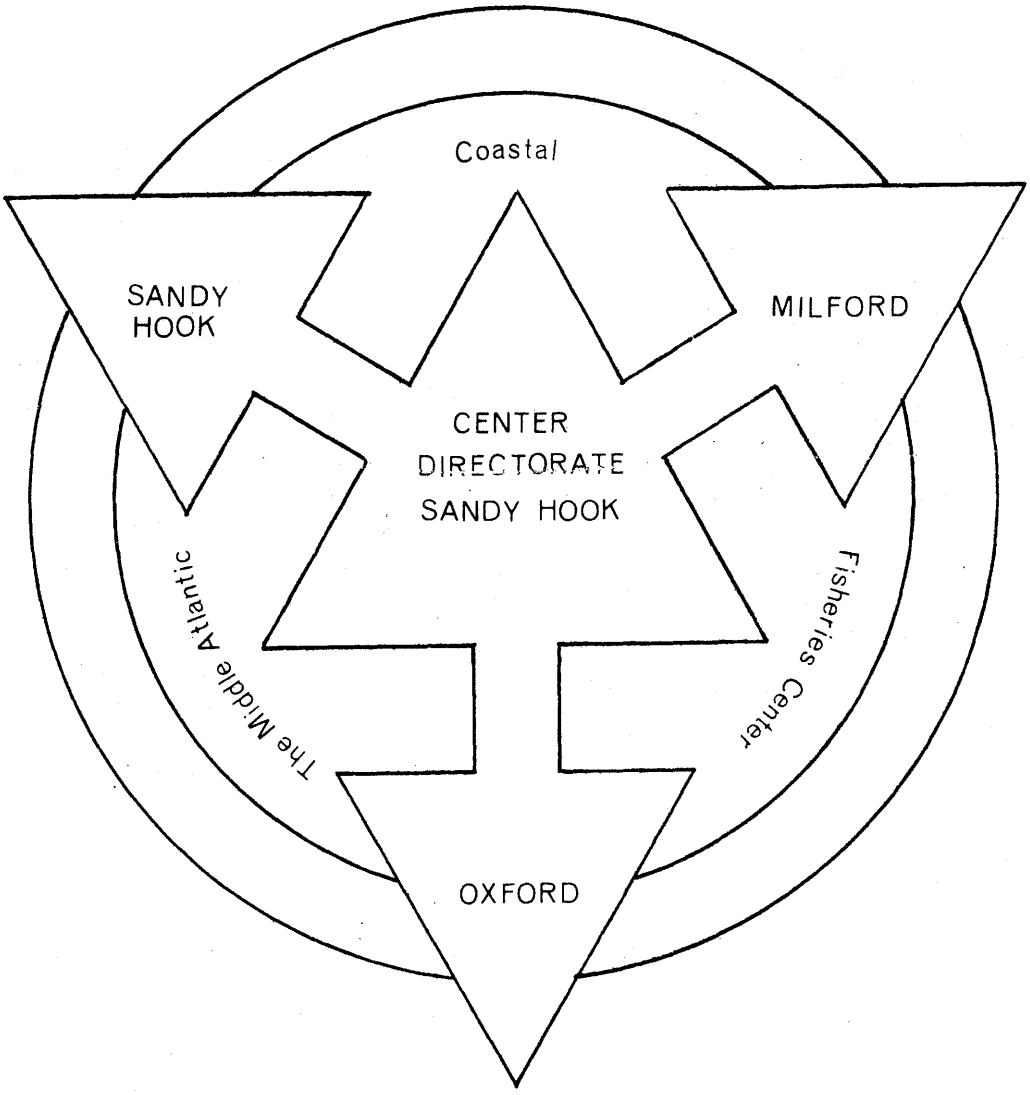
# AN ENVIRONMENTAL SURVEY OF EFFECTS OF DREDGING AND SPOIL DISPOSAL, NEW LONDON, CONNECTICUT: 1st QUARTERLY REPORT

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

MIDDLE ATLANTIC COASTAL FISHERIES CENTER




Informal Report No. 40
1 November 1974

# AN ENVIRONMENTAL SURVEY OF EFFECTS OF DREDGING AND SPOIL DISPOSAL, NEW LONDON, CONNECTICUT: 1st QUARTERLY REPORT

Submitted by

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to

U. S. Navy, Northern Division, Naval Facilities Engineering Command

U. S. Army, Corps of Engineers

Interagency Scientific Advisory Subcommittee on Ocean Dredging and Spoiling

1 November 1974

FOREWARD

This document comprises the initial quarterly report on studies designed to monitor the effects of dredging and spoil disposal at New London, Connecticut, and to establish detailed baselines for the dredging and spoiling sites. The report deals primarily with activities of the principal contractor, the Middle Atlantic Coastal Fisheries Center (MACFC) of the National Marine Fisheries Service (NMFS). Reports from the subcontractors, the University of Connecticut (UCONN) and the New York Ocean Science Laboratory (NYOSL), were received on schedule by MACFC. Subcontractors' reports are included as appendices to the report proper, which merely summarizes activities and available results of UCONN and NYOSL.

Overall goals, schedules and methodologies for the monitoring survey are contained in MACFC Informal Report No. 25-A, "A Proposal for an Environmental Survey of Dredging and Spoil Disposal in the Thames River and New London Dumping Ground" (21 May 1974), and will not be repeated in the quarterly reports. Changes or additions (such as in the diving and sediment trap studies) will be described in the pertinent quarterly report but not in subsequent reports.

Note that results reported in this first document are somewhat minimal. Predredging surveys were, however, as a rule carried out to the satisfaction of the

investigators concerned. Sufficient data have been gathered to enable us to establish environmental baselines for comparison to data collected from during- and post-dredging surveys. All parties to the operations are reminded that the stipulation to immediately report any observed violations of the dumping criteria or other impacts judged significant is still in effect.

A tentative schedule for all field activities is being developed at the request of the Regional Director, NMFS, and the U. S. Army Corps of Engineers.

The diving studies concerned with benthic and demersal macrofauna and sedimentation rates, as well as the cage experiments, require buoys at selected stations if they are to be maximally effective. Other phases of the dump site studies would also benefit from the placing of buoys at key stations to aid in station-finding. We therefore request that buoys be replaced at Stations A3, C3, E3 and F9 in the interest of the accuracy and precision of the monitoring survey.

Reproduction or use of data from these reports must first be cleared through MACFC (and through subcontractors if applicable).

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# I. UCONN TASKS

## A. Suspended Material Transport in the Thames River (Appendix A)

Three pre-dredging cruises were conducted to determine baseline temperature, salinity, suspended solids and light transmission characteristics of the lower Thames River. Two additional surveys of these parameters were completed between the onset of dredging and the 1 October reporting date. These latter cruises also included measurements of turbidity (both surveys) and organic carbon (second survey) in the vicinity of the dredging operation.

The pre-dredging measurements are being used in conjunction with historical data to estimate baseline circulation of the lower river. No adequate historical information exists for suspended material concentrations here; however, the characteristics of the river may be such that pre-dredging measurements of suspended material will be sufficient, in combination with the circulation estimates, to determine routes and fates of suspended materials. Water sample analyses to determine effects of dredging on suspended material characteristics are underway, but no results are yet available.

## B. Effects of Dredging in the Thames River on Shellfish Resources and Phytoplankton (Appendix B)

Four cruises were made in July 1974 to establish baseline values for temperature, salinity, dissolved oxygen and chlorophyll, and to survey the distribution of hard clams (Mercenaria mercenaria), oysters (Crassostrea virginica) and another abundant clam,

Pitar morrhuana. These bivalves were also analyzed for heavy metal concentrations. Results (Appendix B, Table I) showed the oysters to contain highest levels of heavy metals, but these pre-dredging values were similar to concentrations found in bivalves taken from other portions of Long Island Sound.

Sediment elutriates were prepared by shaking river sediments with seawater, then letting the sediment settle and filtering the solution. Effects of these elutriates on phytoplankton were determined by measuring photosynthetic activity in light and dark bottles with and without added elutriate. Results (Appendix B, Table II) indicated that elutriates of Thames River sediments did not inhibit photosynthesis of natural algal populations.

Analyses of heavy metals in river water and sediments were in progress, but results were incomplete (due to instrument failures).

C. Lobster Monitoring and Related Dump Site SCUBA Studies (Appendix B)

Eight pre-dumping surveys were conducted to determine baseline bottom type, visibility, and relative abundance of dominant species at the center and corners of the designated dumping ground. Still and motion pictures were taken to document these baseline conditions. Estimates of lobster distribution and fishing intensity were made from counts of lobster pot buoys and interviews with local lobstermen.

Three dives were completed between the start of dredging and 1 October, again using underwater photography to document bottom conditions. Spoil was observed to have spread to a distance of 200 yards north of the dumping buoy, but none was found at the corners of the designated dumping area. At the buoy designating the dumping site, the spoils had accumulated to a depth of approximately 10 feet and consisted of soft sediments mixed with cohesive clay clumps. Bottom turbidity and spoil erosion appeared minimal. Sonic tagging and monitoring of lobster activities were scheduled to begin in October.

## II. NYOSL TASKS

### A. Physical and Chemical Oceanography of Dump Site Area (Appendix C)

Three cruises were conducted prior to the initiation of dredging and spoiling. Meters were installed to determine currents, and drogues were tracked to examine movement of surface and bottom water masses, over a complete tidal cycle. Water samples were taken five times over a ca. 10 hour period from surface, mid-depth and bottom waters at 13 stations. Parameters examined were temperature, salinity, dissolved oxygen, pH, eH, suspended and volatile solids and total organic carbon. Seston (water column particulate matter) collections were made with 0.3 mm mesh nets at eleven of these stations, and determinations were made for nitrogen, phosphorus and heavy metals content.

Seston collections have been repeated since spoiling commenced. An intensive experiment was also carried out to determine fates of dumped material: upon release of a bargeload of spoil, high-frequency sampling was carried out from anchored vessels to monitor changes in the water column at several discrete locations. After the dumping of a second bargeload, sampling was commenced around drogues to ascertain behavior of the "plume" of spoil material as it moved from the definitive spoiling site.

Most laboratory analyses on the above samples have been completed, but interpretations are still in progress. No significant effects of spoiling to date on the physical or chemical characteristics of the area have been noted. The drogue tracking of the spoil plume revealed that turbidity of surface and bottom water masses had returned to ambient less than three hours after the dump.

B. Demersal Fish Distribution and Abundance (Appendix D)

A baseline cruise including otter trawl tows at nine stations (four of these replicated) was carried out on 18 - 19 July 1974. Eight stations were sampled on 9 - 11 October 1974, with triplicate tows at four stations.

Data on bottom temperature, salinity, numbers of species and individuals, lengths, weights, sex, gonad weights and stomach contents are presented for both cruises. A preliminary observation was that largest population changes between cruises occurred

at the dump center (C6). At C6 catches were much smaller in October, when the trawl often filled with mud. It cannot yet be determined whether this represents a real decline in abundance at C6 or whether the trawl was fishing improperly due to the mud.

## III. MACFC TASKS

### A. Benthic Macrofauna Studies

1. Field Activites: The baseline macrofaunal survey (NI 1) was conducted from 26 June 1974 to 12 July 1974 following methods outlined in MACFC Informal Report 25-A. Forty-one of 45 stations were successfully sampled (see Figs. 1, 1A). Stations E3 and E9, characterized respectively by hard bottom and steep slope, were aborted after several unsuccessful attempts to retrieve a grab sample. Station R6, which was intentionally omitted, is identical with Station LIS 135 for which adequate baseline data have been developed previously by MACFC. Station A10 was added after the macrofaunal segment of the cruise and will be sampled in the future. Coordinates for all stations are given in Table 1.

   In addition to the scientific party from SHL a technician from NYOSL was on board to retrieve sediment cores from each grab as well as living macrofauna for heavy metal analyses. At selected stations a microbiological team from Milford Laboratory (MACFC) secured bacteriological samples.

The second macrofaunal survey (NL 2) began on 23 September 1974 after approximately five weeks of dredging and was concluded on 4 October 1974. Forty-four of 45 stations were occupied and sampled (see Figs. 2, 2A). Stations A10, E3, E9 and R6 were successfully sampled during NL 2. Station D1 was aborted after repeated unsuccessful attempts to obtain a grab sample due to hard bottom. Personnel from NYOSL were placed on board for NL 2 and obtained sediment cores from all stations and macrofauna from approximately two-thirds of the stations. The microbiological investigations were conducted as a separate cruise for NL 2, a practice which will be followed in future cruises.

2. Laboratory Activities: Sediments in the study area, particularly at stations where previous spoiling has occurred, are characterized by large deposits of shell and shell fragments, limiting the amount of volume reduction which can be accomplished by sieving. Additionally, most samples have been extremely high in both faunal density and diversity. These factors have combined to considerably limit the proportion of total samples which can be analyzed during any quarter.

Effort has thus been concentrated on samples from the A and C transects, along which spoils movement would be most likely. Twenty-five of the 205

NL 1 grab samples have been processed to date. Initially, all five grab samples from a station will be fully processed and statistically analyzed. The analysis will determine the minimum number of grabs necessary to accurately characterize a station. In order to obtain a maximum amount of information per unit effort only the minimum number of grabs will be sorted from any one station in the future.

Bottom dissolved oxygen concentrations were determined at each station at the time of sampling. These results are included in this report. Sediment cores designated for grain-size distribution analysis have been forwarded to Dr. Anthony Cok, Adelphi University, for processing. Results from selected stations are expected in early November and are not available for this report.

3. Field Observations: Both dredging and spoiling operations were observed frequently during NL 2. One dump was observed from a distance of about 50' during the sampling of the center station (C6). There was no visual evidence of gross turbidity in the immediate area following the dump. Materials observed in the barge prior to dumping appeared to be compacted and cohesive. Dredging operations during this time were concentrated in the area marked on Figure 2A.

There was no visual evidence of spoil in the grab samples at any station except C6 (center) where all grab samples consisted entirely of spoil. The spoil material was gray-green clayey homogeneous mud. There was no particularly offensive odor or appearance associated with the spoil.

Freshly killed adult hard clams (Mercenaria mercenaria) were present in samples of the spoil; death appeared to be due to shell damage sustained during the dredging and/or dumping process. No living hard clams were observed in the spoil. Several living Pitar morrhuana (a species similar in appearance, but smaller than, the hard clam) were recovered from the dredge spoil. It is not clear at this time whether these individuals originated in the spoil or have migrated to the surface of the spoil from the underlying sediment at Station C6 although the former possibility appears more likely.

4. Results and Discussion: Dissolved oxygen samples in the spoiling area ranged from 7.29 mg/L to 8.50mg/L ($\bar{x}$ = 7.59 mg/L) during NL 1 (Fig. 3, 3A). No particular pattern is evident in these values. Dissolved oxygen in the river varied from a low of 4.40 mg/L at Station R1 increasing downriver to a high of 7.88 mg/L at Station R7 ($\bar{x}$ = 6.24 mg/L). This pattern of increasing oxygen saturation in a downriver direction has frequently been observed in estuarine situations.

Oxygen values in the spoiling area during NL 2 (Fig. 4, 4A), were 6.95 mg/L to 8.80 mg/L ($\bar{x}$ = 7.43 mg/L). These amounts are essentially identical to those encountered during the baseline survey. Again, no pattern is evident and the lowest values are not associated with stations surrounding the designated release point. Oxygen values at the river stations ranged from 4.70 mg/L to 7.15/L ($\bar{x}$ = 6.34 mg/L). The lowest value was recorded within 1/2 mile of the working dredge.

A temporary reduction in DO due to the resuspension of oxidizable materials by dredging has been reported for the Arthur Kill, a tidal waterway near New York City (Brown and Clark, 1968). Our data are insufficient to determine if the observed reduction in oxygen was due to dredging in this case.

Species recorded to date from the offshore stations and the river stations are listed in Tables 2 and 3, respectively. Station R7, which is faunistically more related to the spoiling area, is included in the offshore list. As expected the offshore list is richer in all respects than the river list. The stations surrounding the spoiling area include 157 species in over 20 taxa while the river stations include only 23 species and many taxa are not represented. Nearly all species recorded from the river also occur naturally in the spoiling area. As sample analysis progresses a list of species restricted

to the river will be developed. These organisms may serve as biological "tags" for monitoring any movement of the spoils.

N (total individuals), S (total species), H' (Shannon-Weaver diversity) and J' (equitability) have been calculated for 20 of the grabs processed thus far. These results are presented in Table 4. These data show species richness (S) to be relatively constant at the offshore stations and more variable, and generally lower, in the river. Variations in diversity (H') are quite evident even among replicate samples at a station. This variability will have to be considered in judging whether spoiling has caused reductions in diversity at a given station.

H' is directly dependent upon S and J' and indirectly dependent upon N for small values of N. Figure 5 presents the scatter diagram of H' vs. logN in order to determine if the N we are working with here are small and, hence, exert an effect upon H'. It is evident that there is no such relationship present and therefore we may assume that for the samples considered sample size does not affect diversity. Variations in H', then, appear to be due primarily to variations in equitability as species richness varies only slightly, except for the river stations.

The depressed H' at R4 and R5 is due primarily to decreased S while depressed values at C1 are due to depressed J'. A recent set of mussels (Mytilus edulis) with densities up to and exceeding 20,000/$m^2$ at this station has upset the equitability and may reflect the physical difficulties of living in a current-swept hard bottom station such as C1.

Results at A1 are incomplete but appear to be roughly comparable to C3 and C4 which are in turn apparently typical of the area.

In spite of the attempts of some workers to rigorously define "healthy" diversity values it is impossible to gauge the health of a community merely by examining diversity or equitability. Taken together and in the context of the habitats and species involved these indices do provide a somewhat objective measure of the impact of pollution and other stresses upon a community.

With that in mind, it appears that the offshore stations generally represent healthy benthic communities. Where low diversities do occur they are due primarily to lowered J' in spite of elevated N and S.

B. Sedimentation Rate Studies

Sedimentation rates are measured using sediment traps placed and retrieved by divers. The traps consist of three types of containers mounted by army clamps to a steel tripod base resting on the bottom. The material

collected is dried at 103°C for 24 hr, weighed and extrapolated to a sedimentation rate in $gm/m^2/day$. Organic, inorganic and total carbon content are determined by combustion in a LECO Total Carbon Analyser. A portion of each sample will be sent to NYOSL for analysis for heavy metals burdens.

During the baseline survey (22-26 July 1974), the traps were anchored, buoyed and left in place for 2 - 3 days. Stations sampled included: A3 and E3, both one mile from the designated point; A4, 1/2 mi from the dump point; and A2, a control station 1.5 miles from the dump point (Figure 2). Samples from E3 and A4 were lost when the tripods were overturned by currents. This problem was solved in the second survey (21 - 25 October 1974) by the use of heavier tripods, and all four of the above stations were sampled successfully.

Approximately 10 grams of material were captured in the sediment traps at Station A2 and at A3 during the July sampling. This is roughly twice the amount collected in October. The difference is attributed to seasonal changes in plankton productivity, as was the reduction in seston reported by NYOSL (Appendix C). More detailed analysis of samples is still in progress, and no further results are yet reportable.

## C. Biological Dive Studies

Biological observations of the benthic communities were also conducted, using SCUBA. These measurements supplement the information

obtained from bottom grab samples; they are less quantitative, but large-scale changes can be detected and results are immediately available. A pre-dredging survey was carried out from 22 - 26 July 1974. Stations sampled were A1, A3, C1, C3, D1, E3, A9 and A10 (see Figures 1 and 2). At each of these, a 10 m circle was examined for finfish, large invertebrates and conspicuous features of bottom sediments and topography. This was accomplished by divers situated 5 and 10 m distant from the anchored end of a rope, swimming in a full circle while making observations. Semiquantitative measurements were also conducted at all stations by making 2 - 3 random casts of an aluminum frame 1 $m^2$ in area. All large organisms within the frame were recorded; all fauna within a 1/4 $m^2$ sub-square were enumerated to the fullest extent possible. Observations were recorded underwater on Ascot paper. Specimens of unfamiliar organisms were returned to the laboratory for identification.

Due to constraints on diving time, only three of the pre-dredging stations could be resampled on the cruise of 21 - 25 October 1974. These stations were A3 and C3, each one mile from the dump buoy, and C1, two miles from the dump buoy. No evidence of spoil material was seen at any of these stations. Station A3 had supported moderate densities of amphipod crustaceans in July; none were observed in October. Station C3 was dominated by an anemone, Metridium, and a starfish, Henricia, on both surveys, through densities were lower in October. Station C1 is characterized

by dense populations of mussels, with another starfish, Asterias, and two species of hermit crabs, Pagurus longicarpus and P. pollicaris, also common. No changes were obvious here between July and October.

The changes at A3 and C3 may be seasonal effects. However, benthic communities in the area are known to exhibit patchiness (considerable variability over a small area). It is possible that a small change in dive location between the surveys is responsible for the observed differences. This is why replacement of buoys at key stations would enhance the value of our studies. We would like to set out permanent staked and roped squares on the bottom at these buoys. Such squares could be visited periodically for visual and photographic documentation of changes, including effects of spoil disposal, at discrete locations. Data generated would be far more meaningful than that which the present diving surveys can yield. Until or unless the buoys are replaced, the dive surveys will be given a lower priority than cage and sediment trap experiments, and will be conducted only as time permits.

A dive at the dumping buoy tended to confirm UCONN's observations (reported above) concerning the spoil materials. The spoils were very soft, fine sediments. The 1 1/2 - 2 knot current present during our dive had resuspended some of this material, so that turbidity was more noticeable than at other stations, but not great enough to appreciably reduce bottom visibility. We cannot, however, state with confidence that future erosion will continue to be insignificant.

D. Caged Organisms Experiments

On 24 October, cages containing hard clams (Mercenaria mercenaria) from the Thames River were suspended from the dumping buoy and a control buoy (R-"2A") 2.6 n. mi. west of the dump buoy. Two cages, each containing ca. 25 clams, were suspended 40 feet below the water surface from each buoy. The dump buoy cages were approximately 10 feet above the spoil pile; control cages were 32 feet off bottom, according to chart depths. Clams will be collected periodically to determine whether the spoiling operations are leading to gill fouling, gross or microscopic pathology, or increase in heavy metals content relative to control specimens.

## IV. ACKNOWLEDGMENTS

This work is supported by the U. S. Navy through contract #74-00001 with MACFC. MACFC has subsequently subcontracted portions of the study to UCONN and NYOSL. Principal investigators for the various subprojects are:

UCONN - Dr. W. F. Bohlen (Suspended Material Transport, Thames River); Dr. S. Y. Feng (Dredging Effects on Shellfish Resources and Phytoplankton, Thames River); Dr. W. Lund (Dump Site Lobster Studies); Dr. L. Stewart (Related Dump Site SCUBA Surveys)

NYOSL - Dr. J. E. Alexander (Chemical Oceanography of Dump Site); Dr. H. M. Austin (Fish Distribution and Abundance); Dr. R. Hollman (Physical Oceanography of Dump Site)

MACFC - Mr. A. Draxler (Sediment Trap Experiments); Dr. J. Graikoski (Microbiology); Mr. R. McGrath (Benthic Macrofauna); Mr. R. Reid (SCUBA Surveys, Cage Experiments, Contract Representative).

We wish to thank Ms. Ann Frame for her leading role in identification of benthic macrofauna specimens, and also the many other personnel who aided in collecting, sorting, identifying and diving.

## V. LITERATURE CITED

Brown, C. L. and R. Clark. 1968.

Observations on dredging and dissolved oxygen in a tidal waterway. Water Res. Research 4: 1381-1384.

## IV. LIST OF TABLES AND FIGURES

Table 1

New London Dredge -Disposal Survey

Station Locations

| STATION | LATITUDE, °N | LONGITUDE, °W | STATION | LATITUDE, °N | LONGITUDE, °W |
|---|---|---|---|---|---|
| A1 | 41° 16' 9.5" | 72° 07' 39.5" | D2 | 41° 17' 12" | 72° 06' 24.5" |
| A2 | 41° 16' 09" | 72° 07' 00" | D3 | 41° 16' 49.5" | 72° 05' 55.5" |
| A3 | 41° 16' 8.5" | 72° 06' 18.5" | D4 | 41° 16' 28.5" | 72° 05' 27.5" |
| A4 | 41° 16' 08" | 72° 05' 39" | E1 | 41° 17' 52" | 72° 06' 18" |
| A5 | 41° 16' 08" | 72° 05' 20" | E2 | 41° 17' 27" | 72° 05' 01.5" |
| A7 | 41° 16' 7.5" | 72° 04' 38" | E3 | 41° 16' 59.5" | 72° 05' 38" |
| A8 | 41° 16' 07" | 72° 04' 20" | E4 | 41° 16' 33" | 72° 05' 19" |
| A9 | 41° 16' 07" | 72° 03' 40" | E5 | 41° 16' 21" | 72° 05' 09" |
| A10 | 41° 16' 06" | 72° 02' 20" | F3 | 41° 16' 58" | 72° 04' 21.5" |
| B1 | 41° 16' 42" | 72° 07' 32" | F4 | 41° 16' 33.5" | 72° 04' 40.5" |
| B2 | 41° 16' 33" | 72° 06' 54" | F5 | 41° 16' 21" | 72° 04' 50" |
| B3 | 41° 16' 24.5" | 72° 06' 16" | F7 | 41° 15' 54.5" | 72° 05' 09" |
| B4 | 41° 16' 16.5" | 72° 05' 37.5" | F8 | 41° 15' 42" | 72° 05' 19" |
| C1 | 41° 17' 09" | 72° 07' 17" | F9 | 41° 15' 17" | 72° 05' 38" |
| C2 | 41° 16' 54" | 72° 06' 43" | R1 | 41° 24' 45" | 72° 05' 35" |
| C3 | 41° 16' 38" | 72° 06' 08" | R2 | 41° 23' 13" | 72° 05' 40" |
| C4 | 41° 16' 23" | 72° 05' 33.5" | R3 | 41 21' 55.5" | 72° 05' 23.5" |
| C5 | 41° 16' 15" | 72° 05' 17" | R3.5 | 41° 21' 25" | 72° 05' 16" |
| C6 | 41° 16' 8" | 72° 05' 00" | R4 | 41° 20' 55.5" | 72° 05' 27" |
| C7 | 41° 16° 00" | 72° 04' 42" | R5 | 41° 19' 48" | 72° 05' 07.5" |
| C8 | 41° 15' 52.5" | 72° 04' 25" | R6 | 41° 18' 12.5" | 72° 04' 59" |
| C9 | 41° 15' 37.5" | 72° 03' 51" | R7 | 41° 18' 08.5" | 72° 04' 18" |
| D1 | 41° 17' 33" | 72° 06' 53" | | | |

Table 2: Species recorded from the spoiling area 1 November 1974

Foraminifera

Porifera
- Scypha sp.

Rhynchocoela

Nematoda

Coelenterata (Cnidaria)
- Clytia edwardsi

Eudendrium sp.
- Halecium halecinium

Archiannelidae
- Protodrilus symbioticus

Polychaeta
- Scoloplos acutus
- Phyllodoce arenae
- Ophelina acuminata
- Harmothoe imbricata
- Syllis cornuta
- Eumida sanguinea
- Lepidonotus squamatus
- Prionospio steenstrupi
- Spio sp.
- Syllidae
- Pherusa affinis
- Polydora ligni
- Spio filicornis
- Autolytus alexandri
- Mediomastus ambiseta
- Aricidea jeffreysii
- Nephtys incisa
- Autolytus emertoni
- Scolelepis squamata

Polychaeta (cont.)
- Owenia fusiformis
- Chone infundibuliformis
- Pista maculata
- Spiophanes bombyx
- Polydora socialis
- Scalibregma inflatum
- Asabellides oculata
- Ampharete arctica
- Sabellaria vulgaris
- Glycera americana
- Clymenella torquata
- Clymenella zonalis
- Harmothoe extenuata
- Pholoe minuta
- Ninoe nigripes
- Lumbrineris tenuis
- Drilonereis longa
- Potamilla reniformis
- Tharyx annuiosus
- Nephtys picta
- Polycirrus eximius
- Autolytus cornutus
- Tharyx acutus
- Lumbrineris coccinea
- Lepidonotus sublevis
- Capitella capitata
- Spiochaetopterus oculatus
- Heteromastus filiformis
- Flabelligeridae
- Aglaophamus circinata
- Sthenelais boa
- Sabella crassicornis
- Pista cristata
- Cirratulis grandis
- Marphysa belli
- Harmothoe sp.
- Nereis grayi
- Polycirrus phosphoreus

Table 2 (cont.):

Polychaeta (cont.)
- Caulleriella sp.
- Nereis zonata
- Goniadella gracilis
- Exogone dispar
- Chaetozone setosa

Oligochaeta
- Peloscolex gabriellae

Bivalvia
- Pitar morrhuana
- Astarte undata
- Mytilus edulis
- Musculus corrugatus
- Tellina agilis
- Cerastoderma pinnulatum
- Nucula proxima
- Lyonsia hyalina
- Pandora gouldiana
- Nucula delphinodonta
- Crenella glandula
- Venericardia borealis
- Ensis directus
- Mya arenaria
- Hiatella arctica

Gastropoda
- Mitrella lunata
- Nassarius trivittatus
- Anachis translirata
- Crepidula plana
- Turbonilla elegantula
- Lunatia heros
- Littorina obtusata
- Hydrobia minuta
- Crepidula fornicata
- Urosalpinx cinerea

Nudibranchia
- Aeolidacea

Cumacea
- Eudorella truncatula
- Oxyurostylis smithi

Isopoda
- Edotea triloba
- Ptilanthura tenuis
- Idotea phosphorea
- Chirodotea tuftsi
- Cirolana polita
- Erichsoniella filiformis

Amphipoda
- Ampelisca vadorum
- Unciola irrorata
- Phoxocephalus holbolli
- Leptocheirus pinguis
- Corophium spp.
- Stenopleustes gracilis
- Unciola serrata
- Byblis gaimardi
- Ampelisca verrilli
- Maera danae
- Lembos websteri
- Ischyroceros anguipes
- Caprella equilibra
- Aeginina longicornis
- Calliopius laeviusculus
- Erichthonius brasiliensis
- Photis dentata
- Dulichia monocantha
- Byblis serrata
- Unciola inermis
- Paraphoxus spinosus

Table 2 (cont.):

Amphipoda (cont.)
- Lysianopsis alba
- Amphithoe valida
- Trichophoxus epistomus
- Microdeutopus gryllotalpa
- Caprella linearis
- Caprella unica
- Pontogenia inermis
- Paracaprella tenuis
- Protohaustorius wigleyi
- Gammarus lawrencianus
- Corophium crassicorne
- Corophium acutum

Mysidacea
- Heteromysis formosa
- Neomysis americana

Decapoda
- Crangon septemspinosa
- Eualus pusiolus
- Cancer irroratus
- Pagurus longicarpus

Cirripedia
- Balanus balanus
- Balanus crenatus

Acarina

Pycnogonida
- Nymphon grossipes
- Achelia spinosa
- Anoplodactylus lentus

Ectoprocta
- Electra hastingsae
- Cryptosula pallasiana

Ectoprocta (cont.)
- Hippodiplosia americana
- Electra crustulenta
- Hippodiplosia pertusa
- Parasmittina nitida
- Microporella ciliata
- Bowerbankia gracilis
- Bugula turrita
- Tegella sp.

Echinodermata
- Amphipholis squamata
- Ophiopholis aculeata
- Asterias forbesi

Table 3: Species recorded from inner river stations R4, R5

Oligochaeta

Polychaeta
- Streblospio benedicti
- Melinna cristata
- Asychis elongata
- Haploscoloplos robusta
- Clymenella torquata
- Clymenella zonalis
- Polycirrus eximius
- Tharyx acutus
- Lumbrineris coccinea
- Polydora ligni
- Mediomastus ambiseta
- Aricidea jeffreysii
- Nephtys incisa

Bivalvia
- Pitar morrhuana
- Nucula proxima

Gastropoda
- Nassarius trivittatus
- Lunatia heros
- Retusa canaliculata
- Busycon sp..
- Cylichna oryza

Table 4. Total individuals (N), total species (S), Shannon-Weaver diversity (H'), and equitability (J') for stations sorted as of 1 November 1974

| STATION | GRAB | N | S | H' | J' |
|---|---|---|---|---|---|
| C3 | G1 | 240 | 37 | 2.443 | .674 |
| | G2 | 104 | 35 | 3.290 | .925 |
| | G3 | 318 | 60 | 3.430 | .838 |
| | G4 | 162 | 41 | 3.384 | .911 |
| | G5 | 100 | 27 | 2.583 | .784 |
| C4 | G1 | 181 | 32 | 2.449 | .707 |
| | G2 | 537 | 50 | 2.133 | .545 |
| | G3 | 353 | 50 | 2.680 | .685 |
| | G4 | 730 | 50 | 2.014 | .515 |
| | G5 | 484 | 48 | 2.153 | .556 |
| C1 | G1 | 2821 | 49 | .495 | .127 |
| | G2 | 1036 | 43 | 1.241 | .330 |
| | G3 | 381 | 34 | 1.583 | .449 |
| | G4 | 2038 | 47 | .725 | .188 |
| | G5 | 1155 | 41 | .944 | .247 |
| A1 | G1 | 149 | 36 | 2.597 | .725 |
| | G3 | 79 | 28 | 2.772 | .832 |
| R4 | G4 | 63 | 7 | 1.295 | .665 |
| R5 | G4 | 256 | 22 | 1.388 | .449 |
| R7 | G1 | 409 | 56 | 3.203 | .796 |

Figure 1.

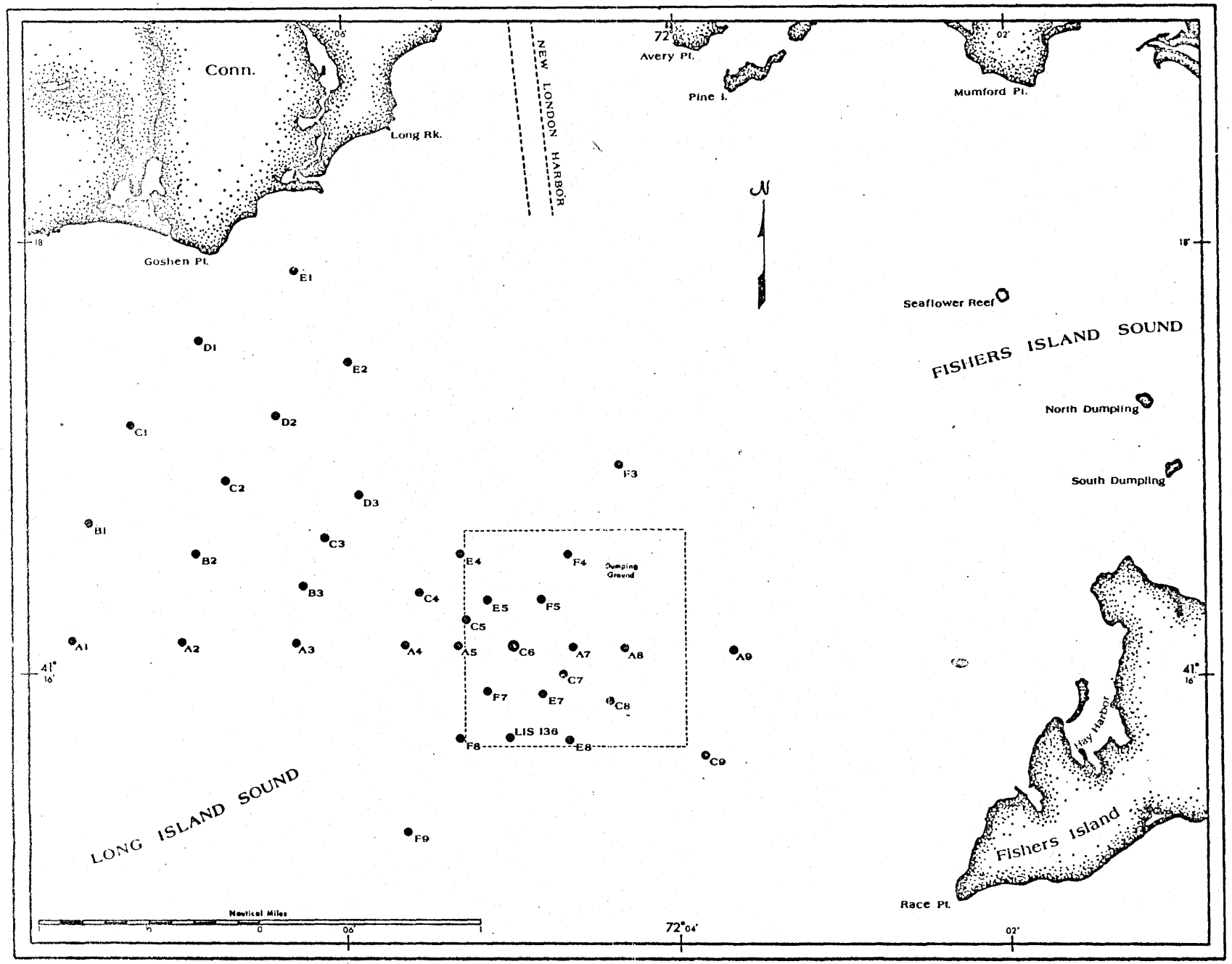
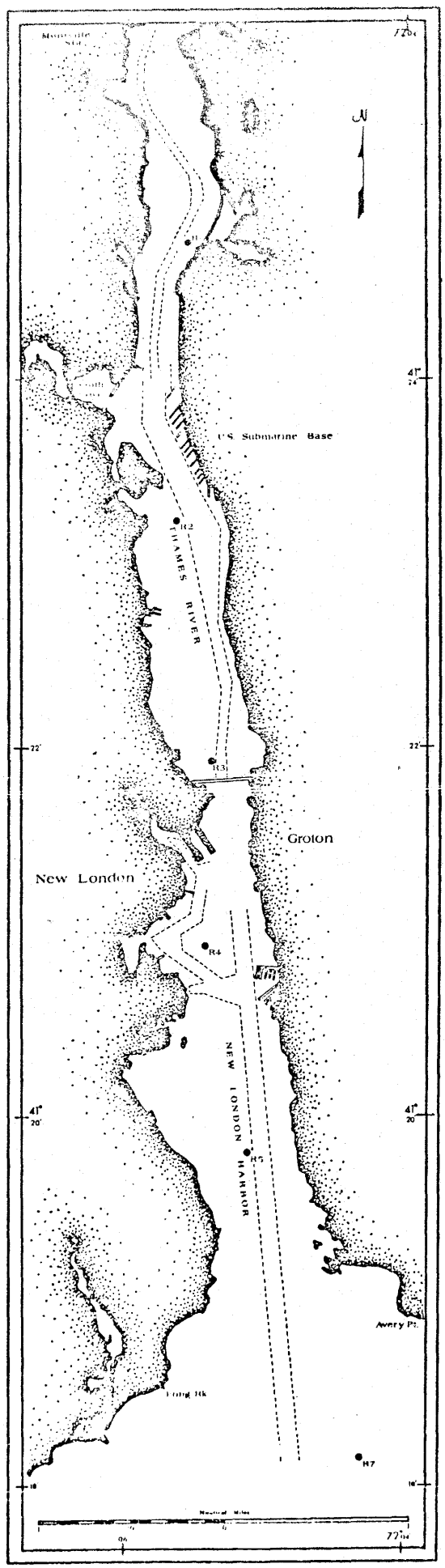
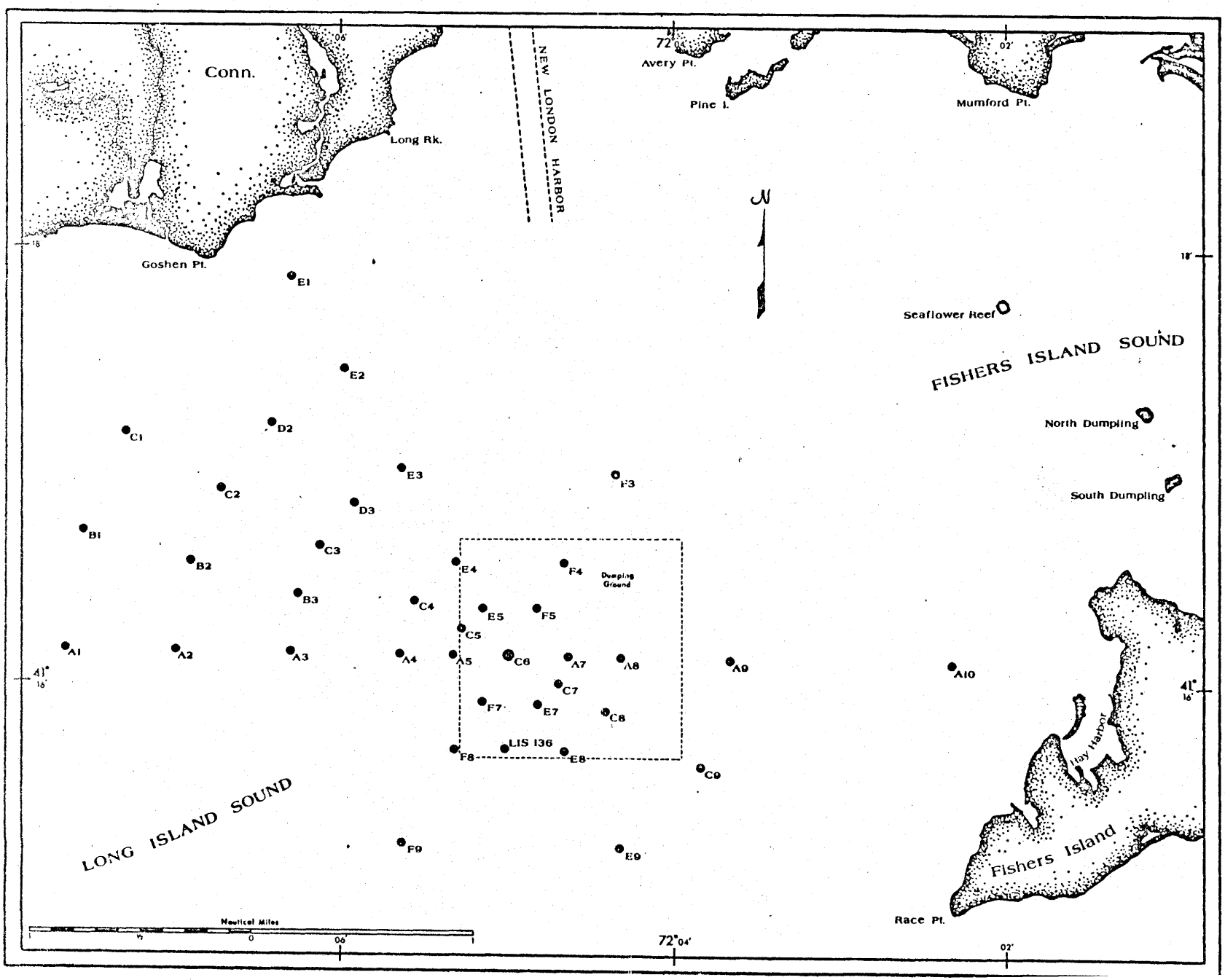

Conn.
Long Rk.
Goshen Pt.
NEW LONDON HARBOR
Avery Pt.
Pine I.
Mumford Pt.
72°
02'
06'
18'
41°
16'
Seaflower Reef
FISHERS ISLAND SOUND
North Dumpling
South Dumpling
E1
D1
E2
D2
C1
C2
D3
F3
B1
C3
B2
B3
C4
E4
F4
Dumping Ground
E5
F5
C5
A1
A2
A3
A4
A5
C6
A7
A8
A9
C7
F7
E7
C8
LIS 136
F8
E8
C9
F9
LONG ISLAND SOUND
Hay Harbor
Fishers Island
Race Pt.
Nautical Miles
72°04'

Figure 1A




GPO 954

Figure 2


Conn.
Long Rk.
NEW LONDON HARBOR
Avery Pt.
Pine I.
Mumford Pt.
Goshen Pt.
Seaflower Reef
FISHERS ISLAND SOUND
North Dumpling
South Dumpling
E1
E2
C1
D2
E3
F3
C2
D3
B1
C3
B2
E4
F4
Dumping Ground
B3
C4
E5
F5
C5
A1
A2
A3
A4
A5
C6
A7
A8
A9
A10
C7
F7
E7
C8
LIS 136
F8
E8
C9
F9
E9
LONG ISLAND SOUND
Nautical Miles
Isay Harbor
Fishers Island
Race Pt.
72°04'
06'
02'
18'
41° 16'

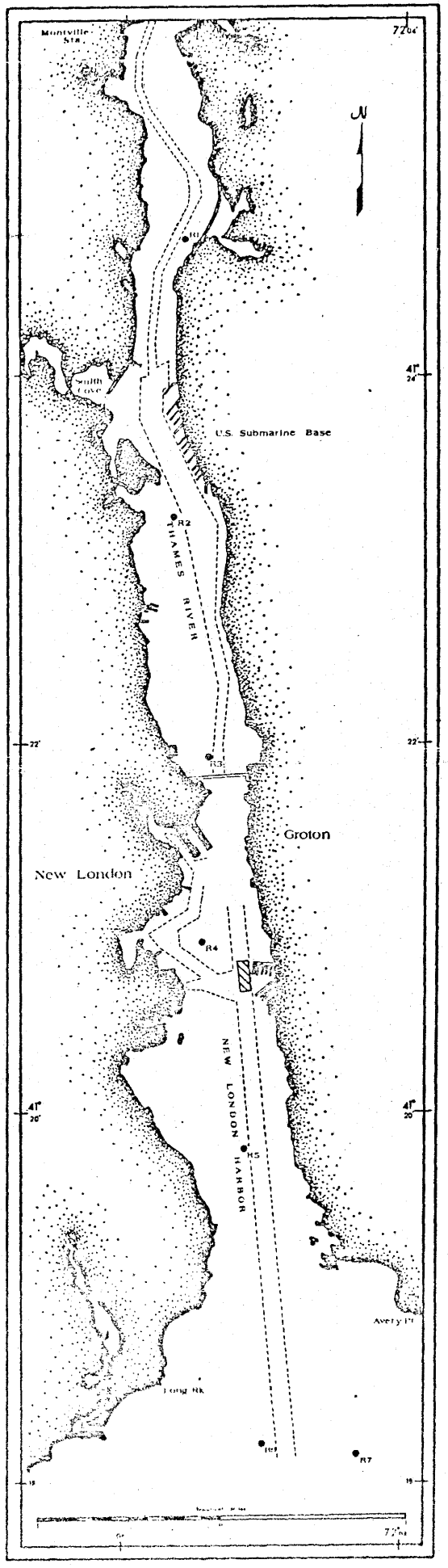



Figure 2A

▨ Site of dredging operations during NL 2

GPO 954-805

Figure 3

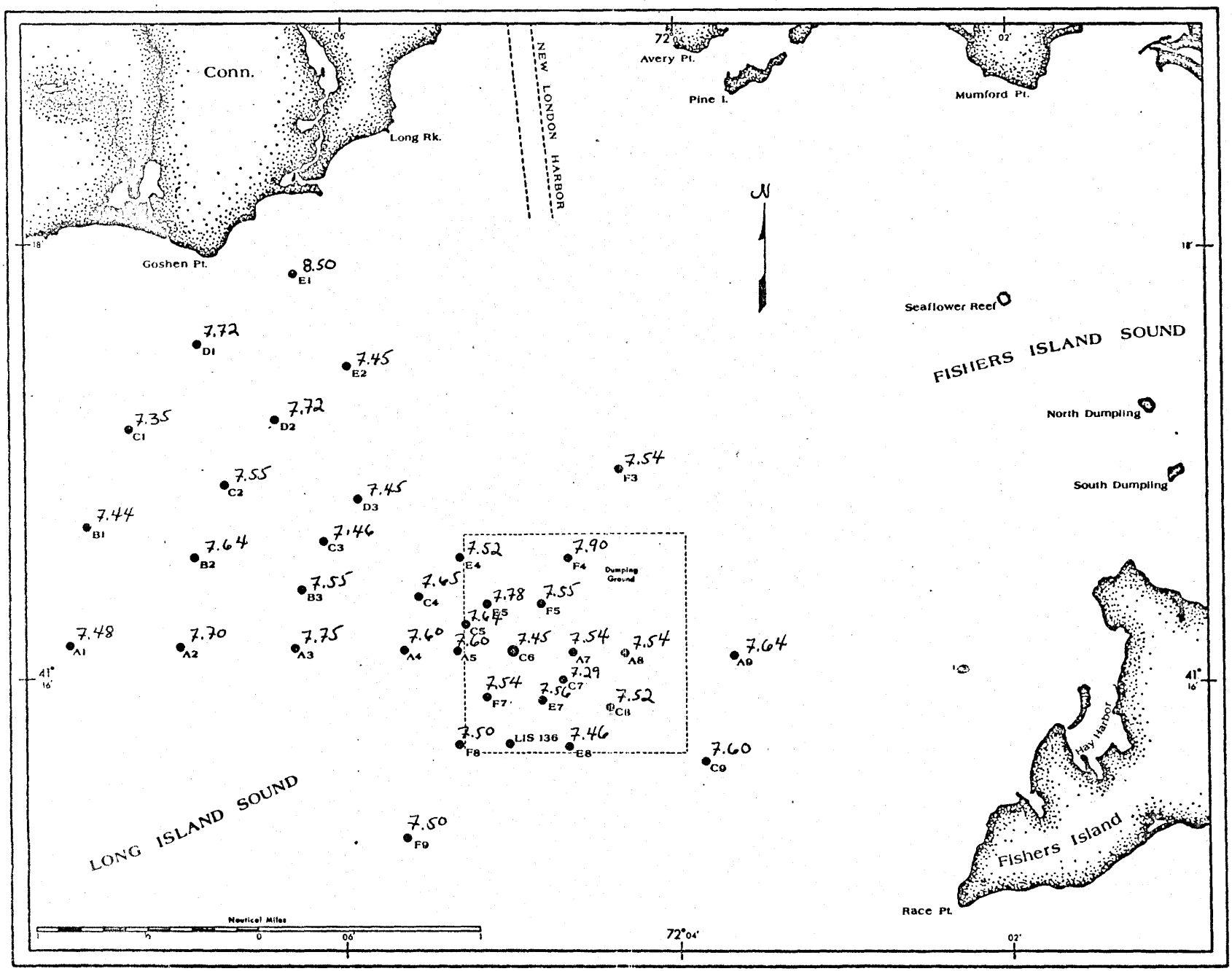

Conn.
Long Rk.
NEW LONDON HARBOR
Avery Pt.
Pine I.
Mumford Pt.
Goshen Pt.
Seaflower Reef
FISHERS ISLAND SOUND
North Dumpling
South Dumpling
Dumping Ground
LONG ISLAND SOUND
Fishers Island
Hay Harbor
Race Pt.
LIS 136
Nautical Miles
72°04'
41° 16'
E1 8.50
D1 7.72
E2 7.45
C1 7.35
D2 7.72
C2 7.55
D3 7.45
B1 7.44
B2 7.64
C3 7.46
B3 7.55
C4 7.65
E4 7.52
F4 7.90
E5 7.78
F5 7.55
C5 7.64
A1 7.48
A2 7.70
A3 7.75
A4 7.60
A5 7.60
C6 7.45
A7 7.54
A8 7.54
A9 7.64
C7 7.29
F7 7.54
E7 7.56
C8 7.52
F8 7.50
E8 7.46
C9 7.60
F9 7.50
F3 7.54

Figure 3A

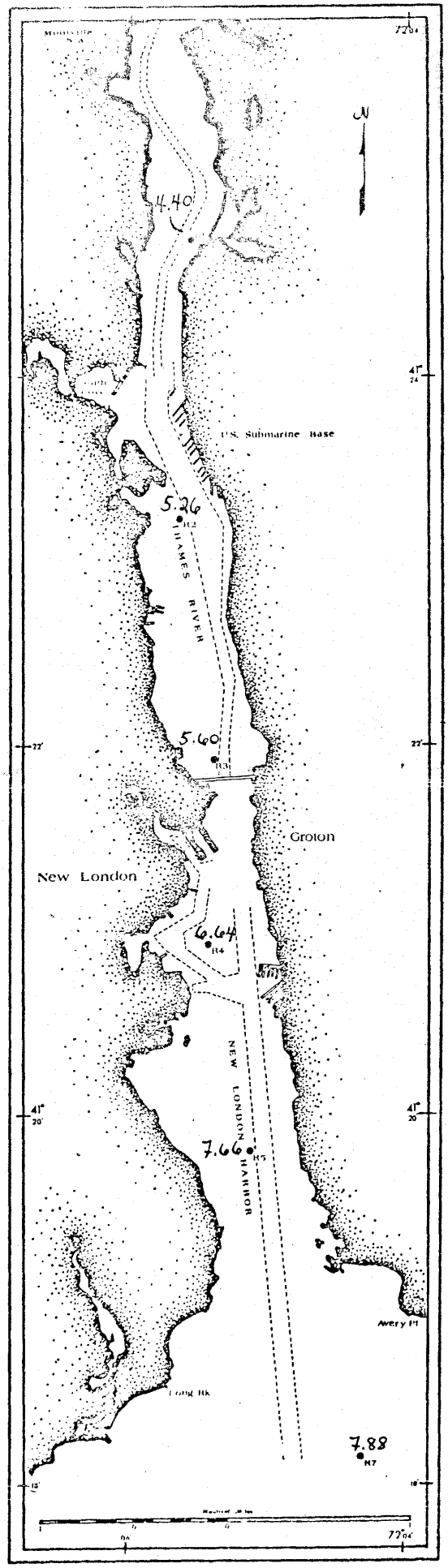

N
4.40
U.S. Submarine Base
5.26
H12
THAMES RIVER
5.60
H13
Groton
New London
6.64
H14
NEW LONDON HARBOR
7.66
H5
Avery Pt
7.88
H7
72°04'
41°24'
41°22'
41°20'

Figure 4

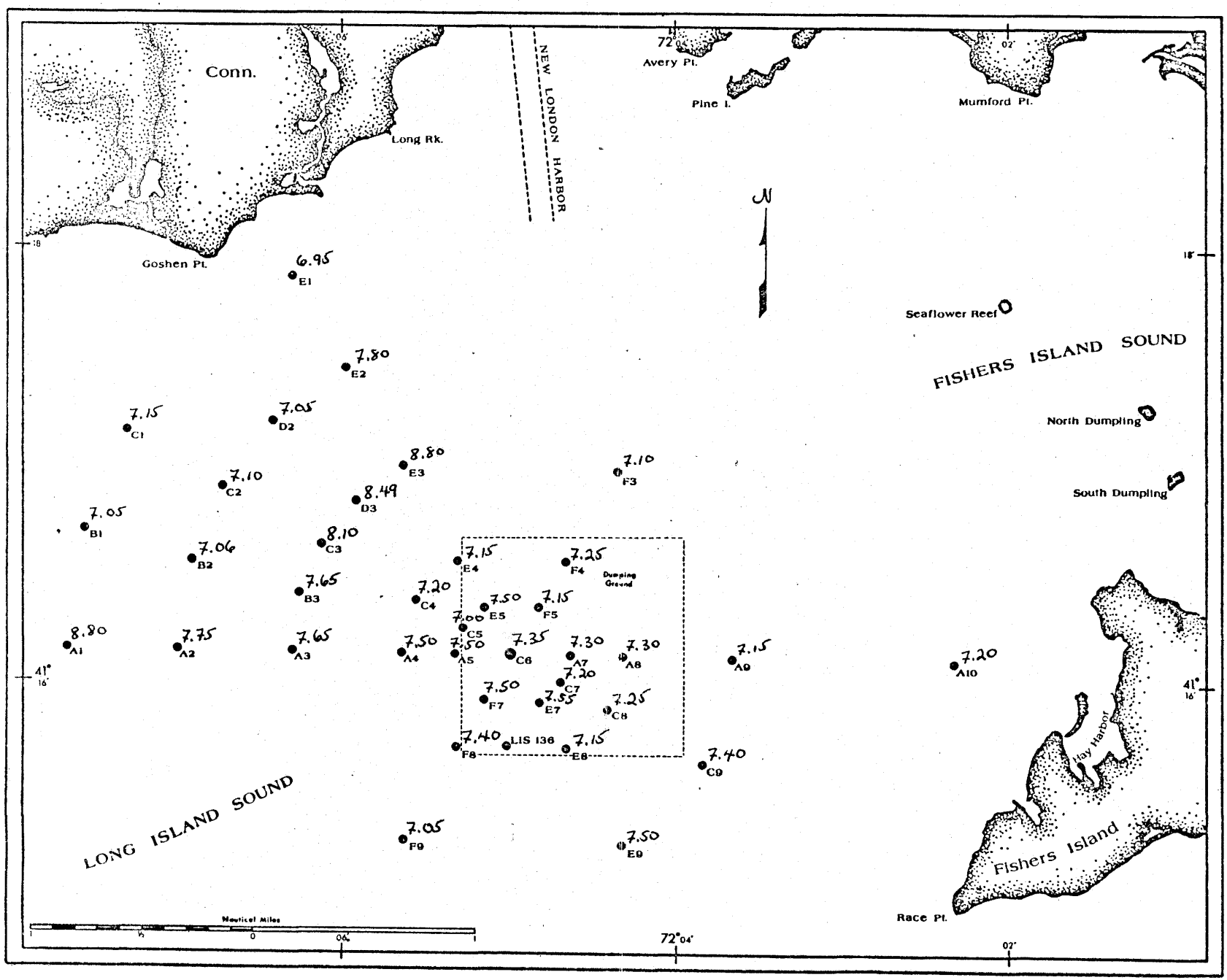
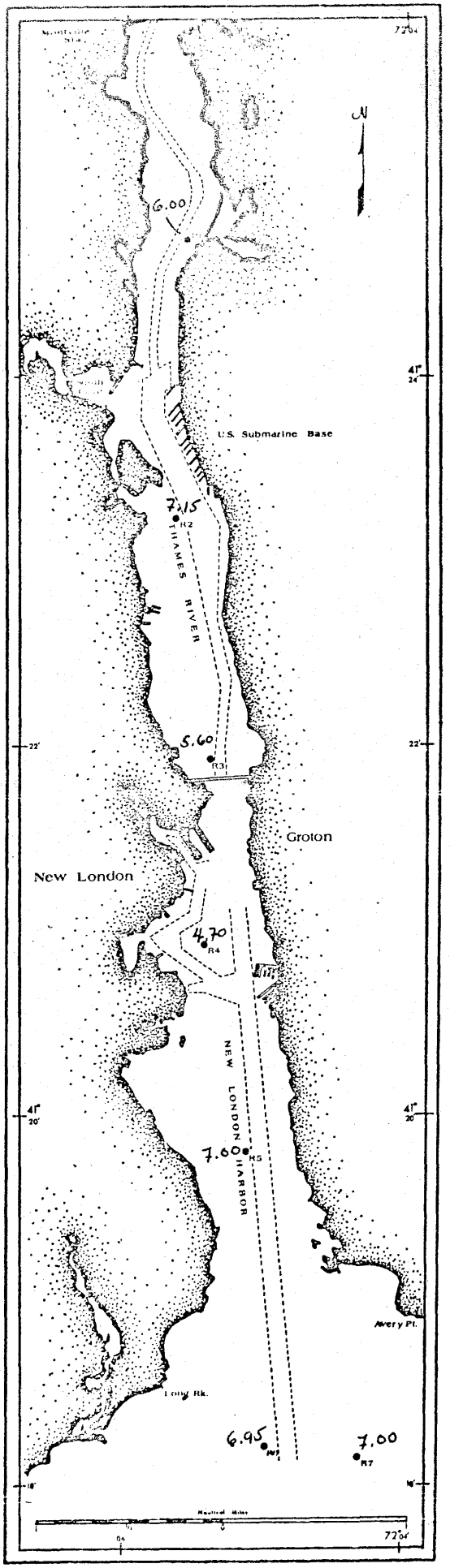

Conn.
Long Rk.
Goshen Pt.
NEW LONDON HARBOR
Avery Pt.
Pine I.
Mumford Pt.
Seaflower Reef
FISHERS ISLAND SOUND
North Dumpling
South Dumpling
Dumping Ground
LIS 136
LONG ISLAND SOUND
Fishers Island
Hay Harbor
Race Pt.
Nautical Miles
72°04'
02'
41° 16'
6.95 E1
7.80 E2
7.15 C1
7.05 D2
8.80 E3
7.10 C2
8.49 D3
7.10 F3
7.05 B1
8.10 C3
7.06 B2
7.15 E4
7.25 F4
7.65 B3
7.20 C4
7.50 E5
7.15 F5
7.00 C5
8.80 A1
7.75 A2
7.65 A3
7.50 A4
7.50 A5
7.35 C6
7.30 A7
7.30 A8
7.15 A9
7.20 A10
7.20 C7
7.50 F7
7.55 E7
7.25 C8
7.40 F8
7.15 E8
7.40 C9
7.05 F9
7.50 E9

Figure 4A


N
6.00
U.S. Submarine Base
7.15
R2
THAMES RIVER
5.60
R3
Groton
New London
4.70
R4
NEW LONDON HARBOR
7.60
R5
Avery Pt.
Long Rk.
6.95
R6
7.00
R7
41° 24'
41° 22'
41° 20'
41° 18'
72°04'
72°04'

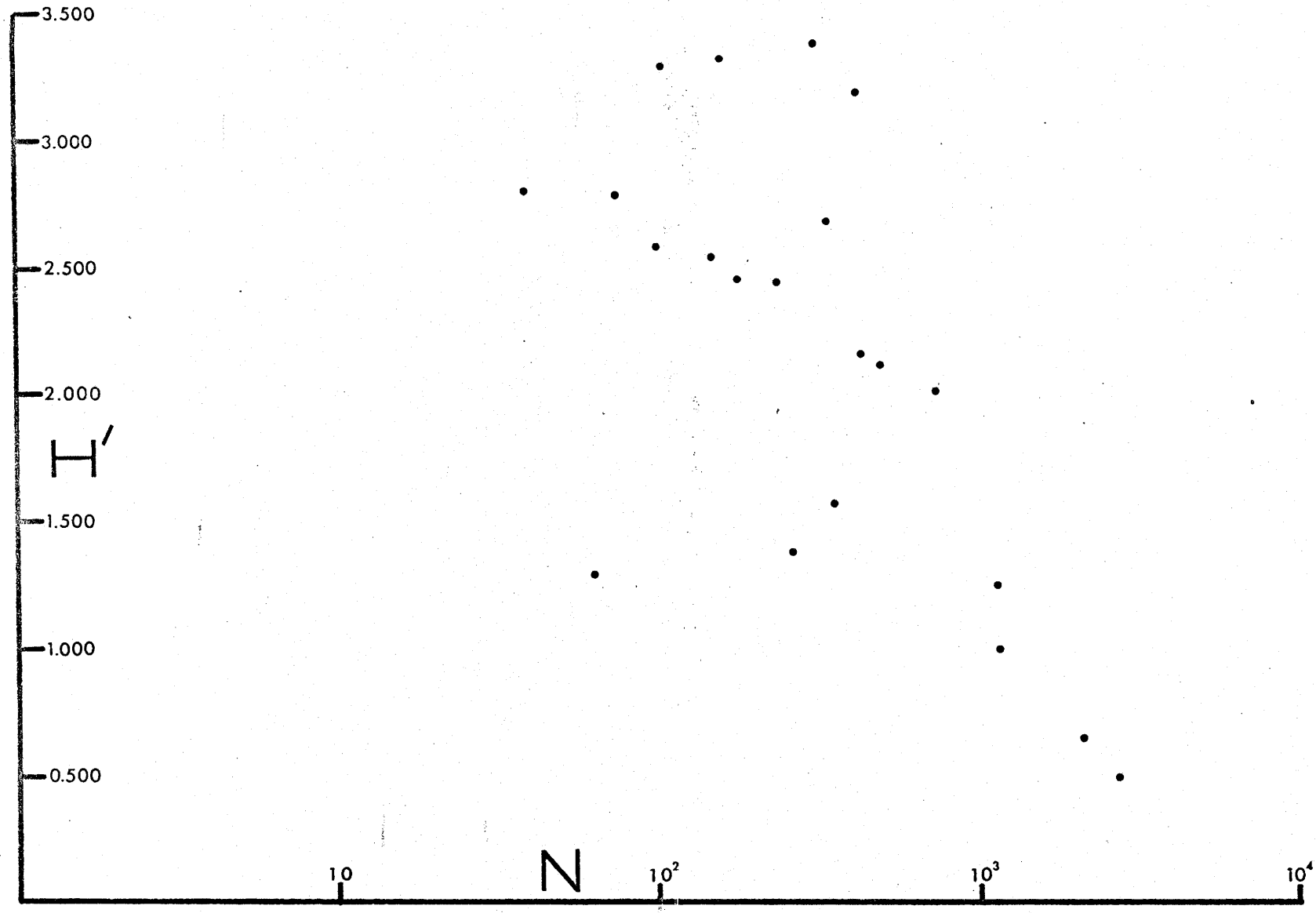



FIG. 5

APPENDIX A September 30, 1974

To: Dr. Robert Reid, Monitoring Project Leader

From: Dr. W. Frank Bohlen, Principal Investigator W. Frank Bohlen.

Subject: The Investigation of Suspended Material Transport in the Thames Estuary: Progress Report for the Quarter Ending September 30, 1974

The first three months of this investigation have been devoted primarily to the establishment of the material transport field characteristic of the study area prior to the initiation of the proposed dredging project. To permit development of an estimate of the mass flux, the density structure of the lower river has been detailed using data extracted from previous investigations. The resultant specific examples are being generalized, using historical streamflow and tidal data for subsequent comparison with estimates prepared using data obtained during the pre-dredging phase (i.e., July-August 1974) of this investigation. Three surveys of the lower river were conducted during this period (Table 1). Additional planned surveys intended to detail baseline conditions were precluded by the initiation of dredging on August 19, 1974. Despite the limited 1974 data, present indications are that a sufficiently reliable estimate of the baseline hydraulic characteristics of the lower Thames can be prepared using the available data set.

Suspended material concentrations have been detailed at a network of eleven stations. Five surveys have been conducted during the

first quarter of the investigation (Table 1). To date, only the ebb tidal cycle has been sampled. Flood tide conditions and the variations over a tidal cycle are to be detailed during the next month. When complete, these data are to be combined with the estimated circulation of the estuary to determine the routes and rates of material transport. At present it is difficult to predict the accuracy and/or general applicability of these estimates. Our understanding of the material concentration field characteristic of the lower Thames is extremely limited. There is essentially no historical data available for this area. The pre-dredging data gathered as part of this study consists of three surveys in July and August 1974 and as such is of limited value in the specification of the degree of spatial and temporal variability characteristic of the transport field prior to the dredging operation. The extent of the limitations imposed by the pre-dredge data will be the subject of continuing study throughout this investigation. The limited variability displayed by the data obtained during the past three months suggests that the material concentrations may vary as a relatively simple function of tidal state and river discharge. Such variability is often characteristic of low discharge-sediment poor rivers. If such a construct is applicable to the Thames estuary the limited data set will not preclude the definition of the baseline transport characteristics.

Following the initiation of dredging in August 1974 each of the

river surveys included a high resolution survey in the vicinity of the operating dredge and attendant barge. Transmission profiles using a short path length transmissometer (0.25 m) were obtained to detail the area impacted by the dredging. Water samples within this area are being analyzed to determine the variations in material concentrations and composition induced by the dredge. These initial analyses are not yet complete.

TABLE 1

Survey Summary - July 1, 1974-September 30, 1974

| | Date | No. of Stations | Parameters Sampled |
|---|---|---|---|
| Pre-Dredging Phase | July 8, 1974 | 11 | Temperature, salinity, suspended solids, transmission |
| | July 22, 1974 | 11 | Temperature, salinity, suspended solids, transmission |
| | August 7, 1974 | 11 | Temperature, salinity, suspended solids transmission |
| Dredging Phase | September 9, 1974 | 22 | Temperature, salinity, suspended solids, transmission, turbidity in vicinity of dredge-barge |
| | September 25, 1974 | 22 | Temperature, salinity, suspended solids, transmission, organic carbon, turbidity in the vicinity of dredge-barge |

APPENDIX B Quarterly Report

# An Investigation on the Effects of Dredging in the Thames River on Shellfish Resources and Phytoplankton

(Contract No. 03-5-043-301)
July 1 to September 30, 1974

Submitted to

Sandy Hook Laboratory, Middle Atlantic Coastal Fisheries Center, National Marine Fisheries Service
NOAA
U. S. Department of Commerce

by

S. Y. Feng

Marine Sciences Institute
University of Connecticut
Noank, Connecticut 06340

Field Accomplishments:

A. River Studies (Pre-dredging) - Four cruises were made in July, 1974. Thirty six water and 18 sediment samples from the six designated transects were collected on July 2 and 18. In addition 84 water samples were analyzed for chlorophyll a, b and c. During each cruise, temperature, salinity and oxygen measurements were taken routinely at three depths (surface, mid-depth and bottom) at each station. A survey of the distribution of hard clams and oysters was conducted on July 21 and 22 from the mouth of the Thames to ca. 11 nautical miles upstream; nineteen samples of Mercenaria mercenaria, 4 samples of Crassostrea virginica and 6 samples of Pitar morrhuana were obtained.

B. New London Dump Site Studies

Pre-dumping survey - Eight cruises were made from May 16 to August 6. Underwater observations were conducted during each cruise at the four corners and two central locations on the designated dump site. On each dive, depth, tidal stage, bottom visibility, current velocity and general direction, bottom type and relative abundance of dominant benthic species were recorded. Notable events were also documented by using the color 16 mm motion or 135 mm still photography. A visual count of lobster pot buoys augmented with information on pot numbers derived from interviewing local lobstermen, permitted us to estimate the distribution of lobsters and fishing intensity in the area during the summer.

Survey conducted during dumping - The degree of spoil dispersal was determined by diving at the corners of the dump site which are ca. 1/2 nautical miles from the present load release area; three dives were made on Aug. 29, Sept. 9 and 16. There were no indications of spoil deposition on the northeast, southwest and northwest corner. Existing bottom conditions at these locations were documented by underwater photography. Dives were also made at the present principle spoil release area ("NL" Buoy) to ascertain the bottom coverage, relative turbidity and biological colonization of the dredge spoil. Observations revealed the existence of a ca. 10 ft. deep soft but apparently stable sediment which was interspaced with large cohesive clay clumps. Erosion by the current appeared minimal. Turbidity observed at the sediment-water interface during a 1.5 knots current was low. It was noted that the spoil had been spread to a distance of 200 yards north of the "NL" Buoy. The activity of finfish and decapod crustaceans on and in the spoil was also noted. Sonic tagging and associated tracking apparatus are being set up for field use. Monitoring of individual lobster activities during dumping will commence in October.

Laboratory Analyses:

A. Heavy Metal Concentrations in Mercenaria mercenaria, Crassostrea virginica and Pitar morrhuana collected from the Thames River.

The concentrations of Zn, Cu, Cd, Ni, Cr and Hg in M. mercenaria, C. virginica and P. morrhuana were determined by either the flame or flameless atomic absorption spectrophotometry. The analyses included 168 M. mercenaria, 55 P. morrhuana and 38 C. virginica. The results are summarized in Table I.

The highest metal concentrations were found in C. virginica. These concentrations found in the oysters were well within the range found in those at other areas on Long Island Sound.

B. Determination of the Effect of Sediment Elutriate on Photosynthesis

The objective of this study was to determine whether the sediment elutriate would inhibit photosynthesis. A sediment elutriate was made by pooling 10 gm of sediment from each of the three grab samples collected from the first five transects which extend from the mouth of the river to the U.S. Navy Sub Base. The sediments (150 gm) were mixed with two liters of sea water collected from the end of the MRL pier. Zooplankters were screened from the water. The sediment suspension was shaken for 48 hrs. on a mechanical shaker and allowed to settle for six days. The elutriate was decanted, prefiltered and finally Millipore filtered (0.45μ).

Inhibition of photosynthesis was determined by introducing aliquots of the elutriate into five light and five dark bottles. In the first series one ml of elutriate was placed into each BOD bottle. Ten ml elutriate were placed into each bottle in the second series. The two series were incubated ca. 30 cm below the surface off the MRL dock with their appropriate controls which consisted of two pairs of light and dark bottles without addition of the elutriate. Five such runs were carried out to allow different light conditions on July 26, 30, Aug. 5, 12 and 16. The light intensity was determined at three different times during each run with a photometer at the surface and the percentage difference at 30 cm with that of the surface was determined with a submersible photometer.

After in situ incubation of the light and dark bottles, dissolved oxygen was determined by the Winkler's method on each bottle. Gross photosynthesis expressed as mg of carbon fixed per cubic meter per hour was determined by Strickland and Parsons' (1968) method. The results from the five separate runs were analyzed statistically for differences by the use of a completely randomized block design.

The results of the five runs are summarized in the following Table II.

The assumption that all samples within each run were homogeneous is valid, since during each run all sample bottles contained water from the same source, incubated under the same light condition and analyzed at the same time. Table III summarizes the statistics of the gross photosynthesis data used in the randomized complete block design.

Since $F=0.545$ (with d.f. $=2,8$) is not significant, the null hypothesis is sustained. It is concluded that the addition of sediment elutriate to a natural population of algae does not inhibit photosynthesis.

C. Heavy Metal Analyses of Water and Sediment Samples

Due to instrument failures in August and September, the results on these samples are still incomplete.

TABLE I. Average metal concentrations (ppm wet weight) in the three species of bivalve molluscs collected from the Thames River (standard deviations in parenthesis).

| Species | Zn | Cu | Cd | Ni | Cr | Hg |
|---|---|---|---|---|---|---|
| *M. mercenaria* | 38.0(5.6) | 3.7(0.8) | 0.15(0.12) | 1.64(0.54) | 0.5(0.13) | 0.035(0.015) |
| *P. morrhuana* | 50.2(21.8) | 2.1(0.4) | 0.30(0.21) | 1.72(0.29) | 0.4(0.17) | 0.019(0.005) |
| *C. virginica* | 1941.6(223.0) | 140.2(14.0) | 0.88(0.13) | 2.53(0.28) | 0.4(0.07) | 0.044(0.005) |

TABLE II. Gross photosynthesis expressed as mg carbon fixed per cubic meter per hr in the control and experimental (sediment elutriate added) BOD bottles containing natural populations of phytoplankton.

| Date | Light Intensity at 30 cm (lux) | % Light of Surface | Incubation Time (hr) | ml elutriate added | C $mg/M^3/hr$ |
|---|---|---|---|---|---|
| 7/26 | 27,500 | 55 | 4 | 0 | 149.99 |
| | | | | 1 | 138.65 |
| | | | | 10 | 187.80 |
| 7/30 | 24,035 | 52 | 5 | 0 | 113.94 |
| | | | | 1 | 110.92 |
| | | | | 10 | 109.91 |
| 8/5 | 20,625 | 58 | 5 | 0 | 31.26 |
| | | | | 1 | 41.34 |
| | | | | 10 | 25.21 |
| 8/12 | 44,352 | 84 | 6 | 0 | 42.85 |
| | | | | 1 | 26.89 |
| | | | | 10 | 25.21 |
| 8/16 | 35,200 | 80 | 6.5 | 0 | 32.58 |
| | | | | 1 | 26.37 |
| | | | | 10 | 44.21 |

TABLE III. Randomized complete block design using the gross photosynthesis data. Null hypothesis: There are no differences between the controls and experimentals.

| Treatment (ml elutriate) | | 0 | 1 | 10 | $\Sigma B_j$ | $\Sigma B_j^2$ |
|---|---|---|---|---|---|---|
| | | 149.99 | 138.65 | 187.80 | 476.44 | 226995.07 |
| | | 113.94 | 110.92 | 109.91 | 334.77 | 112070.95 |
| | | 31.26 | 41.34 | 25.21 | 87.81 | 9566.80 |
| | | 42.85 | 26.89 | 25.21 | 94.95 | 9015.50 |
| | | 32.58 | 26.37 | 44.21 | 103.16 | 10641.98 |
| Total | $\Sigma T_i$ | 370.62 | 344.17 | 392.34 | 1107.13 | 368290.30 |
| Mean | $\bar{X}$ | 74.12 | 68.83 | 78.47 | | |
| | $\Sigma T_i^2$ | 137359.18 | 118542.98 | 153930.67 | | |

Sum of the square of each individual observation = 124705.13
N=15; Treatment a=3; Blocks b=5

Analysis of Variance

| Sources of Error | dif. | Sum of Squares | Mean Square | F |
|---|---|---|---|---|
| Treatments | 2 | 232.78 | 116.93 | |
| Blocks | 4 | 41047.65 | 10261.91 | |
| Error | 8 | 1708.92 | 213.61 | 0.545 |
| Total | 14 | 42989.35 | | |

$F_{(0.01)} = 8.65$; $F_{(0.05)} = 4.46$

APPENDIX C

NEW YORK OCEAN SCIENCE LABORATORY
OF AFFILIATED COLLEGES & UNIVERSITIES, INC.

Drawer EE
Montauk, New York 11954

(516) 668-5800

October 1, 1974

Dr. John B. Pearce
Officer-in-Charge
Sandy Hook Laboratory of Middle
Atlantic Coastal Fisheries Service
National Marine Fisheries Service/NOAA
Highlands, New Jersey 07732

Dear Dr. Pearce:

Submitted herewith is our combined quarterly report with reference to "A Proposal for an Environmental Survey of the Effects of Spoil Disposal at the New London Dumping Grounds, Parts A and B, Chemical and Physical Oceanography", Project No. SR74-48, covering the period from July 1st to September 30, 1974.

To date, 5 cruises have been conducted at the New London Dump Site area; copies of the respective Cruise Reports are appended to this report.

Our initial sampling grid which had included sampling at the four corners of the dump site and at the center was revised in accordance with criteria of the subcommittee (NOAA memo of June 28, 1974). Such revision resulted in an expansion of the number of stations occupied from 5 to 13 and a reduction in the number of samples collected from the different depths at a particular station from 6 to 3 (surface, mid-water and bottom [one foot above]). The total number of samples, however, was increased by approximately 25 percent. The location of these stations are:

| Station | Latitude (°N) | Longitude (°W) |
|---|---|---|
| Center Buoy | 41°16'08" | 72°05'00" |
| W1 | " | 72°05'39" |
| W2 | " | 72°06'18" |
| W3 | " | 72°07'37" |
| E1 | " | 72°04'20" |
| E2 | " | 72°03'42" |
| E3 | " | 72°02'21" |
| N1 | 41°16'30" | 72"05'00" |
| N2 | 41°17'08" | " |
| N3 | 41°18'08" | " |
| S1 | 41°15'38" | " |
| NW1 | 41°17'14" | 72°06'08" |
| NE1 | 41°16'50" | 72°04'04" |

A problem encountered with the drogue tracking part of the experiment was the incidence of heavy fog, which hampered the determination of the drogue locations while in the water. The fog also delayed the start of water sampling in two cruises.

With the exception of the COD analyses on the samples collected during our last cruise all of the water work is complete, the data have been tabulated and are currently being interpreted. Heavy metals studies pertaining to the seston, and the sediment system are underway.

The only serious problem we have encountered is financial. We had not anticipated the need for one of our chemical technicians to be present during the benthic sampling efforts conducted by the Sandy Hook Laboratory. At the present time our travel support funds have been committed.

No untoward effects from the dumping operations have been noted in the chemical or physical data to date. The scarcity of seston in the water column during our September sampling which caused us to double our towing time (to 30 minutes) we have attributed to the normal, transitional period in the plankton cycle.

Respectfully submitted,

James E. Alexander, Ph.D.
Senior Research Scientist
Chemical Oceanography

Rudolph Hoffman, Ph.D.
Senior Research Scientist
Physical Oceanography

bb

cc: Dr. John C. Baiardi
President & Director

NEW YORK OCEAN SCIENCE LABORATORY
CRUISE REPORT NL-1
New London Dump Site Study
Project SR74-48

## I. ACTUAL SCHEDULE

31 July 1974
(Wednesday)

0600 - Depart Montauk enroute to study area
0745 - All vessels berthed at University of Connecticut pier to offload gear and laboratory personnel and to await for fog to clear.
0915 - Depart University of Connecticut pier to implant station buoys.
1040 - Commence water sampling.
2005 - Complete water sampling.
2330 - Arrive Montauk.

## II. VESSELS INVOLVED

*R/V Swordfish*
*R/V Blue Skies*
Boston Whalers (2)

## III. SAMPLING STATIONS AND FREQUENCY OF SAMPLING

In view of the 28 June, 1974 memorandum of Dr. J. Pearce to members of the Interagency Scientific Advisory Subcommittee on Ocean Dredging and Spoiling and State Delegates to the Subcommittee concerning Criteria to be Used in Monitoring U.S. Navy Dredging Project, Thames River Estuary, the original sampling stations (four corners of dump site and one at center) were modified to accomodate the provisions for Criteria for Monitoring, U.S. Navy Dredging Project, New London, Conn. (as appended to the above memorandum). Such modifications were verbally approved by Dr. Pearce.

The precise location of each station sampled during this cruise were:

| Station | Latitude | Longitude |
|---|---|---|
| Center Buoy | 41°16'08" | 72°05'00" |
| W1 | " | 72°05'39" |
| W2 | " | 72°06'18" |
| W3 | " | 72°07'37" |
| E1 | " | 72°04'20" |
| E2 | " | 72°03'42" |
| E3 | " | 72°02'21" |
| S1 | 41°15'38" | 72°05'00" |
| N1 | 41°16'30" | " |
| N2 | 41°17'08" | " |
| N3 | 41°18'08" | " |
| NW1 | 41°17'14" | 72°06'08" |
| NE1 | 41°16'50" | 72°04'04" |

Each station was sampled five times during the sampling period. At each station samples were collected from the surface, mid-water and one foot above the bottom. Parameters determined (and subsequently to be determined) were temperature, salinity, dissolved oxygen, pH, eH, suspended and volatile solids and total organic carbon.

## IV. PERSONNEL

| | |
|---|---|
| O. Custer | Captain (*R/V Swordfish*) |
| T. Lowenguth | Mate " |
| K. Meyer | Captain (*R/V Blue Skies*) |
| Dr. J. Alexander | Chief Scientist |
| Mr. T. White | Research Assistant |
| Mr. G. Mahmood | Research Assistant |
| Mr. S. Gill | Research Assistant |
| Mr. C. Zimmermann | Research Assistant |
| Mr. J. Schneidmuller | Marine Technician |
| Mr. T. Chiuchiolo | Marine Technician |
| Mr. R. Seiler | Graduate Fellow |
| Mr. S. Roschke | Graduate Fellow |
| Ms. A. Morrissey | Graduate Student |
| Mr. J. Flynn | Graduate Student |
| Mr. R. Gomprecht | Graduate Student |
| Mr. B. Holden | Technical Aide |

NEW YORK OCEAN SCIENCE LABORATORY

ADDENDUM
Cruise Report NL-1

Inadvertently, the name of Mr. David McGorry, Technical Aide, was omitted from the list of personnel involved with the above cruise report.

NEW YORK OCEAN SCIENCE LABORATORY
Cruise Report NL-2
New London Dump Site Study
Project SR74-48

## I. ACTUAL SCHEDULE

5 August 1974
(Monday)

0530 - *R/V Swordfish* departs Star Island Marina
0722 - Implant current meters
0740 - Deploy drogues
1310 - Retrieve surface drogue
1850 - Retrieve bottom drogue
1905 - Recover current meters
2040 - Arrive Star Island Marina

## II. VESSEL(S) INVOLVED

*R/V Swordfish*

## III. PERSONNEL

| | |
|---|---|
| Dr. R. Hollman | Chief Scientist |
| Mr. K. Meyer | Captain |
| Mr. S. Gill | Research Assistant |
| Mr. B. Holden | Technical Aide |

NEW YORK OCEAN SCIENCE LABORATORY
CRUISE REPORT NL-3
New London Dump Site Study
Project SR74-48

## I. ACTUAL SCHEDULE

7 August 1974
(Wednesday)

0505 - Depart Montauk, N.Y.

Commence plankton tows at station N-3

Complete plankton tows at station W-3

1900 - Returned to Montauk, N.Y.

## II. VESSEL(S) INVOLVED

*R/V Swordfish*

## III. STATION LOCATION AND SAMPLING FREQUENCY

Individual plankton tows were made around each station previously listed(see Cruise Report NL-1) except stations NW and NE. Nets (opening-closing, 303 micron mesh) were towed at the surface, mid-water and near bottom for 15 minutes at each station.

## IV. PERSONNEL

| | |
|---|---|
| H. DeCastro | Captain |
| T. Loewenguth | Mate |
| Dr. J. Alexander | Chief Scientist |
| Mr. T. Chiuciolo | Marine Technician |
| Mr. R. Seiler | Research Fellow |
| Ms. D. Jiminez | Graduate Student |
| Mr. C. Duffner | Graduate Student |
| Mr. I. Bao | Graduate Student |

NEW YORK OCEAN SCIENCE LABORATORY
Cruise Report NL-4
New London Dump Site Study
Project SR74-48
11 September 1974

## I. ACTUAL SCHEDULE

11 September 1974
(Wednesday)

0515 - Depart Montauk, N.Y.
0820 - Arrive New London Dump Site
0835 - Implant current meters. All vessels remain at anchor due to heavy fog.
1115 - Tug *R.H. Goode* arrive with barge to release dredged materials. All anchored vessels commenced sampling surface, mid-and bottom (one foot above) at approximately 15 minute intervals.
1507 - Commenced survey of east and west transects.
1710 - Tug *R.H. Goode* arrives with second barge. Deployed drogues upon release of dredged materials and immediately commenced water sampling and drogue tracking.
1930 - Completed water sampling and drogue tracking (due to darkness and return of turbidity values to ambient).
2000 - Recover current meter
2215 - Arrive Fort Pond Bay.

## II. VESSELS INVOLVED

| | |
|---|---|
| *R/V Swordfish* | Captain H. DeCastro |
| *R/V Blue Skies* | Captain T. Loewenguth |
| *M/V Dragon* | Captain J. Melrose |
| Boston Whaler | |

## III. SAMPLING STATIONS AND FREQUENCY

Upon release of the barged materials sampling was commenced at as high a frequency as possible (approximately 15 minutes) and continued at an intensity proportionate to the shape of the curve of the turbidity versus time plot. In this plume study samples were collected at the surface, mid and "bottom" depths.

## III. SAMPLING STATIONS AND FREQUENCY (cont.)

A survey of the east-west stations (location previously indicated [Cruise Report NL-1]) was made on a once only basis.

## IV. PERSONNEL

| | |
|---|---|
| Dr. J.E. Alexander | Chief Scientist |
| Mr. T. White | Research Assistant |
| Mr. S. Gill | Research Assistant |
| Mr. C. Zimmermann | Research Assistant |
| Mr. T. Chico | Marine Technician |
| Mr. J. Schneidmuller | Marine Technician |
| Mr. T. Chiuchiolo | Marine Technician |
| Mr. B. Holden | Technical Aide |
| Mr. S. Roschke | Graduate Fellow |

NEW YORK OCEAN SCIENCE LABORATORY
Cruise Report NL-5
New London Dump Study
Project SR74-48

## I. ACTUAL SCHEDULE

16 September 1974
(Monday)

0505 - Depart Montauk enroute New London Dump Site
0708 - Arrive Station S-1 and commence plankton tows
1609 - Complete plankton tows
1740 - Arrive Montauk, N.Y.

## II. VESSEL(S) INVOLVED

*R/V Swordfish*

## III. SAMPLE LOCATION

Surface, mid and bottom water tows were made at stations S-1, C, N-1, N-2, N-3, NE, NW, W-3 and W-2. The remaining stations (W-1, E-1, E-2 and E-3) were not sampled due to winch failure. Due to scarcity of plankton in the area, towing times were increased from 15 to 30 minutes at each station (except for S-1 and C where we towed for 15 minutes).

## IV. PERSONNEL INVOLVED

| | |
|---|---|
| Dr. J. Alexander | Chief Scientist |
| Mr. J. Schneidmuller | Marine Technician |
| Mr. T. Chiuchiolo | Marine Technician |
| Mr. H. DeCastro | Captain, *R/V Swordfish* |
| Mr. T. Loewenguth | Mate, *R/V Swordfish* |

APPENDIX D

# FIRST QUARTERLY REPORT ON THE DEMERSAL FISH POPULATION OF THE NEW LONDON DREDGED MATERIAL DUMP SITE

Dr. Herbert M. Austin
Associate Research Scientist

October 30, 1974

Trawling operations were conducted on 18 and 19 July 1974 to sample the demersal fish population in the area of the proposed New London dredged material dump site. Tows were made at nine stations chosen from those previously used for benthic invertebrate sampling. Stations were selected based upon their proximity to the site, bottom type, depth and direction of tidal currents. Tows were made using a 35' lead rope otter trawl (2" s.m. body, 1" s.m. cod end 1/4" s.m.) for a duration of 15 minutes when possible. Bottom temperature and salinity were measured before and after each tow. This information is included in Table I. All fish captured were identified and enumerated in Table II. A representative sample of each species was kept for laboratory analysis.

Laboratory analysis included measurement of standard length (mm) and total weight (g) of each fish. Gonads were excised, weighed and examined to determine sex. Stomaches were removed, their contents identified to the lowest taxa possible and weighed. Ages were calculated by counting annular rings on scales and/or otoliths. The results of these analyses are found in Table III.

TABLE 1

MEAN BOTTOM DEPTH, TEMPERATURE AND SALINITY

| STATION | DEPTH(m) | BOTTOM TEMPERATURE (°C) | BOTTOM SALINITY (%) |
|---|---|---|---|
| A 2 | 24 | 16.8 | 30.554 |
| A 4 | 20 | 17.1 | 30.374 |
| A 8 | 22 | 17.5 | 30.274 |
| A 9 | 18 | 17.7 | 30.104 |
| C 2 | 18 | 17.6 | 30.050 |
| C 6 | 22 | 17.0 | 30.386 |
| E 9 | 23 | 16.3 | 30.898 |
| F 4 | 16 | 17.9 | 30.212 |
| F 8 | 20 | 17.2 | 30.193 |

TABLE 2

Number of Fish Captured Trawling

| | A2 | A4-1 | A4-2 | A4-3 | A8 | A9 | C2-1* | C2-2 | C-2-3 | C-6-1 | C-6-2 | C 6-3 | F9 | F4 | F8 | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Pseudopleuronectes* | 4 | 57 | 66 | 152 | 69 | 38 | 4 | 38 | 1 | 26 | 344 | 4 | | 77 | 112 | 992 |
| | 1 | 9 | 9 | 21 | | 2 | 2 | 3 | | 2 | 2 | 1 | | 41 | 15 | 108 |
| | 16 | 3 | 3 | 13 | 3 | 12 | 10 | 14 | | | 1 | | | 1 | 4 | 80 |
| | | | | 5 | 13 | 27 | | 2 | 1 | 1 | 2 | 1 | 1 | 5 | 9 | 66 |
| | 9 | 2 | 6 | 4 | 3 | 1 | | 2 | | | 4 | | | 3 | | 31 |
| | 7 | | | 2 | | 1 | | 4 | 1 | 4 | 2 | 1 | | 3 | 1 | 29 |
| | | 3 | | 1 | | | | 5 | | | 2 | 1 | | 3 | 4 | 18 |
| | | | 1 | 1 | | 1 | | | | | 2 | | | 3 | 4 | 12 |
| | | 2 | | | | | | | | | | | | | | 2 |
| | | | | | | | | | | | | | | 1 | | 1 |
| | 1 | | | | | | | | | | | | | | | 1 |
| | | | | | | | | | | | | | 1 | | | 1 |

Replicated Tows — Replicated Tows — Replicated Tows

* 5 min. tow

TABLE III

| Year Class | % of Sample | N | Mean SL mm | Mean WT g | Males # | Males $\bar{X}$%GW | Females # | Females $\bar{X}$%GW | Stomach Contents % by Weight for all Fishes | # Empty |
|---|---|---|---|---|---|---|---|---|---|---|
| *Raja erinacea*, little skate | | | | | | | | | | |
| ---- | 100% | 2 | 504.5 | 651 | 2 | 0.70 | 0 | | 38.78 *Crangon* | 0 |
| | | | | | | | | | 6.80 digested | |
| | | | | | | | | | 54.42 Amphipoda | |
| *Pseudopleuronectes americanus*, winter flounder | | | | | | | | | | |
| 69 | 6.7 | 1 | 314 | 875 | 0 | | 1 | 2.02 | 57.62 Gammaridea | 1 |
| 70 | 20 | 3 | 279 | 585 | 0 | | 3 | 1.60 | 34.88 digested | |
| 71 | 40 | 6 | 244 | 354 | 2 | 0.38 | 4 | 0.94 | 3.36 Polychaeta | |
| 72 | 20 | 3 | 193 | 152 | 0 | | 3 | 0.55 | 1.81 Pelecypoda | |
| 73 | 13.3 | 2 | 161 | 78.5 | 1 | 0.12 | 1 | 0.55 | | |
| *Scophthalmus aquosus*, windowpane flounder | | | | | | | | | | |
| 71 | 100 | 1 | 235 | 224 | 0 | | 1 | 2.19 | | 1 |
| *Tautogolabrus adspersus*, cunner | | | | | | | | | | |
| 72 | 50 | 1 | 193 | 212 | 1 | 0.20 | 0 | | 100% rotten | 0 |
| 73 | 50 | 1 | 119 | 65 | 0 | | 1 | 2.0 | | |

Table III

| Year Class | % of Sample | N | Mean SL mm | Mean WT g | Males # | Males $\bar{X}$%GW | Females # | Females $\bar{X}$%GW | Stomach Contents % by Weight for all Fishes | # Empty |
|---|---|---|---|---|---|---|---|---|---|---|
| *Pseudopleuronectes americanus*, winter flounder | | | | | | | | | | |
| 70 | 6.67 | 1 | 254 | 420 | 1 | 1.99 | 0 | | 27.98 Gammaridea | 0 |
| 71 | 46.67 | 7 | 224 | 290 | 1 | 0.39 | 6 | 0.92 | 11.26 *Ampelisca* | |
| 72 | 26.67 | 4 | 188 | 147 | 1 | 0.11 | 3 | 0.71 | 29.20 *Leptocheirus pingnis* | |
| 73 | 2.00 | 3 | 159 | 90 | 2 | 0.16 | 1 | 0.79 | 0.47 *Unciola* | |
| | | | | | | | | | 0.13 *Caprella* | |
| | | | | | | | | | 12.20 digested | |
| | | | | | | | | | 2.09 sand | |
| | | | | | | | | | 1.41 Pelecypoda | |
| | | | | | | | | | 2.49 Ampharetidae | |
| | | | | | | | | | 2.63 Hydrozoa | |
| | | | | | | | | | 2.56 Chordata | |
| | | | | | | | | | 2.63 Polychaeta | |
| | | | | | | | | | 4.75*Pherusa* | |
| | | | | | | | | | 0.07 nematode | |

C-2-2

Table III

| Year Class | % of Sample | N | Mean SL mm | Mean WT g | Males # | Males $\bar{X}$%GW | Females # | Females $\bar{X}$%GW | Stomach Contents % by Weight for all Fishes | | # Empty |
|---|---|---|---|---|---|---|---|---|---|---|---|
| *Stenotomus chrysops* scup | | | | | | | | | | | |
| 72 | 7.14 | 1 | 164 | 139 | 1 | .19 | 0 | | 100% | *Leptocheirus* sp. | 0 |
| 73 | 92.86 | 13 | 105 | 45.6 | 7 | 0.047 | 2 | 0.10 | 14.4% | Gammaridea | 1 |
| | | | | | | | | | 34.9% | Digested | |
| | | | | | | | | | 2.5% | *Caprella* sp. | |
| | | | | | | | | | 20.1% | *Leptocheirus* sp. | |
| | | | | | | | | | 0.23% | *Photis* sp. | |
| | | | | | | | | | 3.6% | *Ampelisca* sp. | |
| | | | | | | | | | 23.4% | Clam parts | |

Table III

| Year Class | % of Sample | N | Mean SL mm | Mean WT g | Males # | Males $\bar{X}$%GW | Females # | Females $\bar{X}$%GW | Stomach Contents % by Weight for all Fishes | # Empty |
|---|---|---|---|---|---|---|---|---|---|---|
| *Prionotus carolinus*, northern searobin | | | | | | | | | | |
| 71 | 20 | 1 | 260 | 365 | 1 | 1.14 | | | 89.85 *Leptocheirus* | 0 |
| 72 | 80 | 4 | 228 | 220 | 3 | .80 | 1 | 2.38 | 8.03 *Crangon* | |
| | | | | | | | | | 1.30 *Ampelisca* | |
| | | | | | | | | | 0.47 *Unciola* | |
| | | | | | | | | | 0.36 digested | |
| *Tautoga onitis*, tautog | | | | | | | | | | |
| 69 | 100 | 2 | 314 | 1339 | 1 | .35 | 0 | | 80.41 *Pagurus* | 0 |
| | | | | | | | | | 13.63 *Mytilus* | |
| | | | | | | | | | 5.89 Brachyura | |
| | | | | | | | | | 0.01 Gastropoda | |
| | | | | | | | | | 0.04 Stone | |
| | | | | | | | | | 0.01 Hydrozoa | |

TABLE III

| Year Class | % of Sample | N | Mean SL mm | Mean WT g | Males # | Males $\bar{X}$%GW | Females # | Females $\bar{X}$%GW | Stomach Contents % by Weight for all Fishes | # Empty |
|---|---|---|---|---|---|---|---|---|---|---|
| *Raja erinacea*, little skate | | | | | | | | | | |
| --- | 100 | 4 | 440 | 547 | 1 | 1.04 | 3 | 1.63 | 6.49 *Crangon* | |
| | | | | | | | | | 19.95 *Leptocheirus pingnis* | 0 |
| | | | | | | | | | 3.78 Brachyura | |
| | | | | | | | | | 61.75 *Ensis* | |
| | | | | | | | | | 0.95 *Pagurus* | |
| | | | | | | | | | 3.54 *Pherusa* | |
| | | | | | | | | | 3.54 Pelecypoda | |
| *Scophthalmus aquosus*, windowpane flounder | | | | | | | | | | |
| 72 | 100 | 2 | 206 | 187 | 0 | | 2 | 1.74 | 10.67 *Leptocheirus pingnis* | 0 |
| | | | | | | | | | 2.67 *Ampelisca* | |
| | | | | | | | | | 14.67 *Crangon* | |
| | | | | | | | | | 62.67 *Neomysis* | |
| | | | | | | | | | 9.33 Digested | |

TABLE III

| Year Class | % of Sample | N | Mean SL mm | Mean WT g | Males # | Males $\bar{X}$%GW | Females # | Females $\bar{X}$%GW | Stomach Contents % by Weight for all Fishes | # Empty |
|---|---|---|---|---|---|---|---|---|---|---|
| *Pseudopleuronectes americanus*, winter flounder | | | | | | | | | | |
| 71 | 6.7 | 1 | 227 | 280 | 1 | 0.30 | 0 | | 80.6 Gammaridea | 0 |
| 72 | 26.7 | 4 | 186 | 163 | 0 | | 4 | 0.73 | 6.4 Hydrozoa | |
| 73 | 66.6 | 10 | 146 | 71 | 6 | 0.11 | 4 | 0.42 | 5.4 Pelecypoda | |
| | | | | | | | | | 4.9 digested | |
| | | | | | | | | | 2.4 Polychaeta | |
| | | | | | | | | | 0.3 Caprellidea | |

TABLE III

| Year Class | % of Sample | N | Mean SL mm | Mean WT g | Males # | Males $\bar{X}$%GW | Females # | Females $\bar{X}$%GW | Stomach Contents % by Weight for all Fishes | # Empty |
|---|---|---|---|---|---|---|---|---|---|---|
| *Tautogolabrus adspersus*, cunner | | | | | | | | | | |
| 70 | 50 | 1 | 209 | 218 | 1 | 0.08 | 0 | | 41.2 Crustacea | 0 |
| 71 | 50 | 1 | 145 | 79 | 0 | | 1 | 1.70 | 23.8 fish eggs | |
| | | | | | | | | | 17.3 digested | |
| | | | | | | | | | 17.3 Hydrozoa | |
| | | | | | | | | | 0.4 algae | |
| *Paralichthys dentatus*, summer flounder | | | | | | | | | | |
| 70 | 100 | 1 | 450 | 1655 | 0 | | 1 | 0.75 | ---------- | 1 |
| *Scophthalmus aquosus*, windowpane flounder | | | | | | | | | | |
| 70 | 6.7 | 1 | 246 | 282 | 0 | | 1 | 2.02 | 73.7 Gammaridea | 6 |
| 71 | 60.0 | 9 | 188 | 144 | 3 | 0.78 | 6 | 3.70 | 19.2 *Crangon* | |
| 72 | 26.6 | 4 | 161 | 89 | 2 | 0.20 | 2 | 1.81 | 7.0 *Neomysis* | |
| 73 | 6.7 | 1 | 147 | 84 | 1 | 0.23 | 0 | | 0.1 Hydrozoa | |

TABLE III

| Year Class | % of Sample | N | Mean SL mm | Mean WT g | Males # | Males X̄%GW | Females # | Females X̄%GW | Stomach Contents % by Weight for all Fishes | | # Empty |
|---|---|---|---|---|---|---|---|---|---|---|---|
| *Stenotomus chrysops*, scup | | | | | | | | | | | |
| 72 | 21.4 | 3 | 180 | 234 | 2 | 0.57 | 0 | | | | |
| 73 | 78.6 | 11 | 115 | 48 | 4 | 0.18 | 5 | 0.09 | 16.63 | Gammaridea | 0 |
| | | | | | | | | | 62.33 | Cnidaria | |
| | | | | | | | | | 14.72 | digested | |
| | | | | | | | | | 0.57 | Pelecypoda | |
| | | | | | | | | | 3.06 | Polychaeta | |
| | | | | | | | | | 0.13 | Crustacea | |
| | | | | | | | | | 0.13 | crab megalops | |
| | | | | | | | | | 0.38 | *Neomysis* | |
| | | | | | | | | | 2.48 | Ampharetidae | |
| *Tautoga onitis*, tautog | | | | | | | | | | | |
| 69 | 100 | 1 | 412 | 2361 | 0 | | 1 | 0.64 | 99.8 | *Pagurus* | 0 |
| | | | | | | | | | 0.2 | Polychaeta | |
| *Raja erinacea*, little skate | | | | | | | | | | | |
| -- | 100 | 1 | 367 | 415 | 0 | | 1 | 0.96 | 39.1 | *Crangon* | 0 |
| | | | | | | | | | 33.5 | Gammaridea | |
| | | | | | | | | | 27.4 | *Pherusa* | |

NLDS
T-VII-1
18-VII-1

A2

TABLE III

| Year Class | % of Sample | N | Mean SL mm | Mean WT g | Males # | Males $\bar{X}$%GW | Females # | Females $\bar{X}$%GW | Stomach Contents % by Weight for all Fishes | # Empty |
|---|---|---|---|---|---|---|---|---|---|---|
| *Tautogolabrus adspersus*, cunner | | | | | | | | | | |
| 74 | 100% | 1 | 57 | 3.86 | immature | | :52% | | 100% digested | 0 |
| *Stenotomus chrysops*, scup | | | | | | | | | | |
| 73 | 100% | 14 | 107 | 34.2 | 7 | 0.11 | 6 | 0.11 | 14.13% digested | 2 |
| | | | | | | | | | 2.22% Polychaeta | |
| | | | | | | | | | 0.52% Pelecypoda | |
| | | | | | | | | | 6.64% Gammaridea | |
| | | | | | | | | | 0.52% *Neomysis* | |
| | | | | | | | | | 68.46% Cnidaria | |
| | | | | | | | | | 3.48% Crustacea | |
| | | | | | | | | | 1.69 Caprellidea | |
| | | | | | | | | | 0.63 *Scophthalmus aquosus* larvae | |
| | | | | | | | | | 1.96 *Pagurus* | |

TABLE III

| Year Class | % of Sample | N | Mean SL mm | Mean WT g | Males # | Males $\bar{X}$%GW | Females # | Females $\bar{X}$%GW | Stomach Contents % by Weight for all Fishes | # Empty |
|---|---|---|---|---|---|---|---|---|---|---|
| *Tautoga onitis*, tautog | | | | | | | | | | |
| 69 | 11.1 | 1 | 517 | 3067 | 1 | 1.51 | 0 | | 25.51 Brachyura | 0 |
| 70 | 33.3 | 3 | 366 | 1775 | 2 | 0.23 | 1 | 1.27 | 7.67 *Ensis* | |
| 71 | 44.4 | 4 | 306 | 870 | 1 | 0.66 | 3 | 3.62 | 60.89 *Tellina* | |
| 72 | 11.1 | 1 | 285 | 708 | 0 | ---- | 1 | 1.37 | 0.33 Nemertea | |
| | | | | | | | | | 1.67 *Mytilus* | |
| | | | | | | | | | 0.01 Gastropoda | |
| | | | | | | | | | 1.26 *Mercenaria* | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| *Pseudopleuronectes americanus*, winter flounder | | | | | | | | | | |
| 70 | 50% | 2 | 255 | 430 | 0 | | 2 | 1.74 | 72.72 digested | 1 |
| 71 | 50% | 2 | 202 | 176.5 | 1 | 0.19 | 1 | 1.12 | 3.03 Polychaeta | |
| | | | | | | | | | 24.24 *Pherusa* | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| *Mustelus canis*, smooth dog fish | | | | | | | | | | |
| --- | 100% | 1 | 904 | 2433 | 1 | 0.87 | 0 | | 100% Brachyura | 0 |
| | | | | | | | | | | |
| | | | | | | | | | | |

# SECOND QUARTERLY REPORT

# ON THE

# DEMERSAL FISH POPULATION OF

# THE NEW LONDON

# DREDGED MATERIAL DUMP SITE

Dr. Herbert M. Austin
Associate Research Scientist
James Zaborski
Marine Technician

October 31, 1974

Trawling operations were conducted on 9, 10 and 11 October to sample the demersal fish population in the area of the New London dredged material dump site while dumping was in progress. Tows were made at the stations designated in the first quarterly report with the exception of station E9 which was unsuitable for the equipment employed. The gear was the same as that described in the first quarterly report. Bottom temperature and salinity were measured before and after each tow and is included in Table I. All fish captured are identified and enumerated in Table II. The laboratory analyses described in the first quarterly report were employed. The results are found in Table III.

The following is the key to codes used in Table III.

NLDS
9-X-74
T-X-1
A2

| | |
|---|---|
| NLDS | Project New London Dump Site |
| 9-X-74 | Date-9 October 1974 |
| T-X-1 | Cruise Number Trawling-October-1st sampling |
| A2 | Station |

TABLE I

MEAN BOTTOM DEPTH, TEMPERATURE AND SALINITY

| STATION | DEPTH (m) | BOTTOM TEMPERATURE (°C) | BOTTOM SALINITY (°/oo) |
|---|---|---|---|
| A2 | 18 | 16.3 | 31.634 |
| A4 | 18 | 16.6 | 31.252 |
| A8 | 17 | 16.8 | 31.308 |
| A9 | 16 | 16.6 | 31.440 |
| C2 | 11 | 16.2 | 31.298 |
| C6 | 19 | 16.6 | 31.326 |
| F4 | 14 | 16.4 | 31.448 |
| F8 | 21 | 16.6 | 31.182 |

TABLE II

NUMBER OF FISH CAPTURED TRAWLING

| | Replicate Tows | | | | | Replicate Tows | | | Replicate Tows | | Replicate Tows | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | A2-1 | A2-2 | A2-3 | A4 | A8 | A9-1 | A9-2 | A9-3 | C2-1* | C-2-2** | C6-1 | C6-2 | C6-3 | F4 | F8 | Total |
| *Stenotomus chrysops* | | 58 | 17 | | 5 | 66 | 1 | 9 | | | 1 | | 1 | 10 | | 159 |
| *Pseudopleuronectes americanus* | | 2 | 2 | 28 | 2 | 4 | 3 | | 1 | | 2 | 2 | | 16 | 3 | 65 |
| *Scophthalmus aquosus* | | | 18 | | 10 | 4 | 1 | | | | 1 | 1 | | 5 | 20 | 60 |
| *Tautogolabrus adspersus* | | | 1 | 1 | 9 | 1 | 1 | 1 | 3 | | | | | 41 | | 57 |
| *Peprilus triacanthus* | 15 | 1 | 1 | 1 | | 1 | | | | | | | | | | 19 |
| *Prionotus carolinus* | | | | 1 | | 1 | | | | | | 1 | | 1 | 2 | 6 |
| *Trigla gurnardus* | | 3 | | | | 1 | | | | | | | | | 1 | 5 |
| *Monacanthus hispidus* | | | | | 1 | | | | 1 | | | | | 1 | | 3 |
| *Paralichthys dentatus* | | | | | | 1 | | | | | | | | | | 1 |

* 3 min. tow

**12 min. tow, net hung up - no fish taken

NLDS
T-X-1 A2
10-X-74

TABLE III

| Year Class | % of Sample | N | Mean SL mm | Mean WT g | Males # | Males $\bar{X}$%GW | Females # | Females $\bar{X}$%GW | Stomach Contents % by Weight for all Fishes | # Empty |
|---|---|---|---|---|---|---|---|---|---|---|
| *Peprilus triacanthus*, butterfish | | | | | | | | | | |
| 74 | 100 | 2 | 42 | 1.32 | 1 | 0.39 | 1 | 0.62 | 0.05 digested | 1 |

NLDS
T-X-1
10-X-74

A9

TABLE III

| Year Class | % of Sample | N | Mean SL mm | Mean WT g | Males # | Males $\bar{X}$%GW | Females # | Females $\bar{X}$%GW | Stomach Contents % by Weight for all Fishes | # Empty |
|---|---|---|---|---|---|---|---|---|---|---|
| *Stenotomus chrysops*, scup | | | | | | | | | | |
| 73 | 13.3 | 2 | 152 | 103 | 2 | 0.12 | 0 | | 12.18 digested | 0 |
| 74 | 86.7 | 13 | 83 | 16 | | immature | | | 17.64 *Pagurus* | |
| | | | | | | | | | 61.76 *Neomysis* | |
| | | | | | | | | | 0.42 Copepoda | |
| | | | | | | | | | 7.98 *Unciola* | |
| *Paralichthys dentatus*, summer flounder | | | | | | | | | | |
| --- | 100% | 1 | 409 | 900 | 1 | | 1 | 0.55 | | 1 |
| *Scophthalmus aquosus*, windowpane flounder | | | | | | | | | | |
| 72 | 100% | 4 | 161 | 80 | 1 | 0.45 | 1 | 1.71 | 100% *Neomysis* | 1 |

NLDS
9-X-74
T-X-1

A9

TABLE III

| Year Class | % of Sample | N | Mean SL mm | Mean WT g | Males # | Males $\bar{X}$%GW | Females # | Females $\bar{X}$%GW | Stomach Contents % by Weight for all Fishes | # Empty |
|---|---|---|---|---|---|---|---|---|---|---|
| *Tautoga onitis*, tautog | | | | | | | | | | |
| 71 | 100% | 1 | 335 | 1243 | 0 | | 1 | 0.92 | 100% *Cancer* | 0 |
| *Prionotus carolinus*, northern searobin | | | | | | | | | | |
| 72 | 100% | 1 | 224 | 207 | 1 | 0.21 | 0 | | 90.33% Gammaridea | 0 |
| | | | | | | | | | 3.87 *Crangon* | |
| | | | | | | | | | 5.81 Brachyura | |
| *Tautogolabrus adspersus*, cunner | | | | | | | | | | |
| 68 | 100% | 1 | 202 | 233 | 1 | 0.06 | 0 | | 2.5% *Crangon* | 0 |
| | | | | | | | | | 92.5% digested | |
| | | | | | | | | | 2.5% Brachyura | |
| | | | | | | | | | 2.5% *Nassarius* | |
| | | | | | | | | | 0.2% *Musculus niger* | |

NLDS
T-X-1
10-X-74

A9

TABLE III

| Year Class | % of Sample | N | Mean SL mm | Mean WT g | Males # | Males $\bar{X}$%GW | Females # | Females $\bar{X}$%GW | Stomach Contents % by Weight for all Fishes | # Empty |
|---|---|---|---|---|---|---|---|---|---|---|
| *Pseudopleuronectes americanus*, winter flounder | | | | | | | | | | |
| 72 | 75% | 3 | 182 | 116 | 0 | | 1 | 0.81 | 9.38 Pelecypoda | 0 |
| 73 | 25% | 1 | 130 | 20 | 1 | 5.0% | 0 | | 5.73 Gammaridea | |
| | | | | | | | | | 16.14 Polychaete | |
| | | | | | | | | | 4.69 *Ampelisca* | |
| | | | | | | | | | 0.31 *Urciola* | |
| | | | | | | | | | 0.94 *Photis* | |
| | | | | | | | | | 9.90 Porifera | |
| | | | | | | | | | 5.73 *Glycena* | |
| | | | | | | | | | 17.19 *Neomysis* | |
| | | | | | | | | | 28.12 *Pherusa* | |
| | | | | | | | | | 0.52 digested | |
| | | | | | | | | | 0.52 *Musculus niger* | |
| | | | | | | | | | 1.04 unidentified | |

NLDS C 2
T-X-1
10-X-74

TABLE III

| Year Class | % of Sample | N | Mean SL mm | Mean WT g | Males # | Males $\bar{X}$%GW | Females # | Females $\bar{X}$%GW | Stomach Contents % by Weight for all Fishes | | # Empty |
|---|---|---|---|---|---|---|---|---|---|---|---|
| *Tautogolabrus adspersus*, cunner | | | | | | | | | | | |
| 71 | 33.3 | 1 | 150 | 89.7 | 1 | 0.13 | 0 | | 93.3 | *Neomysis* | 0 |
| 72 | 66.7 | 2 | 103 | 28.5 | 1 | 0.11 | 0 | | 6.7 | fish | |
| *Pseudopleuronectes americanus*, winter flounder | | | | | | | | | | | |
| 72 | 100 | 1 | 183 | 112.7 | 1 | 0.04 | 0 | | 100 | digested | 0 |
| *Monacanthus hispidus*, planehead filefish | | | | | | | | | | | |
| - | 100 | 1 | 104 | 39.19 | 1 | 0.36 | 0 | | 100 | Gammaridea | 0 |

NLDS
T-X-1
10-X-74

C6

TABLE III

| Year Class | % of Sample | N | Mean SL mm | Mean WT g | Males # | Males $\bar{X}$%GW | Females # | Females $\bar{X}$%GW | Stomach Contents % by Weight for all Fishes | # Empty |
|---|---|---|---|---|---|---|---|---|---|---|
| *Pseudopleuronectes americanus*, winter flounder | | | | | | | | | | |
| 71 | 100 | 2 | 214 | 220 | 2 | 2.69 | 0 | | | 2 |
| *Scophthalmus aquosus*, windowpane | | | | | | | | | | |
| 73 | 100 | 1 | 160 | 87.20 | 1 | 0.02 | 0 | | 100% *Neomysis* | 0 |
| *Stenotomus chrysops*, scup | | | | | | | | | | |
| 73 | 50 | 1 | 142 | 98 | 1 | 0.06 | 0 | | 73.50 *Neomysis* | 0 |
| 72 | 50 | 1 | 152 | 96 | 0 | | 1 | 0.04 | 5.42 Amphipoda | |
| | | | | | | | | | 5.42 Pelecypoda | |
| | | | | | 0 | | | | 6.62 digested | 0 |

NEW YORK OCEAN SCIENCE LABORATORY

CH 74-40
Cruise Report
New London Dump Site
Project - SR7448F
Vessel - Shang Wheeler

I. Objective:

To sample the demersal fish population in the area of the proposed dredge waste dumping site associated with contract SR7448F.

II. Actual Schedule:

| | | | |
|---|---|---|---|
| 1100 | - | 18 July 1974 | Depart Naval Underwater Systems Center, New London, Conn. |
| 1210 | - | " | Commenced trawling, Station A-8 |
| 1818 | - | " | Terminated trawling Station, C-6 |
| 1900 | - | " | Returned to port |
| 0800 | - | 19 July 1974 | Depart Naval Underwater Systems Center, New London, Conn. |
| 0911 | - | " | Commenced trawling, Station A-9 |
| 1328 | - | " | Terminated trawling, Station E-9 |
| 1430 | - | " | Returned to port |

III. Description of operations:

Demersal fish samples were collected by 30' otter trawl at all stations. Trawls were made for 15 min. where bottom type permitted. BT casts, surface temperatures and bottom salinities were taken commencing and terminating each trawling effort. A total of 9 stations were sampled over the 2 day period, with replicate tows at 4 of the stations. Of those fish captured 25 of each species from each station were preserved in 10% formalin for laboratory analysis. The remainder were counted and released. Measurements were taken where time permitted.

IV. Personnel:

| | |
|---|---|
| P. Broskus | Marine Technician |
| J. Zaborski | " " |
| W. Job | Fisheries Aide. |

NEW YORK OCEAN SCIENCE LABORATORY
CH-74-41
Cruise Report
New London Dump Site
Project SR 7448F
Vessel - Shang Wheeler

## I. OBJECTIVE:

To sample the demersal fish population in the area of the proposed dredge waste dumping site associated with contract SR 7448F.

## II. ACTUAL SCHEDULE:

| | | |
|---|---|---|
| 1540 | 8 October 1974 | Depart NYOSL, Montauk, New York |
| 1800 | 8 October 1974 | Arrive Naval Underwater Systems Center, New London, Conn. |
| 1030 | 9 October 1974 | Commenced Trawling, Station F4 |
| 1630 | 9 October 1974 | Terminated Trawling, Station C6 |
| 1700 | 9 October 1974 | Returned to port |
| 0745 | 10 October 1974 | Depart Naval Underwater Systems Center, New London, Conn. |
| 0820 | 10 October 1974 | Commenced trawling Station A2 |
| 1200 | 10 October 1974 | Terminated trawling due to bad weather conditions, Station F8 |
| 0855 | 11 October 1974 | Commenced trawling, C2 |
| 1045 | 11 October 1974 | Terminated trawling, C2 |
| 1215 | 11 October 1974 | Returned to NYOSL |

## III. DESCRIPTION OF OPERATIONS:

Demersal fish samples were collected by 30' otter trawl at all stations. Trawls were taken for 15 minutes where bottom type permitted. Surface temperatures, bottom salinities, and BT casts were taken commencing and terminating each trawling effort. A total of eight stations were sampled over a two and one half day period, with triplicate tows at Stations A9, C6, A2, and C2. Of those fish captured at least 25 of each species from each station were preserved in 10% formalin for laboratory analysis. The remainder were counted, length frequencies taken, and released.

## IV. PERSONNEL:

| | |
|---|---|
| J. Zaborski | Marine Technician |
| L. Gilman | " " |
| P. Brokus | " " |
| J. Hauer | " " |