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ECOLOGICAL EFFECTS OF RUBBLE WEIR JETTY CONSTRUCTION AT MURRELLS INLET, SOUTH CAROLINA

VOLUME II: CHANGES IN MACROBENTHIC COMMUNITIES OF SANDY BEACH AND NEARSHORE ENVIRONMENTS

by

David M. Knott, Robert F. Van Dolah, Dale R. Calder South Carolina Wildlife and Marine Resources Department Marine Resources Research Institute Charleston, S. C. 29412



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community structure between these zones, several of the dominant species were abundant in both habitats. Five years later, some of these species were not commonly observed, and oligochaetes and nematodes were abundant in the area. Many of these differences were attributed to normal seasonal and yearly variations. Changes resulting from jetty construction included increased species diversity in a wave-sheltered area, as well as changes in abundance and species composition near the jetties. Many of the observed changes were short term or limited to the area between the jetties where sediment characteristics were altered./ Beach and nearshore areas south of the jetties were also changed by extensive shoaling, which presumably altered community structure in that vicinity. Similar modifications in the beach profile were not observed north of the jetties.

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PREFACE

This report was sponsored by the Office, Chief of Engineers (OCE), U. S. Army, as part of the Environmental Impact Research Program (EIRP) Work Unit 31532 entitled Ecological Effects of Rubble Structures, which was assigned to the U. S. Army Coastal Engineering Research Center (CERC). The Center, originally located at Fort Belvoir, Va., moved to the U. S. Army Engineer Waterways Experiment Station (WES), Vicksburg, Miss., on 1 July 1983. The Technical Monitors for the study were Dr. John Bushman and Mr. Earl Eiker of OCE and Nr. David B. Mathis, Water Resources Support Center.

The study and preparation of a draft final report were accomplished during the time period September 1977 to May 1983; preparation of the reproducible copy was done during October and November 1983.

The report was prepared by Dr. Robert F. Van Dolah, Mr. David M. Knott, and Dr. Dale R. Calder through the Marine Resources Research Institute of the South Carolina Wildlife and Marine Resources Department. Dr. Calder is currently at the Royal Ontario Museum.

The authors are very grateful to Mr. Arthur K. Hurme of the CERC for his role in initiating this investigation, and for his support and encouragement throughout the study. We wish to thank Magdalene Maclin, Beth Roland, and George Steele for their considerable efforts on this project, both in the field and laboratory. Other individuals who frequently assisted us in the field included Mary Jo Clise, Stan Hales, Priscilla Hinde, Terry Hodges, and Caroline O'Rourke. Particular thanks are due to Dr. Reid Wiseman, who identified all of the algae found on the jetties, and to Dr. George Sedberry, who identified and analyzed the fish stomachs. Finally, we wish to thank Nancy Beaumont who typed the various drafts of this report, and Karen Swanson who drafted all the figures.

Mr. Hurme was the CERC Technical Advisor for the contract under the general supervision of Mr. Edward J. Pullen, Chief, Coastal Ecology Branch, and Mr. R. P. Savage, Chief, CERC Research Division. Dr. Roger T. Saucier, WES, was the Program Manager of EIRP.

Technical Director of CERC at Fort Belvoir during the study and preparation of the draft final report was Dr. Robert W. Whalin. Commander and Director of WES during preparation of the reproducible copy was COL Tilford C. Creel, CE; Technical Director was Mr. F. R. Brown.

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I. INTRODUCTION

Sandy beaches typify most of the coastline along the southeastern United These beaches represent an environment of high stress and continued States. change for intertidal marine infauna. As a result, relatively few macroinvertebrate species inhabitat the intertidal zone as compared with more stable subtidal areas. On beaches of the southeastern United States. important intertidal species include several haustoriid amphipods, the polychaete Scolelepis squamata, the coquina clam Donax variabilis, and the decapod crustaceans Emerita talpoida and Ocupode quadrata (Pearse et al., 1942; Croker, 1967, 1968; Dexter, 1967, 1969; Dorjes, 1972, 1977; Howard and Dörjes, 1972; Roberts, 1974; Calder et al., 1976; Matta, 1977). Although these organisms are common on open ocean beaches of South Carolina, quantitative studies on the intertidal beach communities between North Carolina and Georgia are lacking. Similarly, subtidal nearshore benthic communities have been examined off North Carolina and Georgia (e.g., Pearse et al., 1942; Day et al., 1971; Frankenberg and Leiper, 1977), but not off South Carolina, with the exception of an investigation in a dredge disposal area near Charleston (Van Dolah et al., 1982) and a limited assessment of the fauna in the entrance channel at Murrells Inlet (Calder et al., 1976).

Due to shoaling problems at the entrance of Murrells Inlet, an important recreational port in South Carolina, construction of two rock jetties was initiated in 1977. Since few studies have quantitatively investigated the biological impact of such structures on nearby areas (Mulvihill et al., 1980), a biological study of the beach and nearshore environments was also initiated at the same time. Specific goals of this study were to:

- 1. Quantitatively assess the intertidal and subtidal macrobenthic communities on the front beaches adjacent to Murrells Inlet.
- 2. Describe changes in those communities over a one-year period during jetty construction to evaluate seasonal differences as well as differences associated with jetty construction.
- 3. Assess the macrobenthic communities on those beaches five years after jetty construction to evaluate any long-term differences attributable to jetty construction.

One additional component of this biological study included an investigation of colonization and community development of algae, macroinvertebrates and fishes on the jetties. Details of that study component are provided in Volume I of this report.

II. DESCRIPTION OF THE STUDY AREA

Murrells Inlet, located on the northeastern coast of South Carolina, USA (Fig. 1), is a comparatively small coastal system characterized by ocean beaches, sand and mud flats, intertidal shellfish beds, and expanses of saltmarshes intersected by shallow tidal creeks. Salinities are generally



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Map showing sampling transects with the location of beach and nearshore stations sampled at Murrells Inlet, South Carolina. Figure l.

high and stable because of the lack of either a river system flowing into the inlet or contact with the Atlantic Intracoastal Waterway. Water temperatures are variable, being dependent on the season, and tides are semidiurnal with a mean tidal range of 1.4 m (National Ocean Survey, 1981).

At its entrance, Murrells Inlet is flanked by Garden City Beach to the northeast and Huntington Beach to the southwest (Fig. 1). The sediments of these beaches and adjacent nearshore areas consist primarily of medium to fine quartz sand with varying amounts of sand-size shell fragments (see Section IV.1b). The intertidal zone covers a horizontal distance of approximately 30-40 m on Garden City Beach and 55 m on Huntington Beach in the areas investigated. Although exposed to the open ocean, wave energy is moderate on these beaches because waters are shallow for a considerable distance offshore.

Because Murrells Inlet is intensively utilized as the home port for a growing number of commercial and recreational fishing boats, there was a need to stabilize the entrance channel to the inlet. In October 1977, construction began on two quarrystone jetties, located on the north and south sides of the inlet entrance (Fig. 1). The north jetty, which extends 1020 m into the ocean, was completed by February 1979. The landward portion of this jetty includes a 411-m weir section (Fig. 1) designed to allow sand to bypass the jetty and settle into a dredged deposition basin, instead of moving around the jetty and creating shoals at the entrance channel. Construction on the south jetty, which extends 1011 m seaward, began in February 1979 and was completed by May 1980. This jetty has no weir section and is topped with an asphalt walkway.

III. MATERIALS AND METHODS

1. Station Locations and Sampling Periods

For the initial phase of the study (1977-78), three transects near the entrance of Murrells Inlet were sampled seasonally (i.e., November, February, May, August). Transect I (HI01-HS03) extended offshore from Huntington Beach and served as a control for comparison with Transects II (SI01-SS03) and III (NI01-NS03), which were located on Garden City Beach and paralleled both sides of the proposed north jetty location (Fig. 1).

Sampling was repeated along Transects II and III during the summer and fall of 1982; however, Transect I was not included in this follow-up phase of the study. Considerable shoaling had occurred off Huntington Beach after completion of the south jetty, and the development of intertidal sand bars in this vicinity rendered subtidal stations HSO1-HSO3 inaccessible by boat. Additionally, intertidal stations on this transect could not be relocated in 1982 due to radical changes in the beach profile and the construction of an access road to the south jetty. For these reasons, new control stations were established in 1982 which were located north of the jetties, beyond the area influenced by beach renourishment that occurred during jetty construction. These new control transects (Transects IV and V; Fig. 1) were more representative of undisturbed areas than the obviously altered stations on Transect I. Selection of two control transects was intended to provide an indication of the natural variability in undisturbed communities.

Three intertidal and three subtidal stations were chosen on each transect. Intertidal stations were located with reference to permanent landmarks near mean high water (MHW), mean tide 'evel (MTL), and mean low water (MLW). Subtidal stations were located using fixed landmarks ashore and included one station adjacent to the beach in depths of 1-2 m (nearshore), one in depths of 2-3 m (midshore), and one in depths of 4-5 m (offshore) on each transect.

Two additional stations (XSO3, YSO3) were also sampled during both seasons of 1982 for further "control" comparisons with the jetty stations SSO3 and NSO3. These sites were in depths equivalent to the other offshore stations, and were located approximately 1.5 km north of the jetties (Fig. 1). The stations were added because muddy sediments were observed at the control stations CSO3 and CSO3, but not at stations SSO3, NSO3, XSO3 or YSO3. Data obtained from samples at YSO3 and XSO3 were substituted for data from CSO3 and CSO3 in the interpretation and analyses presented in this report, with the exception of cluster analysis (see Section IV.2b).

2. Sampling Methods

Three replicate samples were collected at all stations during each seasonal visit. Rarefaction curves (cumulative species number versus number of replicates) based on previous studies of beach and nearshore subtidal areas in South Carolina indicated that this number of replicates was sufficient to characterize species number (Calder, unpublished). Intertidal samples of 0.05 m^2 and 11 cm in depth were taken using a quadrat frame and shovel. Subtidal samples were collected using a 0.10-m^2 modified Van Veen grab. All samples were gently washed on a 0.5-mm-mesh sieve to remove excess sediment and preserved in a 10% formaldehyde-seawater solution with rose bengal stain. In the laboratory, macrofaunal organisms sorted from the samples were preserved in 70% isopropanol, identified to the lowest taxon possible, and counted.

Samples for sediment analysis were collected at all stations during the first four seasons of benthic sampling. In the laboratory, the percentage of shell hash in the sediments was determined by digestion of calcium carbonate with HCl, and the remaining quartz fraction was sieved for 30 minutes on a Ro-Tap machine using a $\frac{1}{4}$ Ø-unit nest of Tyler screens. During the follow-up study in 1982, sediment texture and composition was evaluated only qualitatively during sampling and subsequent sieving.

Samples for measurement of water temperature and salinity were collected at 1 m below the surface and 0.3 m above the bottom during each sampling interval at the innermost and outermost subtidal stations of all transects. Temperatures were read directly from a stem thermometer mounted in a Van Dorn bottle, or by using a Yellow Springs Instrument Company Model 33 S-C-T meter. Salinity samples were returned to the laboratory and analyzed using a Beckman RS7B induction salinometer.

3. Data Analysis

Analyses of community structure were undertaken using several equations. Species diversity was measured using Shannon's formula (Pielou, 1977):

$$H' = -\Sigma p_i \log_2 p_i$$

where H' is the diversity in bits of information per individual, and p_i equals n_i/N or the proportion of the sample belonging to the ith species. Species richness was calculated on the basis of the formula:

$$SR = \frac{s-1}{\ln N}$$

where s is the number of species and lnN is the natural logarithm of the total number of individuals of all species in the sample. Evenness, a measure of the distribution of individuals among the various species, was measured by:

$$J' = \frac{H'}{\log_2 s}$$

where H' is the species diversity and s is the number of species.

A cluster analysis of faunal similarity was undertaken on the data using the Bray-Curtis similarity coefficient on log-transformed abundance. The Bray-Curtis coefficient is defined by Boesch (1977) as:

$$s_{jk} = \frac{2 \sum \min (X_{ij}, X_{ik})}{\sum (X_{ij} + X_{ik})}$$

Clustering was done using flexible sorting with $\beta = -0.25$ (Lance and Williams, 1967). Both normal (site group) and inverse (species group) analyses were performed on the data obtained during the initial phase of this study (1977-78). The resulting dendrograms were evaluated using a variable "stopping rule" (Boesch, 1977) in order to form groups of stations and species. Those groups were then subjected to nodal analysis (Lambert and Williams, 1962) and their coincidence was expressed by graded constancy and fidelity. Constancy expresses the frequency with which species of a particular group are found in a given collection group and fidelity measures the degree to which species are restricted to a particular collection group. Only normal (site group) analyses were performed on 1982 data since these analyses were only intended to assess changes in station similarity that were attributable to jetty effects.

To avoid confusion in interpreting the cluster analysis, rare species which occurred at fewer than three stations and accounted for <1% of the total number of individuals were deleted from the data set. Specimens of indeterminate identity were also deleted, except in those cases where they could be consistently recognized as being unique species.

IV. RESULTS AND DISCUSSION

1. Environmental Parameters

a. Hydrographic Conditions

Surface and bottom water temperatures at the subtidal stations varied widely from season to season (Table 1). South Carolina experienced an unusually cold winter in 1977-78 (Purvis, 1978), and water temperatures in the Murrells Inlet area during February $(6.0-8.4^{\circ}C)$ reflected the cold weather. Water temperatures had risen significantly by May of 1978 (18.2- $20.8^{\circ}C$) and were highest during August of both 1978 and 1982 (27.5-28.7°C). Little evidence of thermocline development was apparent from the data, indicating that waters at these shallow stations were well mixed. Differences from station to station during a given sampling interval were also relatively minor, and reflected normal daily variations.

Salinities fluctuated little and were in the euryhaline range $(30-40 \circ/00)$ at all stations throughout the study (Table 1). Values were lowest in February 1978 (31.9-32.4 $\circ/00$) and highest in August of that year (35.3-35.4 $\circ/00$). As with temperature, salinity differences were generally negligible from surface to bottom and from station to station on a given date. Similar salinity observations were recorded from the Murrells Inlet area during May of 1975 by Calder et al. (1976). They observed a range in salinity of 33.1-34.0 $\circ/00$, and did not detect a horizontal salinity gradient in waters of the area. A difference of less than 0.4 $\circ/000$ salinity was reported from a station located approximately 1.6 km offshore to another at the head of Main Creek near the town of Murrells Inlet. Refractometer readings during 1982 indicated that salinities that year were in the same range as those previously recorded during equivalent seasons of the 1977-78 sampling period.

b. Sediment Characteristics

Sediments at the 18 stations sampled during 1977-78 consisted entirely of sand and shell, with no measurable quantities of either silts or clays being present. Considerable variability was noted with respect to sand grain-size and carbonate content (Appendix A), although several trends were apparent. Intertidally, sediments were usually finest and carbonate content lowest at the high-tide stations. However, finer sediments appeared to move in at stations SIO2 and SIO3 after November 1977, due to sheltering as jetty construction proceeded seaward. Sands were coarser and generally contained a greater percentage of $CaCO_3$ on Transects II and III (Garden City Beach) than on Transect I (Huntington Beach). Sands also tended to be coarser on the beaches during autumn, and especially winter, than in the spring. Subtidally, sediments tended to be coarser in spring than during autumn and winter. Finally, the mean grain-size was generally larger in samples from intertidal stations than from subtidal stations.

Qualitative observations of sediments in 1982 grab and quadrat samples indicated similar patterns to those noted above. On all four transects, sediments at the high-tide stations were fine sand with relatively little

28.0 27.5 18.5 18.0 **GS03** Surf. Temperature and salinity measurements taken during sampling periods at nearshore and offshore stations. Dashes Indicate no samples collected. 28.0 28.0 18.5 18.5 Surf. Bott. CS01 NO DATA NO DATA 18.5 18.0 28.0 28.0 Surf. Bott, **cs03** 19.0 18.5 Surf. Bott. 28.0 28.0 **CS01** HSO3 Surf, Bott, 7.4 19.0 19.8 28.0 27.9 35.0 35.0 32.0 32.0 15.6 14.3 32.8 32.8 35.4 35.3 7.5 HSOI Surf, Bott, TEMPERATURE (^oC) SALINITY (°/00) 33.0 33.0 35.4 35.3 15.9 15.0 6.7 35.3 35.3 35.2 35.1 32.4 32.4 28.5 28.4 18.8 18.8 6.6 33.0 Surf. Bott. 28.0 15.9 15.8 32.0 32.1 35.3 6.9 18.2 28.3 18.5 18.0 NS03 28.0 32.6 35.3 18.8 28.7 7.4 28.0 31.9 32.6 35.3 Bott 16.0 15.9 19.8 28.0 18.5 18.5 8.4 35.2 35.1 Surf. B 19.8 28.0 28.0 32.6 31.9 35.3 8.4 NO DATA -- NO DATA 35.3 32.9 Surf. Bott. 20.8 19.0 18.5 16.0 15.7 6.9 32.0 32.1 28.0 28.0 28.0 28.0 35.2 35.2 20.8 32.5 35.3 7.1 Surf. Bott. 19.8 27.8 28.0 19.0 19.0 32.3 32.6 35.3 Nevember 1977 15.4 15.3 6.1 November 1977 35.1 35.0 <u>ssul</u> 32.6 27.9 28.0 32.2 35.3 18.2 6.0 ÷ February 1978 November 1982 February 1978 Covember 1982 August 1982 August 1978 August 1982 August 1978 May 1978 May 1978 Table 1. SEASON

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shell hash. Sediments were generally coarser at the lower intertidal levels, although fine sands were also present, and the samples contained a moderate to large amount of shell hash. Subtidal sites were usually represented by sandy sediments of fine to medium grain-size with small to moderate amounts of shell hash. Stations SSO2, SSO3, CSO3, and GSO3 were exceptions to this pattern. Sediments at SSO2 and SSO3 were coarser than at the other sites, especially at station SS03, where only very coarse sand with a lot of shell hash was observed. The strong tidal currents on the channel side of the jetty obviously removed fine sediments from the bottom at these sites. Sediments at stations CSO3 and GSO3 were quite muddy compared to all other stations, which had clean sands with little or no evidence of silts or clays. Additional qualitative samples were taken at several locations north of these transects in similar depths. Those samples indicated that muddy sediments were prevalent in the 4- to 5-m depth zone even farther north than the Kingfisher Inn Pier at Garden City. As a result, the additional stations (XS03, YS03) were sampled in both seasons (Fig. 1). Sediments at these latter sites were more similar to those noted at NSO3, where clean sand of fine to moderate grain-size was present.

2. Benthic Community

a. Initial Changes During Jetty Construction (1977-78)

We collected 223 species of benthic macroinvertebrates at the 18 stations sampled during 1977-78. Collections from subtidal stations contained 205 species, whereas those from intertidal stations yielded 88 species. Polychaetes dominated the fauna, both in terms of species (Table 2) and numbers of individuals (Table 3). Together with amphipods and pelecypods, they accounted for more than 95% of the individuals and 70% of the species. The 10 most abundant species, comprising nearly 82% of the fauna, were Spiophanes bombyx, Scolelepis squamata, Protohaustorius deichmannae, Donax variabilis, Acanthohaustorius millsi, Neohaustorius schmitzi, Tellina sp., Ensis directus, Platyischnopidae A, and Parahaustorius longimerus. Complete listings of all organisms collected at each station are provided in Appendices B-D.

(1). Intertidal Community Composition

The spionid Scolelepis squamata accounted for 80% of all polychaetes at the intertidal stations and was present throughout the year. This species was especially abundant at the middle and lower intertidal stations in winter and spring on all three transects (Fig. 2). The only other polychaete represented by substantial numbers in the intertidal zone was another spionid, Spiophanes bombyx. This species was absent from intertidal samples during November, but was present in February (Fig. 2) and numerically co-dominant with S. squamata at stations SIO2 and SIO3. During May and August, S. bombyx was present only at SIO3.

Haustoriid amphipods were well represented in the intertidal zone. Neohaustorius schmitzi was the most abundant, accounting for 77% of the total number of amphipods collected at beach sites. Densities of N. schmitzi were lowest in November and highest during February and May (Fig. 2). This species was most prevalent at middle and lower intertidal stations.

		<u></u>	No. Species		
Taxon	No. Species	No. Species	Both Areas	Percent	Cumul.
	Intertidally	Subtidally	Combined	of Total	Percent
Polychaeta	25	83	89	39.91	39.91
Amphipoda	25	31	38	17.04	56.95
Pelecypoda	13	27	30	13.45	70.40
Decapoda	4	17	17	7.62	78.02
Gastropoda	2	12	12	5.38	83.40
Isopoda	5	8	10	4.48	87.88
Echinodermata	3	6	6	2.69	90.57
Cumacea	5	5	5	2.24	92.81
Mysidacea	1	4	4	1.79	94.60
Anthozoa	0	2	2	0.90	95.50
Hydroida	1	1	1	0.45	95.95
Turbellaria	1	1	1	0.45	96.40
Rhynchocoela	1	1	1	0.45	96.85
Brachiopoda	1	1	1	0.45	97.30
Oligochaeta	0	1	1	0.45	97.75
Tanaidacea	0	1	1	0.45	98.20
Hemichordata	1	1	1	0.45	98.65
Ascidiacea	0	1	1	0.45	99.10
Cephalochordata	0	1	1	0.45	99.55
Unknown Taxon	0	1	1	0.45	100.00
TOTAL	88	205	223		

Table 2. Number of species representing each of the major macroinvertebrate taxa in intertidal and subtidal samples collected from Murrells Inlet during 1977-78.

	No. Individuals	No. Individuals	Total	Percent of	Cumu1.
Taxon	Intertidally	Subtidally	Numbers	Total Fauna	Percent
	1000	10050		<i>(</i> 1 0 0	
Polychaeta	4899	18253	23152	61.00	61.00
Amphipoda	2239	6166	8405	22.15	83.15
Pelecypoda	1546	3082	4628	12.19	95.34
Decapoda	60	237	297	0.78	96.12
Cumacea	31	243	274	0.72	96.84
Isopoda	64	161	225	0.59	97.43
Rhynchocoela	21	169	190	0.50	97.93
Tanaidacea	0	146	146	0.39	98.32
Echinodermata	5	135	140	0.37	98.69
Hydroida	62	33	95	0.25	98.94
Oligochaeta	0	89	89	0.23	99.17
Anthozoa	0	81	81	0.21	99.38
Mysidacea	2	77	79	0.21	99.59
Gastropoda	3	73	76	0.20	99.79
Unknown Taxon	0	52	52	0.14	99.93
Turbellaria	1	10	11	0.03	99.96
Ascidiacea	0	5	5	0.01	99.97
Hemichordata	2	1	3	0.01	99.98
Brachiopoda	1	1	2	0.01	99.99
Cephalochordata	0	2	2	0.01	100.00
TOTAL	8936	29016	37952		

Table 3. Numbers of individuals of each of the major macroinvertebrate taxa in intertidal and subtidal samples collected from Murrells Inlet during 1977-78.

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Two other haustoriids that were found in substantial numbers in the low intertidal zone on Transects II and III were Acanthohaustorius millsi and Parahaustorius longimerus.

Thirteen species of pelecypods were collected intertidally, but only the coquina clam *Donax variabilis* was numerically abundant (Table 4). This species was generally more prevalent in samples from Transect I than from Transects II and III (Fig. 2). Specimens were collected intertidally throughout the year, but largest numbers were present in May samples. Maximum densities were found at HIO3 in May, and densities declined on all three transects between May and August.

(2). Subtidal Community Composition

Spiophanes bombyx was numerically dominant at subtidal stations, accounting for about 45% of the total subtidal fauna (Table 5) and more than 36% of the macroinvertebrates from all intertidal and subtidal stations combined. This spionid underwent large seasonal fluctuations in abundance due to juvenile recruitment (Fig. 3). Densities at most stations increased substantially between November and February, with most of the specimens collected being quite small. Furthermore, the average size of S. bombyx increased over subsequent sampling periods. Numbers of S. bombyx were typically highest at the outermost stations on Transects II and III and at all three Huntington Beach stations (Fig. 3), where sediments were mostly fine sand.

The polychaete Scolelepis squamata was also abundant subtidally, especially during the winter. This species was moderately numerous in May, and infrequent in samples taken during August and November (Fig. 3). Maximum densities of S. squamata occurred at the shallow subtidal stations, and few specimens were collected at the deepest scations of each transect.

Six species of amphipods (Protohaustorius deichmannae, Acanthohaustorius millsi, Platyischnopidae A, Bathyporeia parkeri, Parahaustorius longimerus, and Rhepoxynius epistomus) were common throughout the year at subtidal stations (Fig. 3). Protohaustorius deichmannae was most abundant, and frequently dominant, at two of the subtidal stations nearest the beach (NSO1, HSO1). Maximum numbers of this species were observed in spring samples at HSO1. Parahaustorius longimerus was also common at nearshore stations, particularly on Transects II and III, but was absent at the outermost station on each transect. Acanthohaustorius millsi and Bathyporeia parkeri were most prevalent at midshore stations on each subtidal transect, and A. millsi was the numerically dominant macroinvertebrate at all subtidal stations of Transect I during November. Bathyporeia parkeri was frequently observed in winter and spring samples but was scarce in August samples.

Platyischnopidae A occurred in greatest numbers at midshore and offshore stations. More specimens of this species were collected during February than any other sampling interval. The phoxocephalid *Rhepoxynius* epistomus was also more frequent at midshore and offshore stations than elsewhere.

Table 4. Numbers of individuals and ranked abundance of dominant macroinvertebrate species collected at nine intertidal stations at Murrells Inlet during 1977-78. (Only species comprising $\geq 1\%$ of the total number collected are presented.)

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	MHW	MTL	MLW	Total	% of Fauna	Cumul.	Rank by Number
Coolelonis oquamata	11	2223	1680	3914	43.8	43.8	1
Nolmatorius schmitzi	7	1201	520	1728	19.3	63.1	2
iemax variabilis	5	623	733	1361	15.2	78.3	3
Derivy haves bomby ω	3	69	657	729	8.2	86.5	4
Paraonis fulgers	0	24	144	168	1.9	88.4	5
Par thanstorius longimorus	0	40	125	165	1.8	90.2	6
Aconthokaustorius millsi	0	21	137	158	1.8	92.0	7
Others (81 species)	18	343	352	713	8.0	100.0	-

Numbers of individuals and ranked abundance of dominant macroinvertebrate species collected at nine subtidal stations at Murrells Inlet during 1977-78. (Only species comprising 21% of the total number collected are presented.) Tuble 5.

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							Rank
					% of	Cumul.	by
	Nearshore	Midshore	Offshore	Total	Fauna	*	Number
	436	935	11,828	13,199	45.5	45.5	Ч
	1,851	378	105	2,334	8.0	53.5	2
	1,552	403	15	1,970	6.8	60.3	с
	542	1,069	19	1,630	5.6	65.9	4
· ds	285	102	1,028	1,415	4.9	70.8	5
	399	311	e	713	2.5	73.3	9
	1	16	607	624	2.2	75.5	7
Platvischnopidae 🛝	34	299	229	562	1.9	77.4	30
Maldanidae (undet.)	0	0	412	412	1.4	78.8	6
	57	349	4	410	1.4	80.2	10
	171	201	0	372	1.3	81.5	11
	10	145	112	297	1.0	82.5	12
Others (19) species)	696	1,477	2,632	5,078	17.5	100.0	I



Three species of pelecypods were also common subtidally. Donax variabilis was present almost exclusively at nearshore and midshore sites. Large numbers of juveniles were present in samples from February, but this species was scarce in subtidal samples by May. This decline may reflect a migration into the intertidal zone, since substantial increases in density were observed between February and May at most middle and lower intertidal stations (Fig. 2). In contrast to D. variabilis, the razor clam Ensis directus was collected primarily in fine sands offshore. Length-frequency relationships indicated that a single spawning of E. directus occurred during the study, with the first recruits collected in high densities during February. A third pelecypod, Tellina sp., appeared to spawn at approximately the same time as E. directus and was also prevalent at offshore stations.

(3). Community Structure

Differences in species numbers and overall faunal density occurred along the length of each transect (Table 6). The fauna was scarce at all high intertidal stations, with maximum number of species at this level being five, and overall densities never exceeding 10.7 individuals per 0.1 m². Species numbers and species richness increased seaward along each transect, with abrupt changes occurring between MHW and MTL. A substantial increase in faunal richness was also noted between intertidal and subtidal stations on Transects I and III; however, this difference was less marked on Transect II (Table 6). Midshore and offshore stations typically had the greatest number of species on each transect.

Species diversity (H'), evenness (J'), and species richness (SR) varied considerably from season to season at a given station (Table 6), probably reflecting the different reproductive periodicities of several dominant species. Diversity was generally lowest in samples from the high intertidal stations and in samples with unusually high faunal densities (i.e., May samples at NIO2 and NIO3, February sample at NSO3) which were dominated by a single species. The highest diversity was noted at offshore sites on Transects II and III, and at the midshore site on Transect I. Despite the temporal differences observed in species diversity, consistent seasonal patterns were not clearly reflected by these indices.

Four station groups were chosen from the normal cluster analysis (Fig. 4). Group 1 consisted of the three MHW intertidal stations, all of which lacked a characteristic and persistent suite of macroinvertebrate species, and which were generally represented by very few species and individuals. The internal similarity of this group was lower than other groups, with SIO1 being least similar to all other intertidal stations. Samples from two seasons at this station contained no organisms (Table 6), and only five animals were collected there during the entire study. Three of those five specimens were *Talorehestia megalog hthelma*, a talitrid amphipod that is generally restricted to the higher intertidal level of sandy beaches (Bousfield, 1973). Although this species was deleted prior to computation of similarity, its presence illustrates an affinity to the high intertidal level, and for this reason SIO1 was included with the other higher intertidal stations to form Group 1.

Number of species, estimated numbers of individuals per 0.4 m^2 , species diversity (W^*) in bits, evenness (J^*) , and species richness (S8) tot each station during the 1977-78 sumpling period at Murrells Indet. tuble 6.

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SR	1.2	1.4	0.0	0.0	1.4	2.9	0.8	~	1.7	8.7	0.6	1.9	¥.1	4.5	5.7	3.0	3.6	4.H	6.9	4.0	5.1	6.4	1.7	7.8
-	1.0	0.8	0.0	0.0	0.5	1.0	0.1	0.8	0.7	0.8	0.1	0.8	0.4	0.6	0.4	0.4	0.6	0.6	0.8	0.7	0.8	0.2	0.8	0.6
÷	1.5	I.9	0.0	0.0	1.3	2.8	0.3	7.}	9.1	2.8	0.2	5.5	1.8	2.8	2.0	1.8	2.5	3.1	4.3	3.3	s. 8 . 8	1.4	4.4	3.4
No. 1nd. per 0.1m ²	1.1	10.7	0.7	0.7	26.2	7.5	1340.8	10.1	24.7	23.6	508.2	41.5	156.2	99.4	217.3	96.2	117.0	27.5.9	48.4	66.5	57.0	3516.2	176.7	172.5
No. Spp.	~	Ş	_	-	9	30	1	1	1	11	5	6	20	28	25	18	22	33	35	22	27	65	65	50
Station	101N				N102				801N				LOSN				NS02				NS03			
SR	ı	ł	0.0	1.4	2.1	5.4	1.3	1.6	3.5	5.6	5.0	3.0	3.5	2.8	3.9	4.9	4.5	3.8	3.2	5.8	6.6	7.5	7.0	6.6
-	ī	ł	0.0	0	0.9	0.6	0.6	0.5	0.9	0.4	0.5	0.5	0.6	0.5	0.8	0.6	0.8	0.7	0.6	0.8	0.9	0.4	0.4	0.9
- 1	ı	;	0.0	1.5	2.6		1.8	1 . ts	٤.١	7.1	2.1	1.9	2.5	2.1	3.5	2.9	3.7	3.2	2.9	3.9	4.4	2.4	€4 • •	4.4
rer o la			1.0		۰. -		- 1947 - 19	1 14. 5	6	941	166.1	100.7	51.8	11.2	126.4	86.9	43.4	1.74	124.0	96.5	11.2	1 1. 1. 11	. n. t. l	. / .
No. Multi	0	2		~	٠.	50	Ċ,	61	1.	3	18	16	61	կե	57	87	~, ~,		Î.	-			X .7	:
Statico.	10.00				. fe I S				\$103				1088				2028				1.0124			
Хĸ	0.0	0.5	0.0	0.9	2.1	1.5	1.4	1.6	1.7	1.6	1.2	1.7	4.3	2.0	4.7	4.8	2.4	5.0	1.1	7.5	5.}	5.0	6.7	۶.۶
-	0.0	0.9	0.0	0.9	0.8	0.3	0.5	0.5	8.	0.5	0.5	0.7	0.6	0.4	0.5	0.6	0.3	0.6	0.7	0.8	0.9	0.5	0.4	0.8
=	0.0	0.9	0.0	0.9	2.8	1.1	1.6	1.7	2.3	1.6	1.6	2.2	2.9	1.6	2.7	3.1	1.2		3.8	4.3	4.0	2.8	2.2	3.7
No. Ind. per 0. Im ²	2.0	6.0	0.7	2.0	26.2	295.7	449.6	169.9	45.5	345.1	509.0	81.4	55.9	634.2	364.3	134.3	276.8	298.9	252.6	92.4	29.7	300.8	662.4	65.1
ы. N	-		-	~1	Ξ	10	10	10	x	=	6	6	23	16	34	30	17	35	52	43	57	ۍ ک	52	9
station	1010				701H				8 O H				HS01				HS02				HS03			
Month	202	l e b	Mav	Aug.	Nov.	Feb.	May	$A^{(\mu)}$.	Now.	barb.	May	$\Delta a_{\rm M}$.	Nov.	Feb.	May	Aug.	Nov.	Feb.	May	Aug.		Feb.	Mav	Аид.

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The remaining intertidal stations formed Group 2 (Fig. 4). This group had closer resemblance to the high intertidal stations than to the subtidal stations. Inspection of the matrix of similarity values revealed that resemblance between middle and lower intertidal levels on Transects I and III (i.e., between HIO2 and HIO3, and between NIO2 and NIO3) was greater than between equivalent levels on different transects. However, such a strong resemblance was not apparent between the middle and lower intertidal stations on Transect II (SIO2 and SIO3), which were largely sheltered from wave exposure by the jetty.

Subtidal stations formed two groups, both dissimilar to intertidal stations. These groups differed from one another primarily as a function their distance from shore. Group 3 was composed of midshore and nearshor stations, and offshore stations comprised Group 4 (Fig. 4).

Inverse cluster analysis of the 92 species remaining after data reduction (see Methods) resulted in the selection of 11 species groups (1.6.1e), whose hierarchical arrangement is illustrated in Fig. 5. Nodal diagrams of constancy and fidelity (Fig. 5) indicate distinct distribution patterns (o) most of these species groups.

Species groups A, B, C, and D were frequent (i.e., had high constancy) at offshore stations (Group 4) and were also moderately to highly restricted (faithful) to those stations (Fig. 5). Group E was moderately constant in both subtidal station groups, but was not particularly faithful to either group. While the species comprising Groups A through E were characteristic of the deeper subtidal stations, they were not especially abundant there, and none contributed as much as 1% of the total number of individuals collected subtidally.

Species in Groups H through K, on the other hand, were abundant in the subtidal zone, and Group J was comprised of the most dominant species. These included Scoleky is separately conax variabilis, Spiophanon bombux, Adaptionant species miller, Panamia fullens, and Parahaustorius Longimerna, all of which were fairly ubiquitous at all but the highest intertidal level Numerically dominant species which clustered into Group H included Detributed ring definitions, Elepoxentia entistomus, and Platyischnopidae A, and the dominant subtidal species Entic directus and Bathy, and Platyischnopidae A, were found in Groups I and K, respectively.

Species groups H, I, J, and K were highly constant at subtidial stations $(Fi_{2}, 5)$, and Group J was highly constant at lower and middle intertidal stations as well. Unlike species in previously mentioned subtidal groups (A through E), those of Groups H through K were ubiquitous throughout the subtidal zone. As a consequence, their fidelity was generally low for subtidal station groups, with the exception of Group I, a large assemblage which was more restricted to the deeper offshore stations (Fig. 5).

Group F consisted of species which were frequently collected at middle and lower intertidal stations and which were largely restricted to those stations (Fig. 5). This group was the only assemblage which exhibited a distinct intertidal preference, and consisted of one isopod species, one decaped species, and four haustoriid amphipod species, including

Table 7.

Group A Ogyrides limicola (D) Travisia sp. (P) Trachypenaeus constrictus (D) Apanthura magnifica (I) Phyllodoce arenae (P) Ulivella mutica (Mo) Magelona phyllisae (P) Polynices duplicatus (Mo) Turbonilla sp. (Mo) Podarke obscura (P) Parapriomospio pinnata (P)

Group B

Hemipholis elongata (E) unknown Pelecypoda #3 (Mo) Unciola serrata (Am) Eulalia sanguinea (P) Unione cancellata (Mo) unknown Pelecypoda #9 (Mo) unknown Polychaeta #26 Urassinella Lunulata (Mo) unknown Polychaeta #31

Group C Ferebra dislocata (Mo) unknown Cumacea #2 Mulinia lateralis (Mo) Magelona rosea (P) Erichthonius brasiliensis (Am)

Group D Heteromastus filiformis (P)

Edotea montosa (1) Corophium tuberculatum (Am) Musilopsis bigelowi (My) Satellaria vulgaris (P) Euceramus praelongus (D) Onuphis eremita (P) Scoloplos rubra (P) Tiron tropakis (Am) Brania elavata (P)

Group E Nucula sp. (Mo) Parapleustes aestuarius (Am) Metamusidopsis munda (My) Callianassidae (D)

Group F Exosphaeroma diminutum (1) Amphiporeia virginiana (Am) Emerita talpoida (D) Haustorius longirostris (Am) Nechaustorius schmitzi (Am) Leridactulus dytiscus (Am) Group G unknown Pelecypoda "2 Jassa falcata (Am) Gammarus sp. (Am)

Species groups resulting from inverse numerical classification of data. (Am = Amphipoda; Cn = Cnidaria; Cu = Cumacea; D = Decapoda; E = Echinodermata; I = Isopoda; Mo = Mollusca;

My = Mysidacea; P = Polychaeta; T = Tanaidacea).

Group H Nephtys picta (P) Haploscoloplos sp. (P) Protohaustorius deleimannue (Am) Platyischnopidae A (Am) Rhepoxynius epistomus (Am) Synchelidium americanum (Am) Magelona papillioomnis (P) Renilla reniformis (Cn)

Group I Tharyx marioni (P) Amastigos capertus (P) Batea catherinensis (Am) Owenia fusiformis (P) Ancinus derressus (I) unknown Polychaeta #15 Tellina alternata (Mo) Microprotopus raney! (Am) unknown Pelecypoda #1 Ensis directus (Mo) Spisula solidissima (Mo) Scoleleris texana (P) Caulleriella killarismois (P) Oxyurostylis smithi (Cu) Glycera dibranchiata (P) Dissodactulus mellitar (D) Mellita quinquiecrenforata (E) Pagurus longioarpus (D)

Group J Scolelepis siuamata (P) Donax varialilio (Mo) Spiophanes bombyx (P) Acanthohaustoriue milloi (Am) Paraonis fulgens (P) Parahaustorius longimerue (Am) Lovenella gravilio (Cn)

Group K Boumaniella sp. (My) Ogyrides alphaenestnis (D) Chiridotea stenere (I) unknown Cumacea #3 Eteone heteropoda (P) Displo uncinata (P) Deptognatha saera (T) Bathyporela parkeni (Am) Acanthohaustorius intermedice (Am) unknown Polychaeta #11





Neohaustorius schmitzi, which ranked second in abundance among intertidal species (Table 4).

Three species comprised Group G, and none were abundant or frequently collected. Constancy and fidelity for this group were low in station groups 2 and 3, and no specimens were collected at station groups 1 or 4. No apparent ecological factors or habitat preferences were observed that would characterize this species group.

b. Long-term Changes Following Jetty Construction

Samples collected during the summer and fall of 1982 at the four transects on Garden City Beach contained 156 species of macroinvertebrates, with 150 species found at subtidal stations and only 26 species found at intertidal levels (Appendices E-I). As in 1977-78, polychaetes accounted for the greatest number of species overall (Table 8), followed by amphipods and pelecypods. Taken together, these three taxa comprised greater than 60% of the total species, which was similar to their relative importance in 1977-78 samples (Table 2). In the intertidal zone, however, substantially fewer species of polychaetes and pelecypods were collected during 1982, and amphipods accounted for nearly half of the number of species in the samples. Furthermore, in terms of their numerical abundance, polychaetes did not dominate the intertidal and subtidal collections in 1982 as was noted in 1977-78 (Table 3). Subtidally, amphipods and pelecypods were most abundant in 1982, while oligochaetes and nematodes largely dominated the intertidal fauna (Table 9).

(1). Intertidal Community Composition

Oligochaetes were particularly abundant at the middle intertidal stations in 1982, and were generally restricted to that level and the highest intertidal level (Table 10). Nematodes were also abundant in the upper intertidal zone, with greatest densities at the highest elevations. At the low intertidal level, *Emerita talpoida*, *Donax variabilis*, and *Scolelepis squamata* were co-dominant, and along with oligochaetes and nematodes, they comprised nearly 98% of the intertidal fauna.

Several of the species which were dominant in the intertidal zone during 1977-78 were notably reduced in abundance in 1982 samples. Most of these differences may be attributed to the normal seasonal variation in abundance. For example, *Scolelepis squamata*, *Spiophanes bombyx*, and *Neohaustorius schmitzi* were all dominant in 1977-78 when all four seasons were sampled (Table 4), but were considerably reduced in importance during 1982 summer and fall sampling. Each of these species exhibited peak abundances during the winter or spring of 1978 (see Section IV.2a), thus accounting for their decreased relative abundance in the latter sampling period.

In order to evaluate jetty effects on the composition of the intertidal community, the abundance of species which were dominant during summer and fall was compared between equivalent sampling periods in 1977-78 vs. 1982, and between near-jetty Transects II and III and control Transects IV and V (Fig. 6). Samples collected during winter and spring of 1978 were not included in this comparison, nor were those from Transect I, which was only

	No. Species						
	No. Species	No. Species	Both Areas	Percent	Cumul.		
Taxon	Intertidally	Subtidally	Combined	of Total	Percent		
Polychaeta	3	42	66	28.2	28.2		
Amphipoda	12	29	33	21.2	49 4		
Pelecypoda	3	18	18	11 5	60.9		
Decapoda	2	18	18	11.5	72.4		
Gastropoda	ō	8	8	5.1	77.5		
Isopoda	1	8	8	5.1	82.6		
Mysidacea	1	7	7	4.5	87.1		
Turbellaria	0	5	5	3.2	90.3		
Cumacea	1	4	4	2.6	92.9		
Echinodermata	0	3	3	1.9	94.8		
Anthozoa	1	2	2	1.3	96.2		
01igochaeta	1	1	1	0.6	96.8		
Tanaidacea	0	1	1	0.6	97.5		
Nematoda	1	1	1	0.6	98.1		
Sipunculida	0	1	1	0.6	98.8		
Cephalochordata	0	1	1	0.6	99.4		
Rhynchocoela	0	1	1	0.6	100.0		
TOTAL	26	150	156				

Table 8. Number of species representing each of the major macroinvertebrate taxa in intertidal and subtidal samples collected from Murrells Inlet during 1982.

	No. Individuals	No. Individuals	Total	Percent	Cumu1.
Taxon	Intertidally	Subtidally	Numbers	of Total	Percent
Pelecypoda	921	1753	2674	19.2	19.2
Polychaeta	858	1405	2263	16.2	35.4
Amphipoda	100	2152	2252	16.2	51.6
Nematoda	1428	793	2221	15.9	67.5
Oligochaeta	2105	13	2118	15.2	82.7
Decapoda	1178	242	1420	10.2	92.9
Turbellaria	0	351	351	2.5	95.4
Mysidacea	6	220	226	1.6	97.0
Tanaidacea	0	129	12 9	0.9	97.9
Isopoda	2	94	96	0.7	98.6
Anthozoa	1	56	57	0.4	99. 0
Echinodermata	0	56	56	0.4	99.4
Gastropoda	0	31	31	0.2	99.6
Cumacea	1	19	20	0.1	99.8
Rhynchocoela	0	16	16	0.1	99.9
Cephalochordata	0	8	8	<0.1	99.9
Sipunculida	0	1	1	<0.1	100.0
TOTAL	6600	7339	13939		

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Table 9.	Numbers of individuals of each of the major macroinvertebrate taxa
	in intertidal and subtidal samples collected from Murrells Inlet
	during 1982.
Table 10. Numbers of individuals and ranked abundance of dominant macroinvertebrate species collected at twelve intertidal stations at Murrells Inlet during 1982. (Only species comprising $\geq 1\%$ of the total number are presented.)

	MHW	MTL	MLW	Total	% of Fauna	Cumul. %	Rank by Number
Oligochaeta	174	1930	1	2105	31.9	31.9	1
Nematoda	752	597	79	1428	21.6	53.5	2
Emerita talpoida	2	301	873	1176	17.8	71.3	3
Donax variabilis	5	171	720	896	13.6	84.9	4
Scolelepis suamata	0	206	650	856	13.0	97.9	5
Others (21 species)	8	21	110	139	2.1	100.0	_



Figure 6. Comparison of relative abundance of dominant macroinvertebrates in intertidal samples on the near-jetty and control transects. Cross-hatched bars represent 1977-78 samples and solid bars represent 1982 samples.

sampled during 1977-78. The results of these comparisons (Fig. 6) indicate differences in the abundance and distribution of some species, but similarities for others.

Oligochaetes were not collected in 1977-78, but were moderately abundant on both control transects and on Transect III during either the summer or fall of 1982 (Fig. 6). Nematodes were also low in abundance during 1977-78, but were found in substantially greater numbers in 1982, especially during the fall on the control transects and Transect III. The lack of any consistent pattern of abundance (control vs. near-jetty transects; prior to vs. following construction) illustrates the temporal and spatial variability in the distribution of these organisms, and is probably not indicative of any direct impact from construction of the jetties.

The mole crab *Emerita* talp ida and the coquina clam *Donax* variabilis showed little difference between intial densities and those five years later on Transects II and III (Fig. 6). During the summer of 1982, however, densities on both control transects were considerably higher than on nearjetty Transects II and III, indicating a possible jetty effect on the distribution of these species during their period of maximum abundance.

The most abundant intertidal species in 1977-78 (S. squamata and N. scimitai) were found in high densities on only two transects in the summer of 1982, and were relatively rare during the fall (Fig. 6). The reduced numbers of these species, compared to the initial sampling period, is related to their seasonal pattern of abundance, since peak densities in 1977-78 occurred during winter and spring months, which were not sampled in 1982.

(2). Subtidal Community Composition

Three of the dominant species of macroinvertebrates collected in the subtidal zone during 1982 were restricted to the offshore stations. These were the pelecypod *Travainabla martiniaensis*, the polychaete *Podarke obscurv* and an undetermined flatworm, Turbellaria A (Table 11). Additionally, the fossorial amphipods *Were asjoinably interms* and Platyischnopidae A were most abundant at offshore stations, although they were also observed in lower densities at the shallower stations. Other species, such as the amphipod *Prot React Place deletered*, the mysid *Bormaniella* sp., the polychaete *Mart Place deletered*, and nematodes were found throughout the subtidal zone, but were most abundant at midshore stations. Finally, certain species, including *L. Mart deletered* and the amphipod *Bathyporeia parkeri*, were largely restricted to the nearshore stations (Table 11).

The overwhelming numerical dominance of the subtidal community by Spiophaneo i minar that was observed in 1977-78 (Table 5) was not apparent during 1952. Once again, this difference is most likely a result of the peak abundances of this species during seasons (winter and spring) that were not sampled in 1982 (Fig. 3).

The distribution of three species (C. martinicansis, P. obscura, and Nematoda), which were collected only during 1982, may reflect the effects of jetty construction, particularly along the channel portion of Transect II (Fig. 7). Craceivelle comprehences and P. obscura were collected only Numbers of individuals and ranked abundance of dominant macroinvertebrate species collected at twelve subtidal stations at Murrells Inlet during 1982. (Only species comprising $\geq 2\%$ of the total number are presented.) Table 11.

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					Percent		Rank
					of	Cumul.	by
	Nearshore	Midshore	Offshore	Total	Fauna	Percent	Number
Crushella martinicensis	0	0	1134	1134	15.4	15.4	J
Pristic water us deferminae	148	495	150	793	10.8	26.2	2
Nematoda	213	428	152	793	10.8	37.0	7
Platyischnopidae A	30	62	513	622	8.4	45.4	4
Deliver of Joura	0	0	587	587	8.0	53.4	2
is new more des	393	æ	0	401	5.4	58.8	9
amonificant in the second is	100	139	26	265	3.6	62.4	7
fing corneration apris tomas	15	78	160	253	3.4	65.8	80
Turbellaria A	0	0	246	246	3.3	69.1	6
Rithing operate parkari	156	18	13	187	2.5	71.6	10
Bernwilla sp.	74	91	10	175	2.4	74.0	11
Others (139 species)	507	585	814	1906	26.0	100.0	١

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Figure 7. Comparison of relative abundance of dominant macroinvertebrates in subtidal samples on the near-jetty and control transects. Cross-hatched bars represent 1977-78 samples and solid bars represent 1982 samples.

at SS03 (Appendix E), where sediments were very coarse and contained larger amounts of shell hash than other stations. Nematodes were also considerably more abundant on Transect II, especially during the summer. Jetty construction may also have affected the subtidal distribution of *C. variabilis*, since it was only abundant at control stations in 1982.

Most of the other dominant species, such as the amphipods *P. deichmannae*, Platyischnopidae A, and *R. epistemue*, and the polychaete *M. pepillicornis*, were less abundant on Transect II than on the other transects sampled in 1982. These differences are not necessarily related to the impact of the jetties, however, since similar differences were observed between Transects II and III during the fall of 1977, prior to jetty construction (Fig. 7).

(3). Community Structure

The trends noted in species richness and diversity of 1977-78 samples were generally repeated in the subsequent sampling period. Species numbers and species richness increased seaward along the transects, although the abrupt change noticed between MHW and MTL was not as clear in 1982 (Table 12). This is probably the result of the abundance of nematodes and oligochaetes observed at the MHW level on Transects UII, IV, and V during the latter sampling period, when faunal densities were far greater than those observed initially at that level (Tables 6 and 12). Another similarity with the initial sampling period was the occurrence of lowest diversity values at the upper intertidal level and greatest diversity at the midshore or offshore stations on each transect (Table 12).

Although species richness and diversity estimates at each station revealed no consistent differences among the four transects sampled in 1982 (Table 12), differences were noted in the total number of species and individuals on the intertidal transects sampled in 1977-78 vs. 1982 (Fig. 8). During the summer of 1978, before rock removal created the weir section in the jetty, the finer sediments at sheltered intertidal stations (SI) contained twice as many species as the number collected on the exposed side (NI). By 1982, SI stations were less sheltered hecause the weir section allowed wave action to cross the jetty, and the number of species at those stations was reduced substantially. Additionally, the number of species on both near-jetty transects was lower than on control transects (CI and GI). The number of individuals in intertidal samples was also lowest at the SI stations. These low abundances noted on Transect II reflect, in part, the absence of animals at the highest intertidal level during 1982 (Appendix E).

In the subtidal zone, no consistent differences were noted among transects with respect to the number of species, either between years or among transects within a sampling period (Fig. 9). Furthermore, no consistent differences were noted in overall abundance, except on the channel transect (SS) where *C. martirization and E. Stardy* were very abundant during the fall of 1982 (Fig. 7).

Normal cluster analysis of summer and fall samples showed clear separation of intertidal and subtidal collections (Figs. 10 and 11). Intertidal stations formed three station groups (1, 2, and 6) among summer samples, and two groups (1 and 2) in fall collections. Comparisons of the Number of species, estimated numbers of individuals per 0.1 m^2 , species diversity (H') in bits, evenness (J'), and species richness (SR) for each station sampled at Murrells inlet during 1982. Table 12.

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TANNSECT 11 TANNSECT 11 <th colspa<="" th=""><th>1 1</th><th></th><th></th><th></th><th></th><th></th><th></th><th></th></th>	<th>1 1</th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th>	1 1							
TEAMSECT IV TEAMSECT IV TEAMSECT IV Nurth Nur. No. Indi II. Station Spp. per 0.1nd, III. No. No. No. Indi No. No. No. Indi No. No. No. No. Indi No.	¥	$1.2 \\ 0.2$	0.8 0.7	1.2 2.3	2.3 2.3	4.2 3.6	12.8 8.3	5.7	
TRANSECT II TRANSECT II TRANSECT II TRANSECT IV TRANSECT IV <th colspa<="" td=""><td>-</td><td>0.9 0.3</td><td>0.4 0.6</td><td>$0.4 \\ 0.7$</td><td>0.4 0.7</td><td>0.6 0.7</td><td>0.7 0.4</td><td>0.7</td></th>	<td>-</td> <td>0.9 0.3</td> <td>0.4 0.6</td> <td>$0.4 \\ 0.7$</td> <td>0.4 0.7</td> <td>0.6 0.7</td> <td>0.7 0.4</td> <td>0.7</td>	-	0.9 0.3	0.4 0.6	$0.4 \\ 0.7$	0.4 0.7	0.6 0.7	0.7 0.4	0.7
TRANSECT II TRANSECT III No. No. <th colspan="12</td> <td>' <u>-</u>'</td> <td>1.4 0.1</td> <td>1.0</td> <td>1.4 2.4</td> <td>1.4 2.4</td> <td>2.7</td> <td>4.7 4.4</td> <td>3.4</td>	' <u>-</u> '	1.4 0.1	1.0	1.4 2.4	1.4 2.4	2.7	4.7 4.4	3.4	
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TEANSECT II TEANSECT II Multi Station Spp. per 0.1m ² I' J' SR TRANSECT IV Multi Station Spp. per 0.1m ² I' J' SR Station Spp. per 0.1m ² I' J' SR Multi Station Spp. per 0.1m ² I' J' SR Station Spp. per 0.1m ² I' J' SR Multi S101 0 0.0 - - - No. Imd. No. Imd. I' J' SR Multi S101 0 0.0 - - - No. Imd. No. Imd. No. Imd. No. Imd. No.	Station	6101	6102	6103	CS01	GS02	C030	£0SX	
TEANSECT 11 TEANSECT 11 Multi Station Spp. per 0.1m ² $1'$ $3'$ Station Spp. per 0.1m ² $1'$ $3'$ Station Spp. per 0.1m ² $1'$ $3'$ $1'$ $3'$ Station Spp. per 0.1m ² $1'$ $3'$ Station Spp. per 0.1m ² $1'$ $3''$ $3''$ $3''$ $3''$ $3''$ $3''$ $3''$ $3''$ $3''$ $3''$ $3''$ $3''$ $3''$ $3''$ $3''$ $3''$ $3''$ $3''$ $3'''$	SR	1.5 0.5	1.0	0.7 1.8	2.4 2.8	4.1 2.6	16.2 6.2	6.1 4.8	
TEANSECT III TRANSECT III TRANSECT III TRANSECT III TRANSECT III TRANSECT III Month Station Spp. per 0.1m ² H J' SR Station Spp. per 0.1m ² H' J' SR Station Spp. per 0.1m ² J' SR J' SR Station Spp. per 0.1m ² J' SR J' SR J' SR Station Spp. per 0.1m ² H' J' SR J' SR Station Spp. per 0.1m ² H' J' SR Station Spp. per 0.1m ² J' SR Station Spp. per 0.1m ² J' J' SR Station Spp. per 0.1m ² J' SR Station Spp. per	5	1.0	0.6 0.6	0.6 0.7	0.6 0.6	0.5	0.7	0.5	
TRANSECT II TRANSECT II TRANSECT II TRANSECT II Month Station Spp. per 0.1md, No.	Ŧ	2.0 0.8	$1.6 \\ 1.5$	1.6 2.2	2.3 2.3	2.5 2.7	4.6 3.4	3.6 2.6	
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TRANSECT 11 TRANSECT 11 Munth Station Nu No. ind, Nu Nu No. ind, Nu. Nu No. ind, Nu. TRANSECT 11 hulv Station Spp. per 0.1m2 H' J' SR Station Spp. per 0.1m2 H' hulv S101 0 0.0 - - - NIOL 2 17.3 0.4 hulv S101 0 0.0 - - - NIOL 2 17.3 0.4 hulv S101 0 0.0 0.5 0.5 0.5 0.5 0.5 0.4 0.4 hulv S102 4 1/4.0 1.6 0.8 0.1 2 24.7 0.4 hulv S101 1 4/1 0.8 1.1 6 0.5 0.5 hulv S101 1 7 247 1.4 1.4 1.4 1.4 1.4 1.4 1.4 1.4 1.4 1.4 1.4	-	0.5	0.6	0.2	0.7 0.9	$0.8 \\ 0.8 $	0.7 0.9		
Multi TRANSECT II TRANSECT III Multi Station Spp. per 0. Ind. No. No. Ind. No. No. Ind. Nuc. No. No. Ind. N. No. No. Ind. No. No. Ind. Nuc. S101 0 0.0. - - NIO Nuc. S101 0 0.0. - - NIO 2 6.7 Nuc. S102 4 1/4.0 1.6 0.8 0.5 NIO 2 17.3 Nuc. S102 4 1/4.0 1.6 0.8 0.5 0.7 3 20.7 Nuc. S103 5 12.7 2.1 0.9 1.4 NIO 3 247.3 Nuc. SS01 17 47.7 2.3 0.6 3 247.3 Nuc. SS01 17 2.0 1.1 3 247.3 Nuc. SS01 17 2.3 0.6 3 247.3 Nuc. SS01 17<	'n	0.5	$0.9 \\ 1.0$	$0.6 \\ 1.4$	3.3	4.0	3.8		
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Annth Station TRANSECT II Muth Station No. Ind. Muth S101 0 0.0. - Muth S101 0 0.0. - Muth S101 0 0.0. - Muth S102 4 1/4.0 1.6 Muth S102 4 1/4.0 1.6 Muth S103 5 12.7 2.1 Muth S103 5 29.3 1.8 Muth S801 17 47.7 2.3 Muth S802 37 126.7 2.1 Muth S802 37 156.7 2.1 Muth S803 18 31.7 3.0 Muth S803 23 2.0 1.1 Muth S803 23 3.13 3.0 Muth S803 23 3.3 2.0 Muth S803 23 3	-	ΕT	0.8 0.5	0.9	0.6 0.7	0.4	0.6 0.4		
Annth Station Spr. Per 0.1m2 Mur. Station Spr. Per 0.1m2 Julv S101 0 0.0 Mur. S101 0 0.0 Mur. S102 4 174.0 Mur. S103 5 12.7 Mur. S103 5 29.3 Julv S103 5 29.3 Julv S103 5 29.3 Julv S801 17 47.7 Nov. S801 17 47.7 Nov. S802 37 156.7 Julv S803 37 156.7 Sov. 18 20.3 31.7 Mur. S803 23 33.7 Mur. S803 23 33.7 Mur. S803 23 33.7 Mur. S803 23 33.7	≂	1.1	1.6 0.5	2.1 1.8	2.3 2.0	2.1 3.0	2.9 2.1		
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	Manth	July Nov.	luly Nov.	July Nov	lu ly Novi	hilv Xovi	tu Lv Nov :	taly Nov.	

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Comparison of the number of species and individuals in pooled subtidal samples from the near-jettv and control transects. Cross-hatched bars represent 1977-78 samples and solid bars represent 1982 samples. samples from the near-jetty and control transects. Figure 9.





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entities within those groups showed no well-defined differences attributable to jetty effects. In general, the highest intertidal stations (01's) were low in similarity to other intertidal stations (e.g., groups 2 and 6, Fig. 10). Similarity was also low during the fall between control stations CIO3 and GIO3 and all other intertidal stations (Fig. 11), although this difference was not noted in the analysis of summer samples.

Subtidal stations formed the remaining groups in both dendrograms (Groups 3, 4, and 5). During both seasons of 1982, most SS stations were dissimilar to all other subtidal stations, except the two atypical (muddy) "control" stations CSO3 and GSO3. They were also dissimilar to SS stations sampled in 1977-78, probably as a result of the modified conditions on this transect which were due to jetty construction. Subtidal stations on the north side of the jetty (NS), however, generally showed greater similarity to the control transects and to NS and SS stations sampled in 1977-78.

c. <u>General Discussion</u>

Many previous studies of the benthic macroinvertebrate fauna inhabiting sandy beaches have been limited to the intertidal zone (Croker, 1967, 1968, 1970, 1977; Dexter, 1967, 1969, 1979; Croker et al., 1975; Holland and Dean, 1977; Saloman and Naughton, 1977, 1978; Simon and Dauer, 1977; Croker and Hatfield, 1980) or to shallow subtidal waters (Frankenberg, 1971; Frankenberg and Leiper, 1977; Maurer et al., 1979a; Oliver et al., 1980). Treatment of the intertidal and subtidal zones as distinctly separate habitats is most likely the result of convenience and economy of sampling, with the mean low water mark being traditionally regarded as the transition between intertidal and subtidal communities (Dexter, 1969; Croker, 1977). The results of the present study confirm that a distinct difference in overall community structure exists between the intertidal and subtidal zones (Figs. 4, 10, 11), but it is important to note that many of the numerically dominant species are prevalent in both zones (Tables 4, 5, 10, 11). Scolelepis squamata, for example, was a dominant intertidal species at Murrells Inlet, but it was also important subtidally, ranking third in abundance during 1977-78. Matta (1977) also noted that this species was dominant in the subtidal areas of a high-energy beach in North Carolina, even though it is typically considered an intertidal species (Croker, 1970, 1977; Foster, 1971; Croker et al., 1975; Saloman and Naughton, 1978).

The coquina clam Donax variabilis and the polychaete Spiophanes bombyx are also important in both intertidal and subtidal assemblages (Appendices A-E). D. variabilis is a rapidly burrowing bivalve that is common on beaches along the United States Atlantic coast between New York and Texas (Abbott, 1974), where it is frequently seen in large aggregations. Pearse et al. (1942), Jacobson (1955), and Turner and Belding (1957) reported that populations of D. variabilis move up and down the beach with the tide, and our collections in the nearshore and midshore areas document that it is also common subtidally. Spiophanes bombyx was the most abundant species at Murrells Inlet in 1977-78, ranking first in abundance subtidally and fourth in the intertidal zone. Although collected both intertidally and subtidally in 1982, the reduced abundance of this spionid during that period was probably a result of the lack of sampling during its peak abundance (winter and spring). The dominance of the intertidal zone by oligochaetes and nematodes at Murrells Inlet in 1982 suggests that there may be considerable yearly variability in the dominant species, since these taxa were not common in 1977-78. Additionally, these taxa have not been commonly reported in the literature for similar habitats elsewhere. Specimens of both taxa in our samples were generally rather small, and are often considered meiofauna. Therefore, the large numbers collected in this study may be due, in part, to our use of smaller sieve size (0.5 mm) than that often used in other studies of benthic invertebrates.

The abundance of S. squamata, D. variabilis, S. bombyx, and nematodes across the range of beach elevations at Murrells Inlet illustrates that the intertidal and shallow-water sand regions can be considered an ecological unit, as Fincham (1971) has suggested. However, we are not suggesting that there are no differences between intertidal and subtidal assemblages, since many of the less abundant species were primarily habitat-restricted, with most groups confined to subtidal waters. For example, the nodal analysis of 1977-78 data documents that several species groups (A-D) were specifically restricted to the deepest subtidal stations, while others (E, H, I, K) were more widely distributed in the subtidal zone (Fig. 5). Group F, on the other hand, was restricted to the middle and lower intertidal zones. Very few specimens of this group were found at high intertidal stations, and only one specimen occurred in subtidal samples.

The intertidal fauna of U.S. Atlantic coast sandy beaches has typically been characterized as dominated by peracarid crustaceans, especially haustoriid amphipods (Pearse et al., 1942; Croker, 1967, 1977; Dexter, 1969; Sameoto, 1969a; Holland, 1974; Holland and Dean, 1977). These fossorial amphipods have been frequently noted to dominate subtidal assemblages in shallow nearshore waters as well (Sameoto, 1969b; Dörjes, 1972; Maurer et al., 1979b). At Murrells Inlet, however, polychaete worms dominated the intertidal and subtidal faunal assemblages in the 1977-78 sampling period, both in terms of the number of species and number of individuals. Similar domination of sandy beach fauna by polychaetes has been correlated to the degree of exposure to wave action by previous investigators. Croker (1977) observed increased dominance by polychaetes (S. squamata, Pygosico compares, Paraonic fulgens) with increased protection from wave exposure on New England beaches. Oliver et al. (1985) defined two distinct fagna' zones on a subtidal high-energy beach in California. The first zone was eshallow ((14 m) "prostantian zone" in which the relatively mobile hubstoried. ordicerotid, and phoxocephalid amphipods and ostracod crustaccans were predominant. Deeper waters contained the "polychaete zone," which consisted primarily of organisms that maintain relatively permanent tubes and burrows. These authors attributed this distinct zonation to the decrease in waveinduced bottom disturbance that was associated with increased water depth.

At Murrells Inlet the proportion of polychaete to peracarid crustacean species in the 1977-78 sampling period was 1:1.4 intertidally, and 1:0.6 subtidally. This suggests a similar relationship between the degree of exposure to harsh environments and richness of the polychaete fauna (Table 2) when all four seasons are considered. Although polychaetes did not dominate the subtidal community in the two seasons sampled in 1982, they were a more important component of the community in that zone than in the intertidal zone. The apparent success of polychaete species at Murrells Inlet compared with other sandy beach habitats may be attributed in part to the moderate impact of wave energy in this region. Roberts (1974) also noted that the fauna is more diverse and polychaetes are better represented on moderate wave energy beaches of South Carolina and Georgia than on highenergy beaches.

The degree of wave exposure affects other aspects of community structure as well. Croker (1977) found that species richness, evenness, and diversity were all considerably higher on a semi-protected intertidal beach than at a moderately exposed site over the duration of a four-year study. Other studies have noted a similar relationship between species numbers and the degree of exposure (McIntyre, 1970, 1977; Croker et al., 1975). During construction of the jetty at Murrells Inlet we observed increased species richness in the intertidal assemblage on the sheltered side of the jetty by February (Table 6), and values were notably higher than on the other intertidal transects sampled during that season. However, this increased diversity was short term and the number of species was reduced as opportunists were eliminated. Five years later, the number of species in the intertidal community near the jetty was lower than in the control area, although H' values were not consistently different. The presence of the jetty weir may have minimized any differences due to sheltering, since the intertidal area on the south side of the jetty receives wave action during high tide periods.

The effects of sheltering on community structure were not as apparent along the subtidal portions of Transect II during the 1977-78 period. By August, jetty construction had progressed to a point just past SSO2, and although species numbers increased at SSO1 and SSO2, similar increases were observed on Transect I. Differences were more apparent at SS stations five years later, particularly with respect to the density of dominant species (Fig. 7) and overall community composition (Figs. 10 and 11).

In our study, differences due to jetty construction appeared to be short-term and/or confined to the area between the jetties. However, although the Huntington Beach transect was not re-sampled in 1982, extensive shoaling was noted on that beach for a considerable distance south of the jetties. Presumably, any modifications in the beach community structure associated with sheltering and shoaling effects could be expected to occur in that area. North of the jetties on Garden City Beach, no short-term or long-term changes have occurred which can be attributed to jetty construction, but it is probable that planned nourishment activities on that beach will result in at least some short-term modifications in macroinvertebrate community structure (Naqvi and Pullen, 1982).

V. SUMMARY AND CONCLUSIONS

1. Macrobenthic communities of the intertidal and nearshore subtidal environments at Murrells Inlet, South Carolina, were studied during jetty construction and five years later. Since biological impacts of jetty structures are not well understood, the present study was undertaken in order to describe the benthic communities and to assess any short-term or long-term effects on those communities attributable to jetty construction. 2. Jetty construction commenced on the Murrells Inlet Navigation Project during the fall of 1977 and benthic sampling was initiated just prior to construction along three transects: two adjacent to the north jetty and one further away on Huntington Beach. Sampling continued quarterly for the first year during construction of the north jetty. By March of 1980, the jetties were completed and in 1982, sampling was repeated during two seasons. Transects sampled during this latter effort included the two adjacent to the north jetty and two control transects further north.

3. On each transect, replicate infaunal samples were collected at three intertidal stations, from mean high water to mean low water, and at three subtidal stations located in depths between one and five meters. Intertidal samples were collected using a quadrat box, and subtidal collections were made with a Van Veen grab. Sediment samples were taken at each location during the initial study period (1977-78) and hydrographic measurements were made at subtidal stations.

4. Water temperature in the area reflected normal seasonal variation, and ranged from 6.0° - 28.7°C. Salinities were consistently high and ranged from 31.9 - 35.4 °/oo. Differences between surface and bottom samples were negligible, indicating that these waters were well mixed.

5. Sediments in the area typically consisted of quartz sand and shell hash. Although considerable variability was observed among stations with respect to sediment characteristics, some general patterns of sediment distribution were noted that were related to beach elevation, transect location, and season. Two notable exceptions to these patterns were observed: 1) the appearance of finer sediments and shoaling along the intertidal portion of one transect (Transect II) during jetty construction, and 2) the very coarse, shelly sediments found along the outer subtidal portion of the same transect following jetty construction.

6. The benthic community at Murrells Inlet was initially dominated by several species of polychaetes, amphipods, and pelecypods. In the intertidal zone, the spionid polychaete Scolelepis squamata was most abundant while a different spionid, Spiophanes bombyx, was dominant at subtidal stations. Overall, polychaetes accounted for 40% of the number of species and greater than 60% of the total number of individuals collected during the initial study period. By 1982, however, this dominance by polychaetes was no longer apparent. Oligochaetes and nematodes numerically dominated the intertidal zone during this latter period, while amphipods and pelecypods were most abundant subtidally. This change was probably not related to jetty construction, but was most likely the result of natural yearly variation and limited sampling in 1982, when collections were not made during winter or spring (periods of maximum abundance of S. squamata and S. bombyx). The dominance of nearshore and intertidal beach communities by polychaetes has not been frequently reported in the literature and may be attributed in part to the moderate impact of wave energy in this region.

7. Jetty effects were indicated by the distribution and abundance of a few species (Crassinella martinicensis and Podarke obscura), but this appeared to be restricted to the outer stations on Transect II. Otherwise, comparison of species abundance between years and among transects suggested no widespread impacts attributable to jetty construction.

8. Species richness and diversity were lowest at the upper intertidal stations, and generally increased in a seaward direction along most transects. One significant exception to this trend occurred at the sheltered intertidal stations on Transect II, where species richness was temporarily elevated following initial sheltering by the jetty. This was a short-term effect, however, and by 1982, indices of species diversity and richness were not markedly different from those observed initially.

9. Cluster analysis showed clear separation of intertidal and subtidal stations. Although several of the numerically dominant species were widely distributed throughout both intertidal and subtidal zones, many of the less abundant species were habitat-restricted. Some dissimilarity was noted between subtidal stations sampled during 1982 on Transect II and the remaining subtidal stations, but no other differences in community structure were apparent that could be strictly related to jetty construction.

10. Impacts from jetty construction appear to have been either short-term or limited to areas where changes in sediment characteristics were associated with altered benthic community structure. Extensive shoaling to the south of these jetties precluded repeated sampling in that area; however, modifications in community structure associated with sheltering and shoaling effects should be expected to occur there as well. The area to the north of the jetties does not appear to have been affected by their presence, although future alterations from proposed beach nourishment may have some impact on the beach community in that area.

LITERATURE CITED

- ABBOTT, R.T., American seashells: The marine Mollusca of the Atlantic and Pacific coasts of North America, Van Nostrand Reinholt Co., New York, 1974.
- BOESCH, D.F., "Application of numerical classification in ecological investigations of water pollution," Virginia Institute of Marine Science, Special Scientific Report No. 77, 1977.

E

- BOUSFIELD, E.L., Shallow-water gammaridean Amphipoda of New England, Cornell University Press, Ithaca, New York, 1973.
- CALDER, D.R., BEARDEN, C.M., and BOOTHE, B.B. JR., "Environmental inventory of a small neutral embayment: Murrells Inlet, South Carolina," South Carolina Marine Resources Center, Technical Report No. 10, 1976.
- CROKER, R.A., "Niche specificity of Neohaustorius schmitzi and Haustorius sp. (Crustacea: Amphipoda) in North Carolina," Ecology, Vol. 48, 1967, pp. 971-975.
- CROKER, R.A., "Distribution and abundance of some intertidal sand beach amphipods accompanying the passage of two hurricanes," *Chesapeake* Science, Vol. 9, 1968, pp. 157-162.
- CROKER, R.A., "Intertidal sand macrofauna from Long Island, New York," *Therapeake Science*, Vol. 11, 1970, pp. 134-137.
- CROKER, R.A., "Macroinfauna of northern New England marine sand: Long-term intertidal community structure," Pages 439-450 in B.C. Coull (ed.), Ecology of marine benthos, University of South Carolina Press, Columbia, 1977.
- CROKER, R.A., and HATFIELD, E.B., "Space partitioning and interactions in an intertidal sand-burrowing amphipod guild," *Marine Biology*, Vol. 61, 1980, pp. 79-88.
- CROKER, R.A., HAGER, R.P., and SCOTT, K.J., "Macroinfauna of northern New England marine sand. II. Amphipod dominated intertidal communities," Canadian Journal of Zoology, Vol. 53, 1975, pp. 42-51.
- DAY, J.H., FIELD, H.G., and MONTGOMERY, M.P., "The use of numerical methods to determine the distribution of the benthic fauna across the continental shelf of North Carolina," *Journal of Animal Ecology*, Vol. 40, 1971, pp. 93-125.
- DEXTER, D.M., "Niche diversity of haustoriid amphipods in North Carolina," Crear oake Science, Vol. 8, 1967, pp. 187-192.
- DEXTER, D.M., "Structure of an intertidal sandy-beach community in North Carolina," *Characenke Science*, Vol. 10, 1969, pp. 93-98.

- DEXTER, D.M., "Community structure and seasonal variation in intertidal Panamanian sandy beaches," *Estuarine and Coastal Marine Science*, Vol. 9, 1979, pp. 543-558.
- DURJES, J., "Georgia coastal region, Sapelo Island, U.S.A.: Sedimentology and biology. VII. Distribution and zonation of macrobenthic animals," Senckenbergiana Maritima, Vol. 4, 1972, pp. 183-216.
- DÖRJES, J., "Marine macrobenthic communities of the Sapelo Island, Georgia region," Pages 399-421 in B.C. Coull (ed.), *Ecology of marine benthos*, University of South Carolina Press, Columbia, 1977.
- FINCHAM, A.A., "Ecology and population studies of some intertidal and sublittoral sand-dwelling amphipods," Journal of the Marine Biological Accoriation of the United Kingdom, Vol. 51, 1971, pp. 471-488.
- FOSTER, N.W., "Spionidae (Polychaeta) of the Gulf of Mexico and Caribbean Sea," Studies of the famil of Curacao and other Caribbean Islands, Vol. 36, 1971, pp. 1-183.
- FRANKENBERG, D., "The dynamics of benthic communities off Georgia, USA," The lastic stage plasica, Vol. 7, 1971, pp. 49-55.
- FRANKFNBERG, D., AND LEIPER, A.S., "Seasonal cycles in benthic communities of the Georgia continental shelf," Pages 383-396 in B.C. Coull (ed.), hereign of marine benthos, University of South Carolina Press, Columbia, 1977.
- HOLLAND, A.H., "A study of the intertidal macrofaunal communities inhabiting sand and mud bars of the North Inlet area near Georgetown, S.C., U.S.A.," University of South Carolina, Ph.D. dissertation, Columbia, South Carolina, 1974.
- HOLLAND, A.H., and DEAN, J.M., "The community biology of intertidal macrofauna inhabiting sandbars in the North Inlet area of South Carolina, U.S.A.," Pages 423-438 in B.C. Coull (ed.), *Ecology of marine benthos*, University of South Carolina Press, Columbia, 1977.
- HOWARD, J.D., and DORJES, J., "Animal-sediment relationships in two beachrelated tidal flats; Sapelo Island, Georgia," Journal of Sedimentary Persotopy, Vol. 42, 1972, pp. 608-623.
- JACOBSON, M.K., "Observations on *Donax foosor* Say at Rockaway Beach, New York," *Montilus*, Vol. 68, 1955, pp. 73-77.
- LAMBERT, J.M., and WILLIAMS, W.T., "Multivariate methods in plant ecology. IV. Nodal analysis," *Journal of Ecology*, Vol. 50, 1962, pp. 775-802.

- LANCE, G.N., and WILLIAMS, W.T., "A general theory of classificatory sorting strategies. I. Hierarchical systems," Computer Journal, Vol. 9, 1967, pp. 373-380.
- MATTA, J.F., "Beach fauna study of the CERC Field Research Facility, Duck, North Carolina," MR 77-6, U.S. Army Corps of Engineers, Coastal Engineering Research Center, Fort Belvoir, Virginia, 1977.
- MAURER, D., LEATHEM, W., KINNER, P., and TINSMAN, J., "Seasonal fluctuations in coastal benthic invertebrate assemblages," *Estuarine and Coastal Marine Science*, Vol. 8, 1979a, pp. 181-193.
- MAURER, D., WATLING, L., LEATHEM, W., and KINNER, P., "Seasonal changes in feeding types of estuarine benchic invertebrates from Delaware Bay," Journal of Experimental Marine Biology and Ecology, Vol. 36, 1979b, pp. 125-155.
- MCINTYRE, A.D., "The range of biomass in intertidal sand, with special reference to the bivalve Tellina tenuiv," Journal of the Marine Biological Association of the United Kingdom, Vol. 50, 1970, pp. 561-575.
- MCINTYRE, A.D., "Sandy foreshores," Pages 31-47 in R.S.K. Barnes (ed.), The Coastline, John Wiley and Sons, New York, 1977.
- MULVIHILL, E.L., FRANCISCO, C.A., GLAD, J.B., KASTER, K.B., and WILSON, R.E., "Biological impacts of minor shoreline structures on the coastal environment: state of the art review," U.S. Fish and Wildlife Service, Biological Services Program, FWS/OBS-77/51, 2 vols., 1980.
- NATIONAL OCEAN SURVEY, "Tide tables 1981. High and low water predictions. East coast of North and South America including Greenland," National Oceanic and Atmospheric Administration, Washington, D.C., 1981.
- NAQVI, S.M., and PULLEN, E.J. "Effects of beach nourishment and borrowing on marine organisms," MR 82-14, U.S. Army Corps of Engineers, Coastal Engineering Research Center, Fort Belvoir, Virginia, 1982.
- OLIVER, J.S., SLATTERY, P.N., HULBERG, L.W., and NYBAKKEN, J.W., "Relationships between wave disturbance and zonation of benthic invertebrate communities along a subtidal high-energy beach in Monterey Bay, California," Fishery Bulletin, Vol. 78, 1980, pp. 437-454.
- PEARSE, A.S., HUMM, H.J., and WHARTON, G.W., "Ecology of sand beaches at Beaufort, North Carolina," Ecological Monographs, Vol. 12, 1942, pp. 136-190.

PIELOU, E.C., Mathematical or logy, John Wiley, New York, 1977.

PURVIS, J.C., "Special weather summary," Minatological Data: South Curolina, Vol. 81, No. 2, 1978, p. 15.

ROBERTS, M.H., Jr., "Biology of benthic fauna," Pages 156-327 in M.H. Roberts, Jr. (ed.), A Socio-economic environmental baseline cummary for the South Atlantic region between Cape Hatteras, North Carolina and Cape Camaveral, Florida. Vol. III. Chemical and biological oceanography, Virginia Institute of Marine Science, Gloucester Point, Virginia, 1974.

- SALOMAN, C.H., and NAUGHTON, S.P., "Effect of hurricane Eloise on the benthic fauna of Panama City Beach, Florida, U.S.A.," Marine Biology, Vol. 42, 1977, pp. 357-363.
- SALOMAN, C.H., and NAUGHTON, S.P., "Benthic macroinvertebrates inhabiting the swash zone of Panama City Beach, Florida," Northeast Gulf Science, Vol. 2, 1978, pp. 64-72.
- SAMEOTO, D.D., "Comparative ecology, life histories, and behavior of intertidal sand-burrowing amphipods (Crustacea: Haustoriidae) at Cape Cod," *Journal of the Fisheries Research Board of Canada*, Vol. 26, 1969a, pp. 361-388.
- SAMEOTO, D.D., "Some aspects of the ecology and life cycle of three species of subtidal sand-burrowing amphipods (Crustacea: Haustoriidae)," *Journal of the Fisherice Research Board of Canada*, Vol. 26, 1969b, pp. 1321-1345.
- SIMON, J.L., and DAUER, D.M., "Reestablishment of a benthic community following natural defaunation," Pages 139-154 in B.C. Coull (ed.), Ecology of marine benthos, University of South Carolina Press, Columbia, 1977.
- TURNER, H.J., Jr., and BELDING, D.L., "The tidal migrations of Donax variability Say," Limnology and Oceanography, Vol. 2, 1957, pp. 120-124.
- VAN DOLAH, R.F., CALDER, D.R., and KNOTT, D.M., "Assessment of benthic macrofauna in an ocean disposal area near Charleston, South Carolina," South Carolina Marine Resources Center, Technical Report No. 56, 1983.

*	N	%	x	Standard		
Station	Month	CaCO ₃	Grain Size	Deviation	Skewness	Kurtosis
N101				~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~		
	November	9.38	1,524	0 918	-0 206	-0 657
	February	2.88	1,975	0 474	0.068	-0.057
	May	3.26	2.274	0.599	-0.166	0.906
	August	1.50			0.100	0.770
N102						
	November	10.76	1,575	0.888	-0.401	1 023
	February	8.46	1.939	0.774	-0.698	2 860
	May	7.00	2,092	0.725	-0.862	4.936
	August	4.80				
N103						
	November	11.72	1,768	1,110	-0.475	0 346
	February	17.22	1.323	1.273	-0.338	-0.376
	May	10.18	1,999	0.926	-0.740	2.529
	August	5.00			000,00	2.527
NS01						
	November	5.76	2,856	0.523	-0.657	3,149
	February	11.60	1.693	1.046	-0.437	0.457
	May	5.32	2.819	0.519	-0.822	5.467
	August					51.07
NS02						
	November	4.66	2.667	0.527	-0.643	4.057
	February	3.66	2,521	0.532	-0.710	5,132
	May	12.25	1,248	1.046	-0.142	0.476
	August	9.30				
NL03						
	November	6.72	2,482	0.670	-0.455	1.045
	February	13.18	2,687	0.596	0.683	3,421
	May	6.93	0,558	0.853	0.475	0.552
	August	6.50				

Appendix A. Carbonate content (percent by weight), mean grain size (ø units), standard deviation, skewness, and kurtosis of sediments in the Murrells Inlet study area (1977-78).

(Continued)

Appendix A.	(Continued)
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Station	Month	% CaCO ₃	x Grain Size	Standard Deviation	Skewness	Kurtosis
				<u> </u>		` ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,
5101	November	2 54	2 275	0 548	-0.603	3 565
	February	1 95	2.275	0.401	-0.249	2.126
	May	2.07	2.235	0.392	-0.040	1.707
	August	2.07	2.233	00072		10,00
SI02						
	November	14.64	1.525	1.104	-0.502	0.400
	February	3.50	2.468	0.371	-0.415	4.908
	May	7.23	2.110	0.733	-0.775	3.585
	August					
SI03						
	November	11.34	1.959	1.016	-0.665	1.594
	February	6.44	2.596	0.333	0.035	2.017
	May	5.44	2.576	0.390	-0.338	2.115
	August					
SS01						
	November	7.24	2.071	0.716	-0.556	1.319
	February	3.36	2.097	0.487	-0.541	2.647
	May	6.28	1.876	0.594	-0.465	1.994
	August	6.80				
SS02						
	November	5.48	2.561	0.518	-0.820	4.923
	February	4.04	2.167	0.534	-0.532	2.749
	May	2.88	2.321	0.502	-0.549	2.741
	August	7.10				
SS03						
	November	5.76	2.603	0.714	-0.772	3.639
	February	11.28	2.592	0.595	-0.879	7.307
	May	4.78	2.623	0.548	-0.752	4.516
	August	6.70				

(Continued)

A2

Appendix A. (Concluded)

		%	$\bar{\mathbf{x}}$	Standard		
Station	Month	CaCO3	Grain Size	Deviation	Skewness	Kurtosis
нт01						
	November	1.26	2.490	0.374	-0.161	2.495
	February	1.09	2.447	0.407	0.079	1.660
	May	0.11	2.527	0.316	-0.112	3.343
	August	1.30				
H102						
	November	3.48	2.089	0.594	-0.251	0.455
	February	3.66	2.362	0.425	-0.343	1.687
	May	2.91	2.078	0.488	-0.181	0.800
	August	3.70				
HI03						
	November	4.75	2.040	0.632	0.013	-0.411
	February	3.21	1.976	0.462	-0.079	1.386
	May	2.90	2.131	0.537	-0.323	1.044
	August	3.60				
HS01						
	November	3.75	2.339	0.558	-0.657	3.279
	February	2.66	2.612	0.311	-0.683	10.099
	May	5.43	2.442	0.767	-0.411	-0.196
	August	6.30				
HS02						
	November	2.36	2.510	0.323	-0.246	2.242
	February	3.56	2.461	0.360	-0.279	3.544
	May	3.67	2.756	0.444	-0.293	2.924
	August	6.80				
HS03						
	November	32.10	2.922	0.430	-0.700	11.548
	February	5.40	2.833	0.482	-0.839	7.470
	May	3.88	2,696	0.469	-0.462	3.976
	August	4.80				

A3

Appendix B.

Ranked abundance of benthic macroinvertebrates collected during 1977–1978 at intertidal and subtidal stations on the Huntington Beach transect (Transect I). Estimates represent the mean number per 0.1 m² and A = Ascidiacea, Am = Amphipoda, Brach = Brachiopoda, C = Cumacea, Cc = Cephalochordata, Cn = Cnidaria, D = Decapoda, E = Echinodermata, H = Hemichordata, I = Isopoda, M = Mollusca, My = Mysidacea, P = Polychaeta, T = Tanaidacea.

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SELIES	FALL 1977	WINTER 1978	SPRINC 1978	SUMER 1978	OVERALL
SFEULES					
			101		
Nochaustorius schmitzi (Am)		4.0		0.7	1.0
Donar variabilis (M)	2.0			1.3	3.0
Scolelepis squamata (P)		2.0	ŗ		4.0
Microprotopus raneyi (Am)			0.1		•
		ΞI	102		
Veohaustorius schmitzi (Am)	4.7	239.3	216.7	66.0	1.0
Donar variabilis (M)	8.7	29.3	188.7	6.7	2.0
Parahaustorius longimerus (Am)	0.7		1.3	80.7	3.0
Paraonis fulgens (P)	5.3		9.3	1.3	4.0
Lepidactylus dytiscus (Am)			14.0		5.0
Haustorius longirostris (Am)	0.7	7.3	6.0		6.0
Acanthohaustorius millsi (Am)	2.0		1.3	10.0	7.0
covenella gracilis (Cn)		1.3	11.3		8.0
scolelepis squamata (P)	0.7	8.7		1.3	0.6
spiophanes bombyz (P)		6.0			10.0
crosphaeroma diminutum (I)		•		2.0	11.0
lyttiidae undetermined (N) Actomomotic Silifacedia (N)		1.1 			
leterumuotud juujumuu (r) Interes Poluchassa 40	c (C•1			2.61
inknown Polychaete 64					
merita talboida (D)	0.7				20.0
hiridotea caeca (1)			0.7		20.0
ltylus sp. (Am)		0.7			20.0
un phi poda	0.7				20.0
lemertina (undet.)				0.7	20.0
inknowm Bivalve #2 (M)		0.7			20.0
Muphidae undetermined (P)				0.7	20.0
lephtys picta (P)				0.7	20.0
Haploscoloplos fragilis (P)			0.7		20.0
		-1	1103		
Donar variabilis (M)	8.7	64.7	326.7	40.7	1.0
Neohaustorius schmitzi (Am)	2.0	224.7	116.0	0.7	2.0
Scolelepts squamata (P)	20.7	5.55 5.1	6.7	6.7	3.0
Acanthoruustorrus mittet (Am) Lovenella aracilis (Cn)	0.0	6.7	18.0	13.3	4.0 5.0
Paraonis fulgens (P)			10.7	9.3	6.0

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(Continued)

В1

HIO3 HIO3 Dramatorina longimenta (na) 0.7 0.0 2.7 4.7 7.0 matter variate longimenta (na) 2.0 0.0 2.7 4.7 7.0 matter variate longimenta (na) 2.0 0.0 2.7 4.7 7.0 matter variate longimenta (na) 2.0 0.7 0.7 0.7 0.7 0.7 0.0 strict variation (na) 2.0 0.7	SPECIES	FALL 1977	WINTER 1978	SPRING 1978	SUMMER 1978	OVERALL RANK
$ \begin{array}{cccccc} \text{Productorize longithments (a)} & 0.7 & $			H	[0]		
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	irahiustorius longimerus (An)	0.7		10.7	4.7	7.0
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	uetoriue longiroetris (Am)		10.0	2.7		8.0
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	macea undetermined	2.0			4.7	0.6
	writa talpoida (D)	2.7				10.5
Strip Areas Ambjar (P) 0.7 0.7 0.7 0.7 0.7 Strip Areas (Moter.) 0.7 0.7 0.7 0.7 0.7 More Market (M) 10 10 10.7 10.7 0.7 0.7 Market (More Market (M) 10.7 10.7 10.7 10.7 10.7 10.7 Market (More Market (M) 10.7 10.7 10.7 10.7 10.7 10.7 Market (More Market (M) 10.7 10.7 10.7 10.7 10.7 10.7 10.	phiporaia virginiana (Am)	2.7				10.5
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	inplumes humbur (P)		2.0			12.0
$ \begin{array}{c} creating (\mathbf{w}) & 0.7 & 0.7 & 0.7 & 0.7 & 0.7 & 0.6 & 0.7 & 0.7 & 0.7 & 0.7 & 0.6 & 0.7 $	macea D (undet.)				0.7	16.0
$ \begin{array}{cccccc} \mbox{control} (p) & \mbox{control} (p$	crerretorus raneut (Am)		0.7			16.0
Matrix (under.) 0.7	strosaceus johnsoni (Nv)				0.7	16.0
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	mertina (undet.)			0.7		16.0
$\begin{array}{c} \begin{array}{c} \begin{array}{c} \begin{array}{c} \begin{array}{c} \begin{array}{c} \begin{array}{c} \begin{array}{c} $	line and (M)		0.7			16.0
$\begin{array}{c} \text{Higher endotree for the force point (F) \\ \text{even intervent (F) } \\ \text{Higher endotree (a) } \\ \text{Higher endotree (b) } \\ Higher endotree (b$	brown Bluelve Al (M)		0.7			16.0
HSOI HSOI $(1/2)^{2/2}$ is summer (P) 1.0 447.3 4.3 $(1/2)^{2/2}$ is summer (P) 1.0 447.3 4.3 $(1/2)^{2/2}$ is summer (P) 1.0 447.3 4.3 $(1/2)^{2/2}$ is summer (P) 1.0 4.1 9.4 $(1/2)^{2/2}$ is summer (M) 2.0 31.0 4.1 10.0 $(1/2)^{2/2}$ is summer (M) 1.3 0.7 30.0 4.1 10.0 $(1/2)^{2/2}$ is summer (M) 1.3 0.7 30.0 4.1 10.0 4.0 $(1/2)^{2/2}$ is summer (M) 1.3 0.7 9.1 10.0 4.0 4.0 $(1/2)^{2/2}$ is summer (M) 1.3 0.7 9.1 10.0 4.0 $(1/2)^{2/2}$ is summer (M) 1.3 0.7 9.0 0.0 10.0 $(1/2)^{2/2}$ is summer (M) 0.3 0.7 9.1 10.0 4.0 10.0 $(1/2)^{2/2}$ is statemeter (M) 1.3 0.7 9.1 10.0 10.0 10.0 $(1/2)^{2/2}$	ever heteropola (P)		0.7			16.0
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$			H	10		
$ \begin{array}{c} cvolumetervise (ar) (ar) (ar) (ar) (ar) (ar) (ar) (ar)$	strikter stunneter (P)	1.0	447.3	4.3		1.0
artholoursterius rillei (an) 28.7 59.3 4.7 10.0 3.0 artholoursterius rillei (an) 3.0 67.3 4.7 10.0 3.0 $\alpha_{transchile}$ (b) 3.0 67.3 4.7 10.0 3.0 $\alpha_{transchile}$ (b) 3.0 67.3 4.7 16.7 4.0 $\alpha_{transchile}$ (recting intermedias (m) 3.3 26.7 16.7 5.0 5.0 $\alpha_{transchile}$ (recting intermedias (m) 3.3 3.0 5.7 5.0 7.0 $\alpha_{transchile}$ (recting intermedias (m) 3.3 3.0 5.0 9.0 9.0 9.0 $\alpha_{transchile}$ (recting intermedias (m) 3.3 3.0 5.0 3.0 9.0 9.0 $\alpha_{transchile}$ (recting intermedias (m) 0.3 0.7 9.0 6.0 9.0 9.0 $\alpha_{transchile}$ (recting intermedias (m) 0.3 0.3 0.1 0.3 9.0 9.0 $\alpha_{transchile}$ (recting intermedia 0.3 0.3 0.3 9.0 9.0 9.0 9.0 $\alpha_{transchile}$ (recting intermedis (m) 0.3 0.3 <td>otokunstorius de thromae (Am)</td> <td>2.0</td> <td>31.0</td> <td>193.7</td> <td>63.3</td> <td>2.0</td>	otokunstorius de thromae (Am)	2.0	31.0	193.7	63.3	2.0
$a_{\rm arr}$ unright (b) 3.0 67.3 49.7 5.0 $II (roy haves boldy at (P) 1.3 7.3 49.7 5.0 II (roy haves boldy at (P) 1.3 7.3 26.7 5.0 II (roy haves boldy at (P) 1.3 0.7 9.0 6.0 8.0 art hold at et rive 1.3 0.7 9.0 6.0 8.0 plow (argit (I (roy min (P)) 3.3 0.7 9.0 9.0 8.0 plow (argit (I (roy may (P)) 3.3 0.3 3.0 9.0 9.0 9.0 plow (argit (I (roy may (P)) 0.3 3.0 9.0 9.0 9.0 9.0 plow (argit (I (roy may (P)) 0.3 3.1 11.0 0.3 11.0 11.0 ary (archy (argit (roy)) 0.3 0.3 3.7 11.0 11.0 11.0 ary (archy (a roy)) 0.3 0.3 0.3 0.3 11.0 11.0 12.0 ary (archy (a roy)) 0.3 0.3 0.3 0.3 13.0 14.0 ary (archy (a roy)) 0.3 0.3$	untholymustorius rillei (Am)	28.7	59.3	4.7	10.0	3.0
$(o_1^{A_{11} v_{12} v_{22} v_{13})$ $(o_1^{A_{11} v_{23} v_{22}, (v))$ $(o_1^{A_{12} v_{23} v_{23}, (v))$ $(o_1^{A_{12$	nur wirisbilis (M)	3.0	67.3			4.0
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	ior hunes bombur (P)	1.3	7.3	49.7	3.0	5.0
$ \begin{array}{ccccccc} mtholaustorius (\mathbf{Am}) & 17.3 & 17.3 & 7.0 \\ mtholaustorius intermedius (\mathbf{Am}) & 1.3 & 0.7 & 9.0 & 6.0 & 8.0 \\ mtholaustorius quisticornis (P) & 3.3 & 0.3 & 0.0 & 10.0 \\ mtholaustorius quisticornis (P) & 3.1 & 0.1 & 0.3 & 11.0 \\ mtholaustorius quistance (\mathbf{Am}) & 0.3 & 0.3 & 0.1 & 0.1 & 0.1 \\ mtholaustorius quistance (\mathbf{Am}) & 0.3 & 0.1 & 0.1 & 0.1 & 0.1 \\ mtholaustorius quistance (\mathbf{Am}) & 0.3 & 0.3 & 0.1 & 0.1 & 0.1 \\ mtholaustorius quistance (\mathbf{Am}) & 0.3 & 7.0 & 9.0 & 4.0 & 12.0 \\ mtholaustorius quistance (\mathbf{Am}) & 0.3 & 7.0 & 0.3 & 11.0 & 0.1 & 11.0 \\ mtholaustorius quistance (\mathbf{Am}) & 0.3 & 7.0 & 0.1 & 0.1 & 11.0 \\ mtholaustorius quistance (\mathbf{Am}) & 0.3 & 7.0 & 0.1 & 0.1 & 11.0 \\ mtholaustorius quistance (\mathbf{Am}) & 0.3 & 7.0 & 0.1 & 0.1 & 11.0 & 11.0 \\ mtholaustorius quistance (\mathbf{Am}) & 0.3 & 7.0 & 0.1 & 0.1 & 11.0 & 11.0 & 11.0 \\ mtholaustorius quistance (\mathbf{Am}) & 0.1 & 0.1 & 0.1 & 0.1 & 11.0$	11 in 3 B. (M)		3.3	26.7	16.7	6.0
htys ricta (P) 1.3 0.7 9.0 6.0 8.0 $set conta partitionamis (P)$ 3.0 9.0 6.0 3.0 9.0 $set conta partitionamis (P)$ 3.1 3.0 9.0 4.0 11.0 $set set conta (M)$ 0.3 11.0 0.3 11.0 11.0 $rowis fulgens (P)$ 0.3 3.7 13.0 9.0 6.7 13.0 $set set new (M)$ 0.3 7.0 3.7 14.0 13.0 $set set new (M)$ 0.3 7.0 3.7 14.0 15.0 $set set new (M)$ 0.3 7.0 3.7 14.0 15.0 $set visition for the set (M)$ 1.3 3.3 3.7 14.0 $set visition for the set (M)$ 1.3 3.3 3.7 14.0 $set a under (M)$ 1.3 3.3 3.7 14.0 16.0 $set a under (M)$ 1.3 3.3 2.3 14.0 16.0 17.0 $kinown Polycostere PIS 1.3 3.3 2.3 0.7 2.3 17.0 kino$	unthohaustorius intermedius (Am)			17.3		7.0
$ \begin{array}{cccccc} gelowing quillicornis (P) & 1.0 & 0.0 & 0.0 & 0.0 \\ nebelicium americanum (Am) & 0.3 & 0.3 & 0.1 & 0.0 & 11.0 & 0.1 & 0.1 & 11.0 & 0.1 & 0.1 & 11.0 & 0.1 & 11.0 & 0.1 & 11.0 & 0.1 & 11.0 & 0.1 & $	rhtus ricta (P)	1.3	0.7	0.6	6.0	8.0
$w_{i}elidium umericanum (Am)$ 0.3 9.0 4.0 10.0 w_{i} x x rink or is iterated (Am) 6.7 3.7 1.3 11.0 w_{i} x x rink or is iterated (Am) 6.7 3.7 1.3 12.0 w_{i} x y state (Am) 6.7 3.7 1.3 12.0 w_{i} register (Am) 6.7 3.7 1.3 12.0 w_{i} register (Am) 0.3 7.0 3.7 1.3 12.0 w_{i} register (Am) 0.3 7.0 3.7 1.3 12.0 w_{i} register (Am) 0.3 7.0 3.7 1.4 12.0 w_{i} register (Am) 0.3 3.3 3.7 14.0 15.0 w_{i} register (Am) 0.3 3.3 3.7 14.0 15.0 w_{i} register (Am) 0.3 3.3 3.3 14.0 15.0 w_{i} register (Am) 0.3 3.3 3.3 14.0 15.0 w_{i} register (Am) 0.3 3.3 2.3 15.0 15.0 w_{i} register (Am) 1.3 1.3 2.3	geloni papillicornis (P)	3.3	3.0	6.0	3.0	0.6
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	nchelidium umericanum (Am)	0.3		9.0	4.0	10.0
raonis fulgens (P) 6.7 3.7 1.3 12.0 guras longicarpus (D) 6.7 1.3 1.3 13.0 guras longicarpus (D) 0.3 7.0 3.7 14.0 guras undet. 0.3 7.0 3.7 14.0 macea undet. 0.3 7.0 3.7 14.0 thypervia parkori (Am) 1.3 3.3 2.3 16.0 thypervia parkori (Am) 1.3 3.3 2.3 16.0 antenhaustoriue sp. (Am) 1.3 3.3 2.3 19.0 known Polychaste $Plis$ 1.3 0.7 2.3 19.0 known Polychaste $Plis$ 1.3 0.7 2.3 19.0 known Polychaste $Plis$ 1.3 0.7 2.3 20.0 known Polychaste $Plis$ 1.3 0.7 2.3 20.0 known Polychaste $Plis$ 0.7 2.3 0.7 2.3 known Polych	se aprilas eristamas (Am)			11.0	0.3	11.0
yurus longicurpus (D) atviscinoptidae A (Am) atviscinoptidae A (Am) atvisci	raonis fulgens (P)	6.7		3.7		12.0
atylischnopldae A (Am) 0.3 3.7 3.7 14.0 access undet. 7.0 3.3 3.3 5.0 15.0 thyperscar in the transmission of transmissi transmission of transmission of transmission	gurue longicarpue (D)			6.7	1.3	13.0
acces undet. 7.0 15.0 thypervis parker (Am) 1.3 3.3 2.3 15.0 arch bluetories sp. (Am) 1.3 3.3 5.0 17.0 arch bluetories sp. (Am) 1.3 3.3 5.0 17.0 arch bluetories sp. (Am) 1.3 3.3 5.0 17.0 arch bluetories sp. (Am) 1.3 0.7 1.3 19.0 arch a stange (1) 1.3 0.7 1.3 20.0 meetia (undet.) 1.3 0.7 2.3 20.0 irrid-tea stange (1) 2.3 0.7 21.0 meetia (undet.) 2.3 0.7 2.3 20.0 irrid-tea stange (1) 2.3 0.7 2.3 20.0 arcia (Undet.) 2.3 0.7 2.3 20.0 arcia (Undet.) 2.3 2.3 2.3 2.3 arcia stander (P) 1.0 1.0 2.3 2.3	latyischnopidae A (Am)	0.3		3.7	3.7	14.0
thypureia parkeri (Am) 1.3 3.3 2.3 16.0 archebaustorius sp. (Am) 1.3 3.3 2.3 16.0 archebaustorius sp. (Am) 1.3 3.3 2.3 17.0 archebaustorius sp. (Am) 1.3 0.7 12.0 18.0 $ploselopicates fls 1.3 0.7 1.3 19.0 ploselopicates fls 1.3 0.7 2.3 19.0 ploselopicates flas 1.3 0.7 2.3 20.0 mettina (undet.) 1.3 0.7 2.3 21.0 metea C (Undet.) 2.3 0.7 2.3 20.0 (inid-trea stends (1)) 2.3 0.7 21.0 23.0 (inid-trea stends (1)) 2.3 0.7 2.3 23.0 (inid-trea stends (1)) 1.0 1.0 2.3 23.0 (inid-trea stends (1)) 1.0 1.0 2.3 23.0 (inid-trea stends (1)) 1.0 1.0 2.3 2.3 (inid-trea stends (1)) $	macea undet.		7.0			15.0
arthubauetoriue sp. (Am) 5.0 17.0 4.0 18.0 known Polychaete 15 4.0 18.0 4.0 18.0 known Polychaete 15 4.0 18.0 4.0 18.0 1.7 2.3 19.0 19.0 1.3 0.7 1.3 0.3 20.0 mertinal (under.) 2.1 0.3 21.0 2.3 22.0 2.1 0.2 2.3 22.0 2.1 0.2 2.3 22.0 2.1 0.2 2.3 22.0 2.1 0.2 2.3 22.0 2.2 2.3 22.0 2.1 0.2 2.3 22.0 2.2 2.3 22.0 2.2 0.0 2.2 2.3 2.3 22.0 2.2 0.0 2.2 2.3 2.3 22.0 2.2 0.0 2.2 2.3 2.3 2.3 22.0 2.2 0.0 2.2 2.3 2.3 2.3 22.0 2.2 0.0 2.2 2.3 2.3 2.3 22.0 2.2 0.0 2.2 2.3 2.3 2.3 2.3 2.3 2.3 2.3 2.3 2.3	thyporeid parkers (Am)	1.3	3.3	2.3		16.0
known Polychaete #15 4.0 18.0 Thomary Contropions fragilis (P) 1.7 2.3 19.0 Thomary Contropions fragilis (P) 1.3 0.7 1.3 20.0 Thomary Contropions fragilis (P) 1.3 0.7 1.3 20.0 Thomary Contropions 1.3 0.7 1.3 0.7 21.0 Thomary Contropions 2.3 2.3 20.0 23.0 Thomary Contropions 2.3 2.3 23.0 23.0 Thomary Contropions 1.0 1.0 2.3 23.0 Thomary Contropions 1.0 1.0 2.3 23.0	anthohaustorius sp. (Am)				5.0	17.0
The wellow logicle fragilis (P) 1.7 2.3 19.0 mertina (undet.) 1.3 0.7 1.3 0.3 20.0 miniclea stemps (1) 2.3 0.7 2.3 21.0 marea (1 undet.) 2.3 0.7 2.3 21.0 marea (2 (undet.) 2.3 2.3 23.0 civita lateratis (M) 1.0 1.0 2.3 23.0 civita lateratis (M) 1.0 1.0 23.0 archiver (P) 1.0 1.0 25.5	known Polychaete #15				4.0	18.0
mertina (undeč.) [1.3] 0.7 1.3 0.3 20.0 irriditea stemurs (1) 2.3 0.7 21.0 macea (Undec.) 2.3 2.1 21.0 irridita Literatina (H) 1.0 1.0 2.3 23.0 activata Literatina (H) 1.0 1.0 1.0 25.5 narie activatorite (D) 1.0 1.0 25.5	rleserlories frazilis (P)			1.7	2.3	19.0
irid-treastormanys (1) 2.3 0.7 21.0 21.0 2.3 marces (1 (Indet.) 2.3 23.0 23.0 23.0 23.0 23.0 23.0 23.0	mertina (undet.)	1.3	0.7	1.3	0.3	20.0
maces C (Undet.) 2.3 23.0 definit Lateralia (M) 2.3 23.0 get Construction (D) 1.0 1.0 23.0 23.0 23.0 1.0 1.0 23.0 23.0 23.0 25.5	itridited stones (1)			2.3	0.7	21.0
cinic lateralis (M) 2.3 23.0 gelova resea (P) 1.0 1.0 23.0 artiss alcharmetris (D) 1.0 25.5	macea (Undet)			2.3		23.0
23.0 1.3 2.0 2.3.0 2.3.0 2.5.5 1.0 1.0 2.5.5 1.0 2.5.5	(M) ALTERITA (M)				2.3	23.0
ani basa defaueranterris (D) 1.0 1.0 25.5	(P) Prise (P)	1.0		1.3		23.0
	writes alreaternstris (D)			1.0	1.0	25.5

B2

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	FAL.	UINTER	SPRINC	CINNED	OVEPALT
SPECIES	1977	1978	1978	1978	RANK
		1	100		
	, ,		Incl		
Renilla reniformis (Cn)			0.3	0.7	27.0
Gastrosaccus johnsoni (My)				1.3	31.0
Leptograths caeca (T)		1.0	0.3		31.0
Lovenella gracilis (Cn)		1.3			31.0
Terebra dislocata (M)				1.3	31.0
Tharyz marioni (P)	0.3			1.0	31.0
Unknown Polychaete #2	1.3				31.0
Unknown Polychaete #14	0.3		1.0		31.0
Parahaustorius longimerus (Am)	0.3	0.7			35.5
Glucera dibranchiata (P)			0.3	0.7	35.5
Microprotopus rangui (Am)			0.7		38.0
Heteromostus filiformis (P)		0.7			38.0
Eteme heteronoda (P)		0.7			38.0
Coronhium tuberculatum (Am)			0.3	0.3	40.0
Trochupeneus constructus (D)			•	C 0	50.0
Disadactulus mellitae (D)				0.1	20-02
Roton nathaninensis (Am)			0.3		50.0
Erichthomius brasiliensis (Am)			0.1		50.0
Motomisia munda (Mv)				5 0	0.05
Anninue donnogaus (1)					0.03
firthedia under	0.3				50.0
Turbellaria 80.	1		0.3		50.0
Mollita animoniesperforata (E)				0.3	50.0
Anachis obesa (M)				0.3	50.0
Nassarius trivittatus (M)				0.3	50.0
Tellina alternata (M)	0.3				50.0
Pelecypoda (M)			0.3		50.0
Nucula sp. (M)			0.3		50.0
Olividae (undet.) (M)			0.3		50.0
Dispio uncinata (P)	0.3				50.0
Polydora wehsteri (P)	0.3				50.0
Spio pettiboneae (P)	0.3				50.0
Ampharete americana (P)			0.3		50.0
			<u>1502</u>		
Acanthohaustorius millsi (Am)	219.3	17.3			1.0
Spiophanes bombyz (P)		94.3	96.0	8.7	2.0
Donar variabilis (M)	33.7	60.3			3.0
Scolelepis squamata (P)	0.3	39.0			4.0
Bathyporeia parkeri (Am)	2.3	25.0			0.5
Protohaustorius deichmannae (Am)	9.3	4.3	9.3	3.0	6.0
Tellina sp. (M)			13.3	8.0	7.0
Rhepozynius epistomus (Am)		4.3	14.3	2.3	8.0
Oweria fusiformis (P)		0.3	19.0	0.3	0.6
			•	1.11	0.01
		(Continued)			

B3

	FALL	WINTER	SPRING	SUMMER	OVERALL
SPECIES	1977	1978	1978	1978	RANK
			02		
Batea catharinensis (An)			15.3		11.0
Microprotopus raneyi (Am)			13.7	0.3	12.0
Nemertina (undet.)	0.3	10.3	1.3	0.3	13.0
Magelona papillicornis (P)	3.0	3.7	c u	J./	14.0
rtatylscnnoptage A (Au)		0.2			16.0
Metrumsidonsis munda (Mv)			2.4	0.8	17.0
Synchelidium americanum (Am)	0.7	0.7	2.3	3.3	18.0
Lovenella gracilis (Cn)		6.7			19.5
Nephtys picta (P)	1.0	0.7	3.3	1.7	19.5
Haploscoloplos fragilis (P)		0.7	1.3	4.3	21.0
Cucumaria sp. (E)			6. 0		22.5
Thyone ap. (E)	r		0.0		C.22
Paraonis Juigens (P)	0.1		-	7 5	24.0
mentica renejormeta (un) m.iiiwa altamata (w)		1.1 5 3	C • 7		0.45
Commission tuberouloting (Am)		· · ·	c v		27.0
Anadama ovalis (M)			4.3	0.7	28.0
linknown Polychaete #14			6.4		29.5
Ampharete americana (P)			4.3		29.5
Mitrella lunata (M)			4.0		31.0
Chimidotea stenops (1)	2.0	1.7			32.0
Parahaustorius longimerus (Am)	2.7	0.7			33.0
Mysidopsis bigelowi (My)			0.3	3.0	34.5
Unknown Bivalve #1 (M)		3.3			34.5
Glycera dibranchiata (P)			2.0	0.7	36.0
Mellita quinquiesperforata (E)		1.3	1.0		37.5
Ensis sp. (M)		1.0	1.0	0.3	37.5
Cryurostylis smithi (C)		1.0	1.0		39.5
Mytilidae undet. (M)		,	2.0	r •	39.5
ugymaes appraerostris (D)	~ ~	. n		1./	41.0
Ancinus defressus ([] Molaula membattanaia (1)	C.V	C • T	r +	0.0	0.74
molgula manuallensis (A) Mediomostus californiensis (D)			1.7		44.0
Clumenella tonguata (P)			1.7		0.44
Dispio uncinata (P)	0.3			1.3	0.044
Acetes americanus (D)				1.3	48.5
Acanthoheustorius intermedius (Am)		1.3			48.5
Leptogratha caeca (T)		1.3		•	48.5
Levenna auguocata (M)		1.0		0.5	5 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1
callianasidae under. (D) Unciola Rernata (Am)			0.7	1.0	56.5
Parapleustes aestuarius (Am)				0.7	56.5
Sthenelais boa (P)			0.7		56.5

(Continued)

B4

SPECIES 1977 1978	SPECIES 997 997 993 993 993 993 993 Sub-Litatic and partie<(f) 1982 193 193 193 193 193 Sub-Litatic and partie<(f) 193 193 193 193 193 193 193 Sub-Litatic and partie<(f) 193 0.1 0.1 0.1 193 553 Struct more regional (f) 193 0.1 0.1 0.1 553 553 Struct more (f) 193 0.1 0.1 0.1 553 553 Struct more (f) 0.1 0.1 0.1 0.1 553 553 Struct more (f) 0.1 0.1 0.1 0.1 553 553 Struct more (f) 0.1 0.1 0.1 0.1 553 553 Struct more (f) 0.1 0.1 0.1 0.1 0.1 553 Struct more (f) 0.1 0.1 0.1 0.1 0.1 553	eber I ee	1977	1978	1078	1978	RANK
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	International (i) 0.1	3150163	1167		710	>	
Mile 10.7 0.7 0.7 Strinteries may of (n) 0.7 0.7 0.7 Strinteries (n) 0.7	Mile Mile <th< td=""><td></td><td></td><td></td><td></td><td></td><td></td></th<>						
$ \begin{array}{c} \label{eq:constraints} shell starts unly are (p) \\ \model{eq:constraints} shell starts a magnet (p) \\ \model{eq:constraints} (p) \\ \model{eq:constraints}$	$ \begin{array}{cccccccccccccccccccccccccccccccccccc$			HSO	2		
$ \begin{array}{c} 0.1 \\ 0.1 $	$ \begin{array}{c} \operatorname{constraint} \operatorname{rel} \left(\mathbf{u} \right) \\ \operatorname{constraint} \left(\mathbf{u} \right) $					0.7	56.5
Contractioners (a) 0.1 Constructioners (b) 0.1 Marker (c) 0.1	$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	Sabellaria vulgaris (P)				0.7	56.5
Californic for form whereasts (f) 0.1 0.1 Californic for functions (f) 0.1 0.1 0.1 Playing form spect (f) Playing (f) 0.1 0.1 0.1 Playing form spect (f) Playing (f) 0.1 0.1 0.1 0.1 Playing form spect (f) Playing (f) 0.1 </td <td>$\begin{array}{cccccc} a_{12} (w_{12} w_{13} (w_{12}) (w_{12} (w_{12} (w_{12}) (w_{12} (w_{12}) (w_{12} ($</td> <td>(A) putitus statistic little</td> <td></td> <td>10</td> <td></td> <td></td> <td>56.5</td>	$ \begin{array}{cccccc} a_{12} (w_{12} w_{13} (w_{12}) (w_{12} (w_{12} (w_{12}) (w_{12} (w_{12}) (w_{12} ($	(A) putitus statistic little		10			56.5
$ \begin{array}{ccccc} & 0, & 0, & 0, \\ & Maria sp. (1) & 0, & 0, \\ & Maria sp. (2) & 0, & 0, \\ & Maria sp. (2) & 0, & 0, \\ & Maria sp. (2) & 0, & 0, \\ & Maria sp. (2) & 0, & 0, \\ & Maria sp. (2) & 0, & 0, \\ & Maria sp. (2) & 0, & 0, \\ & Maria sp. (2) & 0, & 0, \\ & Maria sp. (3) & 0, & 0, \\ & Maria sp. (4) & 0, & 0, \\ &$	$ \begin{array}{cccc} (1) & (2) & ($	Eterne heteropoda (P)			0.7		56.5
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	Nigates ap. (1) 0.1 0.1 0.1 0.1 Nigates 0.1 0.1 0.1 0.1 0.1 Life ican encrythants (1) 0.1 0.1 0.1 0.1 Life ican encrythants (1) 0.1 0.1 0.1 0.1 0.1 Applican encrythants (1) 0.1 0.1 0.1 0.1 0.1 Applican encrythants (1) 0.1 0.1 0.1 0.1 0.1 Applicant encrythants (1) 0.1 0.1 0.1 0.1 0.1 0.1 Prediperate encrythants (1) 0.1	Cauterrella Killariensis (P)			1 1		56.5
$ \begin{array}{cccccc} M_{14}(m) & m & m & m & m \\ M_{14}(m) & m & m & m & m & m \\ M_{14}(m) & m & m & m & m & m & m \\ M_{14}(m) & m & m & m & m & m & m \\ M_{14}(m) & m & m & m & m & m & m \\ M_{14}(m) & m & m & m & m & m & m & m \\ M_{14}(m) & m & m & m & m & m & m & m & m \\ M_{14}(m) & m & m & m & m & m & m & m & m & m \\ M_{14}(m) & m & m & m & m & m & m & m & m & m &$	$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	Nerets sp. (P)					56.5
Age (constraints) 0.3 <td>Matrix matrix (1) 0.3 0.3<td>Polydom sp. (P)</td><td></td><td></td><td></td><td></td><td>56.5</td></td>	Matrix matrix (1) 0.3 <td>Polydom sp. (P)</td> <td></td> <td></td> <td></td> <td></td> <td>56.5</td>	Polydom sp. (P)					56.5
Material and particular (1) 0.3 0.3 Material and particular (1) 0.3 0.3 Mathema experiment (1) 0.3 0.3 Mathema expression 0.3 0.3 Mathema expressic 0.3 0.3	$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	Mayelona rusua (P)				Ē	61.5
Agartiant Martiant Martiant <t< td=""><td>Wardfann say fry (n) Ar fann say fry (n) Py (fok) - manue (n) Py (fok</td><td>Libinia emargenata (D)</td><td>, ,</td><td></td><td></td><td></td><td>61.5</td></t<>	Wardfann say fry (n) Ar fann say fry (n) Py (fok) - manue (n) Py (fok	Libinia emargenata (D)	, ,				61.5
$ \begin{array}{c} \label{eq:constraints} \mbox{marries} (1) \\ \mbox{figures interviews} (2) \\ figu$	$M_{articles}$ (marks) (1) $M_{articles}$ (1) $M_{articles}$ (1) $M_{articles}$ (1) $M_{articles}$ (marks) (10) $M_{articles}$ (1) $M_{articles}$ (1) $M_{articles}$ (1) $M_{articles}$ (marks) (10) $M_{articles}$ (1) $M_{articles}$ (1) $M_{articles}$ (1) $M_{articles}$ (marks) (10) $M_{articles}$ (1) M	Mysidacea	0.9				61.5
$ \begin{array}{c} Py_{1}(bdore, arrear, (p)) \\ Py_{2}(bdore, (p)) $	The fit follow team (0) </td <td>Apanthura magnifica (1)</td> <td></td> <td></td> <td></td> <td></td> <td>5 69</td>	Apanthura magnifica (1)					5 69
$\begin{array}{c} Transfurences constructus (0) \\ Transfurences constructus (0) \\ Transfurences constructus (0) \\ Transfurences (0) \\ Tra$	$\begin{array}{cccccc} Provent relation (1) \\ Provent relation (2) \\ Provent re$	Fhyllodore aremie (P)			r.v		5.08
$ \begin{array}{cccc} Qyrides (lowicola (0) \\ Qyrides (lowicola (0) \\ Passolarylas melitae (0) \\ Passolarylas meritae (1) \\ Passolarylas metea (1) \\ Passolarylas (1) \\ Passolaryla$	Querides l'aricola (0) 0.3 0.3 0.3 Revenue l'iter (1) 0.3 0.3 0.3 0.3 Praira.itriter (1) 0.3 0.3 0.3 0.3 0.3 Praira.itriter (1) 0.3	Trachypeneus constrictus (D)					
Exervance fractione (0) 0.3 Exervance (1) 0.3 Previous (my)curve (0) 0.3 Previous (1) 0.3 Exercise (1) 0.3 Scecegoense	$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	(gyrides limicola (D)			, ,	c.0	
Equarks lowishing (0) (0) Equarks lowishing (0) (0) (0) Firstian aristing (0) (0) (0) Firstian striktur (0) (0) (0) Firstian striktur (0) (0) (0) Extrictla harmardi (m) (0) (0) Listricilla harmardi (m) (0) (0) Lastoscons johnsoni (0) (0) (0) Linelia mutica (m) (0) (0) (0) Linelia mutica <td>Figural Complicatives (0) 0.3 0.3 0.3 Figural Complications (0) 0.3 0.3 0.3 0.3 Finitial Criteria (1) 0.3 0.3 0.3 0.3 0.3 Finitial Criteria (1) 0.3 0.3 0.3 0.3 0.3 0.3 Finitial Criteria (1) 0.3 0.3 0.3 0.3 0.3 0.3 0.3 Finitial Criteria (1) 0.3<td>Eucernmus fruelonique (D)</td><td></td><td></td><td></td><td></td><td></td></td>	Figural Complicatives (0) 0.3 0.3 0.3 Figural Complications (0) 0.3 0.3 0.3 0.3 Finitial Criteria (1) 0.3 0.3 0.3 0.3 0.3 Finitial Criteria (1) 0.3 0.3 0.3 0.3 0.3 0.3 Finitial Criteria (1) 0.3 0.3 0.3 0.3 0.3 0.3 0.3 Finitial Criteria (1) 0.3 <td>Eucernmus fruelonique (D)</td> <td></td> <td></td> <td></td> <td></td> <td></td>	Eucernmus fruelonique (D)					
Pissodartytas wellitor (1) Pissodartytas wellitor (1) Pinniza cristata (1) Finniza cristata (1) Constares undet: Finniza cristata (1) Constares undet: Finniza cristata (1) <td>Pissodarylas mellifar (n) 0.3 0.3 0.3 Pissodarylas mellifar (n) 0.3 0.3 0.3 Commens ep. (an) 0.3 0.3 0.3 0.3 Commens ep. (an) 0.3 0.3 0.3 0.3 0.5 Commens ep. (an) Listrefacturat frinker (n) 0.3 0.3 0.3 0.3 0.3 0.3 0.5 Listrefacturat strinker (n) 0.3 0.3 0.3 0.3 0.3 0.3 0.3 0.5 Caters montosa (1) 0.3 0.3 0.3 0.3 0.3 0.3 0.3 0.3 0.3 0.3 0.3 0.3 0.5 0.3 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.3 0.5</td> <td>Progurus longicarpus (D)</td> <td></td> <td></td> <td>0.3</td> <td></td> <td></td>	Pissodarylas mellifar (n) 0.3 0.3 0.3 Pissodarylas mellifar (n) 0.3 0.3 0.3 Commens ep. (an) 0.3 0.3 0.3 0.3 Commens ep. (an) 0.3 0.3 0.3 0.3 0.5 Commens ep. (an) Listrefacturat frinker (n) 0.3 0.3 0.3 0.3 0.3 0.3 0.5 Listrefacturat strinker (n) 0.3 0.3 0.3 0.3 0.3 0.3 0.3 0.5 Caters montosa (1) 0.3 0.3 0.3 0.3 0.3 0.3 0.3 0.3 0.3 0.3 0.3 0.3 0.5 0.3 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.3 0.5	Progurus longicarpus (D)			0.3		
Firmizz cristata (D) Firmizz cristata (D) Firmizz cristata (D) Exprisente sp. (An) Experients and (An) Experients formarie (An) Experients invosus (An) Conserse undet. Conserse undet. Conserse invosus (An) Conserse undet. Conserse invosus (An) Conserse invosus (An) Conserse undet. Conserse invosus (An) <pconserse (an)<="" p=""> <pconserse (<="" td=""><td>Finitizi critetta (b) 0.3 0.3 0.3 Firmitizi e (c) 0.3 0.3 0.3 0.3 Furphens (m) European (1) 0.3 0.3 0.3 0.3 Furphens (m) European (1) 0.3 0.3 0.3 0.3 0.3 European (1) (m) 0.3</td><td>Dissoductylus mellitae (D)</td><td></td><td></td><td>6.0</td><td>, (</td><td></td></pconserse></pconserse>	Finitizi critetta (b) 0.3 0.3 0.3 Firmitizi e (c) 0.3 0.3 0.3 0.3 Furphens (m) European (1) 0.3 0.3 0.3 0.3 Furphens (m) European (1) 0.3 0.3 0.3 0.3 0.3 European (1) (m) 0.3	Dissoductylus mellitae (D)			6.0	, (
(Jarreformer sp. (an)(.3)(Jarreformer sp. (an)(.3)Listreful hurnardi (an)(.3)Listreful hurnardi (an)(.3)Edotea montosa (1)(.3)Edotea montosa (1)(.3)Saccoglossus koasieuskin (1)(.3)Nultina metica (1)(.3)Polinices dariicatus (1)(.3)Polinices dariicatus (1)(.3)Multini deternis (1)(.3)Mutoni deternis (1)(.3)Mutoni deternis (1)(.3)Mutoni deternis (1)(.3)M	Gameras sp. (m) 0.3	Pinniza cristata (D)				0.3	C.U8
Parapharas spinasas (no)0.30.3Listriella harmardi (no)0.30.3Edistrosaceus johnsoni (ny)0.30.3Edistrosaceus johnsoni (ny)0.30.3Edistrosaceus johnsoni (ny)0.30.3Castrosaceus johnsoni (ny)0.30.3Castrosaceus johnsoni (ny)0.30.3Castrosaceus johnsoni (ny)0.30.3Castrosaceus johnsoni (ny)0.30.3Castrosaceus dudet.0.30.3Castrosoficas dudicas (n)0.30.3Nudtbranchts (N)0.30.3Nudtbranchts (N)0.30.3Nudtbranchts (N)0.30.3Nudtbranchts (N)0.30.3Nudtbranchts (N)0.30.3Nuthon Brajee (n)0.30.3Nutsia sp. (P)0.30.3Nutsia sp. (P) <td< td=""><td>$\begin{array}{ccccc} Draptedias stintatis (m) \\ Draptedias stintatis (m) \\ Listricias stintati (m) \\ Editarial Armani (m) \\ Editarial Ramani (m) \\ Editarial Ramani (m) \\ Editarial Ramani (m) \\ Castroscores Johnson (m) \\ Castroscores Johnson (m) \\ Castroscores (m) \\ Castroscore (m) \\ Cas$</td><td>(kurmarus sp. (An)</td><td></td><td></td><td>0.3</td><td></td><td>80.5</td></td<>	$ \begin{array}{ccccc} Draptedias stintatis (m) \\ Draptedias stintatis (m) \\ Listricias stintati (m) \\ Editarial Armani (m) \\ Editarial Ramani (m) \\ Editarial Ramani (m) \\ Editarial Ramani (m) \\ Castroscores Johnson (m) \\ Castroscores Johnson (m) \\ Castroscores (m) \\ Castroscore (m) \\ Cas$	(kurmarus sp. (An)			0.3		80.5
Listriella harmardi (An) Listriella harmardi (An) Edotea montosa (1) Canatrosacus (n) Canatrosacus (n) Canatrosacus (n) Remipholis elongata (E) Hemipholis elongata (E) Hemipholis elongata (E) Remipholis elongata (E) Remipholis elongata (E) Remipholis elongata (E) Remipholis elongata (E) Nudthore duplicatus (H) Nuthor Blateratis (H) Mainon Blateratis (H) Mutor Blateratis (H) Mu	Listric/L3 harmardi (m) 0.3 0.3 0.3 0.3 Gastrosarcus (harmardi (w)) 0.3 0.3 0.3 0.3 0.3 Gastrosarcus (harmardi (w)) Gastrosarcus (harmardi (w)) 0.3 0.3 0.3 0.3 Gastrosarcus (harmardi (w)) Gastrosarcus (harmardi (w)) 0.3 0.3 0.3 0.3 Gastrosarcus (harmardi (w)) Gastrosarcus (harmardi (w)) 0.3 0.3 0.3 0.3 Gastrosarcus (harmardi (h)) Saccogless (constra (h)) 0.3 0.3 0.3 0.3 0.5 Nuclerancha (h) Nuclerati (h) 0.3 0.3 0.3 0.3 0.3 0.5 Notice (are dir (icus (h)) Nuclerati (h) 0.3 0.3 0.3 0.3 0.5 Notice (are dir (icus (h)) Nuclerati (h) 0.3 0.3 0.3 0.5 0.5 Nativic (are dir (icus (h)) Nuclera (h) 0.3 0.3 0.3 0.3 0.5 Nativic (are dir (icus (h)) Nuclera (h) 0.3 0.3 0.3 0.5 0.5 Nuclera (h) Nuclera (h) <td< td=""><td>Paruphozus spinosus (Am)</td><td></td><td></td><td>0.3</td><td></td><td>50.5</td></td<>	Paruphozus spinosus (Am)			0.3		50.5
Edotea montoni (1) 0.3	Educar mentosi (1) 0.3 <	Listriella harmardi (Am)				0.3	80.5
Gastrosaccus joinsent (M)0.30.3Gastrosaccus joinsent (M)0.30.3Remipholis elongata (E)0.30.3Remipholis elongata (E)0.30.3Remipholis elongata (E)0.30.3Saccoglossus koulevskii (H)0.30.3Nudtharnchia (M)0.30.3Nudtharnchia (M)0.30.3Nudtharnchia (H)0.30.3Nudtharnchia (H)0.30.3Nudtharnchia (H)0.30.3Nudtharnchia (H)0.30.3Polinices daplicatus (M)0.30.3Multinic latentis (H)0.30.3Nuture sp. (M)0.30.3Nurdas p. (M)0.30.3Nurdas p. (M)0.30.3Nurdas p. (H)0.30.3Nurdas p. (P)0.30.3Nurdas p. (P)0.30.3Nurdas p. (P)0.30.3Nurdica sp. (P)0.3<	Gastrosaccus joinsoni (Ny) 0.3 0.3 0.3 0.5 $Gastrosaccus$ joinsoni (Ny) 0.3 0.3 0.3 0.5 $Hamipolis elongata (E)$ $Gastrosaccus (N)$ 0.3 0.3 0.5 $Hamipolis elongata (E)$ $Gastrosaccus (N)$ 0.3 0.3 0.3 0.5 $Saccejloses koalenskii (H)$ $Gastrosaccus (N)$ 0.3 0.3 0.5 0.5 $Saccejloses koalenskii (H)$ $Gastrosaccus (N)$ 0.3 0.3 0.5 0.5 $Saccejloses koalenskii (H)$ $Haitic (I)$ $Gastrosacus (N)$ 0.3 0.3 0.5 $Sacsacis trivitatus (N)$ $Maitic (I)$ $Gastrosacus (I)$ 0.3 0.3 0.5 $Maitrik (I)$ $Maitic (I)$ $Gastrosacus (I)$ $Gastrosacus (I)$ 0.3 0.3 0.5 $Maitrik (I)$ $Maitrik (I)$ $Gastrosacus (I)$	Edotea montosa (1)			0.3		80.5
Cumaces undet.0.3Remtipolis elongata (E)0.3Remtipolis elongata (E)0.3Remtolia (N)0.3Nudlbarnchia (N)0.3Nudlbarnchia (N)0.3Nudlbarnchia (N)0.3Nudlbarnchia (N)0.3Nudlbarnchia (N)0.3Nudlbarnchia (N)0.3Polinices darlicatus (N)0.3Nutinic lateralis (N)0.3Nutinic lateralis (N)0.3Nutinic lateralis (N)0.3Nutudae (undet.) (N)0.3Nutudae (undet.) (N)0.3Nutute a spiriformis (P)0.3Nutute lateromatus filiformis (P)0.3Nutute a spiriformis (P)0.3Nutute a spiriformis (P)0.3Nutute a spiriformis (P)0.3Nutute a spiriformis (P)0.3Nutute (P)0.3Nutute a spiriformis (P)0.3Nutute (P)0.3<	Cuasces undet. 0.3 0.3 0.3 0.3 0.3 0.5	Gastrosaccus johnsoni (My)				0.3	80.5
Hemirholis elengata (E) Saccoglossus kovalevskii (H) Saccoglossus kovalevskii (H) Saccoglossus kovalevskii (H) Olivella maiza (M) Polinice durlicatus (M) Massarius trivittatus (M) Massarius trivittatus (M) Massarius trivittatus (M) Massarius trivittatus (M) Massarius trivittatus (M) Massarius trivittatus (M) Maturiz ap. (M) Mucula sp.	Hemipholis elongata (E) 0.3 0.5	Cumacea undet.		0.3			80.5
Saccogloseus kohalevskii (H) Nudibranchia (M) Nudibranchia (M) Nudibranchia (M) Nudibranchia (M) Polinica darkicatus (M) Massarius trivittatus (M) Massarius trivittatus (M) Massarius trivittatus (M) Maturia stvalve H3 (M) Turbovi Blas (M) Nucuda sp. (M) Nucuda sp. (M) Nucuda sp. (M) Nucuda sp. (M) Nucuda sp. (P) Travisia sp. (P) Travis	Saccyloseus koulereskii (H) 0.3 0.3 0.5 Nudbrancha (M) Nudbrancha (M) 0.3 0.3 0.5 Nudbrancha (M) 0.3 0.3 0.3 0.5 Poliniela dupicatus (M) 0.3 0.3 0.3 0.5 Poliniela dupicatus (M) 0.3 0.3 0.3 0.5 Multini lateralia (M) 0.3 0.3 0.3 0.5 Multini lateralia (M) 0.3 0.3 0.3 0.5 Nuchoni la ve (H) 0.3 0.3 0.3 0.5 Nucuda sp. (H) 0.3 0.3 0.3 0.3 0.5 Nucuda sp. (H) 0.3 0.3 0.3 0.3 0.5 Nucuda sp. (P) 0.3 0.3 0.3 0.5 0.5	Hemirholis elonyata (E)			0.3		80.5
Nudtbrancha (M)0.3Olivella mutica (M)0.1Olivella mutica (M)0.3Olivella mutica (M)0.3Nassarius trivitatus (M)0.3Multini latentis (M)0.3Multini latentis (M)0.3Mutuda sp. (M)0.3Turbonilla sp. (M)0.3Mutuda sp. (M)0.3Mutuda sp. (M)0.3Nuruda sp. (M)0.3Nuruda sp. (M)0.3Nuruda sp. (M)0.3Nuruda sp. (M)0.3Olividae (undet.) (M)0.3Onitotae spin sp. (P)0.3Onitotae (undet.) (P)0.3Nurusisia sp. (P)0.3Onitotae (undet.) (P)0.3Nurusisia sp. (P)0.3Nurusisia sp. (P)0.3Onitotae (Undet.) (P)0.3Nurusisia sp. (P)0.3	Nudtbranchia (M) 0.3 0.3 0.3 0.5 Olivella matica (M) 0.1 0.3 0.5 0.5 Polivicia matica (M) 0.3 0.3 0.5 0.5 Nationis distribution (M) 0.3 0.3 0.5 0.5 Matinia lateratis (M) 0.3 0.3 0.3 0.5 Mutown Bivalve #13 (M) 0.3 0.3 0.3 0.3 0.5 Mutown Bivalve #13 (M) 0.3 0.3 0.3 0.3 0.5 0.5 Mutown Bivalve #13 (M) 0.3 0.3 0.3 0.3 0.5 0.3 0.5 Mutown Bivalve #13 (M) 0.3 0.3 0.3 0.3 0.3 0.3 0.5 Mutoka (MEL) 0.3 0.3 0.3 0.3 0.3 0.3 0.5 Mutoka (MEL) 0.3 0.3 0.3 0.3 0.3 0.5 Mutoka (MEL) 0.3 0.3 0.3 0.3 0.3 0.5 0.5 0.5 0	Saccoglossus konulevskii (H)			1	0.3	80.5
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	Olivella mutica (M) 0.1 0.3 0.3 0.5 Polinice daplicatus (M) 0.3 0.3 0.5 0.5 Polinice daplicatus (M) 0.3 0.3 0.5 0.5 Polinice daplicatus (M) 0.3 0.3 0.5 0.5 Multinom Bivalve #13 (M) 0.3 0.3 0.3 0.5 Multinom Bivalve #13 (M) 0.3 0.3 0.3 0.5 Multinom Bivalve #13 (M) 0.3 0.3 0.3 0.3 0.5 Mutuda sp. (M) 0.3 0.3 0.3 0.3 0.5 0.5 Mutuda sp. (M) 0.3 0.3 0.3 0.3 0.5 0.5 0.5 Mutuda sp. (P) 0.3 0.3 0.3 0.3 0.5 0.5 Mutuda sp. (P) 0.3 0.3 0.3 0.3 0.5 0.5 Pravisita sp. (P) 0.3 0.3 0.3 0.3 0.5 0.5 Pravisita sp. (P) 0.3 0.3 0.3 0.3 0.5 0.5 Phyllodocidae (undet.) (P) 0.3	Nudibranchia (M)			0.3		80.5
Polinice durficatus (M)Polinice durficatus (M)0.3Massarius trivittatus (M)Massarius trivittatus (M)0.3Mainic lateralis (M)0.30.3Unknown Blvalve B13 (M)0.30.3Turbouilla sp. (M)0.30.3Mucula sp. (P)0.30.3Unknown Blvalve (P)0.30.3Travisia sp. (P)0.30.3Travisia sp. (P)0.30.3Sabelildee (under.) (P)0.3Sabelildee (under.) (P)0.3Sabelildee (under.) (P) <td< td=""><td>Polinices duplicatus (H) 0.3 0.3 0.5 Massarius trivitatus (H) 0.3 0.3 0.5 Maining lateralis (H) 0.3 0.3 0.5 Maining trivitatus (H) 0.3 0.3 0.5 Mutini lateralis (H) 0.3 0.3 0.5 Turbonilla sp. (H) 0.3 0.3 0.3 0.5 Nucula sp. (H) 0.3 0.3 0.3 0.3 0.5 Nucula sp. (H) 0.3 0.3 0.3 0.3 0.5 Nucula sp. (P) 0.3 0.3 0.3 0.3 0.5 Nucula sp. (P) 0.3 0.3 0.3 0.3 0.5 Nucula sp. (P) 0.3 0.3 0.3 0.3 0.5 Pravisition sp. (P) 0.3 0.3 0.3 0.5 0.5 Substructor Polychaete P 0.3 0.3 0.3 0.5 0.5 Phyllodocidae (undet.) (P) 0.3 0.3 0.3 0.3 0.5 Phyllodocidae (un</td><td>Olivella mutica (M)</td><td></td><td></td><td></td><td>0.3</td><td>80.5</td></td<>	Polinices duplicatus (H) 0.3 0.3 0.5 Massarius trivitatus (H) 0.3 0.3 0.5 Maining lateralis (H) 0.3 0.3 0.5 Maining trivitatus (H) 0.3 0.3 0.5 Mutini lateralis (H) 0.3 0.3 0.5 Turbonilla sp. (H) 0.3 0.3 0.3 0.5 Nucula sp. (H) 0.3 0.3 0.3 0.3 0.5 Nucula sp. (H) 0.3 0.3 0.3 0.3 0.5 Nucula sp. (P) 0.3 0.3 0.3 0.3 0.5 Nucula sp. (P) 0.3 0.3 0.3 0.3 0.5 Nucula sp. (P) 0.3 0.3 0.3 0.3 0.5 Pravisition sp. (P) 0.3 0.3 0.3 0.5 0.5 Substructor Polychaete P 0.3 0.3 0.3 0.5 0.5 Phyllodocidae (undet.) (P) 0.3 0.3 0.3 0.3 0.5 Phyllodocidae (un	Olivella mutica (M)				0.3	80.5
Masarius trivittatus (M) Multivia lateralis (M) Multivia stvalve [13] (M) Turbovilla sp. (M) Mucula sp. (M) Mucula sp. (M) Onlividae (undet.) (M) Unknown stval filformis (P) Travisia sp. (P) Travisia sp. (P) Travisia sp. (P) O.3 O.3 O.3 O.3 O.3 O.3 O.3 O.3 O.3 O.3	Massarius trivitatus (M) 0.3 0.3 0.3 0.3 0.3 0.3 0.3 0.3 0.3 0.5 <td< td=""><td>Polinices durlicatus (M)</td><td></td><td></td><td></td><td>0.3</td><td>80.5</td></td<>	Polinices durlicatus (M)				0.3	80.5
Mulinic lateralis (M)Mulinic lateralis (M)0.3Unknown Bivalve #13 (M)Unknown Bivalve #13 (M)0.3Unknown Bivalve #13 (M)0.30.3Mucuda sp. (M)0.30.3Mucuda sp. (M)0.30.3Munown Bivalve #3 (M)0.30.3Unknown Bivalve #3 (M)0.30.3Travisia sp. (P)0.30.3Travisia sp. (P)0.30.3Travisia sp. (P)0.30.3Unknown Polychaete #20.30.3Sabellidee (undet.) (P)0.30.3	Multinic lateratis (M) 0.3	Nassarius trivittatus (M)				0.3	80.5
Unknown Bivalve #13 (M) 0.3 0.3 0.3 Turboni [La sp. (M) 0.3 0.3 0.3 0.3 Turboni [La sp. (M) 0.3 0.3 0.3 0.3 0.1 vidae (undet.) (M) 0.1 vidae (undet.) (M) 0.3 0.3 0.3 0.3 0.3 Travisia sp. (P) 0.3 0.3 0.3 0.3 0.3 Travisia sp. (P) 0.3 0.3 0.3 0.3 Caraptrionespic primata (P) 0.3 0.3 0.3 Caraptrionespic primata (P) 0.3 Carapt	Unknown Bivalve #13 (M) 0.3 0.3 0.3 Turbouil (La sp. (M) 0.3 0.3 0.3 Turdae (M+1) 0.3 0.3 0.3 0.5 Olividae (unet.) (M) 0.3 0.3 0.3 80.5 Olividae (unet.) (M) 0.3 0.3 80.5 80.5 Olividae (under.) (M) 0.3 0.3 80.5 80.5 Travisia sp. (P) 0.3 0.3 0.3 80.5 Travisia sp. (P) 0.3 0.3 0.3 80.5 Pranpriorspic primata (P) 0.3 0.3 80.5 80.5 Sabellidae (under.) (P) 0.3 0.3 0.3 80.5 Phyllodocidae (under.) (P) 0.3 0.3 0.3 80.5	Mulinia lateralis (M)				0.3	80.5
Turbonilla sp. (M)0.30.3Mucula sp. (M)0.30.30.3Mucula sp. (M)0.30.30.3Unknown Bivalve 33 (M)0.30.30.3Reteromatus filiformis (P)0.30.30.3Travisia sp. (P)0.30.30.3Parapriorospic pirmata (P)0.30.3Sabelildee (Indec.) (P)0.30.3	Turbonilla sp. (M) 0.3 0.3 0.3 Mucula sp. (M) 0.3 0.3 0.3 0.3 Mucula sp. (M) 0.3 0.3 0.3 0.3 0.5 Olividae (undet.) (M) 0.3 0.3 0.3 0.3 0.5 Olividae (undet.) (M) 0.3 0.3 0.3 0.3 0.5 Olividae (undet.) (M) 0.3 0.3 0.3 0.3 0.5 Pravisita sp. (P) 0.3 0.3 0.3 0.3 0.3 0.5 Travisita sp. (P) 0.3 0.3 0.3 0.3 0.5 0.5 Travisita sp. (P) 0.3 0.3 0.3 0.3 0.5 0.5 Unknown Polychae tradita (P) 0.3 0.3 0.3 0.3 0.5 0.5 Phyllodocidae (undet.) (P) 0.3 0.3 0.3 0.3 0.3 0.3 0.5 0.5 Sabellidae (undet.) (P) 0.3 0.3 0.3 0.3 0.3 0.3 0.5 0.5	Unknown Bivalve #13 (M)			0.3		5.08
Mucula sp. (H) Onlividae (undet.) (H) Unknown Bivalue # 3 (H) Heteromaatus filiformis (P) Travisia sp. (P) Paraprionespic privata (P) Unknown Polychaete # 2 Sabellidae (undet.) (P) 0.3 0.3 0.3 0.3 0.3 0.3 0.3 0.3	Mucula sp. (H) 0.3	Turbonilla sp. (M)				0.3	C.U0
Olividae (undet.) (M)U.3Unknown Bivalve #3 (M)0.3Unknown Bivalve #3 (M)0.3Reteromatus filiformis (P)0.3Ranapriots (P)0.3Tranisia sp. (P)0.3Unknown Polychaste #20.3Sabellidae (undet.) (P)0.3	011v1dae (undet.) (H) 0.3 0.3 0.3 0.hknown B1valve f) (H) 0.3 0.3 0.3 0.hknown B1valve f) (H) 0.3 0.3 0.3 0.hknown B1valve f) (H) 0.3 0.3 0.3 0.runis as (P) 0.3 0.3 80.5 7rautsia as (P) 0.3 0.3 80.5 Paraprioncepio pinnata (P) 0.3 0.3 80.5 Unknown Polychaete #2 0.3 0.3 80.5 SabellIdae (undet.) (P) 0.3 0.3 0.3 Phyllodocidae (undet.) (P) 0.3 0.3 0.3	Nucula sp. (M)		, ,	0.3		2.00
Unknown Bivalve # 3 (M) Heteromaatus fiiformis (P) Travieia ep. (P) Oranossio finnata (P) Unknown Polychaete # 2 Sabellidae (undet.) (P) 0.3 0.3 0.3 0.3 0.3 0.3 0.3 0.3	Unknown Bivalve #3 (H) 0.3	Ollvidae (undet.) (M)		6.0	~		
Heteromastus filiformis (P) 0.3 Travisia sp. (P) 0.3 Pranprioncspio pinnata (P) 0.3 Unknown Polychaste #2 0.3 0.3 Sabellidee (undet.) (P) 0.3	Heteromastus filiformis (P) 0.3 0.3 Travisia sp. (P) 0.3 0.3 Unknown Polychaetre P3 0.3 0.3 Sabellidae (undet.) (P) 0.3 0.3 Phyllodocidae (undet.) (P) 0.3 0.3	Unknown Bivalve #3 (M)			6.0		00.00
Travisia sp. (P) Paraprionospio pirmata (P) 0.3 0.3 Unknown Polychaste 2 0.3 0.3 Sabelliaes (undec.) (P) 0.3 0.3	Travisia sp. (P) 0.3 0.3 80.5 Pranpriorspic prinata (P) 0.3 0.3 80.5 Unknow Foloschaete #2 0.3 0.3 80.5 Sabellidae (undet.) (P) 0.3 0.3 80.5 Phyllodocidae (undet.) (P) 0.3 0.3 80.5	Heteromastus filiformis (P)		0.3			\$0.5 8
Paraprioncspio pinnata (P) 0.3 Unknown Polychaete #2 0.3 0.3 0.3 Sabellidae (undet.) (P) 0.3	Paraprioncepto pinnata (P) 0.3 0.0.5 Unknown Polychaete #2 0.3 0.3 80.5 Sabellidae (undet.) (P) 0.3 0.3 80.5 Phyllodocidae (undet.) (P) 0.3 0.3 80.5	Travisia sp. (P)		0.3			5.00 2.00
Unknown Polychaete #2 0.3 0.3 Sabellidae (undet.) (P) 0.3	Unknown Polychaete #2 0.3 0.3 0.3 0.3 0.3 0.3 0.3 0.3 0.3 0.3	Paraprionospio pinnata (P)	0.3				20.08 2.08
Sabellidae (undet.) (P)	Sabellidae (undet.) (P) 0.3 0.3 Phyllodocidae (undet.) (P) 0.3 80.5	Unknown Polychaete #2	0.3				0.00
	Phyllodocidae (undet.) (P) 00.3	Sabellidae (undet.) (P)		0.3			0.9
Phyllodocidae (undet.) (P)		Phyllodocidae (undet.) (P)			0.3		C.U8

(Continued)

В5

GPECIS 101<		EAL 1	LINTED	CPD LNC	CLIMMER	OUFDAL 1
International and the first manual of the first manual m	SPECIES	1977	1978	1978	1978	RANK
Meta Note Note <th< td=""><td></td><td></td><td></td><td></td><td></td><td></td></th<>						
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$			OSH			
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	Spiophanes bombuz (P)	0.7	131.7	453.7	14.3	1.0
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	Tellina sp. (M)	0.3	77.0	29.3	4.0	2.0
Prechamatica (a) (b) (b) (b) (b) (b) (b) (b) (b) (b) (b	Ensis sp. (M)		8.7	63.0	18.0	3.0
$ \begin{array}{ccccc} Marker (k) & 1, 0 & 2, 1 & 1, 0 & 2, 0 \\ Marker (k) & (x) (x) (x) (x) (x) (x) (x) (x) (x) (x)$	Protohaustorius deichmannae (Am)	0.3	17.0	1.7		4.0
$ \begin{array}{cccccc} Wardow Polychetter f_{A} & 1.0 & 2.1 & 1.2 & 1.0 & 1.0 & 2.0 \\ Wardow Polychetter f_{A} & 1.1 & 1.1 & 1.1 & 1.1 & 1.0 & 2.0 \\ Seeleftyris treat (b) & 1.1 & 1.1 & 1.1 & 1.1 & 1.0 & 2.0 \\ Seeleftyris treat (c) & 1.1 & 1.1 & 1.1 & 1.1 & 1.0 & 1.0 & 2.0 \\ Seeleftyris treat (c) & 1.1 & 1.1 & 1.1 & 1.1 & 1.0 & 1.0 & 2.0 & 1.0 & 2.0 & 1.0 & 2.0 & 1.0 & 2.0 & 1.0 & 2.0 &$	Clymenella torquata (P)			17.7		2.0
$ \begin{array}{ccccc} Part A ({\bf m} ({\bf m} ({\bf$	Unknown Polychaete #14	1.0	2.3	12.0	1.0	<u>6.0</u>
$ \begin{array}{ccccc} Sected area (\mathbf{v}) & 1, & 1, & 1, & 1, & 1, & 1, & 1, & 1$	Platyischnopidae A (Am)	0.3	15.7			7.0
Americal (P) Comprise frictor (P) 1.1 3.0 7.3 1.1 9.0 Construction (C) There are the (C) 1.1 2.0 7.0 1.1 9.0 Construct are model (C) 1.1 2.0 2.0 2.1 1.1 9.0 Construct are preformer (n) 2.1 2.0 2.1 1.1 1.1 1.10 Construct are preformer (n) 2.1 2.1 2.1 1.1 1.1 1.1 1.10 Construct are from (n) 2.1 2.1 2.1 1.1	Scolelepis texana (P)		12.0	2.3		8.0
Capera di Branchi da (P) 1.3 0.3 6.0 3.7 10.0 Renge di Branchi (P) 1.3 2.3 2.3 2.3 2.0 1.3 10.0 Renge di Branchi (P) 1.3 2.3 2.3 2.3 2.0 1.3 1.0 Renge di Renni (A) 3.3 2.3 2.3 2.3 1.3 1.0	Nephtys picta (P)	1.7	3.0	7.3	1.3	0.9
Constant of (c) 1.3 2.0 7.0 1.0 $Parge particular (c)$ $Parge particular (c)$ 2.3 2.0 2.3 2.0	Glycera dibranchiata (P)	1.3	0.3	6.0	3.7	10.0
Theory matrix (m) (2) <td>Oxyurostylis smithi (C)</td> <td>1.3</td> <td>2.0</td> <td>7.0</td> <td></td> <td>11.0</td>	Oxyurostylis smithi (C)	1.3	2.0	7.0		11.0
Represential relation (a) (a) </td <td>Tharyz marioni (P)</td> <td>2.3</td> <td>0.3</td> <td>5.3</td> <td>2.0</td> <td>12.0</td>	Tharyz marioni (P)	2.3	0.3	5.3	2.0	12.0
$ \begin{array}{cccccc} \text{denillar veriforme (c)} & 1.3 & 2.3 & 0.3 & 1.3 & 1.3 & 1.0 & 1.3 & 1.0 & 1.3 & 1.0 & 1$	Rhepozynius epistomus (Am)		6.0	2.3	1.0	13.0
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	Renilla reniformis (Cn)	3.3	2.3	0.3	1.3	14.0
Gaulterielia kilariestis (t) 2.3 2.1 4.0 16.0 $Raylosocloplos fragilis (t)$ 5.1 0.7 1.0 4.0 19.5 $Raylosocloplos fragilis (t)$ 5.1 0.3 2.1 10.0 10.0 10.0 $Raylosocloplos fragilis (t)$ 0.3 3.7 0.3 3.7 0.3 10.0 $Rayerita (undet.)$ 0.3 3.7 0.3 3.7 0.3 10.0 $Rayerita (undet.)$ 0.3 3.7 0.3 3.7 0.3 21.0 $Rayerita (undet.)$ 0.3 3.7 0.3 3.7 0.3 21.0 21.0 $Rayerita (undet.)$ 0.3 3.7 0.3 3.7 0.3 21.0 $Rayerita (undet.)$ 0.3 3.7 0.3 2.7 0.7 26.0 $Rayerita (undet.) (t) 0.3 3.7 0.3 2.7 0.3 20.0 Rayerita (undet.) (t) 0.3 0.3 2.7 0.7 26.0 20.0 Rayerita (undet.) (t) 0.3 0.3 2.7 0.3 20.0 20.0$	Overia fusiformis (P)		0.7	5.0	0.7	15.0
mathematical function $mathematical function mathematical function mathemathmathematical$	Caulleriella killariensis (P)		2.3	4.0		16.0
$\phi_{orthobusictories}$ wills: (\mathbf{a}) 5.7 5.7 100	Haploscoloplos fragilis (P)	0.3	0.7	1.0	4.0	17.0
Memetrian (undet.) 0.3 2.3 3.0 3.0 3.1 3.0 3.1	Acanthohaustorius millsi (Am)	5.7				18.0
Mage low appilicornis (P) 2.0 2.1 1.0 0.3 19.5 Synchelidium americornis (P) 0.3 3.7 0.7 21.0 Macrox rowa are iconum (an) 0.3 3.7 0.7 21.0 Macrox rowa are iconum (an) 0.3 3.7 0.7 21.0 Macrox rowa are iconum (an) 0.3 3.7 0.7 21.0 Macrox rowa are iconum (an) 0.3 3.7 0.7 21.0 Scole the system (and iconum (an) 3.7 0.3 3.7 20.0 Scole are projective write (b) 3.7 0.3 2.7 20.0 Every matrox (p) 3.7 0.3 2.7 20.0 Macrox rowa (p) lition 0.7 2.3 2.0 2.0 Every matrox (p) 3.7 0.7 2.0 2.0 Macrox arguine (r) 3.7 0.7 2.0 2.0 Provide arguine (r) 0.7 0.7 2.0 2.0 Provide arguine (r) 0.3 0.7 2.0 2.0<	Nemertina (undet.)	0.3	2.3	3.0		19.5
	Magelona papillicornis (P)	2.0	2.3	1.0	0.3	19.5
Mage/cora rosea (P) 4.3 22.0 Macra rosea (P) 4.0 23.5 Solelepis quarta (P) 4.0 23.5 Solelepis quarta (P) 2.7 0.7 25.0 Solelepis quarta (P) 3.7 0.3 2.7 0.7 25.0 Solelepis quarta (P) 3.7 0.3 2.7 0.7 25.0 Solelepis quarta (P) 0.7 0.7 2.3 0.3 2.0 Pris directs (P) 0.7 0.7 0.7 2.0 2.9 Mage/ora phylicac (P) 0.7 0.7 2.0 2.0 2.0 Phyliodoclase (P) 0.7 0.7 0.7 2.0 2.0 Pereretata (P) 0.7 <td< td=""><td>Synchelidium americanum (Am)</td><td>0.3</td><td>3.7</td><td>0.7</td><td></td><td>21.0</td></td<>	Synchelidium americanum (Am)	0.3	3.7	0.7		21.0
	Mayelona robea (P)			4.3		22.0
$\begin{array}{cccc} Scole lepis agamma (P) \\ Scole lepis agamma (P) \\ Hieroprotopus range (N) \\ Hieroprotopus range (N) \\ Hieroprotopus range (N) \\ State activations (N) \\ Mage contributiate (N) \\ Mage contributiate (N) \\ Point activations (N) \\ Point activations (N) \\ Point activation (N) \\ Point activatio$	Mactra fragilis (M)			4.0		23.5
Excertants proclongus (D) 0.3 3.7 0.3 2.7 0.7 26.0 Microproteque menegi (am) 3.7 0.3 2.7 0.7 26.0 Frier drivetue (H) 3.7 0.3 2.7 0.7 26.0 Frier drivetue (H) 0.7 2.3 0.3 2.7 29.5 Retear actriarisansis (Am) 0.7 0.3 0.7 2.0 29.5 Retear actriarisansis (Am) 0.7 0.3 0.7 2.0 29.5 Retica actriarisansis (Am) 0.7 0.7 0.7 20.0 29.5 Retica actriaria (Mater.) (P) 0.3 0.7 0.7 20.3 31.0 Resonance trivitation (H) 0.7 0.7 0.7 0.7 32.0 Messarius trivitation (P) 0.7 0.7 0.7 0.7 32.0 Messarius trivitation (P) 0.7 0.7 0.7 1.0 36.0 Messarius trivitation (P) 0.7 0.7 0.7 1.7 36.0 Schell	Scolelepis aquamata (P)			4.0		23.5
Microprotopue menegi (Am) 0.3 2.7 0.7 26.0 $Paris directus (M)$ 3.7 2.3 2.0 26.0 $Paris directus (M)$ 0.7 2.1 2.0 28.0 $Paris directus (M)$ 0.7 2.3 29.5 28.0 $Paris directus (M)$ 0.7 2.0 29.5 28.0 $Payllodocidae (udet.) (P)$ 0.3 0.7 2.0 29.5 $Phyllodocidae (udet.) (M)$ 0.3 0.7 0.7 21.0 21.0 $Phyllodocidae (udet.) (M)$ 0.3 0.7 0.7 21.3 21.0 $Phyllodocidae (udet.) (M)$ 0.3 0.7 0.7 21.0 31.0 $Phyllodocidae (udet.) (M)$ 0.3 0.7 0.7 21.0 31.0 $Phyllodocidae (udet.) (M)$ 0.3 0.7 0.7 32.0 31.0 $Phyllodocidae (udet.) (M)$ 0.3 0.7 0.7 31.0 31.0 $Phyllodocidae (udet.) (M)$ Phyllodocidae (udet.) (M) 0.7 0.7	Euceranus praelongus (D)			3.7		26.0
Ensis directue (M) 3.7 26.0 Mage cost privates (N) 0.7 0.7 2.0 28.0 Mage cost privates (M) 0.7 0.7 2.0 29.5 Phylodoctal (M) 0.7 0.7 2.0 29.5 Phylodoctal (M) 0.7 0.7 20 29.5 Phylodoctal (M) 0.7 0.7 20 29.5 Phylodoctal (M) 0.7 0.7 20.3 31.0 Weilitz quinquestrivitation (M) 0.7 0.7 0.7 31.0 Restatus (F) 0.7 0.7 0.7 0.7 31.0 Restatus (P) 0.7 0.7 0.7 0.7 31.0 Restatus (F) 0.7 0.7 0.7 0.7 31.0 Restatus (P) 0.7 0.7 0.7 0.7 31.0 Restatus (P) 0.7 0.7 0.7 0.7 31.0 Restatus (P) 0.7 0.7 0.7 0.7 31.0 0.0 Resta	Microprotopus naneyi (Am)		0.3	2.7	0.7	26.0
Magelona phyllisae (P) 0.7 2.3 0.3 28.0 Magelona phyllisae (P) 0.7 2.0 29.5 29.5 Batea catharinensis (Ma) 0.7 0.7 2.0 29.5 Batea catharinensis (Ma) 0.7 0.7 2.0 29.5 Wentlade A (undet.) (P) 0.7 0.7 0.7 0.7 31.0 Wentlate A (undet.) (P) 0.3 0.7 0.7 0.7 0.7 31.0 Wellita quinquiesperforata (E) 0.3 0.7 0.7 0.7 0.7 31.0 Mellita quinquiesperforata (E) 0.7 0.7 0.7 0.7 31.0 Nescarius trivitatus (P) 0.7 2.0 1.0 0.7 0.7 0.7 31.0 Nescarius trivitatus (P) 0.7 0.7 0.7 0.7 0.7 31.0 Scholatia tuiqqaris (P) 0.8 0.7 0.7 0.7 0.7 0.7 0.7 S	Ensis directus (M)	3.7				26.0
Batea catharinensis (M) 0.7 2.0 29.5 Phyllodocidae (undet.) (P) 2.7 2.0 29.5 Phyllodocidae (undet.) (P) 2.7 2.3 0.7 22.3 21.0 Phyllodocidae (undet.) (P) 0.7 0.7 0.7 21.0 22.0 31.0 Phyllodocidae (undet.) (P) 0.7 0.7 0.7 0.7 32.0 Mellin $trivitatus (M)$ 0.3 0.7 0.7 0.7 33.5 Hetermastus filiformis (P) 0.7 0.7 0.7 0.7 36.0 Nessarius trivitatus (P) 0.7 0.7 0.7 36.0 36.0 Safellaria utgares (P) 0.7 0.7 0.7 36.0 36.0 Outphis areat and (P) 0.7 0.7 0.7 36.0 36.0 Mathia levent (M) 0.7 0.7 0.7 36.0 36.0 Mathia readit of (P) 0.7 0.7 0.7 36.0 36.0 Mathia readit of (P) 0.7 0.7 0.7	Magelona phyllisae (P)	0.7		2.3	0.3	28.0
Phyllodocidae (undet.) (P) 2.7 2.7 $2.9.5$ Veneridae (undet.) (P) 0.3 0.7 0.3 31.0 Veneridae A (undet.) (H) 0.3 0.7 0.7 32.0 Mellita atinquiesperforata (E) 0.3 0.7 0.7 31.0 Mellita atinquiesperforata (E) 0.3 0.7 0.7 31.0 Messarius trivitetus (n) 0.3 2.0 1.0 31.5 Messarius trivitetus (P) 0.7 2.0 1.7 36.0 <i>Cirratulus</i> sp. (P) 0.7 0.7 0.7 36.0 <i>Outphis eremit</i> (P) 0.7 0.7 0.7 36.0 Metanesi regress rige lowit (W) 0.7 0.7 0.7 36.0 Metanesi regress rige lowit (W) 0.7 0.7 0.7 36.0 Metanesi regress rige lowit (W) 0.7 0.7 0.7 36.0 Metanesi regress rige lowit (W) 0.7 0.7 0.7 41.5 Metanesi regress (M) 0.3 0.3 0.7 0.7 41.5 <td>Batea catharinensis (Am)</td> <td></td> <td></td> <td>0.7</td> <td>2.0</td> <td>29.5</td>	Batea catharinensis (Am)			0.7	2.0	29.5
Weildae A (undet.) (H) 2.3 0.3 31.0 Weilita quiquicatus (F) 0.7 0.7 0.7 31.0 Meilita quiquitatus (F) 0.3 0.7 0.7 31.0 Meilita quiquitatus (F) 1.0 1.0 1.0 31.5 Reconnectulus (F) 0.7 0.7 0.7 31.5 Reconnectulus (F) 1.0 1.0 1.0 31.5 Reclurin iugaris (F) 1.7 0.7 1.7 36.0 Subellaria iugaris (F) 0.1 0.7 0.7 36.0 Outphie served a (P) 0.7 0.7 0.7 36.0 Markidezic Pigelowi (Hy) 0.7 0.7 0.7 36.0 Markidezic Pigelowi (Hy) 0.7 0.7 0.7 36.0 Markied regress Pigelowi (Hy) 0.7 0.7 0.7 36.0 Markied regress (Hy) 0.7 0.7 0.7 41.5 Markied regress (Hy) 0.3 0.3 0.7 41.5 Mathing Lativalia (M) 0.3	Phyllodocidae (undet.) (P)			2.7		29.5
Mellita quinquiesperforata (E) 0.7 0.7 0.7 32.0 Mellita quinquiesperforata (F) 0.3 0.7 0.7 31.5 Messarius trivitatus (M) 0.8 1.0 31.5 33.5 Rescaratus filformis (F) 1.0 1.0 31.5 33.5 Rescaratus filformis (F) 1.7 2.0 1.7 36.0 Sabellaria ruigaris (P) 0.7 0.7 1.7 36.0 Outhis eremita (P) 0.7 0.7 0.7 36.0 Outhis eremita (P) 0.7 0.7 0.7 36.0 Mainderse undet. 0.7 0.7 0.7 36.0 Mainderse undet. 0.3 0.3 0.7 1.3 41.5 Matematical regrave matosa (I) 0.3 0.3 0.7 0.7 41.5 Mathina laternalatum (Am) 0.3 0.3 0.7 0.7 41.5	Veneridae A (undet.) (M)			2.3	0.3	31.0
Massarius trivitatus (M) 1.0 1.0 33.5 Recrumants filiformis (P) 2.0 33.5 Recrumantus filiformis (P) 2.0 33.5 Recrumantus filiformis (P) 2.0 33.5 Recrumantus $filiformis (P)$ 2.0 33.5 Recrumantus $filiformis (P)$ 0.0 1.7 36.0 Schellaria utgaris (P) 1.0 0.7 0.7 36.0 Outphis eremita (P) 1.0 0.7 0.7 36.0 Maindertia 0.7 0.7 0.7 36.0 Maindertea made 0.7 0.7 0.7 36.0 Maindertea made 0.3 0.3 0.7 41.5 Mainta lativalue (M) 0.3 0.3 0.7 41.5 Mainta lativale (M) 0.3 0.3 1.0 41.5 Mainta lativale (M) 0.3 0.3 0.7 41.5 Mainta lativale (M) 0.3 0.3 0.7 41.5	Mellita quinquiesperforata (E)	0.3	0.7	0.7	0.7	32.0
Beteromastus filiformis (P) 2.0 33.5 7 irratulue sp. (P) 30.0 36.0 36.0 7 irratulue sp. (P) 1.7 36.0 36.0 5 irratulue sp. (P) 0.0 0.7 0.7 36.0 5 irratulue sp. (P) 0.7 0.7 0.7 36.0 5 irratulue sp. (P) 0.7 0.7 0.7 36.0 5 irdeclasta undet. 0.7 0.7 0.7 36.0 $M_{envision}$ idepsie higoloxit (My) 0.7 0.7 0.7 36.0 $M_{envision}$ idepsie muda (M) 0.7 0.7 0.7 36.0 $M_{envision}$ interculatum (M) 0.3 0.7 0.7 36.0 $M_{envision}$ (M) 0.3 0.7 0.7 41.5 $M_{envision}$ (M) 0.3 0.7 0.7	Nassarius trivittatus (M)			1.0	1.0	33.5
$Cirratulus$ sp. (P) 1.7 36.0 $Sichellaria vulgaris$ (P) 1.7 36.0 $Ouphis eremica (P)$ 1.0 0.7 36.0 $Ouphis eremica (P)$ 0.7 0.7 36.0 $Ouphis eremica (P)$ 0.7 0.7 36.0 $M_{orbits eremica (P)$ 0.7 0.7 1.3 41.5 $M_{orbits eremica (P)$ 0.3 0.7 0.7 41.5 $M_{orbitia Latreal (Am)}$ 0.3 0.3 1.0 41.5	Recornances filiformis (P)		2.0			33.5
Salvellaria $uigaris$ (P)1.736.0 $Outphis$ eremita (P)1.00.736.0 $Outphis$ eremita (P)1.00.736.0 $Outgoelasta undet.0.70.738.0Myaidrpsis higelowi (My)0.30.71.341.5Mytampsid psis muda (My)0.30.30.341.5Mutampsid psis mutom (1)0.30.30.741.5Mutinia latreal ta (M)0.30.30.741.5Mutinia latreal is (M)0.30.30.341.5Mutinia latreal is (M)0.30.30.341.5$	Cirratulue sp. (P)			1.7		36.0
Oruphis eremita (P) 1.0 0.7 0.7 36.0 Oligochaeta undet. 0.7 0.7 0.7 38.0 Mainidratic ingeloui (M) 0.7 0.7 0.7 38.0 Mainidratic ingeloui (M) 0.7 0.7 1.3 41.5 Maining layer muta (M) 0.3 0.3 0.3 0.7 41.5 Maining lativation (M) 0.3 0.3 0.7 41.5 41.5 Maining lativation (M) 0.3 0.3 0.7 41.5 41.5 Maining lativation (M) 0.3 0.3 0.7 41.5 41.5	Sabellaria vulgaris (P)				1.7	36.0
011gochaeta undet. 0.7 0.7 38.0 Mysidspeis highlowi (My) 1.3 41.5 Mysidspeis mada (My) 1.3 41.5 Sedera matosa (II) 0.3 0.7 41.5 Komphium tuberculatum (Mm) 0.3 0.7 41.5 Multinia lationalis (M) 0.3 0.7 41.5	Omuphis eremita (P)	1.0		0.7		36.0
	Oligochaeta undet.		0.7	0.7		38.0
Metamusicopreise munda (My) 1.3 41.5 Edotea mentora (1) 0.3 0.7 41.5 Edotea mentora (1) 1.3 41.5 Completium tuberculatum (Am) 0.3 0.7 41.5 Multinia laterralis (M) 0.3 0.3 0.7 41.5	Mysidepsis Pigelowi (My)				1.3	41.5
Edotea montona (1) 0.3 0.3 0.7 41.5 Completium tuberrutatum (Am) 1.3 41.5 Multinia Latoraiia (M) 0.3 1.0 41.5	Metamusidopsis munda (My)				1.3	41.5
Completium tuberrealatum (Am) 1.3 41.5 Multinia Laterratis (M) 0.3 1.0 41.5	Edotea montosa (1)	0.3	0.3	0.7		41.5
Mulinia Lativalis (M) 0.3 1.0 41.5	Corophium tuberculatum (Am)			1.3		41.5
	Mulinia Latoralia (M)			0.3	1.0	41.5

(Continued)

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Appendix B. (Concluded)

	FALL	WINTER	SPRING	SUPPHER	OVERALI,
SPECIES	1977	1978	1978	1978	RANK
		윈	5		
Paraonis fulgens (P)		1.3			41.5
Tiron tropakis (Am)			1.0		47.0
Pelecypoda (M)		1.0			47.0
Polydora websteri (P)	1.0				47.0
Amphaeretidae (undet.) (P)		1.0			47.0
Brania clavata (P)		1.0			47.0
Pagurus longicarpus (D)			0.7		53.0
Unciola servata (Am)			0.7		53.0
Gastrosaccus johnsoni (My)				0.7	53.0
Cumacea B (undet.)			0.7		53.0
Unknown Polychaete #13	0.7				53.0
Unknown Polychaete #15				0.7	53.0
Maldanidae Undet. (P)		0.7			53.0
Dissodactylus mellitae (D)		0.3		0.3	57.5
Terebra dislocata (M)			0.3	0.3	57.5
Acetes americanus (D)				0.3	70.0
Pinniza sayana (D)		0.3			70.0
Callianasidae undet. (D)				0.3	70.0
Cumacea C (undet.)			0.3		70.0
Bathyporeta parkeri (Am)		0.3			70.0
Erichthonius brasiliensis (Am)			0.3		70.0
Polinices diplicatus (M)				0.3	70.0
Unknown Bivalve #12 (M)			0.3		70.0
Mytilidae undet. (M)		0.3			70.0
Turbonilla sp. (M)			0.3		70.0
Minuspio cirrifera (P)			0.3		70.0
Paranattis sp. (P)			0.3		70.0
Neress acuminata (P)				0.3	70.0
Scoloplos rubra (P)			0.3		70.0
Dispio uncinata (P)		0.3			70.0
Sigambra tentaculata (P)			0.3		70.0
Scolopios sp. (P)	0.3				70.0
Diopatra cuprea (P)			0.3		70.0
Podarke obscura (P)		0.3			70.0
Poecilochaetus sp. (P)			0.3		70.0
Nereidae undet. (P)	0.3				70.0
Paraprionospio pinnata (P)	0.3				70.0
Ampharete americana (P)			0.3		70.0

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PECIES	FALL 1977	WINTER 1978	SPRING 1978	SUMMER 1978	OVERALL
		IS I	10		
alorchestia megalophthalma (Am) mphiporeia virginicana (Am) cosphaeroma diminutum (I)			2 0	1.3 0.7 0.7	2.5
		IS	02		
sohaustorius schmitzi (Am)	0.7	2.0	139.3	130.7	1.0
solelepis squamata (P) max variabilis (M)	0.7 2.0	0.01	0.011	11.3	3.0
siophanes bombyz (P)		39.3		24.0	5.0
cospraceroma auminutum (1) justorius longirostris (Am)	0.7		10.7	2.7	9°0
icroprotopus raneyi (Am) merita talpoida (D)	0.7	9.3	0.7	4.7	0.0
ellina sp. (M) seis sn. (M)		6.0 5.3			10.0
iracaprella tenuis (Am) iracaprella tenuis (Am) Bivelve [1 (M)		2.7 2.0			11.0
iknown Bivalve #3 (M)		2.0	1 1	0.7	12.5
/tilidae Undet. (π) emertina (undet.)		0.7	0.7		15.0
ilorohestia megalophthalma (Am) macca lindat		1.3		1.3	18.5 18.5
marked vice: prophoto the transformed (Am)		1.3 1.3			18.5 18.5
nknown Bivalve #2 (M)		1.3			18.5 18.5
olydora sp. (P)		1.3	0 7		31.5
rpiaactylus ayriscus (nu) niridotea caeca (I)			0.7	, (31.5
nchelidium americanum (Am)		2 0		0.7	31.5
regeneration of teconary (Am) Thispheric virginismus (Am)		0.7			31.5
irahaustorius longimerus (Am)		0.7			31.5
anthohaustorius millei (Am)		0.7			2.15
cyurostylis smith (C) sinus dernessus (T)		0.7			31.5
invella remartis (Am)		0.7			31.5
issa falcata (Am)		0.7			31.5

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			UNI GUO	CIDNER	OVERALL
SPECIES	FALL 1977	WINTER 1978	57KIMG	1978	RANK
		<u>810</u>	21		
					31.5
Holothuroides (E)		0.7			31.5
Nudibranchia (M) Habaaan atvalva #14 (M)				0.7	31.5
Pholadidae (undet.) (M)		0.7			31.5
Unknown Bivelve #4 (M)	,	0.7			31.5
Nereidae Undet. (P)	0. /				31.5
Paraonis fulgens (r)		0.7			31.5
Eulalia sangunea (P) Heber 2014-2014 2014		0.7			31.5
DIRINGAL FOTACIDECE					
		<u>SI(</u>	21		
	-	616.0	12.7		1.0
Scolelepis squamata (P)		5.510	91.3	6.0	2.0
Spiophanes bombyz (P)	ŗ	2.0	4.7	70.0	3.0
Paraonis fulgens (P)	~ ~ ~	30.7	18.0	3.3	4.0
Acanthohaustorius millei (Am)	1.0	24.0	14.7	4.0	5.0
Telling sp. (H)		31.3			6.0
Crass 8p. (A) Crass vonichilic (M)	4.7	18.7			2.0
Preshandradic law (a)		8.7		2.0	8.0
raranaasorras torganistas (no) sochtus otato (D)		2.7	5.3	0.7	0.6
Current proceed and		2.0	4.7	1.3	10.0
umatea undet. Hanloscolonios franilis (P)		0.7		6.7	0.11
Protohaustorius deichnamae (Am)		5.3	2.0		12.0
Amphiporeia virginiana (Am)	5.3				0.61
Microprotopus raneyi (Am)		4.7	c *		16.5
Nemertina (undet.)	-		D		16.5
Mytilidae Undet. (M)	4.0	0 7			16.5
Unk.cown Bivalve // (M)		0 0			16.5
Polydora sp. (V)	r 0		0.7	1.3	19.0
Ecceptaeroma auminicum (1) reconsitio aunaitie (Ca)		3.3			21.0
Lovenetta gractico (M)		3.3			21.0
Unknown Bivalve #9 (M)		3.3			11.0
Polydora sp. (P)		2.7		r (2.63
Magelona rosea (P)			2.0	0.7	25.5
Cumacea B (undet.)		2.0			25.5
Eulalia sanguinea (P)	•	2.0			27.0
Emerita talpoida (D)	1.3	0.7			29.5
Neohaustorius schmitzt (Am)	1.0			0.7	29.5
Paravaprella tenute (Am)			0.7		29.5
Glycera dipranchiata (Y)			•		

(Continued)

С2

(Cont Inued) Appendix C.

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3.55 SUMMER 1978 0.7 7.7 36.0 0.3 19.0 0.7 1.3 0.7 0.3 SPRING 1978 0.7 7.0 8.3 25.3 1.3 29.0 1.3 0.7 0.7 S103 SS01 WINTER 1978 0.7 0.7 1.3 1.3 1.3 0.7 0.7 0.7 0.7 0.7 0.7 0.7 19.3 39.7 8.3 6.7 4.3 1.3 32.7 6.0 3.3 FALL 1977 0.7 0.7 0.7 0.7 3.7 Platylschnopidee A (Am) Turbellaria sp. (Am) Hemriholis elongata (E) Glottidia pyromidata (Brach) Nudibranchia (M) Polinices duplicatus (M) Unknoom Bivalve 14 (M) Unknoom Bivalve 42 (M) Unknoom Bivalve 42 (M) Unknoom Bivalve 42 (M) Parthaustorius longimerus (Am) Acanthohaustorius millsi (Am) Ampeliaca sp. (Am) Succediossus kowalwuskii (H) Chione cuneellata (M) Angorlona papillicormis (P) Magorlona papillicormis (P) Ogyrides alphuerostris (D) Synchelidium americanum (Am) Dispio uncinata (P) Heteromastus filiformis (P) Unknown Polychaete 14 Maldanidae Undet. (P) Edutea montosa (1) Aistrosaccus johnsoni (My) Phyllodocidae (undet.) (P) Tellina 8p. (M) Swolelepis squamata (P) Unknown Polychaete 11 Farwonis fulgens (P) Arenicolidae Undet. (P) Monoculodes sp. (An) Inciola servata (An) Unknowm Polychaete #2 Pinniza cristata (D) Donax variabilis (M) Cumacea C (undet.) ADMATTUS Sp. (Am) SPECIES

(Continued)

13.7

0.3

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Statistical intervention Statist	SPECIES	FALL 1977	WINTER 1978	SPRING 1978	1978	RANK
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$			880 8	1		
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$						C a
$ \begin{array}{ccccccc} 0.3 & 0.3 & 0.3 & 0.3 & 0.3 & 0.3 & 0.3 & 0.4 & 0.3 & 0.4 $	(M) # stratic #1 (M)			10.7	0	
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	Unknown blygive "I vu) Guesson Undef	0.3		0.6		10.0
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	tumates ontoor.					
	Protohoustorius deichmannae (Am)	3.0	1.0	0.4	-	12.0
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	Nerhtug Dicta (P)	0.7		0.0		13.0
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	Bithur oreia parkeri (Am)	4.3	0.3	, ,	0 7	14.5
$ \begin{array}{c} \label{eq:constraint} (\mathbf{v}(\mathbf{v})) \\ \mbox{matrix} (\mathbf{v}) \\ \mbox{matrix} (\mathbf{m}) \\ \mbox{matrix} ($	Parimie Ionativatiue (D)		0.3	C · 7		14.5
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	Distrograme Johnsoni (MV)			1.5	0.2	16.0
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	untranton from the (P)			1.0	0.4	0 21
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$		0.3	0.3	2.0	C • 0	3 8 6
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	Nemertina (under.)	1.0		1.0	0.3	2.01
Planstortide of contract	Ancinum articles and (1)				2.3	10.0
$ \begin{array}{c} Mass constant of the form of the$	Platyischnopidae A (Aut)	1.7				20.02
$ \begin{array}{c} \label{eq:constraint} first of match of product of the form of t$	Haustoridae Undet. (Am)		1.3	0.3		0.12
$ \begin{array}{cccccccc} \label{eq:constraint} \\ Symposizes D (mate: 1) \\ Symposizes D (mate: 1) \\ Stantholmans bornigs (1) \\ Stantholman storing ap. (as) \\ Stantholman storing ap. (b) \\ Stantholman storing (1) \\ Stantholman storing (2) \\ St$	Lovenella gractite (Cn)			1.3		22.0
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	Cumacea D (undet.)		. 0	0.3	0.3	23.0
	Spiophanes bombyz (P)			0.7		26.0
$ \begin{array}{cccccc} Expressional data (1) \\ Expressional data (2) \\ Expressional data (3) \\ Expressional data (4) \\ Expressional data (5) \\ Expressional data (6) \\ Expressional data (7) \\ Expressional data$	Acanthohaustorius sp. (Am)				0.7	26.0
$ \begin{array}{cccc} eq:convertigation: (a) constrained (b) constrained (c) const$	Leptogratha caeca (T)				0.7	26.0
$ \begin{array}{ccccc} Face or factor points (f) \\ Face or factor point (f) \\ Factor functions (m) \\ Factor functions (m) \\ Cross in the functions (m) \\ Cross in the function (m) \\ Factor functio$	Chione cancellata (M)			7 0		26.0
Mage long aprilition aprilition (e) 0.3 0.3 0.0 0.3 0.0 0.3 0.0 0.3 0.0 0.3 0.0 0.3 0.0 0.3 0.0 0.3 0.0 0.3 0.0 0.3 0.0 0.3	Eteone heteropoda (P)				0.7	26.0
Rispostyrius gristamus (a) 0.3 0.3 0.3 0.0 Crassive lia lauratata (h) 0.3 0.3 0.3 0.0 Crassive lia lauratata (h) 0.3 0.3 0.3 0.1 Crassive lia lauratata (h) 0.3 0.3 0.3 41.0 Synchiostoma caribasum (cc) 0.3 0.3 0.3 41.0 Synchiostoma caribasum (cc) 0.3 0.3 0.3 41.0 Synchiostoma scribasum (cc) 0.3 0.3 0.3 41.0 Synchiostoma scribasum (cc) 0.3 0.3 0.3 41.0 Montastorius schritzi (c) 0.3 0.3 0.3 41.0 Kirridota curbina (k) 0.3 0.3 0.3 41.0 Splasorom quadridentatim (1) 0.3 0.3 0.3 41.0 Chridota etemps (1) 0.3 0.3 0.3 41.0 Splasorom quadridentatim (1) 0.3 0.3 0.3 41.0 Chritidata stemps (1) 0.3 0.3 0.3 41.0 Splasorom quadridentatim (1) 0.3 0.3 0.3 41.0 Chritidata promidata (Brach) 0.3 0.3 0.3 41.0 Splasorom splasories (N) 0.3 0.3 0.3 41.0 Chritidat promidata (Brach) 0.3 0.3 0.3 41.0 Chritidia promidata (Brach) 0.3 0.3 0.3 0.3 Splasorom splasories (N) 0.3 0.3 0.3 41.0 Chritidia promidata (Magelona papillicornis (P)		, ,		0.3	30.0
$ \begin{array}{cccc} Crossinella laralizata (h) \\ Crossinella laralizata (p) \\ Branchiastara (re) \\ Branchiastara (re) \\ Ogyrides alpharorita (re) \\ Ogy$	Rhepozynius epistomus (Am)		C • D	1	0.3	30.0
$\begin{array}{cccccc} Clycera dibranchizia (P) \\ Branchizatam (cc) \\ Branchi$	Crassinella lunulata (M)				0.3	30.0
Branchiostoma caribaeum (cc) Branchiostoma caribaeum (cc) Ogyrides alphaeroestris (ne) (n) hieropaus range (ne) (n) hieropaus (ne)	Glycera dibranchiata (P)				0.1	41.0
$\begin{array}{ccccccc} Qgyrides alphaerostris (b) \\ Rechaustortis (an) \\ Rechaustortis estimati (an) \\ Rechaustortis estimati (an) \\ Organostylis smithi (c) \\ Recomposities smithi (c) \\ Organostylis smithi (c) \\ Recomposities smithi (c) \\ Recomposities smithi (c) \\ Recomposities smithi (c) \\ Recomposities manda (hy) \\ Rechaustortis (an) \\ Sphaera andridentatum (1) \\ Sphaera andridentatum (1) \\ Maphilood B \\ Annohleod B \\ Recha faces (h) \\ Recha fac$	Branchiostoma caribaeum (Cc)				0.3	41.0
Wechaustorius schwitzi (Am) 0.3 0.3 1.0 Microprotopus rankyi (C) 0.3 1.0 1.0 Expression could relate a starthi (C) 0.3 0.3 1.0 Expression could relate a starthi (C) 0.3 0.3 1.0 Microprotopus rank (N) 0.3 0.3 0.3 1.0 Expression could relate a starthi (C) 0.3 0.3 1.0 Maphipod B 0.3 0.3 0.3 0.3 Spharcoma quadridentation (N) 0.3 0.3 1.0 Spharcoma quadridentation (N) 0.3 0.3 0.3 Spharcoma quadridentation (N) 0.3 0.3 1.0 Spharcoma quadridentation (N) 0.3 0.3 1.0 Spharcoma quadridentation (N) 0.3 0.3 1.0 Spharcoma general (N) 0.3 0.3 1.0 Spharc	Oqyrides alphaerostris (D)		, (41.0
Microprotopue rareyi($\mathbf{M}_{\mathbf{m}}$) 0.3 0.3 0.1 0.3 41.0 Drywrostylis smithi(\mathbf{C}) 0 .3 41.0 41.0 Drywrostylis smithi(\mathbf{C}) 0 .3 41.0 Metampeidopsis $\mathbf{M}_{\mathbf{m}}$) 0 .3 0 .3 41.0 Metamped 13(\mathbf{N}) 0 .3 0 .3 41.0 Sphaeroma quadridentarum (1) 0 .3 0 .3 41.0 Dasin diacase (M) 0 .3 0 .3 0 .3 41.0 Desina discus (M) 0 .3 0 .3 0 .3 41.0 Desina discus (M) 0 .3 0 .3 0 .3 41.0 Desina discus (M) 0 .3 0 .3 0 .3 41.0 Desina discus (M) 0 .3 0 .3 0 .3 41.0 Desina discus (M) 0 .3 0 .3 0 .3 1 .0Desina discus (M) 0 .3 0 .3 1 .0Desina discus (M) 0 .3 0 .3 1 .0Desina discus (M) 0 .3 0 .3 1 .0Diagon discus (M) 0 .3 0 .3 1 .0<	Neohaustorius schmitzi (Am)		6.0			41.0
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	Microprotopus raneyi (Am)	0.3			0.3	41.0
Metamysidopsis manda (My) 0.3 0.3 41.0 Chiridotea stenops (1) 0.3 0.3 41.0 Sphacea stenops (1) 0.3 41.0 Jassa falcata (Ma) 0.3 0.3 Jassa falcata (M) 0.3 0.3 Jassa falcata (P) 0.3 0.3 Jassa falcata	Oxyurostylis smithi (C)	•				41.0
$ \begin{array}{cccc} Chiridotea stencys (1) \\ Spharvma quadridentatum (1) \\ methods \\ magnetic promidata (1) \\ 0.3 \\ methods \\ clottidia pyramidata (1) \\ 0.3 \\ clottidia pyramidata (1) \\ 0.3 \\ clottidia pyramidata (1) \\ 0.3 \\ cenna genma (1) \\ 0.3 \\ mary marioni (1) \\ mary marioni (1) \\ 0.3 \\ mary marioni (1) \\ 0.3$	Metamysidopsis wurda (My)	د.0				41.0
Sphaeroma quadridentatum (1) 0.3 41.0 Maphipod B 0.3 0.3 41.0 Maphipod B 0.3 0.3 41.0 Jasse falcata (M) 0.3 0.3 41.0 Desinia discus (M) 0.3 0.3 0.3 Macra fragilis (M) 0.3 0.3 0.3 Macra fragilis (M) 0.3 0.3 0.3 Maryz marioni (P) 0.3 0.3 0.3 Dispic uncinata (P) 0.3 0.3 0.3 Unknown Polychaete (P) 0.3 0.3 0.3 Dispic uncinata (P) 0.3 0.3 0.3 <td>Chiridotea sterops (I)</td> <td></td> <td></td> <td></td> <td></td> <td>41.0</td>	Chiridotea sterops (I)					41.0
Amphilood B 0.3 41.0 Jassa falcata (Ma) 0.3 41.0 Jassa falcata (Ma) 0.3 41.0 Jassa falcata (Ma) 0.3 41.0 Genma genar (H) 0.3 41.0 Contrada (Brach) 0.3 41.0 Desiria discus (H) 0.3 0.3 Mactra fragilize (H) 0.3 0.3 Desiria discus (H) 0.3 0.3 Mactra fragilize (H) 0.3 0.3 Desiria discus (H) 0.3 11.0 Desiria discus (H) 0.3 14.0 Dispic uncirata (P) 0.3 0.3 41.0 Unanom Polychaste P31 0.3 0.3 41.0 Dispic uncirata (P) 0.3 0.3 41.0 Unanom Polychaste P3 0.3 41.0 10.3	Sphaeroma quadridentatum (I)					41.0
Jassa falcata (Ma) 0.3 41.0 Contridia pyrmidata (Brach) 0.3 41.0 Comma genma (M) 0.3 41.0 Comma genma (M) 0.3 41.0 Comma genma (M) 0.3 0.3 Comma genma (M) 0.3 41.0 Comma genma (M) 0.3 0.3 Comma genma (M) 0.3 0.3 Mactra frage/m (M) 0.3 0.3 Mactra frage/m (M) 0.3 0.3 Maryar marrioni (P) 0.3 0.3 Vispto uncinata (P) 0.3 0.3 Unknown Polychaete #31 0.3 0.3 Orispto uncinata (P) 0.3 0.3 Unknown Polychaete (P) 0.3 0.3 Unknown Polychaete (P) 0.3 0.3 Unknown Polychaete (P) 0.3 0.3	Amphipod B	0.3			0.3	41.0
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	Jassa falcata (Am)				0.3	41.0
German german (M) 0.3 0.3 41.0 Destrict a discus (M) 0.3 0.3 41.0 Maaryar mariori fragilis (M) 0.3 0.3 41.0 Maaryar mariori (P) 0.3 0.3 41.0 Maaryar mariori (P) 0.3 41.0 41.0 Tharyar mariori (P) 0.3 0.3 41.0 Dispio uncirata (P) 0.3 0.3 41.0 Unknown Polyheate (P) 0.3 0.3 41.0 Ortspio uncirata (P) 0.3 0.3 41.0	Glottidia pyramidata (Brach)	, ,				41.0
Dosinia discus (H) 0.3 4.0 Mactra fragiles (H) 0.3 4.0 Mactra fragiles (H) 0.3 4.0 Mactra fragiles (H) 0.3 4.0 Intervent fragiles (H) 0.3 4.0 Tharyz marioni (P) 0.3 0.3 4.0 Dispic uncinata (P) 0.3 4.0 Unknown Polytheate 0.3 0.3 4.0 Orispic uncinata<(P) 0.3 0.3 4.0 Orispic uncinata<(P) 0.3 0.3 4.0	Genera genera (M)	 				41.0
Mactra fragile (M) Unknown Polychaete #31 0.3 41.0 Tharyz marioni (P) 0.3 41.0 Dispio uncinata (P) 0.3 41.0 Unknown Polychaete #2 0.3 41.0 Uranown Polychaete #2 0.3 41.0	Dosinia discus (M)	د.0		0.3		41.0
Unknown Polycheete 11 0.3 41.0 Tharyz marioni (P) 0.3 41.0 Dispio uncinata (P) 0.3 41.0 Unknown Polycheete 2 0.3 0.3 41.0 Urknown Polycheete 2 41.0	Mactra fragilis (M)			0.3		41.0
$\begin{array}{ccccccc} That y_{x} marcon (P) \\ 0.3 \\ 0.3 \\ 0.3 \\ 0.3 \\ 0.3 \\ 0.3 \\ 0.3 \\ 0.3 \\ 0.3 \\ 0.3 \\ 0.3 \\ 0.3 \\ 0.3 \\ 0.3 \\ 0.1 \\ 0.3 \\ 0.1 \\$	Unknown Polychaete #31					41.0
$\begin{array}{cccc} 0.3 \\ 0.3 \\ 0.3 \\ 0.3 \\ 0.3 \\ 0.3 \\ 0.3 \\ 0.3 \\ 0.1 \\ 0.$	Tharys martont (P)				0.3	41.0
	Utspro uncrnata (r)		0.3		ć	0.14
	unknown rutyunaece te riereilidae (under) (P)				C.U	0.14

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	5.411	11 NTCD	CDD1MC		(WEDALL
SPE, LES	1977	1978	1978	1978	RANK
		220	7		
Amerthohaustorius millei (An)	5	17.7	56.0	14.7	1.0
Buthuporeia parkeri (Am)		4.7	67.3	2.0	2.0
Parahaustorius longimerus (Am)		14.7	20.7	21.3	3.0
Protohustorius deichmannae (Am)	2.7	0.3	36.3	0.3	4.0
Platyischnopidaee A (Am)	8.7	0.3	4.7	14.0	5.0
Scolelepis squamata (P)		24.0		0.3	6.0
Acanthchaustorius intermedius (Am)	6.3		15.3		7.0
Leptognatha caeca (T)	5.0	7.3	2.0	3.0	8.0
Unknown Polychaete #11	4.3	1		0.6	0.6
bonar variabilis (M)	0.3	5.7	•	2.3	0.01
Rugetonic pupiliticornics (r) Snionhanse hombur (P)	1.0	1.0	0.1	c.0	12.0
Paraonis fulgens (P)		3.3	0.4		13.0
Rhenorunius enistomus (Am)	1.0	1	3.7	2.0	14.0
Gastrosaccus johnsoni (My)	0.3		1.0	4.0	15.0
Ogyrides alphaerostris (D)	0.3			4.0	16.0
Chiridotea stenops (I)	0.7		0.7	2.3	17.0
Tellina sp. (M)	1.3	0.3		2.0	18.5
Nephtys picta (P)	1.3	0.7	0.3	1.3	18.5
Metamystaopsts munaa (Hy)	-	0		٤.٤	20.02
Unknown rolycnaece r. Mellito ouimouiesnerfornta (r)		0.4	5 0	2 0	22.0
Cumacea C (undet.)			2.7	2	23.5
Nemertina (undet.)	0.7		1.3	0.7	23.5
Harloscoloplos fragilis (P)		0.3	0.7	1.3	25.0
Synchelidium americanum (Am)	1.0		0.3	0.3	26.0
Mysidopeie bigelowi (My)				1.3	28.0
Cumacea Undet.		0.7	0.3	0.3	28.0
Folydord sp. (P) Louenella annailis (c.)		1.1			28.0 30 5
Echimotidea (E)	1.0				30.5
Pagurus longicarpus (D)	0.3		0.3	0.3	32.0
Callianasidae Undet. (D)				0.7	34.0
Microprotopus raneyt (Am)					0.45
orycera arorancara (r) Oruwrostulis smithi (C)		0.3	0.3	0.1	36.0
Dissodactulus mellitae (D)	0.3	1	1		42.5
Pinnizza sp. (D)	1			0.3	42.5
Edotea montosa (I)				0.3	42.5
Ancinus depressus (1)	0.3				42.5
Parapleustes aestuarius (Am)				0.3	42.5
Itron tropakte (AD) Locar falacia (AD)				0.3	5.24 2.24
vassa jateata (mm) Chione cancellata (M)				5.V 6.0	42.5

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SPECIES	FALL 1977	WINTER 1978	SPRING 1978	Su nd ier 1978	OVERALL RANK
		SSC	22		
Sabellaria vulgaris (P)				0.3	42.5
Heteromastus filiformis (P)	ć	0.3			42.5
Glyceridae Undet. (P) Eteone heteropoda (P)	£.0	0.3			42.5
		SS	33		
		ł	1		•
Spiophanes bombyx (P)		214.3	187.3	4.3 7.0	1.0
Tellina sp. (M)	6.0 2.2	35.0	101/	0.4 0	0.2
Platyischnopidae A (Au)	2.3	4 D	2.3	2.0	4.0
Reputya picita (r) Rhenomunius enistomus (Am)	2.0	6.7	2.0	2.3	5.0
Protohaustorius deichmannae (Am)	0.7	2.3	4.0	4.0	6.0
Glycera dibranchiata (P)	1.3	1.0	6.3	1.0	7.0
Caulleriella killariensis (P)		5.3	2.0		8.0
Mellita quinquiesperforata (E)	1.0	0.7	0.7	4.3	0.6
Dissodactylus mellitae (D)	1.3	0.1	1.0		0.01
Magelona papillicornis (P)		2.3	1./	C . T	12.0
Unknown Polychaete #15	5.0	r (5 5		13.0
Scolelepis texana (P)	2.0 5 - 1	۲./ ۲. ۲			14.0
urgurostyres emterne (L) Habnern Doluchasta 114	r.1	1.7	2.7		15.0
Microprotopus raneui (Am)	1.7		1.0	1.3	16.0
Haploscoloplos fragilis (P)		0.3	2.0	1.3	17.0
Synchelidium americanum (Am)	1.7	0.3	0.7	0.7	18.0
Mactra fragilis (M)	1.3		2.0		C.61
Ensis sp. (M)		2.3	1.0	•	5.61 3.15
Ancinus depressus (1)	0.3	0.7	0.1	1.1 . 0	5 16
Nemertina (undet.)	0.1	0.3	1.1		23.5
Bernic Jante (Cn)	1.1	r c			23.5
branta cruvata (r) Aranthohaustorius intermedius (Am)		7 * 7	2.3		25.5
linknow Polychaete #10	5.7				25.5
Unknown Bivalve #1 (M)	6 1	2.0			27.0
Pagurus longicarpus (D)		0.3	1.0	0.7	29.0
Crassinella lunulata (M)		1.3	0.7		0.92
Unknown Polychaete #2	0.3	0.7			29.0
Unknown Polychaete #2	1.0	0.7			31.5
Unknown Bivalve Fy (M) Sectofonis commute (P)		1.7			31.5
ocotetepte squarket (r) Tinon thomatis (Am)	5 0		0.3	1.0	33.0
Cumarea C (undet.)			1.3		36.5

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			SFRIM,	SUMPLY: N	
PEUTES	1791	1978	1978	1978	RANK
		<u>830</u>			
್ ಪ್ರಾತಿಕ್ರಿಸಿಕೊಂಡಿಗೆ ಮಾಡಿಕೊಂಡಿಗೆ. (MV)				1.3	36.5
to real here in the first of th	0.1	1.0			36.5
vllidae (undet.) (P)		0.1	1.0		36.5
riversit riversit (P)		1.3			36.5
nknown Polychaete #26		1.3			36.5
มูนที่เสียล หรืะสมทางการ์ (II)				1.0	42.0
ว ter z และช่นเรื่อง หมายเรียก (Am)	1.0				42.0
$(\mathbf{M}) = \{\mathbf{x}^{1}, \mathbf{x}^{2}, \mathbf{x}$		1.0			42.0
Denia fasifirmis (P)			1.0		42.0
hyllodocidae (undet.) (P)			1.0		42.0
détea montrosa (I)	0.1		0.7		47.0
errerhium tuderradistum (Am)		0.1	0.7		47.0
hione can lata (M)		0.7	0.3		47.0
nuchis errmita (P)		0.1	0.7		47.0
oludora sn. (P)		0.3	0.7		47.0
athuroreis parkeri (Am)		0.0	0.3	0.3	50.0
uceramus praelongus (D)			0.7		55.0
canthonaustorius milis (Am)		0.7			55.0
ysidorsis higelowi (My)				0.7	55.0
colorios rubra (P)	0.7				55.0
steromastus filiformis (P)		0.7			55.0
ravisia sp. (P)			0.7		55.0
iruonis fulgens (P)		0.7			55.0
llgochaeta Undet.		0.7			55.0
mpharete americana (P)		0.7			55.0
gyrides limicola (D)			0.3	0.3	62.0
inapleustes aestuirius (Am)	0.3		0.3		62.0
erebra concava (M)		0.3	0.3		62.0
ibellaria vulgaris (P)	0.3			0.3	62.0
iaryx marioni (P)		0.3	0.3		62.0
achypeneus constructus (D)				0.3	80.5
sptochela serratorbita (D)	0.3				80.5
innotheres cetreum (D)				0.3	80.5
inniza cristata (D)	0.3				80.5
innixa sayana (D)		0.3			80.5
himidotea stenops (1)				0.3	80.5
nciola serrata (Am)			0.3		80.5
Trelisca sp. (Am)			0.3		80.5
istrosaccus įchnscni (My)				0.3	80.5
vanthura magnifica (1)		0.3			80.5
umacea B (undet.)			0.3		80.5
tilanthura trivarina (1)				0.3	80.5
Jorburaldas (E)		2 0			2 00

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Appendix C. (Concluded)

			CBDINC	SIMMER	OVERALL
SPECIES	FALL 1977	WINTER 1978	24.01W	1978	RANK
		<u>\$503</u>			
Nudibranchia (M)			0.3		80.5
Andersovalis (H)				0.3	80.5
Epitonium humphreysi (M)		0.3			80.5 80.5
Nucula sp. (M)	0.3		0.3		80.5
Terebra dislocata (M) Unknown Bivalve \$5 (M)		0.3	1	ç	80.5 80.5
Distio uncinata (P)		0.3		r.0	80.5
Arminica macutato (P) Nereidae Undet. (P)	0.3				80.5 80.5
Orbiniidae Undet. (P)	0.3				80.5
Paraonidae Undet. (P) Hokoom Polychaete []]	C .0			0.3	80.5
Eulalia sanguinea (P)		0.3		£ 0	80.5
Phyllodice arease (P)				•	80.5
F if id in sp. (P)		0.0			80.5
Terebellidae (undet.) (r)		0.3			80.5
Unknown Polychaete 12/ Migelory, rosed (P)		•	0.3		80.5

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Appendix D.

Ranked abundance of benthic macroinvertehrates collected during 1977-1978 at intertidal and subtidal stations on the north jetty transect (Transect III). Estimates represent the mean number per 0.1 m² and A = Ascidiacea, Am = Amphipoda, Brach = Brachlopoda, C = Cumacea, Cc = Cephalochordata, Cn = Cnidaria, D = Decapoda, E = Echinodermata, H = Hemichordata, I = Isopoda, M = Mollusca, My = Mysidacea, P = Polychaeta, T =Tanaidacea.

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MOL MOL Statistic shamta (s) 113 2.0 Statistic shamta (s) 0.1 0.1 Statistic shamta (s) 0.1 0.1 Statistic shamta (s) 0.1 0.1 Statistic shamta (s) 0.1 0.1 0.1 Harris statistic (s) 0.1 0.1 0.1 0.1 Manon State shamta (s) 0.1 0.1 0.1 0.1 Manon State shamta (s) 0.1 0.1 0.1 0.1 Manon State shamta (s) 0.1 0.1 0.1 0.1 0.1 Manon State shamta (s) 0.1 0.1 0.1 0.1 0.1 0.1 Manon State shames (s) 0.1 0.1 0.1 0.1 0.1 0.1	C2102.00	1977 1977	WINTER 1978	SPRING 1978	SUMMER 1978	OVERALL RANK
$ \begin{array}{c} Substrate header (b) \\ Style header (c) \\ S$			IN	101		
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	Scoletepis symmetra (P)		c 3			
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	Sprophanes bombyr (P) Poludous en (B)		2.0			1.0
$ \begin{array}{ccccc} \begin{tabular}{lllllllllllllllllllllllllllllllllll$	Weellage (r)		2.0			2.5
$ \begin{array}{ccccc} \text{Model and State (1)} & 1.3 & 0.7 &$	ytildae undet. (M) Poludowa inhatawi (D)	1.3	9 			2.5
$ \begin{array}{ccccc} Retrictoria derivation (a) & 0.7 & 0.7 & 0.1 \\ Latratianty of a divide (b) & 0.7 & 0.7 & 0.1 \\ Latratianty of a function (b) & 0.7 & 0.7 & 0.1 \\ Latratianty of a function (b) & 0.7 & 0.7 & 0.1 \\ Latratianty of a function (c) & 0.7 & 0.7 & 0.1 \\ Retrict a targation (c) & 0.7 & 0.7 & 0.7 & 0.7 & 0.7 \\ Retrict a target (c) & 0.7 & 0.7 & 0.7 & 0.7 & 0.7 & 0.7 & 0.7 \\ Retrict a target (c) & 0.7 & 0$	Dmerita talevida (D)	1.3				4.5
$ \begin{array}{ccccc} \text{Actamatic (w)} & 0.7 &$	epidactylus dutiscus (Am)				0.7	n c
$\begin{array}{cccc} \text{Introduction fit allow (a)} & \begin{array}{ccccc} 0 & \begin{array}{cccccc} 0 & \begin{array}{ccccccc} 0 & \begin{array}{cccccccc} 0 & \begin{array}{ccccccccccccccccccccccccccccccccccc$	te tampsidopsis munda (My)	r 0		0.7	- - -	
$ \begin{array}{ccccc} \text{Microm Biratroe II (a)} & \begin{array}{ccccc} 0.7 & 0.7 & 0.7 \\ 0.1 & \text{Microm Biratroe II (a)} & 0.7 & 0.1 \\ 0.1 & \text{Microm Biratroe II (b)} & 0.1 & 0.1 & 0.1 \\ 0.1 & 0.1 & 0.1 & 0.1$	latyischnopidae A (Am)					
NIO2 NIO2 <t< td=""><td>inknown Bivalve #1 (M)</td><td></td><td>0.7</td><td></td><td></td><td>8.0</td></t<>	inknown Bivalve #1 (M)		0.7			8.0
$\begin{array}{ccccc} \text{eleps symmetra} (\mathbf{r}) & \underline{\mathbf{MIQ}} \\ \text{order transitions} & (\mathbf{r}) & 0.7 & 2.0 & 0.7 & 0.$						8.0
$\begin{array}{cccc} collepsis symmata (P) & 18.7 & 2.0 & 1289.0 & 0.7 & 2.0 & 0.7 & 3.0 & 0.7 & 2.0 & 0.7 & 3.0 & 0.7 & 2.0 & 0.7 & 3.0 & 0.7 & 0.7 & 0.7 & 0.0 $			NI	02		
$\begin{array}{ccccccc} max variabilis (n) & 0.7 & 2.0 & 1289.0 & 0.7 & 1.0 \\ metriar targorids (n) & 0.7 & 2.0 & 1.3 & 2.0 \\ metriar value (n) & 0.7 & 2.0 & 0.7 & 2.0 \\ metriar value (n) & 0.7 & 2.0 & 0.7 & 2.0 \\ metriar value (n) & 0.7 & 0.7 & 0.7 & 0.7 & 0.7 \\ metriar value (n) & 0.7$	colelepis sourceta (P)	, , ,		1		
merita talpoida (0) 0.7 0.6 0.7 0.6 0.7 0.6 0.7 0.0 0.7 0.1 0.1 0.7 0.1	onar variabilis (M)	18.7	2.0	1289.0	0.7	-
wertins (undet.) 0.7 2.7 2.7 2.0 2.1 4.7 4.0 $winchrase longinestris$ (un) 0.7 0.7 2.0 0.7 5.0 $winchrase longinestris$ (un) 0.7 0.7 0.7 0.7 5.0 $winchrase longits$ (n) 0.7 0.7 0.7 0.7 0.7 5.0 $winchrase longits 0.7$	merita talpoida (D)	0.7	0.7	46.0		1.0
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	emertina (undet.)	· · +		2.7)	0.2
$\begin{array}{ccccc} \begin{tabular}{c} 0.7 & $	uustorius longirostris (Am)	0.7		1	4.7	0.4
$ \begin{array}{ccccc} reductylus dytiscus (as) \\ ridoctylus dytiscus (as) \\ dirows bivarves (b) \\ crroprotopus raneyi (as) \\ crroprotopus raneyi (b) \\ crroprotopus relation (crroprotopus raneyi (b) \\ crroprotopus relation (crroprotopus raneyi (b) \\ crroprotopus raneyi (b) \\ crroprotopus raneyi (b) \\ crroprotopus raneyi (crroprotopus raneyi (b) \\ crroprotopus raneyi (crroprotopus raneyi (b) \\ crroprotopus raneyi (crroprotopus raneyi (crroprotopus ranewi (crroprotopus raneyi (crroprotopus$	eohaustorius schmitzi (Am)			2.0	0.7	5.0
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	epidactylus dytiscus (Am)			0.7	0.7	6.0
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	iknown Bivalve #1 (M)		-		1.3	7.5
$\begin{array}{c} 0.7 \\ \text{order little durate: (Am)} \\ \text{order (Mm)} \\ $	nnotheres ostreum (D)	0.7	r • 1			7.5
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	corprotopus raneyi (Am)		0.7			13.5
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	Prellidae (undet.) (Am)		0.7			13.5
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	Pitte contract (Am)				,	13.5
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	utua quinquiesperjorata (E)			2 U	0.7	13.5
iopianes bombyr (p) 0.7 0.7 0.7 0.1 $iopianes bombyr (p)$ 0.7 0.7 0.7 0.1 $ijdora sp. (P)$ 0.7 0.7 0.7 0.1 $ijdora sp. (P)$ 0.7 0.7 0.7 11.5 $ijdora sp. (P)$ 0.7 0.7 0.7 11.5 $ijdora sp. (P)$ 0.7 0.7 0.7 11.5 $olelepie summata (P)$ 14.7 6.7 491.3 6.7 1.0 $or to tallorida (D)$ 3.3 1.3 1.3 2.0 2.0 2.0 $or tallorida (D)$ 2.7 0.7 0.7 14.7 5.3 2.0 $or tallorida (D)$ 2.7 0.7 0.7 14.7 5.3 2.0	rtildae linder (N)			0.7		13.5
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	tophanes bombur (P)		0.7	į		
lydora sp. (P) 9.7 0.7 0.7 13.5 13.5 13.5 0.7 0.7 14.7 10.7 13.5 13.5 13.5 13.5 13.5 13.5 13.5 13.5	stontdae (undet.) (P)		0.7			
0.7 0.7 0.7 13.5 01 01 0.7 0.7 13.5 01 01 0.7 0.1 10.5 01 0.7 0.7 0.1 0.7 02 0.7 0.7 14.7 5.3 2.0 03 0.7 0.7 14.7 5.3 2.0 05 0.7 0.7 14.7 15.3 3.0	Ludow an (P)	0.1				[] []
ole le pis e guarrata (P) 14.7 6.7 1103 nuz variatitis (M) 3.3 14.7 6.7 11.0 erita talpoida (D) 2.7 0.7 1.3 14.7 5.3 2.0 ostracroma diminutum (1) 2.7 0.7 15.3 3.0			0.7			13.5
ole le pia squamata (P) 14.7 6.7 491.3 6.7 1.0 naz varialitia (M) 3.3 1.3 1.3 14.7 5.3 2.0 srita talioida (D) 2.7 0.7 1.0 5.3 2.0 2.0 2.0 2.0 0.7 14.7 5.3 2.0 2.0 0.7 14.7 5.3 5.3 5.0 0.7 14.7 5.3 5.3 5.0 0.7 14.7 5.3 5.3 5.0 0.7 14.7 5.3 5.3 5.0 0.7 5.3 5.3 5.0 0.7 5.0 0.7 5.3 5.0 5.0 5.0 5.0 5.0 5.0 5.0 5.0 5.0 5.0						
ole lepis s zurmata (P) 14.7 6.7 491.3 6.7 1.0 nuz variabilia (M) 3.3 1.3 1.3 14.7 5.3 2.0 erita talioida (D) 2.7 0.7 14.7 5.3 3.0 osfriacroma diminutum (1) 2.7 0.7 0.7 15.3 3.0			NIO			
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	olelepis squamata (P)	14.7	6.7	6 19	!	
2.0 2.0 5.3 2.0 0.7 4.0 5.3 2.0 0.1 0.7 5.3 2.0 0.0 0.1 1.0 0.1 0.0 0.0 0.0 0.0 0.0 0	and the second of the (M)	3.3	1.3	C . 1 C P	6.7	1.0
	ostrationa (n) Ostrationa diministra (n)	2.7	0.7			2.0
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(Continued) Appendix D.

			CBETHC	SIDMER	OVERALL
SPECIES	FALL 1977	WINTER 1978	55KLMG	1978	RANK
)IN	11		v v
(= 1)	0.7	6.7	1	1	
Amputporeta Utritutatu Amu				2.1	2 2
nemertina (under.) Def. Jour on (D)		2.7			0.8
rougherd ap. (1) Prichthouise through and a (tm)		2.0			
ETTERTOREUS UTGELEVENSES (A.)		0.7	1.3	1	0.01
NPONGUSEOFEUS SCHNELSE AMU		0.7		0.7	11 5
Mytilidae Undet. (m)	c -				2
Haustorius sp. (Am)					C•11
Unknown Polychaete #11	1.3		0.7		1/.0
Lepidactylus dytiscus (Am)			•	0.7	17.0
Acanthohaustorius millsi (Am)		1		•	17.0
Haustorius longirostris (Am)		0.7	r C		17.0
Lovenella amacilis (Cn)					17.0
Untram Rivelve () (M)		0.7			17.0
CITATIONIC DIVISION OF A CUTATION OF A CUTAT		0.7			17 0
Unknown bivalve 7 (n)				0.7	0.11
Unknown Polychaete 731	r				
Nephtys picta (P)	0.1			0.7	17.0
Eteone heteropoda (P)					
		SN	10		
					•
		L L	134.3	70.3	1.0
Protohaustorius deichmannae (Am)	110.1	0.20	1.45		2.0
Spiothanes bombyx (P)	0.3	40.0	16.0	3,3	3.0
Acanthohaustorius millsi (Am)	12.3	1.1	7 7		4.0
Scolelepis squamata (P)		23.3		1.7	5.0
Paraonis fulgens (P)	0.6	4.3		2.0	6.0
Tellina sp. (M)		2.0		E 9	7.0
Magelona papillicornis (P)	3.0	2.0		, r , r	8.0
lentomatha caeca (T)	0.3	3.3	1.1	C · 7	0.6
Bathuporeia parkeri (Am)	6.3	0.3	0.7		10.0
Nenhtus nicta (P)	2.0	0.1	2.0	· · ·	0.11
Provens longicarnus (D)	1.0		2.0	0.1	12.0
Donar variabilis (M)	1.7	1.0		0.1	13.5
Turbellaria so.	3.0			с г	13.5
Orbiniidae Undet. (P)					15.0
Nemerting (undet.)	1.0	1.3		C .0	16.0
Caulteriella killariensis (P)		2.0			17.0
Donahoustorius longimerus (Am)		1.7		C * D	0.01
Chinidatea stenans (1)	0.7		1.0		0.01
Contraction inchesconi (Mv)	•		0.7	1.0	
Castrona (Junisour Cast	1 7				19.0
Revilla revijormas (Cn)	1.1	() 	0.3	0.7	23.0
Rheporynius epiteronus Anni		0.1	0.3		23.0
Platylschnopidae A (Am)		2		1.3	23.0
Dispio uncinata (P)			1.3		23.0
Glycera arpmnentata vri		(1000)			

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(Continued) Appendix D.

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OVERALL SUMMER 1978 1.0 0.7 0.3 SPRING 1978 1.0 0.3 0.3 0.3 **NSO1** WINTER 1978 0.3 0.7 0.3 0.3 0.3 FALL 1977 0.3 0.3 0.3 1.3 0.3 0.7 Braria clavata (P) Unknown Blvalve (I (M) Diasodactylus mellitae (D) Cumaces C lunder.) Cumaces C under.) Batea catharrinensie (Am) Batea catharrinensie (Am) Unciola serrata (Am) Cumacea Undet. Carella perantis (Am) Carella perantis (Am) Pontogeneildae Undet. (Am) Mellita quinquiesperforata (E) Ensis ap. (M) Mactra fragilis (M) Synchelidium americanum (Am) Dayurostylis smithi (C) Dumbrineris impatiens (P) Armandia maculata (P) Ollgochaeta Undet. Haploscolopios fragilis (P) Unknown Polycheste #14 Polydora sp. (P) Bulalia sanguinea (P) Paleanous heterroseta (P) Polydorus sp. (P) Unknown Polychaete #2 Ogyrides alphaerostris (D) SPECIES

100.7 65.0 18.3 7.0 24.3 10.3 5.0 5.0 2.7 9.7 0.7 32.0 51.7 1.7 Spiophanes bombyr (P) Scoielepis squamata (P) Plaryischnopidae A (Am) Protohaustorius deichmanune (Am) Acanthohaustorius millsi (Am) Alepozynius epistomus (Am) Leptogratha caeca (T) Bathyporeia parkeri (Am) Unknoom Polychaete #11 Magelomi parilicornis (P) Tellira sp. (M) Paraonis fulgens (P)

1.0 2.0 3.0 5.0 6.0 7.0 7.0 8.0 8.0 11.0 11.0

10.3 9.3 3.7 3.7 3.7 3.7 16.7 16.7 16.7 12.0

4.3 5.0 1.0 1.3 0.3 0.3 0.3 0.3

2.3 3.7

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0.3 0.3 0.3

0.3

Unknown Polychaete #26

NS02

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			1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		
SPECTES	1977 1977	UNTEX 1978	5FK1NG 1978	SUMMER 1978	UV EKALL RANK
		N	5		
Nephtys picta (P)	1.3	2.0	1.0	4.0	13.0
Parahaustorius longimerus (Am)		0.7		6.3	14.5
Nemertina (undet.)	0.7	4.3	1.7	0.3	14.5
Sunchelidium americanum (Am)	2.3	4.0			16.5
Ancinus depressus (1)	0.3	3.3	1.0	1.7	16.5
Tellina altermata (M)	6.0				18.0
Acanthohaustorius sp. (Am)			1.7	3.7	19.0
Renilla reniformis (Cn)	3.0	0.7			20.0
Chiridotea stenops (1)		1.7	0.7	0.7	21.0
Gastrosaccus johnsoni (My)			1.0	2.0	22.5
Ensis ap. (M)	1.0	2.0			22.5
Mellita quinquiesperforata (E)	1.3	1.0	0.3	0.3	24.0
Mactra fragilis (M)	0.3		2.0		25.0
Acanthohaustorius intermedius (Am)	1.7				26.0
Donar variabilis (M)		0.7	0.7		27.0
Microprotopus raneyi (Am)			1.0		28.0
Ogyrides alphaerostris (D)		0.3		0.7	30.0
Pagurus longicarpus (D)			0.7	0.3	30.0
Haploscolopios fragilis (P)		0.7	0.3		30.0
Neomusis americana (My)			0.7		34.5
Mvrilidae Undet. (M)			0.7		34.5
Eteone heteropoda (P)		0.7			34.5
Magelona phullisae (P)	0.7				34.5
Unknown Polychaete #2	0.7				34.5
Scolelepis texana (P)	0.7				34.5
Dissodactylus mellitae (D)	0.3		0.3		38.0
Emerita talpoida (D)				0.3	51.0
Pinniza cristata (D)	0.3				51.0
Lepidactylus dytiscus (Am)			0.3		51.0
Gammarus sp. (Am)			0.3		51.0
Cumacea C (undet.)			0.3		51.0
Occyurostylis smithi (C)		0.3			51.0
Corophium tuberculatum (Am)		, (0.3		51.0
Lovenella graculus (Cn)		F • 0	ĉ		0.12
Ulivella mutica (A) Polision durlinatus (A)					0.10
rounces advictue (n) Vessamius tuinittatue (N)	0.3				0.12
Rassarius irivituuus vii Chime onncellata (M)		0.3			51.0
Spisula solidissima (M)				0.3	51.0
Pelecyboda (M)		0.3			51.0
Unknown Bivalve #11 (M)			0.3		51.0
Unknown Bivalve #1 (M)		0.3			51.0
Unknown Bivalve #8 (M)		0.3			51.0
Unknown Bivalve F9 (M) Dispio uncinata (P)		•••		0.3	51.0
		(Continued)			

D4

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OVERALL RANK 51.0 51.0 51.0 51.0 51.0 **1**.0 2.0 SUMMER 1978 40.7 5.3 0.3 11.0 4.7 0.3 4.0 1.3 0.7 0.3 1.3 SPRING 1978 10.0 12.0 10.0 26.3 0.3 19.3 17.3 10.0 0.3 8.0 0.3 0.3 12.7 6.0 с. О 5.0 0.3 0.3 COSN **NS02** (Continued) WINTER 1978 9.3 8.7 8.0 2883.0 165.0 136.7 100.3 24.3 0.7 25.3 3.3 11.3 4.7 5.0 15.0 1.7 12.0 1.7 6.7 2.0 5.3 1.3 <u>.</u>. 7.7 8.3 4.3 0.3 10.3 13.3 3.0 1.7 FALL 1977 0.3 1.7 1.0 011gochaeta Undet. Caulleriella killariensis (P) Glycera dibranchiata (P) Platyischnopidae A (Am) Heteromastus filiformis (P) Glycera dibranchiata (P) Podarke obscura (P) Podarke obscura (P) Eulalia sanguirea (P) Unknown Polychaete #26 Nemerina (undet.) Pagurus Longicarpus (D) Pagurus Longicarpus (D) Pagurus epistomus (Am) Unknown Polychaete 14 Rephtys picta (P) Tharyz marioni (P) Pilargida (undet.) (P) Priomospio cristata (P) Conidides carolinae (P) Haploscolphies fragilis (P) Polydara sp. (P) Unknown Blvalve f9 (M) Unknown Blvalve f9 (M) Spio pettbornea (P) Travisia parba (P) Chiome cancellata (M) Batea catharinensis (Am) Scolelepis tearna (P) Hemipholis tearna (P) Mactha fragilis (M) Obenia fusiformis (P) Spiophanes bombyr (P) Tollina sp. (M) Maldanldae Undet. (P) Ensis sp. (M) Sabellaria vulgaris (P) Ozyurostylis smithi (C) Unknown Taxon SPECIES

D5

OVERALL RANK SUMMER 1978 2.0 1.0 2.0 1.0 0.7 0.3 3.0 1.3 1.0 1.3 0.7 0.7 SPRING 1978 2.3 0.3 $1.7 \\ 0.7$ 2.7 1.0 1.7 1.3 4.7 0.3 0.3 NSO 3 WINTER 1978 5.0 3.0 0.7 1.7 0.3 2.0 1.7 1.7 1.3 3.0 3.3 2.7 1.7 FAL.L. 1977 ¢.) 1.7 3.7 1.7 0.3 1.7 1.0 0.3 Mitripervisjus ruusei (Amu) Unknown Polychaete #30 Prvisiuuuseiriku: Åiinenusis (Amu) Unknown Bivelve J1 (M) Parationosyllis longicirrata (P) Pseudeurythoe ambigua (P) Medita putriputer; entre (E) Mittiputer; usinger; (Am) Podarke obscura (P) Mediomustus californiensis (P) <u>a</u> Chussenella Lunciata (M) Chussenella Lunciata (M) Chupbliam tahurulatam (Am) Gandhellitan amunitam (Am) Plasatatylaa mulitan (D) Tellibat alternata (M) Kuilla meniformis (Cn) Unknown Bivalve #10 (M) Heteromustus filiformis (P) Eulalia sanguinea (P) Schistomeringos rudolphi (p) Magelonu papillicornis (p) Paraprienespie pinnata (P) Tiron tropakis (Am) Folinices duplicatus (M) Turbonilla sp. (M) Nervis (neanthes) suminea Unknown Polychaete #2 Unknown Polychaete #15 Paleanotus heterrieta (P) Nereis sp. (P) Paraonidae Undet. (P) Unecola servica (Am) Unknown Bivalve #31 Phyllodoe arenae (P) Ampelisca verrilli (Am) Chiridotea stenops (1) Charumaría sp. (E) Unknown Blualve #13 (M) Migelona phyllisae (P) Ancinus depressus (1) Unknow Polychaete #26 Cumacea C (undet.) Podarke obscurvi (F ì Cumacea B (undet.) SPECIES

(Continued)

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Model Model <th< th=""><th>SPECIES</th><th>FALL 1977</th><th>WINTER 1978</th><th>SPRING 1978</th><th>SUMMER 1978</th><th>OVERALL RANK</th></th<>	SPECIES	FALL 1977	WINTER 1978	SPRING 1978	SUMMER 1978	OVERALL RANK
$ \begin{array}{ccccc} \mbox{matrix} (0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, $			NSO			
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	Caecum sp. (M)		1.3			77.0
$ \begin{array}{cccccc} Parameter (P) & P$	Polychaeta (Undet.)		1.3			77.0
$\begin{array}{c} P_{12}^{(1)}(1,1,2,1,2,1,2,1,2,1,2,2,2,2,2,2,2,2,2,2$	Puruonis fulgens (P)		1.3			77.0
$ \begin{array}{c} Creticalization (C) (C) (C) (C) (C) (C) (C) (C) (C) (C)$	Polydora sp. (P)				1.3	77.0
$ \begin{array}{ccccccc} Transformation (0) \\ Transformation (0) \\ Stransformation (0) \\ Stransform$	Certocerhule sp. (P)		1.3			0.11
$ \begin{array}{cccc} 1.0 & 1$	Truchypeneus constructus (D)				1.0	84.0
$ \begin{array}{cccc} \mbox{tractural large (n)} & \mbox$	Actinaria Undet. (Cn)			1.0		84.0
$ \begin{array}{ccccc} \text{Mathematical fully interacting (n) } & 0.1 & 0.1 & 0.1 \\ \text{Parking fully field matter (n) } & 0.1 & 0.1 & 0.1 \\ \text{Parking fully field matter (n) } & 0.1 & 0.1 & 0.1 \\ \text{Parking fully field matter (n) } & 0.1 & 0.1 & 0.1 \\ \text{Parking fully field matter (n) } & 0.1 & 0.1 & 0.1 \\ \text{Parking fully field matter (n) } & 0.1 & 0.1 & 0.1 \\ \text{Parking fully field matter (n) } & 0.1 & 0.1 & 0.1 \\ \text{Parking fully field matter (n) } & 0.1 & 0.1 & 0.1 \\ \text{Parking fully field matter (n) } & 0.1 & 0.1 & 0.1 \\ \text{Parking fully field matter (n) } & 0.1 & 0.1 & 0.1 \\ \text{Parking fully field matter (n) } & 0.1 & 0.1 & 0.1 \\ \text{Parking fully field matter (n) } & 0.1 & 0.1 & 0.1 \\ \text{Parking fully field matter (n) } & 0.1 & 0.1 & 0.1 \\ \text{Parking fully field matter (n) } & 0.1 & 0.1 & 0.1 \\ \text{Parking fully field matter (n) } & 0.1 & 0.1 & 0.1 \\ \text{Parking fully field matter (n) } & 0.1 & 0.1 & 0.1 \\ \text{Parking field matter (n) } & 0.1 & 0.1 & 0.1 \\ \text{Parking field matter (n) } & 0.1 & 0.1 & 0.1 \\ \text{Parking field matter (n) } & 0.1 & 0.1 & 0.1 \\ \text{Parking field matter (n) } & 0.1 & 0.1 & 0.1 \\ \text{Parking field matter (n) } & 0.1 & 0.1 & 0.1 \\ \text{Parking field for (n) } & 0.1 & 0.1 & 0.1 \\ \text{Parking field for (n) } & 0.1 & 0.1 & 0.1 \\ \text{Parking field for (n) } & 0.1 & 0.1 & 0.1 \\ \text{Parking field for (n) } & 0.1 & 0.1 & 0.1 \\ \text{Parking for (n) } & 0.1 & 0.1 & 0.1 \\ \text{Parking for (n) } & 0.1 & 0.1 & 0.1 \\ \text{Parking for (n) } & 0.1 & 0.1 & 0.1 \\ \text{Parking for (n) } & 0.1 & 0.1 & 0.1 \\ \text{Parking for (n) } & 0.1 & 0.1 & 0.1 \\ \text{Parking for (n) } & 0.1 & 0.1 & 0.1 \\ \text{Parking for (n) } & 0.1 & 0.1 & 0.1 \\ \text{Parking for (n) } & 0.1 & 0.1 & 0.1 \\ \text{Parking for (n) } & 0.1 & 0.1 & 0.1 \\ \text{Parking for (n) } & 0.1 & 0.1 & 0.1 \\ \text{Parking for (n) } & 0.1 & 0.1 & 0.1 \\ \text{Parking for (n) } & 0.1 & 0.1 & 0.1 \\ \text{Parking for (n) } & 0.1 & 0.1 & 0.1 \\ \text{Parking for (n) } & 0.1 & 0.1 & 0.1 \\ \text{Parking for (n) } & 0.1 & 0.1 & 0.1 \\ \text{Parking for (n) } & 0.1 & 0.1 & 0.1 \\ \text{Parking for (n) } & 0.1 & 0.1 & 0.1 \\ \text{Parking for (n) } & 0.1 & 0.1 & 0.1 \\ \text$	Mitrella Lunata (M)					0.4.0
$ \begin{array}{cccc} \mbox{Markoval} \mbox{Markov} \mbox{Markoval} \mbox$	Nassurius trivittatus (M)				1.0	84.0
$ \begin{array}{ccccc} \mbox{Matchevent} ({\bf y}) & 0.1 & 0.$	Magelona sp. (P)				1.0	0.48
$ \begin{array}{c} eq:constraint of the second o$	Mysidopsis bigelowi (My)	0.3	г С		0.7	5.18
$ \begin{array}{cccc} \label{eq:constraint} \mbox{final points} & 0.1 &$	Tereora austocata (n)				C. 0	2.10
$\begin{array}{cccc} \label{eq:contrast (c)} \\ \mbox{ortical matrix (c)} \\ ortical matrix ($	Finitize receivens (U)		0.1	- 0		5.1% 5.10
$ \begin{array}{cccc} \label{eq:contraction} first array of the first of th$						2 10
$ \begin{array}{cccc} \label{eq:constraint} & (a) & (b) & (c) & ($	Ductodomiillos befeneteini (D)					5 10
$\begin{array}{cccc} \text{Monotime start, (r)} & 0.1 & 0$	crocomercieu Asjerace de la Caolantas mikua (D)			~ ~ ~		5 10
$\begin{array}{ccccc} \begin{array}{ccccccccccccccccccccccccccccc$	uctuptus tuura (r) Notoninnus suinifonus (D)		7 0			2.10
$ \begin{array}{ccccc} \begin{tabular}{lllllllllllllllllllllllllllllllllll$	notoctrius spinigerus (r) Drumidae limisela (n)					01 5
$ \begin{array}{ccccc} \mbox{vertures A} (under, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,$	logitues transcou (U) Norrenaria merrenaria (N)	. 0				5 10
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	Veneridae A (under) (M)		6.0			97.5
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	Cirratulus en (D)			0 - 3	0.3	97.5
Spic setos (p) 0.3 0.3 0.3 0.3 0.3 Spic setos (p) 0.3 0.3 0.3 0.3 0.3 Sprides under. (D) 0.3 0.3 0.3 114.5 Sprides under. (D) 0.3 0.3 0.3 114.5 Sprides under. (D) 0.3 0.3 0.3 114.5 Spreetises under. (D) 0.3 0.3 0.3 0.3 Spreetises under. (D) 0.3 0.3 0.3 114.5 Spreetises of under. (D) 0.3 0.3 0.3 114.5 Spreetises of other (D) 0.3 0.3 0.3 0.3 Spreetises of other (D) 0.3 0.3 0.3 0.3 Aparthura mgnifica (I) 0.3 0.3 0.3 0.3 Aparthura mgnifica (I) 0.3 0.3 0.3 114.5 Aparthura mgnifica (FO) 0.3 0.3 0.3 114.5 Spreeting proverse (FO) 0.3 0.3 0.3 114.5 Spreeting proverse (P) 0.3 0.3 0.3 114	Convolus eremita (D)		۰ ۲			97.5
$ \begin{array}{cccccc} Branchiestama carribasem (cc) \\ Cyprides alphaenostria (D) \\ Cyprides alphaenostria (D) \\ Cyprides alphaenostria (D) \\ Cyprides alphaenostria (D) \\ Cyprides under (D) \\ Arpelisco adorum (D) \\ A$	Shin setasa (D)			1.0		07 5
$ \begin{array}{cccccc} (gyrides alphaerostrie (0) \\ (gyrides alphaerostrie (0) \\ (respictes under. (1) \\ (model argonic (model) \\ (model$	Branchiostoma caribaeum (Cc)					5.711
Craptide Undet. (0) 0.3 0.3 114.5 Ampeliaca vadorum (ma) 0.3 114.5 114.5 Ampeliaca vadorum (ma) 0.3 114.5 114.5 Ampeliaca vadorum (ma) 0.3 0.3 114.5 Edotea montosa (1) 0.3 0.3 114.5 Mysidaca 0.3 0.3 0.3 114.5 Maptipaca (1) 0.3 0.3 0.3 114.5 Amplica (1) 0.3 0.3 114.5 0.3 114.5 Amplica (1) 0.3 0.3 0.3 114.5 0.3 114.5 Phore sp. (1) 0.3 0.3 0.3 114.5 0.3 114.5 Privata arguidae Undet. (1) 0.3 0.3 0.3 <td>Ogurides alphaenostris (D)</td> <td></td> <td>0.3</td> <td>•</td> <td></td> <td>114.5</td>	Ogurides alphaenostris (D)		0.3	•		114.5
Mage iis call a contract (M) 0.3 0.3 0.1 114.5 $Barame tope i (a cypris (M))$ 0.3 0.3 114.5 $Barame tope i (a cypris (M))$ 0.3 0.3 114.5 $Barame tope i (a cypris (M))$ 0.3 0.3 114.5 $Mathan magni fica (I)$ 0.3 0.3 0.3 114.5 $Mathan magni fica (I)$ 0.3 0.3 0.3 114.5 $Mathan magni fica (I)$ 0.3 0.3 114.5 114.5 $Mathan magni fica (I)$ 0.3 0.3 0.3 114.5 $Mathan magni fica (I)$ 0.3 0.3 0.3 114.5 $Mathan magni fica (I)$ 0.3 0.3 0.3 114.5 $Mathan magni fica (I)$ 0.3 0.3 114.5 <td>Grapsidae Undet (D)</td> <td></td> <td>1</td> <td></td> <td>0.3</td> <td>114.5</td>	Grapsidae Undet (D)		1		0.3	114.5
$ \begin{array}{cccc} \mbox{Parametopella cypris (Am)} & 0.3 & 0.$	Ampelisca vadorum (Am)			0.3	1	114.5
Edotea montosa (1) 0.3 114.5 Wysidacea(0.3) 114.5 Wysidacea 0.3 0.3 114.5 Sastrosaccus johnsoni (Ny) 0.3 0.3 114.5 Apathyoda 0.3 0.3 0.3 0.3 Apathyoda 0.6 0.3 0.3 0.3 Apathyoda 0.6 0.3 0.3 0.3 Apathyoda 0.6 0.3 0.3 0.3 Apathyoda 0.3 0.3 0.3 0.3 <td>Parametopella cypris (Am)</td> <td>0.3</td> <td></td> <td></td> <td></td> <td>114.5</td>	Parametopella cypris (Am)	0.3				114.5
Wysidacea 0.3 114.5 $dastrosaccus johnsoni (Ny)$ 0.3 0.3 114.5 $dastrosaccus johnsoni (Ny)$ 0.3 0.3 114.5 $Aponthura magnifica (1)$ 0.3 0.3 114.5 $Aponthura magnifica (1)$ 0.3 0.3 114.5 $Aponthuroidea (E)$ 0.3 0.3 0.3 $Apterias forbesii (E00.30.3114.5Apturoidea (E)0.30.3114.5Apturoidea (E)0.30.3114.5Photica protintPhotica (P)0.3114.5Photica protintPhotica (P)0.3114.5Photica protintPhotica (P)0.3114.5Photica protintPhotica (P)0.3114.5Photica protintPhotica (P)0.30.3Photica ProtintPhotica (P)Photica (P)0.3Photica Protint$	Edotea montosa (1)		0.3			114.5
Gastrosaccus johnsoni (Ny) 0.3 114.5 Aparthura magnifica (1) 0.3 0.3 114.5 Aparthura magnifica (1) 0.3 114.5 Aparthura magnifica $(E0)$ 0.3 114.5 Amphipoles (E) 0.3 0.3 114.5 Apterias forbesii $(E0)$ 0.3 114.5 Apterias forbesii $(E0)$ 0.3 114.5 Apterias forbesii $(E0)$ 0.3 114.5 Atterias forbesii $(E0)$ 0.3 114.5 Dynuroldes (E) 0.3 0.3 114.5 Phicula proving $Prive Prive Priv$	Mysidacea				0.3	114.5
Apanthura magnifica (1) 0.3 0.3 114.5 Amplifica (2) 0.3 0.3 114.5 Amplifica (5) 0.3 0.3 114.5 Amplifica (5) 0.3 0.3 114.5 Mucules (5) 0.3 0.3 114.5 Mucules (7) 0.3 0.3 114.5 Muculas (7) 0.3 0.3 0.3 114.5 Orbinia americana (P) 0.3 0.3 0.3 114.5 Orbinia americana (P) 0.3 0.3 0.3 $0.14.5$ Orbinia americana (P) 0.3 0.3 0.3 $0.14.5$ Orbinia americana (P) 0.3 0.3 0.3 $0.14.5$ Orbinia americana (P) 0.3 0.3 0.3 0.3 0.3 Cycerdae Undet. (P) 0.3 0.3 0.3 0.3 0.3 <td>Gastrosaccus johnsoni (My)</td> <td></td> <td></td> <td>0.3</td> <td></td> <td>114.5</td>	Gastrosaccus johnsoni (My)			0.3		114.5
Amphipoda 0.3 114.5 Asteriat forbesi 0.3 114.5 Asteriat forbesi 0.3 114.5 Asteriat forbesi 0.3 114.5 Ophication of the state of	Apanthura magnifica (I)		0.3			114.5
Maternas forcesti (E0) 0.3 114.5 $Ophitroide (E)$ 0.3 114.5 $Ophitroide (E)$ 0.3 114.5 $Mucula proxima (M)$ 0.3 114.5 $Orbinia americana (P)$ 0.3 114.5 $Suclymene sp. (P)$ 0.3 114.5 $Orbinia americana (P)$ 0.3 114.5 $Suclymene sp. (P)$ 0.3 114.5 $Orbinia americana (P)$ 0.3 114.5 $Orbinia americana (P)$ 0.3 114.5 $Orbinia americana (P)$ 0.3 0.3 $Orbinia application (P)$ 0.3 114.5 $Orbinia application (P)$ 0.3 114.5 $Orbinia application (P)$ 0.3 0.3	Amphipoda	0.3				114.5
Optimuroidea (E) 0.3 114.5 Thyone sp. (E) 0.3 114.5 Thyone sp. (E) 0.3 114.5 Macula proxima (M) 0.3 114.5 Spitonium hump+reyai (M) 0.3 114.5 Orbinia americana (P) 0.3 114.5 Subjamere sp. (P) 0.3 0.3 114.5 Polynoidae Undet. (P) 0.3 0.3 114.5 Pravisia sp. (P) 0.3 0.3 114.5 Pravisia sp. (P) 0.3 0.3 114.5 Pravisia sp. (P) 0.3 0.3 114.5 Propatra cuprea (P) 0.3 0.3 114.5	Asternas forbesut (E0	(0.3	114.5
Nayone sp. (E)0.3114.5Nayone sp. (E)0.3114.5Succula province (H)0.3114.5Succula province (H)0.3114.5Succula province (P)0.3114.5Succula province (P)0.30.3Succula province (P)0.3114.5	Ophiuroidea (E)	0.3				114.5
$\begin{array}{ccccc} mucuta prozena (H) \\ Depitonium humplregei (M) \\ Depitonium humplregei (M) \\ Orbina americana (P) \\ Devimene sp. (P) \\ Devimene sp. (P) \\ Polynoldae Under. (P) \\ Travisia sp. (P) \\ Orbina sp. (P) \\ O$	Tryone sp. (E)				0.3	114.5
bp:tcontum numpfreygt (M) 0.3 114.5 Orbinia americana (P) 0.3 114.5 Drivia americana (P) 0.3 114.5 Euclymene sp. (P) 0.3 114.5 Polynoidae Under. (P) 0.3 114.5 Travisia sp. (P) 0.3 114.5 Providae Under. (P) 0.3 114.5 Diopertidae Under. (P) 0.3 114.5 Diopertidae Under. (P) 0.3 114.5 Diopertidae Under. (P) 0.3 114.5	Nucuta prozima (M)				0.3	114.5
Orbinal americana (P) 0.3 114.5 Euclymene sp. (P) 0.3 114.5 Euclymene sp. (P) 0.3 114.5 Polynoidae Undet. (P) 0.3 114.5 Pravissia sp. (P) 0.3 114.5 Pravissia sp. (P) 0.3 114.5 Pravissia sp. (P) 0.3 114.5 Dispertidae Undet. (P) 0.3 114.5 Dispertidae Undet. (P) 0.3 114.5	Epitonium humpreyer (M)			•	0.3	114.5
Exectymente sp. (P) 0.3 114.5 Polynoidae Undet. (P) 0.3 114.5	Orbinia americana (P)			0.3		114.5
Polynoidae Undet. (P) 0.3 114.5 Travisia sp. (P) 0.3 114.5 Clyceridae Undet. (P) 0.3 0.3 114.5 Dioratra currea (P) 0.3 114.5	Euclymene sp. (P)				0.3	114.5
ravusta sp. (P) 0.3 114.5 Glyceridae Undet. (P) 0.3 0.14.5 Diopatra cuprea (P) 0.3 114.5	Polynoidae Undet. (P)				0.3	114.5
Ciyceridae Under. (P) 0.3 0.14.5 Diopatra cuprea (P) 0.3 114.5	Travisia sp. (P)	0.3				114.5
0.3 114.5 0.3 114.5	Glyceridae Undet. (P)	0.3				114.5
	Unopatra cuprea (P)				0.3	114.5

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(Continued)

Appendix D. (Concluded)

OVERALL RANK		114.5	114.5 114.5 114.5	114.5
SUNDAER 1978				
SPRING 1978	5	0.3		0.3
WINTER 1978	NSO.	0.3		r.0
FALI. 1977			0.3 0.3	
<pre>>>PECLES</pre>		French heteropy add (P)	Eunicidae Undet. () Unknown Polychaet. #11	Priniu 'lavata (P) Phyllodocidae (undet.) (P) Vigmenila torquata (P)

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Appendix E.

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Ranked abundance of benthic macroinvertebrates collected during 1982 at intertidal and subtidal stations on the south jetty transect (Transect II). Estimates represent the mean number per 0.1 m² and A = Ascidiacea, Am = Amphiyuda, Brach = Brachlopoda, C = Cumacea, Cc = Cephalochordata, Cm = Cnidaria, D = Decapoda, E = Echinodermata, H = Hemichordata, I = Isopoda, M = Mujlusca, My = Mysidacea, P = Polychaeta, T = Tanaidacea.

SPECIES	×	SUMMER 1982 SE	×	FALL 1982 SE	OVERALL RANK
			<u>1015</u>		
		NO ANIM	ALS COLLECTED		
			<u>S102</u>		
Emerita tulpoida (D) Nematoda	77.3 56.0	19.7	5.3	2.7	1.0
Saclebryie symmeta (P) Crassincia lunulata (M)	39.3 1.3	10.5	0.7	0.7	2.0 3.0 4.0
			<u>5103</u>		
Nematoda Emerita sultoida (D)			12.7	1.1	1.0
Scole Lepis Ryumata (P) Tellin (M)	с. С.	0.7	10.7 3.3	3.5 1.8	2.0
Rathursterius Longimerus (Am) Rathursterius (Am) Ruthurstla an (Mu)	4.7	1.1			4.0 6.0
Desur strictilis (M) Crussine/la lunulata (M)	0.7	2.0	1.3 1.3	1.3 1.3	6.0 8.0
			S501		
Nematoda	28.7	13.4	11.3	د ب ب	-
tiervers fulgers (P) Pourmeister Sp. (My)	3.7	2.7 1 8	4.7	4.7	2.0
Crussingly lunulata (M) Perpinsing shotsdifermia (M)	1.3	0.9	1.3	0.3	3.0
Platylschnopldae A (Am)	1.0	0.3	0.7	0.3	5.0
Pression and Controlling (My) Pression tearing (M)	1.0	1.0 0.6			0.00
enternetter ettegtatoa (M) Anta namiahilis (M)	1.0	1.0			8.0
laurbrineria importiona (P) Professivie enumera (D)	0.7	0.3	0.7	0.3	11.5
Net http://www.comment.com/ Definitions/comments/comments/comments/comments/comments/comments/comments/comments/comments/comments/comments/ Definitions/comments/comments/comments/comments/comments/comments/comments/comments/comments/comments/comments/			0.7	0.3	11.5
Privarus ap. (1)	0.3	0.3		<u>,</u>	17.5

(Continued)

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OVERALL 17.5 17.5 17.5 17.5 17.5 17.5 0.3 1.2 0.3 0.3 0.6 SE 0.3 7.1 0.3 0.3 0.7 0.7 FALL 1982 0.3 4.3 3.3 1.0 13.0 1.0 0.3 0.7 0.7 0.3 0.3 5.3 × <u>\$\$02</u> SS01 26.2 6.0 1.5 1.5 0.3 0.9 0.9 0.9 1.0 SE 0.3 0.3 $\begin{array}{c} 0.7 \\ 0.3 \\ 0.3 \\ 0.3 \\ 0.3 \end{array}$ 0.3 SUMMER 1982 108.3 17.0 6.0 4.0 0.7 1.3 0.7 0.7 1.3 1.3 1.3 1.3 1.0 0.7 0.7 0.7 0.7 0.7 0.7 0.3 0.3 i× Synchelildium americanum (Am) Avanthchaustorius intermedius (Am) Erichthonius brasiliensis (Am) Currella prantis (Am) Corephium sp. C (Am) Tiron tropakis (Am) Orbinildae (P) Harloscolopics foliosus (P) Trachyrenaeus constrictus (D) Ĵ Paguridae (D) Acconthohaustorius míllsí (Am) Ancinus depreseus (1) 011gochaeta Nephtys picta (P) Spiophanes bombyz (P) Branchiostoma caribaeum (Cc) Rher-zynius epistomus (Am) Methurrinia floridana (Am) Parnoaprella teruis (Am) Chiridotea sternops (1) Hysidae (My) Boumaniella brasiliensie Eunicidae (P) crassinella lunulata (M) Platylschnopidae A (Am) Chione grus (M) Sabellaria vulgaris (P) Ancinus depressus (1) Nematoda Hemipodus roseus (P) Tellina texana (M) Paraonis fulgens (P) Glycera sp. C (P) Pinniza emistata (D) Xanthidae (D) Portunus ap. (D) Paguridae (D) Cumacea B SPECIES

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(Continued) Appendix E.

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		FR 1982		FALL 1982	OVERALL
SPECIES	×	SE	×	SE	RANK
		<u></u>	<u>502</u>		
Bounnariella sp. (Nv)	0.3	0.1			36.5
Jassa falcata (Am)	0.3	0.3			36.5
Amphipoda	0.3	0.3			36.5
Renilla reviformis (Cn)			0.3	0.3	36.5
Actiniaria (Cn)	0.3	0.3			36.5
Olivella mutica (M)			0.3	0.3	36.5
Petricola proladiformis (M)	0.3	0.3			36.5
Sipunculida	0.3	0.3			36.5
Harmethoe sp. (P)		0.3			36.5
Writ LORE FELS Magna (Y)	r 0		0.3	٤.9	3,55
Maraidae (D) Nereidae (D)					2.00
(irratulidae (D)	0.3	c.0		. 0	2.00
Polydora caeca (P)	0.3	0.3		C . D	
		S	S03		
		1			
Crassinella martinicensis (M)			378.0	81.4	1.0
Podarke obscurn (P)			195.7	146.8	2.0
Turbellaria A			82.3	63.8	3.0
(rassinella lunulata (M)	19.3	5.0	7.7	6.2	4·0
Nematoda	14.3	6.1	10.7	8.7	2.0
Turbellaria	0.3	0.3	21.3	21.3	0.0
constraint subserve (P)	æ		12.7	8.6	0.7
Turbellaria B	6.3	1.3	0.6	1.2	0.0
Chione grus (M)	2.7	1.3	0.04		10.0
Ophiuroidea A (E)			1.7	6.0	11.5
Pseudeurythoe ambigua (P)	1.0	1.0	0.7	0.7	11.5
Microprotopus raneyi (Am)	1.0	1.0			15.0
Chiridotea stenops (I)	0.3	0.3	0.7	0.7	15.0
Pisione remota (P)			1.0	1.0	15.0
Autolytus sp. (P)			1.0	0.6	15.0
Hydroides protulicola (P)			1.0	0.6	15.0
Branchiostoma caribaeum (Cc)	0.3	0.3	0.3	0.3	20.5
Dmerita talpoida (D)	0.3	0.3	0.3	0.3	20.5
Pinnotheres sp. (D)	0.7	0.7			20.5
Ancinus depressus (1)	0.7	0.3			20.5
Corophium sp. C (Am)	0.7	0.3			20.5
Turbellaria C			0.7	0.7	20.5
Bathyporeia parkeri (Am)	0.3	0.3			31.5
Ampelisca vadurum (Am)	0.3	0.3			31.5

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Appendix E. (Concluded)

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1.1

SPECIES	x SUMMER 1982	SE	x FALL 1982	SE	OVERALL RANK
		<u>5503</u>			
Protohaustorius deichmannae (Am)	0.3	0.3			31.5
Batea catharinensis (Am)	0.3	0.3			31.5
Edotea montosa (I)	0.3	0.3			31.5
Exosphaeroma diminutum (1)			0.3	0.3	31.5
Boumaniella floridana (My)	0.3	0.3			31.5
Platyischnupidae A (Am)	0.3	0.3			31.5
Actiniaria (Cn)			0.3	0.3	31.5
Turbellaria D			0.3	0.3	31.5
Olivella mutica (M)			0.3	0.3	31.5
Petricola pholadiformis (M)			0.3	0.3	31.5
Arcidae B (M)	0.3	0.3			31.5
Hydroides uncinata (P)			0.3	0.3	31.5
Hydroides sp. (P)			0.3	0.3	31.5
Nephtys picta (P)	0.3	0.3			31.5

E4

Appendix F.

Ranked abundance of benthic macroinvertebrates collected during 1982 at intertidal and subtidal stations on the north jetty transect (Transect III). Estimates represent the mean number per 0.1 m² and A = Ascidiacea, As = Asphipoda, Brach = Brachiopoda, C = Cumacea, Cc = Cephalochordata, Cn = Cnidaria, D = Decapoda, E = Echinodermata, H = Hemichordata, I = Isopoda, M = Mollusca, My = Mysidacea, P = Polychaeta, T = Tanaidacea.

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		MER 1982		FALL 1982	OVERALL
SPECIES	×	SE	X	SE	RANK
			TOIN		
Nematoda	6.0	2.0	16.0	16.0	1.0
Oligochaeta Pirnotheres sp. (D)	0.7	0.7	1.3	1.3	3.0
			<u>N102</u>		
Oligochaeta			424.0	164.1	1.0
Nematoda Socialaria suurmata (P)	16.0		1.0/1	8.12	0.7 7 0
Bonerita talpoida (D)	0.7	0.7	6.9	3.0	4.0
Crassinella lunulata (M) Donax variabilis (M)	4.0	1.1	2.0	1.1 1.3	5.0 6.0
			EOIN		
Scolelepis squamata (P)	227.3	91.1	1.3	0.7	1.0
Donar variabilis (M)			32.7	6.0	2.0
Nematoda	•		28.0	26.0	3.0
Emerita talpoida (D)	8./ 6.0	1.3	2.0	1.1	4.0
Protohaustorius deichmannae (Am)	2.7	2.7			6.0
Batea catharinensis (An)	1.3	1.3			7.0
Rhepoxynius epistomus (Am)	0.7	0.7			0.6
ouroprium sp. A (Am) Oligochaeta			0.7	0.7	0.6
			TOSN		
Bathyporeia parkeri (Am)	50.7	12.2			1.0
Leptognatha caeca (T)	26.7	13.3	2.0	2.0	2.0
Protohaustorius deichmannae (Am)	22.0	10.5	3.0	3.0	3.0
ogyrtaes nayt (U) Nemetoda	6.0 6	1.1	4.5	2.5	5.0
Platyischnopidae A (Am)	7.0	2.6	2.5	2.5	0.0
raranaustorius iongime rus (Am) Boumaniella so. (Mv)	8.0	2.2			0.0 8.0
Rheporynius epistomus (Am)	5.0	2.5			9.0

(Continued)

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	NUNS	ER 1982		FALL 1982	OVERALL	ļ
SPECIES	×	SE	×	SE	RANK	
						ļ
			1051			
Acuthohuustorius intermedius (Am)	3.3	6.0	1.0	1.0	10.5	
Migeiona parillicornis (P)	3.7	1.2	0.5	0.5	10.5	
Mellita juinquesperforata (E)	2.0	1.5	1.5	0.5	12.0	
Boumanieila floridana (My)	1.3	0.9			13.5	
Scolelepis equamata (P)	1.3	6.0			13.5	
Chiridotea stenops (1)	0.7	0.7	0.5	0.5	15.5	
Lumbrineris impatiens (P)	1.0				15.5	
Pagurus longicarpus (D)	0.7	0.7			19.5	
Synchelidium americanum (Am)	0.7	0.3			C.61	
Acanthohaustorius millsi (Am)	0.7	e.o			() () ()	
Nemertinea	0.7	0.3			2.61	
Olivella mutica (M)	0.3	0.3	0.5	0.5	19.5	
Nephtys picta (P)	0.7	0.3			19.5	
Pinniza sp. (D)	0.3	0.3			25.5	
Pimutheres sp. (D)	0.3	0.3			25.5	
Lysianassidae (Am)	0.3	0.3			25.5	
Tellinu sp. (M)	0.3	0.3			25.5	
Dispio uncinata (P)			0.5	0.5	25.5	
Nereidae (P)	0.3	0.3			25.5	
		£,	1502			
Platyischnopidae A	20.7	3.3	4.0	1.0	1.0	
Acanthohaustorius intermedius (Am)	10.3	1.8	5.3	3.9	2.0	
Leptogratha caeca (T)	9.7	4.3	3.7	2.2	3.0	
Rheporynius epistomus (Am)	13.0	5.0			4.0	
Ogyrides hayi (D)	9.3	3.2	0.3	0.3	5.0	
Chiridotea stenops (I)	8.0	1.5	1.0		6.0	
Protohuustorius deichmannae (Am)	3.0	0.6	5.0	1.7	7.0	
Nematoda	6.7	3.2	1.0	0.6	8.0	
Bathyponeia parkeni (Am)	5.3	2.4			9.0	
Magelona papillicornis (P)	2.7	1.8	1.3	0.3	10.0	
Acanthohaustorius millsi (Am)	1.0	1.0	2.3	2.3	11.0	
Boumaniella sp. (My)	3.0	1.5			12.0	
Nephtys picta (P)	1.0	0.6	1.7	0.7	13.0	
Parahaustorius longimerus (Am)	2.3	2.3			14.0	
Mellita quinquesperforata (E)	1.3	0.3	0.7	0.7	15.5	
Echinoides (E)	2.0	1.1			15.5	
Bodotriidae A (C)	1.3	1.3			17.0	
Ancinus depressus (1)	1.0	1.0			19.5	
Boumaniella floridana (My)	1.0	0.6			19.5	
Haustoriidae (Am)	1.0	1.0			19.5	

(Continued)

F2

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	St St	MMER 1982		FALL 1982	OVERALL
SPECIES	×	SE	×	SE	RANK
			s02		
Paraonis fulgens (P)			1.0	1.0	19.5
Pinniza cristata (D)			0.7	0.7	23.0
Tellina texana (M)	0.3	0.3	0.3	0.3	23.0
Scolelepis squamata (P)	0.7	0.7			23.0
Pagurus longicarpus (D)	0.3	0.3			32.0
Albunea paretti (D)	0.3	0.3			32.0
Paguridae (D)		~ ~	0.3	0.3	32.0
currenteres sp. (U)					32.0
by choncilla filt formin (11)					0.25
breckoverud jurijumus II) Amahiada					0.20
(N)			. 0		32.0
success proteins (1) Snisula solidissina (M)	6.0	0.3			0.20
Lumbrineris imatiens (P)		5 5 5	0.3	0.3	32.0
Glucera ornechtala (P)	0.3	0.3		1	32.0
Dispio uncinata (P)			0.3	0.3	32.0
Travisia sp. A (P)	0.3	0.3	:	1 9	32.0
Nephtvldae (P)	0.3	0.3			32.0
Tranie in ramia (P)	10	0.3			32.0
					0.17
		Z	<u> 803</u>		
Platyischnopidae A (Am)	29.7	5.3	3.0	1.0	1.0
Rhet Junius epistomus (Am)	20.7	2.3			2.0
Protohaustorius deichmannae (Am)	17.3	5.0	0.3	0.1	1.0
Nematoda	7.7		5.0	4.0	0.4
Nerhtys picta (P)	4.0	0.6	4.0		5.0
Acomthohaustorius intermedius (Am)	6.3	1.8	0.7	0.7	6.0
Renilla reniformis (Cn)	5.0	1.0	0.7	0.3	7.5
Mellita quinquesperforata (E)	1.0	0.6	4.7	1.4	7.5
Bathyporeia parkeri (Am)	4.0	1.7			9.5
Tellina texana (M)	3.3	0.9	0.7	0.7	9.5
Magelona papillicornis (P)	1.3	0.9	1.3	0.9	11.0
Olivella mutica (M)	2.0	0.6			13.0
Tellina probrina (M)	2.0	1.0			13.0
Sapel Larra vulgaris (P)	,	•	2.0	1.5	13.0
ogyrtaee nayt (D) Aconthohuaetorius millei (Am)	1./	0.3	•	4 C	16.5 2 21
Benmaniella an (Mv)					16.5
Metamusidorsis surfti (Nv)	1.7	1.7			16.5
Mysidopsis bigeloui (MV)	1.3	1.3			20.5
Chiridotea stenops (1)	1.0	0.6	0.3	0.3	20.5

F3

(Continued)

Appendix F. (Concluded)

	SUPPLE	R 1982		FALL 1982		OVERALL
SPECIES	×	SE	×		SE	RANK
		2	503			
			1			
	l U	0.3	1.0		0.6	20.5
Ancinus depressus (1)					2 0	20.5
Leptognatha caeca (T)	с -					24.5
Lepidopa websteri (D)	D.1		1.0		1.0	24.5
Emerita talpoida (D)			1.0		1.0	24.5
Tiron tropakis (Am)						2 4 5
Nemertinea	1.0	0.6				28.0
Synchelidium americanum (Am)	0.7	1 , 1				28.0
Parahaustorius longimerus (Am)	0.7	0.3				0.01
Heminodus roseus (P)			0.7		0./	0.02
Provens longicarrue (D)	0.3	0.3				20.0
Automote sn. (D)	0.3	0.3				58.5
Paguridae (D)			0.3		0.3	38.5
Printing co. (D)			0.3		0.3	28.2
Botos asthuminousie (Am)	0.1	0.3				38.5
During curvets first to (nul)		0.3				38.5
						38.5
Boumaniella floridana (My)						38.5
Strigilla mirubilis (M)	0.3	.				3.8.5
Tellina inis (M)	0.3	0.3				38.5
Oliva sayana (M)			0.9			38.5
Petricola pholadiformis (M)			0.3		C.D	2 96
Selen viridig (M)	0.3	0.3				
Spisula solidissima (M)	0.3	0.3				79.7
Terebra dislocata (M)	0.3	0.3				1.00
Arminu tioring (M)	0.3	0.3				5 5 5
Glucera oznocevhala (P)	0.3	0.3				38.5
Splontdae A (P)	0.3	0.3				C. 82
Paraonis fulgens (P)	0.3	0.3				38.5

F4

Ranked abundance of benthic macroinvertebrates collected during 1982 at intertidal and subtidal stations on the south control transect (Transect IV). Estimates represent the mean number per 0.1 m² and A = Ascidiacea, Am = Amphipoda, Brach = Brachlopoda, C = Cumacea, Cc = Cephalochordata, Cn = Cnidaria, D = Decapoda, E = Echinodermata, H = Hemichordata, I = Isopoda, M = Mollusca, My = Mysidacea, P = Polychaeta, T = Tanaidacea.

Appendix G.

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	NUS	MER 1982		FALL 1982		OVERALL
SPECIES	×	SE			SE	RANK
			C101			
Nemat oda	1.3	0.7	107	3.0	162.2	1.0
Ollgochaeta Durr narisbilis (M)	~ [1.1		0.0	88.0 1.1	3.0
Emerita tal p (a) (D)	Ì				0.7	4.5
Talonshestia megalophthalma (Am) Pinnothenes sp. (D)	1.3	1.3 C.7				4.5 6.0
		- 1	C102			
Nemat oda	10.7	7.0	38	3.7	61.5	1.0
Donur ariabilis (M)	55.3			0.0	2.0	2.0
scol lepts squamata (r) Presenta talnoida (D)	2.7	C.C		0.0	6.6	0.4
Haustorius longirostris (Am)	Ì				1.3	5.0
Amphiporeia virginiana (Am) Economia dianan (P)	r 0	6	U	7	0.7	7.0
Ercyone atstar (r) Syllis spongicola (P)	0.7	0.7				7.0
		-,	C103			
Emerita talpoidu (D)	315.3	134.4				1.0
Denar variabilis (M)	169.3	3.3	1	3.0	7.0	2.0
Scolelepis squamata (P)	181.3	6.8		[.]	0.7	3.0
Amphiporeia urnginiana (Am) Honotonino longinoetri e (Am)	10.0	1.1			0.7	0.4
Namatoda				0	3.0	6.0
Haustorildae (Am)				2.1	2.7	7.0
Pa. thaustorius longimerus (Am)			-	1.3	0.7	8.0
Acanthohaustorius millsi (Am)	0.7	0.7				10.0
Renilla reniformis (Cn)			0	0.7	0.7	10.0
Crassinella lunulata (M)	0.7	0.7				10.0
			CS01			
Donar variabilis (M)	52.7	28.5	-	1.7	1.2	1.0
Paranaustorius tongumerus (Am) Magelona papillicornis (P)	0.3	20.1	2(0.0	3.0	3.0

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The Relation of the second			CINNER 1083		EALT 1087		OVFRALL		
SSQ1 13.7 12.8 4.0 Marticla station (0) 13.7 13.7 12.8 4.0 Series at station (0) 13.7 13.7 13.7 12.8 4.0 Series at station (0) 13.7 13.7 5.9 0.0 0.0 20	SPECIES)H	SUMMER 1792		X 2017 1201	SE	RANK		
G01 1.1 <th <="" colspan="2" td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td></th>	<td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>								
				<u>cs01</u>	•••				
	Nematoda				15.7	12.8	4.0		
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	Emerita talpoida (D)	14.0	14.0				5.0		
	Scolelepis squamata (P)	13.7	5.2				6.0		
$ \begin{array}{ccccc} {\rm Contrained activity and with a discrimination (a) & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & $	Boumaniella Bp. (My)	7.3	5.9		0.3	0.3	7.0		
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	Protohaustorius deichmannae (Am)				5.0	2.0	8.0		
	ketamysidopsis swifti (My)	1.7	1.7				0.6		
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	kathyporeia parkeri (Am)	0.7	0.3		0.7	0.3	10.0		
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	gyrides havi (D)	1.0	1.0				11.5		
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	hiridotea stenops (1)				1.0	0.6	11.5		
	[bunea paretti (D)	0.7	0.3				14.5		
appricant is functional (P) 0.3	emertinea				0.7	0.7	14.5		
derice interact. (b) (c) (c) <td>umbrinerus impatiens (P)</td> <td>0.3</td> <td>0.3</td> <td></td> <td>0.3</td> <td>0.3</td> <td>14.5</td>	umbrinerus impatiens (P)	0.3	0.3		0.3	0.3	14.5		
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	isnio uncinata (P)	•			0.7	0.7	14.5		
$ \begin{array}{ccccc} transformer sp. (0) \\ transformer sp. (1) \\ transformer sp. (2) \\ transformer sp. (3) \\ transformer sp. (4) \\ transforme$	innim anistata (D)	. 0	. (21.0		
	innothenes an (D)						21.0		
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	onidative drive and (1-)						0 1 2		
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	epression and a second (Am)						0.12		
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	aduroscylts smith (U)	•			0.3	0.3	0.12		
	ysidacea A	0.3	0.3				21.0		
$\begin{array}{ccccc} ephys picta (P) & 0.3 & 0.3 & 0.3 & 0.3 & 0.3 & 0.1 & 0.1 & 0.1 \\ araonis figers (P) & 0.3 & 0.3 & 0.3 & 0.3 & 0.3 & 0.1 & 0.1 \\ araonis figers (P) & 0.3 & 0.3 & 0.3 & 0.3 & 0.1 & 0.1 \\ araonis file epicoma papilicornis (P) & 0.3 & 0.3 & 0.3 & 0.1 & 0.1 \\ ageloma papilicornis (P) & 0.3 & 0.1 & 19.5 & 5.5 & 1.0 \\ ageloma papilicornis (P) & 10.3 & 4.4 & 4.5 & 2.2 \\ ageloma papilicornis (P) & 10.3 & 4.4 & 4.5 & 2.5 & 1.0 \\ ageloma papilicornis (P) & 10.3 & 4.4 & 4.5 & 2.5 & 2.0 \\ adellaria ulgaris (P) & 2.1 & 0.3 & 3.0 & 1.0 & 1.0 & 0.0 \\ abellaria ulgaris (P) & 2.7 & 0.3 & 3.0 & 3.0 & 1.0 & 0.5 & 0.0 \\ adetlaria ulgaris (P) & 1.3 & 0.3 & 3.0 & 3.0 & 3.0 & 0.5 & 0.0 \\ agardes haji (D) & 1.3 & 0.3 & 0.3 & 0.3 & 0.5 & 0.0 & 0.5 & 0.0 \\ arconis fugera (P) & 1.3 & 0.9 & 0.5 & 0.5 & 0.0 & 0.5 & 0$	aradella quadripunctata (1)				0.3	0.3	21.0		
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	ephtys picta (P)				0.3	0.3	21.0		
arcorie fulgene (P) 0.3 0.3 0.3 21.0 $cotohaustorius deichmannae (m)$ 89.3 6.1 19.5 5.5 1.0 $qeloma parillicornis (P)$ 10.3 4.2 10.5 3.5 2.0 $qeloma parillicornis (P)$ 10.3 4.2 10.5 3.5 2.0 $qeloma parillicornis (P)$ 10.3 4.4 4.5 2.5 3.0 $qeloma parillicornis (P)$ 10.3 4.4 4.5 2.5 3.0 $qeloma parillicornis (P)$ 10.3 4.4 4.5 2.5 3.0 $qeronue (m)$ 10.3 4.4 4.5 2.5 3.0 3.0 $qheltaria ulgaris (P)$ 10.3 2.3 0.0 1.0 0.0 4.0 $guratic longicarpus (D)$ 2.7 2.7 3.0 1.0 0.0 6.0 $guratic longicarpus (D)$ 2.7 2.7 3.5 3.0 3.0 1.0 $guratic longicarpus (D)$ 1.3 0.3 3.0 1.0 0.0 1.0 0.0 $aconic fulore (P)$ 1.3 0	pionidae (P)	0.3	0.3				21.0		
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	araonis fulgens (P)				0.3	0.3	21.0		
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$									
rotohaustorius deicharane (\mathbf{n}) \mathbf{B} . 6 .1 19 .5 5 .5 10 .0agelona pailitormis (\mathbf{p}) \mathbf{q} .2 \mathbf{q} .2 10 .3 \mathbf{q} .2 20 agelona pailitormis (\mathbf{p}) 10 .3 \mathbf{q} .4 \mathbf{q} .5 2.2 2.0 2.0 heporarius epistomus (\mathbf{m}) 10 .3 2.2 10 .3 2.2 2.0 2.0 heporarius epistomus (\mathbf{m}) 10 .3 2.2 2.2 2.0 2.0 heporarius epistomus (\mathbf{n}) 2.3 2.3 2.0 2.0 2.0 20 10 .3 2.1 2.2 3.0 2.0 2.0 20 20 2.1 2.1 2.2 3.0 2.0 20 20 2.1 2.1 2.2 3.0 2.0 20 20 2.1 2.1 2.2 2.0 2.0 20 20 2.1 2.1 2.1 2.1 2.1 20 20 2.1 2.1 2.1 2.1 2.1 20 20 2.1 2.1 2.1 2.1 2.1 20 20 2.1 2.1 2.1 2.1 2.1 20 20 2.1 2.1 2.1 2.1 2.1 20 20 2.1 2.1 </td <td></td> <td></td> <td></td> <td>CS02</td> <td></td> <td></td> <td></td>				CS02					
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	motohonistomius dei ohmonuos (1m)	1 08	1 7		2 0	5 5	0 1		
Metrodu equencie (r) </td <td>contant of the description of the</td> <td></td> <td>1.0</td> <td></td> <td></td> <td></td> <td></td>	contant of the description of the		1.0						
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	anteriora paper (1)	10.5	7.4		10.5				
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	oumanieita sp. (My)	10.3	4.4		4.5	2.5	0.0		
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	neportyntus episcomus (An)	C./	2.2				0.4		
dbellaria vulgaris (P) 4.0 4.0 6.0 gyridee haji (D) 3.7 0.7 3.5 3.5 7.0 gyridee haji (D) 3.7 0.6 3.5 3.5 8.0 gurate la mate la mate la giovaria (D) 2.7 2.7 2.7 9.0 agurate la reniformis (Cn) 1.3 0.3 1.5 9.0 entila reniformis (Cn) 1.3 0.3 0.5 11.0 entila reniformis (Cn) 1.3 0.3 0.5 12.0 entila reniformis (Cn) 1.3 0.7 3.0 3.0 11.0 entila reniformis (Cn) 1.3 0.9 0.5 12.0 off-unsis fulgens (P) 1.3 0.7 0.5 12.0 ognues hendersoni (D) 1.3 0.7 0.5 15.0 ouraniella floridana (M) 1.3 0.5 0.5 15.0	hiridotea stenops (I)	2.3	0.3		3.0	1.0	5.0		
gyrides hayi (D) 3.7 0.7 7.0 gyrides hayi (D) 3.7 0.7 3.5 3.5 8.0 meatoda (D) 2.7 2.7 2.7 8.0 9.0 agurus langicarpus (D) 2.7 2.7 2.7 9.0 9.0 agurus langicarpus (D) 1.3 0.3 1.5 9.0 9.0 anionis fuigers (D) 1.3 0.3 1.5 0.5 11.0 arconis fuigers (P) 1.3 0.9 0.5 12.0 12.0 arconis fuigers (P) 1.3 0.9 0.5 12.0 12.0 arconis fuigers (P) 1.3 0.9 0.5 0.5 12.0 arconis fuigers (P) 1.3 0.9 0.5 0.5 12.0 arconis fuigers (P) 1.3 0.7 0.5 0.5 15.0 arconis fuigers (P) 1.3 0.9 0.5 0.5 15.0 arconis fuigers (P) 1.3 0.9 0.5 0.5 15.0 arconiella floridana (M) 1.3 0.9	abellaria vulgaris (P)	4.0	4.0				6.0		
ematoda 1.0 0.6 3.5 3.5 3.0 equive longicarpue (D) 2.7 2.7 2.7 9.0 entila reniformis (Cn) 1.3 0.3 1.5 9.0 entila reniformis (Cn) 1.3 0.3 1.5 9.0 entila reniformis (Cn) 1.3 0.3 0.5 11.0 advanta (P) 1.3 0.9 0.5 12.0 atronis futgens (P) 1.3 0.9 0.5 12.0 atronis futgens (P) 1.3 0.7 0.5 12.0 atronis futgens (P) 1.3 0.7 0.5 15.0 atrans sp. (D) 1.3 0.7 0.5 15.0 atrans (P) 1.3 0.9 0.5 15.0 atrans (P) 1.3 0.9 0.5 15.0 atrans (P) 1.0 0.6 0.5 15.0 atrans (P) 1.0 0.6 0.5 15.0 atrans (P) 1.0 0.5 0.5 15.0 atrans (P) 1.0 0.6 0.5 15.0	gyrides hayi (D)	3.7	0.7				7.0		
agurus longicarpus (D) 2.7 2.7 2.7 9.0 enilla reniformis (Cn) 1.3 0.3 1.5 0.5 10.0 'sfi o uncinata (P) 1.3 0.9 0.5 11.0 11.0 'sfi o uncinata (P) 1.3 0.9 0.5 12.0 11.0 'sfi o uncinata (P) 1.3 0.9 0.5 12.0 12.0 'agurus sp. (D) 1.3 0.7 0.5 12.0 15.0 'agurus hendersoni (D) 1.3 0.7 0.9 0.5 15.0 'agurus hendersoni (D) 1.3 0.9 0.6 0.5 15.0 'agurus hendersoni (D) 1.3 0.9 0.5 15.0 15.0 'adurus hendersoni (D) 1.0 0.9 0.5 0.5 15.0 containella floridana (Ny) 1.0 0.6 0.5 0.5 15.0	ematoda	1.0	0.6		3.5	3.5	8.0		
entilarent formule (cn) 1.3 0.3 1.5 0.5 10.0 ustion uncinata (P) 3.0 3.0 3.0 3.0 11.0 arconis fulgens (P) 1.3 0.9 0.5 0.5 12.0 arconis fulgens (P) 1.3 0.7 0.5 0.5 12.0 arconis fulgens (P) 1.3 0.7 0.5 12.0 15.0 argurus sp. (D) 1.3 0.7 0.7 15.0 15.0 argurus lendersoni (D) 1.3 0.9 0.5 0.5 15.0 conneniella floridana (Hy) 1.3 0.9 0.5 0.5 15.0 continue texana (H) 1.0 0.6 0.5 0.5 15.0	agurus lonaicarpus (D)	2.7	2.7				9.0		
is for uncinata (P) 3.0 3.0 3.0 11.0 arconis fuggens (P) 1.3 0.9 0.5 12.0 arconis fuggens (P) 1.3 0.7 0.5 12.0 agrues specification 1.3 0.7 0.5 12.0 agrues specification 1.3 0.7 0.7 15.0 agrues specification 1.3 0.9 0.6 15.0 advance [la floridana (M) 1.3 0.9 0.5 15.0 contrariella floridana (M) 1.0 0.9 0.5 15.0 contrariella floridana (M) 1.0 0.6 0.5 0.5 15.0	lenilla reniformis (Cn)	1.3	0.3		1.5	0.5	10.0		
arconis fulgers (P) 1.3 0.9 0.5 12.0 agurus sp. (D) 1.3 0.7 0.5 15.0 agurus hendersoni (D) 1.3 1.3 0.7 15.0 agurus hendersoni (D) 1.3 0.9 0.5 15.0 bounder la floridana (My) 1.3 0.9 0.6 0.5 15.0 continue that floridana (My) 1.0 0.9 0.6 0.5 15.0 continue that floridana (My) 1.0 0.9 0.6 0.5 15.0 continue that floridana (My) 1.0 0.6 0.5 0.5 15.0	hisrio uncinata (P)				3.0	3.0	11.0		
ugurus sp. (D) 1.3 0.7 15.0 ugurus hendersoni (D) 1.3 1.3 15.0 use hendersoni (D) 1.3 0.9 15.0 courantiella floridana (My) 1.3 0.9 15.0 contractus et and (M) 1.0 0.6 0.5 15.0	araonis fulaens (P)	1.3	0.0		0.5	0.5	12.0		
agguras hendersoni (D) 1.3 1.3 1.3 15.0 $bouraniella floridana (My)$ 1.3 0.9 0.5 15.0 $bouraniella floridana (My)$ 1.0 0.6 0.5 15.0 $bouraniella floridana (My)$ 1.0 0.6 0.5 15.0 $bouraniella floridana (My)$ 1.0 0.6 0.5 15.0	Jaqurus sp. (D)	1.3	0 J				15.0		
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	Pagirris hendersoni (D)		6 1				15.0		
$\frac{1}{2} \frac{1}{2} \frac{1}$	Ration 10 floridano (Mu)						0.51		
	Politica toward (N)				2	5			
		0.1	0.0		0.0	c.n			

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(Continued)

Re(15) $\overline{\pi}$		SUP	MER 1982		ALL 1982	OVERALL
Sector Sector<	SPECIES	I×	SE	 ×	SE	RANK
			3	502		
	Koumannella brassliensis (Hy)	1.0	1.0			18.5
	(W) 8141 DU1118	1.0	0.6			18.5
$ \begin{array}{cccccc} A \\ A $	athyporeia parkeri (Am)	0.7	0.3			20.0
Ministration of the second s	rachypenaeus constrictus (D)	0.3	0.3			26.0
	lbunea paretti (D)	0.3	0.3			26.0
apprictance op. (1) 0.5 0.5 0.5 0.5 apprictant depressant (1) 0.3 0.3 0.5 0.5 0.5 layy stand depressant (1) 0.3 0.3 0.3 0.5 0.5 0.5 layy stand depressant (1) 0.3 0.3 0.3 0.3 0.5 0.5 layy stand depressant (1) 0.3 0.3 0.3 0.3 0.5 0.5 attriation operations (1) 0.3 0.3 0.3 0.3 0.5 0.5 apprint provide stanting (1) 0.3 0.3 0.3 0.3 0.3 0.5 0.5 application operations (1) 0.3 0.3 0.3 0.3 0.3 0.3 application operations (1) 0.3 0.3 0.3 0.3 0.3 0.3 application operations (1) 0.3 0.3 0.3 0.3 0.3 0.3 application operations (1) 0.3 0.3 0.3 0.3 0.3 0.3 application operations (1) 0.3 0.3 0.3 0.3 0.3 </td <td>inning cristata (D)</td> <td>0.3</td> <td>0.3</td> <td></td> <td></td> <td>26.0</td>	inning cristata (D)	0.3	0.3			26.0
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	Ortunue BD. (D)			0.5	0.5	26.0
	Buridae (D)					26.0
Markar expression Constrained Constraint Constraint <th< td=""><td>-Burture (1) Marinia damassis (1)</td><td>~ ~</td><td>~ ~</td><td></td><td></td><td>0.02</td></th<>	-Burture (1) Marinia damassis (1)	~ ~	~ ~			0.02
$ \begin{array}{ccccc} \text{mertanes} & \text{(m)} & 0.3 & 0.3 & 0.3 & 0.5 & 0$	I anoartan achteore (1)					0.02
Institute 0.3 0	Lacylechnopidae A (Am)	0.3	0.3			79.07
Lifta quirqueperforta (1) 0.5 0.5 0.5 26.0 abbritta quirqueperforta (1) 0.3 0.3 0.3 26.0 abbrittarie impatienes (1) 0.3 0.3 0.3 26.0 abbrittarie impatienes (1) 0.3 0.3 0.3 26.0 billarie unigerie (1) 0.3 0.3 0.3 26.0 billarie unigerie (1) 31.1 28.4 31.1 26.0 and of the analysis (1) 31.1 28.4 31.1 26.0 and of the analysis (1) 31.1 28.4 31.1 26.0 and of the analysis (1) 31.1 28.4 31.2 26.0 and of the analysis (1) 31.1 28.4 31.2 26.0 and of the analysis (1) 31.1 20.3 20.3 21.2 and of the analysis (1) 0.3 20.3 20.3 21.3 and of the analysis (1) 0.3 0.3 0.3 21.3 and of the analysis (1) 0.3 0.3 0.3 21.3 and of the analysis (1) 0.3 0.3 0.3 21.3 and of the analysis (1) 0.3 0.3 0.3 21.3 and of the analysis (1) 0.3 0.3	ener tinea			0.5	0.5	26.0
ambrinaria imperiant (p) 0.3 <	ellita quinquesperforata (E)			0.5	0.5	26.0
$\begin{array}{ccccc} olydore communicits (r) & 0.3 &$	umbrinaria importiona (P)	۲-0 1	0.3			26.0
	olidana armoundia (D)					0.96
			•			
CS00 Matcda						
Matrix 71.3 29.4 32.7 23.3 21.0 23.3 22.0 23.3 <			81	50		
Matrix Matrix<		;				
Declaration and and an event (P) 38.7 28.0 4.0 3.5 2.0 Stophism sp. C(am) 31.7 31.2 0.3 0.3 3.5 3.5 Stophism sp. C(am) 31.0	ematoda	71.3	29.4	32.7	23.3	1.0
Activities (ac) 32.7 12.2 0.3 0.3 3.5 reprint as p. C (ac) reprint as p. C (ac) 33.0 32.1 17.3 3.5 reprint as p. C (ac) reprint as p. C (ac) 0.7 0.3 17.3 5.0 reprint as p. C (ac) 0.7 0.7 0.3 17.3 5.0 reprint as p. C (ac) 0.7 0.3 0.7 0.3 5.0 reprint as p. C (ac) 0.3 12.0 0.3 0.7 0.7 0.7 reprove late astronotrie (1) 0.3 0.3 0.3 0.3 5.0 reprove late astronotrie (1) 0.3 0.3 0.3 0.7 9.0 operid affund (1) 0.3 0.3 0.3 0.3 9.0 operid affund (1) 0.3 0.3 0.3 9.0 9.0 operid affund (1) 0.3 0.3 0.3 9.0 9.0 reprove late (1) 0.0 0.3 0.3 9.0 9.0 reprint affund (10	ibellaria vulgaris (P)	88.7	28.0	4.0	3.5	2.0
Strophiam sp. (am) 32.0 <td>itea cathamnensis (An)</td> <td>32.7</td> <td>12.2</td> <td>0.3</td> <td>0.3</td> <td>3.5</td>	itea cathamnensis (An)	32.7	12.2	0.3	0.3	3.5
Storphism sp. C (am) 20.3<	srophium sp. (Am)	33.0	32.0			3.5
Igochaeta 0.7 0.7 18.3 17.3 6.0 ciento a territa (ma) 15.3 8.7 0.3 0.7 0.3 7.0 ciento a territa (ma) 12.0 6.6 0.7 0.3 0.7 9.0 ptochela serratorbita (ma) 12.0 6.6 0.7 0.3 9.0 ogrades afphasrostris (D) 0.3 0.3 0.3 0.3 9.0 ogrades afphasrostris (D) 0.3 0.3 0.3 9.0 9.0 ogrades afphasrostris (D) 0.3 0.3 0.3 9.0 9.0 ogrades afphasrostris (D) 0.3 0.3 0.3 9.0 9.0 gurue pollicaris (D) 0.3 0.3 0.3 9.0 9.0 fila mutica (D) 0.3 0.3 0.3 9.0 9.0 achytus B (D) 0.3 0.3 0.3 9.0 9.0 action (D) 0.3 0.3 0.3 9.0 9.0 action (D) 0.3 0.3 0.3 9.0 9.0 achytus B (D) 0.3	rophium sp. C (Am)	20.3	20.3			5.0
dampus levis (m) 16.3 6.7 0.3 <td>is sochaeta</td> <td>0.7</td> <td>0.7</td> <td>18.3</td> <td>17.3</td> <td></td>	is sochaeta	0.7	0.7	18.3	17.3	
crioia servata (An) 12.0 6.6 0.7 0.7 0.7 9.0 grides alpharoetrie (D) 0.3 0.3 0.3 9.0 9.0 grides alpharoetrie (D) 0.3 0.3 0.3 9.0 9.0 gurdes alpharoetrie (D) 0.3 0.3 0.3 9.0 gurdes alpharoetrie (D) 0.3 0.3 9.0 gurdes langtorie (D) 0.3 0.3 9.0 gurdes pollicarie (D) 0.3 0.3 9.0 ita muttor (D) 0.3 0.3 9.0 ita mu	asmorus Levis (A.)		2.00			0.2
ptochefa serratorbia 0.3 0.3 0.3 0.3 ogebia affinis (D) 0.3 0.3 0.3 0.3 orgebia affinis (D) 0.3 0.3 0.3 0.3 0.0 orgebia affinis (D) 0.3 0.3 0.3 0.3 0.3 0.0 operations (D) 0.3 0.3 0.3 0.3 0.3 0.0 gurants poilicarie (D) 0.3 0.3 0.3 0.3 0.3 jidae<(D)	ciolo servoto (A.)	10.01				
Byrides alphasroetrie () 0.3 0.3 0.3 Sogebia affinis () 0.3 0.3 0.3 Squares longicarpue () 0.3 0.3 9.0 Jidae (D) 0.3 0.3 0.3 9.0 Ididae (D) 0.3 0.3 0.3 9.0 achyura B (D) 0.3 0.3 0.3 9.0 achyura B (D) 0.3 0.3 0.3 9.0 achyura P (D) 0.3 0.3 0.3 9.0 achyura P (D) 0.3 0.3 0.3 9.0 Intrades hay (D) 0.3 0.3 0.3 9.0 intridetes hay (D) 0.3 0.3 0.3 9.0 intridetes detays (D) 0.3 0.3 0.3 9.0 itridetes detays (D) 0.3 0.3 0.3 9.0 <t< td=""><td>sptochelo servertorhito (D)</td><td></td><td></td><td></td><td></td><td></td></t<>	sptochelo servertorhito (D)					
$ \begin{array}{cccccc} 0.2 & 0.3 & 0.3 & 0.3 \\ 0.3 & 0.1 & 0.3 & 0.3 & 0.3 \\ 0.3 & 0.1 & 0.3 & 0.3 & 0.3 \\ 0.3 & 0.1 & 0.3 & 0.3 & 0.3 \\ 0.3 & 0.1 & 0.3 & 0.3 & 0.3 \\ 0.3 & 0.3 & 0.3 & 0.3 & 0.3 \\ 0.4 & 0.4 & 0.4 & 0.3 & 0.3 & 0.3 \\ 0.4 & 0.4 & 0.4 & 0.3 & 0.3 & 0.3 \\ 0.4 & 0.4 & 0.4 & 0.3 & 0.3 & 0.3 \\ 0.4 & 0.4 & 0.4 & 0.3 & 0.3 & 0.3 \\ 0.4 & 0.4 & 0.4 & 0.3 & 0.3 & 0.3 \\ 0.4 & 0.4 & 0.4 & 0.3 & 0.3 & 0.3 & 0.3 \\ 0.4 & 0.4 & 0.4 & 0.3 & 0.3 & 0.3 & 0.3 \\ 0.4 & 0.4 & 0.4 & 0.3 & 0.3 & 0.3 & 0.3 & 0.3 \\ 0.4 & 0.4 & 0.4 & 0.4 & 0.3 & 0.3 & 0.3 & 0.3 \\ 0.4 & 0.4 & 0.4 & 0.4 & 0.3 &$	received an and a second a s					
orgeora differte (1) 0.3 0.3 9.0 gurus politicarie (1) 0.3 0.3 9.0 stra mutica (1) 0.3 0.3 9.0 gurus politicarie (1) 0.3 0.3 9.0 stra mutica (1) 0.3 0.3 9.0 stra mutica (1) 0.3 0.3 9.0 strangure (1) 0.3 0.3 9.0 strangure (1) 0.3 0.3 9.0 strangure (1) 0.3 0.3 9.0 strated (2) 0.3 0.3 9.0 strated at (1) 0.3 0.3 9.0 strated at (2) 0.3 0.3 9.0 strated at (1) 0.3 0.3 9.0	groups approximation (1)		C .D			9.6
Agurants Congrearpus (D) 0.3 0.3 Agurants Congrearpus (D) 0.3 0.3 9.0 Agurants (D) 0.3 0.3 9.0 9.0 Jifametricar (D) 0.3 0.3 9.0 9.0 achyura (D) 0.3 0.3 9.0 9.0 achyura (D) 0.3 0.3 9.0 9.0 achyura (D) 0.3 0.3 9.0 9.0 archyura (D) 0.3 0.3 9.0 9.0 archyura (D) 0.3 0.3 9.0 9.0 intrides hayi<(D)	ogepta allints (D)	0.3	0.3			0.6
quaras pollicaris (D) 0.3 0.3 9.0 lia matica (D) 0.3 0.3 9.0 lidae (D) 0.3 0.3 9.0 achyte (D) 0.3 0.3 9.0 achyte (D) 0.3 0.3 9.0 achyte (D) 0.3 0.3 9.0 arether (D) 0.3 0.3 9.0 arether (D) 0.3 0.3 9.0 arether (D) 0.3 0.3 9.0 intraces hay: (D) 0.3 0.3 9.0 intraces hay: (D) 0.3 0.3 9.0 intraces hay: (D) 0.3 0.3 9.0 intraces temps (I) 0.3 0.3 9.0 intracet a temps (I) 0.3 0.3 9.0 campus sp. D (As) 0.3 0.3 9.0 attactata 0.3 0.3 9.0 attactata 0.3 0.3 9.0 intracta 0.3 0.3 9.0 attactata 0.3 0.3 9.0 attactata	igurus longicarpus (D)	0.3	0.3			0.6
lia mutica (D) 0.3 0.3 0.3 ulidae (D) 0.3 0.3 0.3 achyara B (D) 0.3 0.3 9.0 neestdare (D) 0.3 0.3 9.0 niniza floridana (D) 0.3 0.3 9.0 ninicotas stronga (I) 0.3 0.3 9.0 attrocda 0.3 0.3 0.3 9.0 attractas floridana (D) 0.3 0.3 9.0 attracta 0.3 0.3 0.3 9.0 attrattracta	ugurus pollicaris (D)	0.3	0.3			0.6
ujidae (D) 0.3 0.3 0.3 9.0 achywra B (D) 0.3 0.3 0.3 9.0 achywra B (D) 0.3 0.3 0.3 9.0 gyrdae May (D) 0.3 0.3 0.3 9.0 iwriza floridaru (D) 0.3 0.3 9.0 irricota 0.3 0.3 0.3 9.0 irricota etenopa (I) 0.3 0.3 9.0 itricotaca etenopa (I) 0.3 0.3 9.0 attricota tenopa (I) 0.3 0.3 9.0 attricotara (I) 0.3 0.3 9.0	elia mutica (D)	0.3	0.3			0.9
achyra B (D) 0.3 0.3 0.3 0.3 0.3 0.3 0.3 0.3 0.3 0.3	ulidae (D)	0.3				
materia (0) (0) (0) (0) materia (1) (1) (1) (1) (1) materia (1) (1) (1) (1) (1) (1) materia (1) (1) (1) (1) (1) (1) (1) materia (1) (1) (1) (1) (1) (1) (1) campus (1) (1) (1) (1) (1) (1) campus (1) (1) (1) (1) (1) (1)	rachwira R (D)					
myrides hayi (D) 0.3 0.3 9.0 inniza floridana (D) 0.3 0.3 9.0 itriactoda 0.3 0.3 0.3 9.0 itriactoda 0.3 0.3 0.3 9.0 attrictoda 0.3 0.3 0.3 9.0 itriactoda 0.3 0.3 0.3 9.0 attrictore stropa (1) 0.3 0.3 9.0 attrictore stropa 0.3 0.3 0.3 9.0 attrictore stropa 0.3 0.3 0.3 9.0 attrictore stropa 0.7 0.3 0.3 9.0 attrictore stropa 0.3 0.3 0.3 9.0 attrictore stropa 0.7 0.3 0.3 9.0 attrictore stropa 0.3 0.3 9.0 9.0 a	sections (D)					
grades mize fordand 0.3 0.3 0.3 itracoda 0.3 0.3 0.3 9.0 atvischnopulae 0.3 0.3 0.3 9.0	there is a second se					0.0
-markar Jourward (D) 0.3 0.3 0.3 9.0 11 11.2 9.0 0.3 0.3 0.3 0.3 0.3 0.3 0.3 0.3 0.3 0						0.6
stracoda 0.3 0.3 0.3 9.0 1.1 1.1 0.3 0.3 0.3 0.3 0.3 0.3 0.3 0.3 0.3 0.3	(1) purport of principal	1. 0	C.3			0.6
11 ridotea stenopa (1) 0.3 0.3 0.3 9.0 4.0 4.0 0.3 0.3 0.3 0.3 0.3 0.3 0.3 0.3 0.4 1.3 7.8 9.0 1.4 1.4 1.3 7.8 9.0 1.4 1.4 1.3 7.8 9.0 1.4 1.4 1.4 1.4 1.4 1.4 1.4 1.4 1.4 1.4	stracoda	0.3	0.3			9.0
<i>савторив</i> вр. D (Ам) 0.3 0.3 9.0 Latylachnopidae A (Ам) 0.7 0.7 11.3 7.8 9.0 Latylachnopidae A (Ам) 0.3 0.3 9.0	iiridotea stenops (1)	0.3	0.3			0.9
Latylachnopidae A (Am) 0.7 0.7 11.3 7.8 9.0 urbellaria 0.3 0.3 0.3 9.0	lasmopus sp. D (Am)	0.3	0.3			0.6
	latvischnopidae A (Am)	0.7	2.0	11.3	8 2	
	urhallaria			C.144		0.0
					~~;	

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OVERALL 0.3 1.4 0.6 2.0 0.3 0.3 0.3 SE FALL 1982 0.3 3.3 2.0 0.3 1.3 0.3 I× **CS03** SE 0.3 SUMMER 1982 3.0 5.0 1.0 3.3 1.0 3.0 3.0 0.3 ~~~~~ × (WW) Ampharetidae (P) Terebellidae (P) Magelona rosea (P) Schistomeringos rudolphi (P) Schistomeringos rudolphi (P) Ampelisca vadorum (Am) Asterias forbesii (E) Parvilucina multilineata (M) Crepidula plana (M) Ampharete americana (P) Mucula proxima (M) Nereis succinea (P) Nopatra cuprea (P) Magelona phylitiaae (P) Erichthonius brasiliensis Coniada sp. (P) Phyllodoce sp. (P) Cirriformia grandis (P) Onuphis microcephala (P) Pista sp. (P) Spiophanes bombyr (P) Spiophanes bombyr (P) Owenia fusiformis (P) Nephtys picta (P) Fellia texana (N) Hydroides protulicola (P) Maldanidae (P) (11yeera americana (P) Sigambra tentaculata (P) Glyoera dibranchidaa (P) Polydoan Ligni (P) Goniada maculata (P) Pista quadrilobata (P) Ξ [lyanassa obsoleta (M) Nereis sp. (P) Clymenella torquata Sabella sp. (P) Ensis directus (M) Pinniza sp. A (D) Xanthidae (D) Vrcidae B (M) Vrcidae A (M) Nereídae (P) Polychaeta SPECIES

(Continued)

(Continued) ÷ Appendix

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OVERALL 1.3 0.3 0.3 0.7 1.3 0.7 0.7 SE FALL 1982 0.3 0.3 1.7 1.0 1.3 0.7 0.3 1.3 1.3 0.7 0.7 × **CS03** SE 1.1 0.9 0.9 0.9 0.7 0.11000.66 1.7 6.0 1.3 1.3 0.6 0.7 SUMMER 1982 22.3 0.7 1.3 ~ ~ ~ 1× Fseu currythoe amtriqua (P) Arnabella irricolor (P) Arnilonereis magna (P) Metamysidopsis surfti (My) (rassinella lunulata (M) (Tyoera sp. C (P) Hemipodus roseus (P) Hemipodus roseus (P) Iarreules parvulus (D) Callionassa brijonnis (D) Callionassa brijonus (M) Callionassa brijonus (M) Callionassa brijonus (M) Unciola gp. (Am) Crepidula formicata (M) Sthenelais boa (P) Ancistrosyllis hartharnae (P) Angelona papillicornis (P) Chrysopetallae B (P) Pinniza sp. B (D) Listriella barnardi (Am) Cayurostylis smithi (C) Ophiuroidea B (E) Glottidia pyramidata (Brach) Astyris lunata (M) Pirnotheres sp. (D) Synchelidium americanum (Am) Lembos smithi (Am) Paracaprella tenuis (Am) Paguridae (D) Listriella clymenellae (Am) Heterocrypta granulata (D) Portunus sp. (D) Pelcypoda A (M) Pherusa ehlersi (P) Duphida jerneri (P) Onuphidae (P) Armandia agilis (P) Hydroides dianthus (P) Paropeus herbstii (D) SPECIES

(Continued)

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0.7

Incinus depressus (1) Piron tropakis (A.) Actiniaria (Cn)

0.3

0.7

Appendix G. (Concluded)

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)	SUMMER 1982	i	FALL 1982		OVERALL
SPECIES	×	SE	×		SE	RANK
		01	<u>203</u>			
Olivella mutica (M)			0.7		0.7	76.0
Spisuta solidissima (M)			0.7		0.7	76.0
Sipunculida	0.7	0.7				76.0
Polychaeta A	0.7	0.7				76.0
Amastiaos caperatus (P)			0.7		u.7	76.0
Ancistrosullis jonesi (P)	0.7	0.7				76.0
Spicehaetopterus costarum oculatus (P)	0.7	0.3				76.0
Arabella mutans (P)	0.7	0.3				76.0
Cistenides gouldii (P)	0.7	0.3				76.0
Exogone dispar (P)	0.3	0.3	0.3		0.3	76.0
Spionidae (P)	0.7	0.7				76.0
Hestonidae (P)	0.7	0.3				76.0
Caulleriella killamensis (P)			0.7		0.3	76.0
Mediomastus caiiformiensis (P)	0.7	0.3				76.0
Sylidae (P)	0.3	0.3	0.3		0.3	76.0
Poludora caeca (P)	0.3	0.3				76.0
Sabella microphthalma (P)	0.7	0.7				76.0

Ranked abundance of benthic macroinvertebrates collected during 1982 at intertidal and subtidal stations on the north control transect (Transect V). Estimates represent the mean number per 0.1 m² and A = Ascidiacea, Am = Amphipoda, Brach = Brachlopoda, C = Cumacea, Cc = Cephalochordata, Cn = Cnidaria, D = Decapoda, E = Echinodermata, H = Hemichordata, I = Isopoda, M = Mollusca, M = Hosidacea, P = Polychaeta, T = Tanaidacea. H. Appendix

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	5	MER 1982		FALL 198	2	OVERALL
SPECIES	×	SE		2	SE	RANK
			C101			
Nematoda	0.7	0.7	104	0	6.0	1.0
uligochaeta Talorchestia megalophthalma (Am) Tellina sp. (M)	2.0 0.7	1.1 0.7	6	0	5.0	2.0 3.0 4.0
			6102			
011gochaeta Emerita talpoida (D)	861.3 54.7	731.4 19.9	1.	6 6	0.7	1.0
Nematoda Diversionary (1/2014)	46.7	36.7	25.	Ē	11.1	3.0
terrat variabilis (A) Scolelepis squamata (P)	50.7 32.0	4.0 12.8	0	7	0.7	4.0
Haustorius longirostris (Am)	2.7	0.7				
Crassinella lunulata (M)	0.7	0.7				7.0
			6103			
Donux variabilis (M)	244.0	28.4	14	c	5 01	•
Emerita tulpoida (D)	244.7	38.0		2	C.01	0.1
Amphiporeia virginiana (Am)	14.0	6.0		. რ	0.7	0.4
Scolelerie squimata (P)	14.7	2.9	0.	7	0.7	
Nematoda			8.	0	4.0	5.0
Representation congregerus (Am)			5.	3	5.3	6.0
Perminantaning Ing (my)	2.0	2.0				7.0
Furadella quadrirunctata (1)	0.7	0./			0.7	8.5
Le Fidrotylus dutiscus (Am)				~ r	1.3	8.5
<i>Aurmannyese</i> sp. (Am)	0.7	0.7		-		0.21
Bodotriidae A (C)	0.7	0.7				12.0
18742742 sp. (M)			0.	7	0.7	0.11
Presidella lunulata (M)	0.7	0.7				12.0
		0	105			
(A that ward thills (M)	76.0	41.6				- -
Ehrisouusionus (steimannae (Am) Sooleistis equanata (P)	2.7 13.0	1.8 6.2	17.	7	3.4	3.0

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(Continued)

(Continued) Appendix H.

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5957166		MEK 1982	 I	ALL 1982	OVERALL
SPECIES	×	SE	×	SE	RANK
		3	10		
Magelona papillicornis (P)	0.7	0.7	8.3	0.7	4.0
Dematoda Dematoda			6.3	3.0	5.0
Doundrietud Sp. (my) Douchoustonius Tourimours (Am)	~ ~ ~	1.2	2.0	0.6	6.0
raruruscorrus congumerus (Am) Arinidataa atamaa (I)	0.2	1.0	г с	•	7.0
Distributed sterright (1)		0.1	0.7		
Nemertinea			0.1	0.1	0.01
Pinniza cristata (D)	0.7	0.3		0	12.0
Ogyrides hayi (D)	0.7	0.7			12.0
Metamysidopsis swifti (My)			0.7	0.7	12.0
Albunea paretti (D)	0.3	0.3		- 	18.0
Acanthohaustorius millsi (Am)	0.3	0.3			18.0
Photis sp. (Am)			0.3	0.3	18.0
Boumaniella floridana (My)	0.3	0.3			18.0
Leptogratha caeca (T)			0.3	0.3	18.0
Cumacea A	0.3	0.3			18.0
Nerhtys picta (P)			0.3	0.3	18.0
Glyvera difrinchiata (P)			0.3	0.3	18.0
Paraonis fulgens (P)	0.3	0.3			18.0
		<u>[</u> 3	02		
Protohustorius deichmannae (An)	49.7	13.5	с v	9 1	-
May low woilligonis (P)	L 21	0.6		0.0	
Reimaniella sp. (Mv)	1.9	0.4		0.0 2 5	7 O
Nematoda	0.7	2.0		1. 1	0.0
Rentila reniformis (in)	5.3	1.8	0.7	2.0	
Rheporynius epistomus (Am)	5.3	1.4		- 	
Donax variabilis (M)	2.7	0.3			2.0
Fagurus longicarpus (D)	2.3	2.3			8.0
Pronotheres sp. (D)	1.3	0.7	0.3	0.3	0.6
chemistea stenops (I)	1.0		0.3	0.3	10.0
$(\eta_i, \eta_i) \in (0, 1, 1, 2, 1, 2, 1, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2,$	1.0	0.6			13.5
BERNATIE 14 JIEPTEMA (My)	0.7	0.3	0.3	0.3	13.5
Tolling torna (N)	0.3	0.3	0.7	0.7	13.5
Nervits, rista (P)		0.5	0.3	0.3	13.5
Finamis fulgens (p)	0.1	0.0			<
Mollita quirquesterforata (E)		0.1	0 7	5 0	2 2 1
A. tick a managuezanais (P)	0.7	0.7			17.5
Ξεκκνάτοτη ίως στο Γέτας (D)			0.3	0.3	25.5
Pinnium cristal i (D)	0.3	0.3			25.5

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(Continued)





MICROCOPY RESOLUTION TEST CHART NATIONAL BUREAU OF STANDARDS-1963 A

SPECTES		SE	 ×	20	PANK
	4		I	0E	
			\$02		
		1			
ignohelidium americanum (Am)	0.3	0.3			25.5
ticroprotopus raneyi (Am)			0.3	0.3	25.5
atea catharinensis (Am)	0.3	0.3			25.5
aprella equilibra (Am)			0.3	0.3	25.5
dotea montosa (I)			0.3	0.3	25.5
umacea B	0.3	0.3			25.5
aprella penantis (Am)			0.3	0.3	25.5
elecypoda B (M)			0.3	0.3	25.5
viophanes bombyz (P)	0.3	0.3			25.5
colelepis souchata (P)	0.3	0.3			25.5
olelevis texma (P)	0.3	0.3			25.5
yllodocidae (P)	0.3	0.3			25.5
		Ē	603		
		51			
bellaria vulgaris (P)	32.3	21.4	3.7	0.9	1.0
rophium sp. C (Am)	34.0	19.6			2.0
itea catharinensis (Am)	24.3	6.2	3.7	1.8	3.0
ciola serrata (Am)	3.3	6.0	20.0	6.3	4.0
assinella lunulata (M)	21.7	7.8			5.0
matoda	10.7	4.2	8.3	2.9	6.0
cula proxima (M)	11.0	1.5	1.1	2.6	7.0
astrgos coperatus (P)			15.3	12.4	8.0
asmopus terrs (Am)	10.3	3.9	0.7	0.7	0.6
atomastus californiensis (P)	10.0	10.0			10.0
epranta forneata (M)	0.0	0.1			11.0
nthidae (D)	7.3	7.3	0.3	0.3	12.0
atyischnopidae A (Am)		,	6.0	3.8	13.5
copranes bombyz (P)	1.3	0.9	4.7	2.7	13.5
lychaete B			5.7	2.8	15.0
rophium sp. (Am)	3.7	3.7			16.0
gelona papillicornis (P)	0.3	0.3	2.7	0.9	17.0
pelisca vadorum (Am)	2.0	1.0	0.7	0.7	21.0
racaprella tenuis (Am)	2.7	1.8			21.0
cinus depressus (1)	0.3	0.3	2.3	1.4	21.0
cidae A (N)	2.7	1.8			21.0
reis falsa. (P)	2.7	1.2			21.0
abella irricolor (P)	1.3	1.3	1.3	0.3	21.0
ulleriella killariensis (P)			2.7	1.3	21.0
illina texana (M)			2.3	1-2	26.0
ycera sp. C (P)	2.3	1.2			26.0
Igochaeta		 	2.3	2.3	26.0
opanope sayi (D)	2.0	1.1	1		29.0

(Continued)

H3

	NUNS	ER 1982	IVA	L 1982	OVERALL
SPECIES	×	SE	×	SE	RANK
		CS CS	03		
		ł	ł		
Diopatra cuprea (P)	1.7	0.3	0.3	0.3	29.0
Syllidae (P)	0.3	0.3	1.7	1.2	29.0
Tiron tropakis (Am)	1.7	0.9			33.0
Astyris lunata (M)	1.7	0.7			33.0
Pseudeurythoe ambigua (P)			1.7	0.9	33.0
Podarke obscura (P)	1.7	1.7			33.0
Exogone dispar (P)	1.7	1.7			33.0
Trachypenaeus constrictus (D)	1.0	0.6	0.3	0.3	39.0
Protohaustorius deichmannae (Am)	1.3	1.3			39.0
Nemertinea	0.7	0.3	0.7	0.7	39.0
Sphaerodoridae A (P)			1.3	1.3	0.66
Glucera americana (P)	1.3	0.9			39.0
Nephtus picta (P)	1,3	6.0			39.0
Chrysoneralidae B (P)	1.3	0.7			39.0
Alpheus normanni (D)	0.1				48.0
Introutes normulus (n)		40			48.0
Principal Appletit (D)					48.0
	0.1	0 4 7 C			0.04
raguildae (v) Diumine			-	с -	
riviewa 8p. A (V) Puistetonica kanailianaia (1-)	-	c	0.1	1.0	
		9.0	5		0.04
CURRENT OF ANY					
Nudibranchia (A)	1.0	0.1			0.04
pronta sp. (P)		•	1.0	1.0	48.0
Arabella mutaris (P)	1.0	1.0			0.84
Nervers Lamelloga (P)	1.0	1.0			0.84
Heterocrypta granulata (D)	0.7	0.7			62.0
Pagurus sp. (D)	0.7	0.3			62.0
Penseidae (D)	0.7	0.3	•	•	62.0
Synchelidium anericanum (Am)		1	0.7	0.3	62.0
200FOLGUB BPIROBUB (Am)	0.7	0.7			07.0
		ŗ	0.7	1.1	0.20
Cernethon (A.)					0.10
ucanutade sp. (AL) Matemicidencia suifei (AL)			r 0		0.20
metumyatukyata overjet (ny)					0.45
Americanica econgaca (E) Americanication (M)	5		0.7		0.20
$\mathbf{P}_{\mathbf{A}} = \mathbf{P}_{\mathbf{A}} = $			((0.10
retricold proclastiones (H)	0.3	0.3	0.9	r.0	0.20
rilargidae (r)			0.7	0.7	0.20
uycera capitata (P)	0.5	0.3	0.3	0.3	62.0
poludere ecce (r)					0.20
sorgania casta (r) Sabiatomonianon mudolati (n)					0.20
Some comercingue runsiphi (P)	0.3	0.3	0.3	0.3	0.20
Inh manner agritution (11)			د.0	0.3	A'70

(Continued)

H4

Appendix N. (Concluded)

	SUPPOR	R 1982	AN THE REAL PARTY OF THE PARTY	LL 1982	OVERALL
SPECIES	×	SE	in	SE	RANK
		01	<u>\$03</u>		
Paourus lonaicarous (D)	0.3	0.3			92.5
Portunus gibbesii (D)	0.3	0.3			92.5
Portumus sp. (D)	0.3	0.3			92.5
Automate sp. (D)			C.0	0.3	92.5
Pinnizz sp. (D)			0.3	0.3	92.5
Callianassidae (D)	0.3	0.3			92.5
Pinnotheres sp. (D)	0.3	0.3			92.5
Rhepozynius epistomus (Am)	0.3	0.3			92.5
Microprotopus raney: (Am)	0.3	0.3			92.5
Ocyurostylis smithi (C)	0.3	0.3			92.5
Listriella clumenellae (Am)			0.3	0.3	92.5
Boumaniella floridana (My)	0.3	0.3	1	1	92.5
Caprella penantis (Am)			0.3	0.3	92.5
Boumaniella sp. (My)			0.3	0.3	92.5
Actiniaria (Cn)	0.3	0.3		8	92.5
Ophiothriz angulata (E)			0.3	0.3	92.5
Holothuroidea (E)	0.3	0.3	9		92.5
Crepidula plana (M)	0.3	0.3			92.5
Urosalpinz cinerea (M)	0.3	0.3			92.5
Ensis directus (M)	0.3	0.3			92.5
Spisula solidissima (M)	0.3	0.3			92.5
Abra aequalis (M)	0.3	0.3			92.5
Mulinia lateralis (M)	0.3	0.3			92.5
Tellina sp. (M)	0.3	0.3			92.5
Harmothoe sp. A (P)	0.3	0.3			92.5
Pista palmata (P)			0.3	0.3	92.5
Chone americana (P)	0.3	0.3			92.5
Pherusa ehlersi (P)	0.3	0.3			92.5
Cirriformia sp. (P)			0.3	0.3	92.5
Omuphis nebulosa (P)	0.3	0.3			92.5
Loimia medusa (P)	0.3	0.3			92.5
Ariothella mucosa (P)			0.3	0.3	92.5
Hydroides protulicola (P)	0.3	0.3			92.5
Polycirrus eximius (P)	0.3	0.3			92.5
Spiochaetopterus costarum oculatus (P)			0.3	0.3	92.5
Overia fusiformis (P)	0.3	0.3			92.5
Ancistrosyllis hartmanae (P)	0.3	0.3			92.5
Drilonereis magna (P)			0.3	0.3	92.5
Lepidonotus sublevis (P)	0.3	0.3			92.5
Preta quadre lobata (P)			0.3	0.3	92.5
Nereidae (P)	0.3	0.3			92.5
Phyllodocidae (P)	0.3	0.3	4		92.5
Curysoperature (r)			0.3	0.3	92.5

H5

Ranked abundance of benthic macroinvertebrates collected during 1982 at the additional offshore control stations. Estimates represent the mean number per 0.1 m² and A = Ascidiaces, Am = Amphipoda, Brach = Brachiopoda, C = Cumaces, Cc = Cephalochordats, Cn = Cidaria, D = Decapoda, E = Echinodermata, H = Hemichordata, I = Isopoda, M = Mollusca, My = Mysidaces, P = Polychaets, T = Tanaidacea. Appendix I.

	d Sheets	1987	IV.	1 1082	LIVEBAL
SPECIES	Katero K	SE	.×		RANK
		X	5		
Platviachnonidae A (Am)	10.0	6.4	43.0	7.0	0.1
Rheporunius epistomus (A.)	13.7	6.4	5.0	1.1	2.0
Nonhtus nicta (P)		. I			
Protohoustorius deichmannae (A=)	2.0	2.0	0.4		
(muridea dirhometria (N)		. 0			
Ugyrupes argumeroorres (U)				• •	
Unupris eremica (P)	2.0		1.5	6.0	0.9
kentla rentformus (Cn)	1.3	0.9	1.7	0.7	8.5
Magelona papillicornis (P)	2.3	1.4	0.7	0.7	8.5
Tellina terana (M)	1.7	0.7	1.0	0.6	10.5
Glycera sp. C (P)	2.0	1.0	0.7	0.7	10.5
Dissodactulus mellitae (D)			2.3	2.3	12.5
Sunchelidium americanum (Am)	2.0	1.0	0.3	0.3	12.5
Microphytopus Nameui (A=)	1 7	2			5-51
Raton Arthorinensis (Am)					5 51
Turballaria	2.1	2		0.4	5 51
Armondia anilia (D)		с С		> ~ • c	15 5
Olivello mutico (N)	· · 1				
Trachingenague construictue (D)	- -	4 0	1		
Mollita animawanoformata (5)			с -	0	0.12
Pamilusing multilineata (M)	- 0	r 0			0.12
Cuivetuceta matteretuca (n) Cuivetana hombin (b)				0.0	0.12
(1) Throws compared (1)			0.1	•	0.12
contaaa macutata (P)	0.3	٤.0	0.7	0.5	21.0
Ancinus depressus (1)			0.7	0.7	25.5
Nemertinea			0.7	0.7	25.5
Nudibranchia (M)	0.7	0.7			25.5
Glycera capitata (P)			0.7	0.7	25.5
Garmaropsis sp. (Am)			0.3	0.3	38.0
Listriella barnardi (Am)	0.3	0.3			38.0
Occyurostylis smithi (C)	0.3	0.3			38.0
Chiridotea stenops (1)			0.3	0.3	38.0
Leucothoe spinicarpa (A=)			0.3	0.3	38.0
Cumacea B			0.3	0.3	38.0
Apanthura magnifica (I)			0.3	0.3	38.0
Protohaustorius sp. (Am)	0.3	0.3			38.0
Tellina iris (M)	0.3	0.3			38.0
Astyris lunatn (M)	0.3	0.3			38.0
Petricola pholadiformis (M)	0.3	0.3			38.0
Arcidae A (M)	0.3	0.3			38.0
Terebra dislocata (M)	0.3	0.3			38.0

(Continued)

(Continued) Appendix 1. FALL 1982

OVERALL 38.0 38.0 38.0 38.0 38.0 38.0 38.0 3.0 ... 0.3 2.1 0.6 SE V.44 V.04 0.30 2.0 2.7 1.0 0.7 0.3 (× **YS03 EOSX** 0.6 0.3 SE 0.3 SUMMER 1982 0.3 0.3 IH Ĵ Ĵ ynchelidium americanum (Mm) Icanthohaustorius intermedius Arvilucina multilineata (M) Merita talpoida (D) tellita quinquesperforata (E) tagelona papillicornis (P) Platylachnopidae A (Am) Protohoustorius deichmonos Dissodactylus mellitae (D) Phepocynius epistomus (Am) katea oatharinensis (Mm) Glyceridae (°) Driionareis magna (°) Spionidae (°) Scolelepis tearna (°) Bapiosociopics sp. (°) Phyllodocidae (°) Scolelepis equanata (P) humaniella ep. (Ny) Vinnotheres ep. (D) icinus depresente (1) Tellina texana (M) Mephtys picta (P) Olivella mutica (M) lematoda SPECIES

(Continued)

00

0.3

6.9

0.3

0.3

Bronchicetoma caribaeum (Cc) Trachypenaeus constrictus (D) Ogyrides alphaerostris (D) Paguridae (D)

0.3

0.3

0.3

0.000

tilanthura tricarina (I) enilla reniformis (Cn) lycera sp. C (P)

andia agilis (P)

0.7

0.7

0.3

0.7

0.6

1.0

rtamysidopsis swifti (My) mipodus roseus (P)

tryurostylis smithi (C)

Tronizza sp. A (D)

Thiridotea stenops (1)

Cumacea B

Appendix I. (Concluded)

SPECIES \overline{x} SE \overline{x} SE Finniza sp. (b) y_{303} y_{303} y_{303} 0.3			SUMMER 1982		FALL 1982	OVERALL
YS03 Pinnizz sp. (D) Ogyrides hayi (D) O; 0.3 0.	SPECIES	ĬĦ	SE	×	SE	RANK
Yimiza sp. (b) Yso3 Ogyrides hay (D) 0.3 </td <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>						
Finitiza sp. (0) 0.3 0.3 0.3 0.3 Ogyrides hay (1) 0.3 0.3 0.3 0.3 0.3 Throw tropakts (m) 0.3 0.3 0.3 0.3 0.3 Relative (m) 0.3 0.3 0.3 0.3 0.3 0.3 Mereis false (P) 0.3 0.3 0.3 0.3 0.3 0.3 Mereis false (P) 0.3 0.3 0.3 0.3 0.3 0.3 Spice uncirate (P) 0.3 0.3 0.3 0.3 0.3 0.3 0.3 Coniade merutate (P) 0.3 0.3 0.3 0.3 0.3 0.3 0.3 0.3 0.3 0.3 0.3 0.3 0.3 0.3 0.3 0.3<				<u>XS03</u>		
<i>Qgyrides hayi</i> (D) 0.3 0.3 0.3 0.3 <i>Pancaprella temis</i> (Am) 0.3 0.3 0.3 0.3 <i>Tiron tropakie</i> (Am) 0.3 0.3 0.3 0.3 <i>Tiron tropakie</i> (Am) 0.3 0.3 0.3 0.3 <i>Tiron tropakie</i> (Am) 0.3 0.3 0.3 0.3 <i>Tiron trojekie</i> (Am) 0.3 0.3 0.3 0.3 <i>Tiron trojekie</i> (M) 0.3 0.3 0.3 0.3 <i>Mucula proxim</i> (H) 0.3 0.3 0.3 0.3 <i>Mucula proxima</i> (H) 0.3 0.3 0.3 0.3 <i>Mucula proxima</i> (P) 0.3 0.3 0.3 0.3 <i>Mucula proxima</i> (P) 0.3 0.3 0.3 0.3 <i>Mucula tropicata</i> (P) 0.3 0.3 0.3 0.3 <i>Dispio uncinata</i> (P) 0.3 0.3 0.3 0.3 <i>Splonidae</i> (P) 0.3 0.3 0.3 0.3 0.3 <i>Coniada maculata</i> (P) 0.3 0.3 0.3 0.3 0.3 0.3 <t< td=""><td>Pinniza sp. (D)</td><td></td><td></td><td>0.3</td><td>0.3</td><td>38.0</td></t<>	Pinniza sp. (D)			0.3	0.3	38.0
Paracaprella tenuis (m) 0.3	Ogyrides hayi (D)	0.3	0.3			38.0
Tiron tropatis (m) 0.3 0.3 0.3 Tiron triccellatus (m) 0.3 0.3 0.3 Tiron triccellatus (m) 0.3 0.3 0.3 Tiron triccellatus (m) 0.3 0.3 0.3 Nucula price (m) 0.3 0.3 0.3 Nucula price (m) 0.3 0.3 0.3 Nucula price (m) 0.3 0.3 0.3 Nursia (P) 0.3 0.3 0.3 Spice accord (P) 0.3 0.3 0.3 Coniada maculata (P) 0.3 0.3 0.3 Spionides (P) 0.3 0.3 0.3 Corrada maculata (P) 0.3 0.3 0.3	Paracaprella tenuis (Am)	0.3	0.3			38.0
Tiron triccellatue (m) 0.3 0.3 0.3 Merlina iria (h) 0.3 0.3 0.3 Nerei falsa (P) 0.3 0.3 0.3 Nerei falsa (P) 0.3 0.3 0.3 Nephyse incisa (P) 0.3 0.3 0.3 Nephyse incisa (P) 0.3 0.3 0.3 Splonda merulata (P) 0.3 0.3 0.3 Splonidee (P) 0.3 0.3 0.3 Contada merulata (P) 0.3 0.3 0.3	Tiron tropakis (Am)			0.3	0.3	38.0
Tellina irie (M) 0.3 0.3 0.3 Mucula proxima (H) 0.3 <	Tiron triocellatus (Am)	0.3	0.3			38.0
Mucula procrime (H) 0.3	Telling iris (M)	0.3	0.3			38.0
Mereis falsa (P) 0.3	Mucula proxima (M)	0.3	0.3			38.0
Glycera capitata (P) 0.3 0.3 Neptus inciata (P) 0.3 0.3 0.3 Neptus inciata (P) 0.3 0.3 0.3 Coniada maculata (P) 0.3 0.3 0.3 Splonides (P) 0.3 0.3 0.3 Carpotie (P) 0.3 0.3 0.3 Splonides (P) 0.3 0.3 0.3 Carpotie (P) 0.3 0.3 0.3 Carpotie (P) 0.3 0.3 0.3	Nereis falsa (P)	0.3	0.3			38.0
Mephtys incisa (P) 0.3 0.3 0.3 Dispio uncinata (P) 0.3 0.3 0.3 Goniada maculata (P) 0.3 0.3 0.3 Splonidae (P) 0.3 0.3 0.3 Parronis Iduel (P) 0.3 0.3 0.3	Glycera capitata (P)			0.3	0.3	38.0
Dispio uncinata (P) 0.3 0.3 0.3 Goniada maculata (P) 0.3 0.3 0.3 Splonidae (P) 0.3 0.3 0.3 Parmonis filadeae (P) 0.3 0.3 0.3 Parmonis filadeae (P) 0.3 0.3 0.3	Nephtys incisa (P)			0.3	0.3	38.0
Goniada maculata (P) 0.3 0.3 0.3 5 10	Dispio uncinata (P)	0.3	0.3			36.0
Spionidae (P) 0.3 0.3 0.3 Carteriadae (P) 0.3 0.3 0.3 Carteriadae (P) 0.3 0.3 0.3 0.3 0.3 0.3 0.3 0.3 0.3 0.3	Goniada maculata (P)			0.3	0.3	38.0
Capitellidae (P) 0.3 0.3 0.3 Paraomis fulaens (P) 0.3 0.3	Spionidae (P)			0.3	0.3	38.0
Paraonis fulgens (P)	Capitellidae (P)	0.3	0.3			38.0
	Paraonis fulgens (P)			0.3	0.3	38.0

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