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DATA FROM SOME SUBTIDAL QUANTITATIVE BENTHIC SAMPLES TAKEN IN ESTUARIES OF SOUTH CAROLINA

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SOUTH CAROLINA MARINE RESOURCES CENTER

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INTRODUCTION

A study was initiated at the Marine Resources Research Institute in 1973 to provide the data necessary for sound management and planning purposes in the estuarine areas of South Carolina. Nektonic, benthic, hydrographic, and planktonic samples have been systematically collected at a series of stations covering every major estuary in the state. These stations represent a diverse assemblage of habitats, varying in hydrographic characteristics, biotic assemblages, substrate type, degree of pollution, and distance from the ocean. Collections are therefore available from a substantial number of the subtidal ecological systems recognized by Odum, Copeland, and McMahan (1974) that are known to occur in this state. Several estuaries have received particular attention during the study, including the North Santee, South Santee, Cooper, North Edisto, and South Edisto Rivers, and an intensive survey of the Winyah Bay estuarine system was begun in January of 1977.

Sampling of the benthos was undertaken at 38 stations between June 1973 and October 1975 using qualitative and quantitative collecting gear. A number of reports have been prepared based at least in part on data from qualitative collections (Calder, 1976; Calder and Boothe, 1977; Calder and Hester, 1977; Calder and Maturo, 1977a, b; Harrison, Calder, Coull, and James, 1977; Kraeuter and Calder, 1977). Results from quantitative benthic samples are included in several reports (Boothe, 1977; Shoemaker, Boothe, Petit, and Porter, 1977), and a preliminary account of the macrobenthos of 18 stations in the Santee and Edisto River estuaries has been completed (Calder, Boothe, and Maclin, 1977). Data from miscellaneous quantitative collections at another 16 stations are presented in this report.

Our purpose in preparing this tentative report is to present, in an interim form, data which otherwise would be unavailable for some time or

available only from data sheets. Analysis of the data herein has obviously been carried out only to a limited degree and is therefore subject to revision as well as final interpretation.

We thank John Miglarese and Rick Richter for assistance in the field, Mag Maclin, Karen Turner, Beth Hester, Sue Broadbent, and Dexter Kimsey for sorting samples, Dr. E. L. Bousfield for assistance with several amphipods, and Capt. Vince Taylor for his help on the R/V ANITA. M. H. Shealy, Jr., principal investigator for the Estuarine Survey Program, supported our efforts. Stan Baker, John Guilds, Dexter Kimsey, Michael McClain, and Craig Reeves assisted in various ways. Mag Maclin assisted in preparation of the tables. This study was supported by funds from Coastal Plains Regional Commission Contract No. 10340031.

MATERIALS AND METHODS

Quantitative samples of the benthos were collected using a 0.13 m^2 modified Petersen Grab having a capacity of 10.5 liters. Three replicate samples were collected at each station during each sampling interval. Volume of sediment, estimated depth of penetration, and gross sediment type were recorded for each sample. Collections were sieved immediately in the field using a series of screens having mesh sizes of 2.0, 1.0, and 0.5 mm (Shealy and Boothe, 1975). Organisms and sediment retained by the sieves were removed to collection bottles, preserved in 10% seawater formaldehyde, and stained with rose bengal. Samples were sorted and the invertebrates identified and counted in the laboratory using dissecting microscopes.

Several indices of community structure from Pielou (1975) were applied to the data in this report. Shannon's formula of species diversity

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

where H' is the species diversity in bits of information per individual, and pi equals $\frac{ni}{N}$ or the proportion of the sample belonging to the i^{th} species, was used. Species richness was measured based on 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 was calculated from the formula

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

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

Bottom salinity samples were taken at each station prior to benthic sampling using a 6-liter Van Dorn bottle, and analyzed in the laboratory with a Beckman RS7B induction salinometer. Depth was recorded on station using a

Raytheon DE-275B recording fathometer.

A list of the stations included in this report, along with the depth, bottom type, and salinity regime for each station, is presented in Table 1. Details on the location of these stations are provided by Shealy (1974, 1975).

Table 1. Location, depth, bottom type, and salinity regime for each of the stations sampled in coastal South Carolina.

Station	Location	N	W	Depth (m)	Bottom	Salinity Regime
Y001	Winyah Bay	33°15.6'	79°15.4'	4	mud	limnetic-mesohaline
J003	Cummings Point	32°44.9'	79°51.6'	12	sand, shell, mud	poly-euhaline
J001	Fort Johnson	32°45.4'	79°55,1'	7	mud	meso-polyhaline
C004	Cooper River Mouth	32°51.1'	79°56.0'	7	shell, sand, mud	oligo-polyhaline
C003	North Charleston	32°53.8'	79°57.6'	6	sand, shell, mud	oligo-mesohaline
C002	Big Island	32°58.2'	79°55.5'	6	sand	limnetic-oligohaline
C001	The Tee	33°04.0'	79°55.5'	10	clay	limnetic
W001	Nowell Creek	32°53.1'	79°52.6'	4	mud, sand, shell	mesohaline
K001	Ashley River	32°49.0'	79°58.1'	6	mud	meso-polyhaline
F001	Stono River	32°44.9'	80°00.7'	4	shell, sand, mud	meso-polyhaline
H003	Rock Creek	32°30.9'	80°27.9'	7	sand, shell, mud	meso-polyhaline
H002	Ashepoo River	32°34.0'	80°29.9'	5	sand, mud	oligo-mesohaline
H001	Whale Branch	32°32.1'	80°43.7'	4	sand, mud	meso-polyhaline
P002	Port Royal Sound	32°16.2'	80°43.2'	7	mud, sand, shell	poly-euhaline
P001	Colleton River	32°17.2'	80°49.0'	10	sand, mud	poly-euhaline
G001	Calibogue Sound	32°10.9'	80°47.8'	5	shell, mud, sand	poly-euhaline

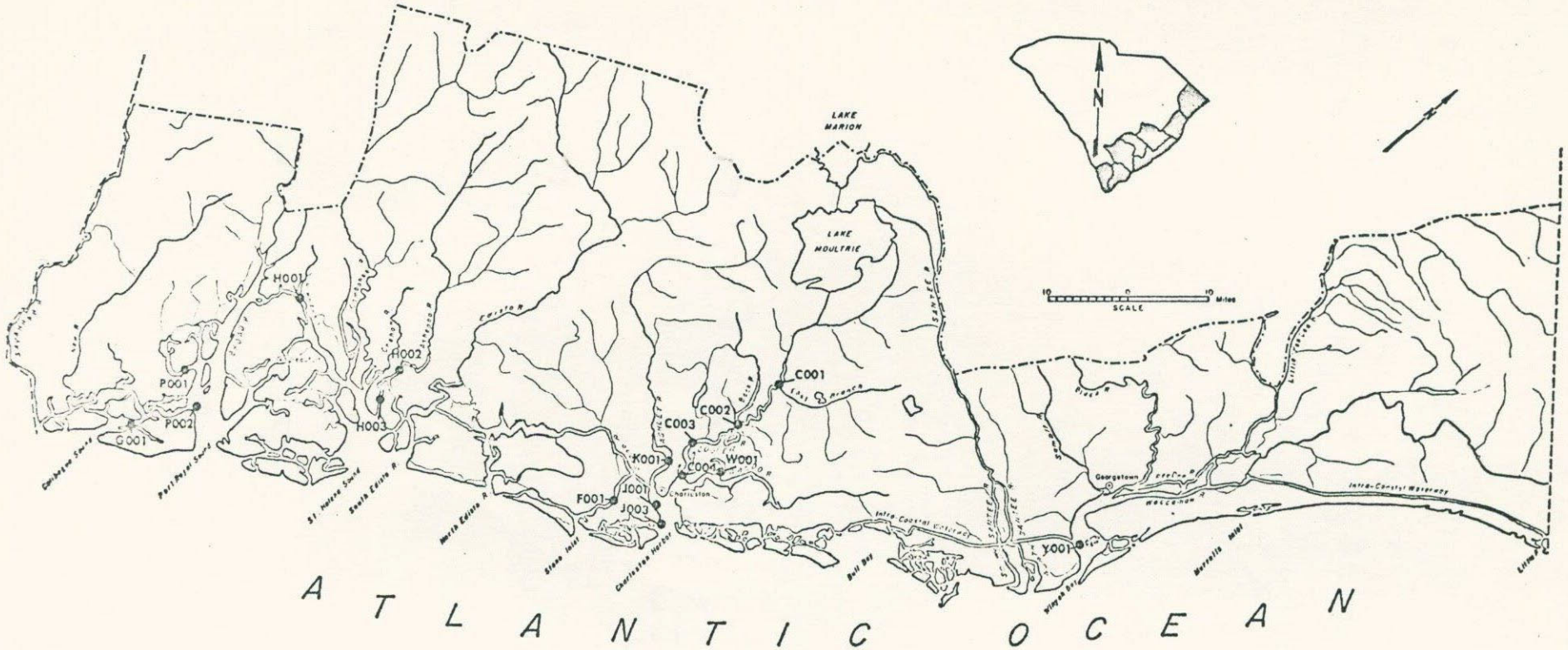

Fig. 1. Location of the stations in coastal waters of South Carolina.

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Table 2. Species of macroinvertebrates collected at station Y001 in July and October 1973 and January and April 1974, and their estimated densities in numbers m^{-2}. Percent of fauna, cumulative percent, and rank by number are given for each species. P = polychaete, B = bivalve, A = amphipod, I = isopod.

	July	Oct.	Jan.	Apr.	% of Fauna	Cumul. %	Rank by Number
Oligochaeta (undet.)	41	61	10	26	20.81	20.81	1
Polychaeta A (undet.)		13	13	77	15.54	36.35	2
Rhynchocoela (undet.)	5	20	18	54	14.63	50.98	3
Streblospio benedicti (P)		38	36		11.16	62.14	5
Notomastus sp. (P)				72	10.86	73.00	5
Heteromastus filiformis (P)		3	8	41	7.84	80.84	6
Paraprionospio pinnata (P)		26	18		6.64	87.48	7
Macoma balthica (B)			8	10	2.71	90.19	8
Mulinia lateralis (B)		10	5		2.26	92.45	9
Monoculodes intermedius (A)			5	3	1.21	93.66	10
Nereis succinea (P)			3	5	1.21	94.87	10
Scolecolepides viridis (P)		5	3		1.21	96.08	10
Ogyrides limicola (D)		5			0.75	96.83	11
Batea catharinensis (A)			3		0.45	97.28	12
Capitellidae (undet.) (P)			3		0.45	97.73	12
Cyathura polita (I)			3		0.45	98.18	12
Caprellidae (undet.) (A)				3	0.45	98.63	12
Polydora ligni (P)		3			0.45	99.08	12
Polychaeta B (undet.)			3		0.45	99.53	12
Polychaeta C (undet.)			3		0.45	99.98	12
No. Individuals	46	184	142	291			
No. Species	2	10	16	9			
Species Richness	0.26	1.73	3.03	1.41			
Species Diversity (H')	0.50	2.72	3.47	2.57			
Evenness (J')	0.50	0.82	0.87	0.81			

Table 3. Species of macroinvertebrates collected at station J003 in June 1973 and January 1974, and their estimated densities in numbers m^{-2}. Percent of fauna, cumulative percent, and rank by number are given for each species. B = bivalve, P = polychaete, I = isopod, A = amphipod, D = decapod, Ba = barnacle.

Species	June	Jan.	% of Fauna	Cumul. %	Rank by Number
Polychaeta A (undet.)	77	20	25.53	25.53	1
Mulinia lateralis (B)	41		10.79	36.32	2
Polychaeta B (undet.)	41		10.79	47.11	2
Tellina sp. A (B)	28		7.37	54.48	3
Rhynchocoela (undet.)	15	5	5.26	59.74	4
Brachidontes sp. (B)	15	3	4.74	64.48	5
Haploscoloplos fragilis		18	4.74	69.22	5
Barnea truncata (B)	15		3.95	73.17	6
Haustoriidae (undet.)		15	3.95	77.12	6
Polychaeta C (undet.)	10		2.63	79.75	7
Polychaeta D (undet.)	5	3	2.11	81.86	8
Polychaeta E (undet.)	8		2.11	83.97	8
Cyathura burbancki (I)	5		1.32	85.29	9
Gammarus sp. (A)	5		1.32	86.61	9
Pelecypoda (undet.)		5	1.32	87.93	9
Ophiuroidea (undet.)	5		1.32	89.25	9
Palaemonetes sp. (D)	5		1.32	90.57	9
Capitellidae (undet.) (P)		3	0.79	91.36	10
Balanus improvisus (Ba)	3		0.79	92.15	10
Edotea montosa (I)		3	0.79	92.94	10
Unidentified Taxon		3	0.79	93.73	10
Magelona sp. (P)		3	0.79	94.52	10
Orbiniidae (undet.) (P)		3	0.79	95.31	10

Table 3. (cont.)

Species	June	Jan.	% of Fauna	Cumul. %	Rank by Number
Polychaeta F (undet.)	3		0.79	96.10	10
Polychaeta G (undet.)	3		0.79	96.89	10
Polydora sp. (P)	3		0.79	97.68	10
Sipunculida (undet.)	3		0.79	98.47	10
Streblospio benedicti	3		0.79	99.26	10
Tellina sp. B (undet.)		3	0.79	100.05	10
No. Individuals	293	87			
No. Species	20	13			
Species Richness	3.34	2.69			
Species Diversity (H')	3.50	3.21			
Evenness (J')	0.81	0.87			

Table 4. Species of macroinvertebrates collected at station J001 in January 1974, and their estimated densities in numbers m^{-2}. Percent of fauna, cumulative percent, and rank by number are given for each species. P = polychaete, G = gastropod.

Species	Jan.	% of fauna	Cumul. %	Rank by Number
Streblospio benedicti (P)	161	47.08	47.08	1
Magelona sp. (P)	100	29.24	76.32	2
Heteromastus filiformis (P)	44	12.87	89.19	3
Eteone heteropoda (P)	8	2.34	91.53	4
Nereis succinea (P)	8	2.34	93.87	4
Glycera sp. (P)	5	1.46	95.33	5
Ilyanassa obsoleta (G)	5	1.46	96.79	5
Rhynchocoela (undet.)	5	1.46	98.25	5
Polychaeta (undet.)	3	0.88	99.13	6
Tharyx setigera (P)	3	0.88	100.01	6
No. Individuals	342			
No. Species	10			
Species Richness	1.54			
Species Diversity (H')	2.05			
Evenness (J')	0.62			

Table 5. Species of macroinvertebrates collected at station C004 during June 1973 and January 1974, and their estimated densities in numbers m^{-2}. Percent of fauna, cumulative percent, and rank by number are given for each species. B = bivalve, A = amphipod, P = polychaete.

Species	June	January	% of fauna	Cumul. %	Rank by Number
Brachidontes exustus (B)	246	20	34.06	34.06	1
Melita nitida (A)		108	13.83	47.89	2
Nereis succinea (P)		92	11.78	59.67	3
Streblospio benedicti (P)	67	8	9.60	69.27	4
Oligochaeta (undet.)	56		7.17	76.44	5
Corophium lacustre (A)		49	6.27	82.71	6
Polychaeta A (undet.)	36		4.61	87.32	7
Pelecypoda (undet.)	18	10	3.59	90.91	8
Rhynchocoela (undet.)	18	5	2.94	93.85	9
Cumacean (undet.)	13		1.66	95.51	10
Parapleustes aestuarius (A)		13	1.66	97.17	10
Mulinia lateralis (B)	8	3	1.41	98.58	11
Polychaeta B (undet.)	5		0.64	99.22	12
Polydora sp. (P)	3		0.38	99.60	13
Unidentified Taxon		3	0.38	99.98	13
No. Individuals	470	311			
No. Species	10	10			
Species Richness	1.46	1.57			
Species Diversity (H')	2.26	2.44			
Evenness (J')	0.68	0.73			

Table 6. Species of macroinvertebrates collected at station C003 in July 1973 and January 1974, and their estimated densities in numbers m^{-2}. Percent of fauna, cumulative percent, and rank by number are given for each species. P = polychaete, A = amphipod, B = bivalve, I = isopod, D = decapod.

Species	July	January	% of fauna	Cumul. %	Rank by Number
Scolecolepides viridis (P)	74	3	36.67	36.67	1
Polychaeta (undet.)	28		13.33	50.00	2
Nereis succinea (P)	10	8	8.57	58.57	3
Monoculodes edwardsi (A)	10	3	6.19	64.76	4
Mulinia lateralis (B)	13		6.19	70.95	4
Rhynchocoela (undet.)	10	3	6.19	77.14	4
Oligochaeta (undet.)	13		6.19	83.33	4
Chiridotea sp. (I)	10		4.76	88.09	5
Notomastus sp. (P)		8	3.81	91.90	6
Amphipoda (undet.)	5		2.38	94.28	7
Brachyuran (undet.) (D)	3		1.43	95.71	8
Gammarus mucronatus (A)		3	1.43	97.14	8
Melita nitida (A)		3	1.43	98.57	8
Palaemonetes sp. (D)		3	1.43	100.00	8
No. Individuals	176	34			
No. Species	10	8			
Species Richness	1.74	1.99			
Species Diversity (H')	2.69	2.84			
Evenness (J')	0.81	0.95			

Table 7. Species of macroinvertebrates collected at station C002 in July 1973, and their estimated densities in numbers m^{-2}. Percent of fauna, cumulative percent, and rank by number are given for each species. I = isopod, A = amphipod, P = polychaete, B = bivalve, D = decapod, G = gastropod.

Species	July	% of fauna	Cumul. %	Rank by Number
Chiridotea sp. (I)	74	34.42	34.42	1
Lepidactylus dytiscus (A)	64	29.77	64.19	2
Scolecolepides viridis (P)	26	12.09	76.28	3
Gammarus daiberi (A)	10	4.65	80.93	4
Mulinia lateralis (B)	10	4.65	85.58	4
Cyathura polita (I)	8	3.72	89.30	5
Undetermined taxon	5	2.33	91.63	6
Mollusca (undet.)	3	1.40	93.03	7
Gammarus sp. (A)	3	1.40	94.43	7
Amphipoda (undet.)	3	1.40	95.83	7
Nereis succinea (P)	3	1.40	97.23	7
Pagurus sp. (D)	3	1.40	98.63	7
Pyramidellidae (undet.) (G)	3	1.40	100.03	7
No. Individuals	215			
No. Species	13			
Species Richness	2.23			
Species Diversity (H')	2.65			
Evenness (J')	0.72			

Table 8. Species of macroinvertebrates collected at station C001 in July 1973 and January 1974, and their estimated densities in numbers m^{-2}. Percent of fauna, cumulative percent, and rank by number are given for each species. A = amphipod, I = isopod, B = bivalve, In = insect larvae and pupae.

Species	July	January	% of fauna	Cumul. %	Rank by Number
Gammarus sp. (A)	210	369	67.09	67.09	1
Cyathura polita (I)	77	44	14.02	81.11	2
Corbicula manilensis (B)	41	8	5.68	86.79	3
Diptera larva (undet.) (In)	49		5.68	92.47	3
Diptera pupae (undet.) (In)	26		3.01	95.48	4
Unidentified Taxon	15		1.74	97.22	5
Chironomidae (undet.) (In)		15	1.74	98.96	5
Corophium lacustre (A)		3	0.35	99.31	6
Mytilopsis leucophaeata (B)	3		0.35	99.66	6
Gastropoda (undet.)	3		0.35	100.01	6
No. Individuals	424	439			
No. Species	8	5			
Species Richness	1.16	0.66			
Species Diversity (H')	2.15	0.86			
Evenness (J')	0.72	0.37			

Table 9. Species of macroinvertebrates collected at station W001 in July and October 1973, and their estimated densities in numbers m^{-2}. Percent of fauna, cumulative percent, and rank by number are given for each species. P = polychaete, B = bivalve, I = isopod, A = amphipod.

Species	July	Oct.	% of fauna	Cumul. %	Rank by Number
Scolecolepides viridis (P)	92	5	21.32	21.32	1
Oligochaeta (undet.)	13	49	13.63	34.95	2
Polydora ligni (P)		61	13.41	48.36	3
Unidentified Taxon	56		12.31	60.67	4
Polychaeta (undet.)	26	15	9.01	69.68	5
Tellina sp. (B)		38	8.35	78.03	6
Rhynchocoela (undet.)		31	6.81	84.84	7
Nereis succinea (P)	10	10	4.40	89.24	8
Edotea montosa (I)	13	3	3.52	92.76	9
Lumbrineris sp. (P)	15		3.30	96.06	10
Mulinia lateralis (B)	10		2.20	98.26	11
Monoculodes edwardsi (A)		5	1.10	99.36	12
Corophium sp. (A)		3	0.66	100.02	13
No. Individuals	235	220			
No. Species	8	10			
Species Richness	1.28	1.67			
Species Diversity (H')	2.48	2.72			
Evenness (J')	0.83	0.82			

Table 10. Species of macroinvertebrates collected at station K001 during July 1973, and their estimated densities in numbers m^{-2}. Percent of fauna, cumulative percent, and rank by number are given for each species. P = polychaete, B = bivalve, C = cumacean, A = amphipod, D = decapod.

Species	July	% by fauna	Cumul. %	Rank by Number
Streblospio benedicti (P)	49	49.00	49.00	1
Rhynchocoela (undet.)	13	13.00	62.00	2
Paraprionospio pinnata (P)	13	13.00	75.00	2
Mulinia lateralis (B)	5	5.00	80.00	3
Polychaeta (undet.)	5	5.00	85.00	3
Leucon americana (C)	3	3.00	88.00	4
Melita nitida (A)	3	3.00	91.00	4
Monoculodes edwardsi (A)	3	3.00	94.00	4
Ogyrides alphaerostris (D)	3	3.00	97.00	4
Haustoriidae (undet.) (A)	3	3.00	100.00	4
No. Individuals	100			
No. Species	10			
Species Richness	1.95			
Species Diversity (H')	2.46			
Evenness (J')	0.74			

Table 11. Species of macroinvertebrates collected at station F001 in January 1974, and their estimated densities in numbers m^{-2}. Percent of fauna, cumulative percent, and rank by number are given for each species. P = polychaete, A = amphipod, C = cumacean.

Species	January	% of fauna	Cumul. %	Rank by Number
Haploscoloplos fragilis (P)	41	33.61	33.61	1
Haustoriidae (undet.) (A)	38	31.15	64.76	2
Polychaeta (undet.)	18	14.75	79.51	3
Orbiniidae A (undet.) (P)	13	10.66	90.17	4
Leptocuma minor (C)	3	2.46	92.63	5
Monoculodes edwardsi (A)	3	2.46	95.09	5
Orbiniidae B (undet.) (P)	3	2.46	97.55	5
Tellina sp. (B)	3	2.46	100.01	5
No. Individuals	122			
No. Species	8			
Species Richness	1.46			
Species Diversity (H')	2.33			
Evenness (J')	0.78			

Table 12. Species of macroinvertebrates collected at station H003 in June and October of 1973 and January and April of 1974, and their estimated densities in numbers m^{-2}. Percent of fauna, cumulative percent, and rank by number are given for each species. P = polychaete, A = amphipod, An = anemone, B = bivalve, C = cumacean, I = isopod, E = echinoderm, T = tunicate, G = gastropod, D = decapod, F = flatworm, H = hydroid.

Species	June	Oct.	Jan.	Apr.	% of fauna	Cumul. %	Rank by Number
Streblospio benedicti (P)	72		136	768	29.10	29.10	1
Oligochaeta (undet.)	79	82	162	87	12.22	41.32	2
Polychaeta A (undet.)	115	33	36	100	8.47	49.79	3
Corophium lacustre (A)			8	233	7.19	56.98	4
Notomastus sp. (P)				131	3.91	60.89	5
Melita nitida (A)			28	100	3.82	64.71	6
Clymenella torquata (P)	46			49	2.83	67.54	7
Rhynchocoela (undet.)	13	3	3	74	2.77	70.31	8
Autolytus sp. (P)				82	2.44	72.75	9
Actiniaria (undet.) (An)	3		3	64	2.09	74.84	10
Heteromastus filiformis (P)	59				1.76	76.60	11
Parapleustes aestuarius (A)			3	54	1.70	78.30	12
Tharyx setigera (P)		3		51	1.61	79.91	13
Ampelisca vadorum (A)			3	44	1.40	81.31	14
Mulinia lateralis (B)	3	8	31	3	1.34	82.65	15
Goniada norvegica (P)	41				1.22	83.87	16
Cyclaspis varians (C)	23			18	1.22	85.09	16
Undetermined Taxon	38				1.13	86.22	17
Glycera sp. (P)			15	20	1.04	87.26	18
Glycera dibranchiata (P)		15	15		0.89	88.15	19
Pelecypoda (undet.)	3		3	23	0.86	89.01	20
Nereis succinea (P)	3			23	0.78	89.79	21

Table 12. (Cont.)

Species	June	Oct.	Jan.	Apr.	% of fauna	Cumul. %	Rank by Number
Monoculodes sp. (A)			5	18	0.69	90.48	22
Edotea montosa (I)				20	0.60	91.08	23
Polychaeta B (undet.)	20				0.60	91.68	23
Sigambra bassi (P)				18	0.54	92.22	24
Unciola serrata (A)				18	0.54	92.76	24
Cyathura burbancki (I)		3		13	0.48	93.24	25
Erichthonius brasiliensis (A)		3	8	3	0.42	93.66	26
Polydora sp. (P)	3		3	8	0.42	94.08	26
Paracaprella tenuis (A)				13	0.39	94.47	27
Podarke obscura (P)				13	0.39	94.86	27
Synchelidium americanum (A)		3	10		0.39	95.25	27
Haploscoloplos fragilis (P)		3	8		0.33	95.58	28
Lumbrineris tenuis (P)			5	5	0.30	95.88	29
Aricidea sp. (P)		3		5	0.24	96.12	30
Brachidontes exustus (B)	3	5			0.24	96.36	30
Hemipholis elongata (E)			8		0.24	96.60	30
Molgula manhattensis (T)			8		0.24	96.84	30
Nassarius vibex (G)			8		0.24	97.08	30
Nephtys sp. (P)		8			0.24	97.32	30
Stylochus ellipticus (F)	3			3	0.18	97.50	31
Lepidonotus sublevis (P)			3	3	0.18	97.68	31
Ophiuroidea (undet.) (E)	3			3	0.18	97.86	31
Barnea truncata (B)				5	0.15	98.01	32
Eurypanopeus depressus (D)				5	0.15	98.16	32

Table 12. (Cont.)

Species	June	Oct.	Jan.	Apr.	% of fauna	Cumul. %	Rank by Number
Lembos websteri (A)				5	0.15	98.31	32
Cumacea (undet.)	5				0.15	98.46	32
Oxyurostylus smithi (C)				5	0.15	98.61	32
Anachis avara (G)			3		0.09	98.70	33
Anadara ovalis (B)			3		0.09	98.79	33
Arabella iricolor (P)				3	0.09	98.88	33
Cleantis planicauda (I)			3		0.09	98.97	33
Gammarus sp. (A)	3				0.09	99.06	33
Nassarius trivittatus (G)				3	0.09	99.15	33
Nudibranch (undet.) (G)				3	0.09	99.24	33
Pagurus longicarpus (D)				3	0.09	99.33	33
Petricola pholadiformis (B)				3	0.09	99.42	33
Polinices duplicatus (G)	3				0.09	99.51	33
Polychaeta C (undet.)	3				0.09	99.60	33
Polychaeta D (undet.)			3		0.09	99.69	33
Sabellaria vulgaris (P)				3	0.09	99.78	33
Polychaeta E (undet.)	3				0.09	99.87	33
Terebellidae (undet.) (P)			3		0.09	99.96	33
Ectopleura dumortieri (H)			3		0.09	100.05	33
No. Individuals	547	172	530	2105			
No. Species	23	13	29	42			
Species Richness	3.49	2.33	4.46	5.36			
Species Diversity (H')	3.51	2.55	3.38	3.70			
Evenness (J')	0.78	0.69	0.70	0.69			

Table 12. (Cont.)

Species	June	Oct.	Jan.	Apr.	% of fauna	Cumul. %	Rank by Number
Lembos websteri (A)				5	0.15	98.31	32
Cumacea (undet.)	5				0.15	98.46	32
Oxyurostylus smithi (C)				5	0.15	98.61	32
Anachis avara (G)			3		0.09	98.70	33
Anadara ovalis (B)			3		0.09	98.79	33
Arabella iricolor (P)				3	0.09	98.88	33
Cleantis planicauda (I)			3		0.09	98.97	33
Gammarus sp. (A)	3				0.09	99.06	33
Nassarius trivittatus (G)				3	0.09	99.15	33
Nudibranch (undet.) (G)				3	0.09	99.24	33
Pagurus longicarpus (D)				3	0.09	99.33	33
Petricola pholadiformis (B)				3	0.09	99.42	33
Polinices duplicatus (G)	3				0.09	99.51	33
Polychaeta C (undet.)	3				0.09	99.60	33
Polychaeta D (undet.)			3		0.09	99.69	33
Sabellaria vulgaris (P)				3	0.09	99.78	33
Polychaeta E (undet.)	3				0.09	99.87	33
Terebellidae (undet.) (P)			3		0.09	99.96	33
Ectopleura dumortieri (H)			3		0.09	100.05	33
No. Individuals	547	172	530	2105			
No. Species	23	13	29	42			
Species Richness	3.49	2.33	4.46	5.36			
Species Diversity (H')	3.51	2.55	3.38	3.70			
Evenness (J')	0.78	0.69	0.70	0.69			

Table 13. Species of macroinvertebrates collected at station H002 during July and October 1973 and January and April 1974, and their estimated densities in numbers m^{-2}. Percent of fauna, cumulative percent, and rank by number are given for each species. A = amphipod, P = polychaete, I = isopod, Py = pycnogonid, D = decapod.

Species	July	Oct.	Jan.	Apr.	% of fauna	Cumul. %	Rank by Number
Haustoriidae (undet.) (A)	369	18	3	72	38.95	38.95	1
Melita nitida (A)	5	123	3		11.05	50.00	2
Corophium lacustre (A)		110			9.27	59.27	3
Scolecolepides viridis (P)	26			74	8.43	67.70	4
Chiridotea sp. (I)	87	5			7.76	75.46	5
Polychaeta (undet.)	10	5	10	26	4.30	79.76	6
Rhynchocoela (undet.)	8	3		28	3.29	83.05	7
Nereis succinea (P)		36			3.04	86.09	8
Notomastus sp. (P)		3	3	28	2.87	88.96	9
Monoculodes sp. (A)	26		3	5	2.87	91.83	9
Cyathura polita (I)	5	3	3	8	1.60	93.43	10
Heteromastus filiformis (P)	18				1.52	94.95	11
Gammarus mucronatus (A)	8			3	0.93	95.88	12
Haploscoloplos fragilis (P)				8	0.67	96.55	13
Amphipoda (undet.)		5			0.42	96.97	14
Oligochaeta (undet.)				5	0.42	97.39	14
Polydora ligni (P)		5			0.42	97.81	14
Spiophanes bombyx (P)		5			0.42	98.23	14
Anoplodactylus lentus (Py)			3		0.25	98.48	15
Edotea montosa (I)		3			0.25	98.73	15
Eteone heteropoda (P)			3		0.25	98.98	15

Table 13. (Cont.)

Species	July	Oct.	Jan.	Apr.	% of fauna	Cumul. %	Rank by Number
Exogone dispar (P)		3			0.25	99.23	15
Xanthidae (undet.)		3			0.25	99.48	15
Ogyrides limicola (D)	3				0.25	99.73	15
Parapleustes aestuarius (A)		3			0.25	99.98	15
No. Individuals	565	333	31	257			
No. Species	11	16	8	10			
Species Richness	1.58	2.58	2.04	1.62			
Species Diversity (H')	1.82	2.52	2.81	2.67			
Evenness (J')	0.53	0.63	0.94	0.80			

Table 14. Species of macroinvertebrates collected at station H001 in July and October of 1973 and January and April of 1974, and their estimated densities in numbers m^{-2}. Percent of fauna, cumulative percent, and rank by number are given for each species. P = polychaete, An = anthozoan, I = isopod, A = amphipod, B = bivalve, C = cumacean, T = tunicate, G = gastropod, Py = pycnogonid.

Species	July	Oct.	Jan.	Apr.	% of fauna	Cumul. %	Rank by Number
Streblospio benedicti (P)	5	13	753	730	37.08	37.08	1
Actiniaria (undet.) (An)	3	274	3	46	8.05	45.13	2
Polychaeta A (undet.)	20	72	90	113	7.29	52.42	3
Oligochaeta (undet.)		5	72	174	6.20	58.62	4
Tellina sp. (B)	3		225		5.63	64.25	5
Rhynchocoela (undet.)	54	41	33	10	3.41	67.66	6
Edotea montosa (I)	8	38	20	56	3.01	70.67	7
Corophium lacustre (A)			8	90	2.42	73.09	8
Melita nitida (A)	3	36	36	18	2.30	75.39	9
Tharyx setigera (P)	28	10	5	33	1.88	77.27	10
Orbiniidae A (undet.) (P)			26	44	1.73	79.00	11
Lumbrineris tenuis (P)		31	18	20	1.70	80.70	12
Nereis succinea (P)		33	26	10	1.70	82.40	12
Sabellaria vulgaris (P)		26	41		1.66	84.06	13
Aiptasia sp. (An)			49		1.21	85.27	14
Autolytus fasciatus (P)				46	1.14	86.41	15
Heteromastus filiformis (P)	44				1.09	87.50	16
Cyathura sp. (I)		28	13		1.01	88.51	17
Syllidae (undet.) (P)			3	36	0.96	89.47	18
Ampelisca vadorum (A)			13	20	0.82	90.29	19
Oxyurostylus smithi (C)			10	18	0.69	90.98	20
Cyclaspis varians (C)	5		15	5	0.62	91.60	21

Table 14. (Cont.)

Species	July	Oct.	Jan.	Apr.	% of fauna	Cumul. %	Rank by Number
Eteone heteropoda (P)			5	18	0.57	92.17	22
Unciola serrata (A)			13	10	0.57	92.74	22
Monoculodes sp. (A)			5	15	0.49	93.23	23
Paracaprella tenuis (A)			3	15	0.44	93.67	24
Brachidontes exustus (B)		15	3		0.44	94.11	24
Eteone lactea (P)		3	15		0.44	94.55	24
Aricidea sp. (P)			5	8	0.32	94.87	25
Molgula manhattensis (T)			10	3	0.32	95.19	25
Notomastus sp. (P)			3	10	0.32	95.51	25
Capitellidae (undet.) (P)	13				0.32	95.83	25
Polychaeta B (undet.)				13	0.32	96.15	25
Arabella iricolor (P)			5	5	0.25	96.40	26
Pelecypoda (undet.)	10				0.25	96.65	26
Orbiniidae B (undet.) (P)			10		0.25	96.90	26
Spionidae (undet.) (P)	10				0.25	97.15	26
Diopatra cuprea (P)	5			3	0.20	97.35	27
Leptocuma minor (C)				8	0.20	97.55	27
Modiolus sp. (B)				8	0.20	97.75	27
Orbinia americana (P)	3	5			0.20	97.95	27
Polydora ligni (P)		3	5		0.20	98.15	27
Paraprionospio pinnata (P)		3	3		0.15	98.30	28
Clymenella torquata (P)				5	0.12	98.42	29
Gammarus sp. (A)				5	0.12	98.54	29
Glycinde sp. (P)				5	0.12	98.66	29
Haploscoloplos fragilis (P)	5				0.12	98.78	29

Table 14. (Cont.)

Species	July	Oct.	Jan.	Apr.	% of fauna	Cumul. %	Rank by Number
Mulinia lateralis (B)		5			0.12	98.90	29
Polychaeta C (undet.)	5				0.12	99.02	29
Diadumene leucolena (An)			3		0.07	99.09	30
Epitoneum sp. (G)		3			0.07	99.16	30
Glycera sp. (P)	3				0.07	99.23	30
Polychaeta D (undet.)	3				0.07	99.30	30
Haustoriidae (undet.) (A)				3	0.07	99.37	30
Lembos websteri (A)			3		0.07	99.44	30
Marphysa sanguinea (P)	3				0.07	99.51	30
Monoculodes intermedius (A)	3				0.07	99.58	30
Gastropoda (undet.)		3			0.07	99.65	30
Pelecypoda (undet.)			3		0.07	99.72	30
Polinices duplicatus (G)		3			0.07	99.79	30
Unidentified Taxon	3				0.07	99.86	30
Tanystylum orbiculare (Py)				3	0.07	99.93	30
No. Individuals	239	650	1553	1606			
No. Species	22	21	36	34			
Species Richness	3.83	3.09	4.76	4.47			
Species Diversity (H')	3.67	3.12	3.05	3.26			
Evenness (J')	0.82	0.71	0.59	0.64			

Table 15. Species of macroinvertebrates collected at station P002 in January 1974 and their estimated densities in numbers m^{-2}. Percent of fauna, cumulative percent, and rank by number are given for each species. A = amphipod, P = polychaete, B = bivalve, I = isopod.

Species	January	% of fauna	Cumul. %	Rank by Number
Oligochaeta (undet.)	1185	74.81	74.81	1
Polychaeta A (undet.)	125	7.89	82.70	2
Haustoriidae (undet.) (A)	120	7.58	90.28	3
Rhynchocoela (undet.)	82	5.18	95.46	4
Polychaeta B (undet.)	15	0.95	96.41	5
Nephtys bucera (P)	13	0.82	97.23	6
Tellina sp. (B)	13	0.82	98.05	6
Streblospio benedicti (P)	8	0.51	98.56	7
Stenothoe minuta (A)	5	0.32	98.88	8
Chiridotea sp. (I)	3	0.19	99.07	9
Glycera sp. (P)	3	0.19	99.26	9
Lumbrineris tenuis (P)	3	0.19	99.45	9
Magelona sp. (P)	3	0.19	99.64	9
Phyllodocidae (undet.) (P)	3	0.19	99.83	9
Synchelidium americanum (A)	3	0.19	100.02	9
No. Individuals	1584			
No. Species	15			
Species Richness	1.90			
Species Diversity (H')	1.45			
Evenness (J')	0.37			

Table 16. Species of macroinvertebrates collected at station P001 in January 1974, and their estimated densities in numbers m^{-2}. Percent of fauna, cumulative percent, and rank by number are given for each species. A = amphipod, An = anemone, P = polychaete, D = decapod, I = isopod, Ph = phoronid, B = bivalve, G = gastropod, E = echinoderm.

Species	January	% of fauna	Cumul. %	Rank by Number
Unciola serrata (A)	694	25.13	25.13	1
Ampelisca vadorum (A)	620	22.46	47.59	2
Actiniaria (undet.) (An)	225	8.15	55.74	3
Polychaeta A (undet.)	166	6.01	61.75	4
Lembos websteri (A)	141	5.11	66.86	5
Sabellaria vulgaris (P)	105	3.80	70.66	6
Rhynchocoela (undet.)	77	2.79	73.45	7
Oligochaeta (undet.)	72	2.61	76.06	8
Pista quadrilobata (P)	64	2.32	78.38	9
Syllis sp. (P)	56	2.03	80.41	10
Eteone sp. (P)	49	1.77	82.18	11
Erichthonius brasiliensis (A)	46	1.67	83.85	12
Podarke obscura (P)	44	1.59	85.44	13
Polydora ligni (P)	44	1.59	87.03	13
Schistomeringos rudolphi (P)	44	1.59	88.62	13
Arabella iricolor (P)	28	1.01	89.63	14
Microdeutopus sp. (A)	26	0.94	90.57	15
Neopanope sayi (D)	26	0.94	91.51	15
Paraphoxus spinosus (A)	18	0.65	92.16	16
Lumbrineris tenuis (P)	18	0.65	92.81	16
Sabella sp. (P)	18	0.65	93.46	16
Notomastus sp. (P)	15	0.54	94.00	17

Table 16. (Cont.)

Species	January	% of fauna	Cumul. %	Rank by Number
Batea catharinensis (A)	13	0.47	94.47	18
Cyathura burbancki (I)	13	0.47	94.94	18
Nereis succinea (P)	13	0.47	95.41	18
Polychaeta B (undet.)	13	0.47	95.88	18
Lepidonotus sublevis (P)	10	0.36	96.24	19
Streblospio benedicti (P)	10	0.36	96.60	19
Glycera sp. (P)	8	0.29	96.89	20
Pelecypoda (undet.)	8	0.29	97.18	20
Orbiniidae (undet.) (P)	5	0.18	97.36	21
Panopeus herbstii (D)	5	0.18	97.54	21
Phoronis architecta (Ph)	5	0.18	97.72	21
Flatworm (undet.)	5	0.18	97.90	21
Alpheus normanni (D)	3	0.11	98.01	22
Capitellidae A (undet.) (P)	3	0.11	98.12	22
Capitellidae B (undet.) (P)	3	0.11	98.23	23
Capitellidae C (undet.) (P)	3	0.11	98.34	24
Glycera dibranchiata (P)	3	0.11	98.45	24
Glycinde solitaria (P)	3	0.11	98.56	24
Heteromastus filiformis (P)	3	0.11	98.67	24
Listriella barnardi (A)	3	0.11	98.78	24
Lysianopsis alba (A)	3	0.11	98.89	24
Marphysa sanguinea (P)	3	0.11	99.00	24
Mulinia lateralis (B)	3	0.11	99.11	24
Notocirrus sp. (P)	3	0.11	99.22	24
Odostomia sp. (G)	3	0.11	99.33	24

Table 16. (Cont.)

Species	January	% of fauna	Cumul. %	Rank by Number
Ophiuroidea (undet.) (E)	3	0.11	99.44	24
Paracaprella tenuis (A)	3	0.11	99.55	24
Potamilla reniformis (P)	3	0.11	99.66	24
Sigambra bassi (P)	3	0.11	99.77	24
Sipunculida (undet.)	3	0.11	99.88	24
Sthenelais sp. (P)	3	0.11	99.99	24
No. Individuals	2761			
No. Species	53			
Species Richness	6.56			
Species Diversity (H')	3.83			
Evenness (J')	0.67			

Table 17. Species of macroinvertebrates collected at station G001 in July of 1973 and January of 1974, and their estimated densities in numbers m^{-2}. Percent of fauna, cumulative percent, and rank by number are given for each species. A = amphipod, P = polychaete, B = bivalve, E = echinoderm, C = cumacean, G = gastropod, I = isopod, D = decapod, An = anemone, T = tunicate, Ph = phoronid.

Species	July	January	% of fauna	Cumul. %	Rank by Number
Polychaeta A (undet.)	61	72	11.06	11.06	1
Sipunculida (undet.)	87	33	9.98	21.04	2
Batea catharinensis (A)	5	77	6.82	27.86	3
Capitellidae A (undet.) (P)	49	15	5.32	33.18	4
Lumbrineris tenuis (P)	51	8	4.90	38.08	5
Capitellidae B (undet.) (P)	56		4.66	42.74	6
Streblospio benedicti (P)	15	38	4.41	47.15	7
Glycera sp. (P)	3	44	3.91	51.06	8
Paraprionospio pinnata (P)	3	41	3.66	54.72	9
Abra lioica (B)		36	2.99	57.71	10
Rhynchocoela (undet.)	28	5	2.74	60.45	11
Hemipholis elongata (E)	13	15	2.33	62.78	12
Diopatra cuprea (P)	13	13	2.16	64.94	13
Ophiuroidea (undet.) (E)	13	8	1.75	66.69	14
Nereis succinea (P)	3	15	1.50	68.19	15
Oxyurostylus smithi (C)		18	1.50	69.69	15
Heteromastus filiformis (P)	13	3	1.33	71.02	16
Ampelisca vadorum (A)	10	5	1.25	72.27	17
Glycinde sp. (P)	15		1.25	73.52	17
Melita nitida (A)	5	8	1.08	74.60	18
Nereis sp. (P)	5	8	1.08	75.68	18
Mulinia lateralis (B)	13		1.08	76.76	18
Nucula proxima (B)		13	1.08	77.84	18

Table 17.(Cont.)

Species	July	January	% of fauna	Cumul. %	Rank by Number
Polychaeta B (undet.)		13	1.08	78.92	18
Tellina sp. (B)		13	1.08	80.00	18
Notomastus sp. (P)	3	8	0.91	80.91	19
Tharyx setigera (P)	8	3	0.91	81.82	19
Asterias forbesi (E)		10	0.83	82.65	20
Haustoriidae (undet.) (A)		10	0.83	83.48	20
Cyclaspis varians (C)		8	0.67	84.15	21
Elasmopus levis (A)		8	0.67	84.82	21
Goniadidae (undet.) (P)	8		0.67	85.49	21
Aricidea sp. (P)	5	3	0.67	86.16	21
Lembos websteri (A)	3	5	0.67	86.83	21
Polinices duplicatus (G)	8		0.67	87.50	21
Sabellaria vulgaris (P)	8		0.67	88.17	21
Sigalionidae (undet.) (P)		8	0.67	88.84	21
Synchelidium americanum (A)		8	0.67	89.51	21
Cyathura burbancki (I)	3	3	0.50	90.01	22
Lepidonotus sublevis (P)	3	3	0.50	90.51	22
Leucothoe sp. (A)	3	3	0.50	91.01	22
Magelona sp. (P)	3	3	0.50	91.51	22
Arabella iricolor (P)		5	0.42	91.93	23
Neopanope sayi (D)	5		0.42	92.35	23
Paraphoxus spinosus (A)		5	0.42	92.77	23
Podarke obscura (P)	5		0.42	93.19	23
Polychaeta C (undet.)	5		0.42	93.61	23
Ampharete sp. (P)		3	0.25	93.86	24

Table 17. (Cont.)

Species	July	January	% of fauna	Cumul. %	Rank by Number
Anachis avara (G)		3	0.25	94.11	24
Actiniaria (undet.) (An)		3	0.25	94.36	24
Clymenella torquata (P)	3		0.25	94.61	24
Edotea montosa (I)	3		0.25	94.86	24
Erichthonius brasiliensis (A)		3	0.25	95.11	24
Eteone heteropoda (P)		3	0.25	95.36	24
Eteone sp. (P)		3	0.25	95.61	24
Pelecypoda A (undet.)		3	0.25	95.86	24
Cumacean (undet.)		3	0.25	96.11	24
Listriella clymenellae (A)		3	0.25	96.36	24
Maldanidae (undet.) (P)	3		0.25	96.61	24
Molgula manhattensis (T)	3		0.25	96.86	24
Nephtys bucera (P)		3	0.25	97.11	24
Nephtys sp. (P)	3		0.25	97.36	24
Ophiothrix angulata (E)		3	0.25	97.61	24
Panopeus herbstii (D)	3		0.25	97.86	24
Paracaprella tenuis (A)		3	0.25	98.11	24
Pelecypoda B (undet.)	3		0.25	98.36	24
Phoronis architecta (Ph)		3	0.25	98.61	24
Phyllodocidae (undet.) (P)	3		0.25	98.86	24
Pinnixa sayana (D)	3		0.25	99.11	24
Polydora ligni (P)	3		0.25	99.36	24
Sabellidae (undet.) (P)	3		0.25	99.61	24
Polychaeta D (undet.)	3		0.25	99.86	24

Table 17. (Cont.)

Species	June	January	% of fauna	Cumul. %	Rank by Number
Spiophanes bombyx (P)	3		0.25	100.11	24
No. Individuals	570	633			
No. Species	47	51			
Species Richness	7.25	7.75			
Species Diversity (H')	4.56	4.85			
Evenness (J')	0.82	0.85			