Resources Authority (MWRA) is responsible for the development of secondary sewage treatment facilities at the new Deer Island Sewage Treatment Plant. In conjunction with these facilities, a new outfall will be located offshore in Massachusetts Bay at a distance of 15 km from Deer Island and a depth of 32 m. The new outfall is scheduled to begin operation in July 1995, initially with an upgraded primary effluent and later with full secondary treated effluent scheduled to be phased in from 1996 to 1999. It is expected that the water and sediment quality of Massachusetts and Cape Cod Bays will not be degraded by this new outfall (EPA, 1988).

In order to monitor the discharge from the new outfall, MWRA has developed an "Effluent Outfall Monitoring Plan" that describes physical, chemical, and biological monitoring necessary to evaluate the response of the Massachusetts Bay ecosystem to the new outfall (MWRA, 1991). Studies conducted prior to the initiation of discharges are termed Baseline Monitoring and are intended to establish a database against which changes due to the discharge can be assessed.

In 1992, SAIC conducted a field program as part of the first phase of the baseline monitoring of the soft-bottom benthic environment. Results of that program are presented in this report evaluating the sedimentary characteristics, biological communities, microbiology, and sediment/animal interactions of stations in Massachusetts Bay and Cape Cod Bay.

1.2 Historical Overview of Benthic Studies in Massachusetts Bay

The benthic infauna of Massachusetts and Cape Cod Bays are chiefly known from a series of studies conducted between 1976 and 1988. To date, no results from these studies have ever been published in the open literature, and all information resides in various federal, state, and municipal reports.

The earliest study of the infauna was by Gilbert *et al.* (1976), in which 37 stations were occupied from Cape Ann to Cape Cod. As part of this project, two replicate 0.1-m² grabs were taken at each station and the contents sieved through a 0.5-mm mesh screen. Portions of this database were reviewed and analyzed by Shea *et al.* (1991). This survey indicated that benthic communities were both rich in species and dense in individuals. Species richness varied from 40 to 125 species per station and density ranged from about 4000 to 60,000 individuals m^{-2}. Nearly the entire study area was dominated by the spionid polychaete *Spio limicola*, comprising 18 to 80% of the fauna.

As part of an application for a waiver from secondary treatment [301(h) waiver], a limited number of benthic stations were established in Massachusetts Bay. Three stations were sampled in 1978 (DWI, DWII, and DWIII), one in 1979 (DWI), and one in 1982 (PD). The results of these studies were recently reviewed by Blake *et al.* (1989). During a re-application following the initial denial of the waiver, additional benthic work in Massachusetts Bay was conducted by Metcalf & Eddy (1984). Five stations were sampled for benthic infauna (Stations 32, 38, 40, 42, and 53).

In summarizing the studies associated with the 301(h) waiver process, Blake *et al.* (1989) identified considerable year-to-year variability, both in overall density of the infauna and in the dominance patterns of the most abundant species. Dense populations of *Spio limicola* were noted in the 1982 samples but were not present in 1978 and 1979.

Following denial of the 301(h) waiver, studies were initiated to assess the marine environment of Massachusetts Bay relative to the establishment of a large sewage outfall that would ultimately deliver secondary treated effluent to this relatively unpolluted environment. New studies were initiated as part of the Secondary Treatment Facilities Plan (STFP). The sampling design included five transects, each with three stations. Six replicate 0.04-m^2 grabs were taken at each station and sieved through 0.3- and 0.5-mm mesh screens. Samples from all 15 stations were fully processed as part of the first survey in March 1987. A subset of the stations were subsequently sampled in May and August 1987, and again in February 1988. The results were presented in Blake *et al.* (1987; 1988). Two sediment profile surveys were also undertaken (SAIC 1987a,b) and reviewed in Shea *et al.* (1991).

The results from the March 1987 survey were used to assess the differences in benthic assemblages among stations and transects to elucidate patterns and trends in benthic communities with increasing distance from shore and from sources of contamination in Boston Harbor. The results from stations sampled seasonally permitted the first assessment of temporal patterns and stability of the communities at defined sites over time.

Important conclusions arising from the STFP studies were that the benthic communities of Massachusetts Bay were rich and that the most distant stations shared affinities with adjacent continental shelf habitats rather than with nearshore estuarine locations. The dominant species in Massachusetts Bay were, with few exceptions, ones that were not typical dominants in nearshore areas such as Boston Harbor. There was evidence that periodic episodes of natural organic enrichment accounted for occasional population explosions of spionid polychaetes such as *Spio limicola*. The stations that were sampled temporally were found to maintain similarity with one another over time.

1.3 Overview of the Present Study

Included in the 1992 SAIC field program were 10 stations at farfield locations sampled for biology in May 1992 as part of a USGS/MWRA survey, 20 stations in the nearfield sampled in August 1992, and 12 stations in the farfield also sampled in August 1992. At each of the August 1992 stations, samples were taken to evaluate sedimentary characteristics, biological communities, microbiology, and chemical constituents[1]. In addition, the sediment profile camera system was used to evaluate animal/sediment interactions and various physical properties of the sediments.

The May and August 1992 samples provide an opportunity to reassess the benthic biology and sediment characteristics of Massachusetts Bay prior to installation of the sewage outfall. The nearfield stations that were sampled with the sediment profile camera and biological grabs allow integrated mapping of physical and biological patterns for the first time. The data also allow for comparisons with the historical results to evaluate the consistency of benthic communities from year to year and to predict which components of the fauna might be most affected by a sewage discharge. The studies also allow further refinement of the sampling requirements for a long-term monitoring program. The farfield data provide the first integrated survey of benthic communities throughout the larger Massachusetts Bay and Cape Cod Bay since the survey of Gilbert *et al.* (1976). A careful

[1]Chemical results are not presented in this report; samples are being analyzed under a separate contract.

comparison of the nearfield and farfield results coupled with an assessment of the historical data should provide the framework for assessing how the biology data should be interpreted as part of the outfall monitoring program.

2.0 METHODS

2.1 Field Operations

Details of the August 1992 sampling program were presented in Blake *et al.* (1992a).

2.1.1 Sampling Design and Location of Stations

Approximate locations of farfield and nearfield stations were established as part of planning for the long-term monitoring program for the establishment of the outfall in Massachusetts Bay (MWRA, 1991). Actual station locations for samples discussed in this report are shown in Figures 1 and 2.

Coordinates for most of the farfield stations were specified by the United States Geological Survey (USGS) as part of parallel studies on the geology and geochemistry of Massachusetts Bay (Bothner, unpublished). Ten biology grabs were taken in the farfield for MWRA on one of the USGS surveys in May 1992, with two stations (WH-2 and WH-3) located in the nearfield area. Twelve farfield stations were sampled as part of the first annual farfield survey in August 1992 (Figure 1).

All nearfield stations were to be selected on the initial survey in August 1992. Given the variable hard- and soft-bottom conditions found in the vicinity of the proposed outfall, the selection of stations where grab samples could be successfully taken was difficult. Soft sediment was known to exist west of the proposed site of the outfall diffuser, but it was hoped that patches of sediments could be found in all quadrants in order to stratify the sampling design. The sediment profile camera was deployed to identify possible soft sediment and locate appropriate stations. The photographs for this purpose were evaluated the same day they were taken, and candidate sites were selected for grab deployment the following day. Most of the 20 stations that were selected, however, were to the west of the outfall site (Figure 2). Suitable stations were not found in the other quadrants, despite use of the sediment profile camera and random drops of the grab to locate sediment soft enough for grab sampling. The sediment and profile camera results documented below provide data on the physical gradients that help explain why it was so difficult to take sediment grabs.

2.1.2 Navigation

Vessel positioning was achieved with the SAIC Portable Integrated Navigation and Survey System (PINSS). This system consisted of Northstar 800 Loran-C and MX4200 Global Positioning System (GPS) receivers interfaced to an 80486 portable computer and a Hewlett-Packard Thinkjet printer. The system provided accurate vessel position and a visual plot of the position in relation to the station location. This information was relayed to the helmsman through a remote CRT display. Position fixes showing date, local time, latitude and longitude were recorded on magnetic disk and sent to the printer as hard-copy backup. Position fixes were recorded manually when samples were taken as well as automatically at specified intervals (5 min for this survey).

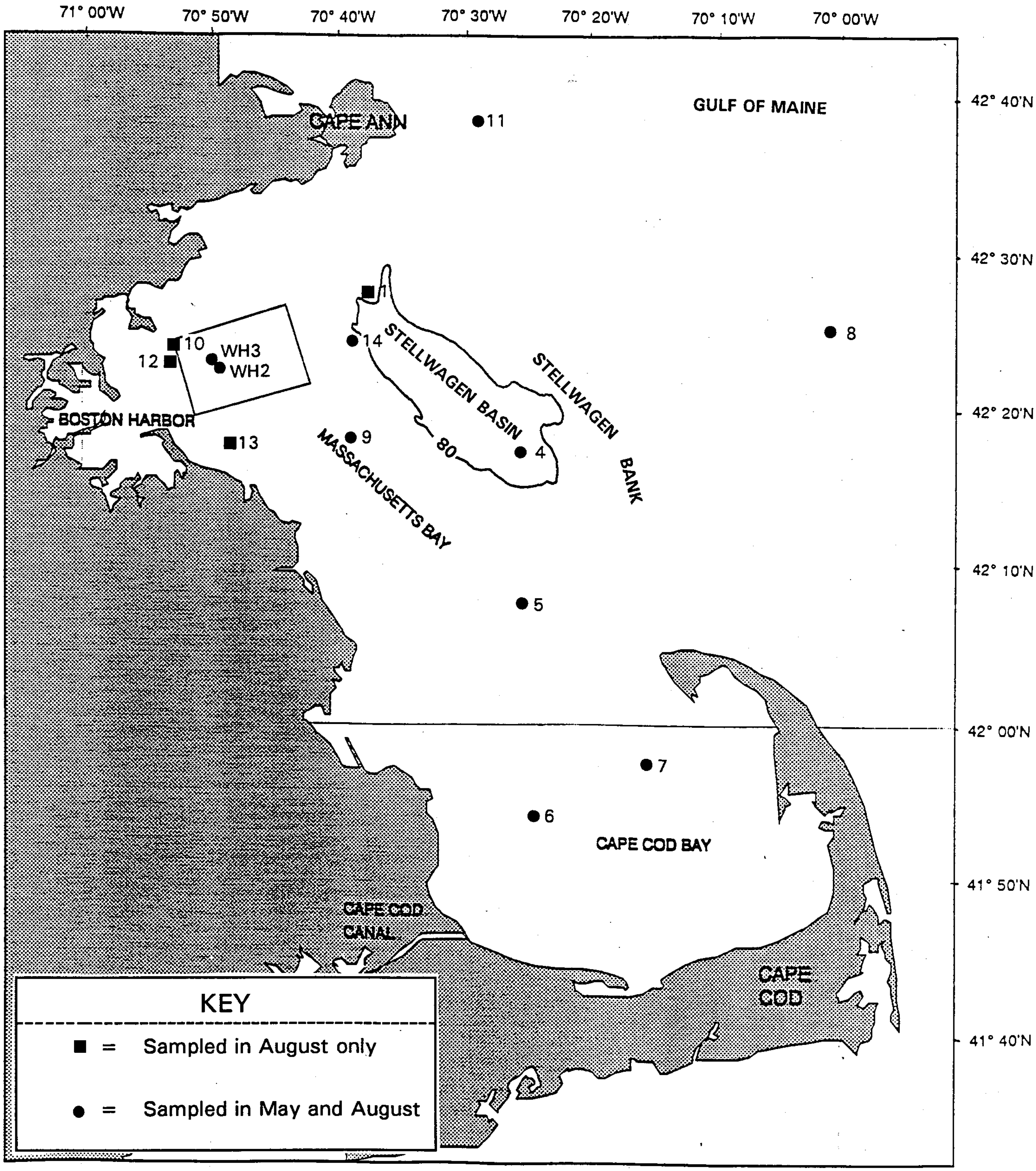


Figure 1. Location of Farfield Stations Sampled in May and August 1992. The rectangular box represents the nearfield area shown in detail in Figure 2.

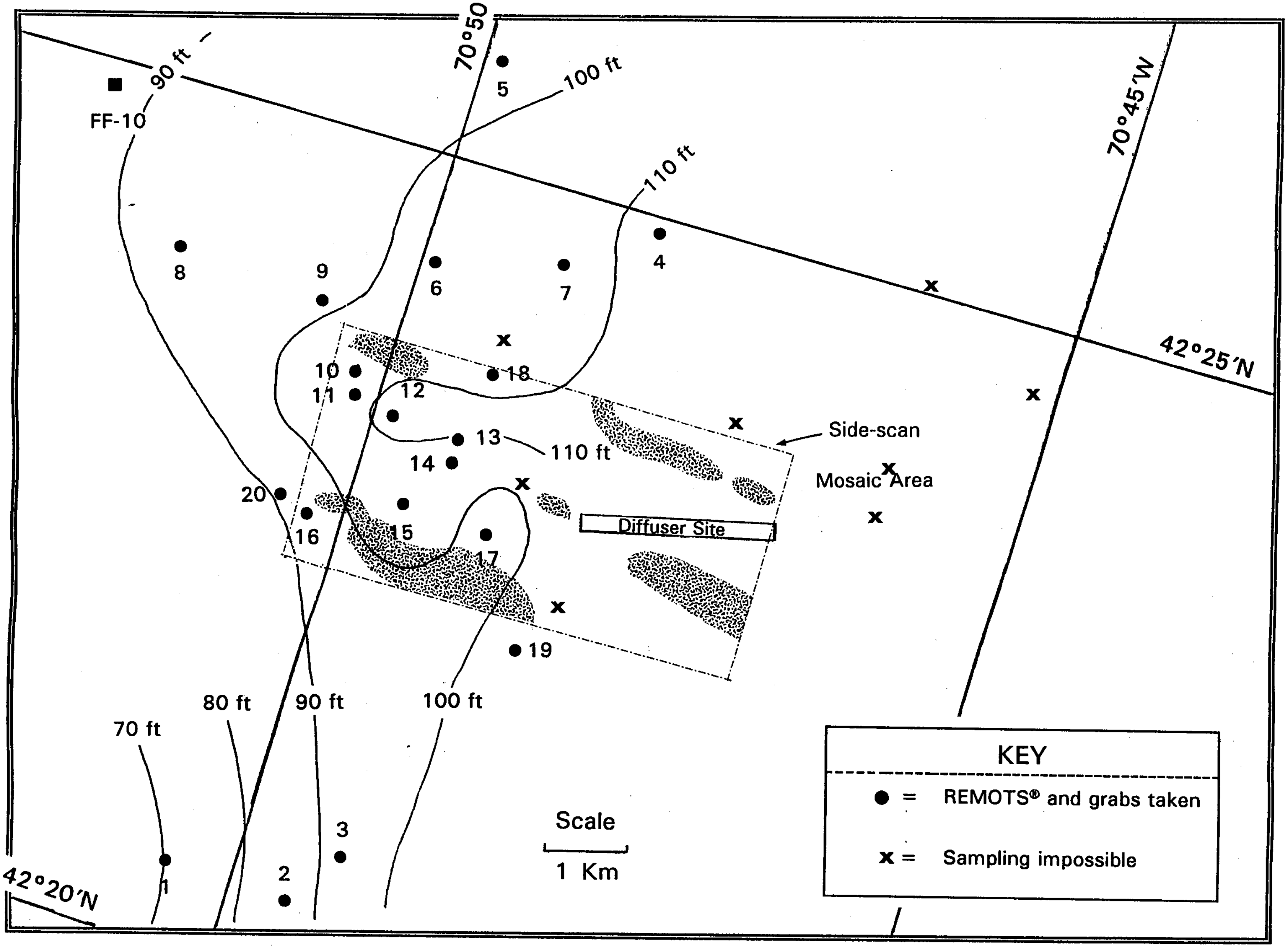


Figure 2. Locations of Nearfield Stations. Depth contours are in feet below MLW. Side scan mosaic area (dashed box) after Butman *et al.*, 1992. Shaded areas within the box are drumlins. Station FF10 has been included to facilitate contouring of data.

2.1.3 Grab Sampling

The summer 1992 samples for benthic infauna, sediment chemistry, grain size, total organic carbon (TOC), and *Clostridium perfringens* spores were obtained with a Ted Young grab. A 0.04-m^2 grab was used for biology samples and a Kynar-coated 0.1-m^2 grab was used for the chemical and physical samples. The 10 nonreplicated biology samples taken in May 1992 were obtained with a 0.1-m^2 Ted Young grab.

Benthic Infauna

For analysis of benthic infauna, three 0.04-m^2 grabs were taken at all nearfield and farfield stations sampled in August 1992. After retrieval of the grab, the sample was examined for quality and integrity. The grab was then placed on a stand so that the jaws could be opened and the sample washed into a bucket positioned below the grab. The entire sample was gently washed into the bucket with seawater filtered through a 5-μm filter cartridge. The sample was then sieved through a 300 μm-mesh screen; the portion retained on the screen was transferred to a prelabeled 1-L plastic jar and fixed in 10% buffered formalin in seawater for two to three days. Any anemones found were preserved separately in small jars to prevent mucus, exuded by the anemones even after fixation, from contaminating the entire sample, making it difficult to sort. To prevent decalcification of molluscs, all samples were transferred to 70–80% ethanol, preceded by a freshwater rinse to avoid formation of a precipitate, as soon as practical after collection.

Sediment

Samples for sediment analysis were obtained with a 0.1-m^2 Kynar-coated grab whose doors were lined with Teflon panels. One grab was collected at the nearfield stations and two replicates were collected at the farfield stations. At all stations, subsamples were taken for determination of grain size and TOC, enumeration of *C. perfringens* spores, and analysis of selected organic compounds and metals. Procedures used to obtain these samples conformed to methods used in the NOAA National Status and Trends program.

To remove organic contaminants and fulfill the sterility requirements for the collection of *C. perfringens*, the grab was cleaned between stations, and the sampling scoop, spatula, and homogenizing jar were cleaned between grabs as follows:

1. Soap (Microclean) and water wash
2. Distilled water rinse
3. Methanol rinse
4. Methylene chloride rinse.

Before the doors of the grab were opened, the captain of the vessel was asked to turn the ship to position the stern sampling area upwind so that stack gases did not contaminate the sample. Water overlying the sediment surface was allowed to drain away so that the sediment remained undisturbed. The top 1 cm of sediment, except that adjacent to the grab walls or doors, was removed with a Teflon scoop and quickly transferred to a 1-L Teflon-lined jar, which was immediately capped.

Homogenization of the sample was carried out in the ship laboratory to avoid contamination by stack gases. The sample was thoroughly stirred with a Teflon spatula and then subsampled, using the same spatula, into five prelabeled containers.

1. The first subsample was for organic analysis. Precleaned, prelabeled 4-oz I-Chem jars were one-half to two-thirds filled with sediment. This ensured that the analytical laboratory received at least 10 g (⅓ oz) of dried sediment. Overfilling was avoided to reduce the chance of jar breakage during freezing. The jars were enclosed in bubble-wrap, frozen, and stored on dry ice in a cooler.
2. The second subsample was for metals analysis. Clean, prelabeled 4-oz Whirl-Paks were two-thirds filled with sediment. The samples were frozen and stored on dry ice covered with a layer of bubble-wrap in a cooler. All metal samples from a given area were kept together in a zipper-closure plastic bag.
3. The third subsample was for *C. perfringens* analysis. Sterile, prelabeled 4-oz Whirl-Paks (unopened bags are sterile) were two-thirds filled with sediment. The laboratory needed 30 g (1 oz) of sample for analysis. The samples were frozen and stored on dry ice covered with a layer of bubble-wrap in a cooler. All *C. perfringens* samples from a given area were kept together in a zipper-closure plastic bag.
4. The fourth subsample was for grain-size analysis. Clean, prelabeled 4-oz Whirl-Paks were two-thirds filled with sediment. The laboratory needed 30 g (1 oz) of dry sediment, excluding sand and water, for analysis. For very watery and sandy sediments, a second sample was collected. The samples were stored cold in a cooler with wet or blue ice to prevent the growth of mold. All grain-size samples from a given area were kept together in a zipper-closure plastic bag.
5. The fifth subsample was for TOC analysis. Clean, prelabeled 4-oz Whirl-Paks were two-thirds filled with sediment. The laboratory needed 10 g (⅓ oz) of sample for analysis. The samples were stored cold in a cooler with wet or blue ice. All TOC samples from a given area were kept together in a zipper-closure plastic bag.

2.1.4 Sediment Profile Imaging REMOTS®

A Benthos Model 3731 Sediment Profile Camera was used in this study (Benthos, Inc., North Falmouth, MA). The camera is designed to obtain *in situ* profile images of the top 15-20 cm of sediment. Functioning like an inverted periscope, the camera consists of a wedge-shaped prism with a front face plate and a back mirror mounted at a 45° angle to reflect the profile of the sediment-water interface up to the camera. The camera is mounted horizontally on top of the prism. The prism assembly is moved up and down by producing tension or slack on the winch wire. Tension on the wire keeps the prism in the up position.

The camera frame was lowered to the seafloor at a rate of about 1 m s^{-1}. Slack on the winch wire allowed the prism to penetrate the sediment vertically when the frame settled onto the bottom. A passive hydraulic piston ensured that the prism entered the sediment slowly (about 6 cm s^{-1}) and did not disturb the sediment-water interface. On impact with the bottom, a trigger activated a 13-s time delay on the shutter release; once the prism came to rest in the sediment, a photograph was taken.

When the camera was raised, a wiper blade cleaned off the faceplate, the film was advanced by a motor drive, the strobe was recharged, and the camera was lowered for another image.

Three replicate photographs were taken at each station. Ektachrome 100 ASA color slide film was used for all photographs. Film was developed, using a JOBO E6 rotary processor, at the end of each sampling day to determine the success of the REMOTS® sampling for that day and, in the case of nearfield survey, to permit the photographs to be used to select appropriate nearfield stations.

2.1.5 Sample Documentation, Custody, and Quality Assurance/Quality Control

Standard SAIC procedures for sample tracking and custody were followed. In preparation for the field surveys, a checklist of all samples to be collected was prepared and sample containers were prelabeled in indelible ink. Benthic infauna samples had inside labels, written in pencil on plasticized paper, as well as outside labels. Label information included month and year; station number; sample type; and replicate number.

All pertinent information on field activities and sampling efforts was recorded in a bound logbook. The chief scientist was responsible for ensuring that sufficient detail was recorded. Entries were recorded in indelible ink and included, at a minimum:

- Date and time of starting work
- Names of field supervisor and team members
- Sampling site and activities
- Details of sampling effort, particularly deviations from standard operating procedures
- Field observations
- Field measurements made
- Sample identification
- Type and number of samples collected
- Sample handling and labeling information.

Chain-of-custody forms were also prepared for each type of sample so that a paper trail could be established to track the samples from the time of collection through the laboratory process.

2.2 Laboratory Methods: Sample Processing and Analysis

2.2.1 Benthic Infauna

Samples for taxonomic analysis of benthic infauna were taken to the SAIC office in Woods Hole where they were transferred from formalin to 70-80% ethanol and shipped to Cove Corporation for sorting. Prior to sorting, each sample was resieved through nested 300-μm and 500-μm mesh screens, and the two resulting fractions were sorted separately. The sorters removed all organisms from the samples and separated them into major taxonomic groups. All residual material was labeled and stored for QC analysis. The first five samples processed by a sorter were resorted by a second technician. If fewer than 5% of the total number of organisms had been missed by the first sorter, only a random selection of that sorter's samples were rechecked. If more than 5% of the total organisms had been missed, the first sorter was required to resort all subsequent samples until five consecutive samples passed the QC check. Taxonomic identification of the fauna was subsequently done by SAIC personnel.

2.2.2 Sediment Grain-Size

Samples for analysis of grain size were shipped to GEO/PLAN for analysis by Dr. Peter Rosen according to a standard method (Folk, 1974) for measuring weight percent gravel, sand, silt, and clay.

2.2.3 Total Organic Carbon

Samples for determination of TOC were shipped on ice to GERG (Geochemical and Environmental Research Group of Texas A&M University). The samples were analyzed according to standard methods used in the NOAA Status and Trends program. Details of the procedures are presented in the Work/Quality Assurance Project Plan (Blake *et al.*, 1992b).

2.2.4 Clostridium Spores

Samples for *C. perfringens* spore analysis were processed by the SAIC Environmental Testing Center in Narragansett, Rhode Island. Spores were extracted from the sediment according to the sonicate-and-settle method (Emerson and Cabelli, 1982) and enumerated by the mCP membrane filtration method (Bisson and Cabelli, 1979).

2.2.5 Sediment Chemistry

Samples that were collected for sediment chemistry (metals and organic compounds) were frozen and archived. Analyses are being carried out, and results are expected in June 1993.

2.2.6 Sediment Profile Imaging Analysis

Replicate photographs were analyzed with the SAIC REMOTS® image analysis system. This system uses a SPARCstation 1+ Sun WorkStation integrated with a PULNIX TMC-50 video camera and frame grabber. Color slides are digitally recorded as color images on computer disk. The image analysis software is a menu-driven program that incorporates user commands via keyboard and trackball. This system displays each color slide on the CRT while measurements of all physical and biological parameters are obtained.

Up to 21 variables can be obtained for each REMOTS® image. All parameters were stored on computer disk and printed out on data sheets for editing by a senior-level scientist before being approved for final data synthesis, statistical analyses, and interpretation. A separate data sheet was generated for each REMOTS® image. Automatic disk storage of all parameters measured allow data from any variables of interest to be compiled, sorted, displayed graphically, contoured, or compared statistically.

REMOTS® photographs were analyzed for sediment type, surface boundary roughness, mud clasts, apparent redox potential discontinuity depth, sedimentary methane, and infaunal successional stages following procedures used for previous Boston Harbor surveys (SAIC, 1992).

2.2.7 Archived Sediment

For the benthic infauna samples, residues will be archived at SAIC for one year, and the identified collections will be kept for a period to be specified by MWRA. In addition, because only one of the three nearfield replicates were planned for processing, the remaining replicates (40 samples) were archived by SAIC pending a decision for further processing.

2.3 Data Management and Analysis

Upon completion of the infaunal identifications, each taxon was assigned a code composed of a letter and three digits and keypunched into a spreadsheet on a personal computer. Preliminary data summaries were performed on this spreadsheet and the data were then converted into a database format that could be entered into a VAX 11/780 computer for further analysis. Data quality was verified by SAIC personnel. The database included counts of organisms for which the identification was uncertain (juveniles, anterior fragments, etc.); these were used for density and rank order tabulations but were not included in calculations of similarity or diversity indices. Animals such as hydroids, that are normally known to be attached to hard surfaces, were excluded from all analyses, as were parasitic and pelagic species.

Statistical treatment of the infaunal data set included an agglomerative clustering technique to determine similarity between samples. The similarity measures used were the Normalized Expected Species Shared (NESS) (Grassle and Smith, 1976) and the Bray-Curtis Similarity Coefficient (Boesch, 1977). For NESS, the number of individuals (m) was set at 50 (separately analyzed replicates of August farfield samples) and 100 (all other nearfield and farfield analyses). The clustering strategy used was group average sorting for both NESS and Bray-Curtis (Boesch, 1977) and data used with the Bray-Curtis coefficient were square root transformed to alleviate bias caused by some of the very abundant dominant species.

Ordination using reciprocal averaging or correspondence analysis was also used. The first step in this analysis included reducing the data to the 50 most abundant species. These data were then clustered using the Bray-Curtis Similarity Coefficient with group average sorting. Ordination was used to analyze the individual cluster groups along axes 1 through 3 in an effort to explain the distribution of the cluster groups. Analysis was performed with the program DECORANA on a Macintosh computer. Delta Graph was used to create the graphical plots, which were modified and printed with MacDraw Professional.

Benthic community parameters, including Shannon-Wiener diversity (H') and its associated evenness value (J'), were calculated along with the rarefaction method (Sanders, 1968) as modified by Hurlbert (1971). The Shannon-Wiener index was calculated using the base $\log_e$. For the rarefaction analyses, the number of individuals was set at defined points ranging between 50 and 4000.

Where practical, maps were prepared depicting the distribution of individual species, communities, or benthic parameters.

3.0 RESULTS

3.1 Nearfield Sites

3.1.1 Distribution of Sediment Types

The location of the 20 nearfield sampling stations relative to bathymetry and bottom topography is shown in Figure 2; station positions can be found in Appendix A. This area has a complex bottom topography related to the presence of submerged drumlins, geological features produced by glacial drift deposits. In plan view, the drumlins are elliptical, with a length of 1 to 2 km. Their maximum dimension is aligned in a NW-SE orientation reflecting the direction of glacial movement. The tops of the drumlins are about 75 ft below mean low water (MLW) and the bottoms are in water depths ranging from 90 to 110 ft below MLW. This topography is a major factor controlling wave-bottom interactions, bottom stability, sediment transport, and the distribution of sediment types (see Figure 3 of Butman *et al.*, 1992).

Stations successfully sampled in this survey consist of sandy to silty sediments ranging in depths from about 110 to 70 ft below MLW. Most stations are located on the flanks of drumlins or in depressions between drumlins. Side-scan images show that the diffuser site and associated hard ground consist of boulder-sized reworked glacial sediment and sandy areas reworked by large-amplitude sand waves with crest-to-crest distances of 10 ft (Figure 4 of Butman *et al.*, 1992).

The distribution of major modal grain sizes at the nearfield site is shown in Figure 3. At those stations that allowed sufficient REMOTS® prism penetration to estimate grain size, the sediments are all sandy, consisting of either fine sand (2-3 phi) or very fine sand (3-4 phi). It is likely that sandy sediments exist in the eastern half of the area, but the hardness of the seafloor prevented prism penetration.

West and north of the future location of the diffuser, sand and gravel content decreases towards the west. Conversely, the proportion of fines (silt-clay and organic matter) increases toward Station FF10 (Figure 4). The increase in the fine fraction toward the shore apparently reflects high anthropogenic input rates of fines from Boston Harbor into Massachusetts Bay. According to Knebel (1993), the existing gradient of increasing mud toward shore would reverse within a few decades if the source of fines from the Harbor were to be cut off. Scouring and resuspension of the fine fractions would result in sandy and gravelly substrata. Stations within the large patch of very fine sands show a sand/mud or sand/mud/sand stratigraphy within the upper 4 to 17 cm of the sediment column (range of prism penetration). The intercalation of sand and mud is commonly encountered at a facies transition between a relatively high kinetic energy environment (sandy hard ground to the east) and a lower kinetic energy area (muds and muddy sands toward the west). During periods of low kinetic energy, muddy silt apparently can accumulate in this area; during storm periods, however, sands wash from the source area (tops of the drumlins) toward the west, covering muddier sediments in deeper water. Sediment from the hardground area may be dispersed in other directions as well, but our limited station array does not allow identification of these transport directions.

Direct evidence of sediment transport can be seen in the distribution of small-scale ripples (Figure 3). Rippled bottom is observed at stations having fine sand (NF13, NF14, NF15, and NF17) and at

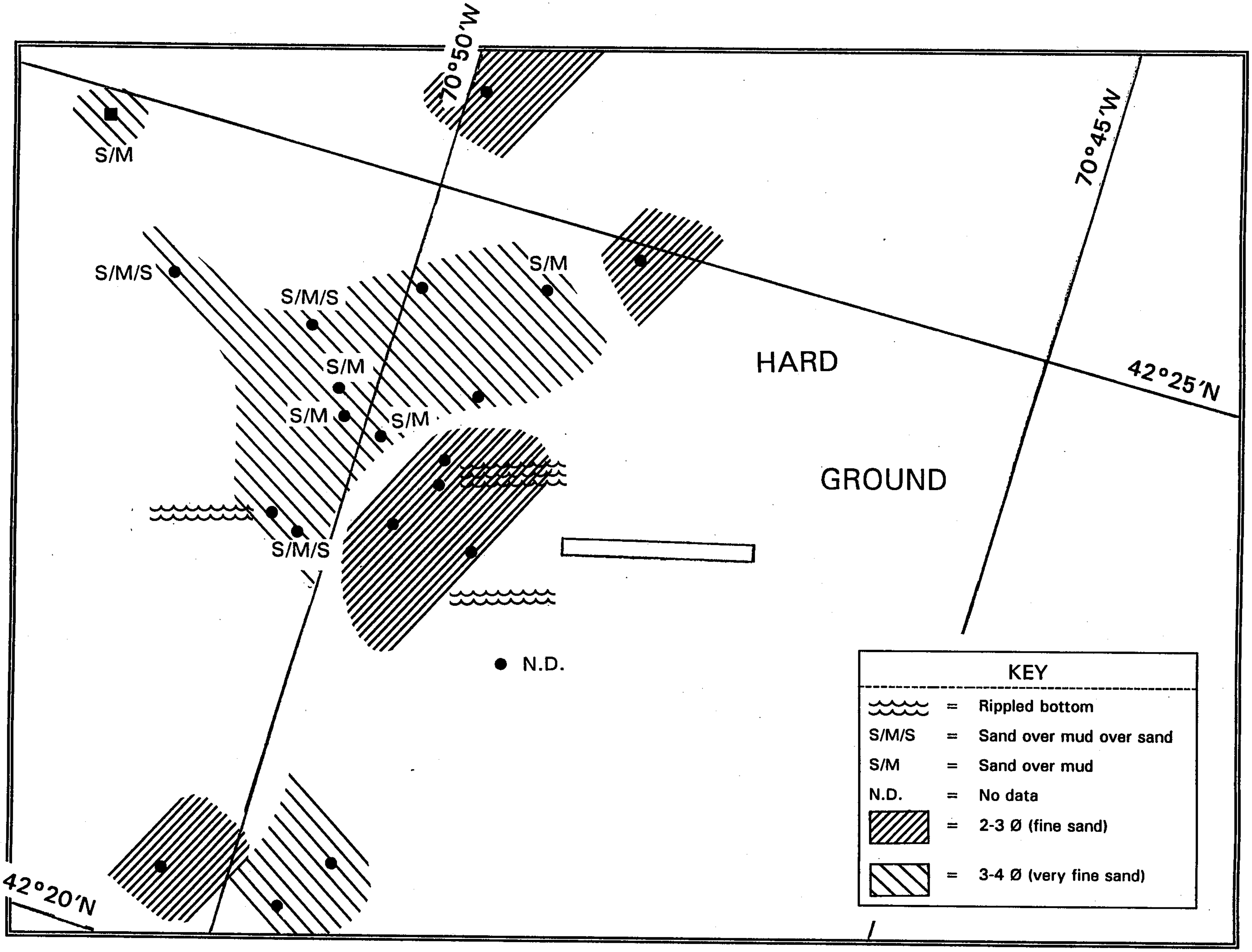


Figure 3. Distribution of Major Modal Grain Size and Other Sedimentary Features in the Nearfield. Data are from REMOTS® images.

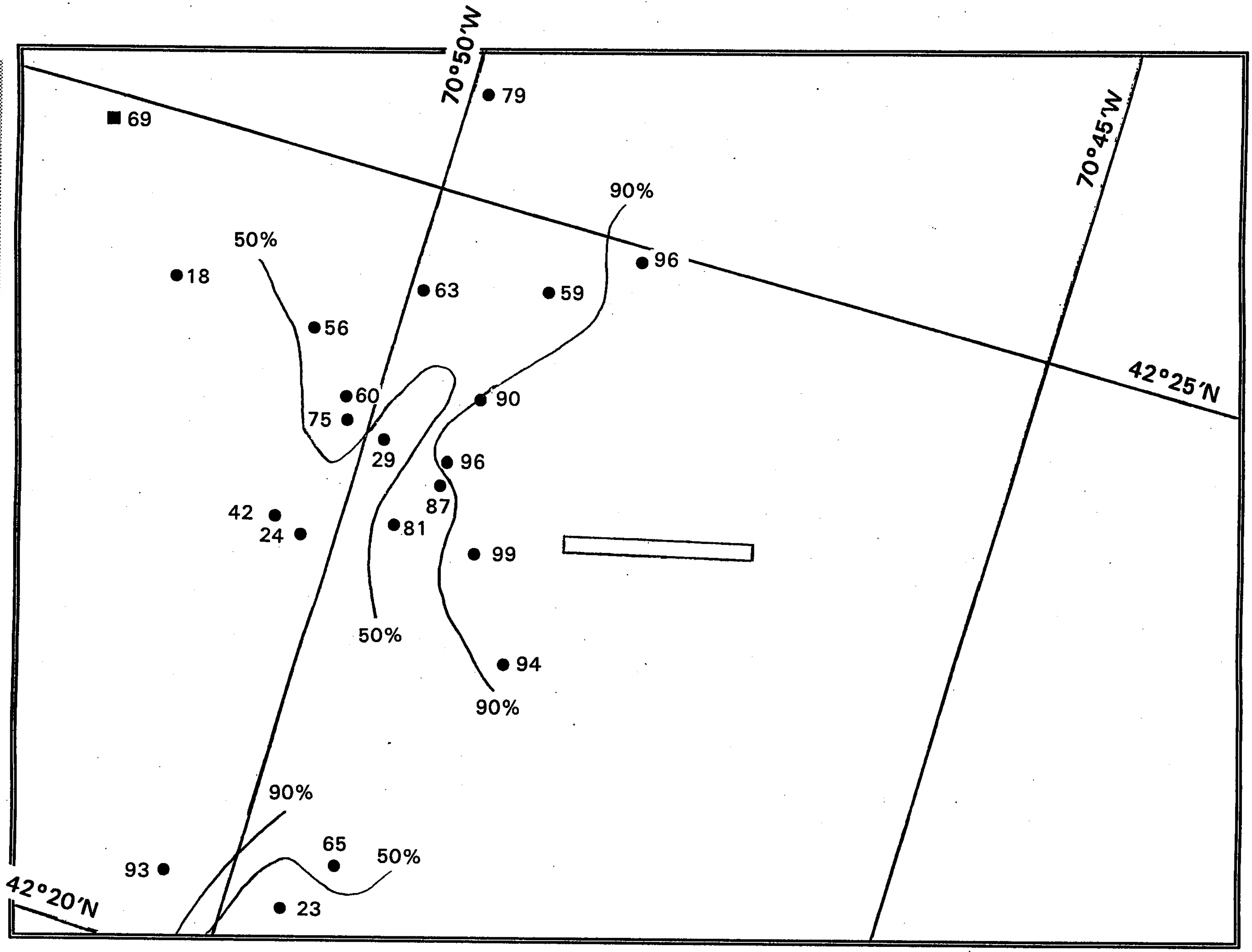


Figure 4. Distribution of Percent Sand and Gravel Contoured on the 50% and 90% Isopleths in the Nearfield.

Station NF20, which has very fine sand. Rippled sediments are located in the transition area between the hardground area and stations generally located within the 100-to-110-ft isobath to the west. Larger amplitude sand waves are associated with the hardground area of the drumlin located immediately north of the diffuser site, as documented in side-scan sonograms (see Figures 3 and 4 of Butman *et al.*, 1992).

Stations NF1, NF2, and NF3 located southwest of the diffuser represent a different sedimentary regime. In contrast to the textural trends described for those stations located north and west of the diffuser, at these three stations the proportion of sand and gravel increases toward the west into shallower water (Figure 4). This difference appears to be related to water depth: Station NF1 is located near the wave-scoured top of the slope that forms the western edge of the Massachusetts Bay basin, and Stations NF2 and NF3 are located on the flanks of this slope.

Sandy sediments frequently washed by bottom currents tend to experience a high degree of compaction and display high shear strengths and hardness. This phenomenon can be seen in gradients in prism penetration depth of the REMOTS® system (Figure 5). Stations NF4, NF13, NF14, NF15, and NF17 fall within a transition area between hard ground to the east and softer sediments to the west. Note again the reverse trend at Stations NF1, NF2, and NF3. Although bottom hardness is often positively correlated with increasing grain size, this is not always a simple linear relationship. The degree of compaction also depends on the interlocking nature of sediment fabrics caused by the burrowing and feeding activities of infaunal organisms (Rhoads and Boyer, 1992). Sandy sediments that are frequently reworked by currents tend to exclude large benthic infaunal organisms. Large deep-burrowing deposit feeders (Stage III organisms) are effective in decreasing sediment compaction in a wide range of sediment types by "dilating" sedimentary fabrics. A detailed list of sediment grain-size data for the nearfield stations can be found in Appendix C.

3.1.2 Total Organic Carbon

Sediments within the nearfield area are generally low in TOC (Figure 6). Sixty percent of the stations (12 of 20) have TOC values less than 1%. The highest average concentrations are found at Station NF8 (3.2%) and Station NF2 (2.6%). In general, the TOC concentrations decrease markedly as the diffuser location and associated hardground coarse sandy sediments are approached. Sediments located within the transition facies (Stations NF4, NF13, NF17, and NF19) contain less than 0.5% TOC, probably because the higher average kinetic energy in the transition zone washes detrital organic matter out of this sediment. TOC data are listed in Appendix C.

3.1.3 Clostridium Spores

The density of *C. perfringens* spores ranged from a few hundred to thousands of colony-forming units (CFUs) per gram dry weight of sediment. The overall pattern of spore densities appears to be related to the kinetic gradients alluded to in Section 3.1.1 on sediment distribution (Figure 7). Sediments located within the transition area near the diffuser site contain only a few hundreds of spores per gram of dry sediment (Stations NF5, NF7, NF13, NF14, NF15, NF17, and NF19). Station NF1 to the south also has low spore counts and consists of compact sands. Sediments with low spore counts tend to contain less than 1% TOC (Figure 6) and are associated with hard-packed sands and gravel (Figures 4 and 5). Spores tend to be less abundant at these stations because these sediments are not retaining a significant organic fraction, probably as a result of frequent washing of the bottom by

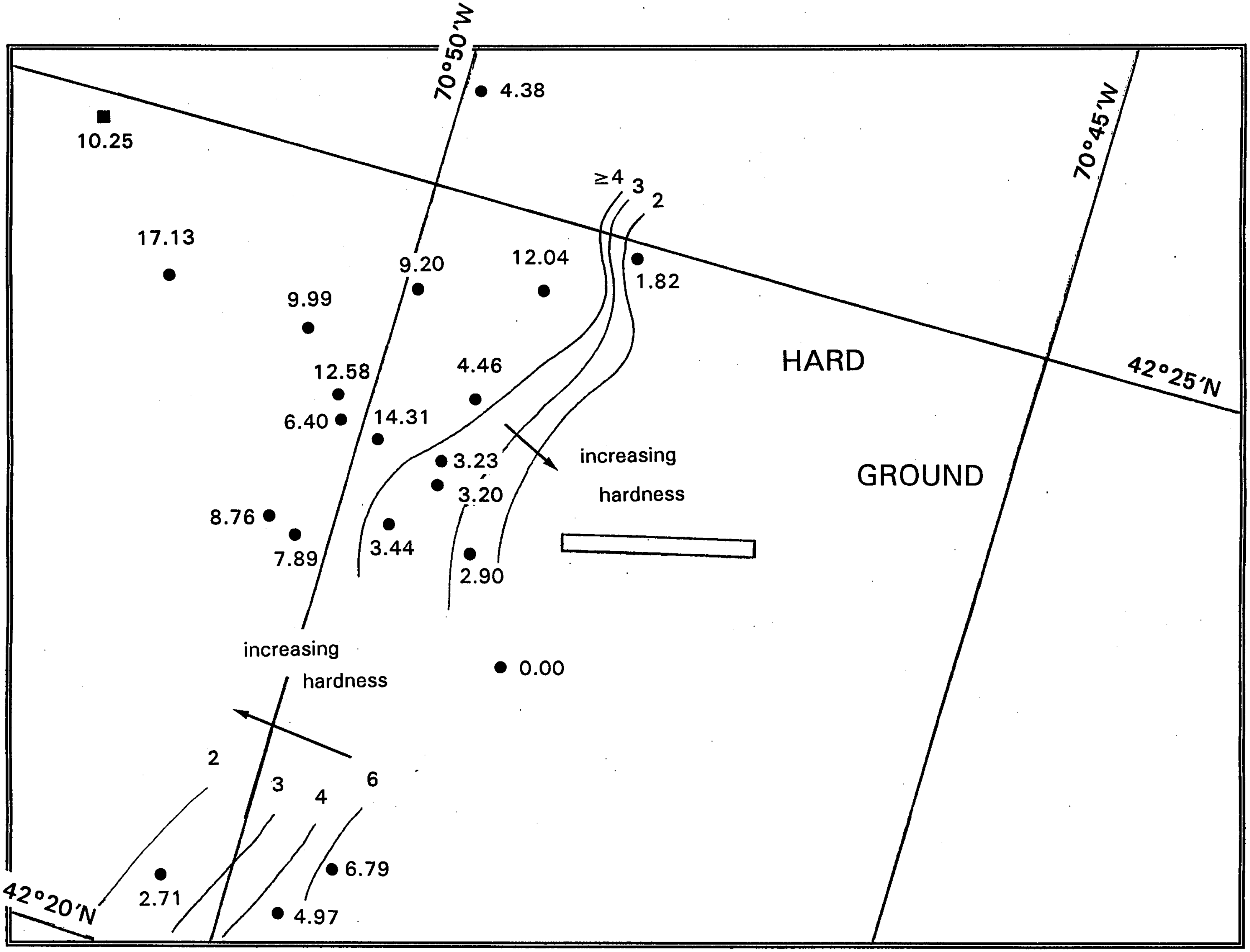


Figure 5. Mean Penetration Depth (cm) of the REMOTS® Camera Prism in the Nearfield.

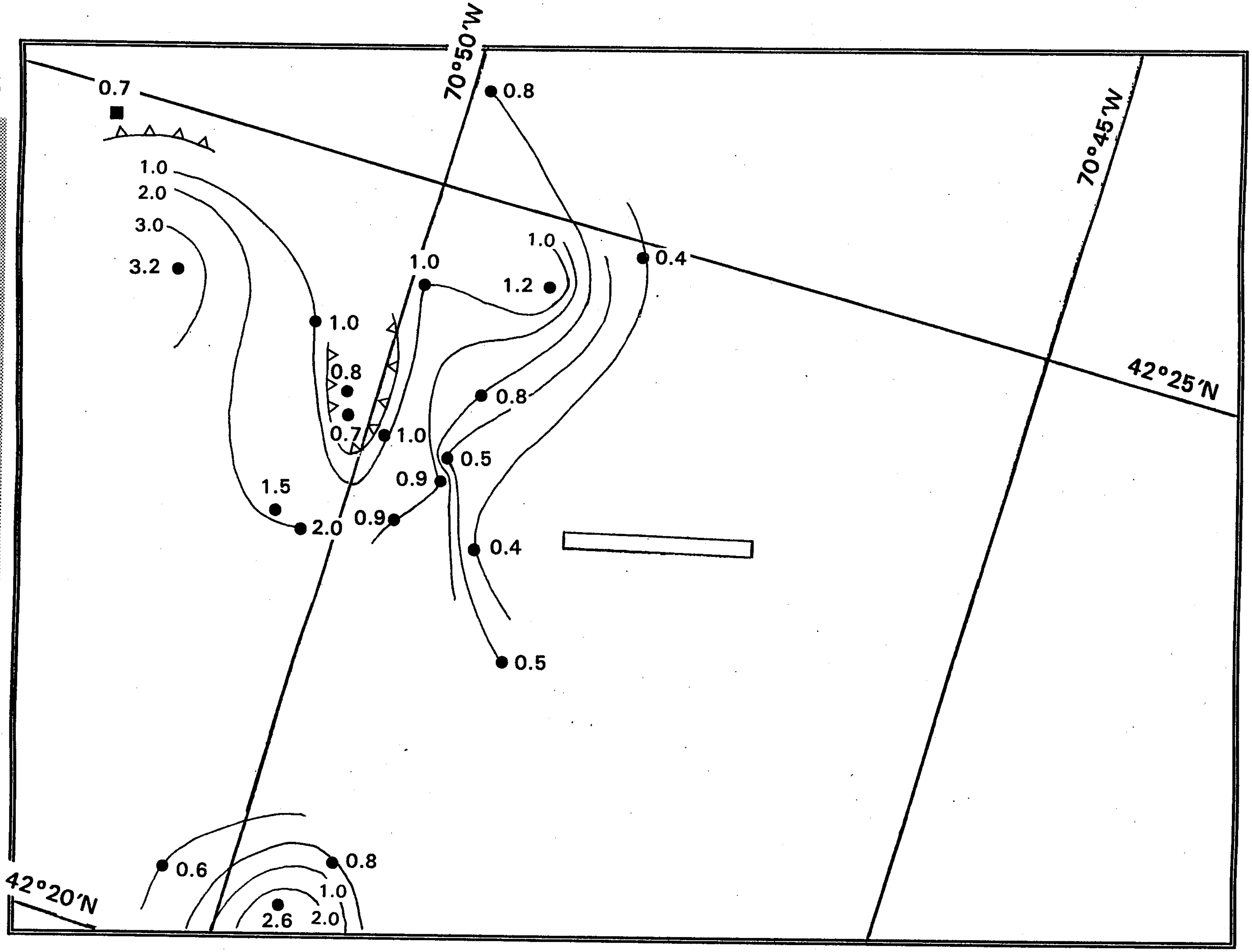


Figure 6. Distribution of Average Total Organic Carbon Contents (wt %) in the Nearfield. Note contour intervals are unequal.

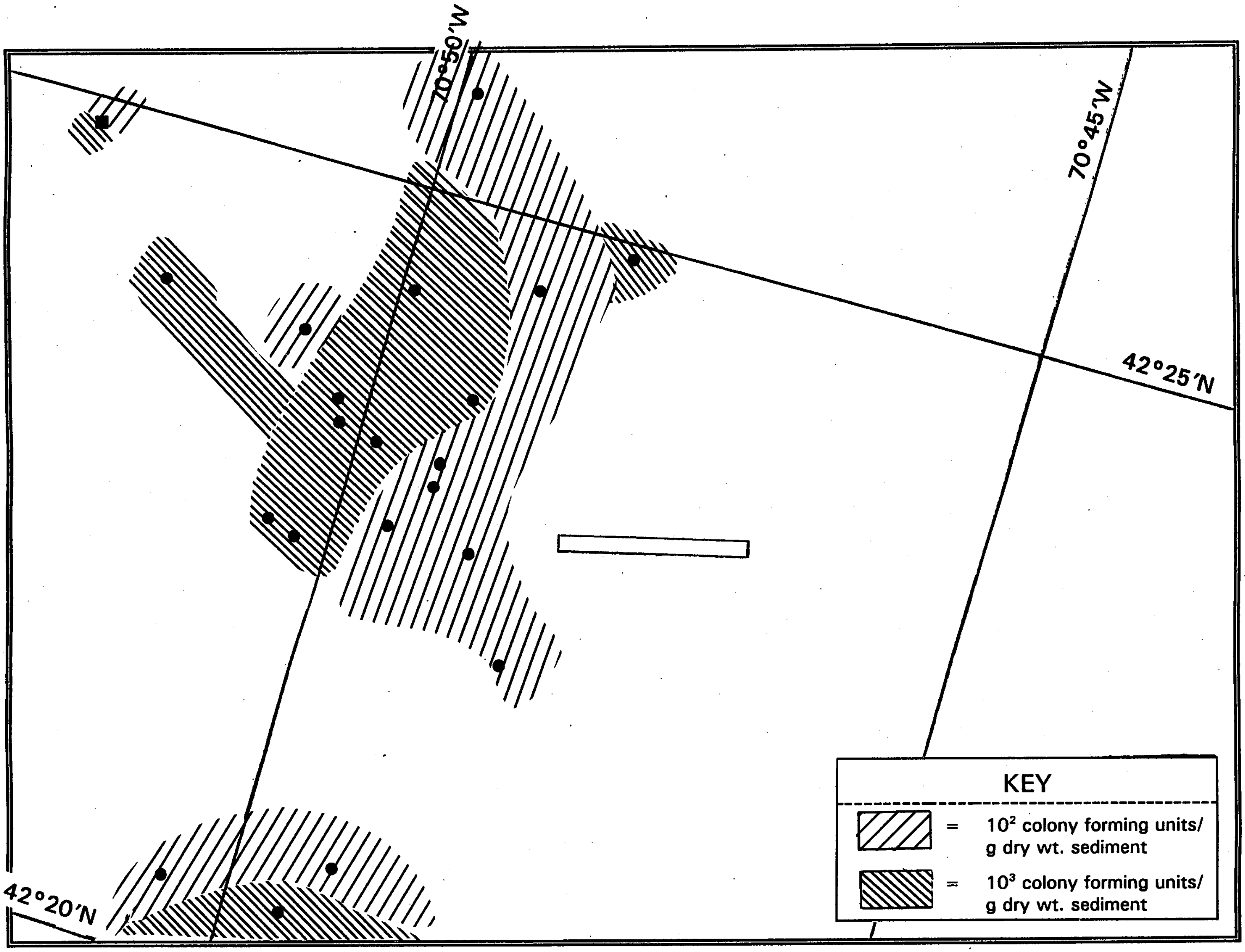


Figure 7. Distribution of *Clostridium perfringens* Spore Counts in the Nearfield. Replicates at Station FF10 ranged from 10^2 to 10^3 colony forming units/g dry wt. sediment.

currents. The balance of the stations have spore counts that are an order of magnitude higher (except Station NF9), suggesting that these stations are more depositional and reflecting the high input rate of fines from Boston Harbor. Detailed lists of the *Clostridium* data are presented in Appendix C.

3.1.4 Apparent Redox Potential Discontinuity (RPD) Depth

The distribution of apparent RPD depths is shown in Figure 8. The greatest mixing depths are located in a cluster of stations northwest of the diffuser site (NF10, NF11, NF12, and NF20) and at Station NF5. Most stations fall within the class 2.16 to 3.24 with a mean of 2.64 ±1.01 cm (Figure 8, Inset).

3.1.5 REMOTS® Successional Stages

Dense polychaete assemblages (Stage I) were present at 19 of the 20 stations. The tubes of these organisms were clearly visible at the surface, protruding into the water. In a few instances the assemblages of spionids were dense enough to form tube mats. These densely populated stations are identified by the symbol TM on Figure 9. At Station NF12, the Stage I polychaetes were accompanied by tubes of ampeliscid amphipods (Stage II) and deep-burrowing organisms (Stage III). Deep-burrowing Stage III organisms are mostly present in the northwest corner of the nearfield area (Stations NF8, NF9, NF6, NF7, NF12) and at a single station (Station NF3) in the southwest quadrant of the sampled area.

3.1.6 Organism-Sediment Indices

Organism-Sediment Indices ≤ +6 are typically encountered in physically disturbed habitats. Physical disturbance (in this case, sediment instability) keeps the successional status in a Stage I condition and prevents deep bioturbation of the sediment column. Low OSI values result from the Stage I status of the bottom and shallow apparent RPD depths. Stations with OSIs ≤ +6 cluster near the transition zone between the hard ground and the softer granular substrata to the west of the diffuser site (Figure 10). One low value (OSI=4) is also present at Station NF2 in the SW quadrant. The remaining stations have OSI values ≥ +6.5. The OSI frequency distribution is bimodal, reflecting the differences in kinetic energy regimes within the sampled area (see Inset, Figure 10). All REMOTS® parameters are listed in detail in Appendix B.

3.1.7 Benthic Infauna

Composition of the Fauna

A total of 206 species of benthic invertebrates were identified from the 20 nearfield stations. Polychaetes dominated the list with 98 species (48%), followed by 52 species of arthropods (25%), 36 species of molluscs (17%), and another 20 species (10%) representing a variety of less well represented taxa. A combined species list for the nearfield and farfield areas can be found in Section 3.7.2. Polychaetes were also the most abundant group, making up 89% of the total number of individuals found throughout the nearfield area. Most of these individuals were represented by the 15 most abundant taxa (82%), all of which were polychaetes. Details of the abundance and dominance patterns of these species are presented in the following section; raw data are presented in Appendix D.

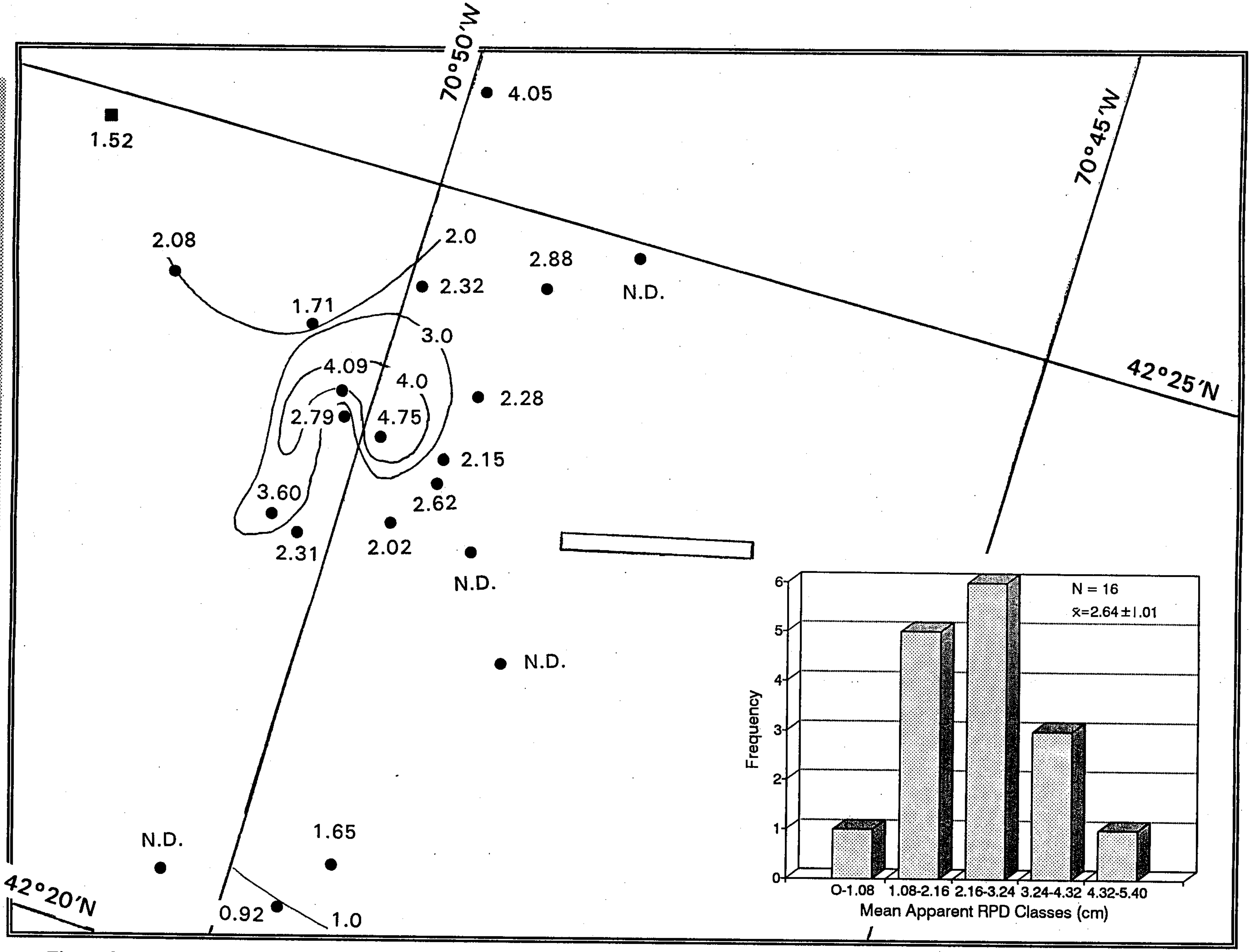


Figure 8. Distribution of Mean Apparent Redox Potential Discontinuity (RPD) Depths in the Nearfield (cm below Sediment-Water Interface). Contours are at 1-cm intervals. Inset: frequency distribution with mean and standard deviation (Station FF10 not included).

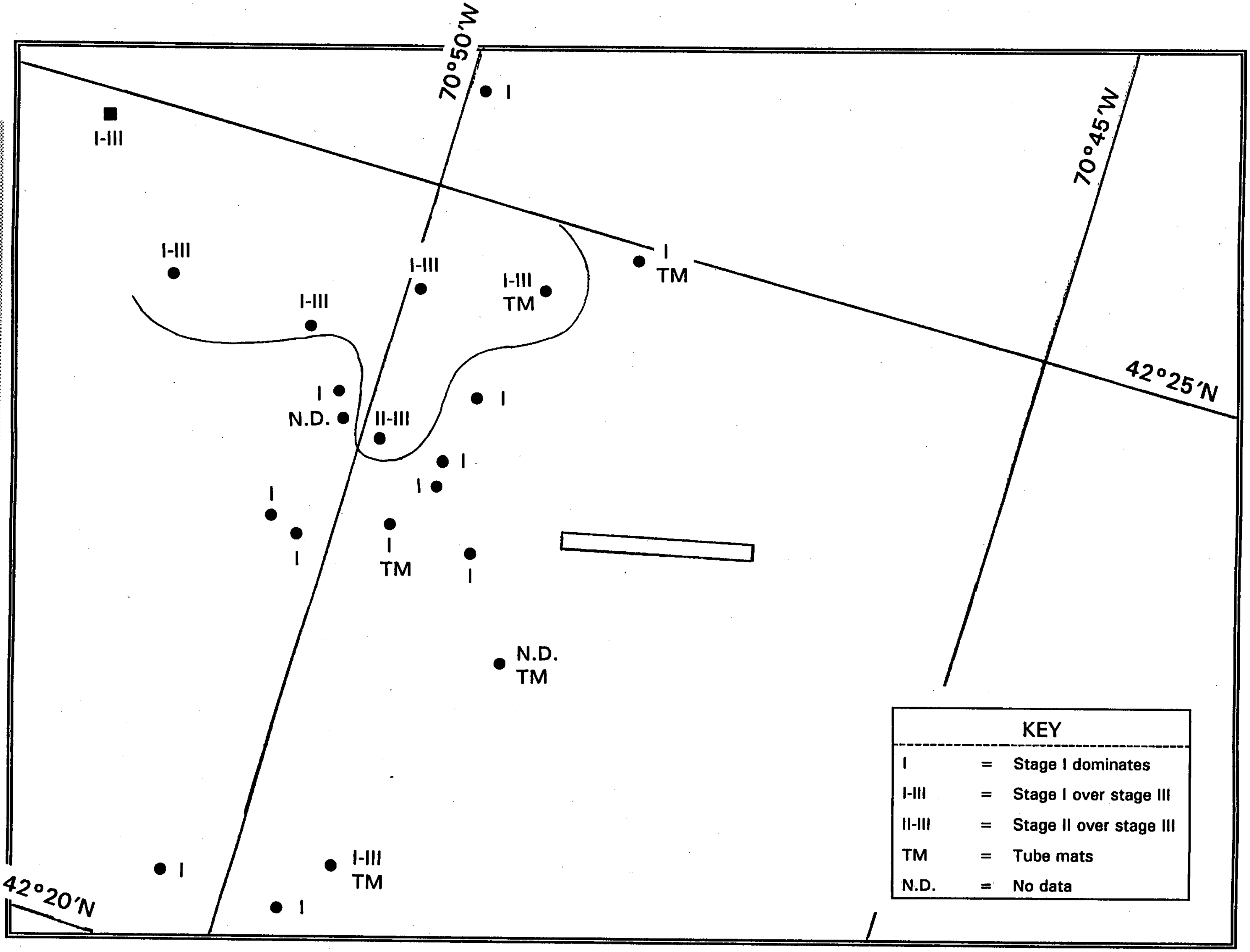


Figure 9. Distribution of Successional Stages in the Nearfield. Line delimits stations showing evidence of Stage III infauna.

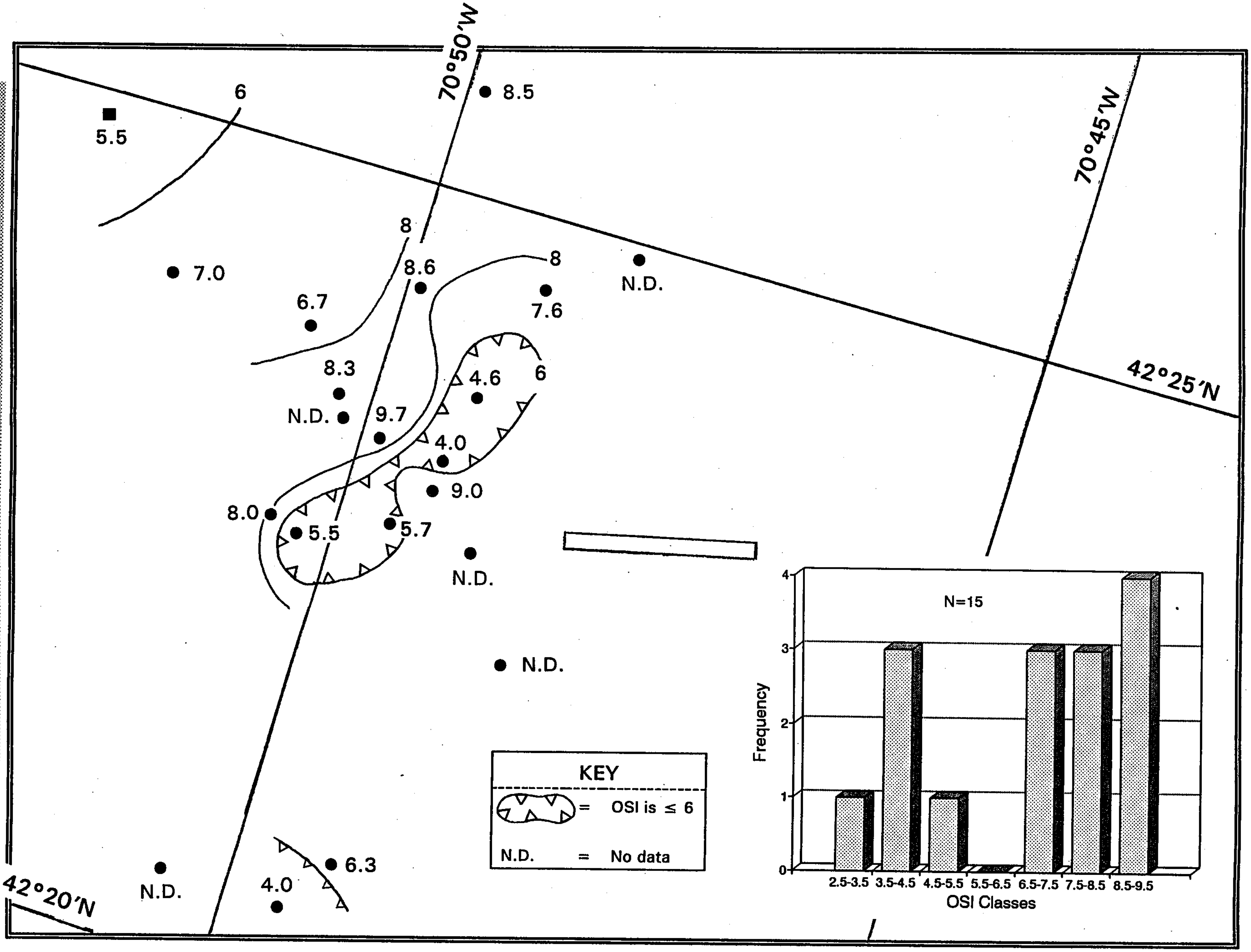


Figure 10. Distribution of Organism-Sediment Indices (OSIs) in the Nearfield. OSI=+6 and +8 isopleths are shown. Inset: frequency distribution (Station FF10 not included).

Distribution and Density of Dominant Species
Total infaunal densities varied by almost an order of magnitude among the nearfield stations, ranging from about 16,000 to 141,000 individuals m^{-2} (Table 1 and Figure 11). The lowest densities were found at a group of three stations (NF2, NF4, and NF17) located along a line that is immediately west of the diffuser and roughly directed north-south. The highest densities were encountered at Stations NF6, NF7, and NF19. The number of individuals in the 0.3-mm fractions was very low compared to the total number of individuals per station (Figure 11A). The most abundant species in the nearfield area was the spionid polychaete *Spio limicola,* which contributed about 23% to the total fauna. Two other polychaetes, the spionid *Polydora socialis* and the capitellid *Mediomastus californiensis*, each contributed 12 to 13% to the total fauna. Of the 17 species accounting for at least 1% of the total fauna, 15 were polychaetes (mostly spionids and cirratulids), one was a bivalve, and one was an amphipod.

The 10 most abundant species at each station and their percent contribution to the fauna are shown in Table 2. Three groups of stations and two single stations can be distinguished based on the two or three most abundant species at each station (Figure 12). Group 1, consisting of Stations NF1, NF4, and NF17, is characterized by the high abundances of the amphipod *Corophium crassicorne* and the polychaete *Exogone hebes*, with spionids or the paraonid polychaete *Aricidea catherinae* also among the top dominant species. Station group 1 approximately coincides with the group of stations having the lowest total infaunal densities (see above). This group further differs from the remaining stations in the presence of relatively many crustaceans and molluscs among the 10 most abundant species; for example, the bivalves *Cerastoderma pinnulatum* at Station NF1 and *Crenella decussata* and *Astarte undata* at Station NF4; the amphipods *Unciola inermis* at Stations NF4 and NF17 and *Pseudunciola obliqua* at Station NF17; and the isopod *Chiridotea tuftsi* at Station NF17. Two polychaetes worth noting are the very abundant juvenile sabellids at Station NF4 and the interstitial species *Polygordius* sp. A at Station NF17.

To the northwest and southeast of station group 1 there are six stations that are dominated by the spionid polychaetes *Spio limicola* and *Polydora socialis* and form a second group. Stations NF3 and NF19 to the southeast and Stations NF5, NF6, NF13, and NF15 to the northeast are included. The percentage of polychaetes among the 10 most abundant species at these stations is much higher than in group 1; in fact, at Stations NF13 and NF15, all 10 dominant species are polychaetes, and at Station NF19 nine of the 10 dominant species are polychaetes (*Phoronis architecta* occupies rank 10). Some bivalves are present at Stations NF3, NF5, and NF6—for example, *Nucula delphinodonta* at Station NF3, *Crenella decussata* at Stations NF5 and NF6, and numerous juvenile nuculids at Station NF6. The only abundant crustacean in station group 2 is *Aeginina longicornis* at Station NF5.

Most of the remaining stations have high abundances of the capitellid polychaete *Mediomastus californiensis* (ranking first or second), accompanied by spionids and/or the paraonid polychaete *Aricidea catherinae*. This third group of stations includes Stations NF9, NF10, NF11, NF12, NF14, NF16, NF18, and NF20, all located to the west of station group 1, and Station NF2, which is southwest of the diffuser. At four of these stations, the oligochaete Tubificidae sp. 2 is among the top 10 species; at Station NF16, it ranks fourth. A different oligochaete, *Tubificoides apectinatus*, occupies rank 5 at Station NF2. Except for some bivalves at Stations NF2, NF11, and NF12 and nemerteans at Station NF12, all other dominant species are polychaetes; Stations NF9 and NF10 are dominated entirely by polychaetes.

Stations NF7 and NF8 have a slightly different suite of dominant species and do not fall into any of these station groups. Station NF7 is dominated by two spionids and the syllid *Exogone verugera*, and

Table 1. Community Parameters for the Nearfield Stations.

Station	Depth (m)	Number of Species	Number of Individuals (m^2)	Diversity (Hurlbert's Rarefaction)										Shannon-Wiener Index and Evenness	
				Spp./ 100 Ind.	Spp./ 250 Ind.	Spp./ 500 Ind.	Spp./ 750 Ind.	Spp./ 1000 Ind.	Spp./ 1250 Ind.	Spp./ 1500 Ind.	Spp./ 2000 Ind.	Spp./ 2500 Ind.	Spp./ 3000 Ind.	*H'*	*J'*
NF-1	21.0	60	26,975	25.6	37.3	47.8	54.3	58.8	*	*	*	*	*	4.21	0.712
NF-2	25.8	47	16,400	24.1	34.2	43.1	*	*	*	*	*	*	*	4.10	0.738
NF-3	29.1	71	77,725	22.6	33.4	42.8	48.6	52.9	56.2	59.0	63.6	67.2	70.4	3.97	0.646
NF-4	34.2	49	18,900	21.4	32.1	42.0	48.9	*	*	*	*	*	*	3.67	0.654
NF-5	27.6	93	71,600	22.7	37.3	51.8	61.5	68.6	74.1	78.6	85.3	90.1	*	3.69	0.564
NF-6	31.2	67	83,325	16.4	26.0	35.3	41.5	46.2	50.0	53.2	58.3	62.2	65.3	2.81	0.463
NF-7	32.4	88	141,225	18.7	29.4	40.1	47.4	52.9	57.4	61.1	67.2	71.9	75.8	3.41	0.528
NF-8	28.2	32	31,550	13.6	19.0	24.1	27.5	30.0	31.9	*	*	*	*	2.72	0.543
NF-9	28.8	82	57,375	26.5	38.9	49.8	57.0	62.7	67.5	71.6	78.5	*	*	4.23	0.665
NF-10	31.8	57	45,850	21.8	30.2	38.3	43.9	48.2	51.6	54.3	*	*	*	3.76	0.645
NF-11	30.6	74	39,300	22.5	35.2	47.4	55.9	62.5	68.0	72.7	*	*	*	3.68	0.593
NF-12	33.3	54	29,050	19.7	29.8	39.7	46.3	51.3	*	*	*	*	*	3.67	0.638
NF-13	32.7	67	31,850	23.0	34.7	46.7	54.9	61.3	66.5	*	*	*	*	3.89	0.641
NF-14	32.4	73	57,825	22.4	33.4	44.2	51.4	56.9	61.2	64.7	70.2	*	*	4.05	0.654
NF-15	31.5	64	67,350	20.1	30.8	40.9	47.1	51.5	54.7	57.2	60.8	63.2	*	3.71	0.618
NF-16	28.5	50	31,625	19.4	28.3	37.1	42.8	46.8	49.8	*	*	*	*	3.55	0.628
NF-17	28.5	51	15,600	27.7	40.0	48.6	*	*	*	*	*	*	*	4.36	0.768
NF-18	31.5	76	45,525	25.8	37.9	48.9	56.2	61.8	66.7	71.0	*	*	*	4.17	0.668
NF-19	31.8	81	100,100	23.5	36.2	46.9	53.3	57.9	61.5	64.4	69.0	72.7	75.7	3.56	0.562
NF-20	27.3	49	31,925	17.6	26.5	35.4	41.2	45.3	48.7	*	*	*	*	3.34	0.594

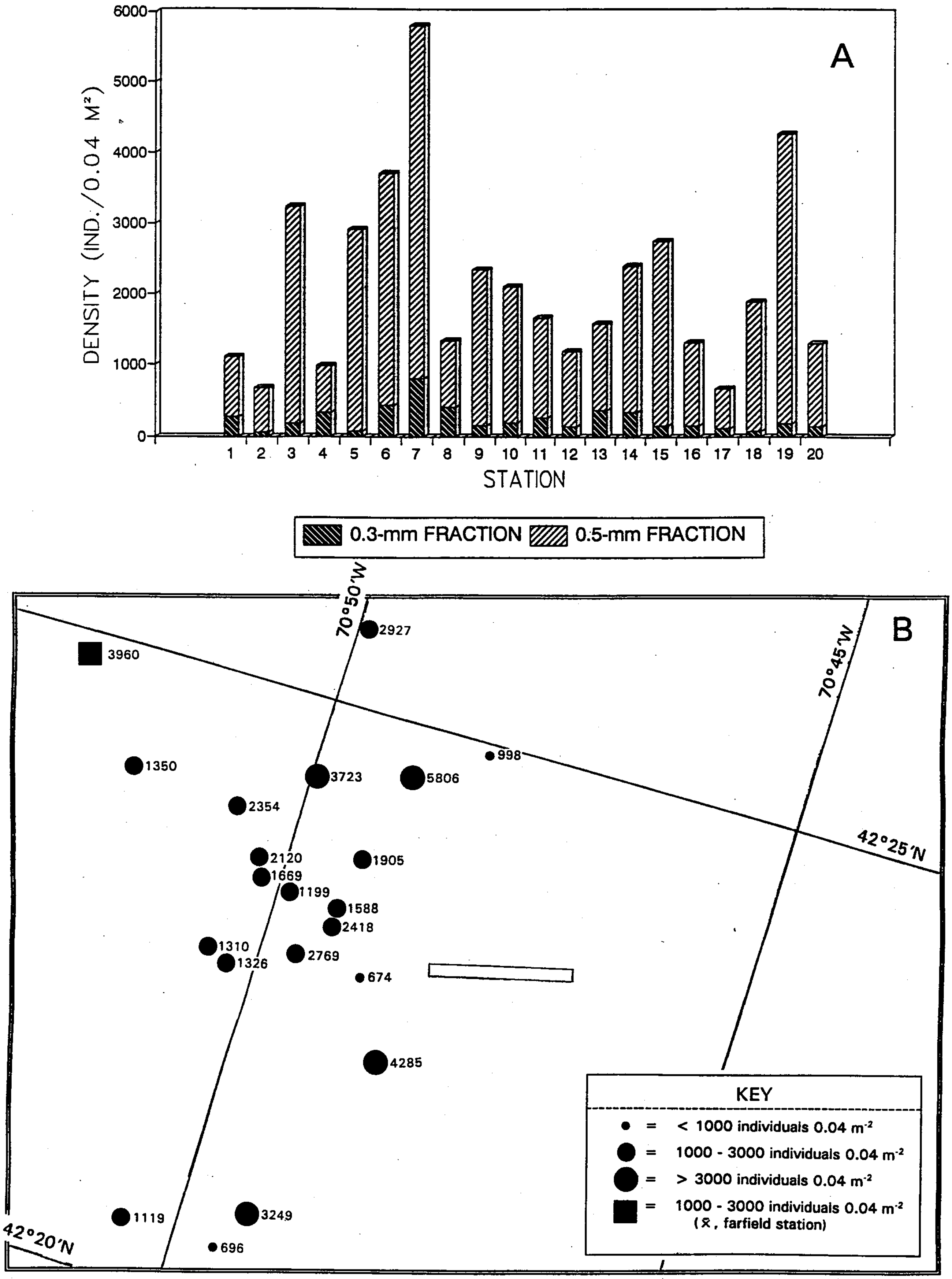


Figure 11. Total Infaunal Densities in the Nearfield. A, Densities of 0.3-mm and 0.5-mm Fractions Separate; B, Geographical Distribution of Total Densities.

Table 2. Dominant Species and Their Contribution to the Total and Identified Fauna at Each Nearfield Station.

Rank	Species	Number of Individuals (0.04 m²)	Percent of Total Fauna	Percent of Identified Fauna
	Station NF-1			
1	*Aricidea catherinae* (Polychaete)	197	17.61	18.26
2	*Exogone hebes* (Polychaete)	172	15.37	15.94
3	*Corophium crassicorne* (Amphipod)	138	12.33	12.79
4	*Polydora socialis* (Polychaete)	86	7.69	7.97
5	*Prionospio steenstrupi* (Polychaete)	66	5.90	6.12
6	*Cerastoderma pinnulatum* (Bivalve)	41	3.66	3.80
7	*Spiophanes bombyx* (Polychaete)	35	3.13	3.24
8	*Euclymene collaris* (Polychaete)	35	3.13	3.24
9	*Aglaophamus circinata* (Polychaete)	29	2.59	2.69
10	*Phoronis architecta* (Phoronid)	28	2.50	2.59
	TOTAL CUMULATIVE PERCENT		73.91	76.65
	Station NF-2			
1	*Mediomastus californiensis* (Polychaete)	158	22.70	24.09
2	*Asabellides oculata* (Polychaete)	74	10.63	11.28
3	*Aricidea catherinae* (Polychaete)	61	8.76	9.30
4	*Hiatella arctica* (Bivalve)	42	6.03	6.40
5	*Tubificoides apectinatus* (Oligochaete)	35	5.03	5.34
6	*Polydora socialis* (Polychaete)	34	4.89	5.18
7	*Tharyx acutus* (Polychaete)	33	4.74	5.03
8	*Spio limicola* (Polychaete)	32	4.60	4.88
9	*Prionospio steenstrupi* (Polychaete)	29	4.17	4.42
10	*Arctica islandica* (Bivalve)	18	2.59	2.74
	TOTAL CUMULATIVE PERCENT		74.14	78.66

Table 2 (Continued)

Rank	Species	Number of Individuals (0.04 m²)	Percent of Total Fauna	Percent of Identified Fauna
	Station NF-3			
1	*Spio limicola* (Polychaete)	677	20.84	21.78
2	*Polydora socialis* (Polychaete)	461	14.19	14.83
3	*Mediomastus californiensis* (Polychaete)	449	13.82	14.44
4	*Ampharete acutifrons* (Polychaete)	245	7.54	7.88
5	*Aricidea catherinae* (Polychaete)	167	5.14	5.37
6	*Tharyx acutus* (Polychaete)	163	5.02	5.24
7	*Ninoe nigripes* (Polychaete)	157	4.83	5.05
8	*Prionospio steenstrupi* (Polychaete)	133	4.09	4.28
-	Ampharetidae spp. (Polychaete)	75	2.31	-.-
9	*Nucula delphinodonta* (Bivalve)	67	2.06	2.16
10	*Levinsenia gracilis* (Polychaete)	64	1.97	2.06
	TOTAL CUMULATIVE PERCENT		81.81	83.08
	Station NF-4			
1	*Polydora socialis* (Polychaete)	186	18.64	24.60
2	*Corophium crassicorne* (Amphipod)	154	14.43	20.37
-	Sabellidae spp. (Polychaete)	154	15.43	-.-
3	*Exogone hebes* (Polychaete)	112	11.22	14.81
4	*Exogone verugera* (Polychaete)	57	5.71	7.54
5	*Crenella decussata* (Bivalve)	34	3.41	4.50
6	*Aglaophamus circinata* (Polychaete)	30	3.01	3.97
7	*Unciola inermis* (Amphipod)	23	2.30	3.04
8	*Astarte undata* (Bivalve)	17	1.70	2.25
-	Cirratulidae spp.	16	1.60	-.-
9	*Aricidea catherinae* (Polychaete)	14	1.40	1.85
-	Maldanidae spp. (Polychaete)	14	1.40	-.-
-	Nemertea spp.	14	1.40	-.-
10	*Chaetozone* sp. B (Polychaete)	13	1.30	1.72
	TOTAL CUMULATIVE PERCENT		83.96	84.66

Table 2 (Continued)

Rank	Species	Number of Individuals (0.04 m²)	Percent of Total Fauna	Percent of Identified Fauna
		Station NF-5		
1	*Spio limicola* (Polychaete)	791	27.02	27.62
2	*Polydora socialis* (Polychaete)	608	20.77	21.23
3	*Polydora quadrilobata* (Polychaete)	488	16.67	17.04
4	*Prionospio steenstrupi* (Polychaete)	152	5.19	5.31
5	*Mediomastus californiensis* (Polychaete)	120	4.10	4.19
6	*Exogone verugera* (Polychaete)	62	2.12	2.16
7	*Crenella decussata* (Bivalve)	53	1.81	1.85
8	*Aeginina longicornis* (Amphipod)	36	1.23	1.26
9	*Maldane glebifex* (Polychaete)	35	1.20	1.22
10	*Aphelochaeta marioni* (Polychaete)	34	1.16	1.19
	TOTAL CUMULATIVE PERCENT		81.28	83.07
		Station NF-6		
1	*Spio limicola* (Polychaete)	1440	38.79	43.32
2	*Polydora socialis* (Polychaete)	937	25.17	28.11
-	Nuculidae spp. (Bivalve)	190	5.10	-.-
3	*Mediomastus californiensis* (Polychaete)	174	4.67	5.22
4	*Crenella decussata* (Bivalve)	141	3.79	4.23
-	Ampharetidae spp. (Polychaete)	122	3.28	-.-
5	*Aphelochaeta marioni* (Polychaete)	108	2.90	3.24
6	*Ampharete acutifrons* (Polychaete)	71	1.91	2.13
7	*Monticellina baptisteae* (Polychaete)	53	1.42	1.59
8	*Scalibregma inflatum* (Polychaete)	42	1.13	1.26
9	*Exogone verugera* (Polychaete)	31	0.83	0.93
-	Orbiniidae spp. (Polychaete)	27	0.73	-.-
10	*Ninoe nigripes* (Polychaete)	25	0.67	0.75
	TOTAL CUMULATIVE PERCENT		90.38	90.79

Table 2 (Continued)

Rank	Species	Number of Individuals (0.04 m²)	Percent of Total Fauna	Percent of Identified Fauna
	Station NF-7			
1	*Spio limicola* (Polychaete)	1917	33.02	33.94
2	*Exogone verugera* (Polychaete)	894	15.40	15.83
3	*Prionospio steenstrupi* (Polychaete)	755	13.00	13.37
4	*Polydora socialis* (Polychaete)	545	9.39	9.65
5	*Mediomastus californiensis* (Polychaete)	401	6.91	7.10
6	*Tharyx acutus* (Polychaete)	136	2.34	2.41
7	*Aphelochaeta marioni* (Polychaete)	125	2.15	2.21
8	*Exogone hebes* (Polychaete)	95	1.64	1.68
9	*Crenella decussata* (Bivalve)	69	1.19	1.22
10	*Ninoe nigripes* (Polychaete)	58	1.00	1.03
	TOTAL CUMULATIVE PERCENT		86.03	88.42
	Station NF-8			
1	*Aricidea catherinae* (Polychaete)	583	43.19	46.20
2	*Mediomastus californiensis* (Polychaete)	197	14.59	15.61
3	*Tharyx acutus* (Polychaete)	179	13.26	14.18
4	*Monticellina baptisteae* (Polychaete)	53	3.93	4.20
5	*Levinsenia gracilis* (Polychaete)	45	3.33	3.57
6	*Spio limicola* (Polychaete)	43	3.19	3.41
7	*Aphelochaeta marioni* (Polychaete)	41	3.04	3.25
-	Cirratulidae spp. (Polychaete)	33	2.44	-.-
8	*Tubificoides apectinatus* (Oligochaete)	26	1.93	2.06
-	Tubificidae spp. (Oligochaete)	22	1.61	-.-
9	*Ninoe nigripes* (Polychaete)	19	1.41	1.51
10	Micrura spp. (Nemertean)	12	1.63	0.95
	TOTAL CUMULATIVE PERCENT		92.82	94.93

Table 2 (Continued)

Rank	Species	Number of Individuals (0.04 m²)	Percent of Total Fauna	Percent of Identified Fauna
	Station NF-9			
1	*Spio limicola* (Polychaete)	585	24.85	25.49
2	*Mediomastus californiensis* (Polychaete)	278	11.81	12.11
3	*Polydora socialis* (Polychaete)	259	11.00	11.29
4	*Ampharete acutifrons* (Polychaete)	124	5.27	5.40
5	*Monticellina baptisteae* (Polychaete)	101	4.29	4.40
6	*Polydora quadrilobata* (Polychaete)	98	4.16	4.27
7	*Prionospio steenstrupi* (Polychaete)	97	4.12	4.23
8	*Aphelochaeta marioni* (Polychaete)	83	3.53	3.62
9	*Ninoe nigripes* (Polychaete)	71	3.02	3.09
10	*Maldane glebifex* (Polychaete)	52	2.21	2.27
	TOTAL CUMULATIVE PERCENT		74.26	76.17
	Station NF-10			
1	*Spio limicola* (Polychaete)	522	24.62	28.46
2	*Mediomastus californiensis* (Polychaete)	372	17.55	20.28
-	Spionidae spp. (Polychaete)	155	7.31	-.-
3	*Maldane glebifex* (Polychaete)	119	5.61	6.49
4	*Ninoe nigripes* (Polychaete)	91	4.29	4.96
5	*Prionospio steenstrupi* (Polychaete)	91	4.29	4.96
6	*Aricidea catherinae* (Polychaete)	70	3.30	3.82
7	*Ampharete acutifrons* (Polychaete)	68	3.21	3.71
8	*Polydora socialis* (Polychaete)	66	3.11	3.60
9	*Tharyx acutus* (Polychaete)	48	2.26	2.62
10	*Leitoscoloplos acutus* (Polychaete)	48	2.26	2.62
	TOTAL CUMULATIVE PERCENT		77.83	81.52

Table 2 (Continued)

Rank	Species	Number of Individuals (0.04 m²)	Percent of Total Fauna	Percent of Identified Fauna
	Station NF-11			
1	*Mediomastus californiensis* (Polychaete)	485	29.06	30.85
2	*Prionospio steenstrupi* (Polychaete)	337	20.19	21.44
3	*Spio limicola* (Polychaete)	136	8.15	8.65
4	*Ninoe nigripes* (Polychaete)	99	5.93	6.30
5	*Aricidea catherinae* (Polychaete)	92	5.51	5.85
-	Cirratulidae spp. (Polychaete)	59	3.54	-.-
6	*Monticellina baptisteae* (Polychaete)	46	2.76	2.93
7	*Levinsenia gracilis* (Polychaete)	35	2.10	2.23
8	*Ampharete acutifrons* (Polychaete)	30	1.80	1.91
9	*Leitoscoloplos acutus* (Polychaete)	22	1.32	1.40
10	*Arctica islandica* (Bivalve)	21	1.26	1.34
	TOTAL CUMULATIVE PERCENT		81.61	82.89
	Station NF-12			
1	*Mediomastus californiensis* (Polychaete)	249	20.77	21.43
2	*Spio limicola* (Polychaete)	198	16.51	17.04
3	*Aricidea catherinae* (Polychaete)	179	14.93	15.40
4	*Ninoe nigripes* (Polychaete)	126	10.51	10.84
5	*Levinsenia gracilis* (Polychaete)	86	7.17	7.40
6	*Prionospio steenstrupi* (Polychaete)	84	7.01	7.23
7	*Leitoscoloplos acutus* (Polychaete)	34	2.84	2.93
8	*Monticellina baptisteae* (Polychaete)	22	1,83	1.89
9	*Micrura* spp. (Nemertea)	20	1.67	1.72
-	Cirratulidae spp. (Polychaete)	19	1.58	-.-
10	*Nucula delphinodonta* (Bivalve)	15	1.25	1.29
	TOTAL CUMULATIVE PERCENT		86.07	87.18

Table 2 (Continued)

Rank	Species	Number of Individuals (0.04 m²)	Percent of Total Fauna	Percent of Identified Fauna
	Station NF-13			
1	*Spio limicola* (Polychaete)	314	19.77	24.65
2	*Polydora socialis* (Polychaete)	212	13.35	16.64
3	*Exogone hebes* (Polychaete)	196	12.34	15.38
-	Maldanidae spp. (Polychaete)	172	10.83	-.-
-	Spionidae spp. (Polychaete)	109	6.86	-.-
4	*Mediomastus californiensis* (Polychaete)	80	5.04	6.28
5	*Aglaophamus circinata* (Polychaete)	53	3.34	4.16
6	*Aricidea catherinae* (Polychaete)	46	2.90	3.61
7	*Exogone verugera* (Polychaete)	42	2.64	3.30
8	*Tharyx acutus* (Polychaete)	41	2.58	3.22
9	*Ampharete acutifrons* (Polychaete)	32	2.02	2.51
10	*Prionospio steenstrupi* (Polychaete)	32	2.02	2.51
	TOTAL CUMULATIVE PERCENT		83.70	82.26
	Station NF-14			
1	*Spio limicola* (Polychaete)	408	16.87	17.64
2	*Mediomastus californiensis* (Polychaete)	346	14.31	14.96
3	*Exogone hebes* (Polychaete)	274	11.33	11.85
4	*Polydora socialis* (Polychaete)	272	11.25	11.76
5	*Prionospio steenstrupi* (Polychaete)	153	6.33	6.61
6	*Ampharete acutifrons* (Polychaete)	136	5.62	5.88
7	*Asabellides oculata* (Polychaete)	123	5.09	5.32
8	*Ninoe nigripes* (Polychaete)	104	4.30	4.50
9	*Exogone verugera* (Polychaete)	60	2.48	2.59
10	Tubificidae sp. 2 (Oligochaete)	47	1.94	2.03
	TOTAL CUMULATIVE PERCENT		79.53	83.14

Table 2 (Continued)

Rank	Species	Number of Individuals (0.04 m²)	Percent of Total Fauna	Percent of Identified Fauna
	Station NF-15			
1	*Spio limicola* (Polychaete)	592	21.38	21.97
2	*Polydora socialis* (Polychaete)	530	19.14	19.67
3	*Mediomastus californiensis* (Polychaete)	407	14.70	15.11
4	*Polydora quadrilobata* (Polychaete)	220	7.95	8.17
5	*Prionospio steenstrupi* (Polychaete)	175	6.32	6.50
6	*Ninoe nigripes* (Polychaete)	135	4.88	5.01
7	*Exogone hebes* (Polychaete)	117	4.23	4.34
8	*Ampharete acutifrons* (Polychaete)	97	3.50	3.60
9	*Aricidea catherinae* (Polychaete)	43	1.55	1.60
10	*Exogone verugera* (Polychaete)	28	1.01	1.04
	TOTAL CUMULATIVE PERCENT		84.65	87.01
	Station NF-16			
1	*Mediomastus californiensis* (Polychaete)	427	32.20	33.75
2	*Aricidea catherinae* (Polychaete)	209	15.76	16.52
3	*Levinsenia gracilis* (Polychaete)	81	6.11	6.40
4	Tubificidae sp. 2 (Oligochaete)	79	5.96	6.25
5	*Tharyx acutus* (Polychaete)	65	4.90	5.14
6	*Spio limicola* (Polychaete)	61	4.60	4.82
7	*Ninoe nigripes* (Polychaete)	59	4.45	4.66
8	*Monticellina baptisteae* (Polychaete)	47	3.54	3.72
9	*Euchone incolor* (Polychaete)	40	3.02	3.16
10	*Leitoscoloplos acutus* (Polychaete)	37	2.79	2.92
	TOTAL CUMULATIVE PERCENT		83.33	87.35

Table 2 (Continued)

Rank	Species	Number of Individuals (0.04 m²)	Percent of Total Fauna	Percent of Identified Fauna
	Station NF-17			
1	*Corophium crassicorne* (Amphipod)	116	17.21	18.59
2	*Pygospio elegans* (Polychaete)	72	10.68	11.54
3	*Exogone hebes* (Polychaete)	70	10.39	11.22
4	*Unciola inermis* (Amphipod)	55	8.16	8.81
5	*Aglaophamus circinata* (Polychaete)	35	5.19	5.61
6	*Aricidea catherinae* (Polychaete)	33	4.90	5.29
7	*Pseudunciola obliqua* (Amphipod)	27	4.01	4.33
8	*Chiridotea tufisi* (Isopod)	23	3.41	3.69
-	Maldanidae spp. (Polychaete)	23	3.41	-.-
9	*Spiophanes bombyx* (Polychaete)	17	2.52	2.72
10	*Polygordius* sp. A (Polychaete)	15	2.23	2.40
	TOTAL CUMULATIVE PERCENT		72.11	74.20
	Station NF-18			
1	*Spio limicola* (Polychaete)	433	22.73	23.78
2	*Prionospio steenstrupi* (Polychaete)	279	14.65	15.32
3	*Mediomastus californiensis* (Polychaete)	211	11.08	11.59
4	*Tharyx acutus* (Polychaete)	92	4.83	5.05
5	*Polydora socialis* (Polychaete)	81	4.25	4.45
6	*Exogone verugera* (Polychaete)	79	4.15	4.34
7	*Exogone hebes* (Polychaete)	65	3.41	3.57
8	*Ninoe nigripes* (Polychaete)	61	3,30	3.35
9	*Aricidea catherinae* (Polychaete)	55	2.89	3.02
10	Tubificidae sp. 2 (Oligochaete)	45	2.36	2.47
	TOTAL CUMULATIVE PERCENT		73.54	76.94

Table 2 (Continued)

Rank	Species	Number of Individuals (0.04 m²)	Percent of Total Fauna	Percent of Identified Fauna
	Station NF-19			
1	*Spio limicola* (Polychaete)	1338	31.23	33.42
2	*Polydora socialis* (Polychaete)	1081	25.23	27.00
3	*Mediomastus californiensis* (Polychaete)	186	4.34	4.65
4	*Ampharete acutifrons* (Polychaete)	138	3.22	3.45
5	*Scalibregma inflatum* (Polychaete)	131	3.06	3.27
-	Ampharetidae spp. (Polychaete)	107	2.50	-.-
6	*Asabellides oculata* (Polychaete)	94	2.19	2.35
7	*Tharyx acutus* (Polychaete)	74	1.73	1.85
8	*Owenia fusiformis* (Polychaete)	71	1.66	1.77
9	*Capitella capitata* complex (Polychaete)	63	1.47	1.57
10	*Laonome kroeyeri* (Polychaete)	56	1.31	1.40
11	*Phoronis architecta* (Phoronid)	56	1.31	1.40
	TOTAL CUMULATIVE PERCENT		79.24	82.12
	Station NF-20			
1	*Mediomastus californiensis* (Polychaete)	420	32.06	32.89
2	*Aricidea catherinae* (Polychaete)	209	15.95	16.37
3	*Prionospio steenstrupi* (Polychaete)	189	14.43	14.80
4	*Ninoe nigripes* (Polychaete)	111	8.47	8.69
5	*Levinsenia gracilis* (Polychaete)	53	4.05	4.15
6	*Monticellina baptisteae* (Polychaete)	49	3.74	3.84
7	Tubificidae sp. 2 (Oligochaete)	46	3.51	3.60
8	*Spio limicola* (Polychaete)	29	2.21	2.27
9	*Tharyx acutus* (Polychaete)	28	2.14	2.19
10	*Exogone verugera* (Polychaete)	27	2.06	2.11
	TOTAL CUMULATIVE PERCENT		88.63	90.92

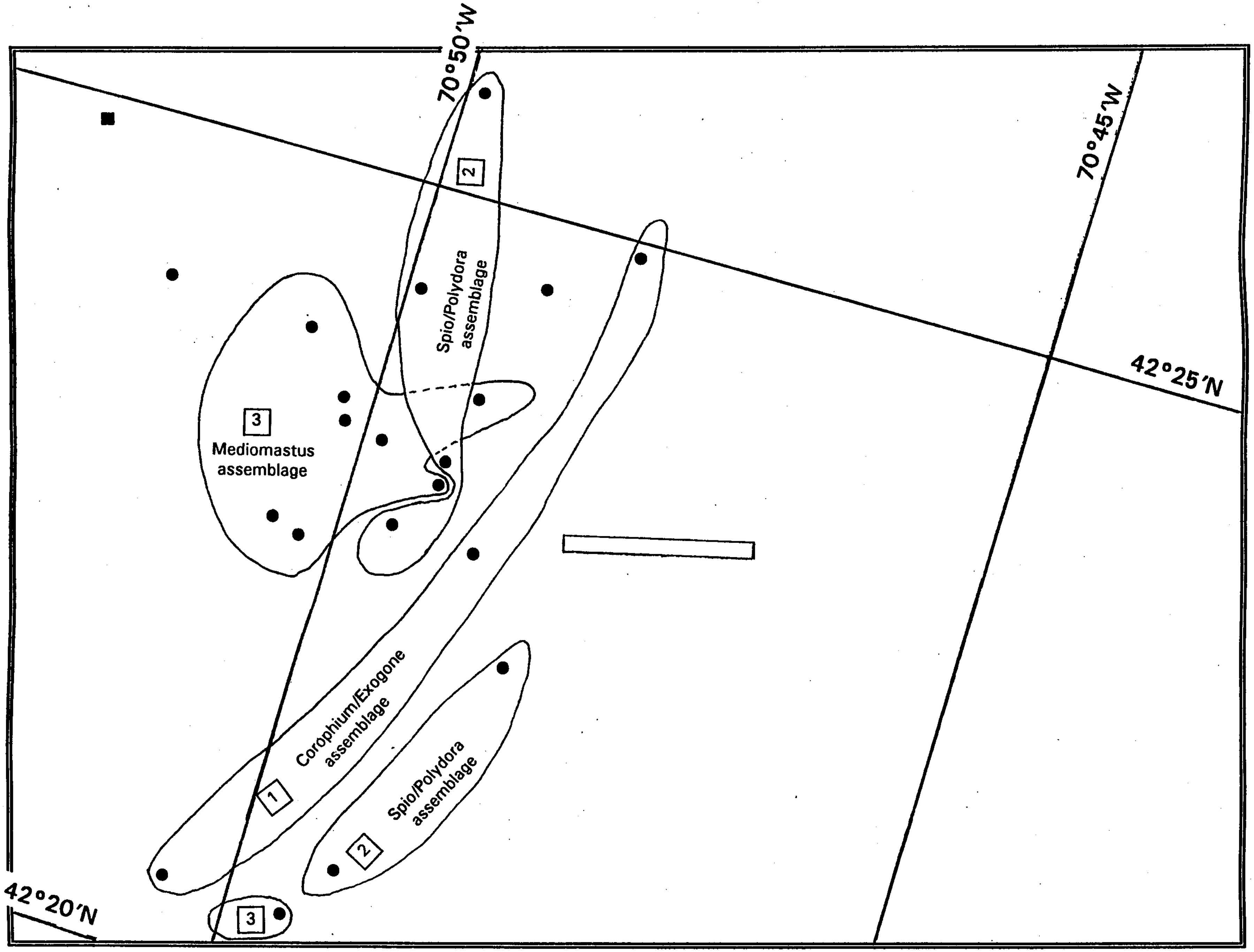


Figure 12. Infaunal Assemblages in the Nearfield.

Station NF8 is dominated by *Aricidea catherinae*, the cirratulid polychaete *Tharyx acutus*, and *Mediomastus californiensis*.

The distribution of some selected species with respect to their total densities, rather than their ranks, is presented in Figures 13 and 14. Figure 13 shows the total numbers of spionid polychaetes at each station. The highest abundances of all spionids combined were found at stations with the highest abundances of *Spio limicola* (NF5, NF6, NF7, and NF19) (Figure 13A). *Polydora socialis* generally was most abundant at the stations with high abundances of *S. limicola* and contributed about half of the spionid individuals at Station NF19, whereas *Polydora quadrilobata* was found in considerable numbers only at Station NF5. *Prionospio steenstrupi* occurred in moderate numbers and was most abundant at Station NF7. Geographically, the highest spionid densities were concentrated at stations farthest away from the diffuser to the northwest and at two stations located west and south of the diffuser (Figure 13B). Figure 14 shows abundances of *Aricidea catherinae*, a species that tended to be more abundant at stations where the spionid polychaetes were less important. By far the highest number of individuals was found at Station NF8 (Figure 14A), and moderate abundances were noted at Stations NF1, NF3, NF12, NF16, and NF20. Geographically, the highest abundances of *A. catherinae* were found at the stations closest to Boston Harbor (Figure 14B).

Species Richness and Diversity

The number of species found at each station (species richness) in the nearfield area ranged from 32 to 93 (Table 1). The fewest species were found at Stations NF2, NF4, NF8, and NF20. The most species were found at Stations NF5, NF7, NF9, and NF19. High and low species richness did not coincide with high and low diversity because there was a wide range of infaunal densities among stations with similar species richness. Because of this wide range, the Shannon-Wiener index H' and the evenness value J' do not track well; i.e., higher H' values do not necessarily correspond to higher J' values. According to Peet (1974), J' is strongly influenced by species richness; i.e., the addition of rare species to samples having few species greatly changes its value. By analogy, H' is strongly influenced by high densities of few species. The nearfield data suggest that J' is too high at stations with low species richness, and H' is too low at stations with low infaunal densities.

Given the uncertainties with H' and J', it is likely that Hurlbert's rarefaction is a more useful and realistic measure for diversity at these stations. Rarefaction data are plotted in Figure 15. The number of expected species per 500 individuals was lowest at Stations NF6, NF8, and NF20 (24.1 to 35.4 species per 500 individuals). The highest diversities were calculated for Stations NF5, NF9, NF17, and NF18 (48.6 to 51.8 species per 500 individuals). Station NF7, where the second highest number of species was reported, is not among the high-diversity stations because it had by far the highest infaunal densities. No spatial pattern could be seen in the distribution of high- and low-diversity stations in the nearfield area.

Community Patterns

Results of the cluster analysis using both Bray-Curtis and NESS are shown in Figure 16. Three clusters of stations and one outlier station (Station NF2) are more or less defined in this analysis. Cluster 1 includes stations NF1, NF4, and NF17. This cluster is in the transitional area between the soft-bottom area and the hard grounds and was previously defined in the dominant species analysis as having high numbers of the amphipod *Corophium crassicorne* and the syllid polychaete *Exogone hebes* as well as spionids and paraonids.

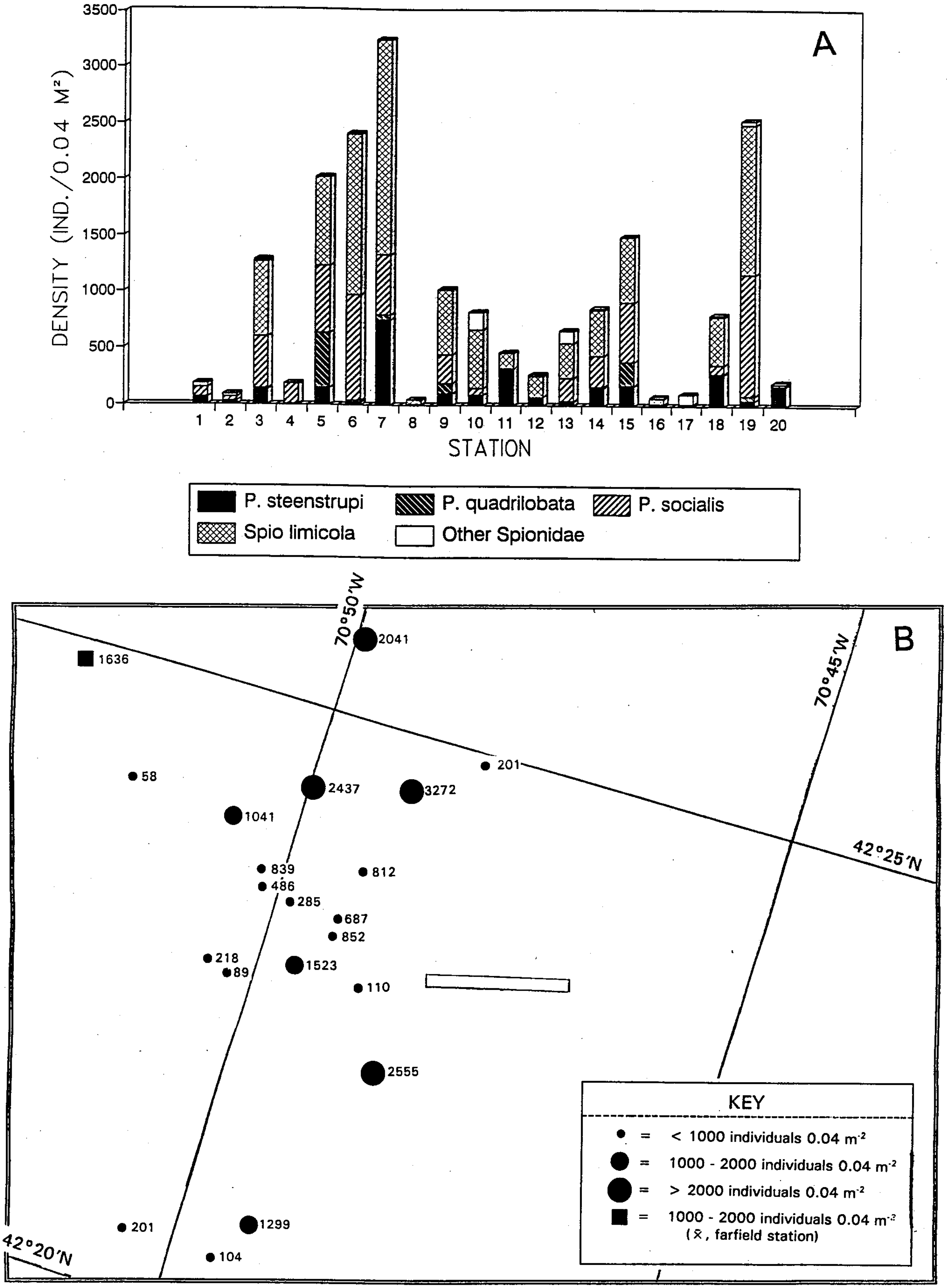
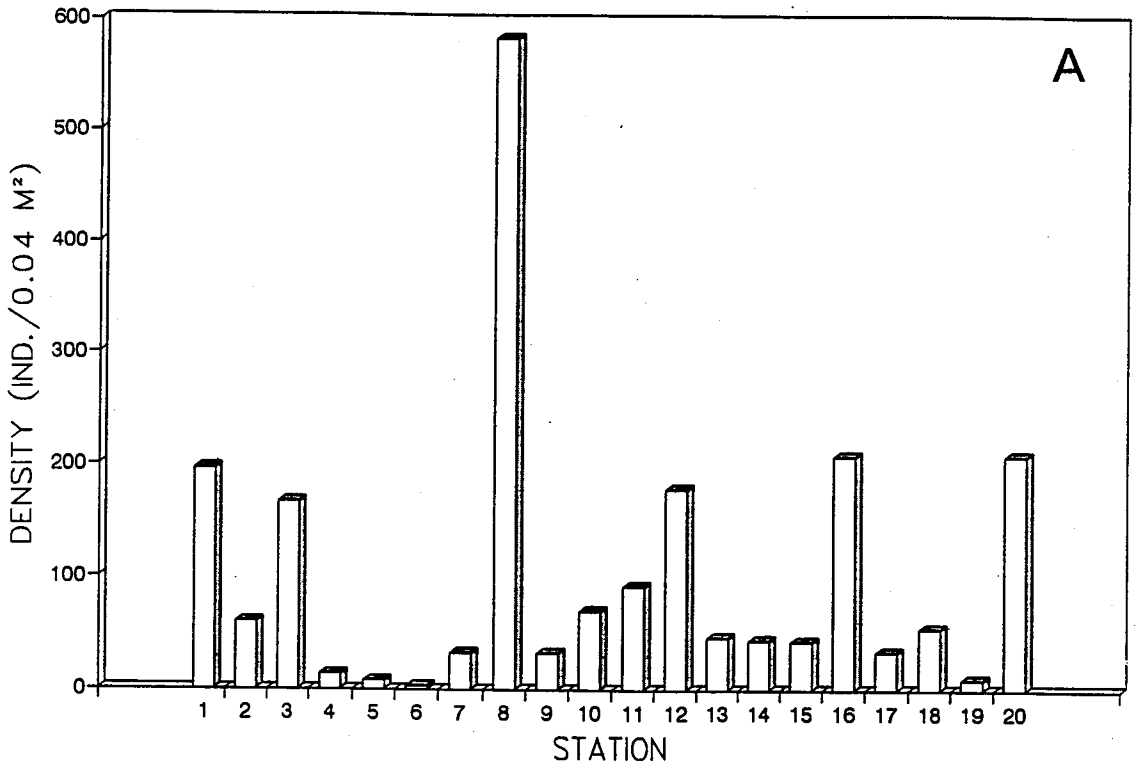


Figure 13. Distribution of Spionid Polychaetes in the Nearfield. A, Total Abundances of Species Kept Separate; B, Geographical Distribution of all Spionids Combined.



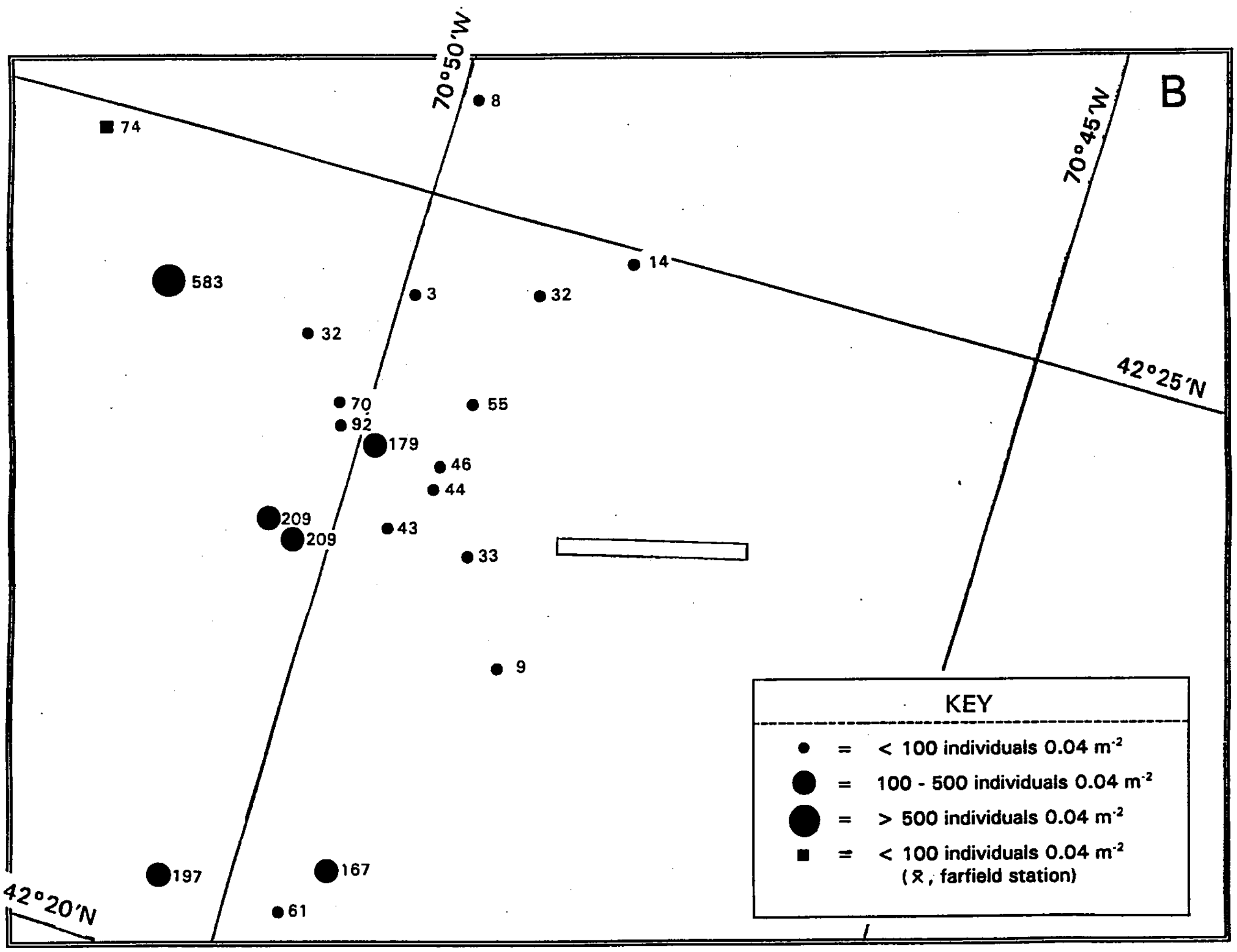


Figure 14. Distribution of *Aricidea catherinae* in the Nearfield.

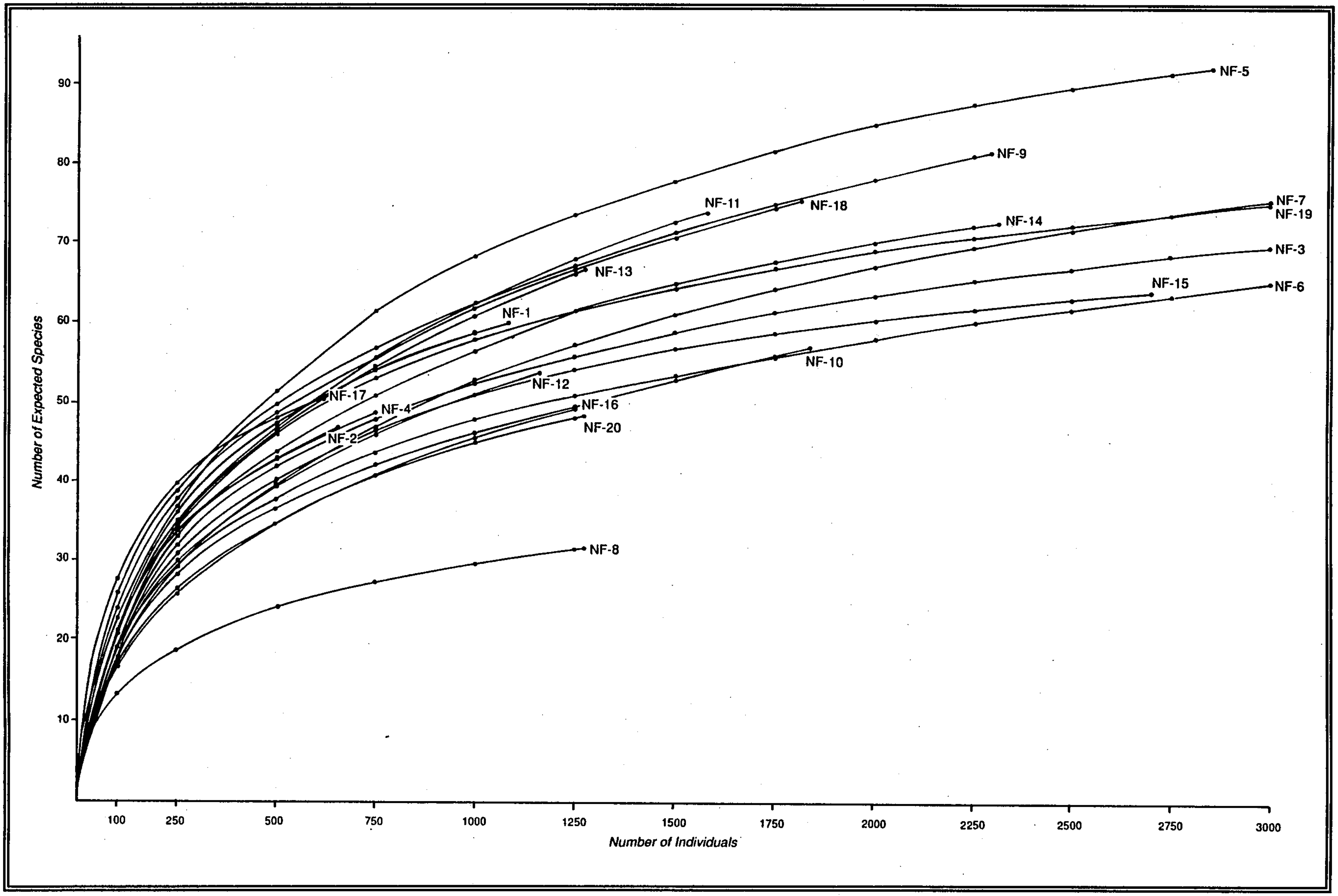


Figure 15. **Rarefaction Curves for the Nearfield Stations.**

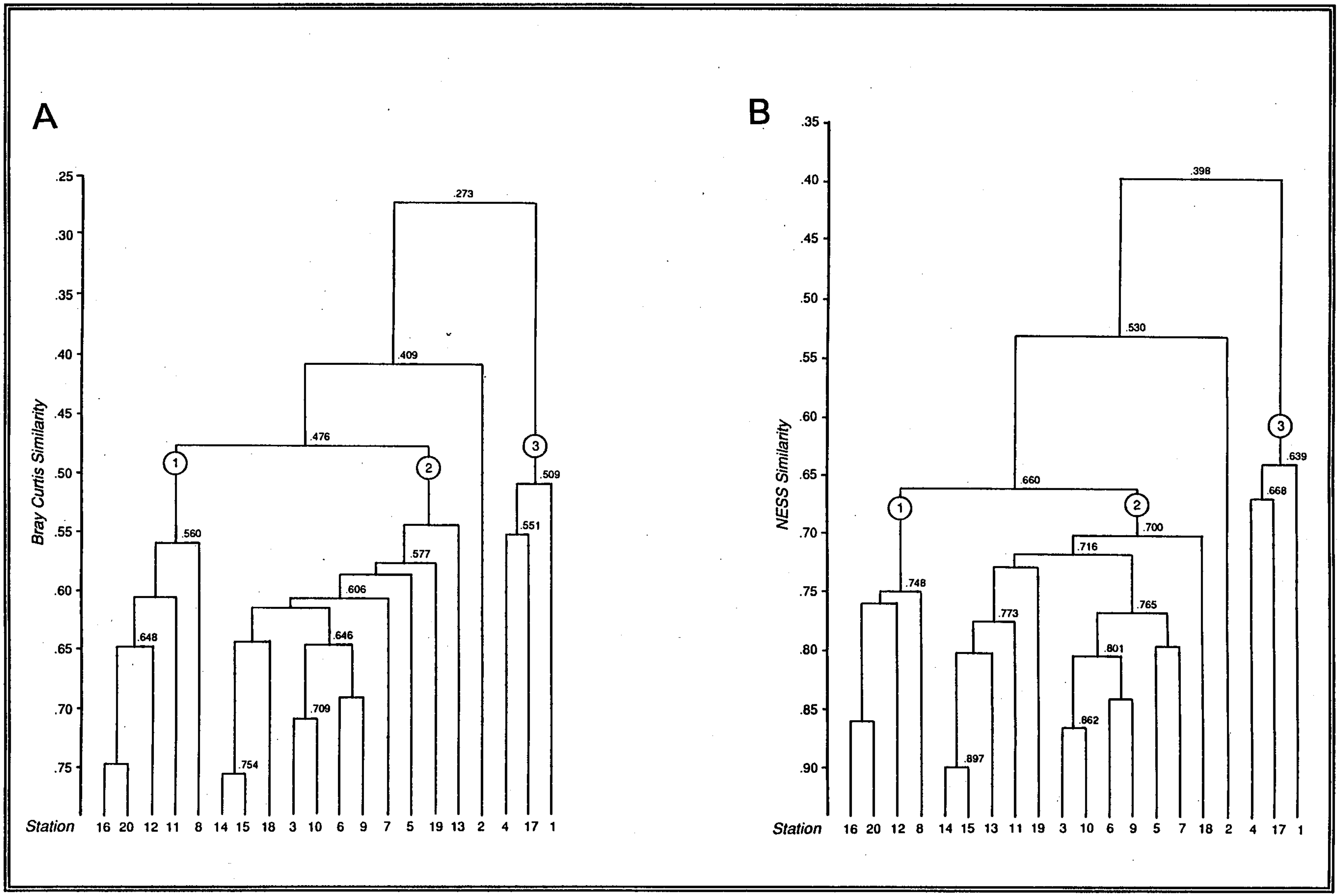


Figure 16. **Similarity Among the Nearfield Stations. A, Bray-Curtis Similarity; B, NESS Similarity. Clustering with group average sorting (UPGMA).**

The second and third clusters are similarly defined with Bray-Curtis and NESS, except for Station NF11 which joins with cluster 3 in Bray-Curtis and with cluster 2 in NESS. Cluster 2 includes most of the spionid-dominated stations, while cluster 3 includes those stations dominated by *Mediomastus californiensis* and *Aricidea catherinae*. Station NF11 had lower densities of *Spio limicola* than other stations in cluster 2 and higher densities of *Aricidea catherinae* than other stations in cluster 3. These density patterns might explain the shifting of Station NF11 in the two different clustering strategies. Station NF2 is an outlier to both clusters 2 and 3. This station, although dominated by *Mediomastus californiensis* and *Aricidea catherinae*, has fewer specimens of these species than other stations in cluster 3. Furthermore, other species, such as *Monticellina baptisteae* and *Levinsenia gracilis*, that are important at stations in cluster 2 are entirely lacking at Station NF2. The clusters (with Station NF11 assigned to cluster 3), are mapped in Figure 17. The outlines of the clusters coincide roughly with the assemblages depicted in Figure 12, but differ from the latter because the entire fauna is assessed in the cluster analysis, whereas the assemblages are characterized by a few dominant species.

Results of the ordination analysis are shown in Figure 18. In this analysis, the individual stations have been assigned symbols that correspond to the station clusters identified in the similarity analysis. Ordination by station is shown in the upper diagram of Figure 18. Group 1 is defined along axis 1, whereas clusters 2 and 3 are defined along axis 2. Outlier Station NF2 shows a correlation with axis 3. When species are plotted, those responsible for pulling the clusters apart can be identified. For example, in the lower diagram of Figure 18, the Group 1 stations are pulled on axis 1 by *Corophium crassicorne, Unciola inermis*, and *Aglaophamus circinata*, whereas *Mediomastus californiensis, Aricidea catherinae, Monticellina baptisteae, Levinsenia gracilis*, and Tubificidae sp. 2 are responsible for pulling all of the cluster 3 stations except NF11 along axis 2. Station NF11 has already been noted to lack some of these species. Station NF2 lies amidst the cluster 2 stations in the ordination plot, but its low profile relative to axis 3 may indicate the reduced importance of spionids at that station.

3.2 Farfield Sites

In the following section, the sedimentary characteristics of the August samples (3.2.1 through 3.2.6) and the benthic communities of the May and August samples (3.2.7) are described.

3.2.1 Distribution of Sediment Types

The 12 farfield stations are distributed over a wide area and located far apart. The low-density spacing of stations does not allow contouring of sedimentary gradients. However, some regional trends can be delineated. Figure 19 shows the major modal grain size as determined from the REMOTS® images (August) and the weight percent silt + clay from sieve analyses of the upper 16 cm of the gravity core samples collected in May by Bothner (unpublished). All but one of the farfield stations lying below a depth of 100 ft (33 m) have major textural modes ≥4 phi (silt-clay); the exception is Station FF9, a sandy bottom located at a depth of 160 ft. The results from both analyses are similar at all stations. Sediment grain-size data of the August farfield samples are listed in Appendix C.

Stations FF1, FF14, FF9, FF4, and FF5 lie within the silt-clay facies of Stellwagen Basin. Stations FF11 and FF8 are located in the fine-grained sediments at the western edge of the Gulf of Maine. Stations FF6 and FF7 are located in the silt-clay basin of Cape Cod Bay. All of these fine-grained stations are interpreted to represent low kinetic energy depositional sites.

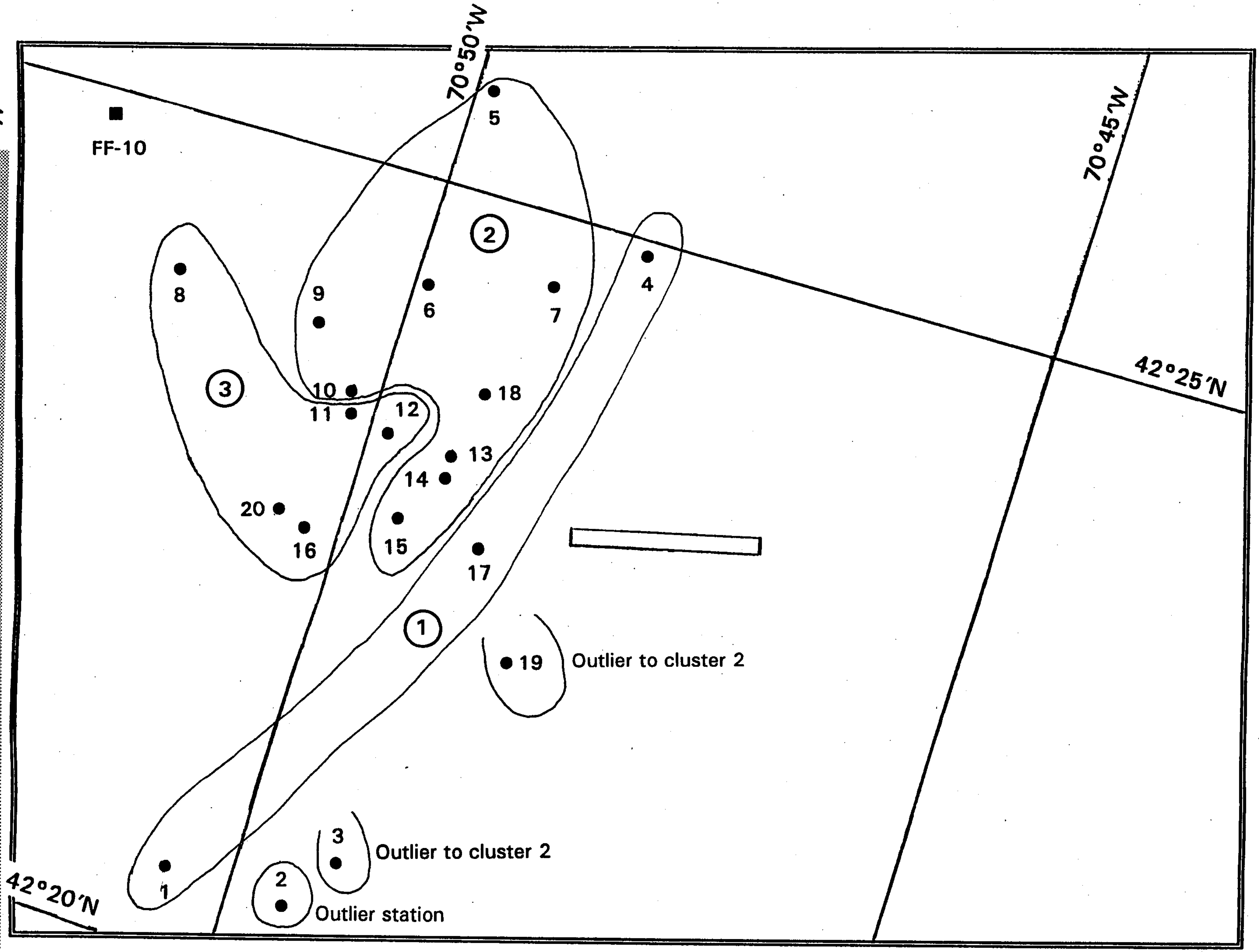


Figure 17. Geographical Distribution of the Station Clusters Defined by NESS and Group Average Sorting (UPGMA).

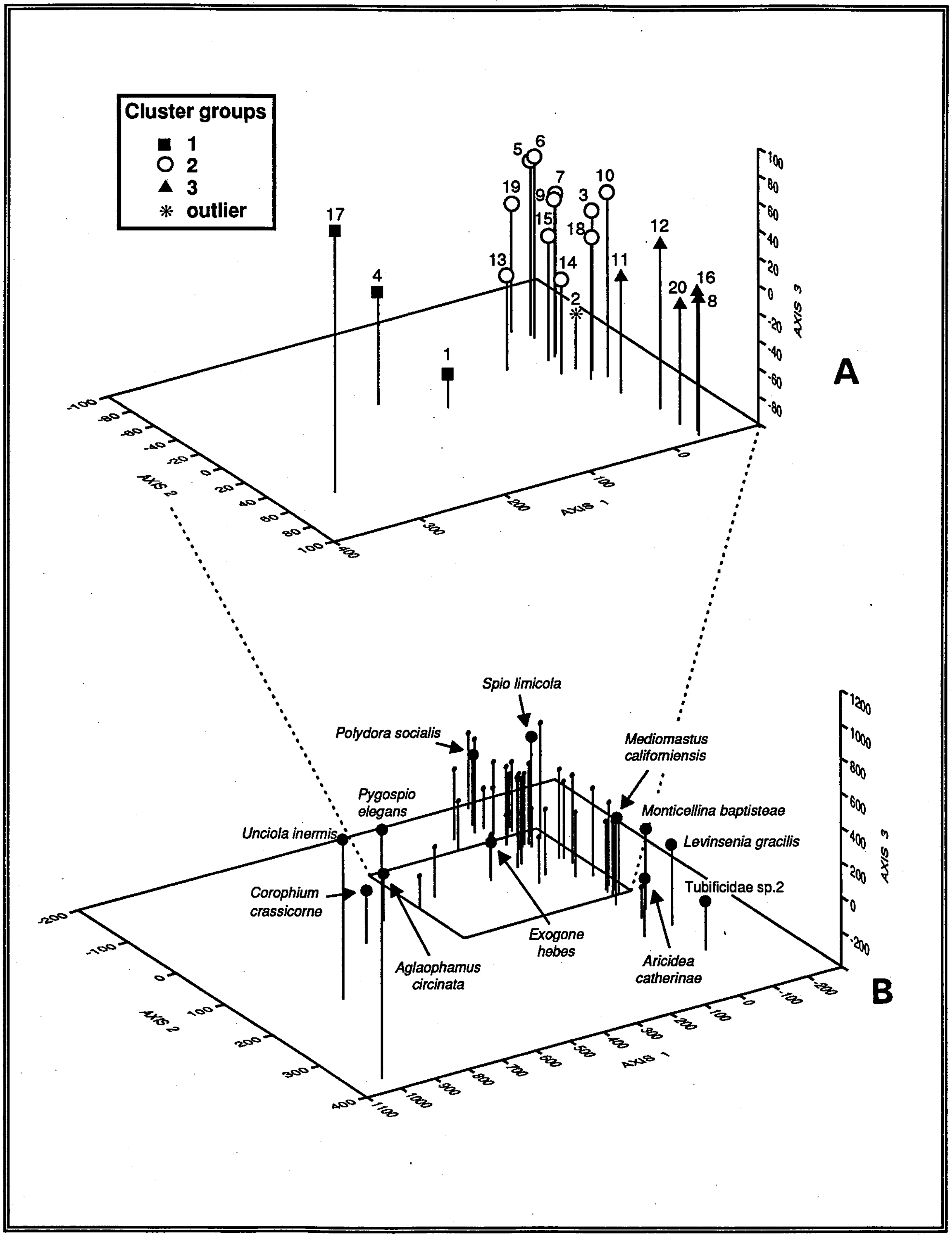


Figure 18. **Ordination by Reciprocal Averaging on the First Three Axes. A, Ordination of Nearfield Stations; B, Ordination of Species.**

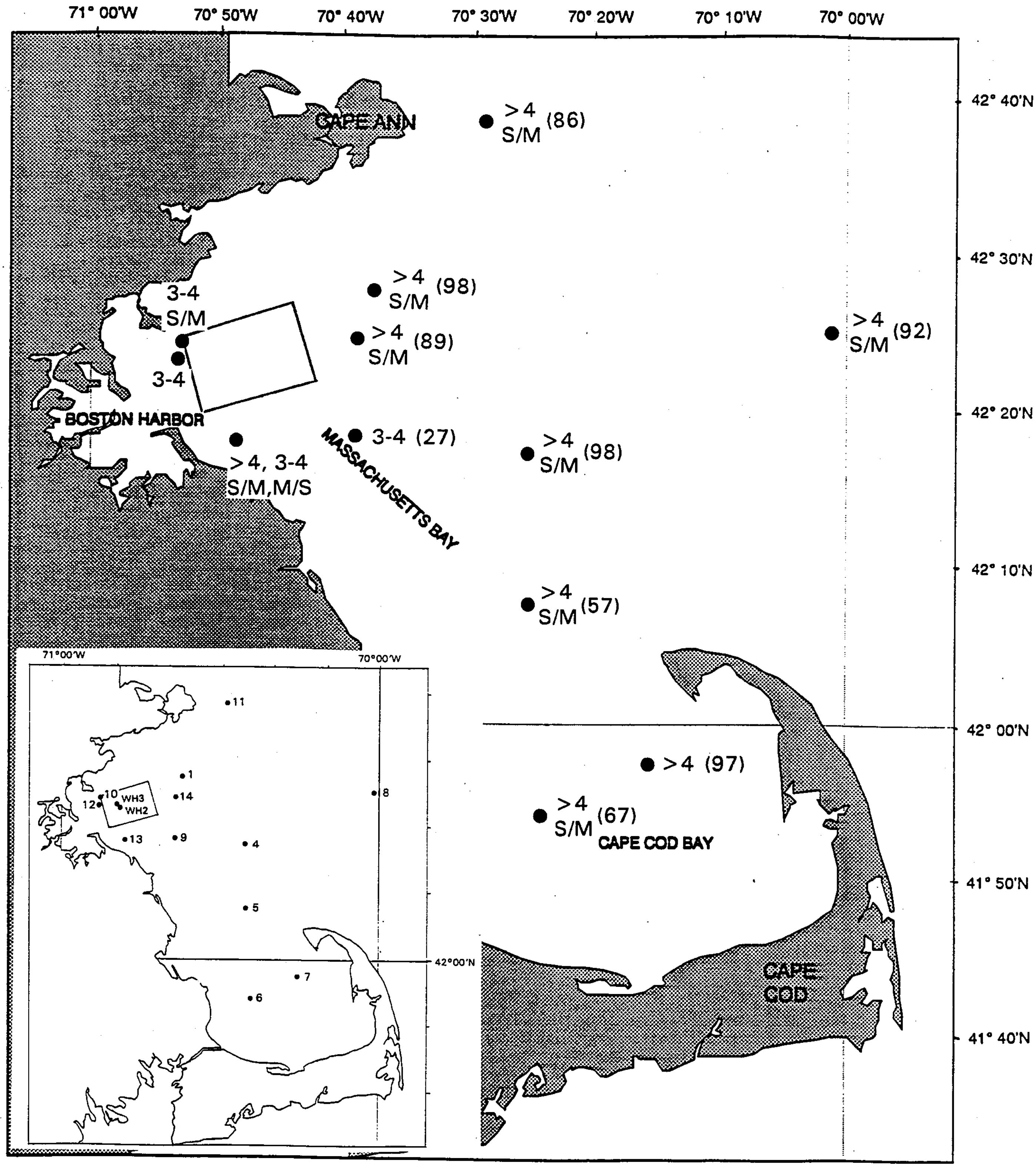


Figure 19. Distribution of Major Modal Grain Size and Other Sedimentary Features in the Farfield. Data are from REMOTS® images. S/M and M/S indicate down-image layers of sand and mud. Values in parentheses are weight percent silt and clay as determined from sieve analysis on the upper 16 cm of gravity cores collected and analyzed by the U.S.G.S.

The sample replicates at Station FF13 are texturally variable. The sieve analysis showed one replicate to have a major mode within the gravel size range (-1.0 phi) and one replicate within the sand size range (<4 >-1 phi). The three REMOTS® images show two with major modes within the >4 phi (silt-clay) class and one within the 3-4 phi (very fine sand) range. Station FF13 apparently lies within an area of bottom that is texturally complex, and small differences in vessel positioning can yield very different sediment types. For this reason FF13 may not be a good candidate for long-term monitoring because spatial variations may mask any temporal changes that might take place in the future.

Down-image variations in texture also were noted (sand-over-mud or mud-over-sand) at all stations except FF7, FF9, and FF12 (Figure 19). This textural grading was also noted in some of the nearfield and Boston Harbor sediments sampled in August. The sand-over-mud stratigraphy may be related to storm events that can transport sand from topographic elevations (submerged drumlins or Stellwagen Bank) into deeper water muds or from nearshore sandy areas into deeper water muds offshore.

3.2.2 Total Organic Carbon (TOC)

The distribution of mean TOC values at the farfield sites is shown in Figure 20; raw data are presented in Appendix C. All stations with a major textural mode of ≥ 4 phi have mean TOC values >1%. Four stations have TOC values over 2% (FF1, FF4, FF7, FF8). The relationship between fine texture and relatively high TOC content is expected in low kinetic energy depositional environments. The very fine sand (3-4 phi) stations FF10 and FF12 contain less than 1% TOC, and the sediment profile images have high optical reflectance, which is often correlated with low inventories of sulfides. These two stations probably represent higher kinetic energy environments where labile organic matter is washed from the sediment.

3.2.3 Clostridium Spores

Figure 21 shows the distribution of spores as CFUs per gram of dry sediment; the corresponding data are listed in Appendix C. Because the counts can vary by an order of magnitude between sample replicates, the range of values is given for each station rather than the mean. The highest concentrations of spores (thousands per gram dry wt.) are found at stations closest to Boston Harbor (FF10, FF12, and FF13) and Gloucester (FF11). The lowest concentrations are found at Station FF7 in Cape Cod Bay south and west of Race Point. One replicate at Station FF5 and both replicates at Station FF8 did not yield an accurate estimate of spore concentrations because of high particulate loads on the filtration membrane. However, these replicates apparently have relatively low spore counts ($<350\ g^{-1}$ dry wt.). It is likely that values of a few hundred spores per gram dry sediment represent background values for inner shelf sediments in this region. Butman *et al.* (1992) reported background spore concentrations of less than 15 CFUs g^{-1} dry wt. at depths below 100 cm in a gravity core taken near the outfall site. The high spore count off Cape Ann (Station FF11) may reflect the Gulf of Maine current pushing Merrimac River waters southward around the Cape. Boston Harbor water apparently moves over this station only during prolonged periods of southwest winds (Blumberg *et al.*, 1993).

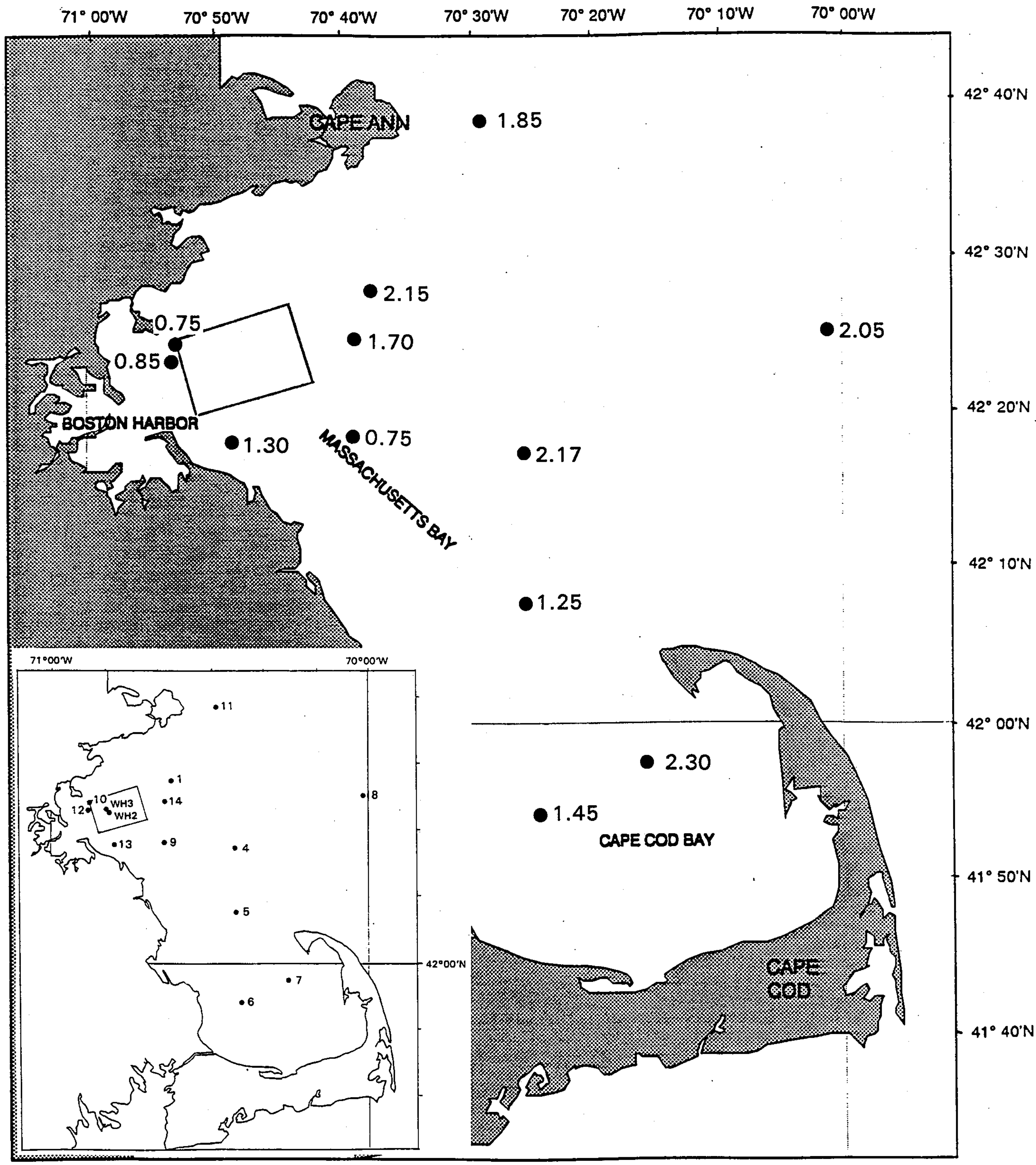


Figure 20. Distribution of Total Organic Carbon Contents (wt %) in the Farfield.

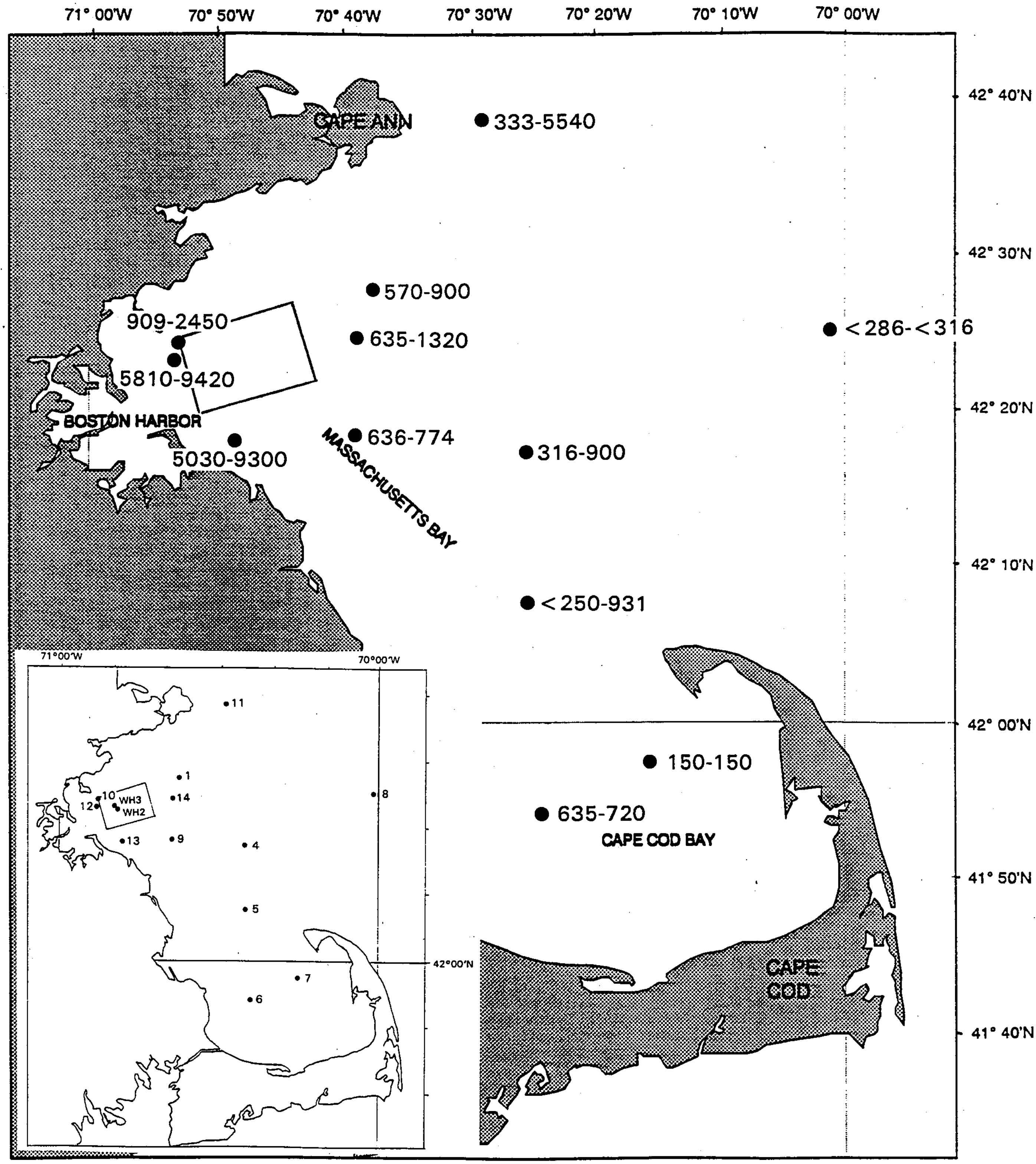


Figure 21. Distribution of *Clostridium perfringens* Spores (colony forming units per gram dry weight of sediment) in the Farfield.

3.2.4 Apparent RPD Depths

Mean apparent RPD depths more than 3 cm deep tend to be associated with intensive biological mixing of the upper sediment column. Figure 22 shows that deep mixing is present at both Cape Cod Bay stations (FF6 and FF7) and at one station in the Stellwagen Basin (FF4). There seems to be a reduction in the mean apparent RPD depth as one approaches Boston Harbor, but the detection of a spatial trend is compromised by the sparse density of farfield stations.

3.2.5 REMOTS® Successional Stages

Stage III seres consisting of large deep-burrowing deposit feeders are found at all stations except FF12, located close to the outer part of Boston Harbor (Stage I only), and FF9, which is located south and east of the nearfield site (Stages I and II). Stage I seres consisting mostly of small deposit-feeding polychaetes are also widely distributed and sufficiently dense in some cases to form tube mats on the sediment surface (Figure 23). Stage II seres are usually filter-feeding amphipods and bivalves, although the sabellid polychaetes *(Euchone)* found in Cape Cod Bay also fit this category.

Stations FF6 and FF7 are located within the *Molpadia oolitica-Euchone incolor* biofacies of Cape Cod Bay (Young and Rhoads, 1971; Rhoads and Young, 1971). Profile images from both stations show the presence of biogenic mounds at the surface. These mounds are known to be formed by fecal accumulations of the holothurian *Molpadia oolitica,* which feeds head-down in the sediment. Some of the tube mats at Station FF6 are likely formed by populations of the filter-feeding polychaete *Euchone incolor* that live on the tops of the holothurian fecal mounds; one individual of *M. oolitica* was found in the grab samples taken at Station FF7 (see Appendix A). The single photographic replicate at Station FF6, containing no Stage I seres, was apparently taken in a depression between holothurian mounds where sedentary infauna are excluded because of the high flux of loose holothurian fecal material (Rhoads and Young, 1971).

The persistence of the *Molpadia oolitica-Euchone incolor* community in the silt-clay basin of Cape Cod Bay since at least 1969 strongly suggests that this assemblage represents a climax benthic assemblage and should serve as an excellent monitoring indicator for detecting environmental change.

3.2.6 Organism-Sediment Indices

Mean station values for the Organism-Sediment Index (OSI) are shown in Figure 24. Past mapping experience in Massachusetts Bay and Boston Harbor has shown that OSI values $\geq +6$ represent habitats that have a low degree of physical disturbance and experience rates of organic loading that are in approximate balance with consumption and remineralization within the sediment column. With the exception of Station FF9, all of the farfield stations lying east of the nearfield area have OSI values greater than +6, although Station FF14 and FF11 are only fractionally higher than +6. The low OSI value at Station FF9 is related to the apparent absence of Stage III seres and the presence of a thin apparent RPD. Station FF11 had one sample replicate with high *C. perfringens* spore counts and one replicate without evidence of Stage III infauna, suggesting that this station may be affected by sewage. The highest OSI values are found at the two *Molpadia oolitica-Euchone incolor* stations (FF6 and FF7) in Cape Cod Bay and at Station FF4 in Stellwagen Basin. All REMOTS® parameters for the farfield stations are listed in Appendix B.

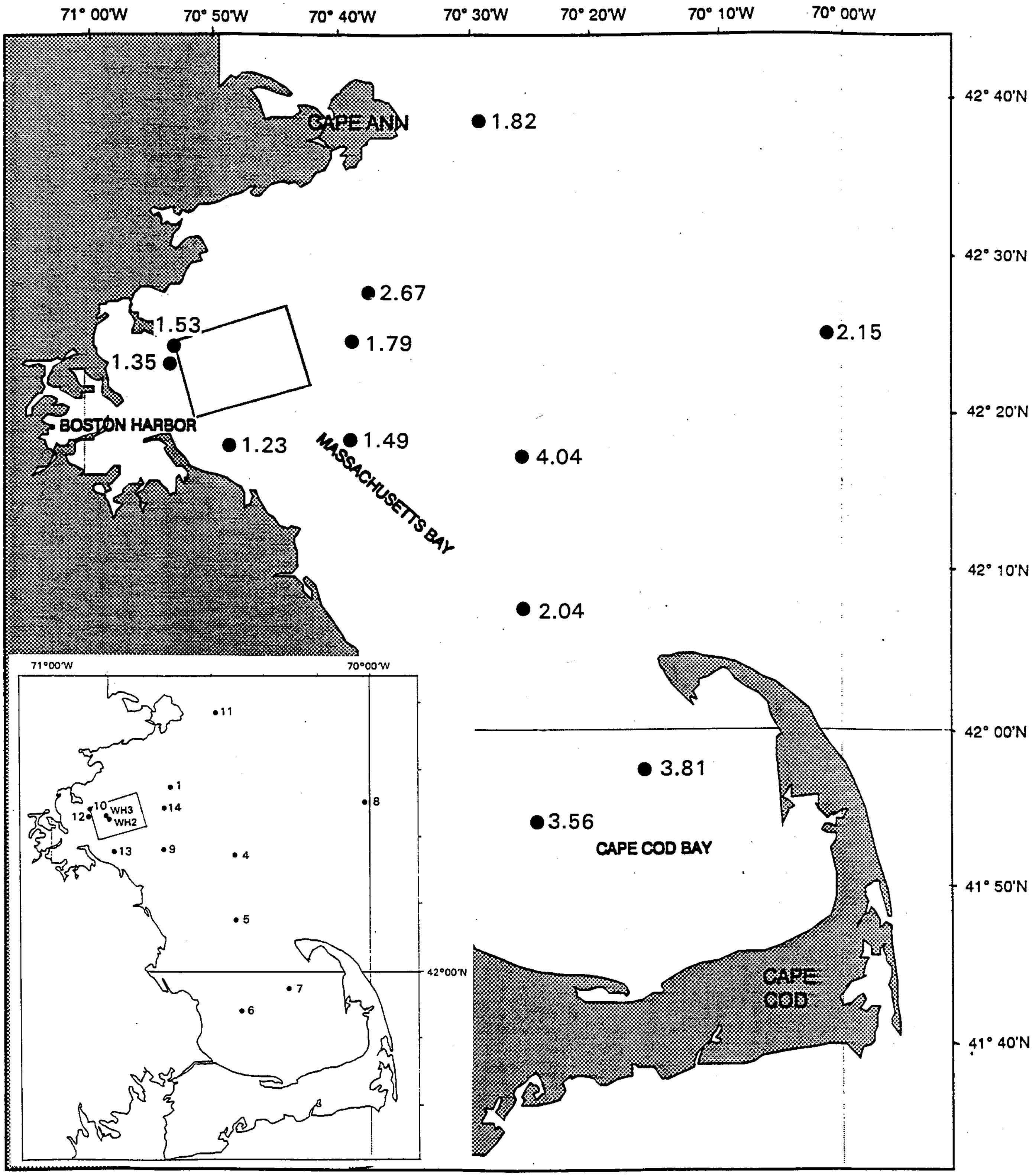


Figure 22. Distribution of Mean Apparent Redox Potential Discontinuity (RPD) Depths in the Farfield (cm below Sediment-Water Interface).

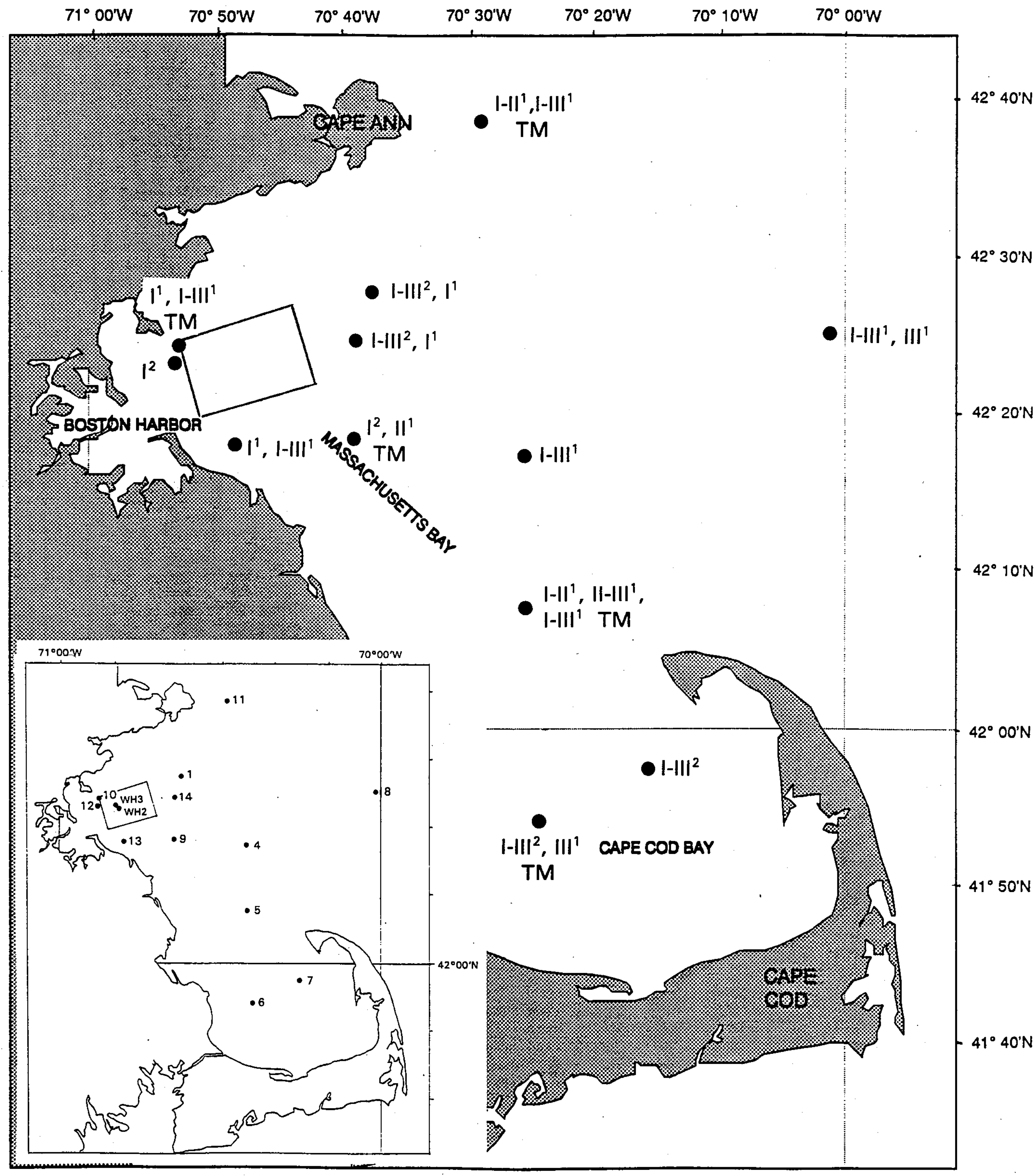


Figure 23. Distribution of Successional Stages in the Farfield. Superscript numbers indicate number of replicate images showing a particular successional stage. TM indicates tube mats.

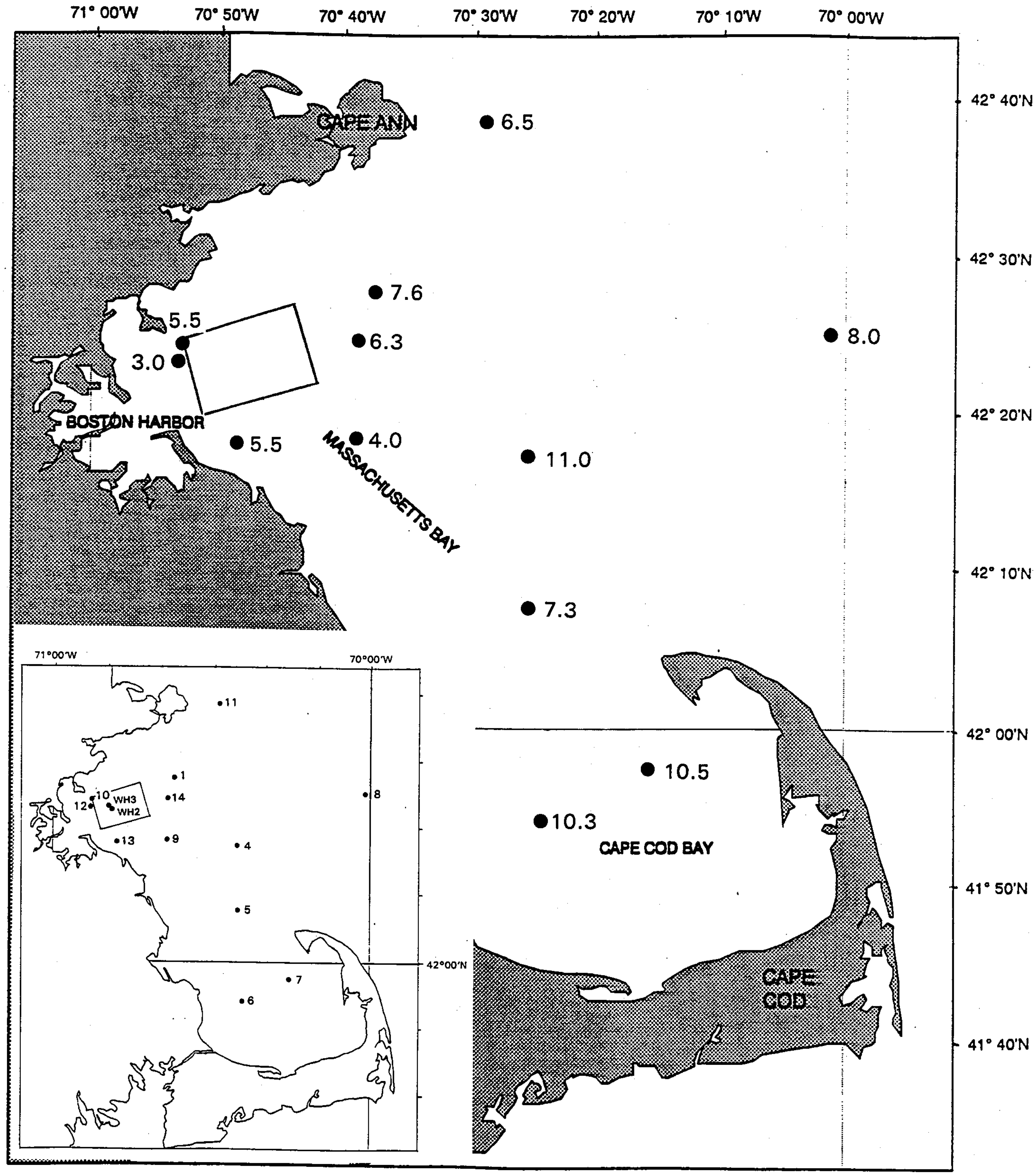


Figure 24. Distribution of Organism-Sediment Indices (OSIs) in the Farfield.

3.2.7 Benthic Infauna

Composition of the Fauna

During the May and August sampling events in the farfield area, 261 species were collected, including 135 polychaetes (52% of all species), 56 crustaceans (21%), 42 molluscs (16%), and 28 species belonging to smaller phyla such as nemerteans, sipunculans, and echinoderms (11%). The best represented polychaete families were the spionids with 14 species, the syllids with 10 species, and the cirratulids and maldanids with 9 species each. Large crustacean groups included the amphipods with 34 species, 5 of which belonged to the Ampeliscidae, and the cumaceans with 11 species, the largest family being the Leuconidae (6 species). Among the molluscs, the bivalve family Nuculanidae was the largest group with 5 species.

In combination with the nearfield samples, the 1992 field program yielded 306 species with roughly the same percentages of polychaetes, crustaceans, and molluscs (Table 3). The majority of these species were present in both sampling areas, and the reason for the absence of some species from either the nearfield or the farfield is most likely the low abundance of these organisms rather than a particular distributional pattern, i.e. additional samples would have shown a similar distribution for all species. The only exception is the fauna at the outer shelf Station FF8 in the Gulf of Maine. That station added to the list several species that are more typical of Georges Bank than of Massachusetts and Cape Cod Bays.

Distribution and Density of Dominant Species

May. Because of the variety of habitats and depth ranges in the large farfield area, infaunal densities varied greatly—from a minimum of about 6000 individuals m^{-2} to a maximum of 139,000 individuals m^{-2} (Figure 25). The lowest densities were found at Station 8 located near Stellwagen Bank and at the unusual Station WH2 in the nearfield area (approximately at the location of Station NF17). The highest densities were reported at Stations 6 and 7, both located in Cape Cod Bay. Most of the individuals contributing to the total infaunal density belong to one capitellid and three spionid polychaetes. *Spio limicola* was the most important species in the May farfield samples, accounting for 30% of all individuals and reaching densities up to 36,000 individuals m^{-2}; two other spionids, *Polydora socialis* and *Prionospio steenstrupi*, each contributed 7 to 8% to the total fauna, with the highest local densities ranging from 15,800 to 25,100 individuals m^{-2}. *Mediomastus californiensis* was the second most important species with 14% of all individuals and densities similar to *Spio limicola* at some stations.

The 10 most abundant species at each station and their percent contribution to the fauna are shown in Table 4. The values for the 0.5-mm fraction are given separately, in parentheses, to allow for direct comparison of this database with those from previous investigations; generally, the number of individuals retained in the 0.3-mm fraction was minimal and differences between the whole samples and the 0.5-mm fraction were negligible. There were two major types of assemblages at the farfield stations that were mostly depth-related. Three of the four stations located in depths between 30 and 40 m are characterized by high densities of *Mediomastus californiensis*, including the Cape Cod Bay Stations 6 and 7 (with two spionids occupying ranks 1 and 2 at Station 6) and Station WH3 located in the nearfield area, approximately at the location of Station NF12. Other interesting dominant species at these three stations include the sabellid polychaete *Euchone incolor* at all three stations and the trichobranchid polychaete *Terebellides atlantis* at Station 6. Two interesting dominants at Station 7 included the oligochaete Tubificidae sp 2, the only nonpolychaete among the dominants at these three stations, and *Apistobranchus tullbergi*, a polychaete that is rarely found among dominant species. The

Table 3. List of Species Identified from Massachusetts Bay Nearfield (August 1992) and Farfield (May and August 1992) Stations.

CNIDARIA
- Actiniaria sp. 1
- Actiniaria sp. 2
- Actiniaria sp. 3
- Actiniaria sp. 4
- Actiniaria sp. 5
- *Ceriantheopsis americanus* (Verrill, 1866)
- *Edwardsia elegans* Verrill, 1869

NEMERTEA
- *Amphiporus angulatus* (Fabricius, 1774)
- *Carinomella lactea* Coe, 1905
- *Cerebratulus lacteus* (Leidy, 1851)
- *Micrura* spp.
- Nemertea sp. 2
- Nemertea sp. 3
- *Tetrastemma vittatum* Verrill, 1874
- *Tubulanus pellucidus* (Coe, 1895)

PRIAPULA
- *Priapulus caudatus* Lamarck, 1816

ANNELIDA - OLIGOCHAETA
- *Tubificoides apectinatus* Brinkhurst, 1965
- Tubificidae sp. 2

ANNELIDA - POLYCHAETA

Family Ampharetidae
- *Ampharete arctica* Malmgren, 1866
- *Ampharete acutifrons* Grube, 1860
- *Amphicteis gunneri* (Sars, 1835)
- *Anobothrus gracilis* (Malmgren, 1866)
- *Asabellides oculata* (Webster, 1879)
- *Melinna cristata* (Sars, 1851)

Family Amphinomidae
- *Paramphinome jeffreysii* (McIntosh, 1868)

Family Apistobranchidae
- *Apistobranchus tullbergi* (Théel, 1879)

Family Arabellidae
- *Drilonereis longa* Webster, 1879

Family Capitellidae
- *Barantolla americana* Hartman, 1963
- *Barantolla* sp. A
- *Capitella capitata* complex (Fabricius, 1780)
- *Heteromastus filiformis* (Claparède, 1864)
- *Mediomastus californiensis* Hartman, 1944

Family Chrysopetalidae
- *Dysponetus pygmaeus* Levinsen, 1879

Family Cirratulidae
- *Aphelochaeta marioni* (Saint-Joseph, 1894)
- *Aphelochaeta monilaris* (Hartman, 1960)
- *Chaetozone setosa* Malmgren, 1867
- *Chaetozone* sp. A
- *Chaetozone* sp. B
- *Cirratulus cirratus* (O.F. Müller, 1776)
- *Monticellina baptisteae* Blake, 1991
- *Monticellina dorsobranchialis* (Kirkegaard, 1959)
- *Tharyx acutus* Webster & Benedict, 1887
- *Tharyx* sp. A

Family Cossuridae
- *Cossura longocirrata* Webster & Benedict, 1887

Family Dorvilleidae
- *Dorvillea sociabilis* (Webster, 1879)
- *Meiodorvillea minuta* (Hartman, 1965)
- *Ophryotrocha bifida* Hilbig & Blake, 1991
- *Ophryotrocha* sp. 1
- *Parougia caeca* (Webster & Benedict, 1884)

Family Flabelligeridae
- *Brada villosa* (Rathke, 1843)
- *Diplocirrus hirsutus* (Hansen, 1879)
- *Diplocirrus longisetosus* (Marenzeller, 1890)
- *Flabelligera affinis* Sars, 1829
- *Pherusa affinis* (Leidy, 1855)
- *Pherusa plumosa* (O.F. Müller, 1776)

Family Goniadidae
- *Goniada maculata* Oersted, 1843

Family Hesionidae
- *Gyptis* cf. *vittata* Webster & Benedict, 1887
- *Microphthalmus sczelkowii* Mecznikow, 1865

Family Lumbrineridae
- *Scoletoma fragilis* (O.F. Müller, 1776)
- *Scoletoma hebes* (Verrill, 1880)
- *Scoletoma impatiens* (Claparède, 1868)
- *Scoletoma tenuis* Verrill, 1873
- *Ninoe nigripes* Verrill, 1873

Family Maldanidae
- *Clymenella torquata* (Leidy, 1855)
- *Clymenura* sp. A
- *Euclymene collaris* (Claparède, 1870)
- *Maldane glebifex* Grube, 1860
- *Praxillella affinis* Sars, 1872)
- *Praxillella gracilis* (Sars, 1861)
- *Praxillella praetermissa* (Malmgren, 1866)
- *Praxillura ornata* Verrill, 1880
- *Rhodine bitorquata* Moore, 1923
- *Rhodine loveni* Malmgren, 1865

Family Nephtyidae
- *Aglaophamus circinata* (Verrill, 1874)
- *Nephtys caeca* (Fabricius, 1780)
- *Nephtys ciliata* (O.F. Müller, 1776)
- *Nephtys discors* Ehlers, 1868

Table 3 (Continued)

Nephtys incisa Malmgren, 1865
Nephtys neotena (Noyes, 1980)

Family Nereididae
Nereis grayi Pettibone, 1956
Nereis zonata Malmgren, 1867
Websterinereis tridentata (Webster, 1800)

Family Onuphidae
Onuphis opalina (Verrill, 1873)

Family Opheliidae
Ophelina abranchiata Støp-Bowitz, 1948
Ophelina acuminata Oersted, 1843

Family Orbiniidae
Leitoscoloplos acutus (Verrill, 1873)
Leitoscoloplos n. sp. B
Scoloplos armiger (O.F. Müller, 1776)

Family Oweniidae
Galathowenia oculata (Zachs,1923)
Myriochele heeri Malmgren, 1867
Owenia fusiformis Delle Chiaje, 1844

Family Paraonidae
Aricidea catherinae Laubier, 1967
Aricidea minuta Southward, 1956
Aricidea quadrilobata Webster & Benedict, 1887
Cirrophorus furcatus (Hartman, 1957)
Levinsenia gracilis (Tauber, 1879)
Levinsenia sp. 2
Paradoneis eliasoni Mackie, 1991
Paradoneis lyra (Southern, 1914)

Family Pectinariidae
Pectinaria gouldi Verrill, 1873

Family Phyllodocidae
Eteone longa (Fabricius, 1780)
Eulalia bilineata (Johnston, 1840)
Eumida sanquinea (Oersted, 1843)
Mystides borealis Théel, 1879
Phyllodoce arenae Webster, 1879
Phyllodoce maculata (Linnaeus, 1767)
Phyllodoce mucosa Oersted, 1843

Family Pholoidae
Pholoe minuta (Fabricius, 1780)

Family Pilargiidae
Ancistrosyllis groenlandica McIntosh, 1879
Synelmis klatti (Friedrich, 1951)

Family Polygordiidae
Polygordius sp. A

Family Polynoidae
Antinoella sarsi (Kinberg in Malmgren, 1865)
Arcteobia anticostiensis (McIntosh, 1874)
Enipo torelli (Malmgren, 1865)
Gattyana amondseni (Malmgren, 1867)
Gattyana cirrosa (Pallas, 1766)
Harmothoe imbricata (Linnaeus, 1767)
Lagisca extenuata (Grube, 1840)

Family Sabellidae
Chone duneri Malmgren, 1867
Chone infundibuliformis Kroeyer, 1856
Chone cf. *magna* (Moore, 1923)
Euchone elegans Verrill, 1873
Euchone incolor Hartman, 1978
Laonome kroeyeri Malmgren, 1866
Potamethus sp. 1
Potamilla neglecta (Sars, 1850)

Family Scalibregmatidae
Scalibregma inflatum Rathke, 1843

Family Sphaerodoridae
Sphaerodoridium claperedii Greeff, 1866
Sphaerodoropsis minuta (Webster & Benedict, 1887)

Family Spionidae
Laonice cirrata (Sars, 1851)
Laonice sp. 1
Polydora caulleryi Mesnil, 1897
Polydora cornuta Bosc, 1802
Polydora quadrilobata Jacobi, 1883
Polydora socialis (Schmarda, 1861)
Prionospio steenstrupi Malmgren, 1867
Pygospio elegans Claperède, 1863
Scolelepis squamata (O.F. Müller, 1806)
Spio filicornis (O.F. Müller, 1776)
Spio limicola Verrill, 1880
Spio thulini Maciolek, 1990
Spiophanes bombyx (Claparède, 1870)
Spiophanes kroeyeri Grube, 1860
Streblospio benedicti Webster, 1879

Family Sternaspidae
Sternaspis scutata (Otto, 1821)

Family Syllidae
Exogone hebes (Webster & Benedict, 1884)
Exogone longicirris (Webster & Benedict, 1887)
Exogone verugera (Claparède, 1868)
Pionosyllis sp. A
Sphaerosyllis brevifrons Webster & Benedict, 1884
Sphaerosyllis longicauda Webster & Benedict, 1887
Syllides japonica Imajima, 1966
Syllides longocirrata Oersted, 1845
Typosyllis alternata (Moore, 1908)
Typosyllis sp. 1

Family Terebellidae
Nicolea zostericola (Oersted, 1844)
Pista cristata (O.F. Müller, 1776)
Polycirrus eximius (Leidy, 1855)
Polycirrus medusa Grube, 1850
Proclea graffii (Langerhans, 1880)

Table 3 (Continued)

Family Trichobranchidae
Terebellides atlantis Williams, 1984
Terebellides stroemi Sars, 1835
Trichobranchus glacialis Malmgren, 1866
Trichobranchus roseus (Malmgren, 1874)

Family Trochochaetidae
Trochochaeta carica (Birula, 1897)
Trochochaeta multisetosa (Oersted, 1844)

SIPUNCULA
Nephasoma diaphanes (Gerould, 1913)
Phascolion strombi (Montagu, 1804)

ECHIURA
Echiurus echiurus (Pallas, 1767)

ARTHROPODA - CHELICERIFORMES - PYCNOGONIDA
Family Nymphonidae
Nymphon grossipes (O. Fabricius?) Kroeyer, 1780
Pycnogonida sp.

ARTHROPODA - CRUSTACEA - MALACOSTRACA
DECAPODA
Decapoda sp. 1

Infraorder Caridea
Family Hippolytidae
Eualus pusiolus (Kroeyer, 1841)

Family Crangonidae
Crangon septemspinosa Say, 1818

Infraorder Anomura
Family Axiidae
Axiidae spp.

Family Paguridae
Pagurus acadianus Benedict, 1901

Infraorder Brachyura
Family Cancridae
Cancer borealis Stimpson, 1859

PERACARIDA
Order Mysidacea
Family Mysidae
Mysis mixta Lilljeborg, 1852

Order Cumacea
Family Lampropidae
Lamprops quadriplicata S.I. Smith, 1879

Family Leuconidae
Eudorella pusilla Sars, 1871
Eudorellopsis deformis (Kroeyer, 1846)
Leucon nr. *acutirostris* Sars, 1865
Leucon sp. 1
Leocon sp. 2
Leucon sp. 3

Family Nannastacidae
Campylaspis rubicunda (Lilljeborg, 1855)
Campylaspis sp. 1

Family Diastylidae
Diastylis cornuifer (Blake, 1929)
Diastylis polita (S.I. Smith, 1879)
Diastylis sculpta Sars, 1871
Diastylis quadrispinosa (Sars, 1871)
Leptostylis longimana (Sars, 1865)

Order Tanaidacea
Family Anarthruridae
Anarthrura cf. *simplex* Sars, 1882

Family Nototanaidae
Tanaissus psammophilus (Wallace, 1919)

Order Isopoda
Family Anthuridae
Ptilanthura tenuis Harger, 1879

Family Idoteidae
Chiridotea tuftsi (Stimpson, 1883)
Edotea triloba (Say, 1818)

Family Cirolanidae
Cirolana polita (Stimpson, 1853)

Family Munnidae
Munna sp. 2

Family Paramunnidae
Pleurogonium inerme Sars, 1882
Pleurogonium rubicundrum Sars, 1863

Order Amphipoda - Gammaridea
Family Ampeliscidae
Ampelisca abdita Mills, 1964
Ampelisca macrocephala Lilljeborg, 1852
Ampeliscidae sp. 1
Ampeliscidae sp. 2
Byblis nr. *gaimardi* (Kroeyer, 1847)

Family Ampithoidae
Ampithoe rubricata (Montagu, 1808)

Family Aoridae
Leptocheirus pinguis (Stimpson, 1853)
Microdeutopus anomalus (Rathke, 1843)
Unciola inermis Shoemaker, 1942
Unciola irrorata Say, 1818
Pseudunciola obliqua (Shoemaker, 1949)

Family Argissidae
Argissa hamatipes (Norman, 1869)

Family Corophiidae
Corophium crassicorne Bruzelius, 1859
Erichthonius rubricornis Smith, 1873

Table 3 (Continued)

Family Haustoriidae
Pseudohaustorius borealis Bousfield, 1965
Family Isaeidae
Photis pollex Walker, 1895

Family Ischyroceridae
Ischyrocerus anguipes Kroeyer, 1838
Jassa marmorata Holmes, 1903

Family Lysianassidae
Anonyx lilljeborgi Boeck, 1871
Hippomedon serratus Holmes, 1905
Hippomedon sp. 1
Orchomene pinguis (Boeck, 1861)

Family Melitidae
Casco bigelowi (Blake, 1929)
Melita dentata (Kroeyer, 1842)

Family Oedicerotidae
Monoculodes edwardsi Holmes, 1905
Oedicerotidae sp. 1
Oedicerotidae sp. 2

Family Phoxocephalidae
Harpinia propinqua Sars, 1895
Phoxocephalus holbolli (Kroeyer, 1942)
Rhepoxynius hudsoni Barnard & Barnard, 1982

Family Pleustidae
Pleustidae sp. 1
Stenopleustes inermis Shoemaker, 1949

Family Podoceridae
Dyopedos monacantha (Metzger, 1875)

Family Pontogeneiidae
Pontogeneia inermis (Kroeyer, 1842)

Family Stenothoidae
Metopella angusta Shoemaker, 1949
Proboloides holmesi Bousfield, 1973

Order Amphipoda - Caprellidea
Family Caprellidae
Aeginina longicornis (Kroeyer, 1842-43)
Mayerella limicola Huntsman, 1915

MOLLUSCA - APLACOPHORA
Family Chaetodermatidae
Chaetoderma nitidulum canadense (Nierstrasz, 1902)

MOLLUSCA - BIVALVIA
Family Arcidae
Arcidae spp.

Family Arcticidae
Arctica islandica (Linnaeus, 1767)

Family Astartidae
Astarte undata Gould, 1841

Family Cardiidae
Cerastoderma pinnulatum (Conrad, 1831)

Family Hiatellidae
Cyrtodaria siliqua (Spengler, 1793)
Hiatella arctica (Linnaeus, 1767)

Family Lyonsiidae
Lyonsia arenosa Möller, 1842

Family Mactridae
Mulinia lateralis (Say, 1822)

Family Montacutidae
Pythinella cuneata (Verrill & Bush, 1898)

Family Myidae
Mya arenaria Linnaeus, 1758

Family Mytilidae
Crenella decussata (Montagu, 1808)
Crenella glandula (Totten, 1834)
Musculus discors (Linnaeus, 1767)
Musculus niger (Gray, 1824)
Mytilus edulis Linnaeus, 1758

Family Nuculanidae
Megayoldia thraciaeformis (Storer, 1838)
Nuculana pernula (Müller, 1771)
Nuculana sp. 1
Yoldia sapotilla (Gould, 1841)
Yoldiella lucida Lovén, 1846

Family Nuculidae
Nucula annulata Hampson, 1971
Nucula delphinodonta Mighels and Adams, 1842
Nuculoma granulosa (Verrill, 1884)
Nuculoma tenuis (Montagu, 1808)

Family Pectinidae
Placopecten magellanicus (Gmelin, 1791)

Family Periplomatidae
Periploma fragile (Totten, 1835)
Periploma papyratium (Say, 1822)

Family Solenidae
Ensis directus Conrad, 1843

Family Tellinidae
Macoma balthica (Linnaeus, 1758)
Tellina agilis Stimpson, 1857

Family Thraciidae
Asthenothaerus hemphilli Dall, 1886
Thracia conradi Couthouy, 1838

Table 3 (Continued)

Family Thyasiridae
Thyasira gouldi Philippi, 1845
Thyasira minutus ? (Verrill & Bush, 1898)

Family Veneridae
Pitar morrhuana Linsley, 1848

MOLLUSCA - GASTROPODA - PROSOBRANCHIA
Family Buccinidae
Colus pubescens (Verrill, 1882)
Colus pygmaeus (Gould, 1841)

Family Nassariidae
Nassarius trivittatus (Say, 1822)

Family Naticidae
Lunatia heros (Say, 1822)

Family Rissoidae
Onoba mighelsi (Stimpson, 1851)
Onoba pelagica (Stimpson, 1851)
Pusillina harpa (Verrill, 1880)
Pusillina pseudoareolata (Warén, 1974)

Family Skeneopsidae
Skeneopsis planorbis (Fabricius, 1780)

Family Trochidae
Solariella obscura (Couthouy, 1838)
Trochidae spp.

Family Turridae
Oenopota incisula (Verrill, 1882)
Oenopota pyramidalis (Ström, 1788)
Propebela exarata (Möller, 1842)
Propebela turricula (Montagu, 1803)

MOLLUSCA - GASTROPODA - OPISTHOBRANCHIA
Family Acteocinidae
Acteocina canaliculata (Say, 1822)

Family Cylichnidae
Cylichna alba (Brown, 1827)
Cylichna gouldi (Couthouy, 1839)

Family Diaphanidae
Diaphana minuta (Brown, 1827)

Family Retusidae
Retusa obtusa (Montagu, 1807)

MOLLUSCA - SCAPHOPODA
Dentalium entale Linnaeus, 1758

PHORONIDA
Phoronis architecta Andrews, 1890

ECHINODERMATA - ASTEROIDEA
Ctenodiscus crispatus (Retzius, 1805)
Henricia sanguinolenta (O.F. Müller, 1776)

ECHINODERMATA - ECHINOIDEA
Echinarachnius parma (Lamarck, 1816)

ECHINODERMATA - HOLOTHUROIDEA
Molpadia oolitica (Pourtales, 1851)

ECHINODERMATA - OPHIUROIDEA
Ophiura robusta (Ayres, 1851)
Ophiura sarsi Lütken, 1855
Ophiura sp. 2

HEMICHORDATA
Stereobalanus canadensis (Spengel, 1893)

CHORDATA - UROCHORDATA
Bostrichobranchus pilularis (Verrill, 1871)
Molgula manhattensis (DeKay, 1843)

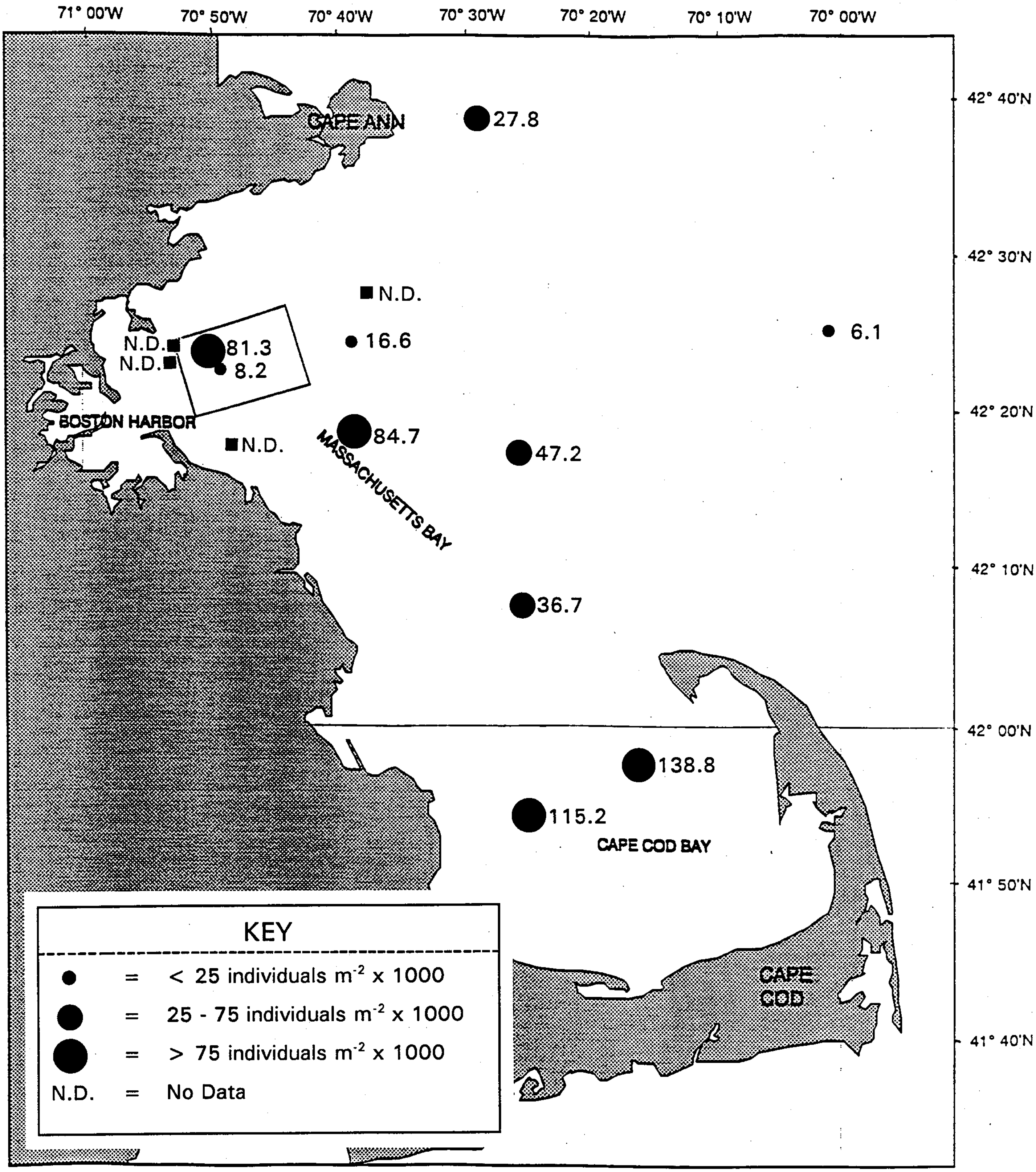


Figure 25. Total Infaunal Densities in the Farfield, May 1992.

Table 4. Dominant Species and Their Contribution to the Total and Identified Fauna at Each Farfield Station, May 1992. Numbers in parentheses are for the 0.5-mm fraction.

Rank	Species	Number of Individuals (0.1 m²)	Percent of Total Fauna	Percent of Identified Fauna
	Station WH-2			
1	*Unciola inermis* (Amphipod)	178 (150)	20.5 (22.2)	21.6 (22.3)
2	*Corophium crassicorne* (Amphipod)	159 (91)	18.3 (13.5)	19.3 (13.2)
3	*Polydora socialis* (Polychaete)	84 (79)	9.7 (13.5)	10.2 (11.7)
4	*Pseudunciola obliqua* (Amphipod)	56 (56)	6.4 (8.3)	6.8 (8.3)
5	*Cirolana polita* (Amphipod)	47 (47)	5.4 (7.0)	5.7 (7.0)
6	*Rhepoxynius hudsoni* (Amphipod)	30 (30)	3.5 (4.4)	3.6 (4.4)
7	*Aglaophamus circinata* (Polychaete)	30 (27)	3.5 (4.0)	3.6 (4.0)
8	*Asthenotherus hemphilli* (Bivalve)	16 (10)	1.8 (1.5)	1.9 (1.5)
9	*Pseudhaustorius borealis* (Amphipod)	16 (16)	1.8 (2.4)	1.9 (2.4)
10	*Phoxocephalus holbolli* (Amphipod)	16 (16)	1.8 (2.4)	1.9 (2.4)
	TOTAL CUMULATIVE PERCENT		72.7 (79.2)	76.7 (77.2)
	Station WH-3			
1	*Mediomastus californiensis* (Polychaete)	2004 (1904)	23.6 (24.1)	24.6 (24.7)
2	*Aricidea catherinae* (Polychaete)	1359 (1264)	16.0 (15.9)	16.7 (16.3)
3	*Prionospio steenstrupi* (Polychaete)	1076 (1073)	12.7 (13.5)	13.2 (13.8)
4	*Ninoe nigripes* (Polychaete)	857 (846)	10.1 (10.6)	10.5 (10.9)
5	*Euchone incolor* (Polychaete)	605 (600)	7.1 (7.5)	7.4 (7.7)
6	*Leitoscoloplos acutus* (Polychaete)	316 (306)	3.7 (3.9)	3.9 (3.9)
7	*Spio limicola* (Polychaete)	310 (308)	3.7 (3.9)	3.8 (4.0)
8	*Levinsenia gracilis* (Polychaete)	260 (251)	3.1 (3.2)	3.2 (3.2)
9	*Tharyx acutus* (Polychaete)	195 (137)	2.3 (1.7)	2.4 (1.8)
10	*Monticellina baptisteae* (Polychaete)	170 (157)	2.0 (2.0)	2.1 (2.0)
	TOTAL CUMULATIVE PERCENT		84.2 (86.3)	87.9 (88.3)

Table 4 (Continued)

Rank	Species	Number of Individuals (0.1 m²)	Percent of Total Fauna	Percent of Identified Fauna
		Station 4		
1	*Spio limicola* (Polychaete)	2958 (2896)	61.6 (66.1)	62.6 (66.6)
2	*Mediomastus californiensis* (Polychaete)	248 (200)	5.2 (4.5)	5.3 (4.6)
3	*Prionospio steenstrupi* (Polychaete)	213 (188)	4.4 (4.3)	4.5 (4.3)
4	*Aricidea quadrilobata* (Polychaete)	170 (145)	3.5 (3.3)	3.6 (3.3)
5	*Anobothrus gracilis* (Polychaete)	148 (146)	3.1 (3.3)	3.1 (3.4)
6	*Chaetozone* sp. A (Polychaete)	134 (99)	2.8 (2.3)	2.8 (2.3)
7	*Cossura longocirrata* (Polychaete)	112 (80)	2.3 (1.8)	2.4 (1.8)
8	*Levinsenia gracilis* (Polychaete)	73 (69)	1.5 (1.6)	1.5 (1.6)
9	*Dentalium entale* (Scaphopod)	65 (52)	1.4 (1.2)	1.4 (1.2)
10	*Thyasira gouldi* (Bivalve)	64 (42)	1.3 (1.0)	1.4 (1.0)
	TOTAL CUMULATIVE PERCENT		87.1 (89.4)	88.5 (90.1)
		Station 5		
1	*Spio limicola* (Polychaete)	2631 (2356)	71.2 (72.2)	72.7 (73.0)
2	*Polydora socialis* (Polychaete)	134 (125)	3.6 (3.8)	3.7 (3.9)
3	*Levinsenia gracilis* (Polychaete)	114 (96)	3.1 (2.9)	3.2 (3.0)
4	*Prionospio steenstrupi* (Polychaete)	98 (85)	2.7 (2.6)	2.7 (2.6)
5	*Aricidea quadrilobata* (Polychaete)	97 (88)	2.6 (2.7)	2.7 (2.7)
6	*Mediomastus californiensis* (Polychaete)	82 (67)	2.2 (2.1)	2.3 (2.1)
7	*Thyasira gouldi* (Bivalve)	57 (47)	1.5 (1.4)	1.6 (1.5)
8	*Chaetozone* sp. A (Polychaete)	52 (50)	1.4 (1.5)	1.4 (1.5)
9	*Cossura longocirrata* (Polychaete)	34 (29)	0.9 (0.9)	0.9 (0.9)
10	*Harpinia propinqua* (Amphipod)	34 (32)	0.9 (1.0)	0.9 (0.9)
	TOTAL CUMULATIVE PERCENT		90.1 (91.1)	92.1 (92.1)

Table 4 (Continued)

Rank	Species	Number of Individuals (0.1m²)	Percent of Total Fauna	Percent of Identified Fauna
		Station 6		
1	*Spio limicola* (Polychaete)	3592 (3360)	30.7 (35.0)	31.2 (35.2)
2	*Polydora socialis* (Polychaete)	2515 (2403)	21.5 (25.0)	21.8 (25.2)
3	*Mediomastus californiensis* (Polychaete)	1414 (1095)	12.1 (11.4)	12.3 (11.5)
4	*Cossura longocirrata* (Polychaete)	842 (446)	7.2 (4.6)	7.3 (4.7)
5	*Euchone incolor* (Polychaete)	625 (402)	5.4 (4.2)	5.4 (4.2)
6	*Aricidea catherinae* (Polychaete)	275 (174)	2.4 (1.8)	2.4 (1.8)
7	*Terebellides atlantis* (Polychaete)	241 (97)	2.1 (1.0)	2.1 (1.0)
8	*Aricidea quadrilobata* (Polychaete)	215 (194)	1.8 (2.0)	1.9 (2.0)
9	*Tharyx acutus* (Polychaete)	209 (113)	1.8 (1.2)	1.8 (1.2)
10	*Prionospio steenstrupi* (Polychaete)	185 (173)	1.6 (1.8)	1.6 (1.8)
	TOTAL CUMULATIVE PERCENT		86.5 (88.6)	87.7 (88.0)
		Station 7		
1	*Mediomastus californiensis* (Polychaete)	3573 (3135)	25.1 (27.6)	25.7 (27.8)
2	*Spio limicola* (Polychaete)	2975 (2798)	20.9 (24.6)	21.4 (24.8)
3	*Cossura longocirrata* (Polychaete)	1798 (1059)	12.6 (9.3)	12.9 (9.4)
4	*Euchone incolor* (Polychaete)	1220 (589)	8.6 (5.2)	8.8 (5.2)
5	Tubificidae sp. 2 (Oligochaete)	948 (712)	6.7 (6.3)	6.8 (6.3)
6	*Aricidea catherinae* (Polychaete)	940 (804)	6.6 (7.1)	6.8 (7.1)
7	*Polydora socialis* (Polychaete)	393 (386)	2.8 (3.4)	2.8 (3.4)
8	*Apistobranchus tullbergi* (Polychaete)	319 (267)	2.2 (2.3)	2.3 (2.4)
9	*Tharyx acutus* (Polychaete)	282 (264)	2.0 (2.3)	2.0 (2.3)
10	*Prionospio steenstrupi* (Polychaete)	232 (230)	1.6 (2.0)	1.7 (2.0)
	TOTAL CUMULATIVE PERCENT		89.1 (90.7)	91.3 (90.1)

Table 4 (Continued)

Rank	Species	Number of Individuals (0.1 m²)	Percent of Total Fauna	Percent of Identified Fauna
	Station 8			
1	*Monticellina baptisteae* (Polychaete)	254 (242)	39.2 (40.2)	41.7 (41.9)
2	*Cossura longocirrata* (Polychaete)	150 (145)	23.1 (24.1)	24.6 (25.1)
3	*Synelmis klatti* (Polychaete)	32 (32)	4.9 (5.3)	5.3 (5.5)
4	*Paradoneis eliasoni* (Polychaete)	30 (29)	4.6 (4.8)	4.9 (5.0)
5	*Barantolla* sp. A (Polychaete)	25 (25)	3.9 (4.2)	4.1 (4.3)
6	*Paramphinome jeffreysi* (Polychaete)	23 (23)	3.5 (3.8)	3.8 (4.0)
7	*Ancistrosyllis groenlandica* (Polychaete)	23 (23)	3.5 (3.8)	3.8 (4.0)
-	Maldanidae spp. (Polychaete)	20 (18)	3.1 (3.0)	-.- (-.-)
8	*Aricidea quadrilobata* (Polychaete)	7 (7)	1.1 (1.2)	1.2 (1.2)
9	*Thyasira gouldi* (Bivalve)	7 (2)	1.1 (0.3)	1.2 (0.3)
10	*Levinsenia gracilis* (Polychaete)	7 (5)	1.1 (0.8)	1.2 (0.9)
	TOTAL CUMULATIVE PERCENT		89.2 (91.5)	91.6 (92.2)
	Station 9			
1	*Spio limicola* (Polychaete)	3316 (3269)	38.0 (40.2)	39.2 (41.9)
2	*Prionospio steenstrupi* (Polychaete)	1579 (1513)	18.1 (19.0)	18.6 (19.3)
3	*Polydora socialis* (Polychaete)	1188 (1166)	13.6 (14.7)	14.0 (14.9)
4	*Ampharete acutifrons* (Polychaete)	523 (416)	6.0 (5.2)	6.2 (5.3)
5	*Mediomastus californiensis* (Polychaete)	464 (381)	5.3 (4.8)	5.5 (4.9)
6	*Exogone verugera* (Polychaete)	166 (133)	1.9 (1.7)	2.0 (1.7)
7	*Levinsenia gracilis* (Polychaete)	156 (136)	1.8 (1.7)	1.8 (1.7)
-	Ophiuroidea spp. (Echinoderm)	71 (19)	0.8 (0.2)	-.- (-.-)
8	*Polydora quadrilobata* (Polychaete)	71 (35)	0.8 (0.4)	0.8 (0.4)
-	Ampharetidae spp. (Polychaete)	66 (7)	0.8 (0.1)	-.- (-.-)
9	*Ninoe nigripes* (Polychaete)	62 (60)	0.7 (0.8)	0.7 (0.8)
10	*Aricidea quadrilobata* (Polychaete)	51 (48)	0.6 (0.6)	0.6 (0.4)
	TOTAL CUMULATIVE PERCENT		88.4 (89.4)	89.5 (91.3)

Table 4 (Continued)

Rank	Species	Number of Individuals (0.1 m²)	Percent of Total Fauna	Percent of Identified Fauna
		Station 11		
1	*Spio limicola* (Polychaete)	780 (771)	27.2 (31.1)	28.0 (31.2)
2	*Prionospio steenstrupi* (Polychaete)	563 (544)	19.6 (21.9)	20.2 (22.0)
3	*Levinsenia gracilis* (Polychaete)	424 (344)	14.8 (13.9)	15.2 (13.9)
4	*Aricidea quadrilobata* (Polychaete)	206 (192)	7.2 (7.7)	7.4 (7.8)
5	*Tubificoides apectinatus* (Oligochaete)	183 (168)	6.4 (6.8)	6.6 (6.8)
6	*Chaetozone* sp. A (Polychaete)	156 (146)	5.4 (5.9)	5.6 (5.9)
7	*Capitella capitata* complex (Polychaete)	120 (13)	4.2 (0.5)	4.3 (0.5)
8	*Anobothrus gracilis* (Polychaete)	42 (41)	1.5 (1.7)	1.5 (1.7)
9	*Cossura longocirrata* (Polychaete)	42 (25)	1.5 (1.0)	1.5 (1.0)
10	*Mediomastus californiensis* (Polychaete)	29 (13)	1.0 (0.5)	1.0 (0.5)
-	Ophiuroidea spp. (Echinoderm)	29 (5)	1.0 (0.2)	-.- (-.-)
	TOTAL CUMULATIVE PERCENT		89.9 (91.2)	91.5 (91.3)
		Station 14		
1	*Spio limicola* (Polychaete)	562 (561)	32.6 (33.9)	33.9 (34.9)
2	*Chaetozone* sp. A (Polychaete)	194 (192)	11.3 (11.6)	11.7 (12.0)
3	*Levinsenia gracilis* (Polychaete)	183 (167)	10.6 (10.1)	11.0 (10.4)
4	*Aricidea quadrilobata* (Polychaete)	103 (101)	6.0 (6.1)	6.2 (6.3)
5	*Cossura longocirrata* (Polychaete)	93 (81)	5.4 (4.9)	5.6 (5.0)
6	*Mediomastus californiensis* (Polychaete)	81 (77)	4.7 (4.6)	4.9 (4.8)
7	*Tubificoides apectinatus* (Oligochaete)	51 (51)	3.0 (3.1)	3.1 (3.2)
8	*Thyasira gouldi* (Bivalve)	43 (42)	2.5 (2.5)	2.6 (2.6)
9	*Prionospio steenstrupi* (Polychaete)	41 (39)	2.4 (2.4)	2.5 (2.4)
10	*Sternaspis scutata* (Polychaete)	30 (30)	1.8 (1.8)	1.8 (1.9)
	TOTAL CUMULATIVE PERCENT		80.3 (81.0)	83.4 (83.5)

fourth 30 to 40-m station (WH2) is very different in terms of the infaunal community and will be treated below.

Nearly all remaining stations, located at depths between 50 and 90 m, were dominated by *Spio limicola* alone or by a combination of *S. limicola* and other spionid, cirratulid, or paraonid polychaetes. At Stations 4 and 5, *S. limicola* alone contributed 63 and 73%, respectively, to the total fauna. At Station 9, all three top dominants, each accounting for at least 10% of all individuals, were spionids. Toward the north of the farfield area, the paraonid *Levinsenia gracilis* became more important, and it ranked third at Stations 11 (off Cape Ann) and 14 (off Nahant).

Two single stations did not fall into either of these larger groups. Station WH2, located very close to WH3 in the nearfield area, was dominated by crustaceans rather than polychaetes. Seven of the top ten species were amphipods that were not found at any of the other farfield stations; one species was the bivalve *Asthenotherus hemphilli* that was absent at all other stations; and the two polychaetes present among the dominants included *Aglaophamus circinata* (rare at stations between 50 and 90 m depth and absent at the 30-m stations) and *Polydora socialis* (the only widespread species). Station 8 was located at a much greater depth than the other farfield stations and had a very different community that included many species more typical for Georges Bank than for Massachusetts Bay. This station was dominated by the cirratulid *Monticellina baptisteae* and the cossurid *Cossura longocirrata*. Ranks 3 and 7 are occupied by two pilargid polychaetes (*Ancistrosyllis groenlandica* and *Synelmis klatti*) that are rare or absent at all other stations. Two other polychaetes ranking fourth and fifth, *Paradoneis eliasoni* and *Barantolla* sp. A, were not found at any other station in the farfield.

Distributional patterns of some selected species in terms of abundance rather than rank are shown in Figures 26-28. Figure 26 shows the distribution of three spionids among the May farfield stations. High abundances of all three species (*P. socialis, P. steenstrupi*, and *S. limicola*) were found in outer Massachusetts Bay at Station 9 and in Cape Cod Bay at Stations 6 and 7, whereas Stations 4 and 5 showed high abundances of *S. limicola* with moderate numbers of the other two species. No spionids were found near Stellwagen Bank at Station 8, and very few were reported at the inner Massachusetts Bay Station WH2. The distribution of the most abundant paraonid polychaetes (Figure 27) shows a slightly depth-related pattern. *A. catherinae* had its peak abundances at some of the 30-m stations, whereas *A. quadrilobata* tended to be more abundant at depths between 50 and 90 m. *Levinsenia gracilis* was most abundant at the more northern stations (4, WH3, and 11), but also at Station 7 in Cape Cod Bay. Almost no paraonids were found at Station WH2, and a different species, *Paradoneis eliasoni*, was abundant at Station 8.

A clearly depth-related distribution can be seen in Figure 28, showing abundances of four cirratulids. The two species *Aphelochaeta marioni* and *Tharyx acutus* were abundant only at the nearshore Stations 6, 7, and WH3, whereas *Chaetozone* sp. A was most common at Stations 4, 11, and 14, located further offshore in the 80 to 90-m depth range. At even greater depths, at Station 8, *Monticellina baptisteae* was the only cirratulid to occur in high abundance. Few or no cirratulids were found at the amphipod-dominated Station WH2 and Stations 5 and 9 in the 50 to 60-m depth range. None of the species shown in Figures 26-28 showed a preference for a particular sediment grain size.

August. Total infaunal densities in the farfield area were again variable, ranging from about 6000 individuals m^{-2} to 99,000 individuals m^{-2} (Figure 29). Generally, densities decreased with increasing

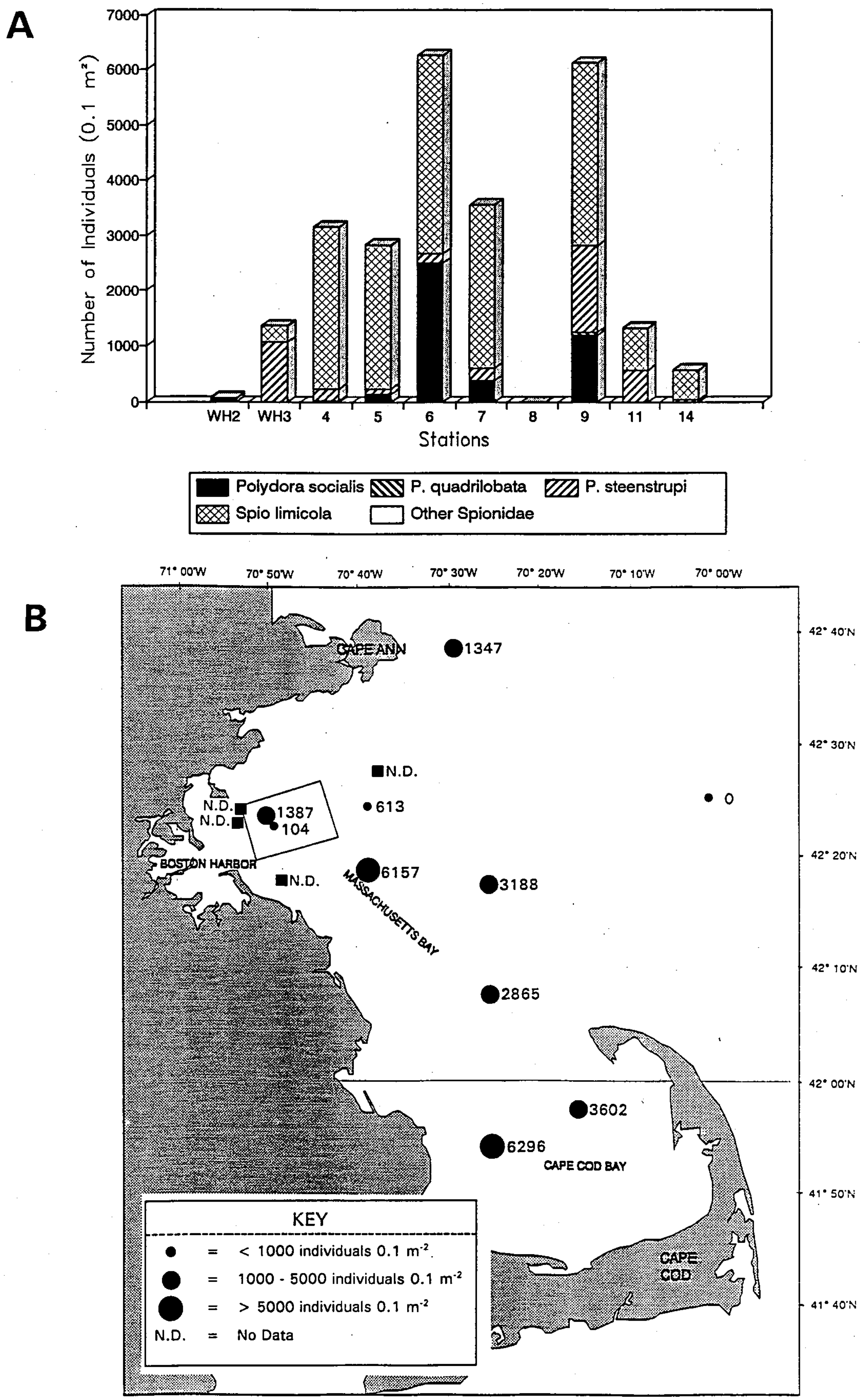
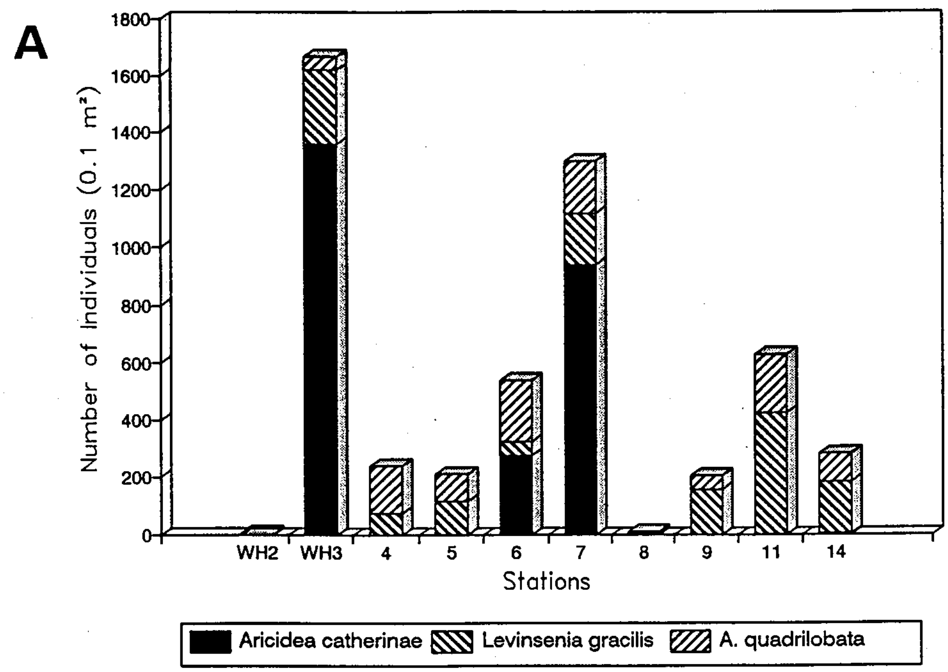


Figure 26. Distribution of Spionid Polychaetes in the Farfield, May 1992. A, Total Abundances of Species Kept Separate; B, Geographical Distribution of All Spionids Combined.



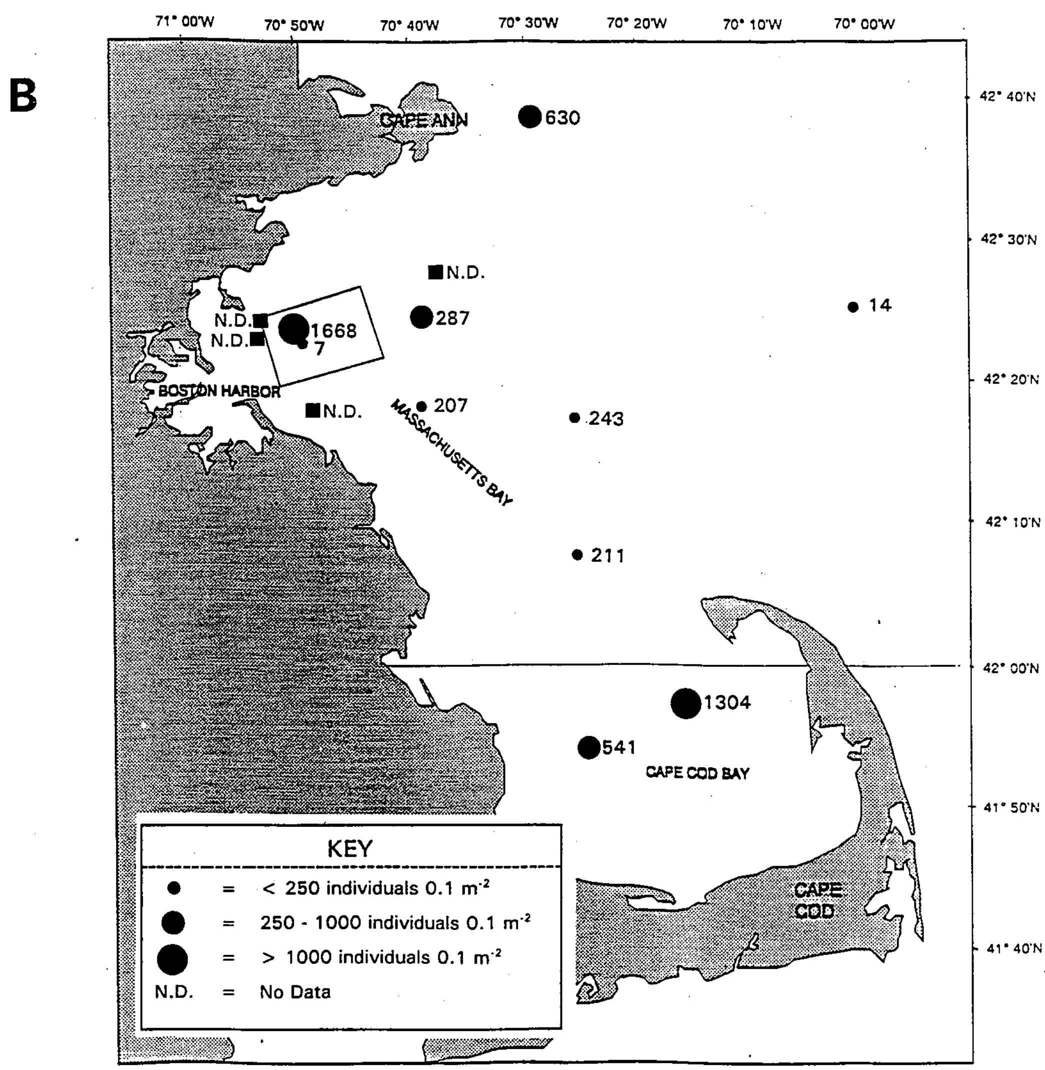


Figure 27. Distribution of Paraonid Polychaetes in the Farfield, May 1992. A, Total Abundances of Species Kept Separate; B, Geographical Distribution of All Paraonids Combined.

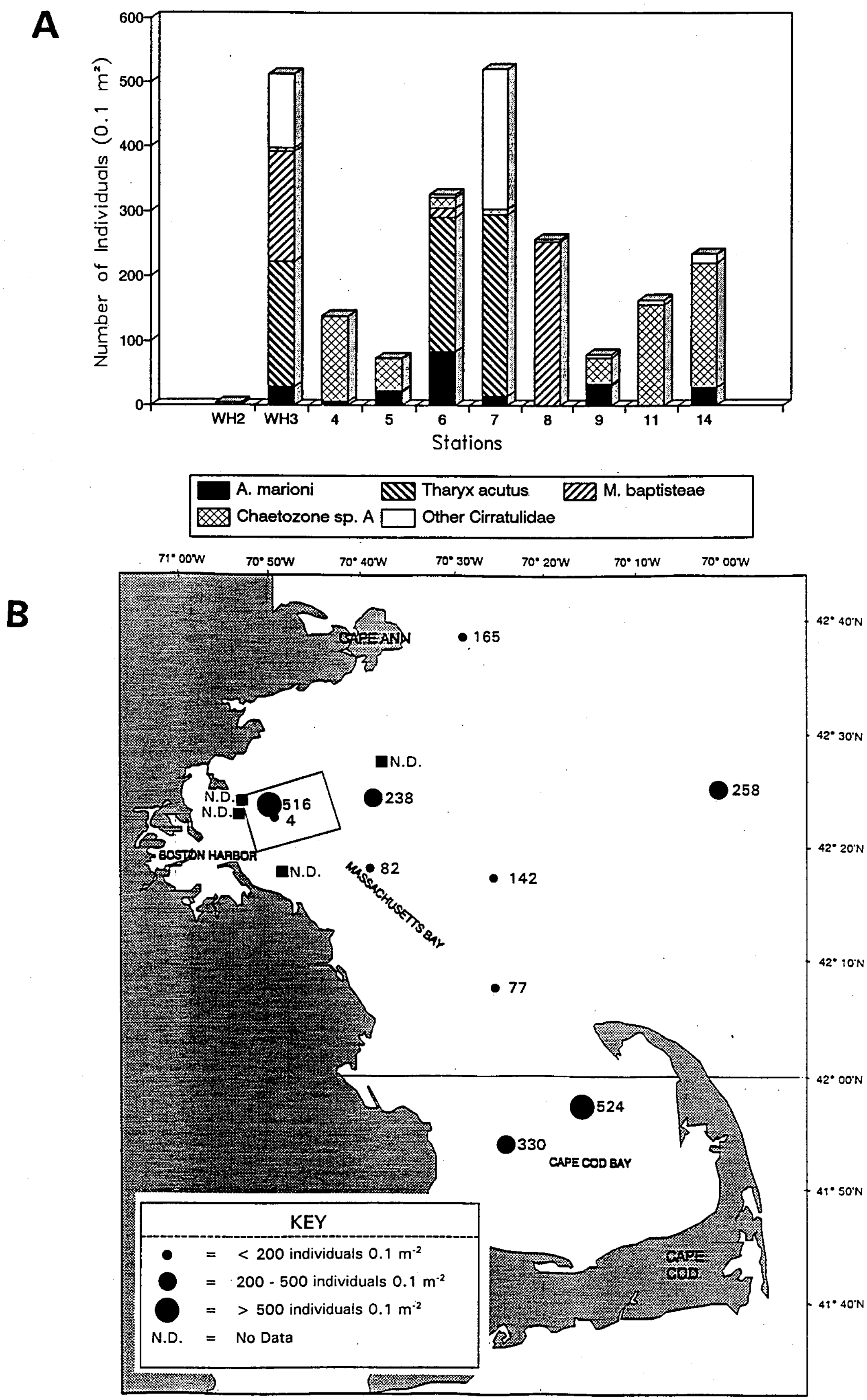


Figure 28. Distribution of Cirratulid Polychaetes in the Farfield, May 1992. A, Total Abundances of Species Kept Separate; B, Geographical Distribution of All Cirratulids Combined.

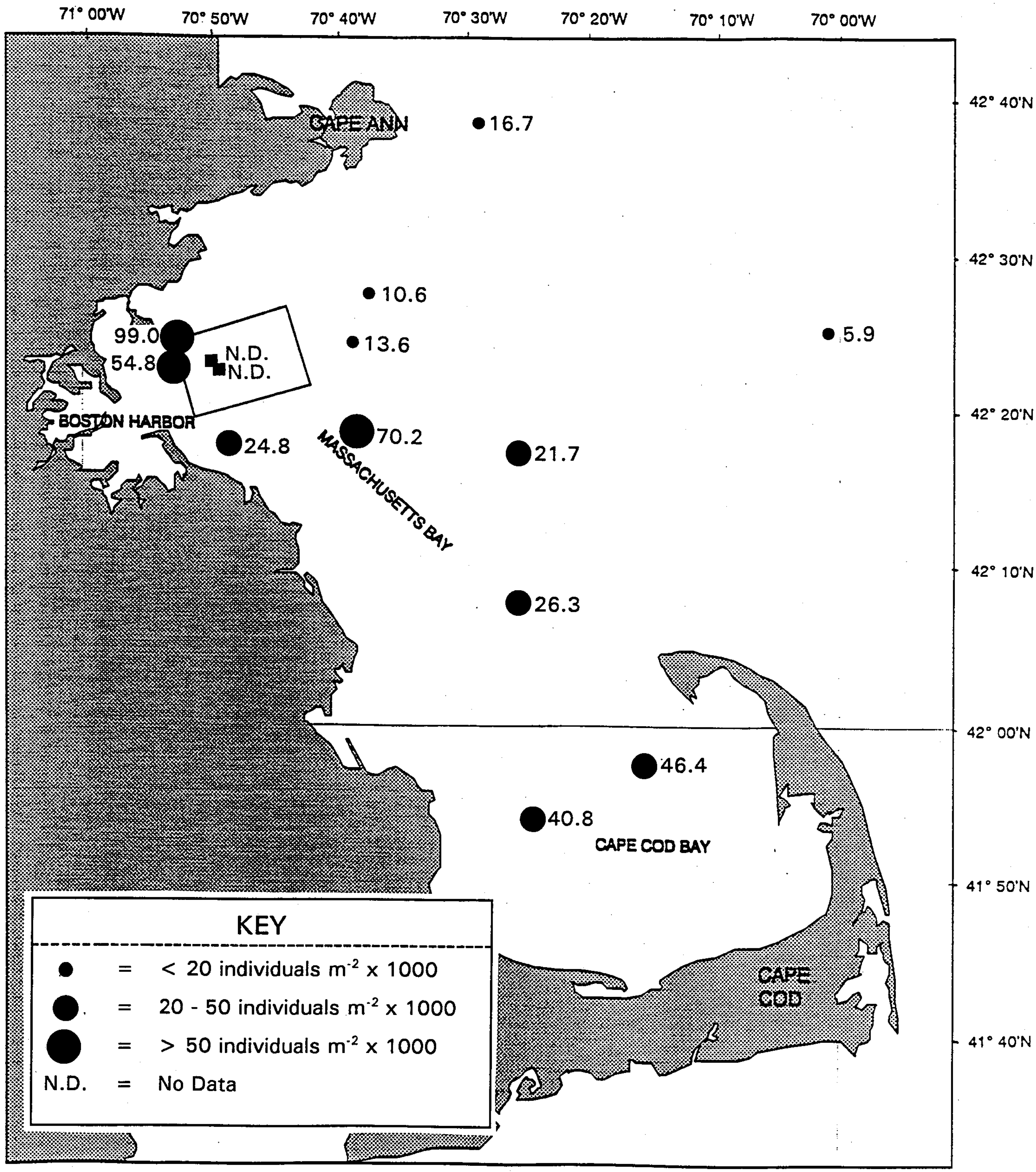


Figure 29. Total Densities in the Farfield, August 1992.

depth. The lowest densities were found at Station FF8 near Stellwagen Bank and at Station FF1, a station to the east of the nearfield area that was not sampled in May. The highest densities were reported from Stations FF9 (southeast of the nearfield area) and FF10, located in the northwest corner of the nearfield area. More than half of all individuals collected in the farfield in August belonged to the same spionid and capitellid polychaetes that had accounted for the majority of all infauna in May. *Spio limicola* contributed 26% of all individuals and reached peak densities of 28,100 individuals m^{-2}. The second most important species, *Mediomastus californiensis*, contributed 11% of all individuals and was found in densities up to 12,100 individuals m^{-2}. The other two spionids, *Prionospio steenstrupi* and *Polydora socialis*, accounted for 10% and 7%, respectively, of the total infauna; the highest local densities of these two species were similar, ranging from 9000 to 9600 individuals m^{-2}. Table 5 shows the total abundances at each station by replicate; means and standard deviations and the difference between the lowest and highest abundances at any one station are also given. The data clearly demonstrate the importance of a replicated sampling design. While some stations yielded alomost identical samples (e.g., Stations FF9 and FF10), others had a much more patchy fauna, resulting in replicates that differed in abundance by a factor greater than 2 (e.g., Stations FF4 and FF13).

Table 5. Total Abundances at Each Farfield Station, August 1992, Replicates Listed Separately.

Station	Number of Individuals (0.04 m²)					
	Replicate 1	Replicate 2	Replicate 3	Mean	Standard Deviation	Difference between smallest and largest Sample (%)
FF1	428	466	383	425.7	41.5	21.7
FF4	820	549	1229	866.0	342.3	123.8
FF5	1284	879	995	1052.7	208.6	46.1
FF6	1484	1432	1980	1632.0	302.5	38.3
FF7	1260	1279	3033	1857.3	1018.2	140.7
FF8	238	263	209	236.7	27.0	25.8
FF9	2746	2893	2779	2806.0	77.1	4.1
FF10	3961	3890	4028	3959.7	69.0	3.5
FF11	597	410	996	667.7	299.3	142.9
FF12	1594	2149	2836	2193.0	622.2	77.9
FF13	1172	408	1401	993.7	520.0	243.3
FF14	599	480	548	542.3	59.7	24.8

The 10 most abundant species and their contribution to the fauna at each station are listed in Table 6. Total raw counts are the sum of three 0.04-m^2 replicates, and the numbers for the 0.5-mm fraction are given in parentheses. The distribution of the entire fauna among the farfield stations can be found

Table 6. Dominant Species and Their Contribution to the Total and Identified Fauna at Each Farfield Station, August 1992. Numbers in parentheses are for the 0.5-mm fraction.

Rank	Species	Number of Individuals (0.12 m²)	Percent of Total Fauna	Percent of Identified Fauna
	Station FF-1			
1	*Cossura longocirrata* (Polychaete	181 (164)	14.2 (14.3)	15.0 (14.8)
2	*Spio limicola* (Polychaete)	120 (119)	9.4 (10.4)	10.0 (10.8)
3	*Chaetozone* sp. A (Polychaete)	99 (85)	7.8 (7.4)	8.2 (7.7)
4	*Tubificoides apectinatus* (Oligochaete)	83 (82)	6.5 (7.2)	6.9 (7.4)
5	*Maldane glebifex* (Polychaete)	74 (74)	5.8 (6.5)	6.2 (6.7)
6	*Anobothrus gracilis* (Polychaete)	59 (59)	4.6 (5.2)	4.9 (5.3)
7	*Prionospio steenstrupi* (Polychaete)	57 (51)	4.5 (4.5)	4.7 (4.6)
8	*Thyasira gouldi* (Bivalve)	45 (38)	3.5 (3.3)	3.7 (3.4)
9	*Heteromastus filiformis* (Polychaete)	42 (41)	3.3 (3.6)	3.5 (3.7)
10	*Aricidea quadrilobata* (Polychaete)	40 (31)	3.1 (2.7)	3.3 (2.8)
	TOTAL CUMULATIVE PERCENT		62.7 (65.1)	66.5 (67.2)
	Station FF-4			
1	*Spio limicola* (Polychaete)	1352 (1313)	52.0 (54.5)	52.8 (58.2)
2	*Scalibregma inflatum* (Polychaete)	220 (214)	8.5 (8.9)	8.6 (9.5)
3	*Mediomastus californiensis* (Polychaete)	133 (100)	5.1 (4.2)	5.2 (4.4)
4	*Prionospio steenstrupi* (Polychaete)	93 (83)	3.6 (3.4)	3.6 (3.7)
5	*Levinsenia gracilis* (Polychaete)	91 (87)	3.5 (3.6)	3.6 (3.9)
6	*Cossura longocirrata* (Polychaete)	64 (50)	2.5 (2.1)	2.5 (2.2)
7	*Chaetozone* sp. A (Polychaete)	56 (55)	2.2 (2.3)	2.2 (2.4)
8	*Dentalium entale* (Bivalve)	55 (30)	2.1 (1.2)	2.2 (1.3)
9	*Anobothrus gracilis* (Polychaete)	41 (39)	1.6 (1.6)	1.6 (1.7)
10	*Polydora socialis* (Polychaete)	38 (38)	1.5 (1.6)	1.5 (1.7)
	TOTAL CUMULATIVE PERCENT		81.6 (83.4)	83.7 (89.0)

Table 6 (Continued)

Rank	Species	Number of Individuals (0.12 m²)	Percent of Total Fauna	Percent of Identified Fauna
		Station FF-5		
1	*Spio limicola* (Polychaete)	2155 (2020)	68.2 (69.6)	69.6 (57.8)
2	*Levinsenia gracilis* (Polychaete)	121 (107)	3.8 (3.7)	3.9 (3.7)
3	*Aricidea quadrilobata* (Polychaete)	84 (74)	2.7 (2.5)	2.7 (2.6)
4	*Thyasira gouldi* (Bivlave)	81 (71)	2.6 (2.4)	2.6 (2.5)
5	*Mediomastus californiensis* (Polychaete)	72 (57)	2.3 (2.0)	2.3 (2.0)
6	*Prionospio steenstrupi* (Polychaete)	70 (62)	2.2 (2.1)	2.3 (2.2)
7	*Polydora socialis* (Polychaete)	69 (59)	2.2 (2.0)	2.2 (2.1)
8	*Chaetozone* sp. A (Polychaete)	43 (42)	1.4 (1.4)	1.4 (1.5)
9	*Ninoe nigripes* (Polychaete)	32 (32)	1.0 (1.1)	1.0 (1.1)
10	*Nucula delphinodonta* (Bivalve)	28 (17)	0.9 (0.3)	0.9 (0.6)
	TOTAL CUMULATIVE PERCENT		86.9 (87.1)	89.0 (76.1)
		Station FF-6		
1	*Spio limicola* (Polychaete)	1249 (1245)	25.5 (26.3)	25.8 (26.5)
2	*Polydora socialis* (Polychaete)	1078 (1077)	22.2 (22.8)	22.3 (22.9)
3	*Mediomastus californiensis* (Polychaete)	853 (825)	17.4 (17.4)	17.7 (17.6)
4	*Cossura longocirrata* (Polychaete)	317 (277)	6.5 (5.9)	6.6 (5.9)
5	Tubificidae sp. 2 (Oligochaete)	98 (96)	2.0 (2.0)	2.0 (2.0)
6	*Euchone incolor* (Polychaete)	98 (93)	2.0 (2.0)	2.0 (2.0)
7	*Aricidea catherinae* (Polychaete)	96 (88)	2.0 (1.9)	2.0 (1.9)
8	*Levinsenia gracilis* (Polychaete)	86 (86)	1.8 (1.8)	1.8 (1.8)
9	*Terebellides atlantis* (Polychaete)	82 (82)	1.7 (1.7)	1.7 (1.7)
10	*Tharyx acutus* (Polychaete)	72 (69)	1.5 (1.5)	1.5 (1.5)
	TOTAL CUMULATIVE PERCENT		82.6 (83.3)	83.4 (83.8)

Table 6 (Continued)

Rank	Species	Number of Individuals (0.12 m²)	Percent of Total Fauna	Percent of Identified Fauna
		Station FF-7		
1	*Mediomastus californiensis* (Polychaete)	1182 (1135)	21.2 (21.8)	21.5 (21.9)
2	*Spio limicola* (Polychaete)	1134 (1131)	20.0 (21.7)	20.6 (21.8)
3	*Cossura longocirrata* (Polychaete)	627 (540)	11.2 (10.4)	11.4 (10.4)
4	Tubificidae sp. 2 (Oligochaete)	613 (600)	11.0 (11.5)	11.1 (11.6)
5	*Euchone incolor* (Polychaete)	553 (494)	9.9 (9.5)	10.0 (9.5)
6	*Aricidea catherinae* (Polychaete)	418 (354)	7.5 (6.8)	7.6 (6.8)
7	*Polydora socialis* (Polychaete)	139 (139)	2.3 (2.7)	2.5 (2.7)
8	*Tharyx acutus* (Polychaete)	122 (108)	2.2 (2.1)	2.2 (2.1)
9	*Prionospio steenstrupi* (Polychaete)	104 (102)	1.9 (2.0)	1.9 (2.0)
10	*Apistobranchus tullbergi* (Polychaete)	92 (91)	1.7 (1.7)	1.7 (1.8)
	TOTAL CUMULATIVE PERCENT		88.6 (90.2)	90.5 (90.6)
		Station FF-8		
1	*Ophiura* sp. 2 (Echinoderm)	137 (86)	19.3 (16.3)	21.8 (18.0)
2	*Monticellina baptisteae* (Polychaete)	124 (115)	17.5 (21.8)	19.7 (24.1)
3	*Cossura longocirrata* (Polychaete)	118 (95)	16.6 (18.0)	18.7 (19.9)
-	Maldanidea spp. (Polychaete)	29 (28)	4.1 (5.3)	-.- (-.-)
4	*Aphelochaeta marioni* (Polychaete)	21 (20)	3.0 (3.8)	3.3 (4.2)
5	*Trochochaeta carica* (Polychaete)	18 (14)	2.5 (2.7)	2.9 (2.9)
6	*Tharyx acutus* (Polychaete)	15 (14)	2.1 (2.7)	2.4 (2.9)
7	*Meiodorvillea minuta* (Polychaete)	14 (1)	2.0 (0.2)	2.2 (0.2)
8	*Carinomella lactea* (Nemertean)	11 (3)	1.5 (0.6)	1.8 (0.6)
9	*Ophelina abranchiata* (Polychaete)	10 (10)	1.4 (1.9)	1.6 (2.1)
10	*Dentalium entale* (Scaphopod)	9 (4)	1.3 (0.8)	1.4 (0.8)
10	*Nephtys incisa* (Polychaete)	9 (8)	1.3 (1.5)	1.4 (1.7)
	TOTAL CUMULATIVE PERCENT		72.6 (75.6)	77.1 (77.4)

Table 6 (Continued)

Rank	Species	Number of Individuals (0.12 m²)	Percent of Total Fauna	Percent of Identified Fauna
		Station FF-9		
1	*Spio limicola* (Polychaete)	3420 (3373)	40.6 (45.0)	41.6 (45.7)
2	*Prionospio steenstrupi* (Polychaete)	1494 (1154)	17.7 (15.4)	18.2 (15.6)
3	*Polydora socialis* (Polychaete)	928 (918)	11.0 (12.2)	11.3 (12.4)
4	*Scalibregma inflatum* (Polychaete)	485 (454)	5.8 (6.1)	5.9 (6.2)
5	*Mediomastus californiensis* (Polychaete)	314 (184)	3.7 (2.5)	3.8 (2.5)
6	*Levinsenia gracilis* (Polychaete)	266 (176)	3.2 (2.3)	3.2 (3.4)
7	*Ampharete acutifrons* (Polychaete)	263 (250)	3.1 (3.3)	3.2 (3.4)
8	*Exogone verugera* (Polychaete)	104 (75)	1.2 (1.0)	1.3 (1.0)
9	*Ninoe nigripes* (Polychaete)	83 (82)	0.9 (1.1)	1.0 (1.1)
10	*Exogone hebes* (Polychaete)	71 (62)	0.8 (0.8)	0.9 (0.8)
	TOTAL CUMULATIVE PERCENT		88.0 (89.7)	90.3 (91.1)
		Station FF-10		
1	*Spio limicola* (Polychaete)	2061 (2055)	17.3 (19.0)	18.9 (20.4)
2	*Prionospio steenstrupi* (Polychaete)	1026 (952)	8.6 (8.8)	9.4 (9.5)
3	*Polydora socialis* (Polychaete)	938 (932)	7.9 (8.6)	8.6 (9.3)
4	*Mediomastus californiensis* (Polychaete)	914 (852)	7.7 (7.9)	8.4 (8.5)
5	*Polydora quadrilobata* (Polychaete)	873 (872)	7.3 (8.0)	8.0 (8.7)
6	*Nucula delphinodonta* (Bivalve)	835 (500)	7.0 (4.6)	7.6 (5.0)
-	Ampharetidae spp. (Polychaete)	663 (590)	5.6 (5.4)	-.- (-.-)
7	*Exogone verugera* (Polychaete)	336 (270)	2.8 (2.5)	3.1 (2.7)
8	*Monticellina baptisteae* (Polychaete)	334 (288)	2.8 (2.7)	3.1 (2.9)
9	*Tharyx acutus* (Polychaete)	323 (266)	2.7 (2.5)	2.7 (2.8)
10	*Ninoe nigripes* (Polychaete)	290 (277)	2.4 (2.6)	2.7 (2.8)
	TOTAL CUMULATIVE PERCENT		72.1 (82.6)	72.6 (72.4)

Table 6 (Continued)

Rank	Species	Number of Individuals (0.12 m²)	Percent of Total Fauna	Percent of Identified Fauna
		Station FF-11		
1	*Spio limicola* (Polychaete)	477 (476)	23.8 (26.3)	24.8 (26.8)
2	*Prionospio steenstrupi* (Polychaete)	417 (393)	20.8 (21.7)	21.7 (22.2)
3	*Levinsenia gracilis* (Polychaete)	308 (274)	15.4 (15.2)	16.0 (15.4)
4	*Aricidea quadrilobata* (Polychaete)	184 (176)	9.2 (9.7)	9.6 (9.9)
5	*Tubificoides apectinatus* (Oligochaete)	102 (101)	5.1 (5.6)	5.3 (5.7)
6	*Mediomastus californiensis* (Polychaete)	69 (26)	3.4 (1.6)	3.6 (1.5)
7	*Chaetozone* sp. A (Polychaete)	44 (44)	2.2 (2.4)	2.3 (2.5)
8	*Anobothrus gracilis* (Polychaete)	40 (37)	2.0 (2.0)	2.1 (2.1)
9	*Cossura longocirrata* (Polychaete)	39 (32)	1.9 (1.8)	2.0 (1.8)
10	*Parougia caeca* (Polychaete)	37 (31)	1.8 (1.7)	1.9 (1.7)
	TOTAL CUMULATIVE PERCENT		85.6 (88.0)	89.2 (89.6)
		Station FF-12		
1	*Mediomastus californiensis* (Polychaete)	1574 (1453)	23.9 (23.9)	24.4 (24.1)
2	*Aricidea catherinae* (Polychaete)	1187 (1101)	18.0 (18.1)	18.4 (18.3)
3	*Prionospio steenstrupi* (Polychaete)	972 (944)	14.8 (15.5)	15.1 (15.7)
4	*Tharyx acutus* (Polychaete)	777 (731)	11.8 (12.0)	12.0 (12.1)
5	*Owenia fusiformis* (Polychaete)	309 (309)	4.7 (5.1)	4.8 (5.1)
6	*Leitoscoloplos acutus* (Polychaete)	286 (229)	4.3 (3.8)	4.4 (3.8)
7	*Ninoe nigripes* (Polychaete)	233 (232)	3.5 (3.8)	3.6 (3.8)
8	*Monticellina baptisteae* (Polychaete)	126 (122)	1.9 (2.1)	1.9 (2.1)
9	*Scoletoma hebes* (Polychaete)	125 (125)	1.9 (2.1)	1.9 (2.1)
10	*Polydora quadrilobata* (Polychaete)	81 (81)	1.2 (1.3)	1.3 (1.3)
	TOTAL CUMULATIVE PERCENT		86.0 (87.6)	87.8 (88.3)

Table 6 (Continued)

Rank	Species	Number of Individuals (0.12 m²)	Percent of Total Fauna	Percent of Identified Fauna
	Station FF-13			
1	*Prionospio steenstrupi* (Polychaete)	698 (691)	23.4 (25.8)	24.3 (26.3)
2	*Polydora cornuta* (Polychaete)	433 (401)	14.5 (15.0)	15.1 (15.2)
3	*Mediomastus californiensis* (Polychaete)	420 (393)	14.1 (14.7)	14.6 (14.9)
4	*Tharyx acutus* (Polychaete)	328 (257)	11.0 (9.6)	11.4 (9.8)
5	*Nephtys neotena* (Polychaete)	131 (105)	4.4 (3.9)	4.6 (4.0)
6	*Photis pollex* (Amphipod)	111 (97)	3.7 (3.6)	3.9 (3.7)
7	*Phyllodoce mucosa* (Polychaete)	107 (106)	3.6 (4.0)	3.7 (4.0)
8	*Aphelochaeta monilaris* (Polychaete)	69 (68)	2.3 (2.5)	2.4 (2.6)
9	*Aricidea catherinae* (Polychaete)	63 (62)	2.1 (2.3)	2.2 (2.4)
10	*Ampelisca abdita* (Amphipod)	51 (47)	1.7 (1.8)	1.8 (1.8)
	TOTAL CUMULATIVE PERCENT		80.8 (83.2)	83.8 (84.7)
	Station FF-14			
1	*Spio limicola* (Polychaete)	607 (607)	36.3 (39.6)	39.7 (42.0)
2	*Levinsenia gracilis* (Polychaete)	112 (99)	6.7 (6.5)	7.3 (6.8)
3	*Aricidea quadrilobata* (Polychaete)	108 (103)	6.5 (6.7)	7.1 (7.1)
4	*Chaetozone* sp. A (Polychaete)	99 (84)	5.9 (5.5)	6.5 (5.8)
5	*Prionospio steenstrupi* (Polychaete)	62 (59)	3.7 (3.9)	4.1 (4.1)
6	*Scalibregma inflatum* (Polychaete)	52 (52)	3.1 (3.4)	3.4 (3.6)
7	*Cossura longocirrata* (Polychaete)	49 (44)	2.9 (2.9)	3.2 (3.0)
8	*Tubificoides apectinatus* (Oligochaete)	33 (32)	2.0 (2.1)	2.2 (2.2)
9	*Thyasira gouldi* (Bivalve)	32 (32)	1.9 (2.1)	2.1 (2.2)
10	*Mediomastus californiensis* (Polychaete)	32 (31)	1.9 (2.0)	2.1 (2.1)
	TOTAL CUMULATIVE PERCENT		70.9 (74.7)	77.5 (78.9)

in Appendix D. Nearly all stations had *Spio limicola* as the top ranking species, and at Stations FF4, FF5, FF9, and FF14 this species alone accounted for at least 40% of the total fauna. At Stations FF6, FF10, and FF11, *S. limicola* contributed about 20% to the total fauna and ranked first; at Station FF7, it occupied a close second after *Mediomastus californiensis*, which contributed an almost equal portion of the total fauna. All stations characterized by high abundances of *S. limicola* are located in depths between 30 and 80 m.

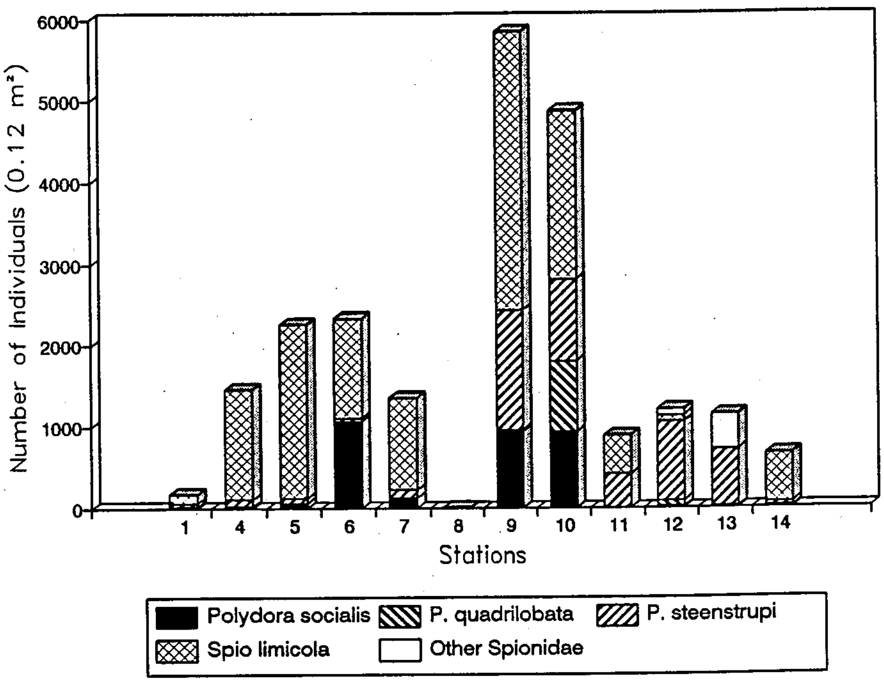
The remaining stations with different dominant species were either shallower or much deeper than the *Spio* stations, except for Station FF1 (70 m). The fauna at this station was characterized by *Cossura longocirrata* and *Spio limicola*, which each contributed only 10 to 15% of the total fauna. Station FF8, located on the outer shelf at 177 m, was dominated by a brittle star, *Ophiura* sp. 2, and two polychaetes that had also been dominant at this station in May (*Monticellina baptisteae* and *Cossura longocirrata*); each of the three species contributed about 20% to the total fauna. It is interesting that 7 of the top 10 species at this station not only are unique to the station, but were replaced between May and August.

Two very shallow stations along the 20-m isobath were added to the August sampling program. Of these two stations, Station FF12, located just west of the nearfield area, was dominated by *Mediomastus californiensis, Aricidea catherinae, Prionospio steenstrupi,* and *Tharyx acutus*, each accounting for 12 to 24% of all individuals. This suite of dominant species is characteristic for many nearfield stations (see Section 3.1.7). Among the lower ranking species at this station were two polychaetes not seen in May and absent from the other stations in August, *Scoletoma hebes* and *Owenia fusiformis*. Station FF13, located east of Hull, was dominated by *Prionospio steenstrupi, Polydora cornuta, Mediomastus californiensis,* and *Tharyx acutus*. The most interesting species is *P. cornuta* because it is more typical for Boston Harbor and was not found at any other nearfield or farfield station. It contributed 15% to the total fauna at this station. Other unusual dominants at this station include the polychaete *Nephtys neotena* and the amphipods *Ampelisca abdita* and *Photis pollex*.

There were very few seasonal changes in the dominant fauna except for declining densities for most species at most stations. The polychaete *Scalibregma inflatum* was rare or absent throughout the farfield area in May, but was among the dominant species at Stations FF4, FF9, and FF14 in August; *Aricidea quadrilobata* was among the dominant species at Stations FF4 and FF6 in May, but rare in August. *Capitella capitata* complex, which was among the lower-ranking dominants at Station FF11, was rare or absent at all stations in August.

Distributional patterns of some common species and their abundances are depicted in Figures 30-32. Figure 30 shows the distribution of four common spionids and some additional species not listed separately ("Other Spionidae"). The highest and lowest densities of all spionids combined coincide with the highest and lowest total infaunal density; however, when species are examined separately, some overlapping depth-related patterns can be seen. *Spio limicola* reached its highest densities in depths of 30 to 60 m. *Polydora socialis* had a similar depth distribution, but densities dropped noticeably in depths greater than 50 m. *Prionospio steenstrupi* was found in greatest densities between 20 and 50 m. *Polydora quadrilobata* was seen in high abundance at only one station off Nahant (FF10) and may be less dependant on depth than on other physicochemical parameters such as grain size or total organic carbon (see also Section 3.2.2). The high number of Other Spionidae at Station FF13 (off Hull) consists mostly of *Polydora cornuta*, a species more typically seen in Boston Harbor (Blake *et al.*, 1993). In comparison with the May data, there was a pronounced change in spionid density at the Cape Cod Bay stations FF6 and FF7. Station FF9 (outer Massachusetts Bay) continued to support very high densities of all three common spionid species, and two other outer

A



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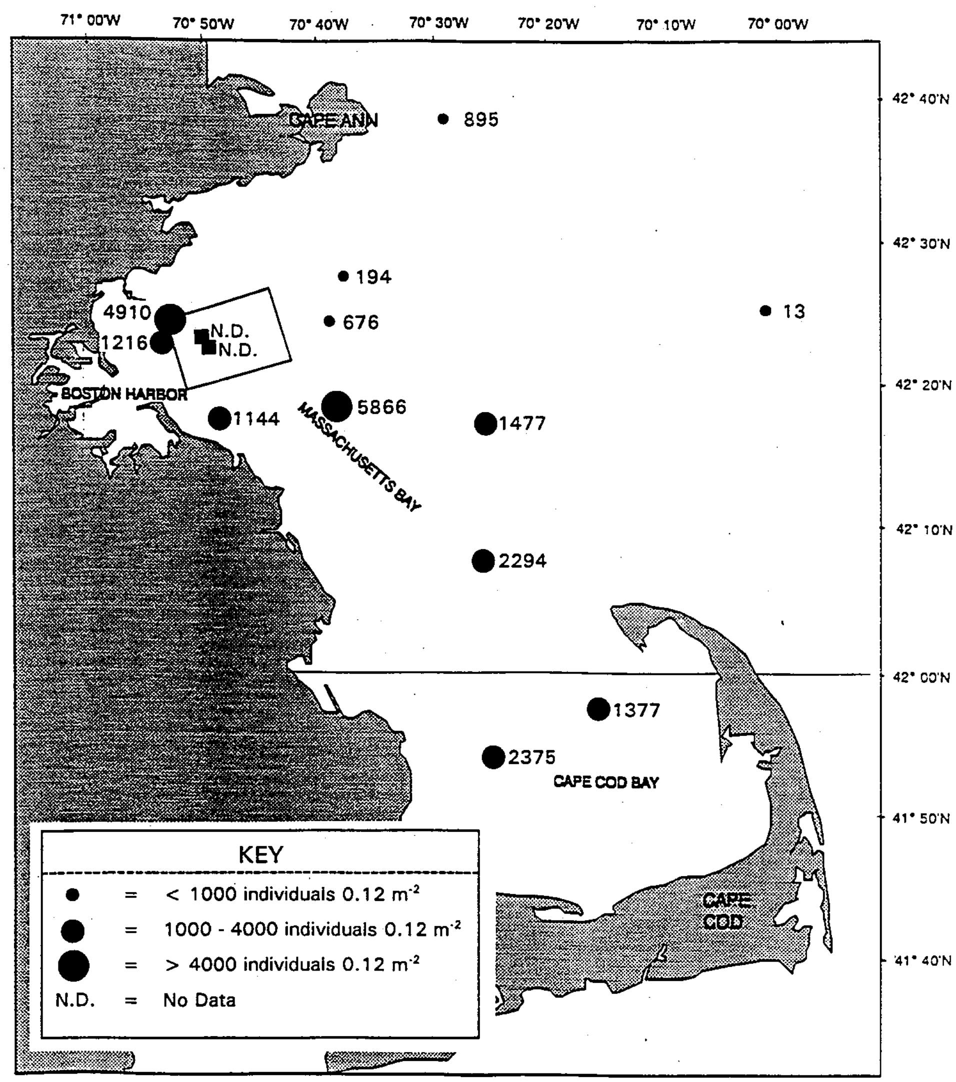

Figure 30. Distribution of Spionid Polychaetes in the Farfield, August 1992. A, Total Abundances of Species Kept Separate; B, Geographical Distribution of All Spionids Combined.

MassachusettsBay stations (FF4 and FF5) were still characterized by *S. limicola* dominating the spionid fauna, although densities dropped between May and August at both stations.

The most common paraonids and their distribution in the farfield area in August 1992 is shown in Figure 31. The two species of *Aricidea* (*A. catherinae* and *A. quadrilobata*) clearly showed the same depth preferences as had been noted in May, with *A. catherinae* being most abundant between 20 and 40 m and *A. quadrilobata* being most abundant between 70 and 90 m. *Levinsenia gracilis* was found in considerable numbers at only one station, but generally seemed to prefer depths between 50 and 90 m. By far the most paraonids were reported at Station FF12, due to a high abundance of *A. catherinae*, and the fewest paraonids were noted at the low-density Stations FF1 and FF8 and at Station FF13, which is located at roughly the same depth as Station FF12, but was characterized by a species composition more similar to the outer Boston Harbor than to Massachusetts Bay.

The distributional patterns of four cirratulid species are shown in Figure 32. *Tharyx acutus* and *Aphelochaeta marioni* were present in high abundance at most of the stations in the 20 to 30-m depth range, whereas *Chaetozone* sp. A occurred at depths between 60 and 80 m. *Monticellina baptisteae*, a species that seemed to be indicative of outer shelf depths in the May samples, was found again at Station FF8, but also at two of the shallowest stations just west of the nearfield area (Stations FF10 and FF12). Its distribution may be influenced by parameters other than depth. Very few cirratulids were found at Stations FF4, FF5, FF9 (outer Massachusetts Bay), and FF11 (off Cape Ann). All these stations have sediments with high silt-clay content (see Section 3.2.1).

Species Richness and Diversity

May. Parameters related to infaunal diversity are listed in Table 7. Species richness ranged from 34 to 109; the lowest species richness was reported at Station WH2, where only 47 species were found, and at Station 8, which had 34 species. Species richness was highest at Stations 6 (81 species) and 9 (109 species). Diversity, when measured with the Shannon-Wiener index, was more dependent on infaunal densities than on species richness. The Shannon-Wiener indices were highest at Stations WH2 ($H' = 4.03$) and 14 ($H' = 3.69$). None of these stations had a particularly high species richness, but had relatively low infaunal densities. Similarly, the stations with the lowest Shannon-Wiener index (Station 4: $H' = 2.61$; Station 5: $H' = 2.07$) had even more species than the high-diversity stations, but also by far higher abundances. Hurlbert's rarefaction method appears to be slightly more sensitive to species richness. The number of expected species per 500 individuals is highest at Stations WH2, 9, and 14, with Station 9 also having the highest species richness of all farfield stations; the lowest number of species per 500 individuals was calculated for Stations 7, 8, and 11, with Station 8 also having the fewest species. Figure 33 shows the rarefaction curves for the May samples. With the exception of the very species-rich Station 9, the spread among the curves is not very wide, and they all seem to level out at about 4000 individuals. At the stations with more than 6000 individuals, only one more species was added for every 1000 additional individuals (not shown in the figure).

August. Community parameters related to diversity are listed in Table 8. Species richness ranged from 53 to 119, with the lowest number of species found at Stations FF8 (n = 53) and FF11 (n = 55) and the highest number of species found at Stations FF9 (n = 104) and FF10 (n = 119). The majority of the farfield stations had about 70 to 80 species. With the exception of a decrease in species richness between the middle and outer shelf, no clear geographical or depth-related pattern could be seen.

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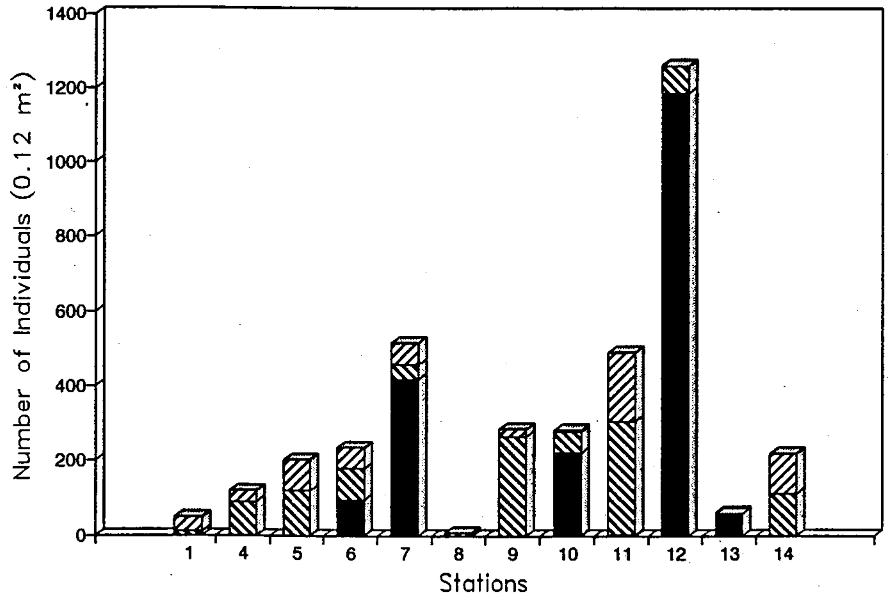

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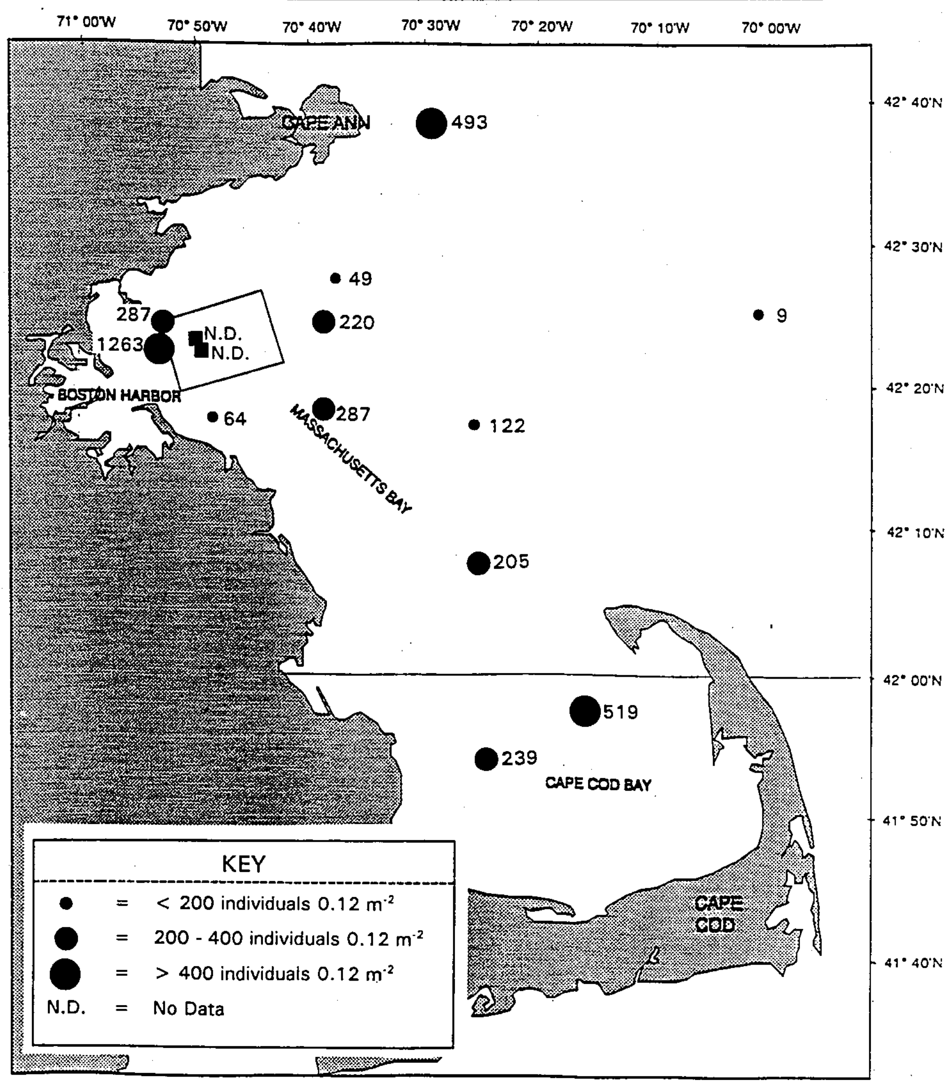
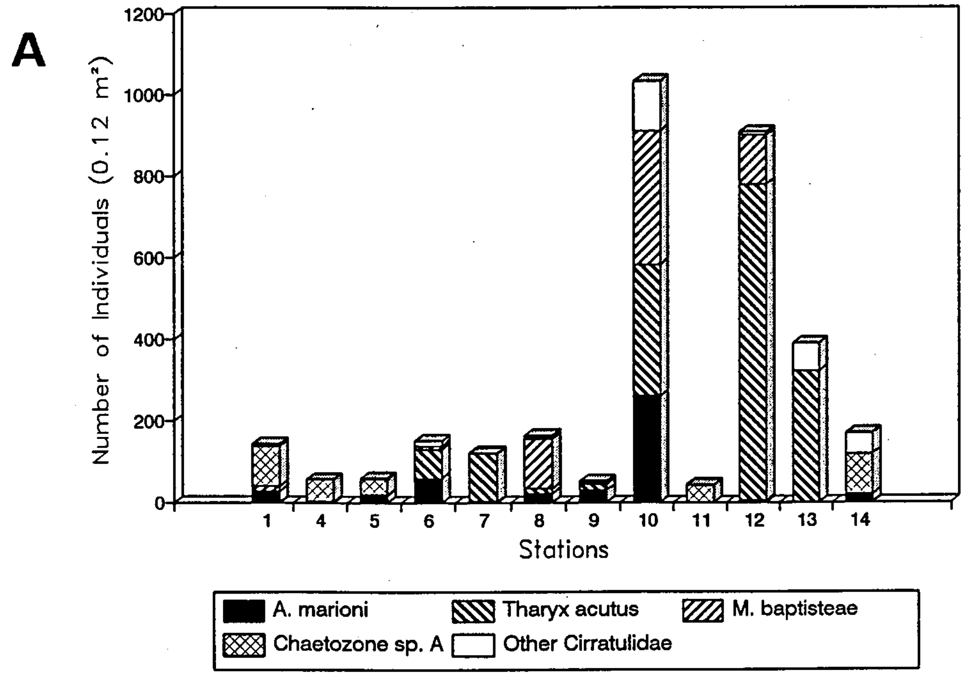


Figure 31. Distribution of Paraonid Polychaetes in the Farfield, August 1992. A, Total Abundances of Species Kept Separate; B, Geographical Distribution of All Paraonids Combined.



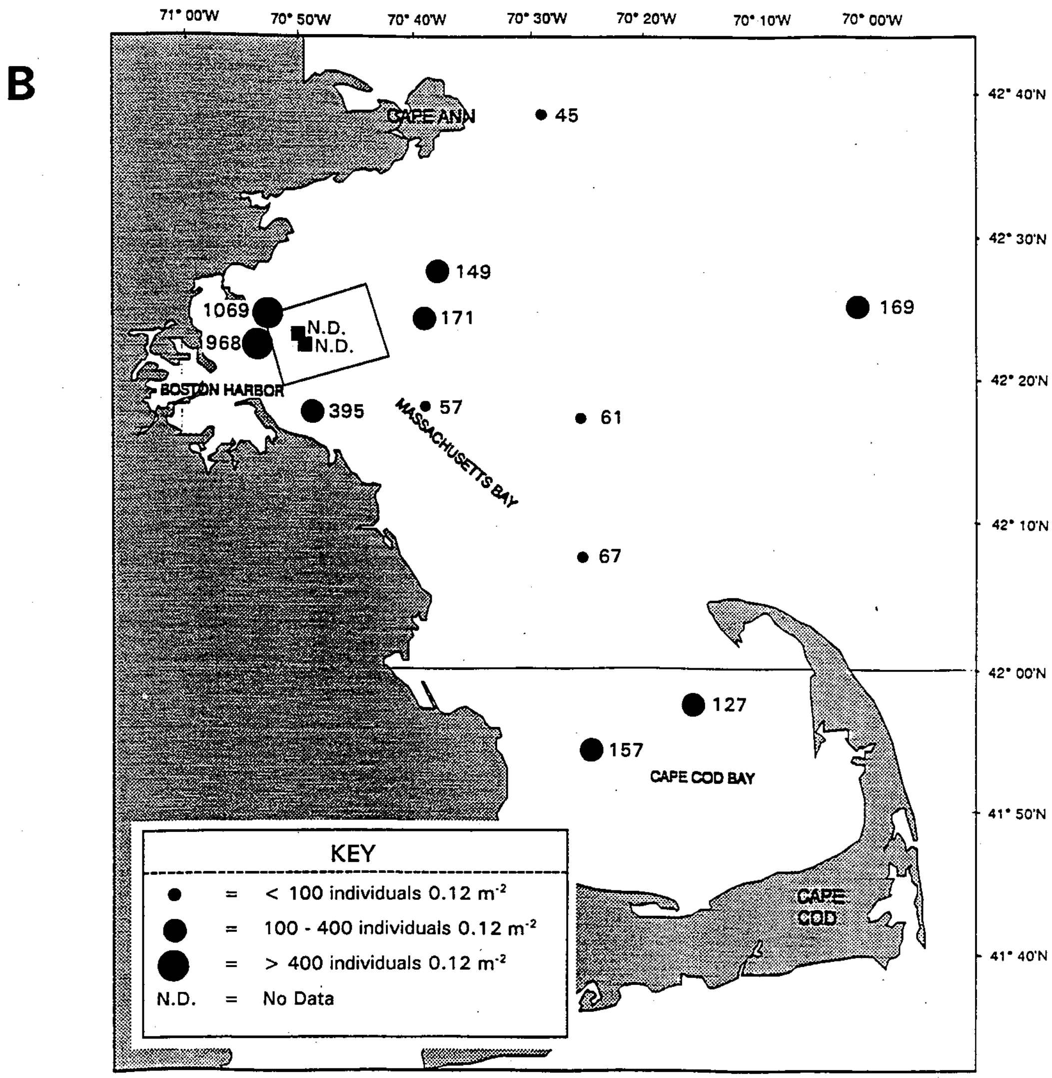


Figure 32. Distribution of Cirratulid Polychaetes in the Farfield, August 1992. A, Total Abundances of Species Kept Separate; B, Geographical Distribution of All Cirratulids Combined.

Table 7. Community Parameters for the Farfield Stations, May 1992.

Station	Depth (m)	Number of Species	Number of Individuals (m^2)	Diversity (Hurlbert's Rarefaction)										Shannon-Wiener Index and Evenness	
				Spp./ 100 Ind.	Spp./ 250 Ind.	Spp./ 500 Ind.	Spp./ 750 Ind.	Spp./ 1000 Ind.	Spp./ 1500 Ind.	Spp./ 2000 Ind.	Spp./ 2500 Ind.	Spp./ 3000 Ind.	Spp./ 4000 Ind.	*H'*	*J'*
WH2	32	47	8,240	25.0	34.9	41.9	46.1	*	*	*	*	*	*	4.03	0.727
WH3	36	76	81,330	18.4	25.6	32.5	37.1	40.6	45.9	50.0	53.5	56.5	61.6	3.62	0.579
4	92	64	47,240	18.0	26.6	34.0	38.7	42.1	47.3	51.2	54.4	57.1	61.5	2.61	0.436
5	64	68	36,710	15.4	24.2	33.1	39.2	44.0	51.4	56.9	61.1	64.6	*	2.07	0.340
6	36	81	115,220	19.0	28.5	37.1	42.6	46.7	52.4	56.5	59.6	62.1	66.1	3.42	0.539
7	39	74	138,840	16.1	22.4	28.8	33.3	36.8	42.2	46.3	49.5	52.2	56.4	3.38	0.544
8	192	34	6,090	16.2	24.4	31.8	*	*	*	*	*	*	*	2.89	0.568
9	51	109	84,700	17.5	29.0	40.8	48.7	54.7	63.7	70.7	76.3	81.1	88.9	3.17	0.468
11	89	55	27,820	16.3	23.9	31.1	36.0	39.6	45.3	49.6	53.2	*	*	3.31	0.573
14	77	55	16,560	21.7	31.6	40.3	45.5	49.1	*	*	*	*	*	3.69	0.638

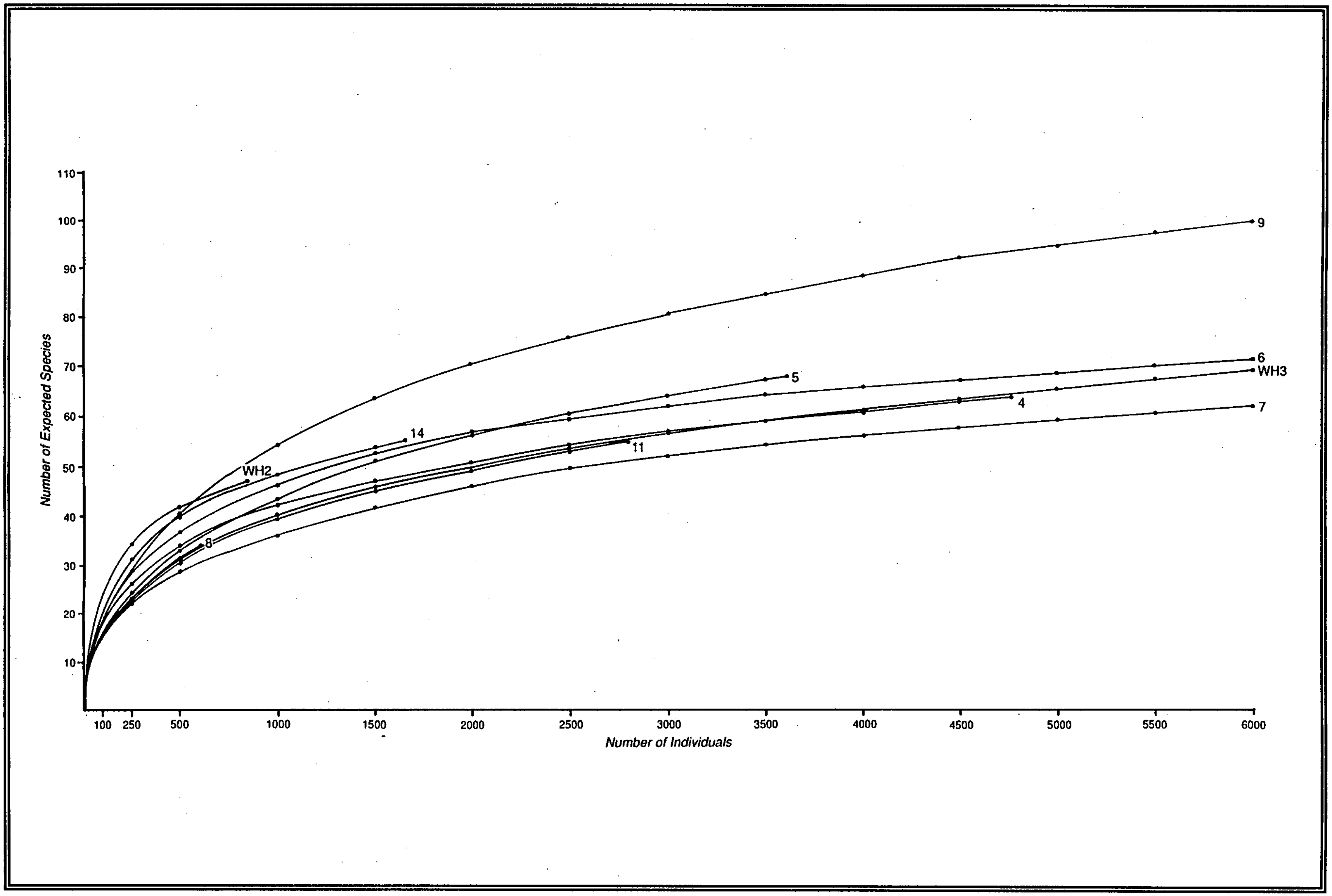


Figure 33. Rarefaction Curves for the Farfield Stations, May 1992.

Table 8. Community Parameters for the Farfield Stations, August 1992.

Station	Depth (m)	Number of Species	Number of Individuals (m^2)	Diversity (Hurlbert's Rarefaction)										Shannon-Wiener Index and Evenness	
				Spp./ 100 Ind.	Spp./ 250 Ind.	Spp./ 500 Ind.	Spp./ 750 Ind.	Spp./ 1000 Ind.	Spp./ 1500 Ind.	Spp./ 2000 Ind.	Spp./ 2500 Ind.	Spp./ 3000 Ind.	Spp./ 4000 Ind.	*H'*	*J'*
FF1	68	78	10,642	31.3	46.3	59.4	67.7	73.9	*	*	*	*	*	4.77	0.759
FF4	86	76	21,650	21.5	32.3	42.1	49.0	54.5	63.3	70.1	75.4	*	*	3.16	0.506
FF5	61	74	26,317	17.8	28.5	38.7	45.6	50.8	58.7	64.6	69.3	73.3	*	2.34	0.377
FF6	33	74	40,800	21.6	32.9	42.5	48.3	52.3	57.7	61.3	64.2	66.6	70.8	3.60	0.579
FF7	37	70	46,433	17.1	24.7	32.0	36.9	40.6	46.4	50.8	54.5	57.7	63.2	3.51	0.573
FF8	177	53	5,917	26.9	40.4	50.0	*	*	*	*	*	*	*	3.96	0.692
FF9	48	104	70,150	17.4	27.9	39.1	46.7	52.5	61.0	67.3	72.5	77.0	84.3	3.14	0.469
FF10	27	119	98,992	28.1	41.2	52.4	59.3	64.5	72.3	78.4	83.3	87.5	94.3	4.52	0.655
FF11	86	55	16,692	18.1	26.6	34.5	39.7	43.7	50.2	*	*	*	*	3.44	0.595
FF12	22	79	54,825	18.7	27.3	35.8	41.7	46.3	53.1	58.1	62.0	65.2	70.3	3.57	0.566
FF13	19	70	24,842	21.5	31.3	40.3	46.1	50.6	57.3	62.5	66.9	*	*	3.80	0.621
FF14	69	66	13,558	24.7	35.8	45.8	52.7	58.0	65.6	*	*	*	*	3.67	0.627

Infaunal diversity, expressed as Shannon-Wiener index, was highest at Stations FF1 ($H' = 4.77$) and FF10 ($H' = 4.52$) and lowest at Station FF5 ($H' = 2.34$). The second lowest H' was calculated for Station FF9, a station that had the second most species, but also the second highest infaunal densities. Similarly, Station FF8, which had the fewest species, ranked third in terms of Shannon-Wiener diversity because it also had by far the lowest infaunal density.

With Hurlbert's rarefaction method, the ranking of stations by their diversity changes little among the high-diversity stations (Figure 34). The highest number of expected species per 500 individuals was calculated for Station FF1 at 59.4, followed by Station FF10 with 52.4 and Station FF8 with 50.0 expected species per 500 individuals. The stations with the lowest diversity, however, were different depending on which diversity measure was used. The lowest numbers of expected species per 500 individuals were calculated for Stations FF7 (n = 32.0), FF11 (n = 34.5), and FF12 (n = 35.8), whereas the low-diversity stations determined with Shannon-Wiener were in the middle range of Hurlbert's rarefaction. The reason for this difference is most likely the greater sensitivity of H' to one or two highly dominant species; all three stations with low H' had very high abundances of *Spio limicola* that alone accounted for 40 to 70% of the total fauna.

Community Patterns

May. Similarity analyses with Bray-Curtis and NESS resulted in two dendrograms shown in figure 35. With Bray-Curtis, two clusters emerge, along with two single outlier stations. Cluster 1, consisting of Stations WH3, 6, 7, and 9, is defined by very high densities of *Mediomastus californiensis* in the range of 15,000 to 36,000 individuals m^{-2} (except for the only loosely affiliated Station 9 with about 5000 individuals m^{-2}). Other species characterizing this cluster include *Prionospio steenstrupi*, *Aricidea catherinae*, *Tharyx acutus*, *Euchone incolor*, and *Ninoe nigripes*. The depth range of the stations in cluster 1 is about 30 to 50 m, and total infaunal densities range from 81,000 to 139,000 individuals m^{-2}. Cluster 2 includes Stations 4, 5, 11, and 14, characterized by high densities of *Chaetozone* sp. A and much lower densities of all species that characterize cluster 1. The depth range of the stations in cluster 2 is 60 to 90 m, and total infaunal densities reach only 47,000 individuals m^{-2}. The outlier stations 8 and WH2 had a very different species composition and very low infaunal densities (6000 to 8000 individuals m^{-2}). The benthic infauna at the 190-m Station 8 included many species more typical of the outer continental shelf than shallow nearshore waters. Station WH2 is very dissimilar to all other stations, joining at the very low similarity level of 0.08, because of the largely amphipod-dominated fauna.

The clustering pattern arising with NESS differs from Bray-Curtis mainly in the position of Station 9. With NESS, this station is part of cluster 2; with Bray-Curtis, it is grouped with cluster 1. This pattern indicates that Station 9 does not have any strong affinities to either cluster 1 or 2. The low density of *Ninoe nigripes* at Station 9 may be a reason for the differences in the clustering patterns between Bray-Curtis and NESS. *Chaetozone* sp. A and *Levinsenia gracilis* are most likely holding cluster 2 together, although densities of both species are moderate (400 to 1900 individuals m^{-2} for *Chaetozone*, 700 to 4200 for *Levinsenia*). The depth range of the stations in cluster 2 is 50 to 90 m. Stations 8 and WH2 are outliers with NESS for the same reasons they are outliers with Bray-Curtis.

August. Similarity analyses with different clustering techniques resulted in very similar dendrograms (Figure 36). Clustering by station (replicates combined) leads to three clusters and one or two outlier stations with both Bray-Curtis (Figure 36A) and NESS (Figure 36B). Cluster 1 consists of the two Cape Cod stations FF6 and FF7 that are characterized by high abundances of *Mediomastus*

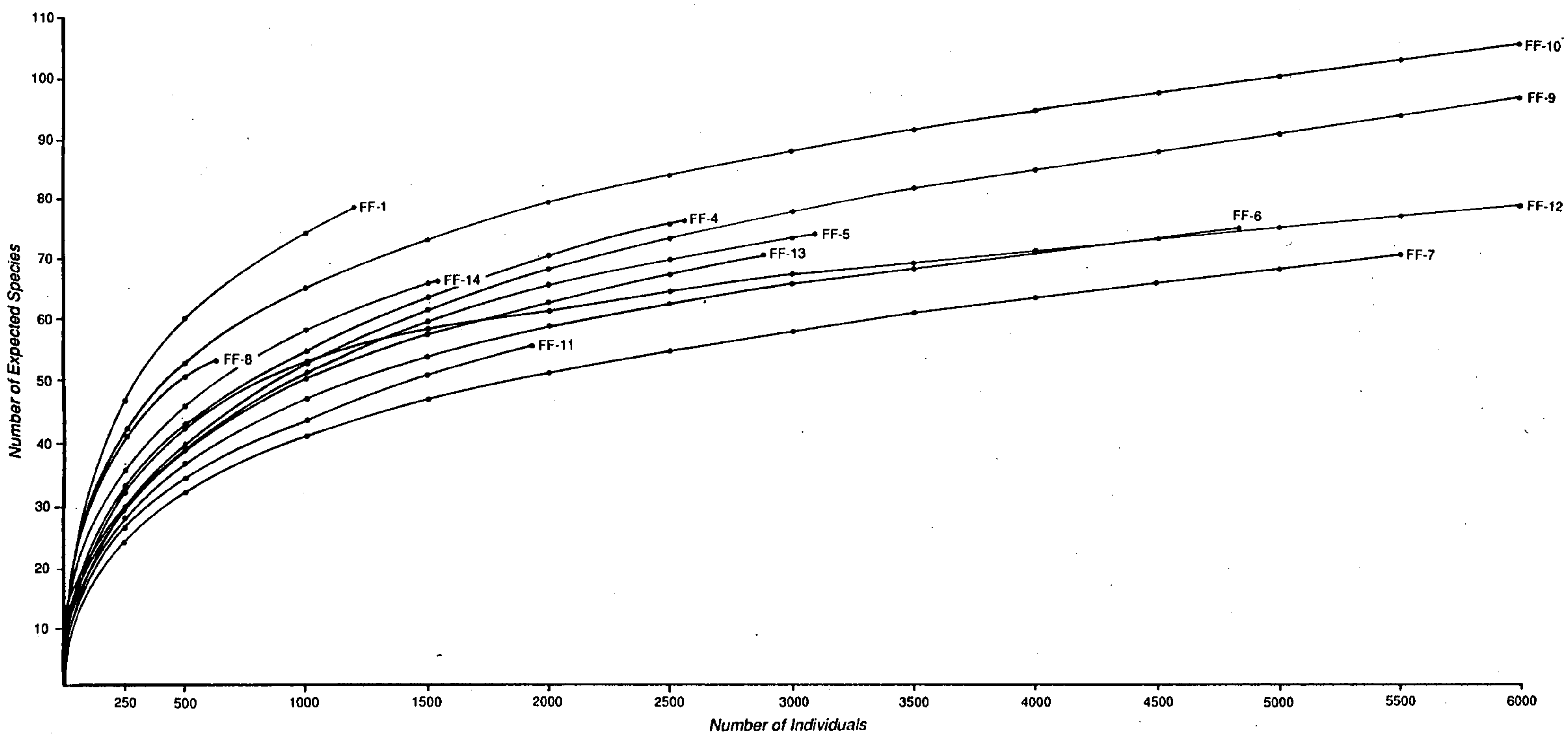


Figure 34. Rarefaction Curves for the Farfield Stations, August 1992.

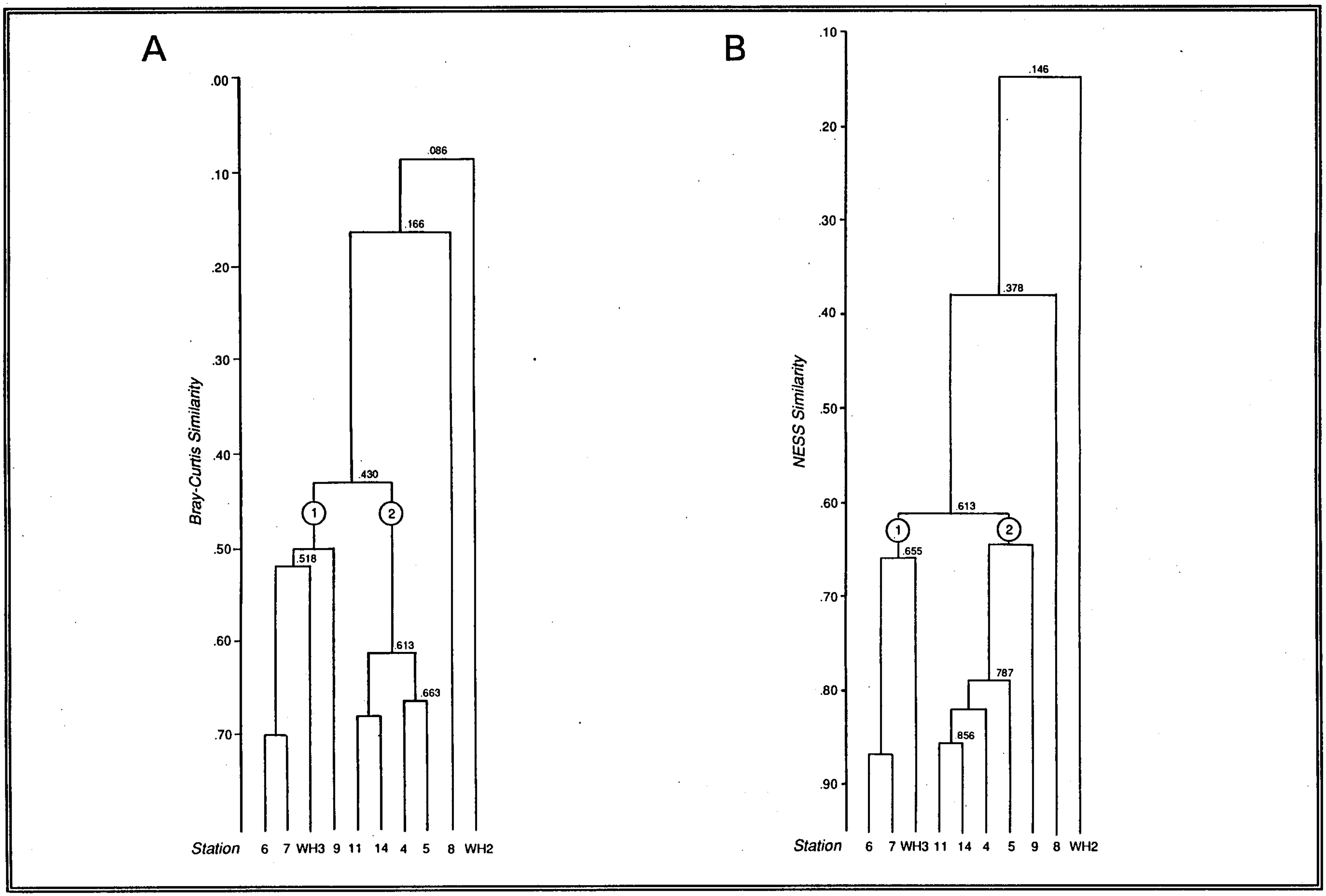


Figure 35. Similarity Among the Farfield Stations, May 1992. A, Bray-Curtis Similarity; B, NESS Similarity. Clustering with group average sorting (UPGMA).

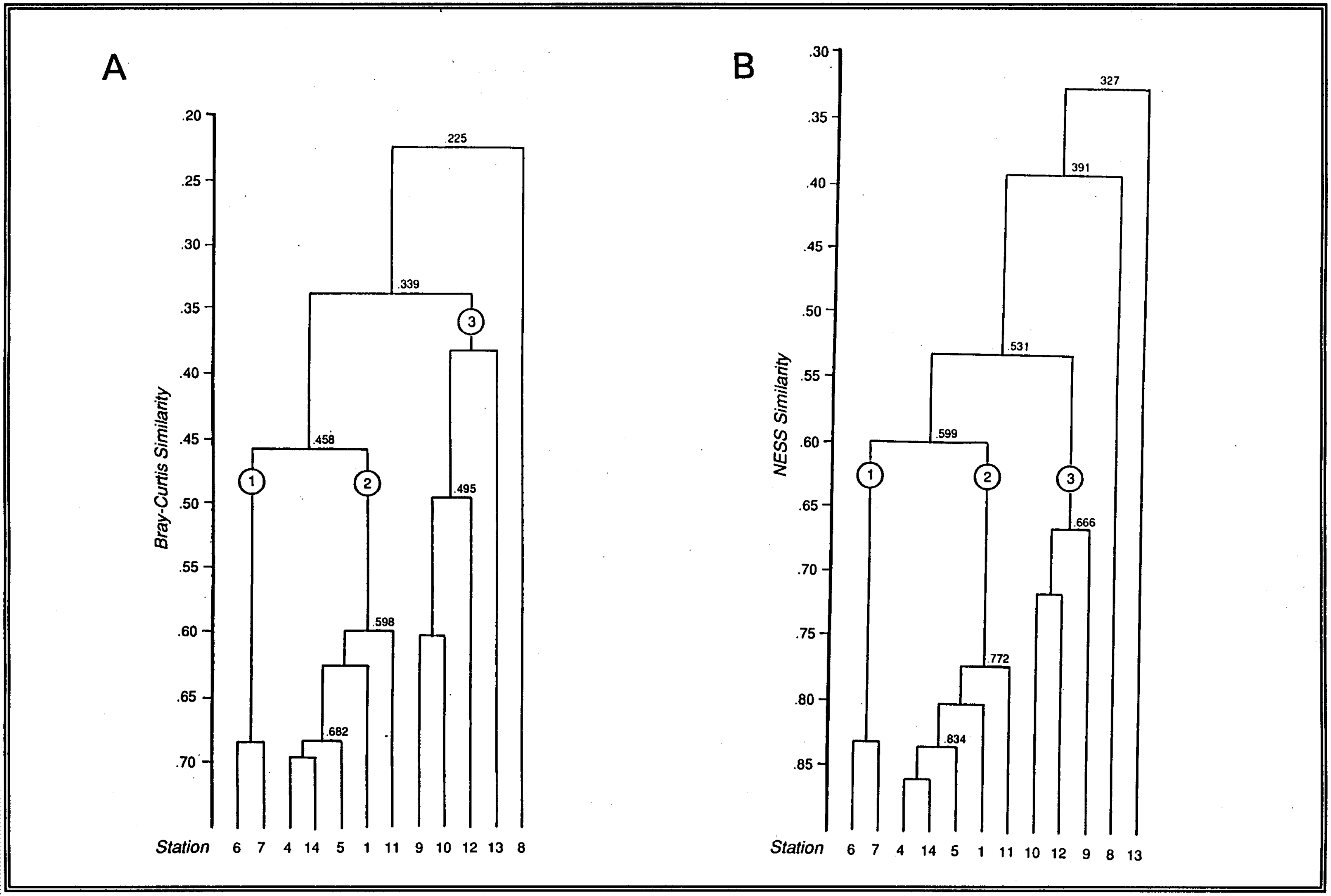


Figure 36. Similarity Among the Farfield Stations, August 1992. A, Bray-Curtis Similarity; B, NESS Similarity. Clustering with group average sorting (UPGMA).

californiensis, *Cossura longocirrata*, *Euchone incolor*, and the oligochaete Tubificidae sp. 2. Cluster 2 includes all stations between 60 and 90 m depth, characterized by moderate abundances of *C. longocirrata*, low abundances of *M. californiensis*, and moderate to high abundances of a different oligochaete, *Tubificoides apectinatus*. Cluster 3 consists of four stations (FF9, FF10, FF12, and FF13) with Bray-Curtis and of three stations (FF9, FF10, and FF12) with NESS. The similarity among the stations in cluster 3 is low compared to the other clusters, probably due to very large differences in the abundances of *Spio limicola*, *Polydora socialis*, and *Aricidea catherinae*. The cluster is held together by high abundances of *Prionospio steenstrupi* and, to a lesser degree, by moderate to high abundances of *Exogone verugera*, *Ampharete acutifrons*, and *Ninoe nigripes*. Station FF8 is an outlier with both clustering techniques, as it was in May. Station FF13 is part of cluster 3 with Bray-Curtis, but moves to an outlier position with even less similarity to the other stations than Station FF8 in the NESS dendrogram. The reason for this shift is the group of lower ranking dominant species that are unique to this station or represented by only a few additional individuals at the other stations, such as the amphipods *Photis pollex* and *Ampelisca abdita* and the polychaete *Phyllodoce mucosa*.

The NESS dendrogram with replicates kept separate (Figure 37) is essentially an extended version of the NESS dendrogram by station. The Cape Cod stations cluster together in cluster 1, and except for some minor shifts, the stations in cluster 2a (which is the same as cluster 2 in the dendrogram by station) group the same way. Station FF9 seems to have equally strong affinities to both clusters 2 and 3; it forms cluster 2b in this dendrogram and joins cluster 2a at a relatively low similarity level of 0.59. It is possible that similar abundances of *Scalibregma inflatum* and *Levinsenia gracilis* cause this shifting pattern. As a result, cluster 3 in Figure 37 consists only of the two nearshore stations FF10 and FF12. The two outlier stations FF8 and FF13 form clusters 4 and 5 with the similarity levels reversed relative to the dendrogram by stations. The cause for this shift may be associated with the different m values for the analysis by station (m = 200) and by replicate (m = 50), i.e., the different sizes of the subsamples used to calculate NESS similarities. The replicates of all stations except for the outliers join at very high similarity levels around 0.90, indicating that the samples taken at any one station were fairly homogeneous.

Ordination of the stations (replicates separate) and the 68 most abundant species, represented by at least 50 individuals, along the first three axes is shown in Figure 38. Cluster groups refer to the NESS dendrogram in Figure 37B; the space for the stations has been enlarged for a better separation. The stations group very clearly, with the clusters being tight and well separated. Axis 1 is associated with depth, with the shallowest stations having the highest values on axis 1. Axis 2 is probably related to grain size; stations with the coarsest sediments have the highest values on axis 2. Axis 3 may be the degree of uniqueness of the infauna to a station; stations that have the highest number of species not found at any other station score highest on axis 3. The species responsible for the ordination pattern of the stations are shown in the bottom half of the figure. This figure provides some additional information to explain the clustering pattern, and it confirms and condenses observations based on the composition of the dominant fauna at each station. The species separating the outlier stations from the remaining farfield stations are *Ophiura* sp. 2 and *Trochochaeta carica* for Station FF8 and *Polydora cornuta* and *Photis pollex* for Station FF13; the oligochaete Tubificidae sp. 2 separates cluster 1 from clusters 2 and 3. *Polydora quadrilobata*, *Owenia fusiformis*, and *Nucula delphinodonta* separate Station FF10 from the other two stations in cluster 3, whereas *Aricidea catherinae* and *Tharyx acutus* pull Stations FF10 and FF12 close together and away from Station FF9. *Cossura longocirrata*, together with *Scalibregma inflatum* and *Levinsenia gracilis*, pulls cluster 2 toward the lower end of axis 1.

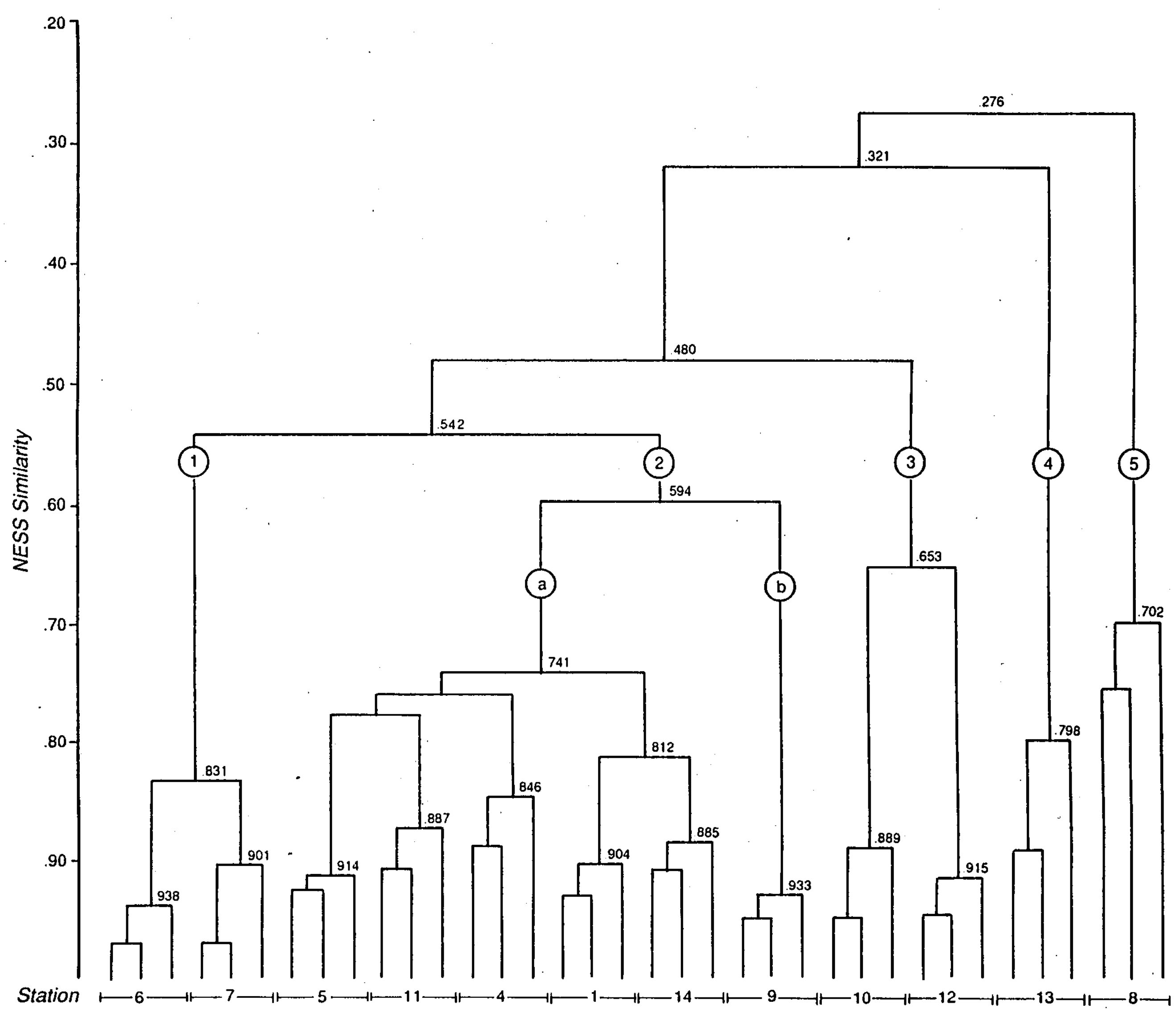


Figure 37. **Similarity Among the Farfield Stations, August 1992, Replicates Kept Separate. Clustering with group average sorting (UPGMA).**

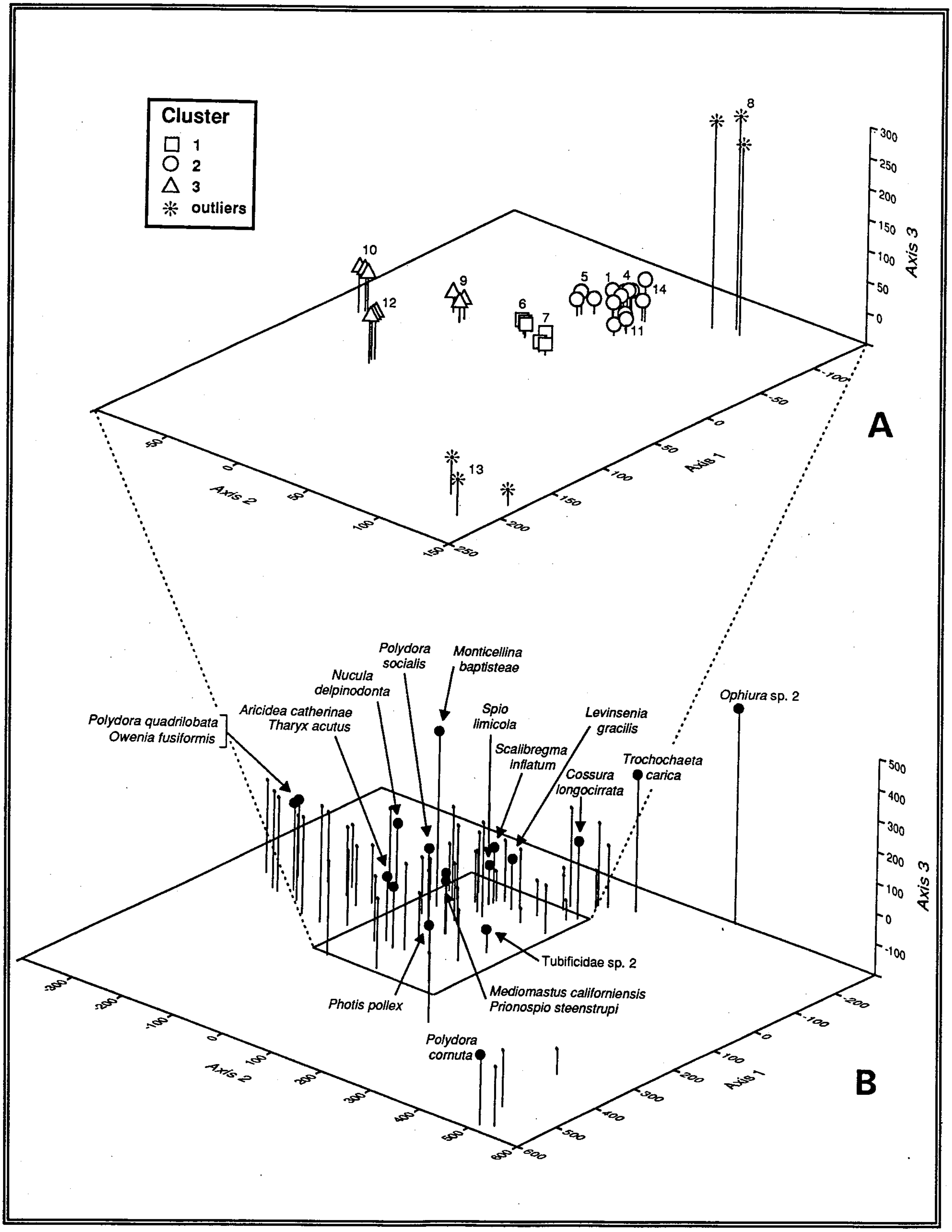


Figure 38. **Ordination by Reciprocal Averaging on the First Three Axes. A, Ordination of Farfield Stations (August 1992); B, Ordination of Species.**

There was very little change in the clustering pattern between the May and August samples, although different species may have been of importance for the respective clusters. An ordination of unreplicated samples does not provide much information and was therefore not done for the May samples.

4.1 Spatial/Temporal Patterns in the Sedimentary Environment

4.1.1 Nearfield

The nearfield sampling area is largely located within an erosional and physically reworked sedimentary environment (Knebel, 1993). Data from this report support this interpretation. The hardground area near the diffuser site is clearly erosional. Stations NF4, NF18, NF13, NF14, NF17, and NF19 lie within a transition zone (Figure 39) located between the erosional hard ground and the physically reworked facies to the west of the diffuser site. These six stations have a high proportion of sand and gravel; shallow REMOTS® prism penetration depths (i.e., they are compact); low inventories of silt and clay, TOC, and *C. perfringens* spores; shallow mean apparent RPD depths; a Stage I successional status; and, with the exception of Station NF13, OSI values < +6. Stations NF1, NF2, and NF3 show another gradient in kinetic energy, with Station NF1 representing an erosional environment and Stations NF2 and NF3 occupying a physically reworked sedimentary facies.

The sand-over-mud stratigraphy noted in stations lying to the west of the transition zone reflects the reworking process in this facies. During periods of low kinetic energy, silt, clay, and detrital organic matter (including *C. perfringens* spores) accumulate in this area, resulting in lower sand and gravel content and higher inventories of TOC and spores. However, this area apparently experiences higher kinetic energy events that introduce sandy sediment as discrete layers. The source of this sand is probably the tops of adjacent drumlins scoured by storm-generated currents. Data from the USGS Long Term Monitoring Station ("B" in Figure 39) indicate that bottom resuspension by storm waves in the fall and winter is capable of resuspending tens of grams of sediment m^{-2} day^{-1}. Several of these resuspension events take place over this period of time (Butman *et al.*, 1992).

4.1.2 Farfield

All farfield stations lying below depths of 100 ft are interpreted to represent low kinetic energy stations where fine sediments accumulate. These same stations have TOC contents ranging between 1.2 and 2.5%. The singular exception is Station FF9, which is a very fine sand with < 1% TOC located at a depth of 160 ft. If the relocation of the effluent outfall were to result in enhanced farfield productivity and increased sedimentation of organic matter, an increase in TOC exceeding 3% can be expected that would affect not only sediment chemistry, but also benthic infaunal structure. For example, it has been shown at Mt. Desert Island, Maine, that sediments containing over 3% organic matter have a relatively low abundance of deposit-feeding bivalves (Bader, 1952). This is attributed to the effect of a large inventory of decomposing organic matter on pore water oxygen and/or accumulation of toxic decomposition products such as hydrogen sulfide or methane. It is also likely (although comparable data are not easily cited) that, as the sediment TOC content exceeds 3%, deposit-feeding polychaetes typical of enrichment environments may increase in abundance (e.g., Spionidae and Capitellidae).

The background of *C. perfringens* spore counts at deepwater (>100 ft) farfield stations is estimated to fall below 350 CFUs g^{-1} dry sediment. The lowest values are found at Cape Cod Bay Station FF7

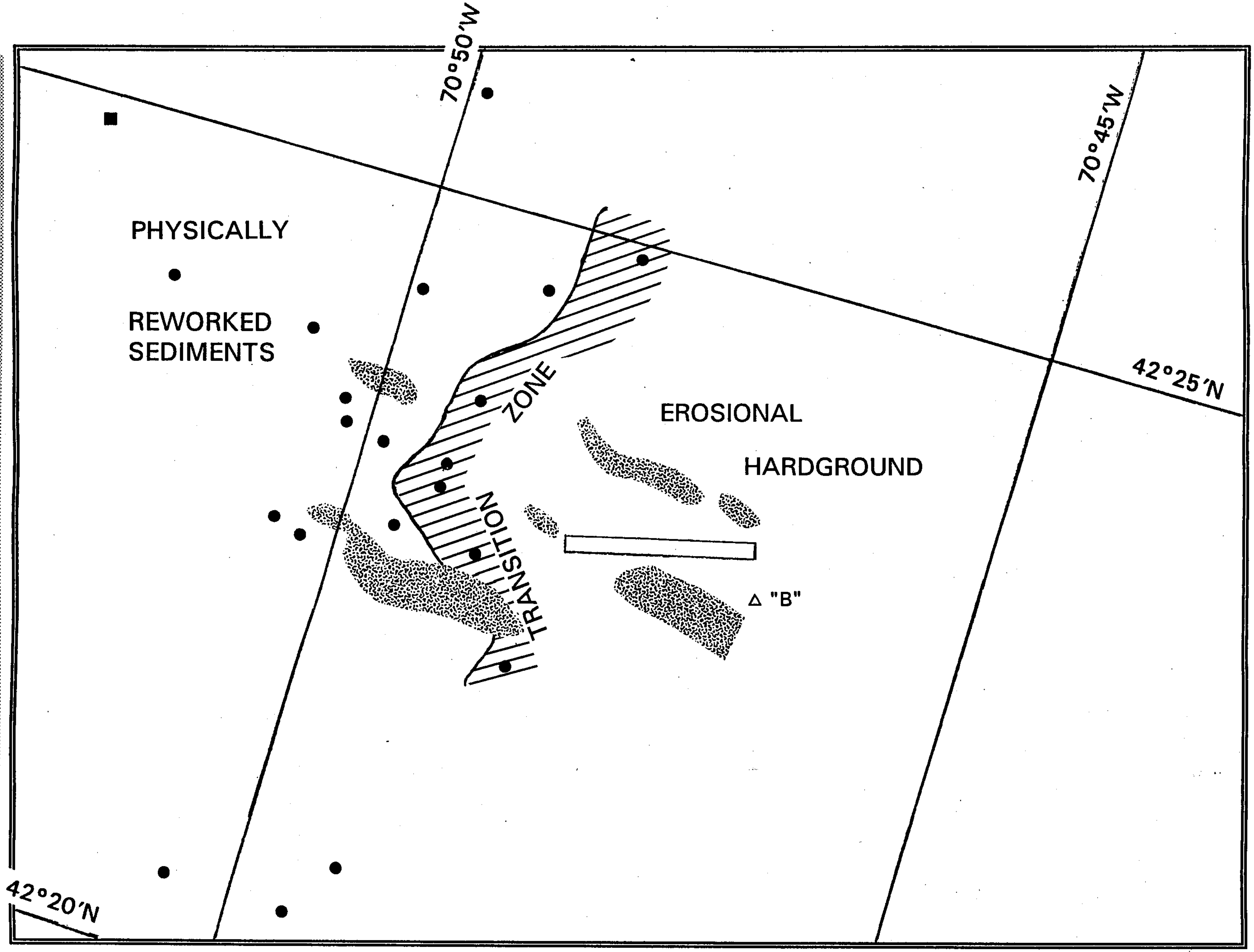


Figure 39. Major Sedimentary Environments Within the Nearfield Study Area. Shaded areas are drumlins. B refers to USGS long-term monitoring station.

(150 CFUs g^{-1} dry sediment) and the highest values (thousands of CFUs per gram of dry sediment) are found at stations nearer the coast in water depths less than 100 ft. There is an order-of-magnitude difference between background spore counts and a clear sewage signature. If the outfall results in an enhanced release of spores to deepwater farfield stations, this event may be detectable from background, especially at stations with low background values (e.g., Station FF7).

The balance of the farfield stations (FF10, FF12, and FF9) have significant proportions of sand with less than 1% TOC and therefore may be stations where the bottom is frequently reworked by bottom currents. Station FF13 is the most variable in sediment properties and may not be a good choice for long-term monitoring because spatial variance may exceed any temporal change that may take place in the future.

4.2 Spatial/Temporal Patterns in Organism-Sediment Relations

4.2.1 Nearfield

The transition zone, defined above as consisting of Stations NF4, NF18, NF13, NF14, NF17, and NF19, is dominated by Stage I seres. Stage II and III seres are limited to those stations lying west of this zone. The frequency and degree of sediment transport and physical reworking within the transition zone apparently excludes these higher successional seres from successfully populating this area. Deep and intensive bioturbation of the sediment column by benthic infauna is therefore limited to stations west of this facies transition. This explains why the transition zone is characterized by compact sediments with shallow apparent RPD depths. The OSI reflects this phenomenon in the distribution of low OSI values ($\leq +6$) within the transition zone relative to areas to the west. Stations NF1, NF2, and NF3 reflect another kinetic gradient. Station NF1 shows attributes of an intensively physically reworked habitat while Stations NF2 and NF3 are located in a lower kinetic energy environment.

4.2.2 Farfield

Stage I and III seres are widespread and well represented at most of the farfield stations. Stations FF6 and FF7 lie within the *Molpadia oolitica-Euchone incolor* assemblage in Cape Cod Bay. This community has been taxonomically stable since at least 1969 and probably for several decades prior to its initial sampling and description (see Young and Rhoads, 1971). *Euchone incolor* was reported to be the third most abundant species at one of the stations sampled for the Cape Cod Bay EIR (Shea *et al.*, 1991).

These two stations should prove to be sensitive to increased organic loading rates if farfield enrichment takes place in the future. The *Molpadia-Euchone* assemblage is apparently limited to Cape Cod Bay, although *Molpadia oolitica* was also found at Station FF14. The limited distribution of this assemblage may be related to the physical protection afforded to the *Molpadia-Euchone* biofacies by outer Cape Cod.

The long-term persistence of the holothurian-sabellid assemblage depends on the maintenance of fecal cones produced by this caudate holothurian. The maintenance of these mounds requires a very low kinetic energy regime. Three suspension-feeding taxa live on the tops of the fecal mounds: the sabellid *Euchone incolor*, the bivalve *Thyasira gouldi*, and the amphipod *Aeginina longicornis*. The fecal mounds elevate these suspension feeders a couple of centimeters above depressions that exist between mounds. The high flux rate of uncompacted feces in the depressions apparently excludes filter feeders from intermound areas because the animals may be choked by accumulating feces. *Molpadia* is a true "keystone species" at Stations FF6 and FF7. Should *Molpadia* disappear, the whole community structure would change dramatically because the suspension-feeding element would be eliminated through trophic group amensalism (Rhoads and Young, 1971). These two farfield stations may prove to be important long-term monitoring stations because of the documented stability of the community since 1969. Stations FF6 and FF7, along with Station FF4, represent the highest OSI values (> +10) and therefore are the most likely to experience change in the earliest phases of enrichment should sewage or enhanced planktic production affect these stations in the future.

4.3 Spatial/Temporal Patterns in Benthic Macrofauna

The benthic communities encountered in the nearfield area during this study were characterized by highly variable infaunal densities and diversity that were closely linked to the sedimentary environment. Infaunal densities varied from 16,000 individuals m^{-2} in sandy sediments to 141,000 individuals m^{-2} in soft muds. Diversity was generally highest at the muddier stations and lowest at sandy stations, ranging from 24.1 to 51.8 expected species per 500 individuals. Throughout most of the nearfield area, except for Stations NF1, NF2, and NF3 in the northwest corner, soft muds related to Boston Harbor inputs were predominant to the west of the diffuser, and hard ground was found around the diffuser and to the east. Between these two bottom types, a transitional zone was identified immediately northeast and southwest of the diffuser. In the southwest corner of the nearfield area, sand was found close to shore, whereas finer, physically reworked sediments were seen away from shore. The three benthic assemblages that could be distinguished roughly follow these sediment types, and similarity analyses revealed clustering patterns reflecting the distribution of these assemblages. Most of the transitional zone was characterized by a *Spio/Polydora* assemblage; a central band of very sandy sediment inhabited by a *Corophium/Exogone* assemblage divided this spionid-dominated zone into a larger western and a smaller eastern portion. Station NF19, which was part of the transitional zone but tending toward hard ground according to the REMOTS® images, supported the highest densities of *S. limicola* and total infauna in the entire nearfield area. This apparent discrepancy may be the result of slightly different positions of the REMOTS® camera and grab at that station; the grab may have hit a depression filled with mud. The stations with the finest sediments were characterized by a *Mediomastus/Aricidea* assemblage.

Overall, deposit-feeding spionid and capitellid polychaetes that live close to the surface (Stage I organisms) were predominant in the benthic infauna, with *Spio limicola* being the most abundant and widespread species. Stage III organisms (deep-burrowing deposit feeders) found along the northern border of the nearfield area included the polychaetes *Scalibregma inflatum*, *Ampharete acutifrons*, and *Maldane glebifex*. The spionids form mats of tubes that are clearly seen in the sediment profile images. As surface deposit feeders, spionids are known to also be capable of extending their palps into the water column and collecting particles as filter feeders (Taghon *et al.*, 1980). This dual feeding capability means that spionids not only can collect particles that naturally settle near them, but also can actively collect particles from the water column. When conditions are suitable, spionids are able to build large populations within a very short time. Rate of reproduction (gametogenesis, spawning, larval development, settlement, and maturation) is incredibly rapid, with eggs spawned from individuals in the laboratory developing, settling, and producing another generation in 17 days (Rice and Simon, 1980; Blake, unpublished data). Species composition is variable because different spionids have been predominate at various times in Massachusetts Bay. Gilbert *et al.* (1976) sampled two stations located at the northern and southern border of the nearfield area, both of which were dominated by *Spio limicola* (77 to 80% of all individuals). In 1982, *Spio limicola* and *Polydora quadrilobata* were the predominate spionids at Station PD, located near Stations FF12, FF13, and FF14 (Blake *et al.*, 1987, 1989), whereas in the 1987-1988 STFP studies, *Prionospio steenstrupi* was the dominant spionid. In the present study, *Spio limicola* and *Polydora socialis* are the dominant spionids, with *Prionospio steenstrupi* and *Polydora quadrilobata* playing a less important role.

Stations close to the border of the transitional zone seem to oscillate between spionids and capitellids as dominant species. For example, the area around Station DW1, close to Stations NF16 and NF20, was dominated by *Polydora socialis* and *S. limicola* (as *S. filicornis* in Blake *et al.*, 1989) in 1978, by *M. californiensis* and three spionid polychaetes in 1979, and by *M. californiensis*, *Aricidea catherinae*, and *P. steenstrupi* in 1992.

In contrast, the fauna in the sandy sediments appears to change little over time. Transect F of Blake *et al.* (1987), positioned in the vicinity of Station NF1, had a benthic assemblage similar to that described for Station NF1, although a different amphipod was found in 1986 (*Pseudunciola obliqua* rather than *Corophium crassicorne*), and the oligochaete Enchytraeidae sp. A was abundant at Station F1 in 1986, but has not been reported since in Massachusetts Bay. Similarly, Station D3 of Blake *et al.* (1987) had a fauna that closely resembled that of the nearby Station NF17. The amphipods *Corophium crassicorne* and *Unciola inermis* were abundant during both years, and two species of *Exogone* (*E. verugera* in 1986, *E. hebes* in 1992) were among the highest ranking polychaetes characterizing the assemblage.

The benthic communities in the farfield area were characterized by wide ranges of species richness and infaunal densities; these ranges reflected the variety of habitats sampled in this large area including the inner Massachusetts Bay, outer Massachusetts Bay including Stellwagen Basin, an offshore location in the southwestern Gulf of Maine, and Cape Cod Bay. Superimposed on these spatial differences was a seasonal trend of generally declining densities between May and August, most noticeably in Cape Cod where densities had been extremely high in May. The sediments in the farfield area varied from fine to very fine sands in inner Massachusetts Bay and the western Gulf of Maine to muddy bottoms with high silt/clay contents in outer Massachusetts Bay and Cape Cod Bay (see Chapters 4.1 and 4.2). The different benthic assemblages found in the farfield area roughly coincided with the distribution of the sediment types, and the clustering patterns generated in similarity analyses reflected the extent of those assemblages.

The Cape Cod Bay stations have sediments rich in silt + clay and organic carbon; they support a stable infauna (the *Molpadia/Euchone* assemblage described by Rhoads and Young, 1971) that thoroughly reworks the sediments. Densities can reach more than 100,000 individuals m^{-2}, mostly due to mats of *Spio limicola*. The Cape Cod stations were very similar to one another and consistently grouped as a separate cluster that was dissimilar to the outer Massachusetts Bay stations that also had muddy sediments (Stations FF1, FF4, FF5, FF11, and FF14). The benthic assemblage in outer Massachusetts Bay was characterized by the dominance of *S. limicola* (except for the northernmost Station FF1). Station FF9 is at an intermediate location between the inner and outer Bay and had stronger affinities with the stations in inner Massachusetts Bay than with those in outer Massachusetts Bay. The inner Bay stations, located in and around the nearfield area (Stations WH2, WH3, FF10, FF12, and FF13), had fine to very fine sand that was often very compact, and a heterogeneous infauna that had a patchy distribution. For example, Station WH2 was dominated by several species of amphipods, whereas the nearby Station WH3 was dominated by *Mediomastus californiensis*, *Aricidea catherinae*, and *Prionospio steenstrupi*. Station FF13 had two amphipods and the Harbor species *Polydora cornuta* among its dominants. Some of the highest and lowest infaunal densities and species richness values were noted at neighboring stations (FF10 and WH2); the clusters formed by these inner Massachusetts Bay stations were the least similar and tended to form outliers. The sandy Stations FF8 (Gulf of Maine) and FF11 (outer Massachusetts Bay) spanned a wide depth range and had faunal assemblages similar in low species richness and density, but with very different species composition.

Gilbert *et al.* (1976) and Battelle (1987) sampled several stations throughout Massachusetts and Cape Cod Bays that were in close proximity to the present farfield stations. The benthic infauna at both Cape Cod stations appears to be very stable over time, although densities varied by as much as an order of magnitude. Areas C and D of Battelle (1987) were very similar to the corresponding farfield stations, although *Polydora socialis* was rare or absent in 1976 and 1986, but ranked second or third in abundance in 1992. *Cossura longocirrata* was the overall third most important species at all four Cape Cod Bay sites sampled by Battelle (1987), but occurred in much lower abundances than in 1992. Station 32 of Gilbert *et al.* (1976) appears to be at the northern border of the *Molpadia/Euchone* assemblage and had a different species composition.

The largely *Spio*-dominated fauna in the outer Massachusetts Bay and Stellwagen Basin is similarly consistent over time; all of the stations sampled by Gilbert *et al.* were dominated by *S. limicola* as well. Some of the lower ranking species were replaced between 1976 and 1992; species such as *Myriochele heeri* and *Aricidea catherinae* were important in 1976, but rare or absent in 1992, whereas *Scalibregma inflatum*, *Levinsenia gracilis*, and *Chaetozone* sp. A were much more common in 1992 than in 1976. One reason for these shifts in species composition may be a change in sediment grain size due to storms; REMOTS® images frequently showed alternating sand and mud layers caused by changing depositional and erosional conditions. In addition, many of the surface deposit feeders have short generation times and may dramatically change in abundance within only a few weeks, so that two sampling events at approximately the same time of year may yield very different abundances of certain species.

Changes over time at the stations located around the nearfield area are difficult to determine because the environment is heterogeneous and results in patchily distributed infauna. Two stations sampled by Gilbert *et al.* (1976), C-1 and C-5, are located close to Stations FF12 and FF10, but had a totally different fauna; the only dominant species shared by both station pairs is *Prionospio steenstrupi*. The much lower percentage *P. steenstrupi* contributed to the total fauna in 1992 corresponds with similar observations in the nearfield and is likely the result of the same reproductive cycles suggested for the nearfield (see above). Likewise, Station FF13 was dominated by *Spio* in 1992 and by *Prionospio* in 1976 (Gilbert's Station 16).

On a larger scale, the infaunal assemblages in Massachusetts and Cape Cod Bays show distributional patterns that are related partly to depth and partly to sediment grain size. In the inner Massachusetts Bay, the finest sediments located in depths between 20 and 30 m are inhabited by species that are also found in parts of Boston Harbor, such as oligochaetes and capitellid, cirratulid, and paraonid polychaetes (*Mediomastus californiensis*, *Tharyx acutus*, and *Aricidea catherinae*). This assemblage was found at Stations FF10, FF12, and NF8 in the present study; it was also reported by Blake *et al.* (1989) for Station DW3. Fine sands at depths between 30 and 90 m in the inner and outer Massachusetts Bay are typically colonized by often very dense assemblages of *Spio limicola*, *Prionospio steenstrupi*, *Polydora socialis*, *P. quadrilobata*, and other spionid polychaetes. This assemblage seems to be limited to Massachusetts Bay itself; stations at comparable depths south of Martha's Vineyard and Nantucket sampled between 1981 and 1984 (Maciolek *et al.*, 1985) had very few spionids and were similar to the Cape Cod Bay stations FF6 and FF7 with high abundances of *Euchone incolor* and *Cossura longocirrata*. The coarsest sediments, located in depths between 20 and 34 m in the inner Massachusetts Bay, are colonized by amphipods and two species of the syllid polychaete *Exogone*. A similar assemblage was described for sandy stations in 60 to 100 m depth on Georges Bank by Maciolek *et al.* (1985). The fauna on the outer continental shelf appears to be uniform in similar sediments between the Gulf of Maine and Georges Bank. Sandy bottoms are characterized by a mostly amphipod dominated fauna, whereas fine sediments as seen at Station FF8 and at Station 14A of Maciolek *et al.* (1985) between Cape Cod and Georges Bank are colonized by the polychaetes *Monticellina baptisteae*, *Cossura longocirrata*, and *Euchone incolor*.

5.0 CONCLUSIONS AND RECOMMENDATIONS

Nearfield

Conclusions

- The 20 nearfield stations are located in an area of inner Massachusetts Bay with a complex bottom topography related to the presence of submerged drumlins. Sediments on the top and flanks of the drumlins are mostly boulders, coarse gravel, and fine or very fine sands. Silt + clay and organic matter are present at some stations between drumlins and closest to shore. The increase in mud toward shore is attributed to the input rates from the Boston Harbor plume that are greater than the rate of erosion and dispersion of fine sediments by waves and tidal currents.

- The total organic carbon (TOC) content of the sediments was generally low (>1%), although a few stations had high values between 2.6% and 3.2%. The diffuser is located in compacted sand with very low TOC concentrations.

- *Clostridium perfringens* spores were most abundant in depositional areas with sediments high in TOC. Around the diffuser, sediments contained only a few hundred spores per gram of dry sediment.

- Stations in the northwest quadrant of the nearfield area had the greatest mixing depths (about 3 cm) and showed evidence of deep-burrowing Stage III organisms.

- The benthic infauna was composed of 206 species, 98 of which (48%) were polychaetes. Crustaceans and molluscs contributed 52 and 36 species (25% and 17%), respectively.

- The 15 most abundant species were all polychaetes, mostly spionids and cirratulids. The overall most abundant and widespread species was *Spio limicola*, followed by *Mediomastus californiensis* and *Polydora socialis*.

- The stations with the highest silt + clay content had an infaunal assemblage dominated by *Mediomastus californiensis* and *Aricidea catherinae*. Stations with fine sand in the transitional zone were characterized by high abundances of *Spio limicola* and *Polydora socialis*. A band of stations immediately west of the diffuser with coarser sediments had a *Corophium crassicorne/Exogone* spp. assemblage. Similarity and ordination analyses resulted in clusters of stations corresponding with these different assemblages.

- Total infaunal density was highest at Stations NF6, NF7, and NF19, all within the *Spio/Polydora* assemblage; density was lowest at Stations NF2, NF4, and NF14, all within the *Corophium/Exogone* assemblage.

- Species richness was highest at Stations NF5, NF7, NF9, and NF19, and lowest at Stations NF2, NF4, NF8, and NF20. Diversity was highest at Stations NF5, NF9, NF17, and NF18, and lowest at Stations NF6, NF8, and NF20.

- The position of the nearfield stations within an area of strong and temporally variable gradients in kinetic energy may result in considerable variance of many, if not all, benthic parameters over time. The transitional zone may move closer to shore after a high kinetic energy event (e.g., a storm) and retreat to the east, into the immediate area of the diffuser, after a long period of low kinetic energy.

- The three southernmost stations, NF1, NF2, and NF3, are on a slope forming the western edge of the Massachusetts Bay basin. They may therefore respond to a different kinetic energy gradient not associated with the drumlin field near the diffuser site. It may be more meaningful to relocate these stations closer to the drumlin field.

Recommendations

- For future monitoring, a sampling design including nine replicated stations is recommended. This design provides broad spatial coverage of the nearfield area and captures the full range of levels of kinetic energy, texture, TOC, *Clostridium* spore counts, and biofacies.

- Stations NF2, NF8, NF9, NF10, and NF12 represent the most stable depositional environments. These stations fall within the *Mediomastus* assemblage with mixtures of Stage I and III seres.

- Stations NF6 and NF15 are in the transitional zone of intermediate kinetic energy. These stations fall within the *Spio/Polydora* assemblage.

- Stations NF4 and NF17 are in a zone of high kinetic energy and fall within the *Corophium/Exogone* assemblage.

Farfield

Conclusions

- The 14 farfield stations are spread over a wide area including inner and outer Massachusetts Bay (with Stellwagen Basin), the Gulf of Maine, and Cape Cod Bay. Sediments ranged from very fine sands in inner Massachusetts Bay, in and around the nearfield area, to silt + clay further offshore and in Cape Cod Bay. The presence of sand-over-mud or mud-over-sand layers indicates changing erosional and depositional conditions throughout most of the farfield area.

- TOC values were within the range of the nearfield values (<1% to 2.3%). The highest TOC concentrations were found at Stations FF1, FF4 (outer Massachusetts Bay), FF7 (Cape Cod Bay), and FF8 (Gulf of Maine). The lowest TOC values were measured at the sandy Stations FF9, FF10, and FF12 in inner Massachusetts Bay.

- *Clostridium perfringens* spores were most abundant (several thousands per gram of dry sediment) near Boston Harbor and Gloucester. The lowest spore counts were reported in Cape Cod Bay.

- Stations FF6 and FF7 in Cape Cod Bay and Station FF4 in Stellwagen Basin had the greatest mixing depths (3 to 4 cm). Stage III deep-burrowing deposit feeders were widespread throughout the farfield area except for inner Massachusetts Bay. Several stations had tube mats formed by spionid and/or sabellid polychaetes.

- The benthic infauna was composed of 261 species, including 135 polychaetes (52% of all species), 56 crustaceans (21%), and 42 molluscs (16%). In combination with the nearfield samples, the 1992 field program yielded 306 species.

- The overall most abundant and widespread species were the same as in the nearfield (*S. limicola*, *M. californiensis*, *P. socialis*) and *Prionospio steenstrupi*.

- The shallowest stations, located in 20 to 30 m of water, had either a *Mediomastus/ Aricidea catherinae* assemblage similar to the muddy nearfield stations, resembled parts of Boston Harbor, or were similar to sandy stations in much greater depths on Georges Bank. Nearly all stations between 30 and 90 m were dominated by *Spio limicola*. The Cape Cod stations had a *Molpadia oolitica/Euchone incolor* assemblage that has been observed consistently since its discovery in 1971. The outer shelf station FF8 had a *Monticellina baptisteae/Cossura longocirrata* assemblage that is also found at similar depths south of Martha's Vineyard and Nantucket.

- Total infaunal density was highest at Stations FF6 and FF7 (Cape Cod Bay) in May and at Stations FF9 and FF10 (outer and inner Massachusetts Bay) in August. The lowest density was found at Stations WH2 and FF8 in May and at Stations FF1 and FF8 in August. In general, densities decreased temporally from May to August and spatially with increasing depth.

- Species richness was highest at Stations FF6 and FF9 in May and at Stations FF9 and FF10 in August. The fewest species were found at Stations WH2 and FF8 in May and at Stations FF8 and FF11 in August. Diversity was highest at Stations WH2, FF9, and FF14 in May and at Stations FF1 and FF10 in August. Diversities were lowest at Stations FF7, FF8, and FF11 in May (caused by very high densities rather than low species richness) and at Stations FF5 and FF7 in August.

- Similarity analyses with different clustering techniques and ordination by reciprocal averaging identified two station groups in May and three groups in August that were roughly defined by depth and sediment grain size. In May, stations grouped into a cluster of shallow stations (silt + clay, 30 to 50 m, inner Massachusetts Bay and Cape Cod Bay), a cluster of deep stations (silt + clay, 60 to 90 m, outer Massachusetts Bay), and two outliers including the outer shelf station FF8 (190 m) and the shallow amphipod station WH2. In August, the shallow May cluster was reduced to the Cape Cod Bay stations; the deep cluster remained the same; and Station FF9 became dissimilar to the Cape Cod Bay stations and joined with three additional shallow August stations in 20 to 30 m depth that had sandy sediments. Station FF8 remained in an outlier position, and the shallow amphipod-dominated station FF13 was an outlier with NESS. It appears that the depth-related station groups were consistent over time even though the species causing this pattern changed between May and August.

Recommendations

- Stations FF6 and FF7 support a stable benthic assemblage that is a good potential indicator of any farfield effects produced by the effluent from the diffuser. Stations FF9 and FF13 lie in a very heterogeneous sedimentary environment and should be relocated for future monitoring.

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APPENDIX A

Positions of Nearfield and Farfield Stations

Table A1. **Positions of Nearfield Stations, August 1992.***

Station	Latitude	Longitude	LORAN-C TDs		Depth (m)
NF-1	42° 20.35'N	70° 50.51'W	13977.61,	25788.82	42
NF-2	42° 20.31'N	70° 49.69'W	13972.55,	25783.64	26
NF-3	42° 20.67'N	70° 49.35'W	13968.74,	25782.67	29
NF-4	42° 24.93'N	70° 48.27'W	13940.90,	25801.28	34
NF-5	40° 25.62'N	70° 50.03'W	13948.41,	25816.97	28
NF-6	42° 24.30'N	70° 49.99'W	13955.15,	25808.99	31
NF-7	42° 24.60'N	70° 48.89'W	13946.07,	25802.95	32
NF-8	42° 24.00'N	70° 51.81'W	13967.99,	25819.58	28
NF-9	42° 23.99'N	70° 50.69'W	13961.15,	25811.60	29
NF-10	42° 23.57'N	70° 50.29'W	13960.32,	25806.55	32
NF-11	42° 23.39'N	70° 50.25'W	13961.13,	25805.38	31
NF-12	42° 23.40'N	70° 49.83'W	13958.18,	25802.42	33
NF-13	42° 23.40'N	70° 49.35'W	13955.22,	25799.28	33
NF-14	42° 23.20'N	70° 49.36'W	13956.21,	25798.18	32
NF-15	42° 22.93'N	70° 49.67'W	13959.68,	25798.67	32
NF-16	42° 22.70'N	70° 50.26'W	13964.64,	25801.03	29
NF-17	42° 22.88'N	70° 48.89'W	13954.97,	25792.74	29
NF-18	42° 23.81'N	70° 49.24'W	13952.55,	25800.65	32
NF-19	42° 22.30'N	70° 48.30'W	13954.00,	25785.11	32
NF-20	42° 22.69'N	70° 50.69'W	13967.25,	25803.80	27

*A list of additional nearfield stations that proved unsuitable for REMOTS® and/or grab sampling can be found in the cruise report (Blake *et al.*, 1992)

Table A2. Positions of Farfield Stations, May 1992

Station	Latitude	Longitude	Depth (m)
WH2	42°22.87'N	70°48.89'W	32
WH3	42°23.39'N	70°49.84'W	36
4	42°17.30'N	70°25.49'W	92
5	42°08.00'N	70°25.35'W	64
6	41°53.90'N	70°24.19'W	36
7	41°57.51'N	70°16.00'W	39
8	42°25.80'N	70°00.01'W	192
9	42°18.75'N	70°39.40'W	51
11	42°39.50'N	70°29.98'W	89
14	42°25.00'N	70°39.29'W	77

Table A3. Positions of Farfield Stations, August 1992.

Station	Latitude	Longitude	LORAN-C TDs	Depth (m)
FF1	42°27.94'N	70°37.31'W	13855.31, 25748.30	68
FF4	42°17.30'N	70°25.50'W	13835.22, 25606.84	86
FF5	42°08.00'N	70°25.35'W	13880.05, 25543.90	61
FF6	41°53.90'N	70°24.20'W	13939.00, 25440.65	33
FF7	41°57.50'N	70°16.00'W	13873.39, 25414.75	37
FF8	42°25.80'N	70°00.00'W	13636.82, 25529.61	177
FF9	42°18.75'N	70°39.40'W	13915.09, 25703.65	48
FF10	42°24.84'N	70°52.72'W	13969.61, 25830.99	27
FF11	42°39.50'N	70°30.00'W	13747.46, 25776.39	86
FF12	42°23.40'N	70°53.98'W	13984.81, 25830.93	22
FF13	42°19.19'N	70°49.38'W	13975.92, 25773.83	19
FF14	42°25.00'N	70°39.29'W	13882.76, 25742.18	69

APPENDIX B

REMOTS® Raw Data for Nearfield and Farfield

Table B1. REMOTS® Data for Nearfield Stations.

Station	Latitude	Longitude	LORAN-C TDs	Depth (ft)	Rep	Boundary Roughness	Grain Size (Phi)	RPD (cm)	OSI
NF1	42 20.35'N	70 50.51'W	13977.61, 25788.82	70	a	0.75	2 to 3	NA	NA
NF1					b	0.88	2 to 3	NA	NA
NF1					c	0.62	2 to 3	NA	NA
NF2	42 20.31'N	70 49.69'W	13972.55, 25783.64	86	a	0.27	3 to 4	0.55	6
NF2					b	0.62	3 to 4	1.31	3
NF2					c	0.97	3 to 4	0.91	3
NF3	42 20.67'N	70 49.35'W	13968.74, 25782.67	97	a	1.11	3 to 4	1.02	7
NF3					b	0.44	3 to 4	2.01	4
NF3					c	1.59	3 to 4	1.92	8
NF4	42 24.93'N	70 48.27'W	13940.90, 25801.28	114	a	1.50	2 to 3	NA	NA
NF4					b	0.88	2 to 3	NA	NA
NF4					c	1.42	2 to 3	NA	NA
NF5	40 25.62'N	70 50.03'W	13948.41, 25816.97	92	a	1.24	2 to 3	3.67	10
NF5					b	0.58	3 to 4	4.43	7
NF5					c	1.55	2 to 3	NA	NA
NF6	42 24.30'N	70 49.99'W	13955.15, 25808.99	104	a	1.15	3 to 4	3.19	10
NF6					b	0.13	3 to 4	1.66	8
NF6					c	1.42	3 to 4	2.1	8
NF7	42 24.60'N	70 48.89'W	13946.07, 25802.95	108	a	1.33	3 to 4	5.2	11
NF7					b	0.62	3 to 4	2.28	9
NF7					c	0.71	3 to 4	1.17	3
NF8	42 24.00'N	70 51.81'W	13967.99, 25819.58	94	a	5.27	3 to 4	1	3
NF8					b	1.19	3 to 4	2.26	9
NF8					c	0.93	3 to 4	2.99	9
NF9	42 23.99'N	70 50.69'W	13961.15, 25811.60	96	a	0.93	3 to 4	1.92	8
NF9					b	0.66	3 to 4	1.86	4

Table B1 (Continued).

Station	Latitude	Longitude	LORAN-C TDs	Depth (ft)	Rep	Boundary Roughness	Grain Size (Phi)	RPD (cm)	OSI
NF9					c	0.93	3 to 4	1.55	8
NF10	42 23.57'N	70 50.29'W	13960.32, 25806.55	106	a	0.62	3 to 4	4.43	7
NF10					b	0.22	2 to 3	4.09	11
NF10					c	1.11	3 to 4	3.76	7
NF11	42 23.39'N	70 50.25'W	13961.13, 25805.38	102	a	1.37	3 to 4	NA	NA
NF11					c	0.88	3 to 4	2.79	NA
NF12	42 23.40'N	70 49.83'W	13958.18, 25802.42	111	a	0.84	3 to 4	5.62	11
NF12					b	2.39	3 to 4	6.15	9
NF12					c	0.31	3 to 4	2.5	9
NF13	42 23.40'N	70 49.35'W	13955.22, 25799.28	109	b	0.71	2 to 3	NA	NA
NF13					c	1.56	2 to 3	2.15	4
NF14	42 23.20'N	70 49.36'W	13956.21, 25798.18	108	a	3.68	2 to 3	NA	NA
NF14					b	1.89	2 to 3	2.62	9
NF14					c	1.56	2 to 3	NA	NA
NF15	42 22.93'N	70 49.67'W	13959.68, 25798.67	105	a	1.75	2 to 3	1.94	8
NF15					b	0.90	2 to 3	1.7	4
NF15					c	2.41	2 to 3	2.43	5
NF16	42 22.70'N	70 50.26'W	13964.64, 25801.03	95	a	0.61	3 to 4	1.6	4
NF16					b	1.51	3 to 4	1.39	3
NF16					c	1.79	3 to 4	3.35	10
NF16					d	1.98	2 to 3	2.9	5
NF17	42 22.88'N	70 48.89'W	13954.97, 25792.74	95	a	0.76	2 to 3	NA	NA
NF17					b	1.60	2 to 3	NA	NA
NF17					c	1.04	2 to 3	NA	NA
NF18	42 23.81'N	70 49.24'W	13952.55, 25800.65	105	a	0.99	3 to 4	1.53	4
NF18					b	1.42	3 to 4	2.05	4
NF18					c	1.23	2 to 3	3.26	6

Table B1 (Continued).

Station	Latitude	Longitude	LORAN-C TDs	Depth (ft)	Rep	Boundary Roughness	Grain Size (Phi)	RPD (cm)	OSI
NF20	42 22.69'N	70 50.69'W	13967.25, 25803.80	91	a	2.88	3 to 4	3.92	7
NF20					b	0.57	3 to 4	3.78	11
NF20					c	0.85	3 to 4	3.14	6

Table B-2. REMOTS® Data for Farfield Stations, August 1992.

Station	Latitude	Longitude	LORAN-C TDs	Depth (ft)	Rep	Average Penetr.	Bound. Roughn.	BR Type	Grain Size		Average RPD	Mud Clasts		
									Major Mode	Range		Count	Dia-met.	Status
FF1	42°27.94'N	70°37.31'W	13855.31, 25748.30	225	a	17.01	0.93	Biological	> 4	2 to > 4	2.79	0	0	x
FF1					b	17.01	1.11	Biological	> 4	3 to > 4	2.48	3	0.35	Both
FF1					c	12.48	0.27	Biological	> 4	3 to > 4	2.74	0	0	x
FF4	42°17.30'N	70°25.50'W	13835.22, 25606.84	285	a	18.71	0.25	Indetermin.	> 4	3 to > 4	3.8	0	0	x
FF4					b	19.38	0.53	Biological	> 4	2 to > 4	4.29	3	0.84	Oxidized
FF5	42°08.00'N	70°25.35'W	13880.05, 25543.90	203	a	11.48	1.73	Biological	> 4	3 to > 4	2.39	0	0	x
FF5					b	9.65	1.86	Biological	> 4	3 to > 4	1.57	0	0	x
FF5					c	9.78	0.44	Biological	> 4	3 to > 4	2.17	0	0	x
FF6	41°53.90'N	70°24.20'W	13939.00, 25440.65	109	a	14.78	0.62	Biological	> 4	3 to > 4	3.12	0	0	x
FF6					b	15.11	2.17	Physical	> 4	3 to > 4	3.54	0	0	x
FF6					c	17.21	0.8	Biological	> 4	3 to > 4	4.03	1	0.44	Reduced
FF7	41°57.50'N	70°16.00'W	13873.39, 25414.75	123	a	NA	NA	NA	> 4	NA	NA	0	0	x
FF7					b	16.86	1.59	Biological	> 4	3 to > 4	4.16	0	0	x
FF7					c	19.18	1.73	Physical	> 4	3 to > 4	3.47	0	0	x
FF8	42°25.80'N	70°00.00'W	13636.82, 25529.61	590	a	16.28	0.35	Biological	> 4	3 to > 4	2.15	3	0.62	Oxidized
FF8					b	20.29	0.49	Indetermin.	> 4	to > 4	NA	0	0	x
FF9	42°18.75'N	70°39.40'W	13915.09, 25703.65	160	a	4.38	0.71	Biological	3 to 4	2 to > 4	1.48	2	0.88	Oxidized

Table B2 (Continued).

Station	Latitude	Longitude	LORAN-C TDs	Depth (ft)	Rep	Average Penetr.	Bound. Roughn.	BR Type	Grain Size		Average RPD	Mud Clasts		
									Major Mode	Range		Count	Dia-met.	Status
FF9					b	5.53	0.44	Physical	3 to 4	3 to > 4	1.75	2	0.31	Oxidized
FF9					c	6.11	0.44	Biological	3 to 4	3 to > 4	1.24	0	0	x
FF10	42°24.84'N	70°52.72'W	13969.61, 25830.99	89	a	NA	NA	Indetermin.	NA	3 to > 4	NA	0	0	x
FF10					b	10.6	0.22	Biological	> 4	3 to > 4	1.64	0	0	x
FF10					c	9.89	0.58	Biological	3 to 4	3 to > 4	1.42	0	0	x
FF11	42°39.50'N	70°30.00'W	13747.46, 25776.39	288	a	13.74	1.73	Biological	> 4	2 to > 4	2.52	0	0	x
FF11					b	19.01	1.28	Biological	> 4	2 to > 4	1.11	0	0	x
FF11					c	NA	NA	NA	> 4	2 to > 4	NA	0	0	x
FF12	42°23.40'N	70°53.98'W	13984.81, 25830.93	72	a	2.19	0.13	Biological	3 to 4	3 to > 4	1.26	0	0	x
FF12					b	2.57	0.44	Biological	3 to 4	3 to > 4	1.44	0	0	x
FF13	42°19.19'N	70°49.38'W	13975.92, 25773.83	63	a	9.34	0.71	Biological	> 4	3 to > 4	0.69	0	0	x
FF13					b	13.19	0.62	Physical	3 to 4	2 to > 4	1.55	2	0.35	Oxidized
FF13					c	16.51	0.62	Biological	> 4	2 to > 4	1.44	0	0	x
FF14	42°25.00'N	70°39.29'W	13882.76, 25742.18	230	a	18.87	0.84	Physical	> 4	2 to > 4	2.23	1	0.8	Reduced
FF14					b	15.78	0.84	Biological	> 4	2 to > 4	1.13	0	0	x
FF14					c	16.39	0.22	Biological	> 4	3 to > 4	2.01	0	0	x

Table B2 (Continued).

Station	Successional Stages	Low DO	OSI	Penetration		RPD			SOM	Bedforms	General Comments
				Max	Min	Min	Max	Area			
FF1	Stage I ON Stage III	NO	9	17.48	16.55	1.19	4.38	38.12	Sand/Mud	0	x
FF1	Stage I ON Stage III	NO	9	17.57	16.46	1.02	3.94	33.66	Sand/Mud	0	
FF1	Stage I	NO	5	12.61	12.35	0.93	4.56	37.27	Sand/Mud	0	pelletal surface
FF4	INDET	NO	NA	18.84	18.59	2.96	4.65	48.17	0	0	overpen
FF4	Stage I ON Stage III	NO	11	19.65	19.12	3.41	5.18	58.5	Sand/Mud	0	mc at surface feeding void?
FF5	Stage I ON Stage III	NO	9	12.35	10.62	0.75	4.03	32.67	Sand/Mud	0	tube mat
FF5	Stage II ON Stage III	NO	8	10.58	8.72	0.66	2.48	21.13	0	0	tube mat ophiuroids? bivalves
FF5	Stage I -> II	NO	5	10	9.56	1.37	2.96	28.98	Sand/Mud	0	tube mat
FF6	Stage III	NO	10	15.09	14.47	2.04	4.2	41.97	Sand/Mud	0	tube mat
FF6	Stage II ON Stage III	NO	10	16.2	14.03	1.99	5.09	47.93	Sand/Mud	Bed Forms	some slope tube mat
FF6	Stage II ON Stage III	NO	11	17.61	16.82	2.96	5.09	54.88	Sand/Mud	0	tube mat
FF7	x	NO	NA	NA	NA	99	99	99	0	0	overpen soft >4 sediments not analyzed
FF7	Stage I ON Stage III	NO	11	17.66	16.06	3.14	5.18	56.14	Sand/Mud	0	some surface slope ophiuroids
FF7	Stage I ON Stage III	NO	10	20.05	18.32	1.64	5.31	47.19	0	0	some surface slope ophiuroids
FF8	Stage I ON Stage III	NO	8	16.46	16.11	1.28	3.01	29.34	Sand/Mud	0	x
FF8	Stage III	NO	NA	20.53	20.05	99	99	99	0	0	full pen soft >4 sediments
FF9	Stage II	NO	5	4.73	4.03	0.8	2.17	20.33	0	0	tube mat amphipods?
FF9	Stage I	NO	4	5.75	5.31	1.06	2.43	23.74	0	0	x
FF9	Stage I	NO	3	6.33	5.89	0.66	1.81	16.83	0	0	
FF10	x	NO	NA	NA	NA	99	99	99	0	0	sediment disturbed not analyzed

Table B2 (Continued).

Station	Successional Stages	Low DO	OSI	Penetration		RPD			SOM	Bedforms	General Comments
				Max	Min	Min	Max	Area			
FF10	Stage I ON Stage III	NO	8	10.71	10.49	0.66	2.61	22.02	Sand/Mud	0	x
FF10	Stage I	NO	3	10.18	9.6	0.58	2.26	19.05	Sand/Mud	0	tube mat
FF11	Stage I -> II	NO	6	14.6	12.88	1.99	3.05	33.71	Sand/Mud	0	tube mat amphipods?
FF11	Stage I ON Stage III	NO	7	19.65	18.36	0.66	1.55	15.03	0	0	x
FF11	x	NO	NA	NA	NA	99	99	99	Sand/Mud	0	overpen soft >4 sediments not analyzed
FF12	Stage I	NO	3	2.26	2.12	0.97	1.55	17.36	0	0	
FF12	Stage I	NO	3	2.79	2.35	1.11	1.77	19.79	0	0	x
FF13	INDET	NO	NA	9.69	8.98	0.49	0.88	9.35	0	0	darker sediment and shallower rpd than other stations surface erosion
FF13	Stage I ON Stage III	NO	8	13.5	12.88	0.66	2.43	20.83	Sand/Mud	0	x
FF13	Stage I	NO	3	16.82	16.2	0.49	2.39	19.6	Sand/Mud	0	x
FF14	Stage I	NO	4	19.29	18.45	0.97	3.5	30.55	Sand/Mud	0	mc is oxidizing
FF14	Stage I ON Stage III	NO	7	16.2	15.35	0.71	1.55	15.33	Sand/Mud	0	x
FF14	Stage I ON Stage III	NO	8	16.51	16.28	0.93	3.1	27.26	Sand/Mud	0	x

APPENDIX C

Sediment Grain-size, Total Organic Carbon (TOC), and *Clostridium perfringens* Counts for Nearfield and Farfield

Table C1. **Sediment Grain Size at Nearfield Stations.**

SAMPLE	% GRAVEL	% SAND	% SILT	% CLAY
MBNF1	0.8	92.2	4.2	2.8
MBNF2	0.0	22.8	47.0	30.2
MBNF3	0.7	64.2	27.5	7.6
MBNF4	37.7	58.6	2.1	1.5
MBNF5	0.5	77.3	14.6	7.7
MBNF6	0.2	62.3	28.1	9.5
MBNF7	0.1	59.4	32.0	8.5
MBNF8	0.0	18.0	59.1	22.9
MBNF9	0.1	56.0	33.6	10.3
MBNF10	0.1	60.2	31.7	7.9
MBNF11	5.3	69.3	17.4	8.1
MBNF12	0.0	29.2	57.4	13.3
MBNF13	0.2	96.0	2.6	1.2
MBNF14	8.9	77.9	9.3	3.9
MBNF15	3.7	76.8	14.3	5.2
MBNF16	0.0	23.5	59.8	16.7
MBNF17	0.1	98.7	0.8	0.4
MBNF18	54.1	36.1	7.3	2.5
MBNF19	8.8	84.9	4.3	2.0
MBNF20	1.5	40.8	46.9	10.9

Table C2. Sediment Grain Size at Farfield Stations, August 1992.

SAMPLE	% GRAVEL	% SAND	% SILT	% CLAY
MBFF1R1	0.6	16.2	60.1	23.1
MBFF1R2	1.0	9.1	81.0	8.9
MBFF4R1	0.0	13.9	64.2	21.9
MBFF4R2	0.3	18.7	62.1	18.9
MBFF5R1	1.1	37.5	49.3	12.0
MBFF5R2	0.2	36.1	50.6	13.1
MBFF6R1	0.0	46.7	40.4	12.9
MBFF6R2	0.1	27.4	55.6	17.0
MBFF7R1	0.0	20.7	66.3	13.0
MBFF7R2	0.0	20.8	64.4	14.7
MBFF8R1	0.0	5.3	50.3	44.4
MBFF8R2	0.0	9.6	53.0	37.4
MBFF9R1	0.2	79.6	14.1	6.0
MBFF9R2	0.0	82.9	12.4	4.7
MBFF10R1	1.3	68.2	26.7	3.8
MBFF10R2	0.7	67.8	27.9	3.6
MBFF11R1	0.1	21.7	63.2	15.0
MBFF11R2	0.0	23.0	63.5	13.6
MBFF12R1	3.8	78.1	16.5	1.5
MBFF12R2	1.7	60.5	32.2	5.7
MBFF13R1	12.1	45.6	32.1	10.2
MBFF13R2	66.7	22.8	7.2	3.3
MBFF14R1	0.3	21.8	60.0	17.9
MBFF14R2	0.1	18.5	75.7	5.6

Table C3. Total Organic Carbon (TOC) Data from Nearfield Stations.

Station	% TOC			
	Replicate 1	Replicate 2	Replicate 3	Average
NF1	0.58	0.60	0.52	0.6
NF2	2.29	2.99		2.6
NF3	0.76	0.65	1.05	0.8
NF4	0.36	0.39	0.41	0.4
NF5	0.73	0.77	0.83	0.8
NF6	1.08	0.95	0.98	1.0
NF7	1.16	1.17	1.26	1.2
NF8	3.14	3.50	2.86	3.2
NF9	1.15	1.00	0.93	1.0
NF10	0.80	0.73	0.73	0.8
NF11	0.74	0.71	0.70	0.7
NF12	1.00	0.95	0.96	1.0
NF13	0.39	0.50	0.47	0.5
NF14	0.90	0.94		0.9
NF15	0.78	0.85	1.13	0.9
NF16	2.06	2.13	1.92	2.0
NF17	0.39	0.47		0.4
NF18	0.75	0.84	0.67	0.8
NF19	0.53	0.34	0.62	0.5
NF20	1.38	1.35	1.62	1.5

Table C4. **Total Organic Carbon (TOC) Data from Farfield Stations, August 1992.**

Station	% TOC			
	Replicate 1	Replicate 2	Replicate 3	Average
FF1	2.26	2.41		2.3
FF1 dup	2.05	1.88		2.0
FF4	1.74	2.97	2.33	2.3
FF4 dup	2.09	1.87	2.03	2.0
FF5	1.15	1.35	1.18	1.2
FF5 dup	1.15	1.09	1.52	1.3
FF6	1.08	1.43	1.24	1.2
FF6 dup	1.64	1.78		1.7
FF7	2.37	2.11	2.10	2.2
FF7 dup	2.45	2.39		2.4
FF8	1.60	1.69		1.6
FF8 dup	2.42	2.64		2.5
FF9	0.66	0.93	0.84	0.8
FF9 dup	0.68	0.68	0.83	0.7
FF10	0.67	0.78	0.78	0.7
FF10 dup	0.91	0.78	0.64	0.8
FF11	2.29	2.23	2.36	2.3
FF11 dup	1.43	1.44		1.4
FF12	0.92	0.64	0.72	0.8
FF12 dup	0.93	0.96	0.83	0.9
FF13	1.46	1.45	1.29	1.4
FF13 dup	1.25	1.01	1.25	1.2
FF14	1.76	1.79	1.31	1.6
FF14 dup	1.94	1.82	1.65	1.8

Table C5. ***Clostridium perfringens* Spore Analysis by Membrane Filtration, Nearfield Stations.**

Station	Sediment Wet Weight (g)	Wet Weight Density (g^{-1})	Sediment Dry Weight (g)	Dry Weight Density (g^{-1})
NF1	5	480	3.8	632
NF2	5	2880	1.7	8470
NF3	5	480	3.9	615
NF4	5	1200	3.6	1670
NF5	5	120	2.9	207
NF6	5	900	2.5	1800
NF7	5	240	2.6	462
NF8	5	3240	2	8100
NF9	5	240	3.3	364
NF10	5	900	3.3	1360
NF11	5	960	3.7	1300
NF12	5	1200	2.8	2140
NF13	5	720	3.9	923
NF14	5	480	3.5	686
NF15	5	120	3.4	176
NF16	5	1560	2	3900
NF17	5	120	3.9	154
NF18	5	900	3.1	1450
NF19	5	300	3.6	417
NF20	5	3120	2.5	6240

Table C6. *Clostridium perfringens* **Spore Analysis by Membrane Filtration, Farfield Stations, August 1992.**

Station	Replicate	Sediment Wet Weight (g)	Wet Weight Density (g^{-1})	Sediment Dry Weight (g)	Dry Weight Density (g^{-1})
FF1	1	5	360	2	900
FF1	2	5	240	2.1	571
FF4	1	5	360	2	900
FF4	2	5	120	1.9	316
FF5	1	5	<120	2.4	<250
FF5	2	5	540	2.9	931
FF6	1	5	330	2.6	635
FF6	2	5	360	2.5	720
FF7	1	5	60	2	150
FF7	2	5	60	2	150
FF8	1	5	<120	2.1	<286
FF8	2	5	<120	1.9	<316
FF9	1	5	420	3.3	636
FF9	2	5	480	3.1	774
FF10	1	5	1620	3.3	2450
FF10	2	5	600	3.3	909
FF11	1	5	2880	2.6	5540
FF11	2	5	180	2.7	333
FF12	1	5	3720	3.2	5810
FF12	2	5	6030	3.2	9420
FF13	1	5	4650	2.5	9300
FF13	2	5	4020	4	5030
FF14	1	5	330	2.6	635
FF14	2	5	660	2.5	1320

APPENDIX D

Infaunal Raw Data for Nearfield and Farfield

MWRA Massachussetts Bay * Nearfield * ALL Species

TAXA NAME	CODE	NF-1	NF-2	NF-3	NF-4	NF-5	NF-6	NF-7	NF-8	NF-9	NF-10	NF-11	NF-12	NF-13	NF-14	NF-15	NF-16	NF-17	NF-18	NF-19	NF-20
TOTAL		1,119	696	3,240	997	2,927	3,721	5,803	1,349	2,354	2,113	1,668	1,198	1,588	2,417	2,769	1,322	674	1,904	4,284	1,306
NASSARIUS TRIVITTATUS	D012	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—
ONOBA MIGHELSI	D027	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—
DIAPHANA MINUTA	D041	—	—	—	—	1	—	—	—	—	—	1	—	1	—	1	—	—	—	—	—
PUSILLINA PSEUDOAREOLATA	D079	—	—	—	—	3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
SOLARIELLA OBSCURA	D083	—	—	—	5	—	—	1	—	—	—	—	—	—	—	—	—	2	—	—	—
CYLICHNA ALBA	D085	—	—	—	—	—	—	6	—	—	—	—	—	—	—	—	—	—	—	—	—
OENOPOTA INCISULA	D092	—	—	1	—	1	—	—	—	—	—	—	—	—	—	—	—	—	2	—	—
PROPEBELA EXARATA	D099	—	—	—	—	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
ONOBA PELAGICA	D101	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—
TROCHIDAE SPP.	D103	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—
NUCULA DELPHINODONTA	D401	—	—	67	—	30	19	13	2	35	22	4	15	2	3	7	5	—	26	17	6
MYTILUS EDULIS	D402	2	4	—	—	—	—	2	—	—	—	—	—	1	—	—	—	—	—	—	—
MUSCULUS NIGER	D403	—	5	—	—	1	—	—	—	1	—	1	—	—	4	—	—	—	—	—	—
CRENELLA DECUSSATA	D405	3	—	—	34	53	141	69	—	35	2	6	—	6	22	11	1	—	34	—	5
CRENELLA GLANDULA	D406	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	1	—
PLACOPECTEN MAGELLANICUS	D410	—	—	—	—	2	—	2	—	—	—	—	—	—	—	—	—	—	—	1	—
ASTARTE UNDATA	D412	—	—	—	17	9	4	—	—	3	—	—	—	1	4	7	—	1	25	6	—
ARCTICA ISLANDICA	D416	4	18	14	11	1	9	12	—	8	2	21	3	20	25	17	3	3	2	42	3
CERASTODERMA PINNULATUM	D418	41	3	—	6	1	2	6	—	7	—	13	—	2	23	8	—	6	1	4	2
ENSIS DIRECTUS	D423	16	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	1	—	—	—
MYA ARENARIA	D425	—	2	1	—	—	3	2	—	4	1	1	3	—	—	—	1	—	—	—	—
PERIPLOMA PAPYRATIUM	D427	—	—	4	—	—	3	—	1	2	—	—	13	1	1	3	4	1	—	1	2
YOLDIA SAPOTILLA	D432	—	1	1	—	3	6	5	3	1	1	1	11	—	—	—	—	—	1	—	—
THRACIA CONRADI	D434	—	—	—	—	1	1	—	—	2	—	2	—	—	—	—	—	—	1	—	—
LYONSIA ARENOSA	D444	—	—	—	—	—	—	5	—	—	—	—	—	—	—	2	—	—	—	1	—
BIVALVIA SPP.	D445	1	1	—	6	3	2	8	—	—	—	1	—	—	1	1	—	8	—	1	1
HIATELLA ARCTICA	D451	14	42	3	2	—	5	6	—	18	1	18	—	1	17	14	—	—	1	51	1
CYRTODARIA SILIQUA	D452	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
MYTILIDAE SPP.	D454	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	1	—	2	—
PITAR MORRHUANA	D457	—	—	—	—	—	1	—	—	—	—	—	1	—	—	—	—	—	—	—	—
OENOPOTA PYRAMIDALIS	D478	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—
NUCULA ANNULATA	D482	—	—	—	—	9	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
NUCULOMA TENUIS	D483	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
ARCIDAE SPP.	D484	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—
NUCULIDAE SPP.	D485	—	—	—	—	—	190	35	—	—	23	1	—	—	—	—	—	—	—	—	—
ASTHENOTHERUS HEMPHILLI	D486	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4	—	—	—
THYASIRA GOULDI	D495	—	—	5	—	10	19	40	—	14	5	—	1	—	—	1	2	—	2	5	1
DENTALIUM ENTALE	D600	—	1	1	—	1	1	1	—	3	2	—	1	—	—	—	2	—	—	—	3
CHAETODERMA NITIDULUM CANADENSE	D700	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—
PTILANTHURA TENUIS	H002	—	—	2	1	5	—	10	—	3	—	—	—	1	—	2	—	8	5	1	—
CHIRIDOTEA TUFTSI	H003	8	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	23	—	—	—
EDOTEA TRILOBA	H005	1	6	10	1	2	10	4	—	16	9	2	1	1	1	11	—	—	1	19	—
CIROLANA POLITA	H013	—	—	—	8	—	—	—	—	—	—	—	—	1	—	—	—	2	—	—	—
PLEUROGONIUM INERME	H019	—	—	—	—	—	—	—	—	—	—	4	—	—	—	—	1	—	—	—	—
PLEUROGONIUM RUBICUNDRUM	H020	1	—	—	—	2	1	1	—	—	—	—	—	—	—	3	—	—	—	4	—
PLEUROGONIUM SPP.	H032	2	1	—	—	—	5	6	—	1	1	—	—	—	—	—	—	—	—	11	—
UNCIOLA IRRORATA	H301	—	—	1	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
PSEUDUNCIOLA OBLIQUA	H302	19	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	27	—	—	—
COROPHIUM CRASSICORNE	H305	138	—	—	154	—	—	—	—	—	—	—	—	2	—	—	—	116	1	—	—
ERICHTHONIUS RUBRICORNIS	H306	—	—	—	—	9	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
ISCHYROCERUS ANGUIPES	H311	—	—	—	—	—	1	1	—	1	1	2	—	—	2	—	—	—	—	—	—
JASSA MARMORATA	H312	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—
HIPPOMEDON SERRATUS	H314	1	—	—	2	—	—	—	—	—	—	—	—	—	—	—	—	4	—	1	—
ORCHOMENE PINGUIS	H317	—	—	—	—	4	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
AMPELISCA MACROCEPHALA	H323	—	—	—	1	2	5	1	—	1	2	—	—	—	1	—	—	5	—	—	—
AMPITHOE RUBRICATA	H324	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—

MWRA Massachussetts Bay * Nearfield * ALL Species

TAXA NAME	CODE	NF-1	NF-2	NF-3	NF-4	NF-5	NF-6	NF-7	NF-8	NF-9	NF-10	NF-11	NF-12	NF-13	NF-14	NF-15	NF-16	NF-17	NF-18	NF-19	NF-20
LEPTOCHEIRUS PINGUIS	H325	1	—	—	—	—	3	—	—	1	—	—	1	—	—	—	—	3	—	—	—
CASCO BIGELOWI	H326	—	—	—	—	—	—	—	—	—	—	—	—	—	2	—	—	—	—	—	—
MELITA DENTATA	H328	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—
HARPINIA PROPINQUA	H334	5	—	—	—	17	—	25	—	—	—	—	—	—	—	—	—	—	—	1	—
PHOXOCEPHALUS HOLBOLLI	H335	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	5	—	—	—
DYOPEDOS MONACANTHUS	H340	6	1	—	—	3	2	4	—	3	—	18	—	5	3	4	—	—	—	38	—
METOPELLA ANGUSTA	H342	—	1	1	1	3	8	4	—	10	—	1	—	4	2	3	—	—	—	6	1
AEGININA LONGICORNIS	H350	—	1	—	—	36	—	—	—	—	—	—	—	2	—	—	—	—	—	—	—
ANONYX LILLJEBORGI	H352	—	—	—	—	3	—	1	—	1	—	1	1	1	1	—	—	—	—	5	1
ARGISSA HAMATIPES	H355	2	—	1	3	3	—	—	—	2	—	7	—	4	4	4	—	1	1	2	—
PHOTIS POLLEX	H356	23	1	4	—	4	10	13	—	28	2	3	—	2	12	9	—	1	—	24	2
STENOPLEUSTES INERMIS	H359	—	—	3	—	6	4	—	—	6	2	3	1	5	8	—	—	—	—	27	1
AMPHIPODA SPP.	H363	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—
MICRODEUTOPUS ANOMALUS	H365	4	—	—	3	3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
MONOCULODES EDWARDSI	H381	—	—	—	2	—	1	1	—	1	—	4	5	1	4	—	—	1	1	1	—
COROPHIUM SPP.	H394	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
UNCIOLA INERMIS	H419	—	—	—	23	—	—	—	—	—	—	—	—	—	—	—	—	55	—	—	—
NYMPHON GROSSIPES	H701	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	1	—
DIASTYLIS POLITA	H709	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1
DIASTYLIS SCULPTA	H710	9	2	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—
DIASTYLIS QUADRISPINOSA	H711	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
CANCER BOREALIS	H720	1	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—
PAGURUS ACADIANUS	H725	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
EUALUS PUSIOLUS	H728	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—
CRANGON SEPTEMSPINOSA	H732	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—
EUDORELLA PUSILLA	H734	2	—	2	—	11	1	2	—	4	—	—	—	3	—	—	—	—	—	5	—
EUDORELLOPSIS DEFORMIS	H735	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	5	—	—	—
TANAISSUS PSAMMOPHILUS	H736	22	1	—	5	—	—	—	—	—	—	—	—	—	—	—	—	3	—	—	—
AMPELISCIDAE SP. 1	H775	—	—	—	—	31	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—
MAYERELLA LIMICOLA	H777	—	—	—	—	—	1	4	—	1	—	—	5	—	—	—	—	—	1	10	—
OEDICERATIDAE SP. 2	H778	—	—	—	—	1	—	—	—	—	—	—	—	2	—	—	—	—	—	3	—
RHEPOXYNIUS HUDSONI	H779	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	11	—	—	—
CAMPYLASPIS RUBICUNDA	H780	—	—	—	—	—	—	4	—	1	—	1	—	—	—	—	—	—	—	—	—
CAMPYLASPIS SP. 1	H781	—	—	—	4	3	—	—	—	1	—	1	—	—	1	4	—	—	2	—	—
CAMPYLASPIS SPP.	H782	—	—	—	—	—	1	—	—	—	—	—	1	—	—	—	—	1	—	—	—
DIASTYLIS CORNUIFER	H783	—	—	—	—	—	—	—	—	1	—	2	—	—	—	—	—	—	—	—	—
DIASTYLIDAE SPP.	H784	—	—	—	13	—	—	—	—	—	—	—	—	—	—	—	—	4	1	—	—
LAMPROPS QUADRIPLICATA	H785	3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
AXIIDAE SPP.	H786	—	—	—	—	1	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—
MUNNA SP. 2	H788	—	—	—	—	4	—	—	—	—	—	1	—	1	—	—	—	—	—	3	—
AMPELISCIDAE SPP.	H789	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
ECHINARACHNIUS PARMA	J004	11	—	—	9	1	—	—	1	—	—	—	—	1	—	—	—	9	—	—	—
OPHIURA ROBUSTA	J006	—	—	—	—	—	—	—	—	—	2	—	—	—	2	2	2	—	3	11	—
OPHIUROIDEA SPP.	J019	—	1	1	5	—	—	—	1	3	2	1	1	—	—	1	—	—	2	11	—
CTENODISCUS CRISPATUS	J024	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
AGLAOPHAMUS CIRCINATA	L001	29	—	—	30	—	—	—	—	—	—	—	—	53	—	—	—	35	—	—	—
AMPHARETE ARCTICA	L003	—	—	3	—	3	1	—	—	—	—	—	—	1	1	—	—	1	27	1	6
AMPHARETE ACUTIFRONS	L004	3	10	245	—	11	71	57	—	124	68	30	6	32	136	97	5	2	—	138	—
ANOBOTHRUS GRACILIS	L005	—	—	1	—	1	—	13	—	—	1	—	3	—	2	—	—	—	—	1	—
APISTOBRANCHUS TULLBERGI	L006	—	—	—	—	—	1	4	—	—	2	—	—	—	5	1	10	—	7	—	—
ARICIDEA CATHERINAE	L007	197	61	167	14	8	3	32	583	32	70	92	179	46	44	43	209	33	55	9	209
ASABELLIDES OCULATA	L009	—	74	7	—	15	—	1	—	29	4	15	1	25	123	23	1	—	8	94	5
CLYMENELLA TORQUATA	L011	—	—	15	—	—	—	—	—	13	1	1	—	—	—	—	—	—	—	—	—
CHAETOZONE SETOSA	L012	—	—	1	—	—	—	15	—	—	—	—	—	—	—	—	—	—	—	—	—
ETEONE LONGA	L016	—	1	4	—	4	2	10	1	1	3	1	2	—	2	1	—	—	7	10	2
EUCHONE ELEGANS	L018	—	4	—	—	—	—	6	—	2	—	14	3	20	32	6	—	4	—	—	—
EUCHONE INCOLOR	L019	—	7	19	—	3	2	30	—	1	20	2	9	4	3	5	40	—	8	5	5

MWRA Massachussetts Bay * Nearfield * ALL Species

TAXA NAME	CODE	NF-1	NF-2	NF-3	NF-4	NF-5	NF-6	NF-7	NF-8	NF-9	NF-10	NF-11	NF-12	NF-13	NF-14	NF-15	NF-16	NF-17	NF-18	NF-19	NF-20
EXOGONE HEBES	L023	172	—	3	112	10	2	95	3	6	6	4	1	196	274	117	7	70	65	19	5
EXOGONE LONGICIRRIS	L024	—	—	—	—	—	—	2	—	—	—	—	—	—	2	1	1	—	9	—	—
EXOGONE VERUGERA	L025	2	—	17	57	62	31	894	—	19	36	3	5	42	60	28	13	3	79	31	27
COSSURA LONGOCIRRATA	L026	—	1	—	—	1	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—
FLABELLIGERA AFFINIS	L030	—	—	—	—	—	—	—	—	—	—	4	—	—	—	—	2	—	—	—	1
GONIADA MACULATA	L032	1	—	—	—	—	—	2	—	—	—	—	—	—	—	—	—	—	1	—	—
HARMOTHOE IMBRICATA	L036	—	—	—	—	3	—	—	1	—	—	—	—	1	—	—	—	—	—	5	—
HETEROMASTUS FILIFORMIS	L038	—	1	—	—	1	—	—	2	1	—	3	—	—	—	—	—	—	—	—	1
SCOLETOMA IMPATIENS	L041	—	—	—	—	—	—	—	—	2	—	1	—	—	—	—	—	—	—	—	6
SCOLETOMA FRAGILIS	L042	—	—	3	—	2	2	27	—	1	3	1	1	—	—	—	1	—	—	—	—
SCOLETOMA TENUIS	L043	—	—	—	—	—	—	3	—	—	—	—	—	—	—	—	—	—	—	—	—
LAONICE CIRRATA	L045	—	—	—	—	2	—	2	—	1	—	—	—	—	—	—	—	1	1	—	—
MICROPHTHALMUS SCZELKOWII	L049	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	1	—	—
NEREIS GRAYI	L054	—	—	—	—	—	—	—	—	—	—	—	—	—	3	—	—	—	4	—	1
NEPHTYS CAECA	L055	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
NEPHTYS INCISA	L056	—	—	2	—	1	2	2	3	—	1	—	2	—	—	—	3	—	2	12	1
NEPHTYS CILIATA	L058	—	10	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
NEPHTYS DISCORS	L059	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—
NINOE NIGRIPES	L061	1	—	157	—	24	25	58	19	71	91	99	126	7	104	135	59	—	61	14	111
PECTINARIA GOULDI	L064	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	1	3	—
OWENIA FUSIFORMIS	L065	—	—	32	2	1	13	1	3	5	—	—	—	—	—	—	—	3	—	71	—
PHERUSA AFFINIS	L066	2	—	—	—	—	2	—	—	—	—	2	—	1	—	—	—	—	—	—	—
POLYCIRRUS EXIMIUS	L067	—	11	2	—	5	—	4	—	2	—	—	—	—	4	—	—	—	26	21	—
PHOLOE MINUTA	L069	1	—	11	1	5	5	39	—	10	6	3	3	3	13	13	—	1	13	21	1
EUMIDA SANQUINEA	L072	—	—	—	—	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
PHYLLODOCE MACULATA	L073	—	—	—	—	—	—	—	—	—	—	—	—	3	—	—	—	—	—	28	—
PHYLLODOCE MUCOSA	L074	14	5	6	6	1	3	2	—	6	—	—	1	10	—	3	—	3	1	19	—
POLYDORA CAULLERYI	L077	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	1	—
POLYDORA SOCIALIS	L080	86	34	461	186	608	937	545	1	259	66	6	2	212	272	530	—	13	81	1,081	—
POLYDORA QUADRILOBATA	L081	7	5	10	1	488	23	48	—	98	3	—	—	11	9	220	—	—	10	50	—
PRIONOSPIO STEENSTRUPI	L085	66	29	133	2	152	23	755	7	97	91	337	84	32	153	175	28	1	279	49	189
PYGOSPIO ELEGANS	L089	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	72	—	—	—
SCOLELEPIS SQUAMATA	L095	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—
PAROUGIA CAECA	L096	—	—	3	—	9	—	18	3	3	18	2	12	2	9	6	13	2	19	—	2
SCOLOPLOS ARMIGER	L097	2	—	—	—	3	3	19	—	3	2	1	8	2	2	5	—	5	7	4	—
SPIO THULINI	L105	—	—	16	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—
SPIO FILICORNIS	L106	3	4	—	—	—	1	2	—	—	1	6	—	1	7	3	—	—	6	1	—
SPIO LIMICOLA	L107	4	32	677	7	791	1,444	1,917	43	585	522	136	198	314	408	592	61	5	433	1,338	29
SPIOPHANES BOMBYX	L109	35	—	—	1	—	—	3	—	1	1	—	—	7	1	3	—	17	—	3	—
APHELOCHAETA MARIONI	L115	—	1	32	1	34	108	125	41	83	29	9	6	4	2	12	5	—	25	19	2
THARYX ACUTUS	L116	1	33	163	2	31	12	136	179	43	48	19	13	41	9	25	65	—	92	74	28
MONTICELLINA BAPTISTEAE	L117	—	—	37	—	2	53	11	53	101	27	46	22	11	4	4	47	—	24	—	49
POLYGORDIUS SP. A	L119	2	—	1	—	—	—	—	—	—	—	—	—	2	—	—	—	15	—	—	—
SPHAERODOROPSIS MINUTA	L124	—	—	—	—	—	—	3	—	—	—	—	—	—	1	—	2	—	—	2	—
SCALIBREGMA INFLATUM	L131	3	16	19	—	23	42	7	5	21	2	3	2	10	3	5	7	2	3	131	2
EUCLYMENE COLLARIS	L134	35	—	—	8	—	—	—	—	2	—	—	—	2	5	4	—	12	—	—	—
PRAXILLELLA GRACILIS	L137	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—
TRICHOBRANCHUS GLACIALIS	L142	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—
CAPITELLA CAPITATA SPECIES COMPLEX	L152	5	3	3	—	10	5	9	2	10	1	5	—	7	1	21	1	—	6	63	2
PRAXILLURA ORNATA	L155	—	—	—	—	9	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
SPHAERODORIDIUM CLAPEREDII	L162	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
ENIPO TORELLI	L165	—	—	—	—	2	—	—	—	1	1	—	—	—	—	—	—	—	—	—	—
LEVINSENIA GRACILIS	L166	1	—	64	—	23	11	15	45	10	25	35	86	—	7	5	81	—	1	3	53
ARICIDEA QUADRILOBATA	L167	—	—	—	—	—	—	3	—	—	—	—	2	—	—	—	—	—	5	—	—
MALDANE GLEBIFEX	L169	—	—	27	—	35	8	14	—	52	119	—	2	—	—	—	—	—	1	—	—
SABELLIDAE SPP.	L170	—	—	1	154	1	—	2	4	1	6	—	—	2	1	—	1	1	29	8	1
GALATHOWENIA OCULATA	L175	2	2	—	—	7	1	4	—	1	2	1	2	—	1	2	—	1	—	—	—

MWRA Massachussetts Bay * Nearfield * ALL Species

TAXA NAME	CODE	NF-1	NF-2	NF-3	NF-4	NF-5	NF-6	NF-7	NF-8	NF-9	NF-10	NF-11	NF-12	NF-13	NF-14	NF-15	NF-16	NF-17	NF-18	NF-19	NF-20
NEPHTYS NEOTENA	L176	1	—	3	—	—	—	—	—	—	1	1	—	—	—	—	—	—	—	—	—
LUMBRINERIDAE SPP.	L178	—	1	1	—	—	1	8	2	1	2	—	1	—	—	2	1	—	—	1	1
AMPHARETIDAE SPP.	L182	1	—	75	1	17	122	29	7	18	—	—	—	—	17	1	—	—	—	107	—
OPHELINA ACUMINATA	L183	—	1	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	1	—	—
CHAETOZONE SP. B	L184	2	—	—	13	—	1	5	—	—	—	—	—	—	—	—	—	7	—	—	—
NEPHTYIDAE SPP.	L187	—	—	2	—	—	13	1	1	1	2	1	—	—	—	6	—	—	—	25	—
LEITOSCOLOPLOS ACUTUS	L189	4	2	34	1	5	18	15	6	14	48	22	34	—	13	18	37	—	18	7	9
MEDIOMASTUS CALIFORNIENSIS	L191	10	158	449	5	120	174	401	197	278	372	485	249	80	346	407	427	3	211	186	420
MALDANIDAE SPP.	L195	23	2	35	14	8	—	—	—	1	1	1	—	172	2	23	—	23	3	1	—
CIRRATULIDAE SPP.	L196	3	9	—	16	2	15	30	33	14	41	59	19	11	23	7	30	1	3	29	1
NEREIDIDAE SPP.	L207	—	—	—	—	—	—	3	—	—	—	—	—	—	—	—	—	—	—	—	—
MONTICELLINA DORSOBRANCHIALIS	L216	—	—	9	—	6	20	—	11	20	6	9	3	1	—	2	5	—	16	5	—
GONIADIDAE SPP.	L217	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—
SYLLIDAE SPP.	L219	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—
LAONOME KROEYERI	L221	—	14	29	1	4	—	—	—	21	2	—	—	1	1	—	2	—	1	56	1
TEREBELLIDAE SPP.	L223	—	—	5	1	1	1	1	—	—	3	—	—	8	17	5	—	—	—	9	—
APHELOCHAETA MONILARIS	L227	—	2	—	—	3	—	1	—	2	—	5	4	—	3	1	—	—	—	15	—
SPHAEROSYLLIS BREVIFRONS	L235	—	—	—	—	—	—	1	—	4	2	—	—	2	1	2	1	—	—	—	—
CLYMENURA POLARIS	L245	—	—	—	2	—	—	—	—	—	—	—	—	—	—	—	—	6	—	—	—
ORBINIIDAE SPP.	L248	3	5	9	2	4	27	10	3	13	26	16	12	10	9	19	10	10	—	34	—
PIONOSYLLIS SP. A	L249	—	—	—	—	3	—	2	—	—	—	13	—	1	1	—	1	—	5	12	1
SPHAEROSYLLIS LONGICAUDA	L250	—	—	1	—	4	2	3	—	—	—	2	—	1	—	—	—	—	6	5	—
TYPOSYLLIS ALTERNATA	L253	—	—	—	—	5	—	—	—	—	—	—	—	—	—	—	—	—	4	1	—
POLYNOIDAE SPP.	L255	1	1	—	—	—	—	1	—	—	2	1	—	—	1	—	1	—	1	2	—
OPHELIIDAE SPP.	L258	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—
PECTINARIA SPP.	L265	—	1	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
TEREBELLIDES SPP.	L266	—	1	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	1	—
SPIONIDAE SPP.	L268	—	—	1	3	—	9	—	7	—	155	—	—	109	—	—	—	1	—	31	—
FLABELLIGERIDAE SPP.	L270	1	8	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—
PHYLLODOCIDAE SPP.	L278	—	—	—	—	—	—	1	—	—	—	—	—	1	6	—	—	—	—	—	—
TROCHOCHAETIDAE SPP.	L279	—	—	—	—	—	1	—	—	1	1	—	—	—	1	—	—	—	—	—	—
GATTYANA CIRROSA	L283	—	—	—	—	—	3	1	—	—	—	—	1	—	—	—	—	—	—	—	—
CHONE DUNERI	L328	1	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
BARANTOLLA AMERICANA	L329	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	2	—	—	—	—
COSSURIDAE SPP.	L330	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—
TROCHOCHAETA CARICA	L331	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
POLYCIRRUS MEDUSA	L332	—	—	—	1	—	—	—	—	1	—	2	—	—	—	—	—	—	—	—	—
SPIOPHANES KROEYERI	L333	—	—	1	1	—	—	—	—	—	—	1	—	—	1	—	—	—	2	1	—
GLYCERIDAE SPP.	L334	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—
PRAXILLELLA AFFINIS	L335	—	—	25	1	1	—	—	—	—	—	—	—	4	—	—	—	—	1	—	—
STERNASPIS SCUTATA	L338	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
PRAXILLELLA PRAETERMISSA	L341	—	—	6	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
RHODINE LOVENI	L354	—	—	—	—	4	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
OPHRYOTROCHA SP. 1	L356	—	—	—	—	5	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—
AMPHICTEIS GUNNERI	L357	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
TYPOSYLLIS SP. 1	L358	—	—	—	—	—	—	4	—	—	—	—	—	—	—	—	—	—	—	10	—
BRADA VILLOSA	L359	—	—	—	—	—	—	—	—	3	—	—	1	—	2	—	—	—	—	—	—
WEBSTERINEREIS TRIDENTATA	L360	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—
ARCTEOBIA ANTICOSTIENSIS	L361	—	—	3	—	—	—	—	—	—	—	—	1	—	—	—	1	—	—	—	—
LAONICE SP. 1	L362	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—
TUBIFICOIDES APECTINATUS	L902	—	35	1	1	—	—	2	26	—	2	1	—	1	13	5	1	—	7	—	7
TUBIFICIDAE SPP.	L903	—	8	—	12	17	—	—	22	—	4	—	1	—	12	4	9	—	35	—	11
TUBIFICIDAE SP. 2	L916	—	—	1	—	—	—	—	—	—	—	—	—	—	47	9	79	—	45	—	46
CEREBRATULUS LACTEUS	Y001	—	1	7	1	—	1	2	—	—	—	—	2	—	—	2	4	—	1	3	4
NEMERTEA SPP.	Y004	3	—	10	14	6	—	21	7	5	17	11	1	1	13	4	8	—	8	7	18
MICRURA SPP.	Y007	—	—	17	—	11	7	17	12	12	20	7	20	—	7	14	7	—	6	10	7
AMPHIPORUS ANGULATUS	Y013	1	—	10	—	—	4	1	1	—	5	3	1	—	4	3	3	—	2	3	6

MWRA Massachussetts Bay * Nearfield * ALL Species

TAXA NAME	CODE	NF-1	NF-2	NF-3	NF-4	NF-5	NF-6	NF-7	NF-8	NF-9	NF-10	NF-11	NF-12	NF-13	NF-14	NF-15	NF-16	NF-17	NF-18	NF-19	NF-20
TETRASTEMMA VITTATUM	Y015	—	—	—	—	—	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—
NEMERTEA SP. 2	Y016	—	—	—	—	—	—	2	1	—	—	—	—	—	—	—	—	—	—	—	—
CARINOMELLA LACTEA	Y017	—	—	—	—	—	—	—	1	1	—	—	—	—	—	—	2	—	—	—	1
HYDROZOA FRAGMENTS	Y098	1	—	—	—	—	—	1	—	—	—	—	—	—	—	—	1	—	—	—	—
EDWARDSIA ELEGANS	Y206	5	3	—	—	—	—	—	—	—	6	—	—	—	4	—	1	—	—	—	—
CERIANTHEOPSIS AMERICANUS	Y208	—	—	—	—	—	—	—	—	1	—	—	—	1	—	1	—	—	1	—	1
ACTINIARIA SPP.	Y209	1	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—
ACTINIARIA SP. 1	Y215	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
ACTINIARIA SP. 2	Y216	—	5	—	—	—	—	1	—	2	—	1	—	—	—	1	1	—	1	3	—
ACTINIARIA SP. 3	Y217	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
MOLGULA MANHATTENSIS	Y405	12	—	—	4	—	—	—	—	—	—	—	—	—	—	4	—	3	2	14	—
PHASCOLION STROMBUS	Y452	—	—	—	—	3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
SIPUNCULA SPP.	Y453	—	—	—	—	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
BOSTRICHOBRANCHUS PILULARIS	Y454	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—
NEPHASOMA DIAPHANES	Y459	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
STEREOBALANUS CANADENSIS	Y553	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2	—	1	—	—
PHORONIS ARCHITECTA	Y951	28	—	38	—	12	—	7	5	22	39	18	1	7	21	25	3	7	8	56	4

MWRA FarField * May92 * All Species

Taxa Name	CODE	WH2	WH3	4	5	6	7	8	9	11	14
TOTAL		869	8,497	4,803	3,696	11,692	14,221	648	8,722	2,863	1,719
NASSARIUS TRIVITTATUS	D012	1	---	---	---	---	---	---	---	---	---
LUNATIA HEROS	D037	1	---	---	---	---	---	---	---	---	---
DIAPHANA MINUTA	D041	---	1	---	---	3	---	---	2	---	---
COLUS PYGMAEUS	D063	---	---	---	---	---	---	---	1	---	---
GASTROPODA SPP.	D076	1	---	1	---	---	---	---	---	1	---
PUSILLINA PSEUDOAREOLATA	D079	---	---	---	2	---	4	---	---	1	---
SOLARIELLA OBSCURA	D083	6	---	---	---	---	---	---	---	---	---
CYLICHNA ALBA	D085	14	---	---	3	28	---	---	2	---	---
RETUSA OBTUSA	D086	---	---	---	---	7	---	---	---	---	---
ACTEOCINA CANICULATA	D089	---	---	---	---	2	---	---	---	---	---
OENOPOTA INCISULA	D092	---	---	---	1	---	---	---	5	---	---
ONOBA PELAGICA	D101	---	---	---	---	55	---	---	---	---	---
PUSILLINA HARPA	D102	---	---	---	---	3	---	---	---	---	---
CYLICHNA GOULDI	D104	---	---	4	2	9	6	---	---	---	---
PROPEBELA TURRICULA	D106	---	---	1	---	---	---	---	---	---	---
NUCULA DELPHINODONTA	D401	---	23	---	6	20	15	---	21	---	---
MYTILUS EDULIS	D402	---	---	---	---	---	2	2	1	1	---
CRENELLA DECUSSATA	D405	---	---	---	---	---	---	1	10	---	2
PLACOPECTEN MAGELLANICUS	D410	---	---	---	---	---	---	---	1	---	---
ASTARTE UNDATA	D412	2	---	---	---	---	---	---	47	---	---
ARCTICA ISLANDICA	D416	5	20	---	---	131	3	---	42	4	---
CERASTODERMA PINNULATUM	D418	---	1	---	---	1	1	---	5	---	---
MYA ARENARIA	D425	---	10	---	---	15	5	1	1	2	---
PERIPLOMA PAPYRATIUM	D427	---	36	1	12	30	1	---	4	1	3
YOLDIA SAPOTILLA	D432	---	26	13	8	12	3	---	32	9	13
NUCULANA PERNULA	D433	---	---	2	---	---	---	---	---	---	---
THRACIA CONRADI	D434	---	4	---	---	2	---	---	2	---	---
MUSCULUS DISCORS	D436	---	---	---	---	---	---	---	1	---	---
LYONSIA ARENOSA	D444	---	1	---	---	---	---	---	---	---	---
BIVALVIA SPP.	D445	6	2	---	---	3	---	---	1	---	---
MYTILIDAE SPP.	D454	2	---	---	---	---	---	---	---	3	---
NUCULA ANNULATA	D482	---	7	11	12	90	53	1	27	8	8
ASTHENOTHERUS HEMPHILLI	D486	16	---	---	---	---	---	---	---	---	---

MWRA FarField * May92 * All Species

Taxa Name	CODE	WH2	WH3	4	5	6	7	8	9	11	14
MEGAYOLDIA THRACIAEFORMIS	D487	---	---	13	---	---	---	---	---	6	2
YOLDIELLA LUCIDA	D488	---	---	---	---	---	---	1	---	---	---
THYASIRA GOULDI	D495	---	3	64	57	67	19	7	48	20	43
PERIPLOMA FRAGILE	D496	1	---	---	---	---	---	---	---	---	---
LYONSIIDAE SPP.	D497	---	---	---	---	---	1	---	---	---	---
DENTALIUM ENTALE	D600	1	6	65	19	3	1	3	1	---	8
CHAETODERMA NITIDULUM CANADENSE	D700	---	1	1	---	---	---	---	1	2	4
PTILANTHURA TENUIS	H002	6	---	---	---	1	---	---	8	---	---
CHIRIDOTEA TUFTSI	H003	10	---	---	---	---	---	---	---	---	---
EDOTEA TRILOBA	H005	2	---	---	---	---	1	---	30	---	---
CIROLANA POLITA	H013	47	---	---	---	---	---	---	---	---	---
PLEUROGONIUM INERME	H019	---	---	---	1	1	2	---	1	---	---
MUNNA SP.	H026	---	---	---	---	---	---	---	2	---	---
PSEUDUNCIOLA OBLIQUA	H302	56	---	---	---	---	---	---	---	---	---
COROPHIUM CRASSICORNE	H305	159	---	---	---	---	---	---	---	---	---
PSEUDOHAUSTORIUS BOREALIS	H310	16	---	---	---	---	---	---	---	---	---
ISCHYROCERUS ANGUIPES	H311	---	---	---	1	---	---	---	5	---	---
JASSA MARMORATA	H312	---	---	---	---	---	---	---	---	---	1
HIPPOMEDON SERRATUS	H314	10	---	---	---	---	---	---	---	---	---
ORCHOMENE PINGUIS	H317	---	1	---	---	---	---	---	---	---	---
AMPELISCA MACROCEPHALA	H323	8	---	---	1	---	---	---	5	---	---
LEPTOCHEIRUS PINGUIS	H325	2	86	---	4	---	---	---	1	---	---
CASCO BIGELOWI	H326	---	---	---	---	---	---	---	2	---	---
MELITA DENTATA	H328	---	---	---	---	---	---	---	---	1	---
HARPINIA PROPINQUA	H334	---	---	14	32	8	---	1	35	6	4
PHOXOCEPHALUS HOLBOLLI	H335	16	---	---	---	---	---	---	---	---	---
DYOPEDOS MONACANTHUS	H340	---	---	2	---	---	2	---	1	---	---
PONTOGENEIA INERMIS	H341	---	2	---	---	---	---	---	---	---	---
METOPELLA ANGUSTA	H342	---	1	---	3	---	1	---	7	---	---
PROBOLOIDES HOLMESI	H344	---	---	---	---	---	---	---	2	---	---
ANONYX LILLJEBORGI	H352	---	---	---	---	---	1	---	2	---	---
PHOTIS POLLEX	H356	---	---	---	1	7	2	---	7	---	---
STENOPLEUSTES INERMIS	H359	---	---	---	---	1	---	---	1	---	---
MICRODEUTOPUS ANOMALUS	H365	---	1	---	---	---	---	---	---	---	---

MWRA FarField * May92 * All Species

Taxa Name	CODE	WH2	WH3	4	5	6	7	8	9	11	14
UNCIOLA SPP.	H371	1	---	---	---	---	---	---	---	---	---
MONOCULODES EDWARDSI	H381	---	---	---	---	---	---	---	2	1	---
CAPRELLIDAE SPP.	H385	---	1	---	---	---	---	---	---	---	---
COROPHIUM SPP.	H387	1	---	---	---	---	---	---	---	---	---
OEDICEROTIDAE SP. 1	H416	---	---	1	---	---	---	---	---	---	---
UNCIOLA INERMIS	H419	178	---	---	---	---	---	---	---	---	---
DIASTYLIS QUADRISPINOSA	H711	---	---	---	---	---	---	---	7	---	---
EUDORELLA PUSILLA	H734	---	1	---	16	10	4	---	14	---	1
EUDORELLOPSIS DEFORMIS	H735	12	---	---	---	---	---	---	---	---	---
TANAISSUS PSAMMOPHILUS	H736	14	---	---	---	---	---	---	---	---	---
PYCNOGONIDA SPP.	H774	---	---	---	---	---	---	---	---	2	---
AMPELISCIDAE SP. 1	H775	---	1	10	5	2	---	---	28	1	---
MAYERELLA LIMICOLA	H777	---	---	---	---	6	8	---	---	---	---
RHEPOXYNIUS HUDSONI	H779	30	---	1	---	---	---	---	---	---	---
CAMPYLASPIS RUBICUNDA	H780	---	3	---	---	1	---	---	---	---	---
CAMPYLASPIS SP. 1	H781	---	---	---	---	---	---	---	1	---	---
DIASTYLIS CORNUIFER	H783	---	1	---	---	---	1	---	1	---	---
HIPPOMEDON SP. 1	H787	---	---	---	4	---	---	---	5	---	---
PLEUSTIDAE SP. 1	H790	1	1	---	---	---	---	---	5	---	---
LEUCON NR. ACUTIROSTRIS	H791	---	---	6	---	---	---	---	---	---	---
LEUCON SP. 1	H792	---	---	2	---	---	---	---	---	---	---
BYBLIS NR. GAIMARDI	H795	---	---	---	3	---	---	---	2	---	---
ANARTHRURA CF. SIMPLEX	H799	---	---	---	---	---	---	1	---	---	---
ECHINARACHNIUS PARMA	J004	11	1	---	---	1	---	---	---	---	---
HENRICIA SANGUINOLENTA	J005	1	---	---	---	---	---	---	---	---	---
OPHIURA ROBUSTA	J006	---	---	---	2	---	2	---	4	---	---
ECHINOIDEA SPP.	J018	---	---	1	8	1	---	1	---	---	---
OPHIUROIDEA SP.	J019	2	2	---	11	4	1	2	71	29	5
ASTEROIDEA SPP.	J021	---	---	---	---	---	---	1	---	---	---
CTENODISCUS CRISPATUS	J024	---	---	---	2	1	---	---	---	---	---
OPHIURA SARSI	J025	---	---	---	---	6	12	---	---	---	---
MOLPADIA OOLITICA	J027	---	---	---	---	---	---	---	---	---	1
HOLOTHUROIDEA SPP.	J028	1	---	---	---	---	---	---	---	---	---
AGLAOPHAMUS CIRCINATA	L001	30	---	1	2	---	---	---	3	3	---

MWRA FarField * May92 * All Species

Taxa Name	CODE	WH2	WH3	4	5	6	7	8	9	11	14
AMPHARETE ARCTICA	L003	1	---	---	---	---	---	---	---	---	---
AMPHARETE ACUTIFRONS	L004	---	118	4	5	---	17	---	523	---	---
ANOBOTHRUS GRACILIS	L005	---	46	148	16	23	68	3	6	42	9
APISTOBRANCHUS TULLBERGI	L006	---	---	35	2	76	319	---	1	---	1
ARICIDEA CATHERINAE	L007	7	1,359	---	---	275	940	---	---	---	1
ASABELLIDES OCULATA	L009	---	1	---	---	---	---	---	---	---	---
ETEONE LONGA	L016	---	12	4	1	14	10	---	8	5	---
EUCHONE INCOLOR	L019	---	605	56	---	625	1,220	1	18	25	4
EXOGONE HEBES	L023	13	5	1	---	---	---	2	45	---	---
EXOGONE LONGICIRRIS	L024	---	2	---	---	---	---	---	---	---	---
EXOGONE VERUGERA	L025	2	130	1	---	---	---	---	166	4	2
COSSURA LONGOCIRRATA	L026	1	1	112	34	842	1,798	150	2	42	93
GONIADA MACULATA	L032	---	---	---	---	---	---	---	2	---	1
HETEROMASTUS FILIFORMIS	L038	---	2	21	8	---	---	---	2	9	23
SCOLETOMA FRAGILIS	L042	---	---	1	---	1	3	---	1	---	---
LAONICE CIRRATA	L045	---	---	---	---	---	---	---	2	---	---
NEPHTYS INCISA	L056	---	16	2	4	115	19	3	11	---	3
NEPHTYS CILIATA	L058	---	13	---	---	---	10	---	---	---	---
NINOE NIGRIPES	L061	---	857	16	25	101	155	---	62	13	8
OWENIA FUSIFORMIS	L065	9	2	---	1	---	---	---	---	1	---
PHERUSA AFFINIS	L066	---	---	---	---	1	---	---	---	---	---
PHOLOE MINUTA	L069	---	55	3	5	14	18	---	19	13	3
PHYLLODOCE MUCOSA	L074	---	---	---	---	---	---	---	1	---	---
POLYDORA CAULLERYI	L077	---	---	---	---	1	---	---	---	---	---
POLYDORA SOCIALIS	L080	84	---	16	134	2,515	393	---	1,188	4	10
POLYDORA QUADRILOBATA	L081	---	---	1	2	2	---	---	71	---	---
PRIONOSPIO STEENSTRUPI	L085	---	1,076	213	98	185	232	---	1,579	563	41
PYGOSPIO ELEGANS	L089	1	---	---	---	---	---	---	---	---	---
PAROUGIA CAECA	L096	---	2	1	---	38	39	---	---	---	---
SCOLOPLOS ARMIGER	L097	5	27	---	---	---	---	---	22	---	---
SYLLIDES JAPONICA	L101	---	1	9	4	19	8	---	2	---	4
SPIO FILICORNIS	L106	---	---	---	---	1	2	---	1	---	---
SPIO LIMICOLA	L107	5	310	2,958	2,631	3,592	2,975	---	3,316	780	562
SPIOPHANES BOMBYX	L109	14	---	---	---	---	---	---	---	---	---

MWRA FarField * May92 * All Species

Taxa Name	CODE	WH2	WH3	4	5	6	7	8	9	11	14
TEREBELLIDES STROEMI	L114	---	---	2	---	---	---	---	1	---	---
APHELOCHAETA MARIONI	L115	---	29	7	21	83	15	---	31	1	29
THARYX ACUTUS	L116	---	195	1	3	209	282	---	4	---	1
MONTICELLINA BAPTISTEAE	L117	---	170	---	---	15	---	254	---	---	---
POLYGORDIUS SP. A	L119	2	1	---	---	---	3	---	3	---	---
SPHAERODOROPSIS MINUTA	L124	---	7	---	---	26	3	---	4	1	1
SCALIBREGMA INFLATUM	L131	---	---	28	2	18	8	---	35	2	4
EUCLYMENE COLLARIS	L134	3	---	---	1	1	---	---	16	2	---
PRAXILLELLA GRACILIS	L137	---	1	3	1	1	---	---	---	1	---
MYRIOCHELE HEERI	L138	---	---	---	---	---	---	---	---	2	3
MELINNA CRISTATA	L139	---	---	2	3	---	---	2	---	---	2
DRILONEREIS LONGA	L151	---	---	---	1	---	---	---	---	---	---
CAPITELLA CAPITATA SPECIES COMPLEX	L152	---	---	---	5	1	5	---	19	120	11
PRAXILLURA ORNATA	L155	---	---	---	---	---	---	---	22	1	---
ENIPO TORELLI	L165	---	2	3	3	5	3	---	8	---	2
LEVINSENIA GRACILIS	L166	---	260	73	114	51	180	7	156	424	183
ARICIDEA QUADRILOBATA	L167	---	49	170	97	215	184	7	51	206	103
MALDANE GLEBIFEX	L169	---	2	2	18	---	---	---	6	3	22
GALATHOWENIA OCULATA	L175	---	1	1	3	6	9	2	3	13	22
SABELLIDAE SPP.	L180	1	4	1	---	---	6	---	1	7	---
OPHELINA ACUMINATA	L183	---	---	---	---	---	---	---	2	---	---
CHAETOZONE SP. B	L184	1	---	---	---	---	---	---	---	---	---
LEITOSCOLOPLOS ACUTUS	L189	---	316	34	5	20	12	---	23	9	18
MEDIOMASTUS CALIFORNIENSIS	L191	---	2,004	248	82	1,414	3,573	5	464	29	81
CIRRATULIDAE SPP.	L194	---	108	---	1	6	218	4	5	8	14
LUMBRINERIDAE SPP.	L198	---	10	---	---	7	8	1	1	---	---
SPIONIDAE SPP.	L199	---	28	34	---	---	---	---	---	1	---
CHAETOZONE SP. A	L206	3	6	134	52	17	9	---	41	156	194
NEREIDIDAE SPP.	L207	---	---	---	---	1	---	---	2	1	---
MONTICELLINA DORSOBRANCHIALIS	L216	---	8	---	---	---	---	---	1	---	---
GONIADIDAE SPP.	L217	---	---	---	---	---	---	1	---	3	---
LAONOME KROEYERI	L221	---	3	---	---	2	---	---	3	---	1
TEREBELLIDAE SPP.	L223	---	23	---	---	---	1	---	17	1	---
LAGISCA EXTENUATA	L228	---	---	---	---	---	3	---	2	---	---

MWRA FarField * May92 * All Species

Taxa Name	CODE	WH2	WH3	4	5	6	7	8	9	11	14
SPHAEROSYLLIS BREVIFRONS	L235	—	2	—	—	—	—	—	2	—	—
NEPHTYIDAE SPP.	L240	—	4	1	11	—	2	—	9	1	3
MALDANIDAE SPP.	L244	14	2	4	5	31	4	20	18	4	16
ORBINIIDAE SPP.	L248	13	5	2	1	7	1	—	—	1	2
SPHAEROSYLLIS LONGICAUDA	L250	—	19	—	—	6	—	—	1	—	—
SYLLIDAE SPP.	L252	—	—	—	—	1	—	1	—	—	—
AMPHARETIDAE SPP.	L254	—	41	3	8	4	40	3	66	6	1
TEREBELLIDES SPP.	L266	—	—	—	—	65	30	—	—	—	—
FLABELLIGERIDAE SPP.	L270	—	—	—	1	—	—	—	2	—	—
PHYLLODOCIDAE SPP.	L278	—	—	1	1	—	—	—	—	—	—
TROCHOCHAETIDAE SPP.	L279	—	—	4	2	1	—	—	2	5	1
GATTYANA CIRROSA	L283	—	3	—	1	—	—	—	—	—	—
POLYNOIDAE SPP.	L324	2	4	10	5	7	10	1	26	—	5
CHONE DUNERI	L328	—	—	—	—	—	19	—	—	—	—
TROCHOCHAETA CARICA	L331	—	—	5	—	—	—	5	—	1	5
POLYCIRRUS MEDUSA	L332	—	—	—	—	—	1	—	1	—	—
PRAXILLELLA AFFINIS	L335	—	—	1	—	—	—	—	—	—	—
STERNASPIS SCUTATA	L338	—	—	8	1	10	2	—	—	25	30
TEREBELLIDES ATLANTIS	L339	—	—	2	1	241	34	—	1	1	—
MYSTIDES BOREALIS	L340	—	—	—	—	4	2	—	—	—	—
PRAXILLELLA PRAETERMISSA	L341	—	—	—	—	9	—	—	—	—	—
SYLLIDES LONGOCIRRATA	L342	—	—	39	2	41	57	—	—	6	9
ANCISTOSYLLIS GROENLANDICA	L344	—	—	—	—	—	—	23	—	—	4
BARANTOLLA SP. A	L345	—	—	—	—	—	—	25	—	—	—
CIRROPHORUS FURCATUS	L346	—	—	—	—	—	—	2	—	—	—
LEVINSENIA SP. 2	L347	—	—	—	—	—	—	2	—	—	—
POTAMETHUS SP. 1	L348	—	—	—	—	—	—	1	—	—	—
OPHELINA ABRANCHIATA	L349	—	—	—	—	—	—	3	—	—	—
PARADONEIS ELIASONI	L350	—	—	—	—	—	—	30	—	—	—
PARAMPHINOME JEFFREYSII	L351	—	—	47	—	—	1	23	—	—	1
SYNELMIS KLATTI	L352	—	—	—	—	—	—	32	—	—	—
ARICIDEA MINUTA	L353	—	—	1	—	—	—	—	9	1	—
RHODINE LOVENI	L354	—	—	—	—	—	—	—	6	—	—
TYPOSYLLIS SP. 1	L358	—	1	—	—	—	—	—	2	—	—

MWRA FarField * May92 * All Species

Taxa Name	CODE	WH2	WH3	4	5	6	7	8	9	11	14
BRADA VILLOSA	L359	—	3	—	—	—	—	—	—	—	—
LAONICE SP. 1	L362	—	1	—	—	—	—	—	—	—	—
LEITOSCOLOPLOS N. SP. B	L369	—	18	—	—	—	—	—	20	—	—
CLYMENURA SP. A	L378	7	—	—	—	—	—	—	—	—	—
DYSPONETUS PYGMAEUS	L379	—	—	—	2	—	—	—	—	—	—
CHONE CF. MAGNA	L380	—	—	—	—	—	1	—	—	—	—
TUBIFICOIDES APECTINATUS	L902	—	4	25	16	—	9	—	—	183	51
TUBIFICIDAE SPP.	L903	—	5	—	—	—	—	—	—	—	1
LIMNODRILOIDES MEDIOPORUS	L917	—	—	—	—	36	948	—	1	—	—
CEREBRATULUS LACTEUS	Y001	—	1	—	1	—	8	1	1	—	—
NEMERTEA SPP.	Y004	1	123	16	23	32	13	4	13	4	14
MICRURA SPP.	Y007	—	113	40	—	54	50	1	12	17	8
AMPHIPORUS ANGULATUS	Y013	3	11	—	2	7	6	—	13	4	2
TETRASTEMMA VITTATUM	Y015	—	—	11	—	3	—	—	—	1	2
NEMERTEA SP. 2	Y016	—	18	—	—	9	—	—	1	—	—
CARINOMELLA LACTEA	Y017	—	1	4	7	2	21	6	—	—	7
NEMERTEA SP. 3	Y018	—	3	—	—	—	—	—	—	—	—
TUBULANUS PELLUCIDUS	Y019	—	—	17	—	—	1	—	—	—	4
HYDROZOA FRAGMENTS	Y098	—	2	—	—	—	2	—	11	5	—
EDWARDSIA ELEGANS	Y206	—	—	—	—	3	—	—	4	—	—
ACTINIARIA SP. 1	Y215	—	—	—	1	—	—	—	2	—	1
ACTINIARIA SP. 2	Y216	—	—	—	—	1	1	—	—	—	—
ACTINIARIA SP. 4	Y218	—	—	—	—	—	2	—	—	—	—
ACTINIARIA SP. 5	Y219	—	—	—	—	—	—	—	4	—	—
MOLGULA MANHATTENSIS	Y405	2	—	—	—	—	—	—	—	—	—
PHASCOLION STROMBUS	Y452	—	—	—	1	—	—	—	9	1	—
SIPUNCULA SPP.	Y453	—	—	1	2	—	—	—	5	1	1
BOSTRICHOBRANCHUS PILULARIS	Y454	—	—	—	—	11	53	—	—	—	—
STEREOBALANUS CANADENSIS	Y553	—	—	2	1	3	4	1	—	1	—
ECHIURUS ECHIURUS	Y701	—	—	—	—	—	—	—	—	2	—
PHORONIS ARCHITECTA	Y951	5	3	—	1	35	—	—	5	—	—

MWRA FarField * AUG92 * 0.5 mm * ALL Species

Taxa Name	CODE	FF9-1	FF9-2	FF9-3	FF10-1	FF10-2	FF10-3	FF11-1	FF11-2	FF11-3	FF12-1	FF12-2	FF12-3	FF13-1	FF13-2	FF13-3	FF14-1	FF14-2	FF14-3
Total By STATION			7,499			10,834			1,808			6,077			2,677			1,532	
TOTAL		2,511	2,379	2,609	3,754	3,705	3,375	550	388	870	1,522	2,051	2,504	1,001	394	1,282	580	461	491
NASSARIUS TRIVITTATUS	D012	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—
SKENEOPSIS PLANORBIS	D031	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
DIAPHANA MINUTA	D041	—	—	—	—	1	1	—	—	—	—	—	—	—	—	—	—	—	—
COLUS PYGMAEUS	D063	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2	—	—
GASTROPODA SPP.	D076	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
PUSILLINA PSEUDOAREOLATA	D079	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
CYLICHNA ALBA	D085	1	1	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—
RETUSA OBTUSA	D086	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
OENOPOTA INCISULA	D092	3	1	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
PROPEBELA EXARATA	D099	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
OPISTHOBRANCHIA SPP.	D100	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
ONOBA PELAGICA	D101	—	—	—	2	11	9	—	—	—	—	—	—	—	—	—	1	—	—
PUSILLINA HARPA	D102	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
CYLICHNA GOULDI	D104	—	—	—	—	—	2	—	—	—	—	—	—	—	—	—	1	—	—
COLUS PUBESCENS	D105	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
NUCULA DELPHINODONTA	D401	8	3	3	97	261	142	—	—	—	—	—	—	—	—	—	8	5	6
MYTILUS EDULIS	D402	—	—	—	—	—	—	—	—	—	—	—	1	—	1	6	—	—	—
MUSCULUS NIGER	D403	—	—	—	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—
CRENELLA DECUSSATA	D405	1	2	—	18	26	41	—	—	—	—	—	—	—	—	—	—	1	3
PLACOPECTEN MAGELLANICUS	D410	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
ASTARTE UNDATA	D412	3	4	1	2	6	6	—	—	—	—	—	—	—	—	—	—	—	—
ARCTICA ISLANDICA	D416	—	1	—	1	4	10	—	—	—	4	2	5	2	1	3	—	—	—
CERASTODERMA PINNULATUM	D418	1	—	—	—	—	—	—	—	—	1	2	5	3	—	2	—	—	—
TELLINA AGILIS	D420	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
ENSIS DIRECTUS	D423	—	—	—	—	—	—	—	—	—	2	1	2	27	1	6	—	—	—
MYA ARENARIA	D425	1	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
PERIPLOMA PAPYRATIUM	D427	—	—	1	5	9	7	—	—	—	—	1	—	—	—	—	—	1	—
YOLDIA SAPOTILLA	D432	10	5	9	19	15	16	1	1	11	1	—	1	—	—	—	6	1	5
THRACIA CONRADI	D434	1	2	2	1	—	3	—	—	—	—	—	1	—	—	—	—	—	—
MUSCULUS DISCORS	D436	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
MACOMA BALTHICA	D439	—	—	—	—	—	—	1	—	—	—	—	—	1	—	—	—	—	—
LYONSIA ARENOSA	D444	—	—	—	3	1	—	—	—	—	—	—	—	—	—	—	—	—	—
BIVALVIA SPP.	D445	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
HIATELLA ARCTICA	D451	—	—	—	—	1	1	—	—	—	1	2	—	3	—	—	—	—	—
MYTILIDAE SPP.	D454	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—
PITAR MORRHUANA	D457	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—
NUCULA ANNULATA	D482	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
NUCULOMA TENUIS	D483	—	—	—	—	—	—	1	1	1	—	—	—	—	—	—	2	3	2
NUCULIDAE SPP.	D485	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
MEGAYOLDIA THRACIAEFORMIS	D487	—	—	—	—	—	—	—	1	4	—	—	—	—	—	—	1	3	1
YOLDIELLA LUCIDA	D488	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
THYASIRA MINUTUS?	D489	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
NUCULOMA GRANULOSA	D490	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
NUCULANA SP. 1	D491	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
THYASIRIDAE SPP.	D492	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
MULINIA LATERALIS	D493	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
PYTHINELLA CUNEATA	D494	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1
THYASIRA GOULDI	D495	13	5	3	30	36	31	1	2	12	—	1	2	—	—	—	12	10	10
DENTALIUM ENTALE	D600	—	—	1	2	2	—	—	—	—	2	—	—	—	—	—	—	18	—
CHAETODERMA NITIDULUM CANADENSE	D700	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
PTILANTHURA TENUIS	H002	3	5	1	18	28	30	—	—	—	—	—	—	—	—	—	—	—	—
EDOTEA TRILOBA	H005	—	2	2	11	12	14	—	—	—	2	2	1	22	2	7	—	—	—
PLEUROGONIUM INERME	H019	—	—	—	—	1	—	—	—	1	2	—	—	8	—	8	—	—	—
PLEUROGONIUM RUBICUNDRUM	H020	—	—	—	—	—	2	—	—	—	—	1	—	4	6	7	—	—	—
CAPRELLIDAE SPP.	H024	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—

MWRA FarField * AUG92 * 0.5 mm * ALL Species

Taxa Name	CODE	FF9-1	FF9-2	FF9-3	FF10-1	FF10-2	FF10-3	FF11-1	FF11-2	FF11-3	FF12-1	FF12-2	FF12-3	FF13-1	FF13-2	FF13-3	FF14-1	FF14-2	FF14-3
MUNNA SPP.	H026	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
PLEUROGONIUM SPP.	H032	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—
UNCIOLA IRRORATA	H301	2	—	—	1	—	—	—	—	—	—	—	—	1	—	—	—	—	—
COROPHIUM CRASSICORNE	H305	—	—	—	—	—	—	—	—	—	—	—	—	3	—	—	—	—	—
ISCHYROCERUS ANGUIPES	H311	—	—	—	42	4	13	—	—	—	—	—	—	—	—	3	—	—	—
HIPPOMEDON SERRATUS	H314	—	—	—	—	9	11	—	—	—	—	—	—	—	—	—	—	—	—
ORCHOMENE PINGUIS	H317	—	—	—	1	—	—	—	—	—	—	—	—	1	—	—	—	—	—
AMPELISCA ABDITA	H321	—	—	—	—	—	—	—	—	—	—	—	—	7	8	32	—	—	—
AMPELISCA MACROCEPHALA	H323	1	1	3	4	1	—	—	—	—	1	—	—	—	—	—	—	—	—
LEPTOCHEIRUS PINGUIS	H325	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—
CASCO BIGELOWI	H326	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—
HARPINIA PROPINQUA	H334	8	7	2	5	—	—	1	1	1	—	—	—	—	—	—	—	—	—
PHOXOCEPHALUS HOLBOLLI	H335	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—
DYOPEDOS MONACANTHUS	H340	—	—	—	—	1	—	—	—	—	6	—	2	1	3	11	—	—	—
METOPELLA ANGUSTA	H342	—	—	2	2	3	2	—	—	—	—	—	2	3	2	—	—	—	—
PROBOLOIDES HOLMESI	H344	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
AEGININA LONGICORNIS	H350	—	—	—	11	41	10	—	—	—	—	—	—	—	—	—	—	—	—
ANONYX LILLJEBORGI	H352	—	7	—	3	1	—	—	—	—	—	—	—	—	—	—	—	—	—
ARGISSA HAMATIPES	H355	—	—	—	1	2	8	—	—	—	2	3	—	11	5	4	—	—	—
PHOTIS POLLEX	H356	1	—	1	14	2	7	—	—	—	9	2	3	40	17	40	—	—	—
STENOPLEUSTES INERMIS	H359	—	—	—	3	7	15	—	—	—	—	—	1	—	—	—	—	—	—
MICRODEUTOPUS ANOMALUS	H365	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—
OEDICEROTIDAE SPP.	H367	—	—	—	—	—	—	—	—	—	3	—	—	—	—	—	—	—	—
AMPHIPODA SPP.	H374	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
MONOCULODES EDWARDSI	H381	—	—	—	—	—	1	—	1	—	—	—	—	—	—	—	2	2	—
COROPHIUM SPP.	H387	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
PHOXOCEPHALIDAE SPP.	H388	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
DIASTYLIS SCULPTA	H710	—	—	—	—	—	—	—	—	—	—	—	—	10	—	—	—	—	—
DIASTYLIS QUADRISPINOSA	H711	—	—	—	2	—	—	—	—	—	—	—	—	—	—	1	—	—	—
CANCER BOREALIS	H720	—	—	—	—	1	—	—	—	—	—	—	2	—	—	—	—	—	—
EUDORELLA PUSILLA	H734	1	—	1	3	3	—	1	2	—	—	—	—	—	—	—	—	—	1
CUMACEA SPP.	H747	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
AMPELISCIDAE SP. 1	H775	7	7	1	16	13	—	—	—	—	—	—	—	—	—	—	—	—	—
MAYERELLA LIMICOLA	H777	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
OEDICERATIDAE SP. 2	H778	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—
CAMPYLASPIS RUBICUNDA	H780	—	—	—	—	—	3	—	—	—	—	—	—	—	—	—	—	—	—
DIASTYLIS CORNUIFER	H783	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	1
DIASTYLIDAE SPP.	H784	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
HIPPOMEDON SP. 1	H787	—	—	6	—	—	2	—	—	—	—	—	—	—	—	—	—	—	—
MUNNA SP. 2	H788	—	—	—	—	—	—	—	—	—	—	—	2	—	—	—	—	—	—
PLEUSTIDAE SP. 1	H790	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—
LEUCON NR. ACUTIROSTRIS	H791	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—
LEUCON SP. 2	H793	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	3	—
LEUCON SP. 3	H794	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1
BYBLIS NR. GAIMARDI	H795	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
STENOTHOIDAE SPP.	H796	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
LEPTOSTYLIS LONGIMANA	H797	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
MYSIS MIXTA	H798	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
DECAPODA SP. 1	H800	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
AMPELISCIDAE SP. 2	H801	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—
ECHINARACHNIUS PARMA	J004	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	2	—
OPHIURA ROBUSTA	J006	—	1	1	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—
OPHIUROIDEA SPP.	J019	1	—	1	—	—	—	17	—	2	—	—	—	—	—	—	1	7	—
CTENODISCUS CRISPATUS	J024	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2	1
OPHIURA SARSI	J025	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	1	1
OPHIURA SP. 2	J026	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	3	1
MOLPADIA OOLITICA	J027	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

MWRA FarField * AUG92 * 0.5 mm * ALL Species

Taxa Name	CODE	FF9-1	FF9-2	FF9-3	FF10-1	FF10-2	FF10-3	FF11-1	FF11-2	FF11-3	FF12-1	FF12-2	FF12-3	FF13-1	FF13-2	FF13-3	FF14-1	FF14-2	FF14-3
AMPHARETE ARCTICA	L003	—	—	1	—	—	—	—	—	—	—	1	3	—	—	—	—	—	—
AMPHARETE ACUTIFRONS	L004	71	43	136	21	55	107	—	—	—	15	6	10	1	—	2	—	—	—
ANOBOTHRUS GRACILIS	L005	—	1	—	5	4	2	5	8	24	—	—	—	—	—	—	5	3	3
APISTOBRANCHUS TULLBERGI	L006	1	—	—	—	2	1	—	—	—	—	—	—	—	—	—	1	1	—
ARICIDEA CATHERINAE	L007	—	—	—	62	68	68	—	—	1	233	339	529	11	12	39	—	—	—
ASABELLIDES OCULATA	L009	—	3	5	14	45	20	—	—	—	14	13	7	2	2	7	—	—	—
CLYMENELLA TORQUATA	L011	—	—	—	12	48	50	—	—	—	3	2	5	—	—	—	—	—	—
CIRRATULUS CIRRATUS	L014	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
PECTINARIA GRANULATA	L015	—	—	—	—	—	—	—	—	1	—	—	—	1	—	1	—	—	—
ETEONE LONGA	L016	8	5	3	3	4	6	2	—	7	2	3	6	—	1	—	—	—	1
EUCHONE INCOLOR	L019	3	3	—	32	45	29	2	—	16	13	10	9	—	—	6	—	—	—
EXOGONE HEBES	L023	10	41	11	25	10	15	—	—	—	—	—	—	—	—	—	—	—	—
EXOGONE LONGICIRRIS	L024	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
EXOGONE VERUGERA	L025	42	24	9	87	131	52	—	—	—	1	1	—	—	—	—	—	—	—
COSSURA LONGOCIRRATA	L026	2	—	1	—	—	—	6	9	17	1	—	—	—	—	—	12	16	16
GONIADA MACULATA	L032	1	2	2	2	1	—	3	—	—	—	—	—	—	—	—	1	—	—
HETEROMASTUS FILIFORMIS	L038	—	—	—	—	2	2	2	3	2	—	—	—	—	—	—	11	5	10
SCOLETOMA IMPATIENS	L041	—	—	—	8	2	—	—	—	—	—	—	—	—	—	—	—	—	—
SCOLETOMA FRAGILIS	L042	1	1	—	—	—	—	1	—	—	1	1	—	—	—	—	—	—	—
LAONICE CIRRATA	L045	—	—	—	—	1	—	—	1	—	—	—	2	—	—	—	—	—	—
MICROPHTHALMUS SCZELKOWII	L049	—	—	—	—	—	—	—	—	—	—	—	—	—	1	2	—	—	—
NEREIS GRAYI	L054	5	3	4	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
NEPHTYS CAECA	L055	—	—	—	—	—	—	—	—	—	—	2	—	—	—	—	—	—	—
NEPHTYS INCISA	L056	3	5	7	3	5	7	—	—	—	1	—	—	1	—	1	—	1	1
NEPHTYS CILIATA	L058	—	—	—	—	—	—	—	—	—	—	—	—	2	1	1	—	—	—
NEPHTYS DISCORS	L059	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—
NINOE NIGRIPES	L061	38	31	13	94	104	79	2	2	5	36	86	110	2	2	1	1	1	2
NICOLEA ZOSTERICOLA	L062	—	—	—	—	—	—	—	—	—	—	—	—	1	—	1	—	—	—
OWENIA FUSIFORMIS	L065	9	—	—	2	21	56	—	—	—	157	60	92	—	—	—	—	—	1
PHERUSA AFFINIS	L066	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
POLYCIRRUS EXIMIUS	L067	2	2	4	—	2	2	—	—	—	—	2	1	—	—	1	—	—	—
PHOLOE MINUTA	L069	3	6	3	6	15	6	1	3	3	2	7	3	—	1	4	—	—	—
PHYLLODOCE ARENAE	L070	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
PHYLLODOCE MUCOSA	L074	1	5	4	1	2	—	—	—	—	3	4	7	36	8	62	—	2	—
POLYDORA CORNUTA	L079	—	—	—	—	—	—	—	—	—	—	1	—	255	4	142	—	—	—
POLYDORA SOCIALIS	L080	397	192	329	377	249	306	—	—	—	—	2	1	—	—	—	—	3	2
POLYDORA QUADRILOBATA	L081	11	4	2	375	187	310	—	—	—	10	42	29	—	—	1	—	—	1
POTAMILLA NEGLECTA	L084	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—
PRIONOSPIO STEENSTRUPI	L085	388	529	237	341	381	230	109	108	176	148	350	446	250	90	351	13	23	23
PARADONEIS LYRA	L090	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
PAROUGIA CAECA	L096	18	10	6	5	4	4	6	4	21	2	3	1	—	—	—	2	7	6
SCOLOPLOS ARMIGER	L097	—	—	—	1	3	—	—	—	—	—	—	—	—	—	—	—	—	—
SYLLIDES JAPONICA	L101	—	—	2	—	—	—	—	—	—	—	—	—	—	—	—	1	1	—
SPIO THULINI	L105	—	—	—	1	—	1	—	—	—	—	—	—	—	—	—	—	—	—
SPIO FILICORNIS	L106	—	—	—	3	—	—	—	—	—	—	3	4	—	—	—	—	—	—
SPIO LIMICOLA	L107	1,088	1,093	1,192	858	542	655	114	82	280	24	22	33	4	—	3	286	149	172
SPIOPHANES BOMBYX	L109	—	1	—	—	1	2	—	—	—	17	19	31	3	—	1	—	—	—
STREBLOSPIO BENEDICTI	L113	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—
TEREBELLIDES STROEMI	L114	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
APHELOCHAETA MARIONI	L115	14	4	11	63	85	111	—	—	—	—	1	4	—	—	—	11	2	5
THARYX ACUTUS	L116	11	1	1	52	102	112	1	—	—	97	221	413	92	—	165	—	1	—
MONTICELLINA BAPTISTEAE	L117	—	—	1	65	122	101	—	—	—	31	63	28	—	—	—	1	—	—
TROCHOCHAETA MULTISETOSA	L118	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
SPHAERODOROPSIS MINUTA	L124	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
PHERUSA PLUMOSA	L130	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—
SCALIBREGMA INFLATUM	L131	93	60	301	8	19	38	1	—	2	14	3	—	—	—	1	7	21	24
EUCLYMENE COLLARIS	L134	2	—	—	—	22	7	—	—	—	—	—	—	—	—	—	—	—	—

MWRA FarField * AUG92 * 0.5 mm * ALL Species

Taxa Name	CODE	FF9-1	FF9-2	FF9-3	FF10-1	FF10-2	FF10-3	FF11-1	FF11-2	FF11-3	FF12-1	FF12-2	FF12-3	FF13-1	FF13-2	FF13-3	FF14-1	FF14-2	FF14-3
PRAXILLELLA GRACILIS	L137	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
MELINNA CRISTATA	L139	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
CHONE INFUNDIBULIFORMIS	L143	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—
CAPITELLA CAPITATA SPECIES COMPLEX	L152	—	7	9	3	1	—	—	1	2	2	6	7	8	9	10	—	—	2
PRAXILLURA ORNATA	L155	3	16	3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
SPHAERODORIDIUM CLAPEREDII	L162	1	—	—	2	—	1	—	—	—	—	—	—	—	—	—	—	—	—
ENIPO TORELLI	L165	—	1	1	—	—	—	—	1	—	—	—	—	—	—	—	2	—	—
LEVINSENIA GRACILIS	L166	53	66	57	15	19	22	126	99	49	18	25	15	1	—	—	58	20	21
ARICIDEA QUADRILOBATA	L167	17	10	2	—	1	3	31	21	124	—	—	—	—	—	—	26	16	61
MALDANE GLEBIFEX	L169	8	2	—	106	51	6	1	—	—	—	—	—	—	—	—	13	3	3
SABELLIDAE SPP.	L170	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
NEPHTYS SPP.	L172	—	—	1	—	—	—	4	1	—	—	—	2	—	—	—	—	—	—
GALATHOWENIA OCULATA	L175	1	1	—	2	2	—	1	4	1	—	—	—	—	—	1	3	1	2
NEPHTYS NEOTENA	L176	—	—	—	—	—	—	—	—	—	—	—	—	17	14	74	—	—	—
LUMBRINERIDAE SPP.	L178	2	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	1	—
SABELLIDAE SPP.	L180	—	—	—	5	8	2	—	—	—	—	—	—	—	—	—	—	—	—
AMPHARETIDAE SPP.	L182	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—
OPHELINA ACUMINATA	L183	—	—	2	—	—	1	—	1	—	—	—	—	1	—	—	—	—	—
CHAETOZONE SP. B	L184	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
LEITOSCOLOPLOS ACUTUS	L189	18	7	6	46	55	50	3	3	9	80	80	69	10	5	26	4	2	13
MEDIOMASTUS CALIFORNIENSIS	L191	—	76	108	307	305	240	16	4	6	437	531	485	122	86	185	17	7	7
CIRRATULIDAE SPP.	L194	—	1	2	—	35	—	—	—	—	—	—	—	—	—	—	—	—	2
CIRRATULIDAE SPP.	L196	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	48	—
LUMBRINERIDAE SPP.	L198	—	2	1	14	50	24	—	—	—	4	—	—	1	—	—	—	—	—
SPIONIDAE SPP.	L199	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
CHAETOZONE SP. A	L206	—	2	1	—	—	—	28	1	15	—	—	—	—	—	—	29	17	38
NEREIDIDAE SPP.	L207	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
THARYX SP. A	L208	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
SCOLETOMA HEBES	L210	—	—	—	39	29	37	—	—	—	26	39	60	1	—	4	—	—	—
SPHAERODORIDAE SPP.	L213	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
PARAONIDAE SPP.	L215	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
MONTICELLINA DORSOBRANCHIALIS	L216	—	—	—	38	16	4	—	—	—	2	2	1	—	—	—	—	—	—
HARMOTHOINAE SPP.	L220	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
LAONOME KROEYERI	L221	3	2	4	12	33	11	—	—	1	—	—	1	—	—	1	—	—	—
TEREBELLIDAE SPP.	L223	1	—	—	—	3	1	—	—	2	—	—	—	—	—	2	—	—	—
APHELOCHAETA NR. MONILARIS	L227	—	—	—	—	—	—	—	—	—	—	—	—	—	68	—	—	—	—
POLYCIRRUS SPP.	L234	—	—	—	7	—	—	—	—	—	—	—	—	—	—	—	—	—	—
NEREIS ZONATA	L237	1	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—
LEITOSCOLOPLOS SPP.	L238	—	—	—	—	—	—	1	—	—	—	1	1	—	—	—	—	—	—
NEPHTYIDAE SPP.	L240	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—
LUMBRINERIS SPP.	L241	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
SYLLIS SPP.	L242	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
MALDANIDAE SPP.	L244	16	4	3	—	2	11	1	—	—	—	—	—	—	—	—	5	3	1
ORBINIIDAE SPP.	L248	—	—	—	2	1	—	—	—	—	—	—	—	—	—	—	—	—	—
PIONOSYLLIS SP. A	L249	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—
SPHAEROSYLLIS LONGICAUDA	L250	1	1	—	2	1	2	—	—	—	—	—	—	—	—	—	—	—	—
APISTOBRANCHUS SPP.	L251	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—
SYLLIDAE SPP.	L252	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
TYPOSYLLIS ALTERNATA	L253	1	—	—	—	4	—	—	—	—	—	—	—	—	—	—	—	—	—
AMPHARETIDAE SPP.	L254	32	2	20	228	236	126	—	—	—	—	2	3	—	—	—	—	—	—
POLYNOIDAE SPP.	L255	—	1	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
TROCHOCHAETA SPP.	L263	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
TEREBELLIDES SPP.	L266	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
SPIONIDAE SPP.	L268	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—
FLABELLIGERIDAE SPP.	L270	—	—	—	—	—	—	—	—	—	7	5	4	7	9	21	—	—	1
LUMBRINERIS SPP.	L271	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
PHYLLODOCIDAE SPP.	L278	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

MWRA FarField * AUG92 * 0.5 mm * ALL Species

Taxa Name	CODE	FF9-1	FF9-2	FF9-3	FF10-1	FF10-2	FF10-3	FF11-1	FF11-2	FF11-3	FF12-1	FF12-2	FF12-3	FF13-1	FF13-2	FF13-3	FF14-1	FF14-2	FF14-3
TROCHOCHAETIDAE SPP.	L279	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
GATTYANA AMONDSENI	L280	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—
DIPLOCIRRUS HIRSUTUS	L281	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1
GATTYANA CIRROSA	L283	—	—	—	—	—	—	2	—	—	—	—	—	—	—	—	—	1	—
POLYNOIDAE SPP.	L324	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—
CAPITELLIDAE SPP.	L326	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
CHONE DUNERI	L328	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—
TROCHOCHAETA CARICA	L331	—	—	1	—	—	—	7	2	3	—	—	—	—	—	—	6	7	4
POLYCIRRUS MEDUSA	L332	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
SPIOPHANES KROEYERI	L333	1	1	—	—	—	1	—	—	—	—	1	—	—	—	—	—	—	—
PRAXILLELLA AFFINIS	L335	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
STERNASPIS SCUTATA	L338	—	—	—	—	—	—	2	—	5	—	—	—	—	—	—	4	6	8
TEREBELLIDES ATLANTIS	L339	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	1
MYSTIDES BOREALIS	L340	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
PRAXILLELLA PRAETERMISSA	L341	8	—	4	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—
SYLLIDES LONGOCIRRATA	L342	—	—	—	—	—	—	—	4	4	—	—	—	—	—	—	1	—	2
TROCHOCHAETA WATSONI	L343	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
ANCISTOSYLLIS GROENLANDICA	L344	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
BARANTOLLA SP. A	L345	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
OPHELINA ABRANCHIATA	L349	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
PARADONEIS ELIASONI	L350	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
PARAMPHINOME JEFFREYSII	L351	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
SYNELMIS KLATTI	L352	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
ARICIDEA MINUTA	L353	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
RHODINE LOVENI	L354	—	—	3	11	2	3	—	—	—	—	—	—	—	—	—	—	—	—
OPHRYOTROCHA SP. 1	L356	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
BRADA VILLOSA	L359	—	1	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—
WEBSTERINEREIS TRIDENTATA	L360	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
ARCTEOBIA ANTICOSTIENSIS	L361	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
LAONICE SP. 1	L362	1	—	—	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—
DIPLOCIRRUS LONGISETOSUS	L363	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2	—
DORVILLEA SOCIABILIS	L364	—	—	—	—	—	—	1	—	—	1	—	—	—	—	—	—	—	2
TRICHOBRANCHUS ROSEUS	L366	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
PROCLEA GRAFFII	L367	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
EULALIA BILINEATA	L368	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—
LEITOSCOLOPLOS N. SP. B	L369	8	7	26	3	2	2	—	—	—	—	2	4	1	—	—	—	—	—
ONUPHIS OPALINA	L370	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
MEIODORVILLEA MINUTA	L371	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
ANTINOELLA SARSI	L373	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—
PISTA CRISTATA	L374	—	1	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
RHODINE BITORQUATA	L375	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
GYPTIS CF. VITTATA	L376	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
OPHRYOTROCHA BIFIDA	L377	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
ARABELLIDAE SPP.	L388	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
TUBIFICOIDES APECTINATUS	L902	—	—	—	—	—	—	35	13	53	24	16	5	—	6	13	9	11	12
TUBIFICIDAE SPP.	L903	—	—	—	—	—	—	—	—	—	—	3	1	—	—	—	—	—	—
TUBIFICIDAE SP. 2	L916	—	—	—	5	12	1	—	—	—	3	—	1	6	15	2	—	—	—
CEREBRATULUS LACTEUS	Y001	1	2	—	5	—	3	—	—	—	6	2	—	—	1	4	—	—	—
NEMERTEA SPP.	Y004	5	8	4	4	4	—	1	1	2	5	7	—	4	—	1	1	10	3
MICRURA SPP.	Y007	13	6	4	19	16	19	3	2	1	3	6	6	—	1	1	3	4	3
AMPHIPORUS ANGULATUS	Y013	6	14	5	2	3	7	4	—	—	10	11	5	1	2	2	3	—	—
TETRASTEMMA VITTATUM	Y015	—	—	—	—	—	—	1	—	3	—	—	—	—	—	—	—	—	—
NEMERTEA SP. 2	Y016	—	—	—	—	1	—	—	—	—	1	—	—	—	—	—	—	—	—
CARINOMELLA LACTEA	Y017	1	—	—	1	—	—	—	—	—	1	—	—	—	—	—	3	1	2
TUBULANUS PELLUCIDUS	Y019	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	5	—	—
HYDROZOA FRAGMENTS	Y098	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
EDWARDSIA ELEGANS	Y206	3	2	2	2	4	1	—	—	—	4	1	1	4	—	1	—	—	—

MWRA FarField * AUG92 * 0.5 mm * ALL Species

Taxa Name	CODE	FF9-1	FF9-2	FF9-3	FF10-1	FF10-2	FF10-3	FF11-1	FF11-2	FF11-3	FF12-1	FF12-2	FF12-3	FF13-1	FF13-2	FF13-3	FF14-1	FF14-2	FF14-3
ACTINIARIA SP. 2	Y216	—	—	—	3	6	4	—	—	—	1	3	2	2	1	3	—	—	—
PHASCOLION STROMBUS	Y452	2	4	2	—	1	2	—	—	—	—	—	—	—	—	—	—	—	1
SIPUNCULA SPP.	Y453	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—
BOSTRICHOBRANCHUS PILULARIS	Y454	—	1	—	—	1	3	—	—	—	—	—	—	—	—	—	—	—	—
STEREOBALANUS CANADENSIS	Y553	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
PRIAPULUS CAUDATUS	Y750	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
PHORONIS ARCHITECTA	Y951	7	4	7	16	9	17	—	—	—	25	24	24	4	8	8	—	—	—

MWRA FarField * AUG92 * 0.5 mm * ALL Species

Taxa Name	CODE	FF1-1	FF1-2	FF1-3	FF4-1	FF4-2	FF4-3	FF5-1	FF5-2	FF5-3	FF6-1	FF6-2	FF6-3	FF7-1	FF7-2	FF7-3	FF8-1	FF8-2	FF8-3
Total By STATION			1,144			2,407			2,904			4,728			5,202			527	
TOTAL		394	420	330	728	490	1,189	1,107	834	963	1,431	1,405	1,892	1,260	1,114	2,828	182	196	149
NASSARIUS TRIVITTATUS	D012	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
SKENEOPSIS PLANORBIS	D031	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
DIAPHANA MINUTA	D041	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—
COLUS PYGMAEUS	D063	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
GASTROPODA SPP.	D076	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
PUSILLINA PSEUDOAREOLATA	D079	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—
CYLICHNA ALBA	D085	—	1	—	—	—	—	1	—	2	2	—	2	—	—	—	—	—	—
RETUSA OBTUSA	D086	—	—	—	—	—	—	—	—	—	—	2	5	1	1	—	—	—	—
OENOPOTA INCISULA	D092	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—
PROPEBELA EXARATA	D099	—	—	1	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—
OPISTHOBRANCHIA SPP.	D100	—	—	—	—	—	—	1	—	1	—	—	—	—	—	—	—	—	—
ONOBA PELAGICA	D101	—	1	1	—	—	—	7	—	—	13	9	7	—	—	—	—	—	—
PUSILLINA HARPA	D102	—	1	—	—	—	—	—	—	—	—	—	—	1	—	—	—	1	—
CYLICHNA GOULDI	D104	—	—	—	1	—	—	—	1	—	1	—	—	—	—	—	—	—	—
COLUS PUBESCENS	D105	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
NUCULA DELPHINODONTA	D401	5	5	5	—	—	—	9	6	2	4	2	2	2	1	4	—	—	—
MYTILUS EDULIS	D402	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
MUSCULUS NIGER	D403	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
CRENELLA DECUSSATA	D405	1	5	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
PLACOPECTEN MAGELLANICUS	D410	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—
ASTARTE UNDATA	D412	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
ARCTICA ISLANDICA	D416	—	—	—	—	—	—	—	—	—	7	8	5	—	—	—	—	—	—
CERASTODERMA PINNULATUM	D418	—	—	—	—	1	—	—	—	—	—	1	—	—	—	—	—	—	—
TELLINA AGILIS	D420	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
ENSIS DIRECTUS	D423	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
MYA ARENARIA	D425	—	—	—	—	—	—	—	—	—	1	—	—	—	1	1	—	—	—
PERIPLOMA PAPYRATIUM	D427	—	—	—	—	1	—	4	2	7	3	7	2	—	—	1	2	—	—
YOLDIA SAPOTILLA	D432	6	13	3	2	1	—	4	4	2	—	1	3	1	—	—	—	—	—
THRACIA CONRADI	D434	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—
MUSCULUS DISCORS	D436	—	—	—	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—
MACOMA BALTHICA	D439	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
LYONSIA ARENOSA	D444	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
BIVALVIA SPP.	D445	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
HIATELLA ARCTICA	D451	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—
MYTILIDAE SPP.	D454	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
PITAR MORRHUANA	D457	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
NUCULA ANNULATA	D482	—	—	—	—	—	—	—	—	—	9	9	5	7	2	11	—	—	—
NUCULOMA TENUIS	D483	1	1	—	1	—	4	2	3	—	1	—	—	—	—	1	1	—	1
NUCULIDAE SPP.	D485	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—
MEGAYOLDIA THRACIAEFORMIS	D487	4	1	1	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—
YOLDIELLA LUCIDA	D488	—	—	1	—	1	1	—	—	—	—	—	—	—	—	—	2	3	3
THYASIRA MINUTUS?	D489	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	1
NUCULOMA GRANULOSA	D490	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—
NUCULANA SP. 1	D491	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	1
THYASIRIDAE SPP.	D492	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—
MULINIA LATERALIS	D493	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
PYTHINELLA CUNEATA	D494	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
THYASIRA GOULDI	D495	13	15	10	—	9	12	28	16	27	16	5	3	1	1	3	3	1	—
DENTALIUM ENTALE	D600	2	7	2	16	14	—	3	4	1	—	—	—	2	—	—	1	1	2
CHAETODERMA NITIDULUM CANADENSE	D700	1	1	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—
PTILANTHURA TENUIS	H002	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
EDOTEA TRILOBA	H005	—	—	—	—	—	—	—	—	—	—	—	—	2	1	—	—	—	—
PLEUROGONIUM INERME	H019	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—
PLEUROGONIUM RUBICUNDRUM	H020	—	—	—	2	—	—	—	—	1	—	—	—	1	—	—	—	—	—
CAPRELLIDAE SPP.	H024	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

MWRA FarField * AUG92 * 0.5 mm * ALL Species

Taxa Name	CODE	FF1-1	FF1-2	FF1-3	FF4-1	FF4-2	FF4-3	FF5-1	FF5-2	FF5-3	FF6-1	FF6-2	FF6-3	FF7-1	FF7-2	FF7-3	FF8-1	FF8-2	FF8-3
MUNNA SPP.	H026	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—
PLEUROGONIUM SPP.	H032	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
UNCIOLA IRRORATA	H301	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
COROPHIUM CRASSICORNE	H305	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
ISCHYROCERUS ANGUIPES	H311	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
HIPPOMEDON SERRATUS	H314	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
ORCHOMENE PINGUIS	H317	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
AMPELISCA ABDITA	H321	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
AMPELISCA MACROCEPHALA	H323	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
LEPTOCHEIRUS PINGUIS	H325	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
CASCO BIGELOWI	H326	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
HARPINIA PROPINQUA	H334	—	—	1	5	—	—	9	3	5	1	2	4	—	—	—	—	—	—
PHOXOCEPHALUS HOLBOLLI	H335	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
DYOPEDOS MONACANTHUS	H340	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—
METOPELLA ANGUSTA	H342	—	—	—	—	—	—	—	—	—	—	—	—	—	—	6	—	—	—
PROBOLOIDES HOLMESI	H344	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
AEGININA LONGICORNIS	H350	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
ANONYX LILLJEBORGI	H352	—	—	—	—	—	—	2	—	1	—	—	—	—	—	—	—	—	—
ARGISSA HAMATIPES	H355	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—
PHOTIS POLLEX	H356	—	—	1	—	—	—	—	1	1	4	4	—	—	1	7	—	—	—
STENOPLEUSTES INERMIS	H359	—	—	—	—	—	—	—	—	—	1	—	—	—	2	2	—	—	—
MICRODEUTOPUS ANOMALUS	H365	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
OEDICEROTIDAE SPP.	H367	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—
AMPHIPODA SPP.	H374	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
MONOCULODES EDWARDSI	H381	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—
COROPHIUM SPP.	H387	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
PHOXOCEPHALIDAE SPP.	H388	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
DIASTYLIS SCULPTA	H710	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
DIASTYLIS QUADRISPINOSA	H711	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—
CANCER BOREALIS	H720	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
EUDORELLA PUSILLA	H734	1	—	—	—	1	—	—	1	2	2	1	6	—	—	3	—	—	—
CUMACEA SPP.	H747	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
AMPELISCIDAE SP. 1	H775	—	1	—	6	3	2	3	1	4	—	—	1	—	—	—	—	—	—
MAYERELLA LIMICOLA	H777	—	1	1	—	—	—	—	—	—	8	8	—	—	—	—	—	—	—
OEDICERATIDAE SP. 2	H778	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
CAMPYLASPIS RUBICUNDA	H780	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
DIASTYLIS CORNUIFER	H783	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
DIASTYLIDAE SPP.	H784	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—
HIPPOMEDON SP. 1	H787	—	—	—	—	—	—	1	—	1	—	—	—	—	—	—	—	—	—
MUNNA SP. 2	H788	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
PLEUSTIDAE SP. 1	H790	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
LEUCON NR. ACUTIROSTRIS	H791	—	—	—	2	2	—	—	—	—	—	—	—	—	—	—	—	—	—
LEUCON SP. 2	H793	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
LEUCON SP. 3	H794	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
BYBLIS NR. GAIMARDI	H795	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
STENOTHOIDAE SPP.	H796	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
LEPTOSTYLIS LONGIMANA	H797	—	—	—	2	—	—	2	—	—	—	—	—	—	—	—	—	—	—
MYSIS MIXTA	H798	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
DECAPODA SP. 1	H800	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
AMPELISCIDAE SP. 2	H801	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
ECHINARACHNIUS PARMA	J004	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
OPHIURA ROBUSTA	J006	1	4	2	—	—	—	—	2	—	—	—	—	1	—	—	—	2	2
OPHIUROIDEA SPP.	J019	—	—	—	6	1	2	4	—	—	—	—	1	—	—	—	—	—	—
CTENODISCUS CRISPATUS	J024	—	2	1	1	—	—	—	—	—	1	—	—	—	—	—	—	—	—
OPHIURA SARSI	J025	—	—	—	—	1	1	2	1	3	—	—	4	2	2	2	—	1	1
OPHIURA SP. 2	J026	—	—	—	—	—	1	—	—	1	—	—	—	—	—	—	37	22	27
MOLPADIA OOLITICA	J027	—	—	—	1	—	—	—	—	—	—	—	—	—	—	1	—	—	—

MWRA FarField * AUG92 * 0.5 mm * ALL Species

Taxa Name	CODE	FF1-1	FF1-2	FF1-3	FF4-1	FF4-2	FF4-3	FF5-1	FF5-2	FF5-3	FF6-1	FF6-2	FF6-3	FF7-1	FF7-2	FF7-3	FF8-1	FF8-2	FF8-3
AMPHARETE ARCTICA	L003	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
AMPHARETE ACUTIFRONS	L004	—	—	—	—	—	1	8	—	—	—	—	—	4	1	27	—	—	—
ANOBOTHRUS GRACILIS	L005	25	14	20	10	24	5	6	13	7	2	4	3	3	11	8	—	—	1
APISTOBRANCHUS TULLBERGI	L006	4	5	10	1	—	4	—	1	4	8	12	14	33	20	38	—	—	1
ARICIDEA CATHERINAE	L007	—	—	—	—	—	—	—	—	—	23	37	28	56	53	245	—	—	—
ASABELLIDES OCULATA	L009	1	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—
CLYMENELLA TORQUATA	L011	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
CIRRATULUS CIRRATUS	L014	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—
PECTINARIA GRANULATA	L015	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
ETEONE LONGA	L016	—	—	1	—	—	—	1	—	1	1	1	2	1	—	—	—	—	—
EUCHONE INCOLOR	L019	—	4	—	4	2	1	—	—	—	29	48	16	70	134	290	—	—	—
EXOGONE HEBES	L023	—	—	1	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—
EXOGONE LONGICIRRIS	L024	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	3
EXOGONE VERUGERA	L025	1	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
COSSURA LONGOCIRRATA	L026	52	71	41	10	14	26	10	6	5	92	101	84	142	103	295	44	33	18
GONIADA MACULATA	L032	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
HETEROMASTUS FILIFORMIS	L038	15	12	14	12	16	10	3	4	2	—	—	—	—	—	—	1	5	1
SCOLETOMA IMPATIENS	L041	1	—	2	—	—	—	—	—	—	—	—	—	—	—	—	1	1	—
SCOLETOMA FRAGILIS	L042	—	2	—	1	—	1	—	—	—	—	2	2	3	2	5	—	—	1
LAONICE CIRRATA	L045	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
MICROPHTHALMUS SCZELKOWII	L049	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
NEREIS GRAYI	L054	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—
NEPHTYS CAECA	L055	—	—	—	—	—	—	—	—	—	—	—	14	—	2	—	—	—	—
NEPHTYS INCISA	L056	—	—	1	—	—	2	1	—	3	6	5	—	4	—	7	—	4	4
NEPHTYS CILIATA	L058	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
NEPHTYS DISCORS	L059	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
NINOE NIGRIPES	L061	3	1	4	3	2	16	16	3	13	19	23	22	13	14	32	—	—	—
NICOLEA ZOSTERICOLA	L062	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
OWENIA FUSIFORMIS	L065	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
PHERUSA AFFINIS	L066	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—
POLYCIRRUS EXIMIUS	L067	—	—	—	—	—	—	—	—	1	1	—	—	1	—	—	—	—	—
PHOLOE MINUTA	L069	2	1	3	2	—	—	1	1	2	2	2	2	1	5	5	—	—	1
PHYLLODOCE ARENAE	L070	1	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—
PHYLLODOCE MUCOSA	L074	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
POLYDORA CORNUTA	L079	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
POLYDORA SOCIALIS	L080	9	4	3	18	—	13	10	20	29	260	285	532	60	24	55	—	—	—
POLYDORA QUADRILOBATA	L081	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
POTAMILLA NEGLECTA	L084	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
PRIONOSPIO STEENSTRUPI	L085	18	22	11	44	14	25	30	14	18	14	13	18	21	15	66	1	2	1
PARADONEIS LYRA	L090	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4	—	—
PAROUGIA CAECA	L096	2	2	—	5	—	10	5	4	2	6	9	4	1	3	11	1	1	1
SCOLOPLOS ARMIGER	L097	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
SYLLIDES JAPONICA	L101	—	1	2	—	—	2	—	3	1	2	4	8	—	—	1	—	—	—
SPIO THULINI	L105	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
SPIO FILICORNIS	L106	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
SPIO LIMICOLA	L107	44	47	28	434	267	612	733	613	674	381	316	548	420	184	527	—	—	—
SPIOPHANES BOMBYX	L109	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
STREBLOSPIO BENEDICTI	L113	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
TEREBELLIDES STROEMI	L114	1	—	1	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—
APHELOCHAETA MARIONI	L115	10	8	12	1	—	—	3	3	10	16	22	21	—	1	—	5	15	—
THARYX ACUTUS	L116	—	—	—	3	—	—	2	1	1	18	26	25	22	25	61	3	5	6
MONTICELLINA BAPTISTEAE	L117	2	2	6	—	—	—	—	—	2	4	3	4	—	—	—	43	44	28
TROCHOCHAETA MULTISETOSA	L118	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
SPHAERODOROPSIS MINUTA	L124	—	—	—	—	—	—	—	—	—	—	2	1	—	1	—	—	—	—
PHERUSA PLUMOSA	L130	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
SCALIBREGMA INFLATUM	L131	15	11	8	16	17	181	2	6	4	9	4	16	15	1	7	—	—	1
EUCLYMENE COLLARIS	L134	—	—	—	—	—	—	—	—	2	—	—	—	—	—	—	—	—	—

MWRA FarField * AUG92 * 0.5 mm * ALL Species

Taxa Name	CODE	FF1-1	FF1-2	FF1-3	FF4-1	FF4-2	FF4-3	FF5-1	FF5-2	FF5-3	FF6-1	FF6-2	FF6-3	FF7-1	FF7-2	FF7-3	FF8-1	FF8-2	FF8-3
PRAXILLELLA GRACILIS	L137	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—
MELINNA CRISTATA	L139	—	1	—	1	—	1	—	—	—	—	—	—	—	—	—	—	—	—
CHONE INFUNDIBULIFORMIS	L143	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
CAPITELLA CAPITATA SPECIES COMPLEX	L152	1	1	—	—	—	—	—	—	1	—	2	—	1	1	1	—	—	—
PRAXILLURA ORNATA	L155	—	—	6	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
SPHAERODORIDIUM CLAPEREDII	L162	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
ENIPO TORELLI	L165	4	3	6	—	—	3	—	1	2	3	1	3	1	1	1	—	—	—
LEVINSENIA GRACILIS	L166	2	3	3	27	23	37	53	15	39	21	36	29	9	7	22	3	3	1
ARICIDEA QUADRILOBATA	L167	11	14	6	7	10	8	31	27	16	15	20	20	5	7	44	—	—	1
MALDANE GLEBIFEX	L169	18	24	32	10	—	18	9	1	—	—	—	—	—	—	—	—	—	—
SABELLIDAE SPP.	L170	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
NEPHTYS SPP.	L172	—	1	—	—	1	—	—	—	—	2	—	—	—	—	—	—	—	—
GALATHOWENIA OCULATA	L175	2	1	2	—	—	3	3	—	—	2	—	4	1	—	3	—	—	—
NEPHTYS NEOTENA	L176	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
LUMBRINERIDAE SPP.	L178	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
SABELLIDAE SPP.	L180	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
AMPHARETIDAE SPP.	L182	6	—	1	—	—	—	3	—	—	—	—	—	—	—	—	—	—	—
OPHELINA ACUMINATA	L183	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—
CHAETOZONE SP. B	L184	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—
LEITOSCOLOPLOS ACUTUS	L189	2	5	1	7	5	16	10	8	4	3	2	5	—	—	1	—	—	—
MEDIOMASTUS CALIFORNIENSIS	L191	11	6	8	23	24	53	23	15	19	279	258	288	257	245	633	1	—	—
CIRRATULIDAE SPP.	L194	—	—	—	—	—	—	—	—	1	4	—	—	—	—	1	—	—	3
CIRRATULIDAE SPP.	L196	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
LUMBRINERIDAE SPP.	L198	—	—	—	—	—	—	—	—	—	2	—	2	—	—	1	—	—	—
SPIONIDAE SPP.	L199	—	—	—	—	—	—	2	2	—	—	—	—	—	—	—	—	—	—
CHAETOZONE SP. A	L206	34	28	23	9	6	40	22	5	15	—	—	—	—	—	2	3	—	2
NEREIDIDAE SPP.	L207	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—
THARYX SP. A	L208	—	—	—	—	—	—	—	—	—	6	—	3	—	—	—	—	—	—
SCOLETOMA HEBES	L210	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	1	—
SPHAERODORIDAE SPP.	L213	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—
PARAONIDAE SPP.	L215	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
MONTICELLINA DORSOBRANCHIALIS	L216	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
HARMOTHOINAE SPP.	L220	—	—	—	1	—	3	—	—	—	—	—	—	—	—	—	—	—	—
LAONOME KROEYERI	L221	—	—	—	—	—	1	—	—	—	—	—	1	—	—	—	—	—	—
TEREBELLIDAE SPP.	L223	—	—	—	—	—	—	—	—	—	1	—	1	1	—	1	—	—	—
APHELOCHAETA NR. MONILARIS	L227	—	1	1	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—
POLYCIRRUS SPP.	L234	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
NEREIS ZONATA	L237	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
LEITOSCOLOPLOS SPP.	L238	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
NEPHTYIDAE SPP.	L240	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	3	—	—
LUMBRINERIS SPP.	L241	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2	4	—
SYLLIS SPP.	L242	5	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
MALDANIDAE SPP.	L244	6	6	3	—	—	3	1	—	2	—	3	1	—	—	1	5	13	10
ORBINIIDAE SPP.	L248	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
PIONOSYLLIS SP. A	L249	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
SPHAEROSYLLIS LONGICAUDA	L250	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—
APISTOBRANCHUS SPP.	L251	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
SYLLIDAE SPP.	L252	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—
TYPOSYLLIS ALTERNATA	L253	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
AMPHARETIDAE SPP.	L254	—	—	—	—	—	—	—	—	—	—	—	—	—	2	—	—	—	—
POLYNOIDAE SPP.	L255	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1
TROCHOCHAETA SPP.	L263	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
TEREBELLIDES SPP.	L266	1	—	—	—	—	—	—	—	—	—	—	2	—	—	—	—	—	—
SPIONIDAE SPP.	L268	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
FLABELLIGERIDAE SPP.	L270	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
LUMBRINERIS SPP.	L271	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
PHYLLODOCIDAE SPP.	L278	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—

MWRA FarField * AUG92 * 0.5 mm * ALL Species

Taxa Name	CODE	FF1-1	FF1-2	FF1-3	FF4-1	FF4-2	FF4-3	FF5-1	FF5-2	FF5-3	FF6-1	FF6-2	FF6-3	FF7-1	FF7-2	FF7-3	FF8-1	FF8-2	FF8-3
TROCHOCHAETIDAE SPP.	L279	—	—	—	—	—	—	—	—	2	—	—	—	—	—	—	—	—	—
GATTYANA AMONDSENI	L280	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
DIPLOCIRRUS HIRSUTUS	L281	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
GATTYANA CIRROSA	L283	—	1	—	2	1	—	—	—	1	—	—	—	—	—	—	—	—	—
POLYNOIDAE SPP.	L324	—	—	—	—	—	—	—	1	1	—	—	—	—	—	—	—	—	—
CAPITELLIDAE SPP.	L326	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
CHONE DUNERI	L328	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
TROCHOCHAETA CARICA	L331	—	1	—	10	6	6	—	1	—	—	—	—	—	—	—	8	3	3
POLYCIRRUS MEDUSA	L332	—	—	—	—	—	—	—	—	—	—	—	1	—	1	—	—	—	—
SPIOPHANES KROEYERI	L333	1	—	1	—	—	1	—	—	1	—	—	—	—	—	—	1	1	1
PRAXILLELLA AFFINIS	L335	—	—	—	—	—	—	—	1	1	—	—	—	—	—	—	—	—	—
STERNASPIS SCUTATA	L338	1	—	3	2	2	2	1	1	1	—	2	5	—	—	—	—	—	—
TEREBELLIDES ATLANTIS	L339	1	—	—	—	—	1	—	—	—	44	21	17	13	5	8	—	—	—
MYSTIDES BOREALIS	L340	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—
PRAXILLELLA PRAETERMISSA	L341	—	—	—	—	—	—	—	—	—	2	1	—	—	—	—	—	—	—
SYLLIDES LONGOCIRRATA	L342	—	3	—	4	7	6	—	—	—	6	7	3	7	4	21	—	—	—
TROCHOCHAETA WATSONI	L343	3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
ANCISTOSYLLIS GROENLANDICA	L344	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	7	1
BARANTOLLA SP. A	L345	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2
OPHELINA ABRANCHIATA	L349	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	6	3
PARADONEIS ELIASONI	L350	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1
PARAMPHINOME JEFFREYSII	L351	—	—	—	—	—	6	—	—	—	—	—	—	—	—	—	—	1	1
SYNELMIS KLATTI	L352	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	6
ARICIDEA MINUTA	L353	—	—	—	—	—	—	—	—	—	2	3	3	—	—	—	—	—	—
RHODINE LOVENI	L354	—	—	—	—	—	—	—	—	—	—	—	8	—	—	—	—	—	—
OPHRYOTROCHA SP. 1	L356	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
BRADA VILLOSA	L359	—	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
WEBSTERINEREIS TRIDENTATA	L360	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—
ARCTEOBIA ANTICOSTIENSIS	L361	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—
LAONICE SP. 1	L362	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
DIPLOCIRRUS LONGISETOSUS	L363	—	1	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
DORVILLEA SOCIABILIS	L364	1	4	—	—	1	2	—	—	—	—	—	—	—	—	—	—	—	1
TRICHOBRANCHUS ROSEUS	L366	—	—	—	—	—	—	—	—	1	—	—	—	—	—	1	2	1	2
PROCLEA GRAFII	L367	—	—	—	—	—	—	—	—	—	—	—	—	2	—	1	—	—	—
EULALIA BILINEATA	L368	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
LEITOSCOLOPLOS N. SP. B	L369	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
ONUPHIS OPALINA	L370	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	1	—
MEIODORVILLEA MINUTA	L371	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—
ANTINOELLA SARSI	L373	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
PISTA CRISTATA	L374	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
RHODINE BITORQUATA	L375	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
GYPTIS CF. VITTATA	L376	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1
OPHRYOTROCHA BIFIDA	L377	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
ARABELLIDAE SPP.	L388	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—
TUBIFICOIDES APECTINATUS	L902	24	37	21	2	—	19	12	7	2	—	—	—	2	1	4	—	—	—
TUBIFICIDAE SPP.	L903	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—
TUBIFICIDAE SP. 2	L916	—	—	—	—	—	—	—	—	—	35	36	25	62	215	323	—	—	—
CEREBRATULUS LACTEUS	Y001	—	—	—	1	1	—	—	—	—	—	—	—	—	1	—	—	—	—
NEMERTEA SPP.	Y004	—	—	5	1	3	7	10	6	3	—	3	3	—	—	—	—	—	1
MICRURA SPP.	Y007	3	3	1	1	8	5	2	3	—	3	3	6	4	2	9	—	—	—
AMPHIPORUS ANGULATUS	Y013	7	—	—	—	—	—	—	—	—	—	—	—	2	—	2	—	—	—
TETRASTEMMA VITTATUM	Y015	—	—	—	1	—	7	—	—	—	—	—	—	—	1	—	—	—	—
NEMERTEA SP. 2	Y016	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
CARINOMELLA LACTEA	Y017	2	2	1	2	1	1	3	1	—	1	—	1	—	1	3	—	1	2
TUBULANUS PELLUCIDUS	Y019	2	2	1	1	—	4	—	—	2	—	—	—	—	1	—	—	1	1
HYDROZOA FRAGMENTS	Y098	—	—	—	—	—	—	—	1	—	—	2	—	—	2	2	—	—	—
EDWARDSIA ELEGANS	Y206	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

MWRA FarField * AUG92 * 0.5 mm * ALL Species

Taxa Name	CODE	FF1-1	FF1-2	FF1-3	FF4-1	FF4-2	FF4-3	FF5-1	FF5-2	FF5-3	FF6-1	FF6-2	FF6-3	FF7-1	FF7-2	FF7-3	FF8-1	FF8-2	FF8-3
ACTINIARIA SP. 2	Y216	—	—	—	—	—	—	—	—	—	23	15	21	—	1	—	—	—	—
PHASCOLION STROMBUS	Y452	1	—	—	—	—	1	4	—	—	—	—	—	—	—	—	—	—	—
SIPUNCULA SPP.	Y453	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	3	—
BOSTRICHOBRANCHUS PILULARIS	Y454	—	—	—	—	—	—	1	—	—	4	—	2	—	—	18	—	—	—
STEREOBALANUS CANADENSIS	Y553	—	—	—	—	—	—	—	—	—	—	1	—	1	2	—	—	—	—
PRIAPULUS CAUDATUS	Y750	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
PHORONIS ARCHITECTA	Y951	—	—	—	—	—	—	—	—	—	4	10	20	—	—	—	—	—	—

The Massachusetts Water Resources Authority
Charlestown Navy Yard
100 First Avenue
Charlestown, MA 02129
(617) 242-6000