# 1993 Annual Soft-Bottom Benthic Monitoring:

# Massachusetts Bay Outfall Studies

Massachusetts Water Resources Authority

Environmental Quality Department

Report 1995-02

# 1993 Annual Soft-Bottom Benthic Monitoring
# Massachusetts Bay Outfall Studies

**Submitted to**

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APRIL 1995

ENVIRONMENTAL QUALITY DEPARTMENT TECHNICAL REPORT SERIES 95-2

Citation:

Coats, D.A., E. Imamura, and J.F. Campbell. 1995. **1993 Annual Soft-Bottom Benthic Monitoring: Massachusetts Bay Outfall Studies.** MWRA Enviro. Quality Dept. Tech. Rpt. Series No. 95-2. Massachusetts Water Resources Authority, Boston, MA. 137 pp.

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# EXECUTIVE SUMMARY

The Massachusetts Water Resources Authority (MWRA) implemented a long-term environmental monitoring program in conjunction with the development of secondary sewage treatment facilities at Deer Island and the new outfall located offshore in Massachusetts Bay, approximately 15 km from Deer Island. The purpose of the monitoring program is to verify compliance with the National Pollutant Discharge Elimination System (NPDES) discharge permit and to assess possible environmental impacts from the effluent discharged from the new outfall located in Massachusetts Bay.

This is the third report pertaining to the benthic component of the Phase I Outfall Monitoring Program. Blake *et al.* (1993) and Shea (1994) previously described the soft-bottom benthic infaunal communities and sediment chemistry from the 1992 sampling program. This report combines the benthic infaunal biology and chemistry results from the 1993 field program.

The overall objective of the Phase I Outfall Monitoring Program is to obtain baseline data for soft-bottom benthic communities and sediment contaminant concentrations at suspected depositional areas. The program consists of nearfield and farfield components. The nearfield sampling locations provide spatial coverage at known depositional sites within 5 km of the outfall. Data obtained at the nearfield stations during the Phase I baseline studies will be used to examine any changes observed to benthic communities and sediment chemistry after the outfall becomes operational. The farfield component provides data on benthic conditions at several stations located in Massachusetts and Cape Cod Bays. The farfield stations are intended to serve primarily as reference stations but can also provide possible warnings should effects to benthic communities or changes in sediment chemistry be observed at locations farther than originally expected. Farfield stations were chosen to correspond to previous benthic studies and also to other ongoing sediment studies in the region.

It should be noted that a change occurred to the benthic program in 1993. The original design, as described in the Effluent Outfall Monitoring Plan Phase I: Baseline Studies (MWRA, 1991), incorporated 15 to 20 nearfield and 12 farfield stations. In 1992, the first year of the program, a single biology grab sample was collected at each of the 20 stations in the nearfield, and three biology samples were collected at each of the 12 farfield stations. The overall objective of this initial approach in the nearfield was to achieve increased spatial descriptions of benthic infaunal communities and to the extent possible, establish relationships between chemical and biological parameters in the pre- and post-discharge phases of the program. In 1993, a change to the design of the benthic program was implemented. This change was due to concern that, in previous studies, the nearfield benthic community was characterized by substantial spatial variability which could make assessment of temporal changes difficult. Also, without some estimate of the scale of spatial variation, it would be difficult to determine whether site-specific changes over time were due to discharge or from sampling in slightly different locations. Results from the 1993 program support this concern. Hence, in consultation with the Outfall Monitoring Task Force, the MWRA's monitoring program oversight committee, the nearfield sampling locations was decreased to nine stations but with increased triplicate grab samples for biology. In the farfield, the original design largely remained unchanged. However, the number of stations were reduced from 11 to nine but maintained the original triplicate grab samples for benthic infaunal analysis.

Significant results from the 1993 sampling program are described below.

Sediment Quality

- The coarsest sediments were located near the mouth of Boston Harbor and grain size fractions were consistent with those of previous studies (*e.g.*, Blake *et al.*, 1993). TOC content was well correlated to mud fractions and coarse sediments near Boston Harbor contained less than 1% TOC. *C. perfringens* spores were not strongly associated with fine grain size, and the highest counts at farfield stations were located near the mouth of Boston Harbor at Stations FF10, FF12, and FF13. Total PAH was somewhat elevated (>5 μg/g) at the northernmost stations FF1 and FF11 compared to concentration ranges determined by Windsor and Hites (1979). Another organic contaminant, PCB, did not exhibit a clear spatial pattern and mean concentrations were comparable to those reported by other investigators (*e.g.*, Boehm *et al.*, 1984). Silver concentration correlated with *C. perfringens* spore counts and was highest at stations near Boston Harbor.

- The anomalously high gravel content observed at Station NF14 was probably related to the high content of glass and tile fragments of anthropogenic origin. However, this station does not appear to be anomalous in other aspects of sediment quality or in macroinfaunal community structure.

Macroinfaunal Assemblages

- The farfield samples contained 39,717 organisms in 226 taxa. A total of 36,884 individuals, or 93%, was classified into 186 species. The density of organisms in the 0.5-mm sieve fraction exceeded that of the 0.3-mm fraction at all stations.

- Farfield stations consistently separate into four distinct groups by virtue of numerical classification and ordination. These four groups are geographically separate. Group A consists of five stations (FF1, FF4, FF5, FF11, and FF14) with the greatest water depths (>60 m) located furthest offshore over the Stellwagen Basin. Group D includes two stations (FF12 and FF13) with the shallowest water depths (≤22 m) adjacent to the entrance to Boston Harbor. Group C contains two mid-depth (27 to 49 m) stations (FF6 and FF7) positioned within Cape Cod Bay to the south. Group B consists of two mid-depth stations (FF10 and FF9) within Massachusetts Bay between Groups A and D.

- The first principal factor in the farfield ordination analysis is related to water depth. Species indicative of farfield Groups A and D correlate strongly with depth, *C. perfringens* spore counts, and silver concentration. Because *C. perfringens* spore counts and silver concentration correlate with total PAH and PCB concentrations, species affiliated with Groups A and D probably also correlate with organic contaminants. The second principal factor that differentiates farfield stations in Group B from C is related to grain size and TOC content.

- The geographic distribution of sediment properties and infaunal community parameters was largely consistent between 1992 and 1993. The greatest temporal disparity in community structure occurred at Station FF13. In 1992, this station was not clearly affiliated with other farfield stations, whereas in 1993 it clustered with Station FF12. The primary difference was the high density of *Polydora cornuta* at Station FF13 in 1992. *P. cornuta* was one of the most common species in Boston Harbor in 1993, yet Station FF13 was the only location within Massachusetts Bay where it was collected in either year. Thus, the affinity of Station FF13 with other farfield stations was determined by the abundance of *P. cornuta*. In 1992, Boston Harbor appeared to have a greater influence on the infaunal assemblage at Station FF13 as reflected by the increased *P. cornuta* abundance. In 1993, the declining influence of the Harbor at this station was reflected by the higher similarity in community structure between Stations FF12 and FF13.

- The midfield samples contained 35,741 organisms in 196 taxa. A total of 33,968 individuals, or 95%, was classified into 165 species. The density of organisms in the 0.5-mm sieve fraction exceeded that of the 0.3-mm fraction at all stations.

- The annelid phylum contained the majority (53%) of the organisms identified at all stations combined and 51% (88) of the species. However, annelids were not the most dominant major taxonomic group at Stations NF2 and NF17 where bivalves and crustaceans respectively dominated.

- Numerical classification revealed that the community structure at individual stations was not always distinct compared to inherent variability within replicates. Generally, the highest similarities among replicate samples were for replicates collected at the associated individual station. However, numerical classification was unable to distinguish between replicate samples from Stations NF9, NF10, and NF16. These stations are in close proximity (≤2.5 km) and their community structure exhibited the highest overall NNESS similarity.
- Stations at midfield distances from the diffuser separate into three distinct groups by virtue of numerical classification. The three groups are not geographically distinct because Group B (with low similarity) bifurcates Group C. Also, the three Stations NF2, NF4 and NF17 show marginal associations under NNESS agglomeration, but are independent of the major clusters using Bray-Curtis similarity measures. Ordination confirms the autonomy of Stations NF2, NF4, and NF17, and reanalysis without these stations resolves the geographic aberration by combining Station NF8 with Group A and Station NF12 with Group C.

- These two modified groups and three independent stations are geographically distinct. The modified Group A combines two farfield stations (FF12 and FF13), which constituted their own group in the farfield analysis, along with Station NF8. The modified Group C consists of the six Stations FF10, NF9, NF10, NF12, NF14, and NF16. The community structure associated with the remaining three stations at midfield distances from the diffuser was distinct and did not compare among one another or with either of the modified groups.

- There was no clear association between species indicative of midfield groups and abiotic variables. Although six of the ten indicator species for midfield groups were identical to those in the farfield, the limited depth range prevented significant correlations.

- Temporal changes in the midfield infaunal community structure were assessed by comparing 1992 and 1993 data. The lack of replication of nearfield infaunal data in 1992 measurably decreases the ability to resolve statistically significant changes over time. The numerical classification among nearfield stations was similar between years, with the lowest similarities between Stations NF2, NF4, and NF17. The only major difference in classification was for Station NF16. In 1992, this station was affiliated with Station NF8 whereas in 1993, this station was part of midfield Group C. Station NF8 was anomalous in both years in that it had the lowest diversity and evenness indices, and a rarefaction well below that of other nearfield stations. It also had the lowest sand and gravel content. The anomalous nature of the infaunal community at Station NF8 was consistent across years despite a three-fold increase in total abundance. However, that large increase was only marginally significant at the 90% confidence level.

# 1.0 INTRODUCTION

The Massachusetts Water Resources Authority (MWRA) implemented a long-term environmental monitoring program in conjunction with the development of secondary sewage treatment facilities at the Deer Island Sewage Treatment Plant. A new outfall, which is a part of these facilities, is located offshore Massachusetts Bay, at approximately 15 km from Deer Island at a water depth of 32 m. The purpose of the monitoring program is to verify compliance with the National Pollutant Discharge Elimination System (NPDES) discharge permit and to assess possible environmental impacts from effluent discharged into Massachusetts Bay.

In the Effluent Outfall Monitoring Plan Phase I: Baseline Studies (MWRA, 1991), MWRA developed an overall strategy for the monitoring program. The focus of this report is the outfall benthic component of the monitoring program. The results of the benthic studies conducted in Boston Harbor may be found in Kropp and Diaz (1995).

The overall objective of the Phase I Outfall Monitoring Program is to obtain baseline data for soft-bottom benthic communities and sediment contaminant concentrations at suspected depositional areas. By design, the outfall program consists of nearfield and farfield components. The nearfield sampling locations provide spatial coverage at known depositional sites within 5 km of the outfall. Data obtained at the nearfield stations during the Phase I baseline studies will be used to examine any changes observed to benthic communities and sediment chemistry after the outfall becomes operational. The farfield component provides data on benthic conditions at several stations located in Massachusetts and Cape Cod Bays. The farfield stations are intended to serve primarily as reference stations but can also provide possible warnings should effects to benthic communities or changes in sediment chemistry be observed at locations farther than originally expected. Farfield stations were chosen to correspond to previous benthic studies and also to other ongoing sediment studies in the region.

The benthic sampling component of the Outfall Monitoring Program began in 1992. Faunal results from the initial sampling program are presented in Blake *et al.* (1993) while sediment chemistry results are provided in Shea (1994). Data from studies conducted as part of initial outfall siting studies may be found in Battelle (1987), Blake *et al.* (1987, 1988), and Shea *et al.* (1991). Earlier studies in the region include Gilbert *et al.* (1976) and Young and Rhoads (1971). This report includes the results from the benthic component, faunal and chemistry, of the Outfall Monitoring Program which was conducted in 1993.

Lastly, it should be noted that a change occurred to the benthic program in 1993. The original design, as described in the Effluent Outfall Monitoring Plan Phase I: Baseline Studies (MWRA, 1991), incorporated 15 to 20 nearfield and 12 farfield stations. In 1992, the first year of the program, a single biology grab sample was collected at each of the 20 stations in the nearfield, and three biology samples were collected at each of the 12 farfield stations. The overall objective of this initial approach in the nearfield was to achieve increased spatial descriptions of benthic infaunal communities and to the extent possible, establish relationships between chemical and biological parameters in the pre- and post-discharge phases of the program. In 1993, a change to the design of the benthic program was implemented. This change was due to concern that, in previous studies, the nearfield benthic community was characterized by substantial spatial variability which could make assessment of temporal changes difficult. Also, without some estimate of the scale of spatial variation, it would be difficult to determine whether site-specific changes over time were due to discharge or from sampling in slightly different locations. Results from the 1993 program support this concern. Hence, in consultation with the Outfall Monitoring Task Force, the MWRA's monitoring program oversight committee, the nearfield sampling locations were decreased to nine stations but with increased triplicate grab samples for biology. In the farfield, the original design largely remained unchanged. However, the number of stations was reduced from 11 to nine but maintained the original triplicate grab samples for benthic infaunal analysis.

Organizationally, this report consists of four sections with Appendices. In Section 2, descriptions of chemical and infaunal sampling protocols and benthic infaunal analysis methods are provided. Results and conclusions are presented in Sections 3 and 4 respectively. Appendix A consists of raw infaunal abundance data and a species list, and raw sediment chemistry data is presented in Appendix B.

## 2.0 METHODS AND MATERIALS

### 2.1 STATION DESIGN

As described in the Introduction, the design of the outfall sampling for the Soft-Bottom Benthic Monitoring Program was changed in 1993 in response to concerns regarding nonreplication in the previous design. There were 20 nearfield stations in 1992 at which one grab sample each for benthic infauna and chemistry was analyzed. Under the new design for 1993 sampling, the number of stations was reduced to nine at which three replicate grab samples for benthic infauna and two for chemistry were collected and analyzed. The farfield design in 1992 consisted of 12 stations at which three replicate grab samples were collected and analyzed for benthic infauna, and two grab samples were collected and analyzed for chemistry. In 1993, the number of stations was reduced to 11 without any changes in replication. Station locations for the 1993 program are shown in Figure 2.1.1 and 2.1.2 for farfield and nearfield stations, respectively. Farfield stations are designated as "FF" and nearfield stations as "NF." Table 2.1.1 lists the location and depth of each of the sampling stations.

Data analyses were conducted on a modified grouping of stations, designated "midfield," to characterize the local benthic community and sediment chemistry within 8 km of the diffuser (Figure 2.1.2). Three farfield stations (FF10, FF12 and FF13) were included along with nearfield stations in the midfield analyses because they were in the general vicinity (<8 km) of the outfall and there was no *a priori* reason to exclude them. Moreover, their inclusion links nearfield and farfield benthic community structure and provides a smooth transition in its interpretation. Because of the inclusion of farfield stations, the midfield analyses examined a total of twelve stations. To avoid confusion with station designators, "midfield" will refer to analysis of these twelve stations and "nearfield" will refer to sampling at the subset of nine nearfield stations designated with the "NF" prefix in Figure 2.1.2.

### 2.2 SAMPLE COLLECTION

The type of samples, measurements, and shipboard processing methods are summarized in Table 2.2.1. At each of the nearfield and farfield stations, benthic grabs (Kynar-coated 0.04-$m^2$ Young grab) were collected for macrofauna and sediment chemistry. Three replicate grab samples were collected for benthic macrofauna. Macrofauna samples were sieved onboard through nested 0.5-mm and 0.3-mm mesh sieves and preserved in buffered 10% formalin. Two replicate grab samples were collected for sediment chemistry, grain size, TOC, and *Clostridium perfringens* spores. Onboard processing of samples and shipboard sampling methods are described in Kropp and Peven (1993). Analysis methods for sediment chemistry samples and *Clostridium perfringens* spore counts were also described in Kropp and Peven (1993). Protocols for collection and analysis of samples follow those specified by the National Oceanic and Atmospheric Administration for the National Status and Trends Mussel Watch Project (Battelle Ocean Sciences, 1992). TOC content of solid samples was determined using a LECO model 761-100 carbon analyzer. Sediment grain size analyses were performed according to methods presented in Folk (1974). *C. perfringens* analysis was performed on sediment samples using methods developed by Emerson and Cabelli (1982) as modified by Saad (D. Saad, MTH Environmental Associates, personal communication).

Navigational positioning was accomplished with a Northstar 8000/Magnavox 4200D differential GPS receiver with a Magnavox MX-5OR DGPS beacon receiver which has an absolute accuracy of 5 m. The Battelle Ocean Sampling System (BOSS) navigation computer was used to track and log the vessel's position throughout the survey, and to fix the sampling position and the time that the grab sampler contacted the seafloor. Coordinates were printed on hardcopy as well as recorded to disk. The navigational system was checked daily for accuracy as described in the CW/QAPP (Kropp and Peven, 1993).

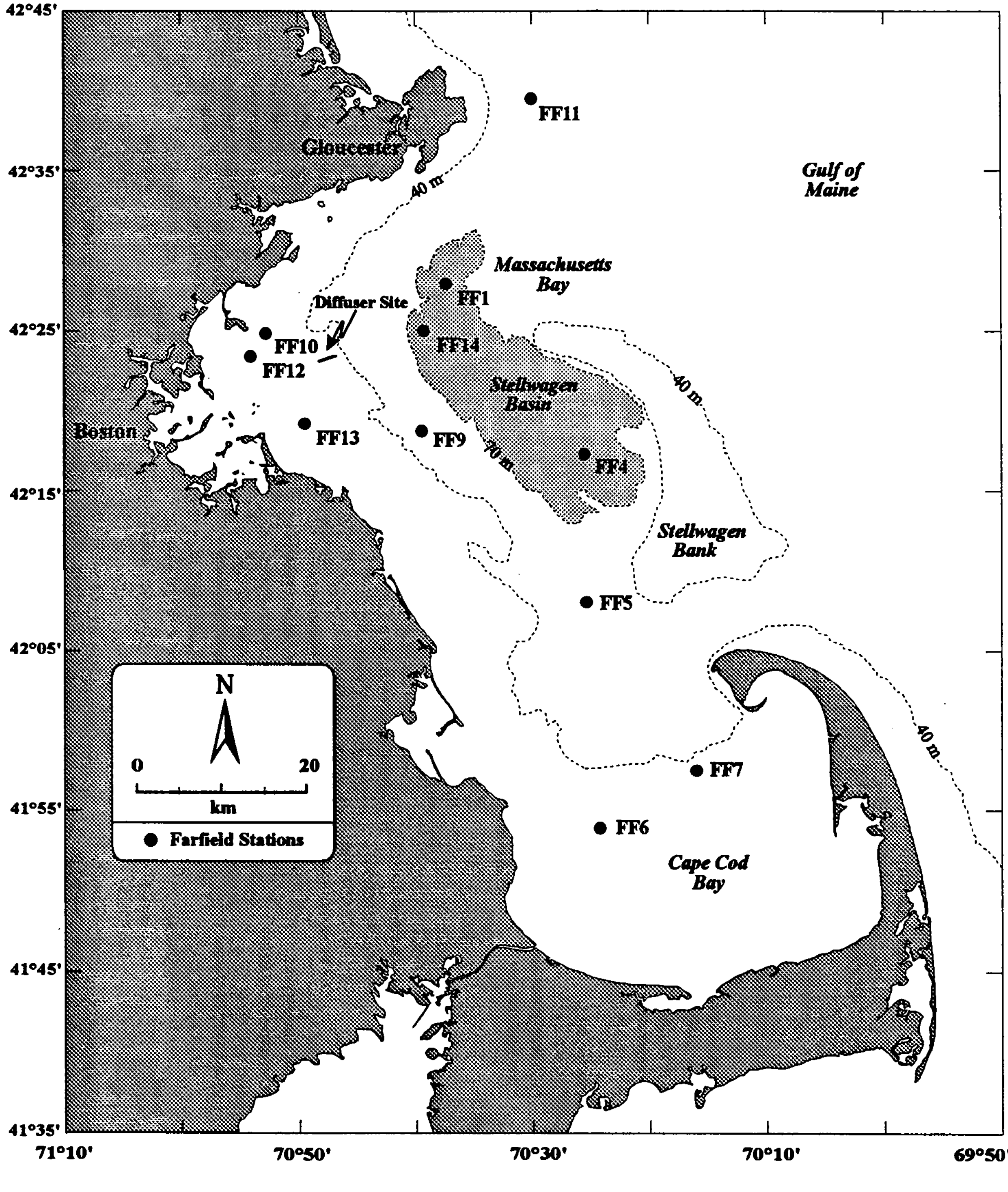



**Figure 2.1.1 Location of farfield stations.**

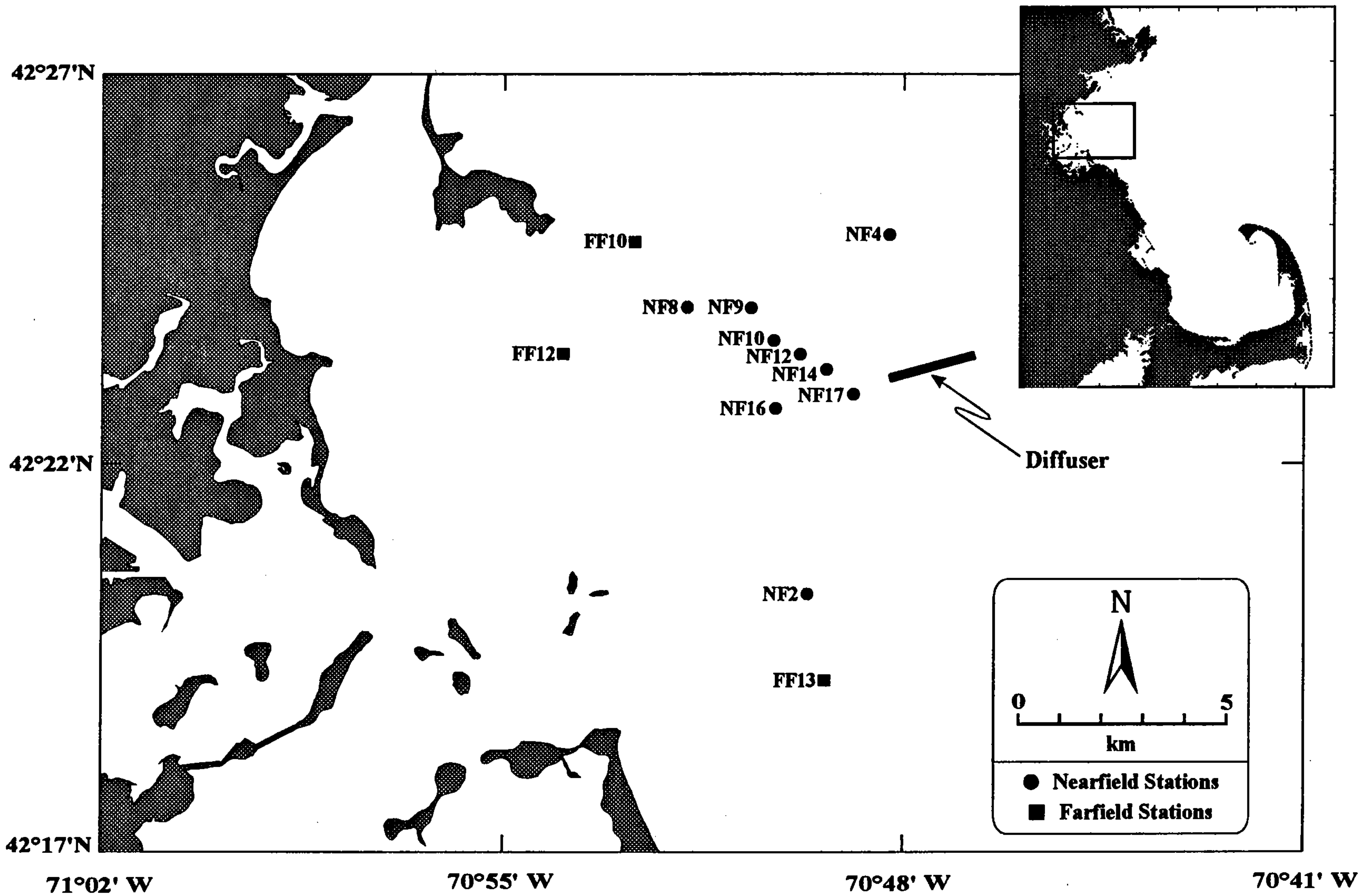



**Figure 2.1.2 Location of near and farfield stations at midfield distances (<8 km) from the diffuser. The inset shows the midfield study area located within Massachusetts and Cape Cod Bays.**

**Table 2.1.1 Reference coordinates of nearfield and farfield benthic stations.**

| Station | Latitude | Longitude | Depth (m) |
|---|---|---|---|
| | **Nearfield Stations** | | |
| NF2 | 42°20.31'N | 70°49.69'W | 30 |
| NF4 | 42°24.93'N | 70°48.27'W | 38 |
| NF8 | 42°24.00'N | 70°51.81'W | 30 |
| NF9 | 42°23.99'N | 70°50.69'W | 31 |
| NF10 | 42°23.57'N | 70°50.29'W | 32 |
| NF12 | 42°23.40'N | 70°49.83'W | 34 |
| NF14 | 42°23.20'N | 70°49.36'W | 34 |
| NF16 | 42°22.70'N | 70°50.26'W | 34 |
| NF17 | 42°22.88'N | 70°48.89'W | 32 |
| | **Farfield Stations** | | |
| FF1 | 42°27.94'N | 70°37.31'W | 84 |
| FF4 | 42°17.30'N | 70°25.50'W | 90 |
| FF5 | 42°08.00'N | 70°25.35'W | 65 |
| FF6 | 41°53.90'N | 70°24.20'W | 37 |
| FF7 | 41°57.50'N | 70°16.00'W | 40 |
| FF9 | 42°18.75'N | 70°39.40'W | 49 |
| FF10 | 42°24.84'N | 70°52.72'W | 29 |
| FF11 | 42°39.50'N | 70°30.00'W | 90 |
| FF12 | 42°23.40'N | 70°53.98'W | 26 |
| FF13 | 42°19.19'N | 70°49.38'W | 22 |
| FF14 | 42°25.00'N | 70°39.29'W | 77 |

**Table 2.2.1 Field samples and measurements.**

| Parameter | Stations[1] | #/Volume | Container | Shipboard Processing/ Preservation |
|---|---|---|---|---|
| Macrofauna | NF<br>FF | 3 grabs per station | Clean, labeled jar | Washed over nested 0.5- & 0.3-mm mesh sieves. Fixed in buffered 10% formalin. |
| Chemistry | NF<br>FF | 2 grabs/ 200 mL | Clean, labeled jar | Used Kynar-coated scoop to remove subsample from top 0-2 cm of sediment surface. Frozen. |
| Grain Size | NF<br>FF | 2 grabs/ 75 mL | Sterile WhirlPak™ bag | As for chemistry |
| *Clostridium perfringens* | NF<br>FF | 2 grabs/ 100 mL | Sterile sample cup | As for chemistry |
| Weather | NF, FF | — | — | Recorded general conditions |
| Sea State | NF, FF | — | — | Recorded general conditions |
| Bottom Depth | NF, FF | — | — | Recorded to nearest 0.1 m |
| Grab Penetration | NF, FF | — | — | Recorded to nearest 0.5 cm |
| Grab Sediment Volume | NF, FF | — | — | Recorded to nearest 0.5 L |
| Sediment Texture | NF, FF | — | — | Described qualitatively |
| Redox Potential Discontinuity Depth | NF, FF | — | — | Recorded to nearest 0.5 cm |

[1]Stations NF are Nearfield Stations: NF2, NF4, NF8, NF9, NF10, NF12, NF14, NF16, NF17;
Stations FF are Farfield Stations: FF1, FF4-FF7, FF9-FF14.

## 2.3 MACROINFAUNAL ANALYSES

Three replicate grab samples from each station were sorted for infaunal organisms. Samples were transferred from formalin to 70% ethanol in the laboratory. Sorting was accomplished under dissecting microscopes and organisms were picked by fine dissecting forceps. Organisms were sorted into the major taxonomic categories (polychaetes, arthropods, mollusks, and miscellaneous) prior to shipment to taxonomists for identification and enumeration. Identifications were made to the lowest practical taxonomic level, usually species. Quality control methods are described in Kropp and Peven (1993).

Macroinfaunal abundance data were coded and entered into the Battelle database and are summarized in Appendix A. Abundance was computed from the total number of organisms contained in replicate samples collected over a 0.04-$m^2$ area of the seafloor. Raw abundance data are presented by taxon, replicate, and size fraction in Appendices A-1 through A-4. Replicate 2 at farfield Station FF7 was not included in the macroinfaunal analyses because of anomalously low abundance for the 0.5-mm fraction. A total of 158 organisms was found in the 0.5-mm fraction of the second replicate sample at Station FF7. This is a factor of ten lower than the abundance observed in the other two replicate samples, while the abundance for the 0.3-mm fraction was comparable to that of the replicates.

To quantify the structure and variability in the macroinfauna of the Massachusetts and Cape Cod Bays, a variety of computational methods was applied to the taxonomic enumeration. These can be categorized as: (1) inspection of species lists ranked by abundance to determine taxonomic composition and species dominance; (2) calculation of species diversity and related community characteristics; and (3) numerical classification and ordination to identify groups of samples having similar species composition and to determine underlying biological and environmental factors responsible for determining community structure.

The methodologies for the computational methods are described below. All community parameters, other than abundance, were computed only for those organisms identified to species level. A list of all taxa identified to species level is presented in Appendix A-5. The first category of analyses defines the phylogenetic structure of these infaunal communities. The second group of computational methods is described in Section 2.3.1 and covers diversity indices that succinctly characterize species abundance relationships. Section 2.3.2 details the third computational category, which addresses similarity indices and clustering. Finally, Section 2.3.3 presents the methodology for community ordination used to distill complex community relationships into a few principal factors.

### 2.3.1 Species Diversity

Diversity indices quantify the *species richness* (number of species at a station), the *species evenness* (distribution of abundance among species) or a *combination* of these community properties.

*Species Richness*

In its simplest form, the total number of individual species present at a station characterizes the diversity of the infaunal community. However, to allow comparison of species richness from samples of varying size, indices are normalized by the total number of individuals $N$ present in the sample. The Margalef species richness index ($d'$) (Margalef, 1951) is commonly used. It strongly increases for increasing number of species and increases only logarithmically for decreasing number of individuals. If only one species is present, then $d'$ is 0.00. For other distributions, the Margalef richness index is given by

$$d' = \frac{S-1}{\ln N}$$

where: $S$ = total number of species
$N$ = total number of individuals
ln = natural logarithm (base e).

The usefulness of this index is limited by an *a priori* assumption of a uniform logarithmic relationship between $S$ and $N$. This assumption is not likely to hold in general and some bias may be introduced in $d'$. A less-biased method for investigating species richness is Hurlbert's (1971) modification of Sander's (1968) rarefaction method. This method predicts the expected number of species $E(S_n)$ present in increasingly rarefied samples of $n$ individuals selected at random from a finite collection of organisms. In this case, the finite collection consists of pooled replicate samples from a particular station. The family of curves generated by plotting $E(S_n)$ as a function of $n$ for several stations provides a measure of richness by comparing $E(S_n)$ at the same $n$, namely the smallest sample size. In this way, rarefaction curves provide a more rigorous method to account for differences in the total number of organisms among a group of samples, each having a unique functional relationship between $S$ and $N$.

*Species Evenness*

The Pielou evenness index ($J'$) (Pielou, 1977) measures the evenness of the distribution of individual organisms among the species present in the sample. $J'$ increases for more even distributions of individuals among species. It expresses the diversity (measured by $H'$ described below) relative to the maximum value it can attain when species are perfectly even, namely ln $S$. Thus, if each species contains the same number of individual organisms, then $J'$ will be a maximum at 1.00. For other distributions, the Pielou evenness index is given by

$$J' = \frac{H'}{\ln S}$$

where: $S$ = total number of species
$H'$ = Shannon-Wiener diversity index.

Peet (1974) has shown that $J'$ is influenced by species richness and that its high sensitivity to sample variation makes it difficult to interpret.

A community parameter inversely related to diversity and evenness indices is the Whittaker dominance index ($C'$) (Whittaker, 1965). $C'$ increases with increasing proportions of individuals associated with a few species. If all individuals are of one species, then $C'$ is maximum and equal to 1.00. If individual organisms are evenly distributed among species ($J'$=1.00), then $C'$ asymptotically approaches 0.00 with increasing numbers of individuals. The Whittaker dominance measure is given by

$$C' = \sum_{j=1}^{S} \left( \frac{n_j}{N} \right)^2$$

where: $S$ = total number of species
$n_j$ = number of individuals in the j[th] species
$N$ = total number of individuals.

*Combined Properties*

A measure of species diversity that combines the concepts of species richness and evenness is the Shannon-Wiener diversity index ($H'$) (Shannon and Weaver, 1949; Green, 1979). It quantifies the relative distribution of individual organisms among the species present in the sample. $H'$ increases for broader distributions of individuals among species (evenness) and for a larger number of evenly distributed species (richness). If only one species is present, then all individuals are members of that species and $H'$ is 0.00. If each individual organism is a separate species, then $H'$ will be a maximum determined by the logarithm of the number of individuals. For other distributions, the Shannon-Wiener diversity index is given by

$$H' = -\sum_{j=1}^{S} \left[ \left( \frac{n_j}{N} \right) \ln \left( \frac{n_j}{N} \right) \right]$$

where: $S$ = total number of species
$n_j$ = number of individuals in the j[th] species
$N$ = total number of individuals
ln = natural logarithm (base e).

Alone, this index is difficult to interpret ecologically because the same value can arise from a community with low richness and high evenness or from a community with high richness and low evenness. Nevertheless, it is a measure that is often cited, is used in the evenness index described above, and has been included in past MWRA reports.

### 2.3.2 Infaunal Similarity

The similarity between pairs of samples is determined from numerical classification based on the unweighted pair-group method (Sneath and Sokal, 1973). Results are expressed in the form of dendrograms where sample pairs are ordered into groups of increasingly greater similarity as measured by resemblance between the abundance for individual species (Boesch, 1977).

The Bray-Curtis and NNESS represent two possible measures of infaunal similarity between samples. The Bray-Curtis similarity coefficient ($B$) (Clifford and Stephenson, 1975; Swartz, 1978) is used to classify abundance data into groups of similar stations or replicate samples. The similarity coefficient ranges between 0 and 1. For pairs of samples that have identical numbers of individuals for each species, the coefficient is 1.00. The similarity coefficient is 0.00 when all species present in one sample are completely absent in the other sample and vice-versa. The Bray-Curtis coefficient is computed as follows

$$B_{jk} = \frac{2 \sum_{i=1}^{S} \min (N_{ij}, N_{ik})}{\sum_{i=1}^{S} (N_{ij} + N_{ik})}$$

where: $B_{jk}$ = similarity coefficient between sample $j$ and sample $k$
$S$ = total number of species
$N_{ij}$ = number of individuals for species $i$ in sample $j$.

When computing similarity coefficients, the abundance ($N$) is logarithmically transformed and the summation is only performed over the dominant species that account for more than 0.5% of the total abundance.

The NESS or Normalized Expected Species Shared (Grassle and Smith, 1976) is a family of similarity measures. They are based on the expected number of species shared between random subsamples of size *m* drawn from each of two sample populations that are under comparison. As with the Bray-Curtis measure, NESS similarities range between 0 and 1. A high similarity coefficient results when most species are shared between sample pairs and their abundances are similar. The advantage of the NESS measure is that the influence of dominant species compared with rare species can be controlled by the sample size *m*. For large *m*, the similarity measure is sensitive to the less-common species. Early formulations of NESS were not able to properly analyze data sets containing species represented by single individuals. To allow for the possibility of singleton species in this data set, a new formulation, designated newNESS or NNESS by Trueblood *et al.* (1994), was used in this investigation. This new formulation is designated NNESS in this report.

### 2.3.3 Community Ordination

The fundamental purpose of ordination is to condense abundance data to a few factors that may be responsible for observed patterns. The ordination technique used here is known as correspondence analysis and is related to principal component analysis (Ludwig and Reynolds, 1988). It is used to simultaneously examine the interrelationship between replicate samples and species abundance, and to reduce that relationship to a few important factors. This technique is equivalent to the reciprocal averaging method used in MWRA reports from prior years.

# 3.0 RESULTS

## 3.1 FIELD OPERATIONS

The survey for the outfall nearfield and farfield monitoring was conducted from August 15 to August 19, 1993. The sampling vessel used for the survey was the M/V *Sea Breeze*. All required samples were successfully collected.

## 3.2 SEDIMENT QUALITY

This section describes the physical and chemical properties of sediment samples as they relate to the quality of the benthic habitat for macroinfaunal communities. As described in Section 2.2, duplicate sediment samples were collected contemporaneously with infaunal samples at all nearfield and farfield stations. Trends in sediment quality data are described separately for nearfield and farfield stations. However, because of the limited distribution of stations and large-amplitude variability over small scales, no contour maps were generated. For the same reasons, spatial trends in the farfield data are uncertain but are provided because they appear to be qualitatively consistent with historical data and there are plausible physical mechanisms for the distribution. Specifically, these mechanisms are low kinetic energy associated with depositional areas and isolated contaminant sources such as Boston Harbor. Further discussion of uncertainties in mapping sediment quality parameters is provided in Section 3.2.2.

### 3.2.1 Farfield Sediments

The surficial sediment texture at farfield stations is shown in Figures 3.2.1 through 3.2.4. The coarsest sediments were collected at the four shallow stations near the mouth of Boston Harbor (Stations FF9, FF10, FF12, and FF13). This distribution is consistent with those of previous studies (*e.g.*, Blake *et al.*, 1993). The presence of coarse sediments near the Boston Harbor mouth has been ascribed to the higher benthic kinetic energy associated with these shallow unprotected sites. In comparison, there is a depositional environment within the deep Stellwagen Basin and in the more-protected Cape Cod Bay. With the exception of Station FF12, little or no gravel was collected at most stations (Figure 3.2.1). Station FF12 lies closest to the mouth of Boston Harbor and had a gravel fraction four times greater than any other farfield station. Sand content (Figure 3.2.2) decreased with increasing distance offshore, and the lowest fractions were observed within Stellwagen Basin (Stations FF1, FF4 and FF14) and offshore Cape Ann (Station FF11). Silt (Figure 3.2.3) and clay (Figure 3.2.4) exhibited the reverse pattern with these mud facies also prevalent within Cape Cod Bay (Stations FF6 and FF7).

The distribution of mean total organic carbon (TOC) at farfield stations is shown in Figure 3.2.5. The TOC pattern is similar to that observed for fine-grained sediments. Higher TOC levels are expected in low kinetic energy environments where organic matter is not washed from sediments. This relationship is reflected in the strong linear association between TOC and mud fraction (silt and clay). Spearman's rank correlation coefficient (***R***) between mud and TOC in replicate samples was above 0.8 and was statistically significant at confidence levels above 99.9% as shown in Table 3.2.1. Sediments contained less than 1% TOC at the four stations near the mouth of Boston Harbor where the sand fraction exceeds 0.6. Spearman's rank correlations between untransformed variables were used in Table 3.2.1 because many of the variables departed from a normal frequency distribution.

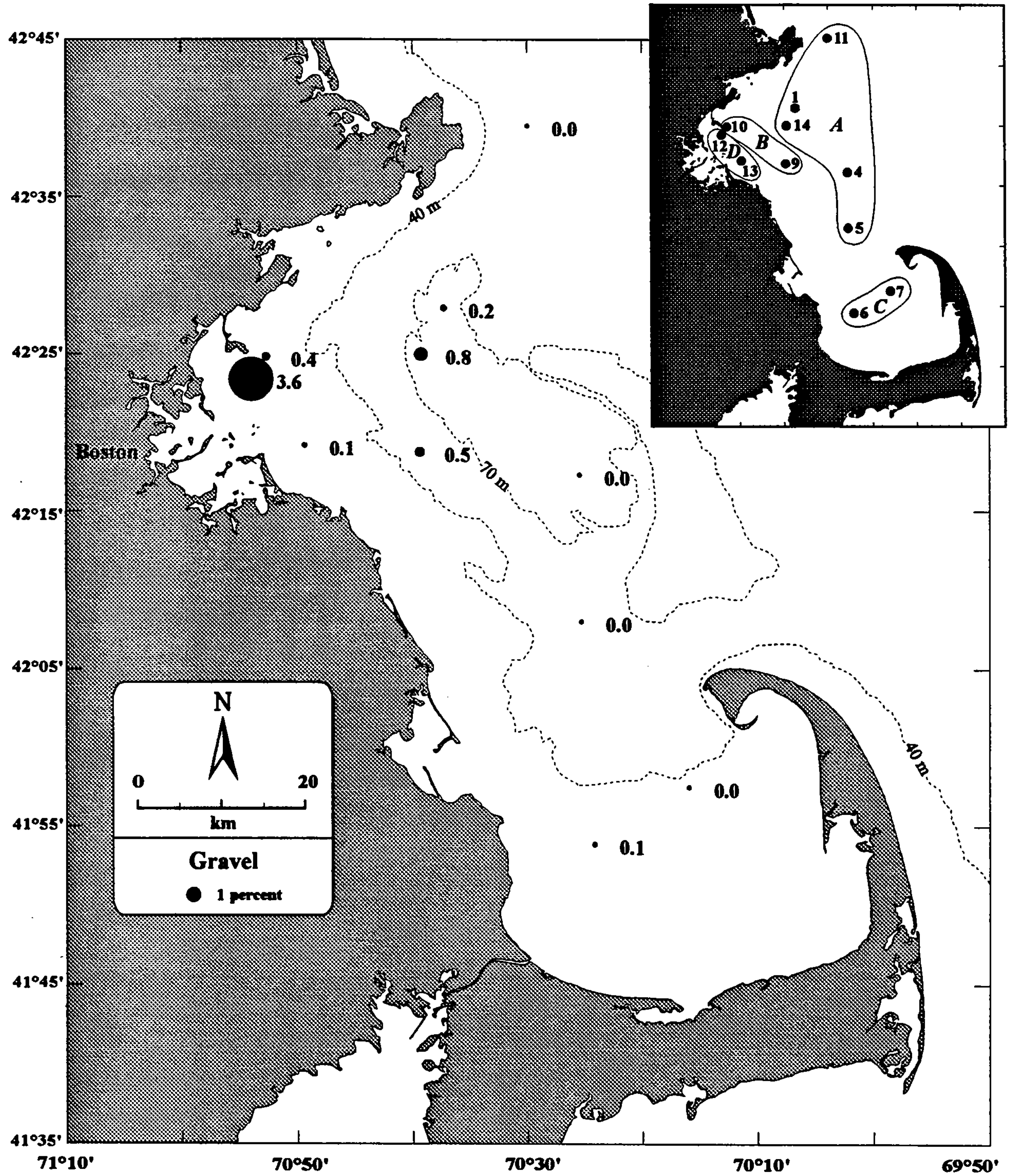



Figure 3.2.1 Geographic distribution of percent gravel at farfield stations. The diameter of the circles scales as a linear function of percent gravel. The inset shows the four farfield station groups determined from benthic infaunal community structure described in Section 3.3.2.

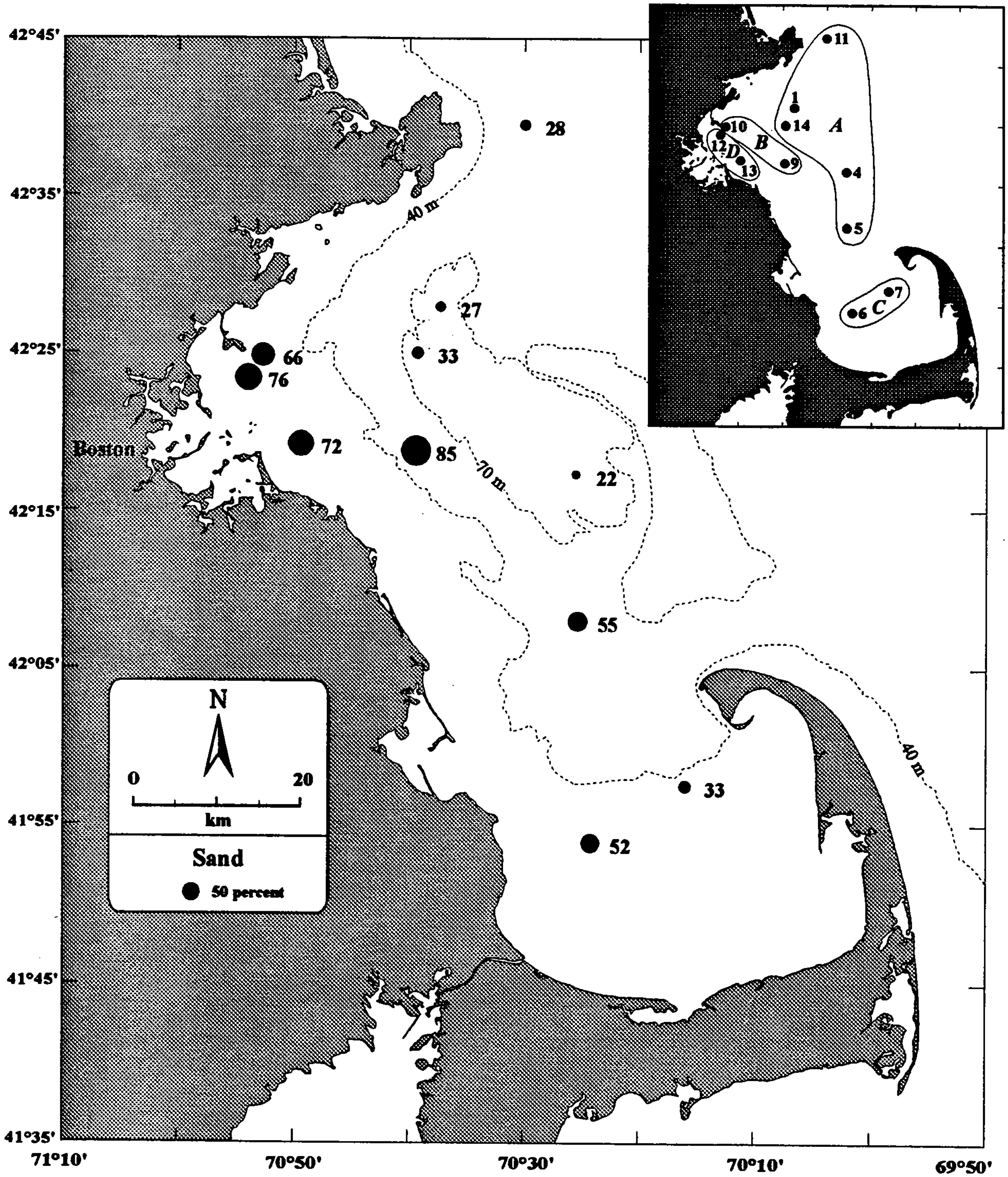



**Figure 3.2.2 Geographic distribution of percent sand at farfield stations. The inset is described in Figure 3.2.1.**

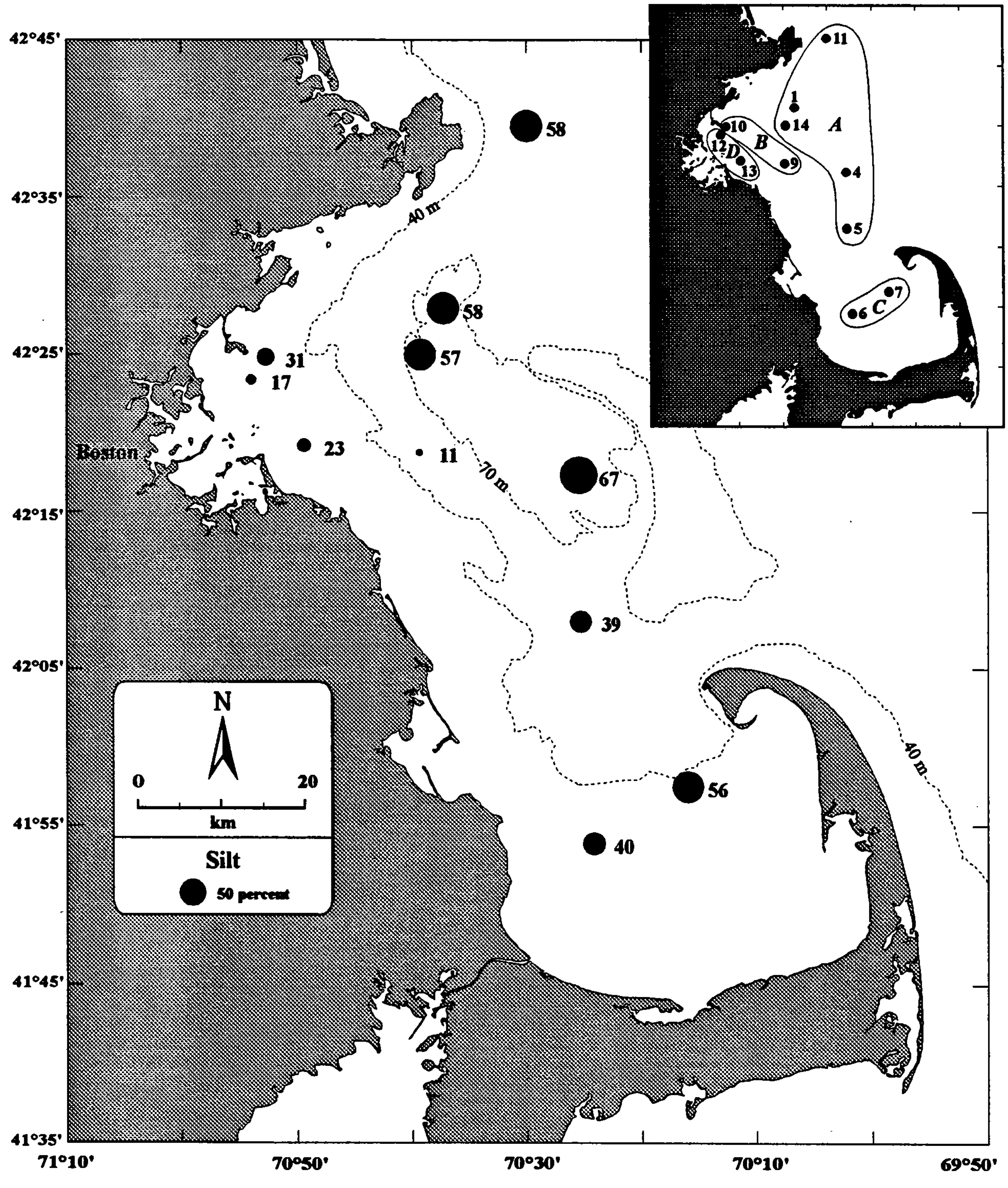



**Figure 3.2.3 Geographic distribution of percent silt at farfield stations. The inset is described in Figure 3.2.1.**

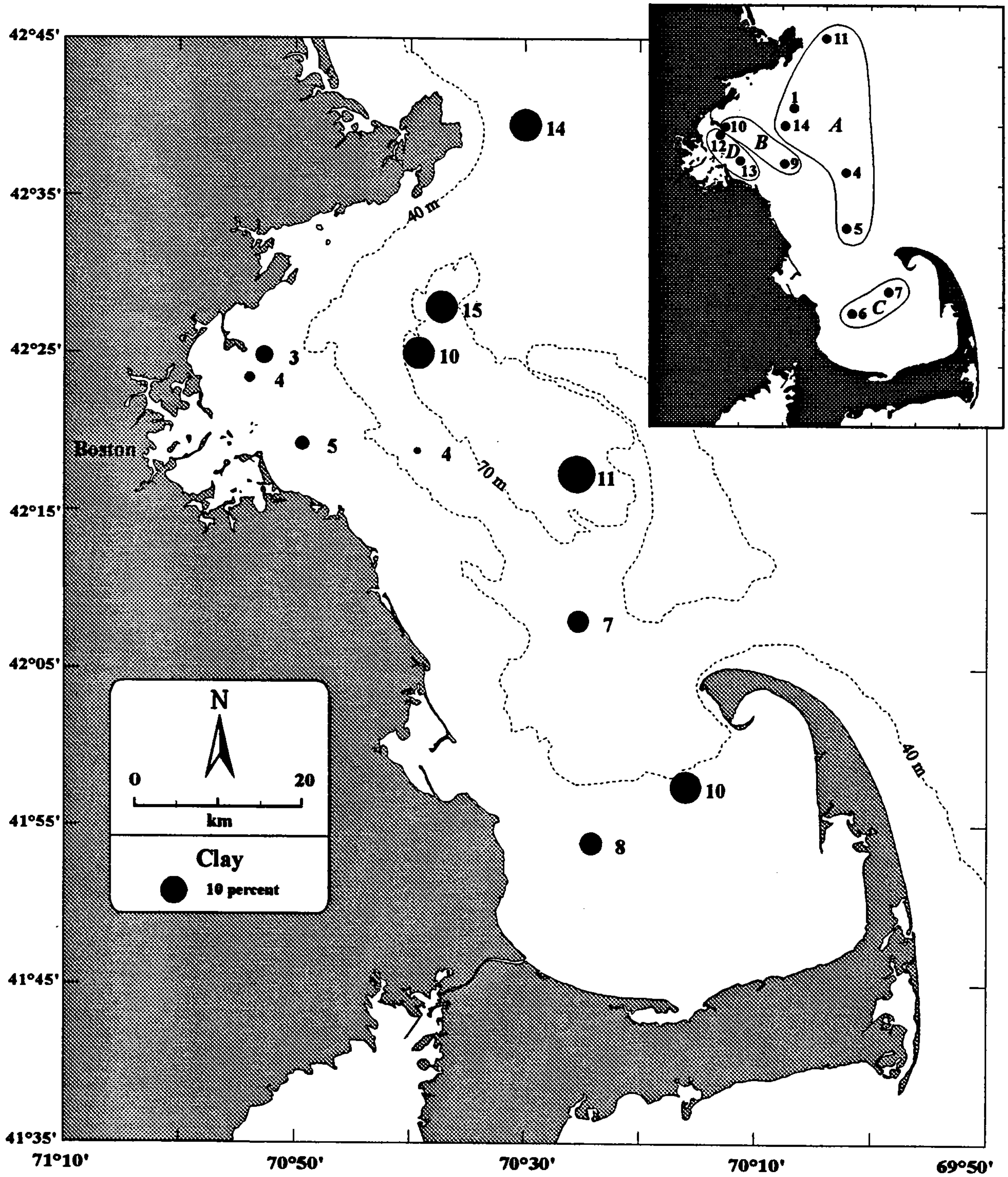



**Figure 3.2.4 Geographic distribution of percent clay at farfield stations. The inset is described in Figure 3.2.1.**

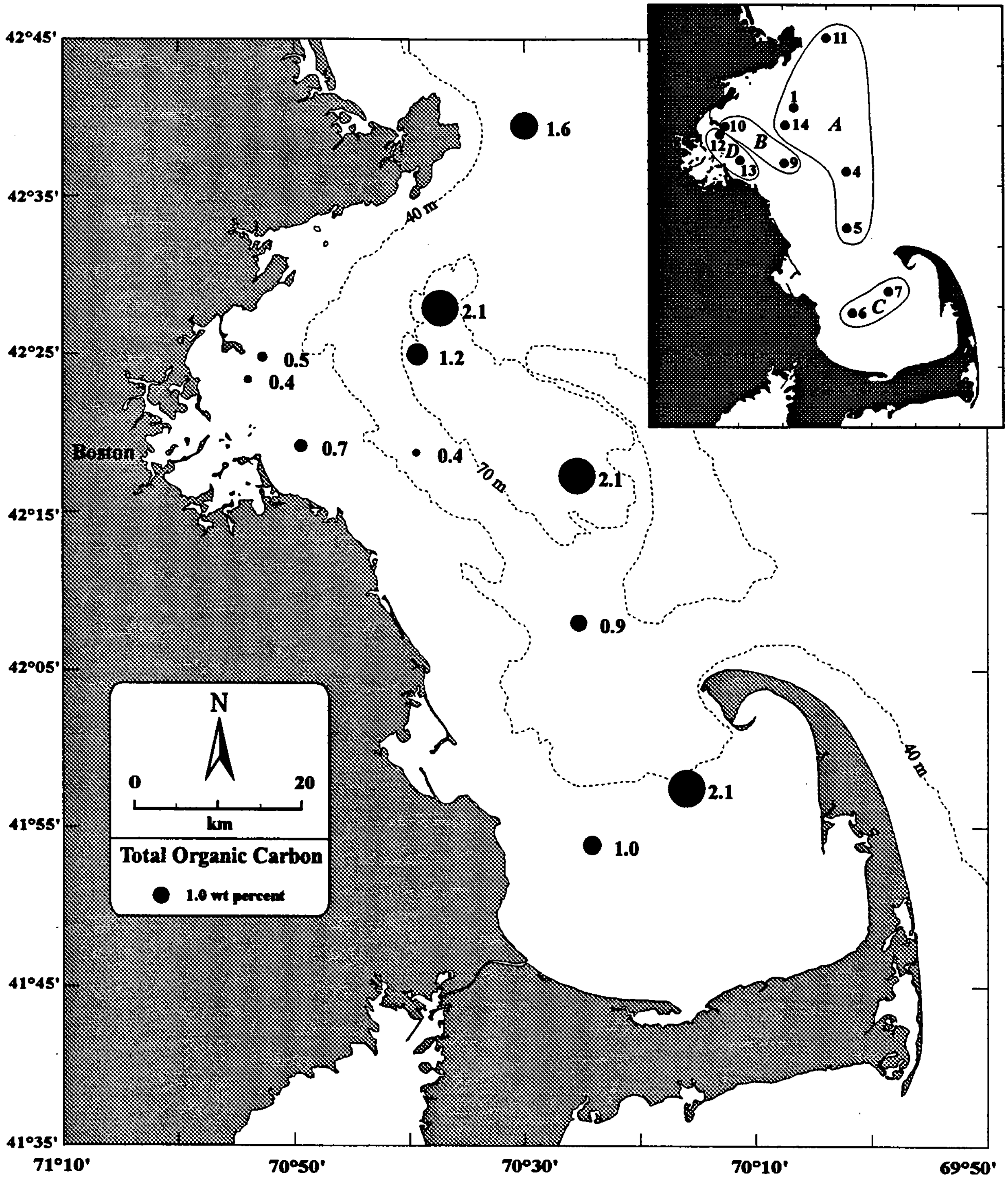



Figure 3.2.5 Geographic distribution of total organic carbon (wt %) at farfield stations. The inset is described in Figure 3.2.1.

**Table 3.2.1 Spearman's rank correlation coefficients (lower diagonal of matrix) between abiotic[1] variables measured in 40 replicate sediment samples at all nearfield and farfield stations. The corresponding significance level (α) is shown in the upper diagonal of the matrix.**

| | Depth (m) | Mud | TOC | *C. perfringens* | Silver | PAH | PCB |
|---|---|---|---|---|---|---|---|
| **Depth (m)** | 1.0000 | 0.001 | 0.002 | 0.002 | 0.058 | 0.818 | 0.778 |
| **Mud fraction** | 0.5207 | 1.0000 | 0.000 | 0.039 | 0.000 | 0.000 | 0.000 |
| **TOC** | 0.4687 | 0.8469 | 1.0000 | 0.024 | 0.001 | 0.000 | 0.000 |
| ***C. perfringens*** | -0.4745 | 0.3278 | 0.3560 | 1.0000 | 0.000 | 0.000 | 0.000 |
| **Silver** | -0.3019 | 0.5396 | 0.5231 | 0.8339 | 1.0000 | 0.000 | 0.000 |
| **PAH** | 0.0376 | 0.6099 | 0.6771 | 0.7771 | 0.6811 | 1.0000 | 0.000 |
| **PCB** | 0.0459 | 0.7709 | 0.7451 | 0.6872 | 0.8783 | 0.7578 | 1.0000 |

[1]Including *Clostridium perfringens* spore counts.

Although *Clostridium perfringens* spores are not strictly abiotic, they are grouped with abiotic variables in this report since they are highly correlated with silver concentration and are indicative of anthropogenic activities. Here, the term "biotic" is reserved strictly for macro-infaunal organisms collected in grab samples. Figure 3.2.6 shows the distribution of *C. perfringens* spores represented by average colony-forming units per gram of dry weight of sediment. These spores are from a naturally occurring bacterium found in the intestinal tract of mammals and their distribution has been established as a sewage effluent tracer (Keay *et al.*, 1993; Hill *et al.*, 1993). In contrast to mud and TOC distributions, *C. perfringens* spores were not strongly associated with grain size ($R$=0.3, α=0.04) as shown in Table 3.2.1. Instead, the highest counts were near the mouth of Boston Harbor at Stations FF10, FF12, and FF13.

The distribution of organic contaminants at farfield stations is represented by total PAH concentrations shown in Figure 3.2.7 and PCB concentrations shown in Figure 3.2.8. Among replicate data, both correlated ($R$>0.6) with TOC levels and *C. perfringens* spore counts (Table 3.2.1). However, the spatial distribution of average levels of total PAH concentration differed slightly from TOC and fine-grained sediment in that the highest PAH concentrations were at northern Stations FF1 and FF11. The levels at these stations exceeded 5 µg/g whereas other stations were close to the range (0.16 to 3.4 µg/g) found by Windsor and Hites (1979). PCB concentration was more spatially uniform and had a mean concentration of 25.4 ng/g comparable to the mean concentration 20.9 ng/g reported by Boehm *et al.* (1984).

The distribution of the trace metal silver is shown in Figure 3.2.9. Silver has been suggested as a useful chemical indicator of sewage related particulates within Massachusetts and Cape Cod Bays (Bothner *et al.*, 1993). This suggestion was based on the positive correlation silver exhibits with *C. perfringens* spore counts as shown in Figure 3.2.10. The high silver concentrations near Boston Harbor at Stations FF12 and FF13 became further elevated (Figure 3.2.11) when normalized by the mud fraction, as suggested by Bothner *et al.* (1993). The distribution of silver was generally consistent with the interpretation by Shea (1994).

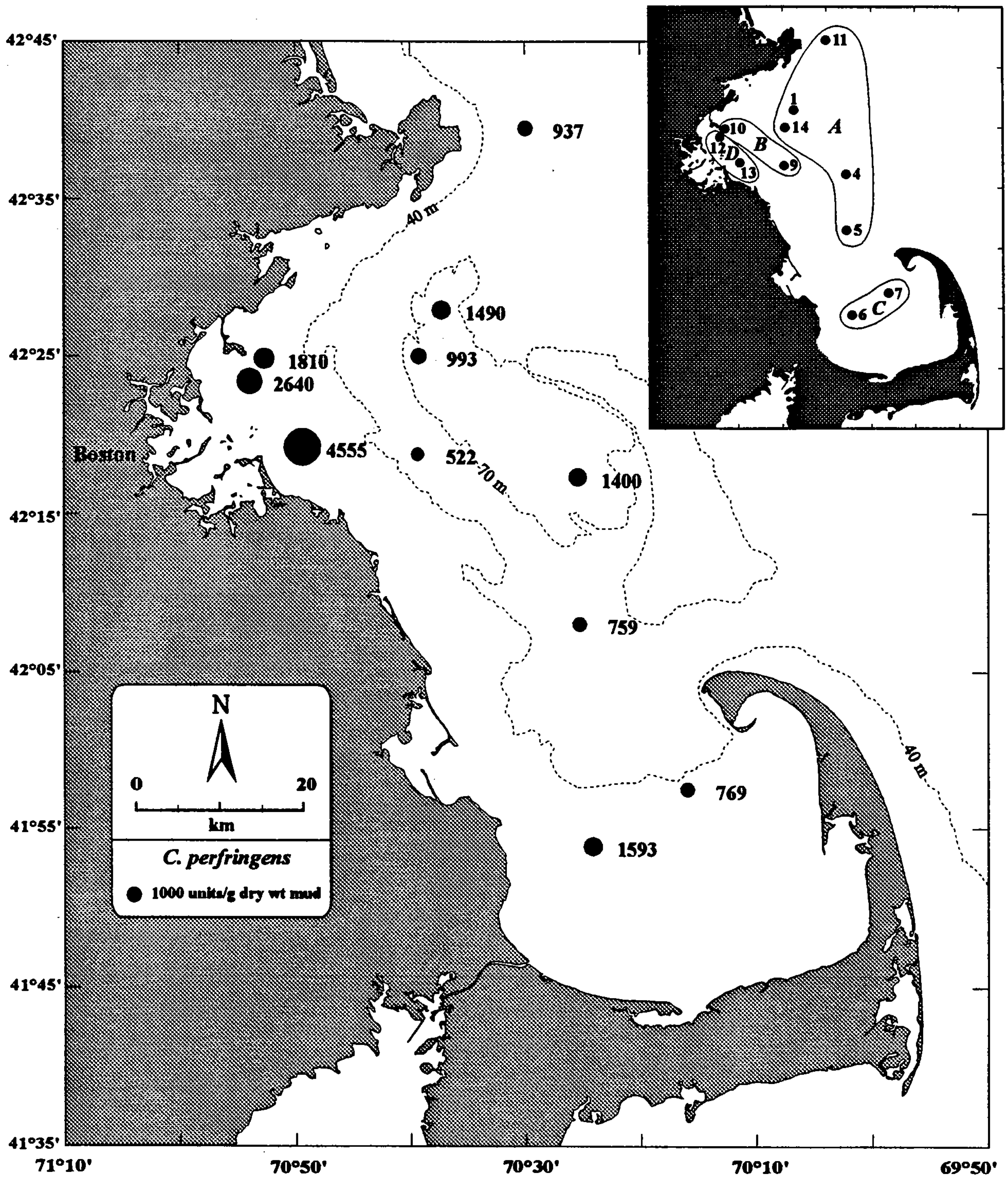



**Figure 3.2.6 Geographic distribution of *Clostridium perfringens* spore counts (colony-forming units/g dry wt) at farfield stations. The inset is described in Figure 3.2.1.**

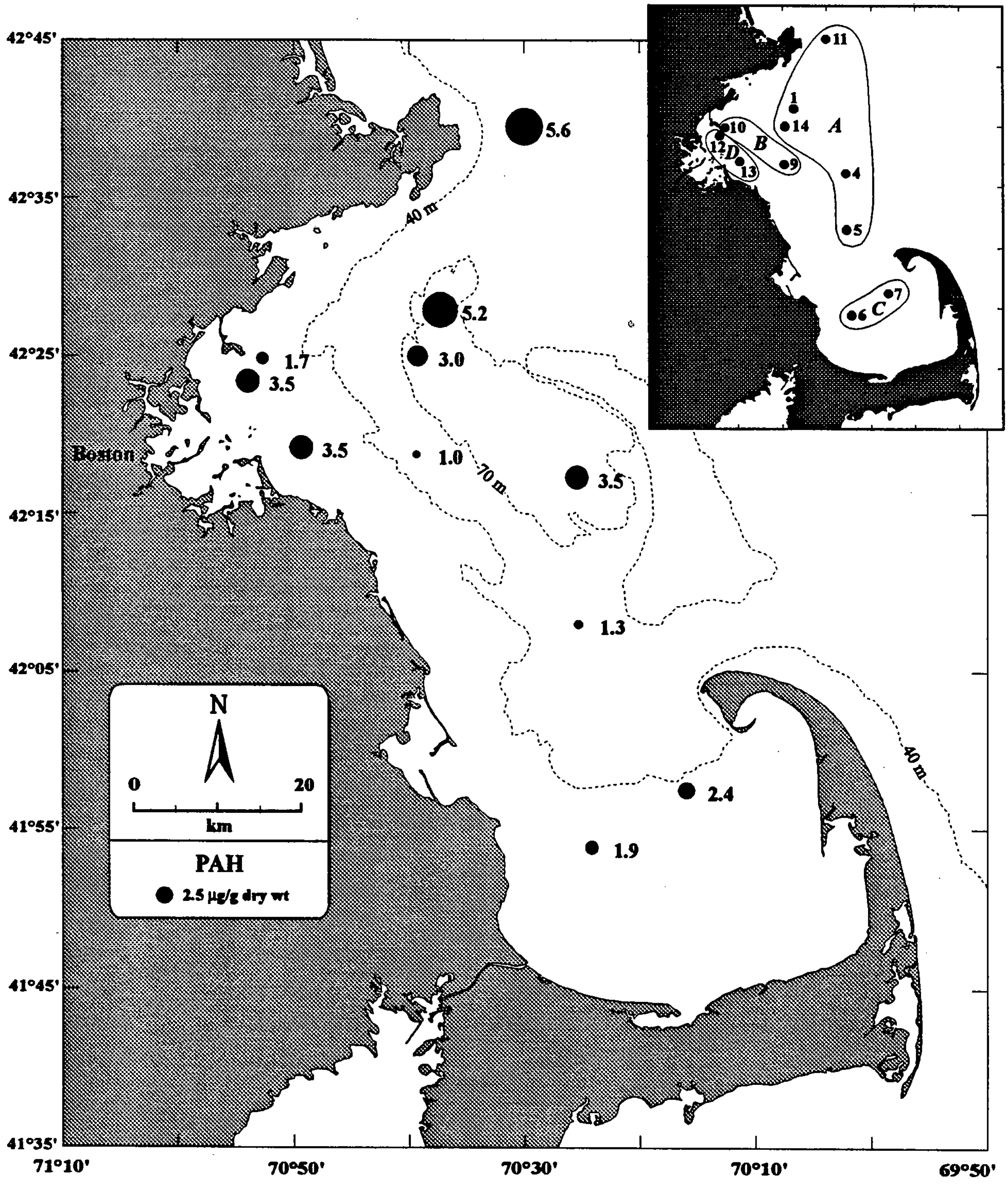



Figure 3.2.7 Geographic distribution of total PAH (µg/g dry wt) at farfield stations. The inset is described in Figure 3.2.1.

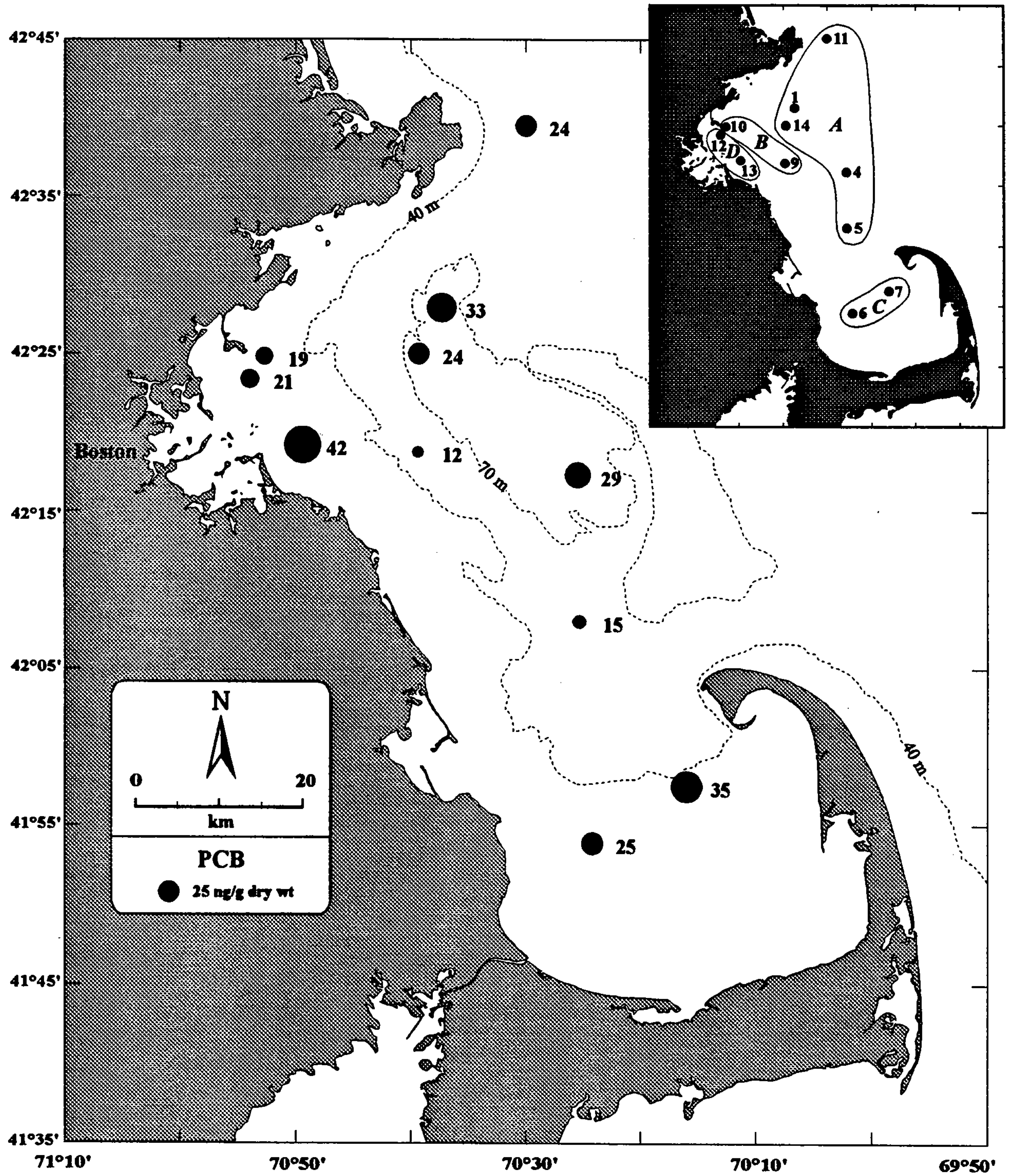



**Figure 3.2.8 Geographic distribution of PCB concentration (ng/g dry wt) at farfield stations. The inset is described in Figure 3.2.1.**

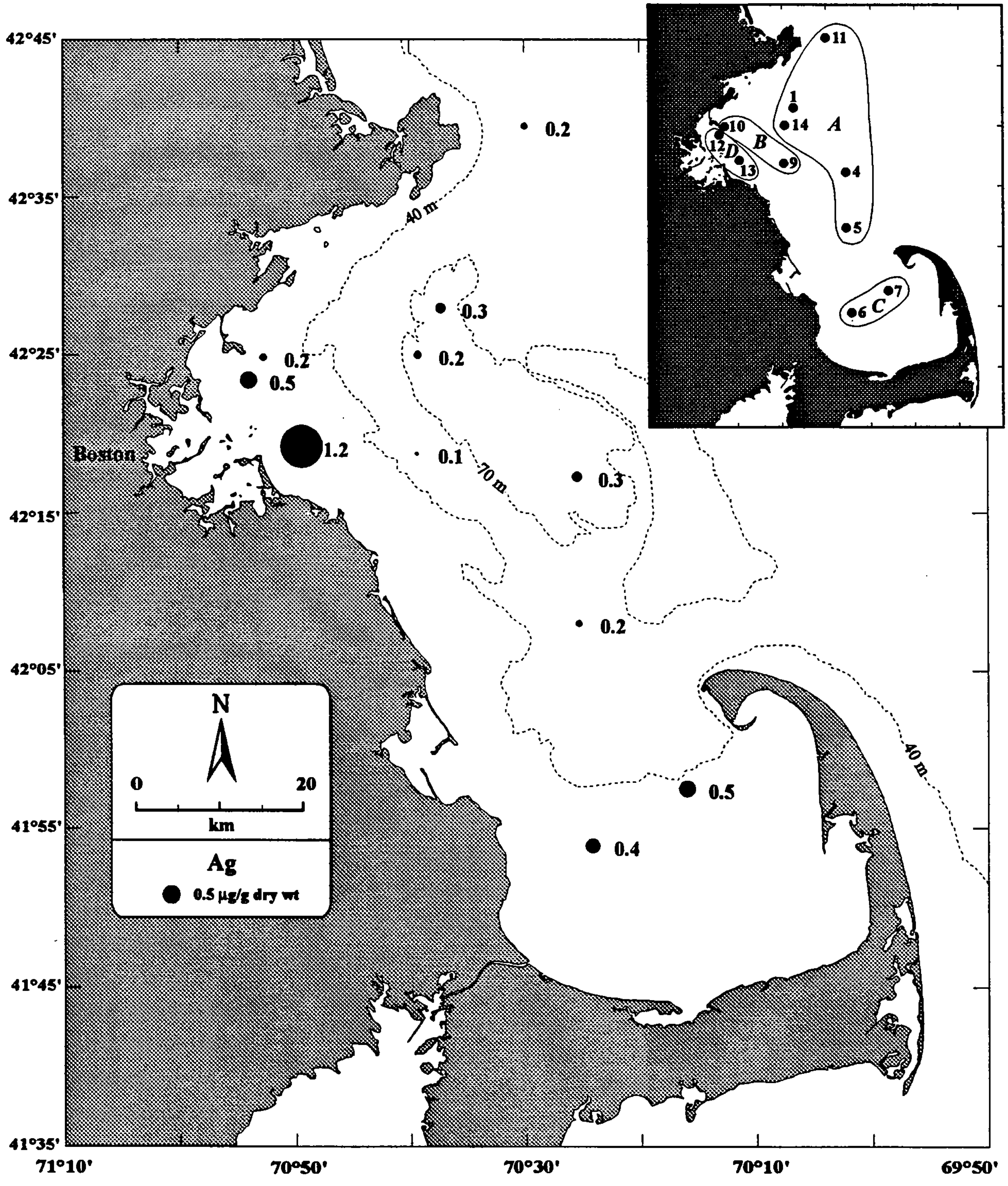



Figure 3.2.9 Geographic distribution of silver concentration (µg/g dry wt) at farfield stations. The inset is described in Figure 3.2.1.

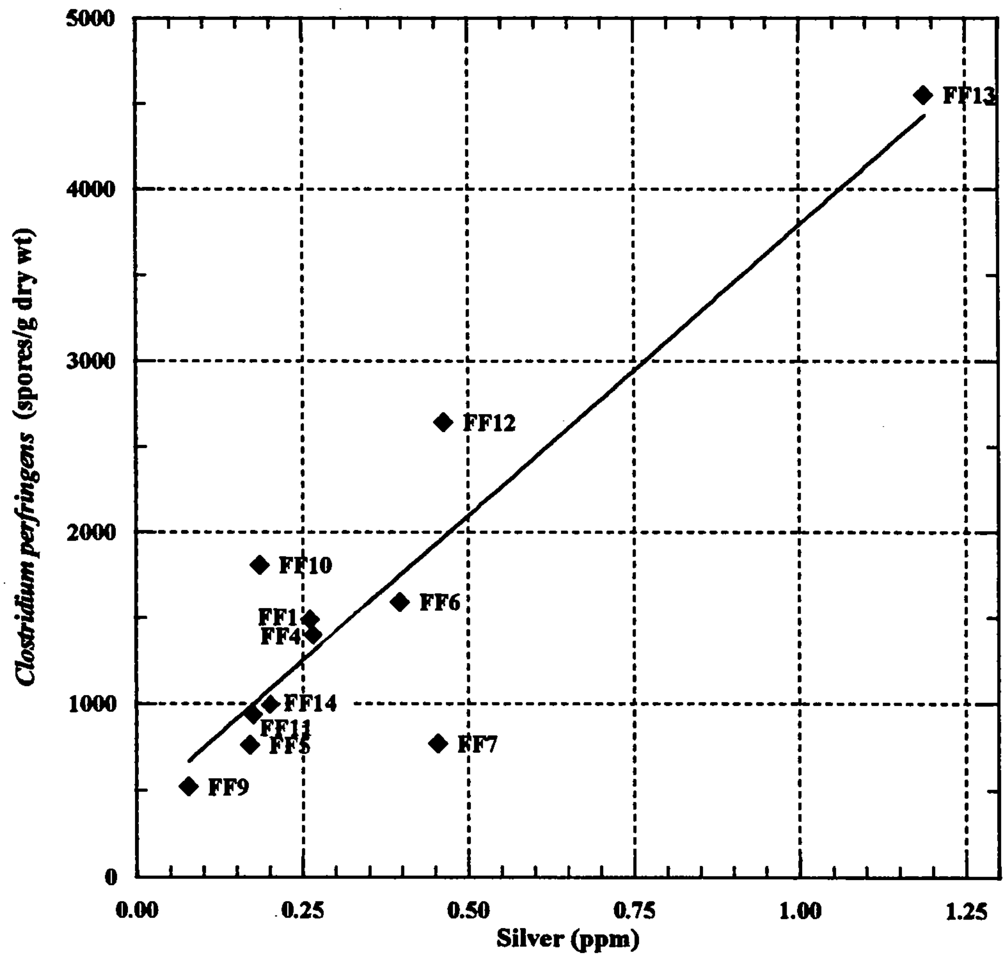



**Figure 3.2.10 Linear regression of *Clostridium perfringens* spore counts on silver concentration yielding an $R^2$=0.8.**

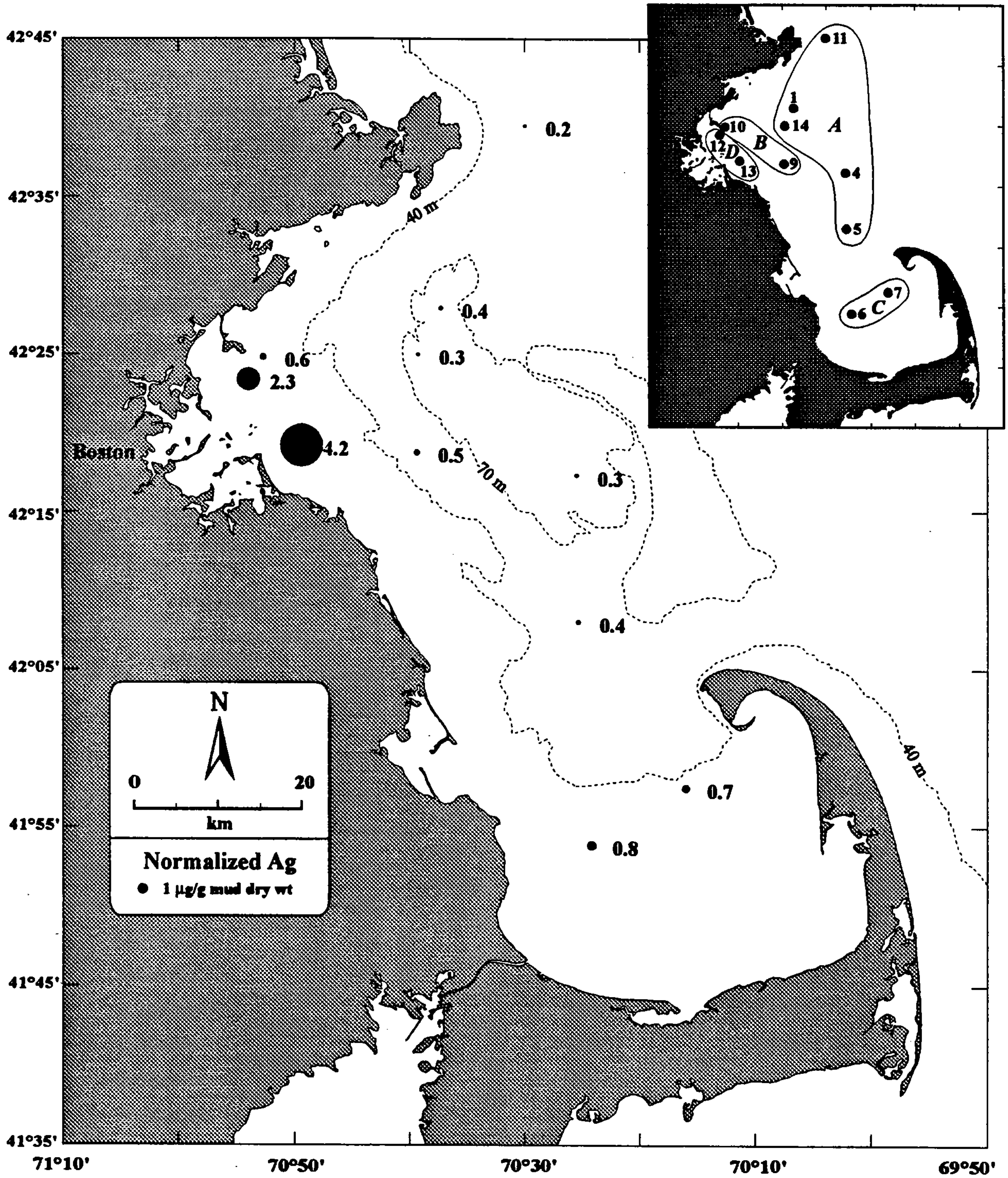



**Figure 3.2.11 Geographic distribution of normalized silver concentration (µg/g mud dry wt) at farfield stations. The inset is described in Figure 3.2.1.**

### 3.2.2 Midfield Sediments

The surficial sediment texture at midfield distances from the diffuser is shown in Figures 3.2.12 through 3.2.15. The most obvious feature of these patterns is the high gravel content (37%) in samples collected at Station NF14 (Figure 3.2.12). This fraction is a factor of ten larger than the gravel fraction at any other nearfield or farfield station. At the time of collection, Campbell (1993) noted that samples from this station contained glass and tile fragments of anthropogenic origin. He speculated that barges may have dumped at this site in the past. Nevertheless, the fraction of finer grained particulates at this station was comparable to those of other stations at midfield distances (Figures 3.3.13 through 3.2.15). Moreover, TOC (Figure 3.2.16), *C. perfringens* spore counts (Figure 3.2.17), organic contaminants (Figures 3.2.18 and 3.2.19) and silver concentration (Figure 3.2.20) at Station NF14 were not anomalous compared to other stations at midfield distances from the diffuser. Finally, as will be subsequently shown, the biological community at Station NF14 was closely related to the five other stations within the modified Group C (indicated as C′ in Figure 3.2.12).

Figures 3.2.14 and 3.2.15 show that the smallest fraction of fine-grained sediments was collected at three stations (NF2, NF4 and NF17). As will be discussed in Section 3.4.4, these stations support macroinfaunal community structures that differ from other stations at midfield distances from the diffuser. No other clear spatial patterns emerge from the pattern of sediment facies, and for reasons described below, the data were not contoured as was done for 1992 data by Blake *et al.* (1993).

The pattern of TOC is shown in Figure 3.2.16. Elevated TOC levels (>1.5%) at Stations NF12 and NF8 correspond to an elevated (≥50%) fraction of silt (Figure 3.2.14) and clay (>8%) at these stations (Figure 3.2.15). This is expected given the high correlation between TOC and mud fraction among all replicates (Table 3.2.1). The variability over this spatially limited region was unexpected in light of the interpretation of farfield data. The highest TOC level at stations at midfield distances from the diffuser (2.9%) exceeded the highest TOC level at any farfield station (Figure 3.2.5). A similar relationship obtained for the mud fractions between mid and farfield stations. Thus, small-scale (<10 km) variability in surficial sediments exceeded large scale (~100 km) trends and an interpretation of spatial patterns from a limited number of widely separated stations is questionable (viz. contouring using semivariogram analysis as suggested by Shea *et al.*, 1991). For example, consider how different the TOC pattern in the farfield (Figure 3.2.5) would appear if Stations FF10, FF12, and FF13 had been located where NF8, NF12, and NF14 are now located. By moving these farfield stations only a few kilometers, they would have exhibited high TOC levels (1.5 to 2.9%) comparable to farfield stations further offshore. This calls into question the result reported in Section 3.2.1 concerning a monotonic increase in TOC concentrations (and fine-grained sediments) with distance from Boston Harbor. Other sediment quality parameters also exhibit large amplitude variability over small spatial scales and make objective mapping difficult.

## 3.3 FARFIELD MACROINFAUNAL ASSEMBLAGES

Farfield statistics were computed to characterize the regional benthic community spanning Cape Cod and Massachusetts Bays (Figure 2.2.1). The most distant farfield stations were separated from the diffuser by more than 80 km.

### 3.3.1 Taxonomic Composition

A total of 226 taxa representing 13 major taxonomic groups was identified among the 39,717 organisms encountered in all farfield samples. Nearly all (36,884 or 93%) of the total number of organisms were classified into 186 species contained within the 226 taxa. Appendices A-3 and A-4 list identified taxa arranged phylogenetically for sieve-size fractions of 0.3 and 0.5 mm, respectively. The total number of organisms per replicate sample ranged from 173 individuals in Replicate 2 at Station FF4 to 2,745 in Replicate 3 at Station FF7 (Table 3.3.1). The coefficient of variation in mean density, defined as the ratio of the standard deviation to mean,

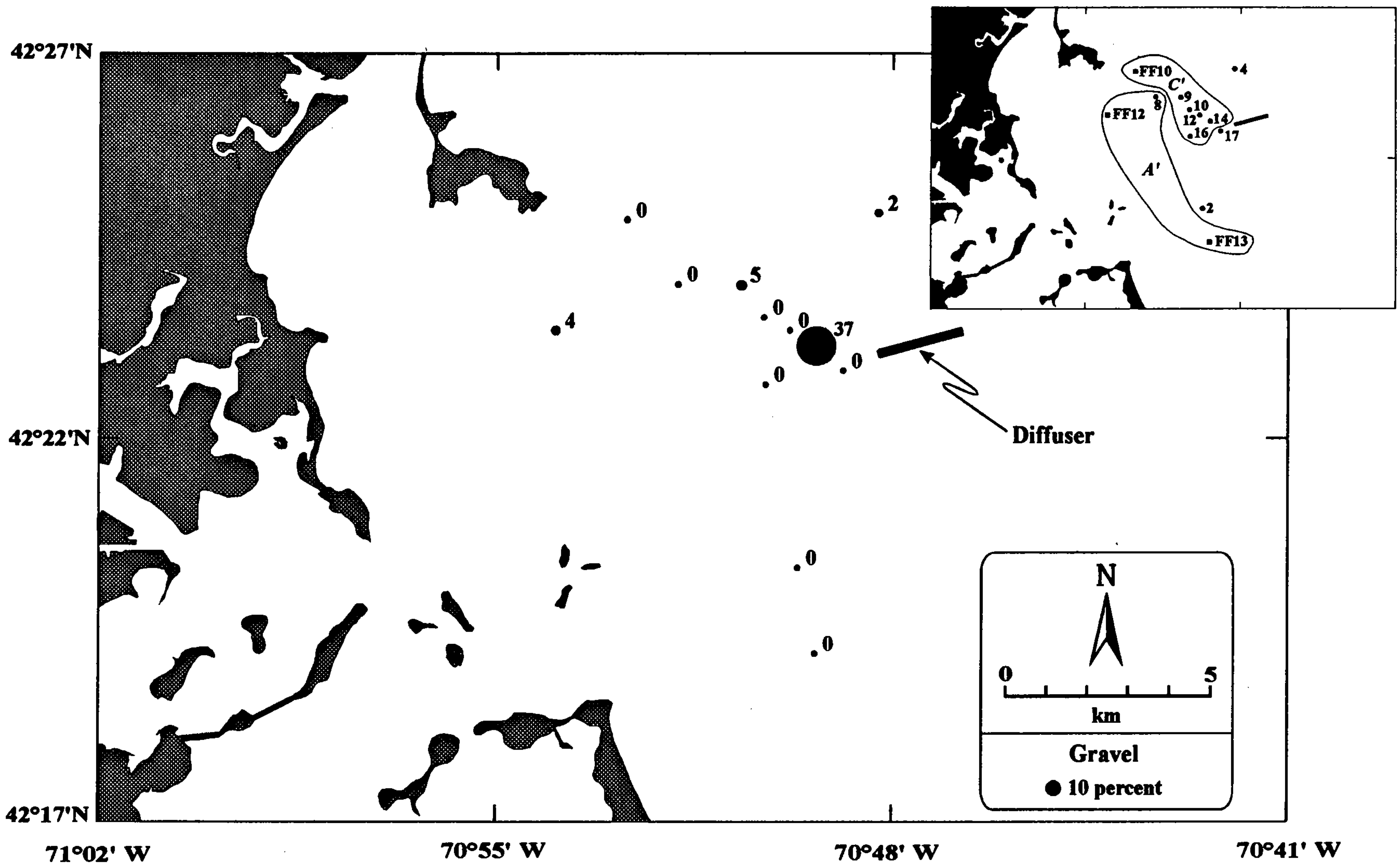



**Figure 3.2.12 Geographic distribution of percent gravel at midfield distances (<8 km) from the diffuser. The diameter of the circles scales as a linear function of percent gravel. The inset shows midfield station groups determined from benthic infaunal community structure summarized in Table 4.3.1.**

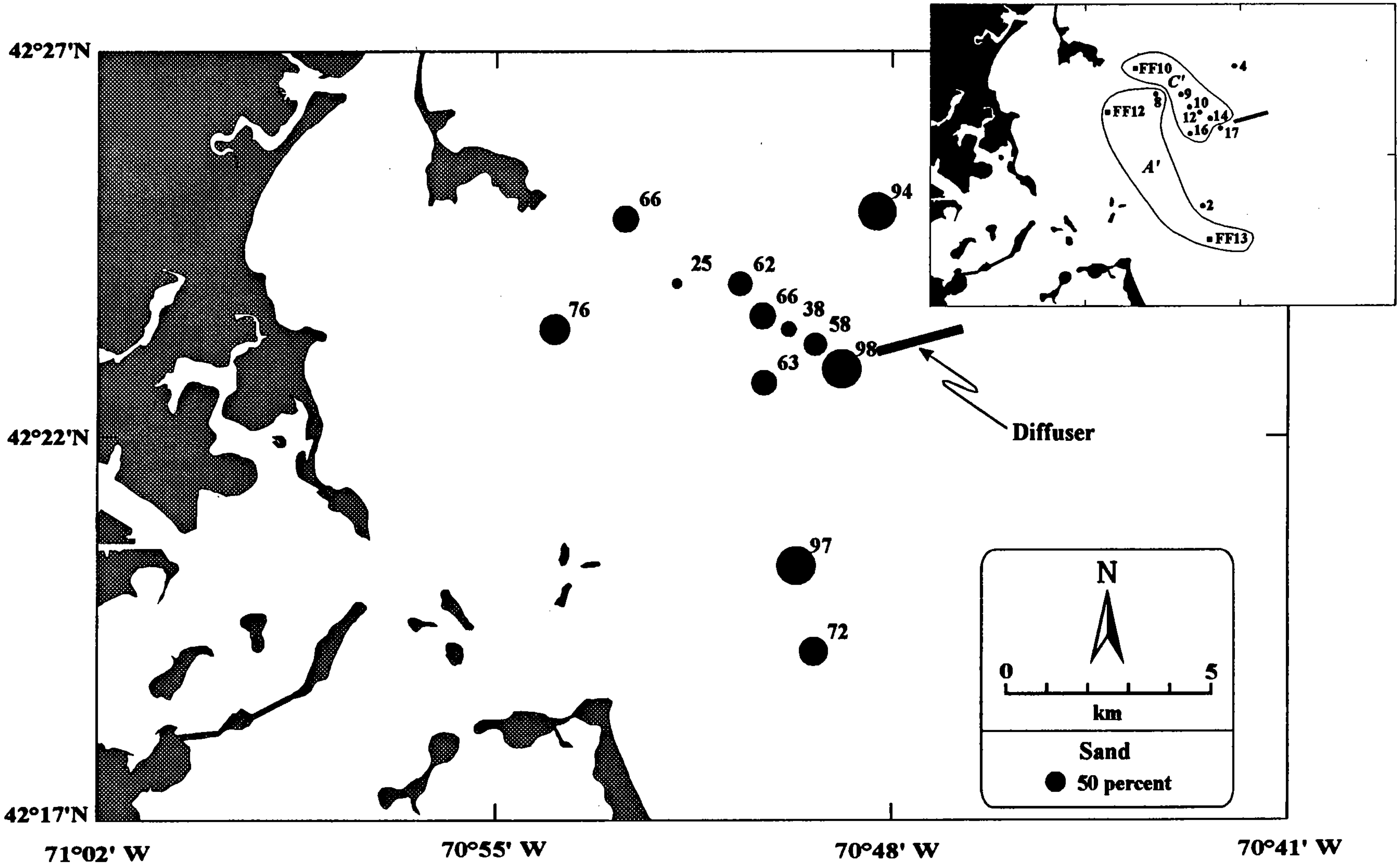



**Figure 3.2.13 Geographic distribution of percent sand at midfield distances from the diffuser. The inset is described in Figure 3.2.12.**

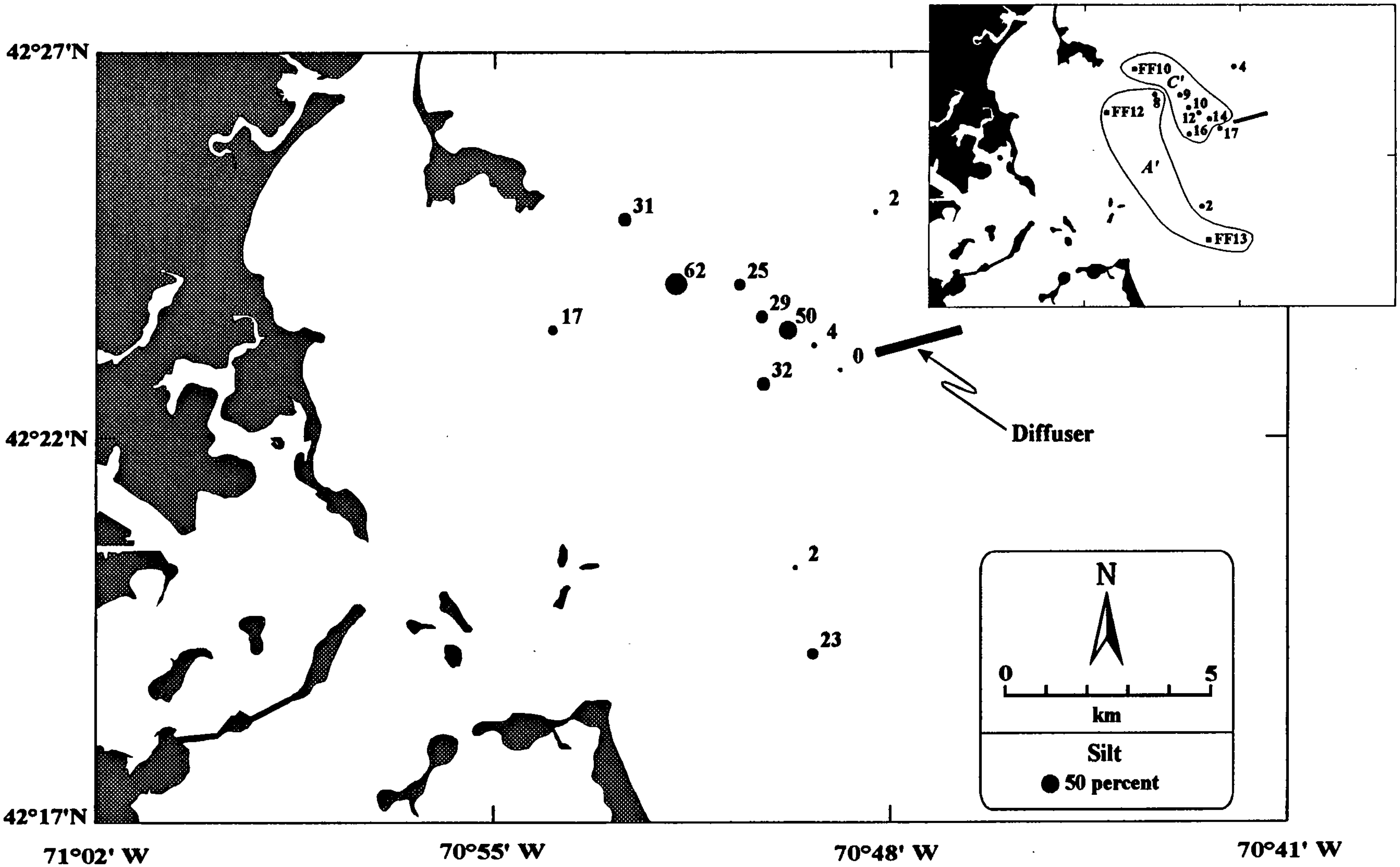



Figure 3.2.14 Geographic distribution of percent silt at midfield distances from the diffuser. The inset is described in Figure 3.2.12.

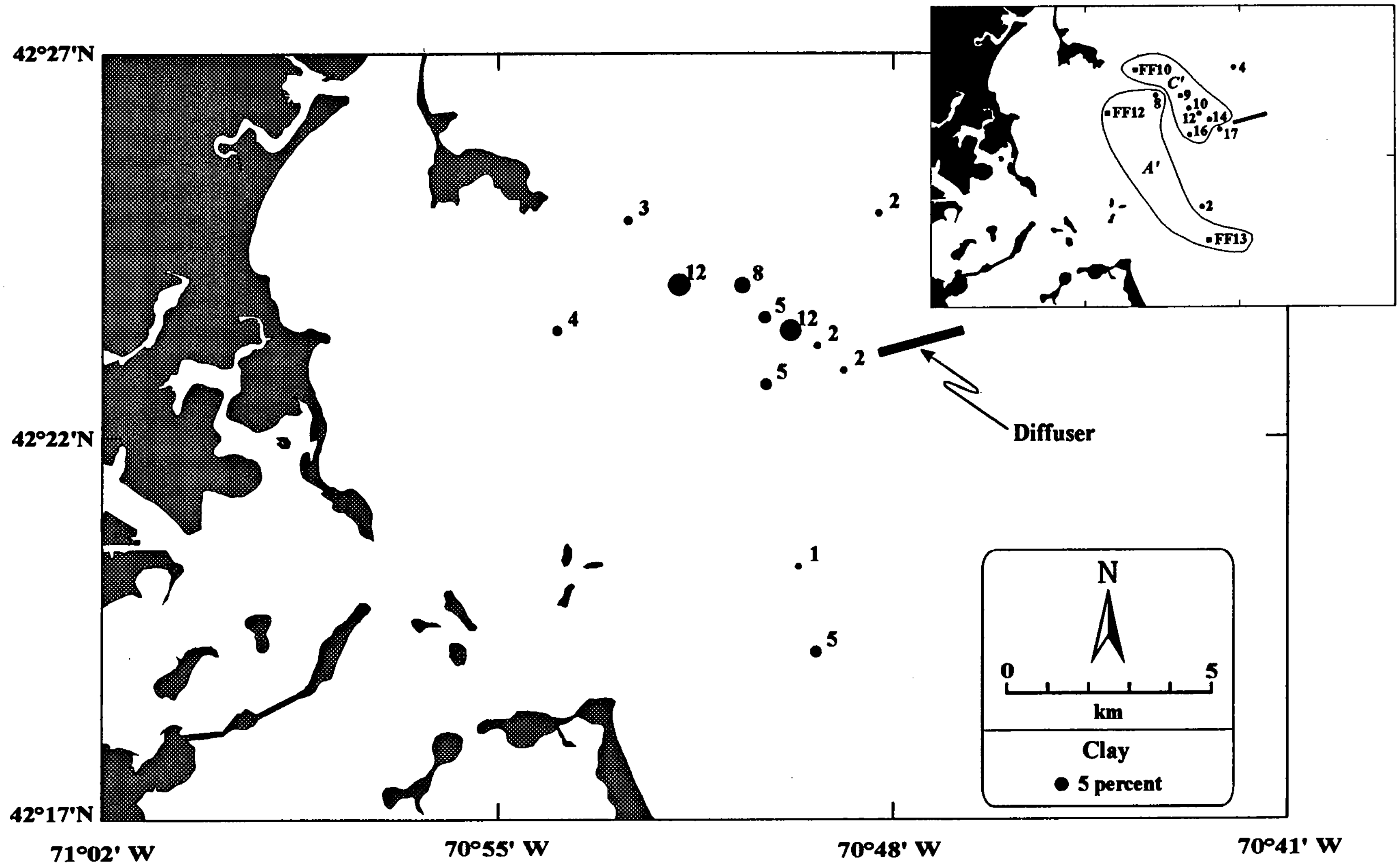



**Figure 3.2.15 Geographic distribution of percent clay at midfield distances from the diffuser. The inset is described in Figure 3.2.12.**

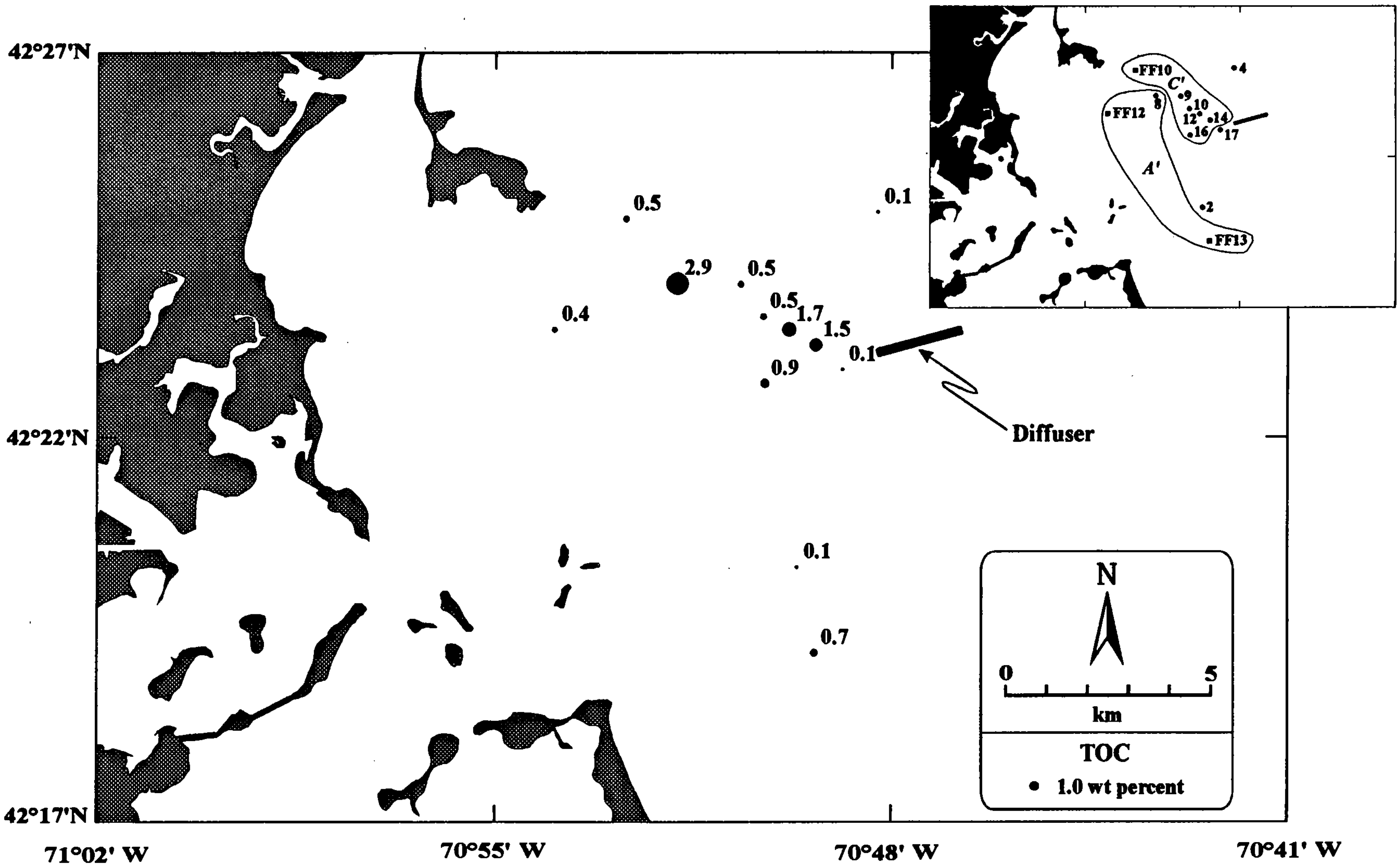



Figure 3.2.16 Geographic distribution of total organic carbon (wt %) at midfield distances from the diffuser. The inset is described in Figure 3.2.12.

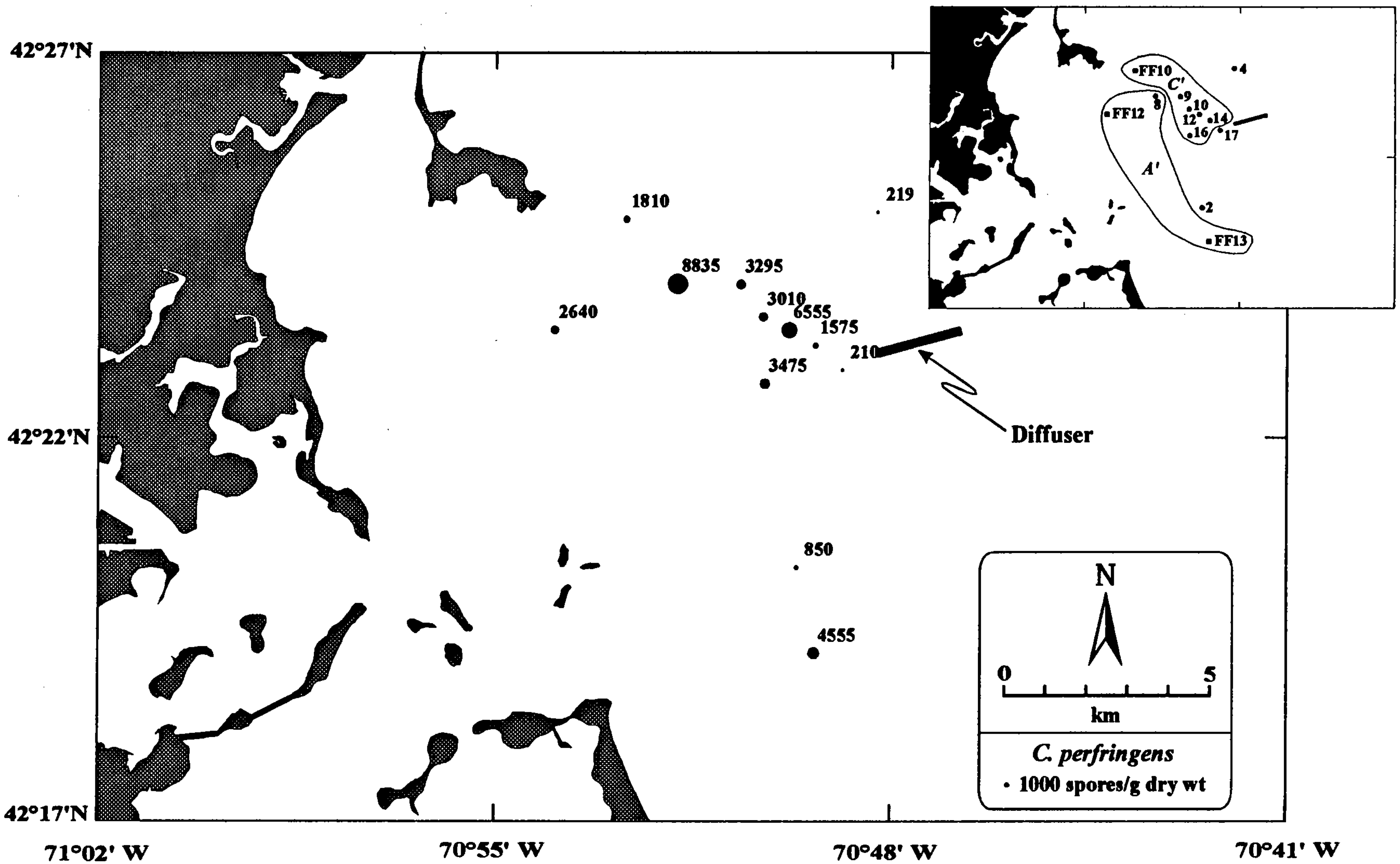



**Figure 3.2.17 Geographic distribution of *Clostridium perfringens* spore counts (spores/g dry wt) at midfield distances from the diffuser. The inset is described in Figure 3.2.12.**

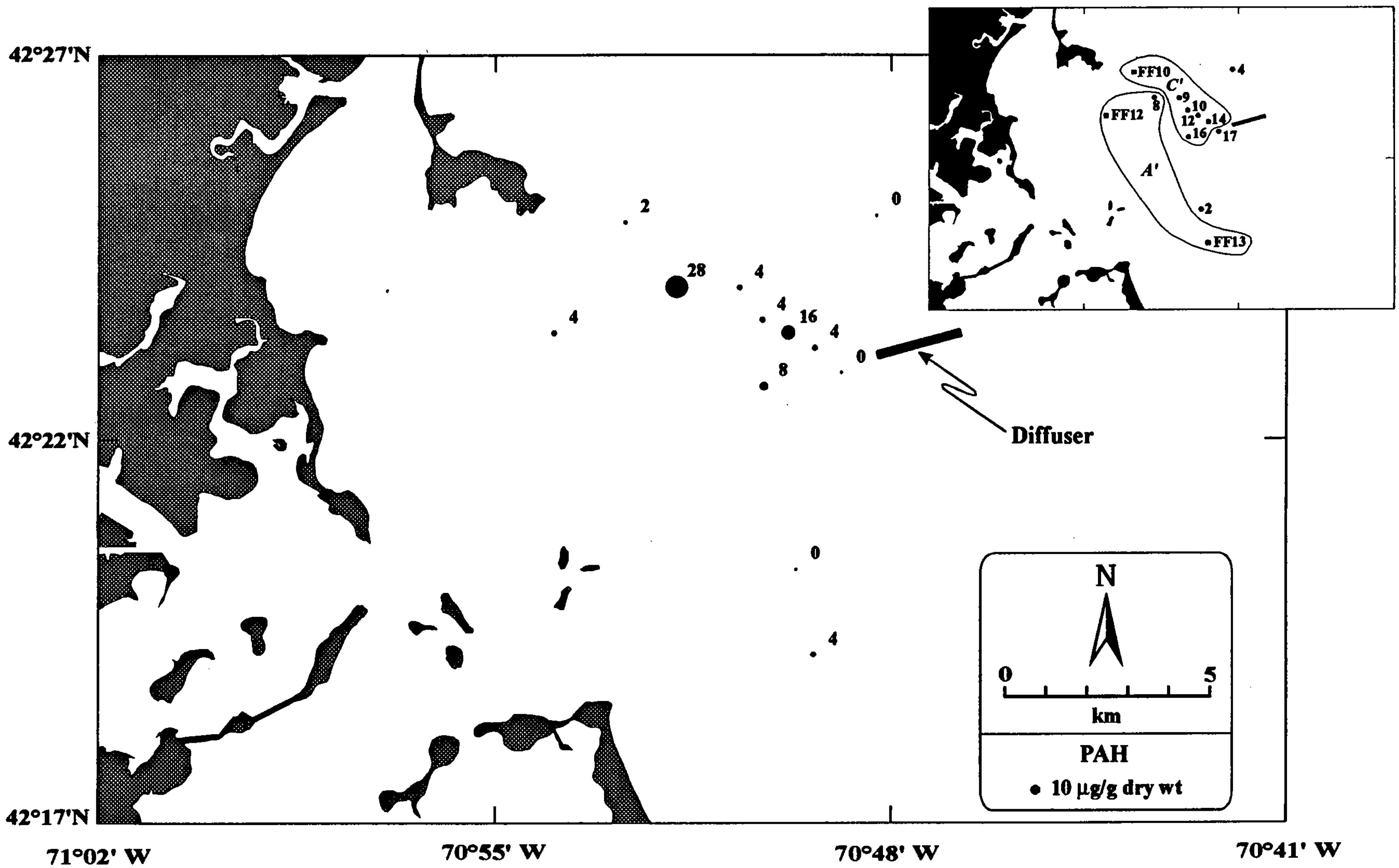



**Figure 3.2.18 Geographic distribution of PAH (µg/g dry wt) at midfield distances from the diffuser. The inset is described in Figure 3.2.12.**

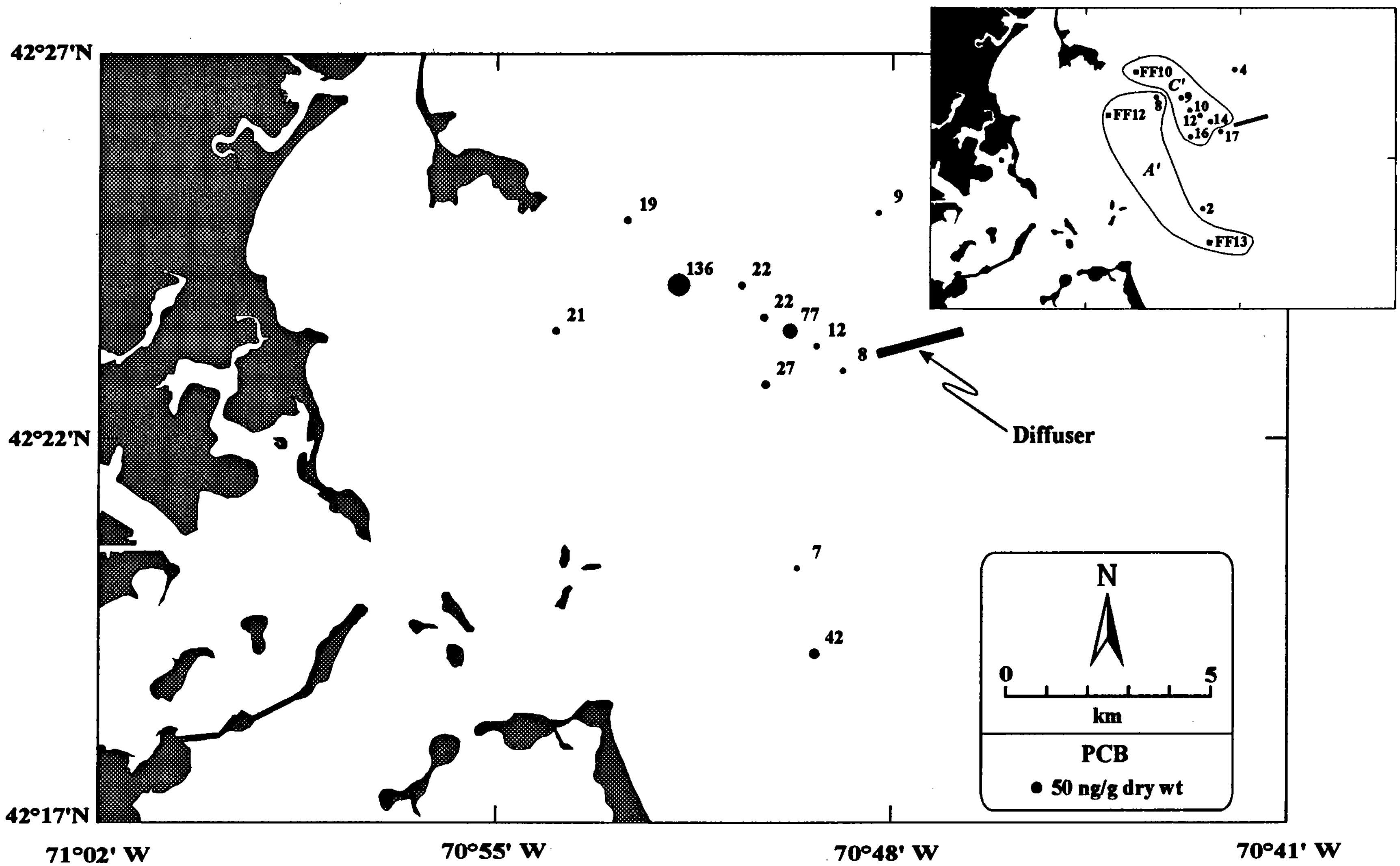



**Figure 3.2.19 Geographic distribution of PCB concentration (ng/g dry wt) at midfield distances from the diffuser. The inset is described in Figure 3.2.12.**

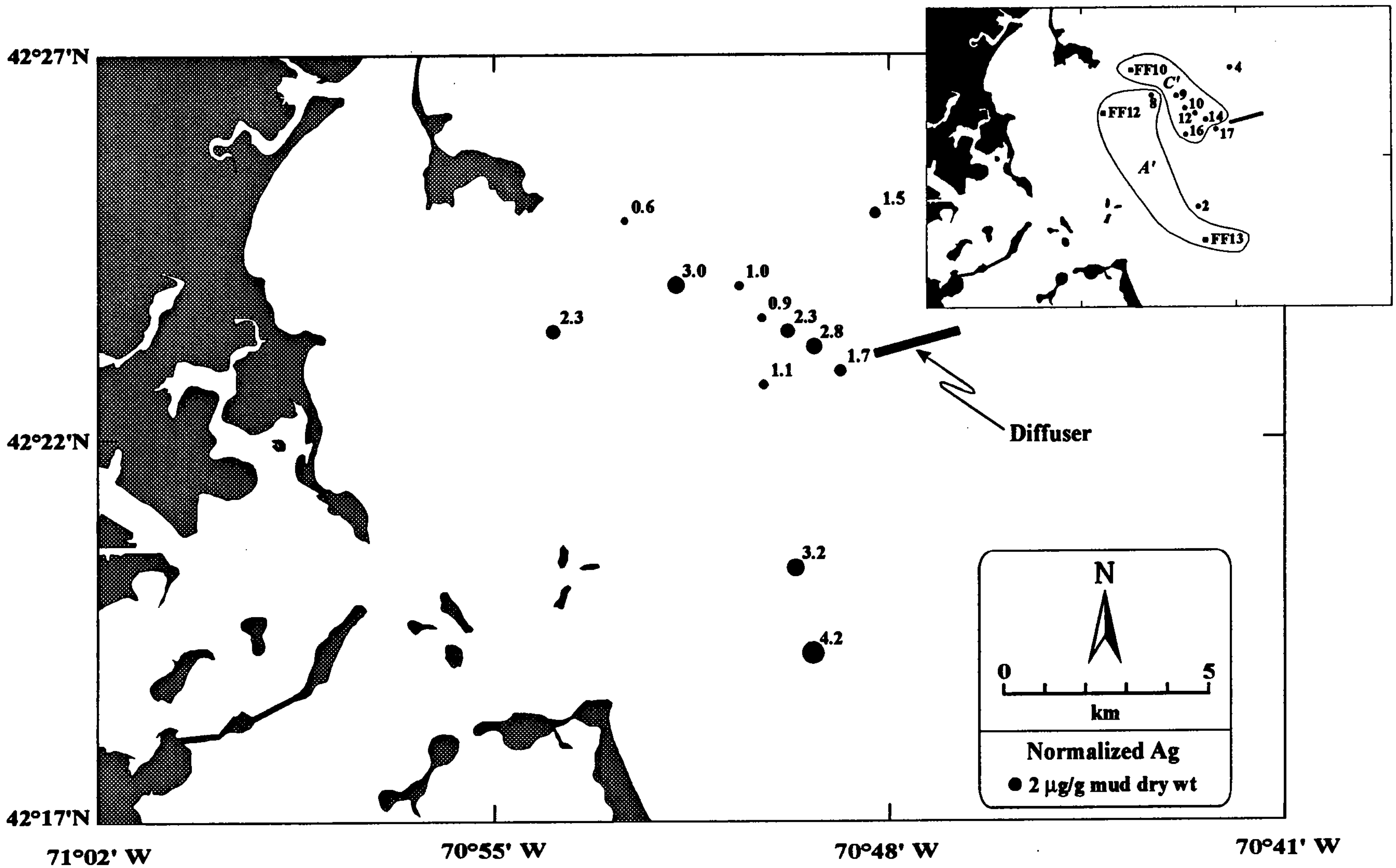



Figure 3.2.20 Geographic distribution of normalized silver concentration (mg/g mud dry wt) at midfield distances from the diffuser. The inset is described in Figure 3.2.12.

was generally less than 30%. A much higher coefficient of variation in mean density was observed at Stations FF4. The high coefficient of variation of 61% at Station FF4 was an artifact of the low mean density, because the standard deviation was comparable to other stations. As discussed in Section 2.3, the total of 936 organisms identified in Replicate 2 from Station FF7 was anomalously low compared to other replicates at this station and therefore, it is not included in the macroinfaunal analysis described below.

Infaunal abundance for each sieve-size fraction tracked variations in total station abundance, and the lowest and highest densities were observed at Stations FF4 and FF7, respectively (Figure 3.3.1). The density of organisms was consistently greater in the 0.5-mm fraction at each station and ranged from 53% of the total density at Station FF11 to nearly 83% at Station FF6.

### 3.3.2 Numerical Classification

The community structure among replicate samples from a given station was more consistent than the community structure between stations. This is evident from the numerical classification of replicate samples at farfield stations presented in Figures 3.3.2 and 3.3.3. Clustering using NNESS similarity (Figure 3.3.2) reveals that the highest similarity was among the replicate samples from each individual station. Replicate samples within individual stations had similarities that exceeded 0.9 at all stations, except Replicate 1 at Station FF4 which had a marginally lower similarity of 0.88 but still aggregated first with the other replicate samples at Station FF4. Clustering using a Bray-Curtis similarity (Figure 3.3.3) yields a similar result albeit not as robust as NNESS because the community structure in Replicate 1 at Station FF4 was a better match with the replicate agglomeration at Station FF1. Nevertheless, using a Bray-Curtis similarity value of 0.82 as a decision rule effectively separates replicate samples from station agglomerations. Stations FF6 and FF7 are an exception to the Bray-Curtis decision rule for separating stations from replicates. They had a relatively high Bray-Curtis similarity (0.84) causing these stations to cluster above the 0.82 decision rule.

Four geographically separate groups of stations were formed by the station clustering using pooled replicate samples. Because of high similarity among replicate samples at individual stations, the numerical classification of pooled abundance shown in Figure 3.3.4 delimited station groups similar to that shown in Figures 3.3.2 and 3.3.3. Using a NNESS similarity of 0.65 as a decision rule in Figure 3.3.4b produced four major clusters. These four clusters were geographically separate as shown in Figure 3.3.5. The weakest cluster was Group B, which included Stations FF9 and FF10 and had a NNESS similarity near 0.7. The lowest NNESS similarity among all other groups exceeded 0.8. Stations FF9 and FF10 did not form a cluster group in the dendrogram using Bray-Curtis similarity (Figure 3.3.4a).

Although stations cluster with respect to total abundance (Figure 3.3.6) to some degree, the clearest pattern emerges from polychaete family densities (Figure 3.3.7). The polychaete class constituted 82% of all organisms and 97% of annelids collected at all farfield stations. The annelid phylum was much more abundant than any other major taxonomic group. From Figure 3.3.7, characteristics of the station groups can be distinguished in terms of relative abundances of spionid, paraonid, cirratulid, and other polychaete families. Stations within Group A were characterized by a comparatively even distribution among the family divisions. Group C had low abundances in the major (spionid, paraonid and cirratulid) polychaete families compared to other polychaete families. Group B, consisting of Stations FF9 and FF10, had the highest densities of spionid polychaetes (Figure 3.3.8). Conversely, Group B had some of the lowest abundances of paraonid polychaetes (Figure 3.3.9). Group D, consisting of Stations FF12 and FF13, exhibited the opposite pattern with comparatively low spionid populations and high paraonid densities (Figures 3.3.7 through 3.3.9).

**Table 3.3.1 Number of macroinfaunal organisms recovered from replicates at farfield stations. Station FF7 does not include Replicate 2 for reasons described in the text.**

| Station | Replicate 1 | Replicate 2 | Replicate 3 | Mean | Standard Deviation | Coefficient of Variation |
|---|---|---|---|---|---|---|
| FF1 | 543 | 730 | 638 | 637 | 94 | 15% |
| FF4 | 619 | 173 | 320 | 371 | 227 | 61% |
| FF5 | 920 | 926 | 990 | 945 | 39 | 4% |
| FF6 | 1234 | 2123 | 1878 | 1745 | 459 | 26% |
| FF7 | 2487 | | 2745 | 2616 | 182 | 7% |
| FF9 | 1341 | 895 | 1197 | 1144 | 228 | 20% |
| FF10 | 1418 | 1415 | 2183 | 1672 | 443 | 26% |
| FF11 | 1085 | 1201 | 931 | 1072 | 135 | 13% |
| FF12 | 1322 | 837 | 1443 | 1201 | 321 | 27% |
| FF13 | 1494 | 945 | 1698 | 1379 | 389 | 28% |
| FF14 | 848 | 1172 | 1030 | 1017 | 162 | 16% |

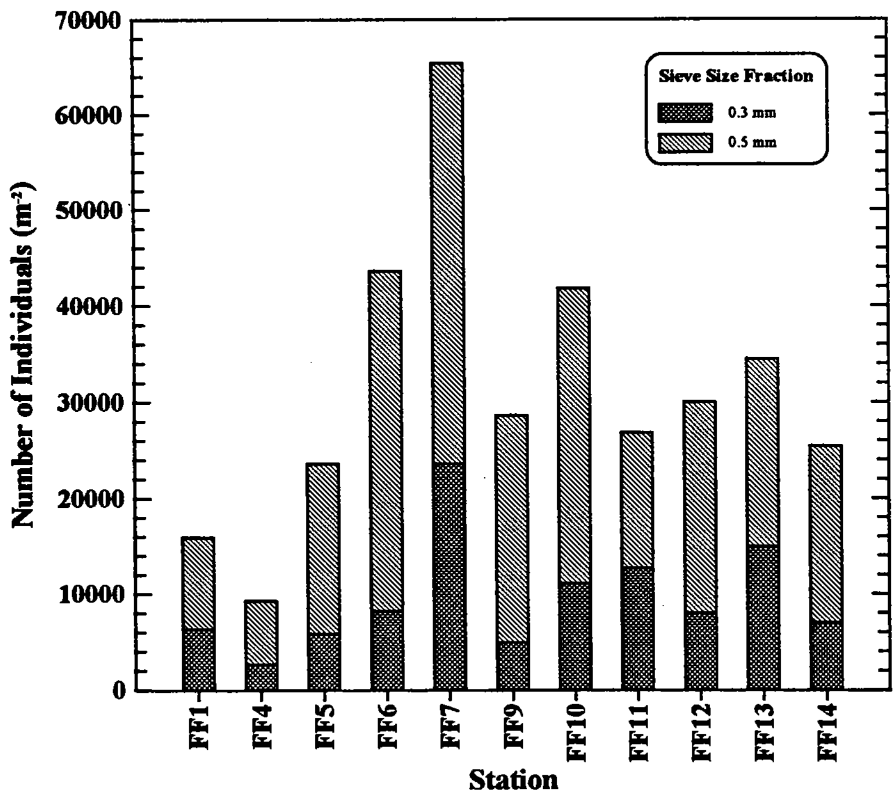



**Figure 3.3.1 Density of organisms determined from the two sieve-size fractions at farfield stations. Station FF7 does not include Replicate 2.**

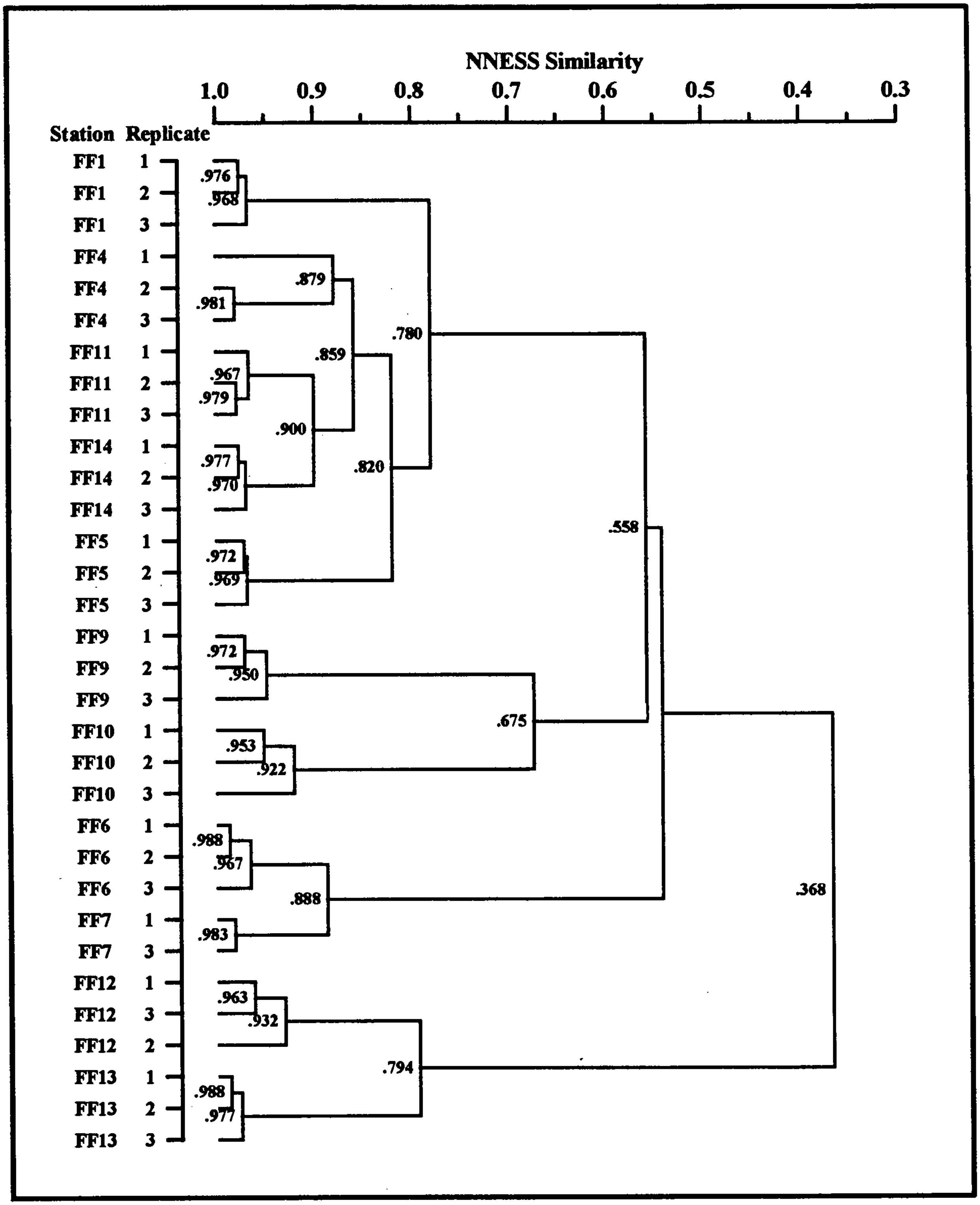



**Figure 3.3.2 Dendrogram resulting from clustering (group average sorting) of NNESS similarity (m=200) among farfield replicates.**

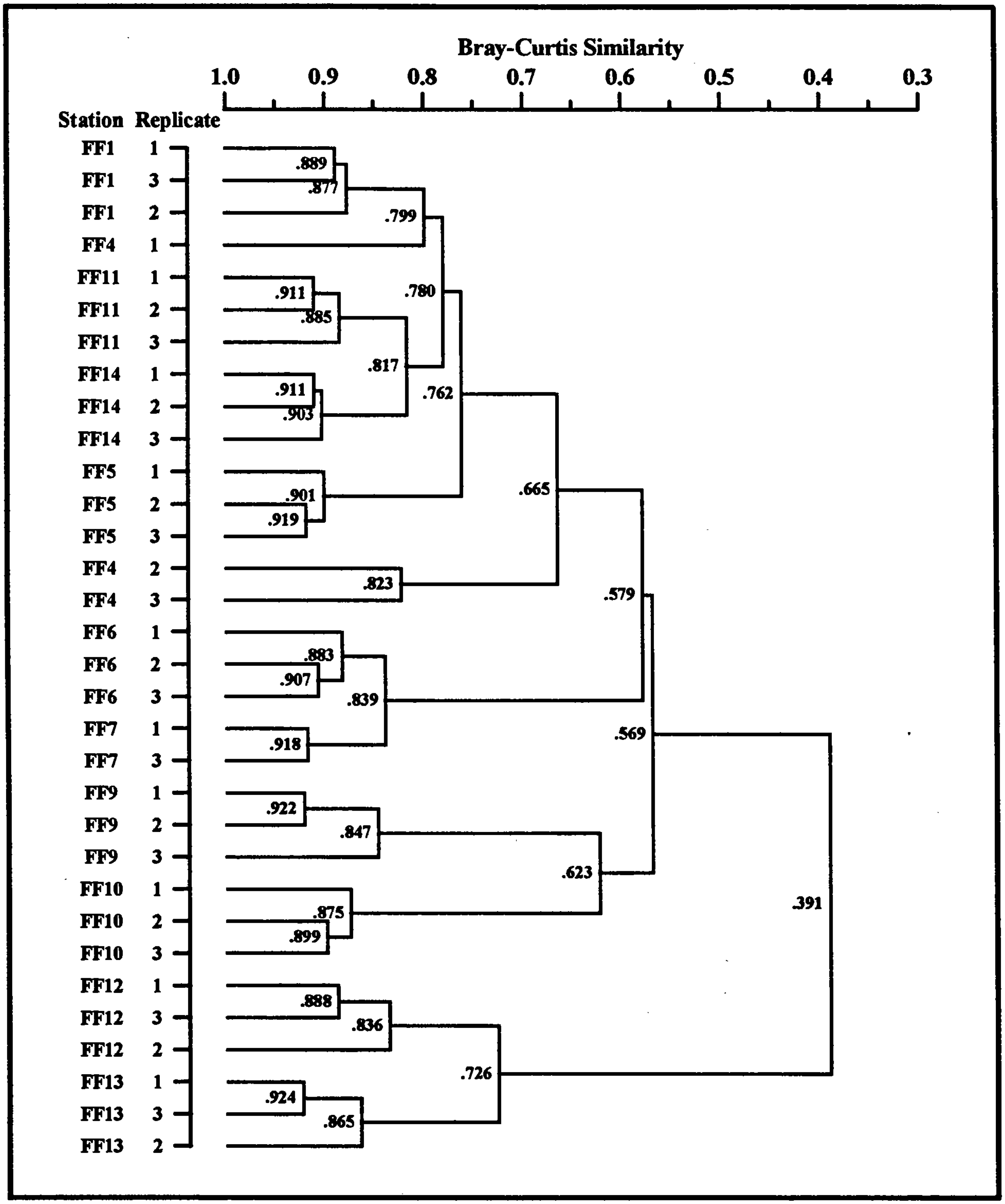



**Figure 3.3.3 Dendrogram resulting from clustering (group average sorting) of Bray-Curtis similarity among farfield replicates.**

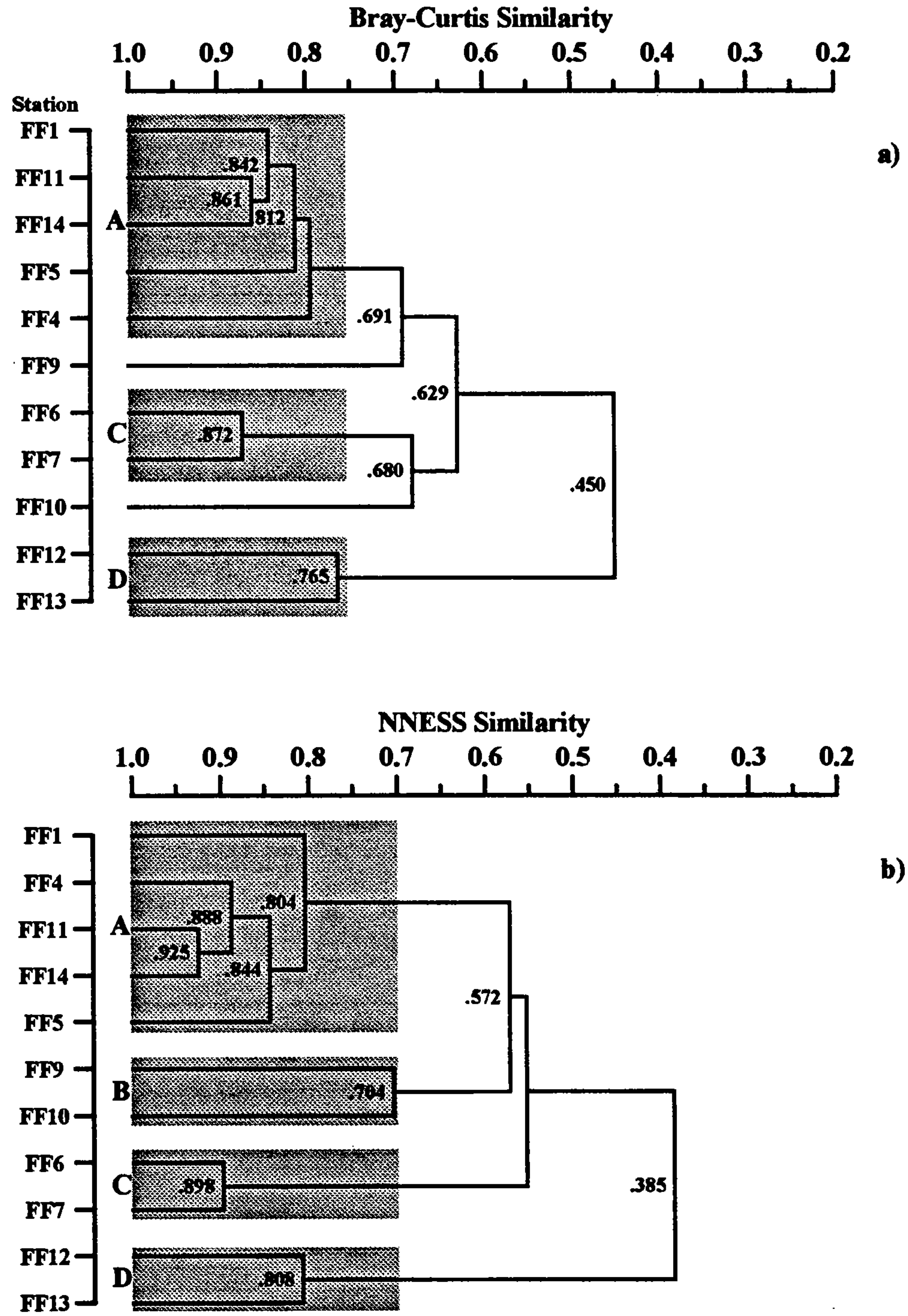



**Figure 3.3.4** Dendrograms resulting from clustering (group average sorting) of pooled replicate abundance data at farfield stations using (a) Bray-Curtis and (b) NNESS (m=200) similarity measures.

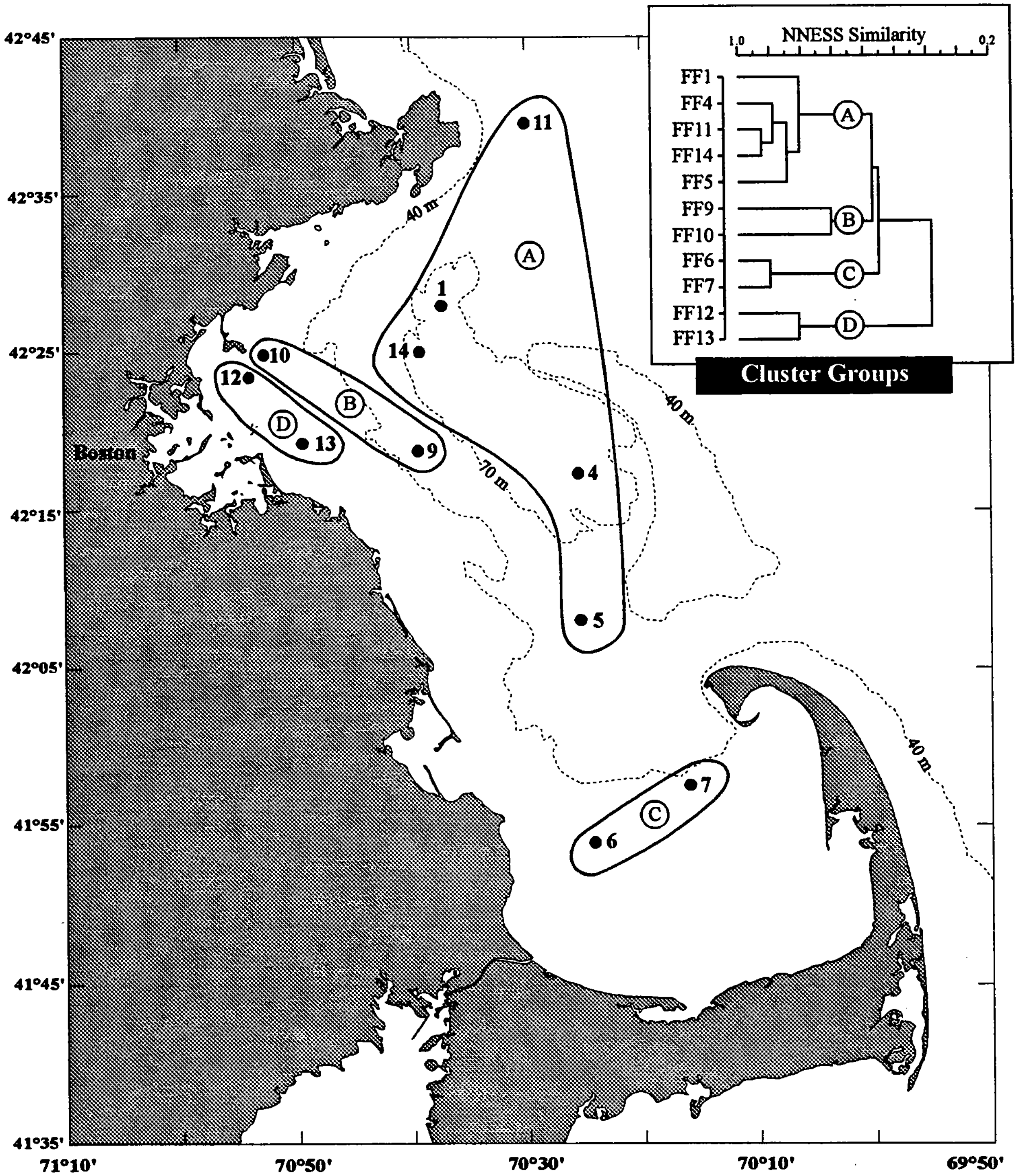



**Figure 3.3.5 Geographic distribution of farfield cluster groups. The inset shows the dendrogram of Figure 3.3.4b.**

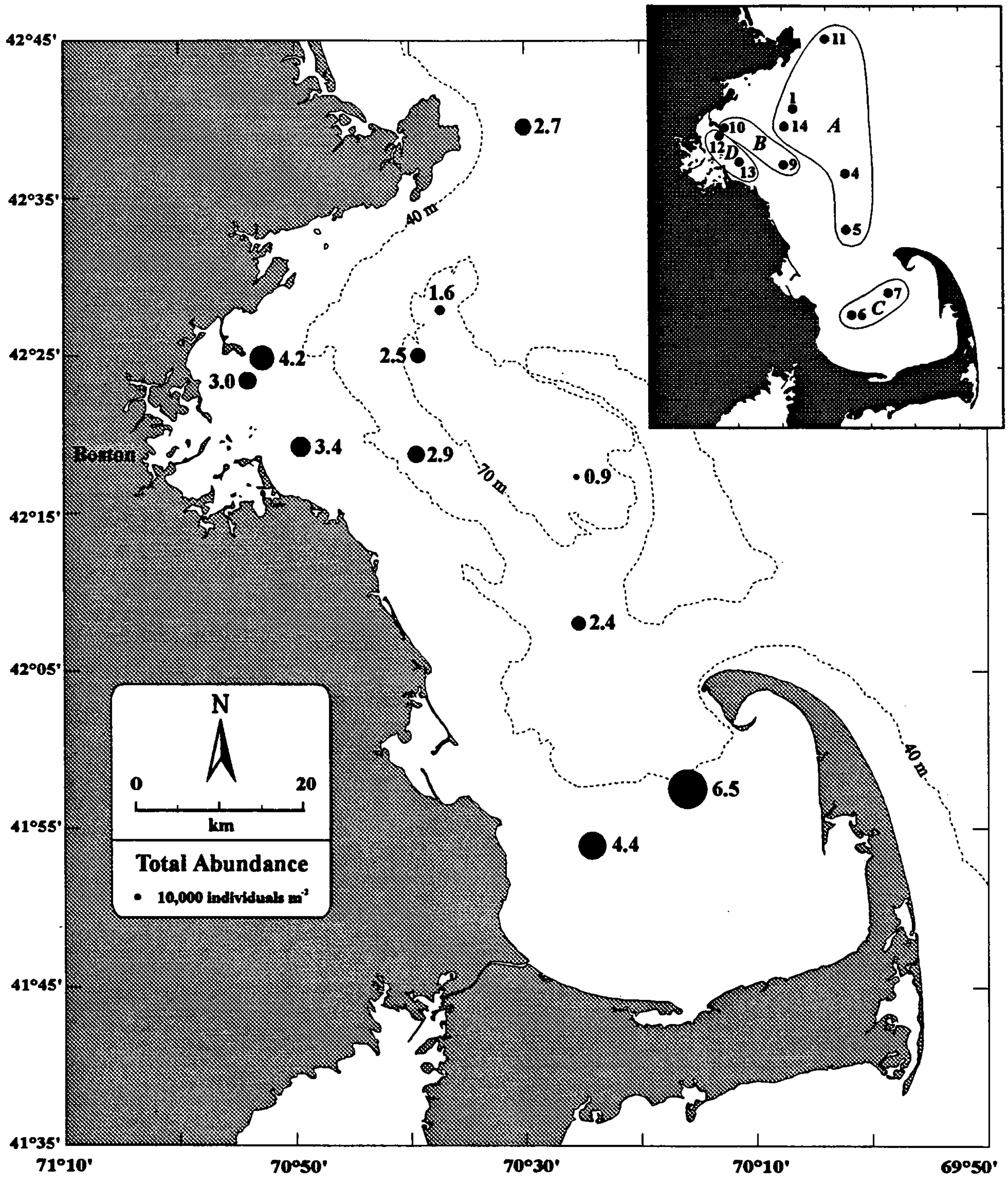



Figure 3.3.6 Geographic distribution of total infaunal density at farfield stations. The diameter of the circles scales as a linear function of infaunal density and the numbers represent 10,000 individuals m$^{-2}$. The inset shows the four farfield station groups shown in Figure 3.3.5 and summarized in Table 4.1.1.

**Table 3.3.2 Density and diversity related community parameters for farfield stations.**

| Farfield Group | Station | Depth (m) | Density ($m^{-2}$) | Density[1] ($m^{-2}$) | Number of Species | Richness d' | Diversity H' | Evenness J' | Dominance C' |
|---|---|---|---|---|---|---|---|---|---|
| A | FF5 | 61 | 23633 | 21425 | 77 | 9.7 | 2.69 | 0.62 | 0.148 |
| | FF14 | 70 | 25417 | 24167 | 65 | 8.0 | 2.72 | 0.65 | 0.114 |
| | FF1 | 84 | 15925 | 14692 | 84 | 11.1 | 3.19 | 0.72 | 0.063 |
| | FF4 | 87 | 9267 | 8558 | 50 | 7.1 | 2.66 | 0.68 | 0.154 |
| | FF11 | 87 | 26808 | 24883 | 69 | 8.5 | 2.75 | 0.65 | 0.099 |
| B | FF10 | 27 | 41800 | 36617 | 86 | 10.1 | 3.22 | 0.72 | 0.071 |
| | FF9 | 49 | 28608 | 26883 | 83 | 10.2 | 2.21 | 0.50 | 0.244 |
| C | FF6 | 33 | 43625 | 40442 | 89 | 10.4 | 2.93 | 0.65 | 0.103 |
| | FF7[2] | 37 | 65400 | 63400 | 59 | 6.8 | 2.51 | 0.61 | 0.140 |
| D | FF12 | 22 | 30017 | 26742 | 56 | 6.8 | 2.07 | 0.51 | 0.246 |
| | FF13 | 19 | 34475 | 33358 | 60 | 7.1 | 2.27 | 0.55 | 0.174 |

[1] Abundance computed using only those taxa identified to species level.
[2] Parameters computed for Station FF7 do not include Replicate 2.

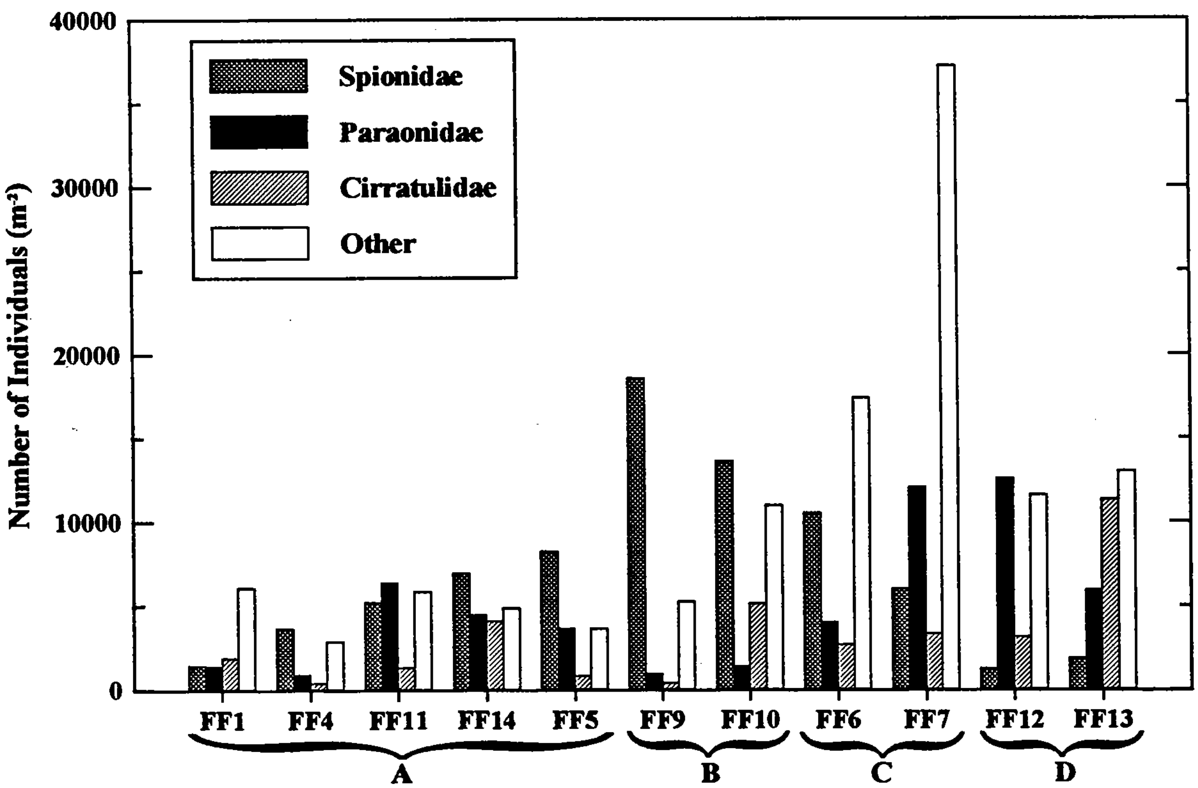



**Figure 3.3.7 Abundance (number of individuals $m^{-2}$) of organisms within the major polychaete families at farfield stations.**

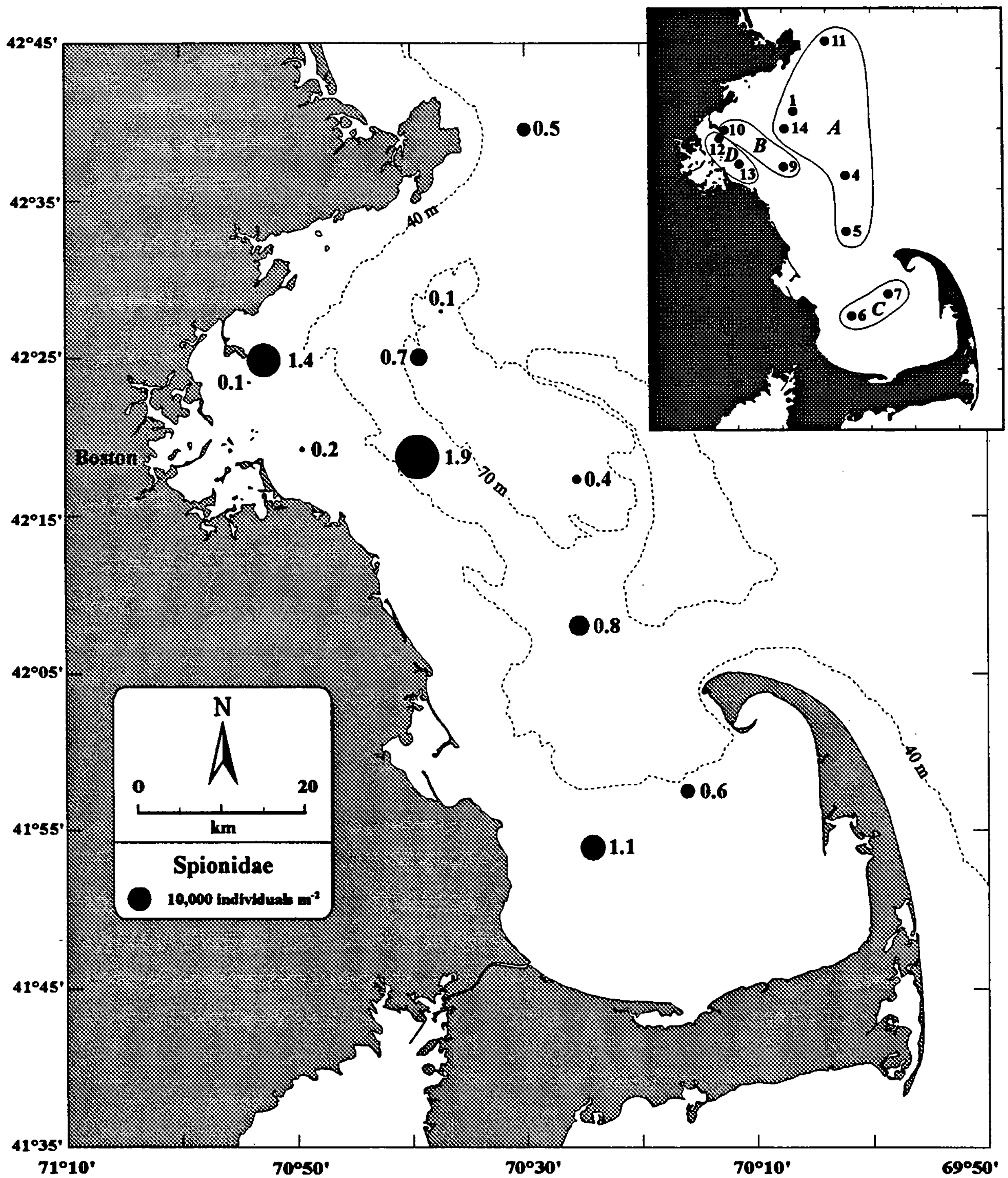



**Figure 3.3.8 Geographic distribution of spionid polychaete abundance at farfield stations. The inset is described in Figure 3.3.6.**

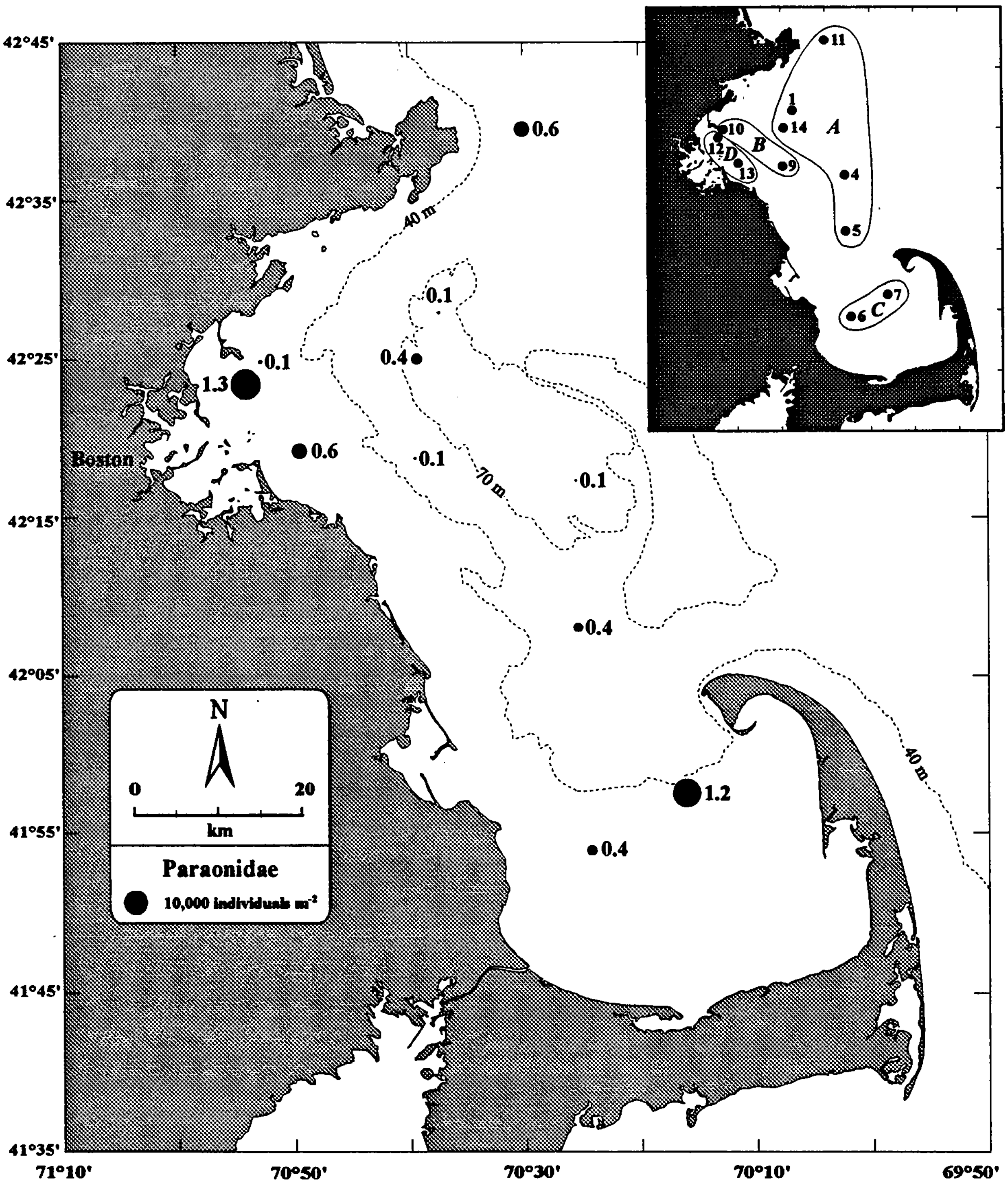



**Figure 3.3.9 Geographic distribution of paraonid polychaete abundance at farfield stations. The inset is described in Figure 3.3.6.**

### 3.3.3 Diversity and Related Community Characteristics

Table 3.3.2 lists organism density and diversity related parameters for farfield stations in the four cluster groups described in Section 3.3.2. For both total abundance and abundance of taxa identified to species level, the highest densities were observed at the two Group C stations (FF6 and FF7) and the lowest densities were observed at the five Group A stations.

Because of the wide variation in abundance among farfield stations, total number of species is not a good indicator of diversity. Instead, comparing rarefaction curves (Figure 3.3.10) at the smallest sample size ($n \approx 1000$ at Station FF4) yields diversity ranking more consistent with the Species Richness Index, Thus, although Station FF6 had the highest number of observed species, it also had a high number of individuals. This resulted in a reduced species richness as defined by $E(S_{1000})$ and $d'$. Nevertheless, the rarefaction curves indicate that stations differ in the functional relationship of the distribution of individuals within species. This introduces bias in diversity indices ($H'$, $J'$, $C'$ and $d'$) as discussed in Section 2.3.1. Although this bias makes it difficult to interpret these indices ecologically, general trends probably remain pertinent.

The diversity statistics in Table 3.3.2 do not exhibit a clear distinction among cluster groups. Stations with the greatest species richness were FF1, FF10, FF6, FF5, and FF9. Stations FF5 and particularly FF9 had anomalously low evenness and correspondingly high dominance indices. This resulted in a reduced diversity index for these stations and, consequently, the highest diversities were associated with the remaining Stations FF1, FF10, and FF6. The high dominance associated with Station FF9 was due to a relatively high density of spionid polychaetes in general (Figure 3.3.7) and the species *Spio limicola* (Table 3.3.3) in particular. A similarly high dominance index and corresponding low evenness were associated with Station FF12 (Table 3.3.2). These indices resulted from the high density of the paraonid polychaete *Aricidea catherinae*, which constituted more than 40% of the individuals collected at that station (Table 3.3.3). The high dominance at Station FF12, combined with its low richness, resulted in the lowest diversity index of any of the farfield stations.

### 3.3.4 Dominant Species

Dominant species and taxa are presented in Table 3.3.3. Here, dominance is defined as the ten most abundant species or taxa identified at a station. At all stations except Stations FF12 and FF13, the spionid polychaete *S. limicola* was a dominant species. Stations FF12 and FF13 constitute the shallow cluster Group D, where spionid polychaete density was low compared to paraonid density (Section 3.3.2). In six of the remaining nine farfield stations, *S. limicola* ranked first and had densities ranging between 6 and 38% of the total infauna collected. Only the capitellid *Mediomastus californiensis* was a dominant species at all farfield stations, with densities ranging between 3 and 19%. One cirratulid polychaete *Tharyx acutus* exhibited some depth-dependent dominance. It was not a dominant species at the five stations that form the deepest cluster Group A. It was more dominant at the shallowest stations within Group D, where it represented over 30% of the individuals collected at the shallowest Station FF13. The paraonid polychaete *A. catherinae* exhibited a similar depth dependence, ranging from high dominance at shallow stations and no dominance within the five deep Group A stations. The related paraonid polychaete *A. quadrilobata* and the cirratulid *Chaetozone sp. A* exhibited the reverse trend, with high dominance at deep Group A stations and no dominance at shallow Group D stations. In fact, *Chaetozone sp. A* was only dominant in the deep Group A stations.

Some other aspects of the ranked abundance of taxa were noteworthy. The oligochaete *Tubificoides apectinatus* had the greatest abundance at two of the five Group A stations (FF1 and FF11). It also ranked high (>22) at other Group A and D stations, but was relatively unimportant (rank>57) at stations within Groups B and C. The seven dominant taxa common to Group C stations in Cape Cod Bay were all polychaetes and included *S.*

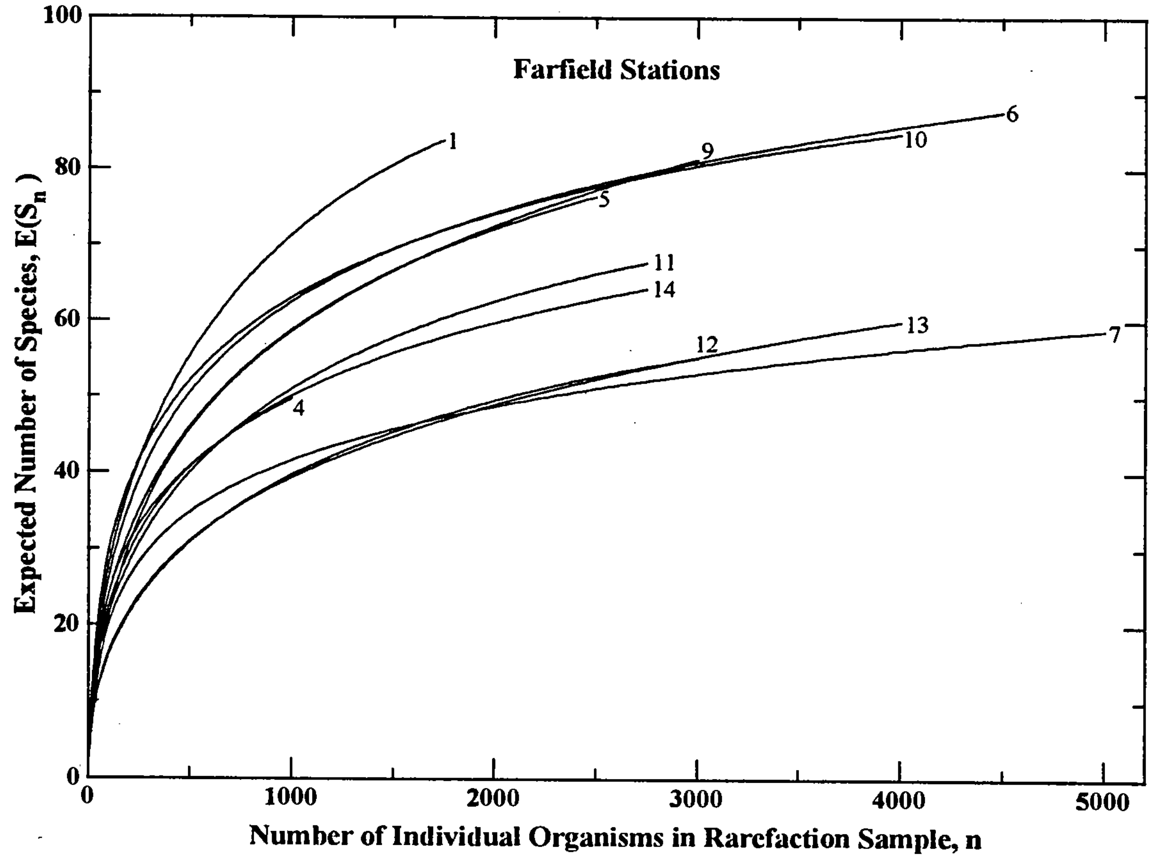



Figure 3.3.10 Hurlbert rarefaction plots for farfield stations.

**Table 3.3.3 Dominant (top ten) macroinfaunal species and taxa identified at farfield stations.**

| Station | Overall Rank | | Taxon | Abundance ($m^{-2}$) | Percent of Total Fauna | Percent of Identified Species |
|---|---|---|---|---|---|---|
| **FF1 (Group A)** | | | | | | |
| | 1 | Oligochaeta | *Tubificoides apectinatus* | 1475 | 9.3 | 10.0 |
| | 2 | Polychaeta | *Maldane glebifex* | 1450 | 9.1 | 9.9 |
| | 3 | Polychaeta | *Chaetozone sp.A* | 1433 | 9.0 | 9.8 |
| | 4 | Polychaeta | *Cossura longocirrata* | 1283 | 8.1 | 8.7 |
| | 5 | Polychaeta | *Anobothrus gracilis* | 1242 | 7.8 | 8.5 |
| | 6 | Polychaeta | *Aricidea quadrilobata* | 1167 | 7.3 | 7.9 |
| | 7 | Polychaeta | *Spio limicola* | 992 | 6.2 | 6.8 |
| | 8 | Bivalvia | *Thyasira gouldii* | 783 | 4.9 | 5.3 |
| | 9 | Bivalvia | *Yoldia sapotilla* | 483 | 3.0 | 3.3 |
| | 10 | Polychaeta | *Mediomastus californiensis* | 458 | 2.9 | 3.1 |
| | | | | | 67.6 | 73.3 |
| **FF4 (Group A)** | | | | | | |
| | 1 | Polychaeta | *Spio limicola* | 3075 | 33.2 | 35.9 |
| | 2 | Polychaeta | *Mediomastus californiensis* | 667 | 7.2 | 7.8 |
| | 3 | Polychaeta | *Levinsenia gracilis* | 542 | 5.8 | 6.3 |
| | 4 | Polychaeta | *Scalibregma inflatum* | 525 | 5.7 | 6.1 |
| | 5 | Polychaeta | *Prionospio steenstrupi* | 517 | 5.6 | 6.0 |
| | 6 | Polychaeta | *Chaetozone sp.A* | 350 | 3.8 | 4.1 |
| | 7 | Polychaeta | *Aricidea quadrilobata* | 308 | 3.3 | 3.6 |
| | 8 | Polychaeta | *Cossura longocirrata* | 258 | 2.8 | 3.0 |
| | 9 | Polychaeta | *Maldane glebifex* | 258 | 2.8 | 3.0 |
| | 10 | Nemertea | *Micrura spp.* | 242 | 2.6 | — |
| | 11 | Bivalvia | *Yoldia sapotilla* | 183 | — | 2.1 |
| | | | | | 72.8 | 78.1 |
| **FF5 (Group A)** | | | | | | |
| | 1 | Polychaeta | *Spio limicola* | 7242 | 30.6 | 33.8 |
| | 2 | Polychaeta | *Aricidea quadrilobata* | 2675 | 11.3 | 12.5 |
| | 3 | Bivalvia | *Thyasira gouldii* | 1583 | 6.7 | 7.4 |
| | 4 | Polychaeta | *Mediomastus californiensis* | 1300 | 5.5 | 6.1 |
| | 5 | Polychaeta | *Levinsenia gracilis* | 925 | 3.9 | 4.3 |
| | 6 | Polychaeta | *Prionospio steenstrupi* | 908 | 3.8 | 4.2 |
| | 7 | Bivalvia | *Nucula delphinodonta* | 775 | 3.3 | 3.6 |
| | 8 | Polychaeta | *Chaetozone sp.A* | 667 | 2.8 | 3.1 |
| | 9 | Crustacea | *Harpinia propinqua* | 658 | 2.8 | 3.1 |
| | 10 | Nemertea | Nemertea spp. | 600 | 2.5 | — |
| | 11 | Bivalvia | Bivalvia spp. | 525 | — | — |
| | 12 | Polychaeta | *Anobothrus gracilis* | 467 | — | 2.2 |
| | | | | | 73.3 | 80.3 |

**Table 3.3.3 (continued) Dominant (top ten) macroinfaunal species and taxa identified at farfield stations.**

| Station | Overall Rank | | Taxon | Abundance ($m^{-2}$) | Percent of Total Fauna | Percent of Identified Species |
|---|---|---|---|---|---|---|
| **FF6 (Group C)** | | | | | | |
| | 1 | Polychaeta | *Spio limicola* | 9575 | 21.9 | 23.7 |
| | 2 | Polychaeta | *Mediomastus californiensis* | 6225 | 14.3 | 15.4 |
| | 3 | Polychaeta | *Cossura longocirrata* | 3150 | 7.2 | 7.8 |
| | 4 | Polychaeta | *Terebellides atlantis* | 2392 | 5.5 | 5.9 |
| | 5 | Gastropoda | *Onoba pelagica* | 2350 | 5.4 | 5.8 |
| | 6 | Polychaeta | *Aricidea quadrilobata* | 2158 | 4.9 | 5.3 |
| | 7 | Polychaeta | *Tharyx acutus* | 2142 | 4.9 | 5.3 |
| | 8 | Polychaeta | *Aricidea catherinae* | 1492 | 3.4 | 3.7 |
| | 9 | Polychaeta | *Ninoe nigripes* | 958 | 2.2 | 2.4 |
| | 10 | Bivalvia | *Nucula annulata* | 892 | 2.0 | 2.2 |
| | | | | | 71.8 | 77.5 |
| **FF7 (Group C)** | | | | | | |
| | 1 | Polychaeta | *Cossura longocirrata* | 16688 | 25.5 | 26.3 |
| | 2 | Polychaeta | *Mediomastus californiensis* | 12175 | 18.6 | 19.2 |
| | 3 | Polychaeta | *Aricidea catherinae* | 8925 | 13.6 | 14.1 |
| | 4 | Polychaeta | *Spio limicola* | 5350 | 8.2 | 8.4 |
| | 5 | Polychaeta | *Tharyx acutus* | 3213 | 4.9 | 5.1 |
| | 6 | Polychaeta | *Aricidea quadrilobata* | 2050 | 3.1 | 3.2 |
| | 7 | Polychaeta | *Euchone incolor* | 1688 | 2.6 | 2.7 |
| | 8 | Polychaeta | *Ninoe nigripes* | 1588 | 2.4 | 2.5 |
| | 9 | Oligochaeta | Tubificidae sp.2 | 1388 | 2.1 | 2.2 |
| | 10 | Polychaeta | *Syllides longocirrata* | 1163 | 1.8 | 1.8 |
| | | | | | 82.9 | 85.5 |
| **FF9 (Group B)** | | | | | | |
| | 1 | Polychaeta | *Spio limicola* | 10958 | 38.3 | 40.8 |
| | 2 | Polychaeta | *Prionospio steenstrupi* | 7200 | 25.2 | 26.8 |
| | 3 | Polychaeta | *Mediomastus californiensis* | 1233 | 4.3 | 4.6 |
| | 4 | Polychaeta | *Exogone verugera* | 883 | 3.1 | 3.3 |
| | 5 | Bivalvia | Bivalvia spp. | 833 | 2.9 | — |
| | 6 | Polychaeta | *Levinsenia gracilis* | 792 | 2.8 | 2.9 |
| | 7 | Polychaeta | *Ampharete acutifrons* | 450 | 1.6 | 1.7 |
| | 8 | Polychaeta | *Polydora socialis* | 358 | 1.3 | 1.3 |
| | 9 | Polychaeta | *Exogone hebes* | 358 | 1.3 | 1.3 |
| | 10 | Polychaeta | *Ninoe nigripes* | 325 | 1.1 | 1.2 |
| | 11 | Polychaeta | *Scoloplos armiger* | 283 | — | 1.1 |
| | | | | | 81.8 | 85.0 |

**Table 3.3.3 (continued) Dominant (top ten) macroinfaunal species and taxa identified at farfield stations.**

| Station | Overall Rank | | Taxon | Abundance ($m^{-2}$) | Percent of Total Fauna | Percent of Identified Species |
|---|---|---|---|---|---|---|
| **FF10 (Group B)** | | | | | | |
| | 1 | Polychaeta | *Spio limicola* | 6775 | 16.2 | 18.5 |
| | 2 | Polychaeta | *Prionospio steenstrupi* | 4642 | 11.1 | 12.7 |
| | 3 | Bivalvia | Nucula spp. | 3517 | 8.4 | — |
| | 4 | Polychaeta | *Mediomastus californiensis* | 2192 | 5.2 | 6.0 |
| | 5 | Polychaeta | *Ninoe nigripes* | 1925 | 4.6 | 5.3 |
| | 6 | Polychaeta | *Monticellina baptiste* | 1858 | 4.4 | 5.1 |
| | 7 | Bivalvia | *Nucula delphinodonta* | 1475 | 3.5 | 4.0 |
| | 8 | Polychaeta | *Leitoscoloplos acutus* | 1292 | 3.1 | 3.5 |
| | 9 | Polychaeta | *Tharyx acutus* | 1258 | 3.0 | 3.4 |
| | 10 | Polychaeta | *Aricidea catherinae* | 1192 | 2.9 | 3.3 |
| | 11 | Bivalvia | *Crenella decussata* | 1092 | — | 3.0 |
| | | | | | 62.5 | 64.7 |
| **FF11 (Group A)** | | | | | | |
| | 1 | Oligochaeta | *Tubificoides apectinatus* | 4592 | 17.1 | 18.5 |
| | 2 | Polychaeta | *Aricidea quadrilobata* | 3683 | 13.7 | 14.8 |
| | 3 | Polychaeta | *Spio limicola* | 3275 | 12.2 | 13.2 |
| | 4 | Polychaeta | *Levinsenia gracilis* | 2633 | 9.8 | 10.6 |
| | 5 | Polychaeta | *Prionospio steenstrupi* | 1892 | 7.1 | 7.6 |
| | 6 | Polychaeta | *Chaetozone sp.A* | 1208 | 4.5 | 4.9 |
| | 7 | Polychaeta | *Euchone incolor* | 958 | 3.6 | 3.9 |
| | 8 | Polychaeta | *Mediomastus californiensis* | 950 | 3.5 | 3.8 |
| | 9 | Polychaeta | *Leitoscoloplos acutus* | 883 | 3.3 | 3.6 |
| | 10 | Polychaeta | *Anobothrus gracilis* | 800 | 3.0 | 3.2 |
| | | | | | 77.9 | 83.9 |
| **FF12 (Group D)** | | | | | | |
| | 1 | Polychaeta | *Aricidea catherinae* | 12100 | 40.3 | 45.2 |
| | 2 | Polychaeta | *Mediomastus californiensis* | 3875 | 12.9 | 14.5 |
| | 3 | Polychaeta | *Tharyx acutus* | 2900 | 9.7 | 10.8 |
| | 4 | Polychaeta | Lumbrineridae spp. | 2725 | 9.1 | — |
| | 5 | Polychaeta | *Ninoe nigripes* | 1375 | 4.6 | 5.1 |
| | 6 | Polychaeta | *Scoletoma hebes* | 1292 | 4.3 | 4.8 |
| | 7 | Polychaeta | *Leitoscoloplos acutus* | 1100 | 3.7 | 4.1 |
| | 8 | Polychaeta | *Prionospio steenstrupi* | 700 | 2.3 | 2.6 |
| | 9 | Polychaeta | *Levinsenia gracilis* | 467 | 1.6 | 1.7 |
| | 10 | Polychaeta | *Spiophanes bombyx* | 433 | 1.4 | 1.6 |
| | 11 | Polychaeta | *Owenia fusiformis* | 317 | — | 1.2 |
| | | | | | 89.8 | 91.8 |

**Table 3.3.3 (continued) Dominant (top ten) macroinfaunal species and taxa identified at farfield stations.**

| Station | Overall Rank | | Taxon | Abundance ($m^{-2}$) | Percent of Total Fauna | Percent of Identified Species |
|---|---|---|---|---|---|---|
| **FF13 (Group D)** | | | | | | |
| | 1 | Polychaeta | *Tharyx acutus* | 11292 | 32.8 | 33.9 |
| | 2 | Polychaeta | *Aricidea catherinae* | 5892 | 17.1 | 17.7 |
| | 3 | Polychaeta | *Nephtys neotena* | 3150 | 9.1 | 9.4 |
| | 4 | Polychaeta | *Mediomastus californiensis* | 3117 | 9.0 | 9.3 |
| | 5 | Polychaeta | *Phyllodoce mucosa* | 2483 | 7.2 | 7.4 |
| | 6 | Polychaeta | *Leitoscoloplos acutus* | 1642 | 4.8 | 4.9 |
| | 7 | Polychaeta | *Prionospio steenstrupi* | 1425 | 4.1 | 4.3 |
| | 8 | Polychaeta | *Capitella capitata* | 567 | 1.6 | 1.7 |
| | 9 | Polychaeta | *Eteone longa* | 517 | 1.5 | 1.5 |
| | 10 | Polychaeta | *Scoletoma hebes* | 508 | 1.5 | 1.5 |
| | | | | | 88.7 | 91.7 |
| **FF14 (Group A)** | | | | | | |
| | 1 | Polychaeta | *Spio limicola* | 5992 | 23.6 | 24.8 |
| | 2 | Polychaeta | *Chaetozone sp.A* | 3667 | 14.4 | 15.2 |
| | 3 | Polychaeta | *Aricidea quadrilobata* | 2408 | 9.5 | 10.0 |
| | 4 | Polychaeta | *Levinsenia gracilis* | 2058 | 8.1 | 8.5 |
| | 5 | Oligochaeta | *Tubificoides apectinatus* | 1683 | 6.6 | 7.0 |
| | 6 | Polychaeta | *Leitoscoloplos acutus* | 958 | 3.8 | 4.0 |
| | 7 | Polychaeta | *Prionospio steenstrupi* | 917 | 3.6 | 3.8 |
| | 8 | Bivalvia | *Thyasira gouldii* | 867 | 3.4 | 3.6 |
| | 9 | Polychaeta | *Mediomastus californiensis* | 833 | 3.3 | 3.4 |
| | 10 | Polychaeta | *Cossura longocirrata* | 683 | 2.7 | 2.8 |
| | | | | | 79.0 | 83.0 |

*limicola, M. californiensis, Cossura Longocirrata, A. Quadrilobata, T. Acutus, A. Catherinae*, and *Ninoe Nigripes*. Some of these species were also among the four dominant taxa common to middepth stations within Group B which were *S. limicola, Prionospio Steenstrupi, M. californiensis*, and *Ninoe Nigripes*. Six dominants were common to the shallow Group D stations. These included the polychaetes *M. californiensis, T. Acutus, A. Catherinae, Scoletoma Hebes, Leitoscoloplos Acutus*, and *P. Steenstrupi*.

### 3.3.5 Relationship Among Cluster Groups

Community ordination techniques were used to define underlying factors responsible for the patterns observed in the station groups. The four groups delineated by numerical classification analyses separated replicate samples geographically (Section 3.3.2). Application of ordination technique further confirmed consistent separation of replicate samples into their respective stations. Ordination distilled two factors that determine the four cluster groups. These two factors accounted for over 60% of the variance in the abundance data. The next (third) factor only explained an additional 12% of the abundance covariance. Thus, to a great degree, these two factors can be used to represent the complex relationships among the large number of species densities contained within replicate samples. These two factors relate to underlying, not-directly-observable constructs within the large set of abundance data.

Figure 3.3.11a shows that replicate samples tightly clustered within groups and that the four groups were separated along two orthogonal principal axes. Thus, the factor (1) that separates Group A from D was linearly independent from the factor (2) that separates Group B from C. Furthermore, these factors consistently distinguished among replicate samples contained within each group. No replicate sample from any station was misplaced in its relation to the other members of the group. This suggests that there were two principal influences that inherently separated the four groups identified in the numerical classifications. From the discussion in Section 3.3.2, Factor 1 is closely correlated with station depth, with decreasing depth corresponding to an increase in Factor 1. Conversely, Factor 2 is associated with another influence unrelated to depth but possibly related to the latteral separation between mid-depth stations.

The species responsible for the separation of clusters into the two factors are shown in Figure 3.3.11b. All of the dominant species discussed in Section 3.3.4 were included in the ordination and their location reflects the trends described in that section. Specifically, *A. catherinae* and *T. acutus* were primarily associated with shallow depths and they were also associated with a large Factor 1, exceeding 1.5, and with relatively low Factor 2 values. The ordination also indicated that the lumbrinerid polychaete *Scoletoma hebes* was associated with shallow stations. Conversely, *A. quadrilobata* and *Chaetozone sp. A* exhibited the opposite trend, with negative Factor 1 values indicative of deep stations. Figure 3.3.11b reveals other species associated with deep stations, including the annelids *Spio limicola, Maldane glebifex, Levinsenia gracilis*, and *Tubificoides apectinatus* as well as the bivalves *Yoldia sapotilla* and *Thyasira gouldii*. As described in Section 3.3.4, the capitellid *M. californiensis* was a dominant species at all farfield stations and its uniform distribution was reflected in small Factor 1 values.

The species responsible for separating Group B from C are also evident from differences in Factor 2 values in Figure 3.3.11b. Species that were comparatively abundant in Group C within Cape Cod Bay were the polychaetes *Cossura longocirrata, Syllides longocirrata*, and *Terebellides atlantis*. All three were dominant species at either Station FF6 or FF7 or both. They were not listed as dominant species at Group B stations in Table 3.3.3. Instead, Group B stations had relatively high abundances of the polychaetes *Prionospio steenstrupi, Monticellina baptiste*, and *Exogone verugera* compared the Group C stations. Again, abundances associated with these polychaetes were ranked among the top ten of taxa at Stations FF9 and FF10 while they were part of the dominant species at Group C stations listed in Table 3.3.3.

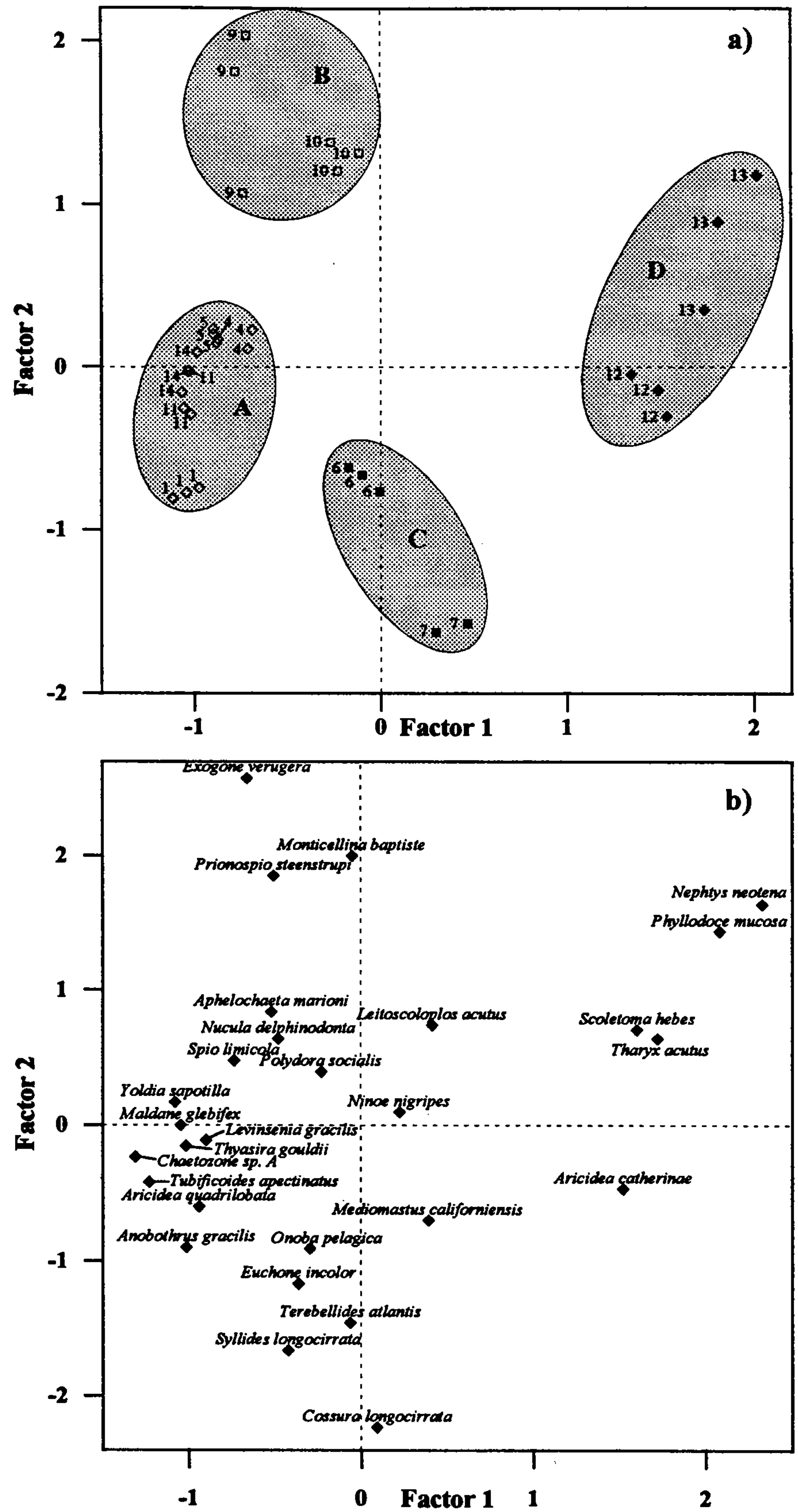



**Figure 3.3.11 Results of correspondence analysis (reciprocal averaging) ordination showing the distribution of a) farfield replicate samples and b) species along the two principal factors.**

### 3.3.6 Association with Abiotic Properties

This section examines abiotic properties that may be responsible for discriminating among the four farfield station groups. As described in Section 3.2.1, *C. perfringens* spore counts are included with abiotic properties because they correlate with truly abiotic variables and differ from the macro-infaunal biological parameters. Because of high correlation among abiotic variables, it is not always possible to isolate a single relevant abiotic property as the cause of infaunal distribution. Moreover, high correlations only indicate a possible linear association and no causality can be ascribed to relationships derived solely from a bivariate correlation. Because of the high ($R$>0.88) intercorrelation among some abiotic properties, particularly PAH, PCB, and silver in Table 3.2.1, only five of the seven variables were examined. Another reason to limit the number of bivariate analyses is that some coefficients in a large table would be expected to be statistically significant by chance alone even though there is no true association among the variables.

**Table 3.3.4 Pearson correlation coefficients between logarithmically transformed abundance of indicator species and selected parameters at farfield stations. Lightly shaded coefficients are statistically significant at the 95% confidence level and dark shading delineates 99% confidence.**

| Farfield Group | Species | Depth | Mud | TOC | *C. perfringens* | Silver |
|---|---|---|---|---|---|---|
| A | *Chaetozone Sp.A* | 0.88 | 0.53 | 0.36 | -0.58 | -0.59 |
| | *Thyasira gouldii* | 0.56 | 0.51 | 0.36 | -0.84 | -0.84 |
| | *Levinsenia gracilis* | 0.53 | 0.40 | 0.27 | -0.90 | -0.86 |
| | *Aricidea quadrilobata* | 0.67 | 0.73 | 0.62 | -0.79 | -0.59 |
| | *Spio limicola* | 0.38 | 0.34 | 0.24 | -0.81 | -0.69 |
| | *Maldane glebifex* | 0.66 | 0.38 | 0.24 | -0.40 | -0.61 |
| | *Tubificoides apectinatus* | 0.61 | 0.54 | 0.42 | 0.06 | 0.06 |
| | *Yoldia sapotilla* | 0.72 | 0.57 | 0.44 | -0.82 | -0.80 |
| B | *Prionospio steenstrupi* | 0.05 | -0.49 | -0.64 | 0.12 | -0.19 |
| | *Monticellina baptiste* | -0.59 | -0.45 | -0.53 | 0.23 | -0.05 |
| | *Exogone verugera* | -0.14 | -0.46 | -0.42 | -0.03 | -0.21 |
| C | *Syllides longocirrata* | 0.47 | 0.85 | 0.85 | -0.40 | -0.22 |
| | *Cossura longocirrata* | 0.45 | 0.69 | 0.73 | -0.61 | -0.33 |
| | *Terebellides atlantis* | -0.00 | 0.35 | 0.41 | -0.33 | -0.05 |
| D | *Tharyx acutus* | -0.87 | -0.44 | -0.34 | 0.60 | 0.66 |
| | *Scoletoma hebes* | -0.72 | -0.64 | -0.62 | 0.78 | 0.54 |
| | *Aricidea catherinae* | -0.83 | -0.38 | -0.27 | 0.57 | 0.62 |

Pearson correlation coefficients in Table 3.3.4 are computed for logarithmically transformed abundance of the species that are most indicative of four farfield groups as determined by the ordination analysis described in Section 3.3.5. Figure 3.3.11 shows that Groups A and D were distinguished by one factor that accounts for most of the variability in community structure. Groups B and C were distinguished by a separate, linearly independent (uncorrelated) factor. Species indicative of these factors are shown in Table 3.3.4. As suggested previously, the first factor is related to depth. Five of the eight species indicative of Group A had a statistically-significant positive correlation with depth at the 95% confidence level. The other three species were also positively correlated with depth and two of these (*T. gouldii* and *L. gracilis*) were statistically significant at the 90% level.

The five stations within Group A were the deepest stations. At all farfield stations, these eight indicator species increased in abundance with increasing depth. Because depth was negatively correlated with *C. perfringens* spore counts and silver concentration (Table 3.2.1), indicator species were generally negatively correlated with these concentrations. A similar negative correlation would be expected between Group A indicator species and PAH and PCB concentrations.

The three indicator species for the shallow Group D exhibited the opposite trend. Abundances of all of these species strongly decreased with depth and increased with increasing *C. perfringens* spore counts, silver concentration, and probably organic contaminants. It is unclear which, if any, of these abiotic and spore-count variables was responsible for the distribution of the eleven species indicative of Groups A and D. It is likely that another related factor, possibly unmeasured or untested, represents the actual mechanism controlling the distribution of both infaunal and abiotic variables. An example of a plausible untested factor is distance from the Boston Harbor contaminant source. It is noteworthy that the correlation of these depth-related species with mud fraction and TOC content (Table 3.3.4) was comparatively low. This lack of correlation with sediment type has been described for *A. catherinae*, *S. limicola*, *T. acutus*, and *T. apectinatus* in previous studies in the region (Shea *et al.*, 1991). All of these species were indicative of either Group A or D.

In contrast, the factor that separates Groups B and C appears to be related to sediment type. Species indicative of the two stations in Cape Cod Bay (Group C) all exhibited positive correlation with the mud fraction and TOC content. With the exception of *C. perfringens* spore counts, no statistically significant correlations existed between these species and the other abiotic variables associated with Factor 1 (*e.g.*, depth) that separates Groups A and D. Although the correlation between the abundance of Group B indicator species and mud fraction and TOC content was not statistically significant at the 95% confidence level, the correlation was consistently negative and relatively high compared to correlations with other abiotic variables. Moreover, prior studies in the region (Shea *et al.*, 1991) determined a strong relationship between sediment type and all three of the Group B indicator species. As before, the actual mechanism controlling the distribution of Group B and C indicator species and the two abiotic variables is not clear. Again, it is possible that a related influence, such as kinetic energy within the benthic boundary layer, could be responsible for the distribution of these species.

### 3.3.7 Interannual Variability

All eleven farfield stations analyzed here were also occupied in August 1992 and the infaunal community structure at that time was described by Blake *et al.* (1993). To lend qualitative insight into interannual changes in community structure, this section compares the results from these two consecutive years. The gross geographic distribution of sediment properties at farfield sites was consistent between the two years. Infaunal community structure generally exhibited a similar consistency. In both years, the same five deep stations were affiliated with farfield Group A (Figure 3.3.5). Also, the pair of stations (FF6 and FF7) within Cape Cod Bay clustered together as Group C in both years. In the 1993 sample, the pair of shallow stations (FF12 and FF13) associated with farfield Group D were autonomous from the slightly deeper pair of Group B stations (FF10 and FF9). However, the similarity among the station pairs was comparatively low (Figure 3.3.4) and clustering performed by Blake *et al.* (1993) did not distinguish among these four stations in the data collected in 1992.

Without reanalysis of the 1992 data, it is not clear whether the differences in clustering farfield Groups B and D were due to actual temporal changes in the taxonomic composition at these stations or whether they were artifacts of slightly different numerical classifications. Nevertheless, community ordination of the 1992 infaunal data suggests that the community structure at Station FF12 was more closely associated with Group B stations (FF9 and FF10) than with Station FF13 in Group D (Figure 3.3.11a). In 1992, Station FF13 was distinguished by a high abundance of *Polydora cornuta*. Changes in its relative ranking and abundance in 1993 are the likely cause of the differences in clustering in 1993. To further explore the significance of this difference, a null hypothesis test was performed on mean *P. cornuta* abundance assuming unequal variances and a log-normal distribution. The decrease in abundance was marginally significant at the 90% confidence level ($\alpha$=0.099)

Differences in ranking of species abundance can lend further insight into the degree of interannual change in community structure. For the most part, ranking of prevalent species was consistent between the two years. There were only eight instances where a species whose abundance ranked in the highest ten in 1992 changed rank by more than sixteen in 1993. At Stations FF4 and FF5, the relative ranking of *Polydora socialis* dropped from 10 to 46 and from 7 to 42, respectively. This change in ranking was due to a decrease in abundance from 316 to 8 $m^{-2}$ at Station FF4 and from 575 to 41 $m^{-2}$ at FF5. At Station FF6, the ranking of *Tubificidae sp. 2* dropped from fifth in 1992 with an abundance of 816 $m^{-2}$ to a rank of 49 with an abundance of 83 $m^{-2}$ in 1993. At Station FF7, the abundance of *Prionospio steenstrupi* decreased from 800 $m^{-2}$ with a rank of 9 in 1992 to 12 $m^{-2}$ with a rank of 49 in 1993. At Station FF11, the abundance of tenth-ranked *Parougia caeca* dropped from 308 $m^{-2}$ in 1992 to 42 $m^{-2}$ in 1993 when its rank was 29. At Station FF12, the abundance of tenth-ranked *Polydora quadrilobata* dropped from 675 $m^{-2}$ in 1992 to 17 $m^{-2}$ in 1993 when its rank was 40.

Finally, two of the largest changes in abundance occurred at Station FF13. Eighth-ranked *Aphelochaeta monilaris* had an abundance of 575 $m^{-2}$ in 1992 but was not observed in the 1993 samples from this station. As mentioned, a dramatic change occurred for *Polydora cornuta* which had the second highest abundance at Station FF13 in 1992. In 1993, the abundance of *P. cornuta* dropped to 25 $m^{-2}$ with a rank of 37. The community ordination performed by Blake *et al.* (1993) lists *P. cornuta* as the indicator species for the separation of Station FF13 from the community structure at other farfield stations. This is the only station where *P. cornuta* was collected in both years and the drop in its abundance in 1993 caused the community structure at Station FF13 to be similar to that of Station FF12. *P. cornuta* was one of the most common species observed within Boston Harbor in 1993 (Kropp and Diaz, 1994). It would appear that, because Station FF13 is adjacent to the mouth of the Harbor, the influence of the Harbor on community structure is reflected in the abundance of *P. cornuta*. Without its influence (*viz.* in 1993) Station FF13 is closely affiliated with other shallow stations within Massachusetts Bay. With strong Harbor influence in 1992, the community structure at Station FF13 was unlike other farfield stations and was comparable to traditional stations within Boston Harbor.

Other aspects of the infaunal communities in 1992 and 1993 were comparable. Total abundance was higher for shallow stations in both years. Also, the range in densities in 1993 (9,000 to 65,000 $m^{-2}$) was comparable to that of 1992 (6,000 to 70,000 $m^{-2}$) except at Station FF10 which had a much higher density (99,000 $m^{-2}$) in 1992. Several species accounted for the elevated abundance at this station in 1992. In both years, the highest numbers of individuals and species were members of the annelid phylum. The distribution of spionid and paraonid polychaetes was similar across years. In 1992, as in 1993, the highest spionid densities were at Stations FF9 and FF10 within farfield Group B. Similarly, the highest paraonid polychaete densities were observed at Station FF12 in both years. Rarefaction curves and community indices were largely comparable across years. The highest diversity index was found at Stations FF1 and FF10 in both years. Station FF1 also had the highest evenness in both years.

### 3.4 MIDFIELD MACROINFAUNAL ASSEMBLAGES

Midfield macroinfaunal statistics were computed using three farfield and nine nearfield stations to characterize the local benthic community within 8 km of the diffuser (Figure 2.1.2). The midfield stations most distant from the diffuser were a factor of 10 closer than those of the farfield analyses.

### 3.4.1 Taxonomic Composition

A total of 196 taxa representing 11 major taxonomic groups was identified among the 35,741 organisms encountered in samples collected at nearfield stations. Nearly all (33,968 or 95%) of the total number of organisms were classified into 165 species contained within the 196 taxa. Appendices A-1 and A-2 list identified taxa arranged phylogenetically for sieve-size fractions of 0.3 and 0.5 mm, respectively. The number of organisms per replicate sample ranged from 148 individuals (Replicate 1 at Station NF17) to 5,025 (Replicate 1 at Station NF8) (Table 3.4.1). Station NF2 exhibited wide variability (large coefficient of variation) in replicate sample densities resulting from a large standard deviation compared to other stations. The Station NF17 mean had a large coefficient of variation due to a low mean value compared to other nearfield stations. Infaunal abundance for each sieve-size fraction tracked variations in total station abundance, and the lowest and highest densities were observed at Stations NF17 and NF8, respectively (Figure 3.4.1). The density of organisms was consistently greater in the 0.5-mm fraction and ranged from 59% of the total station density at Station NF8 to 82% at Station NF12.

### 3.4.2 Numerical Classification

In contrast to the community structure among farfield stations, the greatest similarities were not always among replicate samples from the same midfield station. Numerical classification of replicate samples at midfield distances from the diffuser is presented in Figures 3.4.2 and 3.4.3. Numerical classification was unable to clearly distinguish between replicate samples among Stations NF9, NF10, and NF16. This indicates that the structure of the macroinfaunal community at these stations is indistinguishable compared to differences in community structure at other stations. These three stations are in close proximity (Figure 2.1.2) with a maximum spatial separation of 2.5 km. At other stations, clustering using NNESS or Bray-Curtis similarity revealed the highest similarity was generally among the replicate samples from each individual station. The three replicate samples within these individual stations had NNESS similarities as high as 0.975 at Station NF8 and were above 0.9 at all stations except Replicate 2 at Station NF4. Not surprisingly, numerical classification using Bray-Curtis similarity (Figure 3.4.3) clustered this replicate with Station NF14 replicate samples.

Three distinct cluster groups of stations were evident from pooled replicate clustering. Because of high similarity among replicate samples at individual stations, the numerical classification of pooled abundance shown in Figure 3.4.4 delimited station groups similar to the groupings shown in Figures 3.4.2 and 3.4.3. Using a NNESS similarity of 0.85 as a decision rule in Figure 3.4.4b produced three major clusters and three isolated stations. These three clusters are not completely distinct geographically, since as shown in Figure 3.4.5, Station NF12 of Group B splits Stations NF14 and NF16 from the other stations in Group C. When a less restrictive NNESS similarity (between 0.67 and 0.77) is used as a decision rule in Figure 3.4.4b, the three isolated stations coalesce and three modified cluster groups are formed. This three modified groups are delineated by dashed lines in Figure 3.4.5. Group A, consisting only of farfield Stations FF12 and FF13, remains unchanged. The numerical classification of farfield stations, described in Section 3.3.2, also classified these stations together. Stations NF2 and NF17 form a new Group D, while Groups B and C coalesce to form a new Group E which contains Station NF4.

Stations NF4 and NF17 had relatively low similarity with other stations and they were distinguished by the lowest organism densities (<22,000 individuals $m^{-2}$) of any of the stations at midfield distances from the diffuser (Figure 3.4.6 and Table 3.4.2). Station NF2 also had low abundance. Group D was formed from Stations NF2 and NF17 when decision rules were relaxed.

A pattern consistent with numerical classification also emerged from polychaete family densities (Figure 3.4.7). Except at outlier Stations NF2 and NF17, the annelid phylum was, by far, the most abundant major taxonomic group. From Figure 3.4.7, characteristics of the numerical classifications can be distinguished in terms of relative

**Table 3.4.1 Number of macroinfaunal organisms recovered from replicates at nearfield stations.**

| Station | Replicate 1 | 2 | 3 | Mean | Standard Deviation | Coefficient of Variation |
|---|---|---|---|---|---|---|
| NF2 | 716 | 1817 | 523 | 1019 | 698 | 69% |
| NF4 | 757 | 571 | 1220 | 849 | 334 | 39% |
| NF8 | 5025 | 3506 | 2882 | 3804 | 1102 | 29% |
| NF9 | 964 | 1447 | 1045 | 1152 | 259 | 22% |
| NF10 | 1303 | 904 | 1753 | 1320 | 425 | 32% |
| NF12 | 1354 | 1356 | 2380 | 1697 | 592 | 35% |
| NF14 | 1133 | 621 | 895 | 883 | 256 | 29% |
| NF16 | 632 | 1046 | 1217 | 965 | 301 | 31% |
| NF17 | 148 | 164 | 362 | 225 | 119 | 53% |

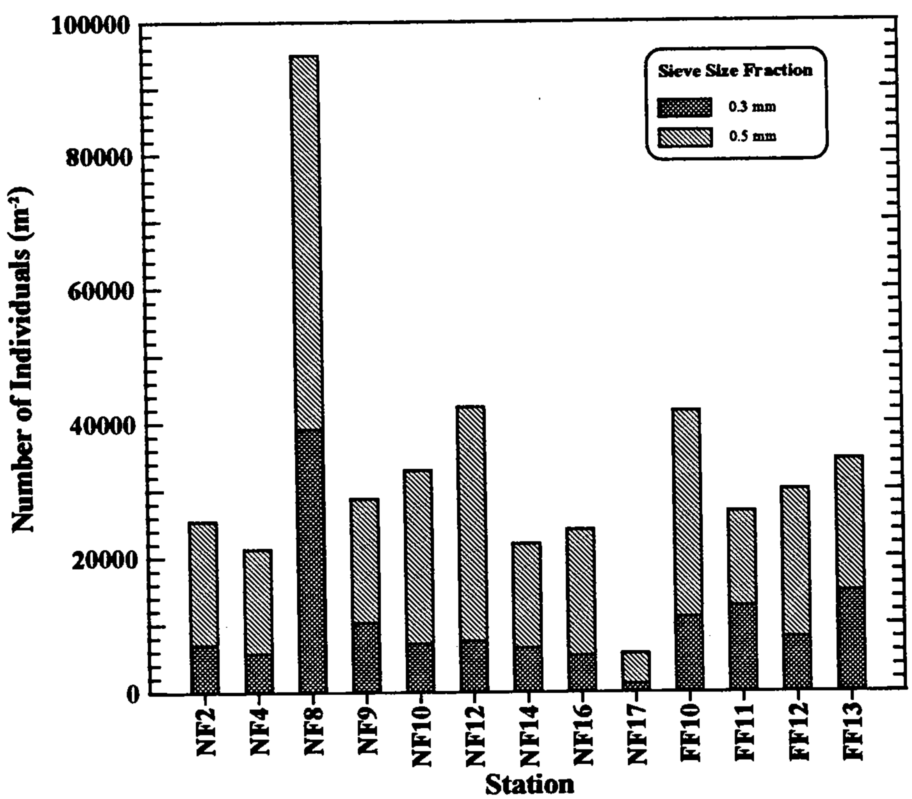



**Figure 3.4.1 Density of organisms determined from the two sieve-size fractions collected from stations at midfield distances from the diffuser.**

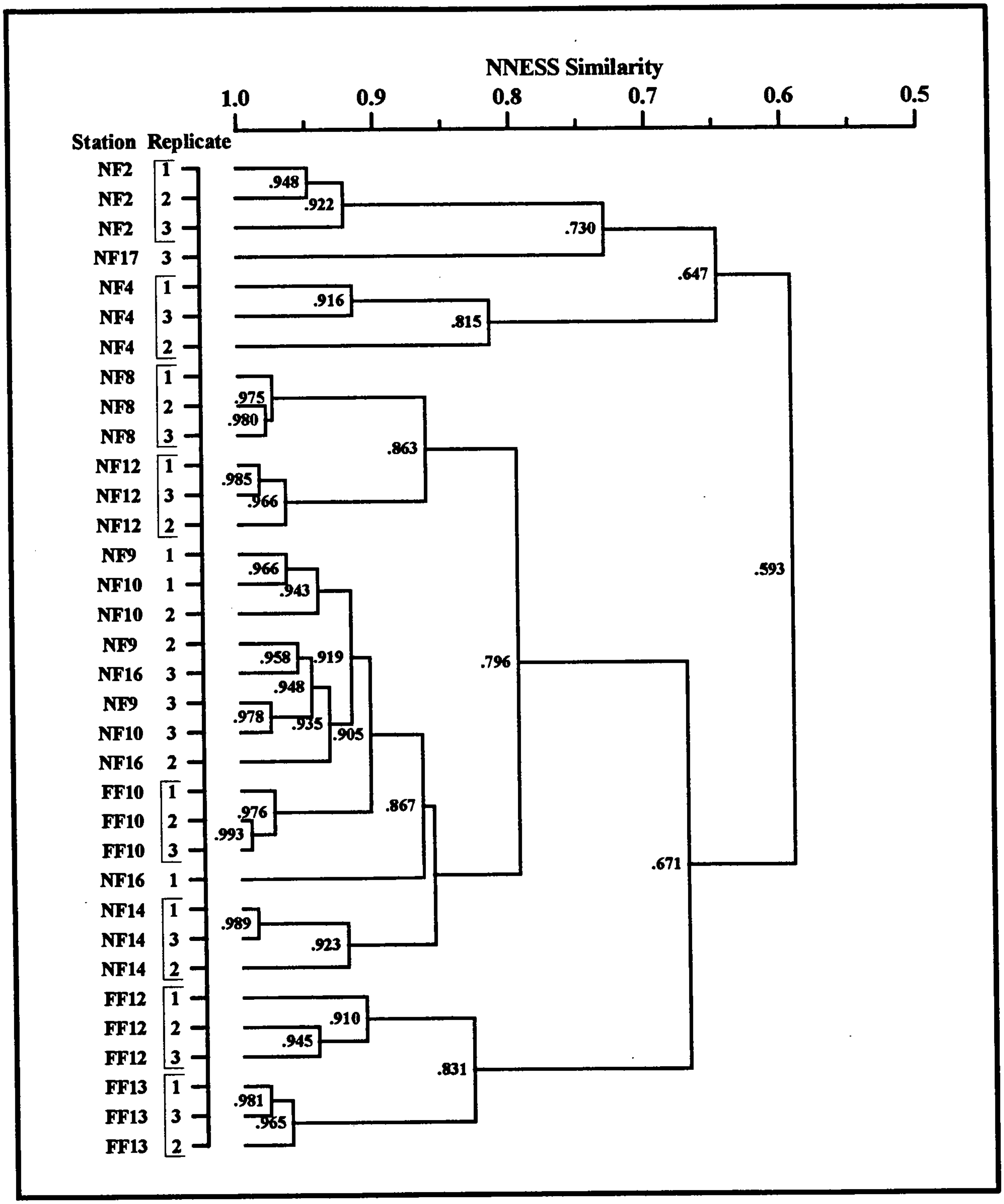



**Figure 3.4.2 Dendrogram resulting from clustering (group average sorting) of NNESS similarity (m=200) among replicates collected at midfield distances. Replicates 1 and 2 from Station NF17 were necessarily excluded because they have fewer than 200 individuals. Stations which exhibit the highest similarities among all three replicates are enclosed by brackets.**

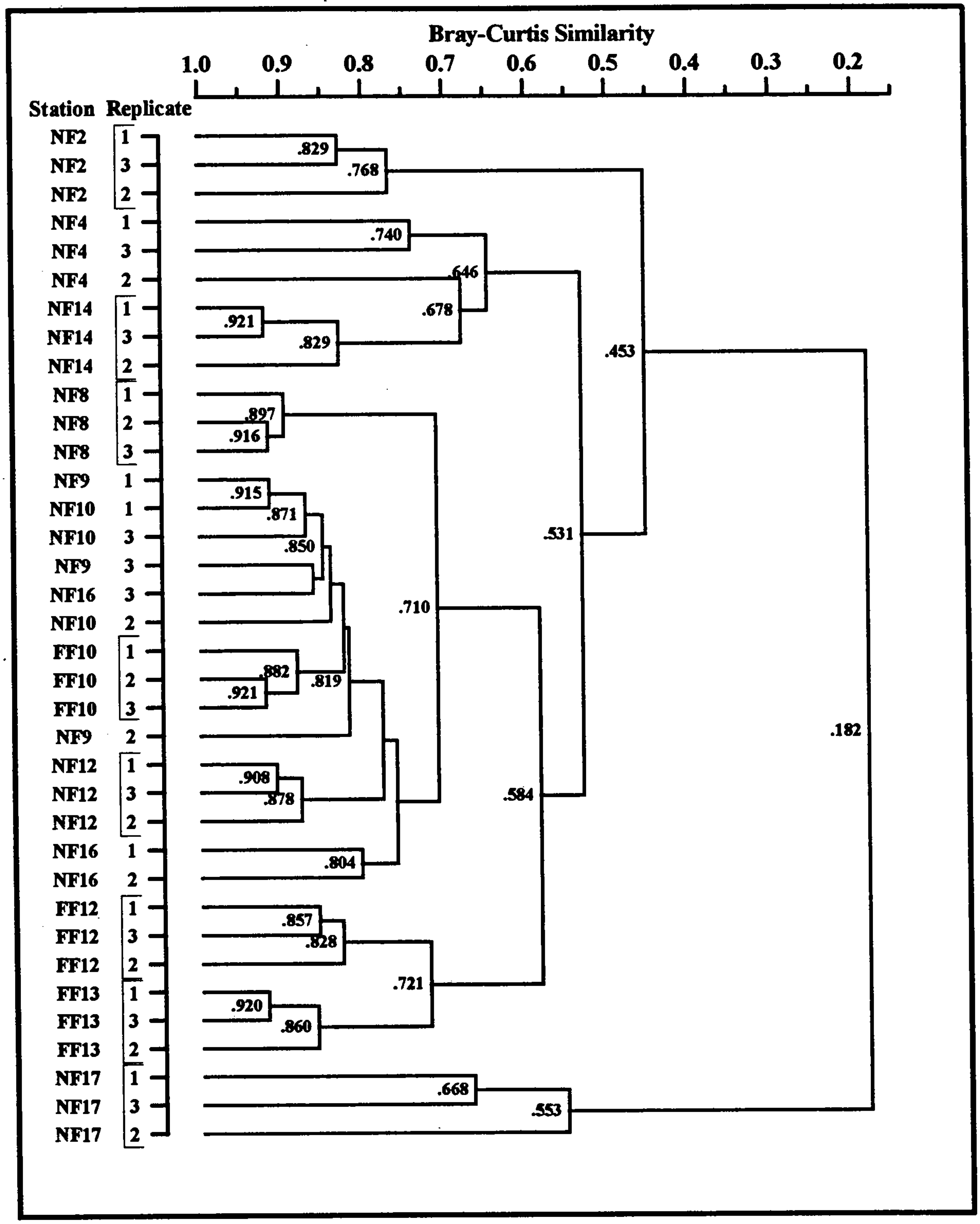



**Figure 3.4.3** Dendrogram resulting from clustering (group average sorting) of Bray-Curtis similarity among replicates collected at midfield distances. Stations which exhibit the highest similarities among all three replicates are enclosed by brackets.

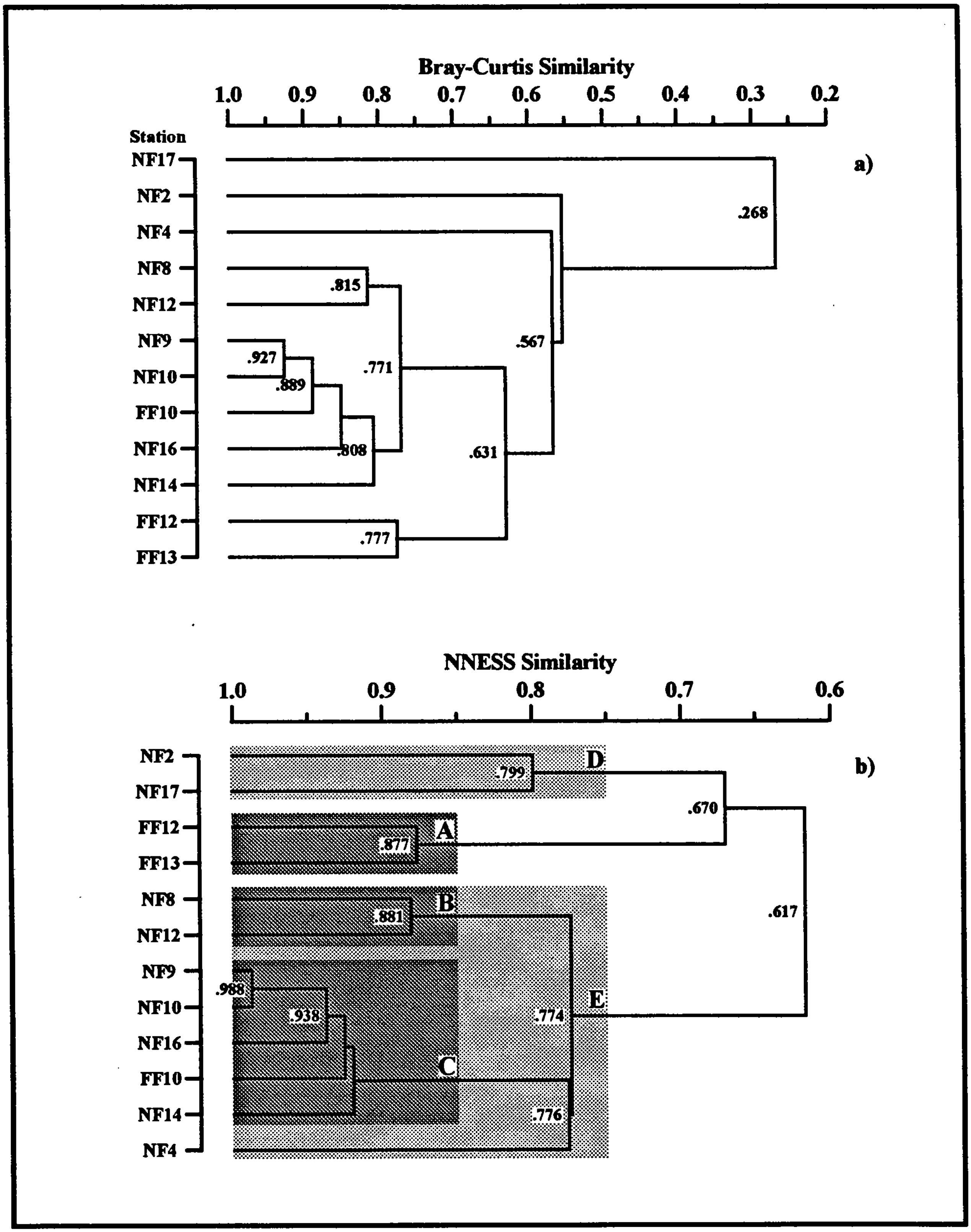



Figure 3.4.4 Dendrograms resulting from clustering (group average sorting) of pooled replicate abundance data at midfield distances (<8km) from the diffuser using (a) Bray-Curtis and (b) NNESS (m=200) similarity measures.

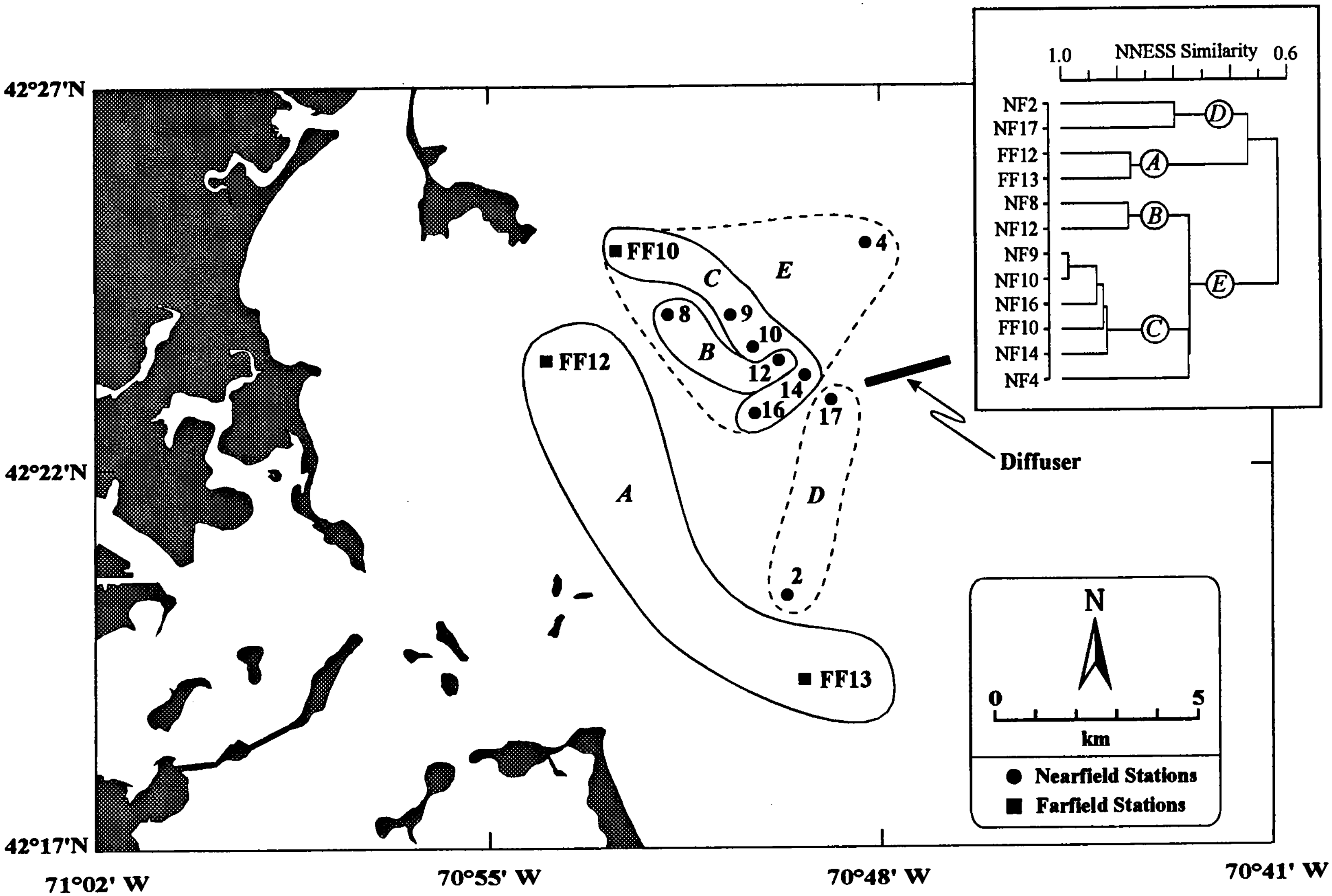



**Figure 3.4.5 Geographic distribution of midfield cluster groups. The inset shows the dendrogram of Figure 3.4.4b.**

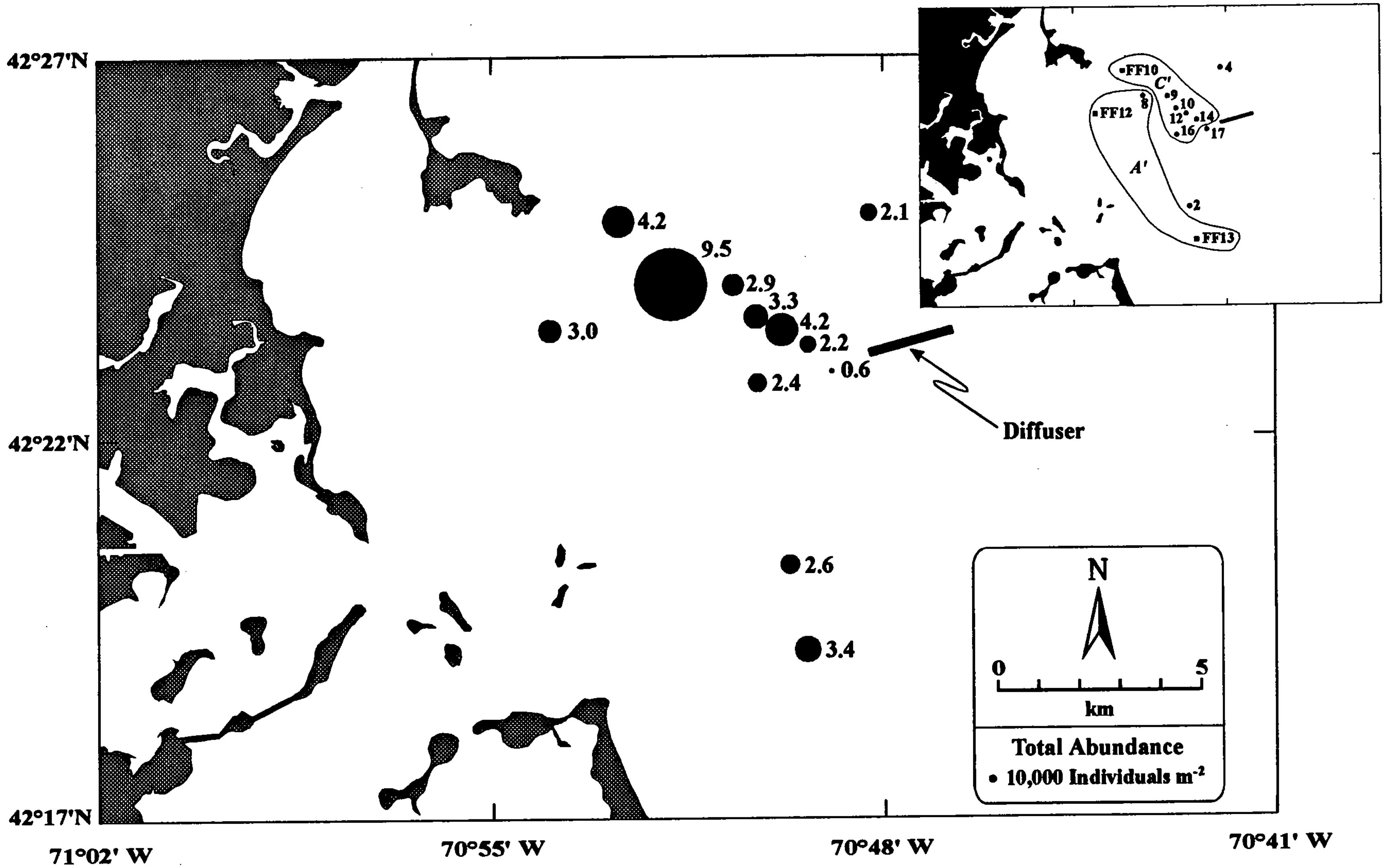



**Figure 3.4.6 Geographic distribution of total infaunal density at midfield distances from the diffuser. The diameter of the circles scales as a linear function of infaunal density and the numbers represent 10,000 individuals $m^{-2}$. The inset shows midfield station groups determined from the benthic infaunal community structure summarized in Table 4.3.1.**

**Table 3.4.2 Density and diversity related community parameters for stations located at midfield distances (<8 km) from the diffuser.**

| Midfield Group | Station | Depth (m) | Density ($m^{-2}$) | Density[1] ($m^{-2}$) | Number of Species | Richness d' | Diversity H' | Evenness J' | Dominance C' |
|---|---|---|---|---|---|---|---|---|---|
| A | FF13 | 19 | 34475 | 33358 | 60 | 7.1 | 2.27 | 0.55 | 0.174 |
| | FF12 | 22 | 30017 | 26742 | 56 | 6.8 | 2.07 | 0.51 | 0.246 |
| B | NF8 | 29 | 95108 | 92383 | 63 | 6.7 | 1.72 | 0.41 | 0.317 |
| | NF12 | 34 | 42417 | 40758 | 64 | 7.4 | 2.38 | 0.57 | 0.157 |
| C | FF10 | 27 | 41800 | 36617 | 86 | 10.1 | 3.22 | 0.72 | 0.071 |
| | NF9 | 29 | 28800 | 27400 | 75 | 9.1 | 2.92 | 0.68 | 0.109 |
| | NF16 | 29 | 24125 | 22650 | 79 | 9.9 | 2.86 | 0.66 | 0.111 |
| | NF10 | 32 | 33000 | 31425 | 76 | 9.1 | 2.59 | 0.60 | 0.140 |
| | NF14 | 33 | 22075 | 20650 | 66 | 8.3 | 2.92 | 0.70 | 0.080 |
| | NF4 | 35 | 21233 | 19700 | 85 | 10.8 | 3.07 | 0.69 | 0.077 |
| D | NF2 | 26 | 25467 | 23108 | 61 | 7.6 | 1.80 | 0.44 | 0.419 |
| | NF17 | 29 | 5617 | 4992 | 35 | 5.3 | 2.30 | 0.65 | 0.235 |

[1] Abundance computed using only those taxa identified to species level.

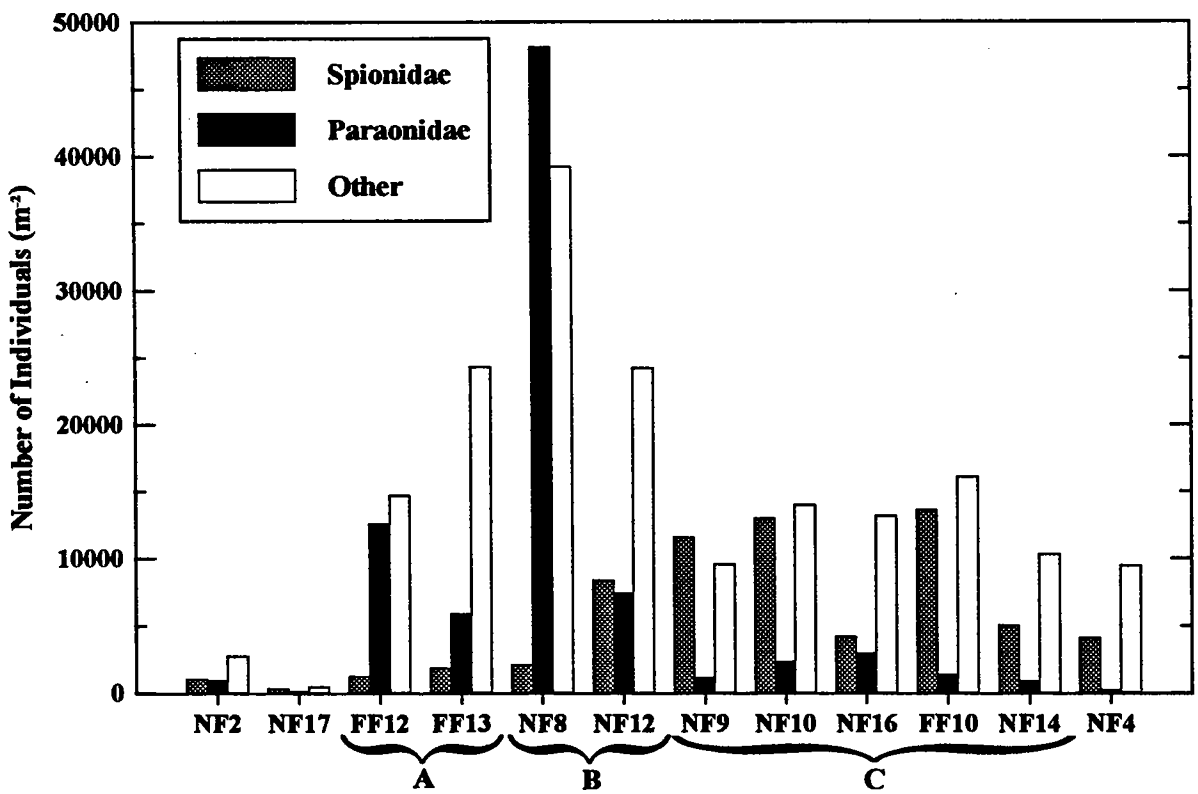



**Figure 3.4.7 Abundance (number of individuals $m^{-2}$) of organisms within the major polychaete families at midfield distances from the diffuser.**

abundances of spionid, paraonid, and other polychaete families. Group A, consisting of Stations FF12 and FF13, exhibited a pattern of relatively low spionid populations and high paraonid densities (Figures 3.4.7 through 3.4.9). Group B stations were also characterized by high paraonid densities. Stations within Group C exhibited an opposite trend with generally low paraonid population densities. In contrast to the farfield, there was no clear relationship between water depth and cluster group in the nearfield (Table 3.4.2). The depth range spanned by nearfield stations was much smaller (26 to 35 m).

### 3.4.3 Diversity and Related Community Characteristics

Table 3.4.2 lists organism density and diversity related parameters for stations at midfield distances from the diffuser organized by the cluster groups described in Section 3.4.2. For both total abundance and abundance of taxa identified to species level, the highest densities were generally observed at the two Group B stations (NF8 and NF12) and the lowest densities were at the two Group D stations (NF2 and NF17).

Although there was a wide variation in abundance among stations at midfield distances from the diffuser, total number of species tracked the ranking of diversity and richness indices. This is because the rarefaction curves (Figure 3.4.10) had similar curvature at sample sizes beyond the smallest sample size ($n \approx 500$) at Station NF17. Thus, comparing $E(S_n)$ rarefaction curves at the smallest sample size yields diversity ranking consistent with the Species Richness Index ($d'$) and the nearfield stations contained within Group C (NF4, NF16, NF9 and NF14) all exhibit elevated $E(S_n)$. Thus, the one clear distinction among diversity statistics for cluster groups was that stations contained within the largest cluster Group C (and including Station NF4) all had the highest diversity index, number of species, evenness index, and richness.

As in the case of farfield analyses, differences in the distribution of individuals among species did introduce some bias in diversity indices ($H'$, $J'$, $C'$ and $d'$) at Station NF2. Although its rarefaction curve lies above that of Group B Stations NF8 and NF12, it exhibited a relatively low diversity index. This is a consequence of the anomalously high dominance index, the highest of all nearfield or farfield stations. The high dominance at Station NF2 was due to the comparatively high density of a single species of bivalve, namely *Hiatella arctica*. This bivalve comprised 64% of the individuals identified to species level at that station (Table 3.4.3).

### 3.4.4 Dominant Taxa and the Relationship Among Cluster Groups

Dominant species and taxa at nearfield stations are presented in Table 3.4.3. Again, dominant species were defined as the ten most abundant species or taxa identified at a station. Community ordination techniques were also used to define underlying factors responsible for the patterns observed in the abundance distribution among taxa, particularly the dominant species at individual stations. A community ordination performed on pooled station data is shown in Figure 3.4.11. As indicated by the numerical classification described in Section 3.4.2, Stations NF2 and NF17 represent outliers. Ordination shown in Figure 3.4.11a confirms the departure of their macroinfaunal community structure from other stations at midfield distances from the diffuser. Ordination also shows that they differ from one another in terms of the first two principal components of midfield abundance. These first two factors accounted for over 60% of the variance in the abundance data. The next (third) factor only explained an additional 13% of the abundance covariance. Although Stations NF2 and NF17 clustered at a relatively low NNESS similarity in Figure 3.4.4b and were designated Group D, the midfield ordination strongly discriminates between the community structure at these stations and suggests that the numerical classification computed from Bray-Curtis similarity in Figure 3.4.4a is a more appropriate portrayal of their unclustered relationship.

The species primarily responsible for discriminating between Stations NF2 and NF17 are shown in Figure 3.4.11b. At Station NF2, a single species of bivalve, *H. arctica*, was responsible for large Factor 2 levels.

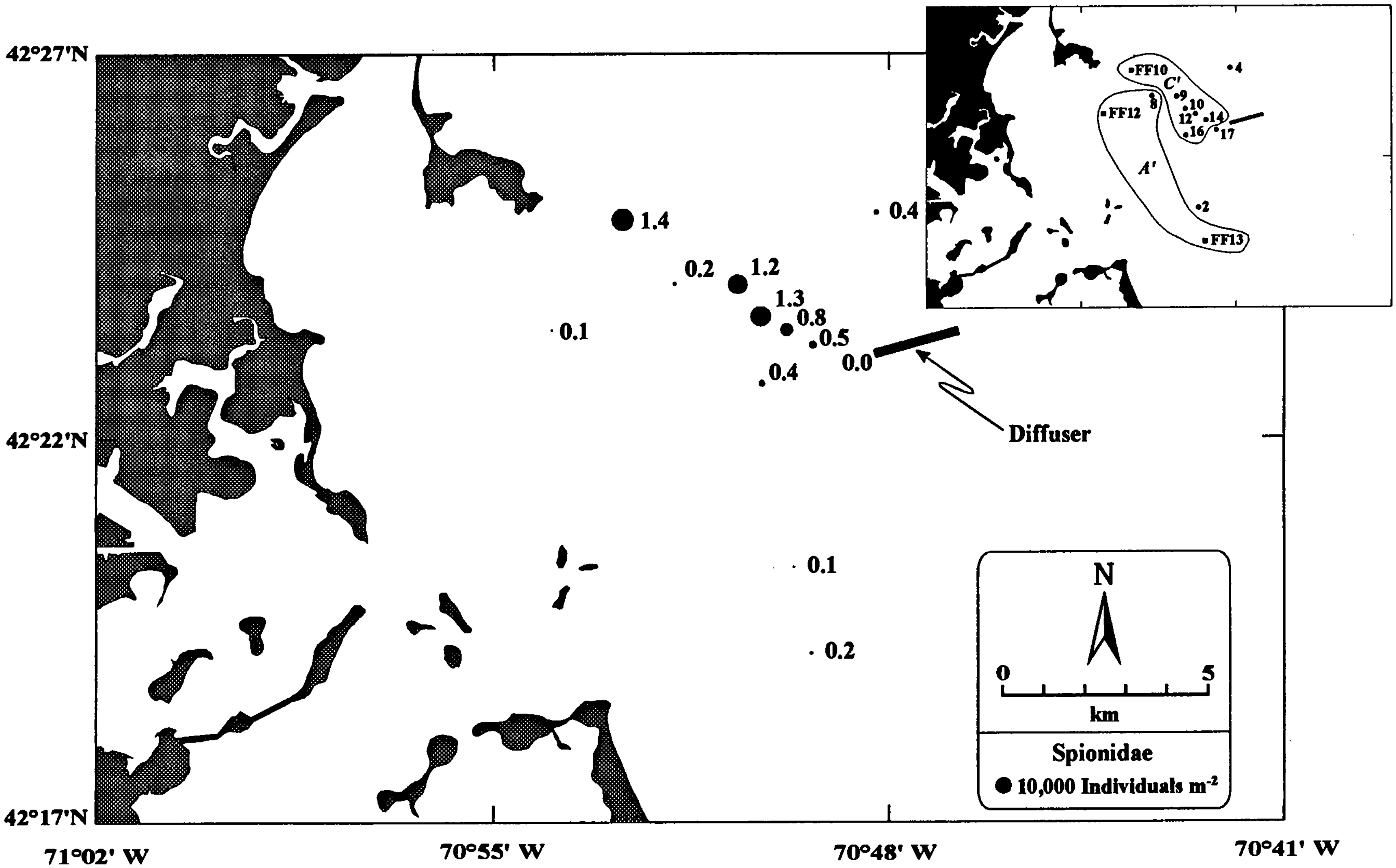



Figure 3.4.8 Geographic distribution of spionid polychaete abundance at midfield distances from the diffuser. The inset is described in Figure 3.4.6.

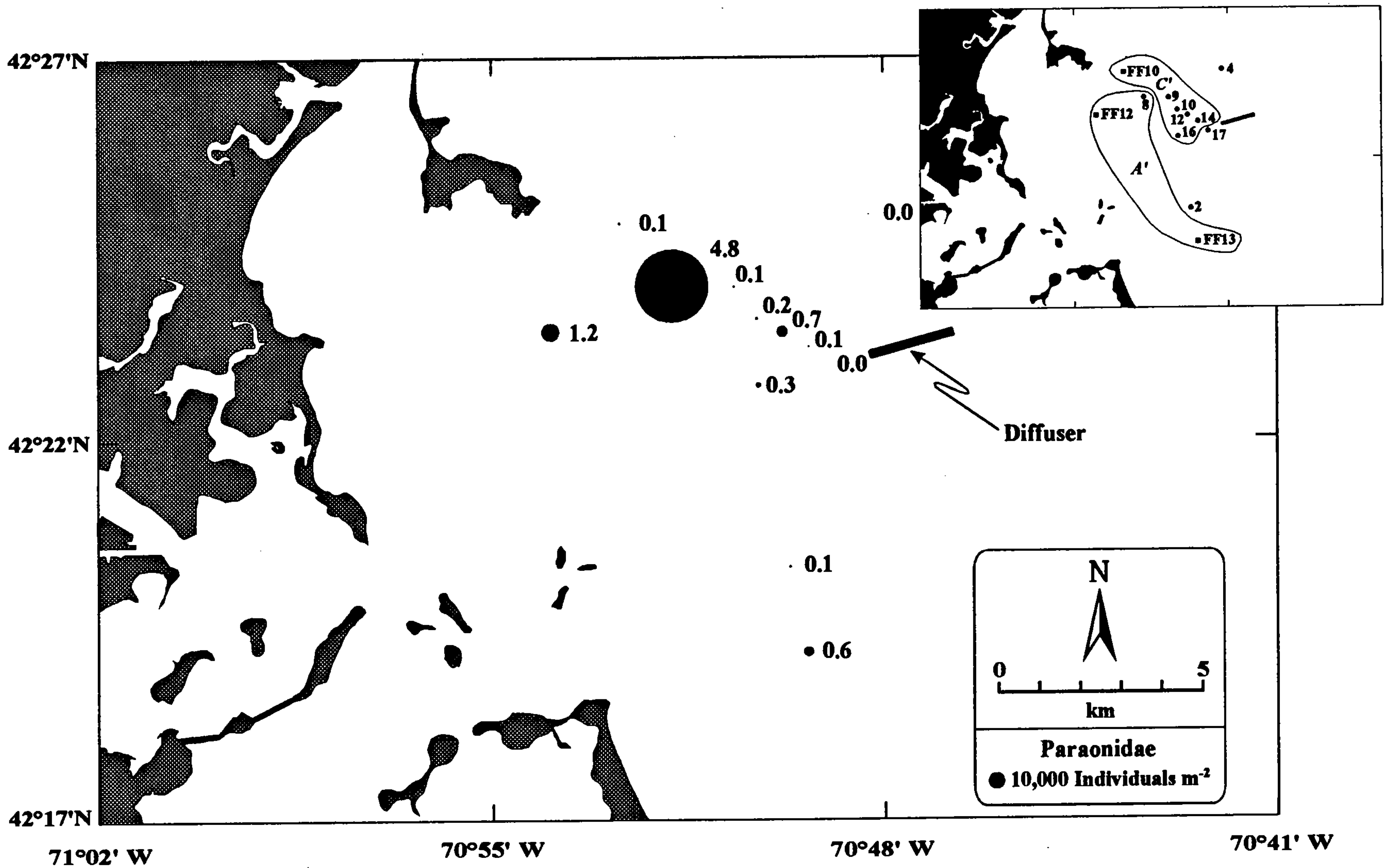



**Figure 3.4.9 Geographic distribution of paraonid polychaete abundance at midfield distances from the diffuser. The inset is described in Figure 3.4.6.**

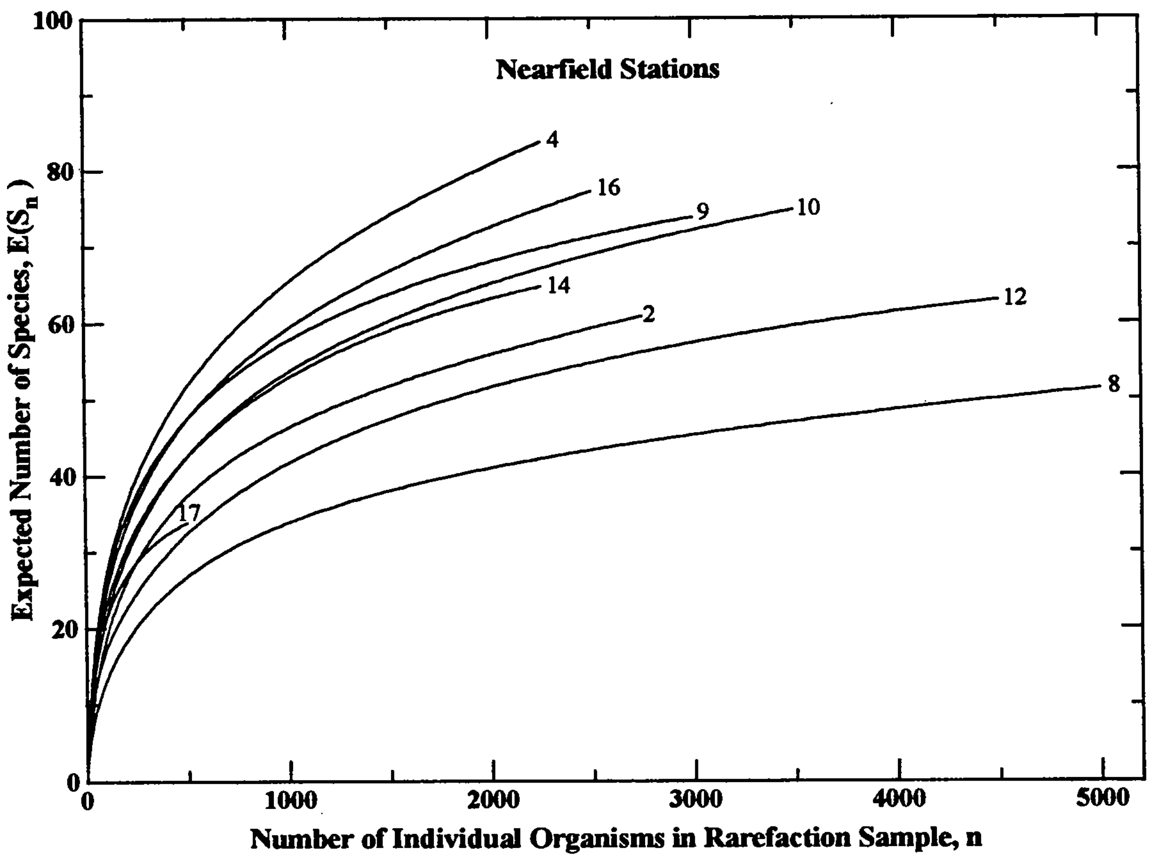



**Figure 3.4.10 Hurlbert rarefaction plots for nearfield stations.**

**Table 3.4.3 Dominant (top ten) macroinfaunal species and taxa identified at nearfield stations.**

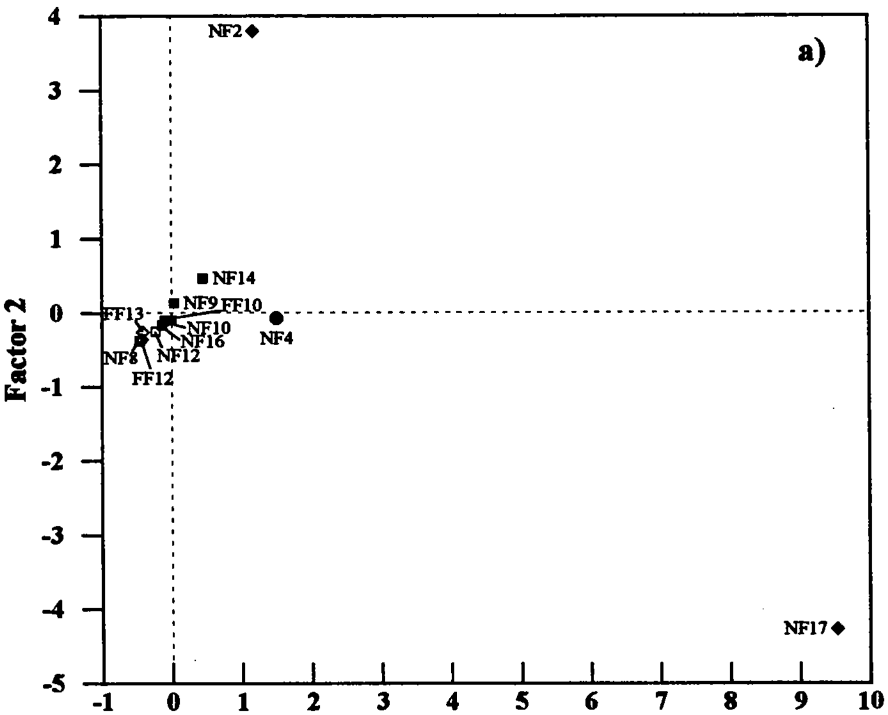
| Station | Overall Rank | | Taxon | Abundance ($m^{-2}$) | Percent of Total Fauna | Percent of Identified Species |
|---|---|---|---|---|---|---|
| **NF2 (Group D)** | | | | | | |
| | 1 | Bivalvia | *Hiatella arctica* | 14800 | 58.1 | 64.0 |
| | 2 | Bivalvia | *Bivalvia spp.* | 2050 | 8.0 | — |
| | 3 | Echinodermata | *Ophiura robusta* | 1267 | 5.0 | 5.5 |
| | 4 | Polychaeta | *Aricidea catherinae* | 900 | 3.5 | 3.9 |
| | 5 | Polychaeta | *Phyllodoce mucosa* | 683 | 2.7 | 3.0 |
| | 6 | Polychaeta | *Tharyx acutus* | 567 | 2.2 | 2.5 |
| | 7 | Bivalvia | *Mytilus edulis* | 483 | 1.9 | 2.1 |
| | 8 | Bivalvia | *Cerastoderma pinnulatum* | 475 | 1.9 | 2.1 |
| | 9 | Crustacea | *Amphipoda sp.1* | 400 | 1.6 | 1.7 |
| | 10 | Polychaeta | *Spio thulini* | 367 | 1.4 | 1.6 |
| | 11 | Polychaeta | *Mediomastus californiensis* | 333 | — | 1.4 |
| | | | | | 86.4 | 87.7 |
| **NF4 (Group E)** | | | | | | |
| | 1 | Polychaeta | *Exogone hebes* | 3008 | 14.2 | 15.3 |
| | 2 | Polychaeta | *Exogone verugera* | 2517 | 11.9 | 12.8 |
| | 3 | Crustacea | *Unciola inermis* | 2292 | 10.8 | 11.6 |
| | 4 | Polychaeta | *Spio limicola* | 2017 | 9.5 | 10.2 |
| | 5 | Polychaeta | *Polydora quadrilobata* | 1042 | 4.9 | 5.3 |
| | 6 | Bivalvia | *Bivalvia spp.* | 1033 | 4.9 | — |
| | 6 | Polychaeta | *Euchone elegans* | 1033 | 4.9 | 5.2 |
| | 8 | Polychaeta | *Polydora socialis* | 800 | 3.8 | 4.1 |
| | 9 | Crustacea | *Ptilanthura tenuis* | 742 | 3.5 | 3.8 |
| | 10 | Crustacea | *Corophium crassicorne* | 700 | 3.3 | 3.6 |
| | 11 | Polychaeta | *Euclymene collaris* | 525 | — | 2.7 |
| | | | | | 71.5 | 74.5 |
| **NF8 (Group B)** | | | | | | |
| | 1 | Polychaeta | *Aricidea catherinae* | 46542 | 48.9 | 50.4 |
| | 2 | Polychaeta | *Tharyx acutus* | 20650 | 21.7 | 22.4 |
| | 3 | Polychaeta | *Mediomastus californiensis* | 9400 | 9.9 | 10.2 |
| | 4 | Polychaeta | *Monticellina baptiste* | 3192 | 3.4 | 3.5 |
| | 5 | Oligochaeta | *Tubificoides apectinatus* | 1883 | 2.0 | 2.0 |
| | 6 | Nemertea | *Micrura spp.* | 1550 | 1.6 | — |
| | 7 | Polychaeta | *Leitoscoloplos acutus* | 1533 | 1.6 | 1.7 |
| | 8 | Polychaeta | *Levinsenia gracilis* | 1500 | 1.6 | 1.6 |
| | 9 | Polychaeta | *Prionospio steenstrupi* | 992 | 1.0 | 1.1 |
| | 10 | Polychaeta | *Spio limicola* | 883 | 0.9 | 1.0 |
| | 11 | Polychaeta | *Monticellina dorsobranchialis* | 567 | — | 0.6 |
| | | | | | 92.7 | 94.3 |

Table 3.4.3 (continued) Dominant (top ten) macroinfaunal species and taxa identified at nearfield stations.

| Station | Overall Rank | | Taxon | Abundance ($m^{-2}$) | Percent of Total Fauna | Percent of Identified Species |
|---|---|---|---|---|---|---|
| **NF9 (Group C)** | | | | | | |
| | 1 | Polychaeta | *Spio limicola* | 7408 | 25.7 | 27.0 |
| | 2 | Polychaeta | *Prionospio steenstrupi* | 3650 | 12.7 | 13.3 |
| | 3 | Polychaeta | *Mediomastus californiensis* | 1875 | 6.5 | 6.8 |
| | 4 | Bivalvia | *Nucula delphinodonta* | 1417 | 4.9 | 5.2 |
| | 5 | Bivalvia | *Hiatella arctica* | 1192 | 4.1 | 4.3 |
| | 6 | Bivalvia | *Crenella decussata* | 1125 | 3.9 | 4.1 |
| | 7 | Polychaeta | *Maldane glebifex* | 975 | 3.4 | 3.6 |
| | 8 | Polychaeta | *Ninoe nigripes* | 917 | 3.2 | 3.3 |
| | 9 | Polychaeta | *Monticellina baptiste* | 800 | 2.8 | 2.9 |
| | 10 | Polychaeta | *Aphelochaeta marioni* | 792 | 2.7 | 2.9 |
| | | | | | 70.0 | 73.5 |
| **NF10 (Group C)** | | | | | | |
| | 1 | Polychaeta | *Spio limicola* | 8608 | 26.1 | 27.4 |
| | 2 | Polychaeta | *Mediomastus californiensis* | 5967 | 18.1 | 19.0 |
| | 3 | Polychaeta | *Prionospio steenstrupi* | 4117 | 12.5 | 13.1 |
| | 4 | Polychaeta | *Aricidea catherinae* | 2008 | 6.1 | 6.4 |
| | 5 | Polychaeta | *Leitoscoloplos acutus* | 1325 | 4.0 | 4.2 |
| | 6 | Polychaeta | *Monticellina baptiste* | 1233 | 3.7 | 3.9 |
| | 7 | Polychaeta | *Maldane glebifex* | 1117 | 3.4 | 3.6 |
| | 8 | Polychaeta | *Ninoe nigripes* | 950 | 2.9 | 3.0 |
| | 9 | Bivalvia | *Nucula delphinodonta* | 700 | 2.1 | 2.2 |
| | 10 | Bivalvia | *Crenella decussata* | 533 | 1.6 | 1.7 |
| | | | | | 80.5 | 84.5 |
| **NF12 (Group B)** | | | | | | |
| | 1 | Polychaeta | *Mediomastus californiensis* | 13008 | 30.7 | 31.9 |
| | 2 | Polychaeta | *Aricidea catherinae* | 6167 | 14.5 | 15.1 |
| | 3 | Polychaeta | *Spio limicola* | 4750 | 11.2 | 11.7 |
| | 4 | Polychaeta | *Prionospio steenstrupi* | 3583 | 8.4 | 8.8 |
| | 5 | Polychaeta | *Ninoe nigripes* | 2458 | 5.8 | 6.0 |
| | 6 | Polychaeta | *Monticellina baptiste* | 2092 | 4.9 | 5.1 |
| | 7 | Polychaeta | *Leitoscoloplos acutus* | 1608 | 3.8 | 3.9 |
| | 8 | Polychaeta | *Tharyx acutus* | 1258 | 3.0 | 3.1 |
| | 9 | Polychaeta | *Levinsenia gracilis* | 1183 | 2.8 | 2.9 |
| | 10 | Polychaeta | *Exogone verugera* | 758 | 1.8 | 1.9 |
| | | | | | 86.9 | 90.5 |

**Table 3.4.3 (continued) Dominant (top ten) macroinfaunal species and taxa identified at nearfield stations.**

| Station | Overall Rank | | Taxon | Abundance ($m^{-2}$) | Percent of Total Fauna | Percent of Identified Species |
|---|---|---|---|---|---|---|
| **NF14 (Group C)** | | | | | | |
| | 1 | Polychaeta | *Exogone hebes* | 3250 | 14.7 | 15.7 |
| | 2 | Polychaeta | *Spio limicola* | 2408 | 10.9 | 11.7 |
| | 3 | Polychaeta | *Mediomastus californiensis* | 2125 | 9.6 | 10.3 |
| | 4 | Bivalvia | *Hiatella arctica* | 1817 | 8.2 | 8.8 |
| | 5 | Bivalvia | *Crenella decussata* | 1592 | 7.2 | 7.7 |
| | 6 | Polychaeta | *Polydora socialis* | 1425 | 6.5 | 6.9 |
| | 7 | Polychaeta | *Exogone verugera* | 1342 | 6.1 | 6.5 |
| | 8 | Polychaeta | *Ninoe nigripes* | 1075 | 4.9 | 5.2 |
| | 9 | Polychaeta | *Prionospio steenstrupi* | 925 | 4.2 | 4.5 |
| | 10 | Polychaeta | *Aricidea catherinae* | 775 | 3.5 | 3.8 |
| | | | | | 75.8 | 81.0 |
| **NF16 (Group C)** | | | | | | |
| | 1 | Polychaeta | *Mediomastus californiensis* | 6150 | 25.5 | 27.2 |
| | 2 | Polychaeta | *Spio limicola* | 2200 | 9.1 | 9.7 |
| | 3 | Polychaeta | *Aricidea catherinae* | 1883 | 7.8 | 8.3 |
| | 4 | Polychaeta | *Prionospio steenstrupi* | 1842 | 7.6 | 8.1 |
| | 5 | Polychaeta | *Ninoe nigripes* | 1508 | 6.3 | 6.7 |
| | 6 | Polychaeta | *Tharyx acutus* | 1125 | 4.7 | 5.0 |
| | 7 | Polychaeta | *Levinsenia gracilis* | 1033 | 4.3 | 4.6 |
| | 8 | Bivalvia | *Crenella decussata* | 783 | 3.2 | 3.5 |
| | 9 | Polychaeta | *Leitoscoloplos acutus* | 758 | 3.1 | 3.3 |
| | 10 | Polychaeta | *Monticellina baptiste* | 567 | 2.3 | 2.5 |
| | | | | | 74.0 | 78.8 |
| **NF17 (Group D)** | | | | | | |
| | 1 | Crustacea | *Corophium crassicorne* | 2317 | 41.2 | 46.4 |
| | 2 | Crustacea | *Chiridotea tuftsi* | 400 | 7.1 | 8.0 |
| | 3 | Crustacea | *Pseudunciola obliquua* | 350 | 6.2 | 7.0 |
| | 4 | Bivalvia | *Bivalvia spp.* | 342 | 6.1 | — |
| | 5 | Polychaeta | *Spiophanes bombyx* | 183 | 3.3 | 3.7 |
| | 5 | Crustacea | *Cirolana polita* | 183 | 3.3 | 3.7 |
| | 7 | Crustacea | *Rhepoxynius hudsoni* | 158 | 2.8 | 3.2 |
| | 8 | Bivalvia | *Cerastoderma pinnulatum* | 142 | 2.5 | 2.8 |
| | 9 | Crustacea | *Amphipoda spp.* | 133 | 2.4 | — |
| | 10 | Crustacea | *Hippomedon satus* | 125 | 2.2 | 2.5 |
| | 11 | Polychaeta | *Exogone hebes* | 117 | — | 2.3 |
| | 11 | Polychaeta | *Aricidea catherinae* | 117 | — | 2.3 |
| | | | | | 77.2 | 82.0 |



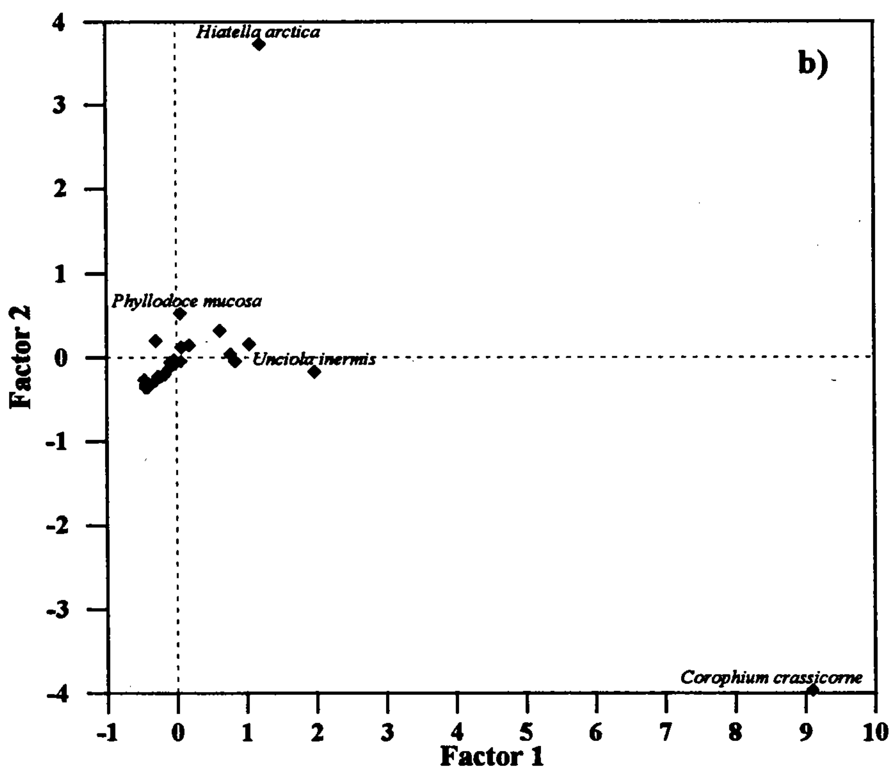




**Figure 3.4.11 Results of correspondence analysis (reciprocal averaging) ordination showing the distribution of (a) stations at midfield distances (<8 km) from the diffuser and (b) species along the two principal factors.**

Table 3.4.3 shows that this species was highly dominant, comprising 58% of the organisms collected at this station. Its elevated abundance resulted in the highest dominance index at any station (Table 3.4.2). Station NF17 was similarly differentiated by a single species, namely the crustacean *Corophium crassicorne*. Again, this species was ranked first in overall station abundance (Table 3.4.3), with 46% of species identified at Station NF17. Note, however, that the absolute density of *C. crassicorne* was low (2,317 individuals $m^{-2}$) as was overall abundance at Station NF17. Station NF17 does not lie along an orthogonal axis and, thus, in addition to its relatively high crustacean abundance associated with large Factor 1 values, it had a comparatively low bivalve abundance (Factor 2). For example, only three *H. arctica* organisms were collected in all replicate samples and sieve fractions at Station NF17 compared to over 1700 collected at Station NF2 (Appendix A-1 and A-2).

Station NF4 also had a comparatively high crustacean abundance and was separated from other stations at midfield distances by a Factor 1 value exceeding 1.0 (Figure 3.4.11a). In contrast to Station NF17, high crustacean abundance at Station NF4 was due to an elevated density of the crustacean *Unciola inermis* (Figure 3.4.11b). *U. inermis* was ranked a close third in abundance at Station NF4 (Table 3.4.3), behind two polychaetes from the genus *Exogone*. However, these two members of the *Exogone* genus were also abundant at other stations and one or both polychaetes were dominant (ranked in the top ten) at Stations NF12, NF14 and NF17. Factor analysis separated Station NF4 from the other stations at midfield distances by virtue of high crustacean abundance (Factor 1) and average bivalve abundance (Factor 2).

To gain insight into underlying factors associated with abundance data at non-outlier stations, another correspondence analysis was performed on data from stations in Groups A, B, and C. This ordination was performed on the nine stations aggregated near the origin in Figure 3.4.11a. Also, to gain a sense of the inherent spread in the station data, the analysis was applied to replicate samples rather than on pooled station data. The ordination shown in Figure 3.4.12 was highly discriminatory, with the first two factors accounting for over 73% of the covariance and the third highest only accounting for 8.2%. The first factor accounts for over half the variance and projection of replicate sample data onto the Factor 1 axis in Figure 3.4.12a reveals aggregations that differ from the numerical classifications. Two groups emerge rather than the three primary cluster groups shown in Figure 3.4.5. Specifically, Group B, containing Stations NF8 and NF12, is split in a manner more geographically consistent. At Factor 1 values near -1.0 in the ordination analysis, Group A Stations FF12 and FF13 are adjacent to NF8. Similarly, positive Factor 1 values include Station NF12 with Group C. With this alternative grouping, Station NF12 no longer bifurcates Group C in Figure 3.4.5.

The correspondence analysis shown in Figure 3.4.12 exhibits a characteristic arch along the Factor 2 axis. This indicates that a nonlinear relationship exists in the data which often makes the ecological interpretation using the purely linear ordination analyses difficult. Specifically, it suggests that there is a nonlinear species-abundance response to a relatively broad environmental gradient and that samples that are collected at opposite ends of the gradient have few species in common. Stations FF12 (Table 3.3.3) and NF14 (Table 3.4.3) only have three dominant taxa in common. Adding a third (linearly-orthogonal) axis to the plot, as was done by Blake *et al.* (1993), would explain only a small (8.2%) amount of additional variability in the data, would make the plot difficult to read, and would not fully resolve the nonlinearity. While there are community ordination methods to handle nonlinear trends in the data, such as polynomial ordination (Phillips, 1978) and nonmetric multi-dimensional scaling (Hill and Gauch, 1980), these techniques were not applied here. Correspondence analysis is somewhat more robust with nonlinear data sets than other ordination techniques such as principal component analysis. Also, the interpretation of the data, presented below, is generally consistent with that of numerical classifications.

The three species primarily responsible for Factor 1 ordination of Stations FF12, FF13, and NF8 near values of -1.0 are shown in Figure 3.4.12b. The polychaete *Aricidea catherinae* was the most dominant species at both Stations FF12 and NF8 where it accounted for over 40% of the individuals collected (Table 3.3.3 and 3.4.3). At

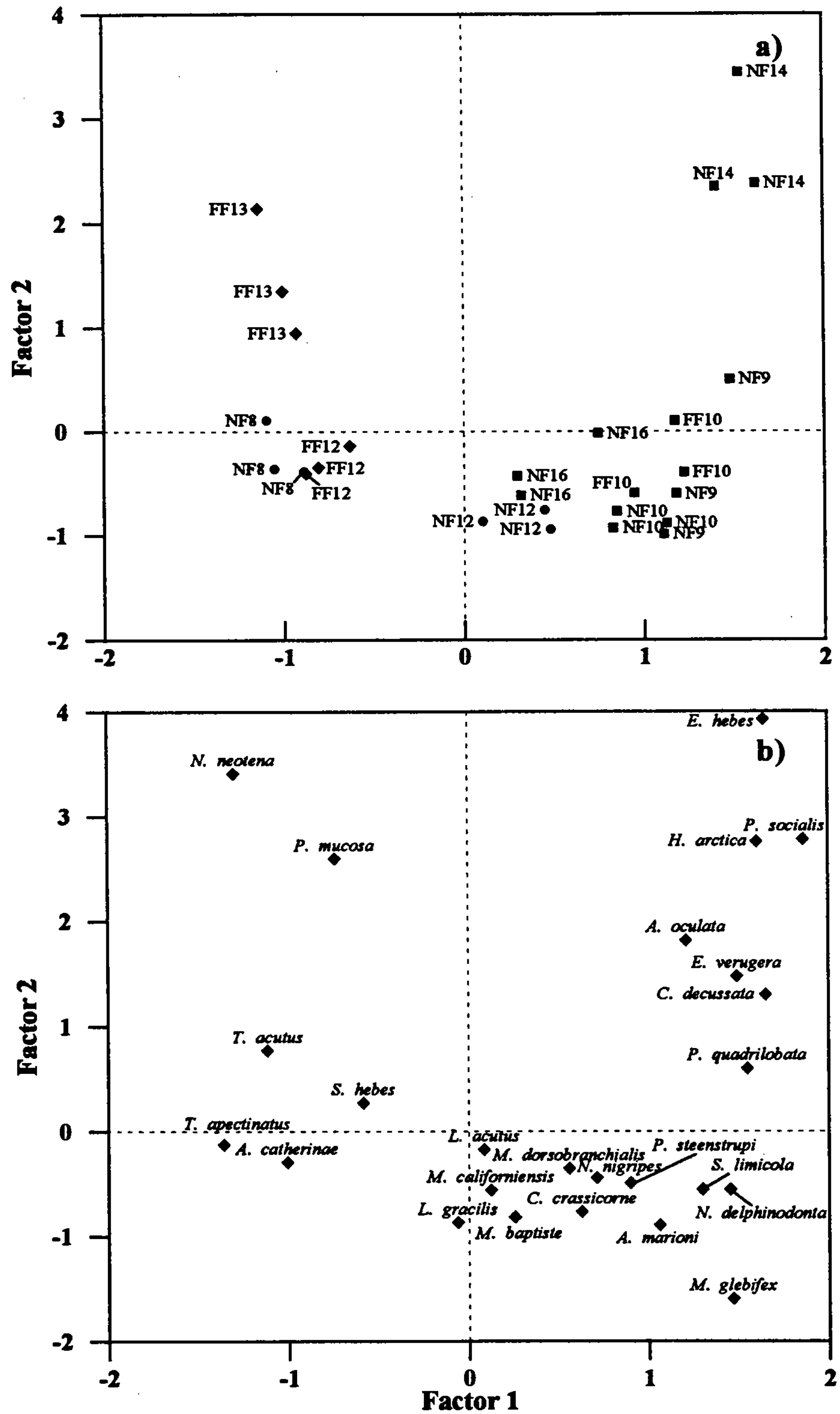



**Figure 3.4.12 Results of correspondence analysis (reciprocal averaging) ordination showing the distribution of (a) replicates collected at midfield distances from the diffuser and (b) species along the two principal factors. Outlier Stations NF2, NF4, and NF17 are not included.**

Station FF13 it ranked second in abundance. The polychaetes *Scoletoma hebes* and *Tharyx acutus* were also in the top ten dominants at these stations, except at Station NF8 where the rank of *S. hebes* was low (near 30) but higher than its rank at any other nearfield station. These are the same species that characterized the farfield group containing Stations FF12 and FF13 as described in Section 3.3.5. Now, however, it appears that the nearfield Station NF8 had a community structure similar to these farfield stations. In addition to these species, the oligochaete *Tubificoides apectinatus* also characterized these stations (Figure 3.4.12b). Although it was ranked with dominant taxa only at Station NF8 (Table 3.4.3), it had a high ranking at Stations FF12 and FF13 (sixteenth and eighteenth, respectively).

Adjacent to the positive Factor 1 values in Figure 3.4.12b were two polychaetes (*Prionospio steenstrupi* and *Spio limicola*) and one bivalve (*Nucula delphinodonta*) that had the greatest association with Group C stations and with Station NF12. The two polychaetes were ranked in the top four taxa with highest abundance at these stations except at Station NF14 where *P. steenstrupi* ranked tenth. All three species generally had higher rankings at these stations than at other stations.

The second ordination factor in Figure 3.4.12a differentiated Station FF13 from Group A and Station NF14 from Group C stations. Separation of Station NF14 is consistent with both dendrograms in Figure 3.4.4 which show that the lowest similarity existed between this station and the other Group C stations. Two polychaetes (*Polydora socialis* and *Exogone hebes*) and one bivalve (*Hiatella arctica*) were primarily responsible for differentiating Station NF14 (Figure 3.4.12b). These three species ranked in the top six taxa at this station, well above other stations in the group, except Station NF9 which also exhibited an elevated abundance of *H. arctica* (Table 3.4.3).

Differentiation of Station FF13 from Stations FF12 and NF8 was due to an elevated abundance of the polychaetes *Nephtys neotena* and *Phyllodoce mucosa* (Figure 3.4.12a). Station FF13 was the only location among those analyzed in this ordination where the abundance of these taxa ranked in the top ten.

### 3.4.5 Association with Abiotic Properties

In contrast to farfield stations, there was no clear relationship between abiotic properties at midfield distances (<8km) from the diffuser and the community structure at midfield stations. Correlations between selected abiotic parameters and midfield indicator species are presented in Table 3.4.4. Even though six of the ten midfield indicator species were also farfield indicator species, most of the correlations were weak and inconsistent within the midfield groups. One would expect overlap in the indicator species because the midfield analysis incorporates three of the farfield stations. In particular, farfield Group D consisted of Stations FF12 and FF13 which constitute most of the midfield Group A modified to include Station NF8. It is not surprising that all three of the species indicative of farfield Group D were also included in midfield Group A. However, while all three of these species were strongly correlated with depth in the farfield (Table 3.3.4), the midfield correlation was much weaker. This is a consequence of the limited midfield depth range which was eight times smaller than in the farfield. Another reason is the comparatively weak discrimination between stations within midfield Groups A′ and B′ as shown in Figure 3.4.12a. In contrast, Stations NF2, NF4, and NF17 were highly isolated from other stations at midfield distances from the diffuser (Figure 3.4.11a). However, for these stations correlations between abiotic variables and indicator species were of little use because of the limited degrees of freedom. For example, *U. inermis* only occurred at Stations NF4 and NF17. Similarly, *C. crassicorne* only occurred at four of the twelve stations at midfield distances from the diffuser. High abundances of these two indicator species (*U. inermis* and *C. crassicorne*) were observed in only one replicate from Stations NF4 and NF17, respectively (Appendices A-1 and A-2). Examination of field logs indicates that there were no obvious visual anomalies (*e.g.*, decaying organisms) associated with these replicate grab samples.

**Table 3.4.4 Pearson correlation coefficients between logarithmically transformed abundance of indicator species and selected parameters at midfield distances. Lightly shaded coefficients are statistically significant at the 95% confidence level and dark shading delineates 99% confidence.**

| Nearfield Group | Species | Depth | Mud | TOC | *C. perfringens* | Silver |
|---|---|---|---|---|---|---|
| NF2 | *Hiatella arctica* | -0.09 | -0.49 | -0.28 | -0.43 | -0.45 |
| NF4 | *Unciola inermis* | 0.41 | -0.47 | -0.38 | -0.48 | -0.33 |
| NF17 | *Corophium crassicorne* | 0.23 | -0.60 | -0.51 | -0.60 | -0.47 |
| Modified A | *Aricidea catherinae* | -0.36 | 0.77 | 0.70 | 0.85 | 0.83 |
| | *Tharyx acutus* | -0.57 | 0.72 | 0.53 | 0.79 | 0.78 |
| | *Scoletoma hebes* | -0.64 | 0.54 | 0.20 | 0.50 | 0.43 |
| | *Tubificoides apectinatus* | -0.51 | 0.15 | 0.34 | 0.38 | 0.47 |
| Modified B | *Prionospio steenstrupi* | -0.06 | 0.61 | 0.36 | 0.52 | 0.32 |
| | *Spio limicola* | 0.53 | 0.45 | 0.33 | 0.29 | 0.11 |
| | *Nucula delphinodonta* | 0.46 | 0.50 | 0.28 | 0.27 | 0.04 |

### 3.4.6 Interannual Variability

All of the nine nearfield stations analyzed herein were occupied in 1992 (Blake *et al.*, 1993). As in the case of the farfield analyses, comparison of results for the two consecutive years can lend insight into interannual changes in the benthic environment at midfield distances from the diffuser. Two aspects make the interpretation of temporal changes in the midfield more difficult than in the farfield. First, the comparatively limited range in abiotic parameters made interpretation of midfield infaunal structure difficult. Stations at midfield distances (<8 km) from the diffuser did not always form clearly delineated groups as they did in the farfield. Secondly, in 1992, only one grab sample was collected at each station and, as a result, greater scatter in the results can be expected. Consequently, it may be difficult to detect temporal change in light of inherent uncertainty in the synoptic data.

This is further supported with 1993 infauna data which indicates substantial within station (i.e., replicate) spatial variability. This was especially noticeable at stations NF9, NF10, NF16, and NF17. This result is consistent to those of earlier studies which served as the basis for redesigning the sampling program from non-replication to a replication in the nearfield in 1993. Without estimates for the scale of spatial variation at these sampling locations, it would be extremely difficult to determine if site-specific changes over time were due to effluent discharges or from sampling in slightly different locations.

The numerical classification of nearfield stations was generally comparable for the two years. The highest similarity was between Stations NF9 and NF10, and the lowest similarities were computed for Stations NF2, NF4, and NF17. In both years, the infaunal community at Station NF2 differed from all other stations and was not affiliated with any station group. Ordination analysis of the 1993 data indicated that the elevated abundance of *Hiatella arctica* was responsible for setting this station apart. In 1992, *H. arctica* was also abundant at this station where it ranked fourth. Two of the species, having among the ten highest abundances in 1992 at Station NF2, substantially decreased in abundance during 1993. *Asabellides oculata* and *Spio limicola*, respectively, dropped from the second and eighth highest abundance in 1992 to rankings of 48 and 34 in 1993. At Stations NF4 and NF17, rankings of the top nine species in 1992 did not drop by more than 18 and the overall community structure was comparable across years. Numerical classification of the 1992 data (Blake *et al.*, 1993) did not yield a high similarity between these stations and other nearfield groups although the two stations were identified as weakly affiliated with one another. The 1993 data did not cluster Stations NF4 and NF17 together by virtue of differences in the respective abundance of *Unciola inermis* and *Corophium crassicorne*. These species were also identified as indicator species for these stations in the ordination of 1992 data.

Perhaps the biggest difference in dendrograms computed for the two years of data was in the affiliation of Station NF16. In 1993, the community structure at Station NF16 was closely associated with Station NF10 and other members of midfield Group C. In 1992, this station was associated with Station NF8. Without reanalysis of a combined data set from 1992 and 1993, the cause for the differences at this station remains unclear. The only major differences in top ten species ranked by abundance in 1992 occurred at Station NF9 where the rank of *Ampharete acutifrons* dropped from 4 in 1992 to 34 in 1993 and *Polydora quadrilobata* dropped from 6 to 60. Neither of these species were highly indicative of cluster groups. Another large change occurred in the abundance of *A. acutifrons* at Station NF14, where its rank dropped from 6 to 46.

Without replication in the 1992 data set, it is difficult to quantitatively test the degree to which these temporal changes are statistically significant. One approach is to assume that the statistics are temporally stationary and that inter-replicate variability computed from the 1993 data can be applied to the 1992 data set using a pooled-variance t-test. Testing total infaunal abundance at nearfield stations indicated that there were no statistically significant differences between years at the 95% confidence level, assuming a log-normal probability distribution. Even the three-fold increase in total abundance at Station NF8, from 31,550 $m^{-2}$ in 1992 to 95,108 $m^{-2}$ in 1993, was only marginally significant at the 90% level ($\alpha$=0.081). Similarly, the substantial decrease in total abundance at Station NF9, from 57,375 $m^{-2}$ in 1992 to 28,800 $m^{-2}$ in 1993, was not quite significant at the 90% level ($\alpha$=0.105). With one exception, few other infaunal community indices at nearfield stations exhibited a consistent pattern between years. The one exception is Station NF8, which had the lowest diversity and evenness indices of all stations sampled in both years. Similarly, its rarefaction curve fell below that of other stations during each year of sampling. Station NF8 also had the lowest sand and gravel content of any midfield station sampled during both years.

At some of the near field stations, large changes in community structure could be a consequence of the substantial change in surficial sediments. The upcoming report on 1994 data will address interannual variability over three years (1992 through 1994) and quantify relationships between infaunal community structure and environmental variables. In the interim, some anecdotal observations are noteworthy. For example, the largest grain-size differences between 1992 and 1993 occurred at Station NF2 where there were also large changes in dominant taxa. Only three taxa were dominates common to both years of infaunal data at this station. As described above, a number of species, including *A. oculata* and *S. limicola*, had among the ten highest abundances in 1992, but substantially decreased in abundance during 1993. Perhaps more dramatic was the virtual absence of 1993 dominants *Ophiura robusta*, Amphipoda sp. 1, and *Spio thulini* in the 1992 data. Coincident with these changes in community structure was a 74% drop in the mud fraction of sediments collected in 1993 as shown in Table 3.4.5. The silt and clay fraction constituted 77.2% of the 1992 sediment sample whereas 1993 samples averaged only 3.1%. At all stations except three (FF10, FF13, and NF17) the mud content decreased in 1993 samples, although the change was not as dramatic as those that occurred at Stations NF2 and NF16. Other changes in the fine sediment fractions at midfield stations were small, and less than 15%. At Station NF16 the mud fraction dropped by 40% and this could account for the change in its affiliation with Station NF8 in 1992 to midfield Group C in 1993. However, the ranking of dominant species was much more consistent between years at Station NF16 as compared to Station NF2. At Station NF16, eight of the top ten most abundant taxa were the common to both years and none of the dominants were absent in either year.

**Table 3.4.5 Comparison of the mean mud fraction (percent silt and clay) in grab samples collected at stations sampled in both 1992 and 1993. Stations are ranked by the greatest change between years.**

| Station | 1992 | 1993 | Difference |
|---|---|---|---|
| NF2 | 77 | 3 | 74 |
| NF16 | 77 | 37 | 40 |
| FF5 | 63 | 45 | 18 |
| FF6 | 63 | 48 | 15 |
| FF1 | 87 | 72 | 15 |
| FF14 | 80 | 67 | 13 |
| FF7 | 79 | 67 | 12 |
| NF9 | 44 | 33 | 11 |
| NF12 | 71 | 62 | 9 |
| NF14 | 13 | 5 | 8 |
| NF8 | 82 | 75 | 7 |
| FF12 | 28 | 21 | 7 |
| NF10 | 40 | 34 | 6 |
| FF11 | 78 | 72 | 6 |
| FF4 | 84 | 78 | 6 |
| FF9 | 19 | 15 | 4 |
| FF10 | 31 | 33 | -2 |
| FF13 | 26 | 28 | -2 |
| NF17 | 1 | 2 | -1 |
| NF4 | 4 | 3 | 1 |

# 4.0 FINDINGS AND CONCLUSIONS

## 4.1 FARFIELD FINDINGS

- The coarsest sediments were located near the mouth of Boston Harbor and grain size fractions were consistent with those of previous studies (*e.g.*, Blake *et al.*, 1993). TOC content was well correlated to mud fractions and coarse sediments near Boston Harbor contained less than 1% TOC. *C. perfringens* spores were not strongly associated with fine grain size, and the highest counts at farfield stations were located near the mouth of Boston Harbor at Stations FF10, FF12, and FF13. Total PAH was somewhat elevated (>5 µg/g) at the northernmost stations FF1 and FF11 compared to concentration ranges determined by Windsor and Hites (1979). Another organic contaminant, PCB, did not exhibit a clear spatial pattern and mean concentrations were comparable to those reported by other investigators (*e.g.*, Boehm *et al.*, 1984). Silver concentration correlated with *C. perfringens* spore counts and was highest at stations near Boston Harbor.

- The anomalously high gravel content observed at Station NF14 was probably related to the high content of glass and tile fragments of anthropogenic origin. However, this station does not appear to be anomalous in other aspects of sediment quality or in macroinfaunal community structure.

- The farfield samples contained 39,717 organisms in 226 taxa. A total of 36,884 individuals, or 93%, was classified into 186 species. The density of organisms in the 0.5-mm sieve fraction exceeded that of the 0.3-mm fraction at all stations. Replicate 2 at farfield Station FF7 was not included in the macroinfaunal analyses because of anomalously low abundance in the 0.5-mm fraction.

- Numerical classification revealed that the community structure at individual stations was distinctly different compared to inherent variability within replicates. The highest similarities among replicate samples were for replicates collected at the associated individual station.

- Farfield stations consistently separate into four distinct groups by virtue of numerical classification (Figure 3.3.4) and ordination (Figure 3.3.11a).

- These four groups are geographically separate (Figure 3.3.5). Group A consists of five stations (FF1, FF4, FF5, FF11, and FF14) with the greatest water depths (>60 m) located furthest offshore over the Stellwagen Basin. Group D includes two stations (FF12 and FF13) with the shallowest water depths (≤22 m) adjacent to the entrance to Boston Harbor. Group C contains two mid-depth (27 to 49 m) stations (FF6 and FF7) positioned within Cape Cod Bay to the south. Group B consists of two mid-depth stations (FF10 and FF9) within Massachusetts Bay between Groups A and D.

**Table 4.1.1 Summary of community structure among farfield station clusters.**

| Farfield Group | Stations | Depth Range (m) | Indicative and Dominant Species | |
|---|---|---|---|---|
| A | FF1<br>FF4<br>FF5<br>FF11<br>FF14 | >60 | *Chaetozone sp.A*<br>*T. gouldii*<br>*L. gracilis*<br>*A. quadrilobata* | *S. limicola*<br>*M. glebifex*<br>*T. apectinatus*<br>*Y. sapotilla* |
| B | FF9<br>FF10 | 27 to 49 | *P. steenstrupi*<br>*M. baptiste* | *E. Verruga* |
| C | FF6<br>FF7 | 33 to 37 | *S. longocirrata,*<br>*C. longocirrata* | *T. atlantis* |
| D | FF12<br>FF13 | ≤22 | *T. acutus*<br>*S. hebes* | *A. catherinae* |

- A limited number of dominant indicative species determine polychaete family abundance and differentiate the four station groups (Table 4.1.1). Elevated abundance of these indicator species is evident from the first two principal factors in an ordination analysis (Figure 3.3.11).

  The broad range of polychaete families that characterize Group A stations consists of the dominants *Chaetozone sp.A* (Cirratulid), *A. quadrilobata* (Paraonid), *Spio limicola* (Spionid), *Maldane glebifex* (Maldanid), and *Levinsenia gracilis* (Paraonid) (Table 3.3.3). Other non-polychaete species that dominate the abundance at Group A stations include the oligochaete *Tubificoides apectinatus* and the bivalves *Yoldia sapotilla* and *Thyasira gouldii*.

  The high density of spionid polychaetes characterizing Group B stations consists mostly of *Prionospio steenstrupi*. Other non-paraonid polychaetes are also highly indicative of this group, specifically, the cirratulid *Monticellina baptiste* and the syllid *Exogone verugera*.

  Polychaetes indicative of Group C stations include *Cossura longocirrata*, *Syllides longocirrata*, and *Terebellides atlantis*, none of which are members of the spionid, paraonid, or cirratulid family.

  The high paraonid density associated with Group D stations was due to a high abundance of *Aricidea catherinae*. Other non-spionid polychaetes are also highly indicative of this group, specifically, the cirratulid *Tharyx acutus* and the lumbrinerid *Scoletoma hebes*.

## 4.2 FARFIELD CONCLUSIONS

- The first principal factor in the farfield ordination analysis is related to, or covaries with water depth. Species indicative of farfield Groups A and D correlate strongly with depth, *C. perfringens* spore counts, and silver concentration. Because *C. perfringens* spore counts and silver concentration correlate with total PAH and PCB concentrations, species affiliated with Groups A and D probably also correlate with organic contaminants. The second principal factor that differentiates farfield stations in Group B from C is related to grain size and TOC content.

- The geographic distribution of sediment properties and infaunal community parameters was largely consistent between 1992 and 1993. The greatest temporal disparity in community structure occurred at Station FF13. In 1992, this station was not clearly affiliated with other farfield stations, whereas in 1993 it clustered with Station FF12. The primary difference was the high density of *Polydora cornuta* at Station FF13 in 1992. *P. cornuta* was one of the most common species in Boston Harbor in 1993, yet Station FF13 was the only location within Massachusetts Bay where it was collected in either year. Thus, the affinity of Station FF13 with other farfield stations was determined by the abundance of *P. cornuta*. In 1992, Boston Harbor appeared to have a greater influence on the infaunal assemblage at Station FF13 as reflected by the increased *P. cornuta* abundance. In 1993, the declining influence of the Harbor at this station was reflected by the higher similarity in community structure between Stations FF12 and FF13.

## 4.3 NEARFIELD FINDINGS

- The nearfield samples contained 35,741 organisms in 196 taxa. A total of 33,968 individuals, or 95%, was classified into 165 species. The density of organisms in the 0.5-mm sieve fraction exceeded that of the 0.3-mm fraction at all stations.

- The annelid phylum contained the majority (53%) of the organisms identified at all stations combined and 51% (88) of the species. However, annelids were not the most dominant major taxonomic group at Stations NF2 and NF17 where bivalves and crustaceans respectively dominated.

- Numerical classification revealed that the community structure at individual stations was not always distinct compared to inherent variability within replicates. Generally, the highest similarities among replicate samples were for replicates collected at the associated individual station. However, numerical classification was unable to distinguish between replicate samples from Stations NF9, NF10, and NF16. These stations are in close proximity (≤2.5 km) and their community structure exhibited the highest overall NNESS similarity (Figure 3.4.4b).

- Stations at midfield distances from the diffuser separate into three distinct groups by virtue of numerical classification (Figure 3.4.5). The three groups are not geographically distinct because Group B (with low similarity) bifurcates Group C. Also, the three Stations NF2, NF4 and NF17 show marginal associations under NNESS agglomeration, but are independent of the major clusters using Bray-Curtis similarity measures (Figure 3.4.4). Ordination (Figure 3.4.11a) confirms the autonomy of Stations NF2, NF4, and NF17, and reanalysis without these stations (Figure 3.4.12a) resolves the geographic aberration by combining Station NF8 with Group A and Station NF12 with Group C.

- These two modified groups and three independent stations are geographically distinct. The modified Group A combines two farfield stations (FF12 and FF13), which constituted their own group in the farfield analysis, along with Station NF8. The modified Group C consists of the six Stations FF10, NF9, NF10, NF12, NF14, and NF16. The community structure associated with the remaining three stations at midfield distances from the diffuser was distinct and did not compare among one another or with either of the modified groups.

**Table 4.3.1 Summary of community structure among stations at midfield distances from the diffuser.**

| Midfield Group | Stations | Characteristics | Indicative and Dominant Species |
|---|---|---|---|
| | NF2 | High bivalve abundance<br>High dominance index | *H. arctica* |
| | NF4 | High crustacean abundance | *U. inermis* |
| | NF17 | Low total abundance<br>High crustacean abundance<br>Low bivalve abundance | *C. crassicorne* |
| Modified A | NF8, FF12, FF13 | Low Spionid<br>High Paraonid | *A. catherinae*<br>*T. acutus*<br>*S. hebes*<br>*T. apectinatus* |
| Modified C | NF9, NF10, NF12, NF14, NF16, FF10 | High diversity, number of species, evenness and richness | *P. steenstrupi*<br>*S. limicola*<br>*N. delphinodonta* |

- Table 4.3.1 summarizes the characteristics of community structure that distinguish the two modified cluster groups and three independent stations.

Independent Station NF2 was unique in its high bivalve abundance consisting largely (64%) of a single species *Hiatella arctica*. Its relative abundance was so large (Table 3.4.3) that the associated dominance index was 35% higher than at any nearfield or farfield station. The density of this bivalve at Station NF2 was responsible for establishing the Factor 2 ordination in Figure 3.4.11, which is responsible for much of the covariance in midfield abundance data.

Independent Station NF4 was characterized by a high crustacean abundance due to the density of *Unciola inermis* (Table 3.4.3). Factor 1 of the correspondence analysis of Figure 3.4.11 is associated with elevated crustacean abundance and Station NF4 was separated from the majority of stations by Factor 1 values exceeding 1.0.

Independent Station NF17 differs from the other independent stations in that is has high Factor 1 values (dense crustaceans) and low Factor 2 values (sparse bivalve) (Figure 3.4.11a). A single species of crustacean, namely *Corophium crassicorne*, was partially responsible for its unique community structure (Table 3.4.3). Although the absolute abundance of this species was low (2,317 $m^{-2}$), the overall abundance at Station NF17 was much lower than at any other station (Figure 3.4.6). The other unique feature of the community structure at Station NF17 was its comparatively low abundance of bivalves, particularly *H. arctica*, that separated Station NF2 along the Factor 2 axis.

Modified Group A stations, consisting of NF8, FF12, and FF13, were distinguished by a high abundance of the polychaetes described in the farfield analysis, namely *Aricidea catherinae*, *Tharyx acutus*, and the lumbrinerid *Scoletoma hebes*. In addition, another annelid, the oligochaete *Tubificoides apectinatus*, was abundant at these stations compared to other stations at midfield distances from the diffuser (Figure 3.4.12b).

Modified Group C stations generally had the highest diversity index, number of species, evenness index, and richness index (Table 3.4.2). This reflects the relatively uniform distribution of abundance among species. Nevertheless, certain species are particularly well associated with this group (Figure 3.4.12b). These include the two polychaetes *Prionospio steenstrupi* and *Spio limicola* and the bivalve *Nucula delphinodonta*.

## 4.4 NEARFIELD CONCLUSIONS

- There was no clear association between species indicative of midfield groups and abiotic variables. Although six of the ten indicator species for midfield groups were identical to those in the farfield, the limited depth range prevented significant correlations.

- Temporal changes in the midfield infaunal community structure were assessed by comparing 1992 and 1993 data. The lack of replication of nearfield infaunal data in 1992 measurably decreases the ability to resolve statistically significant changes over time. The numerical classification among nearfield stations was similar between years, with the lowest similarities between Stations NF2, NF4, and NF17. The only major difference in classification was for Station NF16. In 1992, this station was affiliated with Station NF8 whereas in 1993, this station was part of midfield Group C. Station NF8 was anomalous in both years in that it had the lowest diversity and evenness indices, and a rarefaction well below that of other nearfield stations. It also had the lowest sand and gravel content. The anomalous nature of the infaunal community at Station NF8 was consistent across years despite a three-fold increase in total abundance. However, that large increase was only marginally significant at the 90% confidence level.

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# APPENDIX A-1: NEARFIELD ABUNDANCE (0.3-mm FRACTION)

| Survey 9303 0.3 mm | | Taxon | NF2 | | | NF4 | | | NF8 | | | NF9 | | | NF10 | | | NF12 | | | NF14 | | | NF16 | | | NF17 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 |
| CNIDARIA | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ACTINIARIA | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | ACTINIARIA SP.6 | | 1 | | | | | | | | | | | | | | | | | | | | | | | | | |
| NEMERTEA | | | | 1 | | | 5 | 3 | 37 | | 3 | 6 | 15 | 11 | 13 | 3 | 10 | 17 | 13 | 24 | | | 7 | 4 | 4 | 18 | | | |
| | | NEMERTEA SP.2 | | 1 | | | | 3 | | | | | | | | | | 4 | 2 | 3 | | | | | 1 | | | | |
| | | NEMERTEA SP.3 | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| PALEONEMERTEA | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | TUBULANIDAE | CARINOMELLA LACTEA | | | | | | | 5 | 2 | 2 | | | | | | | | | | | | | | | | | | |
| HETERONEMERTEA | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | LINEIDAE | MICRURA | | | | | 2 | | 4 | 13 | 7 | | 4 | | | | 6 | 4 | 3 | 9 | | | | 1 | | 10 | | | |
| MONOSTYLIFERA | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | AMPHIPORIDAE | AMPHIPORUS ANGULATUS | | | | 1 | | | 15 | 7 | 10 | 6 | 7 | | 6 | 1 | 4 | 14 | 6 | 3 | | | | 1 | 5 | 1 | | | |
| ANNELIDA | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| POLYCHAETA | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | POLYNOIDAE | GATTYANA CIRROSA | | | | | 1 | | | | | | | | | | | | | | | | | | | | | | |
| | SIGALIONIDAE | PHOLOE MINUTA | 3 | 6 | | | 4 | 7 | 6 | | | 3 | 9 | 8 | 3 | 1 | 6 | | | 2 | 12 | | 5 | | 6 | 22 | | 1 | 1 |
| | PHYLLODOCIDAE | ETEONE LONGA | | 1 | | 1 | 1 | | 5 | 2 | 3 | | 2 | 1 | 2 | 2 | 1 | 2 | 1 | 1 | | | | 2 | 3 | | | | |
| | PHYLLODOCIDAE | PHYLLODOCE | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | PHYLLODOCIDAE | PHYLLODOCE ARENAE | 3 | 3 | 1 | 1 | | | | | | | 2 | | | | | | | | | | | | | | | | |
| | PHYLLODOCIDAE | PHYLLODOCE MACULATA | | 3 | | 1 | | | | | | | | | | | | | | | | | | | | | | | |
| | PHYLLODOCIDAE | PHYLLODOCE MUCOSA | 9 | 26 | 3 | 9 | 4 | 3 | 1 | 1 | 1 | 6 | 11 | 2 | 4 | 4 | 1 | | 1 | | 3 | | 3 | 2 | 2 | 7 | | | 1 |
| | HESIONIDAE | MICROPHTHALMUS SCZELKOWII | | | | | | | 2 | | | | | | 1 | | | | | | | | | | | | | | |
| | SYLLIDAE | EXOGONE HEBES | 2 | 12 | 1 | 73 | 17 | 91 | 15 | 8 | 4 | 3 | 5 | 2 | 1 | | 2 | 3 | 1 | 9 | 112 | 4 | 21 | 1 | 5 | 52 | | | 3 |
| | SYLLIDAE | EXOGONE LONGICIRRUS | | | | | | | | | | | | | 1 | | 1 | | | | | | | | | | | | |
| | SYLLIDAE | EXOGONE VERUGERA | | | | 67 | 13 | 58 | 1 | | | 9 | 15 | 8 | 3 | 1 | 3 | 7 | 7 | 25 | 4 | | 5 | 1 | | 10 | | | |
| | SYLLIDAE | SPHAEROSYLLIS LONGICAUDA | | | | | | | 1 | | | | 2 | 2 | 1 | | | | | | | | | | | | | | |
| | SYLLIDAE | SYLLIDES LONGOCIRRATA | | | | | | | | | | | | | | | | | | | | | 1 | | | | | | |
| | SYLLIDAE | TYPOSYLLIS | | | | | | 1 | | | | | | | | | | | | | | | | | | | | | |
| | SYLLIDAE | TYPOSYLLIS SP.1 | | | | | | | | | | | | | | | | | | | 1 | | | | | | | | |
| | NEREIDAE | | | | | | | | | 1 | | | | | | 2 | | | | | | | | | | | | | |
| | NEREIDAE | NEREIS GRAYI | | | | | | | | | | | | | | | | | | | | 1 | | | | | | | |
| | NEPHTYIDAE | | | 1 | | | | | | | | | | | | | | | | | | | | | | | | 1 | |
| | NEPHTYIDAE | AGLAOPHAMUS CIRCINATA | | | | 9 | 3 | 7 | | | | | | | | | | | | | | | | | | | | | |
| | NEPHTYIDAE | NEPHTYS | | | | | | | | | | | | 2 | | | 1 | 1 | | | 1 | 1 | | | | 1 | | | |
| | NEPHTYIDAE | NEPHTYS INCISA | | | | | | | | 2 | 1 | | | | 1 | | | 1 | | 2 | | | | | | | | | |
| | NEPHTYIDAE | NEPHTYS NEOTENA | | 3 | | | | | 6 | | | | 1 | 1 | | 2 | 3 | 5 | | 2 | 1 | 2 | 1 | 1 | 8 | 1 | | | |
| | SPHAERODORIDAE | SPHAERODOROPSIS MINUTA | | | | | | | | | | | | 1 | | | | | | | | | 1 | | | | | | |
| | LUMBRINERIDAE | | | | | | | | 5 | 1 | 1 | | 11 | 13 | 12 | 6 | 2 | 1 | | 9 | | | | 2 | 6 | | | | |
| | LUMBRINERIDAE | NINOE NIGRIPES | | | | | | | | | | 2 | | 1 | 1 | | | | | 2 | | 1 | | | | | | | |
| | LUMBRINERIDAE | SCOLETOMA HEBES | | | | | | | | 1 | | | | | | | | | | | | | | | | | | | |
| | DORVILLEIDAE | PAROUGIA CAECA | | | | | | | 12 | | 6 | 2 | 1 | 6 | 1 | | 5 | 5 | | 14 | 1 | | | | | | | | |
| | ORBINIIDAE | LEITOSCOLOPLOS | | | | | | | 22 | 8 | 4 | 10 | 4 | 11 | 9 | 9 | 13 | 3 | 7 | 15 | 1 | 10 | 1 | 12 | 3 | 1 | | | |
| | ORBINIIDAE | LEITOSCOLOPLOS ACUTUS | | 1 | | | 2 | | | | 2 | | | 14 | 1 | | | | | | | | | | | | | | |
| | ORBINIIDAE | SCOLOPLOS | 1 | | | | | | 15 | | 4 | | | | | 4 | 1 | 1 | | | | | | | 4 | | | | |
| | ORBINIIDAE | SCOLOPLOS ARMIGER | | | | | | | | | | 1 | | | | | | | | | | | | | | | | | |
| | PARAONIDAE | ARICIDEA CATHERINAE | 7 | 46 | 26 | 1 | | 8 | 1431 | 1065 | 510 | 27 | 11 | 3 | 15 | 14 | 17 | 25 | 2 | 87 | 7 | 20 | 3 | 13 | 13 | 9 | | 3 | |
| | PARAONIDAE | ARICIDEA QUADRILOBATA | | | | | | | | | | 2 | | | | | | | | 1 | | | | | | | | | |
| | PARAONIDAE | LEVINSENIA GRACILIS | | 1 | | | | | 10 | 2 | 15 | 4 | | 4 | | | 2 | 5 | 4 | 22 | 1 | 3 | 1 | | 17 | | | | |
| | APISTOBRANCHIDAE | APISTOBRANCHUS TULLBERGI | | | | | | | 1 | | | | | 3 | | | 1 | 1 | 3 | 14 | | 1 | | | 2 | | | | |
| | POLYNOIDAE | POLYDORA CORNUTA | | 1 | | | | | | | | | | | | | | | | | | | | | | | | | |
| | SPIONIDAE | POLYDORA QUADRILOBATA | | | | 1 | | | | | | | | | | | | | | | | | | | | | | | |
| | SPIONIDAE | POLYDORA SOCIALIS | | | | 4 | 5 | | | | | | 1 | | | | | | | | | | | | | | | | |
| | SPIONIDAE | PRIONOSPIO STEENSTRUPI | 2 | 6 | 1 | | 10 | | 36 | 6 | 1 | 63 | 78 | 118 | 76 | 53 | 116 | 41 | 44 | 53 | 33 | 36 | 16 | 18 | 20 | 33 | | | |
| | SPIONIDAE | PYGOSPIO ELEGANS | | | | | | | | | | | | | | | | | | | | | | | | | | 1 | 1 |
| | SPIONIDAE | SPIO FILICORNIS | | | | | | | | | | 1 | 2 | 1 | | | | | | | | | | | | 1 | | | |
| | SPIONIDAE | SPIO LIMICOLA | | | | 9 | 37 | 1 | 3 | | 1 | 22 | 36 | 28 | 31 | 21 | 11 | 11 | 14 | 17 | 8 | 1 | 10 | 3 | | 15 | | | |
| | SPIONIDAE | SPIO THULINI | | 3 | 6 | | 1 | 1 | | | | | | | | | | | | | | 1 | | | | | | | |
| | SPIONIDAE | SPIOPHANES BOMBYX | 1 | | | | 1 | | | | | | | | | | | | | | | | | | | | | | |
| | SPIONIDAE | STREBLOSPIO BENEDICTI | | | | | | | | | 1 | | | | | | | | | | | | | | | | | | |
| | TROCHOCHAETIDAE | TROCHOCHAETA MULTISETOSA | | | | | | | | | | | 1 | | | 1 | | | | | | | | | | | | | |
| | CIRRATULIDAE | APHELOCHAETA MARIONI | | 1 | | | | | | | | 7 | 7 | 14 | 5 | | 1 | 4 | 2 | 4 | | 3 | | | 1 | | | | |
| | CIRRATULIDAE | APHELOCHAETA MONILARIS | | | | | | | | | 1 | | | | | | | | | | | | | | | | | | |
| | CIRRATULIDAE | CHAETOZONE SETOSA | | | | | 3 | 1 | | | | | | | | | | | | | | | | | | | | | |

| Survey 9303 0.3 mm | | NF2 | | | NF4 | | | NF8 | | | NF9 | | | NF10 | | | NF12 | | | NF14 | | | NF16 | | | NF17 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Taxon | | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 |
| CIRRATULIDAE | *MONTICELLINA BAPTISTE* | | | | | | | 49 | 42 | 38 | 10 | 9 | 22 | 24 | 27 | 38 | 14 | 10 | 108 | | 38 | | 6 | 9 | 4 | | | |
| CIRRATULIDAE | *MONTICELLINA DORSOBRANCHIALIS* | | | | | | | 4 | 1 | | | | | | | | | | 1 | | | | | | | | | |
| CIRRATULIDAE | *THARYX ACUTUS* | 3 | 17 | 7 | 1 | 5 | 1 | 671 | 134 | 188 | 5 | 14 | 23 | 10 | 12 | 6 | 13 | 12 | 34 | 2 | 9 | | 6 | 14 | | | | |
| COSSURIDAE | *COSSURA LONGOCIRRATA* | | | | | | | | | | | | | | | | 1 | | | | | | | | | | | |
| FLABELLIGERIDAE | PHERUSA | | | | | | | 1 | | | | | | 2 | | | | | | | | | | | | | | |
| SCALIBREGMIDAE | *SCALIBREGMA INFLATUM* | | | | | | | 1 | | | | | | | | | | | | | | | | | | | | |
| OPHELIIDAE | *OPHELINA ACUMINATA* | | | | | | | | | | | | | | | | | | | | | | | 2 | | | | |
| CAPITELLIDAE | *CAPITELLA CAPITATA* | 3 | | | | 6 | | 2 | | 1 | 2 | | 4 | 4 | 6 | 2 | | | 1 | 2 | 2 | 1 | 1 | 3 | 1 | | | |
| CAPITELLIDAE | *MEDIOMASTUS CALIFORNIENSIS* | 3 | 3 | 6 | | 6 | | 34 | 4 | 6 | 15 | 22 | 5 | 12 | 10 | 23 | 3 | 40 | 55 | 3 | 23 | 3 | 19 | 21 | 10 | | | 1 |
| MALDANIDAE | EUCLYMENINAE | | | | | | 1 | | | | | | | | | | | | | | | | | | | | | |
| AMPHARETIDAE | *AMPHARETE ACUTIFRONS* | | | | | | | | | | | 1 | | | | | | | | | | | | | | | | |
| AMPHARETIDAE | *ASABELLIDES OCULATA* | | | | | | | | | | | 4 | | | | | 1 | | | | | | | | | | | |
| SABELLIDAE | *CHONE DUNERI* | | | | | | | | | | | | | | | | | | | | | | | 1 | | | | |
| SABELLIDAE | *EUCHONE INCOLOR* | | | | | | | | | | 2 | 6 | 1 | | 1 | | 1 | | 4 | | | | | | | | | |
| TUBIFICINA | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ENCHYTRAEIDAE | *ENCHYTRAEIDAE SP.3* | | 1 | | | | | | | | | | | | | | | | | | | | | | | | | |
| TUBIFICIDAE | | | | | | | | | | | 1 | | | | 1 | 3 | | | | | | | | | | | | |
| TUBIFICIDAE | *TUBIFICIDAE SP.2* | 2 | 4 | 2 | 6 | 1 | | 24 | 3 | 5 | | | 18 | | | | | | | | 1 | 13 | 1 | 15 | | | | |
| TUBIFICIDAE | *TUBIFICOIDES APECTINATUS* | 1 | 18 | 12 | | | | 78 | 40 | 25 | | | 1 | | | | | | | | | 1 | | 2 | | | | |
| GASTROPODA | | | 5 | | | | | | | | | 2 | | | | | | | | 1 | | | | 1 | 1 | | | |
| BIVALVIA | | 42 | 102 | 15 | 38 | 8 | 68 | 9 | 2 | | 8 | 13 | 13 | 4 | 3 | 17 | 2 | 6 | 3 | 31 | 22 | 15 | 12 | 25 | 14 | 3 | 11 | 18 |
| NUCULOIDEA | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| NUCULIDAE | *NUCULA DELPHINODONTA* | | | | 2 | | | | | | 10 | 59 | 38 | 27 | 5 | 9 | | 4 | 1 | | | 1 | 7 | 4 | 24 | | | |
| MYTILOIDA | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| MYTILIDAE | *CRENELLA DECUSSATA* | | | | | | | | | | 4 | 48 | 29 | 18 | 5 | 10 | | 2 | | 56 | 27 | 12 | 30 | 17 | 27 | | | |
| MYTILIDAE | *MYTILUS EDULIS* | 4 | 39 | 11 | | | | | | | | 2 | | | | | | | | | | | 2 | 2 | | | | |
| VENEROIDA | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ASTARTIDAE | *ASTARTE UNDATA* | | | | | | | | | | | 5 | 1 | | | | | 1 | | | | | | | | | | |
| CARDIIDAE | *CERASTODERMA PINNULATUM* | | | | | | | | | | | 16 | | | | 2 | | 1 | | | | | | | | | | |
| MYINA | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| HIATELLIDAE | *HIATELLA ARCTICA* | 66 | 279 | 2 | 10 | | 18 | 6 | | | 1 | 117 | 14 | | 1 | 25 | | | | 56 | 62 | 23 | | 8 | 4 | | | |
| CRUSTACEA | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| CUMACEA | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| DIASTYLIDAE | *LEPTOSTYLIS LONGIMANA* | | 1 | | | | 12 | | | 1 | | | | | | | | | | | | | | | | | | |
| ANTHURIDEA | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ANTHURIDAE | *PTILANTHURA TENUIS* | | | | 2 | | | | | | | | | | | | | | | | | | | | | | | |
| ASELLOTA | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| PARAMUNNIDAE | *PLEUROGONIUM INERME* | | | | 2 | | | | | | | | | 1 | | 1 | | | | | | | | | | | | |
| PARAMUNNIDAE | *PLEUROGONIUM RUBICUNDUM* | | | | | | | | | | | | | | | | | 2 | | | | | | | 3 | | | |
| AMPHIPODA | | | 1 | | | | 2 | | | 2 | | | 2 | | | | | | | 6 | 2 | | | | | 1 | 1 | 5 |
| GAMMARIDEA | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ARGISSIDAE | *ARGISSA HAMATIPES* | | | | 1 | | | | | | | | | | | | | | | | | | 1 | | | | | |
| COROPHIIDAE | *COROPHIUM CRASSICORNE* | | 2 | | 3 | 1 | 16 | | | | | | | | | | | | | | | | 1 | 1 | 1 | 4 | 1 | 78 |
| COROPHIIDAE | *PSEUDUNCIOLA OBLIQUUA* | | | | | | | | | | | | | | | | | | | | | | | | | | 9 | |
| COROPHIIDAE | UNCIOLA | | | | | | 1 | | | | | | | | | | | | | | 1 | | | | | | | |
| ISAEIDAE | *PHOTIS POLLEX* | | 6 | | 4 | 1 | 3 | | | | 1 | 7 | 11 | 11 | 2 | 1 | 1 | | 1 | 3 | 5 | 3 | | 1 | 1 | | | |
| OEDICEROTIDAE | *MONOCULODES EDWARDSI* | | | | 1 | | | | | | | | | | | | | | | | | | | | | | | |
| PHOXOCEPHALIDAE | *HARPINIA PROPINQUA* | | | | | | | | | | | 3 | | | | | | | | | | | | | | | | |
| PLEUSTIDAE | | | | | | | 1 | | | | | | | | | | | | | | | | | | | | | |
| PLEUSTIDAE | *STENOPLEUSTES INERMIS* | | | | 1 | | | | | | | 1 | 2 | 4 | | 1 | | | | | | 1 | | | | | | |
| STENOTHOIDAE | *METOPELLA ANGUSTA* | | | | 1 | 2 | | | | 1 | | 2 | 1 | 2 | | | 1 | | | 2 | | | | | | | | |
| SIPUNCULOIDEA | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | SIPUNCULA | | | | | | | | | | | | 1 | | | | | | | | | | | | | | | |
| PHORONIDA | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| PHORONIDAE | *PHORONIS ARCHITECTA* | | | | | | | | | | | | | 1 | 1 | 1 | | | | | | | | | | | | |
| ECHINODERMATA | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| OPHIUROIDEA | | | | | | 1 | | | | | | 3 | 2 | 1 | 1 | 4 | | 2 | 1 | 7 | 4 | | 1 | | 1 | | | |
| CHILOPHIURINA | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| OPHIOLEPIDIDAE | *OPHIURA ROBUSTA* | 4 | 6 | 1 | | | | | | | | | | | | | | | | | | | | | | | | |

# APPENDIX A-2: NEARFIELD ABUNDANCE (0.5-mm FRACTION)

| Survey 9303 0.5 mm Taxon | | NF2 | | | NF4 | | | NF8 | | | NF9 | | | NF10 | | | NF12 | | | NF14 | | | NF16 | | | NF17 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 |
| CNIDARIA | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| HYDROZOA | | | | | | | | 1 | | | | | | | | | | | | | | | | | | | | |
| CERIANTHARIA | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| CERIANTHIDAE | *CERIANTHEOPSIS AMERICANA* | | | | | | | | | | | | | | | | | | | | | | 6 | | | | | |
| ACTINIARIA | *ACTINIARIA SP.2* | 4 | 5 | 2 | | | 1 | | 1 | 1 | | 1 | 3 | | 2 | | | | | 2 | | 1 | | | | 1 | | |
| | *ACTINIARIA SP.6* | 3 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| EDWARDSIIDAE | *EDWARDSIA ELEGANS* | 3 | 4 | | | | | 2 | 2 | | | | | | 2 | | | | | | 1 | 2 | | | | 1 | | 1 |
| PLATYHELMINTHES | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| TURBELLARIA | *TURBELLARIA SP.1* | | | | | | | | | | | | | 1 | | | | | | | | | | | | | | |
| NEMERTEA | | | | | | | | | 1 | | | | | | | | 6 | | 3 | | | | | | 6 | | | |
| | *NEMERTEA SP.2* | | | | | | | | | | | | | | | | 1 | | | | | | | | | | | |
| PALEONEMERTEA | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| TUBULANIDAE | *CARINOMELLA LACTEA* | | | | | | 1 | 4 | 2 | 5 | | | | | | | | 1 | | | | | 1 | 1 | | | | |
| HETERONEMERTEA | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| LINEIDAE | *CEREBRATULUS LACTEUS* | | | | | | | 3 | 9 | 2 | 2 | 5 | | | | 3 | 4 | 4 | 6 | 2 | | | | | | | | |
| LINEIDAE | MICRURA | 2 | | | 4 | 3 | 2 | 34 | 73 | 55 | 7 | 9 | 5 | 15 | 9 | 16 | 21 | 22 | 19 | 4 | 3 | 3 | 6 | 10 | 11 | | | |
| MONOSTYLIFERA | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| AMPHIPORIDAE | *AMPHIPORUS ANGULATUS* | | | | | | | 4 | 14 | 1 | 1 | 1 | 1 | 2 | 2 | 6 | 10 | 4 | | | | | | 4 | 2 | | | |
| ANNELIDA | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| POLYCHAETA | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| POLYNOIDAE | *ENIPO TORELLI* | | | | | | | | 2 | | | | | | | | 2 | | 1 | | | | | 1 | | | | |
| POLYNOIDAE | *GATTYANA CIRROSA* | 1 | 4 | 1 | 1 | 3 | | | | | | 3 | 2 | 2 | 1 | 2 | 1 | 1 | | 1 | 3 | 2 | 2 | | 1 | | | |
| POLYNOIDAE | HARMOTHOINAE | | | | | | | | | | | 1 | | | | | | | | | | 1 | 1 | 1 | | | 1 | 1 |
| SIGALIONIDAE | *PHOLOE MINUTA* | 1 | | 2 | 3 | | 1 | | | 4 | 3 | 2 | 1 | 3 | 1 | 2 | 4 | 3 | 3 | | 3 | 2 | 2 | 2 | 2 | | | |
| PHYLLODOCIDAE | *ETEONE LONGA* | 2 | | 3 | | 1 | | 7 | 2 | 2 | | 1 | 1 | 2 | | 1 | 3 | 2 | | | | | 1 | 2 | | | | |
| PHYLLODOCIDAE | *EULALIA VIRIDIS* | | | | | | | | | | | 1 | | | | | | | | | | | | | | | | |
| PHYLLODOCIDAE | PHYLLODOCE | 2 | | | | | 6 | | | | | | | | | | 1 | | | | | | | | | | | |
| PHYLLODOCIDAE | *PHYLLODOCE ARENAE* | 2 | 4 | 1 | | 1 | | | | | | 1 | 1 | | | | | | | | | | | | | | | |
| PHYLLODOCIDAE | *PHYLLODOCE MACULATA* | 2 | 4 | 4 | 2 | | 4 | | | | | | | | | | | | | | | | | | | | | |
| PHYLLODOCIDAE | *PHYLLODOCE MUCOSA* | 6 | 19 | 19 | 7 | 1 | 1 | 1 | | 2 | 1 | 3 | 2 | 2 | | 5 | 1 | | | 6 | 3 | 7 | 4 | 1 | 2 | 1 | | |
| HESIONIDAE | *MICROPHTHALMUS SCZELKOWII* | | | | | | | | | | | | | | | | | | | | | 1 | | | | | | |
| SYLLIDAE | *EXOGONE HEBES* | | | | 33 | 24 | 123 | | 5 | 3 | 3 | 1 | 2 | 1 | | 6 | 3 | | 1 | 70 | 29 | 154 | | | 2 | 6 | | 5 |
| SYLLIDAE | *EXOGONE LONGICIRRUS* | | | | | | | | | | | | | 1 | | | | | | | | | | | | | | |
| SYLLIDAE | *EXOGONE VERUGERA* | 1 | | | 53 | 11 | 100 | | 3 | 2 | 8 | 17 | 3 | 19 | 1 | 12 | 22 | 14 | 16 | 65 | 26 | 61 | | 2 | 11 | | | |
| SYLLIDAE | *SPHAEROSYLLIS LONGICAUDA* | | | | | | | | | | | | | | | | | | | | | | | | 1 | | | |
| SYLLIDAE | *TYPOSYLLIS SP.1* | | | | | | 1 | | | | | | | | | | | | | 3 | | 1 | | | | | | |
| NEREIDAE | *NEREIS GRAYI* | | | | 1 | | | | | | | | | | | | | | | | | | | | | | | |
| NEPHTYIDAE | | | 2 | | | | | | | | | | | | | | | | | | | | | | | | 1 | |
| NEPHTYIDAE | *AGLAOPHAMUS CIRCINATA* | 1 | | | 10 | | 23 | | | | | | | | | | | | | | | | 1 | | | 6 | 2 | 3 |
| NEPHTYIDAE | NEPHTYS | | | | | | | 1 | 1 | | | | | | | | | | | 1 | | | | | | | | |
| NEPHTYIDAE | *NEPHTYS CAECA* | | | | | | | | | | | | | | | | | | | | | | | | | 1 | | |
| NEPHTYIDAE | *NEPHTYS CILIATA* | | | | | | | | | | | | | | | | | | | | 2 | | | | | | | |
| NEPHTYIDAE | *NEPHTYS INCISA* | | | | | | | 6 | 9 | 7 | | | 2 | | 2 | | 12 | 5 | 13 | | | | 16 | 3 | 3 | | | |
| NEPHTYIDAE | *NEPHTYS NEOTENA* | | | 1 | | | | | | | | | | | | | | | | | | | | | | | | |
| SPHAERODORIDAE | *SPHAERODOROPSIS MINUTA* | | | | | | | | | | | | | | | | | 2 | | | | | | | 1 | | | |
| GLYCERIDAE | *GLYCERA CAPITATA* | | | | | | 1 | | | | | | | | | | | | | | | | | | | | | |
| GONIADIDAE | *GONIADA MACULATA* | | | | | | | | | 1 | | | 1 | | | | | | | | | | | | | | | |
| LUMBRINERIDAE | | | | | | | | | | | | | | | | | | | | | | | | | 1 | | | |
| LUMBRINERIDAE | *NINOE NIGRIPES* | | | | 7 | 7 | 1 | 23 | 18 | 8 | 68 | 18 | 21 | 31 | 32 | 50 | 86 | 77 | 130 | 56 | 41 | 31 | 73 | 44 | 64 | | | |
| LUMBRINERIDAE | *SCOLETOMA FRAGILIS* | | | | | | | | | | | 1 | | 4 | | | | | | 3 | | 2 | | 1 | 1 | | | |
| LUMBRINERIDAE | *SCOLETOMA HEBES* | | | | | | | 1 | 7 | 5 | 1 | 1 | 1 | 2 | | 1 | 1 | | 1 | | | | | 3 | 3 | | | |
| ARABELLIDAE | *DRILONEREIS FILUM* | | | | | 1 | | | | | | | | | | | | | | | | | | | | | | |
| DORVILLEIDAE | *PAROUGIA CAECA* | | | | | 1 | | 7 | 3 | 14 | 3 | | | 1 | 1 | 3 | 24 | 19 | 12 | | 1 | | | 5 | 5 | | | |
| ORBINIIDAE | LEITOSCOLOPLOS | | | | | | | | 1 | 3 | | | | | | | | | | | | | | | | | | |
| ORBINIIDAE | *LEITOSCOLOPLOS ACUTUS* | | 4 | | 3 | | 1 | 69 | 76 | 37 | 19 | 25 | 33 | 43 | 45 | 70 | 68 | 74 | 51 | 10 | 1 | 7 | 16 | 29 | 46 | | | |
| ORBINIIDAE | *LEITOSCOLOPLOS SP.B* | | | | | | | | 1 | | | | | | | 1 | 1 | | 1 | | | | | | | | | |
| ORBINIIDAE | SCOLOPLOS | | | | | | | | | 6 | | | | | | | | | | | | | | | | | | |
| ORBINIIDAE | *SCOLOPLOS ARMIGER* | | | | | | | 1 | | 1 | | 4 | 5 | 4 | 1 | | 4 | 5 | 1 | 5 | 1 | 3 | | | 1 | | | |
| PARAONIDAE | *ARICIDEA CATHERINAE* | 8 | 3 | 18 | 14 | | | 691 | 1055 | 833 | 22 | 19 | 3 | 63 | 21 | 111 | 124 | 140 | 362 | 28 | 7 | 28 | 81 | 71 | 39 | 4 | 4 | 1 |
| PARAONIDAE | *ARICIDEA QUADRILOBATA* | | | | | | | 1 | 2 | 3 | | 1 | | 1 | | 1 | 3 | 2 | 1 | 1 | | | 1 | 1 | | | | |
| PARAONIDAE | *LEVINSENIA GRACILIS* | | | | | | 1 | 70 | 25 | 58 | 14 | 9 | 12 | 11 | 11 | 9 | 32 | 17 | 62 | 2 | 1 | 3 | 40 | 45 | 22 | | | |
| APISTOBRANCHIDAE | *APISTOBRANCHUS TULLBERGI* | | | | | | | 1 | | 2 | | | | | | | | | | | | 1 | | | 3 | | | |
| SPIONIDAE | LAONICE | | | | | | | | | | | | | | | | | | | 1 | | | | | | | | |

| Survey 9303 0.5 mm Taxon | | NF2 1 | NF2 2 | NF2 3 | NF4 1 | NF4 2 | NF4 3 | NF8 1 | NF8 2 | NF8 3 | NF9 1 | NF9 2 | NF9 3 | NF10 1 | NF10 2 | NF10 3 | NF12 1 | NF12 2 | NF12 3 | NF14 1 | NF14 2 | NF14 3 | NF16 1 | NF16 2 | NF16 3 | NF17 1 | NF17 2 | NF17 3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SPIONIDAE | *POLYDORA CAULLERYI* | | | | | | | | 1 | | | | | | | | | | | | | | | | | | | |
| POLYNOIDAE | *POLYDORA CORNUTA* | 1 | 2 | | | | | | | | | 2 | | | | | | | | | | | | 1 | | | | |
| SPIONIDAE | *POLYDORA QUADRILOBATA* | | | | 96 | 13 | 15 | | | | 1 | 1 | | | | | | | | 7 | 6 | 10 | | | | | | |
| SPIONIDAE | *POLYDORA SOCIALIS* | 3 | 5 | 5 | 43 | 37 | 7 | | | | 14 | 30 | | 11 | 2 | 1 | | | | 69 | 47 | 55 | 1 | | 1 | | | |
| SPIONIDAE | *PRIONOSPIO STEENSTRUPI* | 9 | 13 | 4 | | | | 23 | 39 | 14 | 65 | 69 | 45 | 94 | 36 | 119 | 104 | 74 | 114 | 18 | 2 | 6 | | 36 | 114 | 1 | | |
| SPIONIDAE | *PYGOSPIO ELEGANS* | | | | | | | | | | | | | | | | | | | | | | | | | 1 | | 6 |
| SPIONIDAE | SPIO | | | | | | | | | | | | | | | | | | | | | | | | | 1 | | |
| SPIONIDAE | *SPIO FILICORNIS* | 3 | 7 | 5 | | | | 7 | 3 | 5 | 1 | 2 | 4 | | 3 | 5 | | | | | | 3 | 2 | | 7 | | | |
| SPIONIDAE | *SPIO LIMICOLA* | 1 | 4 | | 22 | 169 | 4 | 36 | 36 | 30 | 163 | 400 | 240 | 323 | 220 | 427 | 188 | 204 | 136 | 232 | 10 | 28 | 65 | 81 | 100 | | | |
| SPIONIDAE | *SPIO THULINI* | 6 | 21 | 8 | 1 | 7 | | 1 | | 1 | | | | | | | | | 1 | | | | | | | | | |
| SPIONIDAE | *SPIONIDAE SP.1* | | | | | | | | | | | | | 1 | | | | | | | | | | | | | | |
| SPIONIDAE | *SPIOPHANES BOMBYX* | 1 | 3 | 3 | | 3 | | 1 | | | | | | 2 | 1 | 2 | 1 | 1 | | | | | | | | 9 | 6 | 7 |
| SPIONIDAE | *SPIOPHANES KROEYERI* | | | | | | | | | | | | | | | | | | | | | | | | 1 | | | |
| SPIONIDAE | *STREBLOSPIO BENEDICTI* | | | | | | | | 1 | | | | | | | | | | | | | | | | | | | |
| TROCHOCHAETIDAE | TROCHOCHAETA | | | | | | | | | | | | | 1 | | | | | | | | | | 1 | | | | |
| TROCHOCHAETIDAE | *TROCHOCHAETA MULTISETOSA* | | 1 | 4 | | | | | | | | | 1 | | 8 | 1 | 4 | 2 | 3 | | | | 2 | 6 | | | | |
| CIRRATULIDAE | *APHELOCHAETA MARIONI* | | | 2 | 3 | 11 | 2 | 14 | 9 | 20 | 26 | 16 | 25 | 34 | 6 | 7 | 5 | 28 | 13 | 2 | 2 | 1 | | 7 | 9 | | | |
| CIRRATULIDAE | *APHELOCHAETA MONILARIS* | 1 | 1 | | | | | 16 | 5 | 2 | | | | | | | 1 | 1 | 1 | | | | | 4 | 2 | | | |
| CIRRATULIDAE | *APHELOCHAETA SP.A* | 1 | 1 | | | | | 3 | | 6 | | | | | | | | | | | | | | | | | | |
| CIRRATULIDAE | *CHAETOZONE SP.A* | | | | | | | | | 1 | | | | | | | | | | | | | | | | | | |
| CIRRATULIDAE | *CIRRATULUS CIRRATUS* | | | | | | | | | | | | | | | | | | | | 1 | 2 | | | | | | |
| CIRRATULIDAE | *MONTICELLINA BAPTISTE* | | 1 | | | | | 97 | 58 | 99 | 27 | 16 | 12 | 15 | 5 | 39 | 25 | 18 | 76 | | | | 4 | 15 | 30 | | | |
| CIRRATULIDAE | *MONTICELLINA DORSOBRANCHIALIS* | | | | 1 | | | 31 | 20 | 12 | 4 | 1 | 5 | 1 | 7 | 4 | 2 | | 3 | 2 | 1 | 4 | 7 | 5 | 6 | | | |
| CIRRATULIDAE | *THARYX ACUTUS* | 9 | 23 | 9 | | | 4 | 930 | 308 | 247 | 10 | 23 | 10 | 12 | 7 | 11 | 33 | 15 | 44 | | | 1 | 15 | 42 | 58 | | 1 | 3 |
| COSSURIDAE | *COSSURA LONGOCIRRATA* | | | | | | | | | | | | | | | | 2 | | 1 | | | | | | | | | |
| FLABELLIGERIDAE | PHERUSA | 5 | 7 | | | | | | | 1 | | | | | | | | 1 | | | | | | | 1 | | | 1 |
| FLABELLIGERIDAE | *PHERUSA AFFINIS* | | | | | | | | | | | | | | | | | | | | | | | 1 | | | | |
| SCALIBREGMIDAE | *SCALIBREGMA INFLATUM* | | | | | | 1 | 1 | 5 | 4 | | | | | | | | | | | | 2 | | | | | | |
| OPHELIIDAE | OPHELINA ACUMINATA | | | | | | | | | | | | | | | 1 | | | | | | | | | | | | |
| STERNASPIDAE | *STERNAPSIS SCUTATA* | | | | | | | | | | 1 | | | | | | | | | | | | | | | | | |
| CAPITELLIDAE | *CAPITELLA CAPITATA* | | 1 | 9 | | 8 | | 11 | 10 | 10 | | | 2 | 1 | 3 | | 1 | 1 | 4 | 2 | | | | 6 | 4 | | | |
| CAPITELLIDAE | *HETEROMASTUS FILIFORMIS* | | | | | | | 1 | | | | | | | 1 | | | | | | | | | 1 | | | | |
| CAPITELLIDAE | *MEDIOMASTUS CALIFORNIENSIS* | 4 | 18 | 6 | 4 | 49 | 2 | 359 | 282 | 443 | 90 | 15 | 78 | 103 | 211 | 357 | 326 | 406 | 731 | 90 | 25 | 111 | 117 | 312 | 259 | | 6 | 1 |
| MALDANIDAE | *CLYMENELLA TORQUATA* | | | | | | | | | 1 | 3 | 4 | | 1 | 3 | 1 | | | | | | | | | | | | |
| MALDANIDAE | *CLYMENURA SP.A* | | | | 1 | | 1 | | | | | | | | | | | | | | | | | | | 1 | | 1 |
| MALDANIDAE | *EUCLYMENE COLLARIS* | | | | 40 | 8 | 15 | | | | | | | | | | | | | | | 7 | | | | | | 3 |
| MALDANIDAE | EUCLYMENINAE | | | | 7 | 2 | 9 | | 1 | | | | | | 2 | | 1 | | | 5 | 2 | 1 | | | | 1 | | |
| MALDANIDAE | *MALDANE GLEBIFEX* | | | | | | | | 1 | | 113 | 1 | 3 | 85 | 11 | 38 | 2 | 1 | | | | | | | | | | |
| MALDANIDAE | *PRAXILLELLA GRACILIS* | | | | | 3 | | | | | | | | | | | | | | | | | | | | | | |
| MALDANIDAE | *PRAXILLELLA PRAETERMISSA* | | | | | | | | | | | | | | | | | | 1 | | | | | | | | | |
| OWENIIDAE | *GALATHOWENIA OCULATA* | | | | | | 4 | | | | | | | 1 | | | | | | | | | | | | | | |
| OWENIIDAE | *OWENIA FUSIFORMIS* | | | | | | 3 | | | | | | | | | | | | 1 | | | | | | 1 | | | |
| AMPHICTENIDAE | *PECTINARIA GRANULATA* | 4 | 3 | 2 | | | | | | | | | | | | | | | | | | | | | | | | |
| AMPHARETIDAE | | | | | | | | | | | | | | | | | | | | | | 4 | | 2 | | | | |
| AMPHARETIDAE | *AMPHARETE ACUTIFRONS* | | | | | | 1 | | 1 | | 2 | 5 | 5 | 6 | 10 | 3 | 6 | | 6 | 3 | | | | 2 | 5 | | | |
| AMPHARETIDAE | *AMPHARETE ARCTICA* | | | | | | | | | | | | | | | | | | | | | 1 | | | | | | |
| AMPHARETIDAE | *ANOBOTHRUS GRACILIS* | | | | | | | | | | | | | | | | | | 2 | | | 2 | | | | | | |
| AMPHARETIDAE | *ASABELLIDES OCULATA* | 1 | 1 | | | | | 8 | 9 | 11 | | 32 | 2 | 7 | 4 | 8 | 3 | 1 | 5 | 11 | 5 | 59 | 1 | 27 | 9 | | | |
| TEREBELLIDAE | POLYCIRRUS | 3 | | | 1 | | | 3 | | | | | | | | | | | | | | 1 | | | 3 | | | |
| SABELLIDAE | *CHONE DUNERI* | | | | | | | | | | | | | | | | | 1 | | | | | | | | | | |
| SABELLIDAE | *EUCHONE ELEGANS* | | | | 43 | | 81 | | | | | | | 1 | | | | | | | 1 | 2 | | | | | | |
| SABELLIDAE | *EUCHONE INCOLOR* | | | | | | | | | 5 | | | 2 | 2 | 3 | 5 | 1 | 2 | 6 | 2 | 1 | | | | 6 | | | |
| SABELLIDAE | *LAONOME KROEYERI* | | | | | | 1 | | | | | | | | | | | | | | 1 | | | 1 | 1 | | | |
| ARCHIANNELIDA | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| POLYGORDIIDAE | *POLYGORDIUS SP.A* | | | | | | | | | | | | | | | | | | | | 1 | | | | | | | |
| TUBIFICINA | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| TUBIFICIDAE | *TUBIFICIDAE SP.2* | 4 | 3 | 2 | | | | 3 | 4 | 9 | | | | | | | 1 | | | | 1 | 8 | 3 | 15 | | | | |
| TUBIFICIDAE | *TUBIFICOIDES APECTINATUS* | 4 | 2 | 1 | | 1 | | 10 | 38 | 35 | | | | | | | | | | | | | | | | | | |
| GASTROPODA | | 1 | | | | | 1 | | | | 1 | | | | | 1 | | | | | 1 | 2 | 2 | | | 1 | 1 | |
| | *GASTROPODA SP.A* | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| MESOGASTROPODA | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| RISSOIDAE | *ONOBA PELAGICA* | | | | | | | | | | | 2 | | | | | | | | | | | | | | | | |
| CEPHALASPIDEA | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

| Survey 9303 0.5 mm | Taxon | NF2 1 | NF2 2 | NF2 3 | NF4 1 | NF4 2 | NF4 3 | NF8 1 | NF8 2 | NF8 3 | NF9 1 | NF9 2 | NF9 3 | NF10 1 | NF10 2 | NF10 3 | NF12 1 | NF12 2 | NF12 3 | NF14 1 | NF14 2 | NF14 3 | NF16 1 | NF16 2 | NF16 3 | NF17 1 | NF17 2 | NF17 3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CYLICHNIDAE | *CYLICHNA ALBA* | | | | | 1 | 3 | | | | | | | | | | | | | | | | | | | | | |
| CYLICHNIDAE | *CYLICHNA GOULDI* | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| BIVALVIA | | 58 | 25 | 4 | 4 | 2 | 4 | 2 | | | 2 | 9 | | 9 | 1 | 5 | 2 | | 2 | 6 | 4 | 10 | 1 | 2 | 1 | | 7 | 2 |
| NUCULOIDEA | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| NUCULIDAE | *NUCULA DELPHINODONTA* | | | | 1 | | 1 | 9 | 1 | 3 | 18 | 32 | 13 | 18 | 11 | 14 | 4 | 4 | 8 | 5 | 2 | 2 | | | 21 | | | |
| NUCULIDAE | *NUCULOMA TENUIS* | | | | | | | | | | 1 | | | | | | | | | | | | | | | | | |
| NUCULANIDAE | *YOLDIA SAPOTILLA* | | | | | | | | | | 1 | 3 | 2 | 4 | 1 | | | 3 | 1 | | | | | | 1 | | | |
| MYTILOIDA | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| MYTILIDAE | *CRENELLA DECUSSATA* | | | | 4 | 1 | 12 | | | | 15 | 25 | 14 | 17 | 5 | 9 | 1 | | 1 | 19 | 40 | 37 | | 1 | 19 | | | |
| MYTILIDAE | *CRENELLA GLANDULA* | | | | 1 | | | | | | | | | | | | | | | | | | | | | | | |
| MYTILIDAE | *MUSCULUS NIGER* | | | | | | | | | | | 1 | | | | | | | 1 | | | | | | | | | |
| MYTILIDAE | *MYTILUS EDULIS* | | 3 | 1 | | | | | | 1 | | | | | | | | | | | | | | 1 | | | 5 | |
| VENEROIDA | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| THYASIRIDAE | *THYASIRA GOULDII* | | | | | | | | | | 3 | 10 | 2 | 5 | | 1 | | | | | | | | | 3 | | | |
| CARDITIDAE | *CYCLOCARDIA BOREALIS* | | | | 5 | 1 | 4 | | | | | | | | | | | | | | | | | | | | | |
| ASTARTIDAE | *ASTARTE UNDATA* | | | | 7 | 10 | 10 | | | | 2 | 6 | 2 | 2 | 1 | | 1 | | | 3 | 5 | 5 | | | 1 | | | |
| CARDIIDAE | *CERASTODERMA PINNULATUM* | 17 | 37 | 3 | | 4 | 5 | | | | | 1 | | | | | | | | | | | | | | 4 | 12 | 1 |
| SOLENIDAE | *ENSIS DIRECTUS* | 1 | | | | | | 1 | | | | | | | | | | | | | | | | | | 2 | 10 | 2 |
| TELLINIDAE | *MACOMA BALTHICA* | | | | 1 | | | | | | | | | | | | | | | | | | | | | | | |
| ARCTICIDAE | *ARCTICA ISLANDICA* | 8 | 5 | 4 | 2 | 1 | | 5 | | 2 | 1 | 9 | | | 3 | 9 | 1 | 5 | | 7 | 9 | 12 | 2 | 2 | 8 | | | |
| VENERIDAE | *PITAR MORRHUANA* | | | | | | | | | | | | | | | | | | 1 | | | | | | | | | |
| MYINA | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| MYIDAE | *MYA ARENARIA* | | 1 | | | | | | | | | 1 | 1 | 1 | | 1 | 4 | 1 | 2 | | | | | | 1 | | | |
| HIATELLIDAE | *HIATELLA ARCTICA* | 306 | 868 | 255 | | 6 | 24 | 7 | 1 | 3 | 1 | 10 | | 2 | | 11 | | | | 12 | 28 | 37 | | 9 | 2 | | 2 | 1 |
| PHOLADOMYACEA | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| LYONSIIDAE | *LYONSIA ARENOSA* | | | | | | | | | | | | | | | | | | | | | | | | 1 | | | |
| PERIPLOMATIDAE | *PERIPLOMA PAPYRATIUM* | | | | | | | 1 | | | | | | | | | 2 | 3 | 3 | | | | | | 1 | | | |
| SCAPHOPODA | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| DENTALIDA | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| DENTALIIDAE | *DENTULIUM ENTALE* | | | | | | | | | | | | | | | | | | | | | | | | 1 | | | |
| CRUSTACEA | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| CALANOIDA | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| TEMORIDAE | TEREBELLIDAE | | 1 | | | | | | | | | | | | | | | | | | | | | | | | | |
| CUMACEA | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| LAMPROPIDAE | *LAMPROPS QUADRIPLICATA* | | 2 | | | 1 | | | | | | | | | | | | | | | | | | | | | | |
| LEUCONIDAE | *EUDORELLA PUSILLA* | | | 1 | 1 | 1 | 2 | | | | | 1 | | | | 1 | | | | | | | | | | | | |
| LEUCONIDAE | *EUDORELLOPSIS DEFORMIS* | | | | | | | | | | | | | | | | | | | | | | | | | 1 | 2 | |
| DIASTYLIDAE | *DIASTYLIS QUADRISPINOSA* | | | | | 1 | | | | | | | | | | | | | | 1 | | | | | | | 1 | |
| DIASTYLIDAE | *DIASTYLIS SCULPTA* | 1 | 1 | 1 | | 1 | | | | | | | | | | | | | | | | | | | 1 | | | |
| DIASTYLIDAE | *LEPTOSTYLIS LONGIMANA* | | | | | | 11 | | | | | | | | | | | | | | | | | | | | | |
| CAMPYLASPIDAE | *CAMPYLASPIS RUBICUNDA* | | 1 | | | | | | | | | 1 | | 1 | | | | 1 | | | | | | 1 | | | | |
| CAMPYLASPIDAE | *CAMPYLASPIS SP.1* | | | | | 1 | | | | | | | | | | | | | | | 3 | 1 | | | | | | |
| ANTHURIDEA | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ANTHURIDAE | *PTILANTHURA TENUIS* | | | | 57 | 8 | 22 | | | | | | 1 | 1 | 1 | | | | | 1 | 7 | 4 | | | | 1 | | |
| FLABELLIFERA (ISOPODA) | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| CIROLANIDAE | *CIROLANA POLITA* | | | | | | | | | | | | | | | | | | | | | | | | | 7 | 6 | 9 |
| VALVIFERA | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| IDOTEIDAE | *EDOTEA MONTOSA* | 1 | 2 | | 1 | 3 | 2 | 2 | 1 | | 8 | 10 | 12 | 8 | 2 | 6 | 1 | | 1 | 13 | 8 | 4 | | 3 | 6 | | | |
| CHAETILIIDAE | *CHIRIDOTEA TUFTSI* | | | | | | | | | | | | | | | | | | | | | | | | | 5 | 10 | 33 |
| ASELLOTA | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| PARAMUNNIDAE | *PLEUROGONIUM INERME* | | | | | | | | | | | | | 1 | | | | | | | | | | | | | | |
| PARAMUNNIDAE | *PLEUROGONIUM RUBICUNDUM* | | | | | 1 | | | | | | | | | | | | | | | | | 1 | 1 | 2 | | | |
| AMPHIPODA | | | | | | 7 | | | | | | | | | | | | | | 2 | 1 | 3 | | 3 | | 1 | | 8 |
| | *AMPHIPODA SP.1* | 18 | 19 | 11 | | 1 | 30 | | | | | | | | | | | | | | | | | | | | | |
| GAMMARIDEA | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| AMPELISCIDAE | *AMPELISCA* | | 1 | | 1 | | | | | 1 | 1 | | | | | | | | | | | | | | | 1 | | |
| AMPELISCIDAE | *AMPELISCA MACROCEPHALA* | | | | 9 | 3 | 9 | | | | 1 | 1 | | | 2 | | | | | | | | | | 3 | 3 | | |
| AMPELISCIDAE | *HAPLOOPS TUBICOLA* | | | | 1 | | | | | | | | | | | 2 | | | | 1 | | 1 | | | | | | |
| AORIDAE | *LEPTOCHEIRUS PINGUIS* | | | | | | 4 | | | | | | | | | | | | | | | | 3 | | | | | 1 |
| ARGISSIDAE | *ARGISSA HAMATIPES* | 2 | 5 | 2 | | 2 | 1 | | | | | 1 | | | | | | | | | | | 2 | 2 | 4 | | 1 | 1 |
| COROPHIIDAE | *COROPHIUM CRASSICORNE* | 2 | 3 | 1 | | 4 | 60 | | | | | | | | | | | | | | | | | | | 44 | 22 | 129 |
| COROPHIIDAE | *ERICHTHONIUS RUBRICORNIS* | | | | | | 1 | | | | | | | | | | | | | | | | | | | | | |
| COROPHIIDAE | *PSEUDUNCIOLA OBLIQUUA* | | | | | | | | | | | | | | | | | | | | | | | | | 6 | 14 | 13 |

| Survey 9303 0.5 mm Taxon | | NF2 1 | NF2 2 | NF2 3 | NF4 1 | NF4 2 | NF4 3 | NF8 1 | NF8 2 | NF8 3 | NF9 1 | NF9 2 | NF9 3 | NF10 1 | NF10 2 | NF10 3 | NF12 1 | NF12 2 | NF12 3 | NF14 1 | NF14 2 | NF14 3 | NF16 1 | NF16 2 | NF16 3 | NF17 1 | NF17 2 | NF17 3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| COROPHIIDAE | UNCIOLA | 39 | 72 | 30 | | 2 | 3 | | | | | 3 | | | | | 1 | | | | | | | | 9 | | | |
| COROPHIIDAE | UNCIOLA | 2 | 1 | | | | | | | | | | | | | | | | | | | | | | | 2 | | |
| COROPHIIDAE | *UNCIOLA INERMIS* | | | | 8 | | 267 | | | | | | | | | | | | | | | | | | | | 3 | 1 |
| COROPHIIDAE | *UNCIOLA IRRORATA* | | | 3 | | | | | | | | | | | | | | | | | | | | | | | | |
| HAUSTORIIDAE | *ACANTHOHAUSTORIUS MILLSI* | | | | | | | | | | | | | | | | | | | | | | | | | 7 | 5 | 2 |
| ISAEIDAE | *PHOTIS POLLEX* | | 3 | 1 | | | 4 | | | | | 4 | 2 | 1 | | 1 | | | | | 2 | 3 | | 1 | 1 | | | |
| ISCHYROCERIDAE | *ISCHYROCERUS ANGUIPES* | | | | | 1 | | | | | | | | | | | | | | | | | | | | | | |
| LYSIANASSIDAE | *ANONYX LILLJEBORGI* | | | | 2 | | 2 | | | | | | | 1 | | | | | 1 | 1 | | 1 | 1 | | | | | |
| LYSIANASSIDAE | *HIPPOMEDON SERRATUS* | 1 | | | | 1 | 3 | | | | | 2 | | | | 1 | | | | | | | | | | 1 | 2 | 12 |
| OEDICEROTIDAE | | | | | | | | | | | | | | | | | | | | | 1 | | | | | | | |
| OEDICEROTIDAE | *MONOCULODES EDWARDSI* | | | | | | | | | | | | | 2 | | | | | | | | | | 1 | | | | |
| OEDICEROTIDAE | *OEDICEROTIDAE SP.2* | | | | | 2 | | | | | | | | | | | | | | | | | | | | | | |
| OEDICEROTIDAE | *OEDICEROTIDAE SP.A* | | | | | | | | | | | | 1 | | | | | | | | | | | | | | | |
| PHOXOCEPHALIDAE | *HARPINIA PROPINQUA* | | | | | | 2 | | | | | 2 | 1 | | | 1 | | | | | | | | | 2 | | | |
| PHOXOCEPHALIDAE | *PHOXOCEPHALUS HOLBOLLI* | 1 | | | | | | | | | | | | | 1 | | | | | | | | | | | 2 | 3 | 1 |
| PHOXOCEPHALIDAE | *RHEPOXYNIUS HUDSONI* | | | | | | | | | | | | | | | | | | | | | | | | | 10 | 5 | 4 |
| PLEUSTIDAE | *STENOPLEUSTES INERMIS* | | | | | | 2 | | | | | 1 | | 2 | | | | | | | | | 1 | | 3 | | | |
| PODOCERIDAE | *DYOPEDOS MONOCANTHA* | | | 1 | | | 1 | 1 | | | 1 | 4 | | 1 | | 2 | | | | | 2 | 1 | | | | | | |
| STENOTHOIDAE | *METOPELLA ANGUSTA* | | | | 2 | 1 | 6 | | | | | 4 | | 6 | 2 | 2 | | 1 | 1 | 1 | | | | | 9 | | | |
| CAPRELLIDEA | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| CAPRELLIDAE | *MAYERELLA LIMICOLA* | | | | | | | | | | | | | | | 1 | | | | | | | | | | | | |
| CANCRIDEA | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| CANCRIDAE | *CANCER BOREALIS* | | | | | | | | 1 | | | | | | | | | | | | | 1 | | | | | | |
| PRIAPULIDA | | | | | | | | | | 2 | | | | | | | | | | | | | | | | | | |
| PHORONID PHORONIDAE | *PHORONIS ARCHITECTA* | | | | 1 | | | 3 | 13 | 14 | 3 | 4 | 18 | 2 | 1 | 6 | 5 | | | 3 | | 1 | 1 | | 1 | | | |
| ECHINODERMATA | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| OPHIUROIDEA | | | | | | | | | 1 | 1 | | | 1 | 2 | | 1 | | | | 1 | | 4 | 2 | 2 | | 2 | 4 | |
| SCUTELLINA | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ECHINARACHNIIDAE | *ECHINARACHNIUS PARMA* | | | | | | | | | | | | | | | | | | | | | | | | | 6 | | 1 |

# APPENDIX A-3: FARFIELD ABUNDANCE (0.3-mm FRACTION)

| Survey 9303 0.3 mm Taxon | | FF1 | | | FF4 | | | FF5 | | | FF6 | | | FF7 | | | FF9 | | | FF10 | | | FF11 | | | FF12 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 |
| NEMERTEA | | 9 | 15 | 8 | 6 | 1 | 5 | 19 | 7 | 29 | 24 | 12 | 11 | 2 | 7 | 3 | 2 | 2 | | 11 | 1 | | | 3 | | | | |
| | *NEMERTEA SP.2* | | | | | | | | | 1 | | 7 | | | | | | | | | | | | | | | | |
| PALEONEMERTEA | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| TUBULANIDAE | *CARINOMELLA LACTEA* | | | | | | | | | | | | | | 1 | 2 | | | | | 1 | | | | | | | |
| TUBULANIDAE | *TUBULANUS PELLUCIDUS* | | | | | 1 | 1 | | | | | | | | | | | | | | | | | | | | | |
| HETERONEMERTEA | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| LINEIDAE | MICRURA | | 1 | 1 | 1 | 2 | 2 | 1 | | 4 | 1 | 5 | 13 | 4 | 10 | 5 | | | | | | | | 1 | 1 | 3 | 1 | 1 |
| MONOSTYLIFERA | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| AMPHIPORIDAE | *AMPHIPORUS ANGULATUS* | | 4 | 1 | 2 | | | | 2 | | | 4 | | | | | | | | 3 | 1 | 7 | | | | | | |
| TETRASTEMMATIDAE | *TETRASTEMMA VITTATUM* | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ANNELIDA | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| POLYCHAETA | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| POLYNOIDAE | HARMOTHOINAE | 1 | 1 | 2 | 1 | | | 1 | 2 | 1 | | | | | | | | | | | | 1 | 1 | 1 | | | | |
| SIGALIONIDAE | *PHOLOE MINUTA* | 1 | | 1 | | | 1 | | | | 7 | 2 | 6 | 5 | 7 | 16 | 2 | 1 | | 1 | 1 | 3 | 2 | 1 | 7 | 2 | 2 | 4 |
| PHYLLODOCIDAE | *ETEONE LONGA* | | 3 | 1 | | | | | 1 | 2 | | 1 | 1 | 3 | 2 | 4 | | 1 | 1 | 3 | 3 | 1 | 13 | 9 | 2 | 2 | 2 | |
| PHYLLODOCIDAE | *MYSTIDES BOREALIS* | | | | | | | | | | 1 | 1 | 2 | | 1 | 2 | | | | | | | | | | | | |
| PHYLLODOCIDAE | PHYLLODOCE | | | | | | | | | | | | | 2 | | 1 | | | | | | | | | | | | 1 |
| PHYLLODOCIDAE | *PHYLLODOCE MUCOSA* | 1 | | | 1 | | | 1 | | | 2 | 1 | | | | 2 | 1 | 1 | 1 | | 2 | | | | 1 | 7 | 1 | 3 |
| HESIONIDAE | *MICROPHTHALMUS SCZELKOWII* | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| SYLLIDAE | *EXOGONE HEBES* | | 2 | 1 | | | | | | | | | | | | | 2 | 2 | 17 | 3 | 7 | 21 | | 1 | 1 | 2 | 2 | 2 |
| SYLLIDAE | *EXOGONE VERUGERA* | | 2 | | | | | | | | | | | | | | 8 | 5 | 3 | 7 | 2 | 22 | | | 1 | | | |
| SYLLIDAE | *SPHAEROSYLLIS BREVIFRONS* | | | | | | | | | | | | | | | | | | | | | | 2 | | | | | |
| SYLLIDAE | *SPHAEROSYLLIS LONGICAUDA* | | | | | | | | | | 1 | 3 | 2 | 1 | | | 1 | 2 | | 1 | | 2 | | | | | | |
| SYLLIDAE | *SYLLIDES JAPONICA* | | | | | | | | | | 1 | | 3 | | 3 | 2 | | | | | | | 2 | | 1 | | | |
| SYLLIDAE | *SYLLIDES LONGOCIRRATA* | 15 | 16 | 16 | 12 | 1 | 2 | | | | 1 | 4 | 3 | 22 | 23 | 39 | | | | 1 | | | | 2 | 7 | | | |
| NEREIDAE | | | | | | | | 1 | | | 2 | | 1 | | | | 1 | | | | | | 1 | | 1 | | | |
| NEPHTYIDAE | NEPHTYS | 1 | | | | | | 3 | 3 | | 2 | | 7 | | 2 | 5 | | | | | 1 | 2 | 2 | 2 | 6 | 1 | 1 | 1 |
| NEPHTYIDAE | *NEPHTYS INCISA* | | | | | | | | | | | | | | | | | 1 | | 1 | | 1 | | | | | | |
| NEPHTYIDAE | *NEPHTYS NEOTENA* | | | 1 | 1 | 1 | | | 1 | 2 | 2 | | 2 | | 1 | 4 | | | 1 | 2 | 1 | | 1 | 2 | 3 | 4 | 5 | 1 |
| SPHAERODORIDAE | *SPHAERODOROPSIS MINUTA* | 2 | | | | | | | | | | | 2 | 3 | 2 | 6 | | | | 1 | | 1 | | | | | | |
| GLYCERIDAE | GLYCERA | | | | | | | | | | | | | | | | | | | | | | | | 1 | | | |
| GONIADIDAE | *GONIADA MACULATA* | | 1 | | | | | | | | | | | | | | | | | | | | 2 | 3 | 1 | | | |
| LUMBRINERIDAE | | | | | | | | 1 | 1 | 4 | 6 | 10 | 21 | 3 | 6 | 4 | | 5 | 1 | 6 | | 22 | 7 | 5 | 3 | 3 | 4 | |
| LUMBRINERIDAE | *NINOE NIGRIPES* | | | | | | | | | | | | | 5 | 1 | | | | | | 1 | | | | | 1 | 1 | |
| LUMBRINERIDAE | *SCOLETOMA FRAGILIS* | | | 1 | | | | | | | | | | | | | | | | | | | | | | | | |
| LUMBRINERIDAE | *SCOLETOMA HEBES* | | | | | | | | | | | | | | | | | | | | | | | | | 5 | 6 | 2 |
| DORVILLEIDAE | *DORVILLEA SOCIABILIS* | | | 1 | | | | | | | | | | | | | | | | | | | | | | | | |
| DORVILLEIDAE | *PAROUGIA CAECA* | 1 | | | 2 | | | 2 | | | | 3 | 26 | | | 3 | | 1 | | 2 | 2 | 1 | | | 1 | 1 | 2 | 1 |
| ORBINIIDAE | *LEITOSCOLOPLOS ACUTUS* | 2 | | 6 | 1 | 1 | 2 | 3 | 1 | 4 | | 2 | 6 | 1 | | 3 | 1 | 1 | | 24 | 6 | 6 | 28 | 40 | 19 | 1 | 2 | 3 |
| ORBINIIDAE | *SCOLOPLOS ARMIGER* | | | | | | | | | | | | | | | | | | | | | 1 | | | | 4 | 4 | 3 |
| PARAONIDAE | *ARICIDEA CATHERINAE* | | | | | | | | | | 16 | 46 | 18 | 129 | 130 | 197 | | | | 8 | 11 | 24 | | | | 83 | 73 | 371 |
| PARAONIDAE | *ARICIDEA QUADRILOBATA* | 17 | 9 | 8 | 8 | | 3 | 36 | 28 | 52 | 11 | 22 | 14 | 16 | 32 | 12 | | | 1 | | | | 37 | 63 | 35 | | | |
| PARAONIDAE | *LEVINSENIA GRACILIS* | 7 | 5 | 5 | 12 | 1 | 9 | 13 | 6 | 23 | 2 | 3 | 4 | 32 | 29 | 35 | 5 | 12 | 15 | 1 | | 5 | 51 | 53 | 54 | | 5 | 4 |
| APISTOBRANCHIDAE | *APISTOBRANCHUS TULLBERGI* | 4 | | | 2 | 1 | | 2 | 1 | | 3 | 1 | 13 | 1 | 19 | 12 | | | | | | | | 1 | | | | |
| SPIONIDAE | *POLYDORA SOCIALIS* | | 3 | | | | | | | 1 | 1 | | 2 | 3 | | 2 | 1 | 3 | 2 | | 2 | 2 | | | | | | |
| SPIONIDAE | *PRIONOSPIO STEENSTRUPI* | 1 | 7 | 3 | 6 | 4 | 15 | 9 | 12 | 7 | | 1 | | | | 1 | 24 | 79 | 40 | 80 | 76 | 77 | 88 | 54 | 60 | 36 | 18 | 25 |
| SPIONIDAE | *SPIO LIMICOLA* | 6 | 4 | 5 | 22 | 16 | 8 | 64 | 22 | 33 | 10 | 9 | 23 | 48 | 43 | 108 | 38 | 34 | 79 | 10 | 13 | 25 | 4 | 33 | 22 | | | |
| SPIONIDAE | *SPIOPHANES BOMBYX* | | | | | | | | | | | | | | | | 1 | | | | 1 | 1 | | | | 3 | | 2 |
| SPIONIDAE | *STREBLOSPIO BENEDICTI* | | 1 | 1 | | | | | | | | | | | | | | | | | | | | | | | | |
| TROCHOCHAETIDAE | TROCHOCHAETA | | | | | 1 | 2 | | 2 | 2 | | | | | | | | | | | | | | 1 | | | | |
| TROCHOCHAETIDAE | *TROCHOCHAETA CARICA* | | | 1 | | | | | | | | | | | | | | | | | | | | | | | | |
| TROCHOCHAETIDAE | *TROCHOCHAETA MULTISETOSA* | | | 1 | | | | 5 | | 1 | | | | | | 1 | 1 | | | | | 1 | 2 | 1 | 3 | | | |
| CIRRATULIDAE | *APHELOCHAETA MARIONI* | 2 | | | | | | | | 1 | | | | | | | | | | | | | 2 | | 2 | | | |
| CIRRATULIDAE | *APHELOCHAETA MONILARIS* | 2 | 3 | 2 | | | | | | | | 1 | 2 | | | | | 1 | | | | | | | | | | |
| CIRRATULIDAE | *CHAETOZONE SP.A* | 43 | 51 | 54 | 21 | 5 | 2 | 5 | 2 | 5 | | | 2 | | | | | 1 | 1 | | | | 22 | 14 | 12 | | | |
| CIRRATULIDAE | *MONTICELLINA DORSOBRANCHIALIS* | | | | | | | | | | | | | | | | | | | 8 | 5 | 28 | | | | | | |
| CIRRATULIDAE | *MONTICELLINA BAPTISTE* | | | | | | | | | | | | | | | | | | | 12 | 8 | 12 | | | | | | |
| CIRRATULIDAE | *THARYX ACUTUS* | | | | | | | | | | 13 | 6 | 54 | 26 | 45 | 56 | | | | 8 | 3 | 6 | | | | 17 | 26 | 72 |
| COSSURIDAE | *COSSURA LONGOCIRRATA* | 29 | 42 | 39 | 13 | 2 | 4 | 1 | 2 | 2 | 47 | 59 | 18 | 285 | 166 | 422 | | | 1 | | | | 12 | 10 | 8 | | | |
| FLABELLIGERIDAE | | 1 | | 1 | | | | | 1 | | | | | | | | | | | | | | | | | | | |
| FLABELLIGERIDAE | PHERUSA | | | | | | | | | | | | | | | | | | | | | | | | | 1 | | |
| SCALIBREGMIDAE | *SCALIBREGMA INFLATUM* | | | | | | | 1 | 1 | | | | | | | | | | | | | | 1 | | 2 | | | |
| OPHELIIDAE | *OPHELINA ACUMINATA* | | | | | | | | | 1 | | | | | 1 | | | 1 | | | | | | 1 | 1 | | | 1 |

| Survey 9303 0.3 mm Taxon | | FF1 | | | FF4 | | | FF5 | | | FF6 | | | FF7 | | | FF9 | | | FF10 | | | FF11 | | | FF12 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 |
| CAPITELLIDAE | *CAPITELLA CAPITATA* | | 1 | | | 2 | 4 | | 1 | | 6 | 1 | 8 | 3 | 3 | 1 | | 3 | 5 | | | 3 | 1 | 4 | 4 | 2 | 1 | 4 |
| CAPITELLIDAE | *MEDIOMASTUS CALIFORNIENSIS* | 16 | 7 | 10 | 21 | 6 | 16 | 22 | 12 | 23 | 23 | 9 | 50 | 20 | 31 | 20 | 5 | 17 | 16 | 8 | 14 | 8 | 54 | 28 | 11 | 39 | 17 | 7 |
| AMPHARETIDAE | *AMPHARETE ACUTIFRONS* | | | | | | | | | | | | | | | | 1 | | | | | | | | | | | |
| AMPHARETIDAE | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| AMPHARETIDAE | *ANOBOTHRUS GRACILIS* | 3 | 6 | 3 | 1 | | | | | | | | 2 | | | | | | | | | | | | 2 | | | |
| AMPHARETIDAE | *ASABELLIDES OCULATA* | | | | | | | 1 | | 1 | | | | | | | 1 | 1 | 1 | 1 | | 1 | 2 | 10 | 3 | | | |
| TEREBELLIDAE | POLYCIRRUS | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| TRICHOBRANCHIDAE | *TEREBELLIDES ATLANTIS* | | | | | | | | | | 5 | 3 | 8 | | 4 | | | | | | | | | | | | | |
| SABELLIDAE | CHONE | | | | | | 1 | | | | | | | | | | | | | | | | | | | | | |
| SABELLIDAE | *EUCHONE INCOLOR* | 2 | 2 | | | 1 | 2 | | | 1 | 8 | 10 | 26 | 19 | 34 | 32 | | | | 3 | | 1 | 17 | 32 | 34 | | | |
| ARCHIANNELIDA | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| POLYGORDIIDAE | *POLYGORDIUS SP.A* | | | | | | | | | | | | | 1 | | | | | | | | | | | | | | |
| TUBIFICINA | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| TUBIFICIDAE | | | | | | | | | | | | | 1 | | | | | | | 1 | 1 | 1 | | | | | | |
| TUBIFICIDAE | *TUBIFICIDAE SP.2* | 1 | | | | | 1 | | | | 9 | | 1 | 39 | 107 | 68 | | | | 13 | 9 | 3 | | | | | | |
| TUBIFICIDAE | *TUBIFICOIDES APECTINATUS* | 20 | 70 | 45 | 9 | 1 | 1 | 2 | 1 | | | | | | | | | | | | | | 146 | 94 | 62 | 5 | 4 | 3 |
| GASTROPODA | | | 1 | 1 | 1 | 1 | | | | 1 | 10 | 4 | 2 | | 2 | 2 | | | | 1 | | 2 | | | | | | |
| MESOGASTROPODA | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| RISSOIDAE | *ONOBA PELAGICA* | | | | | | | | | | 15 | | 17 | | | | | | | | | | | | | | | |
| CEPHALASPIDEA | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| CYLICHNIDAE | CYLICHNA | | | | | | | | | | 6 | | 5 | | | | | | | | | | | | | | | |
| APLACOPHORA | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| CHAETODERMATIDA | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| CHAETODERMATIDAE | *CHAETODERMA NITIDULUM* | | 1 | | | | | | | | | | | | | | | | | | | | | 1 | | | | |
| BIVALVIA | | 5 | 8 | 8 | 5 | 5 | 5 | 25 | 8 | 20 | 4 | 3 | 5 | 2 | 13 | 2 | 29 | 37 | 24 | 37 | 10 | 12 | 13 | 19 | 9 | 9 | 7 | 5 |
| NUCULOIDEA | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| NUCULIDAE | NUCULA | 3 | 9 | 3 | 2 | | 1 | 12 | 11 | 31 | 21 | 34 | 13 | 21 | 30 | 56 | 7 | 5 | 3 | 208 | 80 | 134 | 17 | 22 | 9 | | | |
| NUCULANIDAE | *MEGAYOLDIA THRACIAEFORMIS* | 4 | 1 | 1 | | | | | | | | | | | | | | | | | | | | 5 | | | | |
| NUCULANIDAE | *YOLDIA SAPOTILLA* | 5 | 8 | 4 | 6 | 2 | 5 | 1 | 4 | 10 | | | | | | 2 | | | | | 1 | 5 | 7 | 3 | 7 | | | |
| MYTILOIDA | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| MYTILIDAE | *CRENELLA DECUSSATA* | | | | | | | | | | 2 | | | | | | | | | 64 | 10 | 18 | | | | | | |
| MYTILIDAE | MUSCULUS | | | | 1 | | | | | | | | | | | | | | | | | | | | | | | |
| MYTILIDAE | MYTILUS | | | | | | | | | | | | | | | | | | | | | 1 | | | | 4 | | |
| MYTILIDAE | *MYTILUS EDULIS* | | | | | | | | | | | | | | | | | | | 5 | 1 | | | | | | | 1 |
| VENEROIDA | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| THYASIRIDAE | *THYASIRA GOULDII* | 6 | 14 | 1 | | | 2 | 2 | 18 | 19 | 5 | 2 | 2 | | | | | | | | | | | | | | | |
| ASTARTIDAE | *ASTARTE UNDATA* | | | | | | | | | | | | | | | | 2 | 3 | 3 | 7 | | | | 1 | 1 | | | |
| ARCTICIDAE | *ARCTICA ISLANDICA* | | | | | | | | | | 1 | | | | | | | | | | | | | | | | | 1 |
| MYINA | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| HIATELLIDAE | *HIATELLA ARCTICA* | | | 2 | | | | | | | | | | | | | | | | 8 | 2 | 6 | | | | 1 | | |
| PHOLADOMYACEA | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| PERIPLOMATIDAE | *PERIPLOMA PAPYRATIUM* | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| SCAPHOPODA | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| DENT DENTALIIDAE | *DENTULIUM ENTALE* | | | | 4 | 1 | 5 | | | | | | | | | | | | | | | | | 2 | | | | |
| CRUSTACEA | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| CUMACEA | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| LEUCONIDAE | *EUDORELLA PUSILLA* | | | | 1 | | | | 2 | 1 | 1 | 3 | | 2 | | 5 | | | | | | | | | 1 | | | |
| DIASTYLIDAE | DIASTYIS | | | | | | | | | | | 1 | 3 | | | | | | | | | | | | | | | |
| DIKONOPHORA | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| PARATANAIDAE | *TANAISSUS PSAMMOPHILUS* | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ANTHURIDEA | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ANTHURIDAE | *PTILANTHURA TENUIS* | | | | | | | | | | | | | | | | | | | | 2 | | | | | | | |
| VALVIFERA | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| IDOTEIDAE | *EDOTEA MONTOSA* | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ASELLOTA | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| PARAMUNNIDAE | PLEUROGONIUM | | | | | | | | 2 | | 2 | 2 | 1 | | 2 | 2 | | | 4 | | | | | | | | | 1 |
| PARAMUNNIDAE | *PLEUROGONIUM INERME* | 1 | | | | | | | | 2 | | | | | | | | | | | | | | | | | | |
| PARAMUNNIDAE | *PLEUROGONIUM SPINOSISSIMUM* | | | | | | | | 3 | | | | | | | | | 1 | | | | | | | | | | |
| AMPHIPODA | | | | | | | | | | | 1 | | 1 | 2 | 6 | 2 | 1 | 1 | | 6 | | 1 | | | | | | |
| GAMMARIDEA | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| AMPELISCIDAE | AMPELISCA | 2 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| AMPELISCIDAE | *AMPELISCA ABDITA* | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| COROPHIIDAE | COROPHIUM | | | | | | | 1 | | | | | | | | | | | | | | | | | | | | 1 |

| Survey 9303 0.3 mm Taxon | | FF1 | | | FF4 | | | FF5 | | | FF6 | | | FF7 | | | FF9 | | | FF10 | | | FF11 | | | FF12 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 |
| COROPHIIDAE | UNCIOLA | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ISAEIDAE | *PHOTIS POLLEX* | 2 | | | | | | 4 | 2 | 1 | 11 | 2 | 3 | 12 | 9 | 14 | 1 | 2 | 2 | 6 | 4 | 2 | | | | 3 | 4 | 6 |
| PHOXOCEPHALIDAE | *HARPINIA PROPINQUA* | | 2 | 1 | | 1 | | 1 | 2 | 4 | | 2 | | | | | 2 | 1 | | | 1 | 1 | 1 | | 3 | | | |
| PHOXOCEPHALIDAE | *PHOXOCEPHALUS HOLBOLLI* | | | | | | | | | | | | | | | | | | | | | | | 1 | | | | |
| PODOCERIDAE | *DYOPEDOS MONOCANTHA* | | | | | | | | | | | | | | | | | | | | | | | | | | 2 | |
| STENOTHOIDAE | *METOPELLA ANGUSTA* | | | | | | | | 1 | 2 | 1 | 2 | 8 | 12 | 4 | 9 | 1 | 2 | 4 | 4 | 5 | 1 | | | | | | |
| CAPRELLIDEA | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| CAPRELLIDAE | *MAYERELLA LIMICOLA* | | | | 1 | | | | | | 2 | | | | | | | | | | | | | | | | | |
| SIPUNCULOIDEA | SIPUNCULA | 1 | | 1 | | | 1 | 3 | 1 | 2 | | | 3 | | | | 2 | | | | | | 13 | 20 | 22 | | | |
| PRIAPULIDA | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| PRIAPULIDAE | *PRIAPULUS CAUDATUS* | | | | 1 | | | | | | | | | | | | | | | | | | | | | | | |
| PHORONIDA | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| PHORONIDAE | *PHORONIS ARCHITECTA* | | | | | | | | | | | | | | | | | | | | | | | | | 3 | | 1 |
| ECHINODERMATA | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| OPHIUROIDEA | | | 1 | 2 | | | | | 4 | 5 | 1 | 2 | 4 | | 2 | 1 | 2 | 1 | 1 | 1 | | 2 | | 5 | 1 | | | 1 |

| Survey 9303 0.3 mm Taxon | | FF13 1 | FF13 2 | FF13 3 | FF14 1 | FF14 2 | FF14 3 |
|---|---|---|---|---|---|---|---|
| NEMERTEA | | | | 3 | 6 | 6 | 4 |
| | *NEMERTEA SP.2* | | | | | | |
| PALEONEMERTEA | | | | | | | |
| TUBULANIDAE | *CARINOMELLA LACTEA* | | | | | | |
| TUBULANIDAE | *TUBULANUS PELLUCIDUS* | | | | | | |
| HETERONEMERTEA | | | | | | | |
| LINEIDAE | MICRURA | 3 | 1 | 1 | 1 | | |
| MONOSTYLIFERA | | | | | | | |
| AMPHIPORIDAE | *AMPHIPORUS ANGULATUS* | | | 3 | | 2 | 2 |
| TETRASTEMMATIDAE | *TETRASTEMMA VITTATUM* | | | | | 1 | |
| ANNELIDA | | | | | | | |
| POLYCHAETA | | | | | | | |
| POLYNOIDAE | HARMOTHOINAE | | | | | 1 | 4 |
| SIGALIONIDAE | *PHOLOE MINUTA* | 2 | 1 | | | | 1 |
| PHYLLODOCIDAE | *ETEONE LONGA* | 7 | 5 | 11 | 1 | 1 | 1 |
| PHYLLODOCIDAE | *MYSTIDES BOREALIS* | | | | | | |
| PHYLLODOCIDAE | PHYLLODOCE | | | | | | |
| PHYLLODOCIDAE | *PHYLLODOCE MUCOSA* | 86 | 48 | 49 | | | |
| HESIONIDAE | *MICROPHTHALMUS SCZELKOWII* | 2 | | 1 | | | |
| SYLLIDAE | *EXOGONE HEBES* | | 1 | 1 | | | |
| SYLLIDAE | *EXOGONE VERUGERA* | 1 | | | | | |
| SYLLIDAE | *SPHAEROSYLLIS BREVIFRONS* | | | | | | |
| SYLLIDAE | *SPHAEROSYLLIS LONGICAUDA* | 1 | | | | | |
| SYLLIDAE | *SYLLIDES JAPONICA* | | | | | | |
| SYLLIDAE | *SYLLIDES LONGOCIRRATA* | | | | 3 | 6 | 6 |
| NEREIDAE | | | | | | | |
| NEPHTYIDAE | NEPHTYS | | | | | 2 | 1 |
| NEPHTYIDAE | *NEPHTYS INCISA* | | | | | | |
| NEPHTYIDAE | *NEPHTYS NEOTENA* | 60 | 60 | 118 | | | 2 |
| SPHAERODORIDAE | *SPHAERODOROPSIS MINUTA* | | | | | | |
| GLYCERIDAE | GLYCERA | | | | | | |
| GONIADIDAE | *GONIADA MACULATA* | | | | | 1 | |
| LUMBRINERIDAE | | 4 | | 1 | | 1 | |
| LUMBRINERIDAE | *NINOE NIGRIPES* | 1 | | | | | |
| LUMBRINERIDAE | *SCOLETOMA FRAGILIS* | | | | | | |
| LUMBRINERIDAE | *SCOLETOMA HEBES* | 2 | | | | | |
| DORVILLEIDAE | *DORVILLEA SOCIABILIS* | | | | | | |
| DORVILLEIDAE | *PAROUGIA CAECA* | | | | 6 | 1 | 1 |
| ORBINIIDAE | *LEITOSCOLOPLOS ACUTUS* | 20 | 4 | 19 | 11 | 12 | 4 |
| ORBINIIDAE | *SCOLOPLOS ARMIGER* | 4 | 3 | 1 | | | |
| PARAONIDAE | *ARICIDEA CATHERINAE* | 148 | 162 | 68 | | | |
| PARAONIDAE | *ARICIDEA QUADRILOBATA* | | | | 33 | 48 | 17 |
| PARAONIDAE | *LEVINSENIA GRACILIS* | | | | 32 | 46 | 77 |
| APISTOBRANCHIDAE | *APISTOBRANCHUS TULLBERGI* | | | | | 1 | 1 |
| SPIONIDAE | *POLYDORA SOCIALIS* | | | | | | |
| SPIONIDAE | *PRIONOSPIO STEENSTRUPI* | 33 | 27 | 52 | 1 | 6 | 8 |
| SPIONIDAE | *SPIO LIMICOLA* | | | 5 | 13 | 23 | 6 |
| SPIONIDAE | *SPIOPHANES BOMBYX* | | | | | | |
| SPIONIDAE | *STREBLOSPIO BENEDICTI* | | | | | | |
| TROCHOCHAETIDAE | TROCHOCHAETA | | | | | | |
| TROCHOCHAETIDAE | *TROCHOCHAETA CARICA* | | | | | | |
| TROCHOCHAETIDAE | *TROCHOCHAETA MULTISETOSA* | | | | | 2 | |
| CIRRATULIDAE | *APHELOCHAETA MARIONI* | | | | | 3 | 4 |
| CIRRATULIDAE | *APHELOCHAETA MONILARIS* | | | | 2 | 2 | 3 |
| CIRRATULIDAE | *CHAETOZONE SP.A* | | | | 43 | 67 | 56 |
| CIRRATULIDAE | *MONTICELLINA DORSOBRANCHIALIS* | | | | | | |
| CIRRATULIDAE | *MONTICELLINA BAPTISTE* | | | | | | |
| CIRRATULIDAE | *THARYX ACUTUS* | 275 | 83 | 188 | | | |
| COSSURIDAE | *COSSURA LONGOCIRRATA* | | | | 6 | 12 | 21 |
| FLABELLIGERIDAE | | | | | | | |
| FLABELLIGERIDAE | PHERUSA | 1 | | 1 | | | |
| SCALIBREGMIDAE | *SCALIBREGMA INFLATUM* | | | | | | |
| OPHELIIDAE | *OPHELINA ACUMINATA* | | | | | | |

| Survey 9303 0.3 mm Taxon | | FF13 1 | FF13 2 | FF13 3 | FF14 1 | FF14 2 | FF14 3 |
|---|---|---|---|---|---|---|---|
| CAPITELLIDAE | *CAPITELLA CAPITATA* | 7 | 10 | 3 | 4 | 2 | 1 |
| CAPITELLIDAE | *MEDIOMASTUS CALIFORNIENSIS* | 47 | 23 | 19 | 20 | 23 | 11 |
| AMPHARETIDAE | *AMPHARETE ACUTIFRONS* | | | | | | |
| AMPHARETIDAE | | | | | | | 1 |
| AMPHARETIDAE | *ANOBOTHRUS GRACILIS* | | | | | | |
| AMPHARETIDAE | *ASABELLIDES OCULATA* | | | | | | |
| TEREBELLIDAE | POLYCIRRUS | | | 1 | | | |
| TRICHOBRANCHIDAE | *TEREBELLIDES ATLANTIS* | | | | | | |
| SABELLIDAE | CHONE | | | | | | |
| SABELLIDAE | *EUCHONE INCOLOR* | | | | 1 | 1 | |
| ARCHIANNELIDA | | | | | | | |
| POLYGORDIIDAE | *POLYGORDIUS SP.A* | | | | | | |
| TUBIFICINA | | | | | | | |
| TUBIFICIDAE | | | | | | | |
| TUBIFICIDAE | *TUBIFICIDAE SP.2* | | | | | | |
| TUBIFICIDAE | *TUBIFICOIDES APECTINATUS* | 10 | 1 | 5 | 8 | 22 | 37 |
| GASTROPODA | | | | | | | |
| MESOGASTROPODA | | | | | | | |
| RISSOIDAE | *ONOBA PELAGICA* | | | | | | |
| CEPHALASPIDEA | | | | | | | |
| CYLICHNIDAE | CYLICHNA | | | | | | |
| APLACOPHORA | | | | | | | |
| CHAETODERMATIDA | | | | | | | |
| CHAETODERMATIDAE | *CHAETODERMA NITIDULUM* | | | | | | |
| BIVALVIA | | 6 | 7 | 3 | 9 | 5 | 18 |
| NUCULOIDEA | | | | | | | |
| NUCULIDAE | NUCULA | | 1 | | 20 | 23 | 6 |
| NUCULANIDAE | *MEGAYOLDIA THRACIAEFORMIS* | | | | | | |
| NUCULANIDAE | *YOLDIA SAPOTILLA* | | | | | 1 | |
| MYTILOIDA | | | | | | | |
| MYTILIDAE | *CRENELLA DECUSSATA* | | | | | | |
| MYTILIDAE | MUSCULUS | | | | | | |
| MYTILIDAE | MYTILUS | | | | | | |
| MYTILIDAE | *MYTILUS EDULIS* | 15 | 1 | 2 | | | |
| VENEROIDA | | | | | | | |
| THYASIRIDAE | *THYASIRA GOULDII* | | | | | 6 | |
| ASTARTIDAE | *ASTARTE UNDATA* | | | | | | |
| ARCTICIDAE | *ARCTICA ISLANDICA* | | | | | | |
| MYINA | | | | | | | |
| HIATELLIDAE | *HIATELLA ARCTICA* | 4 | | | | | |
| PHOLADOMYACEA | | | | | | | |
| PERIPLOMATIDAE | *PERIPLOMA PAPYRATIUM* | 5 | 6 | | | | |
| SCAPHOPODA | | | | | | | |
| DENT DENTALIIDAE | *DENTULIUM ENTALE* | | | | | | |
| CRUSTACEA | | | | | | | |
| CUMACEA | | | | | | | |
| LEUCONIDAE | *EUDORELLA PUSILLA* | | | | | | |
| DIASTYLIDAE | DIASTYIS | | | | | | |
| DIKONOPHORA | | | | | | | |
| PARATANAIDAE | *TANAISSUS PSAMMOPHILUS* | | | | | | |
| ANTHURIDEA | | | | | | | |
| ANTHURIDAE | *PTILANTHURA TENUIS* | | | | | | |
| VALVIFERA | | | | | | | |
| IDOTEIDAE | *EDOTEA MONTOSA* | 1 | | | | | |
| ASELLOTA | | | | | | | |
| PARAMUNNIDAE | PLEUROGONIUM | 2 | | 9 | | | |
| PARAMUNNIDAE | *PLEUROGONIUM INERME* | | | | | | |
| PARAMUNNIDAE | *PLEUROGONIUM SPINOSISSIMUM* | | | | | | |
| AMPHIPODA | | | | | | | |
| GAMMARIDEA | | | | | | | |
| AMPELISCIDAE | AMPELISCA | | | | | | |
| AMPELISCIDAE | *AMPELISCA ABDITA* | 5 | 5 | 5 | | | |
| COROPHIIDAE | COROPHIUM | | | | | | |

| Survey 9303 0.3 mm Taxon | | FF13 1 | FF13 2 | FF13 3 | FF14 1 | FF14 2 | FF14 3 |
|---|---|---|---|---|---|---|---|
| COROPHIIDAE | UNCIOLA | | | 1 | | | |
| ISAEIDAE | *PHOTIS POLLEX* | 5 | | 6 | 3 | | |
| PHOXOCEPHALIDAE | *HARPINIA PROPINQUA* | | | | | | |
| PHOXOCEPHALIDAE | *PHOXOCEPHALUS HOLBOLLI* | | | | | | |
| PODOCERIDAE | *DYOPEDOS MONOCANTHA* | | | | | | |
| STENOTHOIDAE | *METOPELLA ANGUSTA* | 2 | 1 | 2 | | | |
| CAPRELLIDEA | | | | | | | |
| CAPRELLIDAE | *MAYERELLA LIMICOLA* | | | | | | |
| SIPUNCULOIDEA | SIPUNCULA | | | | | | |
| PRIAPULIDA | | | | | | | |
| PRIAPULIDAE | *PRIAPULUS CAUDATUS* | | | | | | |
| PHORONIDA | | | | | | | |
| PHORONIDAE | *PHORONIS ARCHITECTA* | | | | | | |
| ECHINODERMATA | | | | | | | |
| OPHIUROIDEA | | 3 | 2 | 1 | | 1 | |

# APPENDIX A-4: FARFIELD ABUNDANCE (0.5-mm FRACTION)

| Survey 9303 0.5 mm | | FF1 | | | FF4 | | | FF5 | | | FF6 | | | FF7 | | | FF9 | | | FF10 | | | FF11 | | | FF12 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Taxon | | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 |
| CNIDARIA | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| HYDROZOA | | | | | | | | | | | | | | | | | 1 | | | | | | | | | | | |
| ACTINIARIA | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | *ACTINIARIA SP.2* | | | | | | | | | | | 2 | 3 | | | 2 | | | | 5 | 7 | 2 | | | | 1 | 1 | 3 |
| ATHENARIA | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| EDWARDSIIDAE | *EDWARDSIA ELEGANS* | | | | | | | | | | 1 | 4 | 1 | | | | | | | | 1 | 2 | | | | 3 | 2 | 1 |
| NEMERTEA | | 3 | 1 | 2 | 3 | | | 4 | 7 | 6 | 2 | 8 | 1 | 2 | | | | 2 | 12 | 1 | | | | 1 | | | | |
| | *NEMERTEA SP.2* | | | | | | | | | | 1 | | | | | | | | | | | | | | | | | |
| | *NEMERTEA SP.4* | | | 1 | | | | | | | | | | | | | | | | | | | | | | | | |
| PALEONEMERTEA | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| TUBULANIDAE | *CARINOMELLA LACTEA* | | | 1 | | | | 1 | | 1 | | 1 | | 5 | | 4 | | | | | | | | | | | | 2 |
| TUBULANIDAE | *TUBULANUS PELLUCIDUS* | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| HETERONEMERTEA | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| LINEIDAE | *CEREBRATULUS LACTEUS* | | | | | | | 1 | | | | | | 3 | 2 | 3 | 1 | | | 5 | | 3 | | 1 | | 4 | 2 | |
| LINEIDAE | MICRURA | 5 | 7 | 9 | 11 | 4 | 9 | 1 | 6 | 4 | 5 | 17 | 19 | 11 | 6 | 15 | 5 | 3 | 8 | 13 | 17 | 8 | 4 | 8 | 5 | | 4 | 7 |
| MONOSTYLIFERA | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| AMPHIPORIDAE | *AMPHIPORUS ANGULATUS* | | 1 | | 1 | | | | | | | 1 | | | | | 1 | 1 | | | | 4 | | | | | | |
| TETRASTEMMATIDAE | *TETRASTEMMA VITTATUM* | | | | | | | | | | | 1 | | | | | | | | | | | | | | | | |
| ANNELIDA | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| POLYCHAETA | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| POLYNOIDAE | *BYLGIDES GROENLANDICUS* | | | | | | | 1 | | | | | | | | | | | | | | | | | | | | |
| POLYNOIDAE | *ENIPO TORELLI* | | | | | | | 2 | | | 9 | 3 | 2 | 3 | | 5 | | | 1 | | | | | | 1 | 1 | | 1 |
| POLYNOIDAE | *GATTYANA CIRROSA* | | | | | | | 2 | | | | 1 | | | | | 6 | 5 | 2 | 1 | 2 | 3 | 1 | | 1 | 1 | | |
| POLYNOIDAE | HARMOTHOINAE | 3 | | | 3 | | 2 | | 1 | | | | | | | 1 | | | | | | | | | | | | |
| POLYNOIDAE | LAONICE | | | | | | | | | | | | | | | | | | | | 1 | | | | | | | |
| POLYNOIDAE | *LAONICE CIRRATA* | | | | | | | | | | | | | | | | | | | 1 | | | | | | | | |
| POLYNOIDAE | *POLYDORA CAULLERYI* | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| POLYNOIDAE | *POLYDORA CORNUTA* | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| POLYNOIDAE | *POLYDORA QUADRILOBATA* | | | | | | | | | | 7 | 2 | | | | | | | 1 | 28 | 35 | 65 | | | | 1 | | 1 |
| POLYNOIDAE | *POLYDORA SOCIALIS* | | | 1 | 1 | | | 1 | 2 | 1 | 26 | 45 | 10 | 24 | | 19 | 10 | 6 | 21 | 3 | 8 | 107 | | | | | 1 | |
| POLYNOIDAE | *PRIONOSPIO CIRRIFERA* | | | | | | | | | 1 | | | | | | | 1 | | | | | | | | | | | |
| POLYNOIDAE | *PRIONOSPIO STEENSTRUPI* | 9 | 13 | 10 | 20 | 4 | 13 | 28 | 29 | 24 | 3 | 13 | 1 | | | | 387 | 238 | 96 | 62 | 119 | 143 | 4 | 15 | 6 | 3 | 1 | 1 |
| POLYNOIDAE | *SPIO FILICORNIS* | | | | | | | | | | | | | | | | | | | | | | | | | 2 | | |
| POLYNOIDAE | *SPIO LIMICOLA* | 29 | 30 | 45 | 226 | 32 | 65 | 246 | 245 | 259 | 217 | 448 | 442 | 98 | 3 | 174 | 489 | 169 | 506 | 203 | 214 | 348 | 61 | 93 | 180 | 1 | | 2 |
| POLYNOIDAE | *SPIO THULINI* | | | | | | | | | | | 2 | | | | | | | | | | | | | | | | |
| POLYNOIDAE | *SPIOPHANES BOMBYX* | | | | | | | | | | | | | | | | | | | 1 | 2 | 1 | | | | 32 | 4 | 11 |
| POLYNOIDAE | *SPIOPHANES KROEYERI* | | | 2 | | | | | | | | | | | | | | | | | | | | | | | | |
| SIGALIONIDAE | *PHOLOE MINUTA* | 1 | | 4 | | | | 1 | | 2 | 3 | 1 | 1 | 2 | | 1 | 1 | 6 | 4 | | 4 | 6 | 2 | 5 | 4 | 1 | | |
| AMPHINOMIDAE | *PARAMPHINOME JEFFREYSII* | | | | 4 | 5 | 1 | | | | | | | | | | | | | | | | | | | | | |
| PHYLLODOCIDAE | *ETEONE LONGA* | 1 | 1 | | | | | 3 | 1 | 1 | 1 | 5 | 1 | 5 | 1 | 5 | 5 | | 2 | 1 | 1 | | 6 | 3 | 6 | 4 | | |
| PHYLLODOCIDAE | *MYSTIDES BOREALIS* | | 1 | | | | | | | 1 | | | | 1 | | | | | | | | | | | | | | |
| PHYLLODOCIDAE | *PARANAITIS SPECIOSA* | | | | | | | | | | | 1 | | | | | | | | | | | | | | | | |
| PHYLLODOCIDAE | PHYLLODOCE | | | | | | | 1 | | | 2 | | 2 | | | | | | | | | 1 | | | | | | |
| PHYLLODOCIDAE | *PHYLLODOCE MACULATA* | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| PHYLLODOCIDAE | *PHYLLODOCE MUCOSA* | | | | | | | | 2 | 3 | 5 | 4 | | | | 1 | 1 | 2 | 2 | 5 | 1 | 5 | | | | 11 | | 1 |
| HESIONIDAE | *MICROPHTHALMUS SCZELKOWII* | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| PILARGIDAE | *ANCISTROSYLLIS GROENLANDICA* | | | | | 1 | | | | | | | | | | | | | | | | | | | | | | |
| SYLLIDAE | *EXOGONE HEBES* | | | | | | | | | | | | | | | | 2 | 2 | 18 | | 8 | 13 | | 1 | | | | 1 |
| SYLLIDAE | *EXOGONE LONGICIRRUS* | | | | | | | | | | | | | | | | | | | | | | | | 1 | | | |
| SYLLIDAE | *EXOGONE VERUGERA* | | | | | | | | | | | | | | | | 33 | 33 | 24 | 9 | 10 | 47 | | | | | | |
| SYLLIDAE | *SPHAEROSYLLIS LONGICAUDA* | | | | | | | | | | | 1 | 1 | | | | 1 | | | | 1 | 1 | | | | | | |
| SYLLIDAE | *SYLLIDES JAPONICA* | | | | | | | 1 | | | 2 | 1 | 1 | 1 | | | | | | | | | | | | | | |
| SYLLIDAE | *SYLLIDES LONGOCIRRATA* | 1 | 1 | | 3 | 1 | 1 | | | | 5 | 6 | 8 | 10 | | 22 | | | | | | | 1 | 1 | 2 | | | |
| SYLLIDAE | *TYPOSYLLIS SP.1* | | | 1 | | | | | | | | | | | | | 1 | 1 | | | | 2 | | | | | | |
| NEREIDAE | | | | | | | | | | | | | | | | | 5 | | | | | | | | | | | |
| NEREIDAE | *NEANTHES VIRENS* | | | | | | | | | | | | | | | | | | | | | | | | | | 1 | |
| NEREIDAE | *NEREIS GRAYI* | | | | | | | | | | | | | | | | | | 2 | | | | | | | | | |
| NEPHTYIDAE | *AGLAOPHAMUS CIRCINATA* | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| NEPHTYIDAE | NEPHTYS | 1 | | 1 | | | | 1 | | | 3 | 3 | 4 | 1 | | 2 | | | | 1 | | 1 | 2 | 1 | | | | |
| NEPHTYIDAE | *NEPHTYS CILIATA* | | 2 | | | | | | 1 | | | | | | | | 1 | | | | | | | | | 2 | | 1 |
| NEPHTYIDAE | *NEPHTYS INCISA* | | 1 | | | | | | | | 10 | 6 | 7 | 8 | 9 | 9 | | 1 | 2 | 1 | 3 | 2 | | | | | 1 | 1 |
| NEPHTYIDAE | *NEPHTYS NEOTENA* | | | | | | | | | | | | | | | | | | | 1 | | | | | | | 1 | |
| SPHAERODORIDAE | *SPHAERODOROPSIS MINUTA* | | | | | | | | | | | | 1 | | | 1 | 1 | | | | | | | | | | | |

| Survey 9303 0.5 mm Taxon | | 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 | FF9 1 | FF9 2 | FF9 3 | FF10 1 | FF10 2 | FF10 3 | FF11 1 | FF11 2 | FF11 3 | FF12 1 | FF12 2 | FF12 3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| GONIADIDAE | *GONIADA MACULATA* | 1 | 1 | | | | | | | | | | | | | | 1 | | 1 | | | | 5 | 2 | 1 | | | |
| LUMBRINERIDAE | | | | | | | | 1 | | | | | | | | | | 1 | | | | | | | | 320 | | |
| LUMBRINERIDAE | *ABYSSONINOE WINSNESAE* | 1 | 1 | | | | | | | | | | | | | | | | | | | | 1 | | | | | |
| LUMBRINERIDAE | *NINOE NIGRIPES* | 5 | 1 | 8 | 8 | 1 | 3 | 17 | 14 | 17 | 37 | 45 | 33 | 74 | 30 | 48 | 8 | 9 | 22 | 54 | 97 | 79 | 4 | 2 | 2 | 25 | 83 | 55 |
| LUMBRINERIDAE | *SCOLETOMA FRAGILIS* | | 3 | | | | | | | 1 | 7 | 7 | 8 | 4 | | 16 | 1 | 1 | 2 | 1 | | 1 | 1 | | 1 | | 1 | |
| LUMBRINERIDAE | *SCOLETOMA HEBES* | | | | | | | | | | | | | | | | | | | 11 | 22 | 24 | | | | 44 | 58 | 40 |
| DORVILLEIDAE | *PAROUGIA CAECA* | | | | 1 | 2 | 1 | 2 | 3 | | 1 | 7 | 3 | | | | 3 | 1 | | 2 | | 2 | 2 | 2 | | | | |
| ORBINIIDAE | LEITOSCOLOPLOS | | | | | | 1 | | | 1 | | | | | | | | | | | | | | | | | | |
| ORBINIIDAE | *LEITOSCOLOPLOS ACUTUS* | | 3 | 7 | 1 | 3 | 8 | 8 | | 4 | 1 | 10 | 5 | 2 | | 1 | 6 | 3 | 4 | 28 | 43 | 48 | 10 | 7 | 2 | 38 | 8 | 80 |
| ORBINIIDAE | *SCOLOPLOS ARMIGER* | | | | | | | | | | | | | | | | 17 | 8 | 9 | | 1 | | | | | | | |
| PARAONIDAE | *ARICIDEA CATHERINAE* | | | | | | | | | | 27 | 50 | 22 | 263 | 16 | 125 | | | | 13 | 47 | 40 | 1 | 1 | | 207 | 334 | 384 |
| PARAONIDAE | *ARICIDEA MINUTA* | | | | | | | | | | | | | | | | | 1 | | | | | | | | | | |
| PARAONIDAE | *ARICIDEA QUADRILOBATA* | 43 | 49 | 14 | 20 | 3 | 3 | 84 | 82 | 39 | 34 | 71 | 107 | 58 | | 78 | 4 | 6 | | 1 | | 1 | 127 | 111 | 69 | | | |
| PARAONIDAE | *LEVINSENIA GRACILIS* | 3 | 2 | 2 | 27 | 5 | 11 | 13 | 14 | 42 | 9 | 14 | 6 | 15 | 1 | 2 | 15 | 15 | 33 | 1 | 4 | 5 | 43 | 60 | 55 | 9 | 16 | 22 |
| APISTOBRANCHIDAE | *APISTOBRANCHUS TULLBERGI* | | | 2 | | | | | | | 12 | 38 | 14 | 16 | 2 | 25 | | | | 1 | | 1 | 1 | 1 | | | | |
| TROCHOCHAETIDAE | TROCHOCHAETA | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| TROCHOCHAETIDAE | *TROCHOCHAETA CARICA* | | 2 | 6 | 7 | 2 | 5 | | | | | | | | | | | | | | | | 1 | 1 | | | | |
| TROCHOCHAETIDAE | *TROCHOCHAETA MULTISETOSA* | | | 1 | | | | | 1 | 4 | | | 1 | 1 | | | 1 | 1 | 1 | | | | 3 | | | 1 | | 1 |
| CIRRATULIDAE | | 5 | 5 | 5 | | | | 1 | | | | | 2 | | | | | | | | | | | | | | | |
| CIRRATULIDAE | *APHELOCHAETA MARIONI* | 10 | 6 | 8 | 2 | | | 3 | 2 | 2 | 4 | 22 | 20 | 3 | | 4 | 8 | 2 | 8 | 23 | 47 | 57 | 2 | 2 | | | | 2 |
| CIRRATULIDAE | *APHELOCHAETA MONILARIS* | 1 | | 1 | | | | | | | | 1 | | | | | | | | | | | | | | | | |
| CIRRATULIDAE | *CHAETOZONE SETOSA* | | | | 1 | | | | | | | | | | | | | | | | | | | | | | | |
| CIRRATULIDAE | *CHAETOZONE SP.A* | 9 | 10 | 5 | 2 | 3 | 9 | 17 | 22 | 29 | | 1 | 1 | | | | 12 | 6 | 7 | | | | 34 | 51 | 12 | | | |
| CIRRATULIDAE | *MONTICELLINA BAPTISTE* | | | | | | | | | | 1 | 3 | 2 | | | | | | | 45 | 93 | 53 | | | | 7 | 11 | 5 |
| CIRRATULIDAE | *MONTICELLINA DORSOBRANCHIALIS* | | | | | | | | | | | | | | | | | | | 12 | 29 | 29 | | | | 1 | | |
| CIRRATULIDAE | *THARYX ACUTUS* | | | | | | | | 1 | 2 | 47 | 74 | 63 | 82 | | 93 | | | | 29 | 46 | 59 | | 1 | | 108 | 46 | 79 |
| COSSURIDAE | *COSSURA LONGOCIRRATA* | 10 | 13 | 21 | 6 | 3 | 3 | 5 | 1 | 1 | 59 | 87 | 108 | 312 | 9 | 316 | 2 | 1 | | | | | 7 | 2 | 4 | 1 | | 1 |
| FLABELLIGERIDAE | *BRADA VILLOSA* | | | | | | | | 1 | | | | | | | | | | | | | 1 | | | | | | |
| FLABELLIGERIDAE | *DIPLOCIRRUS HIRSUTUS* | 1 | 2 | | | | | | 2 | 1 | | | 1 | | | | | | | | | | | | | | | |
| FLABELLIGERIDAE | PHERUSA | | | | | | | | | | | | | | | | | | | | | | 1 | | | 1 | | |
| FLABELLIGERIDAE | *PHERUSA AFFINIS* | | | | | | | | | | | | | | | | | | | | | | | | | | | 1 |
| SCALIBREGMIDAE | *SCALIBREGMA INFLATUM* | 2 | 1 | 8 | 25 | 17 | 21 | 3 | | 2 | | 1 | | | | | 13 | 4 | 6 | | | | 1 | 1 | 1 | | | |
| OPHELIIDAE | *OPHELINA ACUMINATA* | | | | | | | | | | | | 1 | | | | | 1 | | | | | | | | | | |
| STERNASPIDAE | *STERNAPSIS SCUTATA* | | | | 1 | | 1 | 5 | 4 | 2 | | 4 | | 1 | | | | | | | | | 1 | 6 | 1 | | | |
| CAPITELLIDAE | *CAPITELLA CAPITATA* | | 1 | | | | | | | | 1 | | | 1 | | | 1 | 1 | 5 | | 1 | 2 | | | | | | 1 |
| CAPITELLIDAE | *HETEROMASTUS FILIFORMIS* | 3 | 4 | 8 | 2 | | | | | | | | | | | | | | | | | | | | | | | |
| CAPITELLIDAE | *MEDIOMASTUS CALIFORNIENSIS* | | 12 | 10 | 13 | 7 | 17 | 26 | 49 | 24 | 159 | 309 | 197 | 578 | 1 | 356 | 30 | 15 | 65 | 31 | 70 | 132 | 13 | 5 | 3 | 169 | 50 | 183 |
| MALDANIDAE | *AXIOTHELLA CATENATA* | | | | | | | 3 | | | | 3 | | | | | | | | | | | | | 2 | | | |
| MALDANIDAE | *CLYMENELLA TORQUATA* | | | | | | | | | | | | | | | | | | | 6 | 13 | 13 | | | | | | |
| MALDANIDAE | EUCLYMENINAE | | 1 | 2 | 3 | 1 | 2 | 3 | | 1 | 2 | 7 | | | | | | 1 | 1 | 1 | 2 | 4 | 1 | 1 | 2 | 1 | | |
| MALDANIDAE | *MALDANE GLEBIFEX* | 53 | 63 | 58 | 29 | | 2 | 7 | 3 | 7 | | | | | | | | | 3 | 23 | 38 | 33 | 2 | | 2 | | | |
| MALDANIDAE | *PRAXILLELLA GRACILIS* | 1 | | 1 | | | | 4 | | | 1 | 1 | | | | | | | | | | | | | | | | |
| MALDANIDAE | *PRAXILLELLA PRAETERMISSA* | | | | | | | | | | | 3 | 1 | | | | | 1 | 19 | 5 | | 98 | | | | | | |
| MALDANIDAE | *PRAXILLURA ORNATA* | | | | | | | | | | | | | | | | 1 | 1 | 5 | | | | | | | | | |
| MALDANIDAE | *RHODINE LOVENI* | | | | | | | | | | | | | 1 | | | | | | | 4 | 1 | | | | | | |
| OWENIIDAE | *GALATHOWENIA OCULATA* | | | | 1 | | | | | | | | | 1 | | | | | | | | 1 | | | | | | |
| OWENIIDAE | *MYRIOCHELE HEERI* | | | | | | | | | | | | 1 | | | | | | 1 | | | | | | | | | |
| OWENIIDAE | *OWENIA FUSIFORMIS* | | | | | | | | | | | | | | | | | | | | | 1 | | | | 32 | | 6 |
| AMPHARETIDAE | *AMPHARETE ACUTIFRONS* | | | | | | | | 1 | | | | | | | 1 | 12 | 26 | 15 | 6 | 3 | 18 | | | | | | |
| AMPHARETIDAE | *AMPHARETE ARCTICA* | | | | | | 1 | | | | | | | | | | | | | | | | | | | | | |
| AMPHARETIDAE | *ANOBOTHRUS GRACILIS* | 30 | 73 | 34 | 2 | 3 | 5 | 23 | 20 | 13 | 3 | 16 | 8 | 21 | | 29 | | 1 | | 2 | 3 | 1 | 23 | 47 | 24 | | | |
| AMPHARETIDAE | *ASABELLIDES OCULATA* | | | | | | | | | | | | | | | | 1 | 3 | 5 | 4 | 14 | 14 | | | | 3 | | |
| AMPHARETIDAE | *MELINNA CRISTATA* | | | 1 | | | | | | | | | | | | | | | | | | | | | | | | |
| TEREBELLIDAE | POLYCIRRUS | | | | | | | | | | | 13 | 1 | | | | 1 | | | | | 1 | | | | | | |
| TEREBELLIDAE | *POLYCIRRUS EXIMIUS* | | | | | | | | | | | 10 | 5 | | | | | | | | | | | | | | | |
| TEREBELLIDAE | *POLYCIRRUS MEDUSA* | | | | | | | | | | | 3 | 1 | | | | 3 | | | | | | | | | | | |
| TEREBELLIDAE | *PROCLEA GRAFFII* | | | | | | | | 1 | | | | | | | | | | | | | | | | | | | |
| TEREBELLIDAE | TEREBELLIDES | | | | | | | | | | | 3 | 1 | | | | | | | | | | | | | | | |
| TRICHOBRANCHIDAE | *TEREBELLIDES ATLANTIS* | 2 | | 1 | | | | 1 | 2 | 2 | 62 | 140 | 69 | 23 | | 33 | | | | | | | | 1 | 2 | | | |
| TRICHOBRANCHIDAE | *TEREBELLIDES STROEMII* | | | | | | | | | | | | | | | | | | | | | | | 1 | | | | |
| SABELLIDAE | *CHONE DUNERI* | | | | | | | | | | | | | | | | | | | | | 1 | | | | | | |
| SABELLIDAE | *EUCHONE INCOLOR* | | 1 | | 2 | 3 | 4 | 1 | | 2 | 6 | 15 | 20 | 26 | 2 | 58 | 1 | 2 | 1 | 3 | 11 | 7 | 15 | 13 | 4 | | | |
| SABELLIDAE | *LAONOME KROEYERI* | | | | | | | | | | | | | | | | | 1 | | | | 2 | | | | | | |

| Survey 9303 0.5 mm Taxon | | FF1 | | | FF4 | | | FF5 | | | FF6 | | | FF7 | | | FF9 | | | FF10 | | | FF11 | | | FF12 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 |
| SABELLIDAE | *PSEUDOPOTAMILLA RENIFORMIS* | 3 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| TUBIFICINA | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| TUBIFICIDAE | | | | | | | | | | | | | | | | | | | | | 1 | | | | | | 1 | |
| TUBIFICIDAE | *TUBIFICIDAE SP.2* | | | | | | | | | | | | | 3 | | 1 | | | | | | 1 | | | | | | |
| TUBIFICIDAE | *TUBIFICOIDES APECTINATUS* | 3 | 17 | 22 | 1 | | 1 | 2 | 5 | 9 | | | | | | 1 | | | | | | | 94 | 92 | 63 | 5 | | |
| TUBIFICIDAE | *TUBIFICOIDES PSEUDOGASTER* | | 3 | | | | | | | | 1 | | | | | | | | | | | | | | | | | |
| GASTROPODA | | | | | | | | | | | 10 | 7 | 1 | | 1 | | 1 | | | 3 | | | 1 | | | | | |
| | *GASTROPODA SP.1* | | | | | | | | | | | | | | | | 1 | | | | | | | | | | | |
| | *GASTROPODA SP.2* | | | | | | | | | | | | | | | | 1 | | | | | | | | | | | |
| MESOGASTROPODA | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| RISSOIDAE | *ONOBA PELAGICA* | 1 | 4 | 1 | | | 1 | 2 | 20 | 17 | 40 | 85 | 125 | 7 | 1 | 18 | | | | 13 | 2 | 8 | 2 | 3 | 1 | | | |
| NATICIDAE | *POLINICES PALLIDUS* | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| STENOGLOSSA | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| NEPTUNEIDAE | *COLUS PYGMAEUS* | 1 | | 1 | | | | | | | | | | | | | | | | | | | | | | | | |
| TOXOGLOSSA | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| TURRIDAE | *OENOPOTA INCISULA* | 1 | | | | | | 2 | | | | | | | 1 | | | | | | | | | 2 | 1 | | | |
| TURRIDAE | *OENOPOTA PYRAMIDALIS* | | | | | | | | | | 1 | | 2 | | | | | | | | | | | | | | | |
| TURRIDAE | *PROPEBELA TURRICULA* | | | | | | | | | 1 | | | | | | | | | | | | | | | | | | |
| CEPHALASPIDEA | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| CYLICHNIDAE | CYLICHNA | 1 | | | | | | | | | 6 | 2 | | | | | | 2 | | 1 | | 2 | | | 1 | | | |
| CYLICHNIDAE | *CYLICHNA ALBA* | | 2 | | | | 1 | | | | 3 | 16 | 9 | | | | | 2 | 1 | | | | | | | | | |
| CYLICHNIDAE | *CYLICHNA GOULDI* | 2 | 1 | 3 | | | | 2 | 7 | 4 | 2 | 8 | 1 | 5 | 3 | | | | | | | | 2 | 3 | | | | |
| APLACOPHORA | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| CHAETODERMATIDA | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| CHAETODERMATIDAE | *CHAETODERMA NITIDULUM* | | 2 | | | | | | | 1 | | | | | | | | | | | | | 1 | | | | | |
| BIVALVIA | | 9 | | | | 1 | | 3 | | 7 | 3 | 9 | 1 | 4 | 4 | | 1 | 4 | 5 | 8 | 1 | 1 | | 4 | | 1 | | 1 |
| NUCULOIDEA | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| NUCULIDAE | *NUCULA ANNULATA* | | | | | | | | | | 30 | 44 | 33 | 15 | 11 | 29 | | | | | | | | | | | | |
| NUCULIDAE | *NUCULA DELPHINODONTA* | | 2 | 7 | | | | 36 | 23 | 34 | 16 | 19 | 13 | 26 | 9 | 27 | 6 | 7 | 2 | 105 | 27 | 45 | 2 | 1 | 1 | 1 | | 1 |
| NUCULIDAE | *NUCULOMA TENUIS* | | 4 | 7 | 5 | 2 | 5 | 2 | 6 | 5 | | | 4 | | 5 | | 3 | | | | | | 6 | 12 | 4 | | | |
| NUCULANIDAE | *MEGAYOLDIA THRACIAEFORMIS* | 7 | 8 | 4 | | | 3 | | | | | | | | | | | | | | | | 7 | 7 | 4 | | | |
| NUCULANIDAE | *NUCULANA PERNULA* | 1 | 4 | | | | | | | | | | | | | | 1 | | | | | | | | | | | |
| NUCULANIDAE | *YOLDIA SAPOTILLA* | 9 | 23 | 9 | 1 | 2 | 6 | 8 | 10 | 11 | 2 | 2 | 1 | 2 | 6 | 3 | 7 | 11 | 2 | 7 | 4 | 25 | 7 | 37 | 17 | | | |
| MYTILOIDA | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| MYTILIDAE | *CRENELLA DECUSSATA* | 5 | 13 | 18 | | | | | | | | | | | | | | 1 | 2 | 14 | 10 | 15 | | | | | | |
| MYTILIDAE | *MUSCULUS NIGER* | 1 | | 1 | | 1 | 1 | | | | | | | | | | | | | | | | | | | | | |
| MYTILIDAE | MYTILUS | | | | | | | | | | | | | | | | | | | | | 1 | | | | | | |
| MYTILIDAE | *MYTILUS EDULIS* | | | | | | | | | | 1 | | | | | | | | | 1 | | | | | | | | |
| VENEROIDA | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| THYASIRIDAE | *THYASIRA GOULDII* | 22 | 24 | 27 | 12 | 3 | 2 | 62 | 54 | 35 | 5 | 27 | 9 | 5 | 4 | 11 | 5 | 4 | 1 | 2 | 6 | 24 | 9 | 16 | 5 | 1 | 3 | |
| ASTARTIDAE | *ASTARTE UNDATA* | | | 2 | | | | | | | | | | | | | 16 | 6 | 1 | 7 | | 2 | | | | | | |
| CARDIIDAE | *CERASTODERMA PINNULATUM* | | | | | | | | | | | | | | | | 2 | | | | | | | | | | | |
| SOLENIDAE | *ENSIS DIRECTUS* | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ARCTICIDAE | *ARCTICA ISLANDICA* | | | | | | | | | | 6 | 16 | 6 | | | | 1 | | | 1 | 3 | 6 | | 1 | | 5 | 6 | 4 |
| VENERIDAE | *PITAR MORRHUANA* | | | | | | | | | | | 1 | 1 | | | | | | | | | | | | | | | |
| MYINA | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| MYIDAE | *MYA ARENARIA* | 1 | 2 | 2 | | | | | | | | 2 | 1 | 1 | 2 | 1 | | | | | 1 | 2 | | | 1 | 1 | | |
| HIATELLIDAE | *HIATELLA ARCTICA* | | | | | | | | | | | | | | | | | | | | | 4 | | | | 5 | | |
| PHOLADOMYACEA | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| PERIPLOMATIDAE | *PERIPLOMA PAPYRATIUM* | | 1 | | | 1 | | 13 | 9 | 16 | 6 | 5 | 7 | | 4 | 7 | 1 | | | 1 | 3 | 7 | | | | | | 1 |
| SCAPHOPODA | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| DENTALIDA | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| DENTALIIDAE | *DENTULIUM ENTALE* | 5 | 1 | 6 | 1 | | 6 | 1 | 13 | 21 | | | | | | | | 1 | | | | | | 4 | | | | |
| CRUSTACEA | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| CUMACEA | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| LAMPROPIDAE | *LAMPROPS QUADRIPLICATA* | | | | | | | | | | | | | | | | | | | | | | | | | | 1 | 1 |
| LEUCONIDAE | *EUDORELLA HIRSUTA* | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| LEUCONIDAE | *EUDORELLA PUSILLA* | 1 | 1 | 1 | 1 | | | 5 | 4 | 8 | 7 | 16 | 4 | 4 | 4 | 17 | 1 | 1 | | | 2 | | 5 | 5 | 3 | | | |
| LEUCONIDAE | *LEUCON ACUTIROSTRIS* | 3 | 2 | | 3 | 1 | 1 | | 1 | | | | | | | | | | | | | | 1 | 1 | 2 | | | |
| DIASTYLIDAE | *DIASTYLIS ABBREVIATA* | | | | | | | | 2 | | | 1 | | | | 1 | | | | | | | | | | | | |
| DIASTYLIDAE | *DIASTYLIS QUADRISPINOSA* | | | | | | | | | | | | 1 | | | | | 4 | 1 | | | | | | | | | |
| DIASTYLIDAE | *DIASTYLIS SCULPTA* | | | | | | | | | | | | | | | | | | | | | | | | | | 1 | 3 |
| DIASTYLIDAE | *LEPTOSTYLIS LONGIMANA* | | | | | | | | 1 | | | 5 | 1 | | | | | | | | | | | 1 | | | | |

| Survey 9303 0.5 mm Taxon | | FF1 | | | FF4 | | | FF5 | | | FF6 | | | FF7 | | | FF9 | | | FF10 | | | FF11 | | | FF12 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 |
| CAMPYLASPIDAE | CAMPYLASPIS RUBICUNDA | | | | | | | | 1 | | 1 | | | 1 | | | | | | | 1 | 1 | | | | | | |
| DIKONOPHORA | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| PARATANAIDAE | TANAISSUS PSAMMOPHILUS | 2 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ANTHURIDEA | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ANTHURIDAE | PTILANTHURA TENUIS | | | | | | | | | | 1 | | | | | | | 1 | 1 | 3 | 7 | 18 | | | | | | |
| VALVIFERA | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| IDOTEIDAE | EDOTEA MONTOSA | | | | | | | | 2 | | | | | 1 | 3 | 1 | 3 | 1 | 4 | 22 | 14 | 19 | | | 1 | | | |
| IDOTEIDAE | EDOTEA TRILOBA | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ASELLOTA | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| MUNNIDAE | | | | | | | | | | | | | | | | | | 1 | | | | | | | | | | |
| PARAMUNNIDAE | PLEUROGONIUM INERME | | | | | | | | 2 | | | | | | | | | | | | | 1 | | | | | | 1 |
| PARAMUNNIDAE | PLEUROGONIUM RUBICUNDUM | | | | | | | | 3 | | | | | | | | | 1 | | 1 | | | | | | | | |
| PARAMUNNIDAE | PLEUROGONIUM SPINOSISSIMUM | | | | | | | | 1 | | | | | | | | 7 | 4 | | | | | | | | | | |
| AMPHIPODA | | | | | | 1 | | | 5 | 1 | 1 | 1 | 1 | 5 | 1 | | 13 | 7 | 2 | 1 | | | | | | | 1 | 2 |
| GAMMARIDEA | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| AMPELISCIDAE | AMPELISCA ABDITA | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| AMPELISCIDAE | AMPELISCA MACROCEPHALA | | | | | | | | | | | | | | | | 5 | 6 | 8 | | 2 | | | | | | | |
| AMPELISCIDAE | BYBLIS GAIMARDI | | | 1 | | | | | 2 | 1 | | | | | | | | | 1 | | | | 1 | 1 | | | | |
| AMPELISCIDAE | HAPLOOPS TUBICOLA | | | | 3 | 1 | 1 | 8 | | 2 | | 1 | | | 1 | | 2 | 1 | 7 | 1 | | 3 | 3 | 1 | 1 | | | |
| AORIDAE | LEPTOCHEIRUS PINGUIS | | | | | | | | | | | | | | | | 2 | 3 | | | | | | | | | | |
| ARGISSIDAE | ARGISSA HAMATIPES | | | | | | | | | | | | | | | | | | | 2 | 1 | | | | | | 2 | |
| EUSIRIDAE | PONTOGENEIA INERMIS | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ISAEIDAE | PHOTIS POLLEX | | | | | | | | 1 | 1 | | | | 2 | | 1 | | 1 | | 1 | | | | | 1 | | 1 | 2 |
| ISCHYROCERIDAE | ISCHYROCERUS ANGUIPES | | | | | | | | | | | | | | | | | | | 2 | 1 | | | | | | | |
| LYSIANASSIDAE | ANONYX LILLJEBORGI | | 1 | | | | | | | | 1 | 3 | 1 | 1 | 2 | 3 | | | | 3 | | | | 1 | 1 | | | |
| LYSIANASSIDAE | HIPPOMEDON SERRATUS | | 1 | | | | | 2 | 2 | | | | | | | | | | | | | 4 | | | | | | |
| LYSIANASSIDAE | ORCHOMENELLA | | | | | | | | | | 1 | | | | | | | | | | | | | | | | | |
| LYSIANASSIDAE | ORCHOMENELLA MINUTA | | | | | | | | 3 | | | | | | | | 2 | 6 | | | | | | | | | | |
| OEDICEROTIDAE | | | | | | | | | | | | | | | 3 | | 1 | | | 1 | | | 2 | 2 | | | | |
| OEDICEROTIDAE | MONOCULODES EDWARDSI | | | | | | | | | | | | 1 | | | | | | | | 1 | | | | | | | |
| PHOXOCEPHALIDAE | HARPINIA PROPINQUA | 10 | | | 2 | 3 | 2 | 8 | 51 | 13 | 6 | 4 | 3 | | | | 13 | 6 | 6 | 1 | 4 | | 5 | 9 | 2 | | | |
| PHOXOCEPHALIDAE | PHOXOCEPHALUS HOLBOLLI | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| PLEUSTIDAE | STENOPLEUSTES INERMIS | | | | | | | | | | | | | | | | | | 3 | | | | | | | | | |
| PODOCERIDAE | DYOPEDOS MONOCANTHA | | | | | | | | | | | | | | | 1 | 1 | 2 | | 1 | | 2 | | | | | | |
| STENOTHOIDAE | METOPELLA ANGUSTA | | | | | | | | 8 | 3 | 12 | 8 | 12 | 13 | 1 | 3 | 4 | 4 | 6 | 3 | 2 | | | | | | | 1 |
| CAPRELLIDEA | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| CAPRELLIDAE | AEGININA LONGICORNIS | | | | | | | | | | | | | | | | | | | 1 | 1 | | | | | | | |
| CAPRELLIDAE | MAYERELLA LIMICOLA | 1 | | | | | | | | | | 1 | | | | | | | | | | | | | | | | |
| DECAPODA | | | | | | | | | | | | | | | | | | | | | | | | | | | | 1 |
| ANOMURA | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| AXIIDAE | AUXIUS SERRATUS | | | | | | | | | | | | | | | | | | | | 1 | | | | | | | |
| SIPUNCULOIDEA | SIPUNCULA | | | | | | | | | 2 | | | | | | | | | | | | | 5 | 2 | 2 | | | |
| GOLFINGIIDAE | NEPHASOMA DIAPHANES | | | | | | | | | | | | | | | | | | | | | | | 1 | | | | |
| GOLFINGIIDAE | PHASCOLION STROMBI | | 1 | | 1 | | 2 | | | 1 | | | | | | | 3 | | 3 | | | | | | | | | |
| PRIAPULIDA | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| PRIAPULIDAE | PRIAPULUS CAUDATUS | | | | | | | | | | 2 | 6 | 3 | | | | | | | | | | | | | | | |
| PHORONIDA | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| PHORONIDAE | PHORONIS ARCHITECTA | | | | | | | | | | 2 | | 4 | | | | 1 | | | 2 | 7 | 19 | | | | 19 | 6 | 4 |
| ECHINODERMATA | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| CRIBELLINA | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| PORCELLANASTERIDA | CTENODISCUS CRISPATUS | 1 | | 1 | | | | 1 | 1 | | | | | | | | | | | | | | | | | | | |
| LEPTOGNATHINA | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ECHINASTERIDAE | HENRICIA SANGUINOLENTA | | | | | | | | | | | 1 | 2 | | | | | | | | | | | | | | | |
| OPHIUROIDEA | | 2 | | | | | | | 1 | | | | | | | | 1 | | | | 3 | 6 | | | | 8 | | |
| CHILOPHIURINA | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| OPHIOLEPIDIDAE | OPHIURA ROBUSTA | | | 3 | | | | | 4 | | 6 | 15 | 6 | 12 | 10 | 7 | | | 1 | 1 | | | 1 | | 3 | | | |
| SCUTELLINA | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ECHINARACHNIIDAE | ECHINARACHNIUS PARMA | | | | | | | | | | | 1 | | | | | | | | | | | | | | | | |
| HOLOTHUROIDEA | | | | | | | | | | | | | | | | | 1 | | | | | | | | | | | |
| UROCHORDATA | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| STOLIDOBRANCHIA | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| MOLGULIDAE | BOSTRICHOBRANCHUS PILULARIS | | | | | | | | | | | | | | | 1 | | | | | | | | | | | | |

| Survey 9303 0.5 mm Taxon | | | FF13 1 | 2 | 3 | FF14 1 | 2 | 3 |
|---|---|---|---|---|---|---|---|---|
| CNIDARIA | | | | | | | | |
| HYDROZOA | | | | | | | | |
| ACTINIARIA | | | | | | | | |
| | | ACTINIARIA SP.2 | 1 | 2 | 1 | | | |
| ATHENARIA | | | | | | | | |
| | EDWARDSIIDAE | EDWARDSIA ELEGANS | 2 | 3 | 1 | | | |
| NEMERTEA | | | | | | 2 | 5 | 1 |
| | | NEMERTEA SP.2 | | | | | | |
| | | NEMERTEA SP.4 | | | | | | |
| PALEONEMERTEA | | | | | | | | |
| | TUBULANIDAE | CARINOMELLA LACTEA | | | | 4 | 4 | 4 |
| | TUBULANIDAE | TUBULANUS PELLUCIDUS | | | | | | 1 |
| HETERONEMERTEA | | | | | | | | |
| | LINEIDAE | CEREBRATULUS LACTEUS | | 2 | | | | 1 |
| | LINEIDAE | MICRURA | 9 | 2 | 23 | 7 | 9 | 4 |
| MONOSTYLIFERA | | | | | | | | |
| | AMPHIPORIDAE | AMPHIPORUS ANGULATUS | | | | | | |
| | TETRASTEMMATIDAE | TETRASTEMMA VITTATUM | | | | 4 | | |
| ANNELIDA | | | | | | | | |
| POLYCHAETA | | | | | | | | |
| | POLYNOIDAE | BYLGIDES GROENLANDICUS | | | | 6 | 3 | 1 |
| | POLYNOIDAE | ENIPO TORELLI | | | | 3 | 5 | |
| | POLYNOIDAE | GATTYANA CIRROSA | 1 | | | | | |
| | POLYNOIDAE | HARMOTHOINAE | | | | | | |
| | POLYNOIDAE | LAONICE | | | | | | |
| | POLYNOIDAE | LAONICE CIRRATA | | | | | | |
| | POLYNOIDAE | POLYDORA CAULLERYI | 1 | | | | | |
| | POLYNOIDAE | POLYDORA CORNUTA | 1 | | 2 | | | |
| | POLYNOIDAE | POLYDORA QUADRILOBATA | 2 | | 1 | | | |
| | POLYNOIDAE | POLYDORA SOCIALIS | | 1 | | | | |
| | POLYNOIDAE | PRIONOSPIO CIRRIFERA | | | | | | |
| | POLYNOIDAE | PRIONOSPIO STEENSTRUPI | 46 | 3 | 10 | 29 | 17 | 49 |
| | POLYNOIDAE | SPIO FILICORNIS | | | | | | |
| | POLYNOIDAE | SPIO LIMICOLA | 1 | | 1 | 237 | 288 | 152 |
| | POLYNOIDAE | SPIO THULINI | | | | | | |
| | POLYNOIDAE | SPIOPHANES BOMBYX | 14 | 17 | 6 | | | |
| | POLYNOIDAE | SPIOPHANES KROEYERI | | | | 1 | | 1 |
| | SIGALIONIDAE | PHOLOE MINUTA | 1 | | 3 | | | 1 |
| | AMPHINOMIDAE | PARAMPHINOME JEFFREYSII | | | | | 1 | |
| | PHYLLODOCIDAE | ETEONE LONGA | 7 | 7 | 25 | 1 | 3 | 1 |
| | PHYLLODOCIDAE | MYSTIDES BOREALIS | | | | | | |
| | PHYLLODOCIDAE | PARANAITIS SPECIOSA | | | | | | |
| | PHYLLODOCIDAE | PHYLLODOCE | | | | | | |
| | PHYLLODOCIDAE | PHYLLODOCE MACULATA | 3 | | | | | |
| | PHYLLODOCIDAE | PHYLLODOCE MUCOSA | 27 | 12 | 76 | | | |
| | HESIONIDAE | MICROPHTHALMUS SCZELKOWII | | | 2 | | | |
| | PILARGIDAE | ANCISTROSYLLIS GROENLANDICA | | | | | | |
| | SYLLIDAE | EXOGONE HEBES | | | | | | |
| | SYLLIDAE | EXOGONE LONGICIRRUS | | | | | | |
| | SYLLIDAE | EXOGONE VERUGERA | | | | | | |
| | SYLLIDAE | SPHAEROSYLLIS LONGICAUDA | | | | | | |
| | SYLLIDAE | SYLLIDES JAPONICA | | | | | | 1 |
| | SYLLIDAE | SYLLIDES LONGOCIRRATA | | | | | 2 | 1 |
| | SYLLIDAE | TYPOSYLLIS SP.1 | | | | | | |
| | NEREIDAE | | | | | | | |
| | NEREIDAE | NEANTHES VIRENS | | | | | | |
| | NEREIDAE | NEREIS GRAYI | | | | | | 1 |
| | NEPHTYIDAE | AGLAOPHAMUS CIRCINATA | | 2 | 1 | | | |
| | NEPHTYIDAE | NEPHTYS | | | | | | |
| | NEPHTYIDAE | NEPHTYS CILIATA | | | 1 | | | |
| | NEPHTYIDAE | NEPHTYS INCISA | | | 1 | | 1 | |
| | NEPHTYIDAE | NEPHTYS NEOTENA | 10 | | 130 | | | |
| | SPHAERODORIDAE | SPHAERODOROPSIS MINUTA | | | | | | |

| Survey 9303 0.5 mm Taxon | | FF13 1 | FF13 2 | FF13 3 | FF14 1 | FF14 2 | FF14 3 |
|---|---|---|---|---|---|---|---|
| GONIADIDAE | *GONIADA MACULATA* | | | | | | 2 |
| LUMBRINERIDAE | | | | | | | |
| LUMBRINERIDAE | *ABYSSONINOE WINSNESAE* | | | | | | 1 |
| LUMBRINERIDAE | *NINOE NIGRIPES* | 2 | 3 | 5 | 4 | 10 | 9 |
| LUMBRINERIDAE | *SCOLETOMA FRAGILIS* | | | | | | |
| LUMBRINERIDAE | *SCOLETOMA HEBES* | 19 | 3 | 37 | | | |
| DORVILLEIDAE | *PAROUGIA CAECA* | | 1 | | 1 | 3 | 7 |
| ORBINIIDAE | LEITOSCOLOPLOS | | | | | | |
| ORBINIIDAE | *LEITOSCOLOPLOS ACUTUS* | 50 | 26 | 78 | 22 | 37 | 29 |
| ORBINIIDAE | *SCOLOPLOS ARMIGER* | | 2 | 7 | | | |
| PARAONIDAE | *ARICIDEA CATHERINAE* | 63 | 94 | 172 | | | |
| PARAONIDAE | *ARICIDEA MINUTA* | | | | | | |
| PARAONIDAE | *ARICIDEA QUADRILOBATA* | | | | 43 | 64 | 84 |
| PARAONIDAE | *LEVINSENIA GRACILIS* | | | | 19 | 26 | 47 |
| APISTOBRANCHIDAE | *APISTOBRANCHUS TULLBERGI* | | | | | | 1 |
| TROCHOCHAETIDAE | TROCHOCHAETA | 1 | 1 | | | | |
| TROCHOCHAETIDAE | *TROCHOCHAETA CARICA* | | | | | 4 | |
| TROCHOCHAETIDAE | *TROCHOCHAETA MULTISETOSA* | 7 | | 1 | 2 | 1 | |
| CIRRATULIDAE | | | | | | | |
| CIRRATULIDAE | *APHELOCHAETA MARIONI* | | | | 6 | 4 | 6 |
| CIRRATULIDAE | *APHELOCHAETA MONILARIS* | | | | 4 | 2 | 10 |
| CIRRATULIDAE | *CHAETOZONE SETOSA* | | | | | | |
| CIRRATULIDAE | *CHAETOZONE SP.A* | | | | 66 | 83 | 125 |
| CIRRATULIDAE | *MONTICELLINA BAPTISTE* | | | | | | |
| CIRRATULIDAE | *MONTICELLINA DORSOBRANCHIALIS* | | | | | | |
| CIRRATULIDAE | *THARYX ACUTUS* | 327 | 102 | 380 | | | |
| COSSURIDAE | *COSSURA LONGOCIRRATA* | | | | 10 | 12 | 21 |
| FLABELLIGERIDAE | *BRADA VILLOSA* | | | | | | |
| FLABELLIGERIDAE | *DIPLOCIRRUS HIRSUTUS* | | | | | | |
| FLABELLIGERIDAE | PHERUSA | 11 | 13 | 16 | | | |
| FLABELLIGERIDAE | *PHERUSA AFFINIS* | | | | | | |
| SCALIBREGMIDAE | *SCALIBREGMA INFLATUM* | | | | 6 | 10 | 6 |
| OPHELIIDAE | *OPHELINA ACUMINATA* | | | | | | |
| STERNASPIDAE | *STERNAPSIS SCUTATA* | | | | 16 | 32 | 12 |
| CAPITELLIDAE | *CAPITELLA CAPITATA* | 4 | 34 | 10 | | | |
| CAPITELLIDAE | *HETEROMASTUS FILIFORMIS* | | | | | | 2 |
| CAPITELLIDAE | *MEDIOMASTUS CALIFORNIENSIS* | 95 | 126 | 64 | 14 | 14 | 18 |
| MALDANIDAE | *AXIOTHELLA CATENATA* | | | | | | |
| MALDANIDAE | *CLYMENELLA TORQUATA* | | | | | | |
| MALDANIDAE | EUCLYMENINAE | | | | 1 | 6 | 1 |
| MALDANIDAE | *MALDANE GLEBIFEX* | | | | 8 | 11 | 11 |
| MALDANIDAE | *PRAXILLELLA GRACILIS* | | | | | 1 | |
| MALDANIDAE | *PRAXILLELLA PRAETERMISSA* | | | | | | |
| MALDANIDAE | *PRAXILLURA ORNATA* | | | | | | |
| MALDANIDAE | *RHODINE LOVENI* | | | | | | |
| OWENIIDAE | *GALATHOWENIA OCULATA* | | | 1 | | 1 | |
| OWENIIDAE | *MYRIOCHELE HEERI* | | | | | | |
| OWENIIDAE | *OWENIA FUSIFORMIS* | | | | | 1 | |
| AMPHARETIDAE | *AMPHARETE ACUTIFRONS* | | | | | | |
| AMPHARETIDAE | *AMPHARETE ARCTICA* | | | | | | |
| AMPHARETIDAE | *ANOBOTHRUS GRACILIS* | | | | 8 | 10 | 1 |
| AMPHARETIDAE | *ASABELLIDES OCULATA* | | | | | | |
| AMPHARETIDAE | *MELINNA CRISTATA* | | | | | | |
| TEREBELLIDAE | POLYCIRRUS | 1 | 1 | | 1 | | |
| TEREBELLIDAE | *POLYCIRRUS EXIMIUS* | | | | | | |
| TEREBELLIDAE | *POLYCIRRUS MEDUSA* | | | | | | |
| TEREBELLIDAE | *PROCLEA GRAFFII* | | | | | | |
| TEREBELLIDAE | TEREBELLIDES | | | | | | 1 |
| TRICHOBRANCHIDAE | *TEREBELLIDES ATLANTIS* | | | | | | |
| TRICHOBRANCHIDAE | *TEREBELLIDES STROEMII* | | | | 1 | 1 | 1 |
| SABELLIDAE | *CHONE DUNERI* | | | | | | |
| SABELLIDAE | *EUCHONE INCOLOR* | | 1 | 1 | 1 | 2 | 2 |
| SABELLIDAE | *LAONOME KROEYERI* | | | | | | |

| Survey 9303 0.5 mm Taxon | | FF13 1 | FF13 2 | FF13 3 | FF14 1 | FF14 2 | FF14 3 |
|---|---|---|---|---|---|---|---|
| SABELLIDAE | *PSEUDOPOTAMILLA RENIFORMIS* | | | | | | |
| TUBIFICINA | | | | | | | |
| TUBIFICIDAE | | | | | | | |
| TUBIFICIDAE | *TUBIFICIDAE SP.2* | | | | | | |
| TUBIFICIDAE | *TUBIFICOIDES APECTINATUS* | | 1 | 1 | 22 | 52 | 61 |
| TUBIFICIDAE | *TUBIFICOIDES PSEUDOGASTER* | | | | | | |
| GASTROPODA | | | | | | | |
| | *GASTROPODA SP.1* | | | | | | |
| | *GASTROPODA SP.2* | | | | | | |
| MESOGASTROPODA | | | | | | | |
| RISSOIDAE | *ONOBA PELAGICA* | | | | 6 | | 3 |
| NATICIDAE | *POLINICES PALLIDUS* | | | | | | |
| STENOGLOSSA | | | | | | | |
| NEPTUNEIDAE | *COLUS PYGMAEUS* | | | | | | |
| TOXOGLOSSA | | | | | | | |
| TURRIDAE | *OENOPOTA INCISULA* | | | | | | |
| TURRIDAE | *OENOPOTA PYRAMIDALIS* | | | | | | |
| TURRIDAE | *PROPEBELA TURRICULA* | | | | | | |
| CEPHALASPIDEA | | | | | | | |
| CYLICHNIDAE | CYLICHNA | | | | | | |
| CYLICHNIDAE | *CYLICHNA ALBA* | | | | | | |
| CYLICHNIDAE | *CYLICHNA GOULDI* | | | | 4 | 3 | 1 |
| APLACOPHORA | | | | | | | |
| CHAETODERMATIDA | | | | | | | |
| CHAETODERMATIDAE | *CHAETODERMA NITIDULUM* | | | | | | 1 |
| BIVALVIA | | | | | | 1 | |
| NUCULOIDEA | | | | | | | |
| NUCULIDAE | *NUCULA ANNULATA* | | | | | | |
| NUCULIDAE | *NUCULA DELPHINODONTA* | | | | 12 | 6 | 7 |
| NUCULIDAE | *NUCULOMA TENUIS* | | | | 6 | 18 | 8 |
| NUCULANIDAE | *MEGAYOLDIA THRACIAEFORMIS* | | | | 1 | 8 | 3 |
| NUCULANIDAE | *NUCULANA PERNULA* | | | | | | |
| NUCULANIDAE | *YOLDIA SAPOTILLA* | | | | 4 | 24 | 2 |
| MYTILOIDA | | | | | | | |
| MYTILIDAE | *CRENELLA DECUSSATA* | | | | | | |
| MYTILIDAE | *MUSCULUS NIGER* | 1 | | | | | |
| MYTILIDAE | MYTILUS | | | | | | |
| MYTILIDAE | *MYTILUS EDULIS* | | 1 | | | | |
| VENEROIDA | | | | | | | |
| THYASIRIDAE | *THYASIRA GOULDII* | | | | 30 | 34 | 34 |
| ASTARTIDAE | *ASTARTE UNDATA* | | | | | | |
| CARDIIDAE | *CERASTODERMA PINNULATUM* | | 5 | | | | |
| SOLENIDAE | *ENSIS DIRECTUS* | | 2 | 1 | | | |
| ARCTICIDAE | *ARCTICA ISLANDICA* | 2 | 6 | 4 | | | |
| VENERIDAE | *PITAR MORRHUANA* | | | | | | |
| MYINA | | | | | | | |
| MYIDAE | *MYA ARENARIA* | | | | | | |
| HIATELLIDAE | *HIATELLA ARCTICA* | 4 | 5 | 5 | | | |
| PHOLADOMYACEA | | | | | | | |
| PERIPLOMATIDAE | *PERIPLOMA PAPYRATIUM* | | | 1 | 1 | | 1 |
| SCAPHOPODA | | | | | | | |
| DENTALIDA | | | | | | | |
| DENTALIIDAE | *DENTULIUM ENTALE* | | 1 | | 1 | 11 | |
| CRUSTACEA | | | | | | | |
| CUMACEA | | | | | | | |
| LAMPROPIDAE | *LAMPROPS QUADRIPLICATA* | | | | | | |
| LEUCONIDAE | *EUDORELLA HIRSUTA* | | | | | 2 | |
| LEUCONIDAE | *EUDORELLA PUSILLA* | | | | | | |
| LEUCONIDAE | *LEUCON ACUTIROSTRIS* | | | | 1 | 2 | |
| DIASTYLIDAE | *DIASTYLIS ABBREVIATA* | | | | | | |
| DIASTYLIDAE | *DIASTYLIS QUADRISPINOSA* | | | | | | |
| DIASTYLIDAE | *DIASTYLIS SCULPTA* | 1 | 1 | | | | |
| DIASTYLIDAE | *LEPTOSTYLIS LONGIMANA* | | | | | | |

| Survey 9303 0.5 mm Taxon | | FF13 1 | 2 | 3 | FF14 1 | 2 | 3 |
|---|---|---|---|---|---|---|---|
| CAMPYLASPIDAE | *CAMPYLASPIS RUBICUNDA* | | | | | | |
| DIKONOPHORA | | | | | | | |
| PARATANAIDAE | *TANAISSUS PSAMMOPHILUS* | | | | | | |
| ANTHURIDEA | | | | | | | |
| ANTHURIDAE | *PTILANTHURA TENUIS* | | | | | | |
| VALVIFERA | | | | | | | |
| IDOTEIDAE | *EDOTEA MONTOSA* | 8 | 4 | 10 | | | |
| IDOTEIDAE | *EDOTEA TRILOBA* | 1 | 1 | | | | |
| ASELLOTA | | | | | | | |
| MUNNIDAE | | | | | | | |
| PARAMUNNIDAE | *PLEUROGONIUM INERME* | 1 | | 1 | | | |
| PARAMUNNIDAE | *PLEUROGONIUM RUBICUNDUM* | | 1 | | | 1 | |
| PARAMUNNIDAE | *PLEUROGONIUM SPINOSISSIMUM* | | | | | | |
| AMPHIPODA | | | 1 | 2 | | | |
| GAMMARIDEA | | | | | | | |
| AMPELISCIDAE | *AMPELISCA ABDITA* | 1 | | 17 | | | |
| AMPELISCIDAE | *AMPELISCA MACROCEPHALA* | | | | | | |
| AMPELISCIDAE | *BYBLIS GAIMARDI* | | | | | | |
| AMPELISCIDAE | *HAPLOOPS TUBICOLA* | | | | 2 | 3 | |
| AORIDAE | *LEPTOCHEIRUS PINGUIS* | | | | | | |
| ARGISSIDAE | *ARGISSA HAMATIPES* | 4 | 3 | 4 | | | |
| EUSIRIDAE | *PONTOGENEIA INERMIS* | 1 | | | | | |
| ISAEIDAE | *PHOTIS POLLEX* | 1 | 1 | 6 | | | |
| ISCHYROCERIDAE | *ISCHYROCERUS ANGUIPES* | | | | | | |
| LYSIANASSIDAE | *ANONYX LILLJEBORGI* | | | | | | |
| LYSIANASSIDAE | *HIPPOMEDON SERRATUS* | | | | | 1 | |
| LYSIANASSIDAE | ORCHOMENELLA | | | | | | |
| LYSIANASSIDAE | *ORCHOMENELLA MINUTA* | 1 | | | | | |
| OEDICEROTIDAE | | | | | 1 | | |
| OEDICEROTIDAE | *MONOCULODES EDWARDSI* | | 1 | | | | |
| PHOXOCEPHALIDAE | *HARPINIA PROPINQUA* | | | | 1 | 3 | |
| PHOXOCEPHALIDAE | *PHOXOCEPHALUS HOLBOLLI* | | | 1 | | | |
| PLEUSTIDAE | *STENOPLEUSTES INERMIS* | | | | | | |
| PODOCERIDAE | *DYOPEDOS MONOCANTHA* | | | | | | |
| STENOTHOIDAE | *METOPELLA ANGUSTA* | | | 5 | | | |
| CAPRELLIDEA | | | | | | | |
| CAPRELLIDAE | *AEGININA LONGICORNIS* | | | | | | |
| CAPRELLIDAE | *MAYERELLA LIMICOLA* | | | | | | |
| DECAPODA | | | | | | | |
| ANOMURA | | | | | | | |
| AXIIDAE | *AUXIUS SERRATUS* | | | | | | |
| SIPUNCULOIDEA | SIPUNCULA | | | | 1 | | |
| GOLFINGIIDAE | *NEPHASOMA DIAPHANES* | | | | | | |
| GOLFINGIIDAE | *PHASCOLION STROMBI* | | | | 1 | 1 | |
| PRIAPULIDA | | | | | | | |
| PRIAPULIDAE | *PRIAPULUS CAUDATUS* | | | | | | |
| PHORONIDA | | | | | | | |
| PHORONIDAE | *PHORONIS ARCHITECTA* | | | 3 | | | |
| ECHINODERMATA | | | | | | | |
| CRIBELLINA | | | | | | | |
| PORCELLANASTERIDA | *CTENODISCUS CRISPATUS* | | | | 1 | | |
| LEPTOGNATHINA | | | | | | | |
| ECHINASTERIDAE | *HENRICIA SANGUINOLENTA* | | | | | | |
| OPHIUROIDEA | | | 1 | 1 | | | |
| CHILOPHIURINA | | | | | | | |
| OPHIOLEPIDIDAE | *OPHIURA ROBUSTA* | | | | 3 | 1 | |
| SCUTELLINA | | | | | | | |
| ECHINARACHNIIDAE | *ECHINARACHNIUS PARMA* | | | 1 | | | |
| HOLOTHUROIDEA | | | | | | | |
| UROCHORDATA | | | | | | | |
| STOLIDOBRANCHIA | | | | | | | |
| MOLGULIDAE | *BOSTRICHOBRANCHUS PILULARIS* | | | | | | |

# APPENDIX A-5: TAXA IDENTIFIED TO SPECIES LEVEL

| | | |
|---|---|---|
| CNIDARIA | Family Cerianthidae | *Ceriantheopsis americana* |
| | | Actiniaria sp. 2 |
| | | Actiniaria sp. 6 |
| | Family Edwardsiidae | *Edwardsia elegans* |
| TURBELLARIA | | Turbellaria sp. 1 |
| NEMERTEA | | Nemertea sp. 2 |
| | | Nemertea sp. 3 |
| | | Nemertea sp. 4 |
| | Family Tubulanidae | *Tubulanus pellucidus* |
| | | *Carinomella lactea* |
| | Family Lineidae | *Cerebratulus lacteus* |
| | Family Amphiporidae | *Amphiporus angulatus* |
| | Family Tetrastemmatidae | *Tetrastemma vittatum* |
| POLYCHAETA | Family Polynoidae | *Gattyana cirrosa* |
| | | *Enipo torelli* |
| | | *Bylgides groenlandicus* |
| | Family Sigalionidae | *Pholoe minuta* |
| | Family Amphinomidae | *Paramphinome jeffreysii* |
| | Family Phyllodocidae | *Phyllodoce mucosa* |
| | | *Phyllodoce maculata* |
| | | *Eteone longa* |
| | | *Eulalia viridis* |
| | | *Mystides borealis* |
| | | *Paranaitis speciosa* |
| | | *Phyllodoce arenae* |
| | Family Hesionidae | *Microphthalmus sczelkowii* |
| | Family Pilargidae | *Ancistrosyllis groenlandica* |
| | Family Syllidae | *Typosyllis sp. 1* |
| | | *Exogone verugera* |
| | | *Exogone hebes* |
| | | *Exogone longicirrus* |
| | | *Sphaerosyllis brevifrons* |
| | | *Sphaerosyllis longicauda* |
| | | *Syllides japonica* |
| | | *Syllides longocirrata* |
| | Family Nereidae | *Neanthes virens* |
| | | *Nereis grayi* |
| | Family Nephtyidae | *Nephtys neotena* |
| | | *Nephtys ciliata* |
| | | *Nephtys caeca* |
| | | *Nephtys incisa* |
| | | *Aglaophamus circinata* |
| | Family Sphaerodoridae | *Sphaerodoropsis minuta* |
| | Family Glyceridae | *Glycera capitata* |
| | Family Goniadidae | *Goniada maculata* |
| | Family Lumbrineridae | *Abyssoninoe winsnesae* |
| | | *Scoletoma fragilis* |
| | | *Scoletoma hebes* |
| | | *Ninoe nigripes* |
| | Family Arabellidae | *Drilonereis filum* |
| | Family Dorvilleidae | *Dorvillea sociabilis* |
| | | *Parougia caeca* |
| | Family Orbiniidae | *Scoloplos armiger* |
| | | *Leitoscoloplos acutus* |

| | | |
|---|---|---|
| | | *Leitoscoloplos sp. B* |
| | Family Paraonidae | *Aricidea quadrilobata* |
| | | *Aricidea minuta* |
| | | *Levinsenia gracilis* |
| | | *Aricidea catherinae* |
| | Family Apistobranchidae | *Apistobranchus tullbergi* |
| | Family Spionidae | Spionidae sp. 1 |
| | | *Laonice cirrata* |
| | Family Polynoidae | *Polydora cornuta* |
| | Family Spionidae | *Polydora socialis* |
| | | *Polydora caulleryi* |
| | | *Polydora quadrilobata* |
| | | *Prionospio steenstrupi* |
| | | *Spio thulini* |
| | | *Spio filicornis* |
| | | *Spio limicola* |
| | | *Spiophanes bombyx* |
| | | *Spiophanes kroeyeri* |
| | | *Pygospio elegans* |
| | | *Streblospio benedicti* |
| | | *Prionospio cirrifera* |
| | Family Trochochaetidae | *Trochochaeta carica* |
| | | *Trochochaeta multisetosa* |
| | Family Cirratulidae | *Cirratulus cirratus* |
| | | *Aphelochaeta sp. A* |
| | | *Monticellina baptiste* |
| | | *Aphelochaeta monilaris* |
| | | *Tharyx acutus* |
| | | *Aphelochaeta marioni* |
| | | *Monticellina dorsobranchialis* |
| | | *Chaetozone sp. A* |
| | | *Chaetozone setosa* |
| | Family Cossuridae | *Cossura longocirrata* |
| | Family Flabelligeridae | *Brada villosa* |
| | | *Pherusa affinis* |
| | | *Diplocirrus hirsutus* |
| | Family Scalibregmidae | *Scalibregma inflatum* |
| | Family Opheliidae | *Ophelina acuminata* |
| | Family Sternaspidae | *Sternapsis scutata* |
| | Family Capitellidae | *Capitella capitata* |
| | | *Heteromastus filiformis* |
| | | *Mediomastus californiensis* |
| | Family Maldanidae | *Clymenella torquata* |
| | | *Maldane glebifex* |
| | | *Axiothella catenata* |
| | | *Praxillella gracilis* |
| | | *Praxillella praetermissa* |
| | | *Rhodine loveni* |
| | | *Euclymene collaris* |
| | | *Clymenura sp. A* |
| | | *Praxillura ornata* |
| | Family Oweniidae | *Owenia fusiformis* |
| | | *Myriochele heeri* |
| | | *Galathowenia oculata* |

| | | |
|---|---|---|
| | Family Amphictenidae | *Pectinaria granulata* |
| | Family Ampharetidae | *Ampharete arctica* |
| | | *Ampharete acutifrons* |
| | | *Melinna cristata* |
| | | *Anobothrus gracilis* |
| | | *Asabellides oculata* |
| | Family Terebellidae | *Polycirrus medusa* |
| | | *Polycirrus eximius* |
| | | *Proclea graffii* |
| | Family Trichobranchidae | *Terebellides atlantis* |
| | | *Terebellides stroemii* |
| | Family Sabellidae | *Chone duneri* |
| | | *Euchone incolor* |
| | | *Euchone elegans* |
| | | *Pseudopotamilla reniformis* |
| | | *Laonome kroeyeri* |
| ANNELIDA | Family Polygordiidae | *Polygordius sp. A* |
| | Family Enchytraeidae | Enchytraeidae sp. 3 |
| | Family Tubificidae | Tubificidae sp. 2 |
| | | *Tubificoides pseudogaster* |
| | | *Tubificoides apectinatus* |
| GASTROPODA | | Gastropoda sp. 1 |
| | | Gastropoda sp. 2 |
| | | Gastropoda sp. A |
| | Family Rissoidae | *Onoba pelagica* |
| | Family Naticidae | *Polinices pallidus* |
| | Family Neptuneidae | *Colus pygmaeus* |
| | Family Turridae | *Oenopota pyramidalis* |
| | | *Oenopota incisula* |
| | | *Propebela turricula* |
| | Family Cylichnidae | *Cylichna alba* |
| | | *Cylichna gouldi* |
| APLACOPHORA | Family Chaetodermatidae | *Chaetoderma nitidulum* |
| BIVALVIA | Family Nuculidae | *Nuculoma tenuis* |
| | | *Nucula annulata* |
| | | *Nucula delphinodonta* |
| | Family Nuculanidae | *Nuculana pernula* |
| | | *Megayoldia thraciaeformis* |
| | | *Yoldia sapotilla* |
| | Family Mytilidae | *Mytilus edulis* |
| | | *Crenella decussata* |
| | | *Crenella glandula* |
| | | *Musculus niger* |
| | Family Thyasiridae | *Thyasira gouldii* |
| | Family Carditidae | *Cyclocardia borealis* |
| | Family Astartidae | *Astarte undata* |
| | Family Cardiidae | *Cerastoderma pinnulatum* |
| | Family Solenidae | *Ensis directus* |
| | Family Tellinidae | *Macoma balthica* |
| | Family Arcticidae | *Arctica islandica* |
| | Family Veneridae | *Pitar morrhuana* |
| | Family Myidae | *Mya arenaria* |
| | Family Hiatellidae | *Hiatella arctica* |
| | Family Lyonsiidae | *Lyonsia arenosa* |

| | | |
|---|---|---|
| | Family Periplomatidae | *Periploma papyratium* |
| SCAPHOPODA | Family Dentaliidae | *Dentulium entale* |
| CRUSTACEA | Family Lampropidae | *Lamprops quadriplicata* |
| | Family Leuconidae | *Leucon acutirostris* |
| | | *Eudorella hirsuta* |
| | | *Eudorella pusilla* |
| | | *Eudorellopsis deformis* |
| | Family Diastylidae | *Diastylis quadrispinosa* |
| | | *Diastylis sculpta* |
| | | *Diastylis abbreviata* |
| | | *Leptostylis longimana* |
| | Family Campylaspidae | *Campylaspis sp. 1* |
| | | *Campylaspis rubicunda* |
| | Family Paratanaidae | *Tanaissus psammophilus* |
| | Family Anthuridae | *Ptilanthura tenuis* |
| | Family Cirolanidae | *Cirolana polita* |
| | Family Idoteidae | *Edotea montosa* |
| | | *Edotea triloba* |
| | Family Chaetiliidae | *Chiridotea tuftsi* |
| | Family Paramunnidae | *Pleurogonium spinosissimum* |
| | | *Pleurogonium rubicundum* |
| | | *Pleurogonium inerme* |
| | | Amphipoda sp. 1 |
| | Family Ampeliscidae | *Ampelisca macrocephala* |
| | | *Ampelisca abdita* |
| | | *Byblis gaimardi* |
| | | *Haploops tubicola* |
| | Family Aoridae | *Leptocheirus pinguis* |
| | Family Argissidae | *Argissa hamatipes* |
| | Family Corophiidae | *Corophium crassicorne* |
| | | *Erichthonius rubricornis* |
| | | *Unciola inermis* |
| | | *Unciola irrorata* |
| | | *Pseudunciola obliquua* |
| | Family Eusiridae | *Pontogeneia inermis* |
| | Family Haustoriidae | *Acanthohaustorius millsi* |
| | Family Isaeidae | *Photis pollex* |
| | Family Ischyroceridae | *Ischyrocerus anguipes* |
| | Family Lysianassidae | *Anonyx lilljeborgi* |
| | | *Hippomedon serratus* |
| | | *Orchomenella minuta* |
| | Family Oedicerotidae | Oedicerotidae sp. 2 |
| | | Oedicerotidae sp. A |
| | | *Monoculodes edwardsi* |
| | Family Phoxocephalidae | *Harpinia propinqua* |
| | | *Phoxocephalus holbolli* |
| | | *Rhepoxynius hudsoni* |
| | Family Pleustidae | *Stenopleustes inermis* |
| | Family Podoceridae | *Dyopedos monocantha* |
| | Family Stenothoidae | *Metopella angusta* |
| | Family Caprellidae | *Mayerella limicola* |
| | | *Aeginina longicornis* |
| | Family Axiidae | *Auxius serratus* |
| | Family Cancridae | *Cancer borealis* |

| | | |
|---|---|---|
| SIPUNCULOIDEA | Family Golfingiidae | *Nephasoma diaphanes* |
| | | *Phascolion strombi* |
| PRIAPULIDA | Family Priapulidae | *Priapulus caudatus* |
| PHORONIDA | Family Phoronidae | *Phoronis architecta* |
| ECHINODERMATA | Family Porcellanasteridae | *Ctenodiscus crispatus* |
| | Family Echinasteridae | *Henricia sanguinolenta* |
| | Family Ophiolepididae | *Ophiura robusta* |
| | Family Echinarachniidae | *Echinarachnius parma* |
| UROCHORDATA | Family Molgulidae | *Bostrichobranchus pilularis* |

# APPENDIX B: SEDIMENT CHEMISTRY DATA

PAH/LAB Spreadsheet

| Column | Full Analyte Name |
|---|---|
| naphthalene | naphthalene |
| C1-naphthal | C1-naphthalenes |
| C2-naphthal | C2-naphthalenes |
| C3-naphthal | C3-naphthalenes |
| C4-naphthal | C4-naphthalenes |
| biphenyl | biphenyl |
| acenaphthyl | acenaphthylene |
| acenaphthen | acenaphthene |
| dibenzofura | dibenzofuran |
| fluorene | fluorene |
| C1-fluorene | C1-fluorenes |
| C2-fluorene | C2-fluorenes |
| C3-fluorene | C3-fluorenes |
| anthracene | anthracene |
| C1-phenanth | C1-phenanthrenes/anthracenes |
| C2-phenanth | C2-phenanthrenes/anthracenes |
| C3-phenanth | C3-phenanthrenes/anthracenes |
| C4-phenanth | C4-phenanthrenes/anthracenes |
| dibenzothio | dibenzothiophene |
| C1-dibenzot | C1-dibenzothiophenes |
| C2-dibenzot | C2-dibenzothiophenes |
| C3-dibenzot | C3-dibenzothiophenes |
| fluoranthen | fluoranthene |
| pyrene | pyrene |
| C1-fluorant | C1-fluoranthenes/pyrenes |
| benz[a]anth | benz[a]anthracene |
| chrysene | chrysene |
| C1-chrysene | C1-chrysenes |
| C2-chrysene | C2-chrysenes |
| C3-chrysene | C3-chrysenes |
| C4-chrysene | C4-chrysenes |
| benzo[b]flu | benzo[b]fluoranthene |
| benzo[k]flu | benzo[k]fluoranthene |
| benzo[e]pyr | benzo[e]pyrene |
| benzo[a]pyr | benzo[a]pyrene |
| perylene | perylene |
| indeno[1,2, | indeno[1,2,3-c,d]pyrene |
| dibenz[a,h] | dibenz[a,h]anthracene |
| benzo[g,h,i | benzo[g,h,i]perylene |
| phenyl deca | phenyl decanes |
| phenyl unde | phenyl undecanes |
| phenyl dode | phenyl dodecanes |
| phenyl trid | phenyl tridecanes |
| phenyl tetr | phenyl tetradecanes |
| naphthalene | naphthalene-d8 |
| acenaphthen | acenaphthene-d10 |
| benzo[a]pyr | benzo[a]pyrene-d12 |
| phenyl nona | phenyl nonane |

PCB/Pesticide Spreadsheet

| Column | Full Analyte Name |
|---|---|
| CL2(08) | CL2(08) |
| HEXACHLOROB | HEXACHLOROBENZENE |
| LINDANE | LINDANE |
| CL3(18) | CL3(18) |
| CL3(28) | CL3(28) |
| HEPTACHLOR | HEPTACHLOR |
| CL4(52) | CL4(52) |
| ALDRIN | ALDRIN |
| CL4(44) | CL4(44) |
| HEPTACHLORE | HEPTACHLOREPOXIDE |
| CL4(66) | CL4(66) |
| 2,4-DDE | 2,4-DDE |
| CL5(101) | CL5(101) |
| CIS-CHLORDA | CIS-CHLORDANE |
| TRANS-NONAC | TRANS-NONACHLOR |
| DIELDRIN | DIELDRIN |
| 4,4-DDE | 4,4-DDE |
| CL4(77) | CL4(77) |
| 2,4-DDD | 2,4-DDD |
| ENDRIN | ENDRIN |
| CL5(118) | CL5(118) |
| 4,4-DDD | 4,4-DDD |
| 2,4-DDT | 2,4-DDT |
| CL6(153) | CL6(153) |
| CL5(105) | CL5(105) |
| 4,4-DDT | 4,4-DDT |
| CL6(138) | CL6(138) |
| CL5(126) | CL5(126) |
| CL7(187) | CL7(187) |
| CL6(128) | CL6(128) |
| CL7(180) | CL7(180) |
| MIREX | MIREX |
| CL7(170) | CL7(170) |
| CL8(195) | CL8(195) |
| CL9(206) | CL9(206) |
| CL10(209) | CL10(209) |
| DBOFB | DBOFB |
| CL5(112) | CL5(112) |

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Product Number S9398PAH.WK1
PAH Data reported in ng/g.

| Station | Latitude | Longitude | Sample Depth(m) | Sample Date | Sample ID | dibenzofura | fluorene | C1-fluorene | C2-fluorene | C3-fluorene | phenanthren | anthracene | C1-phenanth |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FF1 | 42.46650 | 70.62233 | 84.0 | 17-AUG-93 | S93030200 | 18.49 | 29.01 | 28.83 | 74.93 | 114.25 | 259.44 | 71.55 | 262.68 |
| FF1 | 42.46650 | 70.62233 | 84.5 | 17-AUG-93 | S93030198 | 16.24 | 25.9 | 26.13 | 65.78 | 112.69 | 226.2 | 62.04 | 221.08 |
| FF10 | 42.41383 | 70.87917 | 29.0 | 16-AUG-93 | S93030151 | 5.97 | 10.93 | 9.96 | 25.25 | 3.47 < | 89.57 | 34.44 | 68.25 |
| FF10 | 42.41383 | 70.87917 | 29.0 | 16-AUG-93 | S93030153 | 5.74 | 10.11 | 11.97 | 27.96 | 38.11 | 94.34 | 35.83 | 80.83 |
| FF11 | 42.65883 | 70.49967 | 89.5 | 17-AUG-93 | S93030179 | 14.61 | 27.66 | 35.28 | 4.91 < | 4.91 < | 224.09 | 62.56 | 194.9 |
| FF11 | 42.65883 | 70.49967 | 90.0 | 17-AUG-93 | S93030182 | 26.76 | 74.27 | 42.62 | 72.27 | 108.64 | 499.49 | 261.4 | 319.31 |
| FF12 | 42.38933 | 70.90000 | 26.0 | 16-AUG-93 | S93030072 | 4.19 | 7.68 | 8.49 | 21.37 | 29.13 | 52.7 | 23.47 | 46.38 |
| FF12 | 42.38933 | 70.90000 | 26.0 | 16-AUG-93 | S93030074 | 18.31 | 52.92 | 57.24 | 63 | 57.15 | 382.37 | 134.21 | 287.05 |
| FF13 | 42.31917 | 70.82267 | 21.5 | 19-AUG-93 | S93030352 | 9.57 | 15.51 | 17.5 | 47.25 | 73.44 | 130.55 | 41.09 | 109.73 |
| FF13 | 42.31917 | 70.82267 | 21.5 | 19-AUG-93 | S93030354 | 7.17 | 12.78 | 12.4 | 27.39 | 46.94 | 98.75 | 33.2 | 73.74 |
| FF14 | 42.41717 | 70.65350 | 76.0 | 17-AUG-93 | S93030214 | 12.22 | 16.87 | 18.9 | 45.06 | 74.24 | 155.95 | 45.22 | 148.05 |
| FF14 | 42.41717 | 70.65350 | 76.5 | 17-AUG-93 | S93030216 | 10.11 | 14.3 | 15.29 | 37.76 | 60.67 | 120.99 | 34.11 | 116.84 |
| FF4 | 42.28983 | 70.42550 | 89.0 | 17-AUG-93 | S93030234 | 14.82 | 18.65 | 21.37 | 50.59 | 87.54 | 165.72 | 41.68 | 146.19 |
| FF4 | 42.28983 | 70.42550 | 89.0 | 17-AUG-93 | S93030237 | 13.05 | 16.81 | 17.56 | 46.05 | 81.06 | 151.45 | 36.44 | 138.21 |
| FF5 | 42.13333 | 70.42233 | 64.5 | 18-AUG-93 | S93030312 | 4.14 | 5.91 | 6.51 | 22.44 | 3.9 < | 51.79 | 13.92 | 55.51 |
| FF5 | 42.13333 | 70.42233 | 65.0 | 18-AUG-93 | S93030310 | 5.61 | 7.61 | 9.97 | 27.15 | 43.83 | 61.51 | 14.99 | 65.07 |
| FF6 | 41.89783 | 70.40417 | 37.0 | 18-AUG-93 | S93030292 | 11.11 | 12.94 | 17.51 | 36.41 | 63.53 | 115 | 30.05 | 112.27 |
| FF6 | 41.89783 | 70.40417 | 37.0 | 18-AUG-93 | S93030294 | 6.2 | 8.17 | 2.03 < | 4.05 < | 4.05 < | 62.71 | 16.16 | 44.9 |
| FF7 | 41.95767 | 70.26700 | 40.0 | 18-AUG-93 | S93030269 | 11.03 | 13.4 | 13.62 | 7.19 < | 7.19 < | 115.81 | 24.74 | 149.01 |
| FF7 | 41.95767 | 70.26700 | 40.5 | 18-AUG-93 | S93030277 | 10.33 | 12.64 | 12.16 | 46.69 | 5.53 < | 101.41 | 22.95 | 147.27 |
| FF9 | 42.31217 | 70.65683 | 49.0 | 18-AUG-93 | S93030326 | 3.41 | 5.91 | 8.21 | 3.36 < | 3.36 < | 43.48 | 18.88 | 48.46 |
| FF9 | 42.31217 | 70.65683 | 49.0 | 18-AUG-93 | S93030328 | 2.65 | 4.37 | 8.3 | 3.25 < | 3.25 < | 38.7 | 15.06 | 39.89 |
| NF10 | 42.39317 | 70.83833 | 32.0 | 16-AUG-93 | S93030134 | 20.62 | 38.68 | 28.28 | 40.94 | 47.94 | 261.17 | 125.07 | 186.57 |

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PAH Data reported in ng/g.

| Station | Latitude | Longitude | Sample Depth(m) | Sample Date | Sample ID | dibenzofura | fluorene | C1–fluorene | C2–fluorene | C3–fluorene | phenanthren | anthracene | C1–phenanth |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NF10 | 42.39317 | 70.83833 | 32.0 | 16–AUG–93 | S93030136 | 14.65 | 26.73 | 21.08 | 33.57 | 42.71 | 183.3 | 88.2 | 138.19 |
| NF12 | 42.39033 | 70.83083 | 34.0 | 16–AUG–93 | S93030120 | 116.14 | 216.44 | 132.07 | 170.99 | 195.04 | 1374.47 | 633.53 | 813.3 |
| NF12 | 42.39033 | 70.83083 | 34.0 | 16–AUG–93 | S93030122 | 103.51 | 178.7 | 90.53 | 115.38 | 125.13 | 1008.35 | 459 | 539.51 |
| NF14 | 42.38767 | 70.82400 | 34.0 | 16–AUG–93 | S93030105 | 37.71 | 69.85 | 24.21 | 22.3 | 28.99 | 421.79 | 151.24 | 166.18 |
| NF14 | 42.38767 | 70.82400 | 34.5 | 16–AUG–93 | S93030103 | 55.19 | 86.58 | 29.03 | 36.2 | 54.18 | 577.74 | 201.51 | 216.84 |
| NF16 | 42.37767 | 70.83800 | 34.0 | 19–AUG–93 | S93030393 | 21.88 | 41.06 | 19.28 | 27.55 | 33.55 | 289.41 | 99.97 | 133.52 |
| NF16 | 42.37767 | 70.83800 | 34.0 | 19–AUG–93 | S93030397 | 93.23 | 187.25 | 100.44 | 104.37 | 114.28 | 1158.79 | 462.28 | 618.61 |
| NF17 | 42.38150 | 70.81467 | 32.0 | 16–AUG–93 | S93030090 | 0.22 f | 0.58 f | 1.3 f | 3.12 < | 3.12 < | 2.42 | 0.89 f | 2.34 f |
| NF17 | 42.38150 | 70.81467 | 32.5 | 16–AUG–93 | S93030088 | 0.4 f | 0.88 f | 1.48 f | 3.09 | 3.01 < | 6.94 | 1.8 f | 5.33 |
| NF2 | 42.33783 | 70.82883 | 29.5 | 19–AUG–93 | S93030372 | 0.7 f | 1.27 f | 1.86 | 3.68 | 4.84 | 7.24 | 2.87 | 6.97 |
| NF2 | 42.33783 | 70.82883 | 30.0 | 19–AUG–93 | S93030375 | 0.77 f | 1.14 f | 1.51 f | 3.72 | 5.05 | 7.69 | 2.64 | 6.01 |
| NF4 | 42.41550 | 70.80600 | 38.0 | 15–AUG–93 | S93030010 | 1.07 f | 1.7 | 2.14 | 4.9 | 5.76 | 10.49 | 5.94 | 9.56 |
| NF4 | 42.41550 | 70.80600 | 38.0 | 15–AUG–93 | S93030012 | 1.14 f | 1.77 | 2.32 | 4.83 | 2.93 < | 13.77 | 3.81 | 9.62 |
| NF8 | 42.40017 | 70.86383 | 30.5 | 15–AUG–93 | S93030029 | 65.16 | 136.78 | 119.85 | 210.83 | 228.7 | 911.37 | 422.7 | 763.04 |
| NF8 | 42.40017 | 70.86383 | 30.5 | 15–AUG–93 | S93030031 | 126.47 | 264.38 | 256.69 | 364.16 | 412.12 | 1812.45 | 825.92 | 1540.05 |
| NF9 | 42.40100 | 70.84550 | 30.5 | 15–AUG–93 | S93030043 | 13.71 | 25.31 | 24.18 | 44.47 | 53.38 | 174.49 | 94.24 | 145.76 |
| NF9 | 42.40100 | 70.84550 | 31.0 | 15–AUG–93 | S93030045 | 14.34 | 28.78 | 25.14 | 38.74 | 44.75 | 203.09 | 129.13 | 161.62 |

Description of Qualifiers (tabulated to right of data):

f = reported value below method detection limit

< = reported value is the method detection limit

x = matrix interference

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Product Number S9398PAH.WK1

PAH Data reported in ng/g.

| Station | Latitude | Longitude | Sample Depth(m) | Sample Date | Sample ID | C2–phenanth | C3–phenanth | C4–phenanth | dibenzothio | C1–dibenzot | C2–dibenzot | C3–dibenzot | fluoranthen |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FF1 | 42.46650 | 70.62233 | 84.0 | 17–AUG–93 | S93030200 | 266.51 | 157.5 | 185.52 | 22.11 | 36.29 | 67.09 | 65.31 | 532.95 |
| FF1 | 42.46650 | 70.62233 | 84.5 | 17–AUG–93 | S93030198 | 236.15 | 129.28 | 152.35 | 17.65 | 35.82 | 62 | 67.73 | 458.35 |
| FF10 | 42.41383 | 70.87917 | 29.0 | 16–AUG–93 | S93030151 | 65.42 | 43.17 | 55.9 | 7.22 | 8.68 | 18.35 | 1.74 < | 172.23 |
| FF10 | 42.41383 | 70.87917 | 29.0 | 16–AUG–93 | S93030153 | 66.34 | 34.4 | 52.58 | 6.82 | 12.53 | 16.87 | 16.71 | 206.25 |
| FF11 | 42.65883 | 70.49967 | 89.5 | 17–AUG–93 | S93030179 | 209.6 | 119.89 | 142.45 | 17.09 | 39.27 | 62.05 | 66.78 | 428.61 |
| FF11 | 42.65883 | 70.49967 | 90.0 | 17–AUG–93 | S93030182 | 247.97 | 138.58 | 165.18 | 34.69 | 39.95 | 58.19 | 56.56 | 802.86 |
| FF12 | 42.38933 | 70.90000 | 26.0 | 16–AUG–93 | S93030072 | 45.96 | 56.95 | 38.12 | 5.47 | 6.59 | 10.66 | 12.71 | 118.66 |
| FF12 | 42.38933 | 70.90000 | 26.0 | 16–AUG–93 | S93030074 | 187.67 | 104.85 | 119.6 | 26.87 | 28.95 | 30.26 | 25.13 | 616.59 |
| FF13 | 42.31917 | 70.82267 | 21.5 | 19–AUG–93 | S93030352 | 105.96 | 72.81 | 99.88 | 10.92 | 19.31 | 30.44 | 34.74 | 265.61 |
| FF13 | 42.31917 | 70.82267 | 21.5 | 19–AUG–93 | S93030354 | 72.76 | 58.78 | 72.96 | 8.26 | 12.27 | 20.65 | 24.56 | 182.2 |
| FF14 | 42.41717 | 70.65350 | 76.0 | 17–AUG–93 | S93030214 | 148.44 | 87.59 | 87.83 | 13.29 | 22.61 | 36.13 | 44.05 | 314.29 |
| FF14 | 42.41717 | 70.65350 | 76.5 | 17–AUG–93 | S93030216 | 118.94 | 78.19 | 82.08 | 10.15 | 20.84 | 35.25 | 36.48 | 251.27 |
| FF4 | 42.28983 | 70.42550 | 89.0 | 17–AUG–93 | S93030234 | 163.25 | 95.1 | 113.71 | 14.81 | 24.7 | 37.52 | 37.82 | 338.57 |
| FF4 | 42.28983 | 70.42550 | 89.0 | 17–AUG–93 | S93030237 | 149.15 | 82.37 | 122.19 | 13.15 | 24.18 | 35.42 | 41.9 | 314.41 |
| FF5 | 42.13333 | 70.42233 | 64.5 | 18–AUG–93 | S93030312 | 59.02 | 40.02 | 30.45 | 4.47 | 9.46 | 12.18 | 15.04 | 105.19 |
| FF5 | 42.13333 | 70.42233 | 65.0 | 18–AUG–93 | S93030310 | 85 | 42.39 | 46.51 | 5.14 | 8.65 | 15.83 | 23.15 | 124.73 |
| FF6 | 41.89783 | 70.40417 | 37.0 | 18–AUG–93 | S93030292 | 138.01 | 68.66 | 88.6 | 10.54 | 19.32 | 29.15 | 31.42 | 239.22 |
| FF6 | 41.89783 | 70.40417 | 37.0 | 18–AUG–93 | S93030294 | 70.96 | 4.05 < | 4.05 < | 5.71 | 12.08 | 2.03 < | 2.03 < | 112.66 |
| FF7 | 41.95767 | 70.26700 | 40.0 | 18–AUG–93 | S93030269 | 164.68 | 116.56 | 92.19 | 9.5 | 20.26 | 31.86 | 39.32 | 242.91 |
| FF7 | 41.95767 | 70.26700 | 40.5 | 18–AUG–93 | S93030277 | 146.11 | 123.99 | 80.69 | 8.75 | 15.22 | 28.1 | 29.22 | 217.09 |
| FF9 | 42.31217 | 70.65683 | 49.0 | 18–AUG–93 | S93030326 | 57.93 | 41.29 | 62.31 | 5.04 | 8.67 | 16.67 | 28.39 | 90.64 |
| FF9 | 42.31217 | 70.65683 | 49.0 | 18–AUG–93 | S93030328 | 45.46 | 24.05 | 37.21 | 3.29 | 6.35 | 11.57 | 1.63 < | 85.05 |
| NF10 | 42.39317 | 70.83833 | 32.0 | 16–AUG–93 | S93030134 | 138.55 | 79.5 | 94.28 | 20.35 | 23.39 | 28.33 | 21.32 | 441.83 |

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| Station | Latitude | Longitude | Sample Depth(m) | Sample Date | Sample ID | C2-phenanth | C3-phenanth | C4-phenanth | dibenzothio | C1-dibenzot | C2-dibenzot | C3-dibenzot | fluoranthen |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NF10 | 42.39317 | 70.83833 | 32.0 | 16-AUG-93 | S93030136 | 111.25 | 63.34 | 78.44 | 14.14 | 17.09 | 20.71 | 20.14 | 328.38 |
| NF12 | 42.39033 | 70.83083 | 34.0 | 16-AUG-93 | S93030120 | 564.43 | 282.56 | 358.38 | 113.79 | 93.68 | 107.81 | 80.91 | 1959.17 |
| NF12 | 42.39033 | 70.83083 | 34.0 | 16-AUG-93 | S93030122 | 363.24 | 195.92 | 247.15 | 82.48 | 63.02 | 69.94 | 53.05 | 1290.41 |
| NF14 | 42.38767 | 70.82400 | 34.0 | 16-AUG-93 | S93030105 | 87.62 | 40.45 | 49.77 | 29.92 | 17.34 | 14.68 | 10.21 | 428.32 |
| NF14 | 42.38767 | 70.82400 | 34.5 | 16-AUG-93 | S93030103 | 128.08 | 63.93 | 85.1 | 40.3 | 20.76 | 18.11 | 15.5 | 632.11 |
| NF16 | 42.37767 | 70.83800 | 34.0 | 19-AUG-93 | S93030393 | 86.04 | 50.49 | 58.96 | 18.68 | 13.39 | 14.8 | 12.13 | 365.85 |
| NF16 | 42.37767 | 70.83800 | 34.0 | 19-AUG-93 | S93030397 | 373.12 | 177.91 | 202.01 | 88.67 | 63.23 | 60.71 | 46.8 | 1411.31 |
| NF17 | 42.38150 | 70.81467 | 32.0 | 16-AUG-93 | S93030090 | 3.05 f | 3.12 < | 3.12 < | 1.56 < | 1.56 < | 1.56 < | 1.56 < | 3.83 f |
| NF17 | 42.38150 | 70.81467 | 32.5 | 16-AUG-93 | S93030088 | 4.84 | 3.01 < | 3.01 < | 0.53 f | 0.77 f | 1.51 < | 1.51 < | 10.91 |
| NF2 | 42.33783 | 70.82883 | 29.5 | 19-AUG-93 | S93030372 | 6.26 | 4.56 | 3.11 < | 0.65 f | 1.24 f | 1.55 < | 1.55 < | 13.92 |
| NF2 | 42.33783 | 70.82883 | 30.0 | 19-AUG-93 | S93030375 | 6.05 | 4.58 | 7.27 | 0.64 f | 1.22 f | 1.54 < | 1.54 < | 14.93 |
| NF4 | 42.41550 | 70.80600 | 38.0 | 15-AUG-93 | S93030010 | 10.99 | 6.85 | 8.25 | 0.99 f | 1.55 f | 2.43 | 3.03 | 24.38 |
| NF4 | 42.41550 | 70.80600 | 38.0 | 15-AUG-93 | S93030012 | 9.8 | 8.79 | 7.12 | 1.17 f | 1.67 | 2.53 | 3.1 | 22.18 |
| NF8 | 42.40017 | 70.86383 | 30.5 | 15-AUG-93 | S93030029 | 596.75 | 369.65 | 383.34 | 68.36 | 93.88 | 134.65 | 114.23 | 1640.91 |
| NF8 | 42.40017 | 70.86383 | 30.5 | 15-AUG-93 | S93030031 | 1200.93 | 720.77 | 752.5 | 142.33 | 188.39 | 272.02 | 235.64 | 3193.99 |
| NF9 | 42.40100 | 70.84550 | 30.5 | 15-AUG-93 | S93030043 | 123.92 | 79.84 | 89.01 | 13.35 | 18.92 | 26.96 | 22.63 | 364.74 |
| NF9 | 42.40100 | 70.84550 | 31.0 | 15-AUG-93 | S93030045 | 124.42 | 73.39 | 81.52 | 15.87 | 19.79 | 26.48 | 21.06 | 394.12 |

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f = reported value below method detection limit
< = reported value is the method detection limit
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Product Number S9398PAH.WK1
PAH Data reported in ng/g.

| Station | Latitude | Longitude | Sample Depth(m) | Sample Date | Sample ID | pyrene | C1–fluorant | benz[a]anth | chrysene | C1–chrysene | C2–chrysene | C3–chrysene | C4–chrysene |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FF1 | 42.46650 | 70.62233 | 84.0 | 17–AUG–93 | S93030200 | 513.91 | 406.62 | 209.6 | 181.54 | 152.33 | 120.36 | 68.72 | 6.06 < |
| FF1 | 42.46650 | 70.62233 | 84.5 | 17–AUG–93 | S93030198 | 440.4 | 358.84 | 172.83 | 156.18 | 148.35 | 108.73 | 58.3 | 7.01 < |
| FF10 | 42.41383 | 70.87917 | 29.0 | 16–AUG–93 | S93030151 | 163.8 | 114.94 | 62.19 | 50.57 | 39.74 | 33.1 | 17.62 | 3.47 < |
| FF10 | 42.41383 | 70.87917 | 29.0 | 16–AUG–93 | S93030153 | 196.92 | 132.46 | 79.89 | 68.56 | 49.76 | 35.58 | 18.85 | 3.49 < |
| FF11 | 42.65883 | 70.49967 | 89.5 | 17–AUG–93 | S93030179 | 439.46 | 366.3 | 153.14 | 126.46 | 141.66 | 107.42 | 59.13 | 4.91 < |
| FF11 | 42.65883 | 70.49967 | 90.0 | 17–AUG–93 | S93030182 | 661.06 | 497.66 | 302.92 | 234.21 | 193.6 | 114.16 | 58.07 | 4.78 < |
| FF12 | 42.38933 | 70.90000 | 26.0 | 16–AUG–93 | S93030072 | 120.59 | 96.89 | 55.63 | 46.87 | 41.67 | 27.96 | 15.62 | 3.23 < |
| FF12 | 42.38933 | 70.90000 | 26.0 | 16–AUG–93 | S93030074 | 552.55 | 428.3 | 253.95 | 165.73 | 145.28 | 81.77 | 41.31 | 3.46 < |
| FF13 | 42.31917 | 70.82267 | 21.5 | 19–AUG–93 | S93030352 | 264.52 | 187.64 | 126.57 | 101.73 | 97.57 | 84.47 | 48.59 | 3.95 < |
| FF13 | 42.31917 | 70.82267 | 21.5 | 19–AUG–93 | S93030354 | 174.36 | 122.46 | 75 | 60.08 | 57.51 | 48.82 | 26.6 | 3.45 < |
| FF14 | 42.41717 | 70.65350 | 76.0 | 17–AUG–93 | S93030214 | 303.25 | 233.31 | 107.18 | 92.51 | 91.01 | 69.55 | 32.41 | 4.43 < |
| FF14 | 42.41717 | 70.65350 | 76.5 | 17–AUG–93 | S93030216 | 248.96 | 197.44 | 110.81 | 112.32 | 92.69 | 70.02 | 40.79 | 5.05 < |
| FF4 | 42.28983 | 70.42550 | 89.0 | 17–AUG–93 | S93030234 | 305.06 | 227.79 | 126.39 | 112.51 | 112.64 | 88.22 | 49.33 | 5.68 < |
| FF4 | 42.28983 | 70.42550 | 89.0 | 17–AUG–93 | S93030237 | 281.94 | 210.15 | 116.56 | 101.78 | 101.09 | 85.5 | 41.35 | 7.2 < |
| FF5 | 42.13333 | 70.42233 | 64.5 | 18–AUG–93 | S93030312 | 95.62 | 68.98 | 37.65 | 32.32 | 32.86 | 29.94 | 17.8 | 3.9 < |
| FF5 | 42.13333 | 70.42233 | 65.0 | 18–AUG–93 | S93030310 | 106.4 | 82.2 | 42.08 | 39 | 36.89 | 30.77 | 20.49 | 3.99 < |
| FF6 | 41.89783 | 70.40417 | 37.0 | 18–AUG–93 | S93030292 | 218.59 | 157.66 | 83.46 | 79.9 | 71.89 | 56.18 | 32.55 | 4.72 < |
| FF6 | 41.89783 | 70.40417 | 37.0 | 18–AUG–93 | S93030294 | 103.76 | 83.23 | 35.58 | 27.27 | 31.81 | 29.72 | 4.05 < | 4.05 < |
| FF7 | 41.95767 | 70.26700 | 40.0 | 18–AUG–93 | S93030269 | 213.57 | 153.74 | 72.52 | 62.89 | 60.23 | 50.57 | 31.45 | 7.19 < |
| FF7 | 41.95767 | 70.26700 | 40.5 | 18–AUG–93 | S93030277 | 190.97 | 134.15 | 74.2 | 65.4 | 61.99 | 57.5 | 5.53 < | 5.53 < |
| FF9 | 42.31217 | 70.65683 | 49.0 | 18–AUG–93 | S93030326 | 85.46 | 88.15 | 29.97 | 27.36 | 34.83 | 44.83 | 36.14 | 3.36 < |
| FF9 | 42.31217 | 70.65683 | 49.0 | 18–AUG–93 | S93030328 | 82.96 | 63.73 | 36.98 | 31.16 | 28 | 23.01 | 3.25 < | 3.25 < |
| NF10 | 42.39317 | 70.83833 | 32.0 | 16–AUG–93 | S93030134 | 417.79 | 330.56 | 206.43 | 150.55 | 131.64 | 76.93 | 38.7 | 3.41 < |

Massachusetts Water Resources Authority

1993 Sediment Chemistry – Task 12

Product Number S9398PAH.WK1

PAH Data reported in ng/g.

| Station | Latitude | Longitude | Sample Depth(m) | Sample Date | Sample ID | pyrene | C1-fluorant | benz[a]anth | chrysene | C1-chrysene | C2-chrysene | C3-chrysene | C4-chrysene |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NF10 | 42.39317 | 70.83833 | 32.0 | 16-AUG-93 | S93030136 | 314.6 | 235.25 | 157.23 | 119.27 | 104.69 | 60.19 | 32.71 | 3.39 < |
| NF12 | 42.39033 | 70.83083 | 34.0 | 16-AUG-93 | S93030120 | 1757.54 | 1325.87 | 1001.15 | 714.3 | 600.71 | 347.58 | 166.84 | 4.6 < |
| NF12 | 42.39033 | 70.83083 | 34.0 | 16-AUG-93 | S93030122 | 1122.95 | 767.5 | 601.79 | 459.89 | 362.51 | 216.75 | 111.95 | 4.51 < |
| NF14 | 42.38767 | 70.82400 | 34.0 | 16-AUG-93 | S93030105 | 356.96 | 213.54 | 173.19 | 125.04 | 87.12 | 47.08 | 23.9 | 2.9 < |
| NF14 | 42.38767 | 70.82400 | 34.5 | 16-AUG-93 | S93030103 | 523.91 | 281.55 | 221.82 | 162.35 | 104.88 | 62.9 | 32.12 | 2.75 < |
| NF16 | 42.37767 | 70.83800 | 34.0 | 19-AUG-93 | S93030393 | 327.71 | 184.38 | 145.01 | 112.55 | 79.79 | 47.34 | 23.83 | 3.34 < |
| NF16 | 42.37767 | 70.83800 | 34.0 | 19-AUG-93 | S93030397 | 1239.79 | 897.08 | 698.29 | 484.66 | 374.31 | 200.58 | 94.08 | 3.47 < |
| NF17 | 42.38150 | 70.81467 | 32.0 | 16-AUG-93 | S93030090 | 3.57 f | 3.45 | 1.59 f | 1.34 f | 1.31 f | 3.12 < | 3.12 < | 3.12 < |
| NF17 | 42.38150 | 70.81467 | 32.5 | 16-AUG-93 | S93030088 | 11.37 | 7.83 | 4.13 | 3.22 | 2.95 f | 3.01 < | 3.01 < | 3.01 < |
| NF2 | 42.33783 | 70.82883 | 29.5 | 19-AUG-93 | S93030372 | 13.76 | 10.4 | 4.78 | 3.87 | 3.85 | 3.33 | 2.29 f | 3.11 < |
| NF2 | 42.33783 | 70.82883 | 30.0 | 19-AUG-93 | S93030375 | 14.71 | 9.78 | 4.79 | 3.78 | 3.91 | 3.65 | 2.66 f | 3.08 < |
| NF4 | 42.41550 | 70.80600 | 38.0 | 15-AUG-93 | S93030010 | 23.57 | 19.22 | 9.52 | 8.14 | 8.15 | 5.87 | 2.96 f | 3.12 < |
| NF4 | 42.41550 | 70.80600 | 38.0 | 15-AUG-93 | S93030012 | 20.65 | 14.83 | 7.83 | 6.93 | 5.98 | 4.19 | 2.93 < | 2.93 < |
| NF8 | 42.40017 | 70.86383 | 30.5 | 15-AUG-93 | S93030029 | 1533.07 | 1316.8 | 976.45 | 714.04 | 687.82 | 413.44 | 204.52 | 3.98 < |
| NF8 | 42.40017 | 70.86383 | 30.5 | 15-AUG-93 | S93030031 | 3015.58 | 2528.71 | 2014.21 | 1392.4 | 1394.66 | 829.44 | 405.7 | 5.4 < |
| NF9 | 42.40100 | 70.84550 | 30.5 | 15-AUG-93 | S93030043 | 354.16 | 268.7 | 166.53 | 129.82 | 111.29 | 68.39 | 35.93 | 3.5 < |
| NF9 | 42.40100 | 70.84550 | 31.0 | 15-AUG-93 | S93030045 | 369.16 | 277.41 | 174.49 | 138.97 | 113.57 | 70.71 | 36.02 | 3.36 < |

Description of Qualifiers (tabulated to right of data):

f = reported value below method detection limit

< = reported value is the method detection limit

x = matrix interference

Massachusetts Water Resources Authority
1993 Sediment Chemistry -- Task 12
Product Number S9398PAH.WK1
PAH Data reported in ng/g.

| Station | Latitude | Longitude | Sample Depth(m) | Sample Date | Sample ID | benzo[b]flu | benzo[k]flu | benzo[e]pyr | benzo[a]pyr | perylene | indeno[1,2, | dibenz[a,h] | benzo[g,h,i |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FF1 | 42.46650 | 70.62233 | 84.0 | 17-AUG-93 | S93030200 | 339.27 | 115.23 | 172.9 | 227.5 | 63.85 | 182.95 | 39.32 | 162.68 |
| FF1 | 42.46650 | 70.62233 | 84.5 | 17-AUG-93 | S93030198 | 288.24 | 94.36 | 145.63 | 193.72 | 54.47 | 150.03 | 30.78 | 144.74 |
| FF10 | 42.41383 | 70.87917 | 29.0 | 16-AUG-93 | S93030151 | 88.31 | 31.39 | 43.49 | 61.12 | 17.41 | 43.98 | 9.04 | 41.35 |
| FF10 | 42.41383 | 70.87917 | 29.0 | 16-AUG-93 | S93030153 | 105.04 | 38.61 | 52.47 | 76.45 | 21.59 | 52.1 | 11 | 50.58 |
| FF11 | 42.65883 | 70.49967 | 89.5 | 17-AUG-93 | S93030179 | 238.75 | 91.78 | 126.79 | 153.78 | 46.71 | 117.96 | 26.66 | 109.66 |
| FF11 | 42.65883 | 70.49967 | 90.0 | 17-AUG-93 | S93030182 | 382.82 | 143.54 | 179.63 | 276.71 | 84.11 | 189.15 | 42.32 | 166.11 |
| FF12 | 42.38933 | 70.90000 | 26.0 | 16-AUG-93 | S93030072 | 76.97 | 26.66 | 33.51 | 53.35 | 15.02 | 38.75 | 9.01 | 33.47 |
| FF12 | 42.38933 | 70.90000 | 26.0 | 16-AUG-93 | S93030074 | 268.74 | 103.79 | 122.63 | 219.36 | 54.83 | 133.1 | 32.44 | 110.51 |
| FF13 | 42.31917 | 70.82267 | 21.5 | 19-AUG-93 | S93030352 | 207.61 | 66.45 | 96.44 | 127.88 | 44.2 | 90.21 | 20.53 | 78.98 |
| FF13 | 42.31917 | 70.82267 | 21.5 | 19-AUG-93 | S93030354 | 122.09 | 40.11 | 56.74 | 77 | 23.56 | 56.48 | 13.12 | 50.41 |
| FF14 | 42.41717 | 70.65350 | 76.0 | 17-AUG-93 | S93030214 | 181.19 | 60.78 | 91.5 | 116.37 | 37.4 | 95.51 | 20.39 | 88.22 |
| FF14 | 42.41717 | 70.65350 | 76.5 | 17-AUG-93 | S93030216 | 184.54 | 66.55 | 95.98 | 124.8 | 36.97 | 104.14 | 22.28 | 93.85 |
| FF4 | 42.28983 | 70.42550 | 89.0 | 17-AUG-93 | S93030234 | 245.74 | 81.77 | 122.01 | 143.46 | 53.73 | 136.2 | 27.14 | 122.4 |
| FF4 | 42.28983 | 70.42550 | 89.0 | 17-AUG-93 | S93030237 | 228.83 | 73.44 | 115.12 | 139.41 | 50.97 | 132.53 | 25.38 | 117.45 |
| FF5 | 42.13333 | 70.42233 | 64.5 | 18-AUG-93 | S93030312 | 79.08 | 25.36 | 38.14 | 42.23 | 14.12 | 41.82 | 8.19 | 37.44 |
| FF5 | 42.13333 | 70.42233 | 65.0 | 18-AUG-93 | S93030310 | 82.31 | 27.78 | 40.17 | 47.94 | 16.61 | 46.27 | 9.47 | 42.96 |
| FF6 | 41.89783 | 70.40417 | 37.0 | 18-AUG-93 | S93030292 | 151.69 | 55.26 | 75.53 | 92.49 | 30.91 | 86.46 | 18.36 | 75.67 |
| FF6 | 41.89783 | 70.40417 | 37.0 | 18-AUG-93 | S93030294 | 62.56 | 23.35 | 30.5 | 35.68 | 11.6 | 31.46 | 7.6 | 27.89 |
| FF7 | 41.95767 | 70.26700 | 40.0 | 18-AUG-93 | S93030269 | 137.76 | 50.29 | 68.68 | 81.89 | 38.7 | 78.21 | 15.1 | 70.89 |
| FF7 | 41.95767 | 70.26700 | 40.5 | 18-AUG-93 | S93030277 | 151.77 | 46.39 | 72.12 | 80.49 | 32.13 | 77.15 | 15.51 | 70.27 |
| FF9 | 42.31217 | 70.65683 | 49.0 | 18-AUG-93 | S93030326 | 54.77 | 16.69 | 32.11 | 36.81 | 10.77 | 29.88 | 7.64 | 30.62 |
| FF9 | 42.31217 | 70.65683 | 49.0 | 18-AUG-93 | S93030328 | 60.04 | 21.02 | 31.55 | 42.46 | 12.17 | 33.26 | 7.27 | 31.2 |
| NF10 | 42.39317 | 70.83833 | 32.0 | 16-AUG-93 | S93030134 | 244.99 | 89.8 | 118.41 | 199.03 | 50.56 | 125.41 | 31.19 | 105.4 |

Massachusetts Water Resources Authority

1993 Sediment Chemistry – Task 12

Product Number S9398PAH.WK1

PAH Data reported in ng/g.

| Station | Latitude | Longitude | Sample Depth(m) | Sample Date | Sample ID | benzo[b]flu | benzo[k]flu | benzo[e]pyr | benzo[a]pyr | perylene | indeno[1,2, | dibenz[a,h] | benzo[g,h,i |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NF10 | 42.39317 | 70.83833 | 32.0 | 16-AUG-93 | S93030136 | 198.92 | 69.9 | 94.73 | 157.21 | 40.95 | 103.57 | 25.08 | 86.64 |
| NF12 | 42.39033 | 70.83083 | 34.0 | 16-AUG-93 | S93030120 | 1128.73 | 389.16 | 510.34 | 913.84 | 230.41 | 574.26 | 143.62 | 461.06 |
| NF12 | 42.39033 | 70.83083 | 34.0 | 16-AUG-93 | S93030122 | 682.61 | 229.93 | 311.08 | 529.2 | 133.85 | 322.59 | 82.76 | 68.25 |
| NF14 | 42.38767 | 70.82400 | 34.0 | 16-AUG-93 | S93030105 | 178.09 | 61.1 | 78.04 | 142.06 | 35.99 | 84.59 | 20.83 | 73.81 |
| NF14 | 42.38767 | 70.82400 | 34.5 | 16-AUG-93 | S93030103 | 253.41 | 83.1 | 120.15 | 215.85 | 53.9 | 130.77 | 30.38 | 108.18 |
| NF16 | 42.37767 | 70.83800 | 34.0 | 19-AUG-93 | S93030393 | 168.45 | 61.62 | 76.14 | 130.43 | 33.72 | 85.82 | 18.9 | 73.81 |
| NF16 | 42.37767 | 70.83800 | 34.0 | 19-AUG-93 | S93030397 | 706.12 | 240.38 | 320.18 | 612.15 | 134.82 | 342.22 | 85.49 | 290.97 |
| NF17 | 42.38150 | 70.81467 | 32.0 | 16-AUG-93 | S93030090 | 2.66 | 0.88 f | 1.26 f | 1.42 f | 0.59 f | 1.4 f | 0.48 f | 1.51 f |
| NF17 | 42.38150 | 70.81467 | 32.5 | 16-AUG-93 | S93030088 | 5.81 | 2.15 f | 2.9 | 3.74 | 1.13 f | 3.12 f | 0.81 f | 2.98 f |
| NF2 | 42.33783 | 70.82883 | 29.5 | 19-AUG-93 | S93030372 | 8.15 | 2.65 | 3.75 | 4.98 | 1.8 f | 4.66 | 1.02 f | 3.62 f |
| NF2 | 42.33783 | 70.82883 | 30.0 | 19-AUG-93 | S93030375 | 8.38 | 2.91 | 3.81 | 4.94 | 2.7 f | 4.59 | 0.93 f | 3.92 f |
| NF4 | 42.41550 | 70.80600 | 38.0 | 15-AUG-93 | S93030010 | 2.18 < | 6.48 | 7.68 | 10.17 | 2.91 f | 8.37 | 1.76 f | 7.7 |
| NF4 | 42.41550 | 70.80600 | 38.0 | 15-AUG-93 | S93030012 | 13.04 | 5.34 | 6.52 | 8.32 | 2.51 f | 7.08 | 1.41 f | 6.47 |
| NF8 | 42.40017 | 70.86383 | 30.5 | 15-AUG-93 | S93030029 | 1065.44 | 419.68 | 515.97 | 880.11 | 227.78 | 524.1 | 139.53 | 461.93 |
| NF8 | 42.40017 | 70.86383 | 30.5 | 15-AUG-93 | S93030031 | 2087.33 | 854.1 | 1007.55 | 1899.88 | 393.47 | 1057.02 | 272.96 | 871.05 |
| NF9 | 42.40100 | 70.84550 | 30.5 | 15-AUG-93 | S93030043 | 215.25 | 79.51 | 96.78 | 181.14 | 43.7 | 111.25 | 26.9 | 94.64 |
| NF9 | 42.40100 | 70.84550 | 31.0 | 15-AUG-93 | S93030045 | 224.04 | 84.97 | 103.71 | 171.13 | 44.57 | 112.23 | 27.8 | 96.71 |

Description of Qualifiers (tabulated to right of data):

f = reported value below method detection limit

< = reported value is the method detection limit

x = matrix interference

Massachusetts Water Resources Authority

1993 Sediment Chemistry – Task 12

Product Number S9398PAH.WK1

PAH Data reported in ng/g.

| Station | Latitude | Longitude | Sample Depth(m) | Sample Date | Sample ID | phenyl deca | phenyl unde | phenyl dode | phenyl trid | phenyl tetr |
|---|---|---|---|---|---|---|---|---|---|---|
| FF1 | 42.46650 | 70.62233 | 84.0 | 17-AUG-93 | S93030200 | 15.142 < | 15.142 < | 15.142 < | 15.142 < | 15.142 < |
| FF1 | 42.46650 | 70.62233 | 84.5 | 17-AUG-93 | S93030198 | 17.527 < | 17.527 < | 17.527 < | 17.527 < | 17.527 < |
| FF10 | 42.41383 | 70.87917 | 29.0 | 16-AUG-93 | S93030151 | 8.683 < | 8.683 < | 8.683 < | 8.683 < | 8.683 < |
| FF10 | 42.41383 | 70.87917 | 29.0 | 16-AUG-93 | S93030153 | 8.714 < | 8.714 < | 8.714 < | 8.714 < | 8.714 < |
| FF11 | 42.65883 | 70.49967 | 89.5 | 17-AUG-93 | S93030179 | 12.268 < | 12.268 < | 12.268 < | 12.268 < | 12.268 < |
| FF11 | 42.65883 | 70.49967 | 90.0 | 17-AUG-93 | S93030182 | 11.957 < | 11.957 < | 11.957 < | 11.957 < | 11.957 < |
| FF12 | 42.38933 | 70.90000 | 26.0 | 16-AUG-93 | S93030072 | 12.900 | 43.980 | 72.920 | 53.150 | 41.070 |
| FF12 | 42.38933 | 70.90000 | 26.0 | 16-AUG-93 | S93030074 | 14.880 | 64.130 | 75.290 | 63.770 | 75.140 |
| FF13 | 42.31917 | 70.82267 | 21.5 | 19-AUG-93 | S93030352 | 72.750 | 238.560 | 360.400 | 330.830 | 417.960 |
| FF13 | 42.31917 | 70.82267 | 21.5 | 19-AUG-93 | S93030354 | 41.700 | 125.800 | 268.010 | 182.160 | 233.890 |
| FF14 | 42.41717 | 70.65350 | 76.0 | 17-AUG-93 | S93030214 | 11.086 < | 11.086 < | 11.086 < | 11.086 < | 11.086 < |
| FF14 | 42.41717 | 70.65350 | 76.5 | 17-AUG-93 | S93030216 | 12.631 < | 12.631 < | 12.631 < | 12.631 < | 12.631 < |
| FF4 | 42.28983 | 70.42550 | 89.0 | 17-AUG-93 | S93030234 | 14.208 < | 14.208 < | 14.208 < | 14.208 < | 14.208 < |
| FF4 | 42.28983 | 70.42550 | 89.0 | 17-AUG-93 | S93030237 | 18.003 < | 18.003 < | 18.003 < | 18.003 < | 18.003 < |
| FF5 | 42.13333 | 70.42233 | 64.5 | 18-AUG-93 | S93030312 | 9.755 < | 9.755 < | 9.755 < | 9.755 < | 9.755 < |
| FF5 | 42.13333 | 70.42233 | 65.0 | 18-AUG-93 | S93030310 | 9.982 < | 9.982 < | 9.982 < | 9.982 < | 9.982 < |
| FF6 | 41.89783 | 70.40417 | 37.0 | 18-AUG-93 | S93030292 | 38.690 | 84.620 | 146.500 | 11.797 < | 11.797 < |
| FF6 | 41.89783 | 70.40417 | 37.0 | 18-AUG-93 | S93030294 | 10.134 < | 10.134 < | 10.134 < | 10.134 < | 10.134 < |
| FF7 | 41.95767 | 70.26700 | 40.0 | 18-AUG-93 | S93030269 | 17.983 < | 17.983 < | 17.983 < | 17.983 < | 17.983 < |
| FF7 | 41.95767 | 70.26700 | 40.5 | 18-AUG-93 | S93030277 | 13.837 < | 13.837 < | 13.837 < | 13.837 < | 13.837 < |
| FF9 | 42.31217 | 70.65683 | 49.0 | 18-AUG-93 | S93030326 | 8.397 < | 8.397 < | 8.397 < | 8.397 < | 8.397 < |
| FF9 | 42.31217 | 70.65683 | 49.0 | 18-AUG-93 | S93030328 | 8.134 < | 8.134 < | 8.134 < | 8.134 < | 8.134 < |
| NF10 | 42.39317 | 70.83833 | 32.0 | 16-AUG-93 | S93030134 | 8.850 | 44.340 | 44.390 | 39.030 | 30.520 |

Massachusetts Water Resources Authority

1993 Sediment Chemistry – Task 12

Product Number S9398PAH.WK1

PAH Data reported in ng/g.

| Station | Latitude | Longitude | Sample Depth(m) | Sample Date | Sample ID | phenyl deca | phenyl unde | phenyl dode | phenyl trid | phenyl tetr |
|---|---|---|---|---|---|---|---|---|---|---|
| NF10 | 42.39317 | 70.83833 | 32.0 | 16–AUG–93 | S93030136 | 12.120 | 42.430 | 70.290 | 48.220 | 26.890 |
| NF12 | 42.39033 | 70.83083 | 34.0 | 16–AUG–93 | S93030120 | 65.340 | 195.500 | 226.690 | 143.370 | 145.840 |
| NF12 | 42.39033 | 70.83083 | 34.0 | 16–AUG–93 | S93030122 | 68.250 | 192.860 | 227.700 | 166.930 | 140.080 |
| NF14 | 42.38767 | 70.82400 | 34.0 | 16–AUG–93 | S93030105 | 3.710 f | 14.970 | 6.870 f | 8.920 | 7.262 < |
| NF14 | 42.38767 | 70.82400 | 34.5 | 16–AUG–93 | S93030103 | 7.480 | 27.230 | 27.070 | 23.400 | 6.883 < |
| NF16 | 42.37767 | 70.83800 | 34.0 | 19–AUG–93 | S93030393 | 11.980 | 47.590 | 64.080 | 42.110 | 23.290 |
| NF16 | 42.37767 | 70.83800 | 34.0 | 19–AUG–93 | S93030397 | 18.730 | 86.430 | 105.750 | 62.510 | 44.520 |
| NF17 | 42.38150 | 70.81467 | 32.0 | 16–AUG–93 | S93030090 | 7.790 < | 7.790 < | 7.790 < | 7.790 < | 7.790 < |
| NF17 | 42.38150 | 70.81467 | 32.5 | 16–AUG–93 | S93030088 | 7.533 < | 7.533 < | 7.533 < | 7.533 < | 7.533 < |
| NF2 | 42.33783 | 70.82883 | 29.5 | 19–AUG–93 | S93030372 | 3.330 f | 9.140 | 17.410 | 14.010 | 14.480 |
| NF2 | 42.33783 | 70.82883 | 30.0 | 19–AUG–93 | S93030375 | 7.689 < | 9.440 | 14.770 | 12.800 | 7.689 < |
| NF4 | 42.41550 | 70.80600 | 38.0 | 15–AUG–93 | S93030010 | 7.796 < | 7.796 < | 7.796 < | 7.796 < | 7.796 < |
| NF4 | 42.41550 | 70.80600 | 38.0 | 15–AUG–93 | S93030012 | 7.328 < | 7.328 < | 7.328 < | 7.328 < | 7.328 < |
| NF8 | 42.40017 | 70.86383 | 30.5 | 15–AUG–93 | S93030029 | 122.160 | 263.980 | 327.860 | 262.750 | 351.770 |
| NF8 | 42.40017 | 70.86383 | 30.5 | 15–AUG–93 | S93030031 | 186.870 | 493.590 | 710.580 | 450.300 | 378.030 |
| NF9 | 42.40100 | 70.84550 | 30.5 | 15–AUG–93 | S93030043 | 13.190 | 43.150 | 60.070 | 32.330 | 28.490 |
| NF9 | 42.40100 | 70.84550 | 31.0 | 15–AUG–93 | S93030045 | 16.380 | 54.840 | 79.760 | 50.840 | 34.570 |

Description of Qualifiers (tabulated to right of data):

f = reported value below method detection limit

< = reported value is the method detection limit

x = matrix interference

Massachusetts Water Resources Authority

1993 Sediment Chemistry – Task 12

Product Number S9398PST.WK1

| Station | Latitude | Longitude | Sample Depth(m) | Sample Date | Sample ID | CL2(08) ng/g dry wt | | HEXACHLOROB ng/g dry wt | | LINDANE ng/g dry wt | | CL3(18) ng/g dry wt | | CL3(28) ng/g dry wt | | HEPTACHLOR ng/g dry wt | | CL4(52) ng/g dry wt | | ALDRIN ng/g dry wt | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FF1 | 42.46650 | 70.62233 | 84 | 17-AUG-93 | S93030200 | 7.80 | . | 1.56 | . | 0.60 | < | 1.44 | < | 0.71 | < | 1.64 | < | 0.98 | . | 1.26 | < |
| FF1 | 42.46650 | 70.62233 | 84.5 | 17-AUG-93 | S93030198 | 6.85 | . | 2.52 | . | 0.70 | < | 1.67 | < | 0.82 | < | 1.90 | < | 1.22 | . | 1.46 | < |
| FF10 | 42.41383 | 70.87917 | 29 | 16-AUG-93 | S93030151 | 2.07 | . | 1.19 | . | 0.35 | < | 0.83 | < | 0.40 | < | 0.94 | < | 0.45 | < | 0.72 | < |
| FF10 | 42.41383 | 70.87917 | 29 | 16-AUG-93 | S93030153 | 2.18 | . | 0.73 | . | 0.35 | < | 0.83 | < | 0.41 | < | 0.94 | < | 0.45 | < | 0.73 | < |
| FF11 | 42.65883 | 70.49967 | 89.5 | 17-AUG-93 | S93030179 | 2.83 | . | 0.23 | f | 0.49 | < | 1.17 | < | 0.57 | < | 1.33 | < | 0.63 | < | 1.02 | < |
| FF11 | 42.65883 | 70.49967 | 90 | 17-AUG-93 | S93030182 | 6.64 | . | 0.85 | . | 0.48 | < | 1.14 | < | 0.56 | < | 1.29 | < | 0.92 | . | 1.00 | < |
| FF12 | 42.38933 | 70.90000 | 26 | 16-AUG-93 | S93030072 | 1.01 | f | 0.45 | < | 0.32 | < | 0.77 | < | 0.38 | < | 0.88 | < | 0.42 | < | 0.67 | < |
| FF12 | 42.38933 | 70.90000 | 26 | 16-AUG-93 | S93030074 | 1.22 | f | 0.48 | < | 0.34 | < | 0.22 | f | 0.94 | . | 0.94 | < | 0.19 | f | 0.72 | < |
| FF13 | 42.31917 | 70.82267 | 21.5 | 19-AUG-93 | S93030352 | 4.75 | . | 0.26 | f | 0.39 | < | 0.94 | < | 0.46 | < | 1.07 | < | 1.45 | . | 0.82 | < |
| FF13 | 42.31917 | 70.82267 | 21.5 | 19-AUG-93 | S93030354 | 5.04 | . | 0.40 | f | 0.34 | < | 0.82 | < | 0.40 | < | 0.93 | < | 0.97 | . | 0.72 | < |
| FF14 | 42.41717 | 70.65350 | 76 | 17-AUG-93 | S93030214 | 4.25 | . | 0.63 | . | 0.44 | < | 1.06 | < | 1.65 | . | 1.20 | < | 0.67 | . | 0.92 | < |
| FF14 | 42.41717 | 70.65350 | 76.5 | 17-AUG-93 | S93030216 | 3.82 | . | 0.54 | f | 0.50 | < | 1.20 | < | 0.93 | . | 1.37 | < | 0.73 | . | 1.05 | < |
| FF4 | 42.28983 | 70.42550 | 89 | 17-AUG-93 | S93030234 | 6.99 | . | 0.93 | . | 0.57 | < | 1.35 | < | 1.23 | . | 1.54 | < | 0.85 | . | 1.18 | < |
| FF4 | 42.28983 | 70.42550 | 89 | 17-AUG-93 | S93030237 | 5.72 | . | 0.45 | f | 0.72 | < | 1.71 | < | 0.84 | < | 1.95 | < | 0.96 | . | 1.50 | < |
| FF5 | 42.13333 | 70.42233 | 64.5 | 18-AUG-93 | S93030312 | 3.58 | . | 0.48 | f | 0.39 | < | 0.93 | < | 0.60 | . | 1.06 | < | 0.26 | f | 0.81 | < |
| FF5 | 42.13333 | 70.42233 | 65 | 18-AUG-93 | S93030310 | 2.88 | . | 1.81 | . | 0.40 | < | 0.95 | < | 0.47 | < | 1.08 | < | 0.29 | f | 0.83 | < |
| FF6 | 41.89783 | 70.40417 | 37 | 18-AUG-93 | S93030292 | 6.52 | . | 2.27 | . | 0.47 | < | 1.12 | < | 1.56 | . | 1.28 | < | 0.60 | f | 0.98 | < |
| FF6 | 41.89783 | 70.40417 | 37 | 18-AUG-93 | S93030294 | 2.11 | . | 0.36 | f | 0.40 | < | 0.96 | < | 0.47 | < | 1.10 | < | 0.28 | f | 0.84 | < |
| FF7 | 41.95767 | 70.26700 | 40 | 18-AUG-93 | S93030269 | 12.02 | . | 4.31 | . | 0.72 | < | 1.71 | < | 2.22 | . | 1.95 | < | 1.29 | . | 1.50 | < |
| FF7 | 41.95767 | 70.26700 | 40.5 | 18-AUG-93 | S93030277 | 6.10 | . | 0.47 | f | 0.55 | < | 1.32 | < | 0.65 | < | 1.50 | < | 0.89 | . | 1.15 | < |
| FF9 | 42.31217 | 70.65683 | 49 | 18-AUG-93 | S93030326 | 1.95 | . | 0.66 | . | 0.33 | < | 0.80 | < | 0.65 | . | 0.91 | < | 0.33 | f | 0.70 | < |
| FF9 | 42.31217 | 70.65683 | 49 | 18-AUG-93 | S93030328 | 1.47 | . | 0.25 | f | 0.32 | < | 0.77 | < | 0.26 | f | 0.88 | < | 0.12 | f | 0.68 | < |
| NF10 | 42.39317 | 70.83833 | 32 | 16-AUG-93 | S93030134 | 1.45 | f | 0.64 | . | 0.34 | < | 0.81 | < | 0.82 | . | 0.92 | < | 0.44 | < | 0.71 | < |
| NF10 | 42.39317 | 70.83833 | 32 | 16-AUG-93 | S93030136 | 1.38 | f | 0.09 | f | 0.34 | < | 0.81 | < | 0.39 | < | 0.92 | < | 0.44 | < | 0.71 | < |
| NF12 | 42.39033 | 70.83083 | 34 | 16-AUG-93 | S93030120 | 5.20 | . | 0.14 | f | 0.46 | < | 0.93 | f | 1.06 | . | 0.47 | f | 0.34 | f | 0.96 | < |

| | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NF12 | 42.39033 | 70.83083 | 34 | 16–AUG–93 | S93030122 | 3.56 | . | 0.13 | f | 0.45 | < | 0.84 | f | 1.25 | . | 0.23 | f | 0.25 | f | 0.94 | < |
| NF14 | 42.38767 | 70.82400 | 34 | 16–AUG–93 | S93030105 | 0.50 | f | 0.14 | f | 0.29 | < | 0.69 | < | 0.43 | . | 0.79 | < | 0.37 | < | 0.60 | < |
| NF14 | 42.38767 | 70.82400 | 34.5 | 16–AUG–93 | S93030103 | 0.80 | f | 0.07 | f | 0.27 | < | 0.66 | < | 0.53 | . | 0.75 | < | 0.35 | < | 0.57 | < |
| NF16 | 42.37767 | 70.83800 | 34 | 19–AUG–93 | S93030393 | 0.96 | f | 0.06 | f | 0.33 | < | 0.67 | f | 0.70 | . | 0.90 | < | 0.43 | < | 0.70 | < |
| NF16 | 42.37767 | 70.83800 | 34 | 19–AUG–93 | S93030397 | 2.00 | . | 0.10 | f | 0.35 | < | 0.34 | f | 0.74 | . | 0.04 | f | 0.09 | f | 0.72 | < |
| NF17 | 42.38150 | 70.81467 | 32 | 16–AUG–93 | S93030090 | 0.12 | f | 0.02 | f | 0.31 | < | 0.74 | < | 0.18 | f | 0.84 | < | 0.03 | f | 0.65 | < |
| NF17 | 42.38150 | 70.81467 | 32.5 | 16–AUG–93 | S93030088 | 0.18 | f | 0.02 | f | 0.30 | < | 0.72 | < | 0.26 | f | 0.82 | < | 0.39 | < | 0.63 | < |
| NF2 | 42.33783 | 70.82883 | 29.5 | 19–AUG–93 | S93030372 | 0.22 | f | 0.01 | f | 0.31 | < | 0.31 | f | 0.36 | . | 0.84 | < | 0.29 | f | 0.65 | < |
| NF2 | 42.33783 | 70.82883 | 30 | 19–AUG–93 | S93030375 | 0.27 | f | 0.04 | f | 0.31 | < | 0.08 | f | 0.31 | f | 0.83 | < | 0.13 | f | 0.64 | < |
| NF4 | 42.41550 | 70.80600 | 38 | 15–AUG–93 | S93030010 | 1.96 | . | 0.08 | f | 0.31 | < | 0.05 | f | 0.89 | . | 0.84 | < | 0.40 | < | 0.65 | < |
| NF4 | 42.41550 | 70.80600 | 38 | 15–AUG–93 | S93030012 | 0.56 | f | 0.19 | f | 0.29 | < | 0.70 | < | 0.50 | . | 0.79 | < | 0.04 | f | 0.61 | < |
| NF8 | 42.40017 | 70.86383 | 30.5 | 15–AUG–93 | S93030029 | 3.50 | . | 0.09 | f | 0.40 | < | 0.60 | f | 1.65 | . | 0.23 | f | 5.42 | . | 0.83 | < |
| NF8 | 42.40017 | 70.86383 | 30.5 | 15–AUG–93 | S93030031 | 5.90 | . | 0.17 | f | 0.54 | < | 0.37 | f | 1.61 | . | 0.71 | f | 1.64 | . | 1.12 | < |
| NF9 | 42.40100 | 70.84550 | 30.5 | 15–AUG–93 | S93030043 | 1.52 | . | 0.49 | . | 0.35 | < | 0.83 | < | 1.06 | . | 0.95 | < | 0.17 | f | 0.73 | < |
| NF9 | 42.40100 | 70.84550 | 31 | 15–AUG–93 | S93030045 | 1.63 | . | 0.45 | f | 0.33 | < | 0.23 | f | 1.11 | . | 0.91 | < | 0.43 | < | 0.70 | < |

Description of Qualifiers:

f = reported value below method detection limit

< = reported value is the method detection limit

x = matrix interference

Massachusetts Water Resources Authority
1993 Sediment Chemistry – Task 12
Product Number S9398PST.WK1

| Station | Latitude | Longitude | Sample Depth(m) | Sample Date | Sample ID | CL4(44) ng/g dry wt | | HEPTACHLOREPC ng/g dry wt | | CL4(66) ng/g dry wt | | 2,4-DDE ng/g dry wt | | CL5(101) ng/g dry wt | | CIS-CHLORDA ng/g dry wt | | TRANS-NONACL( ng/g dry wt | | DIELDRIN ng/g dry wt | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FF1 | 42.46650 | 70.62233 | 84 | 17-AUG-93 | S93030200 | 0.51 | f | 1.39 | < | 0.81 | f | 0.82 | f | 1.39 | f | 1.18 | < | 1.27 | < | 1.35 | . |
| FF1 | 42.46650 | 70.62233 | 84.5 | 17-AUG-93 | S93030198 | 0.70 | f | 1.61 | < | 0.86 | f | 1.13 | < | 1.03 | f | 1.00 | f | 1.47 | < | 1.21 | f |
| FF10 | 42.41383 | 70.87917 | 29 | 16-AUG-93 | S93030151 | 1.17 | < | 0.80 | < | 0.75 | < | 0.56 | < | 0.49 | f | 0.68 | < | 0.34 | f | 0.65 | f |
| FF10 | 42.41383 | 70.87917 | 29 | 16-AUG-93 | S93030153 | 1.17 | < | 0.80 | < | 0.76 | < | 0.56 | < | 0.34 | f | 0.68 | < | 0.73 | < | 0.66 | f |
| FF11 | 42.65883 | 70.49967 | 89.5 | 17-AUG-93 | S93030179 | 1.65 | < | 1.13 | < | 1.07 | < | 0.79 | < | 0.50 | f | 0.96 | < | 1.03 | < | 2.37 | . |
| FF11 | 42.65883 | 70.49967 | 90 | 17-AUG-93 | S93030182 | 0.40 | f | 1.10 | < | 0.65 | f | 0.77 | < | 0.94 | f | 0.93 | < | 1.00 | < | 1.02 | . |
| FF12 | 42.38933 | 70.90000 | 26 | 16-AUG-93 | S93030072 | 1.09 | < | 0.74 | < | 0.16 | f | 0.52 | < | 0.44 | f | 0.63 | < | 0.68 | < | 0.64 | < |
| FF12 | 42.38933 | 70.90000 | 26 | 16-AUG-93 | S93030074 | 0.15 | f | 0.80 | < | 0.41 | f | 0.56 | < | 0.56 | f | 0.20 | f | 0.07 | f | 0.69 | < |
| FF13 | 42.31917 | 70.82267 | 21.5 | 19-AUG-93 | S93030352 | 0.48 | f | 0.91 | < | 1.10 | . | 0.64 | < | 1.92 | . | 0.44 | f | 0.34 | f | 0.78 | f |
| FF13 | 42.31917 | 70.82267 | 21.5 | 19-AUG-93 | S93030354 | 1.39 | . | 0.79 | < | 0.65 | f | 0.56 | < | 2.71 | . | 0.25 | f | 0.29 | f | 0.68 | f |
| FF14 | 42.41717 | 70.65350 | 76 | 17-AUG-93 | S93030214 | 0.41 | f | 1.02 | < | 0.54 | f | 0.71 | < | 1.05 | f | 0.87 | < | 0.93 | < | 0.85 | f |
| FF14 | 42.41717 | 70.65350 | 76.5 | 17-AUG-93 | S93030216 | 0.41 | f | 1.16 | < | 0.45 | f | 0.81 | < | 0.85 | f | 0.31 | f | 1.06 | < | 1.02 | . |
| FF4 | 42.28983 | 70.42550 | 89 | 17-AUG-93 | S93030234 | 0.36 | f | 1.31 | < | 0.43 | f | 0.91 | < | 0.69 | f | 0.67 | f | 1.19 | < | 1.14 | . |
| FF4 | 42.28983 | 70.42550 | 89 | 17-AUG-93 | S93030237 | 0.43 | f | 1.66 | < | 0.54 | f | 1.16 | < | 0.94 | f | 1.41 | < | 1.51 | < | 1.46 | . |
| FF5 | 42.13333 | 70.42233 | 64.5 | 18-AUG-93 | S93030312 | 0.10 | f | 0.90 | < | 0.18 | f | 0.52 | f | 0.32 | f | 0.76 | < | 0.82 | < | 0.52 | f |
| FF5 | 42.13333 | 70.42233 | 65 | 18-AUG-93 | S93030310 | 0.14 | f | 0.92 | < | 0.17 | f | 0.64 | < | 0.28 | f | 0.78 | < | 0.83 | < | 0.52 | f |
| FF6 | 41.89783 | 70.40417 | 37 | 18-AUG-93 | S93030292 | 0.35 | f | 1.09 | < | 0.58 | f | 0.76 | < | 0.66 | f | 0.92 | < | 0.99 | < | 1.15 | . |
| FF6 | 41.89783 | 70.40417 | 37 | 18-AUG-93 | S93030294 | 0.25 | f | 0.93 | < | 0.52 | f | 0.65 | < | 0.51 | f | 0.79 | < | 0.85 | < | 1.25 | . |
| FF7 | 41.95767 | 70.26700 | 40 | 18-AUG-93 | S93030269 | 0.42 | f | 1.66 | < | 1.56 | < | 1.16 | < | 0.52 | f | 1.41 | < | 1.50 | < | 1.42 | f |
| FF7 | 41.95767 | 70.26700 | 40.5 | 18-AUG-93 | S93030277 | 0.36 | f | 1.27 | < | 0.41 | f | 0.89 | < | 0.72 | f | 1.08 | < | 1.16 | < | 1.10 | . |
| FF9 | 42.31217 | 70.65683 | 49 | 18-AUG-93 | S93030326 | 0.10 | f | 0.77 | < | 0.13 | f | 0.54 | < | 0.30 | f | 0.66 | < | 0.70 | < | 0.44 | f |
| FF9 | 42.31217 | 70.65683 | 49 | 18-AUG-93 | S93030328 | 0.04 | f | 0.75 | < | 0.15 | f | 0.52 | < | 0.10 | f | 0.64 | < | 0.68 | < | 0.45 | f |
| NF10 | 42.39317 | 70.83833 | 32 | 16-AUG-93 | S93030134 | 0.10 | f | 0.49 | f | 0.33 | f | 0.55 | < | 0.56 | f | 0.25 | f | 0.04 | f | 1.00 | . |
| NF10 | 42.39317 | 70.83833 | 32 | 16-AUG-93 | S93030136 | 1.14 | < | 0.78 | < | 0.24 | f | 0.55 | < | 0.58 | f | 0.20 | f | 0.08 | f | 0.67 | f |
| NF12 | 42.39033 | 70.83083 | 34 | 16-AUG-93 | S93030120 | 0.27 | f | 1.06 | < | 1.49 | . | 0.74 | < | 2.03 | . | 0.89 | f | 0.22 | f | 1.97 | . |

| | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NF12 | 42.39033 | 70.83083 | 34 | 16-AUG-93 | S93030122 | 0.17 | f | 1.04 | < | 0.62 | f | 0.73 | < | 1.05 | f | 0.65 | f | 0.17 | f | 1.12 | . |
| NF14 | 42.38767 | 70.82400 | 34 | 16-AUG-93 | S93030105 | 0.98 | < | 0.67 | < | 0.27 | f | 0.47 | < | 0.22 | f | 0.66 | . | 0.03 | f | 1.17 | . |
| NF14 | 42.38767 | 70.82400 | 34.5 | 16-AUG-93 | S93030103 | 0.93 | < | 0.63 | < | 0.49 | f | 0.44 | < | 0.37 | f | 0.33 | f | 0.21 | f | 1.23 | . |
| NF16 | 42.37767 | 70.83800 | 34 | 19-AUG-93 | S93030393 | 1.12 | < | 0.77 | < | 0.31 | f | 0.54 | < | 0.42 | f | 0.11 | f | 0.07 | f | 0.78 | . |
| NF16 | 42.37767 | 70.83800 | 34 | 19-AUG-93 | S93030397 | 0.15 | f | 0.80 | < | 0.65 | f | 0.56 | < | 0.70 | f | 0.30 | f | 0.11 | f | 1.22 | . |
| NF17 | 42.38150 | 70.81467 | 32 | 16-AUG-93 | S93030090 | 0.11 | f | 0.72 | < | 0.06 | f | 0.50 | < | 0.10 | f | 0.61 | < | 0.65 | < | 0.21 | f |
| NF17 | 42.38150 | 70.81467 | 32.5 | 16-AUG-93 | S93030088 | 1.01 | < | 0.69 | < | 0.11 | f | 0.48 | < | 0.06 | f | 0.59 | < | 0.63 | < | 0.28 | f |
| NF2 | 42.33783 | 70.82883 | 29.5 | 19-AUG-93 | S93030372 | 0.07 | f | 0.72 | < | 0.68 | < | 0.11 | f | 0.08 | f | 0.05 | f | 0.65 | < | 0.62 | < |
| NF2 | 42.33783 | 70.82883 | 30 | 19-AUG-93 | S93030375 | 0.07 | f | 0.71 | < | 0.67 | < | 0.06 | f | 0.08 | f | 0.03 | f | 0.64 | < | 0.61 | < |
| NF4 | 42.41550 | 70.80600 | 38 | 15-AUG-93 | S93030010 | 0.08 | f | 0.72 | < | 0.68 | < | 0.13 | f | 0.10 | f | 0.07 | f | 0.03 | f | 0.62 | < |
| NF4 | 42.41550 | 70.80600 | 38 | 15-AUG-93 | S93030012 | 0.03 | f | 0.67 | < | 0.64 | < | 0.39 | f | 0.11 | f | 0.03 | f | 0.61 | < | 0.58 | < |
| NF8 | 42.40017 | 70.86383 | 30.5 | 15-AUG-93 | S93030029 | 0.46 | f | 0.92 | < | 1.20 | . | 0.64 | < | 2.38 | . | 0.82 | . | 0.26 | f | 0.96 | . |
| NF8 | 42.40017 | 70.86383 | 30.5 | 15-AUG-93 | S93030031 | 0.95 | f | 1.24 | < | 2.72 | . | 0.87 | < | 5.28 | . | 1.43 | . | 0.65 | f | 4.04 | . |
| NF9 | 42.40100 | 70.84550 | 30.5 | 15-AUG-93 | S93030043 | 0.20 | f | 0.81 | < | 0.32 | f | 0.56 | < | 0.64 | f | 0.68 | < | 0.08 | f | 0.95 | . |
| NF9 | 42.40100 | 70.84550 | 31 | 15-AUG-93 | S93030045 | 0.14 | f | 0.61 | f | 0.29 | f | 0.54 | < | 0.63 | f | 0.66 | < | 0.70 | < | 1.10 | . |

Description of Qualifiers:

f = reported value below method detection limit

< = reported value is the method detection limit

x = matrix interference

| Station | Latitude | Longitude | Sample Depth(m) | Sample Date | Sample ID | 4,4-DDE ng/g dry wt | | CL4(77) ng/g dry wt | | 2,4-DDD ng/g dry wt | | ENDRIN ng/g dry wt | | CL5(118) ng/g dry wt | | 4,4-DDD ng/g dry wt | | 2,4-DDT ng/g dry wt | | CL6(153) ng/g dry wt | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FF1 | 42.46650 | 70.62233 | 84 | 17-AUG-93 | S93030200 | 1.63 | . | 1.81 | < | 1.50 | < | 3.45 | < | 2.35 | . | 2.64 | . | 1.11 | < | 1.80 | f |
| FF1 | 42.46650 | 70.62233 | 84.5 | 17-AUG-93 | S93030198 | 1.11 | . | 2.10 | < | 1.73 | < | 3.99 | < | 1.72 | . | 1.86 | f | 1.28 | < | 1.19 | f |
| FF10 | 42.41383 | 70.87917 | 29 | 16-AUG-93 | S93030151 | 0.65 | . | 1.04 | < | 0.40 | f | 1.98 | < | 0.80 | . | 0.77 | f | 0.63 | < | 1.11 | f |
| FF10 | 42.41383 | 70.87917 | 29 | 16-AUG-93 | S93030153 | 0.50 | . | 1.04 | < | 0.34 | f | 1.98 | < | 0.89 | . | 0.84 | f | 0.64 | < | 0.77 | f |
| FF11 | 42.65883 | 70.49967 | 89.5 | 17-AUG-93 | S93030179 | 1.05 | . | 1.47 | < | 0.77 | f | 2.79 | < | 0.98 | f | 2.46 | . | 0.90 | < | 0.84 | f |
| FF11 | 42.65883 | 70.49967 | 90 | 17-AUG-93 | S93030182 | 1.54 | . | 1.43 | < | 0.98 | f | 2.72 | < | 1.60 | . | 2.75 | . | 0.87 | < | 0.94 | f |
| FF12 | 42.38933 | 70.90000 | 26 | 16-AUG-93 | S93030072 | 0.48 | . | 0.97 | < | 0.20 | f | 1.84 | < | 0.92 | . | 0.53 | f | 0.59 | < | 0.64 | f |
| FF12 | 42.38933 | 70.90000 | 26 | 16-AUG-93 | S93030074 | 0.93 | . | 1.03 | < | 0.52 | f | 1.97 | < | 1.29 | . | 0.81 | f | 0.63 | < | 1.11 | f |
| FF13 | 42.31917 | 70.82267 | 21.5 | 19-AUG-93 | S93030352 | 1.45 | . | 1.18 | < | 0.69 | f | 2.25 | < | 3.99 | . | 1.27 | . | 0.72 | < | 3.21 | . |
| FF13 | 42.31917 | 70.82267 | 21.5 | 19-AUG-93 | S93030354 | 0.90 | . | 1.03 | < | 0.42 | f | 1.96 | < | 5.23 | . | 0.90 | f | 0.63 | < | 4.87 | . |
| FF14 | 42.41717 | 70.65350 | 76 | 17-AUG-93 | S93030214 | 1.12 | . | 1.33 | < | 0.75 | f | 2.52 | < | 1.61 | . | 1.61 | . | 0.81 | < | 1.67 | f |
| FF14 | 42.41717 | 70.65350 | 76.5 | 17-AUG-93 | S93030216 | 1.12 | . | 1.51 | < | 0.60 | f | 2.87 | < | 1.57 | . | 1.90 | . | 0.92 | < | 1.64 | f |
| FF4 | 42.28983 | 70.42550 | 89 | 17-AUG-93 | S93030234 | 1.48 | . | 1.70 | < | 0.94 | f | 3.23 | < | 1.98 | . | 2.65 | . | 1.04 | < | 1.40 | f |
| FF4 | 42.28983 | 70.42550 | 89 | 17-AUG-93 | S93030237 | 1.29 | . | 2.15 | < | 0.57 | f | 4.10 | < | 1.97 | . | 2.19 | . | 1.32 | < | 1.44 | f |
| FF5 | 42.13333 | 70.42233 | 64.5 | 18-AUG-93 | S93030312 | 0.45 | f | 1.17 | < | 0.17 | f | 2.22 | < | 0.82 | f | 0.70 | f | 0.71 | < | 0.43 | f |
| FF5 | 42.13333 | 70.42233 | 65 | 18-AUG-93 | S93030310 | 0.59 | . | 1.19 | < | 0.35 | f | 2.27 | < | 1.11 | . | 0.93 | f | 0.73 | < | 0.61 | f |
| FF6 | 41.89783 | 70.40417 | 37 | 18-AUG-93 | S93030292 | 1.21 | . | 1.41 | < | 0.74 | f | 2.69 | < | 2.92 | . | 2.25 | . | 0.86 | < | 1.62 | f |
| FF6 | 41.89783 | 70.40417 | 37 | 18-AUG-93 | S93030294 | 0.71 | . | 1.21 | < | 0.36 | f | 2.31 | < | 1.36 | . | 1.55 | . | 0.74 | < | 0.96 | f |
| FF7 | 41.95767 | 70.26700 | 40 | 18-AUG-93 | S93030269 | 1.13 | . | 2.15 | < | 1.78 | < | 4.09 | < | 1.61 | . | 1.75 | f | 1.31 | < | 1.01 | f |
| FF7 | 41.95767 | 70.26700 | 40.5 | 18-AUG-93 | S93030277 | 1.56 | . | 1.65 | < | 1.23 | f | 3.15 | < | 2.82 | . | 2.05 | . | 1.01 | < | 1.60 | f |
| FF9 | 42.31217 | 70.65683 | 49 | 18-AUG-93 | S93030326 | 0.28 | f | 1.00 | < | 0.50 | f | 1.91 | < | 0.81 | . | 0.71 | f | 0.61 | < | 0.39 | f |
| FF9 | 42.31217 | 70.65683 | 49 | 18-AUG-93 | S93030328 | 0.20 | f | 0.97 | < | 0.80 | < | 1.85 | < | 0.49 | f | 0.45 | f | 0.59 | < | 0.27 | f |
| NF10 | 42.39317 | 70.83833 | 32 | 16-AUG-93 | S93030134 | 0.99 | . | 1.02 | < | 0.32 | f | 1.94 | < | 1.13 | . | 0.73 | f | 0.62 | < | 0.78 | f |
| NF10 | 42.39317 | 70.83833 | 32 | 16-AUG-93 | S93030136 | 1.01 | . | 1.01 | < | 1.08 | . | 1.93 | < | 1.21 | . | 0.86 | f | 0.62 | < | 0.93 | f |
| NF12 | 42.39033 | 70.83083 | 34 | 16-AUG-93 | S93030120 | 3.85 | . | 1.38 | < | 2.64 | . | 2.62 | < | 5.58 | . | 3.67 | . | 0.84 | < | 4.66 | . |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NF12 | 42.39033 | 70.83083 | 34 | 16–AUG–93 | S93030122 | 2.73 | . | 1.35 | < | 1.93 | . | 2.56 | < | 4.87 | . | 2.63 | . | 0.82 | < | 3.35 | . |
| NF14 | 42.38767 | 70.82400 | 34 | 16–AUG–93 | S93030105 | 0.47 | . | 0.87 | < | 0.44 | f | 1.65 | < | 0.36 | f | 0.40 | f | 0.53 | < | 0.24 | f |
| NF14 | 42.38767 | 70.82400 | 34.5 | 16–AUG–93 | S93030103 | 0.63 | . | 0.82 | < | 0.46 | f | 1.57 | < | 0.58 | f | 0.50 | f | 0.50 | < | 0.38 | f |
| NF16 | 42.37767 | 70.83800 | 34 | 19–AUG–93 | S93030393 | 0.52 | . | 1.00 | < | 0.45 | f | 1.90 | < | 0.60 | f | 0.52 | f | 0.61 | < | 0.56 | f |
| NF16 | 42.37767 | 70.83800 | 34 | 19–AUG–93 | S93030397 | 1.47 | . | 1.04 | < | 1.10 | . | 1.97 | < | 2.38 | . | 1.36 | . | 0.63 | < | 1.62 | . |
| NF17 | 42.38150 | 70.81467 | 32 | 16–AUG–93 | S93030090 | 0.10 | f | 0.93 | < | 0.10 | f | 1.77 | < | 0.15 | f | 0.07 | f | 0.57 | < | 0.11 | f |
| NF17 | 42.38150 | 70.81467 | 32.5 | 16–AUG–93 | S93030088 | 0.12 | f | 0.90 | < | 0.75 | < | 1.71 | < | 0.15 | f | 0.10 | f | 0.55 | < | 0.08 | f |
| NF2 | 42.33783 | 70.82883 | 29.5 | 19–AUG–93 | S93030372 | 0.09 | f | 0.93 | < | 0.16 | f | 1.77 | < | 0.13 | f | 0.10 | f | 0.57 | < | 0.13 | f |
| NF2 | 42.33783 | 70.82883 | 30 | 19–AUG–93 | S93030375 | 0.10 | f | 0.92 | < | 0.09 | f | 1.75 | < | 0.14 | f | 0.10 | f | 0.56 | < | 0.15 | f |
| NF4 | 42.41550 | 70.80600 | 38 | 15–AUG–93 | S93030010 | 0.33 | f | 0.93 | < | 0.29 | f | 1.77 | < | 0.34 | f | 0.13 | f | 0.57 | < | 0.14 | f |
| NF4 | 42.41550 | 70.80600 | 38 | 15–AUG–93 | S93030012 | 0.30 | f | 0.88 | < | 0.11 | f | 1.67 | < | 0.21 | f | 0.16 | f | 0.54 | < | 0.11 | f |
| NF8 | 42.40017 | 70.86383 | 30.5 | 15–AUG–93 | S93030029 | 3.40 | . | 1.19 | < | 2.56 | . | 2.26 | < | 6.54 | . | 4.38 | . | 0.73 | < | 5.33 | . |
| NF8 | 42.40017 | 70.86383 | 30.5 | 15–AUG–93 | S93030031 | 6.84 | . | 1.61 | < | 5.77 | . | 3.07 | < | 14.46 | . | 10.15 | . | 0.36 | f | 15.92 | . |
| NF9 | 42.40100 | 70.84550 | 30.5 | 15–AUG–93 | S93030043 | 1.21 | . | 1.05 | < | 0.55 | f | 1.99 | < | 1.40 | . | 0.92 | f | 0.64 | < | 1.03 | f |
| NF9 | 42.40100 | 70.84550 | 31 | 15–AUG–93 | S93030045 | 1.01 | . | 1.00 | < | 0.35 | f | 1.91 | < | 0.95 | . | 0.72 | f | 0.61 | < | 1.04 | f |

Description of Qualifiers:

f = reported value below method detection limit

< = reported value is the method detection limit

x = matrix interference

Massachusetts Water Resources Authority

1993 Sediment Chemistry – Task 12

Product Number S9398PST.WK1

| Station | Latitude | Longitude | Sample Depth(m) | Sample Date | Sample ID | CL5(105) ng/g dry wt | | 4,4-DDT ng/g dry wt | | CL6(138) ng/g dry wt | | CL5(126) ng/g dry wt | | CL7(187) ng/g dry wt | | CL6(128) ng/g dry wt | | CL7(180) ng/g dry wt | | MIREX ng/g dry wt | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FF1 | 42.46650 | 70.62233 | 84 | 17-AUG-93 | S93030200 | 1.90 | . | 1.89 | < | 3.99 | . | 1.83 | < | 0.78 | f | 0.96 | f | 1.05 | f | 1.50 | < |
| FF1 | 42.46650 | 70.62233 | 84.5 | 17-AUG-93 | S93030198 | 0.85 | f | 2.19 | < | 3.68 | . | 2.11 | < | 0.51 | f | 0.64 | f | 0.71 | f | 1.73 | < |
| FF10 | 42.41383 | 70.87917 | 29 | 16-AUG-93 | S93030151 | 0.74 | f | 1.08 | < | 2.88 | . | 1.05 | < | 0.35 | f | 0.40 | f | 0.21 | f | 0.86 | < |
| FF10 | 42.41383 | 70.87917 | 29 | 16-AUG-93 | S93030153 | 1.12 | . | 1.09 | < | 1.42 | . | 1.05 | < | 0.25 | f | 0.46 | f | 0.43 | f | 0.86 | < |
| FF11 | 42.65883 | 70.49967 | 89.5 | 17-AUG-93 | S93030179 | 0.23 | f | 1.53 | < | 1.91 | . | 1.48 | < | 0.20 | f | 0.44 | f | 0.59 | f | 1.21 | < |
| FF11 | 42.65883 | 70.49967 | 90 | 17-AUG-93 | S93030182 | 0.80 | f | 1.49 | < | 2.22 | . | 1.44 | < | 0.33 | f | 1.19 | . | 0.67 | f | 1.18 | < |
| FF12 | 42.38933 | 70.90000 | 26 | 16-AUG-93 | S93030072 | 0.60 | f | 1.01 | < | 2.19 | . | 0.97 | < | 0.52 | f | 0.19 | f | 0.59 | f | 0.80 | < |
| FF12 | 42.38933 | 70.90000 | 26 | 16-AUG-93 | S93030074 | 0.48 | f | 1.08 | < | 3.47 | . | 1.04 | < | 0.54 | f | 1.24 | . | 0.89 | . | 0.86 | < |
| FF13 | 42.31917 | 70.82267 | 21.5 | 19-AUG-93 | S93030352 | 4.05 | . | 1.23 | < | 8.91 | . | 1.19 | < | 1.59 | . | 0.55 | f | 1.90 | . | 0.98 | < |
| FF13 | 42.31917 | 70.82267 | 21.5 | 19-AUG-93 | S93030354 | 3.63 | . | 1.08 | < | 9.13 | . | 1.04 | < | 1.08 | . | 1.24 | . | 1.96 | . | 0.85 | < |
| FF14 | 42.41717 | 70.65350 | 76 | 17-AUG-93 | S93030214 | 0.84 | f | 1.38 | < | 2.83 | . | 1.34 | < | 0.64 | f | 0.57 | f | 1.11 | . | 1.10 | < |
| FF14 | 42.41717 | 70.65350 | 76.5 | 17-AUG-93 | S93030216 | 0.44 | f | 1.58 | < | 2.68 | . | 1.52 | < | 0.74 | f | 0.53 | f | 1.39 | . | 1.25 | < |
| FF4 | 42.28983 | 70.42550 | 89 | 17-AUG-93 | S93030234 | 1.82 | . | 1.77 | < | 3.12 | . | 1.71 | < | 0.65 | f | 0.46 | f | 0.79 | f | 1.41 | < |
| FF4 | 42.28983 | 70.42550 | 89 | 17-AUG-93 | S93030237 | 0.78 | f | 2.25 | < | 3.16 | . | 2.17 | < | 0.57 | f | 0.43 | f | 0.75 | f | 1.78 | < |
| FF5 | 42.13333 | 70.42233 | 64.5 | 18-AUG-93 | S93030312 | 0.90 | f | 1.22 | < | 1.34 | . | 1.18 | < | 0.19 | f | 0.14 | f | 0.19 | f | 0.97 | < |
| FF5 | 42.13333 | 70.42233 | 65 | 18-AUG-93 | S93030310 | 1.69 | . | 1.25 | < | 2.20 | . | 1.20 | < | 0.25 | f | 0.18 | f | 0.31 | f | 0.99 | < |
| FF6 | 41.89783 | 70.40417 | 37 | 18-AUG-93 | S93030292 | 2.91 | . | 1.47 | < | 4.48 | . | 1.42 | < | 0.79 | f | 0.47 | f | 0.90 | f | 1.17 | < |
| FF6 | 41.89783 | 70.40417 | 37 | 18-AUG-93 | S93030294 | 0.24 | f | 1.26 | < | 2.11 | . | 1.22 | < | 0.34 | f | 0.30 | f | 0.48 | f | 1.00 | < |
| FF7 | 41.95767 | 70.26700 | 40 | 18-AUG-93 | S93030269 | 1.27 | f | 2.24 | < | 2.69 | . | 2.17 | < | 0.26 | f | 1.24 | < | 0.30 | f | 1.78 | < |
| FF7 | 41.95767 | 70.26700 | 40.5 | 18-AUG-93 | S93030277 | 1.24 | f | 1.73 | < | 3.23 | . | 1.67 | < | 0.39 | f | 0.33 | f | 0.55 | f | 1.37 | < |
| FF9 | 42.31217 | 70.65683 | 49 | 18-AUG-93 | S93030326 | 0.76 | f | 1.05 | < | 1.35 | . | 1.01 | < | 0.19 | f | 0.14 | f | 0.23 | f | 0.83 | < |
| FF9 | 42.31217 | 70.65683 | 49 | 18-AUG-93 | S93030328 | 0.19 | f | 1.01 | < | 1.03 | . | 0.98 | < | 0.14 | f | 0.12 | f | 0.24 | f | 0.80 | < |
| NF10 | 42.39317 | 70.83833 | 32 | 16-AUG-93 | S93030134 | 1.08 | . | 0.40 | f | 2.21 | . | 1.03 | < | 0.55 | f | 1.09 | . | 0.78 | f | 0.84 | < |
| NF10 | 42.39317 | 70.83833 | 32 | 16-AUG-93 | S93030136 | 1.47 | . | 0.36 | f | 2.68 | . | 1.02 | < | 0.70 | f | 1.08 | . | 1.21 | . | 0.84 | < |
| NF12 | 42.39033 | 70.83083 | 34 | 16-AUG-93 | S93030120 | 6.70 | . | 1.34 | f | 10.09 | . | 1.39 | < | 4.02 | . | 11.37 | . | 5.45 | . | 1.14 | < |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NF12 | 42.39033 | 70.83083 | 34 | 16–AUG–93 | S93030122 | 9.66 | . | 0.46 | f | 9.76 | . | 1.36 | < | 1.70 | . | 2.50 | . | 3.05 | . | 1.11 | < |
| NF14 | 42.38767 | 70.82400 | 34 | 16–AUG–93 | S93030105 | 0.12 | f | 0.91 | < | 0.80 | . | 0.88 | < | 0.45 | f | 0.23 | f | 0.16 | f | 0.72 | < |
| NF14 | 42.38767 | 70.82400 | 34.5 | 16–AUG–93 | S93030103 | 0.20 | f | 0.86 | < | 1.22 | . | 0.83 | < | 0.32 | f | 0.38 | f | 0.30 | f | 0.87 | . |
| NF16 | 42.37767 | 70.83800 | 34 | 19–AUG–93 | S93030393 | 1.12 | . | 1.04 | < | 1.96 | . | 1.01 | < | 0.25 | f | 0.37 | f | 0.48 | f | 0.83 | < |
| NF16 | 42.37767 | 70.83800 | 34 | 19–AUG–93 | S93030397 | 4.89 | . | 0.45 | f | 4.67 | . | 1.05 | < | 0.76 | f | 2.47 | . | 1.43 | . | 0.94 | . |
| NF17 | 42.38150 | 70.81467 | 32 | 16–AUG–93 | S93030090 | 0.06 | f | 0.08 | f | 0.32 | f | 0.94 | < | 0.02 | f | 0.04 | f | 0.02 | f | 0.77 | < |
| NF17 | 42.38150 | 70.81467 | 32.5 | 16–AUG–93 | S93030088 | 0.02 | f | 0.94 | < | 0.31 | f | 0.91 | < | 0.02 | f | 0.04 | f | 0.03 | f | 0.75 | < |
| NF2 | 42.33783 | 70.82883 | 29.5 | 19–AUG–93 | S93030372 | 0.05 | f | 0.97 | < | 0.48 | f | 0.94 | < | 0.05 | f | 0.02 | f | 0.08 | f | 0.77 | < |
| NF2 | 42.33783 | 70.82883 | 30 | 19–AUG–93 | S93030375 | 0.06 | f | 0.15 | f | 0.47 | f | 0.93 | < | 0.07 | f | 0.03 | f | 0.12 | f | 0.76 | < |
| NF4 | 42.41550 | 70.80600 | 38 | 15–AUG–93 | S93030010 | 0.03 | f | 0.13 | f | 0.48 | f | 0.94 | < | 0.11 | f | 0.07 | f | 0.14 | f | 0.77 | < |
| NF4 | 42.41550 | 70.80600 | 38 | 15–AUG–93 | S93030012 | 0.87 | < | 0.12 | f | 0.61 | f | 0.88 | < | 0.05 | f | 0.04 | f | 0.11 | f | 0.72 | < |
| NF8 | 42.40017 | 70.86383 | 30.5 | 15–AUG–93 | S93030029 | 6.49 | . | 0.94 | f | 13.41 | . | 1.20 | < | 2.36 | . | 4.56 | . | 4.21 | . | 0.98 | < |
| NF8 | 42.40017 | 70.86383 | 30.5 | 15–AUG–93 | S93030031 | 9.89 | . | 1.83 | . | 32.34 | . | 1.63 | < | 7.34 | . | 10.15 | . | 12.12 | . | 1.34 | < |
| NF9 | 42.40100 | 70.84550 | 30.5 | 15–AUG–93 | S93030043 | 1.35 | . | 0.20 | f | 2.58 | . | 1.05 | < | 0.62 | f | 1.24 | . | 1.09 | . | 0.87 | < |
| NF9 | 42.40100 | 70.84550 | 31 | 15–AUG–93 | S93030045 | 0.93 | f | 0.39 | f | 2.49 | . | 1.01 | < | 0.56 | f | 1.16 | . | 0.97 | . | 0.83 | < |

Description of Qualifiers:

f = reported value below method detection limit

< = reported value is the method detection limit

x = matrix interference

| Station | Latitude | Longitude | Sample Depth(m) | Sample Date | Sample ID | CL7(170) ng/g dry wt | | CL8(195) ng/g dry wt | | CL9(206) ng/g dry wt | | CL10(209) ng/g dry wt | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FF1 | 42.46650 | 70.62233 | 84 | 17-AUG-93 | S93030200 | 1.23 | f | 0.25 | f | 0.40 | f | 0.69 | f |
| FF1 | 42.46650 | 70.62233 | 84.5 | 17-AUG-93 | S93030198 | 0.97 | f | 2.11 | < | 0.21 | f | 0.37 | f |
| FF10 | 42.41383 | 70.87917 | 29 | 16-AUG-93 | S93030151 | 0.45 | f | 1.05 | < | 1.67 | < | 1.09 | < |
| FF10 | 42.41383 | 70.87917 | 29 | 16-AUG-93 | S93030153 | 0.77 | f | 1.05 | < | 1.67 | < | 1.09 | < |
| FF11 | 42.65883 | 70.49967 | 89.5 | 17-AUG-93 | S93030179 | 0.83 | f | 1.48 | < | 2.36 | < | 1.54 | < |
| FF11 | 42.65883 | 70.49967 | 90 | 17-AUG-93 | S93030182 | 0.85 | f | 0.09 | f | 0.28 | f | 0.43 | f |
| FF12 | 42.38933 | 70.90000 | 26 | 16-AUG-93 | S93030072 | 5.41 | x | 0.04 | f | 0.08 | f | 0.28 | f |
| FF12 | 42.38933 | 70.90000 | 26 | 16-AUG-93 | S93030074 | 7.65 | x | 0.07 | f | 0.15 | f | 0.29 | f |
| FF13 | 42.31917 | 70.82267 | 21.5 | 19-AUG-93 | S93030352 | 1.36 | . | 0.33 | f | 0.37 | f | 0.39 | f |
| FF13 | 42.31917 | 70.82267 | 21.5 | 19-AUG-93 | S93030354 | 1.04 | f | 0.17 | f | 0.23 | f | 0.22 | f |
| FF14 | 42.41717 | 70.65350 | 76 | 17-AUG-93 | S93030214 | 1.07 | f | 1.34 | < | 0.22 | f | 0.29 | f |
| FF14 | 42.41717 | 70.65350 | 76.5 | 17-AUG-93 | S93030216 | 1.12 | f | 0.24 | f | 0.26 | f | 0.41 | f |
| FF4 | 42.28983 | 70.42550 | 89 | 17-AUG-93 | S93030234 | 1.62 | f | 0.11 | f | 0.34 | f | 0.47 | f |
| FF4 | 42.28983 | 70.42550 | 89 | 17-AUG-93 | S93030237 | 0.93 | f | 2.17 | < | 0.33 | f | 0.40 | f |
| FF5 | 42.13333 | 70.42233 | 64.5 | 18-AUG-93 | S93030312 | 0.42 | f | 0.07 | f | 0.06 | f | 0.12 | f |
| FF5 | 42.13333 | 70.42233 | 65 | 18-AUG-93 | S93030310 | 0.42 | f | 1.20 | < | 0.11 | f | 0.15 | f |
| FF6 | 41.89783 | 70.40417 | 37 | 18-AUG-93 | S93030292 | 1.05 | f | 0.17 | f | 0.31 | f | 0.56 | f |
| FF6 | 41.89783 | 70.40417 | 37 | 18-AUG-93 | S93030294 | 0.57 | f | 1.22 | < | 1.95 | < | 1.27 | < |
| FF7 | 41.95767 | 70.26700 | 40 | 18-AUG-93 | S93030269 | 0.74 | f | 2.17 | < | 3.45 | < | 2.26 | < |
| FF7 | 41.95767 | 70.26700 | 40.5 | 18-AUG-93 | S93030277 | 0.64 | f | 1.67 | < | 0.21 | f | 0.46 | f |
| FF9 | 42.31217 | 70.65683 | 49 | 18-AUG-93 | S93030326 | 0.34 | f | 1.01 | < | 0.10 | f | 0.08 | f |
| FF9 | 42.31217 | 70.65683 | 49 | 18-AUG-93 | S93030328 | 0.27 | f | 0.98 | < | 1.56 | < | 1.02 | < |
| NF10 | 42.39317 | 70.83833 | 32 | 16-AUG-93 | S93030134 | 4.79 | x | 0.18 | f | 0.32 | f | 0.24 | f |
| NF10 | 42.39317 | 70.83833 | 32 | 16-AUG-93 | S93030136 | 5.57 | x | 0.38 | f | 0.87 | f | 0.36 | f |
| NF12 | 42.39033 | 70.83083 | 34 | 16-AUG-93 | S93030120 | 18.87 | x | 1.55 | . | 3.89 | . | 1.04 | f |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NF12 | 42.39033 | 70.83083 | 34 | 16–AUG–93 | S93030122 | 14.38 | x | 0.79 | f | 0.96 | f | 0.54 | f |
| NF14 | 42.38767 | 70.82400 | 34 | 16–AUG–93 | S93030105 | 2.09 | x | 0.03 | f | 0.03 | f | 0.12 | f |
| NF14 | 42.38767 | 70.82400 | 34.5 | 16–AUG–93 | S93030103 | 3.06 | x | 0.06 | f | 0.06 | f | 0.12 | f |
| NF16 | 42.37767 | 70.83800 | 34 | 19–AUG–93 | S93030393 | 4.79 | x | 0.10 | f | 0.11 | f | 0.17 | f |
| NF16 | 42.37767 | 70.83800 | 34 | 19–AUG–93 | S93030397 | 8.59 | x | 0.25 | f | 0.36 | f | 0.45 | f |
| NF17 | 42.38150 | 70.81467 | 32 | 16–AUG–93 | S93030090 | 0.83 | fx | 0.94 | < | 0.01 | f | 0.98 | < |
| NF17 | 42.38150 | 70.81467 | 32.5 | 16–AUG–93 | S93030088 | 0.62 | fx | 0.91 | < | 0.10 | f | 0.94 | < |
| NF2 | 42.33783 | 70.82883 | 29.5 | 19–AUG–93 | S93030372 | 1.11 | x | 0.94 | < | 0.06 | f | 0.02 | f |
| NF2 | 42.33783 | 70.82883 | 30 | 19–AUG–93 | S93030375 | 1.17 | x | 0.93 | < | 0.03 | f | 0.02 | f |
| NF4 | 42.41550 | 70.80600 | 38 | 15–AUG–93 | S93030010 | 1.29 | x | 0.01 | f | 0.06 | f | 0.05 | f |
| NF4 | 42.41550 | 70.80600 | 38 | 15–AUG–93 | S93030012 | 1.73 | x | 0.01 | f | 0.07 | f | 0.03 | f |
| NF8 | 42.40017 | 70.86383 | 30.5 | 15–AUG–93 | S93030029 | 21.35 | x | 0.94 | f | 0.83 | f | 1.78 | . |
| NF8 | 42.40017 | 70.86383 | 30.5 | 15–AUG–93 | S93030031 | 43.50 | x | 2.40 | . | 2.93 | . | 5.80 | . |
| NF9 | 42.40100 | 70.84550 | 30.5 | 15–AUG–93 | S93030043 | 5.56 | x | 0.21 | f | 0.42 | f | 0.30 | f |
| NF9 | 42.40100 | 70.84550 | 31 | 15–AUG–93 | S93030045 | 5.45 | x | 0.23 | f | 0.44 | f | 0.28 | f |

Description of Qualifiers:

f = reported value below method detection limit

< = reported value is the method detection limit

x = matrix interference

Massachusetts Water Resources Authority
1993 Sediment Chemistry – Task 12
Product Number S9398PST.WK1

| Station | Latitude | Longitude | Sample Depth(m) | Sample Date | Sample ID | CL2(08) ng/g dry wt | | HEXACHLOROB ng/g dry wt | | LINDANE ng/g dry wt | | CL3(18) ng/g dry wt | | CL3(28) ng/g dry wt | | HEPTACHLOR ng/g dry wt | | CL4(52) ng/g dry wt | | ALDRIN ng/g dry wt | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FF1 | 42.46650 | 70.62233 | 84 | 17–AUG–93 | S93030200 | 7.80 | . | 1.56 | . | 0.60 | < | 1.44 | < | 0.71 | < | 1.64 | < | 0.98 | . | 1.26 | < |
| FF1 | 42.46650 | 70.62233 | 84.5 | 17–AUG–93 | S93030198 | 6.85 | . | 2.52 | . | 0.70 | < | 1.67 | < | 0.82 | < | 1.90 | < | 1.22 | . | 1.46 | < |
| FF10 | 42.41383 | 70.87917 | 29 | 16–AUG–93 | S93030151 | 2.07 | . | 1.19 | . | 0.35 | < | 0.83 | < | 0.40 | < | 0.94 | < | 0.45 | < | 0.72 | < |
| FF10 | 42.41383 | 70.87917 | 29 | 16–AUG–93 | S93030153 | 2.18 | . | 0.73 | . | 0.35 | < | 0.83 | < | 0.41 | < | 0.94 | < | 0.45 | < | 0.73 | < |
| FF11 | 42.65883 | 70.49967 | 89.5 | 17–AUG–93 | S93030179 | 2.83 | . | 0.23 | f | 0.49 | < | 1.17 | < | 0.57 | < | 1.33 | < | 0.63 | < | 1.02 | < |
| FF11 | 42.65883 | 70.49967 | 90 | 17–AUG–93 | S93030182 | 6.64 | . | 0.85 | . | 0.48 | < | 1.14 | < | 0.56 | < | 1.29 | < | 0.92 | . | 1.00 | < |
| FF12 | 42.38933 | 70.90000 | 26 | 16–AUG–93 | S93030072 | 1.01 | f | 0.45 | < | 0.32 | < | 0.77 | < | 0.38 | < | 0.88 | < | 0.42 | < | 0.67 | < |
| FF12 | 42.38933 | 70.90000 | 26 | 16–AUG–93 | S93030074 | 1.22 | f | 0.48 | < | 0.34 | < | 0.22 | f | 0.94 | . | 0.94 | < | 0.19 | f | 0.72 | < |
| FF13 | 42.31917 | 70.82267 | 21.5 | 19–AUG–93 | S93030352 | 4.75 | . | 0.26 | f | 0.39 | < | 0.94 | < | 0.46 | < | 1.07 | < | 1.45 | . | 0.82 | < |
| FF13 | 42.31917 | 70.82267 | 21.5 | 19–AUG–93 | S93030354 | 5.04 | . | 0.40 | f | 0.34 | < | 0.82 | < | 0.40 | < | 0.93 | < | 0.97 | . | 0.72 | < |
| FF14 | 42.41717 | 70.65350 | 76 | 17–AUG–93 | S93030214 | 4.25 | . | 0.63 | . | 0.44 | < | 1.06 | < | 1.65 | . | 1.20 | < | 0.67 | . | 0.92 | < |
| FF14 | 42.41717 | 70.65350 | 76.5 | 17–AUG–93 | S93030216 | 3.82 | . | 0.54 | f | 0.50 | < | 1.20 | < | 0.93 | . | 1.37 | < | 0.73 | . | 1.05 | < |
| FF4 | 42.28983 | 70.42550 | 89 | 17–AUG–93 | S93030234 | 6.99 | . | 0.93 | . | 0.57 | < | 1.35 | < | 1.23 | . | 1.54 | < | 0.85 | . | 1.18 | < |
| FF4 | 42.28983 | 70.42550 | 89 | 17–AUG–93 | S93030237 | 5.72 | . | 0.45 | f | 0.72 | < | 1.71 | < | 0.84 | < | 1.95 | < | 0.96 | . | 1.50 | < |
| FF5 | 42.13333 | 70.42233 | 64.5 | 18–AUG–93 | S93030312 | 3.58 | . | 0.48 | f | 0.39 | < | 0.93 | < | 0.60 | . | 1.06 | < | 0.26 | f | 0.81 | < |
| FF5 | 42.13333 | 70.42233 | 65 | 18–AUG–93 | S93030310 | 2.88 | . | 1.81 | . | 0.40 | < | 0.95 | < | 0.47 | < | 1.08 | < | 0.29 | f | 0.83 | < |
| FF6 | 41.89783 | 70.40417 | 37 | 18–AUG–93 | S93030292 | 6.52 | . | 2.27 | . | 0.47 | < | 1.12 | < | 1.56 | . | 1.28 | < | 0.60 | f | 0.98 | < |
| FF6 | 41.89783 | 70.40417 | 37 | 18–AUG–93 | S93030294 | 2.11 | . | 0.36 | f | 0.40 | < | 0.96 | < | 0.47 | < | 1.10 | < | 0.28 | f | 0.84 | < |
| FF7 | 41.95767 | 70.26700 | 40 | 18–AUG–93 | S93030269 | 12.02 | . | 4.31 | . | 0.72 | < | 1.71 | < | 2.22 | . | 1.95 | < | 1.29 | . | 1.50 | < |
| FF7 | 41.95767 | 70.26700 | 40.5 | 18–AUG–93 | S93030277 | 6.10 | . | 0.47 | f | 0.55 | < | 1.32 | < | 0.65 | < | 1.50 | < | 0.89 | . | 1.15 | < |
| FF9 | 42.31217 | 70.65683 | 49 | 18–AUG–93 | S93030326 | 1.95 | . | 0.66 | . | 0.33 | < | 0.80 | < | 0.65 | . | 0.91 | < | 0.33 | f | 0.70 | < |
| FF9 | 42.31217 | 70.65683 | 49 | 18–AUG–93 | S93030328 | 1.47 | . | 0.25 | f | 0.32 | < | 0.77 | < | 0.26 | f | 0.88 | < | 0.12 | f | 0.68 | < |
| NF10 | 42.39317 | 70.83833 | 32 | 16–AUG–93 | S93030134 | 1.45 | f | 0.64 | . | 0.34 | < | 0.81 | < | 0.82 | . | 0.92 | < | 0.44 | < | 0.71 | < |
| NF10 | 42.39317 | 70.83833 | 32 | 16–AUG–93 | S93030136 | 1.38 | f | 0.09 | f | 0.34 | < | 0.81 | < | 0.39 | < | 0.92 | < | 0.44 | < | 0.71 | < |
| NF12 | 42.39033 | 70.83083 | 34 | 16–AUG–93 | S93030120 | 5.20 | . | 0.14 | f | 0.46 | < | 0.93 | f | 1.06 | . | 0.47 | f | 0.34 | f | 0.96 | < |

| | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NF12 | 42.39033 | 70.83083 | 34 | 16–AUG–93 | S93030122 | 3.56 | . | 0.13 | f | 0.45 | < | 0.84 | f | 1.25 | . | 0.23 | f | 0.25 | f | 0.94 | < |
| NF14 | 42.38767 | 70.82400 | 34 | 16–AUG–93 | S93030105 | 0.50 | f | 0.14 | f | 0.29 | < | 0.69 | < | 0.43 | . | 0.79 | < | 0.37 | < | 0.60 | < |
| NF14 | 42.38767 | 70.82400 | 34.5 | 16–AUG–93 | S93030103 | 0.80 | f | 0.07 | f | 0.27 | < | 0.66 | < | 0.53 | . | 0.75 | < | 0.35 | < | 0.57 | < |
| NF16 | 42.37767 | 70.83800 | 34 | 19–AUG–93 | S93030393 | 0.96 | f | 0.06 | f | 0.33 | < | 0.67 | f | 0.70 | . | 0.90 | < | 0.43 | < | 0.70 | < |
| NF16 | 42.37767 | 70.83800 | 34 | 19–AUG–93 | S93030397 | 2.00 | . | 0.10 | f | 0.35 | < | 0.34 | f | 0.74 | . | 0.04 | f | 0.09 | f | 0.72 | < |
| NF17 | 42.38150 | 70.81467 | 32 | 16–AUG–93 | S93030090 | 0.12 | f | 0.02 | f | 0.31 | < | 0.74 | < | 0.18 | f | 0.84 | < | 0.03 | f | 0.65 | < |
| NF17 | 42.38150 | 70.81467 | 32.5 | 16–AUG–93 | S93030088 | 0.18 | f | 0.02 | f | 0.30 | < | 0.72 | < | 0.26 | f | 0.82 | < | 0.39 | < | 0.63 | < |
| NF2 | 42.33783 | 70.82883 | 29.5 | 19–AUG–93 | S93030372 | 0.22 | f | 0.01 | f | 0.31 | < | 0.31 | f | 0.36 | . | 0.84 | < | 0.29 | f | 0.65 | < |
| NF2 | 42.33783 | 70.82883 | 30 | 19–AUG–93 | S93030375 | 0.27 | f | 0.04 | f | 0.31 | < | 0.08 | f | 0.31 | f | 0.83 | < | 0.13 | f | 0.64 | < |
| NF4 | 42.41550 | 70.80600 | 38 | 15–AUG–93 | S93030010 | 1.96 | . | 0.08 | f | 0.31 | < | 0.05 | f | 0.89 | . | 0.84 | < | 0.40 | < | 0.65 | < |
| NF4 | 42.41550 | 70.80600 | 38 | 15–AUG–93 | S93030012 | 0.56 | f | 0.19 | f | 0.29 | < | 0.70 | < | 0.50 | . | 0.79 | < | 0.04 | f | 0.61 | < |
| NF8 | 42.40017 | 70.86383 | 30.5 | 15–AUG–93 | S93030029 | 3.50 | . | 0.09 | f | 0.40 | < | 0.60 | f | 1.65 | . | 0.23 | f | 5.42 | . | 0.83 | < |
| NF8 | 42.40017 | 70.86383 | 30.5 | 15–AUG–93 | S93030031 | 5.90 | . | 0.17 | f | 0.54 | < | 0.37 | f | 1.61 | . | 0.71 | f | 1.64 | . | 1.12 | < |
| NF9 | 42.40100 | 70.84550 | 30.5 | 15–AUG–93 | S93030043 | 1.52 | . | 0.49 | . | 0.35 | < | 0.83 | < | 1.06 | . | 0.95 | < | 0.17 | f | 0.73 | < |
| NF9 | 42.40100 | 70.84550 | 31 | 15–AUG–93 | S93030045 | 1.63 | . | 0.45 | f | 0.33 | < | 0.23 | f | 1.11 | . | 0.91 | < | 0.43 | < | 0.70 | < |

Description of Qualifiers:

f = reported value below method detection limit

< = reported value is the method detection limit

x = matrix interference

Massachusetts Water Resources Authority
1993 Sediment Chemistry – Task 12
Product Number S9398PST.WK1

| Station | Latitude | Longitude | Sample Depth(m) | Sample Date | Sample ID | CL4(44) ng/g dry wt | | HEPTACHLOREPC ng/g dry wt | | CL4(66) ng/g dry wt | | 2,4-DDE ng/g dry wt | | CL5(101) ng/g dry wt | | CIS-CHLORDA ng/g dry wt | | TRANS-NONACL( ng/g dry wt | | DIELDRIN ng/g dry wt | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FF1 | 42.46650 | 70.62233 | 84 | 17-AUG-93 | S93030200 | 0.51 | f | 1.39 | < | 0.81 | f | 0.82 | f | 1.39 | f | 1.18 | < | 1.27 | < | 1.35 | . |
| FF1 | 42.46650 | 70.62233 | 84.5 | 17-AUG-93 | S93030198 | 0.70 | f | 1.61 | < | 0.86 | f | 1.13 | < | 1.03 | f | 1.00 | f | 1.47 | < | 1.21 | f |
| FF10 | 42.41383 | 70.87917 | 29 | 16-AUG-93 | S93030151 | 1.17 | < | 0.80 | < | 0.75 | < | 0.56 | < | 0.49 | f | 0.68 | < | 0.34 | f | 0.65 | f |
| FF10 | 42.41383 | 70.87917 | 29 | 16-AUG-93 | S93030153 | 1.17 | < | 0.80 | < | 0.76 | < | 0.56 | < | 0.34 | f | 0.68 | < | 0.73 | < | 0.66 | f |
| FF11 | 42.65883 | 70.49967 | 89.5 | 17-AUG-93 | S93030179 | 1.65 | < | 1.13 | < | 1.07 | < | 0.79 | < | 0.50 | f | 0.96 | < | 1.03 | < | 2.37 | . |
| FF11 | 42.65883 | 70.49967 | 90 | 17-AUG-93 | S93030182 | 0.40 | f | 1.10 | < | 0.65 | f | 0.77 | < | 0.94 | f | 0.93 | < | 1.00 | < | 1.02 | . |
| FF12 | 42.38933 | 70.90000 | 26 | 16-AUG-93 | S93030072 | 1.09 | < | 0.74 | < | 0.16 | f | 0.52 | < | 0.44 | f | 0.63 | < | 0.68 | < | 0.64 | < |
| FF12 | 42.38933 | 70.90000 | 26 | 16-AUG-93 | S93030074 | 0.15 | f | 0.80 | < | 0.41 | f | 0.56 | < | 0.56 | f | 0.20 | f | 0.07 | f | 0.69 | < |
| FF13 | 42.31917 | 70.82267 | 21.5 | 19-AUG-93 | S93030352 | 0.48 | f | 0.91 | < | 1.10 | . | 0.64 | < | 1.92 | . | 0.44 | f | 0.34 | f | 0.78 | f |
| FF13 | 42.31917 | 70.82267 | 21.5 | 19-AUG-93 | S93030354 | 1.39 | . | 0.79 | < | 0.65 | f | 0.56 | < | 2.71 | . | 0.25 | f | 0.29 | f | 0.68 | f |
| FF14 | 42.41717 | 70.65350 | 76 | 17-AUG-93 | S93030214 | 0.41 | f | 1.02 | < | 0.54 | f | 0.71 | < | 1.05 | f | 0.87 | < | 0.93 | < | 0.85 | f |
| FF14 | 42.41717 | 70.65350 | 76.5 | 17-AUG-93 | S93030216 | 0.41 | f | 1.16 | < | 0.45 | f | 0.81 | < | 0.85 | f | 0.31 | f | 1.06 | < | 1.02 | . |
| FF4 | 42.28983 | 70.42550 | 89 | 17-AUG-93 | S93030234 | 0.36 | f | 1.31 | < | 0.43 | f | 0.91 | < | 0.69 | f | 0.67 | f | 1.19 | < | 1.14 | . |
| FF4 | 42.28983 | 70.42550 | 89 | 17-AUG-93 | S93030237 | 0.43 | f | 1.66 | < | 0.54 | f | 1.16 | < | 0.94 | f | 1.41 | < | 1.51 | < | 1.46 | . |
| FF5 | 42.13333 | 70.42233 | 64.5 | 18-AUG-93 | S93030312 | 0.10 | f | 0.90 | < | 0.18 | f | 0.52 | f | 0.32 | f | 0.76 | < | 0.82 | < | 0.52 | f |
| FF5 | 42.13333 | 70.42233 | 65 | 18-AUG-93 | S93030310 | 0.14 | f | 0.92 | < | 0.17 | f | 0.64 | < | 0.28 | f | 0.78 | < | 0.83 | < | 0.52 | f |
| FF6 | 41.89783 | 70.40417 | 37 | 18-AUG-93 | S93030292 | 0.35 | f | 1.09 | < | 0.58 | f | 0.76 | < | 0.66 | f | 0.92 | < | 0.99 | < | 1.15 | . |
| FF6 | 41.89783 | 70.40417 | 37 | 18-AUG-93 | S93030294 | 0.25 | f | 0.93 | < | 0.52 | f | 0.65 | < | 0.51 | f | 0.79 | < | 0.85 | < | 1.25 | . |
| FF7 | 41.95767 | 70.26700 | 40 | 18-AUG-93 | S93030269 | 0.42 | f | 1.66 | < | 1.56 | < | 1.16 | < | 0.52 | f | 1.41 | < | 1.50 | < | 1.42 | f |
| FF7 | 41.95767 | 70.26700 | 40.5 | 18-AUG-93 | S93030277 | 0.36 | f | 1.27 | < | 0.41 | f | 0.89 | < | 0.72 | f | 1.08 | < | 1.16 | < | 1.10 | . |
| FF9 | 42.31217 | 70.65683 | 49 | 18-AUG-93 | S93030326 | 0.10 | f | 0.77 | < | 0.13 | f | 0.54 | < | 0.30 | f | 0.66 | < | 0.70 | < | 0.44 | f |
| FF9 | 42.31217 | 70.65683 | 49 | 18-AUG-93 | S93030328 | 0.04 | f | 0.75 | < | 0.15 | f | 0.52 | < | 0.10 | f | 0.64 | < | 0.68 | < | 0.45 | f |
| NF10 | 42.39317 | 70.83833 | 32 | 16-AUG-93 | S93030134 | 0.10 | f | 0.49 | f | 0.33 | f | 0.55 | < | 0.56 | f | 0.25 | f | 0.04 | f | 1.00 | . |
| NF10 | 42.39317 | 70.83833 | 32 | 16-AUG-93 | S93030136 | 1.14 | < | 0.78 | < | 0.24 | f | 0.55 | < | 0.58 | f | 0.20 | f | 0.08 | f | 0.67 | f |
| NF12 | 42.39033 | 70.83083 | 34 | 16-AUG-93 | S93030120 | 0.27 | f | 1.06 | < | 1.49 | . | 0.74 | < | 2.03 | . | 0.89 | f | 0.22 | f | 1.97 | . |

| | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NF12 | 42.39033 | 70.83083 | 34 | 16–AUG–93 | S93030122 | 0.17 | f | 1.04 | < | 0.62 | f | 0.73 | < | 1.05 | f | 0.65 | f | 0.17 | f | 1.12 | . |
| NF14 | 42.38767 | 70.82400 | 34 | 16–AUG–93 | S93030105 | 0.98 | < | 0.67 | < | 0.27 | f | 0.47 | < | 0.22 | f | 0.66 | . | 0.03 | f | 1.17 | . |
| NF14 | 42.38767 | 70.82400 | 34.5 | 16–AUG–93 | S93030103 | 0.93 | < | 0.63 | < | 0.49 | f | 0.44 | < | 0.37 | f | 0.33 | f | 0.21 | f | 1.23 | . |
| NF16 | 42.37767 | 70.83800 | 34 | 19–AUG–93 | S93030393 | 1.12 | < | 0.77 | < | 0.31 | f | 0.54 | < | 0.42 | f | 0.11 | f | 0.07 | f | 0.78 | . |
| NF16 | 42.37767 | 70.83800 | 34 | 19–AUG–93 | S93030397 | 0.15 | f | 0.80 | < | 0.65 | f | 0.56 | < | 0.70 | f | 0.30 | f | 0.11 | f | 1.22 | . |
| NF17 | 42.38150 | 70.81467 | 32 | 16–AUG–93 | S93030090 | 0.11 | f | 0.72 | < | 0.06 | f | 0.50 | < | 0.10 | f | 0.61 | < | 0.65 | < | 0.21 | f |
| NF17 | 42.38150 | 70.81467 | 32.5 | 16–AUG–93 | S93030088 | 1.01 | < | 0.69 | < | 0.11 | f | 0.48 | < | 0.06 | f | 0.59 | < | 0.63 | < | 0.28 | f |
| NF2 | 42.33783 | 70.82883 | 29.5 | 19–AUG–93 | S93030372 | 0.07 | f | 0.72 | < | 0.68 | < | 0.11 | f | 0.08 | f | 0.05 | f | 0.65 | < | 0.62 | < |
| NF2 | 42.33783 | 70.82883 | 30 | 19–AUG–93 | S93030375 | 0.07 | f | 0.71 | < | 0.67 | < | 0.06 | f | 0.08 | f | 0.03 | f | 0.64 | < | 0.61 | < |
| NF4 | 42.41550 | 70.80600 | 38 | 15–AUG–93 | S93030010 | 0.08 | f | 0.72 | < | 0.68 | < | 0.13 | f | 0.10 | f | 0.07 | f | 0.03 | f | 0.62 | < |
| NF4 | 42.41550 | 70.80600 | 38 | 15–AUG–93 | S93030012 | 0.03 | f | 0.67 | < | 0.64 | < | 0.39 | f | 0.11 | f | 0.03 | f | 0.61 | < | 0.58 | < |
| NF8 | 42.40017 | 70.86383 | 30.5 | 15–AUG–93 | S93030029 | 0.46 | f | 0.92 | < | 1.20 | . | 0.64 | < | 2.38 | . | 0.82 | . | 0.26 | f | 0.96 | . |
| NF8 | 42.40017 | 70.86383 | 30.5 | 15–AUG–93 | S93030031 | 0.95 | f | 1.24 | < | 2.72 | . | 0.87 | < | 5.28 | . | 1.43 | . | 0.65 | f | 4.04 | . |
| NF9 | 42.40100 | 70.84550 | 30.5 | 15–AUG–93 | S93030043 | 0.20 | f | 0.81 | < | 0.32 | f | 0.56 | < | 0.64 | f | 0.68 | < | 0.08 | f | 0.95 | . |
| NF9 | 42.40100 | 70.84550 | 31 | 15–AUG–93 | S93030045 | 0.14 | f | 0.61 | f | 0.29 | f | 0.54 | < | 0.63 | f | 0.66 | < | 0.70 | < | 1.10 | . |

Description of Qualifiers:

f = reported value below method detection limit

< = reported value is the method detection limit

x = matrix interference

Massachusetts Water Resources Authority
1993 Sediment Chemistry – Task 12
Product Number S9398PST.WK1

| Station | Latitude | Longitude | Sample Depth(m) | Sample Date | Sample ID | 4,4-DDE ng/g dry wt | | CL4(77) ng/g dry wt | | 2,4-DDD ng/g dry wt | | ENDRIN ng/g dry wt | | CL5(118) ng/g dry wt | | 4,4-DDD ng/g dry wt | | 2,4-DDT ng/g dry wt | | CL6(153) ng/g dry wt | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FF1 | 42.46650 | 70.62233 | 84 | 17-AUG-93 | S93030200 | 1.63 | . | 1.81 | < | 1.50 | < | 3.45 | < | 2.35 | . | 2.64 | . | 1.11 | < | 1.80 | f |
| FF1 | 42.46650 | 70.62233 | 84.5 | 17-AUG-93 | S93030198 | 1.11 | . | 2.10 | < | 1.73 | < | 3.99 | < | 1.72 | . | 1.86 | f | 1.28 | < | 1.19 | f |
| FF10 | 42.41383 | 70.87917 | 29 | 16-AUG-93 | S93030151 | 0.65 | . | 1.04 | < | 0.40 | f | 1.98 | < | 0.80 | . | 0.77 | f | 0.63 | < | 1.11 | f |
| FF10 | 42.41383 | 70.87917 | 29 | 16-AUG-93 | S93030153 | 0.50 | . | 1.04 | < | 0.34 | f | 1.98 | < | 0.89 | . | 0.84 | f | 0.64 | < | 0.77 | f |
| FF11 | 42.65883 | 70.49967 | 89.5 | 17-AUG-93 | S93030179 | 1.05 | . | 1.47 | < | 0.77 | f | 2.79 | < | 0.98 | f | 2.46 | . | 0.90 | < | 0.84 | f |
| FF11 | 42.65883 | 70.49967 | 90 | 17-AUG-93 | S93030182 | 1.54 | . | 1.43 | < | 0.98 | f | 2.72 | < | 1.60 | . | 2.75 | . | 0.87 | < | 0.94 | f |
| FF12 | 42.38933 | 70.90000 | 26 | 16-AUG-93 | S93030072 | 0.48 | . | 0.97 | < | 0.20 | f | 1.84 | < | 0.92 | . | 0.53 | f | 0.59 | < | 0.64 | f |
| FF12 | 42.38933 | 70.90000 | 26 | 16-AUG-93 | S93030074 | 0.93 | . | 1.03 | < | 0.52 | f | 1.97 | < | 1.29 | . | 0.81 | f | 0.63 | < | 1.11 | f |
| FF13 | 42.31917 | 70.82267 | 21.5 | 19-AUG-93 | S93030352 | 1.45 | . | 1.18 | < | 0.69 | f | 2.25 | < | 3.99 | . | 1.27 | . | 0.72 | < | 3.21 | . |
| FF13 | 42.31917 | 70.82267 | 21.5 | 19-AUG-93 | S93030354 | 0.90 | . | 1.03 | < | 0.42 | f | 1.96 | < | 5.23 | . | 0.90 | f | 0.63 | < | 4.87 | . |
| FF14 | 42.41717 | 70.65350 | 76 | 17-AUG-93 | S93030214 | 1.12 | . | 1.33 | < | 0.75 | f | 2.52 | < | 1.61 | . | 1.61 | . | 0.81 | < | 1.67 | f |
| FF14 | 42.41717 | 70.65350 | 76.5 | 17-AUG-93 | S93030216 | 1.12 | . | 1.51 | < | 0.60 | f | 2.87 | < | 1.57 | . | 1.90 | . | 0.92 | < | 1.64 | f |
| FF4 | 42.28983 | 70.42550 | 89 | 17-AUG-93 | S93030234 | 1.48 | . | 1.70 | < | 0.94 | f | 3.23 | < | 1.98 | . | 2.65 | . | 1.04 | < | 1.40 | f |
| FF4 | 42.28983 | 70.42550 | 89 | 17-AUG-93 | S93030237 | 1.29 | . | 2.15 | < | 0.57 | f | 4.10 | < | 1.97 | . | 2.19 | . | 1.32 | < | 1.44 | f |
| FF5 | 42.13333 | 70.42233 | 64.5 | 18-AUG-93 | S93030312 | 0.45 | f | 1.17 | < | 0.17 | f | 2.22 | < | 0.82 | f | 0.70 | f | 0.71 | < | 0.43 | f |
| FF5 | 42.13333 | 70.42233 | 65 | 18-AUG-93 | S93030310 | 0.59 | . | 1.19 | < | 0.35 | f | 2.27 | < | 1.11 | . | 0.93 | f | 0.73 | < | 0.61 | f |
| FF6 | 41.89783 | 70.40417 | 37 | 18-AUG-93 | S93030292 | 1.21 | . | 1.41 | < | 0.74 | f | 2.69 | < | 2.92 | . | 2.25 | . | 0.86 | < | 1.62 | f |
| FF6 | 41.89783 | 70.40417 | 37 | 18-AUG-93 | S93030294 | 0.71 | . | 1.21 | < | 0.36 | f | 2.31 | < | 1.36 | . | 1.55 | . | 0.74 | < | 0.96 | f |
| FF7 | 41.95767 | 70.26700 | 40 | 18-AUG-93 | S93030269 | 1.13 | . | 2.15 | < | 1.78 | < | 4.09 | < | 1.61 | . | 1.75 | f | 1.31 | < | 1.01 | f |
| FF7 | 41.95767 | 70.26700 | 40.5 | 18-AUG-93 | S93030277 | 1.56 | . | 1.65 | < | 1.23 | f | 3.15 | < | 2.82 | . | 2.05 | . | 1.01 | < | 1.60 | f |
| FF9 | 42.31217 | 70.65683 | 49 | 18-AUG-93 | S93030326 | 0.28 | f | 1.00 | < | 0.50 | f | 1.91 | < | 0.81 | . | 0.71 | f | 0.61 | < | 0.39 | f |
| FF9 | 42.31217 | 70.65683 | 49 | 18-AUG-93 | S93030328 | 0.20 | f | 0.97 | < | 0.80 | < | 1.85 | < | 0.49 | f | 0.45 | f | 0.59 | < | 0.27 | f |
| NF10 | 42.39317 | 70.83833 | 32 | 16-AUG-93 | S93030134 | 0.99 | . | 1.02 | < | 0.32 | f | 1.94 | < | 1.13 | . | 0.73 | f | 0.62 | < | 0.78 | f |
| NF10 | 42.39317 | 70.83833 | 32 | 16-AUG-93 | S93030136 | 1.01 | . | 1.01 | < | 1.08 | . | 1.93 | < | 1.21 | . | 0.86 | f | 0.62 | < | 0.93 | f |
| NF12 | 42.39033 | 70.83083 | 34 | 16-AUG-93 | S93030120 | 3.85 | . | 1.38 | < | 2.64 | . | 2.62 | < | 5.58 | . | 3.67 | . | 0.84 | < | 4.66 | . |

Massachusetts Water Resources Authority

1993 Sediment Chemistry – Task 12

Product Number S9398PST.WK1

| | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NF12 | 42.39033 | 70.83083 | 34 | 16-AUG-93 | S93030122 | 2.73 | . | 1.35 | < | 1.93 | . | 2.56 | < | 4.87 | . | 2.63 | . | 0.82 | < | 3.35 | . |
| NF14 | 42.38767 | 70.82400 | 34 | 16-AUG-93 | S93030105 | 0.47 | . | 0.87 | < | 0.44 | f | 1.65 | < | 0.36 | f | 0.40 | f | 0.53 | < | 0.24 | f |
| NF14 | 42.38767 | 70.82400 | 34.5 | 16-AUG-93 | S93030103 | 0.63 | . | 0.82 | < | 0.46 | f | 1.57 | < | 0.58 | f | 0.50 | f | 0.50 | < | 0.38 | f |
| NF16 | 42.37767 | 70.83800 | 34 | 19-AUG-93 | S93030393 | 0.52 | . | 1.00 | < | 0.45 | f | 1.90 | < | 0.60 | f | 0.52 | f | 0.61 | < | 0.56 | f |
| NF16 | 42.37767 | 70.83800 | 34 | 19-AUG-93 | S93030397 | 1.47 | . | 1.04 | < | 1.10 | . | 1.97 | < | 2.38 | . | 1.36 | . | 0.63 | < | 1.62 | . |
| NF17 | 42.38150 | 70.81467 | 32 | 16-AUG-93 | S93030090 | 0.10 | f | 0.93 | < | 0.10 | f | 1.77 | < | 0.15 | f | 0.07 | f | 0.57 | < | 0.11 | f |
| NF17 | 42.38150 | 70.81467 | 32.5 | 16-AUG-93 | S93030088 | 0.12 | f | 0.90 | < | 0.75 | < | 1.71 | < | 0.15 | f | 0.10 | f | 0.55 | < | 0.08 | f |
| NF2 | 42.33783 | 70.82883 | 29.5 | 19-AUG-93 | S93030372 | 0.09 | f | 0.93 | < | 0.16 | f | 1.77 | < | 0.13 | f | 0.10 | f | 0.57 | < | 0.13 | f |
| NF2 | 42.33783 | 70.82883 | 30 | 19-AUG-93 | S93030375 | 0.10 | f | 0.92 | < | 0.09 | f | 1.75 | < | 0.14 | f | 0.10 | f | 0.56 | < | 0.15 | f |
| NF4 | 42.41550 | 70.80600 | 38 | 15-AUG-93 | S93030010 | 0.33 | f | 0.93 | < | 0.29 | f | 1.77 | < | 0.34 | f | 0.13 | f | 0.57 | < | 0.14 | f |
| NF4 | 42.41550 | 70.80600 | 38 | 15-AUG-93 | S93030012 | 0.30 | f | 0.88 | < | 0.11 | f | 1.67 | < | 0.21 | f | 0.16 | f | 0.54 | < | 0.11 | f |
| NF8 | 42.40017 | 70.86383 | 30.5 | 15-AUG-93 | S93030029 | 3.40 | . | 1.19 | < | 2.56 | . | 2.26 | < | 6.54 | . | 4.38 | . | 0.73 | < | 5.33 | . |
| NF8 | 42.40017 | 70.86383 | 30.5 | 15-AUG-93 | S93030031 | 6.84 | . | 1.61 | < | 5.77 | . | 3.07 | < | 14.46 | . | 10.15 | . | 0.36 | f | 15.92 | . |
| NF9 | 42.40100 | 70.84550 | 30.5 | 15-AUG-93 | S93030043 | 1.21 | . | 1.05 | < | 0.55 | f | 1.99 | < | 1.40 | . | 0.92 | f | 0.64 | < | 1.03 | f |
| NF9 | 42.40100 | 70.84550 | 31 | 15-AUG-93 | S93030045 | 1.01 | . | 1.00 | < | 0.35 | f | 1.91 | < | 0.95 | . | 0.72 | f | 0.61 | < | 1.04 | f |

Description of Qualifiers:

f = reported value below method detection limit

< = reported value is the method detection limit

x = matrix interference

Massachusetts Water Resources Authority

1993 Sediment Chemistry – Task 12

Product Number S9398PST.WK1

| Station | Latitude | Longitude | Sample Depth(m) | Sample Date | Sample ID | CL5(105) ng/g dry wt | | 4,4–DDT ng/g dry wt | | CL6(138) ng/g dry wt | | CL5(126) ng/g dry wt | | CL7(187) ng/g dry wt | | CL6(128) ng/g dry wt | | CL7(180) ng/g dry wt | | MIREX ng/g dry wt | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FF1 | 42.46650 | 70.62233 | 84 | 17–AUG–93 | S93030200 | 1.90 | . | 1.89 | < | 3.99 | . | 1.83 | < | 0.78 | f | 0.96 | f | 1.05 | f | 1.50 | < |
| FF1 | 42.46650 | 70.62233 | 84.5 | 17–AUG–93 | S93030198 | 0.85 | f | 2.19 | < | 3.68 | . | 2.11 | < | 0.51 | f | 0.64 | f | 0.71 | f | 1.73 | < |
| FF10 | 42.41383 | 70.87917 | 29 | 16–AUG–93 | S93030151 | 0.74 | f | 1.08 | < | 2.88 | . | 1.05 | < | 0.35 | f | 0.40 | f | 0.21 | f | 0.86 | < |
| FF10 | 42.41383 | 70.87917 | 29 | 16–AUG–93 | S93030153 | 1.12 | . | 1.09 | < | 1.42 | . | 1.05 | < | 0.25 | f | 0.46 | f | 0.43 | f | 0.86 | < |
| FF11 | 42.65883 | 70.49967 | 89.5 | 17–AUG–93 | S93030179 | 0.23 | f | 1.53 | < | 1.91 | . | 1.48 | < | 0.20 | f | 0.44 | f | 0.59 | f | 1.21 | < |
| FF11 | 42.65883 | 70.49967 | 90 | 17–AUG–93 | S93030182 | 0.80 | f | 1.49 | < | 2.22 | . | 1.44 | < | 0.33 | f | 1.19 | . | 0.67 | f | 1.18 | < |
| FF12 | 42.38933 | 70.90000 | 26 | 16–AUG–93 | S93030072 | 0.60 | f | 1.01 | < | 2.19 | . | 0.97 | < | 0.52 | f | 0.19 | f | 0.59 | f | 0.80 | < |
| FF12 | 42.38933 | 70.90000 | 26 | 16–AUG–93 | S93030074 | 0.48 | f | 1.08 | < | 3.47 | . | 1.04 | < | 0.54 | f | 1.24 | . | 0.89 | . | 0.86 | < |
| FF13 | 42.31917 | 70.82267 | 21.5 | 19–AUG–93 | S93030352 | 4.05 | . | 1.23 | < | 8.91 | . | 1.19 | < | 1.59 | . | 0.55 | f | 1.90 | . | 0.98 | < |
| FF13 | 42.31917 | 70.82267 | 21.5 | 19–AUG–93 | S93030354 | 3.63 | . | 1.08 | < | 9.13 | . | 1.04 | < | 1.08 | . | 1.24 | . | 1.96 | . | 0.85 | < |
| FF14 | 42.41717 | 70.65350 | 76 | 17–AUG–93 | S93030214 | 0.84 | f | 1.38 | < | 2.83 | . | 1.34 | < | 0.64 | f | 0.57 | f | 1.11 | . | 1.10 | < |
| FF14 | 42.41717 | 70.65350 | 76.5 | 17–AUG–93 | S93030216 | 0.44 | f | 1.58 | < | 2.68 | . | 1.52 | < | 0.74 | f | 0.53 | f | 1.39 | . | 1.25 | < |
| FF4 | 42.28983 | 70.42550 | 89 | 17–AUG–93 | S93030234 | 1.82 | . | 1.77 | < | 3.12 | . | 1.71 | < | 0.65 | f | 0.46 | f | 0.79 | f | 1.41 | < |
| FF4 | 42.28983 | 70.42550 | 89 | 17–AUG–93 | S93030237 | 0.78 | f | 2.25 | < | 3.16 | . | 2.17 | < | 0.57 | f | 0.43 | f | 0.75 | f | 1.78 | < |
| FF5 | 42.13333 | 70.42233 | 64.5 | 18–AUG–93 | S93030312 | 0.90 | f | 1.22 | < | 1.34 | . | 1.18 | < | 0.19 | f | 0.14 | f | 0.19 | f | 0.97 | < |
| FF5 | 42.13333 | 70.42233 | 65 | 18–AUG–93 | S93030310 | 1.69 | . | 1.25 | < | 2.20 | . | 1.20 | < | 0.25 | f | 0.18 | f | 0.31 | f | 0.99 | < |
| FF6 | 41.89783 | 70.40417 | 37 | 18–AUG–93 | S93030292 | 2.91 | . | 1.47 | < | 4.48 | . | 1.42 | < | 0.79 | f | 0.47 | f | 0.90 | f | 1.17 | < |
| FF6 | 41.89783 | 70.40417 | 37 | 18–AUG–93 | S93030294 | 0.24 | f | 1.26 | < | 2.11 | . | 1.22 | < | 0.34 | f | 0.30 | f | 0.48 | f | 1.00 | < |
| FF7 | 41.95767 | 70.26700 | 40 | 18–AUG–93 | S93030269 | 1.27 | f | 2.24 | < | 2.69 | . | 2.17 | < | 0.26 | f | 1.24 | < | 0.30 | f | 1.78 | < |
| FF7 | 41.95767 | 70.26700 | 40.5 | 18–AUG–93 | S93030277 | 1.24 | f | 1.73 | < | 3.23 | . | 1.67 | < | 0.39 | f | 0.33 | f | 0.55 | f | 1.37 | < |
| FF9 | 42.31217 | 70.65683 | 49 | 18–AUG–93 | S93030326 | 0.76 | f | 1.05 | < | 1.35 | . | 1.01 | < | 0.19 | f | 0.14 | f | 0.23 | f | 0.83 | < |
| FF9 | 42.31217 | 70.65683 | 49 | 18–AUG–93 | S93030328 | 0.19 | f | 1.01 | < | 1.03 | . | 0.98 | < | 0.14 | f | 0.12 | f | 0.24 | f | 0.80 | < |
| NF10 | 42.39317 | 70.83833 | 32 | 16–AUG–93 | S93030134 | 1.08 | . | 0.40 | f | 2.21 | . | 1.03 | < | 0.55 | f | 1.09 | . | 0.78 | f | 0.84 | < |
| NF10 | 42.39317 | 70.83833 | 32 | 16–AUG–93 | S93030136 | 1.47 | . | 0.36 | f | 2.68 | . | 1.02 | < | 0.70 | f | 1.08 | . | 1.21 | . | 0.84 | < |
| NF12 | 42.39033 | 70.83083 | 34 | 16–AUG–93 | S93030120 | 6.70 | . | 1.34 | f | 10.09 | . | 1.39 | < | 4.02 | . | 11.37 | . | 5.45 | . | 1.14 | < |

| | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NF12 | 42.39033 | 70.83083 | 34 | 16-AUG-93 | S93030122 | 9.66 | . | 0.46 | f | 9.76 | . | 1.36 | < | 1.70 | . | 2.50 | . | 3.05 | . | 1.11 | < |
| NF14 | 42.38767 | 70.82400 | 34 | 16-AUG-93 | S93030105 | 0.12 | f | 0.91 | < | 0.80 | . | 0.88 | < | 0.45 | f | 0.23 | f | 0.16 | f | 0.72 | < |
| NF14 | 42.38767 | 70.82400 | 34.5 | 16-AUG-93 | S93030103 | 0.20 | f | 0.86 | < | 1.22 | . | 0.83 | < | 0.32 | f | 0.38 | f | 0.30 | f | 0.87 | . |
| NF16 | 42.37767 | 70.83800 | 34 | 19-AUG-93 | S93030393 | 1.12 | . | 1.04 | < | 1.96 | . | 1.01 | < | 0.25 | f | 0.37 | f | 0.48 | f | 0.83 | < |
| NF16 | 42.37767 | 70.83800 | 34 | 19-AUG-93 | S93030397 | 4.89 | . | 0.45 | f | 4.67 | . | 1.05 | < | 0.76 | f | 2.47 | . | 1.43 | . | 0.94 | . |
| NF17 | 42.38150 | 70.81467 | 32 | 16-AUG-93 | S93030090 | 0.06 | f | 0.08 | f | 0.32 | f | 0.94 | < | 0.02 | f | 0.04 | f | 0.02 | f | 0.77 | < |
| NF17 | 42.38150 | 70.81467 | 32.5 | 16-AUG-93 | S93030088 | 0.02 | f | 0.94 | < | 0.31 | f | 0.91 | < | 0.02 | f | 0.04 | f | 0.03 | f | 0.75 | < |
| NF2 | 42.33783 | 70.82883 | 29.5 | 19-AUG-93 | S93030372 | 0.05 | f | 0.97 | < | 0.48 | f | 0.94 | < | 0.05 | f | 0.02 | f | 0.08 | f | 0.77 | < |
| NF2 | 42.33783 | 70.82883 | 30 | 19-AUG-93 | S93030375 | 0.06 | f | 0.15 | f | 0.47 | f | 0.93 | < | 0.07 | f | 0.03 | f | 0.12 | f | 0.76 | < |
| NF4 | 42.41550 | 70.80600 | 38 | 15-AUG-93 | S93030010 | 0.03 | f | 0.13 | f | 0.48 | f | 0.94 | < | 0.11 | f | 0.07 | f | 0.14 | f | 0.77 | < |
| NF4 | 42.41550 | 70.80600 | 38 | 15-AUG-93 | S93030012 | 0.87 | < | 0.12 | f | 0.61 | f | 0.88 | < | 0.05 | f | 0.04 | f | 0.11 | f | 0.72 | < |
| NF8 | 42.40017 | 70.86383 | 30.5 | 15-AUG-93 | S93030029 | 6.49 | . | 0.94 | f | 13.41 | . | 1.20 | < | 2.36 | . | 4.56 | . | 4.21 | . | 0.98 | < |
| NF8 | 42.40017 | 70.86383 | 30.5 | 15-AUG-93 | S93030031 | 9.89 | . | 1.83 | . | 32.34 | . | 1.63 | < | 7.34 | . | 10.15 | . | 12.12 | . | 1.34 | < |
| NF9 | 42.40100 | 70.84550 | 30.5 | 15-AUG-93 | S93030043 | 1.35 | . | 0.20 | f | 2.58 | . | 1.05 | < | 0.62 | f | 1.24 | . | 1.09 | . | 0.87 | < |
| NF9 | 42.40100 | 70.84550 | 31 | 15-AUG-93 | S93030045 | 0.93 | f | 0.39 | f | 2.49 | . | 1.01 | < | 0.56 | f | 1.16 | . | 0.97 | . | 0.83 | < |

Description of Qualifiers:

f = reported value below method detection limit

< = reported value is the method detection limit

x = matrix interference

Massachusetts Water Resources Authority

1993 Sediment Chemistry – Task 12

Product Number S9398PST.WK1

| Station | Latitude | Longitude | Sample Depth(m) | Sample Date | Sample ID | CL7(170) ng/g dry wt | | CL8(195) ng/g dry wt | | CL9(206) ng/g dry wt | | CL10(209) ng/g dry wt | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FF1 | 42.46650 | 70.62233 | 84 | 17-AUG-93 | S93030200 | 1.23 | f | 0.25 | f | 0.40 | f | 0.69 | f |
| FF1 | 42.46650 | 70.62233 | 84.5 | 17-AUG-93 | S93030198 | 0.97 | f | 2.11 | < | 0.21 | f | 0.37 | f |
| FF10 | 42.41383 | 70.87917 | 29 | 16-AUG-93 | S93030151 | 0.45 | f | 1.05 | < | 1.67 | < | 1.09 | < |
| FF10 | 42.41383 | 70.87917 | 29 | 16-AUG-93 | S93030153 | 0.77 | f | 1.05 | < | 1.67 | < | 1.09 | < |
| FF11 | 42.65883 | 70.49967 | 89.5 | 17-AUG-93 | S93030179 | 0.83 | f | 1.48 | < | 2.36 | < | 1.54 | < |
| FF11 | 42.65883 | 70.49967 | 90 | 17-AUG-93 | S93030182 | 0.85 | f | 0.09 | f | 0.28 | f | 0.43 | f |
| FF12 | 42.38933 | 70.90000 | 26 | 16-AUG-93 | S93030072 | 5.41 | x | 0.04 | f | 0.08 | f | 0.28 | f |
| FF12 | 42.38933 | 70.90000 | 26 | 16-AUG-93 | S93030074 | 7.65 | x | 0.07 | f | 0.15 | f | 0.29 | f |
| FF13 | 42.31917 | 70.82267 | 21.5 | 19-AUG-93 | S93030352 | 1.36 | . | 0.33 | f | 0.37 | f | 0.39 | f |
| FF13 | 42.31917 | 70.82267 | 21.5 | 19-AUG-93 | S93030354 | 1.04 | f | 0.17 | f | 0.23 | f | 0.22 | f |
| FF14 | 42.41717 | 70.65350 | 76 | 17-AUG-93 | S93030214 | 1.07 | f | 1.34 | < | 0.22 | f | 0.29 | f |
| FF14 | 42.41717 | 70.65350 | 76.5 | 17-AUG-93 | S93030216 | 1.12 | f | 0.24 | f | 0.26 | f | 0.41 | f |
| FF4 | 42.28983 | 70.42550 | 89 | 17-AUG-93 | S93030234 | 1.62 | f | 0.11 | f | 0.34 | f | 0.47 | f |
| FF4 | 42.28983 | 70.42550 | 89 | 17-AUG-93 | S93030237 | 0.93 | f | 2.17 | < | 0.33 | f | 0.40 | f |
| FF5 | 42.13333 | 70.42233 | 64.5 | 18-AUG-93 | S93030312 | 0.42 | f | 0.07 | f | 0.06 | f | 0.12 | f |
| FF5 | 42.13333 | 70.42233 | 65 | 18-AUG-93 | S93030310 | 0.42 | f | 1.20 | < | 0.11 | f | 0.15 | f |
| FF6 | 41.89783 | 70.40417 | 37 | 18-AUG-93 | S93030292 | 1.05 | f | 0.17 | f | 0.31 | f | 0.56 | f |
| FF6 | 41.89783 | 70.40417 | 37 | 18-AUG-93 | S93030294 | 0.57 | f | 1.22 | < | 1.95 | < | 1.27 | < |
| FF7 | 41.95767 | 70.26700 | 40 | 18-AUG-93 | S93030269 | 0.74 | f | 2.17 | < | 3.45 | < | 2.26 | < |
| FF7 | 41.95767 | 70.26700 | 40.5 | 18-AUG-93 | S93030277 | 0.64 | f | 1.67 | < | 0.21 | f | 0.46 | f |
| FF9 | 42.31217 | 70.65683 | 49 | 18-AUG-93 | S93030326 | 0.34 | f | 1.01 | < | 0.10 | f | 0.08 | f |
| FF9 | 42.31217 | 70.65683 | 49 | 18-AUG-93 | S93030328 | 0.27 | f | 0.98 | < | 1.56 | < | 1.02 | < |
| NF10 | 42.39317 | 70.83833 | 32 | 16-AUG-93 | S93030134 | 4.79 | x | 0.18 | f | 0.32 | f | 0.24 | f |
| NF10 | 42.39317 | 70.83833 | 32 | 16-AUG-93 | S93030136 | 5.57 | x | 0.38 | f | 0.87 | f | 0.36 | f |
| NF12 | 42.39033 | 70.83083 | 34 | 16-AUG-93 | S93030120 | 18.87 | x | 1.55 | . | 3.89 | . | 1.04 | f |

Massachusetts Water Resources Authority

1993 Sediment Chemistry – Task 12

Product Number S9398PST.WK1

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NF12 | 42.39033 | 70.83083 | 34 | 16-AUG-93 | S93030122 | 14.38 | x | 0.79 | f | 0.96 | f | 0.54 | f |
| NF14 | 42.38767 | 70.82400 | 34 | 16-AUG-93 | S93030105 | 2.09 | x | 0.03 | f | 0.03 | f | 0.12 | f |
| NF14 | 42.38767 | 70.82400 | 34.5 | 16-AUG-93 | S93030103 | 3.06 | x | 0.06 | f | 0.06 | f | 0.12 | f |
| NF16 | 42.37767 | 70.83800 | 34 | 19-AUG-93 | S93030393 | 4.79 | x | 0.10 | f | 0.11 | f | 0.17 | f |
| NF16 | 42.37767 | 70.83800 | 34 | 19-AUG-93 | S93030397 | 8.59 | x | 0.25 | f | 0.36 | f | 0.45 | f |
| NF17 | 42.38150 | 70.81467 | 32 | 16-AUG-93 | S93030090 | 0.83 | fx | 0.94 | < | 0.01 | f | 0.98 | < |
| NF17 | 42.38150 | 70.81467 | 32.5 | 16-AUG-93 | S93030088 | 0.62 | fx | 0.91 | < | 0.10 | f | 0.94 | < |
| NF2 | 42.33783 | 70.82883 | 29.5 | 19-AUG-93 | S93030372 | 1.11 | x | 0.94 | < | 0.06 | f | 0.02 | f |
| NF2 | 42.33783 | 70.82883 | 30 | 19-AUG-93 | S93030375 | 1.17 | x | 0.93 | < | 0.03 | f | 0.02 | f |
| NF4 | 42.41550 | 70.80600 | 38 | 15-AUG-93 | S93030010 | 1.29 | x | 0.01 | f | 0.06 | f | 0.05 | f |
| NF4 | 42.41550 | 70.80600 | 38 | 15-AUG-93 | S93030012 | 1.73 | x | 0.01 | f | 0.07 | f | 0.03 | f |
| NF8 | 42.40017 | 70.86383 | 30.5 | 15-AUG-93 | S93030029 | 21.35 | x | 0.94 | f | 0.83 | f | 1.78 | . |
| NF8 | 42.40017 | 70.86383 | 30.5 | 15-AUG-93 | S93030031 | 43.50 | x | 2.40 | . | 2.93 | . | 5.80 | . |
| NF9 | 42.40100 | 70.84550 | 30.5 | 15-AUG-93 | S93030043 | 5.56 | x | 0.21 | f | 0.42 | f | 0.30 | f |
| NF9 | 42.40100 | 70.84550 | 31 | 15-AUG-93 | S93030045 | 5.45 | x | 0.23 | f | 0.44 | f | 0.28 | f |

Description of Qualifiers:

f = reported value below method detection limit

< = reported value is the method detection limit

x = matrix interference

The Massachusetts Water Resources Authority
Charlestown Navy Yard
100 First Avenue
Charlestown, MA 02129
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