

Florida Keys National Marine Sanctuary Benthic Community Assessment,  
August-September 1998

SUBMITTED TO

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## INTRODUCTION

The Florida Keys National Marine Sanctuary (NMS) region was sampled during August and September, 1998. One aspect of this evaluation was benthic community characterization, which was accomplished via sample collection by National Oceanic and Atmospheric Administration (NOAA) personnel and laboratory and data analysis by Barry A. Vittor & Associates, Inc. (BVA).

The Florida Keys NMS region and 1998 sampling stations are indicated in Figure 1.

## METHODS

### *Sample Collection And Handling*

A Young dredge (area = 0.04 m<sup>2</sup>) was used to collect replicate bottom samples at each of 20 stations in and around the Florida Keys NMS. Macroinfaunal samples were sieved through a 0.5-mm mesh screen and preserved with 10% formalin on ship. Macroinfaunal samples were transported to the BVA laboratory in Mobile, Alabama.

### *Sediment Analysis*

Sediment texture was determined at half-phi intervals using the hydrometer technique for fractions smaller than 44  $\mu$ m and nested sieves for larger particle fractions. Texture parameters that were computed included percent gravel, sand, and silt /clay. Total organic carbon (TOC) content was measured as ash-free dry weight expressed as a percentage.

### *Macroinfaunal Sample Analysis*

In the laboratory of BVA, benthic samples were inventoried, rinsed gently through a 0.5 mm mesh sieve to remove preservatives and sediment, stained with Rose Bengal, and stored in 70% isopropanol solution until processing. Sample material (sediment, detritus, organisms) was placed in white enamel trays for sorting under Wild M-5A dissecting microscopes. All macroinvertebrates were carefully removed with forceps and placed in labelled glass vials containing 70% isopropanol. Each vial represented a major taxonomic

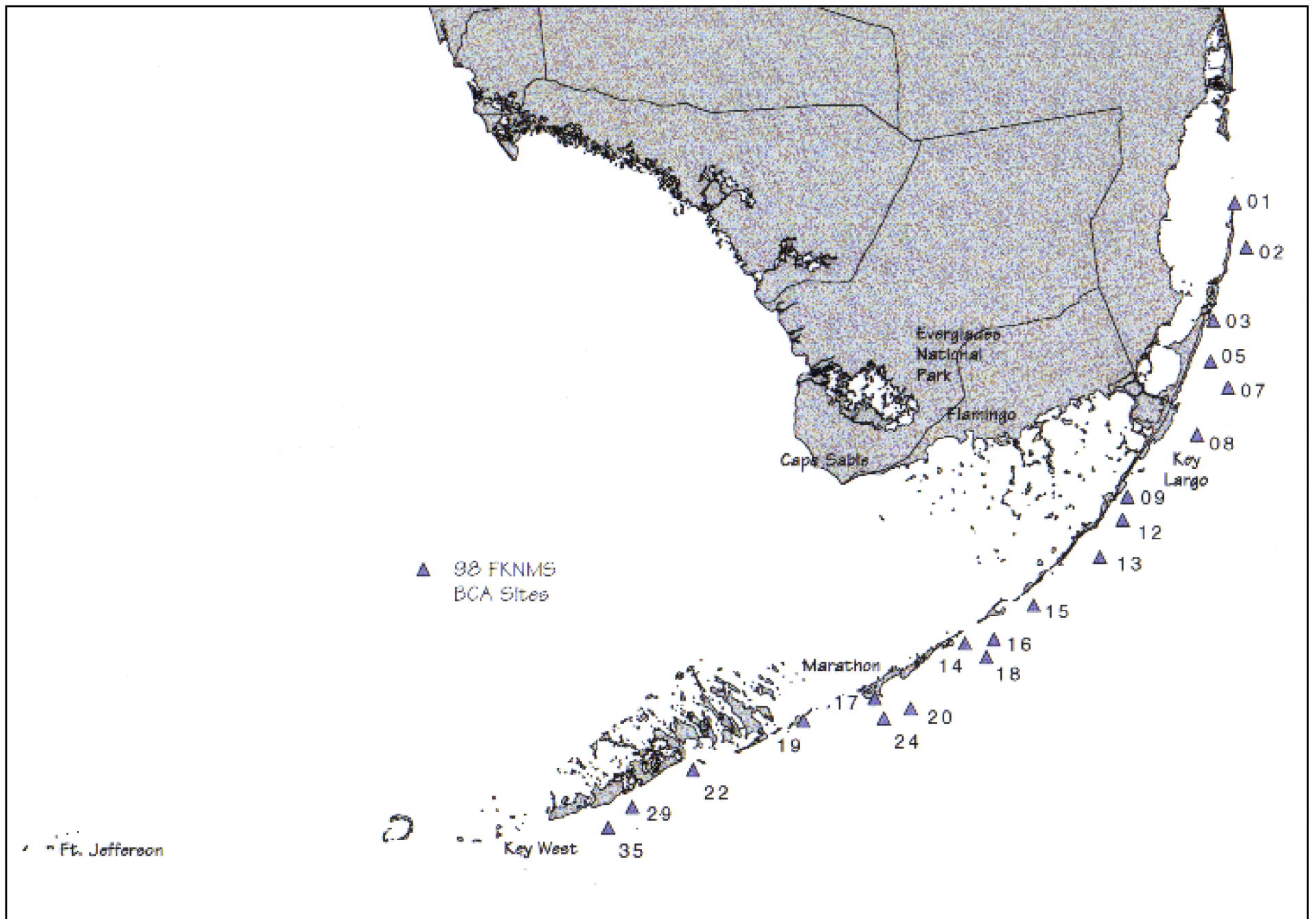


Figure 1. Area sampled for the Florida Keys NMS Stations, August-September 1998.



group (e.g. Polychaeta, Mollusca, Arthropoda). All sorted macroinvertebrates were identified to the lowest practical identification level (LPIL), which in most cases was to species level unless the specimen was a juvenile, damaged, or otherwise unidentifiable. The number of individuals of each taxon, excluding fragments, was recorded. A voucher collection was prepared, composed of representative individuals of each species not previously encountered in samples from the region.

## **DATA ANALYSIS**

All data generated as a result of laboratory analysis of macroinfauna samples were first coded on data sheets. Enumeration data were entered for each species according to station and replicate. These data were reduced to a data summary report for each station, which included a taxonomic species list and benthic community parameters information. Archive data files of species identification and enumeration were prepared.

The QA and QC reports for the Florida Keys to Dry Tortugas samples are given in the Appendix.

The analytical methodologies utilized for this study were similar to those used in similar benthic community characterization reports prepared for other state and federal agency surveys. Macroinfaunal characterization involves an evaluation of several biological community structure parameters (e.g., species abundance, species composition and species diversity indices) during initial data reduction, followed by pattern and classification analysis for delineation of taxa assemblages. Since species are distributed along environmental gradients, there are generally no distinct boundaries between communities. However, the relationships between habitats and species assemblages often reflect the interactions of physical and biological factors and indicate major ecological trends.

### ***Assemblage Structure***

Several numerical indices were chosen for analysis and interpretation of the macroinfaunal data. Selection was based primarily on the ability of the index to provide a

meaningful summary of data, as well as the applicability of the index to the characterization of the benthic community. Infaunal abundance is reported as the total number of individuals per station and the total number of individuals per square meter (= density). Taxa richness is reported as the total number and mean number of taxa represented in a given station collection.

Taxa diversity, which is often related to the ecological stability and environmental "quality" of the benthos, was estimated by the Shannon-Weaver Index (Pielou, 1966), according to the following formula:

$$H' = - \sum_{i=1}^S p_i (\ln p_i)$$

where, S = is the number of taxa in the sample,

i = is the i'th taxa in the sample, and

$p_i$  = is the number of individuals of the i'th taxa divided by the total number of individuals in the sample.

Taxa diversity within a given community is dependent upon the number of taxa present (taxa richness) and the distribution of all individuals among those taxa (equitability or evenness). In order to quantify and compare faunal equitability to taxa diversity for a given area, Pielou's Index J' (Pielou, 1966) was calculated as  $J' = H' / \ln S$ , where  $\ln S = H'_{\max}$  or the maximum possible diversity, when all taxa are represented by the same number of individuals;

thus,  $J' = H' / H'_{\max}$ .

Several stations were not sampled due to hard live bottom (corals). Due to missing station data statistical analysis was not performed on the macroinfaunal data. However, macroinfaunal data were graphically analyzed to identify any differences in density and number of taxa between stations.

## **HABITAT CHARACTERISTICS**

Location and sediment data for the 20 stations are given in Table 1 and Figures 2 and 3. Stations 1, 9, 12, 13, 14, and 15 were not sampled due to hard bottom substrate (presumably corals). Sediment composition at the 20 stations varied from 100% sand at station 8 to 34% clay at station 35 (Table 1; Figure 2). Gravel (presumably shell/coral hash)/sand were predominant at most stations, with silt/clay fractions contributing to the sediment at stations 2, 3, 5, and 35 (Figure 3). The total organic carbon (TOC) fraction of the sediment was 0.0 at all stations (Table 1).

## **BENTHIC COMMUNITY CHARACTERIZATION**

### ***Faunal Composition, Abundance, And Community Structure***

Table 2 provides a complete phylogenetic listing for all stations as well as data on taxa abundance and station occurrence. Microsoft <sup>TM</sup>Excel 5.0 (Macintosh version) spreadsheets are being provided separately to NOAA which include: raw data on taxa abundance and density by replicate, a complete taxonomic listing with station abundance and occurrence, a major taxa table with overall taxa abundance, and an assemblage parameter table including data on mean number of taxa, mean density, taxa diversity and taxa evenness by station.

A total of 8,113 organisms, representing 509 taxa, were identified from the 20 stations (Table 3). Polychaetes were the most numerous organisms present representing 50.8% of the total assemblage, followed in abundance by bivalves (10.0%), gastropods (9.4%) and malacostracans (8.5%). Polychaetes represented 38.7% of the total number of taxa followed by malacostracans (21.8%), bivalves(15.1%) and gastropods (12.0%)(Table 3).

The abundance of major taxa by station are given in Table 4. The number of taxa per station ranged from 73 at Station 17 to 182 at Station 35. The number of organisms per station ranged from 247 at Station 5 to 996 at Station 2. The percentage abundance of the major taxa at the 20 stations is given in Figure 4 and Table 4.

Table 1. Summary of location and sediment data for the Florida Keys NMS Stations, July-August 1998.

Station	Date	Longitude	Latitude	Depth (m)	Temperature	D.O.	Conductivity	Salinity	% Gravel	% Sand	% Silt	% Clay	Description	TOC
1	8/11/98	80°09.90	25°32.58	1.2	31.2	4.5	60.8	35.7	–	–	–	–	–	0.0
2	8/11/98	80°09.30	25°27.18	2.1	30.9	4.8	60.1	35.5	0.0	66.4	8.4	25.3	CLAYEY SAND	0.0
3	8/11/98	80°15.06	25°19.20	2.7	32.0	3.7	61.5	35.7	0.0	61.5	9.9	28.6	CLAYEY SAND	0.0
5	8/11/98	80°16.26	25°14.46	4.0	31.5	4.7	60.8	35.5	0.0	65.7	6.7	27.7	CLAYEY SAND	0.0
7	8/13/98	80°14.58	25°11.04	1.5	31.1	3.0	59.6	35.0	0.0	99.7	–	–	SAND	0.0
8	8/12/98	80°19.50	25°06.12	4.9	31.3	5.0	60.0	35.1	0.0	100.0	–	–	SAND	0.0
9	8/12/98	80°29.52	25°00.25	2.4	31.8	4.3	60.7	35.3	–	–	–	–	–	0.0
12	8/12/98	80°30.60	24°57.66	4.3	31.3	4.7	60.2	35.3	–	–	–	–	–	0.0
13	8/12/98	80°34.26	24°53.70	7.0	31.1	4.7	59.7	35.1	–	–	–	–	–	0.0
14	8/5/98	80°52.98	24°46.02	4.0	32.3	4.7	61.5	35.4	–	–	–	–	–	0.0
15	8/5/98	80°43.56	24°49.26	7.3	31.7	5.6	60.1	34.9	–	–	–	–	–	0.0
16	8/5/98	80°49.26	24°45.90	6.1	31.9	5.5	60.2	34.8	0.0	99.2	–	–	SAND	0.0
17	8/4/98	81°05.46	24°41.22	0.9	33.8	6.2	62.9	35.3	0.0	99.8	–	–	SAND	0.0
18	8/5/98	80°50.52	24°43.98	6.1	31.3	5.1	59.7	35	0.0	99.7	–	–	SAND	0.0
19	8/3/98	81°14.88	24°39.84	0.6	32.6	4.8	61.3	35.1	0.0	99.5	–	–	SAND	0.0
20	8/4/98	81°01.14	24°39.36	6.4	30.6	4.4	58.9	34.9	0.0	99.7	–	–	SAND	0.0
22	8/3/98	81°29.64	24°36.06	3.7	31.8	4.6	59.2	34.3	0.0	95.7	–	–	SAND	0.0
24	8/4/98	81°04.74	24°38.64	7.0	31.0	5.2	59.2	34.9	0.0	99.6	–	–	SAND	0.0
29	7/30/98	81°38.04	24°32.76	7.0	–	–	–	–	0.0	95.0	–	–	SAND	0.0
35	7/30/98	81°41.46	24°30.72	8.8	–	–	–	–	0.0	58.0	8.2	33.8	SANDY CLAY	0.0

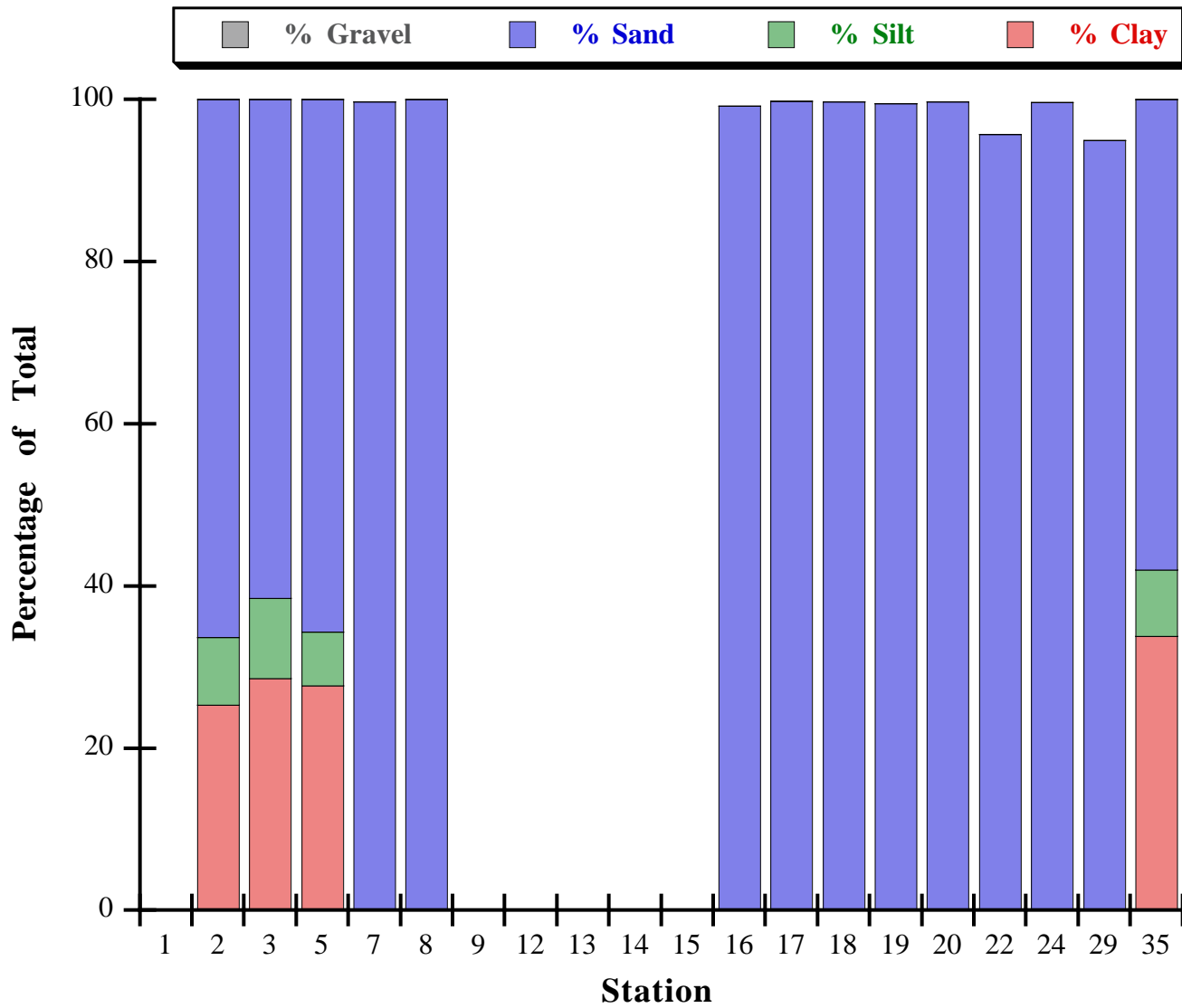


Figure 2. Sediment composition for the Florida Keys NMS Stations, July-August 1998.

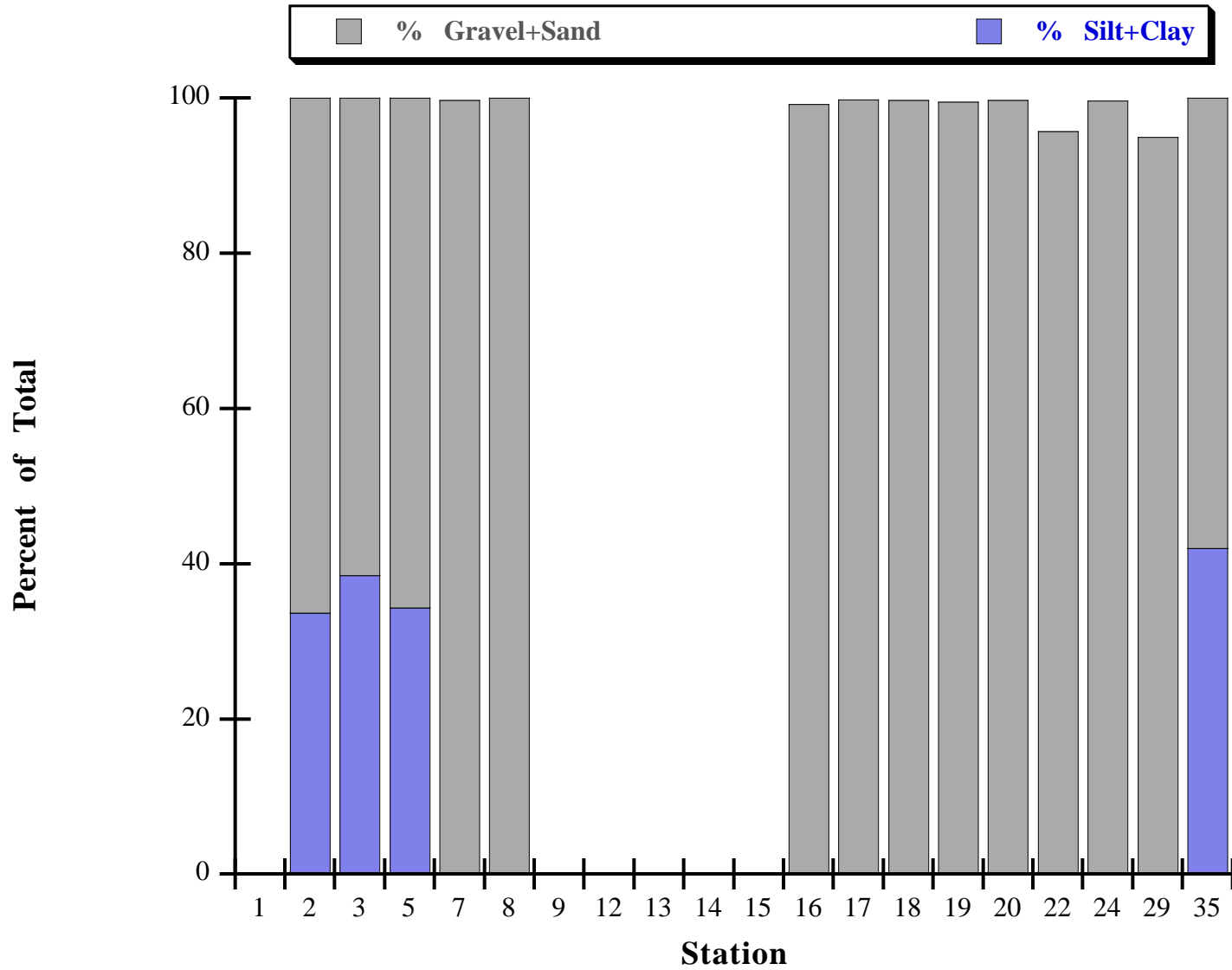


Figure 3. Percent gravel+sand and percent silt+clay content of the sediments for the Florida Keys NMS Stations, July-August 1998.

Table 2. Abundance and distribution of taxa for the Florida Keys NMS Stations, July-August 1998.

Taxonomic Name	Phylum	Class	No. of Individuals	% of Total	Cummulative %	Station Occurrence	Occurrence %
Oligochaeta (LPIL)	A	Olig	607	7.48	7.48	14	100.0
<i>Caecum nitidum</i>	M	Gast	335	4.13	11.61	9	64.3
<i>Scoletoma verrilli</i>	A	Poly	192	2.37	13.98	13	92.9
<i>Leptocheilia</i> (LPIL)	Ar	Mala	174	2.14	16.12	11	78.6
<i>Protodorvillea kefersteini</i>	A	Poly	173	2.13	18.25	11	78.6
Sipuncula (LPIL)	S		171	2.11	20.36	11	78.6
<i>Nematonereis hebes</i>	A	Poly	167	2.06	22.42	11	78.6
Rhynchozoela (LPIL)	R		157	1.94	24.36	14	100.0
Sabellidae (LPIL)	A	Poly	141	1.74	26.09	12	85.7
<i>Exogone rolani</i>	A	Poly	137	1.69	27.78	10	71.4
<i>Exogone lourei</i>	A	Poly	126	1.55	29.34	12	85.7
Syllidae (LPIL)	A	Poly	118	1.45	30.79	13	92.9
<i>Syllis cornuta</i>	A	Poly	109	1.34	32.13	14	100.0
Lumbrineridae (LPIL)	A	Poly	108	1.33	33.46	12	85.7
<i>Hesionura coineaui</i>	A	Poly	104	1.28	34.75	6	42.9
Capitellidae (LPIL)	A	Poly	100	1.23	35.98	13	92.9
<i>Haplocytheridea setipunctata</i>	Ar	Ostr	95	1.17	37.15	1	7.1
<i>Golfingia</i> sp.HH	S		86	1.06	38.21	10	71.4
<i>Opisthodonta</i> sp.B	A	Poly	84	1.04	39.25	6	42.9
<i>Lembos smithi</i>	Ar	Mala	82	1.01	40.26	3	21.4
<i>Haplosyllis spongicola</i>	A	Poly	78	0.96	41.22	5	35.7
Bivalvia (LPIL)	M	Biva	77	0.95	42.17	14	100.0
Spionidae (LPIL)	A	Poly	69	0.85	43.02	10	71.4
<i>Schistomeringos pectinata</i>	A	Poly	68	0.84	43.86	12	85.7
<i>Lima pellucida</i>	M	Biva	68	0.84	44.69	4	28.6
<i>Plakosyllis quadrioculata</i>	A	Poly	67	0.83	45.52	4	28.6
<i>Caulleriella</i> cf. <i>alata</i>	A	Poly	65	0.80	46.32	10	71.4
Lucinidae (LPIL)	M	Biva	63	0.78	47.10	10	71.4
<i>Monticellina dorsobranchialis</i>	A	Poly	63	0.78	47.87	6	42.9
Maldanidae (LPIL)	A	Poly	63	0.78	48.65	10	71.4
<i>Ceratonereis mirabilis</i>	A	Poly	59	0.73	49.38	11	78.6

Table 2. Continued:

<b>Taxonomic Name</b>	<b>Phylum</b>	<b>Class</b>	<b>No. of Individuals</b>	<b>% of Total</b>	<b>Cummulative %</b>	<b>Station Occurrence</b>	<b>Occurrence %</b>
<i>Synasterope setisparsa</i>	Ar	Ostr	59	0.73	50.10	5	35.7
Terebellidae (LPIL)	A	Poly	58	0.71	50.82	11	78.6
<i>Tubulanus</i> (LPIL)	R	Anop	58	0.71	51.53	9	64.3
<i>Caecum pulchellum</i>	M	Gast	57	0.70	52.24	9	64.3
<i>Cylindrobulla beauui</i>	M	Gast	57	0.70	52.94	5	35.7
<i>Harbansus paucichelatus</i>	Ar	Ostr	56	0.69	53.63	6	42.9
<i>Dentatisyllis carolinae</i>	A	Poly	55	0.68	54.31	9	64.3
<i>Scoloplos rubra</i>	A	Poly	54	0.67	54.97	5	35.7
Nereididae (LPIL)	A	Poly	53	0.65	55.63	11	78.6
<i>Aricidea taylora</i>	A	Poly	53	0.65	56.28	9	64.3
<i>Ceratocephale oculata</i>	A	Poly	53	0.65	56.93	10	71.4
<i>Pitar fulminatus</i>	M	Biva	52	0.64	57.57	5	35.7
<i>Notomastus latericeus</i>	A	Poly	52	0.64	58.22	11	78.6
<i>Solemya occidentalis</i>	M	Biva	50	0.62	58.83	4	28.6
<i>Prionospio</i> (LPIL)	A	Poly	48	0.59	59.42	11	78.6
<i>Scoletoma ernesti</i>	A	Poly	47	0.58	60.00	5	35.7
Cirratulidae (LPIL)	A	Poly	46	0.57	60.57	10	71.4
<i>Aricidea</i> (LPIL)	A	Poly	45	0.55	61.12	11	78.6
Cerithiidae (LPIL)	M	Gast	45	0.55	61.68	7	50.0
<i>Prionospio cristata</i>	A	Poly	45	0.55	62.23	9	64.3
Ophiuroidea (LPIL)	E	Ophi	45	0.55	62.79	8	57.1
<i>Alvania auberiana</i>	M	Gast	44	0.54	63.33	5	35.7
<i>Questa caudicirra</i>	A	Poly	44	0.54	63.87	3	21.4
<i>Rutiderma darbyi</i>	Ar	Ostr	43	0.53	64.40	13	92.9
<i>Heteropodarke formalis</i>	A	Poly	42	0.52	64.92	5	35.7
<i>Lucina radians</i>	M	Biva	41	0.51	65.43	6	42.9
<i>Tellina</i> (LPIL)	M	Biva	40	0.49	65.92	10	71.4
<i>Chone</i> (LPIL)	A	Poly	38	0.47	66.39	10	71.4
<i>Cirrophorus lyra</i>	A	Poly	37	0.46	66.84	8	57.1
<i>Nereis falsa</i>	A	Poly	36	0.44	67.29	11	78.6
<i>Prionospio steenstrupi</i>	A	Poly	33	0.41	67.69	9	64.3
<i>Podarkeopsis levifuscina</i>	A	Poly	33	0.41	68.10	8	57.1



Table 2. Continued:

<b>Taxonomic Name</b>	<b>Phylum</b>	<b>Class</b>	<b>No. of Individuals</b>	<b>% of Total</b>	<b>Cummulative %</b>	<b>Station Occurrence</b>	<b>Occurrence %</b>
<i>Sphaerosyllis piriferopsis</i>	A	Poly	32	0.39	68.50	8	57.1
<i>Tricolia thalassicola</i>	M	Gast	30	0.37	68.86	3	21.4
<i>Eunice unifrons</i>	A	Poly	29	0.36	69.22	5	35.7
Eunicidae (LPIL)	A	Poly	28	0.35	69.57	9	64.3
Hesionidae (LPIL)	A	Poly	28	0.35	69.91	11	78.6
<i>Paracerceis caudata</i>	Ar	Mala	28	0.35	70.26	10	71.4
<i>Caecum floridanum</i>	M	Gast	27	0.33	70.59	2	14.3
<i>Shoemakerella cubensis</i>	Ar	Mala	26	0.32	70.91	3	21.4
<i>Terebellides parvus</i>	A	Poly	26	0.32	71.23	3	21.4
<i>Glycera</i> sp.D	A	Poly	25	0.31	71.54	4	28.6
<i>Aricidea philbinae</i>	A	Poly	25	0.31	71.85	1	7.1
<i>Caulleriella</i> (LPIL)	A	Poly	25	0.31	72.16	8	57.1
<i>Streblosoma hartmanae</i>	A	Poly	25	0.31	72.46	4	28.6
<i>Isolda pulchella</i>	A	Poly	25	0.31	72.77	3	21.4
<i>Aspidosiphon albus</i>	S		25	0.31	73.08	6	42.9
<i>Armandia maculata</i>	A	Poly	24	0.30	73.38	8	57.1
<i>Pitar simpsoni</i>	M	Biva	24	0.30	73.67	5	35.7
<i>Glycera abbranchiata</i>	A	Poly	24	0.30	73.97	5	35.7
<i>Pettibonella multiuncinata</i>	A	Poly	23	0.28	74.25	5	35.7
<i>Asteropella monambon</i>	Ar	Ostr	23	0.28	74.53	3	21.4
<i>Eusarsiella paniculata</i>	Ar	Ostr	23	0.28	74.82	5	35.7
<i>Crepidula aculeata</i>	M	Gast	22	0.27	75.09	1	7.1
<i>Mooreonuphis pallidula</i>	A	Poly	22	0.27	75.36	5	35.7
<i>Paramphinome</i> sp.B	A	Poly	22	0.27	75.63	7	50.0
<i>Fabricinuda trilobata</i>	A	Poly	21	0.26	75.89	4	28.6
<i>Aspidosiphon muelleri</i>	S		21	0.26	76.15	3	21.4
Amphiuridae (LPIL)	E	Ophi	20	0.25	76.40	5	35.7
<i>Pteromeris perplana</i>	M	Biva	20	0.25	76.64	4	28.6
<i>Axiothella mucosa</i>	A	Poly	20	0.25	76.89	8	57.1
<i>Paraeupolymnia</i> sp.A	A	Poly	19	0.23	77.12	7	50.0
<i>Leitoscoloplos</i> (LPIL)	A	Poly	18	0.22	77.35	6	42.9
Actiniaria (LPIL)	Cn	Anth	18	0.22	77.57	7	50.0

Table 2. Continued:

<b>Taxonomic Name</b>	<b>Phylum</b>	<b>Class</b>	<b>No. of Individuals</b>	<b>% of Total</b>	<b>Cummulative %</b>	<b>Station Occurrence</b>	<b>Occurrence %</b>
<i>Ceratonereis (LPIL)</i>	A	Poly	18	0.22	77.79	7	50.0
<i>Ceradocus shoemakeri</i>	Ar	Mala	18	0.22	78.01	4	28.6
<i>Cumella garrityi</i>	Ar	Mala	18	0.22	78.23	7	50.0
<i>Syllis lutea</i>	A	Poly	18	0.22	78.45	5	35.7
<i>Taylorphloe hirsuta</i>	A	Poly	18	0.22	78.68	5	35.7
<i>Ehlersia ferrugina</i>	A	Poly	18	0.22	78.90	6	42.9
<i>Branchiomma nigromaculatum</i>	A	Poly	17	0.21	79.11	5	35.7
<i>Aclis hendersoni</i>	M	Gast	17	0.21	79.32	4	28.6
<i>Abra lioica</i>	M	Biva	17	0.21	79.53	1	7.1
<i>Eunice (LPIL)</i>	A	Poly	17	0.21	79.74	5	35.7
<i>Aricidea catherinae</i>	A	Poly	17	0.21	79.95	5	35.7
<i>Antalis antillarum</i>	M	Scap	17	0.21	80.16	8	57.1
<i>Codakia orbicularis</i>	M	Biva	16	0.20	80.35	3	21.4
Semelidae (LPIL)	M	Biva	16	0.20	80.55	5	35.7
<i>Diplodonta (LPIL)</i>	M	Biva	16	0.20	80.75	5	35.7
<i>Lucina muricata</i>	M	Biva	15	0.18	80.93	4	28.6
<i>Lima (LPIL)</i>	M	Biva	15	0.18	81.12	2	14.3
<i>Exogone dispar</i>	A	Poly	15	0.18	81.30	3	21.4
<i>Pleuromeris tridentata</i>	M	Biva	14	0.17	81.47	4	28.6
<i>Ervilia nitens</i>	M	Biva	14	0.17	81.65	6	42.9
<i>Aricidea cerrutii</i>	A	Poly	14	0.17	81.82	6	42.9
<i>Parapionosyllis uebelackerae</i>	A	Poly	14	0.17	81.99	4	28.6
<i>Pitar (LPIL)</i>	M	Biva	14	0.17	82.16	3	21.4
<i>Diplodonta punctata</i>	M	Biva	14	0.17	82.34	5	35.7
<i>Amboleberis americana</i>	Ar	Ostr	13	0.16	82.50	7	50.0
<i>Microdeutopus myersi</i>	Ar	Mala	13	0.16	82.66	2	14.3
Lineidae (LPIL)	R	Anop	13	0.16	82.82	10	71.4
Melitidae (LPIL)	Ar	Mala	13	0.16	82.98	5	35.7
<i>Leptosynapta (LPIL)</i>	E	Holo	12	0.15	83.13	4	28.6
<i>Eusarsiella elofsoni</i>	Ar	Ostr	12	0.15	83.27	2	14.3
<i>Kalliapseudes sp.C</i>	Ar	Mala	12	0.15	83.42	4	28.6
<i>Musculus lateralis</i>	M	Biva	12	0.15	83.57	5	35.7

Table 2. Continued:

<b>Taxonomic Name</b>	<b>Phylum</b>	<b>Class</b>	<b>No. of Individuals</b>	<b>% of Total</b>	<b>Cummulative %</b>	<b>Station Occurrence</b>	<b>Occurrence %</b>
<i>Arca zebra</i>	M	Biva	12	0.15	83.72	1	7.1
<i>Ervilia concentrica</i>	M	Biva	12	0.15	83.87	2	14.3
<i>Heteropodarke lyonsi</i>	A	Poly	12	0.15	84.01	4	28.6
<i>Fimbriosthenelais minor</i>	A	Poly	12	0.15	84.16	5	35.7
<i>Cirrophorus</i> (LPIL)	A	Poly	12	0.15	84.31	4	28.6
Polyplacophora (LPIL)	M	Poly	12	0.15	84.46	6	42.9
<i>Harpinia</i> sp.A	Ar	Mala	12	0.15	84.60	4	28.6
<i>Glycera americana</i>	A	Poly	11	0.14	84.74	3	21.4
<i>Caecum imbricatum</i>	M	Gast	11	0.14	84.88	1	7.1
<i>Exogone atlantica</i>	A	Poly	11	0.14	85.01	4	28.6
<i>Branchiostoma</i> (LPIL)	C	Lept	11	0.14	85.15	5	35.7
<i>Platynereis dumerilli</i>	A	Poly	11	0.14	85.28	6	42.9
<i>Eusarsiella childi</i>	Ar	Ostr	11	0.14	85.42	1	7.1
<i>Atys riiseana</i>	M	Gast	10	0.12	85.54	3	21.4
<i>Dipolydora socialis</i>	A	Poly	10	0.12	85.66	1	7.1
Paraonidae (LPIL)	A	Poly	10	0.12	85.79	6	42.9
<i>Lucina</i> (LPIL)	M	Biva	10	0.12	85.91	5	35.7
<i>Armandia agilis</i>	A	Poly	10	0.12	86.03	3	21.4
<i>Eusarsiella absens</i>	Ar	Ostr	10	0.12	86.16	2	14.3
<i>Odontosyllis enopla</i>	A	Poly	10	0.12	86.28	5	35.7
<i>Exogone</i> (LPIL)	A	Poly	10	0.12	86.40	6	42.9
<i>Codakia costata</i>	M	Biva	10	0.12	86.53	1	7.1
<i>Processa</i> (LPIL)	Ar	Mala	10	0.12	86.65	3	21.4
<i>Eunice</i> sp.K	A	Poly	10	0.12	86.77	1	7.1
<i>Gouldia cerina</i>	M	Biva	9	0.11	86.89	2	14.3
<i>Glycera</i> (LPIL)	A	Poly	9	0.11	87.00	4	28.6
<i>Ceratonereis irritabilis</i>	A	Poly	9	0.11	87.11	5	35.7
<i>Goniada teres</i>	A	Poly	9	0.11	87.22	4	28.6
<i>Caecum</i> (LPIL)	M	Gast	9	0.11	87.33	5	35.7
Decapoda Natantia (LPIL)	Ar	Mala	9	0.11	87.44	4	28.6
Phyllodocidae (LPIL)	A	Poly	9	0.11	87.55	4	28.6
<i>Malmgreniella maccraryae</i>	A	Poly	9	0.11	87.66	3	21.4

Table 2. Continued:

<b>Taxonomic Name</b>	<b>Phylum</b>	<b>Class</b>	<b>No. of Individuals</b>	<b>% of Total</b>	<b>Cummulative %</b>	<b>Station Occurrence</b>	<b>Occurrence %</b>
<i>Pagurus</i> (LPIL)	Ar	Mala	9	0.11	87.77	3	21.4
<i>Crenella divaricata</i>	M	Biva	9	0.11	87.88	4	28.6
<i>Galathowenia oculata</i>	A	Poly	9	0.11	87.99	2	14.3
<i>Acanthochitona pygmaea</i>	M	Poly	9	0.11	88.11	4	28.6
Onuphidae (LPIL)	A	Poly	9	0.11	88.22	3	21.4
<i>Tellina iris</i>	M	Biva	9	0.11	88.33	4	28.6
<i>Dasybranchus lunulatus</i>	A	Poly	8	0.10	88.43	3	21.4
Dorvilleidae (LPIL)	A	Poly	8	0.10	88.52	3	21.4
<i>Syllis danieli</i>	A	Poly	8	0.10	88.62	4	28.6
<i>Cyclaspis unicornis</i>	Ar	Mala	8	0.10	88.72	2	14.3
<i>Leptosynapta multigranula</i>	E	Holo	8	0.10	88.82	3	21.4
<i>Leitoscoloplos robustus</i>	A	Poly	8	0.10	88.92	4	28.6
<i>Chevalia carpenteri</i>	Ar	Mala	8	0.10	89.02	3	21.4
<i>Pettiboneia duofurca</i>	A	Poly	8	0.10	89.12	4	28.6
<i>Pionosyllis gesae</i>	A	Poly	8	0.10	89.21	3	21.4
Eulimidae (LPIL)	M	Gast	8	0.10	89.31	5	35.7
<i>Erichthonius brasiliensis</i>	Ar	Mala	8	0.10	89.41	6	42.9
Gastropoda (LPIL)	M	Gast	7	0.09	89.50	7	50.0
<i>Notomastus tenuis</i>	A	Poly	7	0.09	89.58	4	28.6
<i>Cycloapseudes</i> sp.A	Ar	Mala	7	0.09	89.67	2	14.3
<i>Chaetozone</i> (LPIL)	A	Poly	7	0.09	89.76	3	21.4
<i>Syllis broomensis</i>	A	Poly	7	0.09	89.84	5	35.7
<i>Dorvillea largidentis</i>	A	Poly	7	0.09	89.93	4	28.6
<i>Grubeosyllis clavata</i>	A	Poly	7	0.09	90.02	3	21.4
Serpulidae (LPIL)	A	Poly	7	0.09	90.10	4	28.6
<i>Aspidosiphon</i> (LPIL)	S		7	0.09	90.19	3	21.4
<i>Opisthosyllis longidentata</i>	A	Poly	7	0.09	90.27	3	21.4
<i>Synelmis ewingi</i>	A	Poly	7	0.09	90.36	2	14.3
<i>Mediomastus</i> (LPIL)	A	Poly	7	0.09	90.45	3	21.4
<i>Portunus ordwayi</i>	Ar	Mala	7	0.09	90.53	4	28.6
<i>Trichobranchnus glacialis</i>	A	Poly	7	0.09	90.62	2	14.3
Aoridae (LPIL)	Ar	Mala	7	0.09	90.71	4	28.6

Table 2. Continued:

<b>Taxonomic Name</b>	<b>Phylum</b>	<b>Class</b>	<b>No. of Individuals</b>	<b>% of Total</b>	<b>Cummulative %</b>	<b>Station Occurrence</b>	<b>Occurrence %</b>
<i>Semele</i> (LPIL)	M	Biva	7	0.09	90.79	4	28.6
<i>Batea carinata</i>	Ar	Mala	7	0.09	90.88	5	35.7
Montacutidae (LPIL)	M	Biva	6	0.07	90.95	2	14.3
<i>Eurydice personata</i>	Ar	Mala	6	0.07	91.03	1	7.1
<i>Bushia elegans</i>	M	Biva	6	0.07	91.10	2	14.3
<i>Branchiosyllis oculata</i>	A	Poly	6	0.07	91.17	1	7.1
<i>Chione cancellata</i>	M	Biva	6	0.07	91.25	4	28.6
<i>Tellina gouldii</i>	M	Biva	6	0.07	91.32	4	28.6
<i>Lysidice</i> sp.B	A	Poly	6	0.07	91.40	4	28.6
<i>Nereis</i> (LPIL)	A	Poly	6	0.07	91.47	2	14.3
<i>Semele bellastrata</i>	M	Biva	6	0.07	91.54	4	28.6
<i>Lembos</i> (LPIL)	Ar	Mala	6	0.07	91.62	4	28.6
<i>Grubeosyllis rugulosa</i>	A	Poly	6	0.07	91.69	3	21.4
<i>Goniadides carolinae</i>	A	Poly	6	0.07	91.77	3	21.4
<i>Branchiosyllis exilis</i>	A	Poly	6	0.07	91.84	3	21.4
<i>Scoloplos texana</i>	A	Poly	6	0.07	91.91	4	28.6
<i>Paraonis fulgens</i>	A	Poly	6	0.07	91.99	5	35.7
<i>Cumingia tellinoides</i>	M	Biva	6	0.07	92.06	1	7.1
<i>Pherusa inflata</i>	A	Poly	6	0.07	92.14	3	21.4
<i>Phyllodoce arenae</i>	A	Poly	5	0.06	92.20	4	28.6
<i>Carpias</i> (LPIL)	Ar	Mala	5	0.06	92.26	2	14.3
<i>Cyclaspis varians</i>	Ar	Mala	5	0.06	92.32	5	35.7
Majidae (LPIL)	Ar	Mala	5	0.06	92.38	3	21.4
<i>Eusarsiella</i> (LPIL)	Ar	Ostr	5	0.06	92.44	3	21.4
<i>Caecum johnsoni</i>	M	Gast	5	0.06	92.51	3	21.4
<i>Kalliapseudes bahamaensis</i>	Ar	Mala	5	0.06	92.57	2	14.3
<i>Ceradocus sheardi</i>	Ar	Mala	5	0.06	92.63	2	14.3
<i>Phascolion strombi</i>	S		5	0.06	92.69	2	14.3
<i>Amakusanthura magnifica</i>	Ar	Mala	5	0.06	92.75	4	28.6
<i>Palaemonetes</i> (LPIL)	Ar	Mala	5	0.06	92.81	1	7.1
<i>Acteocina candei</i>	M	Gast	5	0.06	92.88	2	14.3
<i>Neaeromya floridana</i>	M	Biva	5	0.06	92.94	2	14.3

Table 2. Continued:

<b>Taxonomic Name</b>	<b>Phylum</b>	<b>Class</b>	<b>No. of Individuals</b>	<b>% of Total</b>	<b>Cummulative %</b>	<b>Station Occurrence</b>	<b>Occurrence %</b>
<i>Lumbrineris latreilli</i>	A	Poly	5	0.06	93.00	2	14.3
<i>Lucina nassula</i>	M	Biva	5	0.06	93.06	3	21.4
<i>Alpheus</i> (LPIL)	Ar	Mala	5	0.06	93.12	4	28.6
<i>Scolelepis squamata</i>	A	Poly	4	0.05	93.17	1	7.1
<i>Deutella incerta</i>	Ar	Mala	4	0.05	93.22	2	14.3
<i>Hiatella arctica</i>	M	Biva	4	0.05	93.27	3	21.4
<i>Decamastus</i> cf. <i>gracilis</i>	A	Poly	4	0.05	93.32	3	21.4
Veneridae (LPIL)	M	Biva	4	0.05	93.37	3	21.4
<i>Streptosyllis pettiboneae</i>	A	Poly	4	0.05	93.42	3	21.4
<i>Eobrolgus spinosus</i>	Ar	Mala	4	0.05	93.47	2	14.3
<i>Dulichella appendiculata</i>	Ar	Mala	4	0.05	93.52	2	14.3
<i>Tellina tampaensis</i>	M	Biva	4	0.05	93.57	2	14.3
<i>Actinoseta chelisparsa</i>	Ar	Ostr	4	0.05	93.62	3	21.4
<i>Spio pettiboneae</i>	A	Poly	4	0.05	93.66	4	28.6
<i>Apseudes</i> (LPIL)	Ar	Mala	4	0.05	93.71	2	14.3
<i>Pseudophilomedes ambon</i>	Ar	Ostr	4	0.05	93.76	2	14.3
Callianassidae (LPIL)	Ar	Mala	4	0.05	93.81	2	14.3
<i>Chiton marmoratus</i>	M	Poly	4	0.05	93.86	2	14.3
<i>Pinnixa</i> (LPIL)	Ar	Mala	4	0.05	93.91	2	14.3
<i>Diopatra</i> cf. <i>papillata</i>	A	Poly	4	0.05	93.96	3	21.4
Pectinidae (LPIL)	M	Biva	4	0.05	94.01	2	14.3
<i>Calyptrea centralis</i>	M	Gast	4	0.05	94.06	2	14.3
<i>Semele nuculoides</i>	M	Biva	4	0.05	94.11	2	14.3
<i>Lioberus castaneus</i>	M	Biva	4	0.05	94.16	2	14.3
Amphipoda (LPIL)	Ar	Mala	4	0.05	94.21	3	21.4
Processidae (LPIL)	Ar	Mala	4	0.05	94.26	2	14.3
Hamineidae (LPIL)	M	Gast	4	0.05	94.31	2	14.3
<i>Cyclaspis</i> (LPIL)	Ar	Mala	4	0.05	94.35	3	21.4
<i>Dorvillea clavata</i>	A	Poly	4	0.05	94.40	1	7.1
<i>Owenia fusiformis</i>	A	Poly	4	0.05	94.45	3	21.4
<i>Eusarsiella cornuta</i>	Ar	Ostr	4	0.05	94.50	2	14.3
<i>Asthenothaerus hemphilli</i>	M	Biva	4	0.05	94.55	4	28.6

Table 2. Continued:

<b>Taxonomic Name</b>	<b>Phylum</b>	<b>Class</b>	<b>No. of Individuals</b>	<b>% of Total</b>	<b>Cummulative %</b>	<b>Station Occurrence</b>	<b>Occurrence %</b>
<i>Levinsenia gracilis</i>	A	Poly	4	0.05	94.60	2	14.3
<i>Leucothoe spinicarpa</i>	Ar	Mala	4	0.05	94.65	2	14.3
<i>Cerithium eburneum</i>	M	Gast	4	0.05	94.70	1	7.1
<i>Leptochelia forresti</i>	Ar	Mala	4	0.05	94.75	3	21.4
<i>Pseudopolydora</i> (LPIL)	A	Poly	4	0.05	94.80	3	21.4
<i>Laevicardium sybariticum</i>	M	Biva	4	0.05	94.85	3	21.4
Paratanaidae (LPIL)	Ar	Mala	4	0.05	94.90	3	21.4
Anthuridae (LPIL)	Ar	Mala	4	0.05	94.95	1	7.1
<i>Nereis grayi</i>	A	Poly	4	0.05	95.00	2	14.3
<i>Aricidea suecica</i>	A	Poly	4	0.05	95.04	2	14.3
Ampharetidae (LPIL)	A	Poly	4	0.05	95.09	3	21.4
<i>Nucula aegeenis</i>	M	Biva	4	0.05	95.14	3	21.4
<i>Olivella</i> (LPIL)	M	Gast	4	0.05	95.19	1	7.1
<i>Ophiostigma isocanthum</i>	E	Ophi	4	0.05	95.24	1	7.1
<i>Netamelita barnardi</i>	Ar	Mala	4	0.05	95.29	1	7.1
<i>Arabella mutans</i>	A	Poly	4	0.05	95.34	3	21.4
<i>Loimia medusa</i>	A	Poly	4	0.05	95.39	2	14.3
<i>Laonice cirrata</i>	A	Poly	3	0.04	95.43	3	21.4
<i>Syllis ortizi</i>	A	Poly	3	0.04	95.46	2	14.3
<i>Caulleriella</i> sp.B	A	Poly	3	0.04	95.50	1	7.1
<i>Trachycardium</i> (LPIL)	M	Biva	3	0.04	95.54	2	14.3
<i>Lumbrinerides dayi</i>	A	Poly	3	0.04	95.58	2	14.3
Acmaeidae (LPIL)	M	Gast	3	0.04	95.61	1	7.1
Xanthidae (LPIL)	Ar	Mala	3	0.04	95.65	1	7.1
<i>Tegula lividomaculata</i>	M	Gast	3	0.04	95.69	2	14.3
<i>Ampelisca schellenbergi</i>	Ar	Mala	3	0.04	95.72	1	7.1
<i>Crassinella lunulata</i>	M	Biva	3	0.04	95.76	3	21.4
<i>Asteropella maclaughlinae</i>	Ar	Ostr	3	0.04	95.80	1	7.1
<i>Bhawania goodei</i>	A	Poly	3	0.04	95.83	2	14.3
<i>Podarke</i> sp.D	A	Poly	3	0.04	95.87	1	7.1
<i>Latreutes fucorum</i>	Ar	Mala	3	0.04	95.91	1	7.1
<i>Bulla striata</i>	M	Gast	3	0.04	95.94	1	7.1

Table 2. Continued:

<b>Taxonomic Name</b>	<b>Phylum</b>	<b>Class</b>	<b>No. of Individuals</b>	<b>% of Total</b>	<b>Cummulative %</b>	<b>Station Occurrence</b>	<b>Occurrence %</b>
Mytilidae (LPIL)	M	Biva	3	0.04	95.98	2	14.3
<i>Ervilia</i> (LPIL)	M	Biva	3	0.04	96.02	2	14.3
<i>Kalliapseudes</i> (LPIL)	Ar	Mala	3	0.04	96.06	3	21.4
<i>Micropholis gracillima</i>	E	Ophi	3	0.04	96.09	2	14.3
<i>Dorvillea sociabilis</i>	A	Poly	3	0.04	96.13	2	14.3
Cyindroleberididae (LPIL)	Ar	Ostr	3	0.04	96.17	2	14.3
Ostracoda (LPIL)	Ar	Ostr	3	0.04	96.20	3	21.4
<i>Vaunthompsonia</i> (LPIL)	Ar	Mala	3	0.04	96.24	1	7.1
<i>Melinna maculata</i>	A	Poly	3	0.04	96.28	2	14.3
<i>Modiolus modiolus squamosus</i>	M	Biva	3	0.04	96.31	1	7.1
Cardiidae (LPIL)	M	Biva	3	0.04	96.35	2	14.3
Limidae (LPIL)	M	Biva	3	0.04	96.39	1	7.1
<i>Piromis roberti</i>	A	Poly	3	0.04	96.43	1	7.1
<i>Paranesidea</i> sp.A	Ar	Ostr	3	0.04	96.46	2	14.3
<i>Pitho anisodon</i>	Ar	Mala	3	0.04	96.50	2	14.3
<i>Elasmopus</i> (LPIL)	Ar	Mala	3	0.04	96.54	2	14.3
Arcidae (LPIL)	M	Biva	3	0.04	96.57	2	14.3
<i>Cumella</i> (LPIL)	Ar	Mala	3	0.04	96.61	3	21.4
<i>Tellina similis</i>	M	Biva	3	0.04	96.65	1	7.1
<i>Campylaspis</i> sp.U	Ar	Mala	3	0.04	96.68	3	21.4
<i>Prionotoleberis salomani</i>	Ar	Ostr	3	0.04	96.72	2	14.3
Tanaidacea (LPIL)	Ar	Mala	3	0.04	96.76	2	14.3
<i>Ophiactis</i> (LPIL)	E	Ophi	3	0.04	96.80	1	7.1
<i>Carpias algicola</i>	Ar	Mala	3	0.04	96.83	1	7.1
<i>Crepidula</i> (LPIL)	M	Gast	2	0.02	96.86	1	7.1
<i>Odontosyllis</i> (LPIL)	A	Poly	2	0.02	96.88	2	14.3
<i>Syllis gracilis</i>	A	Poly	2	0.02	96.91	2	14.3
<i>Rutiderma</i> (LPIL)	Ar	Ostr	2	0.02	96.93	2	14.3
<i>Zebina browniana</i>	M	Gast	2	0.02	96.96	2	14.3
Atyidae (LPIL)	Ar	Mala	2	0.02	96.98	1	7.1
<i>Potamethus</i> sp.A	A	Poly	2	0.02	97.00	1	7.1
<i>Solecurtus sanctaemarthae</i>	M	Biva	2	0.02	97.03	1	7.1



Table 2. Continued:

<b>Taxonomic Name</b>	<b>Phylum</b>	<b>Class</b>	<b>No. of Individuals</b>	<b>% of Total</b>	<b>Cummulative %</b>	<b>Station Occurrence</b>	<b>Occurrence %</b>
Naticidae (LPIL)	M	Gast	2	0.02	97.05	1	7.1
<i>Pionosyllis</i> (LPIL)	A	Poly	2	0.02	97.08	1	7.1
<i>Rutiderma mollitum</i>	Ar	Ostr	2	0.02	97.10	2	14.3
<i>Ampelisca</i> (LPIL)	Ar	Mala	2	0.02	97.13	1	7.1
Rissoidae (LPIL)	M	Gast	2	0.02	97.15	2	14.3
<i>Odostomia weberi</i>	M	Gast	2	0.02	97.18	1	7.1
<i>Magelona</i> sp.I	A	Poly	2	0.02	97.20	2	14.3
<i>Sabellaria</i> sp.A	A	Poly	2	0.02	97.23	1	7.1
<i>Bowmaniella brasiliensis</i>	Ar	Mala	2	0.02	97.25	1	7.1
Diogenidae (LPIL)	Ar	Mala	2	0.02	97.28	1	7.1
<i>Crepidula maculosa</i>	M	Gast	2	0.02	97.30	2	14.3
<i>Glans dominguensis</i>	M	Biva	2	0.02	97.33	2	14.3
Tellinidae (LPIL)	M	Biva	2	0.02	97.35	2	14.3
<i>Nereiphylla fragilis</i>	A	Poly	2	0.02	97.37	2	14.3
Asciacea (LPIL)	C	Asci	2	0.02	97.40	1	7.1
<i>Mesorhoea sexspinosa</i>	Ar	Mala	2	0.02	97.42	2	14.3
<i>Mithrax forceps</i>	Ar	Mala	2	0.02	97.45	1	7.1
<i>Marginella lavalleeana</i>	M	Gast	2	0.02	97.47	2	14.3
<i>Syllis sardai</i>	A	Poly	2	0.02	97.50	2	14.3
<i>Glycera</i> sp.E	A	Poly	2	0.02	97.52	2	14.3
<i>Streblospio benedicti</i>	A	Poly	2	0.02	97.55	2	14.3
<i>Cerapus</i> sp.B	Ar	Mala	2	0.02	97.57	1	7.1
<i>Ancistrosyllis jonesi</i>	A	Poly	2	0.02	97.60	1	7.1
<i>Metharpinia floridana</i>	Ar	Mala	2	0.02	97.62	1	7.1
<i>Alpheus normanni</i>	Ar	Mala	2	0.02	97.65	2	14.3
<i>Vaunthompsonia</i> sp.B	Ar	Mala	2	0.02	97.67	1	7.1
<i>Cylichna bidentata</i>	M	Gast	2	0.02	97.70	1	7.1
<i>Kefersteinia cirrata</i>	A	Poly	2	0.02	97.72	2	14.3
Lysianassidae (LPIL)	Ar	Mala	2	0.02	97.74	1	7.1
Echinoidea (LPIL)	E	Echi	2	0.02	97.77	2	14.3
Goniadidae (LPIL)	A	Poly	2	0.02	97.79	2	14.3
<i>Armandia</i> (LPIL)	A	Poly	2	0.02	97.82	1	7.1

Table 2. Continued:

<b>Taxonomic Name</b>	<b>Phylum</b>	<b>Class</b>	<b>No. of Individuals</b>	<b>% of Total</b>	<b>Cummulative %</b>	<b>Station Occurrence</b>	<b>Occurrence %</b>
Pteriidae (LPIL)	M	Biva	2	0.02	97.84	2	14.3
<i>Tagelus divisus</i>	M	Biva	2	0.02	97.87	2	14.3
Aclididae (LPIL)	M	Gast	2	0.02	97.89	2	14.3
<i>Eunice</i> sp.L	A	Poly	2	0.02	97.92	1	7.1
<i>Trypanosyllis vittigera</i>	A	Poly	2	0.02	97.94	1	7.1
<i>Serolis mgrayi</i>	Ar	Mala	2	0.02	97.97	1	7.1
Cylindebullidae (LPIL)	M	Gast	2	0.02	97.99	2	14.3
<i>Neomegamphopus</i> (LPIL)	Ar	Mala	2	0.02	98.02	2	14.3
<i>Paracypridina floridensis</i>	Ar	Ostr	2	0.02	98.04	1	7.1
Aeginellidae (LPIL)	Ar	Mala	2	0.02	98.06	2	14.3
<i>Bactrocythara asarca</i>	M	Gast	2	0.02	98.09	2	14.3
<i>Americardia guppyi</i>	M	Biva	2	0.02	98.11	1	7.1
Alpheidae (LPIL)	Ar	Mala	2	0.02	98.14	1	7.1
Polynoidae (LPIL)	A	Poly	2	0.02	98.16	2	14.3
<i>Hepatus</i> (LPIL)	Ar	Mala	2	0.02	98.19	1	7.1
<i>Elysia</i> (LPIL)	M	Gast	2	0.02	98.21	1	7.1
Vitrinellidae (LPIL)	M	Gast	2	0.02	98.24	1	7.1
Paguridae (LPIL)	Ar	Mala	2	0.02	98.26	2	14.3
Palaemonidae (LPIL)	Ar	Mala	2	0.02	98.29	1	7.1
<i>Processa fimbriata</i>	Ar	Mala	1	0.01	98.30	1	7.1
<i>Anachis floridana</i>	M	Gast	1	0.01	98.31	1	7.1
<i>Ancistrosyllis carolinensis</i>	A	Poly	1	0.01	98.32	1	7.1
<i>Capitella capitata</i>	A	Poly	1	0.01	98.34	1	7.1
<i>Capitella jonesi</i>	A	Poly	1	0.01	98.35	1	7.1
Apseudidae (LPIL)	Ar	Mala	1	0.01	98.36	1	7.1
<i>Sabaco americanus</i>	A	Poly	1	0.01	98.37	1	7.1
<i>Demonax microphthalmus</i>	A	Poly	1	0.01	98.39	1	7.1
<i>Euryplax nitida</i>	Ar	Mala	1	0.01	98.40	1	7.1
Conidae (LPIL)	M	Gast	1	0.01	98.41	1	7.1
<i>Albunea paretii</i>	Ar	Mala	1	0.01	98.42	1	7.1
<i>Ebalia stimpsonii</i>	Ar	Mala	1	0.01	98.43	1	7.1
<i>Olivella floralia</i>	M	Gast	1	0.01	98.45	1	7.1

Table 2. Continued:

<b>Taxonomic Name</b>	<b>Phylum</b>	<b>Class</b>	<b>No. of Individuals</b>	<b>% of Total</b>	<b>Cummulative %</b>	<b>Station Occurrence</b>	<b>Occurrence %</b>
<i>Pseudovermilia occidentalis</i>	A	Poly	1	0.01	98.46	1	7.1
<i>Asteropella pax</i>	Ar	Ostr	1	0.01	98.47	1	7.1
<i>Pyrgocythara coxi</i>	M	Gast	1	0.01	98.48	1	7.1
<i>Asteropterygion occulitristis</i>	Ar	Ostr	1	0.01	98.50	1	7.1
<i>Graptacme calamus</i>	M	Scap	1	0.01	98.51	1	7.1
<i>Upogebia</i> (LPIL)	Ar	Mala	1	0.01	98.52	1	7.1
<i>Leptocheilia</i> sp.D	Ar	Mala	1	0.01	98.53	1	7.1
<i>Philine sagra</i>	M	Gast	1	0.01	98.55	1	7.1
<i>Sipunculus nudus</i>	S		1	0.01	98.56	1	7.1
Caecidae (LPIL)	M	Gast	1	0.01	98.57	1	7.1
<i>Ophiophragmus pulcher</i>	E	Ophi	1	0.01	98.58	1	7.1
<i>Tellina tenella</i>	M	Biva	1	0.01	98.59	1	7.1
Goneplacidae (LPIL)	Ar	Mala	1	0.01	98.61	1	7.1
<i>Ebalia</i> (LPIL)	Ar	Mala	1	0.01	98.62	1	7.1
<i>Spiochaetopterus oculatus</i>	A	Poly	1	0.01	98.63	1	7.1
<i>Hydroides</i> sp.E	A	Poly	1	0.01	98.64	1	7.1
<i>Paleanotus chrysolepis</i>	A	Poly	1	0.01	98.66	1	7.1
<i>Tectonatica pusilla</i>	M	Gast	1	0.01	98.67	1	7.1
<i>Glycera</i> sp.F	A	Poly	1	0.01	98.68	1	7.1
Sigalionidae (LPIL)	A	Poly	1	0.01	98.69	1	7.1
<i>Caulleriella</i> sp.K	A	Poly	1	0.01	98.71	1	7.1
<i>Macoma</i> (LPIL)	M	Biva	1	0.01	98.72	1	7.1
<i>Parthenope granulata</i>	Ar	Mala	1	0.01	98.73	1	7.1
<i>Parapinnixa</i> (LPIL)	Ar	Mala	1	0.01	98.74	1	7.1
<i>Drilonereis</i> (LPIL)	A	Poly	1	0.01	98.76	1	7.1
<i>Pinnixa floridana</i>	Ar	Mala	1	0.01	98.77	1	7.1
<i>Scolelepis</i> (LPIL)	A	Poly	1	0.01	98.78	1	7.1
<i>Rissoina catesbyana</i>	M	Gast	1	0.01	98.79	1	7.1
<i>Spio</i> (LPIL)	A	Poly	1	0.01	98.80	1	7.1
Hippolytidae (LPIL)	Ar	Mala	1	0.01	98.82	1	7.1
<i>Asthenothaerus</i> (LPIL)	M	Biva	1	0.01	98.83	1	7.1
<i>Westheideia minutimala</i>	A	Poly	1	0.01	98.84	1	7.1

Table 2. Continued:

<b>Taxonomic Name</b>	<b>Phylum</b>	<b>Class</b>	<b>No. of Individuals</b>	<b>% of Total</b>	<b>Cummulative %</b>	<b>Station Occurrence</b>	<b>Occurrence %</b>
<i>Mexieulepis weberi</i>	A	Poly	1	0.01	98.85	1	7.1
<i>Lumbrineris coccinea</i>	A	Poly	1	0.01	98.87	1	7.1
Opheliidae (LPIL)	A	Poly	1	0.01	98.88	1	7.1
<i>Chione</i> (LPIL)	M	Biva	1	0.01	98.89	1	7.1
<i>Limnoria</i> (LPIL)	Ar	Mala	1	0.01	98.90	1	7.1
<i>Chione grus</i>	M	Biva	1	0.01	98.92	1	7.1
<i>Lysidice notata</i>	A	Poly	1	0.01	98.93	1	7.1
Sphaeromatidae (LPIL)	Ar	Mala	1	0.01	98.94	1	7.1
<i>Marphysa</i> sp.B	A	Poly	1	0.01	98.95	1	7.1
Mysidae (LPIL)	Ar	Mala	1	0.01	98.96	1	7.1
<i>Euphrosine</i> cf. <i>triloba</i>	A	Poly	1	0.01	98.98	1	7.1
Bairdiidae (LPIL)	Ar	Ostr	1	0.01	98.99	1	7.1
Oweniidae (LPIL)	A	Poly	1	0.01	99.00	1	7.1
<i>Actinoseta</i> (LPIL)	Ar	Ostr	1	0.01	99.01	1	7.1
<i>Crassinella</i> (LPIL)	M	Biva	1	0.01	99.03	1	7.1
<i>Dentalium</i> (LPIL)	M	Scap	1	0.01	99.04	1	7.1
<i>Asteropella</i> (LPIL)	Ar	Ostr	1	0.01	99.05	1	7.1
<i>Patelloida pustulata</i>	M	Gast	1	0.01	99.06	1	7.1
<i>Campylaspis heardi</i>	Ar	Mala	1	0.01	99.08	1	7.1
Glyceridae (LPIL)	A	Poly	1	0.01	99.09	1	7.1
<i>Glycinde solitaria</i>	A	Poly	1	0.01	99.10	1	7.1
<i>Arabella</i> (LPIL)	A	Poly	1	0.01	99.11	1	7.1
<i>Arabella multidentata</i>	A	Poly	1	0.01	99.12	1	7.1
<i>Turbonilla</i> (LPIL)	M	Gast	1	0.01	99.14	1	7.1
<i>Syllis</i> (LPIL)	A	Poly	1	0.01	99.15	1	7.1
Pholoidae (LPIL)	A	Poly	1	0.01	99.16	1	7.1
<i>Notocirrus</i> sp.A	A	Poly	1	0.01	99.17	1	7.1
<i>Eteone</i> (LPIL)	A	Poly	1	0.01	99.19	1	7.1
<i>Microphthalmus</i> (LPIL)	A	Poly	1	0.01	99.20	1	7.1
<i>Pionosyllis</i> sp.E	A	Poly	1	0.01	99.21	1	7.1
<i>Paranaitis gardineri</i>	A	Poly	1	0.01	99.22	1	7.1
<i>Bittium varium</i>	M	Gast	1	0.01	99.24	1	7.1

Table 2. Continued:

<b>Taxonomic Name</b>	<b>Phylum</b>	<b>Class</b>	<b>No. of Individuals</b>	<b>% of Total</b>	<b>Cummulative %</b>	<b>Station Occurrence</b>	<b>Occurrence %</b>
<i>Anadara notabilis</i>	M	Biva	1	0.01	99.25	1	7.1
<i>Periclimenes</i> (LPIL)	Ar	Mala	1	0.01	99.26	1	7.1
Melphidippidae (LPIL)	Ar	Mala	1	0.01	99.27	1	7.1
Columbellidae (LPIL)	M	Gast	1	0.01	99.29	1	7.1
<i>Perioculodes cerasinus</i>	Ar	Mala	1	0.01	99.30	1	7.1
<i>Magelona</i> (LPIL)	A	Poly	1	0.01	99.31	1	7.1
<i>Laevicardium laevigatum</i>	M	Biva	1	0.01	99.32	1	7.1
<i>Acarina</i> (LPIL)	Ar	Arac	1	0.01	99.33	1	7.1
Epitoniidae (LPIL)	M	Gast	1	0.01	99.35	1	7.1
<i>Calozodion wadei</i>	Ar	Mala	1	0.01	99.36	1	7.1
<i>Paguristes</i> (LPIL)	Ar	Mala	1	0.01	99.37	1	7.1
<i>Abra</i> (LPIL)	M	Biva	1	0.01	99.38	1	7.1
<i>Ampelisca abdita</i>	Ar	Mala	1	0.01	99.40	1	7.1
<i>Nudibranchia</i> (LPIL)	M	Gast	1	0.01	99.41	1	7.1
<i>Volvarina avenacea</i>	M	Gast	1	0.01	99.42	1	7.1
<i>Nassarius albus</i>	M	Gast	1	0.01	99.43	1	7.1
<i>Nereis acuminata</i>	A	Poly	1	0.01	99.45	1	7.1
<i>Cadulus quadridentatus</i>	M	Scap	1	0.01	99.46	1	7.1
<i>Engoniophos uncinatus</i>	M	Gast	1	0.01	99.47	1	7.1
<i>Nereis pelagica</i>	A	Poly	1	0.01	99.48	1	7.1
Asteroidea (LPIL)	E	Aste	1	0.01	99.49	1	7.1
Orbiniidae (LPIL)	A	Poly	1	0.01	99.51	1	7.1
Holothuroidea (LPIL)	E	Holo	1	0.01	99.52	1	7.1
<i>Scoloplos</i> (LPIL)	A	Poly	1	0.01	99.53	1	7.1
<i>Listriella barnardi</i>	Ar	Mala	1	0.01	99.54	1	7.1
<i>Drilonereis longa</i>	A	Poly	1	0.01	99.56	1	7.1
Portunidae (LPIL)	Ar	Mala	1	0.01	99.57	1	7.1
<i>Automate</i> (LPIL)	Ar	Mala	1	0.01	99.58	1	7.1
<i>Diopatra cuprea</i>	A	Poly	1	0.01	99.59	1	7.1
<i>Laevicardium</i> (LPIL)	M	Biva	1	0.01	99.61	1	7.1
Dentaliidae (LPIL)	M	Scap	1	0.01	99.62	1	7.1
<i>Tricolia</i> (LPIL)	M	Gast	1	0.01	99.63	1	7.1

Table 2. Continued:

<b>Taxonomic Name</b>	<b>Phylum</b>	<b>Class</b>	<b>No. of Individuals</b>	<b>% of Total</b>	<b>Cummulative %</b>	<b>Station Occurrence</b>	<b>Occurrence %</b>
<i>Mesanthura floridensis</i>	Ar	Mala	1	0.01	99.64	1	7.1
<i>Metatiron triocellatus</i>	Ar	Mala	1	0.01	99.65	1	7.1
Trochidae (LPIL)	M	Gast	1	0.01	99.67	1	7.1
<i>Astraea phoebia</i>	M	Gast	1	0.01	99.68	1	7.1
<i>Cubanocuma</i> sp.A	Ar	Mala	1	0.01	99.69	1	7.1
<i>Cerodrillia perryae</i>	M	Gast	1	0.01	99.70	1	7.1
<i>Dosinia discus</i>	M	Biva	1	0.01	99.72	1	7.1
<i>Hepatus epheliticus</i>	Ar	Mala	1	0.01	99.73	1	7.1
Phoxocephalidae (LPIL)	Ar	Mala	1	0.01	99.74	1	7.1
<i>Tellina mera</i>	M	Biva	1	0.01	99.75	1	7.1
<i>Synopia ultramarina</i>	Ar	Mala	1	0.01	99.77	1	7.1
Synopiidae (LPIL)	Ar	Mala	1	0.01	99.78	1	7.1
<i>Antalis</i> (LPIL)	M	Scap	1	0.01	99.79	1	7.1
<i>Epitonium novangliae</i>	M	Gast	1	0.01	99.80	1	7.1
<i>Saccocirrus</i> sp.A	A	Poly	1	0.01	99.82	1	7.1
<i>Macrocoeloma trispinosum</i>	Ar	Mala	1	0.01	99.83	1	7.1
Glycymerididae (LPIL)	M	Biva	1	0.01	99.84	1	7.1
<i>Listriella</i> sp.G	Ar	Mala	1	0.01	99.85	1	7.1
<i>Phoronis</i> (LPIL)	Ph		1	0.01	99.86	1	7.1
<i>Aricidea wassi</i>	A	Poly	1	0.01	99.88	1	7.1
<i>Cymatoica orientalis</i>	M	Biva	1	0.01	99.89	1	7.1
<i>Trachycardium muricatum</i>	M	Biva	1	0.01	99.90	1	7.1
<i>Pyramidella crenulata</i>	M	Gast	1	0.01	99.91	1	7.1
Turridae (LPIL)	M	Gast	1	0.01	99.93	1	7.1
<i>Ranellidae</i> (LPIL)	M	Gast	1	0.01	99.94	1	7.1
<i>Batea catharinensis</i>	Ar	Mala	1	0.01	99.95	1	7.1
Carditidae (LPIL)	M	Biva	1	0.01	99.96	1	7.1
<i>Apseudes propinquus</i>	Ar	Mala	1	0.01	99.98	1	7.1
<i>Lyonsia beana</i>	M	Biva	1	0.01	99.99	1	7.1
<i>Cyclaspis pustulata</i>	Ar	Mala	1	0.01	100.00	1	7.1

Table 2. Continued:

**Taxa Key**

A = Annelida

Olig = Oligochaeta

Poly = Polychaeta

Ar = Arthropoda

Arac = Arachnida

Mala = Malacostraca

Ostr = Ostracoda

C = Chordata

Asci = Ascidiacea

Lept = Leptocardia

E = Echinodermata

Aste = Asteroidea

Echi = Echinoidea

Holo = Holothuroidea

Ophi = Ophiuroidea

M = Mollusca

Biva = Bivalvia

Gast = Gastropoda

Scap = Scaphopoda

Ph = Phoronida

R = Rhynchocoela

S = Sipuncula

Table 3. Summary of overall abundance of major taxonomic groups for the Florida Keys NMS Stations, July-August 1998.

<b>Taxa</b>	<b>Total No. Taxa</b>	<b>% of Total</b>	<b>Total No. Individuals</b>	<b>% of Total</b>
<b>ANNELIDA</b>				
<b>Polychaeta</b>	197	38.7	4124	50.8
<b>Oligochaeta</b>	1	0.2	607	7.5
<b>MOLLUSCA</b>				
<b>Bivalvia</b>	77	15.1	814	10.0
<b>Gastropoda</b>	61	12.0	765	9.4
<b>Other Mollusc</b>	9	1.8	47	0.6
<b>ARTHROPODA</b>				
<b>Malacostraca</b>	111	21.8	691	8.5
<b>Ostracoda</b>	27	5.3	388	4.8
<b>OTHER TAXA</b>	26	5.1	677	8.3
<b>TOTAL</b>	<b>509</b>		<b>8,113</b>	



Table 4. Summary of abundance of major taxonomic groups by station for the Florida Keys NMS Stations, July-August 1998.

Station	Taxa	No. of Taxa	% of Total	No. of Individuals	% of Total
<b>2</b>	Annelida	77	51.0	680	68.3
	Mollusca	39	25.8	178	17.9
	Arthropoda	26	17.2	85	8.5
	Other Taxa	9	6.0	53	5.3
	<b>Total</b>	<b>151</b>		<b>996</b>	
<b>3</b>	Annelida	53	58.9	197	72.7
	Mollusca	17	18.9	38	14.0
	Arthropoda	13	14.4	19	7.0
	Other Taxa	7	7.8	17	6.3
	<b>Total</b>	<b>90</b>		<b>271</b>	
<b>5</b>	Annelida	39	44.8	150	60.7
	Mollusca	18	20.7	39	15.8
	Arthropoda	20	23.0	28	11.3
	Other Taxa	10	11.5	30	12.1
	<b>Total</b>	<b>87</b>		<b>247</b>	
<b>7</b>	Annelida	55	52.9	518	58.1
	Mollusca	33	31.7	326	36.5
	Arthropoda	11	10.6	18	2.0
	Other Taxa	5	4.8	30	3.4
	<b>Total</b>	<b>104</b>		<b>892</b>	
<b>8</b>	Annelida	61	63.5	304	58.8
	Mollusca	22	22.9	145	28.0
	Arthropoda	7	7.3	16	3.1
	Other Taxa	6	6.3	52	10.1
	<b>Total</b>	<b>96</b>		<b>517</b>	
<b>16</b>	Annelida	60	61.9	330	77.8
	Mollusca	12	12.4	19	4.5
	Arthropoda	18	18.6	29	6.8
	Other Taxa	7	7.2	46	10.8
	<b>Total</b>	<b>97</b>		<b>424</b>	
<b>17</b>	Annelida	39	53.4	254	76.3
	Mollusca	16	21.9	51	15.3
	Arthropoda	13	17.8	16	4.8
	Other Taxa	5	6.8	12	3.6
	<b>Total</b>	<b>73</b>		<b>333</b>	

Table 4. Continued:

<b>Station</b>	<b>Taxa</b>	<b>No. of Taxa</b>	<b>% of Total</b>	<b>No. of Individuals</b>	<b>% of Total</b>
<b>18</b>	Annelida	38	51.4	225	73.1
	Mollusca	18	24.3	42	13.6
	Arthropoda	12	16.2	21	6.8
	Other Taxa	6	8.1	20	6.5
	<b>Total</b>	<b>74</b>		<b>308</b>	
<b>19</b>	Annelida	47	49.0	277	40.3
	Mollusca	11	11.5	49	7.1
	Arthropoda	35	36.5	345	50.2
	Other Taxa	3	3.1	16	2.3
	<b>Total</b>	<b>96</b>		<b>687</b>	
<b>20</b>	Annelida	58	54.2	389	59.2
	Mollusca	26	24.3	187	28.5
	Arthropoda	15	14.0	24	3.7
	Other Taxa	8	7.5	57	8.7
	<b>Total</b>	<b>107</b>		<b>657</b>	
<b>22</b>	Annelida	59	39.9	173	35.6
	Mollusca	33	22.3	127	26.1
	Arthropoda	48	32.4	162	33.3
	Other Taxa	8	5.4	24	4.9
	<b>Total</b>	<b>148</b>		<b>486</b>	
<b>24</b>	Annelida	64	51.2	286	50.4
	Mollusca	30	24.0	146	25.7
	Arthropoda	19	15.2	62	10.9
	Other Taxa	12	9.6	74	13.0
	<b>Total</b>	<b>125</b>		<b>568</b>	
<b>29</b>	Annelida	87	48.1	455	56.6
	Mollusca	46	25.4	137	17.0
	Arthropoda	32	17.7	125	15.5
	Other Taxa	16	8.8	87	10.8
	<b>Total</b>	<b>181</b>		<b>804</b>	
<b>35</b>	Annelida	89	48.9	493	53.4
	Mollusca	48	26.4	142	15.4
	Arthropoda	34	18.7	129	14.0
	Other Taxa	11	6.0	159	17.2
	<b>Total</b>	<b>182</b>		<b>923</b>	

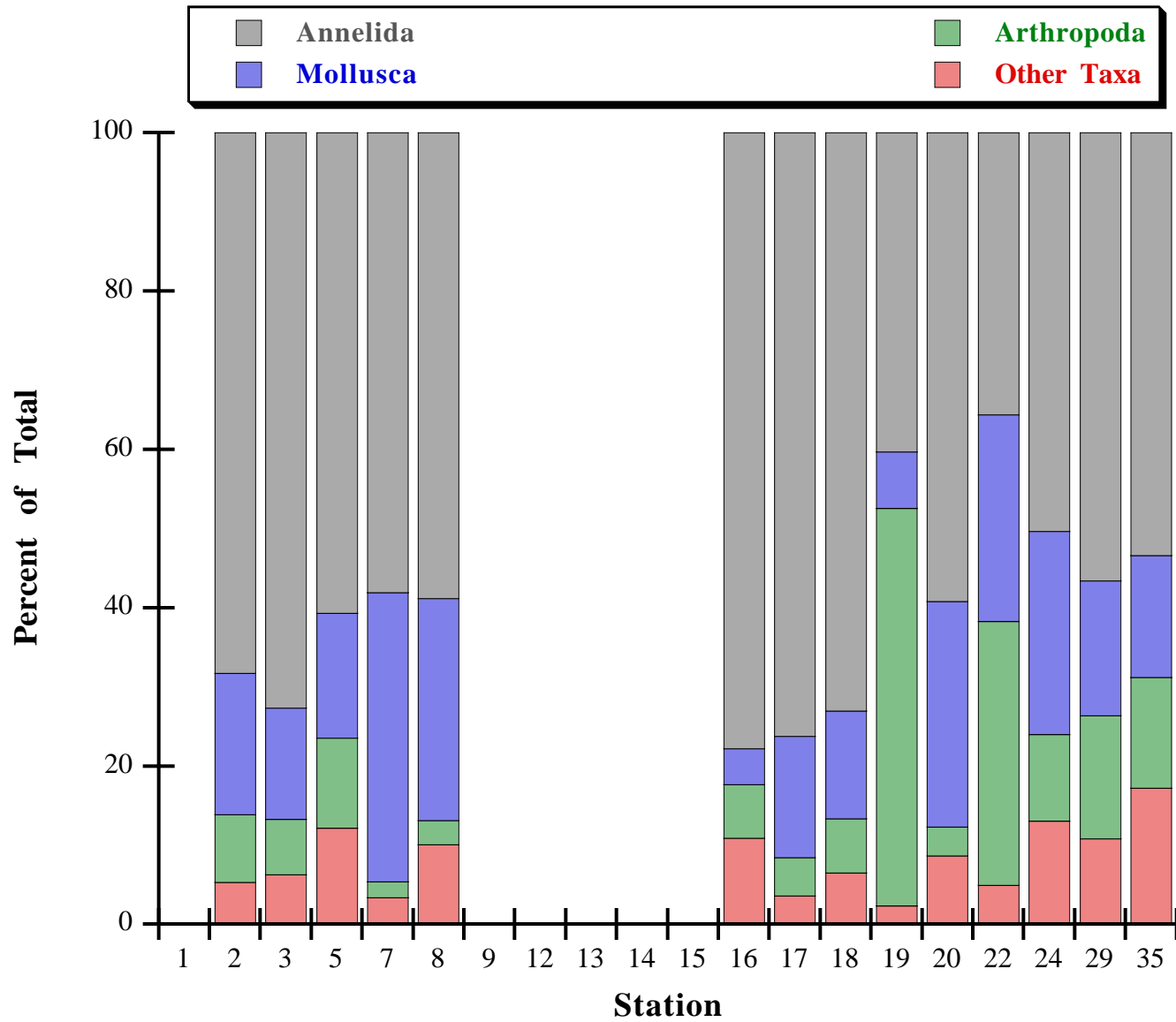


Figure 4. Percent abundance of major taxonomic groups for the Florida Keys NMS Stations, July-August 1998.

The dominant taxa collected from the samples were Oligochaeta (LPIL), the gastropod, *Caecum nitidum*, and the polychaete, *Seoletoma verrilli*, representing 7.5%, 4.1%, and 2.4% of the total number of individuals, respectively (Table 2). Oligochaetes, bivalves, rhynchocoels, and the polychaete, *Syllis cornuta*, were the most widely distributed taxa being found at 100% of the stations (Table 2). The distribution of dominant taxa representing > 10% of the total assemblage at each station is given in Table 5.

Station mean density and mean number of taxa data are given in Table 6 and Figures 5, 6, 7, and 8. Mean densities per stations exhibited considerable variation and ranged from 2058 organisms/m<sup>2</sup> at Station 5 to 8,300 organisms/m<sup>2</sup> at Station 2 (Table 6; Figures 5 and 6). The mean number of taxa per replicate also varied and ranged from 30.7 at Station 17 to 97.0 at Station 35 (Table 6; Figures 7 and 8).

Taxa diversity and evenness are given in Table 6 and Figures 9 and 10. Taxa diversity ( $H'$ ) was uniformly high, with all stations but one (17) having diversity values > 3.0; values ranged from 2.89 at Station 17 to 4.58 at Station 29 (Table 6, Figure 9). Taxa evenness ( $J$ ) was also high, with all stations but four (7, 17, 19, and 20) having evenness values > 0.8; values ranged from 0.67 at Station 17 to 0.91 at Station 22 (Table 6; Figure 10).

Table 5. Percentage abundance of dominant taxa (>10% of the total) for the Florida Keys NMS Stations, July-August 1998.

Taxa	2	3	5	7	8	16	17	18	19	20	22	24	29	35	
<b>SIPUNCULA</b>															
Sipuncula (LPIL)														9.5	
<b>ANNELIDA</b>															
<b>Polychaeta</b>															
<i>Monticellina dorsobranchialis</i>	5.5		5.3												
<i>Protodorvillea kefersteini</i>										7.6					
<i>Nematonereis hebes</i>								6.7	10.1						
Lumbrineridae (LPIL)								6.2							
<i>Scoletoma ernesti</i>						7.5	6.2								
<i>Scoletoma verrilli</i>	8.4								6.2						
<i>Aricidea taylori</i>						6.6	6.2								
<i>Cirrophorus lyra</i>								6.2							
<i>Hesionura coineau</i>				6.4	7.1										
<i>Questa caudicirra</i>	5.2		6.9	5.0		9.1									
<i>Exogone lourei</i>	5.2		6.9	5.0		9.1									
<i>Opisthodonta</i> sp.B	5.2		6.9	5.0		9.1									
Sabellidae (LPIL)				6.1											
<b>Oligochaeta</b>															
Oligochaeta (LPIL)	24.7	13.8	8.1	7.9	13.2	43.2	19.2								
<b>MOLLUSCA</b>															
<b>Bivalvia</b>															
Bivalvia (LPIL)					6.4										
<i>Lima pellucida</i>												7.2			
<b>Gastropoda</b>															
<i>Caecum pulchellum</i>											6.0				
<i>Caecum nitidum</i>	18.9							17.0							
<b>ARTHROPODA</b>															
<b>Malacostraca</b>															
<i>Lembos smithi</i>									11.6						
<i>Leptochelia</i> (LPIL)												7.1	7.0		
<b>Ostracoda</b>															
<i>Haplocytheridea setipunctata</i>									13.8						
<i>Harbansus paucichelatus</i>									6.1						









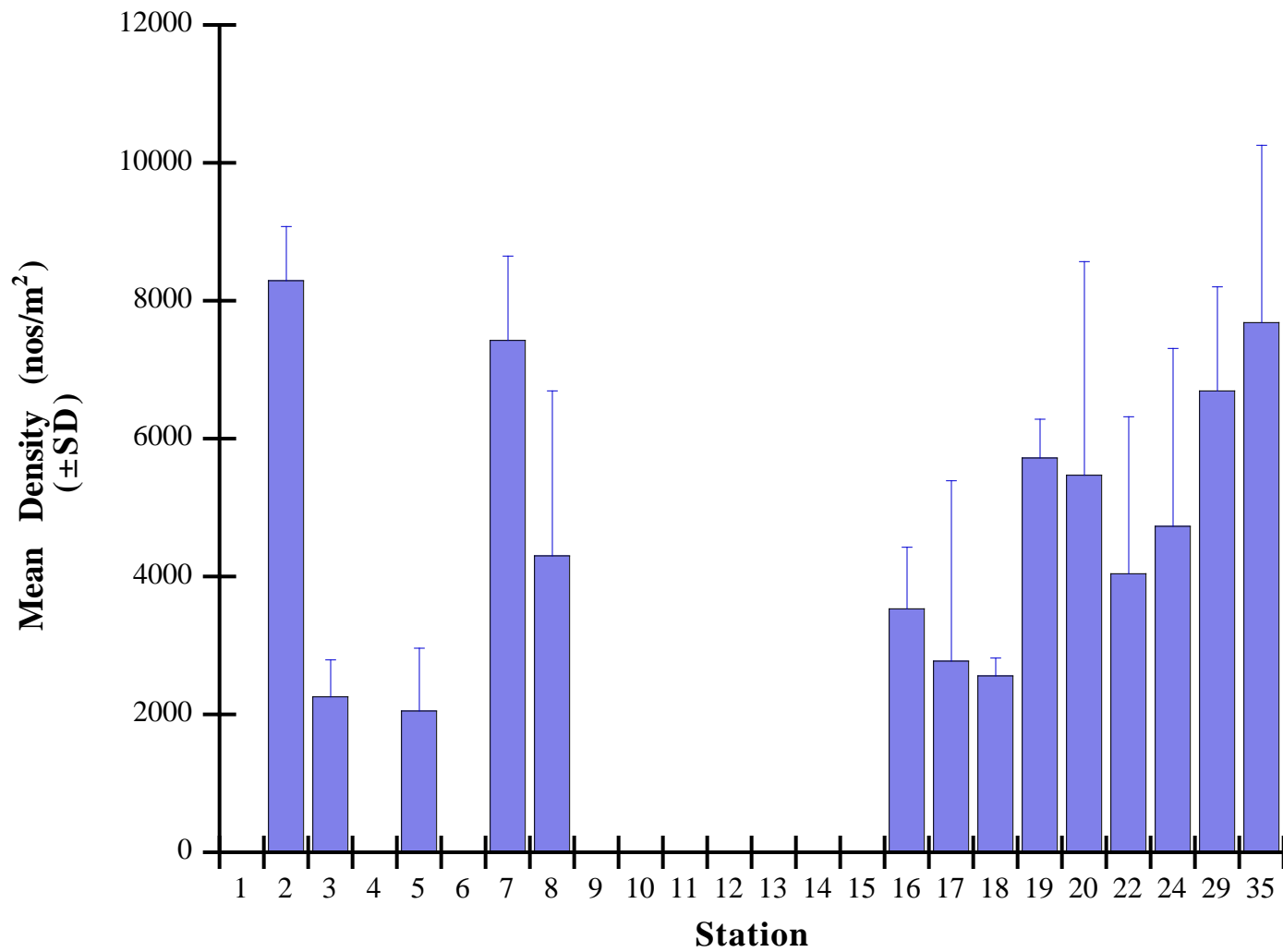


Figure 5. Mean macroinvertebrate densities for the Florida Keys NMS Stations, July-August 1998.

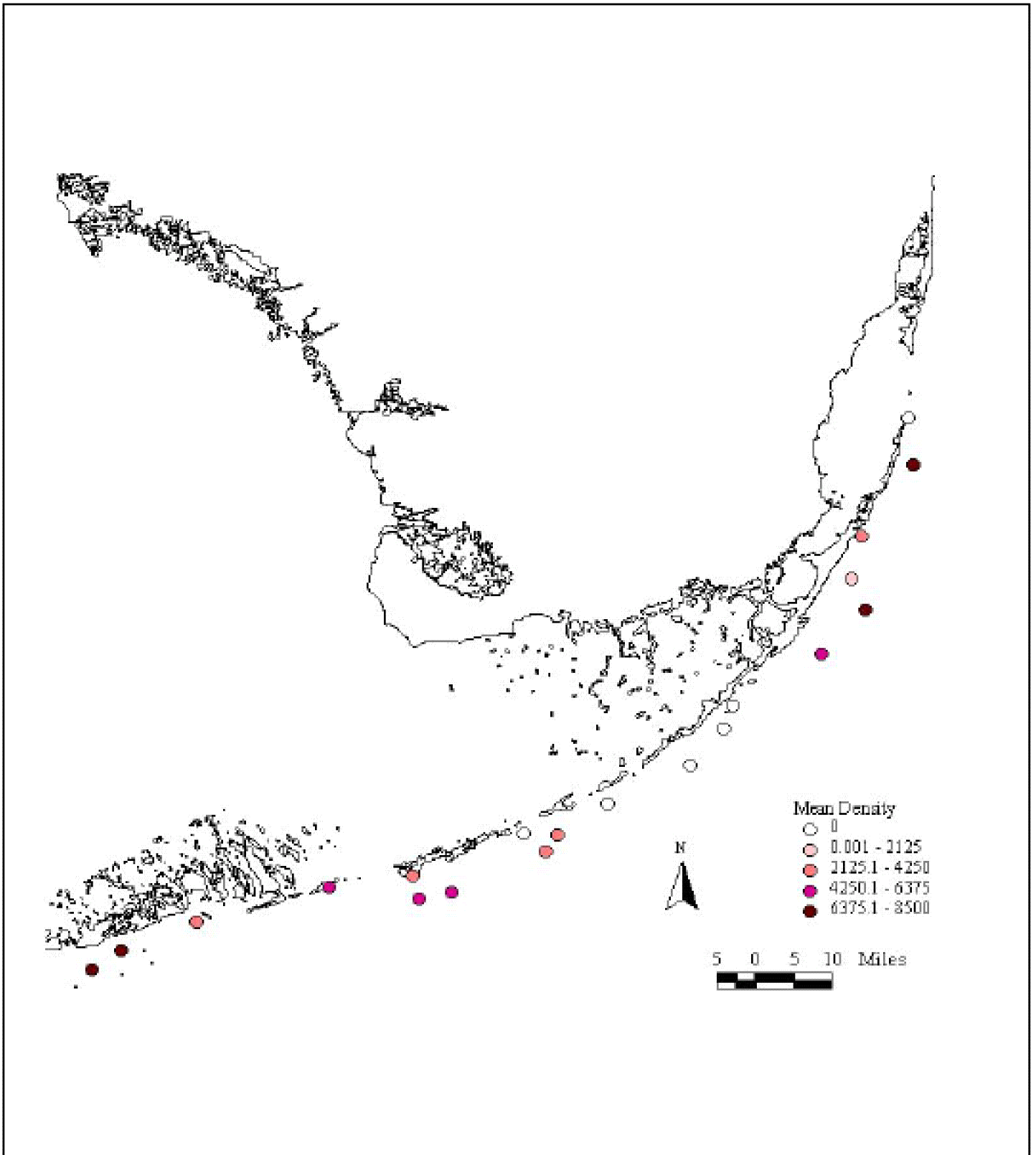


Figure 6. Map of macroinvertebrate density by station for the Florida Keys NMS Stations, August-September 1998.

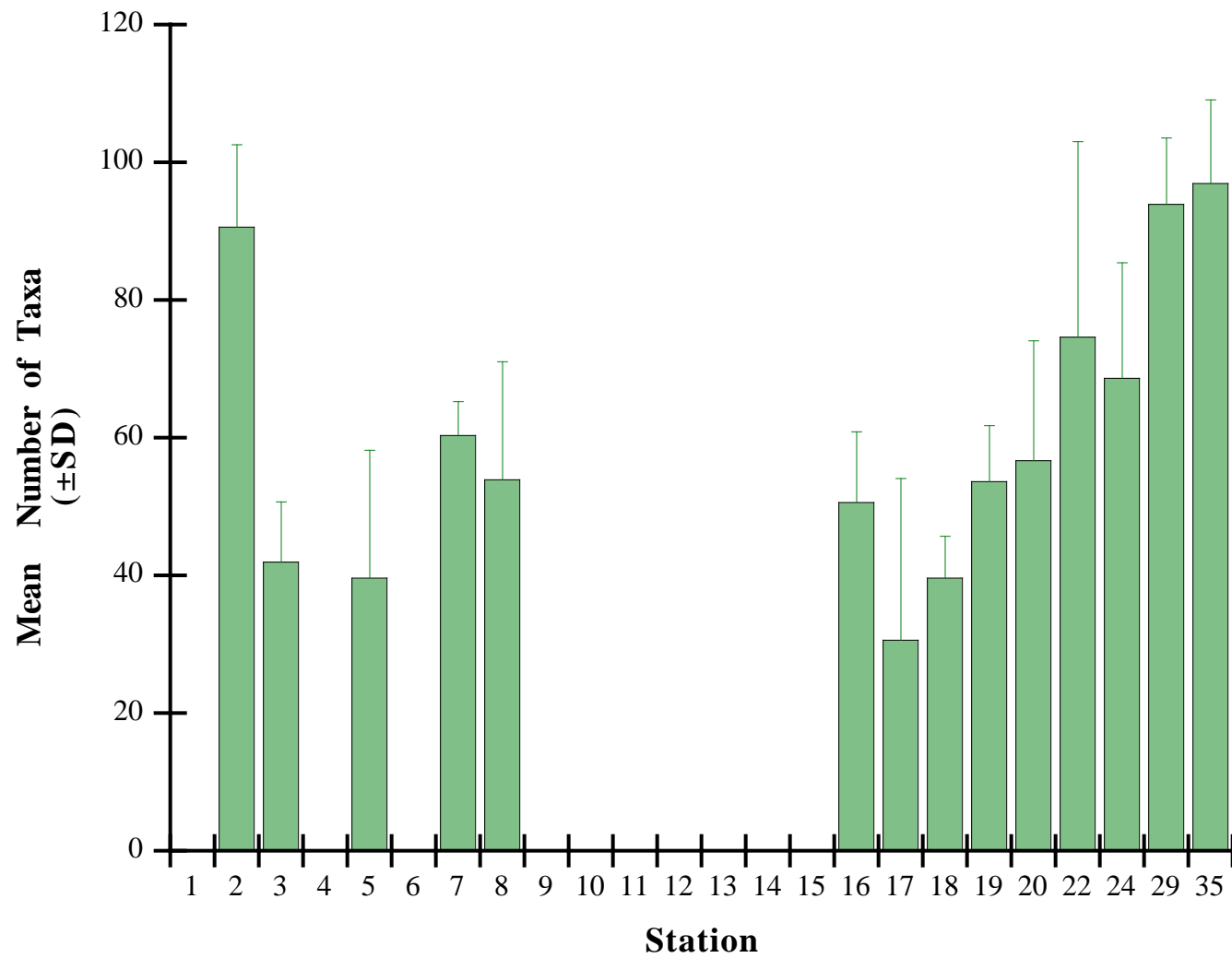


Figure 7. Mean number of macroinvertebrate taxa per replicate for the Florida Keys NMS Stations, July-August 1998.

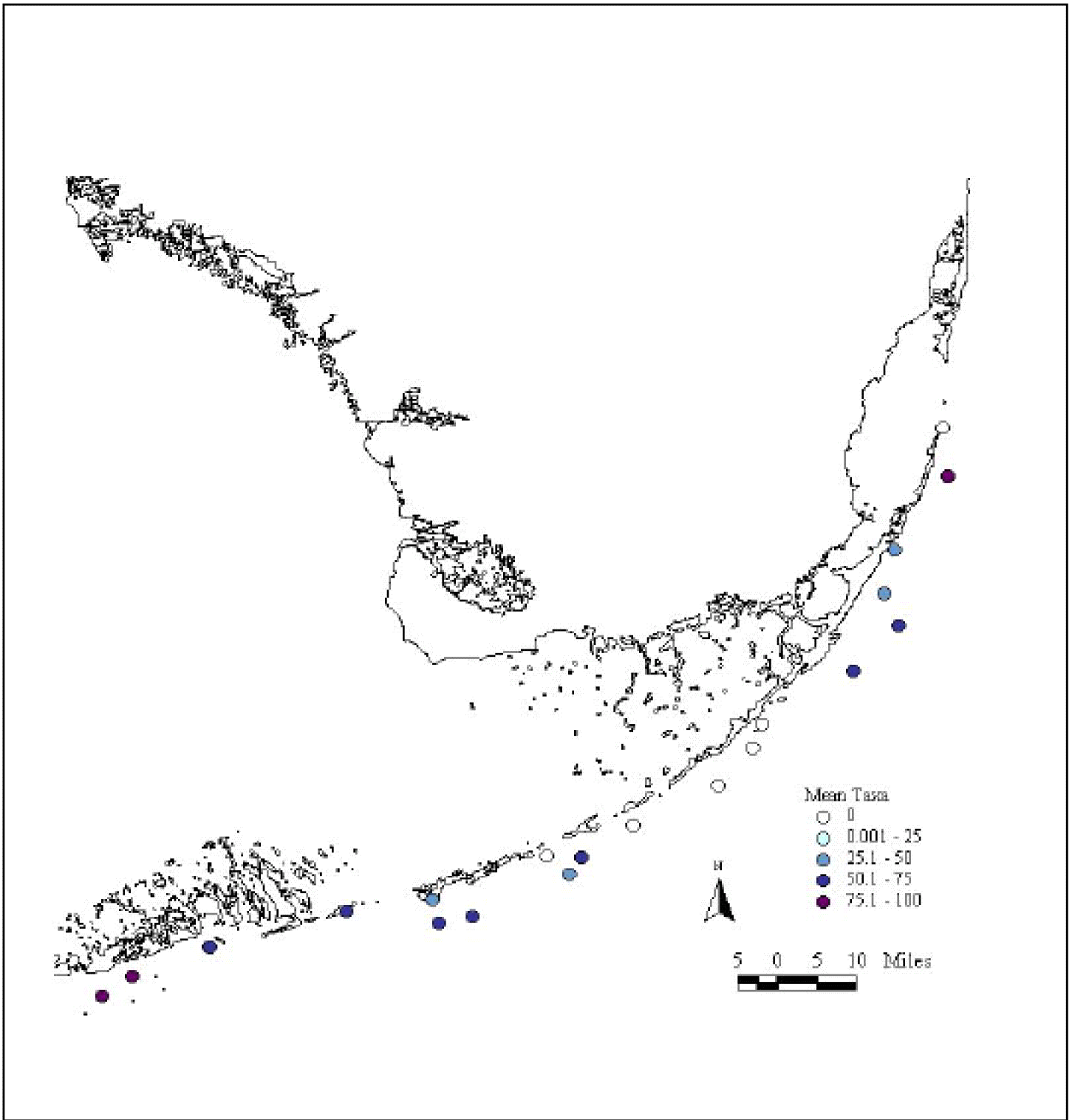


Figure 8. Map of number of taxa by station for the Florida Keys NMS Stations, August-September 1998.

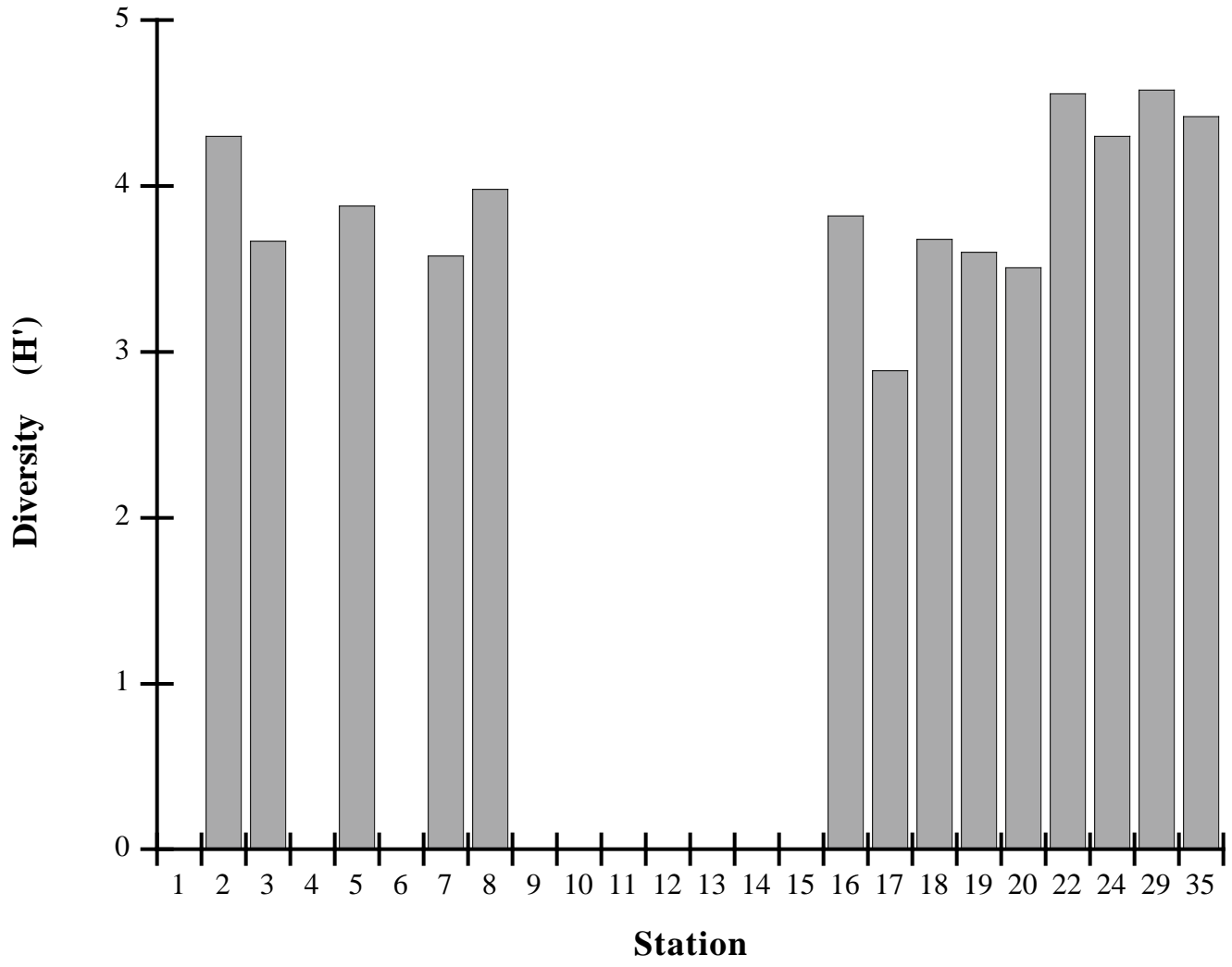


Figure 9. Taxa diversity (H') for the Florida Keys NMS, July-August 1998.

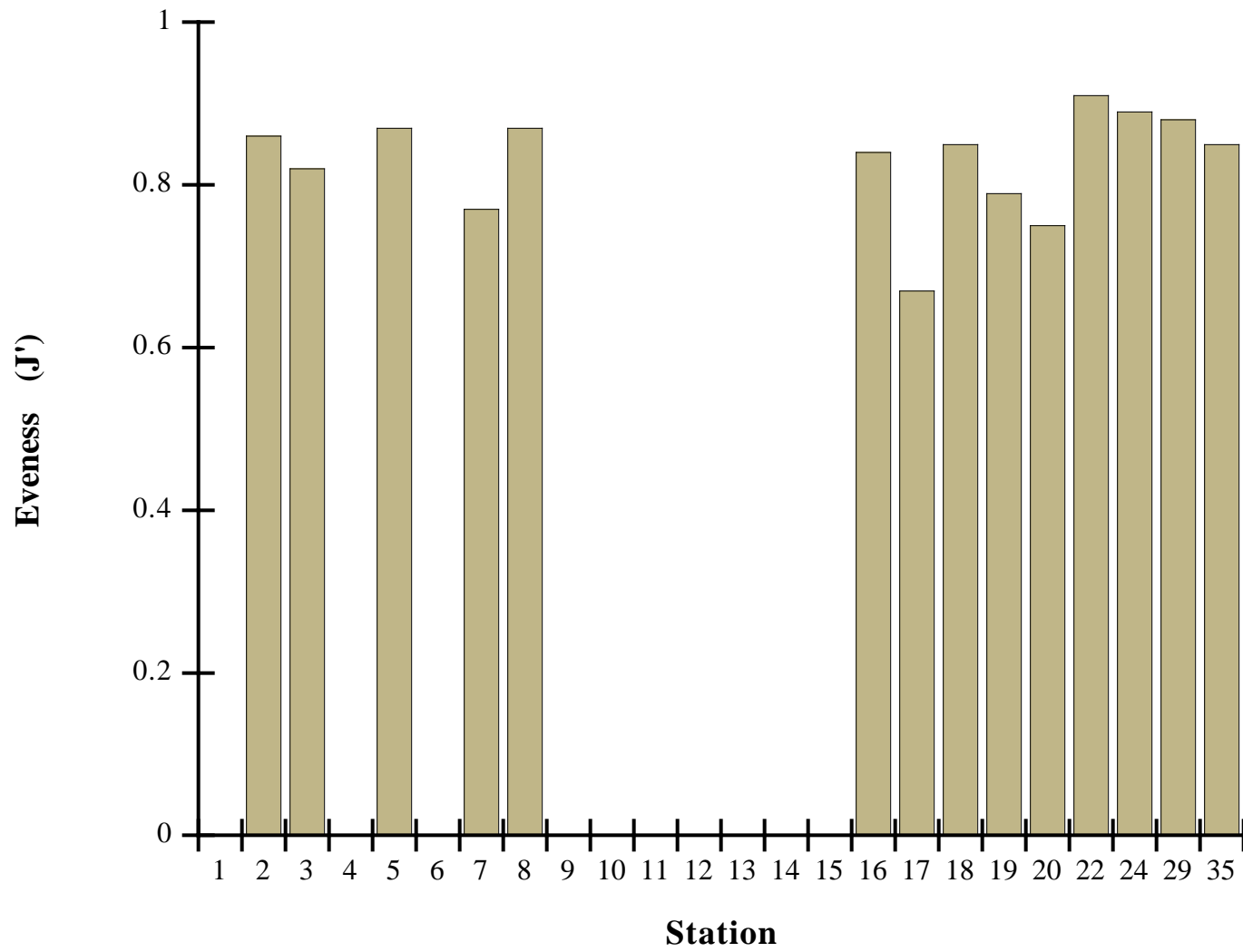


Figure 10. Taxa evenness (J') for the Florida Keys NMS, July-August 1998.

## **LITERATURE CITED**

Pielou, E.C. 1966. The measurement of diversity in different types of biological collections. *Journal of Theoretical Biology* 13:131-144.





## **APPENDIX**



## QUALITY ASSURANCE STATEMENT

Client/Project **NOAA**

Work Assignment Title **Florida Keys-NMS-1998**

Work Assignment Number **FKNMS98**

Task Number

Description of Data Set or Deliverable: **42 Benthic macroinvertebrate samples collected in August of 1998; Young Dredge grabs.**

Description of audit and review activities: **Judged accuracy rates were well above standard levels for sorting and taxonomy. Laboratory QC reports were completed. Copies of reports and QC results follow (see attachments.) All taxonomic data were entered into computer and printed. This list was checked for accuracy against original taxonomic data sheets.**

Description of outstanding issues or deficiencies which may affect data quality: **None**

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Signature of QA Officer or Reviewer

Date

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Signature of Project Manager

Date



## QUALITY CONTROL REWORKS

Client/Project **NOAA**

Work Assignment Title **Florida Keys-NMS-1998**

Work Assignment Number **FKNMS98**

Task Number

### Sorting Results:

Sample #	% Accuracy
FK98-05-1	100%
FK98-08-2	97%
FK98-17-2	100%
FK98-18-2	100%
FK98-24-1	100%

### Taxonomy Results:

Sample #	Taxa	% Accuracy
FK98-02-2	Crust./Moll.	95%
FK98-16-2	Crust./Moll.	100%
FK98-05-2	Crust./Moll.	96.8%
FK98-18-3	Crust./Moll.	100%
FK98-22-3	Crust./Moll.	97.4%
FK98-02-2	Poly./Misc.	97.4%
FK98-22-1	Poly./Misc.	100%
FK98-07-1	Poly./Misc.	98.5%
FK98-17-3	Poly./Misc.	100%
FK98-22-3	Poly./Misc.	98.8%

Description of outstanding issues or deficiencies which may affect data quality: **None**

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Signature of QA Officer or Reviewer

Date