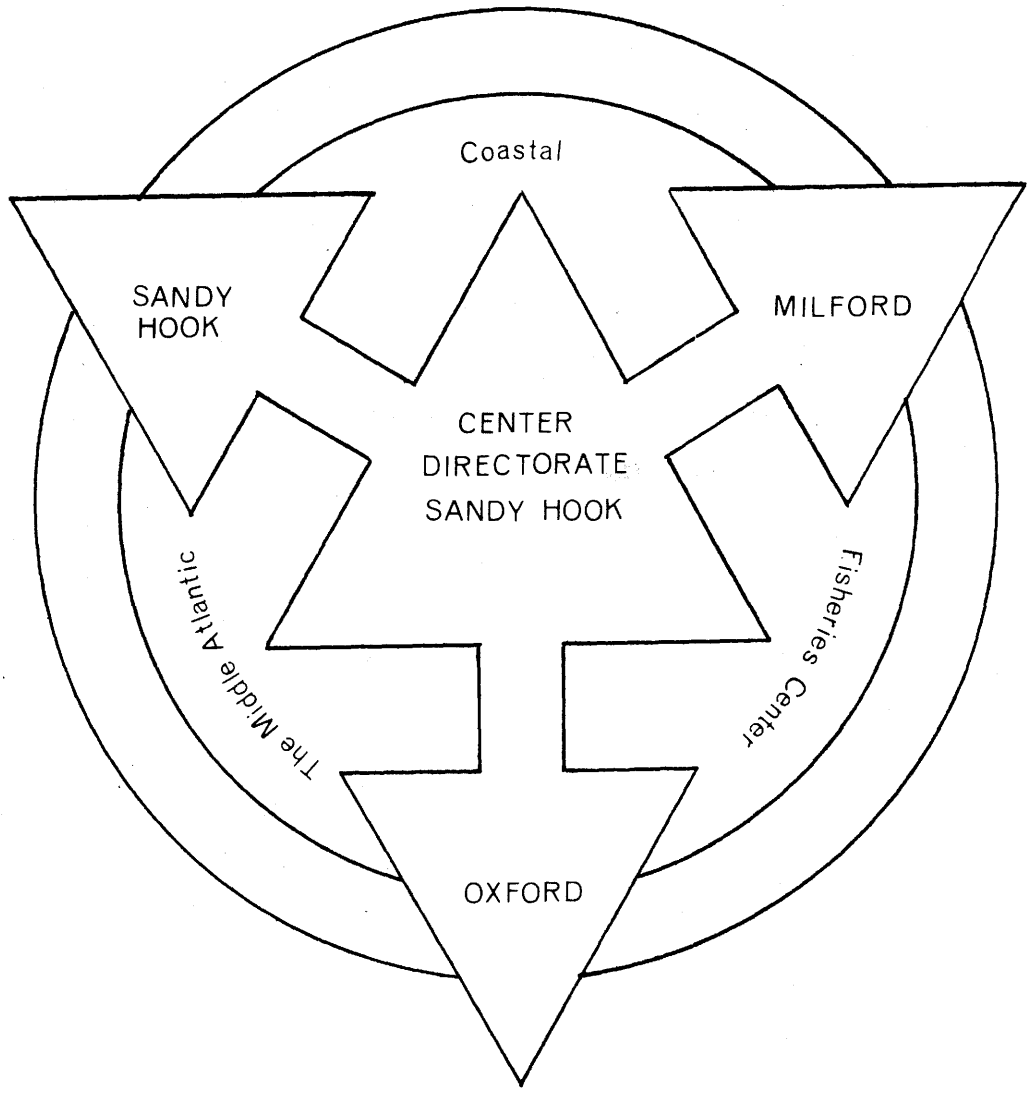
EPIBENTHIC AND INFAUNA BASELINES, ALTERNATIVE DUMP SITES #1 AND #2

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
Northeast Region

MIDDLE ATLANTIC COASTAL FISHERIES CENTER



Informal Report No. 39
October 1974

Ecosystems Investigations

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Alternative Dump Sites #1 and #2

INTRODUCTION

Although considerable data are available in regard to the distribution and abundance of benthic invertebrates in the New York Bight apex (see Figure 1, item 8), relatively little is known in regard to the benthic invertebrates which habituate waters of the Middle Atlantic Bight deeper than 50 m. A recent paper by Wigley and McIntyre (1964) does provide some data for benthic assemblages in relatively shoal and deeper waters off of Cape Cod. Hathaway (1966) gives some limited information on benthic organisms found at a series of stations along the Atlantic coast of the United States.

During the period 21 - 30 June 1974 personnel from Ecosystems Investigations, Middle Atlantic Coastal Fisheries Center (MACFC), participated in collecting Smith-McIntyre bottom grab samples from the R.V. Venture at 69 stations located within the two alternative dump sites proposed by EPA (see Figure 1, item 1). In addition, bottom photographs were taken by personnel associated with the NOAA Atlantic Oceanographic and Meterological Laboratory (AOML), Miami.

The preserved fauna contained in the bottom grabs have been superficially examined and selected bottom samples have been completely sorted to taxa and tentatively identified. In addition, all bottom photographs taken at stations within

the alternative dump sites have been examined and the epibenthic fauna visible enumerated.

This paper is the first attempt to: 1) determine the distribution, abundance and diversity of epibenthic organisms and benthic infauna at stations within the two alternate dump sites; and 2) present data useful in assessing between station variation in the benthic and demersal fauna. Subsequent reports will provide data on the relationships between benthic assemblages and sediment type as well as the heavy metal burdens in sediments collected at the sampling stations reported upon in this paper.

MATERIALS AND METHODS

Smith-McIntyre Quantitative Bottom Grab samples (0.1 m^2) were taken at the stations indicated in Figure 2. Small aliquots of surficial sediment were removed from each sample for analyses for the presence of heavy metals and grain size distribution.

The sediments remaining in each sample were then washed through standard stainless steel geological screens with a minimum aperture of 1.00 mm. The materials remaining on the screens were fixed in formalin and preserved in 70% ethanol. Biological materials were subsequently picked from the preserved samples using dissecting microscopes. Preliminary identifications were accomplished using various keys and descriptions appropriate for use with fauna found on the continental shelf of

the Middle Atlantic Bight. Where identifications were uncertain or difficult, specimens are being furnished to the appropriate taxonomic authorities.

Bottom sediments will be analyzed by personnel of AOML. Heavy metal content of sediments will be determined by Mr. Richard Greig, Environmental Chemistry and Microbiology Investigation, MACFC.

Samples taken at selected stations were furnished to Dr. Leah Koditschek for baseline determinations of microorganisms. Finally, we have also retained aliquots for future studies on the benthic meiofauna.

RESULTS

Epibenthic macrofauna: Examination of bottom photographs taken at 46 sampling stations located in alternative dump sites 1 and 2 have enabled us to assess the abundance and distribution of the larger surface-dwelling invertebrates. Species which could be detected in each photograph were identified and enumerated. These data are given in Table 1. Stations 1 - 71 were located within alternative dump site 2. Stations 72 - 104 were within site 1; Figures 4 to 17 were taken at stations within site 1.

Each photograph included a surface area of approximately four square meters. Since 46 stations were surveyed, this investigation covered a total of approximately 184 square meters (m^2); approximately 56 m^2 at site 1 and 128 m^2 at site 2.

Eight taxonomic groups could be identified in the photographs. Where resolution of an object was poor and identification difficult, the object was not counted. Common sand dollars were, by far, the dominant organism, both in abundance and, probably, biomass. No sand dollars were in evidence in two photographs (Stations 1 and 96) and 420 were counted in one photograph taken at Station 4 (see Table 1).

The next most numerous taxon was the common sea star, *Asterias* sp. These two taxa were found in different abundances at the two alternate dump sites. Combining data from all stations within site 1, 289 dollars were counted, or 5.1 dollars/m^2; 2,430 dollars were found at site 2, or 19/m^2. Sea stars were more abundant at site 1, with 0.30/m^2; 0.14 sea stars/m^2 were calculated for site 2.

In addition to sand dollars and sea stars, burrowing sea anemones, scallops, shrimp, cancroid crabs, sea urchins, and finfish were also observed. It should be noted that our enumeration of the larger macrofauna having a contagious distribution, and appearing in bottom photographs, are verified by actual counts of organisms found in Smith-McIntyre grab samples (see Table II). For example, if we extrapolate from the number of sand dollars found per grab sample, which includes a surface area of 0.1 m^2, to the numbers observed in the bottom photos, (approximately 4 m^2) we counted and calculated a maximum of 100 dollars/m^2 at Station 100 and 90 dollars at Station 86. In the photographs we found a maximum of 105 dollars/m^2 (Table I).

Infauna: We have superficially examined benthic grab samples collected from the so called alternative dump sites #1 and #2. We also sorted and identified samples collected from five stations located at intervals along a transect extending from the northwest corner to the southeast corner of the sampling grid established for alternate dump site #1 (Figure 2). Species common to Stations 102, 100, 92, 86 and 82 are given in Table II as well as the numbers of species and individuals, equitability and diversity. Histograms summarizing these data are presented in Figure 3.

Preliminary identification and enumeration indicates that 92 species were common to the five stations which were completely sorted and identified. The station with the largest number of species was Station 86 where we found 57 distinguishable taxa. This station was particularly rich in attached or epibenthic species.

Many of the species present at the alternate dump site are also common to stations found in the New York Bight apex. A detailed report being prepared will compare similar stations sampled in the Bight apex with the stations sampled within 16 proposed alternative dump sites.

DISCUSSION

The data reported herein indicate that alternative dump site #1 is a productive benthic environment. It is probable that the biomass per unit surface area is large; relative to other portions of the Bight based on bottom photographs, we believe that the majority of biomass consists of the common sand dollar, Echinarachnius parma. The importance of sand dollars as food for demersal fish is unknown although Echinarachnius parma, and the west coast Dendraster, have been found in the guts of flounders and other finfish.

Gross examination of bottled samples taken from stations within the alternate dump sites indicates that the between station variation seen in the sorted and identified samples (Table II) is representative of most stations sampled.

ACKNOWLEDGMENTS

Samples were collected during the period 21 - 30 June 1974 when the R. V. Venture was involved in a joint AOML-MACFC operation within the proposed alternate dump sites. Ms. Leslie Rogers, Ecosystems Investigations, MACFC, was the biologist

in charge of field operations and responsible for the collection and field processing of benthic fauna. Mrs. Marty Halsey, Mrs. Ann Frame, Mr. David Radosh, Ms. Jan Caracciolo and Ms. Rogers were instrumental in sorting and identifying the benthic organisms. Dr. John Pearce, Director, Ecosystems Investigations, was responsible for overall supervision of the project and preparation of the data report.

The data presented in this report are tentative and before referencing the report permission should be obtained from the Director, MACFC

LITERATURE CITED

Hathaway, J. (Ed.). 1966. Data File. Continental Margin Program Atlantic coast of the United States. Vol. 1. Sample Collection Data. Tech. Rept., Ref. No. 66-8, Woods Hole, Mass. 184 pp.

Wigley, R. and A. McIntyre. 1964. Some quantitative comparisons of offshore and macrobenthos South of Martha's Vineyard. Limnol. Oceanogr., 9(4): 485-493.

Table 1: Taxa (given as common names) as numbers of individuals per 4 m^2 counted in bottom photographs (Figures 3 - 16).

	Station																						
axa	1	2	3	4	5	6	7	8	9	10	11	12	13	29	37	45	53	54	55	56	57	61	62
nemone	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
callop	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
hrimp	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ancroid	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ea Star	0	0	2	1	1	0	0	0	0	0	1	2	0	1	0	0	0	0	1	0	1	1	1
rchin	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ollar	0	30	310	420	72	7	76	41	114	240	210	108	93	41	30	20	56	18	25	31	22	44	30
infish	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table I. (cont'd):

Taxa	Station 63	64	65	66	67	68	69	70	71	72	73	75	92	93	95	96	97	98	99	100	102	103	104	Total
Anemone	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	2
Scallop	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1
Shrimp	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1
Cancroid	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	3
Sea Star	0	0	0	1	1	1	2	0	1	1	2	0	3	1	0	0	0	4	2	1	2	1	0	35
Urchin	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
Dollar	15	23	105	9	89	3	62	130	56	110	96	4	13	2	19	0	17	3	7	4	7	3	4	2719
Finfish	0	0	0	0	1	1	0	1	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	6

Table II: Benthic infauna (#/0.1 m^2) at stations located within alternate dump site #1.

Species	#102	#100	#92	#86	#82
Actiniaria:				4	
Cerianthus americanus				1	
Rhynchocoela		2		1	1
Phoronida:					
Phoronis architecta	1	13			
Archiannelida:					
Protodrillus symbioticus	1	1	14	1	6
Polychaeta:					
? Phyllodace arenae			1	4	
? Harmothoe sp.	1				
Phaloe minuta				1	
Sthenelais limicola		4	3	2	
? Hemipodus roseus			7	1	
? Glycera capitata		1			2
Glycera dibranchiata	1		2		
Glycera sp.	1				
? Nephtys bucera				1	
Aglaophamus circinata	3	4	6	9	7
Exogone verugera		1	1	15	8
Nereis grazi		2		4	
Notomastus latericeus				2	
Scalibregma inflatum		8	8	8	2
Clymenella torquata	1	1		29	
? Clymenella zonalis		3	1	47	
? Leiochone dispar		2	1		
? Euclymene collaris					3
? Opelina acuminata			2	5	
? Prionospio steenstrupi				2	
? Polydora concharum	4				
Polydora socialis				32	
Laonice cirrata				2	
Spiophanes bombyx	21	46	178	2	7
Unid. Spionidae			34		
Aricidea jeffreysii	3	1	1		
Sabellidae sp.	6				
Lumbrineris acuta			1		
Lumbrineris tenuis				1	
Drilonereis longa				1	
Drilonereis magna	3	2	2		1
Chaetozone setosa				2	
Owenia fusiformis				20	
Orbinia sp.	1				
Scoloplos robustus	8	4	2		
Tharyx sp.	13	7	25		20
Pectinaria sp.	1				
Ampharate artica	3		7	55	9
Asabellides oculata	1				
Polycirrus eximius	4	3			
Nicolea venustula				2	
Euchone rubrocincta		31	6	28	26
Sipunculida				24	
Mollusca:					
Lunatia heros			1		1
Mitrella lunata				9	1
Colus sp.			2		
Mytilus edulis				2	
Astarte castanea	1		1	1	
Artica islandica	2	1			1
Cerastoderma pinnulatum	2				2

Table II (Cont'd):

Species	#102	#100	#92	#86	#82
Ensis directus	1	1		1	
Lyosnia hyalina			2	5	
Trachycarduim muricatum				8	
Unidentified Bivalve #1	1				
Unidentified Gastropod #1	1				
Crustacea:					
Centropages sp.	1				
Crab Zoea - Unid		1			
Eudorella emarginata				28	1
Eudorella sp.		1			
Eudorellopsis deformis				12	
Diastylis sculpta		1	1	20	
Petalosarsia declivis	1				
Ptilanthura tricarina				3	
Tanaids:					
Leptochelia savignyi	1	3	1		1
Isopods:					
Cirolana concharum					4
Cirolana polita			1		
Edotea triloba	1	2	1		1
Amphipods:					
Ampelisca agassizi			1	177	
Ampelisca macrocephala		1		6	
Byblis serrata	5	11	1	2	
Aoridae sp.				1	
Corophium crassicorne		2	1	12	2
Ericthonius hunteri	1		4	3	
Unciola irrorata	4	11	12	6	4
Pseudounciola obliqua	6	6	2		
Hippomedon serratus					1
Photis sp. #1				1	
Podoceropsis nitida			1	1	
Leptocheirus pinguis	1		1	2	
Phoxocephalus holbolli	1		3		3
Trichophoxus epistomus		2	1	5	
Harpinia crenulata				4	
Stenopleustes inermis			1	1	
Echinodermata:					
Echinarachnius parma	2	10	1	9	1
Arbacia punctulata				2	
Echinoidea (Urchin)	1		14		
Ophiuroidae				2	
Ascidian				1	
Total # individuals	110	188	321	664	115
Total # taxa	37	33	40	57	25
Diversity (H')	3.087	2.770	2.052	3.015	2.638
Equitability (J')	.855	.792	.556	.746	.652

Figure 1. Location of benthic sampling areas in New York Bight. Alternate dump sites #1 (north) and #2 (south) indicated by 1.

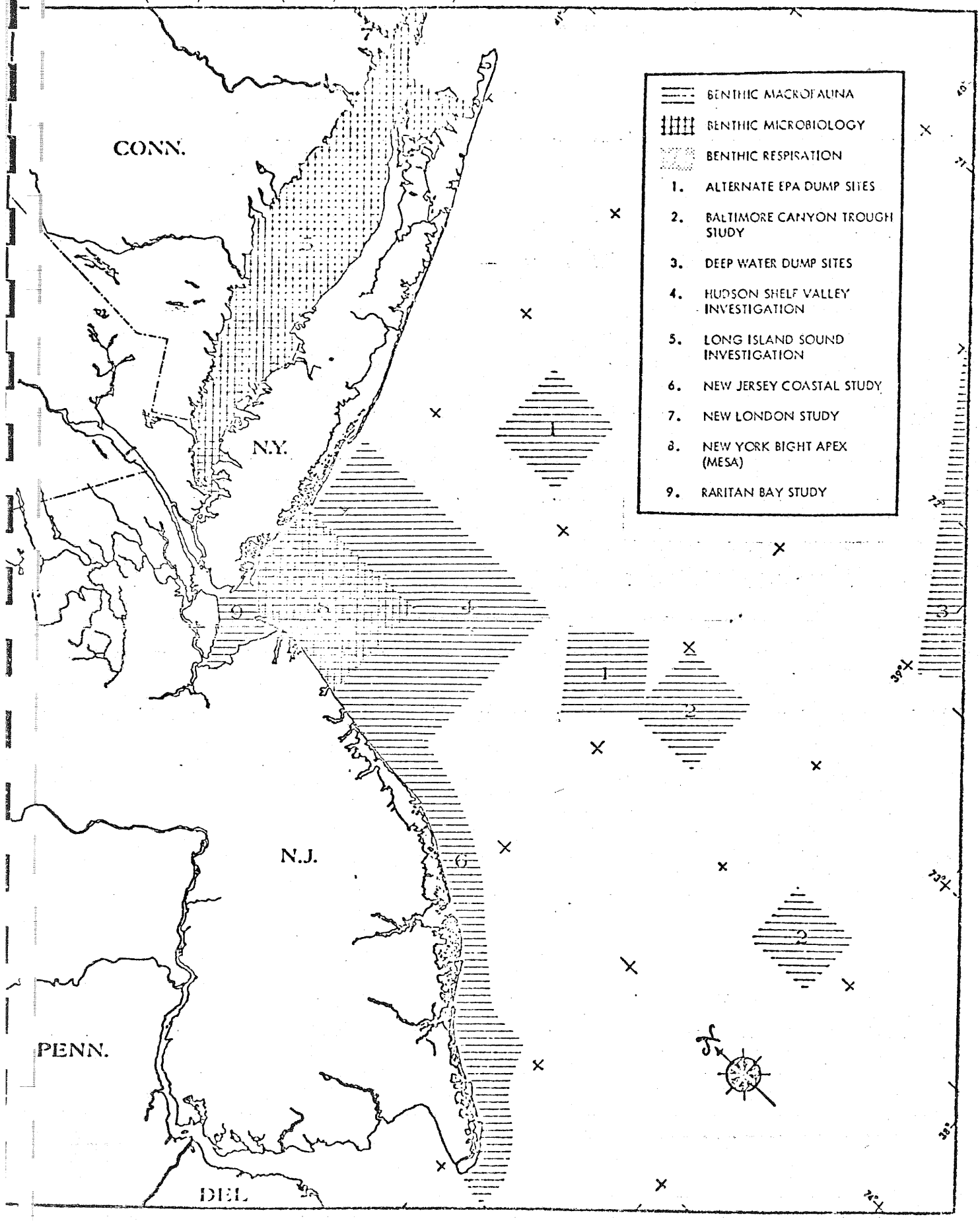


Figure 3. Benthic sampling stations located within alternative dump site area #1 (north):

• = Stations sampled with Smith-McIntyre Grab

X = Stations at which bottom photographs were taken

O = Stations from which samples have been sorted.

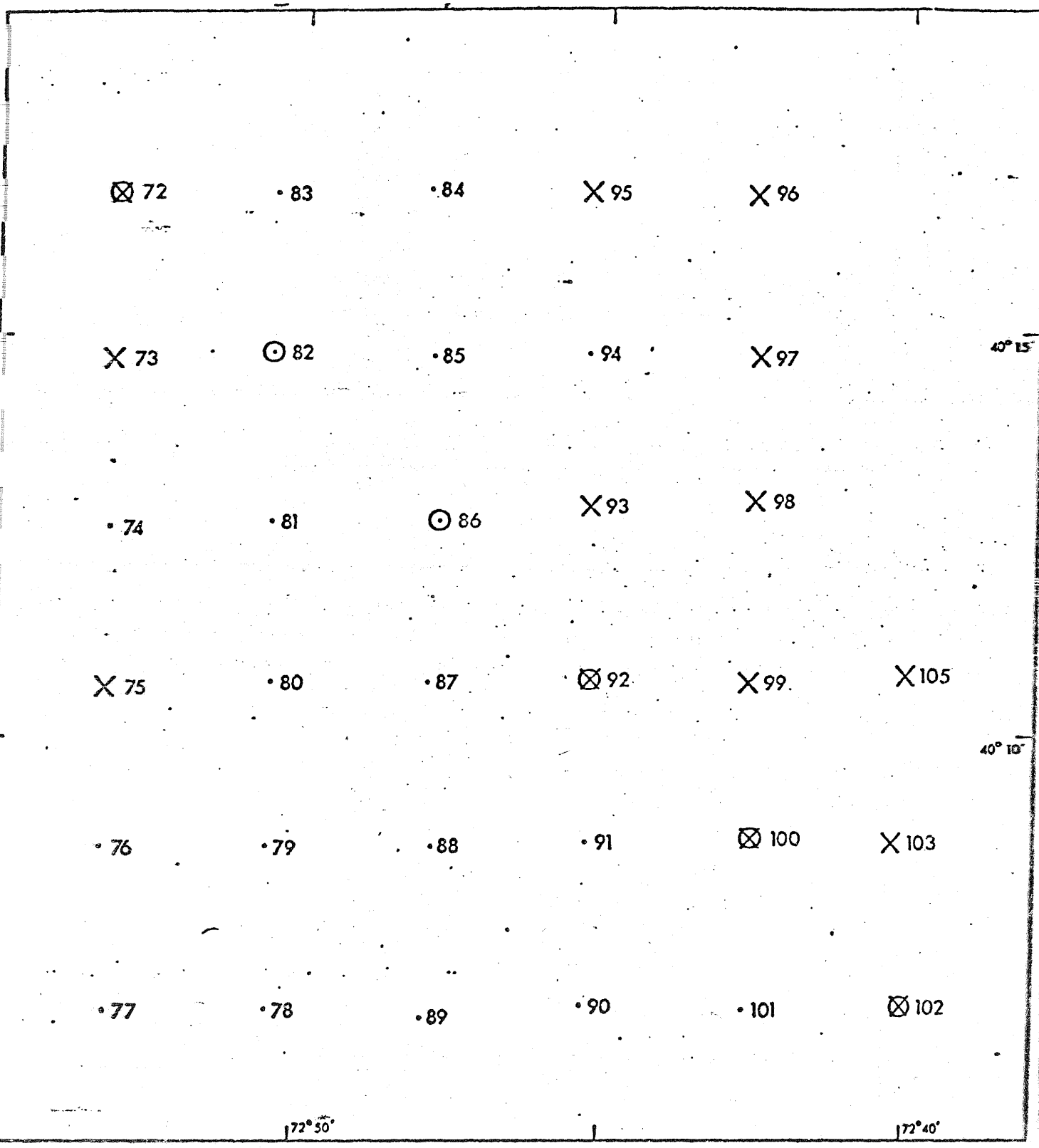
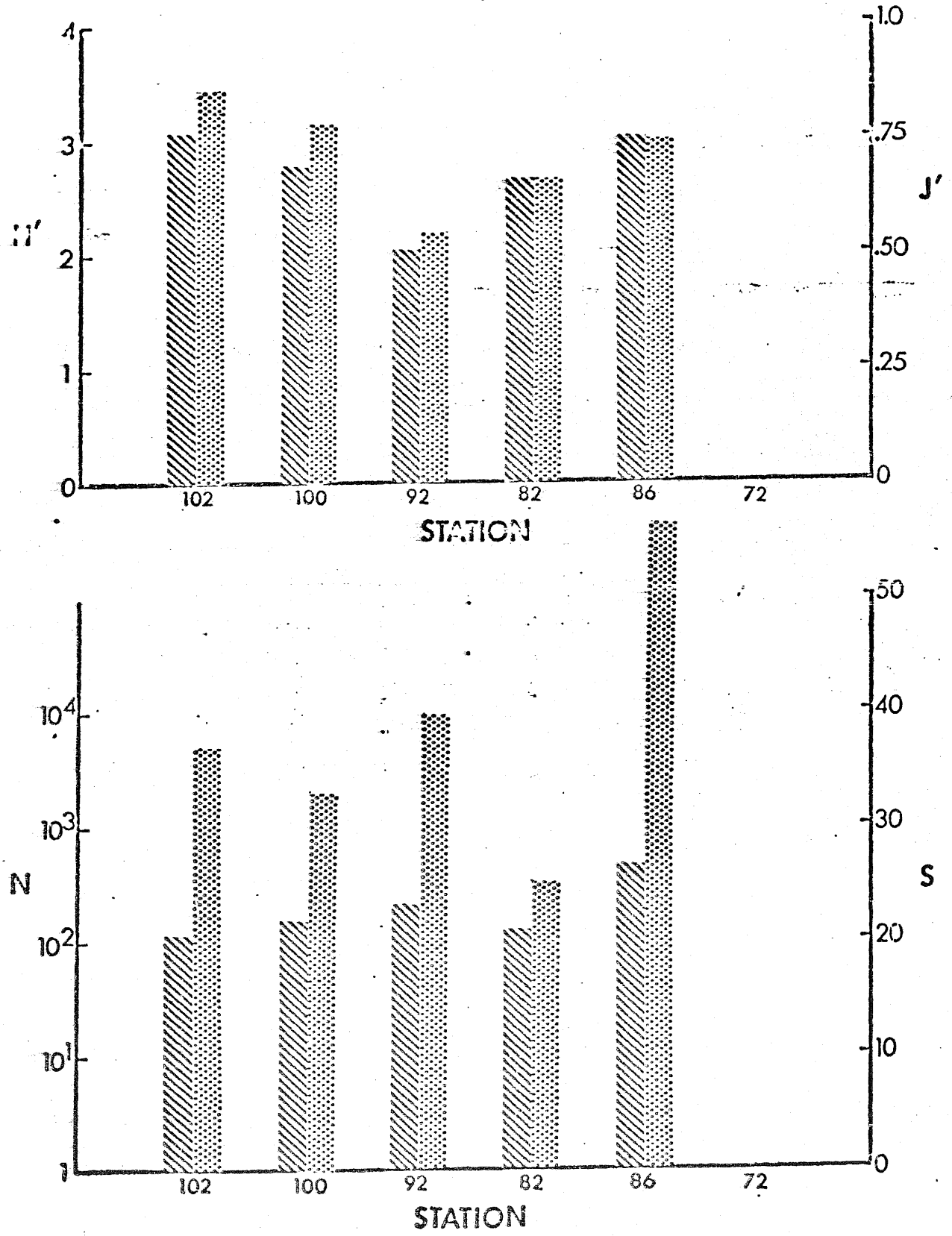


Figure 3.


H'
J'
0
1
2
3
4
0
.25
.50
.75
1.0
102
100
92
82
86
72
STATION
N
S
1
10^1
10^2
10^3
10^4
0
10
20
30
40
50
102
100
92
82
86
72
STATION
N = INDIVIDUALS
S = SPECIES
H' = DIVERSITY
J' = EQUITABILITY

Figures 4 - 17. Photographs showing epibenthic communities at selected stations in alternate dump site #1.

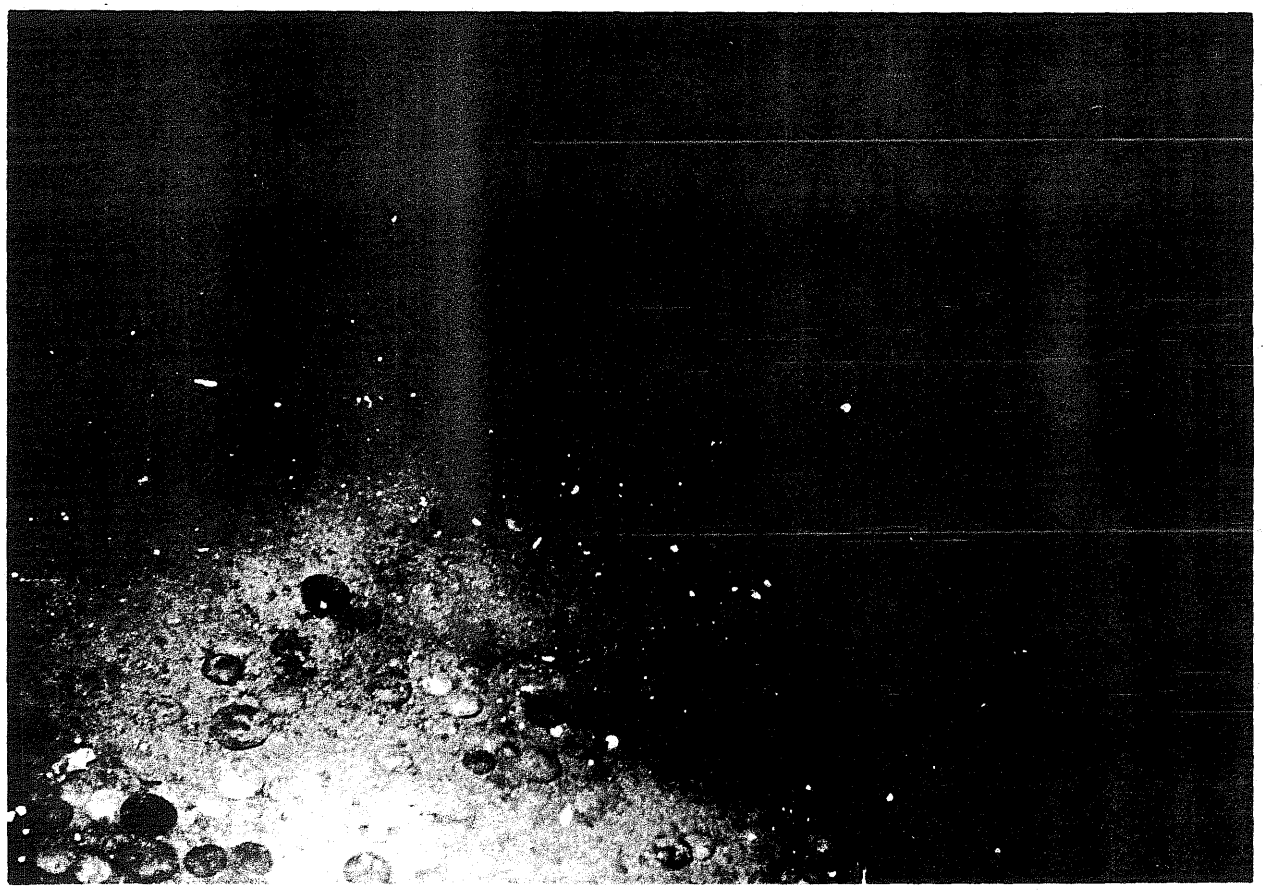


Figure 4. Station 72

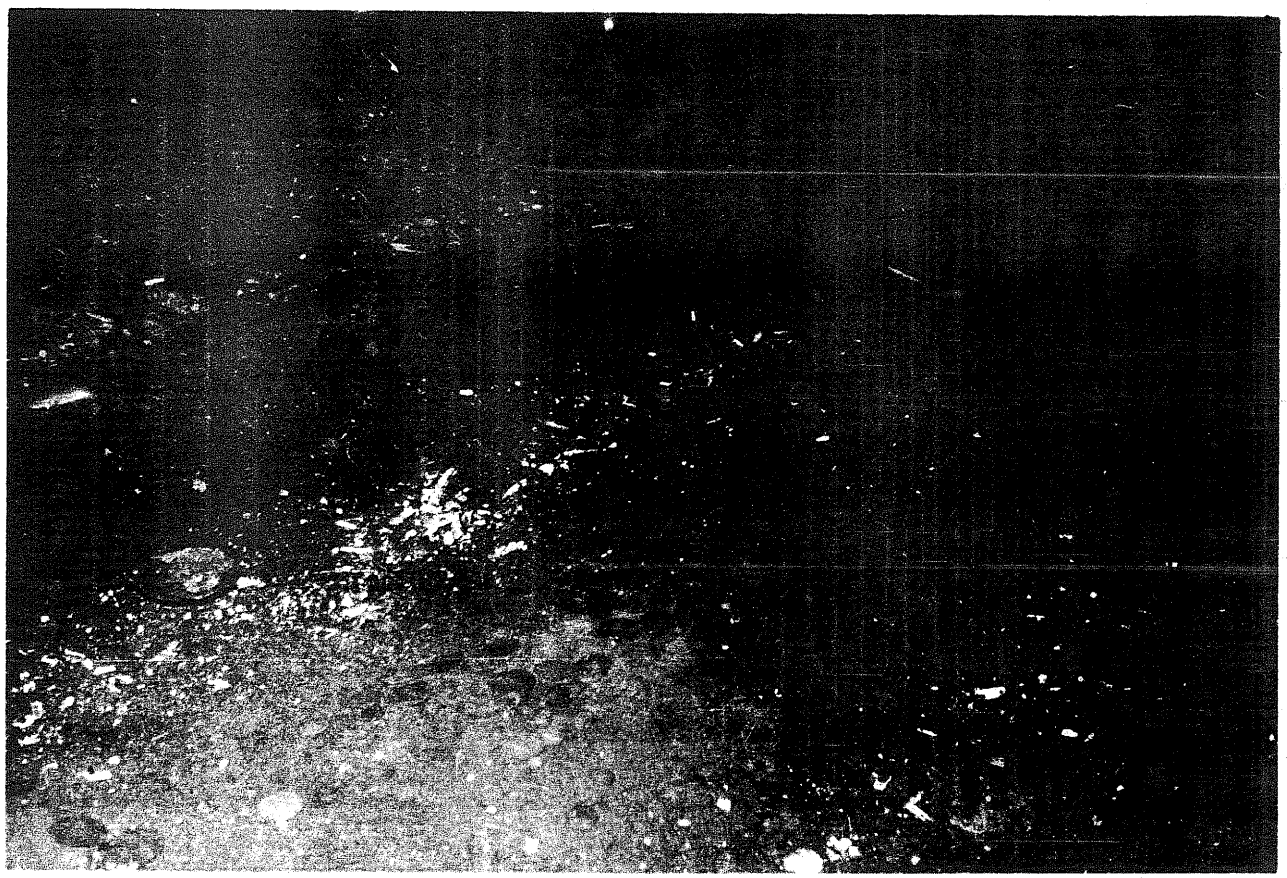


Figure 5. Station 73

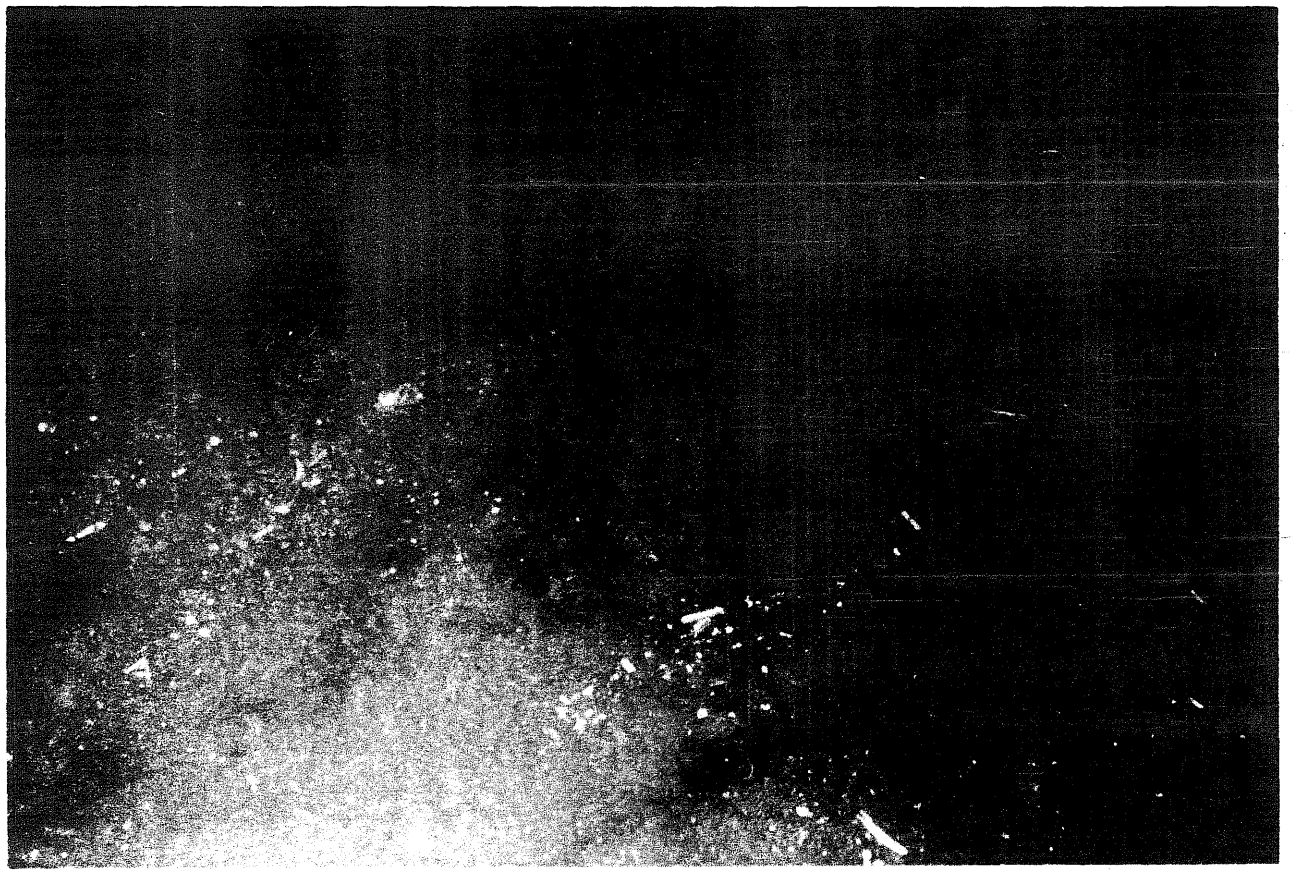


Figure 6. Station 75

Figure 7. Station 92

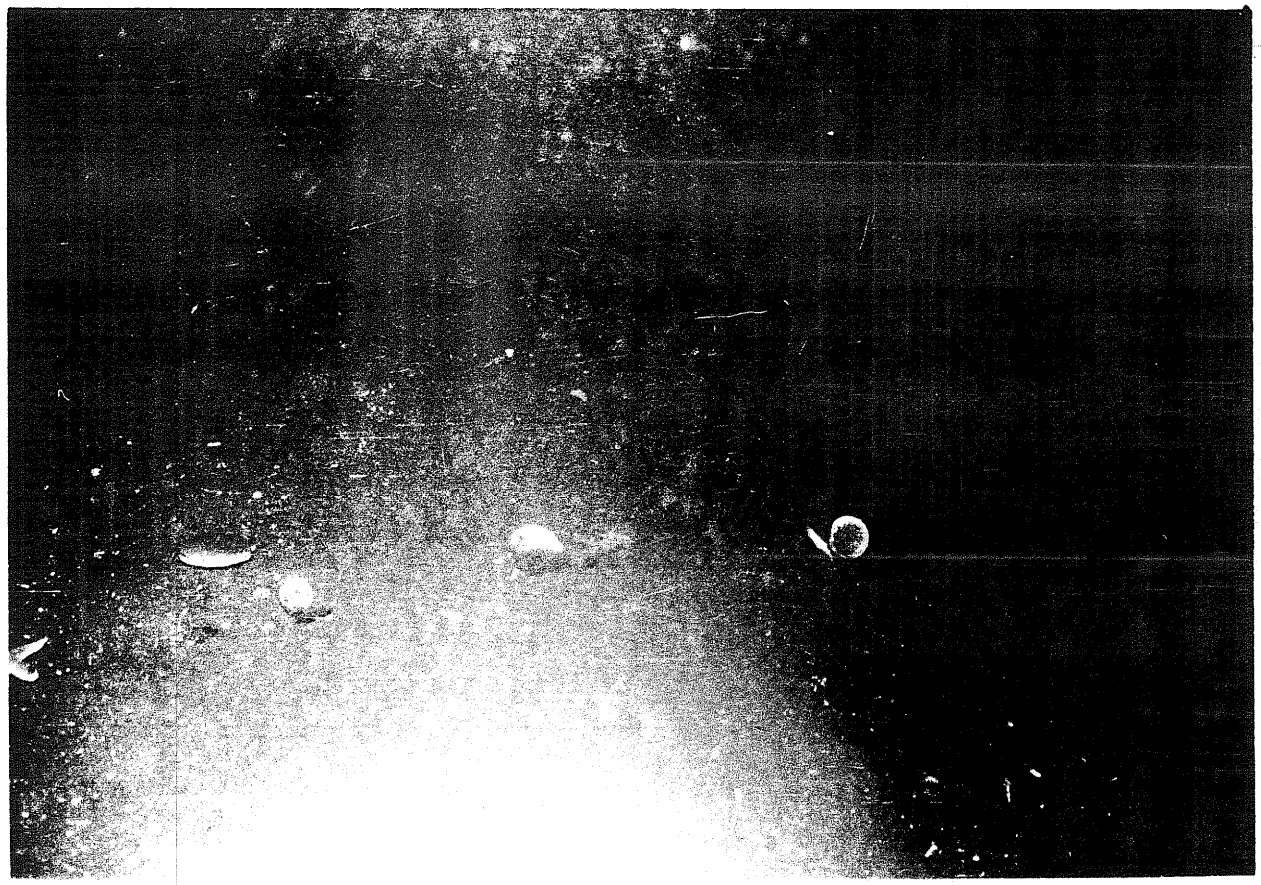


Figure 8. Station 93

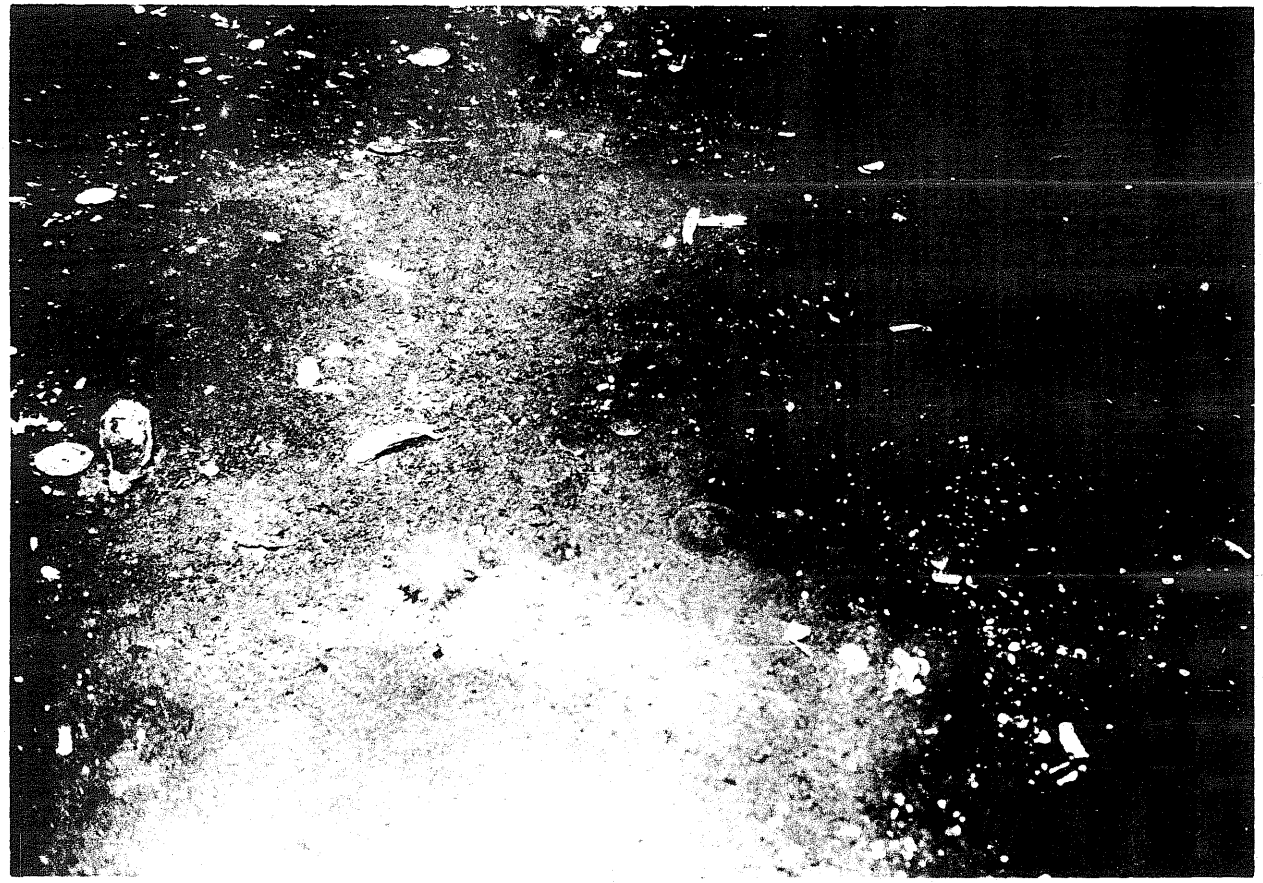


Figure 9. Station 95

Figure 10. Station 96

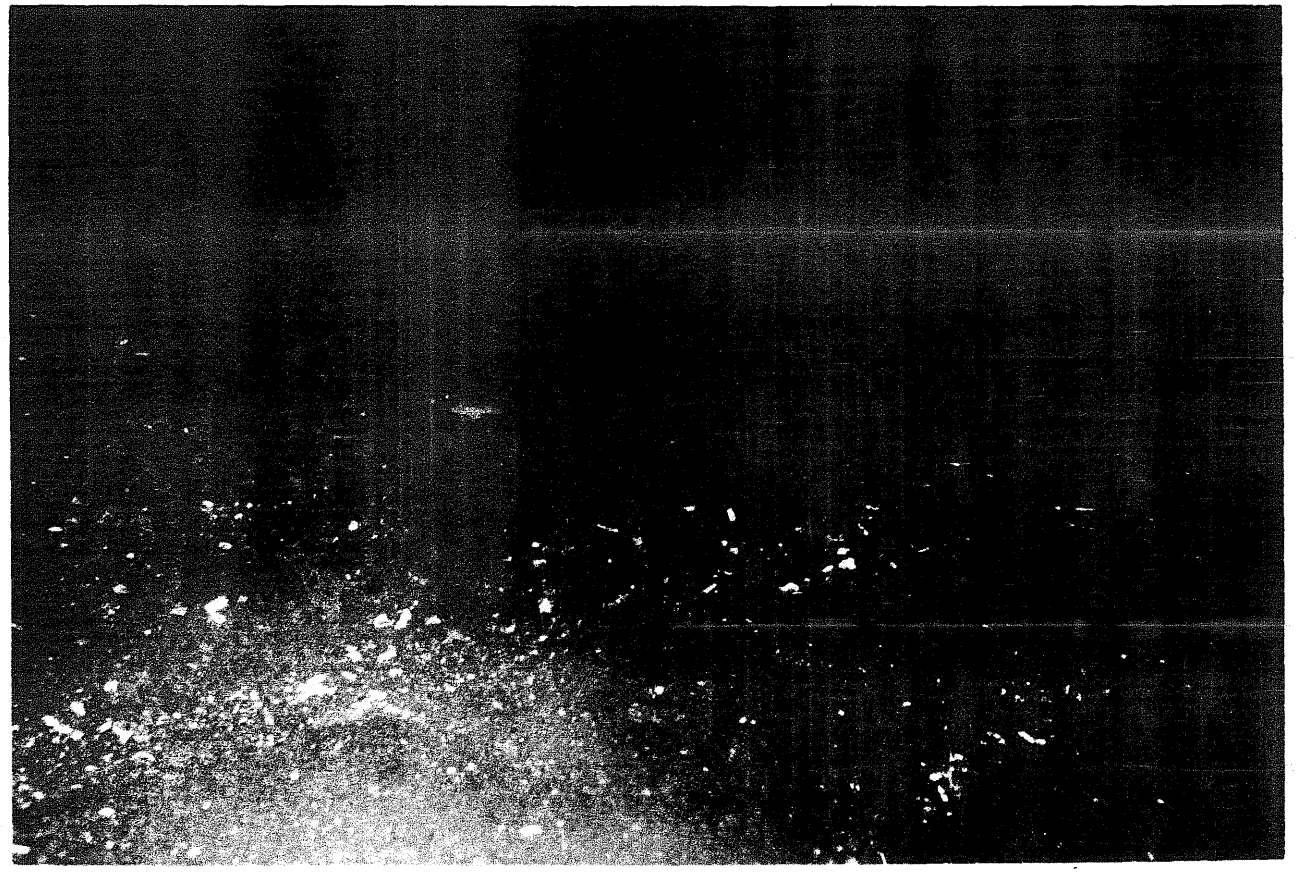


Figure 11. Station 97

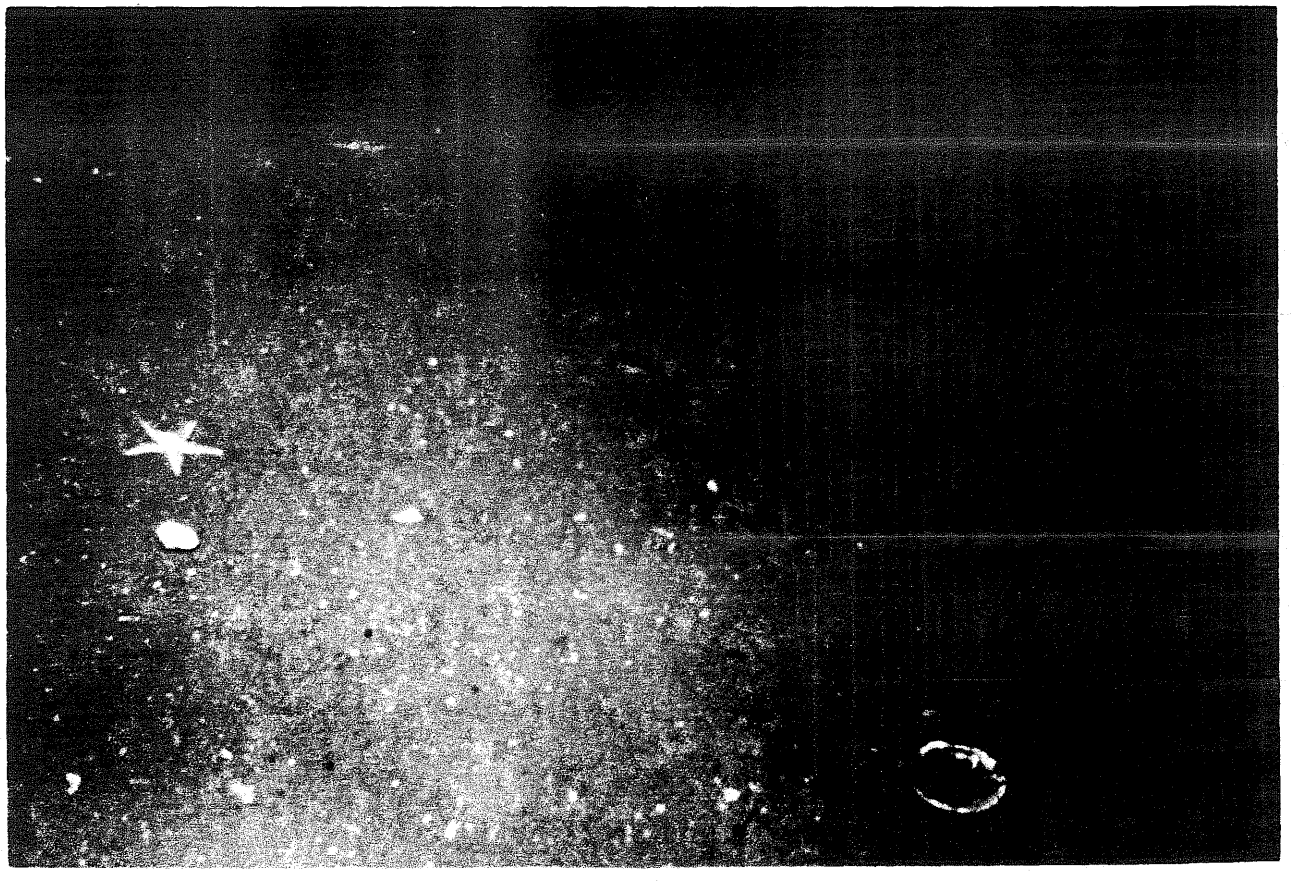


Figure 12. Station 98

Figure 13. Station 99

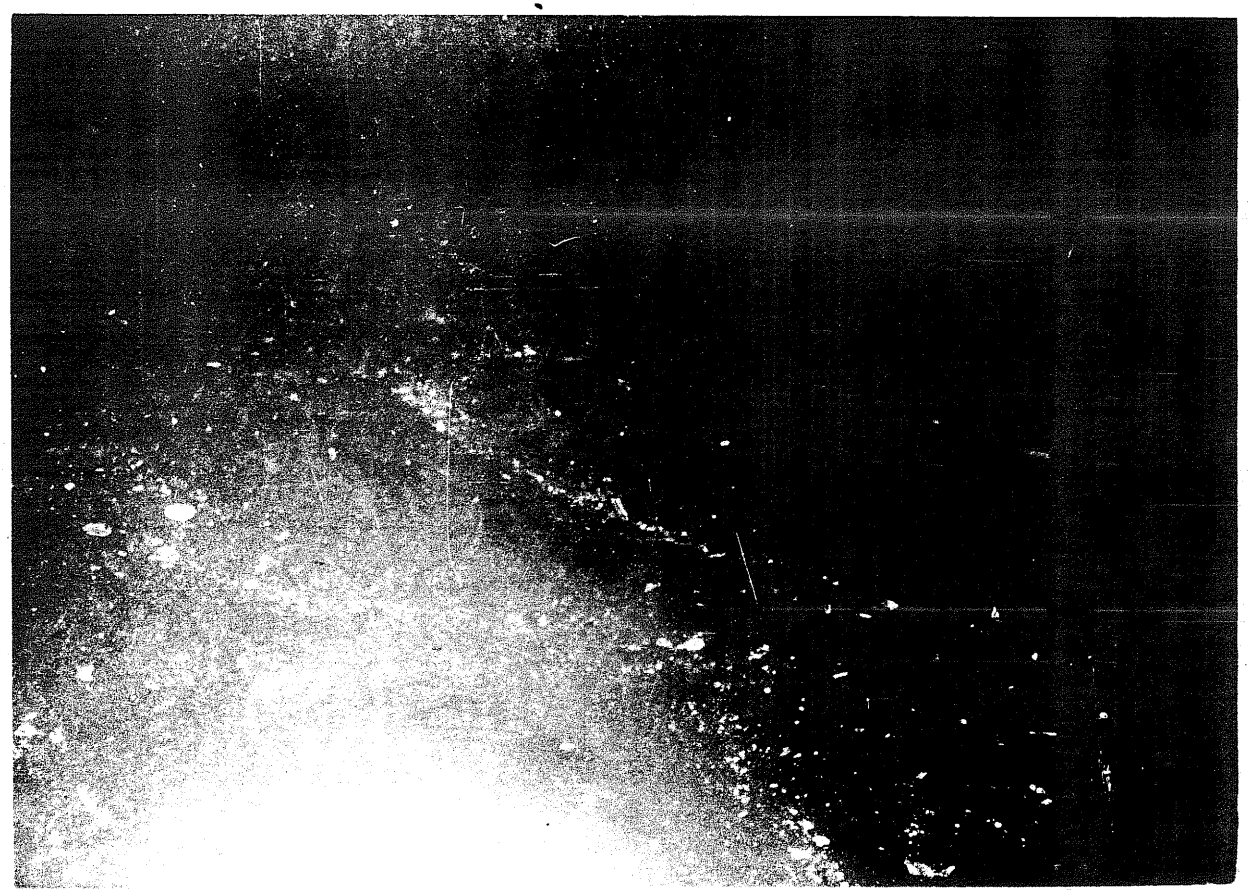


Figure 14. Station 100

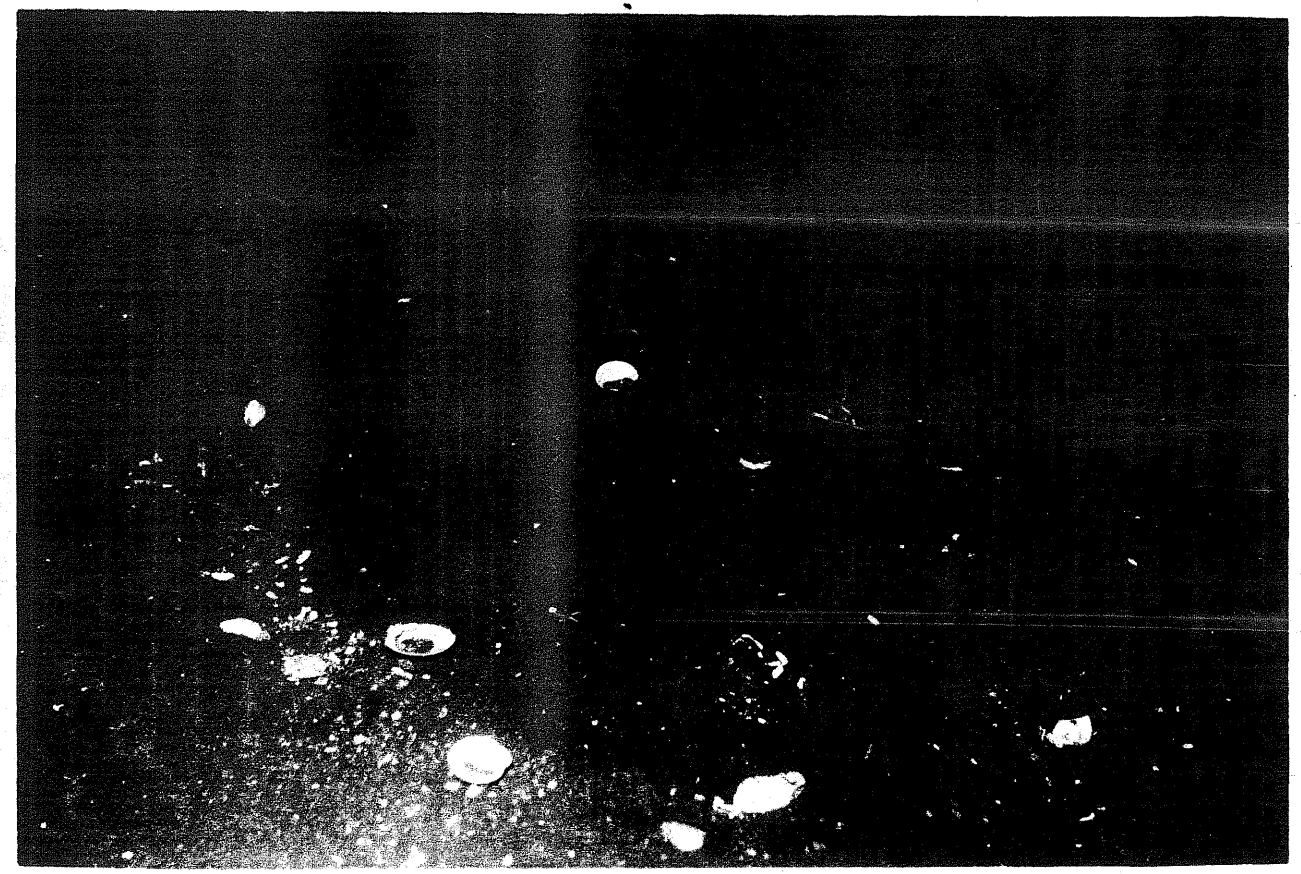


Figure 15. Station 102

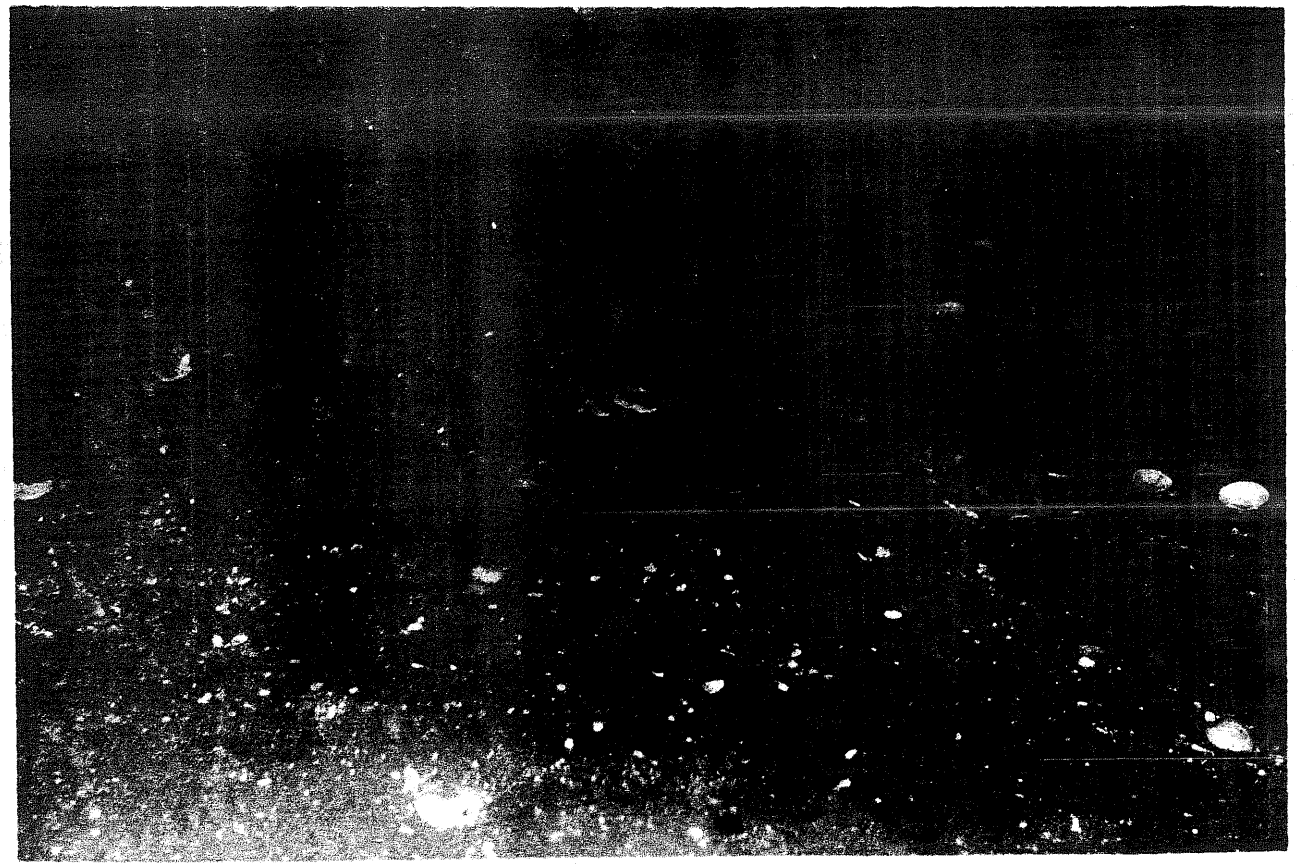


Figure 16. Station 103

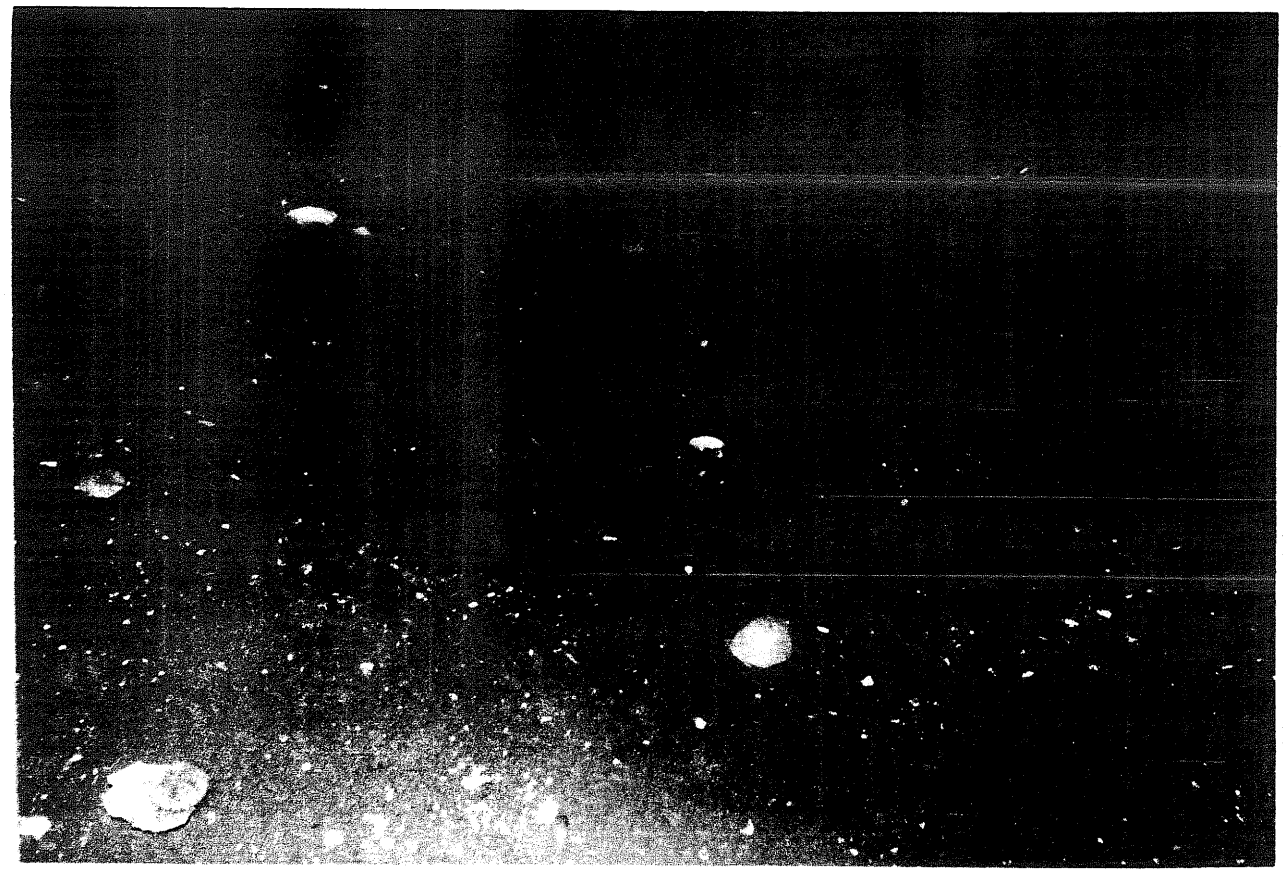


Figure 17. Station 104