

THIRD SUMMARY REPORT

on

**THE GEORGES BANK
BENTHIC MONITORING PROGRAM**

to

**UNITED STATES DEPARTMENT OF THE INTERIOR
MINERALS MANAGEMENT SERVICE
Washington, D.C. 20240**

Under Contract No. 14-12-0001-29192

April 15, 1983

**BATTELLE
New England Marine Research Laboratory
397 Washington Street
Duxbury, MA 02332**

AND

**WOODS HOLE OCEANOGRAPHIC INSTITUTION
Woods Hole, MA 02543**

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INTRODUCTION

This report comprises the Third Summary Report on progress on the Georges Bank Benthic Infauna Monitoring Program under Contract No. 14-12-0001-29192 to Battelle New England Marine Research Laboratory and its subcontractor, Woods Hole Oceanographic Institution. It is a report on the progress which has been made on samples taken during Cruises M5, M6, and M7, and covers the period October 1, 1982 to April 1, 1983.

The primary objective of the Georges Bank Monitoring Program is to link the fate of discharges from oil and gas exploratory operations to effects on nearby benthic species and communities. The extent of deposition and accumulation of toxic materials as a result of drilling activities and the resultant effects on the benthic biota are to be determined. While two additional contractors are responsible for analysis of trace metals

and hydrocarbons in sediments and biota, the major specific question to be addressed by the Battelle/W.H.O.I. portion of the program is whether benthic infaunal populations change at selected regions on Georges Bank during various stages of OCS oil and gas exploratory activity compared with control sites, and whether these changes can be related to observed changes in pollutant levels associated with discharges.

The Biological Task Force (BTF) for OCS Lease Sale No. 42 on Georges Bank was established to recommend to the Department of the Interior, Minerals Management Service, Supervisor of Oil and Gas Operations in the North Atlantic "the design of environmental studies and surveys as well as periodic sampling of environmental conditions to provide warning of adverse effects of OCS exploration". The Minerals Management Service of the U.S. Department of the Interior has implemented the monitoring program recommended by the BTF, with some modifications in sampling stations and methodology.

METHODS

Field Sampling

All station locations sampled on Cruise M5 (July, 1982), M6 (November, 1982), and M7 (February, 1983) were the same as those sampled during the first year, with three exceptions. Changes of station locations which were recommended at the June 24, 1982 meeting of the Scientific Review Board were implemented. Regional Stations 7 and 14, which were sampled during the first year, were relocated to nearby areas and designated as Stations 7A and 14A. Station 7A is at the head of Lydonia Canyon, and Station 14A is in the Great South Channel of the Gulf of Maine. Starting with Cruise M4, Station 13 was relocated to Station 13A in order to sample an area of the "Mudpatch" which had finer sediments. The locations of stations sampled during all seven cruises are given in the Final Report for Year One (Battelle and W.H.O.I., 1983, Table 3, Figs. 2 and 3).

Laboratory Processing

Laboratory processing procedures for the Van Veen grab samples, rocking chair dredge samples, otter trawl samples, bottom photographs and sediment grain size analysis

essentially have not been changed during the second year, and are described in the Final Report for Year One (Battelle and W.H.O.I., 1983). The procedure for preparation of sediment samples for CHN analyses was revised and an additional step of treating the samples with sulfurous acid to remove carbonate carbon was added. Final analyses of the CHN composition will be made on the Perkin-Elmer CHN Elemental Analyzer Model 240, as during the first year of the project.

Selected species were taken from the archived infaunal samples of Cruises M1 through M4, and from ongoing work on Cruises M5 and M6 as they were processed, for life history analyses. To date, work has concentrated on the polychaetes. Nine species have been examined. These include species from the families Cossuridae, Paraonidae and Cirratulidae. These worms tend to coil or fragment easily, making it difficult to obtain accurate length measurements. To substitute for this measurement, a series of alternate measurements are taken from complete specimens. These include counts of total setigers, width measurements across the thorax, length from the tip of the prostomium to the first setiger and, if appropriate, the length of the branchial region with total numbers of branchiae. From these data points, an appropriate measurement is selected following a regression analysis performed against total number of setigers. Once an appropriate measurement is selected we can process several samples fairly rapidly. Where possible, additional data are collected on the state of reproduction including presence of natatory setae, eggs, sperm or modified segments. Egg measurements are obtained for some species. For at least one species (Cossura longicirrata) it is necessary to use total setiger counts due to the variety of modified body segments found on reproductive individuals.

PROGRESS TO DATE

Weather conditions allowed for all samples to be taken on Cruises M5 and M6; these are listed in each Cruise Report from M5 and M6 (Battelle and W.H.O.I., 1982 a and b, Table 1). Inclement weather made sampling impossible at some stations and with some types of gear during Cruise M7. Most of the regional stations were sampled, however most of the site-specific stations were not sampled. The Cruise Report for M7 lists the samples taken (Battelle and W.H.O.I., 1982c, Table 1).

Van Veen Grab Samples

Appendix A summarizes our progress to date in the laboratory analysis of the infaunal grab samples. Sorting, identification, and weighing of all samples from Cruise M5 and samples from Cruise M4, Station 13A are complete. Sorting, identification, and weighing of mollusca, echinoderms, and miscellaneous groups are nearly complete for Cruise M6 samples. Identification and weighing of the Cruise M6 polychaetes and arthropods are approximately 50% complete. A sample from Cruise M6, Station 5-1, Replicate 3, was not preserved aboard ship, and consequently was not analyzed. Table 1 is a list of the species which were first identified in Cruise M5 and M6 samples. Laboratory processing has not begun on samples from Cruise M7.

A preliminary comparison of the new regional stations to the ones they replaced was made. Stations 7 and 7A are near the head of Lydonia Canyon. Station 7A had a somewhat different species composition with a higher species richness (number of species) and a higher density of organisms than Station 7. Fauna collected at Station 7A was similar to that at other stations with relatively high percentages of mud, such as Station 13. The polychaetes, Levensenia gracilis and Aricidea suecica, were abundant at Station 7A, and rare or absent at Station 7. The oligochaetes, Limnodriloides medioporus and Peloscolex intermedius, were common at 7A, and two different species which are characteristic of coarse or medium sand were found at Station 7. The tube-building amphipod, Ampelisca agassizi, was more common at Station 7A. Organisms typically found attached to hard substrates such as hydroids, bryozoans, limpets, and chitons were found at Station 7 and not at Station 7A.

Both Stations 13 and 13A have similar species compositions, which are characteristic of muddy sediments. Densities of all taxonomic groups except polychaetes were higher at Station 13A than at Station 13. The abundance of the amphipod, Ampelisca agassizi, increased from approximately 25 per replicate at Station 13 to over 150 specimens per replicate at Station 13A. The bivalve, Periploma papyratium, was also more abundant at Station 13A, while Nucula proxima was less abundant. The brittle star, Amphiplus abditus, was common at Station 13A, and absent at Station 13. The oligochaetes, Limnodriloides medioporus and Peloscolex intermedius, were common at both stations. The polychaetes, Exogone verugera and Aricidea suecica, were common at Station 13A, whereas densities of Euchone incolor, Levensenia gracilis, and Cossura longicirrata were much lower at Station 13A than at Station 13.

Station 14 was located in an area of sabellid reefs in the Gulf of Maine, where the polychaete Chone sp. A was the dominant organism and averaged nearly 1,500 specimens per replicate in July, 1981 (M1). At Station 14A polychaetes frequently associated with mud, such as Tharyx annulosus and Euchone incolor, were abundant. The bivalve, Nuculana messanensis was more common at Station 14A than at any other station. Few oligochaetes, arthropods, and echinoderms were collected at either station.

Rocking Chair Dredge Samples

During Cruises M5 and M6, rocking chair dredge samples were taken at all the designated stations. During M7, only two replicate samples were collected at Station 1, due to inclement weather. Specimens of the ocean quahog, Arctica islandica, were retained for tissue analysis by representatives from Science Applications, Inc. None were archived at Battelle.

Otter Trawl Samples

During Cruise M5, otter trawl samples were collected at Stations 2, 13, and between Stations 5-14 and 5-22. On Cruise M6, otter trawl samples were collected at Stations 2, 13, 13A and between Stations 5-14 and 5-22. One unsuccessful otter trawl sample was made during Cruise M7 at Station 1. Various species of flounder were taken for chemical analysis, and one specimen of each species was preserved and archived at Battelle.

Bottom Photo Analysis

Useful film footage from Cruise M5 was obtained from all stations except Stations 12 through 15, and Stations 5-11, 5-12, and 5-28. Photographs were taken at most stations on Cruise M6 and at most regional stations on Cruise M7. No photographs were obtained from the site-specific stations on Cruise M7 due to inclement weather. Photographs taken on Cruise M5 have been analyzed and duplicate slides made. All original film and duplicate slides are archived at Battelle.

Life History Analyses

To date we have worked on eight species, with emphasis on Stations 13 and 5. Measurements and observations on the following species, from the following stations and cruises have been completed:

1. Cossura longicirrata, Sta. 13 (M1 through M5)
2. Levensenia gracilis, Sta. 13 (M1)
3. Aricidea catherinae, Sta. 13 (M1)
4. Aricidea suecica, Sta. 13 (M1)
5. Tharyx acutus, Sta. 13 (M1 through M4); Sta. 5-1 (M1 through M4)
6. Tharyx annulosus, Sta. 13 (M1 through M4); Sta. 5-1 (M1 through M4)
7. Tharyx dorsobranchialis, Sta. 13 (M1 through M4)
8. Tharyx sp. A, Sta. 5-1 (M1 through M4)

Gametes have been observed in all species. Preliminary results indicate that definite periods of reproduction and recruitment can be identified. For example, smaller Cossura longicirrata are more abundant in the Cruise M4 (May, 1982) samples than in samples from the three previous collecting periods. This also corresponds to the time of lowest density for the species. The subsequent cruise (M5) in July, 1982 had very high densities. For some species, there is definite indication of summer reproduction (Aricidea suecica) while for others, a winter reproduction (Tharyx acutus) is suggested.

Secondary Production

A technique for computer-integrated measurements of specimens has been developed. Arthropod samples from Cruises M1 and M3 have been transferred from Battelle to W.H.O.I. Work on establishing a regression between the biomass of individuals and the appropriate length measurement has begun.

Grassle Historical Sample Analyses

A total of 16 samples from Grassle's Station A have been sorted and transferred to W.H.O.I. for counts and identifications. None of the samples have been completely identified to date.

CHN Analysis

None of the samples taken on Cruises M5, M6 or M7 for CHN analysis have been completely analyzed at this time. Details of the revised procedure for preparation of the samples will be finalized and implemented by 15 April 1983.

Sediment Grain Size Analysis

Samples collected on Cruise M5 have been analyzed. Samples from Cruises M6 and M7 have not yet been processed.

Hydrographic Measurements

All dissolved oxygen, salinity and temperature profile data are currently archived at Battelle.

Data Processing

Verification of all data from the first year has been done. Copies of verified raw data are stored on disk. Various SORT routines have been written to provide information about stations at which particular species occur.

Additional N.O.D.C. (NOAA Office of Data Codes) codes have been requested for species collected during the first year.

LITERATURE CITED

- Battelle and Woods Hole Oceanographic Institution. 1982a. Cruise Report BLM-M5 R/V Oceanus: 21 July - 28 July 1982 for Georges Bank Benthic Infauna Monitoring Program. Duxbury, MA unnumbered pages.
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- Battelle and Woods Hole Oceanographic Institution. 1982c. Cruise Report MMS-M7 R/V Endeavor: 5 February - 11 February 1983 for Georges Bank Benthic Infauna Monitoring Program. Duxbury, MA 10 pp.
- Battelle and Woods Hole Oceanographic Institution. 1983. Georges Bank Benthic Infauna Monitoring Program Final Report for Year One. Duxbury, MA 153 pp.

TABLE 1. ADDITIONAL TAXA COLLECTED IN GEORGES BANK
INFAUNAL SAMPLES FROM CRUISES M5 and M6

PORIFERA

Halichondria bowerbanki Burton, 1930

CNIDARIA

HYDROZOA

Antennularia americana Nutting, 1900
Calycella syringa (Linnaeus, 1767)
Clytia johnstoni (Alder, 1856)
Sertularella gigantea Mereschkowsky, 1878
Thuiaria argentea (Linnaeus, 1758)
Thuiaria tenera (Sars, 1873)

ANTHOZOA

Cerianthus borealis Verrill, 1865
Hexactiniae sp. D, sp. E, sp. F, sp. G
Anthozoa sp. I, sp. J

NEMERTEA

Zygeupolia spp.

ANNELIDA

OLIGOCHAETA

Tubificidae

Adelodrilus multispinosus Erseus, 1979
Heterodrilus sp. A

POLYCHAETA

Ampharetidae

Samytha sexcirrata Sars, 1856

Arabellidae

Arabellidae sp. C
Arabellidae sp. D

Dorvilleidae

Ophryotrocha sp. B
Protodorvillea minuta (Hartman, 1965)
Schistomeringos sp. E

Flabelligeridae

Flabelligera cf. cirrifera
Flabelligera sp. C
Flabelligeridae sp. A

Maldanidae

Clymenura sp. A
Maldanella sp. A
Maldanidae sp. F, sp. G
Nicomache lumbricalis (Fabricius, 1780)

Nereididae

Ceratocephale loveni Malmgren, 1867
Nereis sp. A, sp. B

Onuphidae

Mooreonuphis sp. A
Onuphis opalina (Verrill, 1873)
Rhamphobrachium sp. B

Opheliidae

Ophelina abranchiata Støp-Bowitz, 1948

Oweniidae

Myriowenia nr. californienis Hartman, 1960

Paraonidae

Aricidea nr. hartmani (Strelzov, 1968)
Aricidea sp. E, sp. F

Phyllodocidae

Mystides rarica (Ushakov, 1958)

Pilargidae

Ancistrosyllis groenlandica McIntosh, 1879
Synelmis klatti (Friedrich, 1950)

Polygordidae

Polygordius sp. B

Polynoidae

Eucranta villosa Malmgren, 1865

Nemidia torelli Malmgren, 1865

Sphaerodoridae

Sphaerephesia nr. similisetis Fauchald, 1972

Terebellidae

Leaena nr. abbranchiata (Sars, 1865)

Leaena minima Hartman & Fauchald, 1971

Polycirrus sp. D, sp. F, sp. G, sp. H

MOLLUSCA

GASTROPODA

Prosobranchia

Alvania harpa Verrill, 1882

Alvania mighelsii (Stimpson, 1851)

Opisthobranchia

Okenia sp. A

Onchidoris sp. A

Onchidoris aspera Adler & Hancock, 1842

Philine quadrata Wood, 1839

BIVALVIA

Astarte elliptica Brown, 1827

Cuspidaria pellucida Stimpson, 1853

Leptonacea sp. B

Nuculana pernula Müller, 1779

Solemya borealis Totten, 1834

ARTHROPODA

PYCNOGONIDA

Anoplodactylus lentus Wilson, 1878

MALACOSTRACA

Stomatopoda

Platysquilla nr. enodis (Manning, 1962)

Cumacea

Diastylis cornuifer (Blake, 1929)

Isopoda

Hemiarthrus abdominalis (Kroyer)

Amphipoda

Hyperiidea

Hyperia glaba (Montagu)
Hyperiidea sp. A, sp. B

Amphiloichidae

Gitana nr. sarsi

Calliopiidae

Haliragoides inermis (Sars, 1882)

Ischyroceridae

Idunella sp. A

Liljeborgidae

Liljeborgidae sp. A

Lysianassidae

Lysianassidae sp. C

Pleustidae

Pleustidae sp. B

Stegocephalidae

Andaniopsis nordlandica (Boeck)

Caprellidea

Caprella linearis (Linnaeus, 1767)

Decapoda

Hippolytidae

Hippolytidae sp. A

Pandalidae

Dichelopandalus leptoceras (Smith, 1881)

Paguridae

Pagurus politus (Smith, 1882)

Brachyura

Brachyura sp. B

ECTOPROCTA

Alcyonidiidae

Alcyonidium parasiticum (Fleming, 1828)

Flustrellidridae

Flustrellidra hispida (Fabricius, 1780)

Calloporidae

Amphiblestrum flemingi (Busk, 1854)

ECHINODERMATA

OPHIUROIDEA

Ophiuroidea, sp. H, juv.

ASTEROIDEA

Asteroidea sp. D, juv.

HOLOTHUROIDEA

Cucumaria frondosa
Havelockia scabra

APPENDIX A

PROGRESS CHARTS

SAMPLES SORTED

Regional Stations	M-5						M-6						M-7						M-8					
	1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6
1	X	X	X	X	X	X	X	X	X	X	X	X												
2	X	X	X	X	X	X	X	X	X	X	X	X												
3	X	X	X	X	X	X	X	X	X	X	X	X												
4	X	X	X	X	X	X	X	X	X	X	X	X												
6	X	X	X	X	X	X	X	X	X	X	X	X												
7A	X	X	X	X	X	X	X	X	X	X	X	X												
8	X	X	X	X	X	X	X	X	X	X	X	X												
9	X	X	X	X	X	X	X	X	X	X	X	X												
10	X	X	X	X	X	X	X	X	X	X	X	X												
11	X	X	X	X	X	X	X	X	X	X	X	X												
12	X	X	X	X	X	X	X	X	X	X	X	X												
13	X	X	X	X	X	X	X	X	X	X	X	X												
13A	X	X	X	X	X	X	X	X	X	X	X	X												
14A	X	X	X	X	X	X	X	X	X	X	X	X												
16	X	X	X	X	X	X	X	X	X	X	X	X												
17	X	X	X	X	X	X	X	X	X	X	X	X												
18	X	X	X	X	X	X	X	X	X	X	X	X												

Total M-5 Samples	Total M-6 Samples	Total M-7 Samples	Total M-8 Samples
<u>102</u>	<u>102</u>	<u>78</u>	<u> </u>
Number Completed	Number Completed	Number Completed	Number Completed
<u>102</u>	<u>102</u>	<u>0</u>	<u> </u>

SAMPLES SORTED

Site-Specific Stations	M-5						M-6						M-7						M-8					
	1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6
S-1(=R-5)	X	X	X	X	X	X	X	X		X	X	X												
S-2	X	X	X	X	X	X	X	X		X	X	X												
S-3	X	X	X	X	X	X	X	X		X	X	X												
S-4	X	X	X	X	X	X	X	X		X	X	X												
S-5	X	X	X	X	X	X	X	X		X	X	X												
S-6	X	X	X	X	X	X	X	X		X	X	X												
S-8	X	X	X	X	X	X	X	X		X	X	X												
S-9	X	X	X	X	X	X	X	X		X	X	X												
S-10	X	X	X	X	X	X	X	X		X	X	X												
S-11	X	X	X	X	X	X	X	X		X	X	X												
S-12	X	X	X	X	X	X	X	X		X	X	X												
S-14	X	X	X	X	X	X	X	X		X	X	X												
S-16	X	X	X	X	X	X	X	X		X	X	X												
S-18	X	X	X	X	X	X	X	X		X	X	X												
S-20	X	X	X	X	X	X	X	X		X	X	X												
S-22	X	X	X	X	X	X	X	X		X	X	X												
S-25	X	X	X	X	X	X	X	X		X	X	X												
S-28	X	X	X	X	X	X	X	X		X	X	X												
S-29	X	X	X	X	X	X	X	X		X	X	X												

Total M-5 Samples	Total M-6 Samples	Total M-7 Samples	Total M-8 Samples
<u>114</u>	<u>113</u>	<u>18</u>	<u> </u>
Number Completed	Number Completed	Number Completed	Number Completed
<u>114</u>	<u>82</u>	<u>0</u>	<u> </u>

ARTHROPOD SAMPLES COMPLETED

Regional Stations	M-5						M-6						M-7						M-8					
	1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6
1	X	X	X	X	X	X	X	X	X	X	X													
2	X	X	X	X	X	X	X	X	X	X	X													
3	X	X	X	X	X	X																		
4	X	X	X	X	X	X	X	X	X	X	X													
6	X	X	X	X	X	X																		
7A	X	X	X	X	X	X	X	X	X	X	X													
8	X	X	X	X	X	X																		
9	X	X	X	X	X	X	X	X	X	X	X													
10	X	X	X	X	X	X	X	X	X	X	X													
11	X	X	X	X	X	X																		
12	X	X	X	X	X	X																		
13	X	X	X	X	X	X																		
13A	X	X	X	X	X	X																		
14A	X	X	X	X	X	X																		
16	X	X	X	X	X	X	X	X	X	X	X													
17	X	X	X	X	X	X	X	X	X	X	X													
18	X	X	X	X	X	X	X	X	X	X	X													

Total M-5 Samples	Total M-6 Samples	Total M-7 Samples	Total M-8 Samples
<u>102</u>	<u>102</u>	<u>78</u>	<u> </u>
Number Completed	Number Completed	Number Completed	Number Completed
<u>102</u>	<u>54</u>	<u>0</u>	<u> </u>

ARTHROPOD SAMPLES COMPLETED

Site-Specific Stations	M-5						M-6						M-7						M-8					
	1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6
5-1(=R-5)	X	X	X	X	X	X	X	X	X	X	X													
5-2	X	X	X	X	X	X																		
5-3	X	X	X	X	X	X																		
5-4	X	X	X	X	X	X																		
5-5	X	X	X	X	X	X																		
5-6	X	X	X	X	X	X																		
5-8	X	X	X	X	X	X																		
5-9	X	X	X	X	X	X																		
5-10	X	X	X	X	X	X																		
5-11	X	X	X	X	X	X																		
5-12	X	X	X	X	X	X																		
5-14	X	X	X	X	X	X																		
5-16	X	X	X	X	X	X																		
5-18	X	X	X	X	X	X																		
5-20	X	X	X	X	X	X																		
5-22	X	X	X	X	X	X																		
5-25	X	X	X	X	X	X																		
5-28	X	X	X	X	X	X																		
5-29	X	X	X	X	X	X																		

Total M-5 Samples	Total M-6 Samples	Total M-7 Samples	Total M-8 Samples
<u>114</u>	<u>113</u>	<u>18</u>	<u> </u>
Number Completed	Number Completed	Number Completed	Number Completed
<u>114</u>	<u>5</u>	<u>0</u>	<u> </u>

ECHINODERM SAMPLES COMPLETED

Regional Stations	M-5						M-6						M-7						M-8					
	1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6
1	X	X	X	X	X	X	X	X	X	X	X													
2	X	X	X	X	X	X	X	X	X	X	X													
3	X	X	X	X	X	X	X	X	X	X	X													
4	X	X	X	X	X	X	X	X	X	X	X													
6	X	X	X	X	X	X	X	X	X	X	X													
7A	X	X	X	X	X	X	X	X	X	X	X													
8	X	X	X	X	X	X	X	X	X	X	X													
9	X	X	X	X	X	X	X	X	X	X	X													
10	X	X	X	X	X	X	X	X	X	X	X													
11	X	X	X	X	X	X	X	X	X	X	X													
12	X	X	X	X	X	X	X	X	X	X	X													
13	X	X	X	X	X	X	X	X	X	X	X													
13A	X	X	X	X	X	X	X	X	X	X	X													
14A	X	X	X	X	X	X	X	X	X	X	X													
16	X	X	X	X	X	X	X	X	X	X	X													
17	X	X	X	X	X	X	X	X	X	X	X													
18	X	X	X	X	X	X	X	X	X	X	X													
Total M-5 Samples	<u>102</u>						<u>102</u>						<u>78</u>						<u> </u>					
Number Completed	<u>102</u>						<u>102</u>						<u>0</u>						<u> </u>					

ECHINODERM SAMPLES COMPLETED

Site-Specific Stations	M-5						M-6						M-7						M-8					
	1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6
5-1(=R-5)	X	X	X	X	X	X	X	X	X	X	X													
5-2	X	X	X	X	X	X	X	X	X	X	X													
5-3	X	X	X	X	X	X	X	X	X	X	X													
5-4	X	X	X	X	X	X	X	X	X	X	X													
5-5	X	X	X	X	X	X	X	X	X	X	X													
5-6	X	X	X	X	X	X	X	X	X	X	X													
5-8	X	X	X	X	X	X	X	X	X	X	X													
5-9	X	X	X	X	X	X	X	X	X	X	X													
5-10	X	X	X	X	X	X	X	X	X	X	X													
5-11	X	X	X	X	X	X	X	X	X	X	X													
5-12	X	X	X	X	X	X	X	X	X	X	X													
5-14	X	X	X	X	X	X	X	X	X	X	X													
5-16	X	X	X	X	X	X	X	X	X	X	X													
5-18	X	X	X	X	X	X	X	X	X	X	X													
5-20	X	X	X	X	X	X	X	X	X	X	X													
5-22	X	X	X	X	X	X	X	X	X	X	X													
5-25	X	X	X	X	X	X	X	X	X	X	X													
5-28	X	X	X	X	X	X	X	X	X	X	X													
5-29	X	X	X	X	X	X	X	X	X	X	X													
Total M-5 Samples	<u>114</u>						<u>113</u>						<u>18</u>						<u> </u>					
Number Completed	<u>114</u>						<u>38</u>						<u>0</u>						<u> </u>					

MISCELLANEOUS PHYLA SAMPLES COMPLETED

Regional Stations	M-5						M-6						M-7						M-8					
	1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6
1	X	X	X	X	X	X	X	X	X	X	X													
2	X	X	X	X	X	X	X	X	X	X	X													
3	X	X	X	X	X	X	X	X	X	X	X													
4	X	X	X	X	X	X	X	X	X	X	X													
6	X	X	X	X	X	X	X	X	X	X	X													
7A	X	X	X	X	X	X	X	X	X	X	X													
8	X	X	X	X	X	X	X	X	X	X	X													
9	X	X	X	X	X	X	X	X	X	X	X													
10	X	X	X	X	X	X	X	X	X	X	X													
11	X	X	X	X	X	X	X	X	X	X	X													
12	X	X	X	X	X	X	X	X	X	X	X													
13	X	X	X	X	X	X	X	X	X	X	X													
13A	X	X	X	X	X	X	X	X	X	X	X													
14A	X	X	X	X	X	X	X	X	X	X	X													
16	X	X	X	X	X	X	X	X	X	X	X													
17	X	X	X	X	X	X	X	X	X	X	X													
18	X	X	X	X	X	X	X	X	X	X	X													

Total M-5 Samples	Total M-6 Samples	Total M-7 Samples	Total M-8 Samples
<u>102</u>	<u>102</u>	<u>78</u>	<u> </u>
Number Completed	Number Completed	Number Completed	Number Completed
<u>102</u>	<u>102</u>	<u>0</u>	<u> </u>

MISCELLANEOUS PHYLA SAMPLES COMPLETED

Site-Specific Stations	M-5						M-6						M-7						M-8					
	1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6
5-1(=R-5)	X	X	X	X	X	X	X	X	X	X	X													
5-2	X	X	X	X	X	X																		
5-3	X	X	X	X	X	X																		
5-4	X	X	X	X	X	X																		
5-5	X	X	X	X	X	X																		
5-6	X	X	X	X	X	X																		
5-8	X	X	X	X	X	X																		
5-9	X	X	X	X	X	X																		
5-10	X	X	X	X	X	X																		
5-11	X	X	X	X	X	X																		
5-12	X	X	X	X	X	X																		
5-14	X	X	X	X	X	X																		
5-16	X	X	X	X	X	X																		
5-18	X	X	X	X	X	X																		
5-20	X	X	X	X	X	X																		
5-22	X	X	X	X	X	X																		
5-25	X	X	X	X	X	X																		
5-28	X	X	X	X	X	X																		
5-29	X	X	X	X	X	X																		

Total M-5 Samples	Total M-6 Samples	Total M-7 Samples	Total M-8 Samples
<u>114</u>	<u>113</u>	<u>18</u>	<u> </u>
Number Completed	Number Completed	Number Completed	Number Completed
<u>114</u>	<u>5</u>	<u>0</u>	<u> </u>

MOLLUSC SAMPLES COMPLETED

Regional Stations	M-5						M-6						M-7						M-8					
	1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6
1	X	X	X	X	X	X	X	X	X	X	X	X												
2	X	X	X	X	X	X	X	X	X	X	X	X												
3	X	X	X	X	X	X	X	X	X	X	X	X												
4	X	X	X	X	X	X	X	X	X	X	X	X												
6	X	X	X	X	X	X	X	X	X	X	X	X												
7A	X	X	X	X	X	X	X	X	X	X	X	X												
8	X	X	X	X	X	X	X	X	X	X	X	X												
9	X	X	X	X	X	X	X	X	X	X	X	X												
10	X	X	X	X	X	X	X	X	X	X	X	X												
11	X	X	X	X	X	X	X	X	X	X	X	X												
12	X	X	X	X	X	X	X	X	X	X	X	X												
13	X	X	X	X	X	X	X	X	X	X	X	X												
13A	X	X	X	X	X	X	X	X	X	X	X	X												
14A	X	X	X	X	X	X	X	X	X	X	X	X												
16	X	X	X	X	X	X	X	X	X	X	X	X												
17	X	X	X	X	X	X	X	X	X	X	X	X												
18	X	X	X	X	X	X	X	X	X	X	X	X												

Total M-5 Samples	Total M-6 Samples	Total M-7 Samples	Total M-8 Samples
<u>102</u>	<u>102</u>	<u>78</u>	<u> </u>
Number Completed	Number Completed	Number Completed	Number Completed
<u>102</u>	<u>102</u>	<u>0</u>	<u> </u>

MOLLUSC SAMPLES COMPLETED

Site-Specific Stations	M-5						M-6						M-7						M-8					
	1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6
5-1(=R-5)	X	X	X	X	X	X	X	X	X	X	X	X												
5-2	X	X	X	X	X	X	X	X	X	X	X	X												
5-3	X	X	X	X	X	X	X	X	X	X	X	X												
5-4	X	X	X	X	X	X	X	X	X	X	X	X												
5-5	X	X	X	X	X	X	X	X	X	X	X	X												
5-6	X	X	X	X	X	X	X	X	X	X	X	X												
5-8	X	X	X	X	X	X	X	X	X	X	X	X												
5-9	X	X	X	X	X	X	X	X	X	X	X	X												
5-10	X	X	X	X	X	X	X	X	X	X	X	X												
5-11	X	X	X	X	X	X	X	X	X	X	X	X												
5-12	X	X	X	X	X	X	X	X	X	X	X	X												
5-14	X	X	X	X	X	X	X	X	X	X	X	X												
5-16	X	X	X	X	X	X	X	X	X	X	X	X												
5-18	X	X	X	X	X	X	X	X	X	X	X	X												
5-20	X	X	X	X	X	X	X	X	X	X	X	X												
5-22	X	X	X	X	X	X	X	X	X	X	X	X												
5-25	X	X	X	X	X	X	X	X	X	X	X	X												
5-28	X	X	X	X	X	X	X	X	X	X	X	X												
5-29	X	X	X	X	X	X	X	X	X	X	X	X												

Total M-5 Samples	Total M-6 Samples	Total M-7 Samples	Total M-8 Samples
<u>114</u>	<u>113</u>	<u>18</u>	<u> </u>
Number Completed	Number Completed	Number Completed	Number Completed
<u>114</u>	<u>36</u>	<u>0</u>	<u> </u>

POLYCHAETE SAMPLES COMPLETED

Regional Stations	M-5						M-6						M-7						M-8					
	1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6
1	X	X	X	X	X	X	X	X	X	X	X													
2	X	X	X	X	X	X	X	X	X	X	X													
3	X	X	X	X	X	X	X	X	X	X	X													
4	X	X	X	X	X	X	X	X	X	X	X													
6	X	X	X	X	X	X	X	X	X	X	X													
7A	X	X	X	X	X	X	X	X	X	X	X													
8	X	X	X	X	X	X	X	X	X	X	X													
9	X	X	X	X	X	X	X	X	X	X	X													
10	X	X	X	X	X	X	X	X	X	X	X													
11	X	X	X	X	X	X	X	X	X	X	X													
12	X	X	X	X	X	X	X	X	X	X	X													
13	X	X	X	X	X	X	X	X	X	X	X													
13A	X	X	X	X	X	X	X	X	X	X	X													
14A	X	X	X	X	X	X	X	X	X	X	X													
16	X	X	X	X	X	X	X	X	X	X	X													
17	X	X	X	X	X	X	X	X	X	X	X													
18	X	X	X	X	X	X	X	X	X	X	X													

Total M-5 Samples	Total M-6 Samples	Total M-7 Samples	Total M-8 Samples
<u>102</u>	<u>102</u>	<u>78</u>	<u> </u>
Number Completed	Number Completed	Number Completed	Number Completed
<u>102</u>	<u>26</u>	<u>0</u>	<u> </u>

POLYCHAETE SAMPLES COMPLETED

Site-Specific Stations	M-5						M-6						M-7						M-8					
	1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6
5-1(=R-5)	X	X	X	X	X	X	X	X	X	X	X													
5-2	X	X	X	X	X	X	X	X	X	X	X													
5-3	X	X	X	X	X	X	X	X	X	X	X													
5-4	X	X	X	X	X	X	X	X	X	X	X													
5-5	X	X	X	X	X	X	X	X	X	X	X													
5-6	X	X	X	X	X	X	X	X	X	X	X													
5-8	X	X	X	X	X	X	X	X	X	X	X													
5-9	X	X	X	X	X	X	X	X	X	X	X													
5-10	X	X	X	X	X	X	X	X	X	X	X													
5-11	X	X	X	X	X	X	X	X	X	X	X													
5-12	X	X	X	X	X	X	X	X	X	X	X													
5-14	X	X	X	X	X	X	X	X	X	X	X													
5-16	X	X	X	X	X	X	X	X	X	X	X													
5-18	X	X	X	X	X	X	X	X	X	X	X													
5-20	X	X	X	X	X	X	X	X	X	X	X													
5-22	X	X	X	X	X	X	X	X	X	X	X													
5-25	X	X	X	X	X	X	X	X	X	X	X													
5-28	X	X	X	X	X	X	X	X	X	X	X													
5-29	X	X	X	X	X	X	X	X	X	X	X													

Total M-5 Samples	Total M-6 Samples	Total M-7 Samples	Total M-8 Samples
<u>114</u>	<u>113</u>	<u>18</u>	<u> </u>
Number Completed	Number Completed	Number Completed	Number Completed
<u>114</u>	<u>28</u>	<u>0</u>	<u> </u>