Tampa Bay Estuary Program
Technical Publication #02-98

OVERVIEW OF MANATEE RIVER BENTHOS: 1993-1997

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INTRODUCTION

1997 was the fifth year of benthic monitoring of the Manatee River segment of Tampa Bay. Previous results have been summarized in Grabe *et al.* (1996), Karlen & Grabe (1996), and Grabe (1997). Field and laboratory methods are outlined in Grabe *et al.* (1996) and Karlen & Grabe (1996).

STUDY AREA

Figure 1 depicts the locations of all stations sampled during 1993-1997. Figure 2 summarizes, by year, the quartile distribution of near-bottom water temperature, dissolved oxygen, and salinity. Salinities were generally higher during the 1997 sampling than during 1993-1996 and dissolved oxygen concentrations were slightly higher in 1996 and 1997 than during 1993-1995. Sample depths were generally similar between years (Figure 3). Silt-clay data for 1997 are not available at this writing and thus silt-clay data are not discussed.

RESULTS

Abundance: Total benthic abundance ranged from approximately 1,900 to >29,000 organisms per m^2 (Figure 4). Over the five -year study period, approximately 40% of the stations had densities >10,000 per m^2 , with the range between 1,500 and 91,000 organisms per m^2 (Figure 5).

Numbers of Taxa: In 1997, the number of taxa at Manatee River stations ranged from 17 to 60 (Figure 6); for the five-year period the range was 16 to 74. For the entire survey period, the median number of taxa per sample was 33 (Figure 7). The mean number of taxa for 1993-1996 was virtually identical to the 1994-1997 period (Figure 8).

Diversity: Median Shannon-Wiener diversity was generally similar during each year (Figure 9) and also for the 1993-1996 and 1994-1997 periods (Figure 8). For the five years of study, approximately 10% of the Manatee River had species diversity <2 and the diversity was >4 in approximately 25% of the river (Figure 10).

Benthic Index: The median Benthic Index was somewhat lower than that of previous years, with the exception of 1995 (Figure 11); the moving averages for the 1993-1996 and 1994-1997 periods were virtually identical (Figure 8). Approximately 50% of the Manatee River had a Benthic Index score indicative of a "healthy benthic community (based upon baywide comparisons with sediment metals contamination and suboptimal dissolved oxygen concentrations; EPC unpublished data). Benthic Index scores representative of "degraded" benthic habitat were observed at approximately 19% of the study sites (Figure 12). For the two four-year periods, there was a slight decline in the estimated areal extents of both "degraded" and "healthy" habitat from 1993-1996 to 1994 to 1997 and an increase in "marginal" habitat (Figure 13). Within the Manatee River, the Benthic Index did not appear to be associated with sample depth (Figure 14), salinity (Figure 15), or dissolved oxygen (Figure 16).

An association between the Benthic Index and the PEL ("predicted effects level") quotient for metals, (a measure of overall sediment contamination by trace metals; PEL quotients <0.1 suggest a low probability that sediments are toxic; PEL quotients >1.0 suggest sediments have a high probability of toxicity), was also not evident (Figure 15). Note, however, that the PEL quotients observed to date in the Manatee River are quite low (*i.e.*, <0.1), and that data are available for only 1996 and 1997. Pesticide data from 1996 and 1997 were uniformly below method detection limits and no samples have been analyzed for polycyclic aromatic hydrocarbons. Factors associated with the areas of Manatee River with subnominal Benthic Index scores need to be examined more rigorously in the future to try to better understand why these areas appear to be "degraded". To this end, additional data on sediment contaminants, over several orders of magnitude, is desirable.

Dominant Taxa: Eleven taxa occurred in at least 60% of the samples for the 1993-1996 period and only six taxa occurred in at least 60% of the samples for 1994-1997 (Table 1).

The four most abundant taxa in the 1993-1996 samples were the same as in 1994-1997: *Ampelisca abdita* (Amphipoda), *Monticellina dorsobranchialis* (Polychaeta), *Grandidierella bonnieroides* (Amphipoda), and *Amygdalum papyrium* (Bivalvia) (Table 2). For 1993-1996 these taxa comprised 46% of total benthic abundance in the Manatee River and 43% for 1994-1997.

CONCLUSIONS

Benthic community parameters during 1997 were within the ranges observed during 1993-1996. Based upon four-year "lagged" sampling intervals, species richness, diversity, Benthic Index , and taxonomic composition of Manatee River benthos was generally similar for 1993-1996 and 1994-1997. Between 19.6% and 18.8% of the Manatee River benthic habitat was estimated to be "degraded" and between 52.2% and 47.9% was estimated to be "healthy" for 1993-1996 and 1994-1997 respectively.

LITERATURE CITED

GRABE, S.A. 1997. *Overview of Manatee River and Terra Ceia Bay Benthos: 1996.* Environmental Protection Commission of Hillsborough County. Tampa, FL.

GRABE, S.A., C.M. COURTNEY, Z. LIN, D. ALBERDI, H.T. WILSON, & G. BLANCHARD. 1996. *Environmental Monitoring and assessment Program-Estuaries. West Indian Province 1993 Sampling. Volume III. Technical Report: A Synoptic Survey of the Benthic Macroinvertebrates and Demersal Fishes of the Tampa Bay Estuarine System.* TBNEP Tech. Publ. #95-12.

KARLEN, D.J. & S.A. GRABE. 1996. *Technical Report: A Synoptic Survey of the Benthic Macroinvertebrates of Terra Ceia Bay and the Manatee River. October 1993-1995 1995.* TBNEP Tech. Publ. 03-96.

Table 1. Percent occurrence of macroinvertebrate taxa which occurred in 60% or more of samples: by survey period. Manatee River, 1993-1996 & 1994-1997.

TAXA	1993-1996	1994-1997
Cyclaspis cf. Varians (C)	78.3	75.0
Mulinia lateralis (B)	73.9	77.1
Paraprionospio pinnata (P)	73.9	72.9
Glycinde solitaria (P)	73.9	64.5
Mediomastus spp. (P)	69.6	NR
Ampelisca holmesi (A)	67.4	NR
Monticellina dorsobranchialis (P)	65.2	66.7
Mysella planulata (B)	65.2	64.5
Grandidierella bonnieroides (A)	60.9	NR
Ampelisca abdita (A)	60.9	NR
Acteocina canaliculata (G)	60.9	NR

NR= occurred in <60% of samples
A= Amphipoda B=Bivalvia C=Cumacea G=Gastropoda P=Polychaeta

Table 2. Mean numbers per m^2 (percent of total abundance) of the ten most abundant taxa of benthic macroinvertebrates in the Manatee River by survey period: 1993-1996 and 1994-1997.

TAXON	1993-1996	1994-1997
Ampelisca abdita (A)	3165 (25.1)	2401 (20.9)
Monticellina dorsobranchialis (P)	940 (7.4)	1164 (10.1)
Grandidierella bonnieroides (A)	918 (7.3)	834 (7.3)
Amygdalum papyrium (B)	794 (6.3)	515 (4.5)
Mulinia lateralis (B)	578 (4.6)	300 (2.60
Cyclaspis cf. varians (C)	538 (4.3)	398 (3.5)
Mediomastus spp. (P)	411 (3.3)	324 (2.8)
Ampelisca holmesi (A)	366 (2.9)	NR
Paraprionospio pinnata (P)	309 (2.4)	345 (3.0)
Xenanthura brevitelson (I)	230 (1.8)	NR
Streblospio benedicti (P)	NR	403 (3.5)
Mediomastus californiensis (P)	NR	392 (3.4)

NR= not ranked in top 10 for survey period
A= Amphipoda B=Bivalvia C=Cumacea G=Gastropoda I=Isopoda
P=Polychaeta

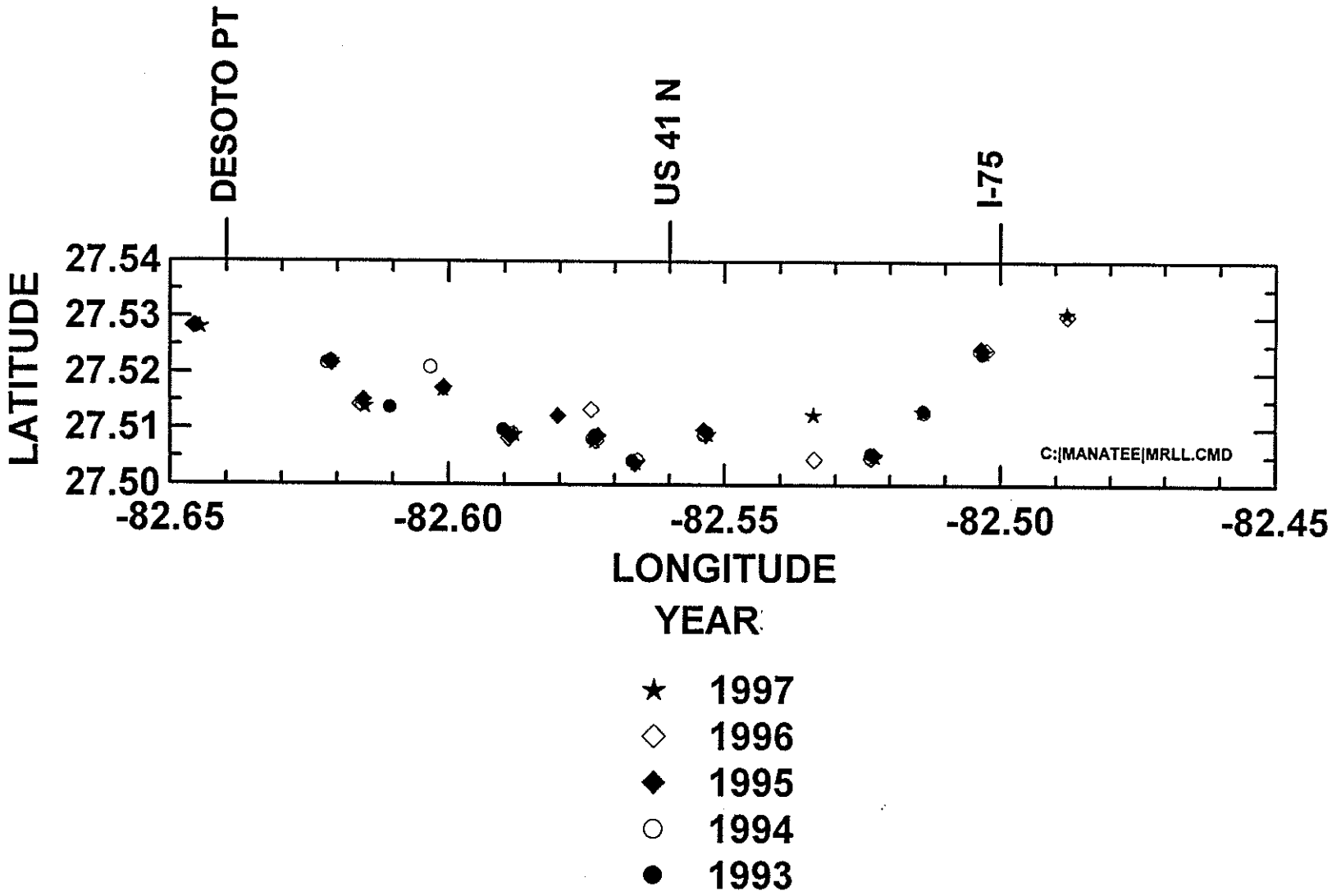

Figure 1. Schematic representation of sampling locations for sediments and benthic macroinvertebrates in the Manatee River, 1993-1997.

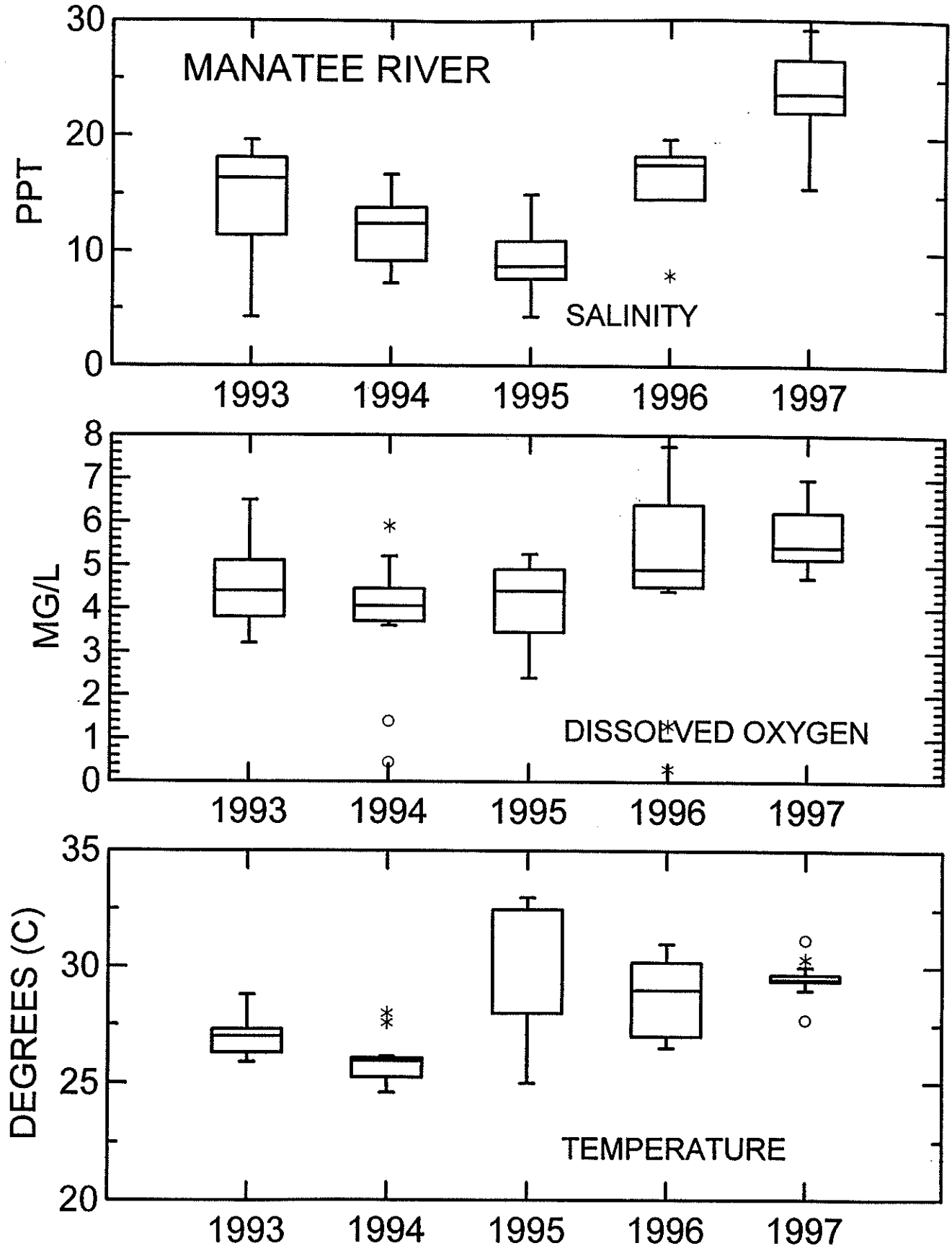

Figure 2. Quartile distribution of salinity, dissolved oxygen, and water temperature in near-bottom waters of the Manatee River, 1993-1997. Horizontal mid-line represents the median value and hinges represent the 25th and 75th percentiles.

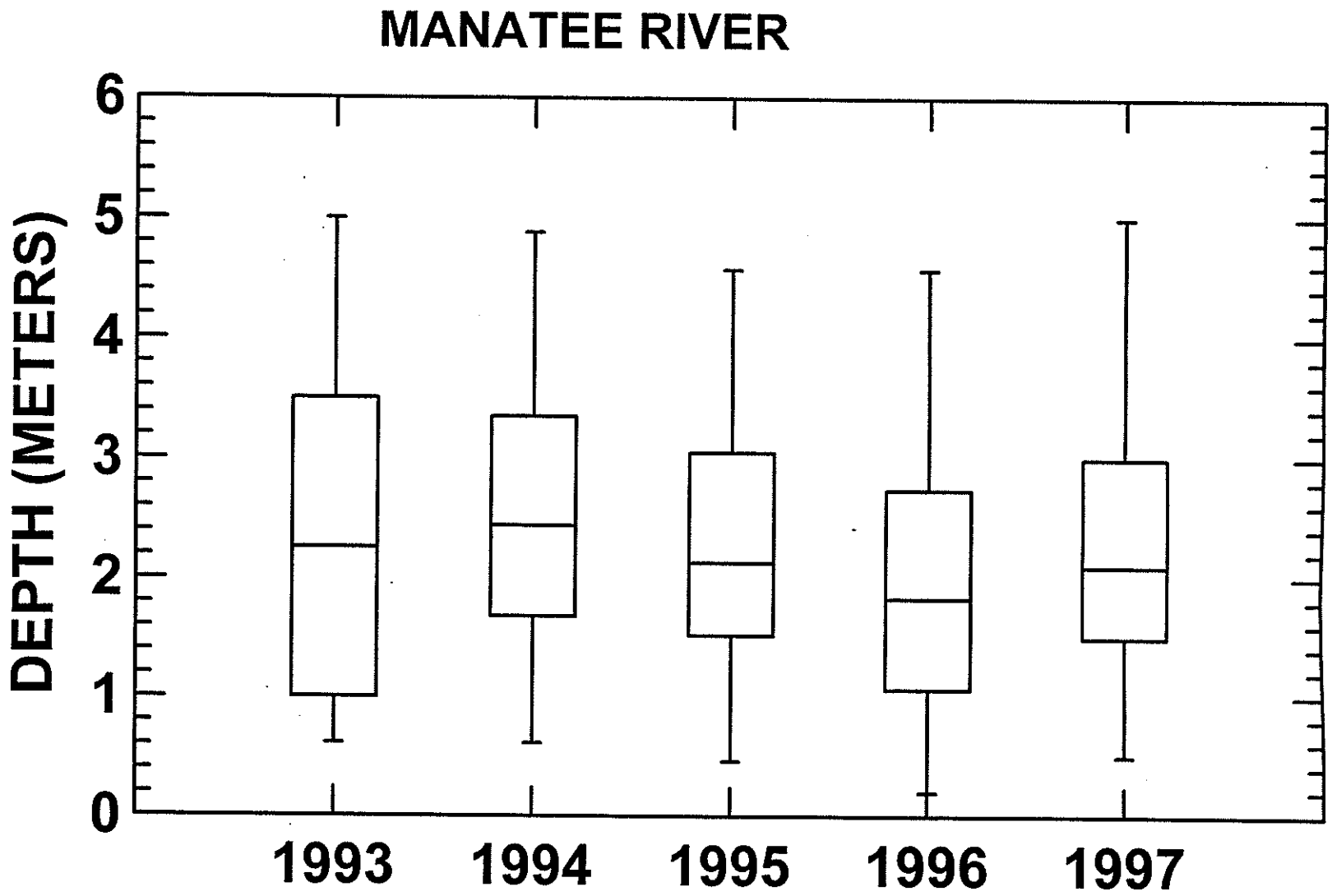

Figure 3. Quartile distribution of sample depths for sediments and benthic macroinvertebrates in the Manatee River, 1993-1997. Horizontal mid-line represents the median value and hinges represent the 25th and 75th percentiles.

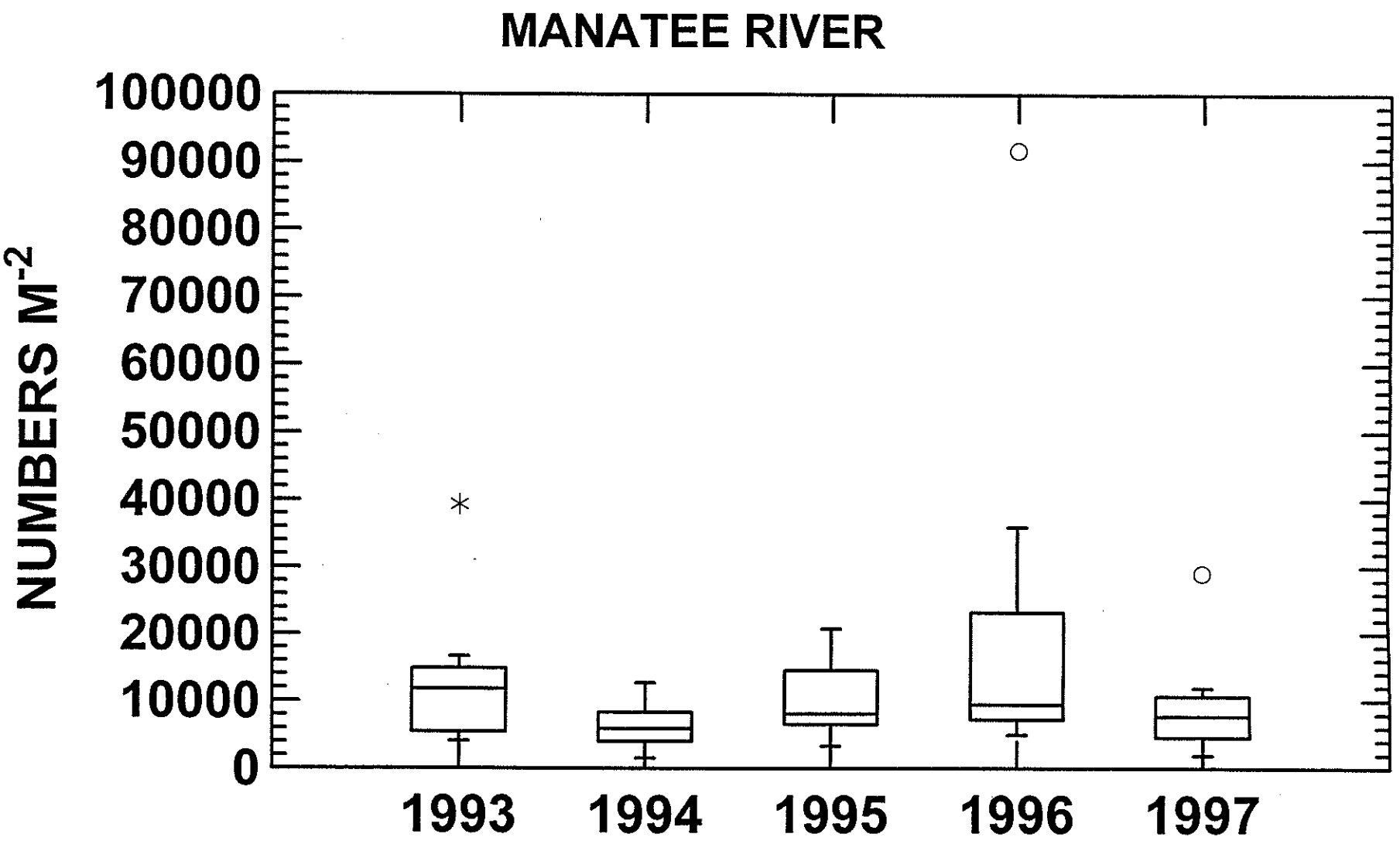

Figure 4. Quartile distribution of total abundance of benthic macroinvertebrates in the Manatee River, 1993-1997. Horizontal mid-line represents the median value and hinges represent the 25th and 75th percentiles.

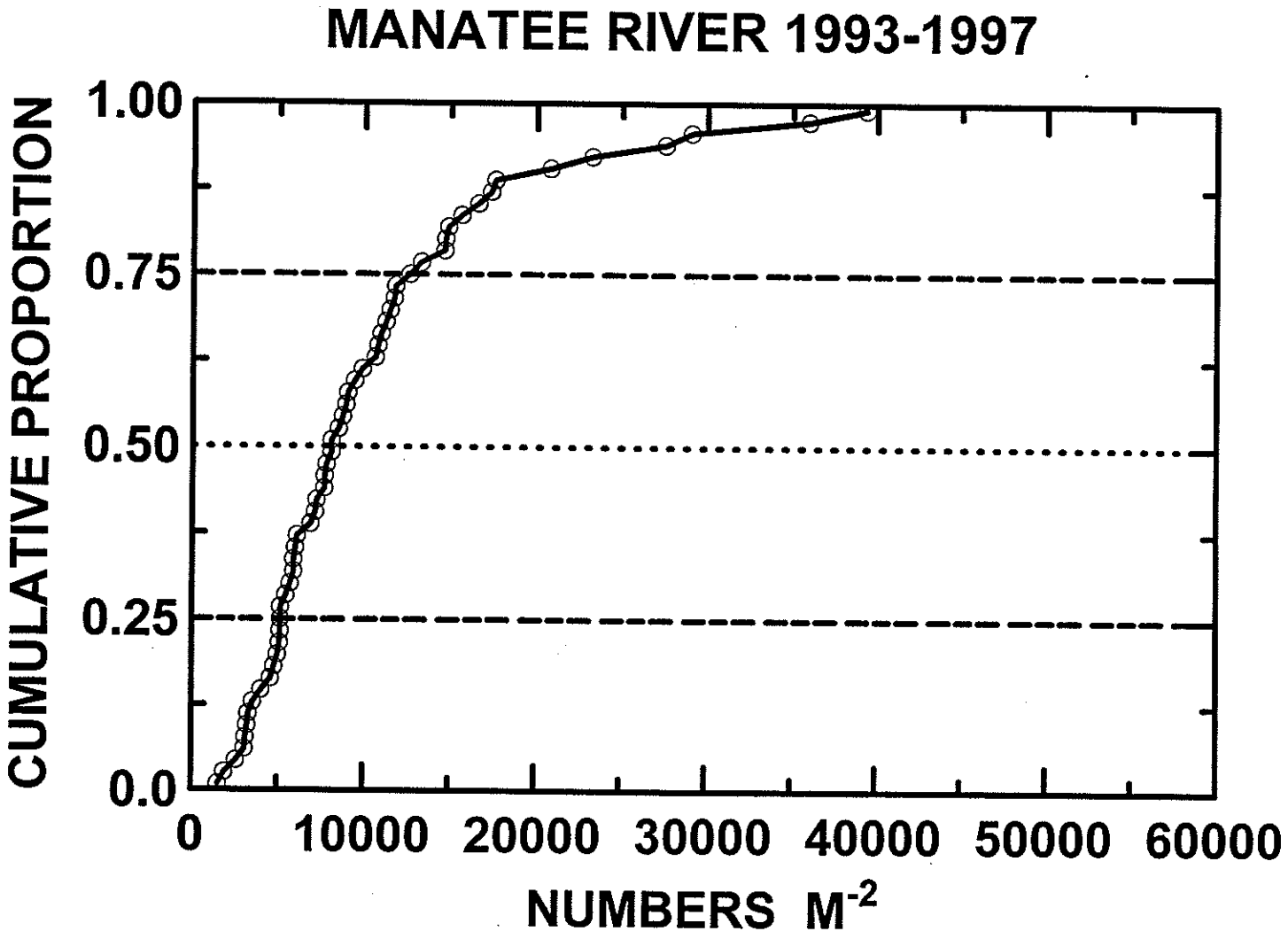

Figure 5. Cumulative frequency distribution of total abundance of benthic macroinvertebrates in the Manatee River, 1993-1997.

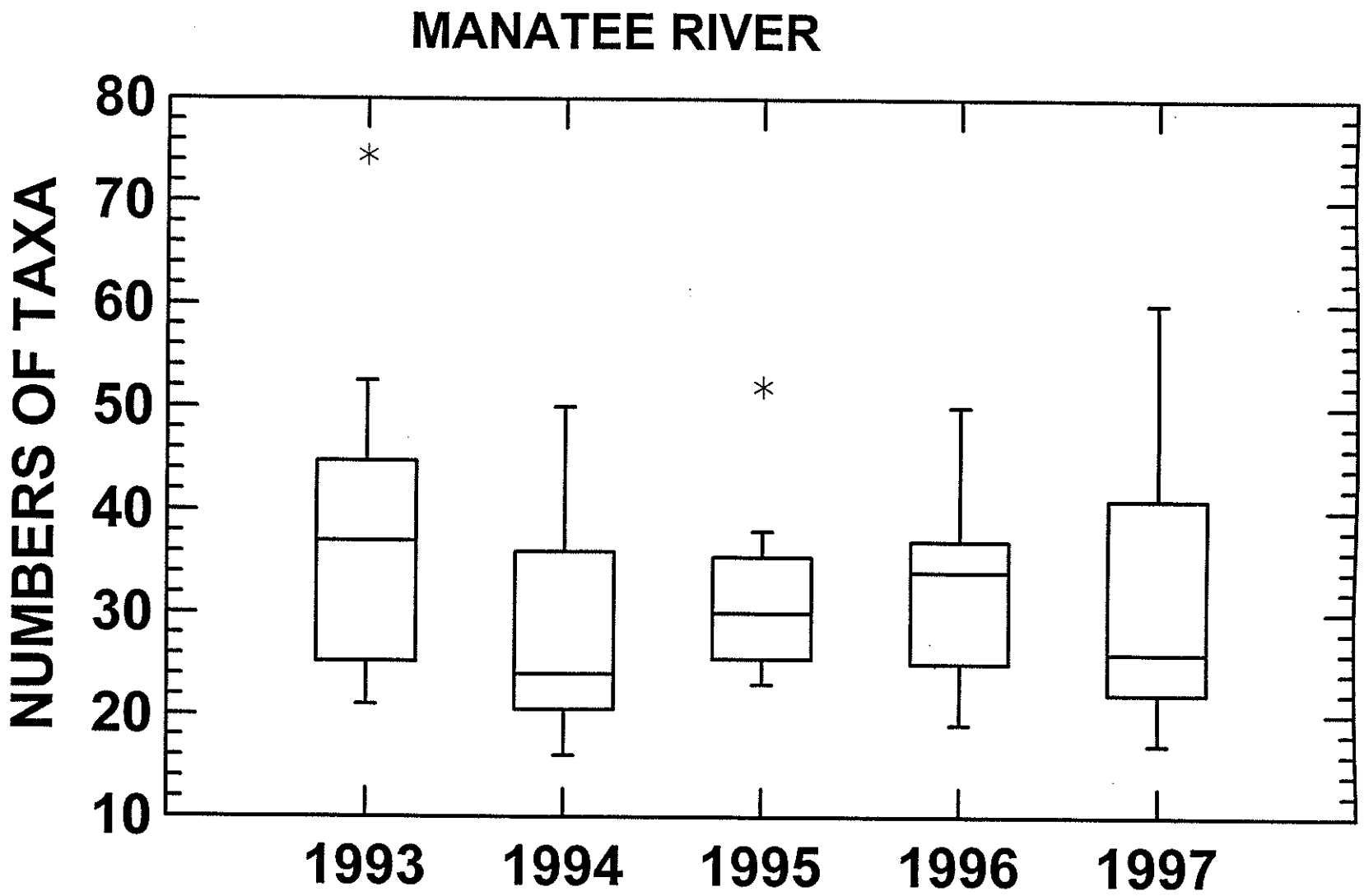

Figure 6. Quartile distribution of numbers of taxa of benthic macroinvertebrates in the Manatee River, 1993-1997. Horizontal mid-line represents the median value and hinges represent the 25th and 75th percentiles.

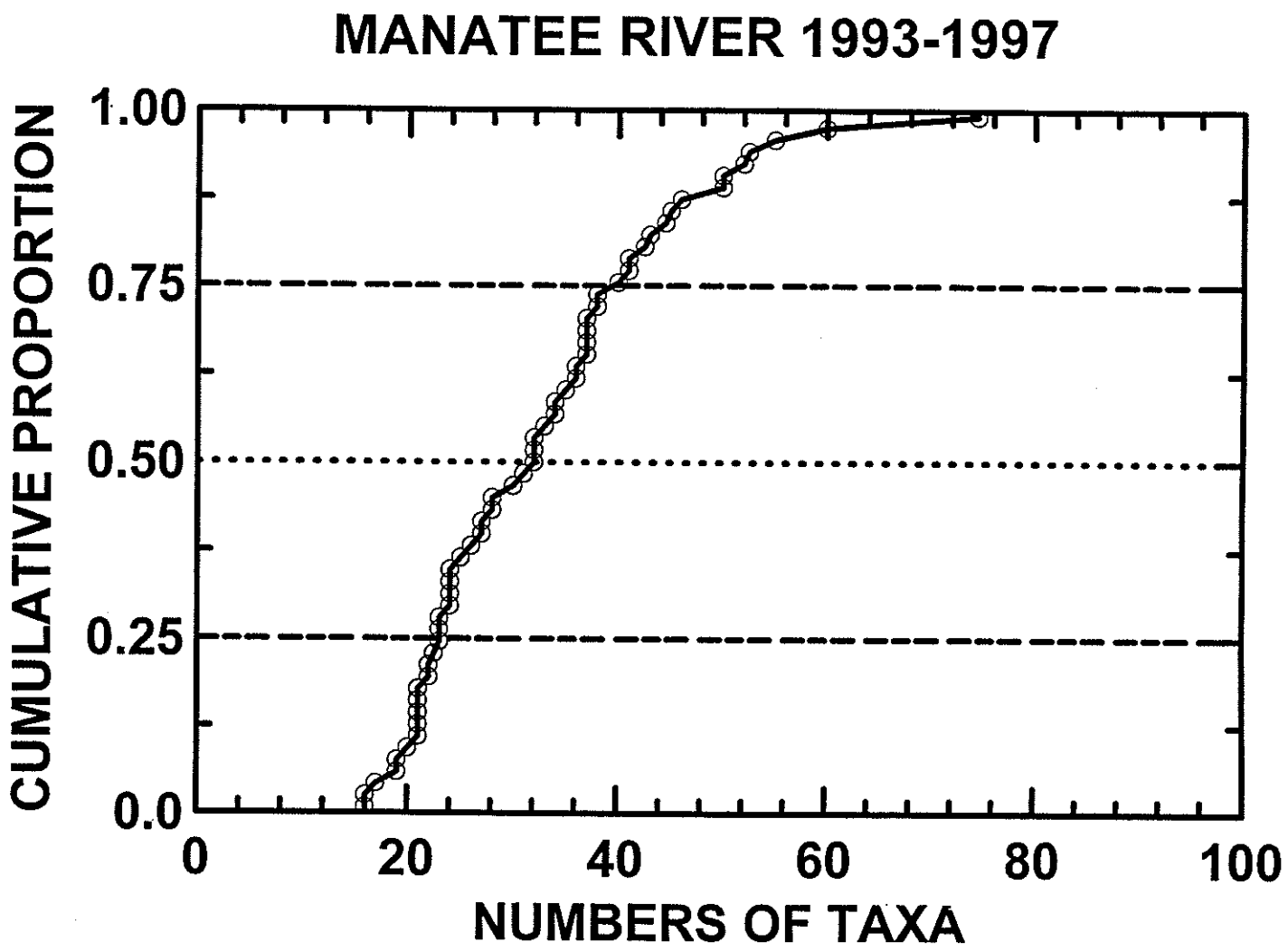

Figure 7. Cumulative frequency distribution of numbers of taxa of benthic macroinvertebrates in the Manatee River, 1993-1997.

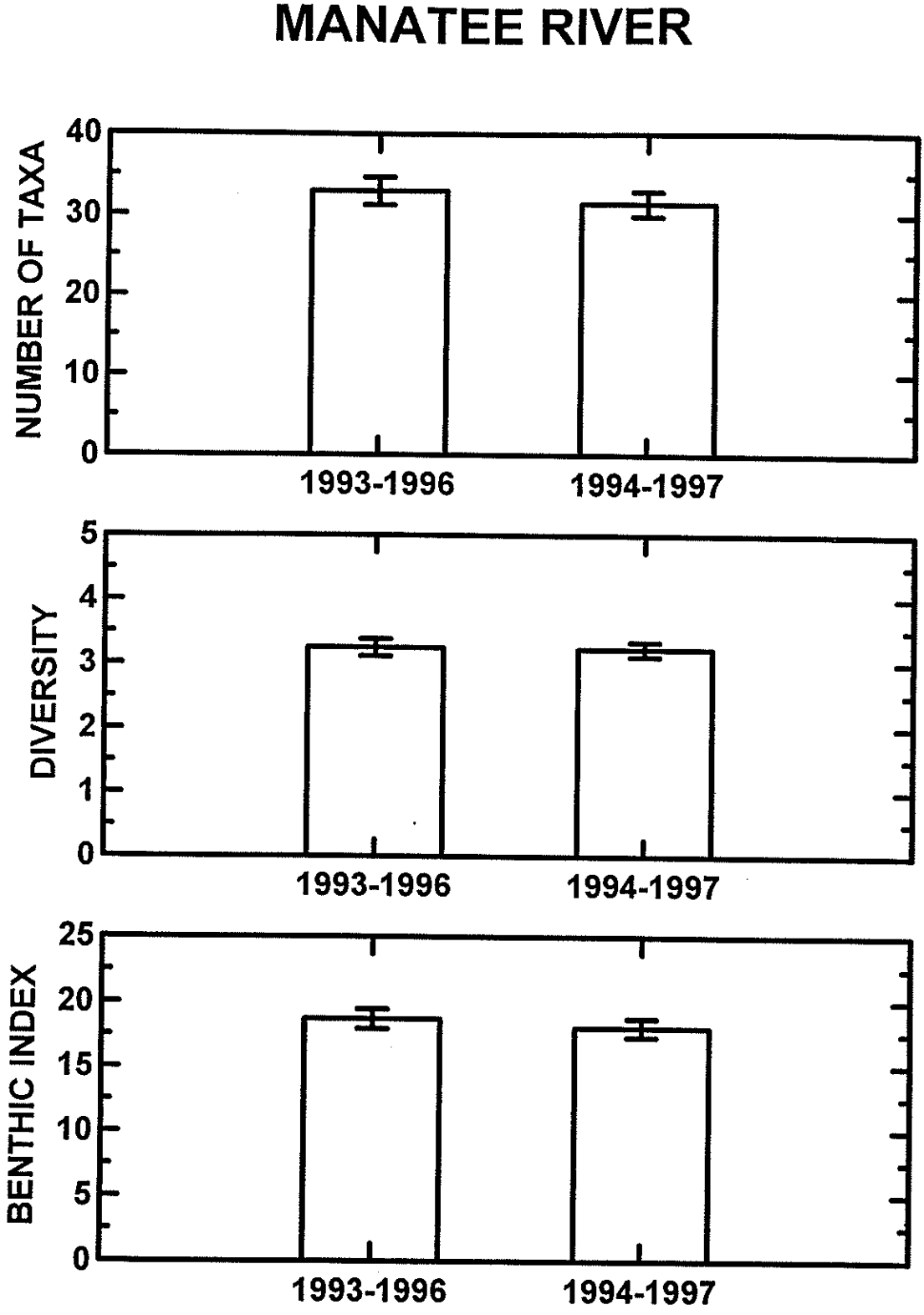

Figure 8. Four-year moving averages of mean (standard error) numbers of taxa, Shannon-Wiener diversity, and the Tampa Bay Benthic Index: Manatee River 1993-1996 and 1994-1997.

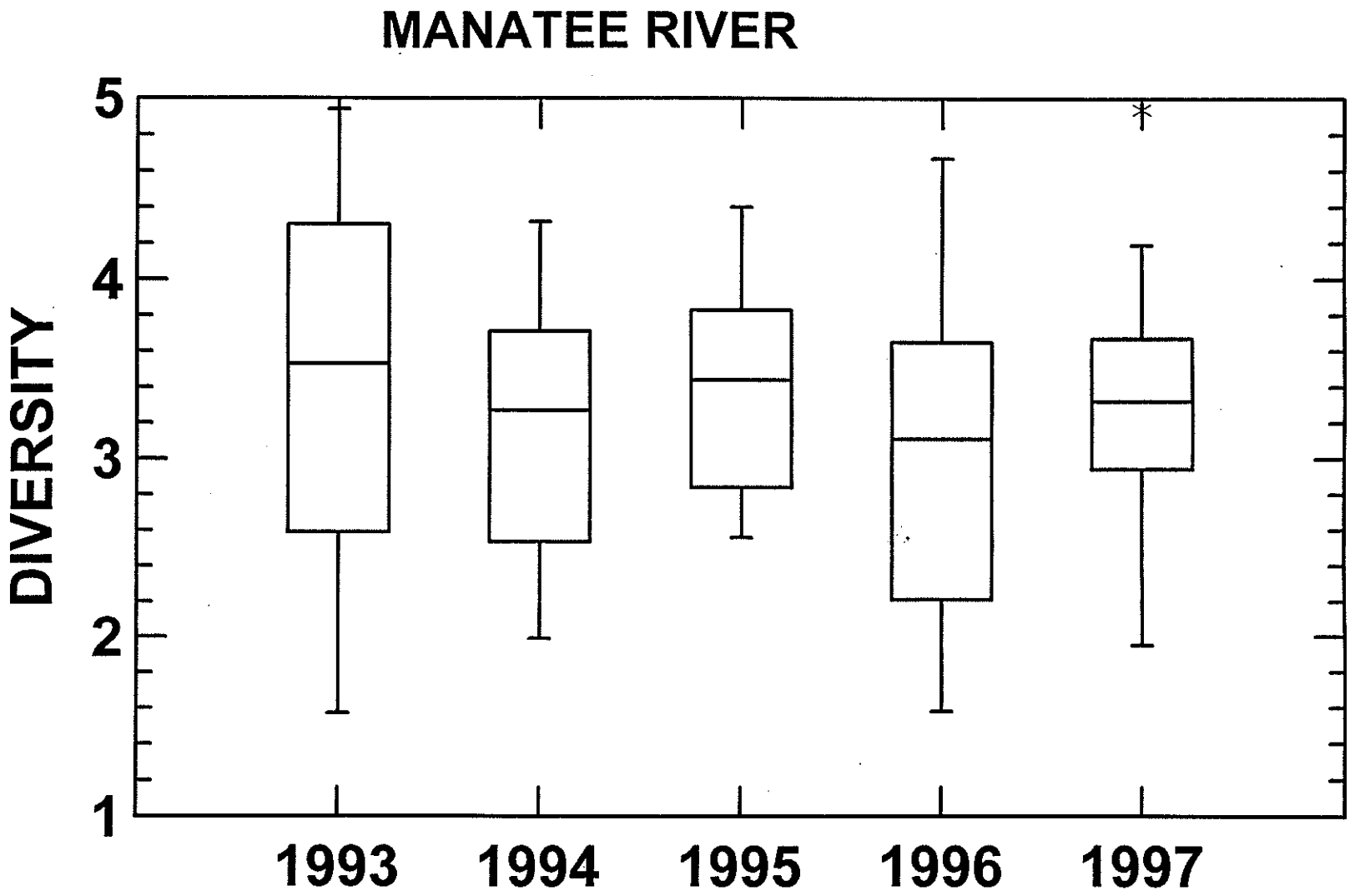

Figure 9. Quartile distribution of Shannon-Wiener diversity of macroinvertebrates in Terra Ceia Bay, 1993-1997. Horizontal mid-line represents the median value and hinges represent the 25th and 75th percentiles.

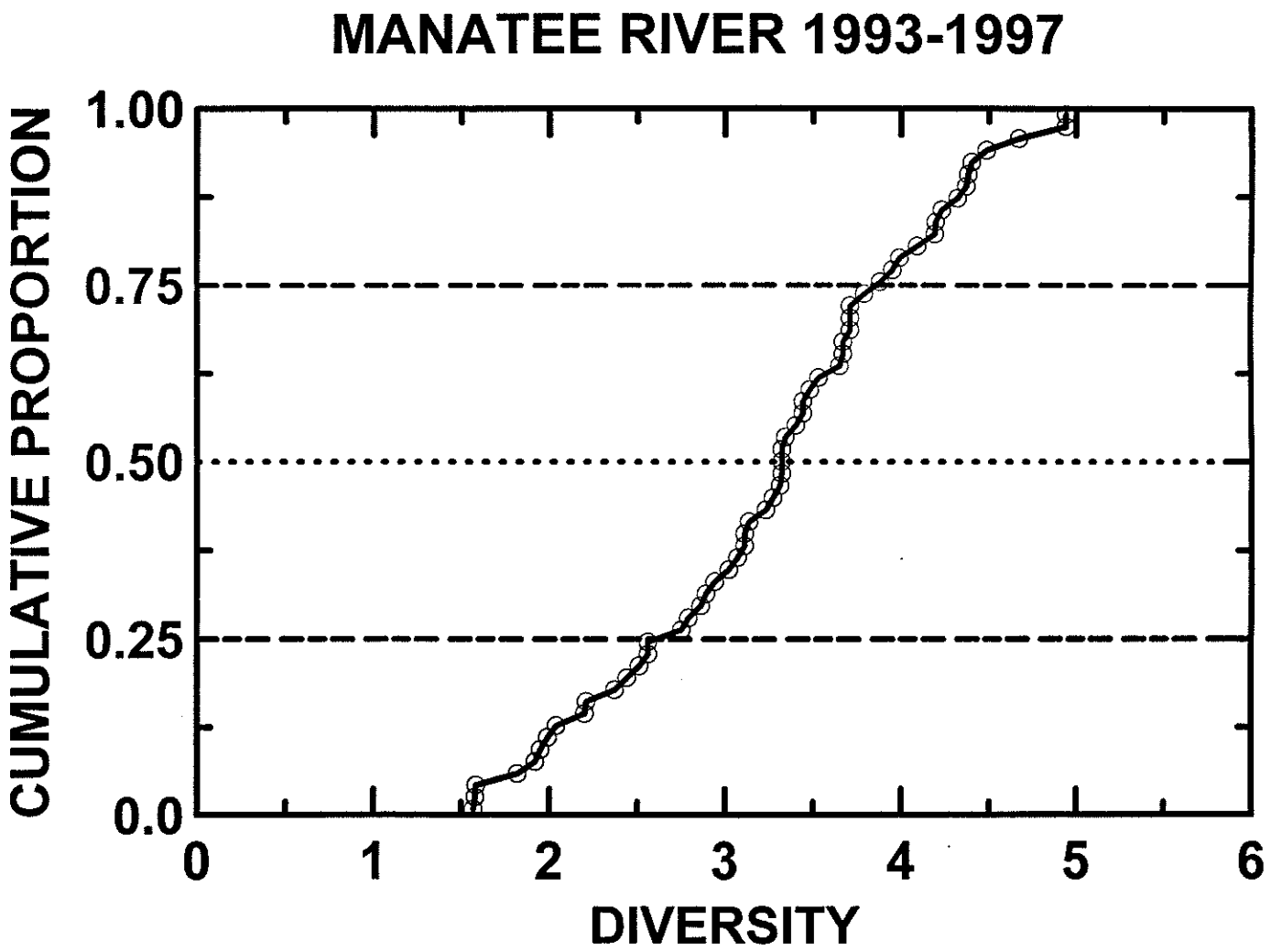

Figure 10. Cumulative frequency distribution of Shannon-Wiener diversity of benthic macroinvertebrates in the Manatee River, 1993-1997.

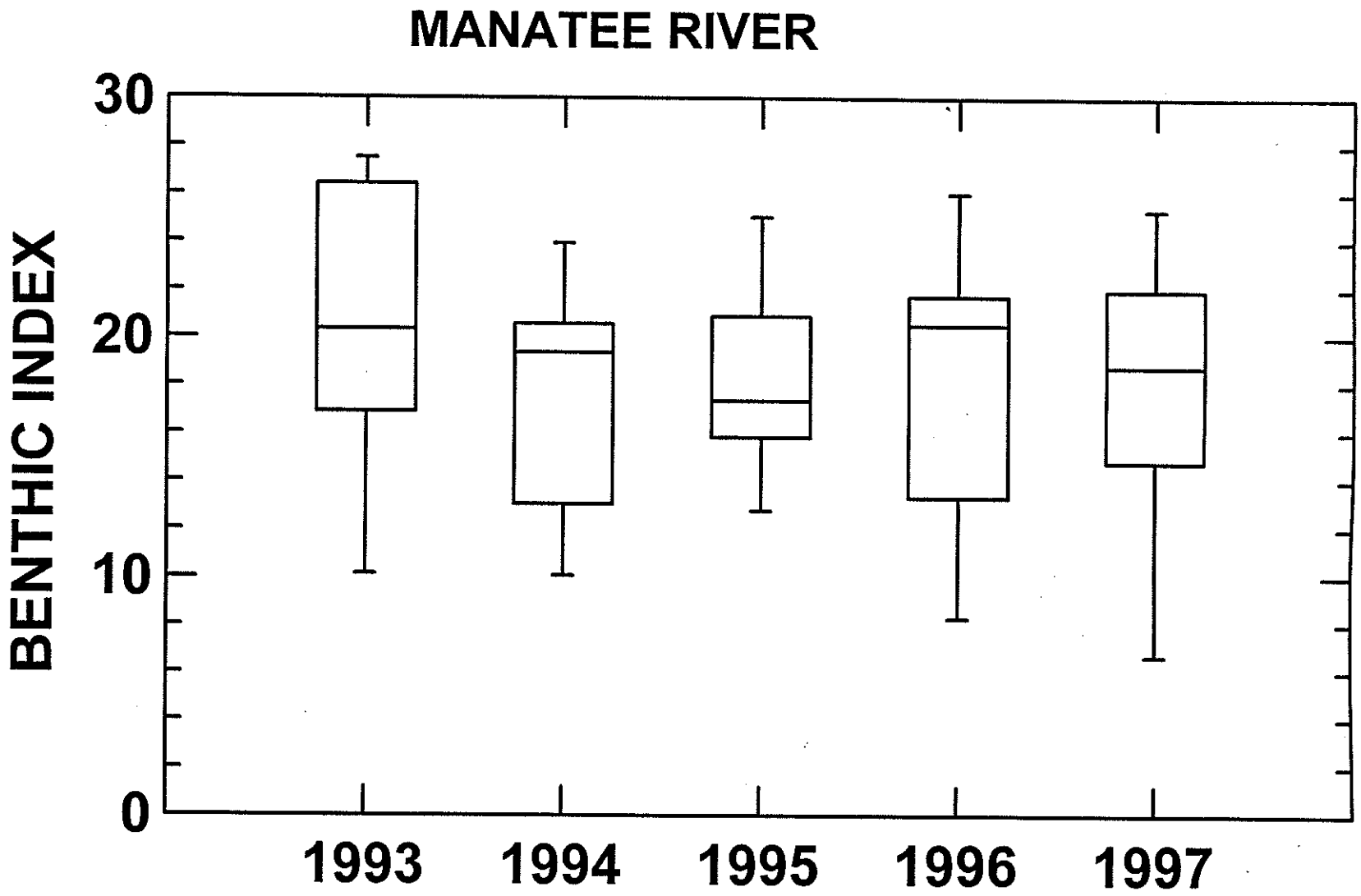

Figure 11. Quartile distribution of the Tampa Bay Benthic index in the Manatee River, 1993-1997. Horizontal mid-line represents the median value and hinges represent the 25th and 75th percentiles.

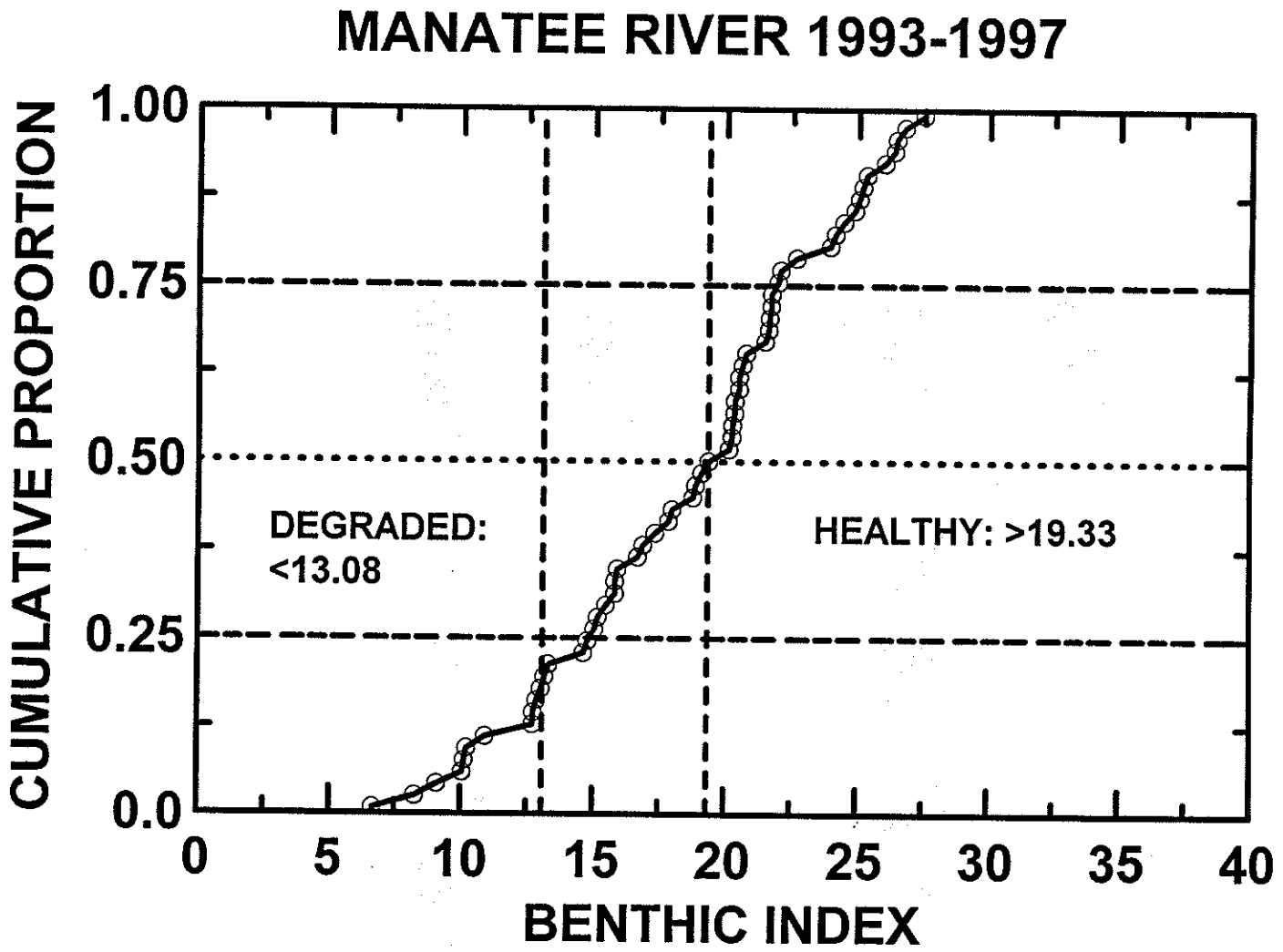

Figure 12. Cumulative frequency distribution of the Tampa Bay Benthic Index in the Manatee River, 1993-1997. Index scores <13.08 are considered diagnostic of "degraded" benthic habitat and scores >19.33 are diagnostic of "healthy" habitat.

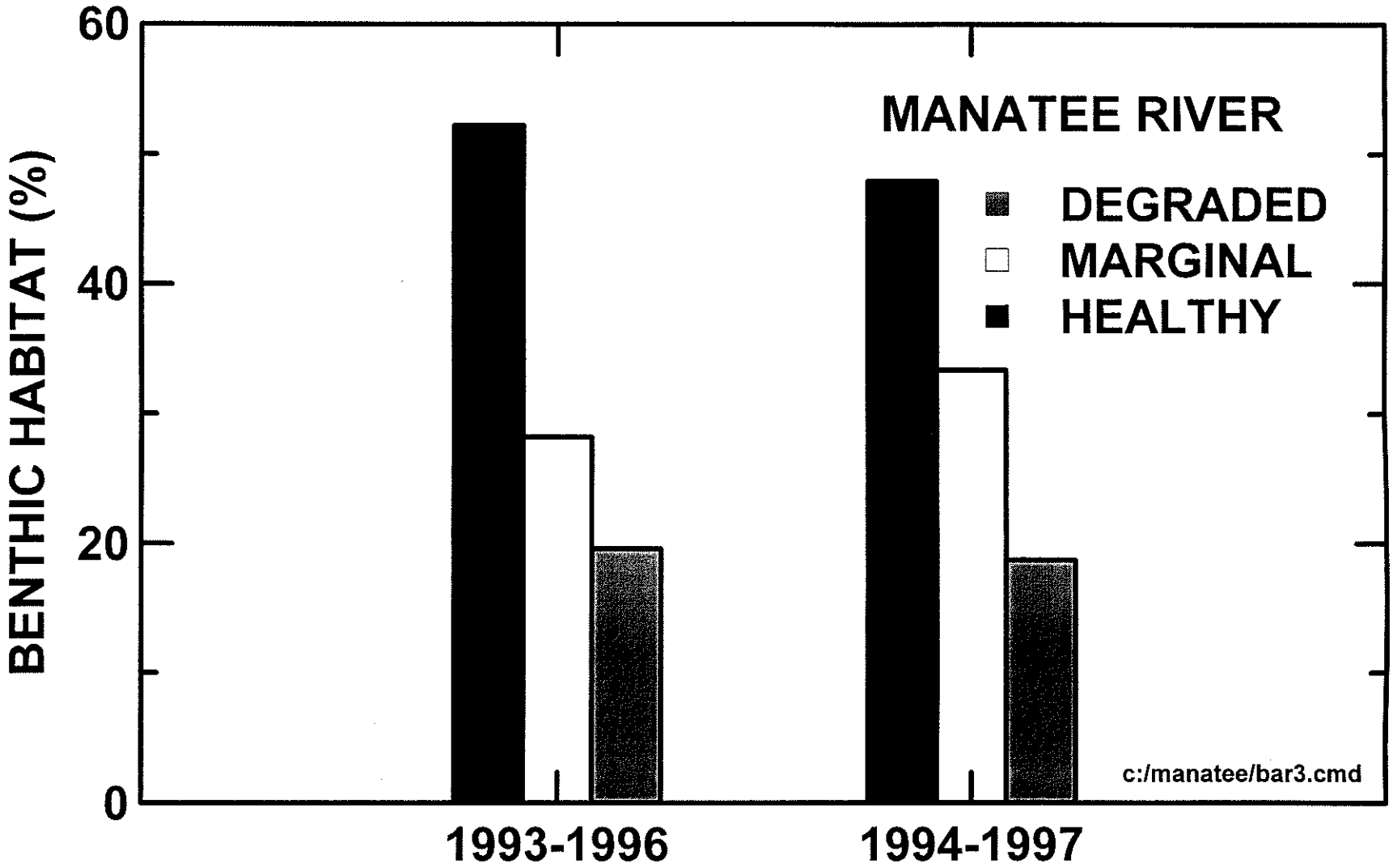

Figure 13. Four-year moving averages of the mean percentage of "degraded", "marginal", and "healthy" benthic habitat, based upon the Tampa Bay Benthic Index. Manatee River, 1993-1996 vs. 1994-1997.

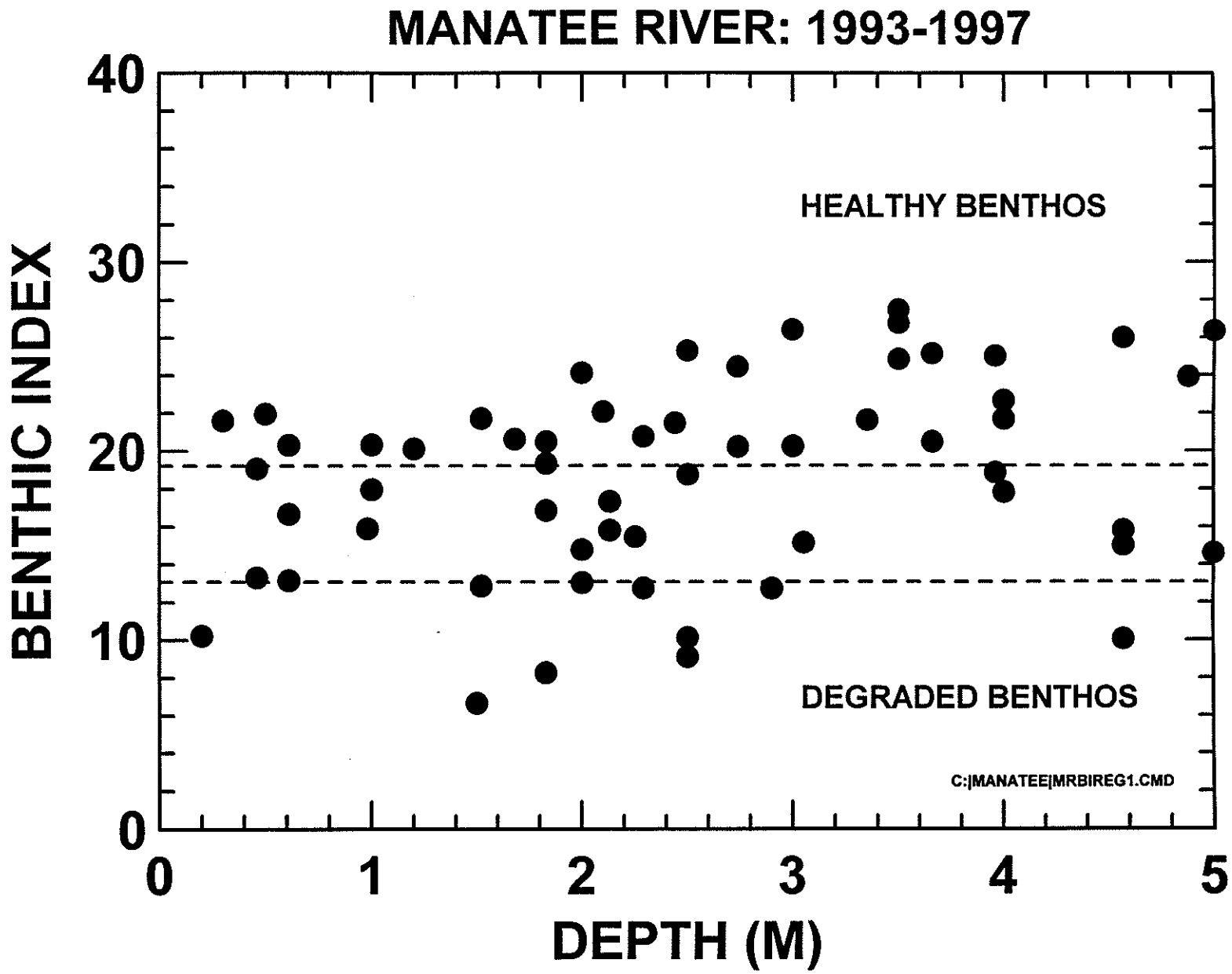

Figure 14. Association between the Tampa Bay Benthic Index and sample depth, in the Manatee River: 1993-1997. and 1994-1997.

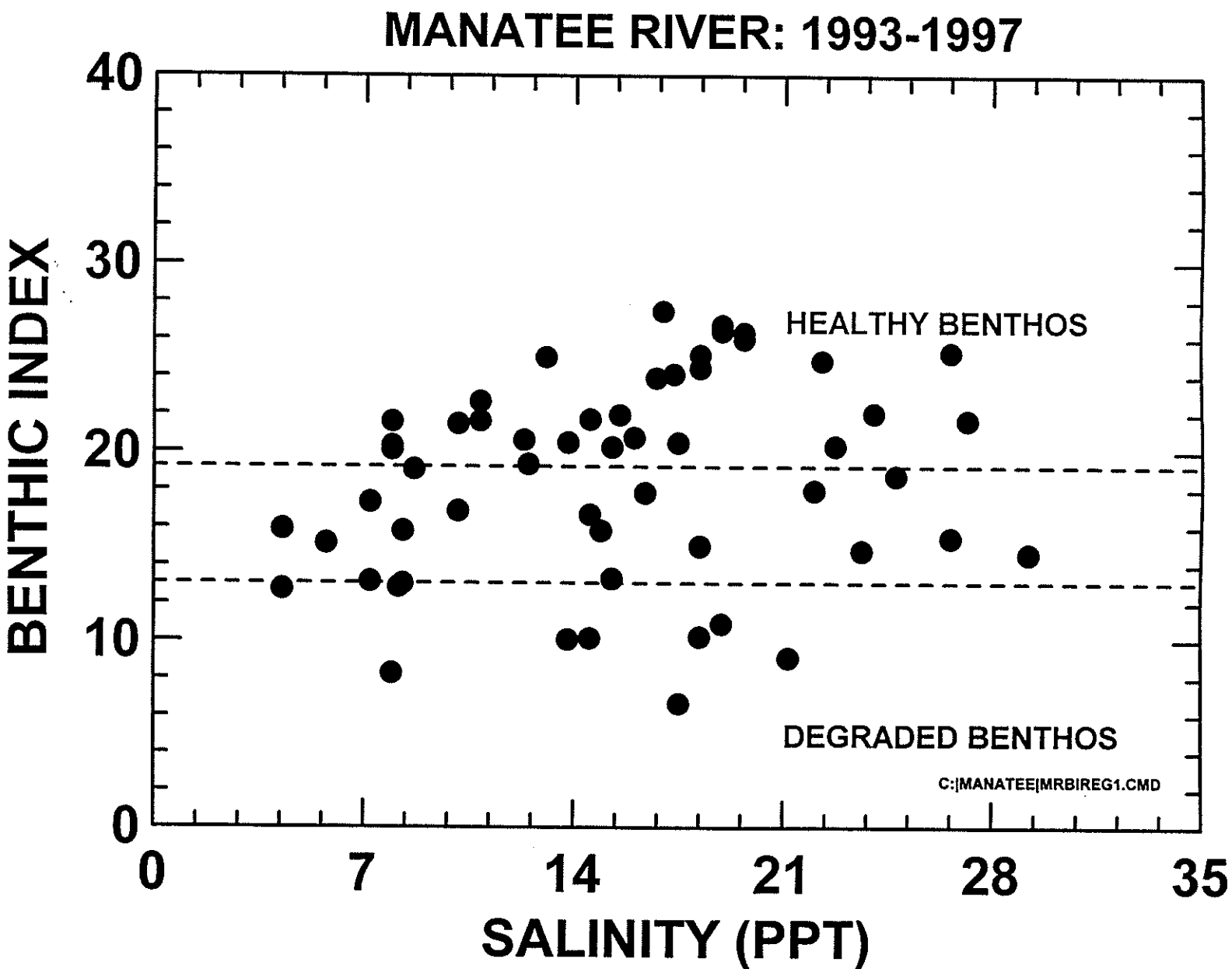

Figure 15. Association between the Tampa Bay Benthic Index and salinity, in the Manatee River: 1993-1997. and 1994-1997.

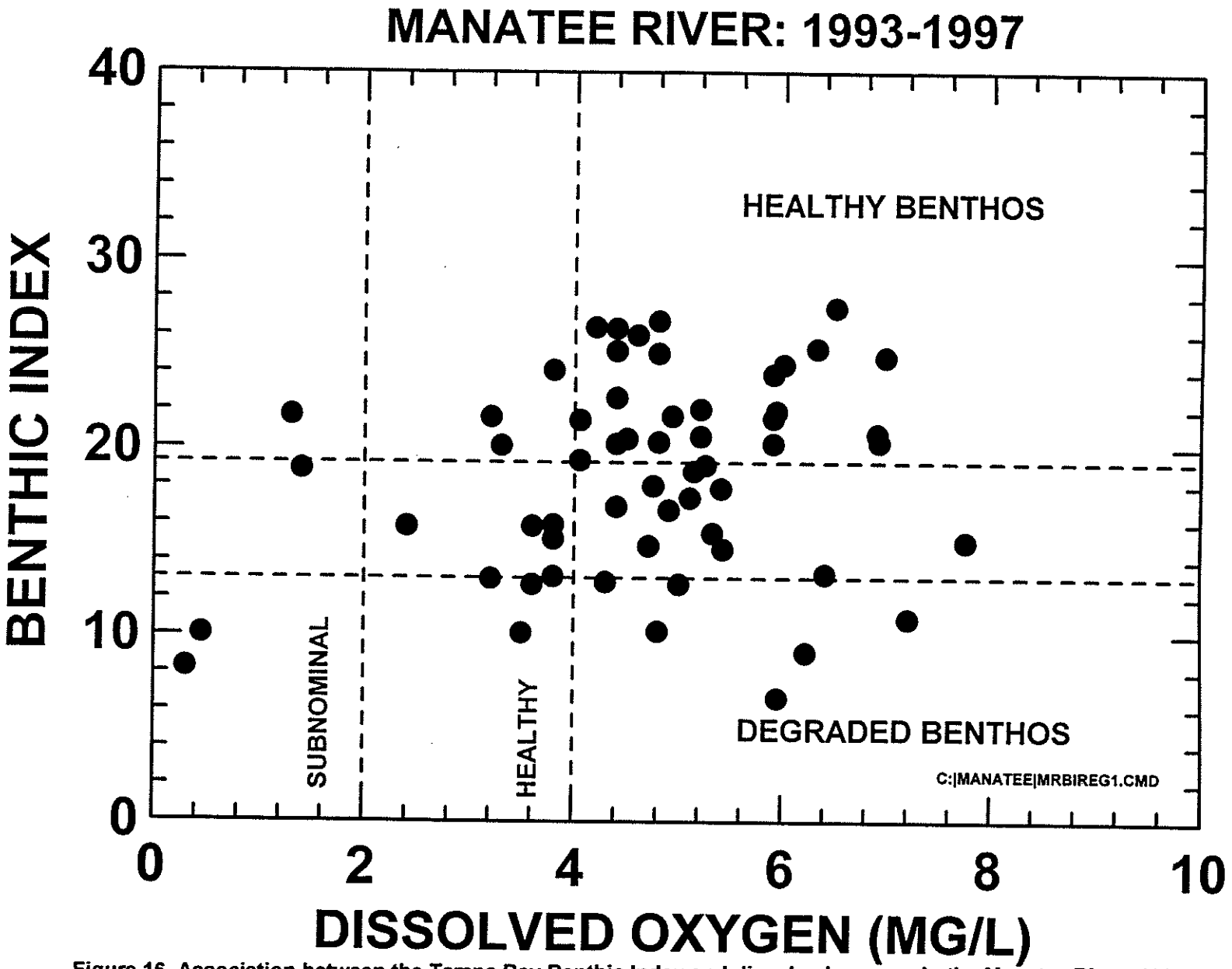

Figure 16. Association between the Tampa Bay Benthic Index and dissolved oxygen, in the Manatee River: 1993-1997. and 1994-1997.

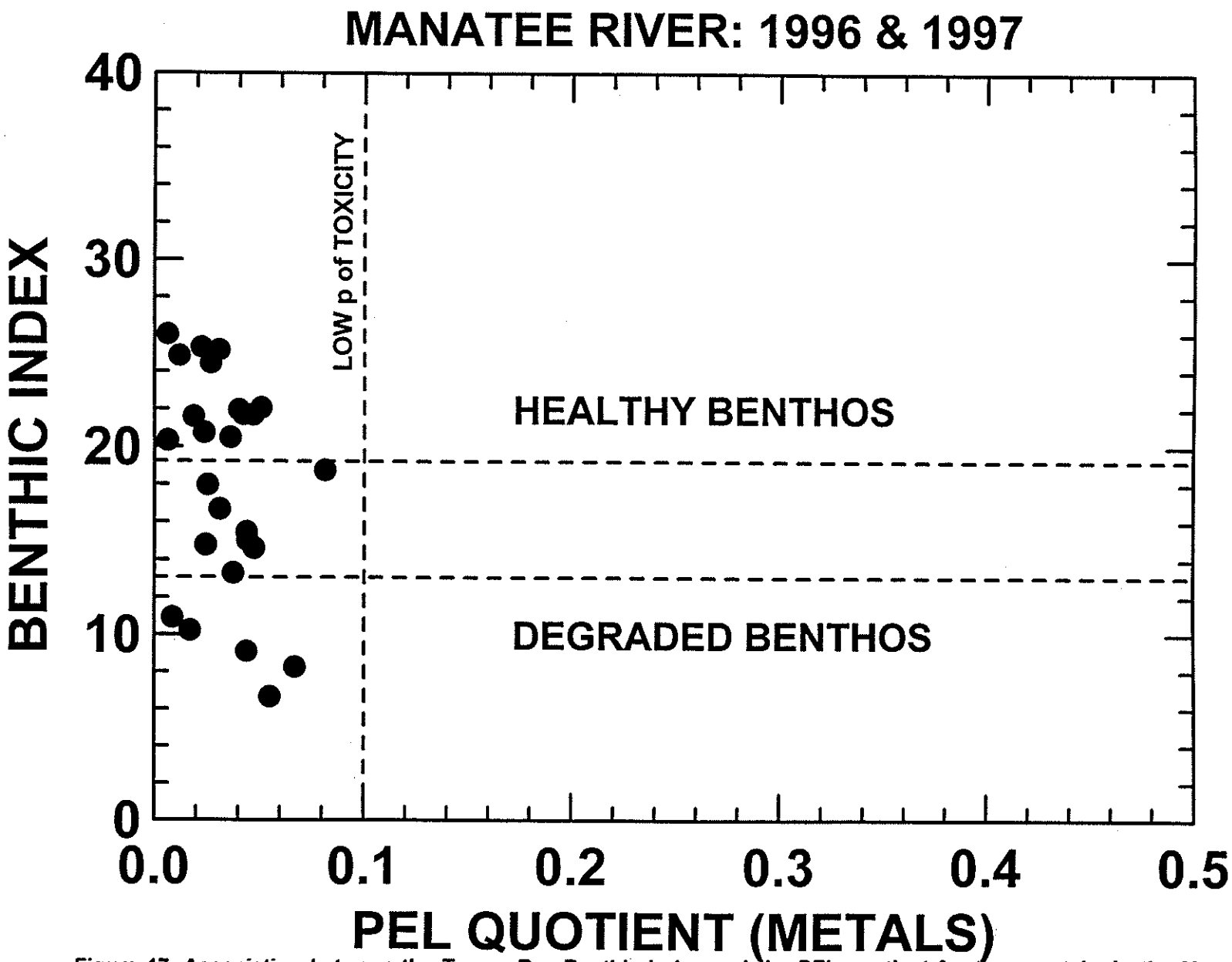

Figure 17. Association between the Tampa Bay Benthic Index and the PEL quotient for trace metals, in the Manatee River: 1993-1997. Sediments with a PEL quotient <0.1 have a low probability of toxicity.

APPENDIX A

MANATEE RIVER BENTHOS: 1997

STATION DATA

1997 MANATEE RIVER BENTHOS (RUN DATE 4 sep 98)

Project	=1997 TAMPA BAY BENTHOS
Location	=MANATEE RIVER
Date	=SEP 97
Name	=97MR09

Sample Characteristics		
Number of Species	:	62
Density of All Species	:	11825.00 /M2
Diversity (Hprime -log base 2)	:	4.21
Evenness (Hprime/Hmax)	:	0.71

Taxa	Observed	Percentage
Nemertea U	25.00	0.21
Nemertea N	50.00	0.42
Nemertea G	75.00	0.63
Sigalion sp. A	25.00	0.21
Bhawania heteroseta	50.00	0.42
Phyllodoce arenae	125.00	1.06
Synelmis ewingi (=sp. B)	50.00	0.42
Syllis sp. A	25.00	0.21
Syllis cornuta	75.00	0.63
Exogone	25.00	0.21
Exogone dispar	425.00	3.59
Sphaerosyllis glandulata	25.00	0.21
Grubeosyllis (Brania) clavata	300.00	2.54
Streptosyllis pettiboneae	100.00	0.85
Parapionosyllis uelebackerae	1075.00	9.09
Parapionosyllis? sp. A	125.00	1.06
Goniadides carolinae	150.00	1.27
Aricidea cerrutii	25.00	0.21
Prionospio heterobranchia	175.00	1.48
Prionospio cristata	100.00	0.85
Prionospio perkinsi	25.00	0.21
Spio pettiboneae	300.00	2.54
Scolelepis texana	25.00	0.21
Poecilochaetus johnsoni	25.00	0.21
Caulleriella zetlandicus	125.00	1.06
Armandia maculata	50.00	0.42
Travisia hobsonae	1825.00	15.43
Capitella capitata	25.00	0.21
Mediomastus californiensis	125.00	1.06
Axiothella mucosa	175.00	1.48
Polycirrus plumosa	450.00	3.81
Boguea enigmatica	25.00	0.21
Caecum strigosum	300.00	2.54
Crepidula	25.00	0.21

1997 MANATEE RIVER BENTHOS (RUN DATE 4 sep 98)

Project	*=1997 TAMPA BAY BENTHOS*
Location	*=MANATEE RIVER*
Date	*=SEP 97*
Name	*=97MR09-CONTINUED*

Taxa	*Observed*	*Percentage*
Tectonatica pusilla	*25.00*	*0.21*
Olivella pusilla	*75.00*	*0.63*
Turbonilla sp.	*25.00*	*0.21*
Tornatina inconspicua	*250.00*	*2.11*
Pteromeris perplanna	*25.00*	*0.21*
Mulinia lateralis	*50.00*	*0.42*
Tellina lineata	*50.00*	*0.42*
Semele nuculoides	*75.00*	*0.63*
Asthenothaerus hemphilli	*100.00*	*0.85*
Oxyurostylis	*25.00*	*0.21*
Oxyurostylis smithi	*50.00*	*0.42*
Halmyrapseudes bahamensis	*50.00*	*0.42*
Leptochelia (Hargeria) rapax	*25.00*	*0.21*
Amakusanthura magnifica	*150.00*	*1.27*
Ampelisca sp. C	*25.00*	*0.21*
Batea catharinensis	*50.00*	*0.42*
Metharpinia floridana	*275.00*	*2.33*
Eudevenopus honduranus	*25.00*	*0.21*
Pagurus	*25.00*	*0.21*
Upogebia	*25.00*	*0.21*
Portunus ordwayi	*25.00*	*0.21*
Pinnotheridae	*50.00*	*0.42*
Dissodactylus mellitae	*75.00*	*0.63*
Pinnixa spp.	*75.00*	*0.63*
Phascolion crypta	*175.00*	*1.48*
Glottidia pyramidata	*25.00*	*0.21*
Mellita tenuis	*50.00*	*0.42*
Branchiostoma floridae	*3425.00*	*28.96*

1997 MANATEE RIVER BENTHOS (RUN DATE 4 sep 98)

Project	=1997 TAMPA BAY BENTHOS
Location	=MANATEE RIVER
Date	=SEP 97
Name	=97MR10

Sample Characteristics

Number of Species	:	58
Density of All Species	:	5475.00 /M2
Diversity (Hprime -log base 2)	:	5.01
Evenness (Hprime/Hmax)	:	0.86

Taxa	Observed	Percentage
Thenaria	25.00	0.46
Nemertea F	75.00	1.37
Nemertea K	25.00	0.46
Phyllodoce arenae	25.00	0.46
Podarke obscura	50.00	0.91
Exogone dispar	25.00	0.46
Brania wellfleetensis	25.00	0.46
Ceratonereis irritabilis	25.00	0.46
Glycera americana	25.00	0.46
Glycinde solitaria	75.00	1.37
Kinbergonuphis simoni	25.00	0.46
Lumbrineris sp. D	25.00	0.46
Scoloplos rubra	25.00	0.46
Aricidea taylori	100.00	1.83
Cirrophorus	25.00	0.46
Prionospio heterobranchia	75.00	1.37
Apoprionospio pygmaea	25.00	0.46
Spio pettiboneae	50.00	0.91
Paraprionospio pinnata	600.00	10.96
Magelona pettiboneae	25.00	0.46
Spiochaetopterus costarum	50.00	0.91
Monticellina dorsobranchialis	300.00	5.48
Notomastus latericeus	25.00	0.46
Mediomastus californiensis	325.00	5.94
Pectinaria gouldii	25.00	0.46
Melinna cristata	75.00	1.37
Isolda pulchella	25.00	0.46
Chone cf. americana	25.00	0.46
Fabriciunda trilobata	175.00	3.20
Tubificidae	250.00	4.57
Tubificoides wasselli	50.00	0.91
Gastropoda	25.00	0.46
Caecum strigosum	25.00	0.46
Jaspidella blanesi	50.00	0.91
Mysella planulata	275.00	5.02
Macoma tenta	25.00	0.46
Tellina sp.	25.00	0.46
Lyonsia hyalina floridana	75.00	1.37

Project	=1997 TAMPA BAY BENTHOS
Location	=MANATEE RIVER
Date	=SEP 97
Name	=97MR10-CONTD

Taxa	Observed	Percentage
Oxyurostylis smithi	125.00	2.28
Cyclaspis cf. varians	25.00	0.46
Xenanthura brevitelson	175.00	3.20
Amakusanthura magnifica	200.00	3.65
Ampelisca holmesi	700.00	12.79
Aoridae	50.00	0.91
Paramicrodeutopus cf. myersi	25.00	0.46
Rudilemboides naglei	75.00	1.37
Erichthonius brasiliensis	25.00	0.46
Grandidierella bonnieroides	200.00	3.65
Listriella barnardi	25.00	0.46
Eudevenopus honduranus	75.00	1.37
Paguroidea	75.00	1.37
Upogebia	25.00	0.46
Heterocrypta granulata	50.00	0.91
Panopeus sp.	50.00	0.91
Phascolion crypta	175.00	3.20
Phoronis	50.00	0.91
Amphipholis sp.	25.00	0.46
Branchiostoma floridae	150.00	2.74

1997 MANATEE RIVER BENTHOS (RUN DATE 4 sep 98)

Project	=1997 TAMPA BAY BENTHOS
Location	=MANATEE RIVER
Date	=SEP 97
Name	=97MR11

Sample Characteristics

Number of Species	:	19
Density of All Species	:	3100.00 /M2
Diversity (Hprime -log base 2)	:	3.02
Evenness (Hprime/Hmax)	:	0.71

Taxa	Observed	Percentage
Sthenelais sp. A	25.00	0.81
Podarkeopsis levifuscina	25.00	0.81
Glycinde solitaria	50.00	1.61
Prionospio perkinsi	675.00	21.77
Paraprionospio pinnata	650.00	20.97
Carazziella hobsonae	25.00	0.81
Monticellina dorsobranchialis	825.00	26.61
Notomastus latericeus	25.00	0.81
Tubificidae	100.00	3.23
Strombiformis bilineatus	25.00	0.81
Orobitella (=Neaeromya) floridana	250.00	8.06
Mysella planulata	100.00	3.23
Tellina lineata	25.00	0.81
Oxyurostylis	25.00	0.81
Cyclaspis cf. varians	175.00	5.65
Amakusanthura magnifica	25.00	0.81
Listriella barnardi	25.00	0.81
Micropholis atra	25.00	0.81
Micropholis gracillima	25.00	0.81

1997 MANATEE RIVER BENTHOS (RUN DATE 4 sep 98)

Project	=1997 TAMPA BAY BENTHOS
Location	=MANATEE RIVER
Date	=SEP 97
Name	=97MR12
Last Modified	=15:17:39 on September 2,1998

Sample Characteristics		
Number of Species	:	33
Density of All Species	:	10650.00 /M2
Diversity (Hprime -log base 2)	:	2.86
Evenness (Hprime/Hmax)	:	0.57

Taxa	Observed	Percentage
Podarkeopsis levifuscina	25.00	0.23
Glycinde solitaria	75.00	0.70
Aricidea taylori	25.00	0.23
Prionospio perkinsi	100.00	0.94
Paraprionospio pinnata	625.00	5.87
Spiochaetopterus costarum	25.00	0.23
Monticellina dorsobranchialis	2325.00	21.83
Mediomastus californiensis	25.00	0.23
Sabaco americanus	25.00	0.23
Pectinaria gouldii	25.00	0.23
Fabriciunda trilobata	100.00	0.94
Tubificidae	25.00	0.23
Teinostoma sp.	75.00	0.70
Nassarius vibex	100.00	0.94
Eulimastoma sp.	50.00	0.47
Turbonilla cf. dalli	25.00	0.23
Rictaxis punctostriatus	25.00	0.23
Acteocina canaliculata	125.00	1.17
Amygdalum papyrium	50.00	0.47
Orobitella (=Neaeromya) floridana	325.00	3.05
Mysella planulata	4875.00	45.77
Mulinia lateralis	150.00	1.41
Macoma tenta	250.00	2.35
Tellina versicolor	50.00	0.47
Chione cancellata	25.00	0.23
Xenanthura brevitelson	100.00	0.94
Amakusanthura magnifica	450.00	4.23
Sphaeroma quadridentata	25.00	0.23
Ampelisca holmesi	350.00	3.29
Pinnotheridae	50.00	0.47
Phascolion crypta	100.00	0.94
Hemipholis elongata	25.00	0.23
Micropholis gracillima	25.00	0.23

1997 MANATEE RIVER BENTHOS (RUN DATE 4 sep 98)

Project	=1997 TAMPA BAY BENTHOS
Location	=MANATEE RIVER
Date	=SEP 97
Name	=97MR13

Sample Characteristics

Number of Species	:	42
Density of All Species	:	9900.00 /M2
Diversity (Hprime -log base 2)	:	3.68
Evenness (Hprime/Hmax)	:	0.68

Taxa	Observed	Percentage
Nemertea B	25.00	0.25
Malmgreniella maccraryae	50.00	0.51
Malmgreniella taylori	25.00	0.25
Podarkeopsis levifuscina	25.00	0.25
Glycinde solitaria	50.00	0.51
Lumbrineris sp. D	25.00	0.25
Scoloplos rubra	100.00	1.01
Prionospio perkinsi	425.00	4.29
Paraprionospio pinnata	1350.00	13.64
Monticellina dorsobranchialis	1650.00	16.67
Mediomastus californiensis	150.00	1.52
Sabaco americanus	25.00	0.25
Fabriciunda trilobata	25.00	0.25
Tectonatica pusilla	25.00	0.25
Nassarius vibex	100.00	1.01
Jaspidella blanesi	75.00	0.76
Eulimastoma sp.	175.00	1.77
Diplodonta semiaspera	25.00	0.25
Orobitella (=Neaeromya) floridana	1650.00	16.67
Mysella planulata	2125.00	21.46
Mulinia lateralis	125.00	1.26
Macoma tenta	200.00	2.02
Abra aequalis	25.00	0.25
Cyclaspis cf. varians	200.00	2.02
Leptochelia (Hargeria) rapax	50.00	0.51
Amakusanthura magnifica	450.00	4.55
Ampelisca abdita	25.00	0.25
Ampelisca vadorum	25.00	0.25
Ampelisca holmesi	25.00	0.25
Ampelisca sp. C	25.00	0.25
Ampelisca abdita/vadorum	25.00	0.25
Cymadusa compta	200.00	2.02
Grandidierella bonnieroides	100.00	1.01
Listriella barnardi	25.00	0.25
Monoculodes nyei	25.00	0.25
Libinia dubia	25.00	0.25
Panopeus sp.	25.00	0.25
Pinnotheridae	50.00	0.51
Hemipholis elongata	25.00	0.25
Amphioplus sepultus (=abditus)	50.00	0.51
Micropholis atra	75.00	0.76
Micropholis gracillima	25.00	0.25

1997 MANATEE RIVER BENTHOS (RUN DATE 4 sep 98)

Project	=1997 TAMPA BAY BENTHOS
Location	=MANATEE RIVER
Date	=SEP 97
Name	=97MR14

Sample Characteristics		
Number of Species	:	32
Density of All Species	:	8750.00 /M2
Diversity (Hprime -log base 2)	:	2.94
Evenness (Hprime/Hmax)	:	0.59

Taxa	Observed	Percentage
Turbellaria sp. A	25.00	0.29
Nemertea A	25.00	0.29
Malmgreniella maccraryae	175.00	2.00
Podarkeopsis levifuscina	50.00	0.57
Nephtys cryptomma	25.00	0.29
Drilonereis longa	100.00	1.14
Schistomeringos cf. rudolphi	25.00	0.29
Scoloplos rubra	75.00	0.86
Aricidea taylori	25.00	0.29
Prionospio perkinsi	525.00	6.00
Paraprionospio pinnata	800.00	9.14
Carazziella hobsonae	125.00	1.43
Spiochaetopterus costarum	100.00	1.14
Monticellina dorsobranchialis	4450.00	50.86
Sabaco americanus	25.00	0.29
Melinna maculata	25.00	0.29
Fabriciunda trilobata	25.00	0.29
Eulimastoma sp.	50.00	0.57
Amygdalum papyrium	150.00	1.71
Orobitella (=Neaeromya) floridana	600.00	6.86
Mysella planulata	500.00	5.71
Mulinia lateralis	75.00	0.86
Macoma tenta	75.00	0.86
Tellina versicolor	75.00	0.86
Corbula contracta	25.00	0.29
Lyonsia hyalina floridana	25.00	0.29
Cyathura polita	200.00	2.29
Ampelisca sp. C	25.00	0.29
Upogebia affinis	25.00	0.29
Phoronis ?architecta	25.00	0.29
Amphioplus sepultus (=abditus)	275.00	3.14
Amphioplus thrombodes	25.00	0.29

1997 MANATEE RIVER BENTHOS (RUN DATE 4 sep 98)

Project	=1997 TAMPA BAY BENTHOS
Location	=MANATEE RIVER
Date	=SEP 97
Name	=97MR15

Sample Characteristics		
Number of Species	:	41
Density of All Species	:	11275.00 /M2
Diversity (Hprime -log base 2)	:	3.23
Evenness (Hprime/Hmax)	:	0.60

Taxa	Observed	Percentage
Phyllodoce arenae	25.00	0.22
Podarkeopsis levifuscina	50.00	0.44
Glycera americana	25.00	0.22
Diopatra cuprea	25.00	0.22
Lumbrineris sp. D	125.00	1.11
Scoloplos rubra	25.00	0.22
Aricidea taylori	100.00	0.89
Polydora socialis	25.00	0.22
Paraprionospio pinnata	225.00	2.00
Carazziella hobsonae	2675.00	23.73
Magelona pettiboneae	25.00	0.22
Poecilochaetus johnsoni	150.00	1.33
Spiochaetopterus costarum	75.00	0.67
Monticellina dorsobranchialis	4050.00	35.92
Mediomastus californiensis	550.00	4.88
Sabaco americanus	100.00	0.89
Isolda pulchella	25.00	0.22
Pista cristata	50.00	0.44
Fabriciunda trilobata	1125.00	9.98
Tubificidae	175.00	1.55
Teinostoma sp.	25.00	0.22
Nassarius vibex	75.00	0.67
Eulimastoma sp.	50.00	0.44
Turbonilla interrupta	25.00	0.22
Turbonilla conradi	25.00	0.22
Turbonilla cf. dalli	25.00	0.22
Acteocina canaliculata	300.00	2.66
Nucula crenulata	75.00	0.67
Mysella planulata	475.00	4.21
Pteromeris perplanna	25.00	0.22
Mulinia lateralis	25.00	0.22
Asthenothaerus hemphilli	25.00	0.22
Oxyurostylis smithi	25.00	0.22
Cyclaspis cf. varians	50.00	0.44
Kalliapseudes sp. A	25.00	0.22
Grandidierella bonnieroides	50.00	0.44
Listriella barnardi	175.00	1.55
Upogebia	25.00	0.22
Pinnotheridae	50.00	0.44
Phoronis ?architecta	75.00	0.67
Amphioplus sepultus (=abditus)	25.00	0.22

1997 MANATEE RIVER BENTHOS (RUN DATE 4 sep 98)

Project	=1997 TAMPA BAY BENTHOS
Location	=MANATEE RIVER
Date	=SEP 97
Name	=97MR16

Sample Characteristics		
Number of Species	:	22
Density of All Species	:	3150.00 /M2
Diversity (Hprime -log base 2)	:	3.67
Evenness (Hprime/Hmax)	:	0.82

Taxa	Observed	Percentage
Neanthes succinea	25.00	0.79
Aricidea taylori	175.00	5.56
Paraprionospio pinnata	650.00	20.63
Monticellina dorsobranchialis	200.00	6.35
Piromis roberti	25.00	0.79
Mediomastus californiensis	100.00	3.17
Melinna maculata	25.00	0.79
Teinostoma sp.	175.00	5.56
Acteocina canaliculata	25.00	0.79
Orobitella (=Neaeromya) floridana	225.00	7.14
Mysella planulata	250.00	7.94
Erycina floridana (=Mysella A)	200.00	6.35
Mulinia lateralis	600.00	19.05
Macoma tenta	25.00	0.79
Tellina versicolor	25.00	0.79
Asthenothaerus hemphilli	25.00	0.79
Cyclaspis cf. varians	100.00	3.17
Ampelisca holmesi	100.00	3.17
Upogebia	25.00	0.79
Pinnixa sp. D	25.00	0.79
Pinnixa E	25.00	0.79
Amphioplus sepultus (=abditus)	125.00	3.97

1997 MANATEE RIVER BENTHOS (RUN DATE 4 sep 98)

Project	=1997 TAMPA BAY BENTHOS
Location	=MANATEE RIVER
Date	=SEP 97
Name	=97MR17

Sample Characteristics		
Number of Species	:	27
Density of All Species	:	4600.00 /M2
Diversity (Hprime -log base 2)	:	3.72
Evenness (Hprime/Hmax)	:	0.78

Taxa	Observed	Percentage
Glycera americana	25.00	0.54
Glycinde solitaria	25.00	0.54
Aricidea philbinae	25.00	0.54
Paraprionospio pinnata	25.00	0.54
Streblospio benedicti	75.00	1.63
Monticellina dorsobranchialis	50.00	1.09
Capitella capitata	25.00	0.54
Heteromastus filiformis	75.00	1.63
Mediomastus californiensis	625.00	13.59
Hobsonia florida	50.00	1.09
Tubificidae	25.00	0.54
Nassarius vibex	25.00	0.54
Rictaxis punctostriatus	275.00	5.98
Acteocina canaliculata	300.00	6.52
Haminoea succinea	25.00	0.54
Amygdalum papyrium	525.00	11.41
Mysella planulata	150.00	3.26
Mulinia lateralis	575.00	12.50
Macoma constricta	25.00	0.54
Tellina sp.	550.00	11.96
Tellina versicolor	800.00	17.39
Americamysis	25.00	0.54
Cyclaspis cf. varians	125.00	2.72
Cyathura polita	50.00	1.09
Xenanthura brevitelson	25.00	0.54
Ampelisca holmesi	75.00	1.63
Trachypenaeus	25.00	0.54

1997 MANATEE RIVER BENTHOS (RUN DATE 4 sep 98)

Project	=1997 TAMPA BAY BENTHOS
Location	=MANATEE RIVER
Date	=SEP 97
Name	=97MR18

Sample Characteristics		
Number of Species	:	24
Density of All Species	:	1925.00 /M2
Diversity (Hprime -log base 2)	:	3.99
Evenness (Hprime/Hmax)	:	0.87

Taxa	Observed	Percentage
Nemertea Q	150.00	7.79
Nemertea K	75.00	3.90
Laeonereis culveri	50.00	2.60
Leitoscoloplos fragilis	150.00	7.79
Streblospio benedicti	100.00	5.19
Mediomastus californiensis	250.00	12.99
Tubificidae	50.00	2.60
Gastropoda	50.00	2.60
Eulimastoma sp.	50.00	2.60
Rictaxis punctostriatus	25.00	1.30
Acteocina canaliculata	175.00	9.09
Bivalvia	25.00	1.30
Amygdalum papyrium	375.00	19.48
Mysella planulata	25.00	1.30
Mulinia lateralis	50.00	2.60
Tellina sp.	100.00	5.19
Tellina versicolor	50.00	2.60
Tagelus divisus	25.00	1.30
Anomalocardia auberiana	25.00	1.30
Cyclaspis cf. varians	25.00	1.30
Xenanthura brevitelson	25.00	1.30
Ampelisca spp.	25.00	1.30
Grandidierella bonnieroides	25.00	1.30
Pinnotheridae	25.00	1.30

1997 MANATEE RIVER BENTHOS (RUN DATE 4 sep 98)

Project	=1997 TAMPA BAY BENTHOS
Location	=MANATEE RIVER
Date	=SEP 97
Name	=97MR19

Sample Characteristics		
Number of Species	:	24
Density of All Species	:	7700.00 /M2
Diversity (Hprime -log base 2)	:	2.37
Evenness (Hprime/Hmax)	:	0.52

Taxa	Observed	Percentage
Nemertea Q	50.00	0.65
Nemertea K	25.00	0.32
Neanthes succinea	25.00	0.32
Glycinde solitaria	100.00	1.30
Aricidea taylori	25.00	0.32
Prionospio perkinsi	50.00	0.65
Paraprionospio pinnata	125.00	1.62
Magelona sp. A	25.00	0.32
Spiochaetopterus costarum	25.00	0.32
Monticellina dorsobranchialis	75.00	0.97
Mediomastus californiensis	4475.00	58.12
Melinna maculata	25.00	0.32
Tubificidae	125.00	1.62
Teinostoma sp.	25.00	0.32
Eulimastoma sp.	50.00	0.65
Rictaxis punctostriatus	225.00	2.92
Acteocina canaliculata	375.00	4.87
Amygdalum papyrium	175.00	2.27
Mysella planulata	175.00	2.27
Mulinia lateralis	1275.00	16.56
Tellina sp.	150.00	1.95
Cyclaspis cf. varians	25.00	0.32
Xenanthura brevitelson	50.00	0.65
Ampelisca holmesi	25.00	0.32

1997 MANATEE RIVER BENTHOS (RUN DATE 4 sep 98)

Project	=1997 TAMPA BAY BENTHOS
Location	=MANATEE RIVER
Date	=SEP 97
Name	=97MR20

Sample Characteristics		
Number of Species	:	25
Density of All Species	:	29075.00 /M2
Diversity (Hprime -log base 2)	:	1.98
Evenness (Hprime/Hmax)	:	0.43

Taxa	Observed	Percentage
Nemertea Q	25.00	0.09
Nemertea K	50.00	0.17
Neanthes succinea	25.00	0.09
Glycinde solitaria	75.00	0.26
Diopatra cuprea	25.00	0.09
Prionospio heterobranchia	25.00	0.09
Streblospio benedicti	15225.00	52.36
Mediomastus californiensis	9050.00	31.13
Hobsonia florida	175.00	0.60
Tubificidae	25.00	0.09
Hydrobiidae	25.00	0.09
Teinostoma sp.	25.00	0.09
Eulimastoma sp.	575.00	1.98
Rictaxis punctostriatus	125.00	0.43
Acteocina canaliculata	75.00	0.26
Amygdalum papyrium	1725.00	5.93
Mulinia lateralis	275.00	0.95
Tellina sp.	750.00	2.58
Tellina versicolor	250.00	0.86
Cyclaspis cf. varians	50.00	0.17
Cyathura polita	175.00	0.60
Xenanthura brevitelson	25.00	0.09
Amakusanthura magnifica	175.00	0.60
Grandidierella bonnieroides	50.00	0.17
Rhithropanopeus harrisii	75.00	0.26

1997 MANATEE RIVER BENTHOS (RUN DATE 4 sep 98)

Project	=1997 TAMPA BAY BENTHOS
Location	=MANATEE RIVER
Date	=SEP 97
Name	=97MR21

Sample Characteristics		
Number of Species	:	17
Density of All Species	:	6125.00 /M2
Diversity (Hprime -log base 2)	:	3.32
Evenness (Hprime/Hmax)	:	0.81

Taxa	Observed	Percentage
Nemertea U	200.00	3.27
Nemertea F	75.00	1.22
Polydora cornuta	75.00	1.22
Streblospio benedicti	400.00	6.53
Mediomastus californiensis	725.00	11.84
Hobsonia florida	100.00	1.63
Hydrobiidae	1375.00	22.45
Amygdalum papyrium	150.00	2.45
Mulinia lateralis	125.00	2.04
Macoma tenta	50.00	0.82
Tellina sp.	1275.00	20.82
Tagelus plebeius	200.00	3.27
Mysidopsis	25.00	0.41
Cyathura polita	625.00	10.20
Xenanthura brevitelson	300.00	4.90
Grandidierella bonnieroides	400.00	6.53
Polypedilum scalaneum group	25.00	0.41

APPENDIX B

MANATEE RIVER BENTHOS: 1997

MEAN ABUNDANCE
&
FREQUENCY OF OCCURRENCE DATA

Taxa	Mean (Divisor = N)	Std.Dev.	M / N
Thenaria	1.92	----	1/ 13
Turbellaria sp. A	1.92	----	1/ 13
Nemertea U	17.31	55.33	2/ 13
Nemertea Q	17.31	42.55	3/ 13
Nemertea N	3.85	----	1/ 13
Nemertea G	5.77	----	1/ 13
Nemertea F	11.54	28.17	2/ 13
Nemertea K	13.46	24.19	4/ 13
Nemertea B	1.92	----	1/ 13
Nemertea A	1.92	----	1/ 13
Malmgreniella maccraryae	17.31	49.35	2/ 13
Malmgreniella taylori	1.92	----	1/ 13
Sigalion sp. A	1.92	----	1/ 13
Sthenelais sp. A	1.92	----	1/ 13
Bhawania heteroseta	3.85	----	1/ 13
Phyllodoce arenae	13.46	34.78	3/ 13
Podarke obscura	3.85	----	1/ 13
Podarkeopsis levifuscina	13.46	19.41	5/ 13
Synelmis ewingi (=sp. B)	3.85	----	1/ 13
Syllis sp. A	1.92	----	1/ 13
Syllis cornuta	5.77	----	1/ 13
Exogone	1.92	----	1/ 13
Exogone dispar	34.62	117.50	2/ 13
Sphaerosyllis glandulata	1.92	----	1/ 13
Grubeosyllis (Brania) clavata	23.08	----	1/ 13
Brania wellfleetensis	1.92	----	1/ 13
Streptosyllis pettiboneae	7.69	----	1/ 13
Parapionosyllis uelebackerae	82.69	----	1/ 13
Parapionosyllis? sp. A	9.62	----	1/ 13
Ceratonereis irritabilis	1.92	----	1/ 13
Neanthes succinea	5.77	10.96	3/ 13
Laeonereis culveri	3.85	----	1/ 13
Nephtys cryptomma	1.92	----	1/ 13
Glycera americana	5.77	10.96	3/ 13
Glycinde solitaria	34.62	37.55	7/ 13
Goniadides carolinae	11.54	----	1/ 13
Diopatra cuprea	3.85	9.39	2/ 13
Kinbergonuphis simoni	1.92	----	1/ 13
Lumbrineris sp. D	13.46	34.78	3/ 13
Drilonereis longa	7.69	----	1/ 13
Schistomeringos cf. rudolphi	1.92	----	1/ 13
Scoloplos rubra	17.31	32.89	4/ 13
Leitoscoloplos fragilis	11.54	----	1/ 13
Aricidea philbinae	1.92	----	1/ 13
Aricidea taylori	34.62	55.47	6/ 13
Cirrophorus	1.92	----	1/ 13
Aricidea cerrutii	1.92	----	1/ 13

Taxa	Mean (Divisor = N)	Std.Dev.	M / N
Polydora socialis	1.92	----	1/ 13
Polydora cornuta	5.77	----	1/ 13
Prionospio heterobranchia	21.15	50.87	3/ 13
Apoprionospio pygmaea	1.92	----	1/ 13
Prionospio cristata	7.69	----	1/ 13
Prionospio perkinsi	138.46	237.31	6/ 13
Spio pettiboneae	26.92	83.21	2/ 13
Paraprionospio pinnata	388.46	424.59	9/ 13
Streblospio benedicti	1215.38	4210.83	4/ 13
Scoloplepis texana	1.92	----	1/ 13
Carazziella hobsonae	217.31	739.26	3/ 13
Magelona pettiboneae	3.85	9.39	2/ 13
Magelona sp. A	1.92	----	1/ 13
Poecilochaetus johnsoni	13.46	41.60	2/ 13
Spiochaetopterus costarum	21.15	33.61	5/ 13
Caulleriella zetlandicus	9.62	----	1/ 13
Monticellina dorsobranchialis	1071.15	1587.35	9/ 13
Piromis roberti	1.92	----	1/ 13
Armandia maculata	3.85	----	1/ 13
Travisia hobsonae	140.38	----	1/ 13
Capitella capitata	3.85	9.39	2/ 13
Heteromastus filiformis	5.77	----	1/ 13
Notomastus latericeus	3.85	9.39	2/ 13
Mediomastus californiensis	1261.54	2624.79	11/ 13
Sabaco americanus	13.46	28.17	4/ 13
Axiothella mucosa	13.46	----	1/ 13
Pectinaria gouldii	3.85	9.39	2/ 13
Hobsonia florida	25.00	54.01	3/ 13
Melinna cristata	5.77	----	1/ 13
Melinna maculata	5.77	10.96	3/ 13
Isolda pulchella	3.85	9.39	2/ 13
Pista cristata	3.85	----	1/ 13
Polycirrus plumosa	34.62	----	1/ 13
Chone cf. americana	1.92	----	1/ 13
Fabriciunda trilobata	111.54	309.00	5/ 13
Boguea enigmatica	1.92	----	1/ 13
Tubificidae	59.62	80.06	8/ 13
Tubificoides wasselli	3.85	----	1/ 13
Gastropoda	5.77	14.98	2/ 13
Hydrobiidae	107.69	380.84	2/ 13
Teinostoma sp.	25.00	50.00	5/ 13
Caecum strigosum	25.00	82.92	2/ 13
Strombiformis bilineatus	1.92	----	1/ 13

Taxa	Mean (Divisor = N)	Std.Dev.	M / N
Crepidula	1.92	----	1/ 13
Tectonatica pusilla	3.85	9.39	2/ 13
Nassarius vibex	23.08	40.13	4/ 13
Olivella pusilla	5.77	----	1/ 13
Jaspidella blanesi	9.62	24.02	2/ 13
Eulimastoma sp.	76.92	157.28	7/ 13
Turbonilla sp.	1.92	----	1/ 13
Turbonilla interrupta	1.92	----	1/ 13
Turbonilla conradi	1.92	----	1/ 13
Turbonilla cf. dalli	3.85	9.39	2/ 13
Rictaxis punctostriatus	51.92	94.90	5/ 13
Acteocina canaliculata	105.77	137.75	7/ 13
Tornatina inconspicua	19.23	----	1/ 13
Haminoea succinea	1.92	----	1/ 13
Bivalvia	1.92	----	1/ 13
Nucula crenulata	5.77	----	1/ 13
Amygdalum papyrium	242.31	474.93	7/ 13
Dipleodonta semiaspera	1.92	----	1/ 13
Orobitella (=Neaeromya) floridana	234.62	464.19	5/ 13
Mysella planulata	688.46	1378.31	10/ 13
Erycina floridana (=Mysella A)	15.38	----	1/ 13
Pteromeris perplanna	3.85	9.39	2/ 13
Mulinia lateralis	255.77	365.88	11/ 13
Macoma tenta	48.08	82.58	6/ 13
Macoma constricta	1.92	----	1/ 13
Tellina sp.	219.23	397.80	6/ 13
Tellina lineata	5.77	14.98	2/ 13
Tellina versicolor	96.15	222.40	6/ 13
Tagelus plebeius	15.38	----	1/ 13
Tagelus divisus	1.92	----	1/ 13
Abra aequalis	1.92	----	1/ 13
Semele nuculoides	5.77	----	1/ 13
Chione cancellata	1.92	----	1/ 13
Anomalocardia auberiana	1.92	----	1/ 13
Corbula contracta	1.92	----	1/ 13
Lyonsia hyalina floridana	7.69	21.37	2/ 13
Asthenothaerus hemphilli	11.54	28.17	3/ 13
Mysidopsis	1.92	----	1/ 13
Americamysis	1.92	----	1/ 13
Oxyurostylis	3.85	9.39	2/ 13
Oxyurostylis smithi	15.38	36.14	3/ 13
Cyclaspis cf. varians	59.62	68.87	9/ 13
Halmyrapseudes bahamensis	3.85	----	1/ 13
Kalliapseudes sp. A	1.92	----	1/ 13
Leptochelia (Hargeria) rapax	5.77	14.98	2/ 13
Cyathura polita	80.77	177.70	4/ 13
Xenanthura brevitelson	53.85	90.05	7/ 13
Amakusanthura magnifica	111.54	167.59	6/ 13
Sphaeroma quadridentata	1.92	----	1/ 13

Taxa	Mean (Divisor = N)	Std.Dev.	M / N
Ampelisca spp.	1.92	----	1/ 13
Ampelisca abdita	1.92	----	1/ 13
Ampelisca vadorum	1.92	----	1/ 13
Ampelisca holmesi	98.08	205.01	6/ 13
Ampelisca sp. C	5.77	10.96	3/ 13
Ampelisca abdita/vadorum	1.92	----	1/ 13
Cymadusa compta	15.38	----	1/ 13
Aoridae	3.85	----	1/ 13
Paramicrodeutopus cf. myersi	1.92	----	1/ 13
Rudilemboides naglei	5.77	----	1/ 13
Batea catharinensis	3.85	----	1/ 13
Erichsonius brasiliensis	1.92	----	1/ 13
Grandidierella bonnieroides	63.46	116.64	6/ 13
Listriella barnardi	19.23	48.04	4/ 13
Monoculodes nyei	1.92	----	1/ 13
Metharpinia floridana	21.15	----	1/ 13
Eudevenopus honduranus	7.69	21.37	2/ 13
Trachypenaeus	1.92	----	1/ 13
Paguroidea	5.77	----	1/ 13
Pagurus	1.92	----	1/ 13
Upogebia	7.69	12.01	4/ 13
Upogebia affinis	1.92	----	1/ 13
Libinia dubia	1.92	----	1/ 13
Heterocrypta granulata	3.85	----	1/ 13
Portunus ordwayi	1.92	----	1/ 13
Panopeus sp.	5.77	14.98	2/ 13
Rhithropanopeus harrisii	5.77	----	1/ 13
Pinnotheridae	17.31	23.68	5/ 13
Dissodactylus mellitae	5.77	----	1/ 13
Pinnixa spp.	5.77	----	1/ 13
Pinnixa sp. D	1.92	----	1/ 13
Pinnixa E	1.92	----	1/ 13
Polypedilum scalaneum group	1.92	----	1/ 13
Phascolion crypta	34.62	68.11	3/ 13
Phoronis	3.85	----	1/ 13
Phoronis ?architecta	7.69	21.37	2/ 13
Glottidia pyramidata	1.92	----	1/ 13
Hemipholis elongata	3.85	9.39	2/ 13
Amphipholis sp.	1.92	----	1/ 13
Amphioplus sepultus (=abditus)	26.92	76.01	3/ 13
Amphioplus thrombodes	1.92	----	1/ 13
Amphioplus sepultus (=abditus)	9.62	----	1/ 13
Micropholis atra	7.69	21.37	2/ 13
Micropholis gracillima	5.77	10.96	3/ 13
Mellita tenuis	3.85	----	1/ 13
Brachiostoma floridae	275.00	947.36	2/ 13

APPENDIX C

MANATEE RIVER BENTHOS: 1997

RANKED MEAN ABUNDANCE :
TAXA COMPRISING >0.5%
OF
TOTAL BENTHIC ABUNDANCE

1997 MANATEE RIVER BENTHOS (RUN DATE 4 sep 98)

Overall Summary of 13 Samples

Summary Characteristics

Number of Species	:	185
Density of All Species	:	8734.62
Diversity (Hprime -log base 2)	:	4.92
Evenness (Hprime/Hmax)	:	0.65

Taxa	Observed	Percentage
Mediomastus californiensis	1261.54	14.44
Streblospio benedicti	1215.38	13.91
Monticellina dorsobranchialis	1071.15	12.26
Mysella planulata	688.46	7.88
Paraprionospio pinnata	388.46	4.45
Branchiostoma floridae	275.00	3.15
Mulinia lateralis	255.77	2.93
Amygdalum papyrium	242.31	2.77
Oroboidella (=Neaeromya) floridana	234.62	2.69
Tellina sp.	219.23	2.51
Caecum pulchellum hobsonae	217.31	2.49
Travisia hobsonae	140.38	1.61
Prionospio perkinsi	138.46	1.59
Fabricinuda trilobata	111.54	1.28
Amakusanthura magnifica	111.54	1.28
Hydrobiidae	107.69	1.23
Acteocina canaliculata	105.77	1.21
Ampelisca holmesi	98.08	1.12
Tellina versicolor	96.15	1.10
Parapionosyllis uelebackerae	82.69	0.95
Cyathura polita	80.77	0.92
Eulimastoma sp.	76.92	0.88
Grandidierella bonnieroides	63.46	0.73
Cyclaspis cf. varians	59.62	0.68
Tubificidae	59.62	0.68
Xenanthura brevitelson	53.85	0.62
Ricinaxis punctostriatus	51.92	0.59
Macoma tenta	48.08	0.55

APPENDIX D

MANATEE RIVER BENTHOS: 1993-1996

MEAN ABUNDANCE
&
FREQUENCY OF OCCURRENCE DATA

1993-1996 MANATEE RIVER BENTHOS (RUN DATE 4 sep 98)
MEAN DENSITY (#/M2), S.D., & FREQUENCY OF OCCURRENCE

Taxa	Mean (Divisor = N)	Std.Dev.	M / N
Porifera	0.54	----	1/ 46
Actiniaria	1.63	----	1/ 46
Athenaria	201.09	1300.42	6/ 46
Thenaria	164.67	700.35	9/ 46
Thenaria sp. A	0.54	----	1/ 46
Turbellaria	8.97	36.96	5/ 46
Turbellaria sp. B	1.09	5.15	2/ 46
Nemertea sp.	13.86	35.38	12/ 46
Nemertea S	1.09	----	1/ 46
Nemertea R	0.54	----	1/ 46
Nemertea O	1.09	----	1/ 46
Nemertea Q	3.26	15.46	3/ 46
Nemertea N	7.61	18.16	9/ 46
Nemertea L	1.09	5.15	2/ 46
Nemertea M	0.54	----	1/ 46
Nemertea F	36.96	52.57	24/ 46
Nemertea I	7.61	15.70	10/ 46
Nemertea K	11.96	23.42	12/ 46
Nemertea B	17.93	30.81	16/ 46
Nemertea J	7.61	25.20	5/ 46
Malmgreniella maccraryae	25.54	55.46	13/ 46
Malmgreniella taylori	5.43	15.51	7/ 46
Sthenelais sp. A	7.88	27.81	5/ 46
Bhawania heteroseta	12.77	45.07	5/ 46
Paramphinome sp. B	0.54	----	1/ 46
Nereiphylla castanea	15.76	41.20	12/ 46
Paranaitis gardineri	0.27	----	1/ 46
Eumida sp. A	0.54	----	1/ 46
Eumida cf. sanguinea	0.54	----	1/ 46
Phyllodoce arenae	11.14	24.19	12/ 46
Gyptis crypta	1.63	----	1/ 46
Parahesione luteola	3.80	16.64	3/ 46
Podarke obscura	4.89	21.16	5/ 46
Podarkeopsis levifuscina	39.95	88.88	21/ 46
Cabira incerta	0.54	----	1/ 46
Synelmis ewingi (=sp. B)	1.09	----	1/ 46

1993-1996 MANATEE RIVER BENTHOS (RUN DATE 4 sep 98)-CONTINUED
MEAN DENSITY (#/M2), S.D., & FREQUENCY OF OCCURRENCE

Taxa	Mean (Divisor = N)	Std.Dev.	M / N
Syllis sp. A	1.09	----	1/ 46
Syllis cornuta	13.04	36.42	6/ 46
Syllis cf. lutea	1.09	----	1/ 46
Exogone dispar	3.53	15.96	3/ 46
Exogone lourei	7.61	----	1/ 46
Exogone arenosa	6.52	----	1/ 46
Sphaerosyllis taylori	0.27	----	1/ 46
Grubeosyllis (Brania) clavata	73.37	460.93	3/ 46
Brania wellfleetensis	6.25	20.54	5/ 46
Brania sp. A	5.98	----	1/ 46
Streptosyllis pettiboneae	25.00	96.61	5/ 46
Parapionosyllis uelebackerae	112.23	749.91	3/ 46
Parapionosyllis? sp. A	0.54	----	1/ 46
Ceratonereis irritabilis	0.54	----	1/ 46
Ceratonereis (?composetia) sp. A	0.54	----	1/ 46
Neanthes succinea	33.15	87.37	11/ 46
Nereis falsa	16.30	96.21	3/ 46
Nereis lamellosa	3.26	15.46	3/ 46
Ceratocephale sp. A	0.54	----	1/ 46
Laeonereis culveri	21.20	87.51	5/ 46
Nephtys cf. hombergii	0.54	2.58	2/ 46
Nephtys bucera	2.72	15.12	2/ 46
Nephtys picta	0.27	----	1/ 46
Nephtys cryptomma	1.09	5.15	2/ 46
Aglaophamus verrilli	1.90	6.44	4/ 46
Glyceridae	0.27	----	1/ 46
Glycera americana	3.26	7.65	8/ 46
Goniadidae	0.27	----	1/ 46
Glycinde solitaria	38.04	51.23	34/ 46
Goniadides carolinae	2.45	13.34	2/ 46
Diopatra cuprea	2.17	9.97	3/ 46
Kinbergonuphis simoni	0.27	----	1/ 46
Lumbrineris latreilli	4.35	16.92	4/ 46
Lumbrineris verrilli	1.63	6.77	3/ 46
Lumbrineris coccinea	0.27	----	1/ 46
Lumbrineris sp. E	0.54	----	1/ 46
Lumbrineris sp. D	1.36	6.58	2/ 46
Drilonereis longa	1.36	4.73	4/ 46
Arabella mutans	0.27	----	1/ 46
Schistomeringos cf. rudolphi	1.36	4.73	4/ 46
Leitoscoloplos robustus	11.96	57.25	3/ 46
Scoloplos rubra	6.52	14.61	10/ 46
Scoloplos sp. D	0.27	----	1/ 46
Leitoscoloplos	0.54	2.58	2/ 46
Leitoscoloplos fragilis	17.93	97.28	3/ 46

1993-1996 MANATEE RIVER BENTHOS (RUN DATE 4 sep 98)-CONTINUED
MEAN DENSITY (#/M2), S.D., & FREQUENCY OF OCCURRENCE

Taxa	Mean (Divisor = N)	Std.Dev.	M / N
Paraonidae	0.54	----	1/ 46
Aricidea philbinae	4.35	16.92	4/ 46
Aricidea taylori	184.78	490.36	18/ 46
Cirrophorus	24.18	130.34	5/ 46
Cirrophorus ?lyra	2.72	----	1/ 46
Aricidea cerrutii	0.54	----	1/ 46
Spionidae	0.54	----	1/ 46
Laonice cirrata	2.17	10.31	2/ 46
Polydora	0.27	----	1/ 46
Polydora socialis	2.45	7.74	5/ 46
Polydora cornuta	2.72	10.84	3/ 46
Prionospio	0.54	----	1/ 46
Prionospio multibranchiata	2.99	----	1/ 46
Prionospio heterobranchia	5.98	36.96	2/ 46
Prionospio steenstrupi	5.43	24.81	3/ 46
Apoprionospio pygmaea	19.57	49.49	10/ 46
Prionospio cristata	1.09	----	1/ 46
Apoprionospio dayi	0.54	----	1/ 46
Prionospio perkinsi	135.33	335.25	15/ 46
Spio pettiboneae	15.76	57.88	5/ 46
Paraprionospio pinnata	309.24	384.86	34/ 46
Streblospio benedicti	76.63	254.21	12/ 46
Scolelepis texana	1.09	4.43	3/ 46
Carazziella hobsonae	55.71	240.74	7/ 46
Magelona pettiboneae	3.80	14.16	5/ 46
Poecilochaetus	0.27	----	1/ 46
Poecilochaetus johnsoni	27.99	----	1/ 46
Spiochaetopterus costarum	1.63	5.66	4/ 46
Cirratulidae	1.90	----	1/ 46
Caulleriella	1.63	8.17	2/ 46
Caulleriella cf. alata	3.80	----	1/ 46
Caulleriella sp. E	32.61	----	1/ 46
Tharyx	1.63	8.17	2/ 46
Monticellina dorsobranchialis	940.22	2184.53	30/ 46
Chaetozone	1.63	8.17	2/ 46
Chaetozone sp. A	0.27	----	1/ 46
Cirriformia	0.54	----	1/ 46
Cirriformia sp. D	8.97	----	1/ 46
Cirriformia sp. B	0.54	2.58	2/ 46
Macrochaeta cf. clavicornis	3.80	----	1/ 46
Piromis roberti	12.50	81.05	3/ 46
Armandia maculata	21.20	125.83	3/ 46
Travisia hobsonae	71.20	321.24	4/ 46

1993-1996 MANATEE RIVER BENTHOS (RUN DATE 4 sep 98)-CONTINUED
MEAN DENSITY (#/M2), S.D., & FREQUENCY OF OCCURRENCE

Taxa	Mean (Divisor = N)	Std.Dev.	M / N
Capitella capitata	2.17	8.46	3/ 46
Heteromastus filiformis	2.72	12.05	3/ 46
Notomastus	0.54	----	1/ 46
Notomastus latericeus	1.09	4.43	3/ 46
Mediomastus	411.41	689.49	32/ 46
Mediomastus ambiseta	201.90	419.80	23/ 46
Mediomastus californiensis	52.45	124.15	13/ 46
Maldanidae	1.36	4.73	4/ 46
Sabaco americanus	0.27	----	1/ 46
Asychis sp.	0.54	----	1/ 46
Asychis elongatus	0.54	----	1/ 46
Clymenella torquata	2.17	11.58	2/ 46
Axiothella mucosa	1.63	----	1/ 46
Rhodine sp. A	0.54	----	1/ 46
Pectinaria gouldii	7.07	14.11	12/ 46
Ampharetidae	0.27	----	1/ 46
Amphicteis gunneri	3.53	13.61	4/ 46
Hobsonia florida	40.76	131.80	10/ 46
Melinna maculata	8.97	28.46	8/ 46
Isolda pulchella	1.63	6.77	3/ 46
Pista quadrilobata	0.27	----	1/ 46
Polycirrus	3.26	15.24	4/ 46
Polycirrus sp. E	0.82	----	1/ 46
Polycirrus sp. C	8.42	55.28	2/ 46
Loimia viridis	0.54	----	1/ 46
Chone sp.	1.63	8.17	2/ 46
Chone cf. americana	2.17	11.27	3/ 46
Megalomma pigmentum	3.53	11.08	6/ 46
Fabriciunda trilobata	109.51	353.06	15/ 46
Demonax	0.27	----	1/ 46
Boguea enigmatica	0.54	----	1/ 46
Polygordius sp. (Archiannelida B)	1.90	9.12	2/ 46
Archiannelida sp. A	1.63	----	1/ 46
Enchytraeidae	0.27	----	1/ 46
Tubificidae	55.16	108.13	21/ 46
Gastropoda	5.43	17.81	7/ 46
Hydrobiidae	0.54	----	1/ 46
Sayella fusca	91.30	548.92	7/ 46

1993-1996 MANATEE RIVER BENTHOS (RUN DATE 4 sep 98)-CONTINUED
MEAN DENSITY (#/M2), S.D., & FREQUENCY OF OCCURRENCE

Taxa	Mean (Divisor = N)	Std.Dev.	M / N
Vitrinellidae	0.27	----	1/ 46
Teinostoma sp.	0.54	----	1/ 46
Teinostoma ?nesacum	0.54	----	1/ 46
Vitrinellidae sp. A	0.54	----	1/ 46
Cochliolepis striata	0.27	----	1/ 46
Cyclostremiscus suppressus	2.72	----	1/ 46
Caecum pulchellum	0.54	----	1/ 46
Caecum imbricatum	0.54	----	1/ 46
Caecum cf. johnsoni	97.55	458.97	4/ 46
Bittiolum varium	1.09	----	1/ 46
Epitonium rupicolum	2.72	12.05	3/ 46
Melanella ?intermedia	1.09	----	1/ 46
Microeulima hemphilli	4.08	13.96	4/ 46
Crepidula	1.09	4.43	3/ 46
Crepidula plana	4.35	----	1/ 46
Tectonatica pusilla	2.17	6.62	5/ 46
Eupleura sulcidentata	0.27	----	1/ 46
Astris lunulata	11.41	33.42	7/ 46
Parvanachis obesa	7.07	20.69	7/ 46
Melongena corona	3.80	18.98	3/ 46
Nassarius vibex	8.42	19.19	9/ 46
Olivella	0.82	----	1/ 46
Olivella pusilla	14.13	60.93	4/ 46
Jaspidella blanesi	14.67	47.31	6/ 46
Gibberula lavalleenana	0.54	----	1/ 46
Prunum apicinum	3.53	10.76	5/ 46
Turridae	0.27	----	1/ 46
Pyrgocythara plicosa	0.27	----	1/ 46
Odostomia	11.68	56.67	4/ 46
Eulimastoma teres	3.26	16.34	2/ 46
Eulimastoma ?engonia	3.26	13.55	3/ 46
Turbonilla sp.	0.54	----	1/ 46
Turbonilla conradi	7.61	18.35	8/ 46
Turbonilla cf. dalli	1.09	5.15	2/ 46
Turbonilla nr. mighelsi	0.54	----	1/ 46
Sayella sp.	1.09	5.15	2/ 46
Boonea impressa	1.63	6.24	3/ 46
Odostomia gibbosa	0.54	----	1/ 46
Odostomia virginiana	27.17	69.69	11/ 46
Rictaxis punctostriatus	30.43	42.05	21/ 46
Acteocina canaliculata	76.36	111.28	28/ 46
Tornatina inconspicua	4.62	22.26	2/ 46
Haminoea succinea	4.35	24.04	4/ 46
Aplysiidae sp. A	0.54	----	1/ 46
Acanthochitona pygmaea	0.27	----	1/ 46

1993-1996 MANATEE RIVER BENTHOS (RUN DATE 4 sep 98)-CONTINUED
MEAN DENSITY (#/M2), S.D., & FREQUENCY OF OCCURRENCE

Taxa	Mean (Divisor = N)	Std.Dev.	M / N
Bivalvia	44.57	85.34	19/ 46
Nucula crenulata	21.20	39.16	15/ 46
Nuculana acuta	0.82	4.08	2/ 46
Anadara transversa	2.45	8.98	4/ 46
Brachidontes exustus	3.53	18.76	3/ 46
Amygdalum papyrium	794.02	2239.70	27/ 46
Anomia simplex	0.27	----	1/ 46
Parvilucina multilineata	1.63	5.66	4/ 46
Lucina nassula	3.26	13.55	3/ 46
Diplodonta semiaspera	8.70	22.18	11/ 46
Diplodonta punctata	0.54	----	1/ 46
Neaeromya sp.	5.43	----	1/ 46
Orobitella (=Neaeromya) floridana	16.30	----	1/ 46
Mysella planulata	115.76	200.04	30/ 46
Erycina floridana (=Mysella A)	174.46	473.71	14/ 46
Pteromeris perplanna	1.09	----	1/ 46
Laevicardium mortoni	1.63	6.77	3/ 46
Mulinia lateralis	578.26	1687.44	34/ 46
Macoma tenta	9.51	41.60	6/ 46
Macoma constricta	0.54	----	1/ 46
Tellina sp.	88.86	233.50	21/ 46
Tellina versicolor	74.73	141.75	21/ 46
Tagelus plebeius	2.72	7.41	6/ 46
Tagelus divisus	3.80	10.50	6/ 46
Abra aequalis	3.26	12.76	4/ 46
Mytilopsis leucophaeta	29.35	140.56	4/ 46
Cyclinella tenuis	0.54	----	1/ 46
Dosinia discus	0.54	----	1/ 46
Gemma gemma	12.50	70.66	3/ 46
Agriopoma texasiana	0.27	----	1/ 46
Chione cancellata	5.43	24.10	3/ 46
Anomalocardia auberiana	0.27	----	1/ 46
Parastarte triquetra	0.54	----	1/ 46
Sphenia antillensis	5.71	22.32	4/ 46
Corbula contracta	1.36	5.42	3/ 46
Corbula barrattiana	0.54	----	1/ 46
Corbula swiftiana	0.54	----	1/ 46
Lyonsia hyalina floridana	36.14	102.17	13/ 46
Asthenothaerus hemphilli	9.24	31.45	6/ 46
Dentalium antillarum	0.54	----	1/ 46

1993-1996 MANATEE RIVER BENTHOS (RUN DATE 4 sep 98)-CONTINUED
MEAN DENSITY (#/M2), S.D., & FREQUENCY OF OCCURRENCE

Taxa	Mean (Divisor = N)	Std.Dev.	M / N
Cirripedia	0.54	----	1/ 46
Mysidopsis almyra	2.72	----	1/ 46
Mysidopsis furca	1.09	5.15	2/ 46
Bowmaniella sp.	1.63	----	1/ 46
Americamysis	0.27	----	1/ 46
Americamysis alleni	0.82	----	1/ 46
Leucon americanus	0.54	----	1/ 46
Oxyurostylis	1.90	6.44	4/ 46
Oxyurostylis smithi	38.04	120.36	16/ 46
Oxyurostylis lecroyae	6.79	18.58	8/ 46
Cyclaspis pustulata	0.54	----	1/ 46
Cyclaspis cf. varians	538.04	899.67	36/ 46
Cyclaspis sp. C	0.54	----	1/ 46
Cyclaspis sp. D	0.54	----	1/ 46
Halmyrapseudes bahamensis	2.17	11.58	2/ 46
Kalliapseudes sp. A	6.79	21.84	6/ 46
Leptochelia	20.11	125.57	2/ 46
Cyathura polita	105.43	224.92	11/ 46
Xenanthura brevitelson	229.89	558.42	17/ 46
Amakusanthura magnifica	70.11	101.53	22/ 46
Sphaeroma quadridentata	0.54	----	1/ 46
Serolis mgrayi	0.82	4.08	2/ 46
Edotia triloba	15.76	38.32	12/ 46
Munna sp. n.	0.54	----	1/ 46
Uromunna hayesi	0.27	----	1/ 46
Gammaridea	1.09	5.15	2/ 46
Ampelisca spp.	5.43	19.66	4/ 46
Ampelisca abdita	3165.76	10376.00	28/ 46
Ampelisca vadorum	16.85	71.45	4/ 46
Ampelisca holmesi	366.30	705.59	31/ 46
Ampelisca sp. C	16.03	53.40	8/ 46
Ampelisca sp. A	1.63	----	1/ 46
Amphilochus neopolitanus	0.54	----	1/ 46
Gitanopsis	0.54	----	1/ 46
Gitanopsis laguna	6.52	----	1/ 46
Globosolembos smithi	0.82	----	1/ 46
Bemlos spinicarpus	1.09	----	1/ 46
Bemlos brunneamaculatus mackinneyi	0.27	----	1/ 46
Bemlos unifasciatus	0.54	----	1/ 46
Paramicrodeutopus cf. myersi	14.13	74.70	4/ 46
Rudilemboides naglei	18.21	83.28	5/ 46
Bemlos	1.09	5.15	2/ 46
Bemlos unicornis	8.97	----	1/ 46
Argissa hamatipes	0.82	4.08	2/ 46
Batea catharinensis	2.17	11.58	2/ 46

1993-1996 MANATEE RIVER BENTHOS (RUN DATE 4 sep 98)-CONTINUED
MEAN DENSITY (#/M2), S.D., & FREQUENCY OF OCCURRENCE

Taxa	Mean (Divisor = N)	Std.Dev.	M / N
Cerapus sp. C (="tubularis")	81.79	281.70	13/ 46
Monocorophium acherusicum	1.09	----	1/ 46
Apocorophium louisianum	94.02	347.18	4/ 46
Erichthonius brasiliensis	8.70	28.00	7/ 46
Grandidierella bonnieroides	917.66	2255.34	28/ 46
Elasmopus laevis	2.99	----	1/ 46
Melita	0.54	2.58	2/ 46
Photis sp. C	2.72	----	1/ 46
Listriella barnardi	9.78	25.94	11/ 46
Shoemakerella cubensis	0.27	----	1/ 46
Monoculodes nyei	1.09	5.15	2/ 46
Metharpinia floridana	23.37	81.55	4/ 46
Eudevenopus honduranus	29.35	85.16	11/ 46
Paracaprella	0.27	----	1/ 46
Penaeoidea	0.27	----	1/ 46
Alpheus armillatus	1.63	----	1/ 46
Processa hemphilli	0.54	----	1/ 46
Ambidexter symmetricus	1.36	5.42	3/ 46
Thalassinidea	0.54	----	1/ 46
Callichirinae sp.	1.09	----	1/ 46
Paguroidea	0.54	----	1/ 46
Pagurus	3.26	14.77	3/ 46
Pagurus gymnodactylus	0.27	----	1/ 46
Petrolisthes armatus	1.63	----	1/ 46
Upogebia	4.08	14.45	6/ 46
Brachyura	2.72	16.65	2/ 46
Heterocrypta granulata	0.27	----	1/ 46
Xanthidae	1.09	5.79	2/ 46
Hexapanopeus angustifrons	13.86	90.30	2/ 46
Panopeus bermudensis	5.43	35.03	2/ 46
Rhithropanopeus harrisii	17.93	56.62	9/ 46
Dyspanopeus texanus	2.99	14.24	2/ 46
Pinnotheridae	0.82	4.08	2/ 46
Pinnixa spp.	32.07	55.32	20/ 46
Pinnixa cf. pearsei	7.34	34.22	4/ 46
Pinnixa cf. floridana	1.63	8.17	2/ 46
Pinnixa sp. B	1.09	----	1/ 46
Pinnixa sp. A	2.17	6.62	5/ 46
Pinnixa sp. D	1.09	5.15	2/ 46
Polypedilum scalaneum group	1.09	----	1/ 46

1993-1996 MANATEE RIVER BENTHOS (RUN DATE 4 sep 98)-CONTINUED
MEAN DENSITY (#/M2), S.D., & FREQUENCY OF OCCURRENCE

Taxa	Mean (Divisor = N)	Std.Dev.	M / N
Sipuncula	0.27	----	1/ 46
Phascolion crypta	16.03	46.30	8/ 46
Aspidosiphonidae	7.61	----	1/ 46
Phoronis	2.72	11.76	4/ 46
Phoronis ?architecta	4.89	17.18	5/ 46
Phoronis sp. C	0.54	----	1/ 46
Glottidia pyramidata	0.82	4.08	2/ 46
Ophiuroidea	17.66	67.47	7/ 46
Hemipholis elongata	11.41	64.05	2/ 46
Amphiuridae	15.76	57.10	4/ 46
Amphiodia pulchella	2.17	10.31	2/ 46
Amphiodia nr. riisei	0.54	----	1/ 46
Ophiophragmus	0.54	----	1/ 46
Ophiophragmus wurdemani	10.33	50.98	3/ 46
Ophiophragmus pulcher	1.09	----	1/ 46
Amphioplus	0.82	4.08	2/ 46
Amphioplus sepultus (=abditus)	7.07	32.77	3/ 46
Amphioplus thrombodes	3.53	15.52	4/ 46
Micropholis	0.27	----	1/ 46
Micropholis atra	7.07	24.10	6/ 46
Micropholis gracillima	2.45	10.41	3/ 46
Echinoidea	0.54	----	1/ 46
Mellita tenuis	3.80	19.16	3/ 46
Synaptidae sp. A	0.54	----	1/ 46
Enteropneusta	0.27	----	1/ 46
Ascidiacea	0.82	----	1/ 46
Branchiostoma floridae	56.52	201.88	6/ 46

APPENDIX E

MANATEE RIVER BENTHOS: 1994-1997

MEAN ABUNDANCE
&
FREQUENCY OF OCCURRENCE DATA

1994-1997 MANATEE RIVER BENTHOS (RUN DATE 4 sep 98)
MEAN DENSITY (#/M2), S.D., & FREQUENCY OF OCCURRENCE

Taxa	Mean (Divisor = N)	Std.Dev.	M / N
Porifera	0.52	----	1/ 48
Actiniaria	1.56	----	1/ 48
Athenaria	184.38	1273.71	2/ 48
Thenaria	64.06	336.67	6/ 48
Thenaria sp. A	0.52	----	1/ 48
Turbellaria	5.21	32.60	2/ 48
Turbellaria sp. B	1.04	5.05	2/ 48
Turbellaria sp. A	0.52	----	1/ 48
Nemertea sp.	3.13	13.27	3/ 48
Nemertea U	4.69	29.02	2/ 48
Nemertea S	1.04	----	1/ 48
Nemertea R	0.52	----	1/ 48
Nemertea O	1.04	----	1/ 48
Nemertea Q	7.81	26.87	6/ 48
Nemertea N	8.33	18.83	10/ 48
Nemertea L	1.04	5.05	2/ 48
Nemertea M	0.52	----	1/ 48
Nemertea G	1.56	----	1/ 48
Nemertea F	26.56	43.58	18/ 48
Nemertea I	7.29	15.44	10/ 48
Nemertea K	15.10	25.13	16/ 48
Nemertea B	11.46	26.78	10/ 48
Nemertea A	0.52	----	1/ 48
Nemertea J	7.29	24.71	5/ 48
Malmgreniella maccraryae	22.92	49.96	12/ 48
Malmgreniella taylori	4.17	13.97	5/ 48
Sigalion sp. A	0.52	----	1/ 48
Sthenelais sp. A	1.56	8.00	2/ 48
Bhawania heteroseta	11.98	44.36	4/ 48
Nereiphylla castanea	11.98	39.94	7/ 48
Eumida sp. A	0.52	----	1/ 48
Phyllodoce arenae	5.73	20.13	6/ 48
Gyptis crypta	1.56	----	1/ 48
Parahesione luteola	3.65	16.30	3/ 48
Podarke obscura	1.56	8.00	2/ 48
Podarkeopsis levifuscina	34.38	83.42	21/ 48
Synelmis ewingi (=sp. B)	1.04	----	1/ 48

1994-1997 MANATEE RIVER BENTHOS (RUN DATE 4 sep 98)
MEAN DENSITY (#/M2), S.D., & FREQUENCY OF OCCURRENCE

Taxa	Mean (Divisor = N)	Std.Dev.	M / N
Syllis sp. A	1.56	8.00	2/ 48
Syllis cornuta	9.90	30.40	5/ 48
Exogone	0.52	----	1/ 48
Exogone dispar	11.98	62.74	4/ 48
Exogone lourei	7.29	----	1/ 48
Sphaerosyllis glandulata	0.52	----	1/ 48
Grubeosyllis (Brania) clavata	76.56	452.34	4/ 48
Brania wellfleetensis	4.69	18.35	4/ 48
Streptosyllis pettiboneae	19.79	90.35	4/ 48
Parapionosyllis uelebackerae	23.96	155.14	3/ 48
Parapionosyllis? sp. A	3.13	18.32	2/ 48
Ceratonereis irritabilis	0.52	----	1/ 48
Ceratonereis (?composetia) sp. A	0.52	----	1/ 48
Neanthes succinea	22.92	77.50	8/ 48
Nereis falsa	2.08	11.34	2/ 48
Nereis lamellosa	3.13	15.15	3/ 48
Ceratocephale sp. A	0.52	----	1/ 48
Laeonereis culveri	10.42	46.08	4/ 48
Nephtys bucera	2.60	14.80	2/ 48
Nephtys cryptomma	1.56	6.12	3/ 48
Aglaophamus verrilli	1.56	6.12	3/ 48
Glycera americana	3.13	8.36	6/ 48
Glycinde solitaria	38.02	51.31	31/ 48
Goniadides carolinae	3.65	21.87	2/ 48
Diopatra cuprea	1.56	6.12	3/ 48
Kinbergonuphis simoni	0.52	----	1/ 48
Lumbrineris latreilli	4.17	16.58	4/ 48
Lumbrineris verrilli	0.52	----	1/ 48
Lumbrineris sp. E	0.52	----	1/ 48
Lumbrineris sp. D	4.17	18.83	4/ 48
Drilonereis longa	2.60	14.80	2/ 48
Schistomeringos cf. rudolphi	1.04	5.05	2/ 48
Leitoscoloplos robustus	4.17	----	1/ 48
Scoloplos rubra	8.85	21.57	10/ 48
Leitoscoloplos fragilis	20.31	97.12	4/ 48
Aricidea philbinae	4.69	16.83	5/ 48
Aricidea taylori	146.88	465.39	17/ 48
Cirrophorus	22.92	127.67	4/ 48
Cirrophorus ?lyra	2.60	----	1/ 48
Aricidea cerrutii	0.52	----	1/ 48

1994-1997 MANATEE RIVER BENTHOS (RUN DATE 4 sep 98)
MEAN DENSITY (#/M2), S.D., & FREQUENCY OF OCCURRENCE

Taxa	Mean (Divisor = N)	Std.Dev.	M / N
Spionidae	0.52	----	1/ 48
Laonice cirrata	2.08	10.10	2/ 48
Polydora socialis	1.56	6.12	3/ 48
Polydora cornuta	4.17	14.89	4/ 48
Prionospio heterobranchia	5.73	27.41	3/ 48
Prionospio steenstrupi	2.08	----	1/ 48
Apoprionospio pygmaea	16.15	47.68	7/ 48
Prionospio cristata	3.13	16.00	2/ 48
Apoprionospio dayi	0.52	----	1/ 48
Prionospio perkinsi	155.73	343.33	16/ 48
Spio pettiboneae	14.58	60.98	4/ 48
Paraprionospio pinnata	345.31	400.55	35/ 48
Streblospio benedicti	402.60	2199.49	16/ 48
Scolelepis texana	1.04	5.05	2/ 48
Carazziella hobsonae	106.25	445.50	7/ 48
Magelona pettiboneae	2.60	7.72	5/ 48
Magelona sp. A	0.52	----	1/ 48
Poecilochaetus johnsoni	3.65	21.87	2/ 48
Spiochaetopterus costarum	6.25	19.64	6/ 48
Caulleriella	1.56	8.00	2/ 48
Caulleriella cf. alata	3.65	----	1/ 48
Caulleriella zetlandicus	2.60	----	1/ 48
Tharyx	1.56	8.00	2/ 48
Monticellina dorsobranchialis	1163.54	2236.78	32/ 48
Chaetozone	1.56	8.00	2/ 48
Cirriformia	0.52	----	1/ 48
Piromis roberti	11.98	79.39	2/ 48
Armandia maculata	1.56	8.00	2/ 48
Travisia hobsonae	64.06	288.43	4/ 48
Capitella capitata	1.56	6.12	3/ 48
Heteromastus filiformis	3.65	15.46	3/ 48
Notomastus	0.52	----	1/ 48
Notomastus latericeus	1.56	6.12	3/ 48
Mediomastus	324.48	633.35	24/ 48
Mediomastus ambiseta	193.23	412.91	22/ 48
Mediomastus californiensis	391.67	1435.27	23/ 48

1994-1997 MANATEE RIVER BENTHOS (RUN DATE 4 sep 98)
MEAN DENSITY (#/M2), S.D., & FREQUENCY OF OCCURRENCE

Taxa	Mean (Divisor = N)	Std.Dev.	M / N
Maldanidae	0.52	----	1/ 48
Sabaco americanus	3.65	15.46	4/ 48
Asychis sp.	0.52	----	1/ 48
Asychis elongatus	0.52	----	1/ 48
Clymenella torquata	2.08	11.34	2/ 48
Axiothella mucosa	5.21	27.27	2/ 48
Rhodine sp. A	0.52	----	1/ 48
Pectinaria gouldii	6.77	14.35	10/ 48
Amphicteis gunneri	3.13	13.27	3/ 48
Hobsonia florida	45.83	130.50	13/ 48
Melinna cristata	1.56	----	1/ 48
Melinna maculata	8.33	27.45	8/ 48
Isolda pulchella	1.56	6.12	3/ 48
Pista cristata	1.04	----	1/ 48
Polycirrus	2.60	14.80	2/ 48
Polycirrus plumosa	9.38	----	1/ 48
Loimia viridis	0.52	----	1/ 48
Chone sp.	1.56	8.00	2/ 48
Chone cf. americana	0.52	----	1/ 48
Megalomma pigmentum	1.04	5.05	2/ 48
Fabriciunda trilobata	48.44	175.07	15/ 48
Boguea enigmatica	0.52	----	1/ 48
Polygordius sp. (Archiannelida B)	1.04	----	1/ 48
Archiannelida sp. A	1.56	----	1/ 48
Tubificidae	61.46	105.43	25/ 48
Tubificoides wasselli	1.04	----	1/ 48
Gastropoda	2.08	8.68	3/ 48
Hydrobiidae	29.69	198.37	3/ 48
Sayella fusca	87.50	537.43	7/ 48
Teinostoma sp.	7.29	27.75	6/ 48
Teinostoma ?nesacum	0.52	----	1/ 48
Cyclostremiscus suppressus	2.60	----	1/ 48
Caecum pulchellum	0.52	----	1/ 48
Caecum imbricatum	0.52	----	1/ 48
Caecum cf. johnsoni	55.21	375.19	2/ 48
Caecum strigosum	6.77	43.37	2/ 48
Bittiolum varium	1.04	----	1/ 48
Epitonium rupicolum	2.60	11.80	3/ 48
Melanella ?intermedia	1.04	----	1/ 48
Strombiformis bilineatus	0.52	----	1/ 48
Microeulima hemphilli	2.60	10.62	3/ 48

1994-1997 MANATEE RIVER BENTHOS (RUN DATE 4 sep 98)
MEAN DENSITY (#/M2), S.D., & FREQUENCY OF OCCURRENCE

Taxa	Mean (Divisor = N)	Std.Dev.	M / N
Crepidula	0.52	----	1/ 48
Tectonatica pusilla	2.08	6.98	4/ 48
Astris lunulata	1.04	5.05	2/ 48
Parvanachis obesa	1.04	5.05	2/ 48
Melongena corona	3.13	18.32	2/ 48
Nassarius vibex	10.42	26.21	8/ 48
Olivella pusilla	15.10	60.30	5/ 48
Jaspidella blanesi	16.67	47.36	8/ 48
Gibberula lavalleenana	0.52	----	1/ 48
Prunum apicinum	2.60	9.28	4/ 48
Eulimastoma sp.	20.83	86.65	7/ 48
Eulimastoma teres	3.13	16.00	2/ 48
Eulimastoma ?engonia	3.13	13.27	3/ 48
Turbonilla sp.	1.04	5.05	2/ 48
Turbonilla interrupta	0.52	----	1/ 48
Turbonilla conradi	5.21	15.44	6/ 48
Turbonilla cf. dalli	2.08	6.98	4/ 48
Turbonilla nr. mighelsi	0.52	----	1/ 48
Sayella sp.	1.04	5.05	2/ 48
Boonea impressa	1.04	5.05	2/ 48
Odostomia gibbosa	0.52	----	1/ 48
Odostomia virginiana	26.04	68.41	11/ 48
Rictaxis punctostriatus	33.85	60.91	18/ 48
Acteocina canaliculata	67.71	102.62	26/ 48
Tornatina inconspicua	7.81	40.00	2/ 48
Haminoea succinea	0.52	----	1/ 48
Aplysiidae sp. A	0.52	----	1/ 48
Bivalvia	13.02	36.10	10/ 48
Nucula crenulata	14.58	30.87	11/ 48
Nuculana acuta	0.52	----	1/ 48
Anadara transversa	1.04	5.05	2/ 48
Brachidontes exustus	2.60	----	1/ 48
Amygdalum papyrium	514.58	1373.72	28/ 48
Parvilucina multilineata	0.52	----	1/ 48
Lucina nassula	3.13	13.27	3/ 48
Diplodonta semiaspera	7.81	21.97	8/ 48
Diplodonta punctata	0.52	----	1/ 48
Neaeromya sp.	5.21	----	1/ 48
Orobitella (=Neaeromya) floridana	79.17	275.33	6/ 48
Mysella planulata	259.90	757.62	31/ 48
Erycina floridana (=Mysella A)	161.98	466.23	11/ 48
Pteromeris perplanna	2.08	8.68	3/ 48
Laevicardium mortoni	0.52	----	1/ 48
Mulinia lateralis	300.00	563.19	37/ 48

1994-1997 MANATEE RIVER BENTHOS (RUN DATE 4 sep 98)
MEAN DENSITY (#/M2), S.D., & FREQUENCY OF OCCURRENCE

Taxa	Mean (Divisor = N)	Std.Dev.	M / N
Macoma tenta	14.58	46.94	9/ 48
Macoma constricta	1.04	5.05	2/ 48
Tellina sp.	141.67	304.90	24/ 48
Tellina lineata	1.56	8.00	2/ 48
Tellina versicolor	88.02	175.64	21/ 48
Tagelus plebeius	6.25	29.40	5/ 48
Tagelus divisus	3.65	10.30	6/ 48
Abra aequalis	2.60	11.80	3/ 48
Semele nuculoides	1.56	----	1/ 48
Mytilopsis leucophaeta	28.13	137.67	4/ 48
Cyclinella tenuis	0.52	----	1/ 48
Dosinia discus	0.52	----	1/ 48
Gemma gemma	11.98	69.19	3/ 48
Chione cancellata	2.60	10.62	3/ 48
Anomalocardia auberiana	0.52	----	1/ 48
Parastarte triquetra	0.52	----	1/ 48
Sphenia antillensis	2.60	12.88	2/ 48
Corbula contracta	1.04	5.05	2/ 48
Corbula barrattiana	0.52	----	1/ 48
Lyonsia hyalina floridana	35.94	100.39	12/ 48
Asthenothaerus hemphilli	8.85	28.01	7/ 48
Dentalium antillarum	0.52	----	1/ 48
Cirripedia	0.52	----	1/ 48
Mysidopsis	0.52	----	1/ 48
Mysidopsis almyra	2.60	----	1/ 48
Mysidopsis furca	1.04	5.05	2/ 48
Bowmaniella sp.	1.56	----	1/ 48
Americamysis	0.52	----	1/ 48
Leucon americanus	0.52	----	1/ 48
Oxyurostylis	2.60	7.72	5/ 48
Oxyurostylis smithi	20.31	64.96	13/ 48
Oxyurostylis lecroyae	5.73	18.04	6/ 48
Cyclaspis pustulata	0.52	----	1/ 48
Cyclaspis cf. varians	397.92	810.55	36/ 48
Cyclaspis sp. C	0.52	----	1/ 48
Cyclaspis sp. D	0.52	----	1/ 48
Halmyrapseudes bahamensis	3.13	13.27	3/ 48
Kalliapseudes sp. A	3.13	12.23	4/ 48
Leptochelia	19.27	122.93	2/ 48
Leptochelia (Hargeria) rapax	1.56	8.00	2/ 48
Cyathura polita	103.65	221.45	12/ 48
Xenanthura brevitelson	224.48	547.64	20/ 48
Amakusanthura magnifica	83.33	124.66	22/ 48
Sphaeroma quadridentata	1.04	5.05	2/ 48
Serolis mgrayi	0.52	----	1/ 48
Edotia triloba	13.02	37.18	8/ 48
Munna sp. n.	0.52	----	1/ 48

1994-1997 MANATEE RIVER BENTHOS (RUN DATE 4 sep 98)
MEAN DENSITY (#/M2), S.D., & FREQUENCY OF OCCURRENCE

Taxa	Mean (Divisor = N)	Std.Dev.	M / N
Gammaridea	1.04	5.05	2/ 48
Ampelisca spp.	3.65	13.63	4/ 48
Ampelisca abdita	2400.52	9844.82	22/ 48
Ampelisca vadorum	0.52	----	1/ 48
Ampelisca holmesi	261.98	620.91	27/ 48
Ampelisca sp. C	15.63	52.24	9/ 48
Ampelisca abdita/vadorum	0.52	----	1/ 48
Amphilochus neopolitanus	0.52	----	1/ 48
Cymadusa compta	4.17	----	1/ 48
Aoridae	1.04	----	1/ 48
Bemlos spinicarpus	1.04	----	1/ 48
Bemlos unifasciatus	0.52	----	1/ 48
Paramicrodeutopus cf. myersi	1.56	8.00	2/ 48
Rudilemboides naglei	1.56	----	1/ 48
Bemlos	0.52	----	1/ 48
Argissa hamatipes	0.52	----	1/ 48
Batea catharinensis	3.13	13.27	3/ 48
Cerapus sp. C (="tubularis")	73.44	276.59	7/ 48
Apocorophium louisianum	90.10	340.24	4/ 48
Erichthonius brasiliensis	4.17	18.83	4/ 48
Grandidierella bonnieroides	833.85	2214.63	26/ 48
Photis sp. C	2.60	----	1/ 48
Listriella barnardi	10.94	28.67	12/ 48
Monoculodes nyei	1.04	5.05	2/ 48
Metharpinia floridana	24.48	85.13	4/ 48
Eudevenopus honduranus	28.65	83.79	10/ 48
Trachypenaeus	0.52	----	1/ 48
Processa hemphilli	0.52	----	1/ 48
Ambidexter symmetricus	0.52	----	1/ 48
Thalassinidea	0.52	----	1/ 48
Callichirinae sp.	1.04	----	1/ 48
Paguroidea	2.08	11.34	2/ 48
Pagurus	1.56	8.00	2/ 48
Upogebia	2.60	7.72	5/ 48
Upogebia affinis	0.52	----	1/ 48

1994-1997 MANATEE RIVER BENTHOS (RUN DATE 4 sep 98)
MEAN DENSITY (#/M2), S.D., & FREQUENCY OF OCCURRENCE

Taxa	Mean (Divisor = N)	Std.Dev.	M / N
Libinia dubia	0.52	----	1/ 48
Heterocrypta granulata	1.04	----	1/ 48
Portunus ordwayi	0.52	----	1/ 48
Panopeus sp.	1.56	8.00	2/ 48
Rhithropanopeus harrisii	17.19	55.82	8/ 48
Dyspanopeus texanus	1.56	----	1/ 48
Pinnotheridae	5.21	14.55	6/ 48
Dissodactylus mellitae	1.56	----	1/ 48
Pinnixa spp.	24.48	53.47	14/ 48
Pinnixa cf. pearsei	1.04	----	1/ 48
Pinnixa cf. floridana	1.04	----	1/ 48
Pinnixa sp. A	0.52	----	1/ 48
Pinnixa sp. D	1.56	6.12	3/ 48
Pinnixa E	0.52	----	1/ 48
Polypedilum scalaneum group	1.56	8.00	2/ 48
Phascolion crypta	18.75	47.96	9/ 48
Aspidosiphonidae	7.29	----	1/ 48
Phoronis	1.56	8.00	2/ 48
Phoronis ?architecta	6.77	19.80	7/ 48
Phoronis sp. C	0.52	----	1/ 48
Glottidia pyramidata	1.04	5.05	2/ 48
Ophiuroidea	4.17	16.58	3/ 48
Hemipholis elongata	9.90	61.40	3/ 48
Amphiuridae	15.10	55.96	4/ 48
Amphiodia pulchella	2.08	10.10	2/ 48
Amphiodia nr. riisei	0.52	----	1/ 48
Amphipholis sp.	0.52	----	1/ 48
Ophiophragmus	0.52	----	1/ 48
Ophiophragmus wurdemani	9.90	49.93	3/ 48
Ophiophragmus pulcher	1.04	----	1/ 48
Amphioplus	0.52	----	1/ 48
Amphioplus sepultus (=abditus)	14.06	50.50	6/ 48
Amphioplus thrombodes	3.65	15.46	4/ 48
Amphioplus sepultus (=abditus)	2.60	----	1/ 48
Micropholis atra	4.69	18.35	4/ 48
Micropholis gracillima	3.65	11.52	5/ 48
Echinoidea	0.52	----	1/ 48
Mellita tenuis	3.65	19.29	2/ 48
Synaptidae sp. A	0.52	----	1/ 48
Branchiostoma floridae	112.50	516.64	6/ 48

APPENDIX F

MANATEE RIVER BENTHOS: 1993-1996

RANKED MEAN ABUNDANCE : TAXA COMPRISING >0.5% OF TOTAL BENTHIC ABUNDANCE

1993-1996 MANATEE RIVER BENTHOS (RUN DATE 4 sep 98)

RANKED MEAN ABUNDANCE (#/M2): >0.5% OF TOTAL ABUNDANCE

Overall Summary of 46 Samples

Summary Characteristics

Number of Species	:	*359*
Density of All Species	:	*12628.80*
Diversity (Hprime -log base 2)	:	*5.05*
Evenness (Hprime/Hmax)	:	*0.59*

Taxa	*Observed*	*Percentage*
Ampelisca abdita	*3165.76*	*25.07*
Monticellina dorsobranchialis	*940.22*	*7.45*
Grandidierella bonnieroides	*917.66*	*7.27*
Amygdalum papyrium	*794.02*	*6.29*
Mulinia lateralis	*578.26*	*4.58*
Cyclaspis cf. varians	*538.04*	*4.26*
Mediomastus	*411.41*	*3.26*
Ampelisca holmesi	*366.30*	*2.90*
Paraprionospio pinnata	*309.24*	*2.45*
Xenanthura brevitelson	*229.89*	*1.82*
Mediomastus ambiseta	*201.90*	*1.60*
Athenaria	*201.09*	*1.59*
Aricidea taylori	*184.78*	*1.46*
Erycina floridana (=Mysella A)	*174.46*	*1.38*
Thenaria	*164.67*	*1.30*
Prionospio perkinsi	*135.33*	*1.07*
Mysella planulata	*115.76*	*0.92*
Parapionosyllis uelebackerae	*112.23*	*0.89*
Fabriciunda trilobata	*109.51*	*0.87*
Cyathura polita	*105.43*	*0.83*
Caecum cf. johnsoni	*97.55*	*0.77*
Apocorophium louisianum	*94.02*	*0.74*
Sayella fusca	*91.30*	*0.72*
Tellina sp.	*88.86*	*0.70*
Cerapus sp. C (="tubularis")	*81.79*	*0.65*
Streblospio benedicti	*76.63*	*0.61*
Acteocina canaliculata	*76.36*	*0.60*
Tellina versicolor	*74.73*	*0.59*
Grubeosyllis (Brania) clavata	*73.37*	*0.58*
Travisia hobsonae	*71.20*	*0.56*
Amakusanthura magnifica	*70.11*	*0.56*

APPENDIX G

MANATEE RIVER BENTHOS: 1994-1997

RANKED MEAN ABUNDANCE :
TAXA COMPRISING >0.5%
OF
TOTAL BENTHIC ABUNDANCE

1994-1997 MANATEE RIVER BENTHOS (RUN DATE 4 sep 98)

RANKED MEAN ABUNDANCE (#/M2): >0.5% OF TOTAL ABUNDANCE

Overall Summary of 48 Samples

Summary Characteristics

Number of Species	:	*320*
Density of All Species	:	*11492.71*
Diversity (Hprime -log base 2)	:	*5.14*
Evenness (Hprime/Hmax)	:	*0.62*

Taxa	*Observed*	*Percentage*
Ampelisca abdita	*2400.52*	*20.89*
Monticellina dorsobranchialis	*1163.54*	*10.12*
Grandidierella bonnieroides	*833.85*	*7.26*
Amygdalum papyrium	*514.58*	*4.48*
Streblospio benedicti	*402.60*	*3.50*
Cyclaspis cf. varians	*397.92*	*3.46*
Mediomastus californiensis	*391.67*	*3.41*
Paraprionospio pinnata	*345.31*	*3.00*
Mediomastus	*324.48*	*2.82*
Mulinia lateralis	*300.00*	*2.61*
Ampelisca holmesi	*261.98*	*2.28*
Mysella planulata	*259.90*	*2.26*
Xenanthura brevitelson	*224.48*	*1.95*
Mediomastus ambiseta	*193.23*	*1.68*
Athenaria	*184.38*	*1.60*
Erycina floridana (=Mysella A)	*161.98*	*1.41*
Prionospio perkinsi	*155.73*	*1.36*
Aricidea taylori	*146.88*	*1.28*
Tellina sp.	*141.67*	*1.23*
Branchiostoma floridae	*112.50*	*0.98*
Carazziella hobsonae	*106.25*	*0.92*
Cyathura polita	*103.65*	*0.90*
Apocorophium louisianum	*90.10*	*0.78*
Tellina versicolor	*88.02*	*0.77*
Sayella fusca	*87.50*	*0.76*
Amakusanthura magnifica	*83.33*	*0.73*
Orobitella (=Neaeromya) floridana	*79.17*	*0.69*
Grubeosyllis (Brania) clavata	*76.56*	*0.67*
Cerapus sp. C (="tubularis")	*73.44*	*0.64*
Acteocina canaliculata	*67.71*	*0.59*
Thenaria	*64.06*	*0.56*
Travisia hobsonae	*64.06*	*0.56*
Tubificidae	*61.46*	*0.53*