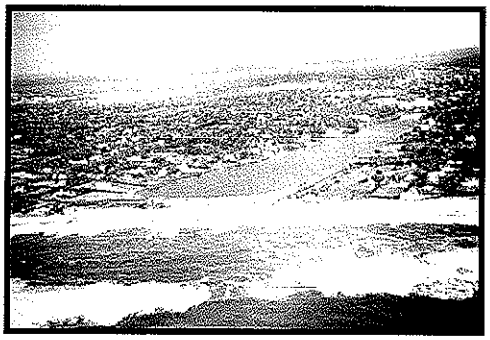
Final

Atlantic Coast of Long Island, Fire Island Inlet to Montauk Point, New York



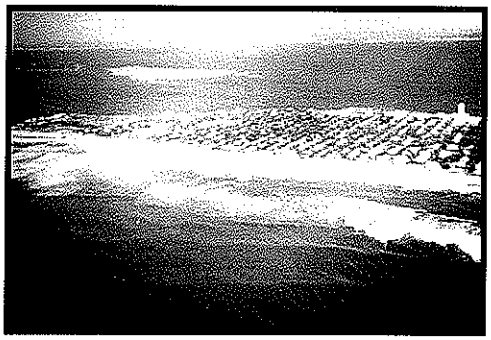
Comparative Study of Beach Invertebrates on the Westhampton Barrier Island

Prepared for:

US Army Corps of Engineers, NY District

For The Fire Island Inlet to Montauk Point Storm Damage Reduction Reformulation Study

April 19, 1999



Prepared by EEA, Inc. for:
A Joint Venture, URS Consultants, Inc./Moffatt & Nichol Engineers

INTRODUCTION

The objective of the study described herein is to determine the relative abundance and species composition of macrobenthic invertebrates on a barrier beach on the south shore of Long Island. Two areas were assessed: one an "old beach" that has been relatively stable for a period of years, and a "new beach" of recently nourished origin. Comparisons between the two will assist in determining impacts of beach nourishment projects for planned Environmental Impact Statements (EISs).

This work is sponsored by the New York District Army Corps of Engineers under the Montauk Point to Democrat Reformulation Contract. The prime contractor is URS/Greiner - Moffat and Nichol, JV and the subcontractor is EEA, Inc. of Garden City, New York.

METHODOLOGY

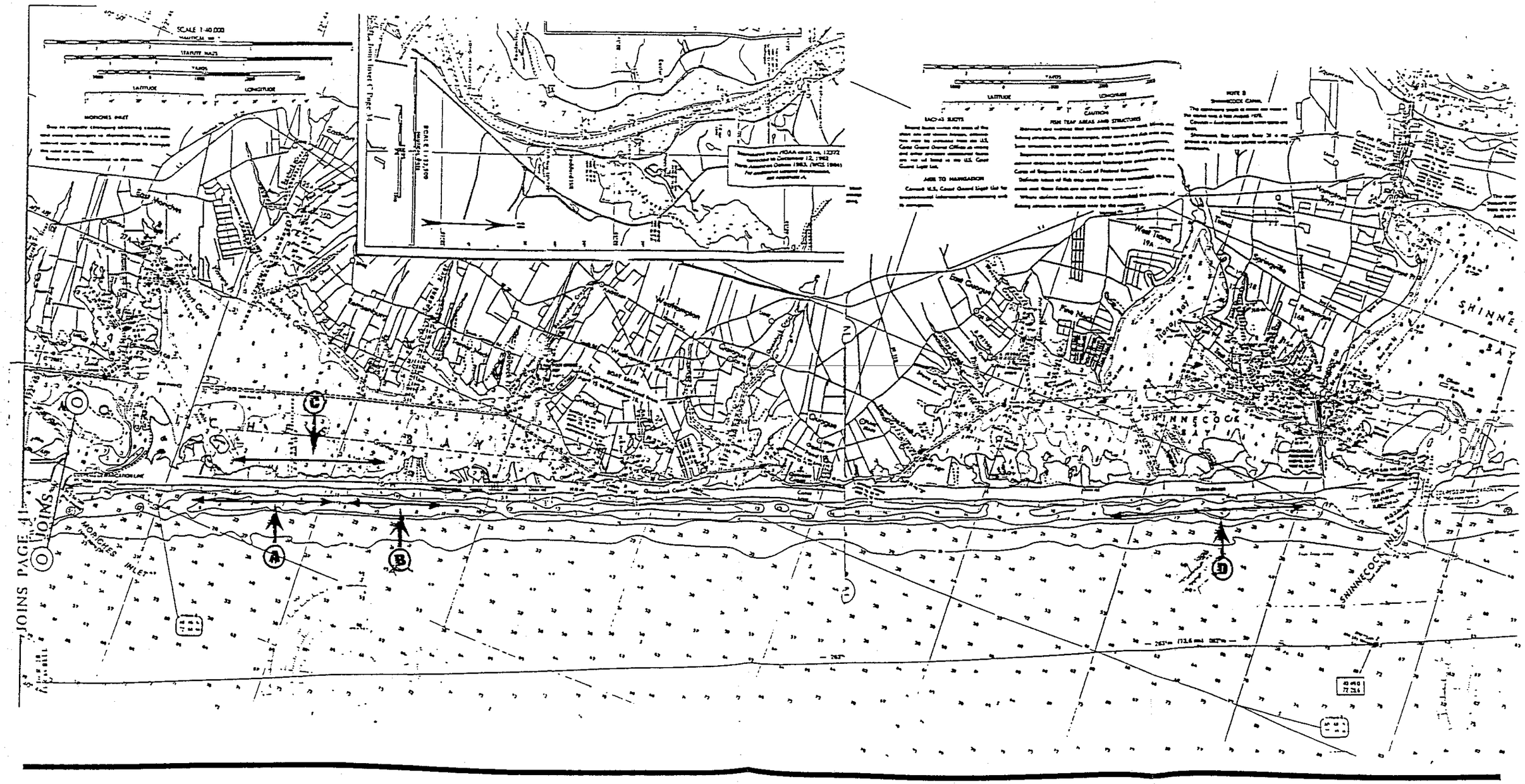
Station Locations

A total of 24 transects were established along a beach in Westhampton, New York, west of Shinnecock Inlet. The transects were established as follows: transects 1 through 10 were located in the area of the 1992 breach where nourishment had taken place. Transects were spaced 1,000 feet apart. Distances were measured utilizing a Hip-Chain™. The position of each station was fixed utilizing a Garmin GPS45XL. Transects 11 through 16 were established in the groin field to the east of the placement area. The transects were located approximately in the center between groins. The position of each transect was fixed similar to those in the placement area. Transects 17 through 20 were established on the bayside of the breach just opposite to those in the placement area (Figure 1). Again, the transects were 1,000 feet apart measured with the Hip-Chain™, and positions fixed with a GPS (Table 1). Transects 21 through 26 were established as a control set. These transects were established in the scour area immediately west of Shinnecock Inlet. The four transects were spaced 1,000 feet apart and fixed utilizing the procedures previously discussed.

Sample Collection

A total of three samples were collected at each of the 24 transects. Sample No. 1 was collected in the high tide wrackline; No. 2 was collected at the approximate mid-tide line; and No. 3 was collected in the sub-tidal surf zone.

Each sample was collected utilizing a three-inch diameter aluminum tube which was inserted eight inches into the sediment. The core was removed from the substrate and transferred to a plastic wash tub.



STATION LOCATIONS

A = Transects 1 through 10
B = Transects 11 through 16
C = Transects 17 through 20
D = Transects 21 through 24

FIGURE 1

All samples were sieved through a 0.5 millimeter stainless steel sieve until most of the fine material was removed from the sample. The contents of the sieve were transferred to a wide mouth one-liter sample which contained both an external and internal label identifying the sample. The samples were then preserved in a 10 percent buffered formaldehyde solution. In the laboratory, each sample was rinsed in fresh water ans sorted utilizing a stereo-dissecting microscope. All organisms were identified to the lowest practical taxon, counted, and stored in a vial of 70 percent isopropyl alcohol.

RESULTS

All 72 samples were collected from the 24 transects between April 22 and May 5, 1998. The samples were evenly divided between the wrack line, the mid-tide zone, and the surf zone, with 24 samples collected in each.

A total of 2,244 organisms representing 37 different taxa were identified from the samples (Table 2). The mollusks comprised the greatest portion of organisms at 39 percent. The second largest component were the nematodes (19.2 percent), closely followed by the oligochaete (18.5 percent), and then the nemertean at 13.6 percent. The polychaete worms and crustaceans combined for only 9.7 percent of all the organisms.

The three different zones sampled (i.e., wrack line, mid-tide and surf) were divided as follows: the wrack line contained 30.8 percent of all the organisms collected; the mid-tide zone 26 percent; and the surf zone 43.2 percent for all samples collected.

Samples collected from the placement location averaged 48.3 organisms per sample, while samples collected in the groin field averaged 79.0 organisms per sample, and the updrift control area averaged 78.8 organisms per sample. The bayside samples averaged 243 organisms per sample.

DISCUSSION

As expected, it is clearly evident that the sediments associated with the bayside environment are more productive than those associated with the ocean beach. Bayside sediment contained a partial order of magnitude more organisms than found in each of the three locations sampled on the oceanside.

A comparison of the three oceanside areas (i.e., placement, groin field and control) exhibited similar results. The number of organisms present in the control area and the groin field were nearly identical: 78.8 and 79.0 organisms per sample, respectively. The number of organisms from the placement area was slightly lower than either of the others at 48.3 organisms per sample. Again this is as expected. The completion of the beach restoration was only recently completed (winter 1997/1998), and as the literature indicates, it requires approximately 12 to 18 months of the benthic community to re-establish itself.

The results of EEA's study differ from those previously conducted on the barrier island beaches and in Moriches Bay (Kluft 1998; Reilly 1978; Cerrato 1986; and O'Connor 1972). This is chiefly due to the smaller sieve size used by EEA (i.e., 0.5 mm), while all the other studies have utilized a 1.0 mm sieve. Other factors, such as early sampling date, may explain the total lack of mole crabs (*Emerita talpoida*) from the samples. The fact that the amphipod (*Talorchestia longicornis*) is not adequately sampled with a small corer and is more effectively sampled via pit trap (Ginsberg 1998) may help explain the extremely low abundance for this species. Additionally, species abundance is strongly influenced by the amount of wrack on the beach. Observations made during EEA's survey indicated what appeared to be a sparse wrackline.

During the April/May survey, EEA observed small groups of piping plover (*Charadrius melodus*) and sanderling (*Clidris alba*) feeding in the wrackline and at the water's edge on the oceanside. On the same day, great number of piping plovers, sanderlings, dulin (*Calidris alpina*), willets (*Catoptrophorus semipalmatus*), black-bellied plover (*Pluvialis squatorola*), and American oystercatchers (*Haematopus palliatus*) were observed feeding on the flat in the vicinity of the breach on the bayside.

CONCLUSION

- The intertidal sediments of the bay beaches are more productive than the high energy ocean environment.
- The sediments in the placement area re-colonize quickly, being nearly as abundant (e.g., 60 percent) as the control area in only a few months after the completion of the project.
- Core sampling does not adequately sample certain species of amphipods.
- Wildlife (e.g., shorebirds) are utilizing the area of beach nourishment immediately following the completion of the project.
- The three study zones (i.e., wrackline, mid-tide, and surf zone) support similar abundance of organisms with only the surf zone slightly higher.

TABLE 1

BENTHIC SAMPLING
STATION LOCATIONS

Placement Area			
1.	N. 40° 46. 244 W. 72° 43. 746	6.	N. 40° 46. 535 W. 72° 42. 867
2.	N. 40° 46. 288 W. 72° 43. 738	7.	N. 40° 46. 632 W. 72° 42. 437
3.	N. 40° 46. 402 W. 72° 43. 269	3.	N. 40° 46. 671 W. 72° 42. 259
4.	N. 40° 46. 458 W. 72° 43. 042	9.	N. 40° 46. 719 W. 72° 42. 019
5.	N. 40° 46. 452 W. 72° 43. 028	10.	N. 40° 46. 748 W. 72° 41. 820
Groin Field			
11.	N. 40° 46. 978 W. 72° 41. 030	14.	N. 40° 47. 197 W. 72° 40. 138
12.	N. 40° 47. 053 W. 72° 40. 675	15.	N. 40° 47. 234 W. 72° 39. 930
13.	N. 40° 47. 110 W. 72° 40. 419	16.	N. 40° 47. 305 W. 72° 39. 702
Bay Side of Breach			
17.	N. 40° 46. 771 W. 72° 42. 597	19.	N. 40° 46. 834 W. 72° 42. 156
18.	N. 40° 46. 784 W. 72° 42. 549	20.	N. 40° 46. 809 W. 72° 42. 176
Control Up-Drift			
21.	N. 40° 50. 482 W. 72° 28. 741	23.	N. 40° 50. 354 W. 72° 29. 165
22.	N. 40° 50. 455 W. 72° 28. 954	24.	N. 40° 50. 213 W. 72° 29. 323

TABLE 2

BENTHIC INVERTEBRATE ABUNDANCES
NOS./CORE

	Station 1			Station 2			Station 3			Station 4			Station 5		
	Rep.			Rep.			Rep.			Rep.			Rep.		
Species	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
Phylum rhynchocoela															
Nemertean worms		31			4			8			8			13	
Phylum Aschelminthes															
Nematod worms					8	1		1		1				3	1
Phylum mollusca															
Littorina littorea						1									
Gastopod unid															
Mytilus edulis						260				3				1	
Gemma gemma															
Mya arenaria															
Pitar morrhuana															
Phylum annelida															
Glycera americana															
Nereis succina															
N.															
Capitella capitata															
Heteromastus filiformis															
Clymenella torquata															
Polydora sp (Jw.)															
Scolelepis squamata			1		1				1					1	
Polychaete larvae						1									
Class oligochaeta	1	2			10		3								
Phylum arthropoda															

TABLE 2 - Continued

BENTHIC INVERTEBRATE ABUNDANCES
NOS./CORE

	Station 1			Station 2			Station 3			Station 4			Station 5		
	Rep.			Rep.			Rep.			Rep.			Rep.		
Species	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
Class arachnida															
Class Insecta	1														
Balanus sp. (Cypris)															
Isopod sp.															
Talorchestia megalophthalma															
Grammarus annulatus															
Psammonyx nobilis															
Paraphoxus epistomus			1												

TABLE 2

BENTHIC INVERTEBRATE ABUNDANCES
NOS./CORE

	Station 6			Station 7			Station 8			Station 9			Station 10		
	Rep.			Rep.			Rep.			Rep.			Rep.		
Species	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
Phylum platyhelminthes								1							
Phylum rhynchocoela															
Nemertean worms					10	1		29	1		11			10	5
Phylum Aschelminthes															
Nematod worms						1		1		1				1	
Phylum mollusca															
Littorina littorea						1									
Gastopod unid															
Mytilus edulis				10						3				2	1
Gemma gemma															
Mya arenaria															
Pitar morrhuana															
Phylum annelida															
Glycera americana															
Neantles succina															
N.															
Capitella capitata															
Heteromastus filiformis															
Clymenella torquata															
Polydora sp (Jw.)															
Scolelepis squamata								1			1				
Polychaete larvae					1										

TABLE 2 Continued

BENTHIC INVERTEBRATE ABUNDANCES
NOS./CORE

	Station 6			Station 7			Station 8			Station 9			Station 10		
	Rep.			Rep.			Rep.			Rep.			Rep.		
Species	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
Class oligochaeta		4		1				3	2				1		1
Phylum arthropoda															
Class arachnida															
Class Insecta					1					1					
Dptera				2						1					
Lady bug				1											
Balanus sp. (Cypris)			1												
Isopod sp.						1									
Talorchestia megalophthalma															
Grammarus annulatus															
Psammonyx nobilis															
Amphipod (juv)										1					

TABLE 2

BENTHIC INVERTEBRATE ABUNDANCES
NOS./CORE

	Station 11			Station 12			Station 13			Station 14			Station 15		
	Rep.			Rep.			Rep.			Rep.			Rep.		
Species	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
Phylum rhynchocoela															
Nemertean worms	11	15			1	6		7	15	4	1	18		8	2
Phylum Aschelminthes															
Nematod worms	1	1										1		1	2
Phylum mollusca															
Littorina littorea															
Gastopod unid															
Mytilus edulis										1		4		2	7
Gemma gemma															
Mya arenaria															
Pitar morrhuana															
Phylum annelida															
Glycera americana															
Nereis succina															
N.															
Capitella capitata															
Heteromastus filiformis															
Clymenella torquata															
Polydora sp (Juv.)															
Scolelepis squamata															
Polychaete larvae					1										
Class oligochaeta	2			1		14	4						1		
Phylum arthropoda															

TABLE 2 Continued

BENTHIC INVERTEBRATE ABUNDANCES NOS./CORE

	Station 11			Station 12			Station 13			Station 14			Station 15		
	Rep.			Rep.			Rep.			Rep.			Rep.		
Species	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
Class arachnida															
Class Insecta		2				2			1						
Diptera										1					
Balanus sp. (Cypris)					1			1							
Isopod sp.															
Talorchestia megalophthalma							1								
Grammarus annulatus															
Psammonyx nobilis					3										
Amphipod (juv)					2										

TABLE 2

BENTHIC INVERTEBRATE ABUNDANCES
NOS./CORE

	Station 16			Station 17			Station 18			Station 19			Station 20		
	Rep.			Rep.			Rep.			Rep.			Rep.		
Species	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
Anthozoa															1
Phylum platuhelminthes															1
Phylum rhynchocoela															
Nemertean worms		4	1	27			25	6			3	2	5		
Phylum aschelminthes															
Nematod worms		54	1	1	12		1		198		2	125			3
Phylum mollusca															
Littorina littorea				2			1								
Gastopod unid				1											
Mytilus edulis	68		1	190			12	3	18						
Gemma gemma				2	1		1	11	5						
Mya arenaria								1							
Pitar morrhuana									2						
Phylum annelida															
Prionospio heterobranchia									60						
Scolecolepides viridus															1
Glycera americana									1			1			
Neanthes succina									6						
N. arenaceodonta						1									
Capitella capitata						2									
Heteromastus filiformis									2						
Clymenella torquata						5		2	6			4		2	3

TABLE 2 - Continued

BENTHIC INVERTEBRATE ABUNDANCES
NOS./CORE

	Station 16			Station 17			Station 18			Station 19			Station 20		
	Rep.			Rep.			Rep.			Rep.			Rep.		
Species	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
Polydora sp (Juv.)									2		1	3			1
Scolelepis squamata															
Haplosocoloplos sp. (juv.)					1	1		4	1		1			2	1
Polychaete larvae					2			1							
Syllidae							4					1			
Spio sp. (juv.)									1			1			
Lumbrineris tenuis															1
Class oligochaeta	3	191	2		2	1		35	92		4	12	4	2	1
Phylum arthropoda															
Class arachnida															
Class insecta	3				2			3		1	1				
Insect larvae								3		1					
Coleoptera											1				
Balanus sp. (Cypris)															
Isopod sp.															
Talorchestia megalophthalma															
Grammarus annulatus															
Psammonyx nobilis															
Sphaeroma quadridentatus								1							
Amphipod (juv)							1		4						

TABLE 2

BENTHIC INVERTEBRATE ABUNDANCES
NOS./CORE

	Station 21			Station 22			Station 23			Station 24					
	Rep.			Rep.			Rep.			Rep.					
Species	1	2	3	1	2	3	1	2	3	1	2	3			
Phylum rhynchocoela															
Nemertean worms			2			1	12								
Phylum aschelminthes															
Nematod worms			1	1				1			5				
Phylum mollusca															
Littorina littorea															
Gastopod unid						1									
Mytilus edulis			1	199		3	4			57	3	2			
Gemma gemma															
Mya arenaria															
Pitar morrhuana															
Phylum annelida															
Glycera americana															
Nereis succina															
N.															
Capitella capitata															
Heteromastus filiformis															
Clymenella torquata															
Polydora sp (Juv.)															
Scolelepis squamata			1												
Class oligochaeta			6	6				1		1		2			
Phylum arthropoda															
Class arachnida							1								

TABLE 2 - Continued

BENTHIC INVERTEBRATE ABUNDANCES
NOS./CORE

	Station 21			Station 22			Station 23			Station 24					
	Rep.			Rep.			Rep.			Rep.					
Species	1	2	3	1	2	3	1	2	3	1	2	3			
Class insecta															
Diptera				1			7								
Coleoptera															
Balanus sp. (Cypris)								1	1						
Isopod sp.															
Talorchestia megalophthalma															
Grammarus annulatus															
Psammonyx nobilis															

Bibliography

Cerrato, R.M., 1986. A seasonal study of benthic fauna in Moriches Bay. Marine Science Research Center, State University of New York at Stony Brook. Special Report No. 72. 160 pp.

Kluft, J., 1998. The Beach Invertebrates of Fire Island National Seashore: Spatial and Temporal Distributions. Marine Science Research Center, State University of New York at Stony brook. Master Thesis, in progress.

Ginsberg, H.S., 1998. Personal communication.

O'Connor, J.S., 1972. The Benthic Macrofauna of Moriches Bay, New York. The Biological Bulletin, Vol. 142, No. 1, pp. 84-102

Reilly, F.J., Jr., and V.J. Bellis, 1978. A Study of Ecological Impacts of Beach Nourishment with Dredged Materials on the Intertidal Zone. Institute for Coastal and Marine Resources. Technical Report No.4, East Carolina University.