ROOKERY BAY, FLORIDA
BENTHIC COMMUNITY ASSESSMENT

SUBMITTED TO

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NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL OCEAN SERVICE
OFFICE OF OCEAN RESOURCES, CONSERVATION AND ASSESSMENT
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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

INTRODUCTION

Rookery Bay, Florida was sampled during March, 1997. 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).

METHODS

Sample Collection And Handling

A Young dredge (area = 0.04 m^2) was used to collect replicate bottom samples at each of 13 stations in Rookery Bay, Florida. Macroinfaunal samples were sieved through a 0.5–mm mesh screen and preserved with 10% formalin on ship. Macroinfaunal samples were transported to BVA's laboratory in Mobile, Alabama.

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 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/QC reports for the Rookery Bay samples are given in the Appendix.

The analytical methodologies utilized for this study were similar to those used in other benthic community characterization reports prepared for NOAA. 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 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 Pielou's 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}.

Macroinfaunal data were graphically and statistically analyzed to identify any differences in density and number of taxa per replicate between stations. Data for total density and mean taxa per replicate were ln(x) transformed to meet normality assumptions (Shapiro-Wilk W; SAS Institute, 1995). Transformed density and taxa data were analyzed using a one-way ANOVA, while post-hoc comparisons were calculated using paired t-tests (SAS Institute, 1995).

Numerical classification analysis (Boesch 1977) was performed on the faunal data to examine within- and between- stations differences at the Sabine Lake stations and to compare faunal composition at each station within the site. Both normal and inverse classification analyses were used in this study. Normal analysis (sometimes called Q-analysis) treats samples as individual observations, each being composed of a number of attributes (i.e. the various taxa from a given sample). Normal analysis is instructive in helping to ascertain community structure and to infer specific ecological conditions between sampling stations from the relative distributions of species. Inverse classification (termed R-analysis) is based on taxa as individuals, each of which is characterized by its relative abundance in the various samples. This type of analysis is commonly used to identify species groupings with particular habitats or environmental conditions.

Classification analysis of both station collections (normal analysis) and taxa (inverse analysis) was performed using the Czekanowski quantitative index of faunal similarity (Field and MacFarlane 1968). This index is computationally equivalent to the Bray-Curtis similarity measure (Bray and Curtis 1957). The value of the similarity index is 1.0 when two samples are identical and 0 when no taxa are in common. Hierarchical clustering of similarity values is achieved using

the group-average sorting strategy (Lance and Williams 1967) and displayed in the form of dendograms.

Both similarity classification and cluster analysis were performed using the microcomputer package, "Community Analysis System 5.0" (Bloom 1994), as modified for use in BVA's benthic data management program. Taxa used in these analyses were selected according to their percent abundance and percent frequency. Total densities for each of the selected taxa at a given station were log-transformed [x=ln(x+1)] for the analysis.

BENTHIC COMMUNITY CHARACTERIZATION

Faunal Composition, Abundance, And Community Structure

Table 1 provides a complete phylogenetic listing for all stations as well as data on taxa abundance and station occurrence. Four Microsoft ™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 and QA/QC comments, 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 13,481 organisms, representing 539 taxa, were identified from the 13 stations (Table 2). Polychaetes were the most numerous organisms present representing 48.0% of the total assemblage, followed in abundance by bivalves (21.5%), malacostracans (13.1%) and gastropods (5.7%). Polychaetes represented 35.4% of the total number of taxa followed by malacostracans (26.7%), gastropods (13.4%) and bivalves (12.2%) (Table 2). The percentage abundance of the major taxa at the 13 stations is given in Figure 1.

The dominant taxa collected from the samples were the polychaete, *Haplosyllis spongicola,* the bivalves, *Anadara transversa* and *Ervilia cocentrica*, oligochaetes and the polychaete, *Prionospio* sp. representing 22.6%, 7.2%, 3.0%, 2.3% and 2.0% of the total number of individuals, respectively (Table 1). Oligochaetes and rhynchocoels were found at 100% of the

Table 1. Abundance and distribution of taxa for the Rookery Bay stations, March 1997. Taxa above the shades life of data were included in the classification analysis.

Taxa	Phylum	Class	No. of Individuals	% of Total	Cumulative %	Station Occur.	% Station Occur.	Comments
Haplosyllis spongicola	A	Poly	3040	22.55	22.55	4	30.8	
Anadara transversa	M	Biva	970	7.20	29.75	5	38.5	
Ervilia concentrica	M	Biva	406	3.01	32.76	7	53.8	
Bivalvia (LPIL)	M	Biva	367	2.72	35.48	11	84.6	crushed and/or juvenile specimen.
Oligochaeta (LPIL)	A	Olig	315	2.34	37.82	13	100.0	marine and some estuarine specimens only identified to class
Prionospio (LPIL)	A	Poly	270	2.00	39.82	11	84.6	missing identification characters
Goniadides carolinae	A	Poly	237	1.76	41.58	10	76.9	
Crassinella lunulata	M	Biva	212	1.57	43.15	9	69.2	
Armandia maculata	A	Poly	192	1.42	44.57	10	76.9	
Rhynchocoela (LPIL)	R		192	1.42	46.00	13	100.0	no identifible characters
Caecum pulchellum	M	Gast	187	1.39	47.38	11	84.6	
Prionospio cristata	A	Poly	183	1.36	48.74	8	61.5	
Cirrophorus lyra	A	Poly	175	1.30	50.04	7	53.8	
Mediomastus (LPIL)	A	Poly	168	1.25	51.29	10	76.9	anterior portions only; probably *M. californiensis* ; pygidium needed for species ID
Sabellidae (LPIL)	A	Poly	155	1.15	52.44	7	53.8	missing branchial crown
Eudevenopus honduranus	Ar	Mala	152	1.13	53.56	11	84.6	
Branchiostoma (LPIL)	C	Lept	139	1.03	54.60	11	84.6	genus is lowest identification level
Rutiderma darbyi	Ar	Ostr	122	0.90	55.50	10	76.9	
Aricidea taylori	A	Poly	120	0.89	56.39	8	61.5	
Amphipoda (LPIL)	Ar	Mala	109	0.81	57.20	12	92.3	significantly damaged
Abra aequalis	M	Biva	108	0.80	58.00	3	23.1	
Leptochelia (LPIL)	Ar	Mala	101	0.75	58.75	9	69.2	mature male necessary for species identification
Semelidae (LPIL)	M	Biva	93	0.69	59.44	12	92.3	specimen is too small to examine hinge area
Caecum imbricatum	M	Gast	91	0.68	60.11	10	76.9	
Golfingia (LPIL)	S		88	0.65	60.77	8	61.5	immature and/or damaged specimen
Tubulanus (LPIL)	R	Anop	85	0.63	61.40	9	69.2	genus is lowest identification level
Harbansus paucichelatus	Ar	Ostr	84	0.62	62.02	9	69.2	
Melitidae (LPIL)	Ar	Mala	81	0.60	62.62	8	61.5	specimen lacks third uropod
Metharpinia floridana	Ar	Mala	81	0.60	63.22	10	76.9	
Tellina (LPIL)	M	Biva	79	0.59	63.81	6	46.2	due to small size, external and internal characters were not apparent
Tellinidae (LPIL)	M	Biva	78	0.58	64.39	7	53.8	crushed and/or juvenile specimens
Aricidea finitima	A	Poly	75	0.56	64.94	7	53.8	
Polyplacophora (LPIL)	M	Poly	69	0.51	65.45	5	38.5	immature specimen
Exogone rolani	A	Poly	66	0.49	65.94	12	92.3	
Ophiuroidea (LPIL)	E	Ophi	66	0.49	66.43	9	69.2	central disk missing characters
Ampelisca (LPIL)	Ar	Mala	65	0.48	66.92	8	61.5	juvenile specimen or missing characters
Paramphinome sp.B	A	Poly	64	0.47	67.39	6	46.2	
Acteocina bidentata	M	Gast	64	0.47	67.87	6	46.2	
Ostreidae (LPIL)	M	Biva	63	0.47	68.33	1	7.7	crushed and/or juvenile specimens
Photis (LPIL)	Ar	Mala	62	0.46	68.79	9	69.2	immature specimen
Sphaerosyllis piriferopsis	A	Poly	59	0.44	69.23	6	46.2	
Exogone lourei	A	Poly	57	0.42	69.65	7	53.8	
Maldanidae (LPIL)	A	Poly	56	0.42	70.07	10	76.9	fragmented portion; pygidium necessary for positive identification
Lucinidae (LPIL)	M	Biva	55	0.41	70.48	10	76.9	juvenile specimen
Eusarsiella absens	Ar	Ostr	54	0.40	70.88	4	30.8	
Syllis broomensis	A	Poly	50	0.37	71.25	5	38.5	
Neomegamphopus (LPIL)	Ar	Mala	50	0.37	71.62	4	30.8	immature specimen or missing gnathopods
Cyclaspis (LPIL)	Ar	Mala	50	0.37	71.99	11	84.6	uropod missing or damaged
Ostrea equestris	M	Biva	49	0.36	72.35	1	7.7	
Chone (LPIL)	A	Poly	47	0.35	72.70	7	53.8	
Caulleriella ct. *alata*	A	Poly	46	0.34	73.04	7	53.8	
Cirratulidae (LPIL)	A	Poly	44	0.33	73.37	9	69.2	
Cirratodactylis floridensis	Ar	Mala	43	0.32	73.69	5	38.5	
Chione grus	M	Biva	41	0.30	73.99	6	46.2	
Gastropoda (LPIL)	M	Gast	41	0.30	74.30	10	76.9	
Golfingia sp.HH	S		41	0.30	74.60	6	46.2	
Sabellaria sp.A	A	Poly	40	0.30	74.90	5	38.5	
Syllis cornuta	A	Poly	40	0.30	75.19	7	53.8	
Owenia fusiformis	A	Poly	39	0.29	75.48	9	69.2	
Gammaropsis (LPIL)	Ar	Mala	39	0.29	75.77	4	30.8	
Galathowenia oculata	A	Poly	38	0.28	76.05	11	84.6	
Fabricinuda trilobata	A	Poly	37	0.27	76.33	7	53.8	
Erichthonius brasiliensis	Ar	Mala	37	0.27	76.60	4	30.8	
Scoletoma verrilli	A	Poly	36	0.27	76.87	9	69.2	
Diplodonta (LPIL)	M	Biva	36	0.27	77.14	8	61.5	
Aricidea (LPIL)	A	Poly	35	0.26	77.40	8	61.5	
Apseudes propinquus	Ar	Mala	34	0.25	77.65	4	30.8	
Bhawania heteroseta	A	Poly	33	0.24	77.89	6	46.2	
Turbonilla (LPIL)	M	Gast	33	0.24	78.14	9	69.2	
Crepidula plana	M	Gast	33	0.24	78.38	1	7.7	
Eunice unifrons	A	Poly	32	0.24	78.62	6	46.2	
Deutella incerta	Ar	Mala	32	0.24	78.86	8	61.5	
Argopecten gibbus	M	Biva	32	0.24	79.10	5	38.5	
Aglaophamus verrilli	A	Poly	31	0.23	79.33	4	30.8	
Spionidae (LPIL)	A	Poly	31	0.23	79.56	8	61.5	
Dulichiella appendiculata	Ar	Mala	31	0.23	79.79	5	38.5	
Lysidice notata	A	Poly	30	0.22	80.01	4	30.8	
Ampithoe (LPIL)	Ar	Mala	30	0.22	80.23	1	7.7	
Aoridae (LPIL)	Ar	Mala	30	0.22	80.45	5	38.5	
Cyclaspis sp.N	Ar	Mala	30	0.22	80.68	10	76.9	
Onuphidae (LPIL)	A	Poly	29	0.22	80.89	9	69.2	
Syllis (LPIL)	A	Poly	29	0.22	81.11	6	46.2	
Litocorsa antennata	A	Poly	28	0.21	81.31	6	46.2	
Ampithoidae (LPIL)	Ar	Mala	27	0.20	81.51	1	7.7	
Lioberus castaneus	M	Biva	27	0.20	81.71	5	38.5	
Calyptraea centralis	M	Gast	27	0.20	81.92	9	69.2	
Polycirrus (LPIL)	A	Poly	26	0.19	82.11	6	46.2	
Elasmopus (LPIL)	Ar	Mala	26	0.19	82.30	4	30.8	
Ancistrosyllis hartmanae	A	Poly	25	0.19	82.49	5	38.5	
Terebellidae (LPIL)	A	Poly	25	0.19	82.67	5	38.5	
Maera caroliniana	Ar	Mala	25	0.19	82.86	5	38.5	
Bulla striata	M	Gast	25	0.19	83.04	1	7.7	
Sipuncula (LPIL)	S		25	0.19	83.23	6	46.2	
Magelona pettiboneae	A	Poly	24	0.18	83.41	6	46.2	

TABLE 1 CONTINUED:

Taylorpholoe hirsuta	A	Poly	24	0.18	83.58	4	30.8
Arcidae (LPIL)	M	Biva	24	0.18	83.76	4	30.8
Phoxocephalidae (LPIL)	Ar	Mala	23	0.17	83.93	5	38.5
Eusarsiella childi	Ar	Ostr	22	0.16	84.10	4	30.8
Anadara (LPIL)	M	Biva	22	0.16	84.26	3	23.1
Pectinidae (LPIL)	M	Biva	22	0.16	84.42	4	30.8
Sigambra tentaculata	A	Poly	21	0.16	84.58	2	15.4
Vitrinellidae (LPIL)	M	Gast	21	0.16	84.73	4	30.8
Aeginellidae (LPIL)	Ar	Mala	20	0.15	84.88	5	38.5
Photis pugnator	Ar	Mala	20	0.15	85.03	3	23.1
Veneridae (LPIL)	M	Biva	20	0.15	85.18	8	61.5
Actiniaria (LPIL)	Cn	Anth	19	0.14	85.32	7	53.8
Nucula aegeenis	M	Biva	19	0.14	85.46	5	38.5
Rictaxis punctostriatus	M	Gast	19	0.14	85.60	4	30.8
Apoprionospio pygmaea	A	Poly	18	0.13	85.74	5	38.5
Genetyllis castanea	A	Poly	18	0.13	85.87	4	30.8
Monticellina dorsobranchialis	A	Poly	18	0.13	86.00	6	46.2
Asteropterygion oculitristis	Ar	Ostr	18	0.13	86.14	7	53.8
Parasterope zeta	Ar	Ostr	18	0.13	86.27	4	30.8
Dentatisyllis carolinae	A	Poly	17	0.13	86.40	5	38.5
Calozodion wadei	Ar	Mala	17	0.13	86.52	6	46.2
Kalliapseudes sp.C	Ar	Mala	17	0.13	86.65	6	46.2
Eusarsiella spinosa	Ar	Ostr	17	0.13	86.77	4	30.8
Pseudophilomedes ambon	Ar	Ostr	17	0.13	86.90	6	46.2
Tectonatica pusilla	M	Gast	17	0.13	87.03	8	61.5
Aricidea wassi	A	Poly	16	0.12	87.14	2	15.4
Polygordius (LPIL)	A	Poly	16	0.12	87.26	6	46.2
Carpias (LPIL)	Ar	Mala	16	0.12	87.38	2	15.4
Paranesidea sp.A	Ar	Ostr	16	0.12	87.50	1	7.7
Pararicia belizensis	A	Poly	15	0.11	87.61	5	38.5
Prionospio multibranchiata	A	Poly	15	0.11	87.72	2	15.4
Kupellonura sp.A	Ar	Mala	15	0.11	87.83	2	15.4
Ampithoe sp.C	Ar	Mala	15	0.11	87.95	1	7.7
Chevalia carpenteri	Ar	Mala	15	0.11	88.06	4	30.8
Maera (LPIL)	Ar	Mala	15	0.11	88.17	3	23.1
Rildardanus laminosa	Ar	Mala	15	0.11	88.28	3	23.1
Eusarsiella disparalis	Ar	Ostr	15	0.11	88.39	4	30.8
Caecum johnsoni	M	Gast	15	0.11	88.50	4	30.8
Nereis micromma	A	Poly	14	0.10	88.61	4	30.8
Phyllodoce arenae	A	Poly	14	0.10	88.71	5	38.5
Amakusanthura magnifica	Ar	Mala	14	0.10	88.81	9	69.2
Paguridae (LPIL)	Ar	Mala	14	0.10	88.92	6	46.2
Ascidiacea (LPIL)	C	Asci	13	0.10	89.01	4	30.8
Exogone (LPIL)	A	Poly	13	0.10	89.11	5	38.5
Exogone atlantica	A	Poly	13	0.10	89.21	3	23.1
Lumbrineris latreilli	A	Poly	13	0.10	89.30	6	46.2
Pettiboneia duofurca	A	Poly	13	0.10	89.40	5	38.5
Schistomeringos pectinata	A	Poly	13	0.10	89.50	4	30.8
Scoloplos rubra	A	Poly	13	0.10	89.59	7	53.8
Cyclaspis pustulata	Ar	Mala	13	0.10	89.69	7	53.8
Semele (LPIL)	M	Biva	13	0.10	89.79	2	15.4
Ehlersia ferrugina	A	Poly	12	0.09	89.87	3	23.1
Leitoscoloplos (LPIL)	A	Poly	12	0.09	89.96	3	23.1
Phyllodocidae (LPIL)	A	Poly	12	0.09	90.05	6	46.2
Plakosyllis quadrioculata	A	Poly	12	0.09	90.14	3	23.1
Schistomeringos rudolphi	A	Poly	12	0.09	90.23	3	23.1
Bodotriidae (LPIL)	Ar	Mala	12	0.09	90.32	6	46.2
Lucina multilineata	M	Biva	12	0.09	90.41	2	15.4
Semele purpurascens	M	Biva	12	0.09	90.50	1	7.7
Acteocina candei	M	Gast	12	0.09	90.59	3	23.1
Odostomia (LPIL)	M	Gast	12	0.09	90.68	6	46.2
Phascolion sp.B	S		12	0.09	90.76	1	7.7
Branchiosyllis exilis	A	Poly	11	0.08	90.85	2	15.4
Isolda pulchella	A	Poly	11	0.08	90.93	6	46.2
Paraprionospio pinnata	A	Poly	11	0.08	91.01	4	30.8
Protodorvillea kefersteini	A	Poly	11	0.08	91.09	3	23.1
Amphilochidae (LPIL)	Ar	Mala	11	0.08	91.17	5	38.5
Corophium sp.T	Ar	Mala	11	0.08	91.25	2	15.4
Chione (LPIL)	M	Biva	11	0.08	91.34	4	30.8
Pyramidellidae (LPIL)	M	Gast	11	0.08	91.42	5	38.5
Turridae (LPIL)	M	Gast	11	0.08	91.50	9	69.2
Synelmis ewingi	A	Poly	10	0.07	91.57	4	30.8
Dosinia discus	M	Biva	10	0.07	91.65	4	30.8
Olividae (LPIL)	M	Gast	10	0.07	91.72	6	46.2
Cirrophorus (LPIL)	A	Poly	9	0.07	91.79	3	23.1
Laonice cirrata	A	Poly	9	0.07	91.85	4	30.8
Scoletoma ernesti	A	Poly	9	0.07	91.92	4	30.8
Spio pettiboneae	A	Poly	9	0.07	91.99	3	23.1
Amakusanthura signata	Ar	Mala	9	0.07	92.06	3	23.1
Anthuridae (LPIL)	Ar	Mala	9	0.07	92.12	4	30.8
Chevalia (LPIL)	Ar	Mala	9	0.07	92.19	1	7.7
Isaeidae (LPIL)	Ar	Mala	9	0.07	92.26	4	30.8
Oxyurostylis smithi	Ar	Mala	9	0.07	92.32	3	23.1
Pinnixa (LPIL)	Ar	Mala	9	0.07	92.39	5	38.5
Eusarsiella radiicosta	Ar	Ostr	9	0.07	92.46	2	15.4
Corbulidae (LPIL)	M	Biva	9	0.07	92.52	4	30.8
Semele nuculoides	M	Biva	9	0.07	92.59	3	23.1
Phoronis (LPIL)	Ph		8	0.06	92.65	5	38.5
Ancistrosyllis sp.C	A	Poly	8	0.06	92.71	2	15.4
Capitellidae (LPIL)	A	Poly	8	0.06	92.77	5	38.5
Sigalionidae (LPIL)	A	Poly	8	0.06	92.83	3	23.1
Colomastix (LPIL)	Ar	Mala	8	0.06	92.89	1	7.7
Neomegamphopus hiatus	Ar	Mala	8	0.06	92.95	2	15.4
Oedicerotidae (LPIL)	Ar	Mala	8	0.06	93.00	4	30.8
Eusarsiella gettlesoni	Ar	Ostr	8	0.06	93.06	2	15.4
Amphiuridae (LPIL)	E	Ophi	8	0.06	93.12	3	23.1
Aricidea suecica	A	Poly	7	0.05	93.18	2	15.4
Nematonereis hebes	A	Poly	7	0.05	93.23	4	30.8
Nereidae (LPIL)	A	Poly	7	0.05	93.28	6	46.2
Onuphis eremita oculata	A	Poly	7	0.05	93.33	3	23.1
Sthenelais boa	A	Poly	7	0.05	93.38	4	30.8
Cerapus (LPIL)	Ar	Mala	7	0.05	93.43	5	38.5
Eobrolgus spinosus	Ar	Mala	7	0.05	93.49	1	7.7
Metatiron triocellatus	Ar	Mala	7	0.05	93.54	5	38.5

TABLE 1 CONTINUED:

Synopiidae (LPIL)	Ar	Mala	7	0.05	93.59	2	15.4
Tanaidacea (LPIL)	Ar	Mala	7	0.05	93.64	4	30.8
Decapoda Natantia (LPIL)	Ar	Mala	7	0.05	93.69	4	30.8
Asteropella maclaughlinae	Ar	Ostr	7	0.05	93.75	6	46.2
Anomia simplex	M	Biva	7	0.05	93.80	2	15.4
Montacutidae (LPIL)	M	Biva	7	0.05	93.85	5	38.5
Acteocina canaliculata	M	Gast	7	0.05	93.90	5	38.5
Neodrillia cydia	M	Gast	7	0.05	93.95	3	23.1
Rissoidae (LPIL)	M	Gast	7	0.05	94.01	3	23.1
Ischnochiton papillosus	M	Poly	7	0.05	94.06	4	30.8
Axiothella mucosa	A	Poly	6	0.04	94.10	4	30.8
Eunice (LPIL)	A	Poly	6	0.04	94.15	4	30.8
Malmgreniella maccraryae	A	Poly	6	0.04	94.19	4	30.8
Odontosyllis enopla	A	Poly	6	0.04	94.24	3	23.1
Poecilochaetus (LPIL)	A	Poly	6	0.04	94.28	5	38.5
Syllis gracilis	A	Poly	6	0.04	94.33	5	38.5
Ceradocus shoemakeri	Ar	Mala	6	0.04	94.37	2	15.4
Paramicrodeutopus myersi	Ar	Mala	6	0.04	94.41	2	15.4
Kalliapseudes (LPIL)	Ar	Mala	6	0.04	94.46	5	38.5
Paratanaidae (LPIL)	Ar	Mala	6	0.04	94.50	3	23.1
Pagurus (LPIL)	Ar	Mala	6	0.04	94.55	4	30.8
Xanthidae (LPIL)	Ar	Mala	6	0.04	94.59	4	30.8
Gastrochaena hians	M	Biva	6	0.04	94.64	3	23.1
Acteocina sp.B	M	Gast	6	0.04	94.68	2	15.4
Caecum (LPIL)	M	Gast	6	0.04	94.73	4	30.8
Caecum cooperi	M	Gast	6	0.04	94.77	5	38.5
Philine (LPIL)	M	Gast	6	0.04	94.81	1	7.7
Turbonilla interrupta	M	Gast	6	0.04	94.86	2	15.4
Armandia agilis	A	Poly	5	0.04	94.90	2	15.4
Ceratocephale oculata	A	Poly	5	0.04	94.93	2	15.4
Eunicidae (LPIL)	A	Poly	5	0.04	94.97	4	30.8
Goniadidae (LPIL)	A	Poly	5	0.04	95.01	2	15.4
Grubeosyllis clavata	A	Poly	5	0.04	95.04	1	7.7
Lumbrineridae (LPIL)	A	Poly	5	0.04	95.08	5	38.5
Scoloplos (LPIL)	A	Poly	5	0.04	95.12	2	15.4
Sphaerosyllis perkinsi	A	Poly	5	0.04	95.16	2	15.4
Syllis lutea	A	Poly	5	0.04	95.19	1	7.7
Carpias bermudensis	Ar	Mala	5	0.04	95.23	2	15.4
Americhelidium americanum	Ar	Mala	5	0.04	95.27	3	23.1
Metatiron tropakis	Ar	Mala	5	0.04	95.30	3	23.1
Photis melanicus	Ar	Mala	5	0.04	95.34	2	15.4
Photis sp.J	Ar	Mala	5	0.04	95.38	2	15.4
Cumella garrityi	Ar	Mala	5	0.04	95.42	3	23.1
Oxyurostylis (LPIL)	Ar	Mala	5	0.04	95.45	3	23.1
Decapoda Reptantia (LPIL)	Ar	Mala	5	0.04	95.49	4	30.8
Euceramus praelongus	Ar	Mala	5	0.04	95.53	2	15.4
Majidae (LPIL)	Ar	Mala	5	0.04	95.56	4	30.8
Actinoseta hummelincki	Ar	Ostr	5	0.04	95.60	2	15.4
Eusarsiella (LPIL)	Ar	Ostr	5	0.04	95.64	3	23.1
Eusarsiella sp.E	Ar	Ostr	5	0.04	95.68	3	23.1
Branchiopoda (LPIL)	Ar	Bran	5	0.04	95.71	1	7.7
Diplodonta punctata	M	Biva	5	0.04	95.75	2	15.4
Laevicardium laevigatum	M	Biva	5	0.04	95.79	3	23.1
Macoma (LPIL)	M	Biva	5	0.04	95.82	3	23.1
Musculus lateralis	M	Biva	5	0.04	95.86	1	7.7
Semele bellastriata	M	Biva	5	0.04	95.90	2	15.4
Tellina sybaritica	M	Biva	5	0.04	95.93	2	15.4
Acteocina (LPIL)	M	Gast	5	0.04	95.97	4	30.8
Strombiformis hemphilli	M	Gast	5	0.04	96.01	3	23.1
Turbonilla portoricana	M	Gast	5	0.04	96.05	1	7.7
Ischnochiton (LPIL)	M	Poly	5	0.04	96.08	1	7.7
Ampharete sp.A	A	Poly	4	0.03	96.11	4	30.8
Ampharetidae (LPIL)	A	Poly	4	0.03	96.14	3	23.1
Autolytus sp.A	A	Poly	4	0.03	96.17	2	15.4
Cirratulus (LPIL)	A	Poly	4	0.03	96.20	1	7.7
Diopatra cuprea	A	Poly	4	0.03	96.23	3	23.1
Kinbergonuphis virgata	A	Poly	4	0.03	96.26	1	7.7
Loimia medusa	A	Poly	4	0.03	96.29	1	7.7
Megalomma pigmentum	A	Poly	4	0.03	96.32	2	15.4
Mooreonuphis nebulosa	A	Poly	4	0.03	96.35	1	7.7
Horoloanthura irpex	Ar	Mala	4	0.03	96.38	2	15.4
Paracerceis caudata	Ar	Mala	4	0.03	96.41	2	15.4
Ampeliscidae (LPIL)	Ar	Mala	4	0.03	96.44	1	7.7
Batea (LPIL)	Ar	Mala	4	0.03	96.47	2	15.4
Colomastix iricinae	Ar	Mala	4	0.03	96.50	1	7.7
Ischyroceridae (LPIL)	Ar	Mala	4	0.03	96.53	3	23.1
Listriella barnardi	Ar	Mala	4	0.03	96.56	3	23.1
Melphidippidae (LPIL)	Ar	Mala	4	0.03	96.59	2	15.4
Podocerus kleidus	Ar	Mala	4	0.03	96.62	3	23.1
Cumacea (LPIL)	Ar	Mala	4	0.03	96.65	4	30.8
Cumella (LPIL)	Ar	Mala	4	0.03	96.68	2	15.4
Processidae (LPIL)	Ar	Mala	4	0.03	96.71	2	15.4
Cylindroleberididae (LPIL)	Ar	Ostr	4	0.03	96.74	3	23.1
Philomedidae (LPIL)	Ar	Ostr	4	0.03	96.77	3	23.1
Glycymeris pectinata	M	Biva	4	0.03	96.80	3	23.1
Hiatella arctica	M	Biva	4	0.03	96.82	3	23.1
Macrocallista maculata	M	Biva	4	0.03	96.85	4	30.8
Mytilidae (LPIL)	M	Biva	4	0.03	96.88	4	30.8
Caecum nitidium	M	Gast	4	0.03	96.91	1	7.7
Conus jaspideus	M	Gast	4	0.03	96.94	3	23.1
Olivella (LPIL)	M	Gast	4	0.03	96.97	2	15.4
Cylindrobulla beauii	M	Gast	4	0.03	97.00	1	7.7
Amphictene sp.A	A	Poly	3	0.02	97.03	2	15.4
Aricidea philbinae	A	Poly	3	0.02	97.05	1	7.7
Cirratulus sp.B	A	Poly	3	0.02	97.07	1	7.7
Cirrophorus perdidoensis	A	Poly	3	0.02	97.09	1	7.7
Eupolymnia nebulosa	A	Poly	3	0.02	97.11	3	23.1
Fimbriosthenelais minor	A	Poly	3	0.02	97.14	2	15.4
Glycera americana	A	Poly	3	0.02	97.16	2	15.4
Hesione picta	A	Poly	3	0.02	97.18	2	15.4
Mediomastus californiensis	A	Poly	3	0.02	97.20	3	23.1

TABLE 1 CONTINUED:

Notomastus americanus	A	Poly	3	0.02	97.23	1	7.7
Oweniidae (LPIL)	A	Poly	3	0.02	97.25	2	15.4
Paraonidae (LPIL)	A	Poly	3	0.02	97.27	3	23.1
Phyllodoce (LPIL)	A	Poly	3	0.02	97.29	2	15.4
Pista quadrilobata	A	Poly	3	0.02	97.31	1	7.7
Podarkeopsis levifuscina	A	Poly	3	0.02	97.34	2	15.4
Scolelepis (LPIL)	A	Poly	3	0.02	97.36	2	15.4
Sphaerosyllis aciculata	A	Poly	3	0.02	97.38	2	15.4
Syllidae (LPIL)	A	Poly	3	0.02	97.40	2	15.4
Terebellides (LPIL)	A	Poly	3	0.02	97.43	1	7.7
Rocinela signata	Ar	Mala	3	0.02	97.45	2	15.4
Ampelisca bicarinata	Ar	Mala	3	0.02	97.47	3	23.1
Ampelisca sp.A	Ar	Mala	3	0.02	97.49	2	15.4
Corophium (LPIL)	Ar	Mala	3	0.02	97.51	3	23.1
Elasmopus sp.H	Ar	Mala	3	0.02	97.54	3	23.1
Lembos (LPIL)	Ar	Mala	3	0.02	97.56	3	23.1
Leucothoe spinicarpa	Ar	Mala	3	0.02	97.58	2	15.4
Liljeborgiidae (LPIL)	Ar	Mala	3	0.02	97.60	3	23.1
Shoemakerella cubensis	Ar	Mala	3	0.02	97.63	3	23.1
Cyclaspis unicornis	Ar	Mala	3	0.02	97.65	1	7.7
Apseudidae (LPIL)	Ar	Mala	3	0.02	97.67	2	15.4
Leptochela serratorbita	Ar	Mala	3	0.02	97.69	3	23.1
Pinnotheridae (LPIL)	Ar	Mala	3	0.02	97.72	2	15.4
Porcellanidae (LPIL)	Ar	Mala	3	0.02	97.74	3	23.1
Rutiderma (LPIL)	Ar	Ostr	3	0.02	97.76	2	15.4
Synasterope setisparsa	Ar	Ostr	3	0.02	97.78	2	15.4
Argopecten (LPIL)	M	Biva	3	0.02	97.80	1	7.7
Mesodesmatidae (LPIL)	M	Biva	3	0.02	97.83	1	7.7
Solemya velum	M	Biva	3	0.02	97.85	2	15.4
Haminoea (LPIL)	M	Gast	3	0.02	97.87	2	15.4
Jaspidella jaspidea	M	Gast	3	0.02	97.89	1	7.7
Volvulella persimilis	M	Gast	3	0.02	97.92	2	15.4
Acanthochitona pygmaea	M	Poly	3	0.02	97.94	1	7.7
Calyptraeidae (LPIL)	M	Gast	3	0.02	97.96	2	15.4
Lineidae (LPIL)	R	Anop	3	0.02	97.98	3	23.1
Phascolion strombi	S		3	0.02	98.00	2	15.4
Aricidea cerrutii	A	Poly	2	0.01	98.02	1	7.7
Boccardiella ligerica	A	Poly	2	0.01	98.03	1	7.7
Brania wellfleetensis	A	Poly	2	0.01	98.05	2	15.4
Caulleriella sp.K	A	Poly	2	0.01	98.06	2	15.4
Ceratonereis irritabilis	A	Poly	2	0.01	98.08	2	15.4
Chaetozone sp.B	A	Poly	2	0.01	98.09	2	15.4
Cirrophorus furcatus	A	Poly	2	0.01	98.11	1	7.7
Glycera dibranchiata	A	Poly	2	0.01	98.12	2	15.4
Goniada littorea	A	Poly	2	0.01	98.14	2	15.4
Grubeosyllis rugulosa	A	Poly	2	0.01	98.15	1	7.7
Lepidonotus variabilis	A	Poly	2	0.01	98.17	2	15.4
Marphysa acicularium	A	Poly	2	0.01	98.18	1	7.7
Mooreonuphis pallidula	A	Poly	2	0.01	98.20	2	15.4
Nephtys incisa	A	Poly	2	0.01	98.21	2	15.4
Nereis (LPIL)	A	Poly	2	0.01	98.23	2	15.4
Pilargidae (LPIL)	A	Poly	2	0.01	98.24	2	15.4
Polynoidae (LPIL)	A	Poly	2	0.01	98.26	2	15.4
Psammolyce ctenidophora	A	Poly	2	0.01	98.27	2	15.4
Scoletoma hebes	A	Poly	2	0.01	98.29	1	7.7
Scoloplos sp.B	A	Poly	2	0.01	98.30	1	7.7
Terebellides parvus	A	Poly	2	0.01	98.32	1	7.7
Trichobranchus glacialis	A	Poly	2	0.01	98.33	1	7.7
Accalathura crenulata	Ar	Mala	2	0.01	98.35	2	15.4
Batea carinata	Ar	Mala	2	0.01	98.36	1	7.7
Hartmanodes nyei	Ar	Mala	2	0.01	98.38	2	15.4
Listriella (LPIL)	Ar	Mala	2	0.01	98.39	2	15.4
Listriella sp.G	Ar	Mala	2	0.01	98.40	1	7.7
Lysianassidae (LPIL)	Ar	Mala	2	0.01	98.42	2	15.4
Metatiron (LPIL)	Ar	Mala	2	0.01	98.43	2	15.4
Parametopella (LPIL)	Ar	Mala	2	0.01	98.45	1	7.7
Tiron (LPIL)	Ar	Mala	2	0.01	98.46	1	7.7
Nannastacidae (LPIL)	Ar	Mala	2	0.01	98.48	2	15.4
Mysidacea (LPIL)	Ar	Mala	2	0.01	98.49	1	7.7
Mysidae (LPIL)	Ar	Mala	2	0.01	98.51	2	15.4
Alpheidae (LPIL)	Ar	Mala	2	0.01	98.52	1	7.7
Leptochela (LPIL)	Ar	Mala	2	0.01	98.54	1	7.7
Hypoconcha arcuata	Ar	Mala	2	0.01	98.55	1	7.7
Petrolisthes politus	Ar	Mala	2	0.01	98.57	1	7.7
Pinnixa cylindrica	Ar	Mala	2	0.01	98.58	2	15.4
Amboleberis americana	Ar	Ostr	2	0.01	98.60	2	15.4
Asteropella monambon	Ar	Ostr	2	0.01	98.61	1	7.7
Ostracoda (LPIL)	Ar	Ostr	2	0.01	98.63	2	15.4
Podocopa (LPIL)	Ar	Ostr	2	0.01	98.64	2	15.4
Mellitidae (LPIL)	E	Echi	2	0.01	98.66	2	15.4
Arcinella cornuta	M	Biva	2	0.01	98.67	2	15.4
Corbula contracta	M	Biva	2	0.01	98.69	2	15.4
Glycymerididae (LPIL)	M	Biva	2	0.01	98.70	2	15.4
Lima pellucida	M	Biva	2	0.01	98.72	2	15.4
Lyonsia hyalina floridana	M	Biva	2	0.01	98.73	2	15.4
Macrocallista nimbosa	M	Biva	2	0.01	98.75	2	15.4
Tagelus divisus	M	Biva	2	0.01	98.76	1	7.7
Varicorbula operculata	M	Biva	2	0.01	98.78	2	15.4
Aclididae (LPIL)	M	Gast	2	0.01	98.79	1	7.7
Atys sandersoni	M	Gast	2	0.01	98.81	1	7.7
Bittium varium	M	Gast	2	0.01	98.82	1	7.7
Caecum floridanum	M	Gast	2	0.01	98.84	1	7.7
Cyclostremiscus beauii	M	Gast	2	0.01	98.85	1	7.7
Hamineidae (LPIL)	M	Gast	2	0.01	98.86	2	15.4
Marginellidae (LPIL)	M	Gast	2	0.01	98.88	2	15.4
Melanella (LPIL)	M	Gast	2	0.01	98.89	2	15.4
Nannodiella oxia	M	Gast	2	0.01	98.91	1	7.7
Olivella floralia	M	Gast	2	0.01	98.92	2	15.4
Strombiformis (LPIL)	M	Gast	2	0.01	98.94	2	15.4
Zebina browniana	M	Gast	2	0.01	98.95	1	7.7
Aspidosiphon albus	S		2	0.01	98.97	1	7.7

TABLE 1 CONTINUED:

Turbellaria (LPIL)	Pl	Turb	1	0.01	98.98	1	7.7
Brachiopoda (LPIL)	B		1	0.01	98.98	1	7.7
Acoetes pleei	A	Poly	1	0.01	98.99	1	7.7
Aglaophamus circinata	A	Poly	1	0.01	99.00	1	7.7
Ancistrosyllis (LPIL)	A	Poly	1	0.01	99.01	1	7.7
Ancistrosyllis carolinensis	A	Poly	1	0.01	99.01	1	7.7
Arabella multidentata	A	Poly	1	0.01	99.02	1	7.7
Aricidea sp.Q	A	Poly	1	0.01	99.03	1	7.7
Boguea enigmatica	A	Poly	1	0.01	99.04	1	7.7
Boguea sp.A	A	Poly	1	0.01	99.04	1	7.7
Caulleriella (LPIL)	A	Poly	1	0.01	99.05	1	7.7
Ceratonereis (LPIL)	A	Poly	1	0.01	99.06	1	7.7
Chaetozone (LPIL)	A	Poly	1	0.01	99.07	1	7.7
Cirriformia sp.B	A	Poly	1	0.01	99.07	1	7.7
Demonax (LPIL)	A	Poly	1	0.01	99.08	1	7.7
Dipolydora socialis	A	Poly	1	0.01	99.09	1	7.7
Eulepethidae (LPIL)	A	Poly	1	0.01	99.09	1	7.7
Glycera (LPIL)	A	Poly	1	0.01	99.10	1	7.7
Glycera sp.E	A	Poly	1	0.01	99.11	1	7.7
Glyceridae (LPIL)	A	Poly	1	0.01	99.12	1	7.7
Goniada teres	A	Poly	1	0.01	99.12	1	7.7
Hemipodus roseus	A	Poly	1	0.01	99.13	1	7.7
Hesionidae (LPIL)	A	Poly	1	0.01	99.14	1	7.7
Heteropodarke lyonsi	A	Poly	1	0.01	99.15	1	7.7
Kinbergonuphis simoni	A	Poly	1	0.01	99.15	1	7.7
Lepidasthenia varia	A	Poly	1	0.01	99.16	1	7.7
Megalomma (LPIL)	A	Poly	1	0.01	99.17	1	7.7
Mooreonuphis (LPIL)	A	Poly	1	0.01	99.18	1	7.7
Mooreonuphis intermedia	A	Poly	1	0.01	99.18	1	7.7
Nereis acuminata	A	Poly	1	0.01	99.19	1	7.7
Notomastus (LPIL)	A	Poly	1	0.01	99.20	1	7.7
Notomastus hemipodus	A	Poly	1	0.01	99.21	1	7.7
Orbiniidae (LPIL)	A	Poly	1	0.01	99.21	1	7.7
Pholoidae (LPIL)	A	Poly	1	0.01	99.22	1	7.7
Piromis roberti	A	Poly	1	0.01	99.23	1	7.7
Polycirrus plumosus	A	Poly	1	0.01	99.24	1	7.7
Proceraea sp.B	A	Poly	1	0.01	99.24	1	7.7
Scolelepis squamata	A	Poly	1	0.01	99.25	1	7.7
Scoletoma candida	A	Poly	1	0.01	99.26	1	7.7
Scoloplos acmeceps	A	Poly	1	0.01	99.27	1	7.7
Sigambra bassi	A	Poly	1	0.01	99.27	1	7.7
Sphaerosyllis (LPIL)	A	Poly	1	0.01	99.28	1	7.7
Spiochaetopterus oculatus	A	Poly	1	0.01	99.29	1	7.7
Streblosoma hartmanae	A	Poly	1	0.01	99.30	1	7.7
Streptosyllis pettiboneae	A	Poly	1	0.01	99.30	1	7.7
Syllis variegata	A	Poly	1	0.01	99.31	1	7.7
Thalenessa sp.C	A	Poly	1	0.01	99.32	1	7.7
Trypanosyllis (LPIL)	A	Poly	1	0.01	99.32	1	7.7
Trypanosyllis vittigera	A	Poly	1	0.01	99.33	1	7.7
Westheideia minutimala	A	Poly	1	0.01	99.34	1	7.7
Chiridotea (LPIL)	Ar	Mala	1	0.01	99.35	1	7.7
Hyssuridae (LPIL)	Ar	Mala	1	0.01	99.35	1	7.7
Isopoda (LPIL)	Ar	Mala	1	0.01	99.36	1	7.7
Munnidae (LPIL)	Ar	Mala	1	0.01	99.37	1	7.7
Xenanthura brevitelson	Ar	Mala	1	0.01	99.38	1	7.7
Ampelisca abdita	Ar	Mala	1	0.01	99.38	1	7.7
Ampelisca sp.C	Ar	Mala	1	0.01	99.39	1	7.7
Bateidae (LPIL)	Ar	Mala	1	0.01	99.40	1	7.7
Caprellidae (LPIL)	Ar	Mala	1	0.01	99.41	1	7.7
Ceradocus (LPIL)	Ar	Mala	1	0.01	99.41	1	7.7
Gibberosus (LPIL)	Ar	Mala	1	0.01	99.42	1	7.7
Parametopella cypris	Ar	Mala	1	0.01	99.43	1	7.7
Photis sp.D	Ar	Mala	1	0.01	99.44	1	7.7
Phtisica marina	Ar	Mala	1	0.01	99.44	1	7.7
Unciola serrata	Ar	Mala	1	0.01	99.45	1	7.7
Campylaspis heardi	Ar	Mala	1	0.01	99.46	1	7.7
Campylaspis sp.M	Ar	Mala	1	0.01	99.47	1	7.7
Cyclaspis bacescui	Ar	Mala	1	0.01	99.47	1	7.7
Cyclaspis sp.O	Ar	Mala	1	0.01	99.48	1	7.7
Diastylidae (LPIL)	Ar	Mala	1	0.01	99.49	1	7.7
Bowmaniella (LPIL)	Ar	Mala	1	0.01	99.50	1	7.7
Apseudes (LPIL)	Ar	Mala	1	0.01	99.50	1	7.7
Leptochelia sp.D	Ar	Mala	1	0.01	99.51	1	7.7
Hippolytidae (LPIL)	Ar	Mala	1	0.01	99.52	1	7.7
Processa hemphilli	Ar	Mala	1	0.01	99.53	1	7.7
Sicyonia laevigata	Ar	Mala	1	0.01	99.53	1	7.7
Thor manningi	Ar	Mala	1	0.01	99.54	1	7.7
Goneplacidae (LPIL)	Ar	Mala	1	0.01	99.55	1	7.7
Heterocrypta granulata	Ar	Mala	1	0.01	99.55	1	7.7
Pilumnus sayi	Ar	Mala	1	0.01	99.56	1	7.7
Portunus (LPIL)	Ar	Mala	1	0.01	99.57	1	7.7
Upogebiidae (LPIL)	Ar	Mala	1	0.01	99.58	1	7.7
Cytherideidae (LPIL)	Ar	Ostr	1	0.01	99.58	1	7.7
Eusarsiella paniculata	Ar	Ostr	1	0.01	99.59	1	7.7
Harbansus (LPIL)	Ar	Ostr	1	0.01	99.60	1	7.7
Ostracoda Family P	Ar	Ostr	1	0.01	99.61	1	7.7
Pseudophilomedes (LPIL)	Ar	Ostr	1	0.01	99.61	1	7.7
Rutiderma mollitum	Ar	Ostr	1	0.01	99.62	1	7.7
Rutidermatidae (LPIL)	Ar	Ostr	1	0.01	99.63	1	7.7
Sarsiellidae (LPIL)	Ar	Ostr	1	0.01	99.64	1	7.7
Holothuroidea (LPIL)	E	Holo	1	0.01	99.64	1	7.7
Lytechinus variegatus	E	Echi	1	0.01	99.65	1	7.7
Ophiolepididae (LPIL)	E	Ophi	1	0.01	99.66	1	7.7
Ophiuridae (LPIL)	E	Ophi	1	0.01	99.67	1	7.7
Bushia (LPIL)	M	Biva	1	0.01	99.67	1	7.7
Bushia sp.A	M	Biva	1	0.01	99.68	1	7.7
Chama macerophylla	M	Biva	1	0.01	99.69	1	7.7
Chione pygmaea	M	Biva	1	0.01	99.70	1	7.7
Corbula (LPIL)	M	Biva	1	0.01	99.70	1	7.7
Crassinella (LPIL)	M	Biva	1	0.01	99.71	1	7.7
Dosinia (LPIL)	M	Biva	1	0.01	99.72	1	7.7

TABLE 1 CONTINUED:

Laevicardium (LPIL)	M	Biva	1	0.01	99.73	1	7.7
Linga amiantus	M	Biva	1	0.01	99.73	1	7.7
Macoma brevifrons	M	Biva	1	0.01	99.74	1	7.7
Pitar simpsoni	M	Biva	1	0.01	99.75	1	7.7
Psammobiidae (LPIL)	M	Biva	1	0.01	99.75	1	7.7
Tagelus (LPIL)	M	Biva	1	0.01	99.76	1	7.7
Tellina aequistriata	M	Biva	1	0.01	99.77	1	7.7
Tellina iris	M	Biva	1	0.01	99.78	1	7.7
Anachis mangelioides	M	Gast	1	0.01	99.78	1	7.7
Arene tricarinata	M	Gast	1	0.01	99.79	1	7.7
Bullidae (LPIL)	M	Gast	1	0.01	99.80	1	7.7
Cerithiidae (LPIL)	M	Gast	1	0.01	99.81	1	7.7
Cerithium eburneum	M	Gast	1	0.01	99.81	1	7.7
Conus (LPIL)	M	Gast	1	0.01	99.82	1	7.7
Conus sennotorum	M	Gast	1	0.01	99.83	1	7.7
Crassispira leucocyma	M	Gast	1	0.01	99.84	1	7.7
Eulimidae (LPIL)	M	Gast	1	0.01	99.84	1	7.7
Fasciolaria (LPIL)	M	Gast	1	0.01	99.85	1	7.7
Macromphalina (LPIL)	M	Gast	1	0.01	99.86	1	7.7
Macromphalina palmalitoris	M	Gast	1	0.01	99.87	1	7.7
Mitrella lunata	M	Gast	1	0.01	99.87	1	7.7
Murex (LPIL)	M	Gast	1	0.01	99.88	1	7.7
Murex dilectus	M	Gast	1	0.01	99.89	1	7.7
Philinidae (LPIL)	M	Gast	1	0.01	99.90	1	7.7
Pyrgocythara coxi	M	Gast	1	0.01	99.90	1	7.7
Scaphandridae (LPIL)	M	Gast	1	0.01	99.91	1	7.7
Strombus alatus	M	Gast	1	0.01	99.92	1	7.7
Terebra dislocata	M	Gast	1	0.01	99.93	1	7.7
Terebridae (LPIL)	M	Gast	1	0.01	99.93	1	7.7
Volvarina avenacea	M	Gast	1	0.01	99.94	1	7.7
Volvarina helei	M	Gast	1	0.01	99.95	1	7.7
Antalis (LPIL)	M	Scap	1	0.01	99.96	1	7.7
Antalis antillarum	M	Scap	1	0.01	99.96	1	7.7
Scaphopoda (LPIL)	M	Scap	1	0.01	99.97	1	7.7
Acanthochitona spiculosa	M	Poly	1	0.01	99.98	1	7.7
Chaetopleura apiculata	M	Poly	1	0.01	99.98	1	7.7
Crepidula maculosa	M	Gast	1	0.01	99.99	1	7.7
Phascolion (LPIL)	S		1	0.01	100.00	1	7.7

TAXA KEY

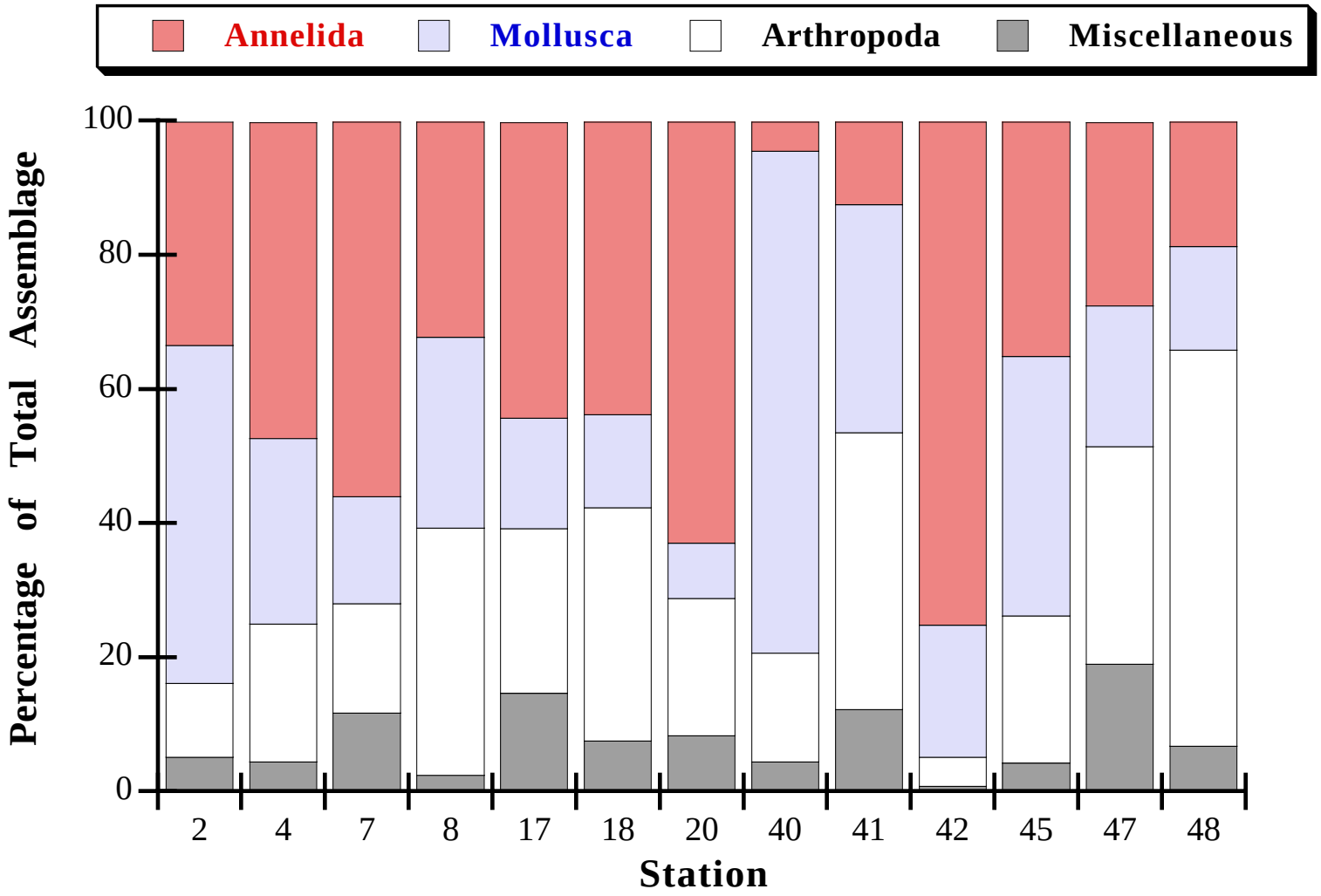
Phylum
Class

A = Annelida
Olig = Oligochaeta
Poly = Polychaeta
Ar = Arthropoda
Bran = Branchiopoda
Mala = Malacostraca
Ostr = Ostracoda
B = Brachiopoda
C = Chordata
Asci = Ascidiacea
Lept = Leptochardii
Cn = Cnidaria
Anth = Anthozoa
E = Echinodermata
Echi = Echinoidea
Holo = Holothuroidea
Ophi = Ophiuroidea
M = Mollusca
Biva = Bivalvia
Gast = Gastropoda
Poly = Polyplacophora
Scap = Scaphopoda
Ph = Phoronida
Pl = Platyhelminthes
Ph = Phoronida
R = Rhynchocoela
Anop = Anopla
S = Sipuncula

Table 2. Summary of abundance of major taxomonic groups for the Rookery Bay stations, March 1997.

Taxa	Total No. Indivs.	% Total	Total No. Taxa	% Total
Annelida				
Polychaeta	6471	48.0	191	35.4
Oligochaeta	315	2.3	1	0.2
Mollusca				
Bivalvia	2905	21.5	66	12.2
Gastropoda	771	5.7	72	13.4
Other Mollusca	89	0.7	9	1.7
Arthropoda				
Malacostraca	1760	13.1	144	26.7
Other Arthropoda	457	3.4	33	6.1
Miscellaneous	713	5.3	23	4.3
TOTAL	**13481**		**539**	

Figure 1. Percent abundance of major taxa for the Rookery Bay stations, March 1997.



stations. The distribution of taxa representing > 5% of the total assemblage at each station is given in Table 3.

Station mean density and mean number of taxa data are given in Table 4 and Figures 2 and 3. Mean densities ranged from 2,100.0 organisms·m^{-2} (SD = 1203.8) at Station 48 to 35,108.3 organisms·m^{-2} (SD = 45484.8) at Station 42 (Table 4; Fig. 2). The mean number of taxa per replicate ranged from 25.0 taxa·rep^{-1} (SD = 4.6) at Station 48 to 119.7 taxa·rep^{-1} (SD = 36.7) at Station 45 (Table 4; Fig. 3).

ANOVA analyses were performed on transformed density and taxa richness data for the Rookery Bay stations. ANOVA and post-hoc test results for density data are given in Table 5. There were highly significant differences in densities between the Rookery Bay stations. In general, Stations 2, 4, 7, 42 and 45 had significantly higher densities than the remaining stations. ANOVA and post-hoc test results for taxa data are given in Table 6. There were highly significant differences in taxa numbers between the stations. In general, Stations 2, 4, 7, 42 and 45 had significantly greater numbers of taxa than the remaining stations.

Taxa diversity and evenness are given in Table 4 and Figure 4. Taxa diversity (H') varied considerably and ranged from 1.77 at Station 42 to 4.61 at Station 45. Taxa evenness (J') also exhibited considerable variation and ranged from 0.34 at Station 42 to 0.89 at Station 18 (Table 4; Fig. 4).

Numerical Classification Analysis

Normal (station) and inverse (species) classification analyses were performed on the Rookery Bay data set and displayed as dendrograms (Figs. 5 and 6). Selection of the species included in the analyses was based on a minimum representation of 0.37% of total individuals. Count data for the 45 taxa selected were included in a matrix of station and species groups (Table 7). These taxa accounted for 72.4% of the total macroinfaunal assemblage.

Numerical classification of the 13 stations can be interpreted at a four-group level (≈ 24 – 34% level of similarity). Group A contained Station 8 and was dominated by two taxa, *Eusarsiella*

Table 3. Percent abundance of dominant taxa (> 5% of the total) for the Rookery Bay stations, March 1997.

	STATION												
Taxa	**2**	**4**	**7**	**8**	**17**	**18**	**20**	**40**	**41**	**42**	**45**	**47**	**48**
Acteocina bidentata				8.9									
Amphipoda (LPIL)									6.2				
Anadara transversa	39.2									6.0			
Aricidea finitima						7.9							
Armandia maculata					6.0	5.5							
Bivalvia (LPIL)		6.3	5.2								5.1		
Branchiostoma (LPIL)												10.5	
Caecum pulchellum									5.1				
Cirrophorus lyra			5.0										
Crassinella lunulata		6.4											
Cyclaspis (LPIL)													7.5
Ervilia concentrica								63.5	9.1				
Eudevenopus honduranus													19.8
Eusarsiella absens				9.8									
Golfingia (LPIL)					7.4								
Goniadides carolinae					8.7		14.4						
Haplosyllis spongicola							14.7			69.6			
Harbansus paucichelatus													8.3
Metharpinia floridana									10.9				5.6
Oligochaeta (LPIL)							6.4						
Prionospio (LPIL)			6.0	7.1									
Prionospio cristata		6.2											
Rutiderma darbyi									5.8			16.8	
Sabellidae (LPIL)											6.2		
Tellinidae (LPIL)				7.7									

Table 4. Summary of benthic macroinfaunal data for the Rookery Bay stations, March 1997.

Station	Number of Replicates	Total No. Taxa	Mean Taxa per Repl.	Mean Taxa per Repl. (SD)	Total No. Indivs.	Mean Density (nos/m^2)	Mean Density (SD)	H' Diversity	J' Evenness
2	3	161	91.3	19.6	1689	14075.0	556.8	3.24	0.64
4	3	188	100.3	21.4	1311	10925.0	5655.8	2.74	0.85
7	3	216	106.7	28.1	1452	12100.0	5250.4	4.45	0.83
8	3	95	52.3	7.0	492	4100.0	912.8	3.73	0.82
17	3	132	68.0	5.6	516	4300.0	66.1	4.22	0.86
18	3	102	45.7	18.8	330	2750.0	1244.7	4.11	0.89
20	3	126	58.7	12.7	668	5567.7	1800.1	3.81	0.79
40	3	55	29.0	5.3	554	4617.7	3552.8	1.93	0.48
41	3	66	34.3	9.3	276	2300.0	246.2	3.58	0.85
42	3	176	88.7	7.6	4213	35108.3	45484.8	1.77	0.34
45	3	231	119.7	36.7	1377	11475.0	4604.4	4.61	0.85
47	3	83	38.0	11.1	351	2925.0	1713.7	3.65	0.83
48	3	52	25.0	4.6	252	2100.0	1023.8	3.24	0.82

Figure 2. Mean macroinvertebrate densities for the Rookery Bay stations, March 1997

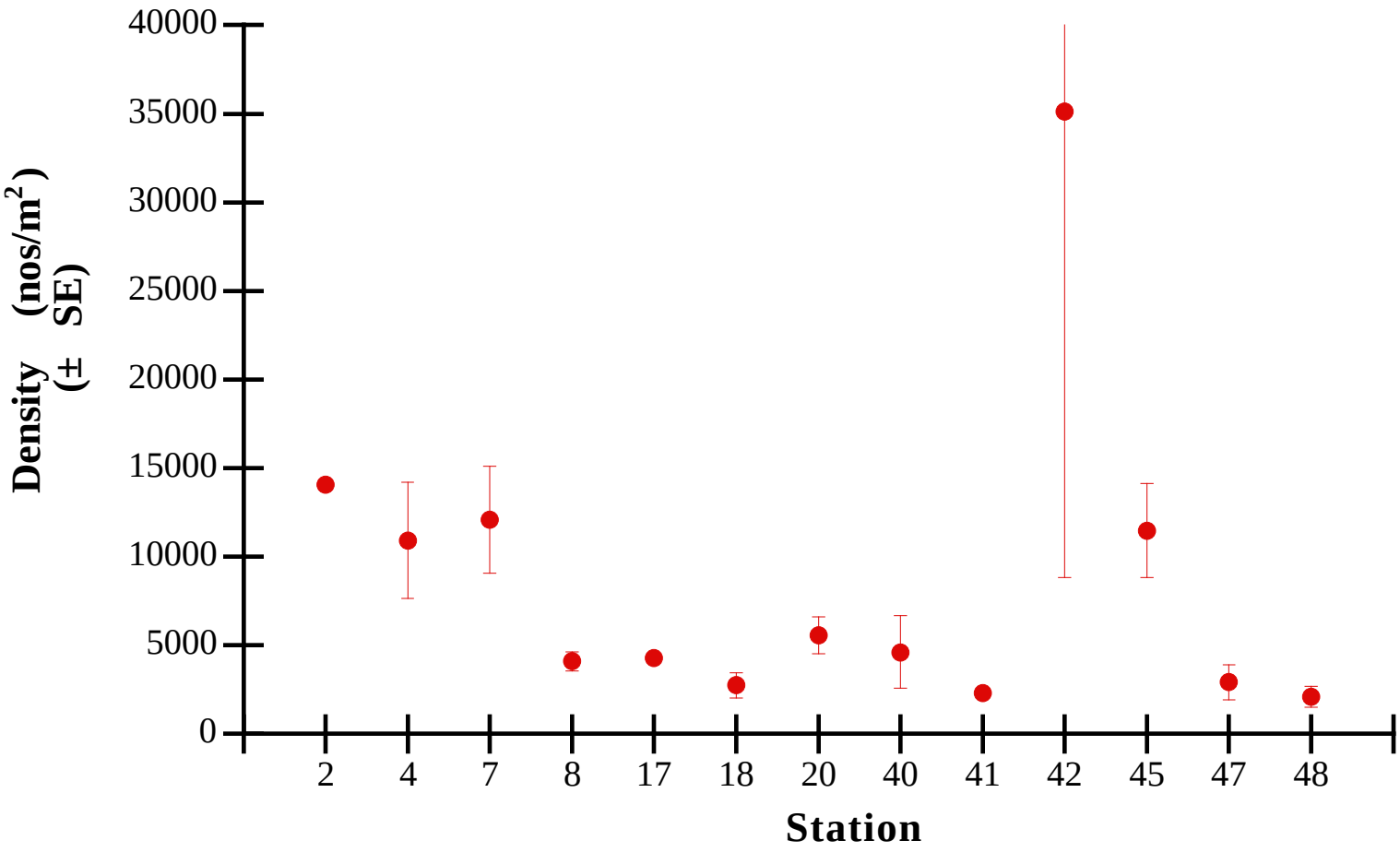


Figure 3. Mean number of macroinvertebrate taxa per replicate for the Rookery Bay stations, March 1997.

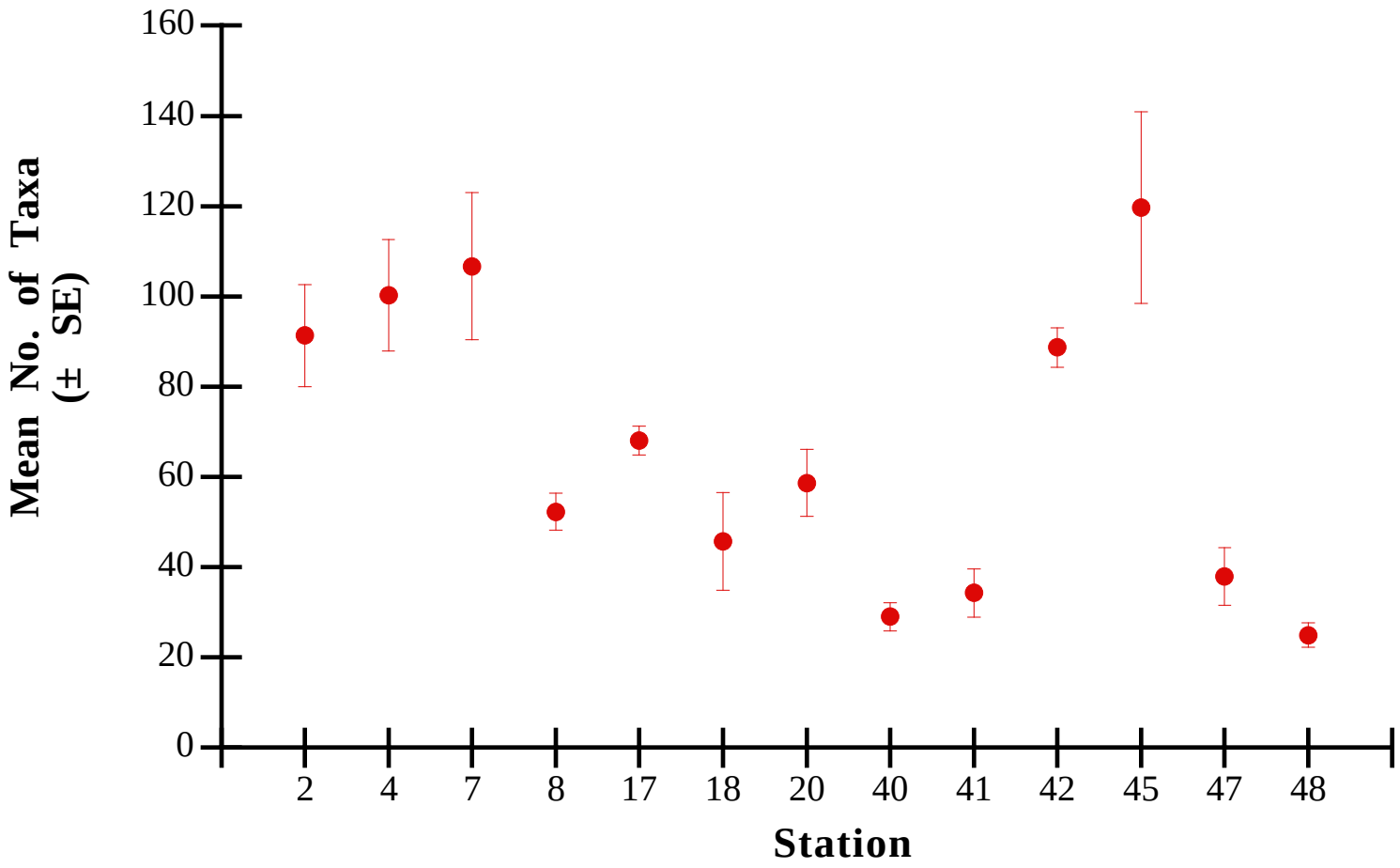


Table 5. ANOVA and post-hoc comparison results for density differences among stations for the Rookery Bay samples, March 1997.

Shapiro-Wilk W Test for Normality

W= 0.96 Prob < W = 0.31

ANOVA Table

Source	DF	Sum of Squares	Mean Square	F Ratio	Prob > F
Model	12	21.15	1.76	**5.41**	**0.0002**
Error	26	8.48	0.33		
Total	38	29.63	0.78		

Paired t-test comparisons for density data by station.

	2	**4**	**7**	**8**	**17**	**18**	**20**	**40**	**41**	**42**	**45**	**47**	**48**
2		ns	ns	*	*	*	*	*	*	ns	ns	*	*
4			ns	ns	ns	*	ns	*	*	ns	ns	*	*
7				*	*	*	ns	*	*	ns	ns	*	*
8					ns	ns	ns	ns	ns	*	*	ns	ns
17						ns	ns	ns	ns	*		ns	ns
18							ns	ns	ns	*	*	ns	ns
20								ns	ns	*		ns	*
40									ns	*	*	ns	ns
41										*	*	ns	ns
42											ns	*	*
45												*	*
47													ns
48													

* = significantly different at p < 0.05; ns = not significant.

Table 6. ANOVA and post-hoc comparison results for taxa differences among stations for the Rookery Bay samples, March 1997.

Shapiro-Wilk W Test for Normality

W= 0.95 Prob < W = 0.15

ANOVA Table

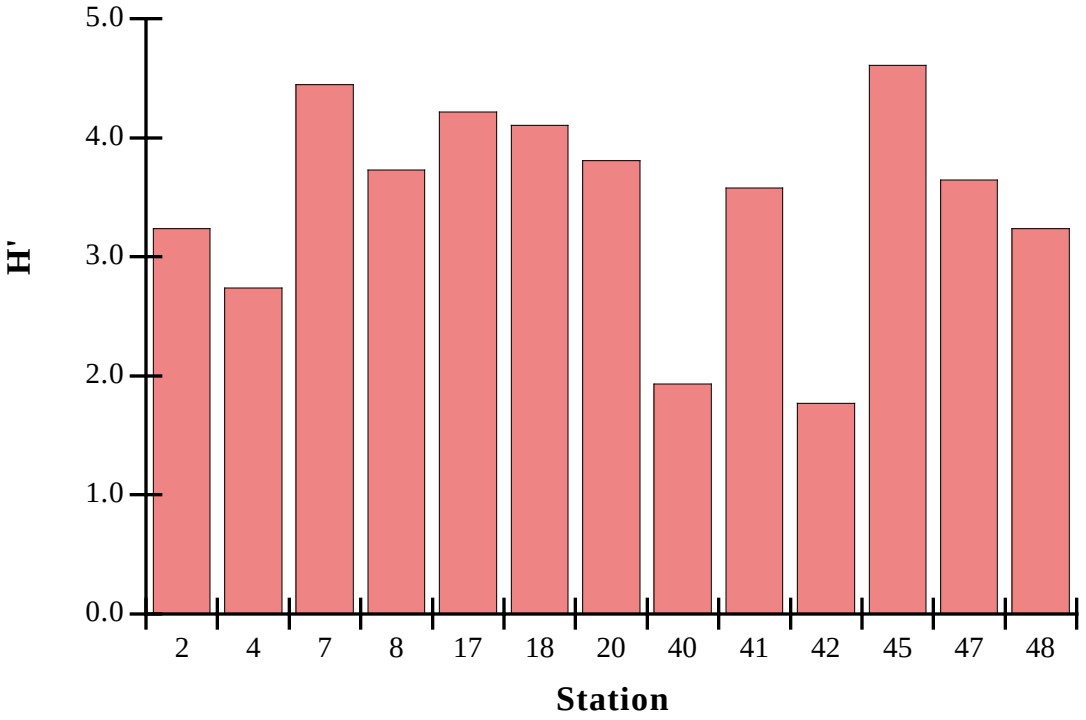
Source	DF	Sum of Squares	Mean Square	F Ratio	Prob > F
Model	12	10.02	0.83	**13.17**	**<0.0001**
Error	26	1.65	0.06		
Total	38	11.66	0.31		

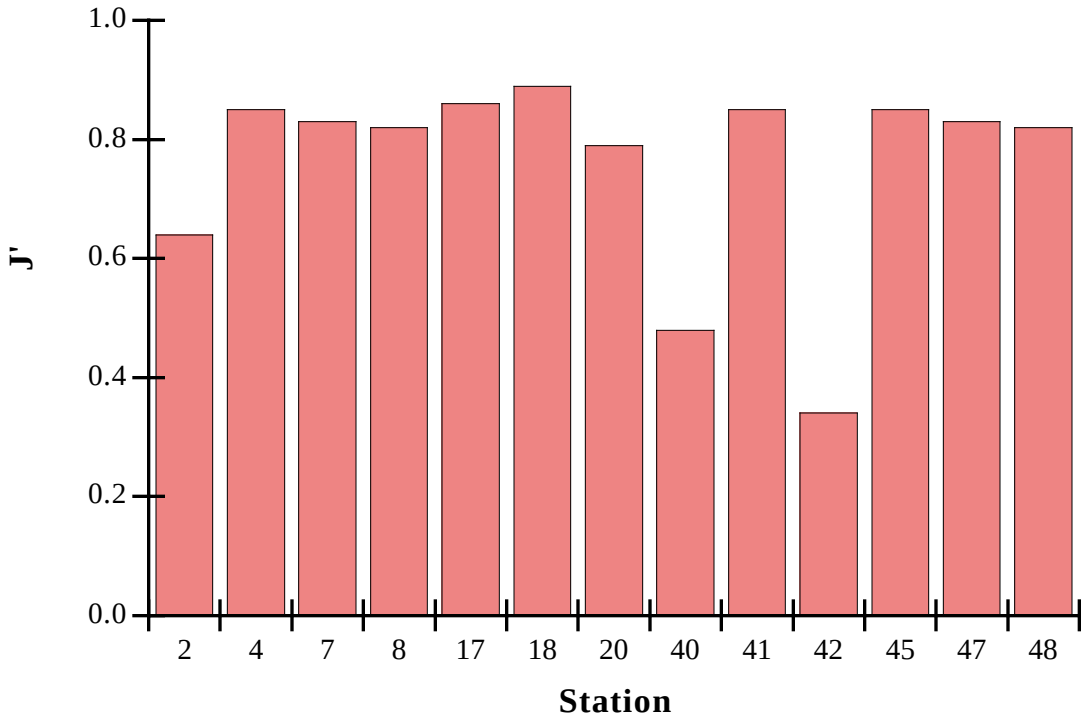
Tukey-Kramer HSD means comparisons for taxa data by station.

	2	**4**	**7**	**8**	**17**	**18**	**20**	**40**	**41**	**42**	**45**	**47**	**48**
2		ns	ns	ns	ns	*	ns	*	*	ns	ns	*	*
4			ns	ns	ns	*	ns	*	*	ns	ns	*	*
7				ns	ns	*	ns	*	*	ns	ns	*	*
8					ns	ns	ns	ns	ns	ns	*	ns	ns
17						ns	ns	*	ns	ns	ns	ns	*
18							ns	ns	ns	ns	*	ns	ns
20								ns	ns	ns	ns	ns	*
40									ns	*	*	ns	ns
41										*	*	ns	ns
42											ns	*	*
45												*	*
47													ns
48													

* = significantly different at p < 0.05; ns = not significant.

Figure 4. Taxa diversity (H') and taxa evenness for the Rookery Bay stations, March 1997.





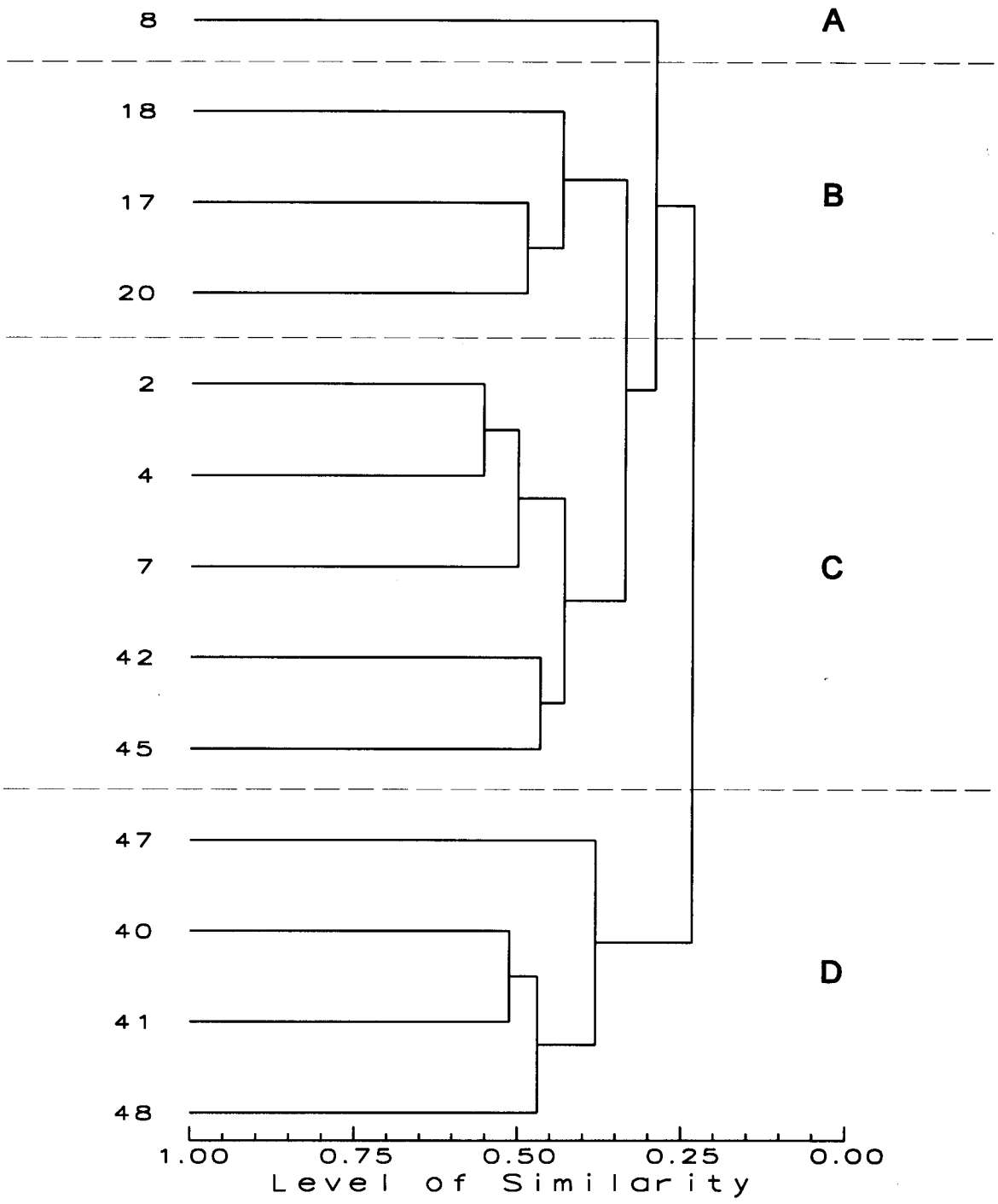


Figure 5. Normal (station) classification analysis for the Rookery Bay stations. Large, bolded letters (A, B, C, D) denote station groupings.

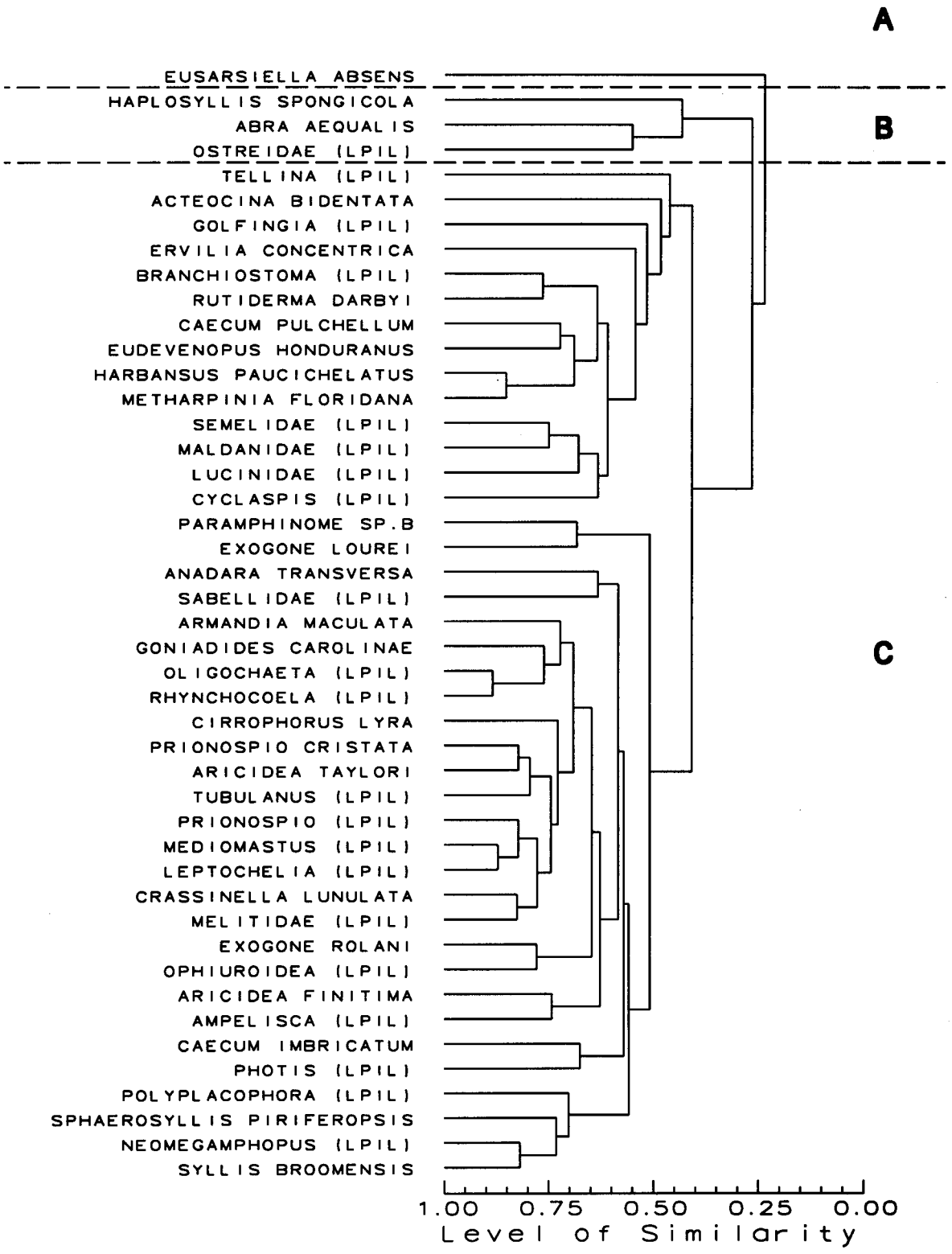


Figure 6. Inverse (species) classification analysis for the Rookery Bay stations. Large, bolded letters (A, B, C) denote species groupings.

Table 7. Data matrix for the Rookery Bay station and species groups compiled from classification analysis dendrograms.

	A	B			C					D				
	8	**18**	**17**	**20**	**2**	**4**	**7**	**42**	**45**	**47**	**40**	**41**	**48**	
Eusarsiella absens	48		3			2				1				**A**
Haplosyllis spongicola				98				2933	6				3	
Abra aequalis							3	39	66					**B**
Ostreidae (LPIL)								63						
Tellina (LPIL)						9		5	55	4	5		1	
Acteocina bidentata	44							2	6		4	1	7	
Golfingia (LPIL)	5	2	38	15				4	8	14	2			
Ervilia concentrica				9			1	4		6	352	25	9	
Branchiostoma (LPIL)	2	3	6	13	1		43	6		37	8	11	9	
Rutiderma darbyi		3	6	4		5	2	19		59	6	16	2	
Caecum pulchellum	7	2	1	2	3			122	11	3	15	14	7	
Eudevenopus honduranus	24	16	10	1		6		8	9	2	15	11	50	
Harbansus paucichelatus	17	8	4					1	3	10	8	12	21	
Metharpinia floridana	3	8	2				4	1	1	10	8	30	14	
Semelidae (LPIL)	2		9	3	2	7	3	25	24	6	2	7	3	
Maldanidae (LPIL)	2				2	1	7	11	5	10	1	7	10	
Lucinidae (LPIL)	18	2			5	6	1	6	5	3	2	7		
Cyclaspis (LPIL)	1	2		1	1	4	2	4	4		10	2	19	
Paramphinome sp.B			1	5		4	43		5				6	
Exogone lourei				2	1	2	38	1	11	2				
Anadara transversa					662	33	7	251	17					
Sabellidae (LPIL)	21				24	16	3	4	86				1	
Armandia maculata	2	18	31	22	1	51	43	21	2			1		
Goniadides carolinae		10	45	96	28	16	19	5	4	13	1			
Oligochaeta (LPIL)	3	11	16	43	83	38	66	21	15	4	3	6	6	
Rhynchocoela (LPIL)	1	12	5	13	42	26	38	5	16	6	13	8	7	
Cirrophorus lyra	1	4	7	4	49	37	73							
Prionospio cristata	3	3		3	60	81	5	3	25					
Aricidea taylori	1		2	3	41	64	4	3	2					
Tubulanus (LPIL)	1	2	1	3	18	22	21	1	16					
Prionospio (LPIL)	35	14	13	8	33	36	87	17	19	7			1	
Mediomastus (LPIL)	3	3	5	7	30	32	32	9	30	17				
Leptochelia (LPIL)	3	3	7	9	27	15	9	7	21					**C**
Crassinella lunulata		1	10	5	37	84	41	25	7	2				
Melitidae (LPIL)		1	5	1	20	26	11	13	4					
Exogone rolani	7	1	1	2	8	5	21	10	8	1		1	1	
Ophiuroidea (LPIL)			5	1	4	2	30	9	12			2	1	
Aricidea finitima	3	26	4			17	13	3	9					
Ampelisca (LPIL)	1	10	4	1	3	13	3		30					
Caecum imbricatum	2	8	12	2	2	11	1	42			8	3		
Photis (LPIL)	7		12	1	4	27	1	3	2			5		
Polyplacophora (LPIL)			1		29	21	16			2				
Sphaerosyllis piriferopsis			2	8	7	20	19	3						
Neomegamphopus (LPIL)					5	7	37	1						
Syllis broomensis					10	9	24	5	2					

absens and *Acteocina bidentata*, which were either absent or had low densities at the remaining stations. Group B was represented by Stations 17, 18 and 20; Group C contained Stations 2, 4, 7, 42, and 45 which had the highest station densities; and Group D contained Stations 47, 40, 41 and 48 (Table 7; Fig. 5).

Classification of the 45 taxa at the 13 stations could be interpreted at a three–group level (≈ 24 – 26% similarity; Table 7 and Fig. 6). Group A was represented the single taxa, *Eusarsiella absens* which was found in high densities only at Station 8 (Table 7). Group B included three taxa found in high densities at three stations. Group C included the remaining taxa found across the remaining stations (Table 7; Fig. 6).

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APPENDIX

QUALITY CONTROL REWORKS

Client/Project: NOAA
Work Assignment Title: Rookery Bay 1997 Task Number: 4

Sorting Results:

Sample #	% Accuracy
41-001	100%
18-002	100%
41-002	100%
42-001	100%
8-003	100%
2-003	96%
40-002	99%

Taxonomy Results:

Sample #	Taxa	% Accuracy
41-001	Crust./Moll.	96.2%
40-002	Crust./Moll.	95.7%
45-003	Crust./Moll.	96%
7-002	Crust./Moll.	97%
17-002	Crust./Moll.	96%
7-002	Poly./Misc.	98.7%
4-001	Poly./Misc.	97%
17-002	Poly./Misc.	98.6%
20-002	Poly./Misc.	95%

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

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Signature of QA Officer or Reviewer Date

QUALITY ASSURANCE STATEMENT

Client/Project: NOAA

Work Assignment Title: Rookery Bay 1997

Work Assignment Number: 9703 Task Number: 4

Description of Data Set or Deliverable: 39 Benthic macroinvertebrate samples collected in March of 1997; 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 attachment.) 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