INFAUNAL MACROMOLLUSCAN ASSEMBLAGES

OF THE EASTERN GULF OF MEXICO

University of South Florida, Department of .Marine Science

Principal Investigator:
Norman J. Blake

Associate Investigators:
David Bishof
John Studt

INTRODUCTION

Molluscs and polychaetes usually comprise the largest part of subtidal macroinfaunal (>500 µm) communities. This study was part of an attempt to characterize the benthic macrofaunal communities of the shelf and shelf break of the eastern Gulf of Mexico based upon quantitative sampling at 45 selected stations.

The infaunal macromolluscs of the shelf and slope of the eastern Gulf of Mexico mostly have been studied qualitatively. Techniques such as trawls and dredges have yielded much valuable information concerning the taxonomy and zoogeographic distributions of macromolluscs (Pulley, 1952; William Lyons, unpublished}. In order to undertake a more ecological approach in which the assemblages are analyzed based upon their "structure" (diversity, species richness, evenness) or in which they are "classified" based upon the temporal and spatial distribution of individuals and species, replicate samples should be taken by a qualitative technique, preferably over multiple seasorts.

METHODS

Figure 1 shows the station locations for the study along each of the six transects. Depths for each station are shown in Table 1. Each station was sampled during June 1975, September 1975, and January 1976. Station locations were determined by either Raydist or DECCA Hi Fix to a reported accuracy of ±30 m.

At each of the 45 stations an attempt was made to collect nine replicate box cores (21.3 cm x 30.5 cm) for macroinfaunal analysis. If after three successive attempts with the box core an adequate sample was

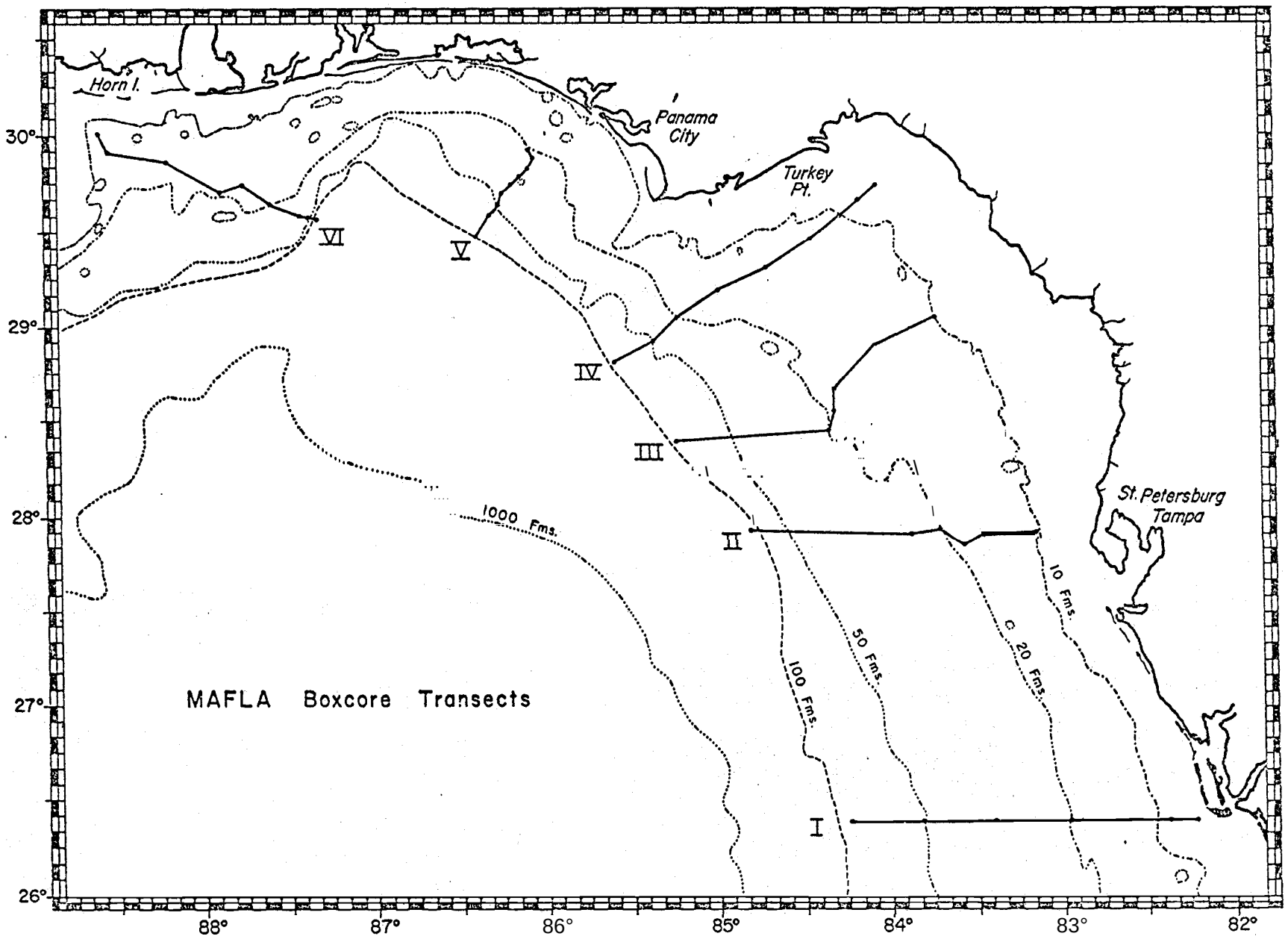


Figure 1. Location of the 45 box core stations on the six transects of the MAFLA study area during the 1975-1976 seasonal sampling.

TABLE 1.
BOX CORE STATION LOCATIONS AND DEPTHS

C*M. = 87° CLARKE (1866)

BOX CORE STATION NOS.	DEPTH (M)	LATITUDE (N)	LONGITUDE(W)
2637	21	30° 01' 57.6"	88° 36' 58.58"
2638	24	29° 55' 29.633"	88° 33' 28.422"
2639	32	29° 53' 28.163"	88° 12' 28.021"
2640	35	29° 43' 28.612"	87° 54' 29.103"
2641	37	29° 45' 29.999"	87° 46' 29.072"
2642	36	29° 40' 29.965"	87° 37' 00.777"
2643	69	29° 36' 30.901"	87° 26' 57.646"
2644	75	29° 36' 12.660"	87° 23' 31.656"
2645	106	29° 35' 01.370"	87° 20' 06.365"
2101	11	26° 25' 00.233"	82° 14' 55.228"
2102	18	26° 24' 59.642"	82° 25' 00.200"
2103	37	26° 25' 01.273"	82° 58' 00.301"
2104	53	26° 25' 01.144"	83° 23' 00.754"
2105	90	26° 25' 00.918"	83° 49' 58.987"
2106	168	26° 24' 57.174"	84° 14' 59.247"
2207	19	27° 57' 00.142"	83° 08' 58.259"
2208	31	27° 56' 00.097"	83° 27' 30.782"
2209	34	27° 52' 30.523"	83° 33' 59.552"
2210	37	27° 57' 29.742"	83° 42' 29.381"
2211	43	27° 56' 29.170"	83° 52' 59.621"
2212	189	27° 56' 59.551"	84° 48' 00.607"
2313	176	28° 24' 02.916"	85° 15' 06.974"
2314	29	28° 28' 59.934"	84° 20' 59.902"
2315	29	28° 34' 01.342"	84° 20' 06.082"
2316	35	28° 42' 00.862"	84° 19' 59.566"
2317	29	28° 55' 59.313"	84° 05' 59.980"
2318	20	29° 05' 00.568"	83° 44' 59.371"
2419	10	29° 47' 00.918"	84° 05' 00.431"
2420	14	29° 41' 59,856"	84° 11' 00.192"
2421	19	29° 37' 00.294"	84° 17' 00.750"

TABLE 1.
BOX CORE STATION LOCATIONS AND DEPTHS (continued)

C.M. = 87° CLARKE (1866)

BOX CORE STATION NOS.	DEPTH (M)	LATITUDE (N)	LONGITUDE (W)
" 2422	24	29° 29' 59.623"	84° 26' 59.811"
2423	30	29° 19' 58.932"	84° 44' 00.409"
2424	28	29° 12' 59.423"	85° 00' 01.004"
2425	36	29° 04' 59.526"	85° 14' 59.290"
2426	82	28° 57' 59.052"	85° 22' 5S.260"
2427	1 7 1	28° 49' 59.244"	S5° 37' 06.583"
2528	37	29° 54' 54.111"	86° 05' 00.407"
2529	38	29° 55' 59.797"	86° 06' 30.632"
2530	41	29° 50' 53.231"	86° 06' 24.405"
2531	45	29° 47' 59.987"	86° 09' 29.830"
2532	52	29° 45' 53.139"	86° 12' 18.162"
2533	67	29° 42' 53.424"	86° 15' 30.062"
2534	73	29° 39' 59.332"	86° 16' 59.158"
2535	117	29° 36' 59.163"	86° 19' 59.782"
2536	189	30° 18' 20.883"	86° 11' 59.148"

not obtained, a modified Sanders anchor dredge was used to collect two samples. The dredge was required at only six of the 135 station samplings.

A sample (five centimeters in diameter x depth of core) was taken from two of the nine box core replicates for sediment analysis leaving a total of approximately 0.54 m^2 for macroinfauna analysis. The top 15 cm of each of the nine replicates after sediment plug removal was sieved through a 500 μm mesh Nitex screen. The material remaining on the screen was placed in a cloth bag and narcotized for 30 min in 15% $MgSO_4$ after which it was preserved in 10% buffered formalin. The relatively less dense fauna (small polychaetes, crustaceans) were removed from the samples by flotation in a saturated NaCl solution. The remaining fauna were stained with one per cent rose bengal and sorted from the sediment. Fauna were divided into five groups (polychaetes, molluscs, crustaceans, echinoderms, and other) and stored in 70% EtOH. Wet weight biomass determinations were made for each group to the nearest 0.1 mg.

Only polychaetes (Vittor and Kritzler) and molluscs (Blake) were identified to the lowest practical taxonomic level.

All molluscs were identified to at least the family level, but only those individuals identified to at least the genus level were included in analyses. Key references for molluscan identification were Heath (1918), Henderson (1920), Clench (1941-1972), Hughes and Thomas (1971), Keen (1971), Kaas (1972), and Abbott (1974).

A standard analysis package was developed in collaboration with the DMSAG group. This package included the following:

1. Tabulation of numerical species dominance based upon an accumulated sum of the nine replicates (0.54 m^2).

2. Calculation of measurements of community structure. The sum of the species collected in the nine replicates were used for these calculations. The Shannon-Wiener index of H' (Pielon, 1966) was used to measure species diversity as follows:

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

where pi is the proportion of individuals which belong to the species.

Species diversity has both a "species richness" component and an "evenness" component (Floyd and Ghelardi, 1964). Species richness (Margelef, 1958) was measured as follows:

$$SR = (S-1)/in\ N$$

where S is the number of species and N is the total number of individuals. Evenness (Pielon, 1966) was measured by the following formula:

$$J' = H'/\log_2 S\ .$$

3. Calculation of similarity. Affinity between stations and seasons was calculated using Sander's (1960) minimal faunal abundance (MFA) and the Morisita (1959) coefficient ($C\lambda$). These affinities were calculated as follows:

For two S species assemblages A and B with proportionate abundances of the ith species ai and b_i respectively,

$$MFA = \sum_{i=1} c_i, \text{where } c_i = \begin{cases} ai, & a \leq b_i \\ b_i, & b_i \leq b \end{cases}, \quad 0 \leq a, b, c \leq 1.$$

The value may be presented as a percentage by multiplying by 100.

$$C_\lambda = Z \sum_{i=1}^{\infty} \frac{n1i\ n2i}{(\lambda 1 + \lambda Z)\ N1N2}$$

N1i and N2i are the number of specimens of conjoint species and N1 and N2 are the total number of individuals in the two samples. The coefficients are determined for the two samples by

$$\lambda = \sum_{i=1}^{\infty} \frac{n_i(n_i-1)}{N(N-1)}$$

The 145 x 144 half matrices resulting MFA and C_λ were clustered by the Mountford (1962) weighted pair group method and the results presented as a dendrogram.

RESULTS

Sediments

The surficial sediment characteristics (Doyle. 1976) at the 45 box core stations are shown in Table 2. Sediments can be classified based upon particle size as well as mineral composition into five substrate types ranging from lime mud to coarse sand (quartz). On Transects I - VI, coarse to fine sand high in calcium carbonate content was present at most of the nearshore stations; the sediment at stations 2101, 2207, 2318, and 2419 contained quartz sand as well as some carbonates. At the deeper stations, the sediments were classified as lime muds even though particle size ranged from clay to sand.

Sample replication

In the 1974 MAFLA program, seven box cores were taken at each station for macrofaunal analysis. Indications were that this number was inadequate to describe the benthic assemblages at the majority of the stations. Figure 2 shows the cumulative number of molluscan species in the nine replicates at four different stations during the summer 1975 sampling effort. At the shallow mud stations of Transects and VI, species saturation is reached within three to four replicates; and at the shallow sand stations of these two transects, species saturation is reached at five to six replicates. Seven replicates at the shallow sand stations of Transects I, II, III, and IV (represented in the' figure by 2103) yield 70-85% of the species collected with nine replicates; and even with nine replicates, species saturation is not reached at some of these stations because of the continued addition of rare species.

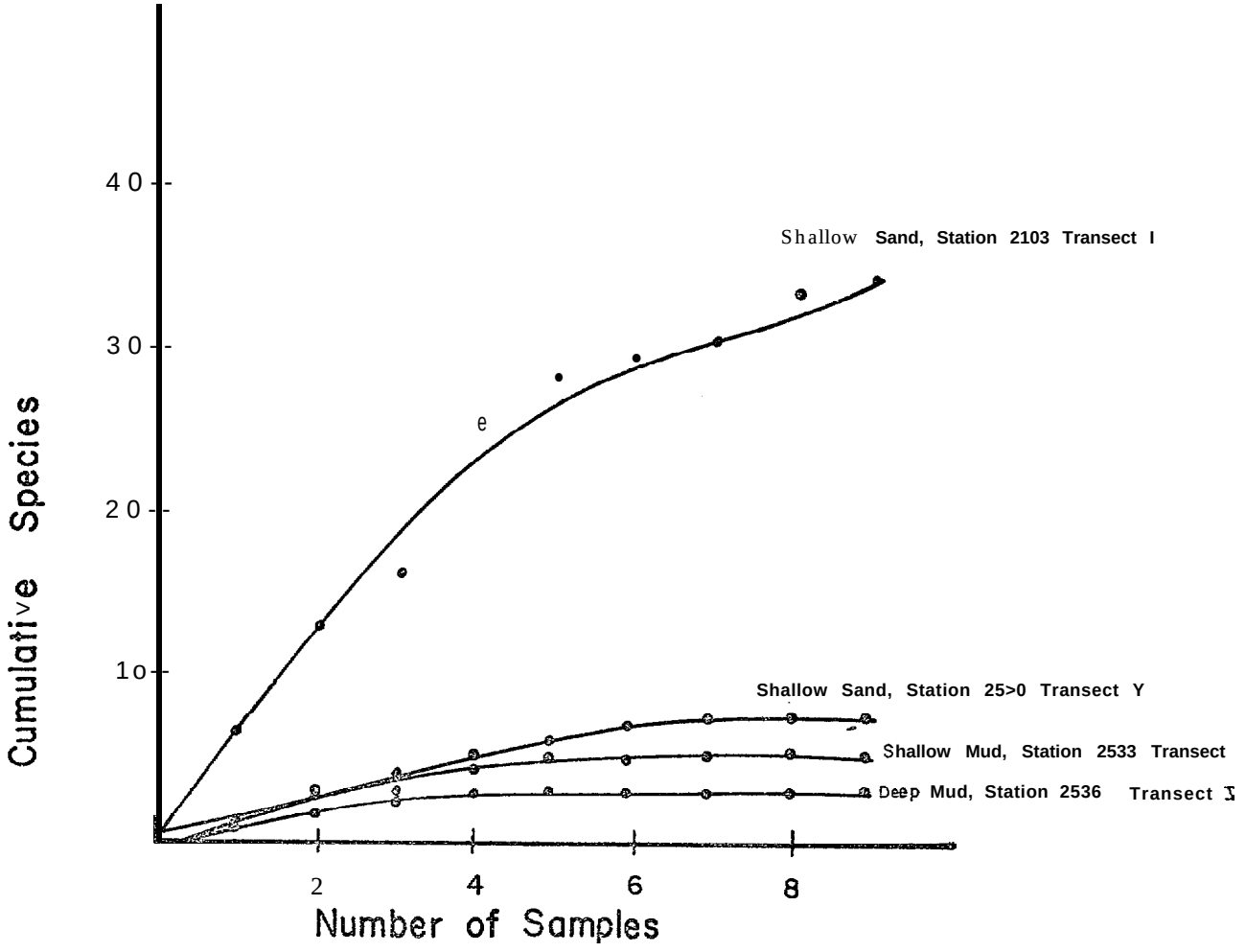


Figure 2. The cumulative number of species of macromolluscs collected with nine box cores in four different habitat types.

TABLE 2.
Surficial Sediment Characteristics for the
45 Box Core Stations (from Doyle, 1976)

Station	Mean Sediment Diameter (mm)	Calcium Carbonate (%)	Classifications
2101	.010	47.72	Carbonate clay
2102	.260	27.65	Carbonate sand
2103	.390	61.26	Carbonate sand
2104	.440	90.47	Carbonate sand
2105	.410	91.96	Carbonate sand
2106	.260	82.93	Carbonate sand
2207	.140	43.43	Carbonate sand
2208	.004	83.34	Carbonate clay "
2209	.210	83.51	Carbonate sand
2210	not available	86.67	Carbonate sand
2211	.620	93.18	Coarse carbonate sand
2'212	.260	88.00	Carbonate sand
2313	.009	85.04	Carbonate clay (Lime mud)
2314	not available	63.63	Coarse carbonate sand
2315	not available	64.35	Carbonate sand
2316	.180	53.55	Carbonate sand
2317	.052	79.48	Fine sand
2318	.480	10.77	Carbonate sand
2419	.210	19.19	Carbonate sand
2420	.250	66.87	Carbonate sand
2421	.125	51.53	Carbonate sand
2422	.440	43.81	Carbonate sand
2423	.430	72.46	Carbonate sand
2424	.270	9.27	Carbonate sand
2425	.490	8.27	Carbonate sand
2426	.280	34.27	Carbonate clay (Lime mud)
2427	.035	78.38	Carbonate clay (Lime mud)
2428	.740	58.62	Coarse carbonate sand
2529	1.100	71.82	Coarse carbonate sand
2530	.940	74.73	Coarse carbonate sand -
2531	.880	84.71	Coarse carbonate sand
2532	.410	75.79	Carbonate sand
2533	.790	86.85	Coarse carbonate sand
2534	1.000	91.00	Coarse carbonate sand
2535	.020	69.31	Carbonate clay (Lime mud)
2536	.019	74.17	Carbonate clay (Lime mud)
2637	.026	13.29	Silty day
2638	.020	17.54	Silty clay
2639	.130	20.78	Carbonate sand
2640	.420	19.67	Carbonate sand
2641	.150	5.31	Sand
2642	.250	6.51	Sand
2643	.570	83.97	Coarse carbonate sand
2644	.650	88.54	Coarse carbonate sand
2645	.710	84.29	Coarse carbonate sand

Species composition

Samples collected from the 45 stations during the three seasons of 1975 - 1976 yielded 282 identifiable macromolluscan (>500 μm) taxa (Table 3). The species included 141 gastropod, 120 bivalves, 13 scaphapods, 7 polyplacophorans, 1 aplacophoran. The list contains some species which are basically temperate in geographical distribution as well as others which are basically subtropical to tropical in geographical distribution. Although little is known about the ecology of the vast majority of species identified, both filter feeders and deposit feeders are represented in the list. Since all individuals collected by the box core and anchor dredge were identified to the lowest practical taxonomic level, the species list contains a limited number of epifaunal molluscs as well as infaunal molluscs.

Species abundances

Table 4 shows all molluscan species which were collected at the 45 stations during the three seasons and which represented at least five per cent of the total number of individuals. At the shallow water (20-90 m) stations of Transects I, II, III, and IV (Figure I), relatively more species were present in at least five per cent abundance than were present at the deeper water stations of these transects or the stations located on the Transects V and VI.

The abundances of the 282 species taken quantitatively by box core ranged from very rare (1 individual/0.54 m^2) to common (605 individuals/ 0.54 m^2). The most abundant species collected in the study were *Tellina versicolor*, *Parvilucina multilineata*, *Abra lioica*, and *Varicorbula operculata* respectively. *Tellina versicolor* occurred over broad areas of the MAFLA shelf (28 out of 45 stations) especially at the sand station in less than 90 m of water. The deeper water mud stations had generally lower

TABLE 3
INFAUNAL MOLLUSCS COLLECTED FROM MAFLA TRANSECTS I-VI DURING 1975-76

GASTROPODA

Scissurellidae
Scissurella crispata

Fissurellidae
Emarginula phrixodes
Emarginula pumila
Rimula frenulata
Hemitoma sp.
Diodora dysoni
Diodora jaumei
Lucapinella limatula

Trochidae
Solariella lucunella
Calliostoma roseolum
Calliostoma fascinans

Cyclostrematidae
Arene tricarinata

Turbinidae
Turbo castanea

Phasiaellidae
Tricolia thalassicola

Rissoidae
Alvania auberiana

Rissoinidae
Rissoina bryerea
Rissoina multicostata
Zebina browniana

Vitrinellidae
Cyclostremiscus sp.
Episcynia inornata
Teinostoma biscaynens

Tornidae
Macromphalina palmalitoris
Macromphalina floridana
Cochliolepis striata

Caedidae
Caecum pulchellum
Caecum bipartitum

Caecidae - continued
Caecum floridanum
Caecum imbricatum
Caecum cubitatum
Caecum stigosum
Caecum cornucopiae

Turritellidae
Turritella acropora

Architectonicidae
Pseudomalaxis centrifuga

Modulidae
Modulus modulus

Cerithiidae
Cerithium stratum
Cerithium litteratum
Finella dubia
Cerithiopsis crystallinum
Cerithiopsis taeniolata
Seila adamsi

Triphoridae
Triphora sp.

Epitoniidae
Opalia sp.
Epitonium krebsii
Epitonium novangliae

Mellanellidae
Melanella arcuata
Vitreolina bermudezi
Eulima bifasciatus
Eulimostrica hemphilli
Niso aeglees
Ocenida scalaris

Aclididae
Henrya sp.

Atlantidae
Atlanta peronii

Crepidulidae
Calyptraea centralis
Crucibulum auricula

GASTROPODA continued

Strombidae
Strombus alatus

Eratoidae
Triva maltbiana

Naticidae
Polinices lacteus
Polinices duplicates
Sigatica carolinensis
Sigatica semisulcata
Sinum perspectivum
Natica livida
Natica marochiensis
Natica canrena
Natica pusilla

Cassidae
Phalium granulatum

Cymatiidae
Distorsio constricta macgintyi

Muricidae
Murex cabritii
Murex macgintyi
Murex leviculus
Murex pomum
Ocenebra minirosea
Poirieria stimpsonii
Calotrophon ostrearum

Columbellidae
Anachis hotessieriana
Anachis obesa
Anachis iontha
Mitrella lunata
Psarostola glypta
Psarostola minor
Psarostola sp.

Buccinidae
Cantharus cancellarius

Nassariidae
Nassarius albus

Fasciolariidae
Fasciolaria lilium hunteria

Olividae
Oliva sayana
Olivella sp.

Vexillinae
Costellaria laterculatum

Cancellariidae
Cancellaria reticulate
Trigonostoma tenerum

Marginellidae
Marginella hartleyanum
Marginella eburneola
Hyalina avena
Hyalina veliei

Conidae
Conus jaspideus

Terebridae
Terebra dislocata
Terebra glossema
Terebra nassula
Terebra concava

Turridae
Cochlespria radiata
Microdrillia comatoropis
Mitrolumna biplicata
Cerodrillia simpsoni
Glyphoturris sp.
Brachycythara biconica
Brachycythara barbarae
Cryoturris fargoi
Cryoturris fi'lifers
Cryoturris citronella
Cryoturris quadrilineata
Kurtziella atrostyla
Rubellatoma rubella
Ithycythara lanceolata
Nannodiella melanitica
Glyphostoma hendersoni
Pyrocythara sp.
Daphnella
Platycythara elata
Rimosodaphnelle morra
Thelecythara floridana

Pyramidellidae
Odostomia seminuda
Turbonilla sp.

GASTROPODA continued

Acteonidae
Acteon punctostriatus
Acteon candens

Acteocinidae
Acteocina candei

Cylichnidae
Cylichna sp.
Scaphander sp.

Philinidae
Philine sagra

Bullidae
Bulls *striata*

Haminoeidae
Atys riiseana
Haminoea succinea

Retusidae
Retusa sulcata
Pyrunculus caelatus
Volvulella persimilis
Volvulella recta
Volvulella texasiana
Volvulella paupercula

Volvatellidae
Cylindrobulla beauii

Cuvieridae
Diacria trispinosa
Cavolinia uncinata

Siphonariidae
Williamia krebsii

SCAPHOPODA

Dentaliidae
Dentalium laqueatum
Dentalium texasianum
Dentalium ceratum
Dentalium bartletti
Dentalium semistriolatum
Dentalium ensiculus
Dentalium sowerbyi
Dentalium callipeplum
Dentalium eboreum

Siphonodentaliidae
Cadulus carolinensis
Cadulus quadridentatus
Cadulus tetrodon
Cadulus parvus

POLYPLACOPHORA

Ischnochitonidae
Ischnochiton boogii
Ischnochiton floridanus
Ischnochiton papillosus
Ischnochiton hartmeyeri

Chaetopleuridae
Chaetopleura apiculata

Chitonidae
Chiton squamosus

Acanthochitonidae
Acanthochitona pygmaea

APLACOPHORA

Chaetodermatidae
Chaetoderma sp.

BIVALVIA

Nuculidae
Nucula proxima
Nucula aegeensis

Nuculanidae
Nuculana carpentri
Nuculana acuta
Nuculana concentric
Yoldia solenoids

Solemyacidae
Solemya velure

Arcidae
Arca zebra
Barbatia domingensis
Anadara baughmani
Bathyarca sp;

BIVALVIA continued

Limopsidae
Limopsis cristata
Limopsis minuta
Limopsis sulcata

Glycymerididae
Glycymenis pectinata

Manzanellidae
Nucinella adamsi

Mytilidae
Crenella divaricata
Gregariella coralliophaga
Musculus lateralis
Lithophaga aristata
Modiolus americanus
Amygdalum papyrium
Amygdalum sagittatum
Botula fuses
Dacrydium vitreum

Pinnidae
Atrina sp.

Pteriidae
Pteria colymbus

Malleidae
Malleus candeanus

Pectinidae
Pecten raveneli
Chlamys benedicti
Aequipectin muscosus
Cyclopecten nanus
Argopecten gibbus

Plicatulidae
Plicatula gibbosa

Anomiidae
Anemia simplex

Limidae
Lima pellucida
Limatula setifera
Limes bronniana

Ostreidae
Ostrea equestris

Lucinidae
Linga pensylvanica
Linga sombrerensis
Linga excavata
Linga amiantus
Linga leacocyma
Parvilucina multilineata
Parvilucina blanda
Lucina nassula
Lucks muricata
Lucina radians
Anodontia Philippians
Anodontia albu
Divaricella dentata

Thyasiridae
Thyasira trisinuata
Thyasira flexuosa

Ungulinidae
Diplodonta punctata

Chamidae
Chama macerophylla
Chama congregata
Arcinella cornuta

Lasaeidae
Erycina emmonsi

Leptonidae
Montacuta limpida
Mysella sp.
Pythinella cuneata

Carditidae
Glans dominguensis
Pleuromersis tridentata
Pteromeris perplana

Astartidae
Astatre nana

Crassatellidae
Eucrassatella speciosa
Crassinella lunulata

Cardidiidae
Trachycardium egmontianum
Americardia media
Nemocardium peramabile
Nemocardium tincture
Laevicardium laevigatum
Laevicardium picture

BIVALVIA continued

Mactridae
Ervilia concentrica

Tellinidae
Tellina magna
Tellina listeri
Tellina squamifera
Tellina aequistriata
Tellina gouldii
Tellina alternata
Tellina versicolor
Tellidora cristata
Macoma tageliformis
Cymatoica orientalis

Semelidae
Semele purpurascens
Semele bellastriata
Semele nuculoides
Abra aequalis
Abra lioica

Solecurtidae
Solecurtus cumingianus
Solecurtus sanctaemarthae

Vesicomyidae
Vesicoma sp.

Veneridae
Periglypta listeri
Ventricolaria rugatina
Circomphalus strigillinus
Chione cancellata
Chione latilirata
Chione grus
Gouldia cerina
Pitar simpsoni
Pitar cordatus
Callista eucymata
Macrocallista maculata
Dosinia discus

Cooperellidae
Cooperella atlantica

Corbulidae
Varicorbula operculata
Corbula contracta
Corbula cymella

Gastrochaenidae
Gastrochaena hians

Hiatellidae
Hiatella arctica

Lyonsiidae
Lyonsia hyalina floridana

Pandoridae
Pandora inflata

Periplomatidae
Periploma cf. compressa

Poromyidae
Poromya granulata

Verticordiidae
Verticordia ornata

Cuspidariidae
Cuspidaria jeffreysi
Cardiomya costellata
Cardiomya perrostrata

TABLE 4.
Species Dominance At The 45 Box Core Stations During 1975 - 1976

Species	Summer % by number	Summer number	Fall % by number	Fall number	Winter % by number	Winter number
Station 2101						
Parvilucina multilineata	15.82	25	9.69	22	-----	
Tellina versicolor	12.03	19	-----	--	-----	--
Solemya velum	9.49	15	16.30	37	11.97	28
Crepidula fornicata	7.59	12		. .	-----	--
Calyptraea centralis	6.96	11	-----	- -	-----	- -
Diplodonta punctata	5.06	8	5.29	12	-----	--
Ischnochiton papillosus		--	32.16	73	26.07	61
Cerithium atratum		--	5.73	13		--
Plicatula gibbosa	-----	--	--------	- -	5.56	13
Station 2102						
Tellina versicolor	25.97	20	54.12	92	33.16	64
Atys riiseana	11.69	9		- -	———	- -
Caecum bipartitum	10.39	8	-----	. .	7.77	15
Eulimostrica hemphilli	10.39	8	-----	--	13.47	26
Laevicardium pictum	7.79	6	-----	- -	-----	- -
Varicorbula operculata		--		--	9.33	18
Station 2103						
Crenella divaricata	8.00	8	-----	--	-----	--
Varicorbula operculata	7.00	7	-----	--	-----	--
Tellina versicolor	6.00	6	14.62	19	6.96	16
Laevicardium pictum	6.00	6	-----	. --	-----	--
Atys riiseana	5.00	5	-----	- -	-----	- -
Parvilucina multilineata	5.00	5	14.62	19	6.52	15
Abra lioica	5.00	5	----	- -	-----	- -
Diplodonta punctata	-----	--	6.15	8	-----	- -
Caecum pulchellum	-----	--	8.46	11	-----	. ..-
Lyonsia hyalina floridana	-----	--	-----	- -	6.96	16
Finella dubia	-----	--	-----	--	5,65	13

TABLE 4. (Continued)

Species Dominance At The 45 Box Core Stations During 1975 - 1976

Species	Summer Z by number	numb e r	Fall % by number	numb er	Winter % by number	numb e r
Station 2104						
Tellina versicolor	11.67	7	-----	--	9.09	8
Olivella sp.	6.67	4	-----	--	-----	--
Amygdalum papyrium	6.67	4	-----	--	-----	--
Abra lioica	5.00	3	6.86	7	-----	--
Eulima bifasciatus	5.00	3	-----	--	-----	--
Brachycythara barbarae	5.00	3	-----	--	-----	--
Ischnochiton papillosus	-----	--	13.73	14	-----	--
Crassinella lunata	-----	--	6.86	7	6.82	6
Cadulus parvus	-----	--	5.88	6	-----	--
Semele nuculoides	-----	--	-----	--	9.09	8
Varicorbula operculata	-----	--	-----	--	5.68	5
Station 2105						
Abra lioica	31.58	12	51.72	15	8.77	5
Nucinella adamsi	10.53	4	-----	--	-----	--
Eucrassatella speciosa	7.89	3	-----	--	-----	--
Nuculana acuta	5.26	2	-----	--	-----	--
Cadulus parvus	-------	--	6.90	2	-----	--
Ischnochiton papillosus	-----	--	6.90	2	15,79	9
Parvilucina multilineata	-----	--	-----	--	8,77	5
Semele nuculoides	-----	--	-----	--	7.02	4
Limopsis sulcata	-----	--	-----	--	.5.26	3
Barbatia dominguensis	-----	--	-----	--	5.26	3
Station 2106						
Abra lioica	14.63	6	14.29	6	10.71	1
Linga sombrerensis	14.63	6	-----	--	-----	--
Cardiomya sp.	7,32	3	-----	--	-----	--
Thyasira trisinuata	--.--	--	19.05	8	-----	--

TABLE 4. (continued)
Species Dominance At The 45 Box Core Stations During 1975 - 1976

Species	Summer % by number	number	Fall % by number	number	Winter % by number	number
Station 2106 continued						
Cyclopecten nanus	-----	--	14.29	6	------	--
Limopsis cristata	-----	--	7.14	3	17.86	5
Parvilucina multilineata	-----	--	-----	--	25.00	7
Chaetoderma sp.	-----	--	-----	--	14.29	4
Dentalium texasianum	-----	--	-----	--	7.14	2
Station 2207						
Tellina versicolor	29.76	50	23.16	41	------	--
Solemya velum	9.52	16	38.98	69	------	--
Varicorbula operculata	-----	--	7.91	14	24.44	33
Station 2208						
Parvilucina multilineata	36.09	61	29.41	65	8.33	14
Caecum bipartitum	18.34	31	------	--	14.88	25
Caecum cubitatum	11.83	20	13.12	29	5.95	10
Acteocina candei	8.28	14	------	--	-------	--
Tellina versicolor	7.69	13	------	--	5.36	9
Caecum pulchellum	....	.-	37.10	82	-----	--
Abra lioica	------	--	------	--	16.07	27
Station 2209						
Parvilucina multilineata	26.60	50	29.71	71	31.40	38
Caecum bipartitum	24.47	46	-------	--	9.92	12
Finella dubia	11.17	21	-----	--	------	--
Acteocina candei	10.11	19	15.90	38	------	--
Caecum pulchellum	-----	--	22.59	54	------	--
Abra lioica	------	--	----.-	--	17.36	21

TABLE 4. (continued)
Species Dominance At The 45 Box Core Stations During 1975 - 1976

Species	Summer % by number	Summer number	Fall % by number	Fall number	Winter % by number	Winter number
Station 2210						
Parvilucina multilineata	50.74	241 *	33.21	87	5.45	43
Caecum bipartitum	9.68	46	-----	--	-----	--
Cues..un cubitatum	7.79	37	26.72	70	-----	--
Caecum pulchellum	-----	--	10.69	28	-----	--
Varicorbula operculata	-----	--	-----	--	34.22	270
Station 2211						
Crassinella lunulata	18.75	15	12.31	8	5.48	4
Gouldia cerina	6.25	5	-----	--	-----	--
Pitar simpsoni	6.25	5		--	-----	--
Parvilucina multilineata	5.00	4	-----	--	6.85	5
Corbula cymella	-----	--	6.15	4	-----	--
Frycina emmonsi	-----	--	6.15	4	-----	--
Gastrochaena hians	-----	--	-----	--	5.48	4
Varicorbula operculata		--		--	5.48	4
Station 2212						
Abra lioica	20.51	8	24.14	7	23.26	10
Cerithiopsis crystallinum	10.26	4	17.24	5	9.30	4
Verticordia ornata	7.69	3	6.90	2	-----	--
Cyclopecten nanus	7.69	3	-----	--	-----	--
Bathyarca glomerula	5.13	2	6.90	2	-----	--
Dentalium sp.	5.13	2	-----	--	-----	--
Nuculana acuta	5'.13	2	-----	--	-----	--
Thyasira trisinuata	5.13	2		--	-------	--
Chaetoderma sp.	———	--		--	25.58	11
Parvilucina multilineata	-----	--	-----	--	11.63	5

TABLE 4. (continued)
Species Dominance At The 45 Box Core Stations During 1975 - 1976

Species	Summer % by number	Summer number	Fall % by number	Fall number	Winter % by number	Winter number
Station 2313						
Abra lioica	47.62	10	92.86	13	40.00	6
Nuculana carpenter	9.52	2	-----	--	-----	--
Nemocardium peramabile	------	--	7.14	1	-----	--
Amygdalum papyrium	-----	--	-----	--	6.67	1
Cardiomya perrostrata	-----	--	-----	--	6.67	1
Lyonsia hyalina floridana	-----	--	-----	--	20.00	3
Cerithiopsis crystalline	-----	--	-----	--	6.67	1
Dentalium sp.	-----	--	-----	--	6.67	1
Station 2314						
Parvilucina multilineata	37.23	51 *	-----	-- *	———	--
Tellina versicolor	13.14	18	-----	--	15.79	6
Gastrochaena hians	———	--	51.08	118	-----	--
Barbatia dominguensis	-----	--	5.19	12		——
Botula fasca	-----	--	7.79	18	-----	--
Atys riiseana	-----	--	-----	--	5.26	2
Philine sagra	-----	--		--	7.89	3
Varicorbula operculata	-----	--	-----	--	5.26	2
Tellina aequistriata		--	-----	--	5.26	2
Pitar simpsoni	-----	--	-----	--	5.26	2
Cardiomya perrostrata	-----	--	-----	--	21.05	8
Station 2315						
Parvilucina multilineata	39.59	116 *	17.02	16	-----	--
Tellina versicolor	7.51	22	43.62	41	-----	--
Philine sagra	-----	--	6.38	6	-----	--
Varicorbula operculata	-----	--	5.32	5	-----	--

TABLE 4. (continued)
Species Dominance At The 45 Box Core Stations During 1975 - 1976

Species	Summer % by number	Summer number	Fall % by number	Fall number	Winter % by number	Winter number
Station 2315 continued						
Gastrochaena hians	-----	--	-----	--	32.67	33
Corbula cymella	-----	--	-----	--	8.91	9
Station 2116						
Tellina versicolor	43.84	32	-----	--	7.38	9
Acanthochitona pygmaea	-----	--	15.85	13	-----	--
Abra lioica	-----	--	8.54	7	-----	--
Crassinella lunulata	-----	--	8.54	7	-----	--
Varicorbula operculata	-----	--	-----	—	14.75	18
Ischnochiton papillosus	-----	--	-----	--	7.38	9
Corbula cymella	-----	--	-----	--	5.74	7
Dentalium bartletti	-----	--	-----	--	5.74	7
Station 2317						
Cymatoica orientalism	15.63	10	-----	--	-----	--
Tellina versicolor	10.94	7	55.56	45	-----	--
Parvilucina multilineata	6.25	4	-----	--	-----	--
Lucina radians	6.25	4	-----	--	-----	--
Varicorbula operculata	6.25	4	-----	--	73.78	605
Station 2318						
Diplodonta punctata	16.67	4	5.26	6	-----	--
Abra lioica	8.33	2	19.30	2	-----	--
Tellina versicolor	8.33	2	10.53	12	18.52	5
Semele nuculoides	-----	--	5.26	6	-----	--
Thyasira trisinuata	-----	--	6.14	7	-----	--

TABLE 4. (continued)
Species Dominance At The 45 Box Core Stations During 1975 - 1976

Species	Summer % by number	Summer number	Fall % by number	Fall number	Winter % by number	Winter number
Station 2318 continued						
Cadulus quadridentatus	-----	--	-----	--	51.85	14
Acteocina candei	-----	--	-----	--	7.41	2
Station 2419						
Tellina versicolor	48.53	33	27.27	18	64.00	16
Abra lioica	7.35	5	-----	--	-----	--
Ervilia concentrica	-----	--	10.61	7	-----	--
Solemya velum	-----	--	27.27	18	-----	--
Diplodonta punctata	-----	--	12.12	8	8.00	2
Station 2420						
Cadulus Sp.	17.07	14	-----	--	-----	--
Diplodonta punctata	12.20	10	-----	--	-----	--
Abra lioica	8.54	7	-----	--	-----	--
Tellina versicolor	6.10	5	-----	--	-----	--
Acanthochitona pygmaea	-----	--	30.49	25	-----	--
Rissoinea multicostata	-----	---	7.32	6	-----	--
Eulima bifasciatus	-----	--	-----	--	14.29	1
Lyonsia hyalina floridana	-----	--	-----	--	14.29	1
Turbonilla sp.	-----	--	-----	--	28.57	2
Crassinella lunulata	-----	--	-----	--	28.57	2
Gastrochaena hians	-----	--	-----	--	14.29	1
Station 2421						
Varicorbula operculata	17.50	7	-----	--	88.29	407 *
Caecum pulchellum	15.00	6	-----	--	-----	--
Caecum bipartitum	15.00	6	-----	--	-----	--

TABLE 4. (continued)
Species Dominance At The 45 Box Core Stations During 1975 - 1976

Species	Summer % by number	Summer number	Fall % by number	Fall number	Winter % by number	Winter number
Station 2421 continued						
Tellina versicolor	7.50	3	7.59	6	-----	— *
Volvulella persimilis	5.00	2	-----	--	-----	--
Solemya velum	-----	--	53.16	42	-----	--
Parvilucina multilineata	-----	--	6.33	5	-----	--
Station 2422						
Semele bellastriata	10.87	5	———	--	-----	-- *
Cymatoica orientalism	8.70	4	-----	--	-----	--
Corbula cymella	8.70	4	6.67	3	-----	--
Acanthochitona pygmaea	6.52	3		--	-----	--
Varicorbula operculata	6.52	3	-----	--	-----	--
Laevicardium laevigatum	6.52	3	-----	--	-----	--
Macrocallista maculata	6.52	3	-----	--	11.54	6
Semele nuculoides	-----	--	6.67	3	-----	--
Parvilucina multilineata	-----	--	20.00	9	-----	--
Tellina versicolor	-----	--	11.11	5	-----	--
Cylindrobulla beauii	-----	--	6.67	3	-----	--
Diplodonta punctata	-----	--	-----	--	9.62	5
Pitar cordatus	-----	--	-----	--	23.08	12
Dosinia discus	-----	--	-----	--	7.69	4
Station 2423						
Laevicardium laevigatum	11.76	4	-----	--	-----	--
Macrocallista maculata	8.82	3	-----	--	-----	--
Tellina versicolor	5.88	2	-----	--	-----	--
Pitar simpsoni	5.88	2	-----	--	-----	--
Lyonsia hyalina floridana	5.88	2	-----	--	-----	--
Corbula cymella	5.88	2	-----	--	33.33	3

TABLE 4. (continued)
Species Dominance At The 45 Box Core Stations During 1975 - 1976

Species	Summer % by number	numb er	Fall % by number	number	Winter % by number	numb er
Station 2423 continued						
Caecum stigosum	-----	--	23.53	12	-----	--
Macromphalina floridana	-----	--	11.76	6	-----	--
Gouldia cerina	-----	--	9.80	5	-----	--
Parvilucina multilineata	-----	--	5.88	3	-----	--
Amygdalum papyrium	-----	--	-----	--	11.11	1
Diplodonta punctata	-----	--	-----	--	11.11	1
Amygdalum sagittatum	-----	--	-----	--	11.11	1
Chione cancellata	-----	--	-----	--	11.11	1
Varicorbula operculata	-----	--	-----	--	11.11	1
Station 2424						
Tellina versicolor	6.25	2	19.51	16	23.08	6
Chione cancellata	6.25	2	-----	--	-----	--
Crenella divaricata	6.25	2	-----	--	-----	--
Diplodonta punctata	6.25	2	-----	--	-----	--
Cadulus quadridentatus	6.25	2	-----	--	-----	--
Caecum cubitatum	-----	--	6.10	5	-----	--
Crassinella lunulata	-----	--	7.32	6	-----	--
Corbula cymella	-----	--	6.10	5	-----	--
Varicorbula operculata	-----	--	6.10	5	-----	--
Semele nuculoides	-----	--	-----	--	15.38	4
Corbula contracta	-----	--	-----	--	11.54	3
Station 2425						
Tellina versicolor	13.33	2	5.88	2	55.38	72
Crucibulum auricula	13.33	2	-----	--	-----	--
Solemya velum	13.33	2	-----	--	-----	--
Pecten raveneli	13.33	2	-----	--	-----	--

TABLE 4. (continued)
Species Dominance At The 45 Box Core Stations During 1975 - 1976

Species	Summer % by number	number	Fall % by number	number	Winter % by number	number
Station 2425 continued						
Semele bellastriata	13.33	2	-----		-----	--
Pteromeris perplana	13.33	2	-----	--	-----	--
Marginella hartleyanum	6.67	1	8.82	3	-----	--
Crassinella lunulata	-----	--	14.71	5	-----	--
Gastrochaena hians	-----	--	8.82	3	-----	--
Lima pellucida	-----	--	5.88	2	-----	--
Chlamys benedicti	-------	--	5.88	2	-----	--
Ischnochiton sp.	-----	--	-----		8,46	11
Station 2426						
Tellina versicolor	21.05	4	20.00	2	15.79	3
Abra lioica	5.26	1	-----	--	10.53	2
Poromya granulata	5.26	1	-----	--	-----	--
Nucinella adamsi	5.26	1	-----	--	-----	
Dentalium sp.	-----	--	10.00	1	-----	
Parvilucina multilineata	-----		10.00	1	-----	--
Cadulus sp.	-----		20.00	2	-----	--
Nuculana acuta	-----	--	10.00	1	15.79	3
Pandora inflata	-----	--	-----	--	5.26	1
Limopsis cristata	———	--	-----	--	5.26	1
Olivella sp.	-----	--	-----	--	5.26	1
Solariella lacunella	-----	--	-----	--	5.26	1
Cardiomya perrostrata	-----	--	-----	--	5.26	1
PhiLine sagra	-----	--	———	--	10.53	2
Station 2427						
Abra lioica	50.00	4	55.56	5	68.75	11
Cuspidaria sp.	12.50	1	-----	--	-----	--
Dentalium sp.	-----	--	-----	--	6.25	1

TABLE 4. (continued)
Species Dominance At The 45 Box Core Stations During 1975 - 1976

Species	Summer % by number	Summer number	Fall % by number	Fall number	Winter % by number	Winter number
Station 2427 continued						
Cardiomya perrostrata	-----	--	-----	--	6.25	1
Dentalium ensiculus	-----	--	-------	--	6.25	1
Nemocardium peramabile	-----	--	-----	--	6.25	1
Station 2528						
Ischnochiton boogii	26.09	6	7.69	1	-----	--
Chlamys benedicti	13.04	3	-----	--	-----	--
Gastrochaena hians	8.70	2	7.69	1	-----	--
Gouldia cerina	-----	--	7.69	1	5.26	1
Tellina versicolor	-----	--	7.69	1	10.53	2
Varicorbula operculata	-----	--	7.69	1	5.26	1
Diplodonta punctata	-----	--	15.38	2	-----	--
Pteromeris perplana	-----	--	7.69	1	-----	--
Volvulella persimilis	-----	--	7.69	1	-----	--
Tellina listeri	-----	--	7.69	1	-----	--
Natica marochiensis	-----	--	7.69	1	-----	--
Semele bellastriata	-----	--	-----	--	5.26	1
Polinices duplicates	-----	--	-----	--	5.26	1
Chione cancellata	-----	--	-----	--	5.26	1
Cyclopecten nanus	-----	--	-----	--	26.32	5
Semele purpurascens	-----	--	-----	--	5.26	1
Crassinella lunulata	-----	--	-----	--	5.26	1
Corbula contracta	-----	--	-----	--	5.26	1
Abra lioica	-----	--	-----	--	5.26	1
Station 2529						
Diplodonta punctata	5.88	1	7.14	1	-----	--
Semele purpurascens	5.88	1	-----	--	-----	--
Dentalium ceratum	.5.88	1	-----	--	-----	--

TABLE 4. (continued)
Species Dominance At The 45 Box Core Stations During 1975 - 1976

Species	Summer % by number	Summer number	Fall % by number	Fall number	Winter % by number	Winter number
Station 2529 continued						
Crenella divaricata	-----	--	14.29	2	-----	--
Lima pellucida	----	-	7.14	1	-----	--
Pleuromeris tridentata	-----	--	14.29	2	-----	--
Crassinella lunulata	-----	--	7.14	1	-----	--
Gouldia cerina	-----	--	7.14	1	-----	--
Gastrochaena hians	-----	--	7.14	1	-----	--
Solecurtus sanctaemarthae	-----	--	-----	--	8.33	1
Tellina versicolor	-----	--	-----	--	8.33	1
Cyclopecten nanus	-----	--	-----	--	16.67	2
Philine sagra	-----	--	-----	--	8.33	1
Ischnochiton papillosus	-----	--	-----	--	8.33	1
Varicorbula operculata	-----	--	-----	--	16.67	2
Amygdalum papyrium	-----	--	-----	--	8.33	1
Station 2530						
Crenella divaricata	18.18	2	14.29	3	-----	--
Astarte nana	18.18	2	-----	--	-----	-
Pleuromeris tridentata	9.09	1	-----	--	-----	--
Chione cancellata	9.09	1	-----	--	-----	--
Nassarius	9.09	1	-----	--	-----	--
Cuspidaria jeffreysi	9.09	1	-----	--	-----	--
Crassinella lunulata	-----	--	14.29	3	-----	--
Ischnochiton boogii	-----	--	14.29	3	-----	--
Tellina versicolor	-----	--	-----	--	30.00	3
Diplodonta punctata	-----	--	-----	--	20.00	2
Semele bellastriata	-----	--	-----	--	20. 0	2
Pecten raveneli	-----	--	-----	--	10. 0	1
Chione latilirata	-----	--	-----	--	10. 0	1

TABLE 4. (continued)
Species Dominance At The 45 Box Core Stations During 1975 - 1976

Species	Summer % by number	number	Fall % by number	number	Winter % by number	number
Station 2531						
Gastrochaena hians	12.50	2	-----	--	-----	--
Amygdalum papyrium	6.25	1	-----	--	-----	--
Diplodonta punctata	6.25	1	-----	--	-----	--
Semele bellastriata	6.25	1	-----	--	8.33	1
Crenella divaricata	6.25	1	5.00	1	-----	--
Dentalium sp.	6.25	1	-----	--	-----	--
Semele purpurascens	6.25	1	10.00	2	-----	--
Crassinella lunulata	-----	--	20.00	4	8.33	1
Ischnochiton papillosus	-----	--	20.00	4	-----	--
Pitar simpsoni	-----	--	5.00	1	8.33	1
Laevicardium larvigatum	-----	--	5.00	1	-----	--
Polinices duplicates	-----	--	5.00	1	-----	--
Marginella hartleyanum	-----	--	5.00	1	-----	--
Ischnochiton boogii	-----	--	10.00	2	-----	--
Varicorbula operculata	-----	--	-----	--	8.33	1
Macoma sp.	-----	--	-----	--	16.67	2
Tellina versicolor	-----	--	-----	--	33.33	4
Station 2532						
Tellina versicolor	17.65	3	-----	--	30.77	4
Amygdalum papyrium	5.88	1	-----	--	-------	--
Dentalium sowerbyi	5.88	1	-----	--	-----	--
Acanthochitona pygmaea	5.88	1	-----	--	-----	.
Macoma sp.	5.88	1	-----	--	-----	--
Corbula sp.	5.88	1	-----	--	-----	--
Pitar simpsoni	-----	--	28.57	2	-----	--
Astarte nana	-----	--	14.29	1	-----	--
Solemya velum	-----	--	14.29	1	-----	--
Diplodonta punctata	-----	--	-----	--	15.38	2

TABLE 4. (continued)
Species Dominance At The 45 Box Core Stations During 1975 - 1976

Species	Summer % by number	number	Fall % by number	numb er	Winter % by number	number
Station 2533						
Limopsis sulcata	30.77	4	50.00	2	16.67	1
Pitar simpsoni	15.38	2	-----	--	-----	--
Limopsis cristata	7.69	1	-----	--	-----	--
Limopsis minuta	7.69	1	-----	--	-----	--
Solariella lacunella	7.69	1	-----	--	-----	--
Abra lioica	-----	--	25.00	1	-----	--
Astarte nana	-----	--	25.00	1	-----	--
Cuspidaria jeffreysi	-----	--	-----	--	16.67	1
Station 2534						
Pitar simpsoni	44,44	4	100.00	3	12.50	1
Limopsis sulcata	22.22	2	-----	--	-----	--
Abra lioica	22,22	2	-----	--	12.50	1
Gouldia cerina	-----	--	-----	--	25.00	2
Varicorbula operculata	-----	--	-----	--	12.50	1
Cyclopecten nanus	-----	--	-----	--	25.00	2
Nassarius vibex	-----	--	-----	--	12.50	1
Station 2535						
Abra lioica	40,00	2	No living molluscs		40.00	2
Tellina versicolor	20,00	1			-----	--
Nuculana acuta	20.00	1			-----	--
Nassarius vibex	-----	--			20.00	1
Anadara baughmani	-----	--			20.00	1

TABLE 4. (continued)
Species Dominance At The 45 Box Core Stations During 1975 - 1976

Species	Summer % by number	number	Fall % by number	number	Winter % by number	number
Station 2536						
Yoldia solenoides	20.00	1	-----	--	14.29	1
Nuculana acuta	20.00	1	100.00	1	-----	--
Cerithiopsis crystallinum	20.00	1	-----	--	-----	--
Abra lioica	-----	--	-----	--	14.29	1
Amygdalum sagittatum	-----	--	-----	--	14.29	1
Chaetoderma sp.	-----	--	-----	--	28.57	2
Station 2637						
Abra lioica	33.33	1	-----	--	-----	--
Varicorbula operculata	33.33	1	-----	--	-----	--
Nuculana concentrica	33.33	1	100.00	1	-----	--
Tellina versicolor	-----	--	-----	--	42.86	3
Urosalpinx sp.	-----	--	-----	--	14.29	1
Cardiomya perrostrata	-----	--	-----	--	14.29	1
Nuculana sp.	-----	--	-----	--	14.29	1
Station 2638						
Nuculana concentrica	66.67	24	-----	--	57.14	8
Tellina versicolor	13.89	5	33.33	1	14.29	2
Anachis obesa	5.56	2	-----	--	-----	--
Nucula proxima	-----	--	66.67	2	7.14	1
Chione latilirata	-----	--	-----	--	7.14	1
Station 2639						
Nuculana concentric	32.93	27	14.29	1	-----	--
Pythinella cuneata	12.20	10	-----	--	-----	--
Tellina versicolor	10.98	9	-----	--	-----	--

TABLE 4. (continued)
Species Dominance At The 45 Box Core Stations During 1975 - 1976

Species	Summer % by number	number	Fall % by number	number	Winter % by number	number
Station 2639 continued						
Solecurtus cumingianus	-----	--	14.29	1	-----	--
Nuculana proxima	-----	--	14.29	1	8.33	3
Tellina squamifera	-----	--	14.29	1	11.11	4
Tellina alternata	-----	--	28.57	2	-----	--
Gouldia cerina	-----	--	14.29	1.	-----	--
Amygdalum papyrium	-----	--	-----	--	5.56	2
Pearostola glypta	-----	--	-----	--	5.56	2
Chione latilirata	-----	--	-----	--	5.56	2
Diplodonta punctata	-----	--	-----	--	8.33	3
Sinum perspectivum	-----	--	-----	--	8.33	3
Lyonsia hyalina floridana	-----	--	-----	--	5.56	2
Station 2640						
Tellina versicolor	40.79	31	46.43	13	25.00	5
Macoma sp.	5.26	4	-----	--	-----	--
Lyonsia hyalina floridana	-----	--	7.14	2	-----	--
Varicorulb operculata	-----	--	10.71	3	-----	--
Crassinella lunulata	-----	--	-----	--	5.00	1
Chione latilirata	-----	--	-----	--	10.00	2
Nuculana concentrica	-----	--	-----	--	5.00	1
Amygdalum papyrium	-----	--	-----	--	10.00	2
Arcopsis adamsi	-----	--	-----	--	5.00	1
Gouldia cerina	-----	--	-----	--	5.00	1
Philine sagra	-----	--	7.14	--	-----	--
Station 2641						
Tellina versicolor	26.19	11	67.57	25	29.85	20
Cadulus quadridentatus	14.29	6	-----	--	-----	--
Cardiomya costellata	7.14	3	-----	--	-----	--

TABLE 4. (continued)
Species Dominance At The 45 Box Core Stations During 1975 - 1976

Species	Summer % by number	Summer number	Fall % by number	Fall number	Winter % by number	Winter number
Station 2641 continued						
Tellina aequistriata	7.14	3	-----	--	-----	--
Abra lioica	----	--	5.41	2	-----	--
Carciomya ornatissima	-----	--	5.41	2	-----	--
Solemya velum	-----	--	-----	--	8.96	6
Diplodonta punctata	-----	--	------	--	7.46	5
Station 2642						
Tellina versicolor	43.18	19	56.00	14	56.25	18
Macoma sp.	6.82	3	-----	--	-----	--
Lyonsia hyalina floridana	-----	--	8.00	2	-----	--
Cadulus quadridentatus	-----	--	8.00	2		--
Tellina aequistriata	-----	--	-----	--	6.25	2
Station 2643						
Tellina versicolor	41.18	7	30.77	4	29.41	5
Abra lioica	23.53	4	———	--	-----	--
Macoma sp.	5.88	1	7.69	1	5.88	1
Nuculana acuta	5.88	1	-----	--	23..53	4
Scaphander sp.	5.88	1	-----	--	-----	--
Amygdalum papyrium	-----	--	7.69	1	-----	
Tellina squamifera	-----	--	15.38	2	-----	--
Massarius albus	-----	--	7.69	1	-----	--
Tellina alternata	-----	--	7.69	1	-----	--
Gouldia cerina	-----	--	-----	--	5.88	1
Cyclopecten nanus	-----	--	-----	--	5.88	1
Verticordia ornata	-----	--	-----	--	5.88	1
Cardiomya perrostrata	-----	--	-----		5.88	1
octopus Sp.	-----	--		--	5.88	1

TABLE 4. (continued)
Species Dominance At The 45 Box Core Stations During 1975 - 1976

Species	Summer % by number	Summer number	Fall % by number	Fall number	Winter % by number	Winter number
Station 2644						
Abra lioica	50.00	3	-----	--	-----	--
Linga sombrerensis	16.67	1	-----	--	-----	--
Macoma sp.	16.67	1	-----	--	-----	--
Pitar simpsoni	-----	--	50.00	1	50.00	2
Pleuromeris tridentata	-.---	--	-----	--	25.00	1
Station 2645						
Abra lioica	20,00	3	No living molluscs		No living molluscs	
Limopsis minuta	6.67	1				
Astarte nana	6.67	1				
Limopsis cristata	6,67	1				
Olivella sp.	6,67	1				

abundances of all species. Abra lioca was the dominant species at most of the deep water (greater than 90 m) stations, although it occurred in abundances of only 1-15 individuals/0.54 m^2. Seasonality of species abundances is also suggested in Table 4. Some species which were completely absent from any of the nine replicates of one sampling were present in four to six of the nine replicates of another sampling and at times became the dominant species. The most abundant species listed above showed a definite trend toward maximum abundances during the winter sample suggesting a fall or winter recruitment. For example, *Varicorbula operculata* increased from seven individuals/0.54 m^2 in the summer to 605 in the winter, the latter number being mostly juveniles.

Community structure

'Indices of community structure are shown in Table 5. The Shannon-Wiener index (H') and evenness (J') for the 'three seasons at the" stations which were box cored are graphically presented in Figure 3. In general, H' which ranged from 0.26 to 3.36 declined from nearshore to offshore. and also from south (Transect I) to north (Transect VI). This index was therefore higher for the assemblages inhabiting the coarser sand sediment than for those inhabitating the finer mud sediments. Evenness (J') showed no consistent trend with either latitude or depth and ranged from 0.20 to 1.00.

Diversity also varied between seasons. At the nearshore stations at the southern transects (I, II, III, IV), H' was usually lowest during the fall sampling as a result of both the decline in the number of species and changes in dominance. Because of generally low species richness and abundances and even the non-occurrence of species, conclusions based upon values of these indices should be regarded as tentative at best.

Table 5. Species diversity (H'), eveness (J'), species richness (SR) at the 45 Box Core stations during the 1975 - 1976 seasonal sampling.

	Summer 1975				Fall 1975				Winter 1975			
Sta.#	H'	J'	SR	N	H'	J'	SR	N	H'	J'	SR	N
2101	3.08	.83	7.9	158	2.14	.67	4.24	227	2.85	.76	7.5	234
2102	2.35	.81	3.9	77	1.89	.58	4.9	170	2.47	.71	6.1	193
2103	3.37	.92	8.2	100	2.92	.84	6.6	130	3.36	.87	8.5	230
2104	3.23	.94	7.3	60	3.13	.88	7.4	102	3.12	.91	6.7	88
2105	1.99	.80	3.0	38	1.25	.64	1.8	29	1.8	.91	4.2	57
2106	2.09	.87	2.7	41	2.43	.86	4.3	42	2.03	.33	2.7	28
2207	3.05	.78	9.4	168	2.08	.62	5.4	177	2.45	.77	4.7	135
2208	2.07	.67	4.1	169	1.70	.57	3.5	221	2.52	.83	3.9	168
2209	2.27	.69	5.0	188	2.15	.66	4.6	239	2.27	.76	4.0	121
2210	*2.26	.55	9.7	475	2.04	.60	5.2	262	1.45	.44	3.9	789
2211	2.74	.85	5.4	80	2.86	.93	5.0	65	3.08	.94	5.8	73
2212	2.02	.92	2.2	39	1.88	.86	3.4	29	1.76	.80	2.1	43
2313	.90	.65	1.0	21	.26	.37	2.6	14	1.48	.83	1.8	15
2314	*2.55	.74	6.3	137	*1.84	.60	3.9	231	2.40	.89	3.8	38
2315	*2.67	.68	8.8	293	1.85	.65	3.5	94	2.33	.77	4.3	101
2316	2.11	.68	5.09	62	2.57	.84	4.5	82	3.24	.91	7.56	90
2317	3.01	.89	6.7	64	1.92	.62	4.8	81	.99	.35	2.48	640
2318	1.93	.93	2.2	24	2.81	.84	5.7	114	1.36	.70	1.8	27
2419	1.46	.59	2.6	68	2.07	.74	3.6	66	1.01	.56	1.6	25
2420	2.47	.85	3.9	82	2.34	.78	4.3	82	2.95	.93	6.01	46
2421	2.15	.87	3.0	40	1.76	.61	3.9	79	.59	.20	3.3	461
2422	2.87	.94	5.2	46	2.59	.90	4.5	45	2.62	.87	4.8	52
2423	2.70	.95	4.5	34	2.47	.84	4.6	51	1.67	.93	2.3	9
2424	2.78	.98	4.6	32	2.76	.87	5.2	82	2.02	.88	2.8	26
2425	1.93	.99	2.2	15	2.47	.93	3.7	34	1.72	.56	4.3	130
2426	1.15	.83	1.0	19	1.55	.96	1.7	10	2.08	.95	2.7	19
2427	.50	.72	2.1	8	----	---	---	9	.95	.59	1.4	16
2528	1.54	.86	1.6	23	2.27	.99	3.5	13	2.18	.91	2.6	19
2529	1.10	1.00	.7	17	2.04	.98	2.6	14	1.89	.97	2.4	12
2530	1.73	.97	2.1	11	1.93	.93	2.3	21	1.52	.95	1.7	10
2531	1.91	.98	2.2	16	2.02	.92	2.7	20	1.61	.90	2.0	12
2532	1.67	.93	1.8	17	1.04	.95	1.0	7	.64	.92	.39	13
2533	1.43	.89	2.6	13	1.04	.95	1.4	4	.69	1.00	.56	6
2534	1.04	.95	.9	9	----	---	---	3	1.73	.97	2.4	8
2535	1.04	.95	1.2	5	----	---	---		1.04	.95	1.2	5
2536	1.10	1.00	1.2	5	----	---	---	1	1.33	.96	1.5	7
2637	1.10	1.00	1.8	3	----	---	---	1	1.25	.90	1.5	7
2638	1.11	.57	1.7	36	.64	.92	.9	3	1.36	.84	1.5	14
2639	2.04	.74	3.4	82	1.75	.98	2.6	7	2.76	.95	4.7	36
2640	1.45	.63	2.1	76	1.84	.77	3.0	28	1.73	.89	2.0	20
2641	1.90	.82	2.4	42	1.08	.52	1.9	37	2.2	.78	3.6	67
2642	1.43	.62	2.4	44	1.41	.68	2.2	25	1.53	.64	2.9	32
2643	1.27	.79	1.4	17	1.61	.90	2.0	13	1.80	.87	2.5	17
2644	.95	.86	1.1	6	----	---	---	2	.64	.92	.72	4
2645	1.48	.92	1.5	15	----	---	---	---	----	---	---	---

*based on two anchor dredges rather than nine box cores

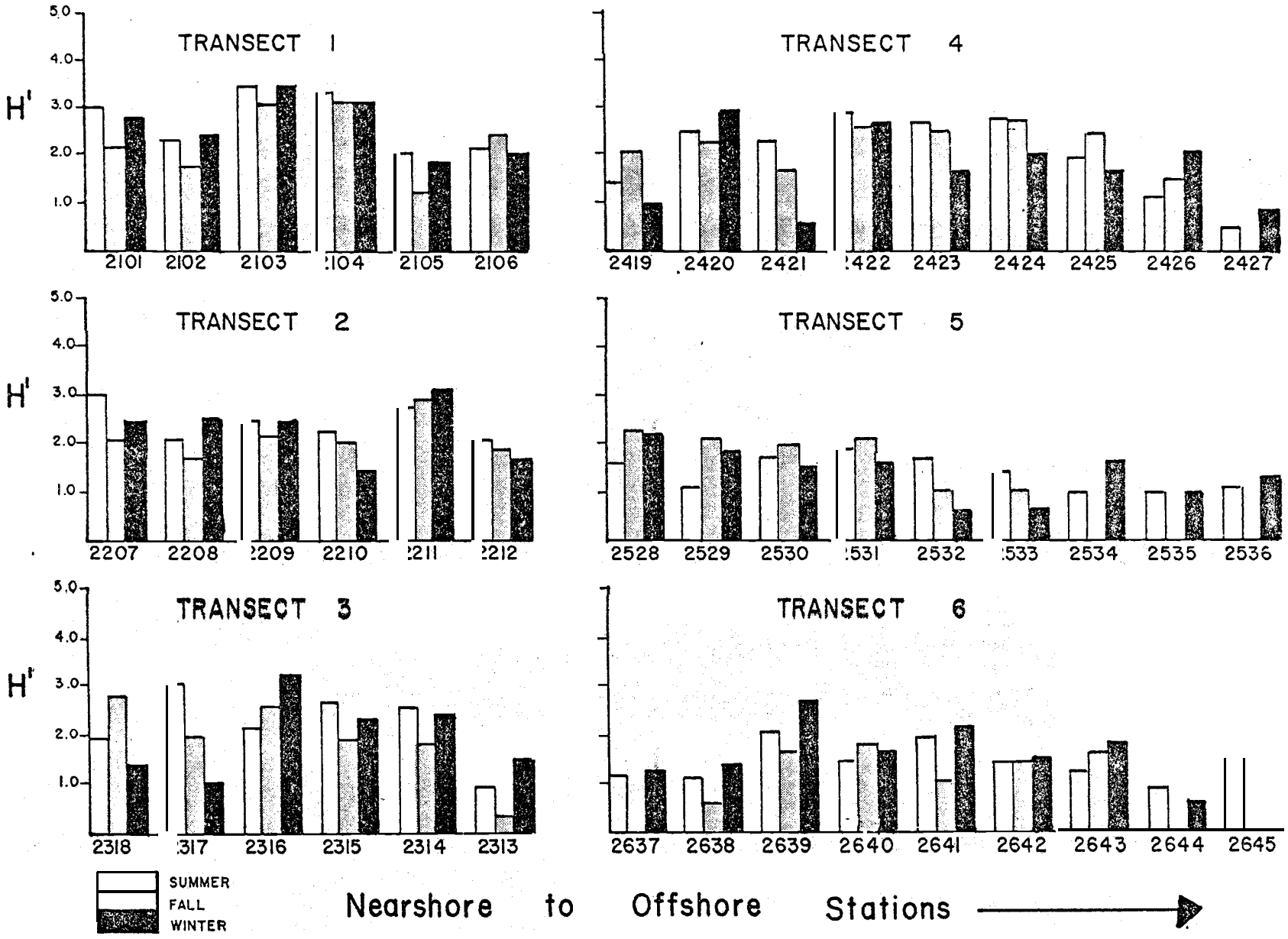


Figure 3. The Shannon-Wiener index for the 45 box core stations during the 1975-1976 seasonal sampling.

CLASSIF1CATION

Similarity relationships at all stations between seasons are depicted after Mountford clustering in a dendrogram (Figure 4). Visual examination of the dendrogram reveals the following general tendencies about the molluscan assemblages:

1. Species composition at most stations is highly seasonally dependent throughout the MAFLA area. Affinities between any two seasons for any station vary as little as 20% (deep water or northern stations) to as much as 60% (nearshore, southern stations). There is, therefore, little within station seasonal continuity especially at the nearshore southern stations.

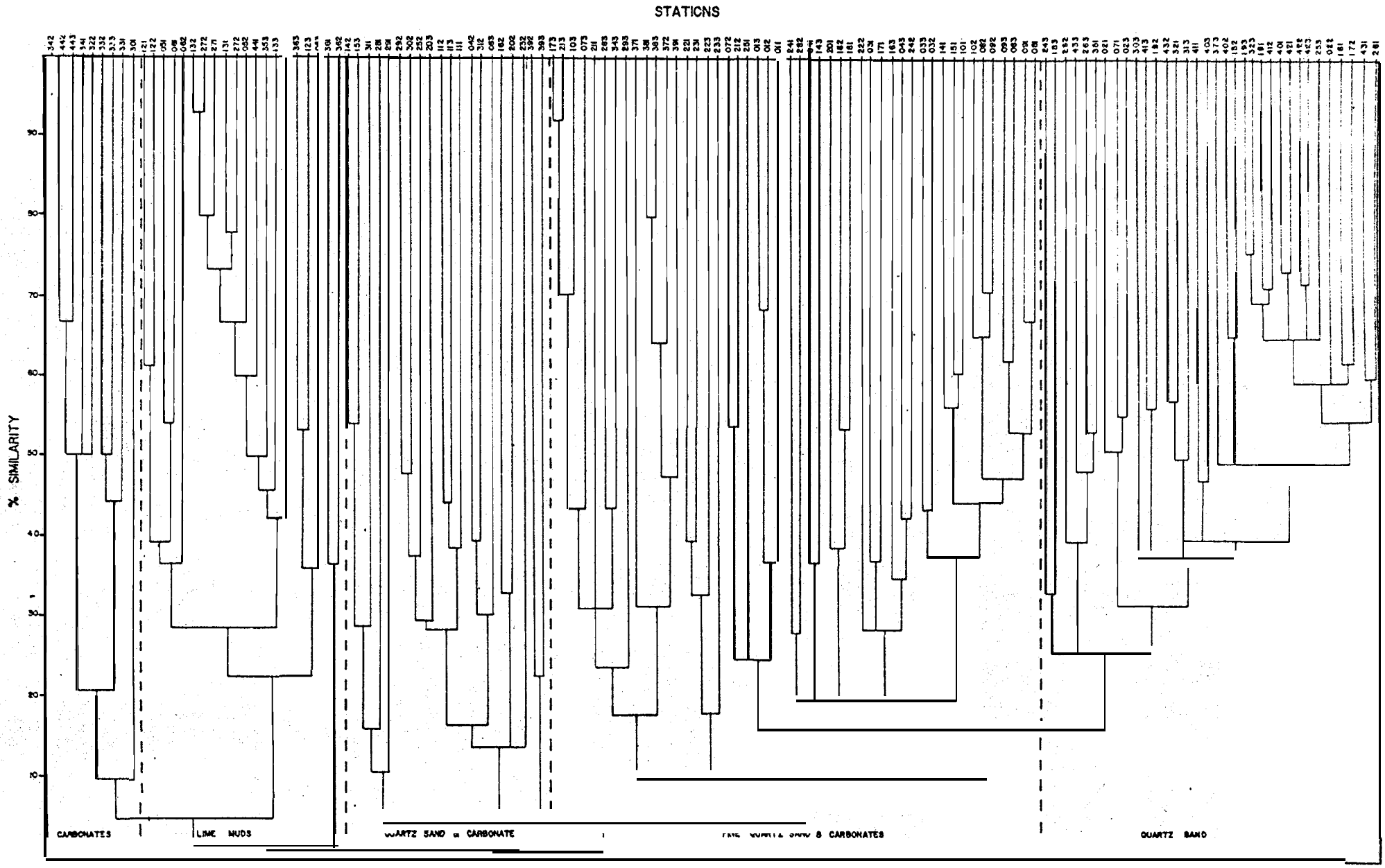
2. Stations exhibiting low diversities (Table 4) show greater affinity. This tendency is for the northern and deep water stations. For example, 1534 and 2644 during the fall sampling were 100% similar and 2313 and 2327 were 92.9% similar for the fall sampling.

3. Approximately one third of the stations show similarities exceeding 50% indicating that approximately two thirds of the assemblages exhibit taxonomic heterogeneity of 50% or greater. The mean affinity for the stations considered as a whole is approximately 30%.

Five major clusters are created at very low similarity levels (4.2% to 15.6%). These faunal breaks appear to be only partially related to sediment classification. Other factors which appear to be of importance, are season, latitude, depth, or even sampling problems.

Because of the variability in species composition indicated by low between season affinities, anomalies to the classification based upon the truncation are apparent within the dendrogram. . 'For example 2424, whose sediment classification is carbonate sand, appears within one cluster for the summer and fall samplings and a different cluster for the winter sampling.

Figure 4. Dendrogram resulting from the Mountford clustering of the 45 box core stations over three seasons. Station number is indicated by the first two digits and season by the last digit (1=summer, 2=fall, and 3=winter). Dashed vertical lines separate major groups. The major sediment classifications within these groups are shown.


STATIONS
% SIMILARITY
90
80
70
60
50
40
30
20
10
CARBONATES
LIME MUDS
QUARTZ SAND & CARBONATE
QUARTZ SAND
342 442 443 341 322 332 323 331 301 121 122 051 061 062 132 272 271 131 272 052 441 353 133 363 123 361 362 142 153 311 281 291 292 302 202 252 203 112 113 111 042 312 083 182 202 232 392 393 173 213 103 073 211 283 343 293 371 381 383 372 391 221 231 223 233 072 212 251 013 012 011 241 282 143 201 182 181 222 031 171 163 043 242 033 032 141 151 101 102 082 092 093 063 081 083 243 183 282 433 263 301 021 071 023 303 413 182 432 321 313 411 403 373 402 152 153 323 181 412 401 421 422 423 253 022 161 172 431 281

DISCUSSION

The MAFLA box core sampling program has enabled the collection of a vast amount of data on benthic communities which far exceeds the precision and accuracy of collections made thus far on almost any other continental shelf. Such large amounts of data necessitate that this final report be only an initial attempt to understand and explain the molluscan assemblages based upon the limited employment of structural and classification techniques.

Variations in species composition and abundance by habitat and season contribute to assemblages appearing to be unique entities in time and space. Populations within the MAFLA area obviously are affected by seasonal phenomena such as recruitment based upon innate reproductive cycles or larval settlement induced through larval transport by seasonal currents such as the Loop Current. Loss within the populations may result either because of natural physiological factors such as age or because of adverse environmental conditions such as a hurricane, a phenomenon which may have affected some populations in Transects V and VI during the Fall 1976.

The stations which generally showed the lowest diversity (<2.00) were found on the shelf break or on the northern two transects (V and VI). On the northern transects especially, the assemblages are obviously influenced by the Mississippi River. Large amounts of fine sediments are contributed to these stations and turbidity remains high throughout the year (Manheim, 1976, MAFLA final report). This environment, and to a lesser extent the slope environment, must be inhabited 'by species tolerant

of such conditions. These assemblages must be composed of essentially deposit feeders. Relatively few species in small abundances occur at these stations and any environmental perturbation is likely to eliminate the assemblage. Such assemblages are extremely difficult to adequately sample since the number of individuals per unit area is small. Measures of diversity and affinity at these stations based upon molluscs are tentative at best. Polychaetes and molluscs should be considered together especially at the northern and deeper stations.

On the southern transects, the assemblages are still typified by relatively low numbers of individuals compared to other assemblages in more temperate areas (Popham and Ellis, 1971; Boesch, 1972). The near-shore stations of Transects I, II, III and IV are characterized by species with few individuals although considerably more than appear on the northern Transects V and VI.

Clear definition of these molluscan assemblages is difficult based upon the techniques employed. The Mountford Clustering technique yielded very low similarity values between stations as well as between seasons. The partial definition of a community based upon a dominant mollusc in the Petersen-Thorson fashion (Thorson, 1957) is not readily apparent for the majority of the stations although in the construction of biolithologic map the Peterson–Thorson concept was applied based upon the summer sampling.

A more appropriate definition of the majority of the MAFLA benthic communities was given by Mills (1.969) who viewed a community as a continuum in time and space and as "a group of organisms occurring in a

particular environment, presumably interacting with each other, and separable by means of ecological survey from other groups." A start has been made but because of the variability, a low predictive capability exists for describing the benthic macromolluscan assemblages over the majority of the MAFLA area.

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