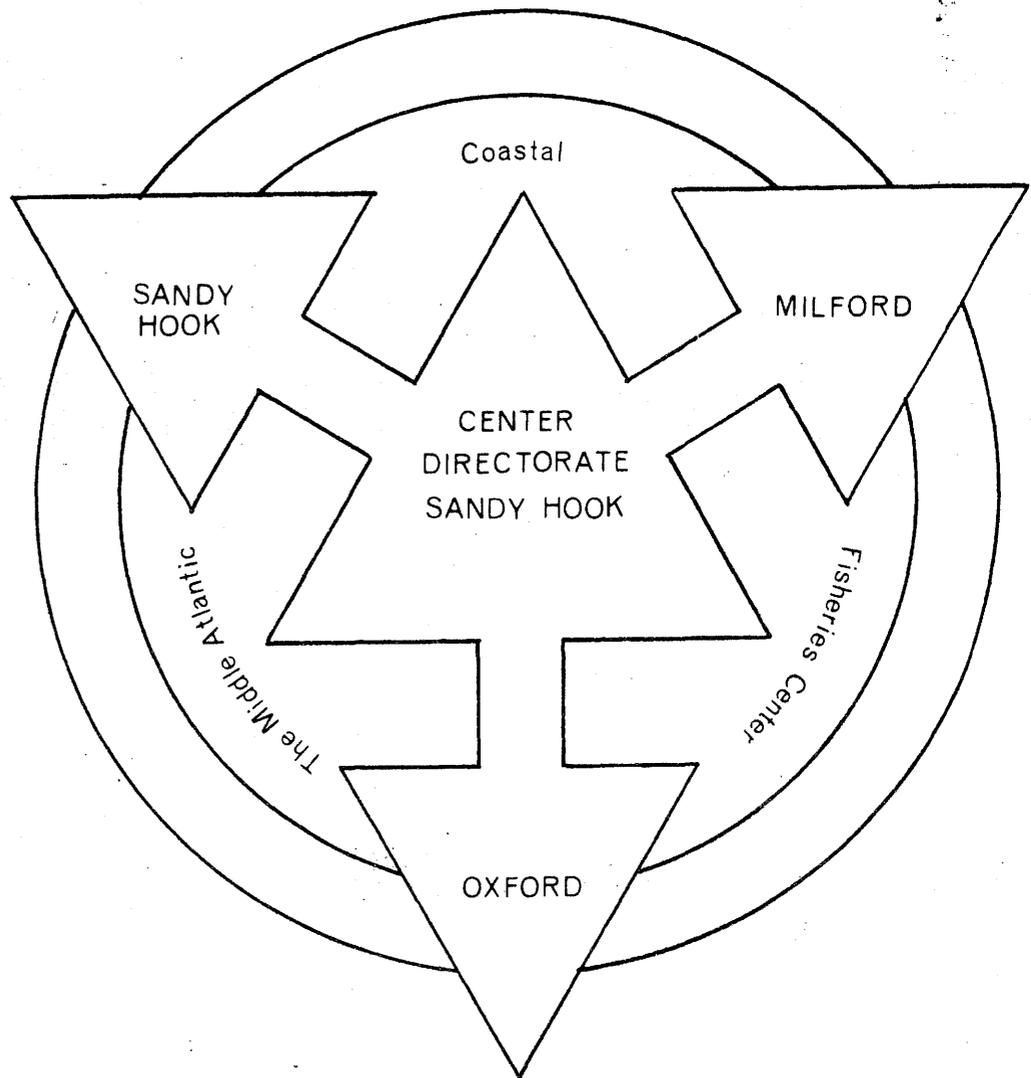


EXPANDED WORK STATEMENTS --
BLM-OCS BALTIMORE CANYON STUDIES



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

MIDDLE ATLANTIC COASTAL FISHERIES CENTER



Informal Report No. 61

April 1975

Expanded Work Statement: Project Management
Biological Baselines Data-Acquisition for OCS (BCT) Area

Task: Project Management

A.

Experience dictates that effective oversight and timely completion of an extensive multi-disciplinary study requires the full-time efforts of an overall project manager assisted by a small staff of specialized experts. In view of the specialized interests of BLM and of the rigid and early deadlines proposed, we strongly recommend support of a Project Manager, a Data Manager, a Scientific Writer and a secretary. While overall responsibility for managing the six tasks outlined herein rests with the Middle Atlantic Coastal Fisheries Center, National Marine Fisheries Service, it is intended that this group will act as a Steering Committee, so that all planning for and conduct of research, all data analyses and all reports will be responsive to BLM's needs. The Project Manager will be responsible for reducing the proposal and approved research protocols (for all tasks) to a Program Development Plan. The Project Manager will also be responsible for submission of monthly technical progress reports that will define the progress on each Task and will serve as the Technical Point of Contact for all Tasks. Concurrent with the research, the Scientific Writer will be designing and preparing the final report for each Task. The Data Manager will be responsible for preparation of a data-management plan and for ensuring the flow of data from the researcher to the computer operators and, after interpretation, to the writer. The team will also be responsible for searches of the scientific literature for materials pertinent to one or more of the several Tasks.

B. Work Products:

1. Program Development Plan for OCS (BCT) baselines study.
Data Management Plan
2. Monthly technical progress reports on all Tasks.
3. Bi-annual in-depth Task review and report.
4. Final report encompassing Tasks #3, #4, #5, and #6.
5. Suggestions and recommendations for BLM follow-on studies.
6. Timely deposit of all data in EDS/NODC archives.

C. Task: Budget Summary

<u>Cost Item</u>	<u>FY ' 76</u>	<u>FY ' 77</u>	<u>FY ' 78</u>
Direct Labor	76.9	82.3	87.5
Supplies, materials, travel	15.0	11.0	8.0
Support	<u>76.4</u>	<u>78.7</u>	<u>87.9</u>
	168.3	172.0	183.4

D. All Tasks: Budget Summary (by year and by Task):

	Year 1	Year 2	Year 3
Project Management	168.3	172.0	183.4
Task #1 Historical hydrographic data	71.2	-	-
Task #2 Pilot trajectory Model	89.0	-	-
Task #3 Historical fisheries data	157.9	84.5	-
Task #4 Historical zooplankton data	551.1	177.0	177.0
Task #5 Expansion of MARMAP activities	461.6	480.2	501.5
Task #6 Historical benthic macrofaunal data	134.6	77.1	-
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Total:	1,633.7	990.8	861.9
3 year total:		3486.4	

The above are current cost-estimates on work chargeable to Bureau of Land Management. Past, present and anticipated expenditures by NMFS/MACFC and NOS/MACFC for related research and ship operations and by NMFS/Narragansett for related zooplankton studies will total approximately \$ thousand per year or \$ million for the duration of the project. BLM charges constitute approximately % of the total costs.

Expanded Work Statement; Task #1
Biological Baselines Data-Acquisition for OCS (BCT) Area

Task #1: Assemblage of historical hydrographic data.

Lead Agency: Environmental Data Service

A. Available hydrographic data:

It is anticipated that EDS rather than NMFS will be the lead agency for this task. Upon request, MACFC, the component of NMFS most closely associated with the Middle Atlantic Outer Continental Shelf area, will provide the EDS with a summarization of our existing physical oceanographic data. Over the past 15 years the NMFS has routinely gathered hydrographic information in support of biological sampling cruises in the Middle Atlantic Bight. These data, primarily salinity and temperature, have been accumulated into a data file maintained at Sandy Hook Laboratory. Together with similar hydrographic data from NODC and other agencies, this file is composed of magnetic tape records using a uniform card-image format. The file is presently about 50,000 records long. Data collected during present field operations of the Center are accessed in a timely fashion. These data can be retrieved according to any parameter in the file such as date, latitude, longitude or source. In conjunction with proposed users of such data, the Center will arrange to present the data in a conveniently usable form. Manipulation will be performed to make the file compatible with other files to be entered in a data bank of pertinent information on the outer continental shelf in the area of interest to the Bureau of Land Management.

B. Work Products:

1. In response to instructions from lead-agency representatives:
 - Will provide data-tapes on hydrographic observations made during many cruises in the Middle Atlantic Bight (50,000 observations).
 - Will convert all tapes to data-tape format established by lead-agency.
 - Will key all tapes to coded stations or other such locational parameters as may be required by the lead-agency.

C. Task #1, Budget Summary:

<u>Cost Item</u>	<u>FY '76</u>
Direct Labor	27.2
Supplies, materials, travel	3.9
(Federal Contract) ADP Services	14.0
Support	<u>26.1</u>
	\$71.2

Expanded Work Statement; Task #2
Biological Baselines Data-Acquisition for OCS (BCT) Area

Task # 2: Pilot Trajectory Model

Lead Agency: Environmental Research Laboratories

A. Contribution of biological "target" data:

When considering the movement of entrained contaminants, or transport of surface suspended pollutants, in the context of a pollutant trajectory model, it is essential that the biological "targets" be identified and their possible fates predicted.

Generalized patterns of surface and bottom drift have been developed by Bumpus (1973) based on surface and bottom drifter movement. His studies indicate a general shoreward movement of shelf water in the Middle Atlantic Bight. It is also known that certain fractions of petroleum are water soluble and that petroleum itself can be carried through the water column to bottom sediments. It is therefore possible to identify those species and ecological groups of the biota which might be affected by surface floating petroleum as well as entrained residues and water soluble fractions.

Four general ecological groups of animals will be affected by chronic or acute oil spills: 1) zooplankton, including fish eggs and larvae; 2) pelagic finfish; 3) the benthos, including bottom dwelling metazoan invertebrates, demersal finfish and microorganisms; and 4) inshore estuarine communities which involve a wide range of flora and fauna. We would propose to contribute to the biological aspects of a pollutant trajectory model study by: 1) on the basis of existing historical data and reports for groups noted above, plot the distributions of organisms in relation to known or observed paths of water movement; 2) on the basis of biological data to result from work up of existing samples during the initial phase of the BCT studies, plot the distributions of organisms in relation to known paths of water movement; and 3) based on information commonly available in the literature, assess the possible effects of acute and chronic levels of petroleum derived pollutants on the aforementioned ecological groups and species.

This would allow the development of a first order trajectory model which would have predictive capabilities in terms of assessing chronic and acute oil spills associated with oil exploration and drilling on the continental shelf within the confines of the Middle Atlantic Bight.

This task would be completed and an appropriate report prepared within one calendar year following an award of contract.

B. Work Products:

Biological - Zooplankton:

1. Species listings; by station or area as reported in published literature and reports; reference task # .
2. Seasonal distribution, abundance and biomass as reported in published literature and reports; plotted on standard charts; reference task # .
3. Resume of current knowledge in regard to the impact of petroleum or petroleum related products on zooplankton, including fish eggs and larvae.
4. Correlation of foregoing with hydrographic data concerned with currents and mass transport.

Biological - Pelagic Finfish:

1. Species listings; by station or areas as reported in published literature and reports; reference task # .
2. Seasonal distribution, abundance and biomass as reported in published literature and reports; plotted on standard charts; reference task # .
3. Resume of current knowledge in regard to the impact of petroleum or petroleum related products on pelagic finfish.
4. Correlation of foregoing with hydrographic data concerned with currents and mass transport.

Biological - Benthic Invertebrates and Demersal Finfish:

1. Species listings of dominant species, by station or area as reported in published literature and reports; reference task # 6.
2. Distribution, abundance and biomass as reported in published literature and available reports; plotted on standard charts; reference task # 6.
3. Resume of current knowledge in regard to the impact of petroleum and petroleum related products on benthic invertebrates, demersal finfish and marine microorganisms.
4. Correlation of foregoing with hydrographic data concerned with currents and mass transport.

Biological - Inshore Estuarine Communities:

1. Location of estuarine communities subject to contamination by water transported petroleum having origins in the Baltimore Canyon Trough oil exploration and drilling.
2. Review of literature concerned with effects of petroleum on estuarine and marshland communities and species.
3. Correlation of foregoing with current knowledge of mass transport systems related to major current systems.

C. Task #2, Budget Summary:

<u>Cost Item</u>	<u>FY '76</u>
Direct Labor	41.1
Supplies, materials, travel	4.7
(Federal Contract) ADP Services	4.0
Support	<u>39.2</u>
	\$89.0

Expanded Work Statement; Task # 3
Biological Baselines Data-Acquisition for OCS (BCT) Area

Task #, 3: Historical Fisheries/Ichthyoplankton/Shellfish Data.

Lead-Agency: National Marine Fisheries Service

A. Historical Trawl Fisheries Surveys:

As the lead agency within NOAA for fisheries matters, NMFS will assume responsibility for assemblages, analysis and summarization of available historical Outer Continental Shelf - pertinent fisheries and ichthyoplankton data.

The Middle Atlantic Coastal Fisheries Center (MACFC) has recently assumed responsibility for survey and assessment of trawl fisheries in the Middle Atlantic Bight including all the area of potential oil development for the Mid-Atlantic Outer Continental Shelf. Historical trawl fisheries data are available in this area from three basic ongoing surveys: a long term semi-annual offshore assessment study, a medium term semi-annual inshore assessment study and a recent monthly assessment study. The long term studies include 15 assessment cruises conducted by the Northeast Fisheries Center (NEFC) through the Mid-Atlantic area from the fall of 1967 thru the spring of 1974, and two cruises, fall of 1974 and spring of 1975 conducted by MACFC. Trawl stations are made at an intensity of one per 300 sq. miles at depth between 15 and 200 fathoms. The medium term inshore study conducted by MACFC includes six semi-annual cruises from the fall of 1972 thru spring 1975. Inshore surveys are made at an intensity of one station per 150 sq. miles at depths less than 15 fathoms. A monthly survey, initiated in June 1974, is conducted in a 6300 sq. mile corridor in the area of the Hudson Canyon. Trawls are made at all depths to 200 fathoms and at an overall intensity of one trawl per 150 sq. miles. Data collected on these cruises include hydrographic, meteorological and biological observations. Biological information is primarily fisheries oriented and includes by species total weight, total number and length frequencies. Additional observations or samples determined on a species by species basis may include age and growth samples, stomach samples, gonad samples and other samples or observations. The data format used is identical for all survey cruises conducted by MACFC and NEFC; however, neither fisheries center maintains a data bank which includes all three fisheries surveys applicable to the Mid-Atlantic OCS area. Since MACFC is now responsible for all trawl surveys in this area, establishing a comprehensive fisheries data bank at MACFC is essential for both NMFS and BLM assessment of potential drilling impact. This will require duplicating and transferring from NEFC to MACFC all data from the 15 previously mentioned semi-annual offshore cruises. MACFC personnel on temporary assignment to NEFC will take duplicate magnetic tapes or cards as appropriate and reprogram them as necessary to make the data compatible with MACFC's computer facilities. MACFC will then provide a summarization of the total data on trawl fisheries available for the Mid-Atlantic OCS area.

B. Sportfish/Commercial Fish Activities and Interactions:

Provisions toward an understanding of fisheries are provided by ongoing research in the Middle Atlantic Bight; but no complete measurement of effects of recreational fishing of fish stocks is presently being made. Measurements of the removals and the interaction of removal mechanisms (i.e., competition between fishery elements) are vital to successful management of the fisheries and assessment of man produced impacts such as offshore oil development. Basically, the proportions and fractions of the recreation harvest to total harvest must be determined and the biological characteristics of the catch described. MACFC specifically proposes to provide a report to the BLM based on data collected during a one-year pilot study of the Ocean City, Maryland area.

C. Historical Ichthyoplankton Surveys:

Ichthyoplankton data for the Mid-Atlantic OCS are also available from previous surveys. Comprehensive surveys of the area were conducted by MACFC personnel in 1967 and 1968. Semi-annual ichthyoplankton surveys in conjunction with the semi-annual offshore fisheries surveys were initiated in the spring of 1968 by NEFC. MACFC assumed responsibility for ichthyoplankton sampling on these cruises in the fall of 1973 and standard MARMAP sampling procedures were initiated in the fall of 1974. Standard MARMAP procedures have been used by MACFC on semi-annual inshore cruises and monthly corridor cruises since the fall of 1973 and July 1974, respectively. As with the fisheries data, the ichthyoplankton data are archived in two separate data banks at NEFC and MACFC and compiling the data at a single location is essential. Some ichthyoplankton samples collected prior to the fall of 1973 may yet need to be sorted and identified. Supplementary funding for sorting and identifying archived samples will be necessary.

D. Historical Ocean-Shellfish Surveys:

MACFC also conducts periodic surveys of the living invertebrate resources of the Mid-Atlantic continental shelf (See Figure 3-1). A primary species is the surf clam used in over 60% of all clam products produced in the United States and most of the 82.2 million pounds of shucked meats landed in 1973 came from the BLM "area of interest". MACFC conducted eight surf clam cruises over regions of the continental shelf from Montauk Point, N.Y., to Cape Hatteras, N.C., from 1965 thru 1974. Selected portions of the data have been published, but no single listing of the data is presently available. A complete analysis of the data collected on all cruises is essential for determination of potential impact due to oil development. The present form of the data, however, will make total analysis difficult. As a significant impact may also occur on commercial fishing operations, it is essential to better define the locations of fishing activities and identify possible areas of conflict. Over 15,000 interviews have been made

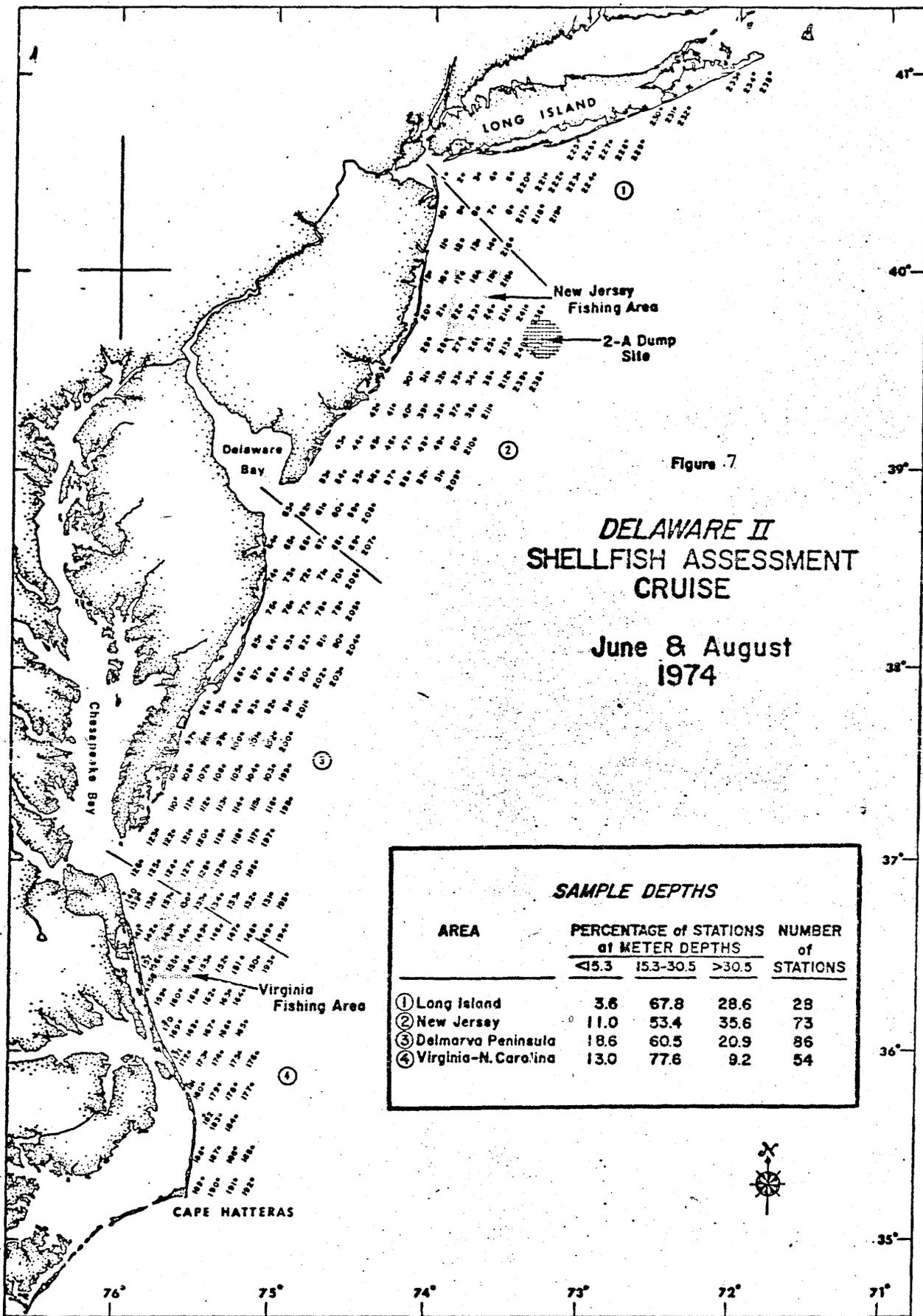


Figure 3-1 Station location and number occupied during the June 13-28, 1974, Delaware II cruise by areas. The depths sampled are analyzed in the table insert. The location of a proposed alternate dump site (2-A) and the locations of two fishing areas that were sampled during the August 5-10, 1974, Delaware II cruise are shown in relation to the Middle Atlantic Bight.

with surf clam vessel operations since 1965. As with the surf clam cruise data only selected portions of the data have been analyzed and published. The present form of accumulated data, however, makes it very difficult to efficiently and thoroughly identify specific locations of resource harvest except in a general way from published annual reports. The interview data contain observations on the location fished, quantity removed and size composition of the catch that have use in determinations of levels that can be economically harvested and locating areas where oil development impact might be greatest.

E. Work Products:

Hydrographic

1. Salinities listings, by cruise, by station in OCS(BCT) area (2800 measurements).
2. SYMAP salinities by cruise in OCS(BCT) area (computer-generated contour map).
3. Water temperature listings, by cruise, by station in OCS(BCT) area (2800 measurements).
4. SYMAP temperatures by cruise in OCS(BCT) area (computer-generated contour map).

Biological-Demersal Finfish

1. Species listings, by station - approximately 2800 stations;
2. Distributions and abundances (D&A) of fishes, by species, by season (2800);
3. SYMAP reproductions of D&A above. (Computer-generated contour maps of OCS(BCT) area, demonstrating seasonal distributions and abundances);
4. Total demersal (trawl-vulnerable) finfish biomass - OCS(BCT) area (tonnage and value) by season (time-series averaged data);
5. Initial data on spawning seasons by dominant species (to be supplemented and expanded by operations under Task # 5);
6. Distribution of populations (dominant species) by year-class (time-series averaged data). (Initial data to be supplemented and expanded by operations under Task # 5).

Biological - Ichthyoplankton

1. Distribution and abundances (D&A) listings of eggs (by species), by cruise, over OCS(BCT) area;
2. Distribution and abundances (D&A) listings of larvae (by species), by cruise, over OCS(BCT) area;
3. Relative distributions of (mixed) larvae, by cruise, in OCS(BCT) area.
4. Relative diversities of species of larvae, by cruise, in OCS(BCT) area.
5. SYMAP reproductions of D&A above by cruise and by species.
6. Initial data on diel movements of ichthyoplankton (initial data to be supplemented under operations in Task # 5).

Biological - Sportfish/Commercial Fish Activities

1. Total removal of fish and shellfish by sportfish and commercial vessels in the lower OCS(BCT) area (by species, tonnage, and value).
2. Impact of sportfishing in the lower OCS(BCT) area. Number of anglers, vessels, harvest by species.
3. Impact of commercial finfish and shellfish fishing in the lower OCS(BCT) area. Number of vessels - harvest by species.
4. Significance of commercial/recreational fishing relative to competition for all resources in the lower OCS(BCT) area.

Biological - Shellfish

1. Distributions and abundances listings of surf clams, by station, by cruise, in OCS(BCT) area.
2. Distribution and abundances listing of ocean quahog, by station, in OCS(BCT) area.
3. Distribution and abundances listing of sea scallops, by station, in OCS(BCT) area.
4. Tonnage and value of ocean shellfish resources in OCS(BCT) area.
5. Preparation of SYMAP contours of shellfish concentrations in OCS(BCT) area.
6. Analysis in changes in distribution and diversity in OCS(BCT) area derived from historical surveys.

F. Task # 3, Budget Summary:

<u>Cost Item</u>	<u>FY '76</u>	<u>FY '77</u>
Direct Labor	61.7	49.4
Supplies, materials, travel	16.0	8.0
(Federal Contract) ADP Services	21.0	10.0
Support	59.2	47.1
	<u>\$157.9</u>	<u>\$114.5</u>

Total for Task:

\$272.8

Expanded Work Statement; Task # 4

Biological Baselines Data-Acquisition for OCS (BCT) Area

Task # 4: Historical zooplankton data

Lead-Agency: National Marine Fisheries Service

A. Introduction:

In the Middle Atlantic "lease" area (OCS/BCT), the zooplankton provide the food base for the important fish stocks of the region. Knowledge of the species-composition, abundances, productivity and condition of the zooplankton is needed to provide a data-base (baselines) against which future changes may be detected. First considerations, in the description of the zooplankton population of the Middle Atlantic Bight, must be the form of reviews of existing (historical) data and information and a definition of the contributions of the zooplankton to the support of the important fishery resources of the area. This information can best be obtained by considering the historical data in the form of a time-series. Potential impacts can be forecasted only if the variations now observed in the abundances and distributions of most species, from season-to season, year-to-year and area-to-area, are taken into account. Baseline information is only meaningful in terms of possible environmental effects of oil development when the variations caused by natural environmental fluctuations or already ongoing human activities are also considered. For example, present trends in the abundance of important zooplankters (obviously not now affected by off-shore oil development) are important considerations. The general level of abundance is useful for determining what is at stake with respect to potential environmental impacts. The variations examined in the absence of oil development are useful for monitoring, assessing and evaluating the effects of environmental change due to subsequent oil development. Thus, historical baselines, in the form of time-series which may demonstrate trend-lines, represent the "before" situation and can easily be compared to observations taken during the monitoring of oil development and operations, thereby permitting hypothesizations as to the effects of the development. The proposed work represents a sub-set of the Middle Atlantic Coastal Fisheries Center's MARMAP program. As such, many of the needs of the proposed research can be met through specialized analysis of the data generated by ongoing and augmented MARMAP tasks, in addition to the analysis of pertinent historical data.

B. Proposed Research, Phase I.

During the first 18 months, analysis will be made of 1300 samples collected during earlier systematic surveys of the ichthyoplankton of the Mid-Atlantic "lease" area. Expanded MARMAP survey coverage during the initial years of baseline studies will provide an additional 900 zooplankton samples for analyses. These surveys, which will be made from NOAA-owned or

chartered vessels will follow MARMAP I operational and sampling procedures. During years 2 and 3, the number of samples for analysis will be reduced to 900 per year. A schematic depiction of zooplankton sorting and data management protocols is attached (Fig. 4-1).

Proposed Research, Phase II.

Information from an additional 1500 zooplankton samples collected from earlier ichthyoplankton surveys, using a Gulf V sampler, would be added to the above at a cost of \$179,000.00. A description of the sampling design, areas and methods are given in Clark (et al), 1969 ^{1/}. Sampling locations are given in the attached figure (Fig. 4-2).

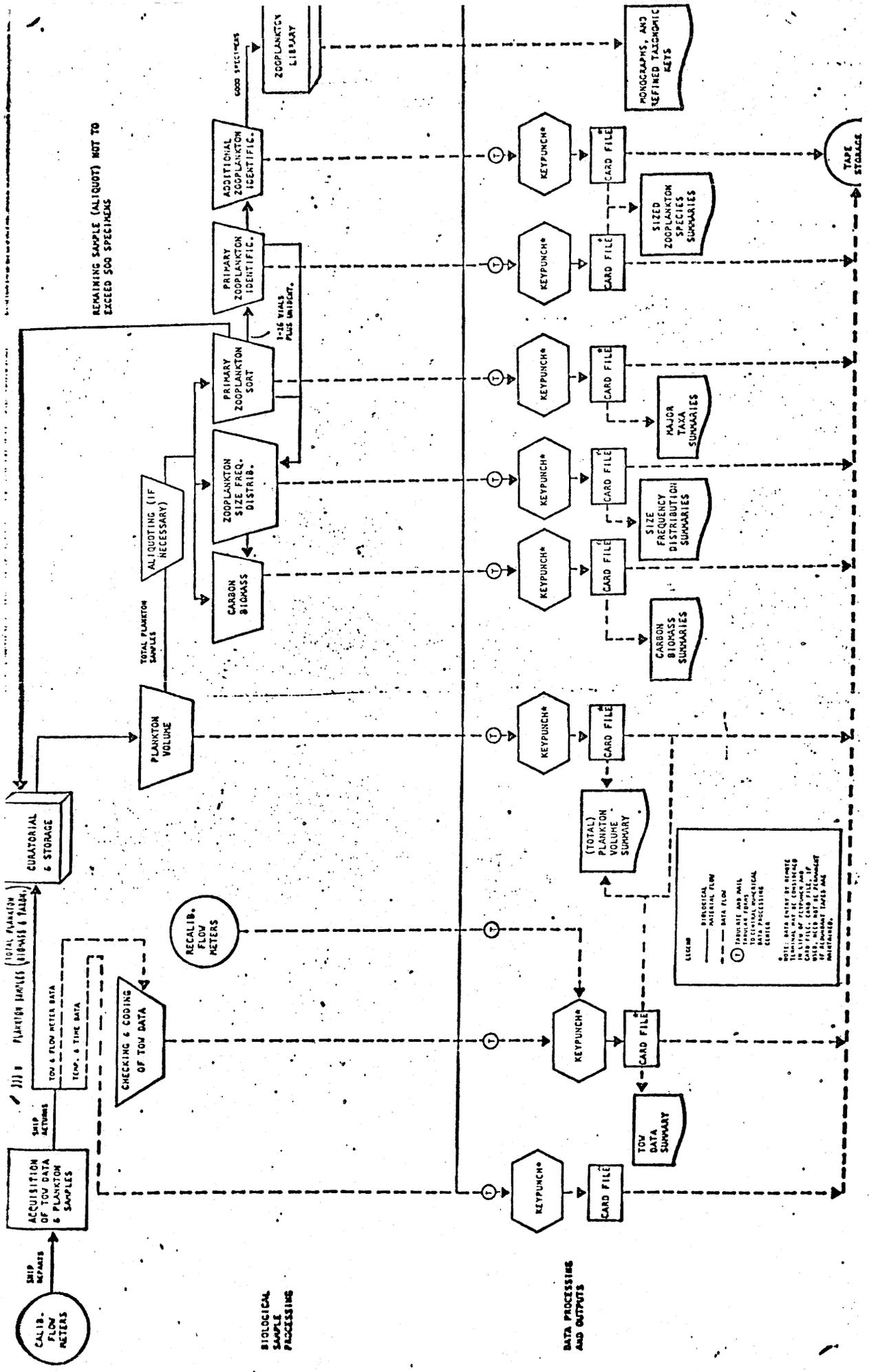
C. Work Products:

1. Data report in ADP format listing the species composition by cruise, sampling location and time.
2. Density distribution charts of zooplankton groups and species in the Mid-Atlantic "lease" area by month, season and years.
3. Estimates of standing stocks, generation time, species composition, diversity, for the principal zooplankton constituents.
4. Comparison of the results with historical data from the literature from existing data sources.

D. Task # 4, Budget Summary:

<u>Cost Item</u>	<u>FY '76</u>	<u>FY '77</u>	<u>FY '78</u>
Personal Services	208.4	76.3	76.3
Supplies, materials, travel	58.7	10.3	10.3
(Federal Contract) ADP Services	81.5	20.2	20.2
Support	<u>202.5</u>	<u>70.2</u>	<u>70.2</u>
Total:	\$551.1	\$177.0	\$177.0

^{1/} Studies of Estuarine Dependence of Atlantic Coastal Fishes, by John Clark, W.G. Smith, A.W. Kendall and M. Fahay. Technical Paper 28, U.S. Bur. of Sport Fish. and Wildlife, 1969.



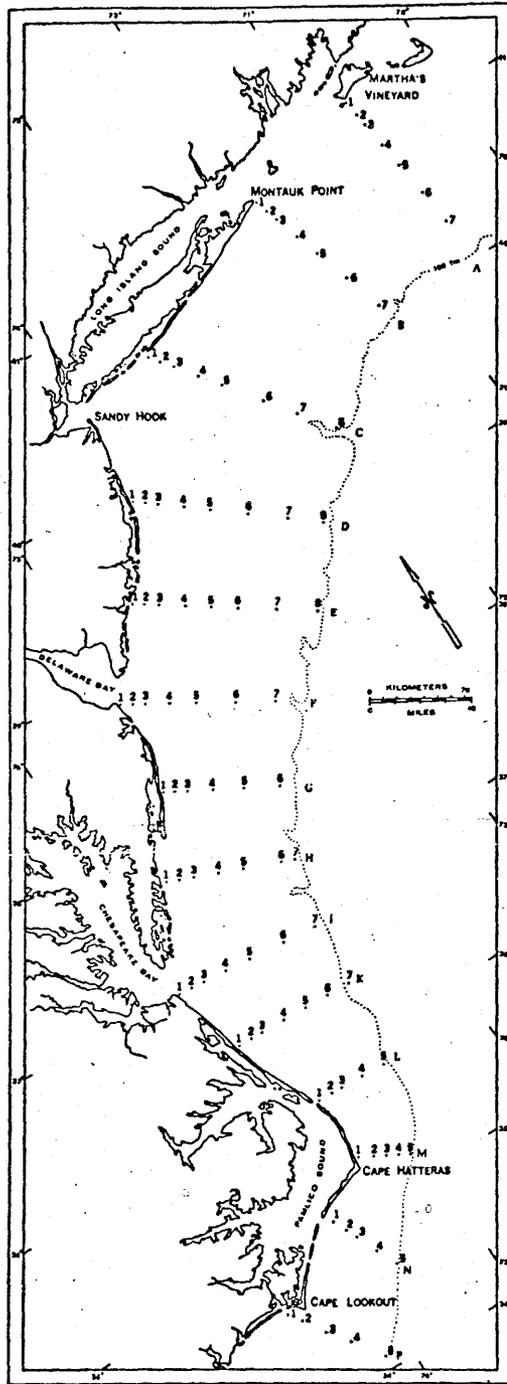


Figure 2:--R. V. Dolphin Survey, 1965-66.
Locations of transects and collecting
stations.

Expanded Work Statement, Task # 5
Biological Baselines Data-Acquisition for OCS (BCT) Area

Task # 5: Expansion of MARMAP survey activities.

Lead-Agency: National Marine Fisheries Service

A. Special Information:

As the lead agency in NOAA for fisheries matters NMFS and MACFC in particular will expand MARMAP operations in the Outer Continental Shelf area and related shoreward areas. The proposed expanded trawl fisheries study area includes the continental shelf and slope to depths of 800 meters lying between longitude 71 40' West and latitude 37 45' North (Figure 5-1). This area is recognized by the International Commission for Northwest Atlantic Fisheries (ICNAF) as containing a highly significant wintering and spawning zone for fishes referred to as the ICNAF "banana" (Figure 5-2). The ICNAF "banana" area is bounded by straight lines between points as follows:

<u>North Latitude</u>	<u>West Latitude</u>
40 05'	71 40'
39 50'	71 40'
37 50'	74 00'
37 50'	74 25'
39 40'	72 40'

The rest of the proposed study area includes all or part of the continental shelf portions of ICNAF subareas 6A and 6B.

B. Biological - Finfish Surveys:

The current semi-annual survey is adequate to measure major stock changes for selected trawl species. However, substantial increases in sampling intensity may be necessary in order to achieve the accuracy required for assessment of less drastic changes which nevertheless are significant from the standpoint of management. Trawl catches are highly variable even within relatively restricted areas because fish are not uniformly distributed and random trawl hauls, even after stratification, result in a frequency distribution of catches which is highly skewed. In order to achieve a precision above our current + 50% (depending on species) it is necessary to increase the sampling intensity. Doubling the intensity of sampling from one trawl per 300 sq. miles to one per 150 sq. miles gives a very general precision of $\pm 30\%$ but the process of increasing intensity in a given cruise rapidly reaches a point of diminishing returns. A more effective method of increasing precision is by increasing the number of cruises seasonally -- since combining separate estimates of fish abundance from different cruises can further increase precision. Even so, it is

unlikely that resource assessment surveys can yield an abundance index more precise than $\pm 20\%$, for most species. However, more frequent cruises do eliminate the obvious seasonal bias of semi-annual sampling. In FYs 76, 77 & 78, resource assessment cruises will be conducted bi-monthly covering a 6300 sq. mile corridor around the Hudson Canyon (Figure 5-3). These cruises will cover the northern third of the proposed expanded sampling area. On each cruise 40-54 trawls, 19 neuston tows, and 23 subsurface plankton tows will be made. The proposed increased sampling area (Figure 5-4) would require a minimum total of 96 trawls to be compared to the minimum number of stations occupied on the semi-annual survey. An increase of 40-50 more stations would be required to make the sampling intensity of the expanded study area comparable to the ongoing bi-monthly study area. Expanding the size of the study area will provide information on seasonal occurrences and migration patterns which is currently not available for the Mid-Atlantic OCS. Baseline biological data will also be collected for key species. These data including condition factors and gonadal indices can be accurately determined and may provide evidence of response to environmental stress before measurable population changes occur.

C. Biological - Sportfish/Commercial Fish Interactions: OCS (BCT) Area:

The pilot sportfishing activity survey at Ocean City, Maryland (Figure 5) is scheduled to terminate June 30, 1975. Information from this study is limited to the southern one-fourth of the proposed study area and projections of the data to more northern portions of the Mid-Atlantic OCS would be highly inaccurate at best. As no reliable sportfishing survey exists for most of the BLM area, MACFC proposes to initiate a study of sportfishing activities in New Jersey coastal areas. Preliminary indications are that at least five areas in New Jersey (Cape May, Atlantic City, Barnegat, Pt. Pleasant, and Highlands) have charter and party boat fleets from equal to to much greater than Ocean City and a large increase of sampling effort will be required to sample these port areas. Emphasis will be placed on charter, party and private boat fishing offshore areas and collection of biological data will be concentrated on pelagic species not taken during trawl surveys.

D. Biological - Ichthyoplankton:

Semi-annual surveys cannot provide adequate ichthyoplankton data as the pelagic life stages of some species may last but a few weeks. For some species even bi-monthly sampling may be inadequate for determining spatial and temporal location of major spawnings. No attempt at seasonal studies of ichthyoplankton in the Mid-Atlantic OCS has been made since the 1965-66 study conducted by MACFC. In the intervening years major improvements in sampling, sorting and identification techniques have occurred along with

major changes in relative abundance of important fish stocks. Accordingly, no historical data exist to adequately establish present-day baselines. MACFC proposes to sample ichthyoplankton concurrently with trawl surveys during the study years. A study in the northern BCT area will include collection of 23 subsurface tows and 19 neuston tows bi-monthly which would be increased to a total of 41 subsurface and 41 neuston tows in the expanded area (Figure 5-6). Standardized MARMAP procedures will be used for collecting samples. Ichthyoplankton will be separated from the raw samples obtained under an outside sorting contract and returned for identification using in-house expertise. Identification will be made to the lowest taxonomic level possible with current available knowledge. At the present time about 90% of the larval fish can be identified to species and about 15% of fish eggs can be identified to species. Taxonomic studies involving extensive special collections or rearing of laboratory spawned eggs and larvae would be necessary for significant further improvement in identification capabilities. While these special studies are highly desirable it is questionable if significant progress could be made in the proposed time frame of this study.

E. Biological-Oceanshellfish:

Adequate recent historical cruise data exist to access the possible influence of oil development on surf clam resources (Figure 7). However, two other important resources need additional surveys. The ocean quahog which is concentrated at greater depths than surf clams is an important latent living marine resource of the continental shelf. MACFC proposes to extend sampling from the latest surf clam cruises to greater depths (from 40 m to 75 m) where ocean quahogs occur. No survey of sea scallops has been conducted since 1960. These important shellfish tend to be concentrated between 50 and 100 meters, an area likely to be directly impacted by offshore oil development. MACFC proposes to sample sea scallops in a manner consistent with the 1960 survey to provide historical continuity.

F. Work Products:

Hydrographic

1. Salinities listings, by cruise, by station in OCS(BCT) area (700 measurements per year).
2. SYMAP salinity distribution by cruise in OCS(BCT) area (computer-generated contour maps).
3. Water temperature listings, by cruise, by station in OCS(BCT) area (700 measurements per year; XBT's total water column)
4. SYMAP water temperature by cruise in OCS(BCT) area.
5. SYMAP temperature profiles at selected transects.

Biological - Demersal Finfish

1. Species listing, by station - approximately 300 stations.
2. Seasonal distribution and abundance (D&A), fishes by species, for the 15 most important species.
3. SYMAP reproduction of D&A above.
4. Total demersal (trawl-vulnerable) finfish biomass - OCS(BCT) area (tonnage and value) by season (time-series averaged data).
5. Initial data on spawning seasons by dominant species.
6. Distribution of populations (dominant species) by year-class (time-series averaged data).
7. Annual estimation of pre-recruits (dominant species).
8. Migratory patterns of principal species as determined by trawl availability.

Biological - Ichthyoplankton

1. Distribution and abundance (D&A) listing of eggs (by species), by cruise over OCS(BCT) area.
2. D&A listings of larvae (by species), by cruise over OCS(BCT) area.
3. Relative distributions of (mixed) larvae, by cruise, in OCS(BCT) area.
4. Relative diversity of species of larvae, by cruise, in OCS(BCT) area.
5. SYMAP reproduction of D&A above by cruise and by species.

Biological- Sportfish/Commercial Fish Activities

1. Total removal of fish and shellfish by sportfish and commercial vessels in the OCS(BCT) area along the New Jersey Coast - by species, tonnage and value-distribution and range of fisheries.
2. Impact of sportfishing in the OCS(BCT) area. Number of anglers, vessels, harvest by species.
3. Impact of commercial finfish and shellfish fishing in the OCS(BCT) area. Number of vessels and harvest by species.
4. Significance of commercial/recreational fishing relative to competition for all resources in the OCS(BCT) area.

Biological - Shellfish

1. Distribution and abundance listings of surf clams, by station, in OCS(BCT) area.
2. Distribution and abundance listing of ocean quahogs, by station, in OCS(BCT) area.
3. Distribution and abundance listings of sea scallops, by station, in OCS(BCT) area.
4. Tonnage and value of ocean shellfish resources in OCS(BCT) area.
5. Preparation of SYMAP contours of shellfish concentrations.

G. Task #5, Budget Summary:

<u>Cost Items</u>	<u>FY 76</u>	<u>FY 77</u>	<u>FY 78</u>
Direct Labor	158.3	167.8	178.7
Supplies, materials, travel	45.0	45.0	45.0
(Federal Contract) ADP-Services	47.0	47.0	47.0
(Non-Federal Contracts): Charters/Sorting	56.0	56.0	56.0
Support	<u>155.3</u>	<u>164.4</u>	<u>174.8</u>
Total	\$461.6	\$480.2	\$501.5

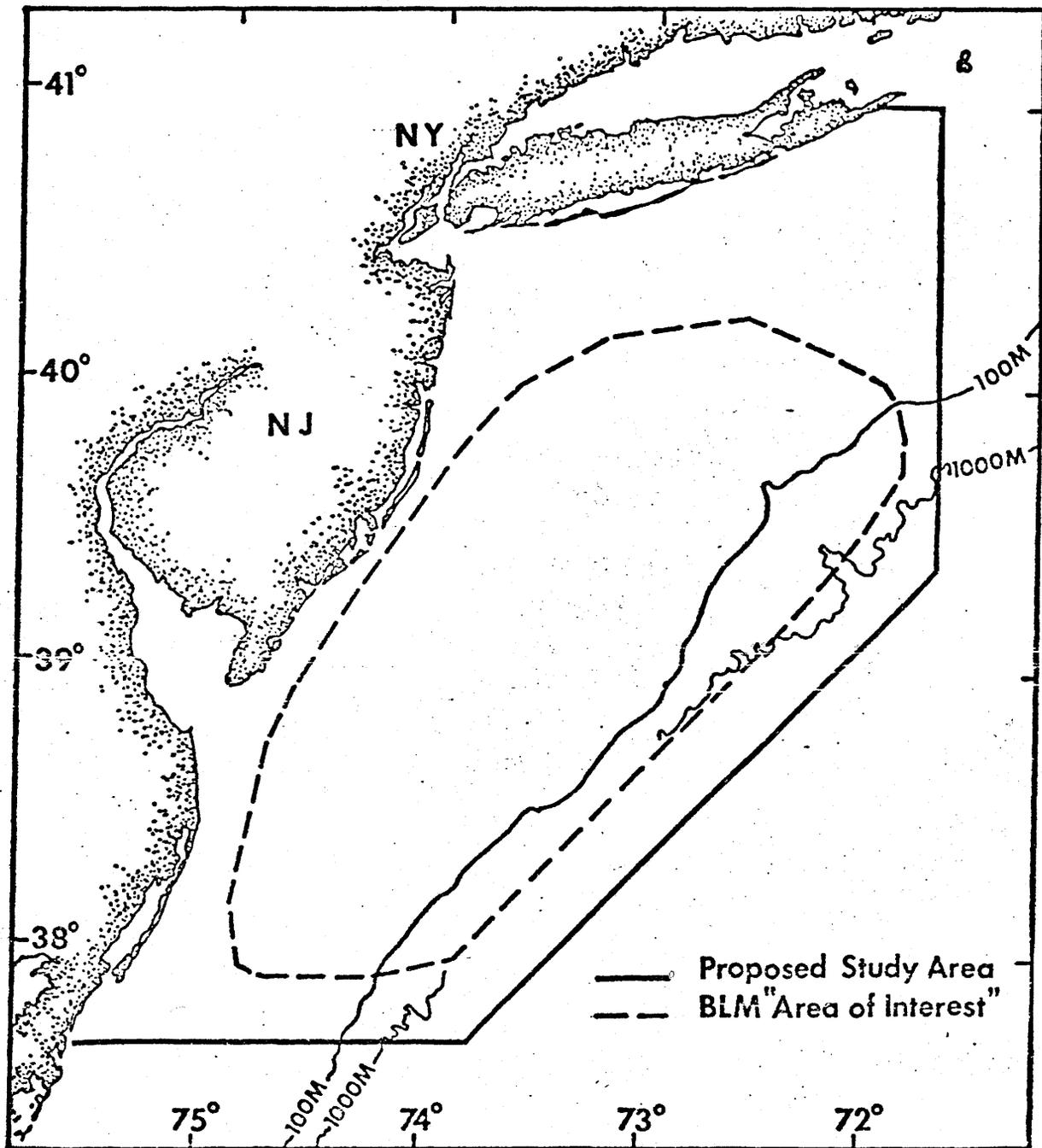


Figure 1. Location of Proposed Study Area

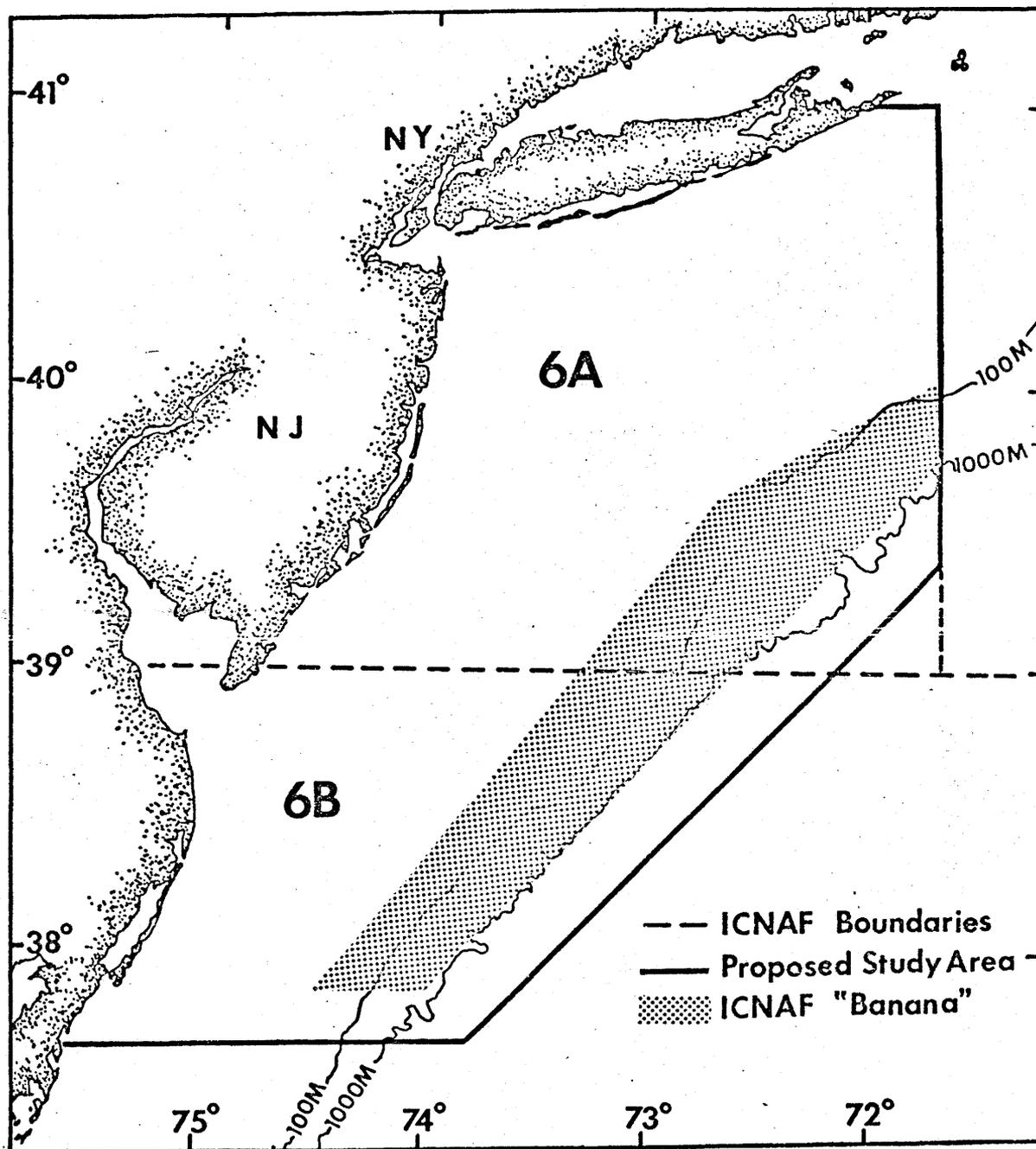


Figure 2. Relationship of ICNAF Areas 6A, 6B and ICNAF "Banana" to Proposed Study Area.

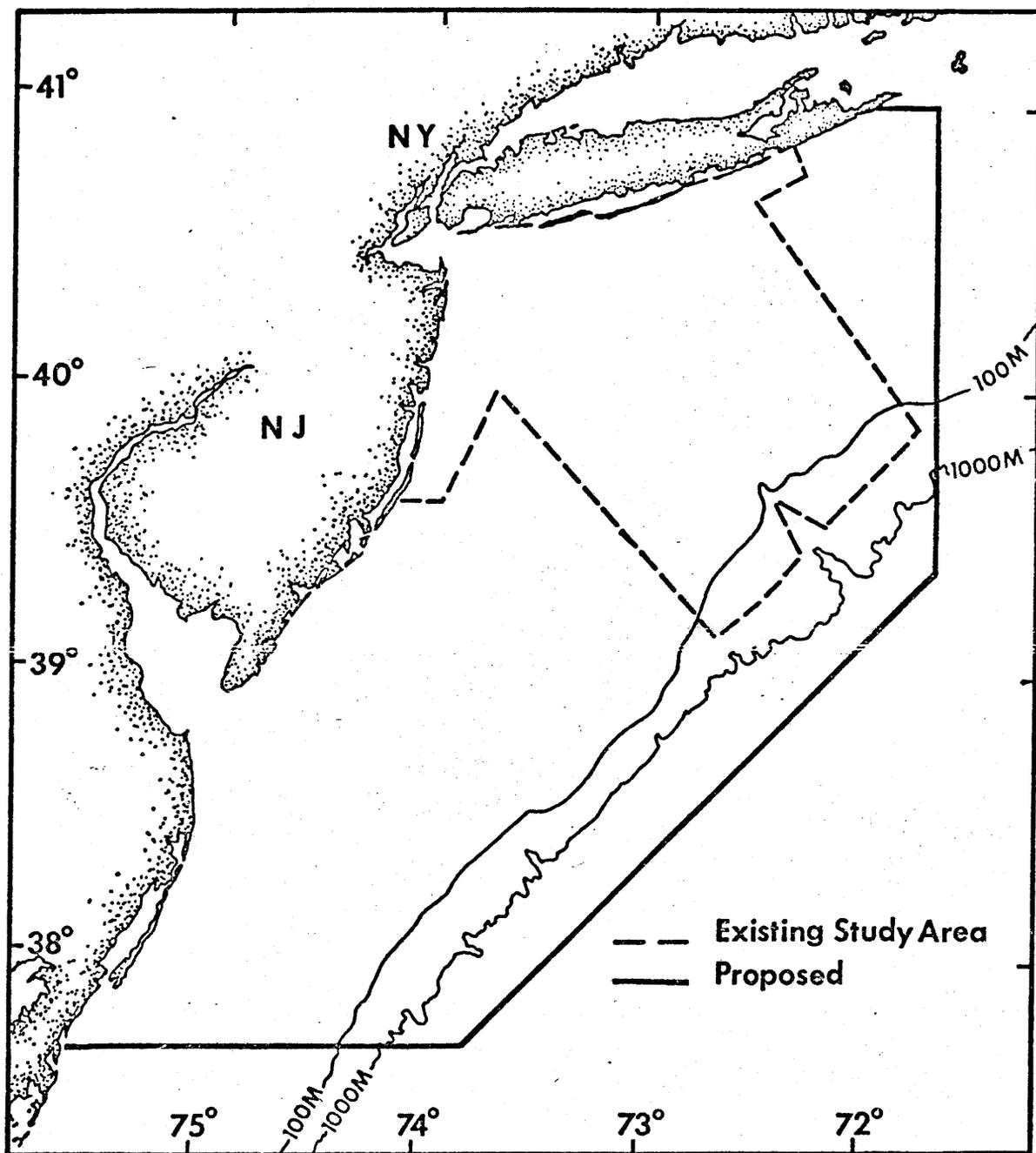


Figure 3. Existing and Proposed Groundfish Study Areas.

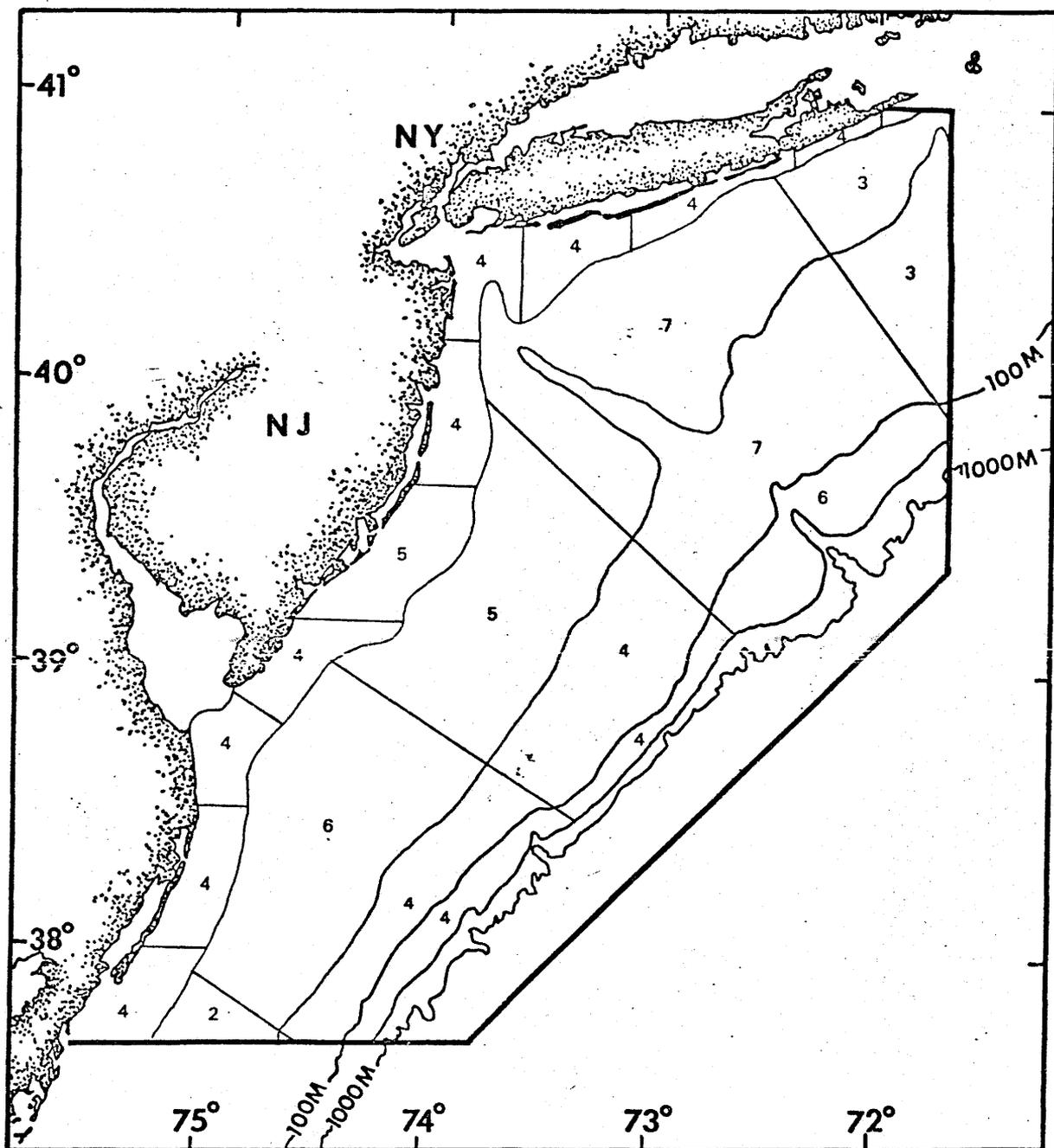


Figure 4. Existing Sampling Strata and Numbers of Stations per Strata.

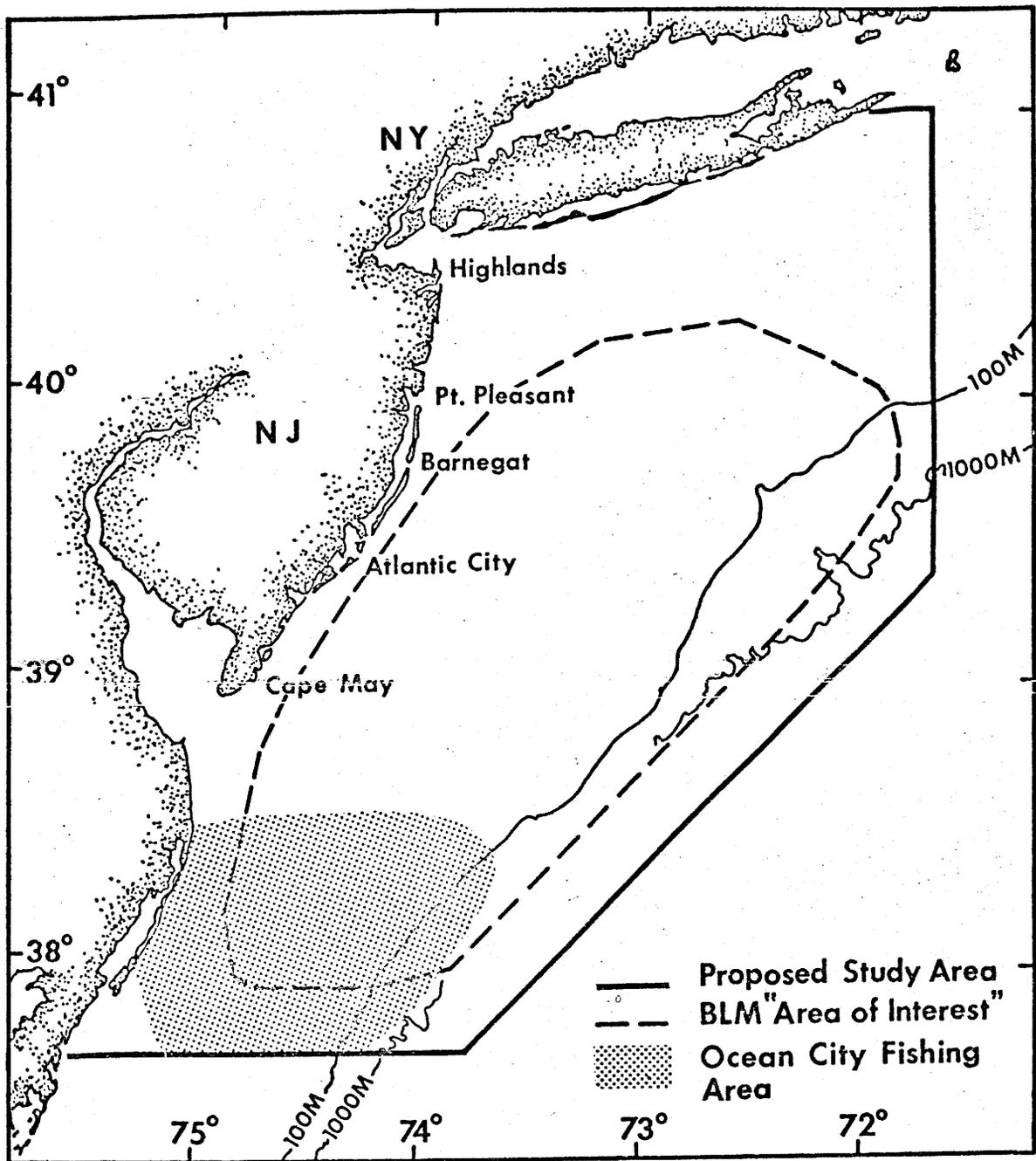


Figure 5. Location of Proposed Study Area Showing Areas Fished by Ocean City Fishermen and New Jersey Major Sport Fishing Ports.

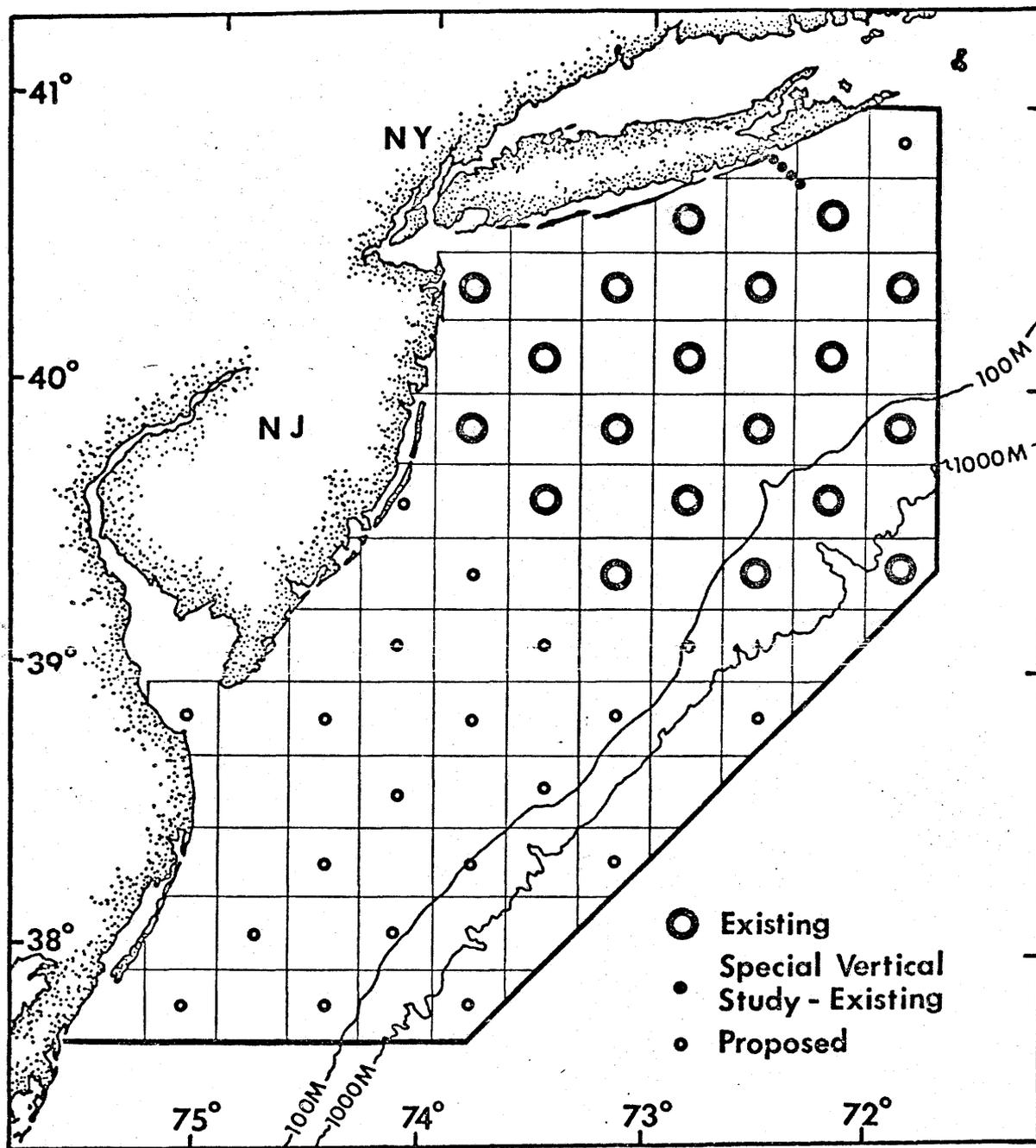


Figure 6. Existing and Proposed Ichthyoplankton Bi-Monthly Sampling Stations.

Expanded Work Statement, Task # 6
Biological Baselines Data-Acquisition for OCS (BCT) Area

Task # 6: Historical benthic macrofaunal data

Lead-Agency: National Marine Fisheries Service

A. Introduction:

It is now well understood that chronic or acute oil pollution can have major, long lasting effects on both the benthic infauna and epibenthic forms (Sanders, 1973). Since the majority of benthic organisms are relatively immotile or move only short distances they are excellent indicators of pollution events where the pollutant either results in a major change in community structure or is accumulated in the tissues in measurable amounts.

B. Descriptions of sources and status of existing benthic samples:

The Middle Atlantic Coastal Fisheries Center presently holds sizable collections (Middle Atlantic Bight and New Jersey Coast) of benthic organisms which can form an immediately available baseline against which future changes in benthic community structure can be compared. The collections consist of screened and sorted benthic grab (Smith-McIntyre) samples, each taken in a highly standardized fashion at permanently established sampling sites (stations) located in the Middle Atlantic Bight. In addition to the stored benthic fauna, each station can be characterized as to sediment type and heavy metal burden. Some sediment subsamples are frozen and are available for hydrocarbon analyses.

(1) Samples were collected, from the R/V Mt. Mitchell, in May 1974 at two principal sites (Figs. 6-1 and 6-2) located within the boundaries of the Baltimore Canyon Trough. Samples were collected at 93 stations; replicate samples were taken at 21 of the 93 sampling stations. Of the total of 114 grab samples, 17 have been sorted to the 1 mm size fraction and 8 have been identified to the species level.

In addition to the samples collected within the BCT, numerous grab samples have been collected (R/V Venture and R/V Delaware II cruises) within the EPA-designated alternate dump sites (Fig. 6-1). They are being processed for data reports under the auspices of the NOAA-MESA program. Comparisons will be made with the faunistic data from the BCT. The two sampling areas appear to be very similar.

(2) Two cruises were also made to a series of stations located along the New Jersey coastline from Sandy Hook to Cape May (Fig. 6-3), an area likely to be affected by oil escaping from exploration and drilling activities.

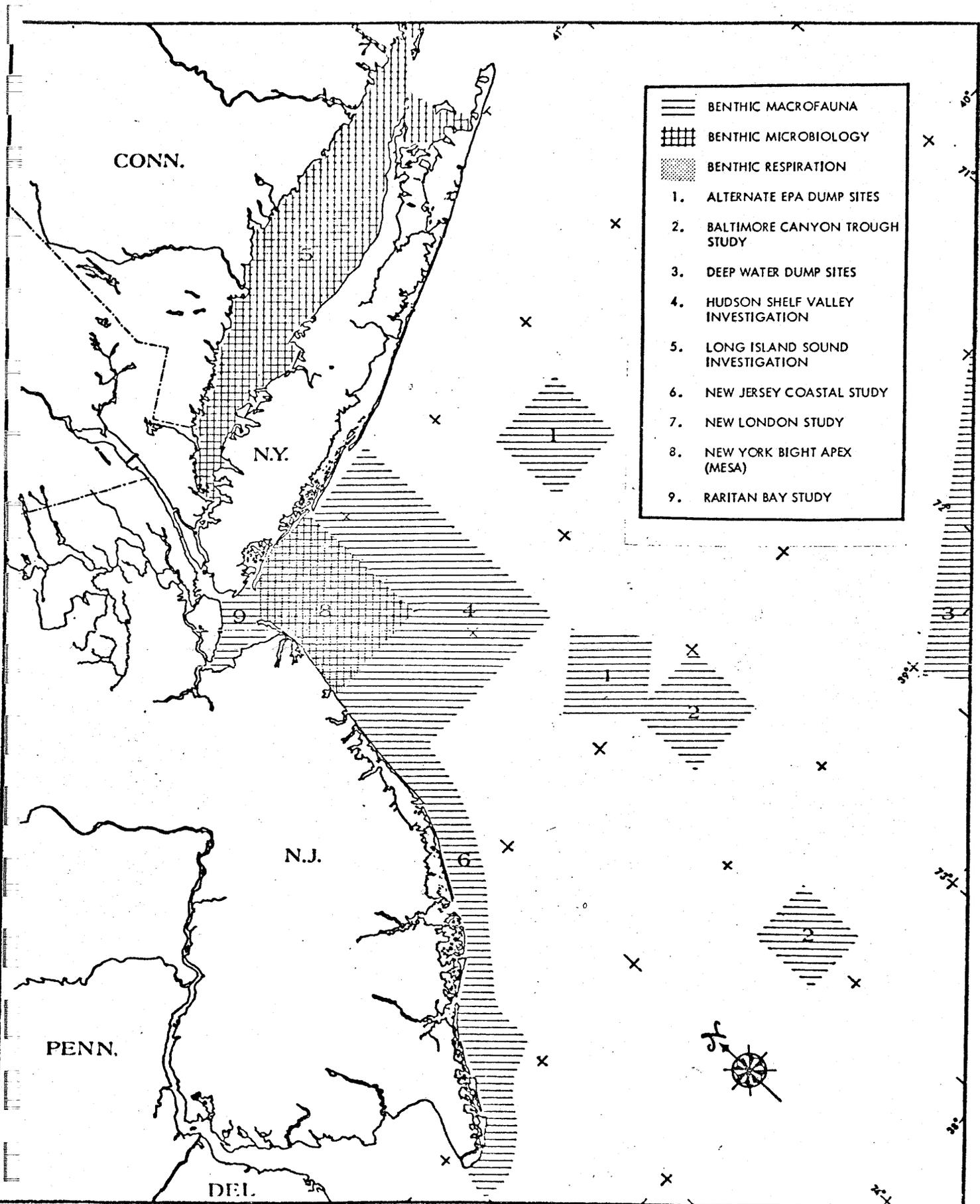


Figure 1

R = Replicate grab
 H = Heavy Metal
 W = Water Sample (Bottom only)

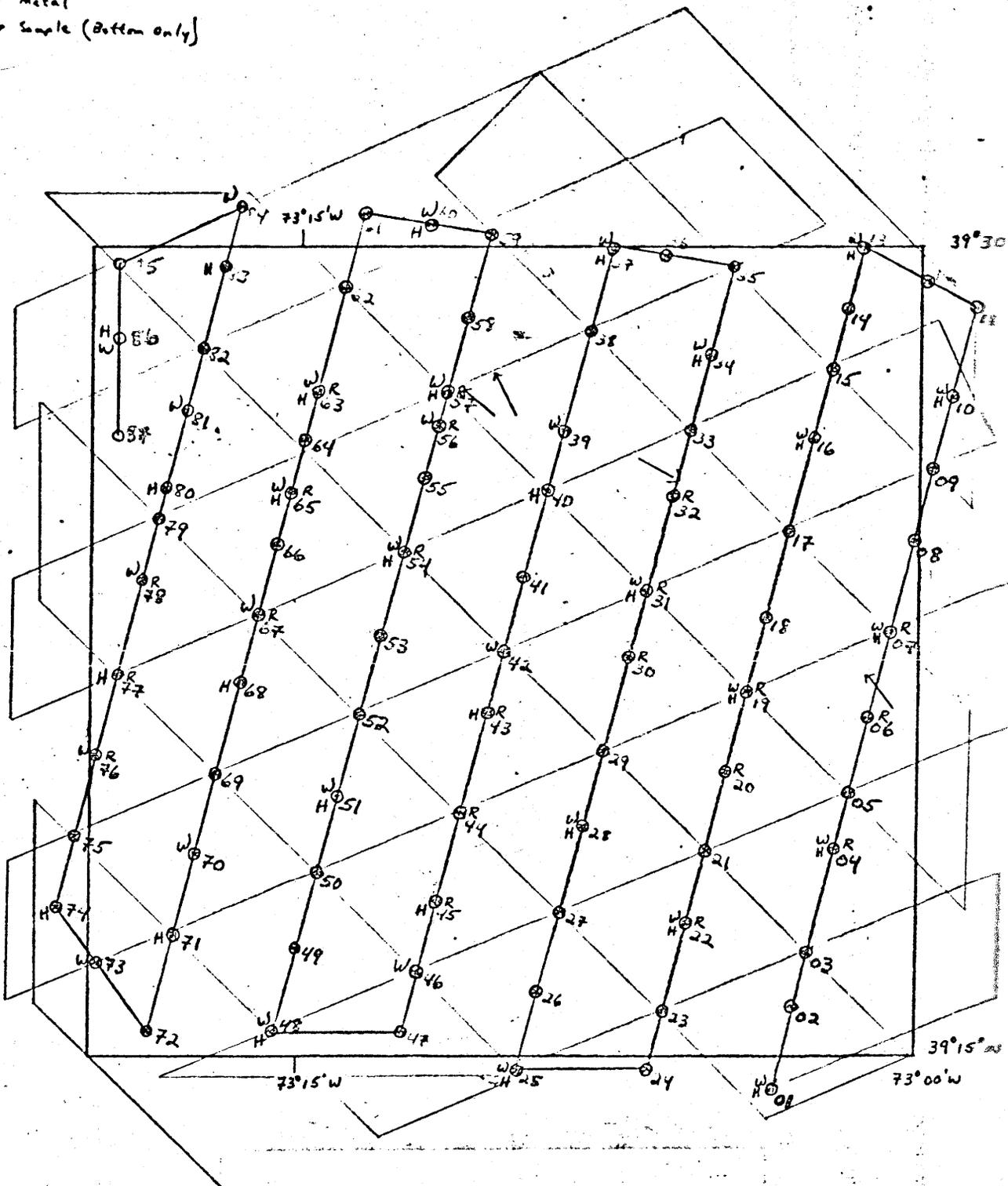
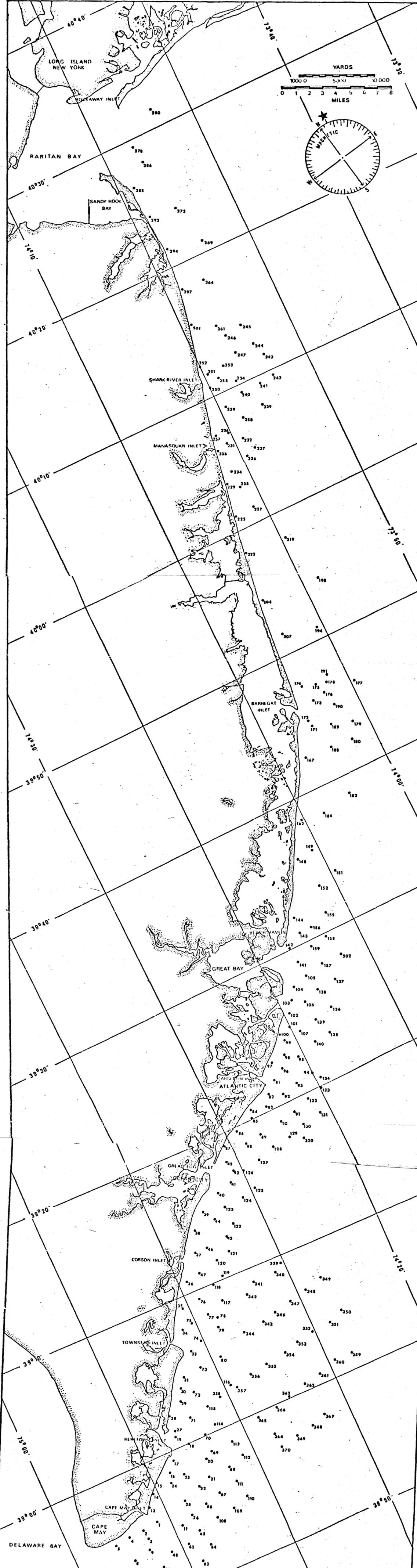


Figure 2. Baltimore Canyon Trough Sub Area #1 Sample Grid



LONG ISLAND
NEW YORK

RARITAN BAY

SANDY HOOK
BAY

SHARK RIVER INLET

MANASQUAN INLET

BARNEGAT
INLET

GREAT BAY

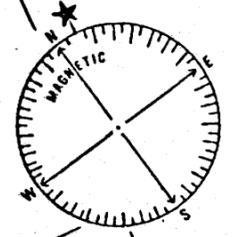
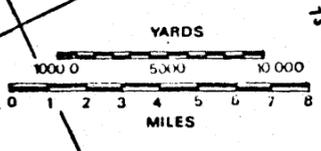
ATLANTIC CITY

CORSON INLET

TOWNSEND INLET

CAPE MAY

DELAWARE BAY



The first cruise, terminated in November 1972, culminated in a series of benthic grab samples collected from 246 stations. Of these, approximately 100 have been sorted to the 1 mm size fraction and 30 samples have been identified to the species level. Fifty-one of the original stations were resampled in July-August 1973. Duplicate samples were taken at each of the stations resampled.

Considering both the BCT stations and the New Jersey coastline stations, we presently hold 324 samples to be sorted and identified. In addition, seventy-eight sorted samples remain to be identified. A recent analysis of the time required for sorting and identifying benthic grab samples indicates that four college level work/study students and three professional identifiers can process approximately 350 samples per year. This analysis was based on sorting and identification of samples collected 1) offshore, in waters similar to the BCT, 2) from the highly organic sludge disposal area and 3) inshore, in the immediate sublittoral zone. We therefore assume that four sorters and three professional identifiers could make similar progress on the BCT and New Jersey shore samples.

C. Work to be done:

We therefore propose that we: 1) complete the sorting and identification of the aforementioned benthic grab samples from the Baltimore Canyon Trough and New Jersey coastline; 2) relate the resulting data to sediment type and existing heavy metal burdens (as an indication of present contamination); and 3) prepare a report on the distribution and abundance of benthic fauna in the Middle Atlantic Bight, particularly as the fauna would relate to offshore oil exploration and drilling. The benthic data would be relatable to demersal fish data and would be of extreme importance in the development of a first-order pollutant trajectory model as proposed in Task # 2.

The work up of data, including sample sorting and identification, would be completed 12 months after award of a contract. The final report would be available 18 months after award of contract.

D. Work Products:

Biological - Benthic species - Baltimore Canyon Trough:

1. Species listings by station; 114 samples from 93 stations.
2. Distributions and abundances of benthic species at each station.
3. Computations of diversity indices.
4. Within station variation as shown in duplicate samples.
5. Between station variation, including comparison with offshore benthos in other sampling areas of New York Bight.

Biological - Benthic species - New Jersey coastline:

1. Species listings by station; 246 samples from 246 stations collected in November 1972; 51 samples from 51 stations resampled in July-August 1973.
2. Distributions and abundances of benthic species at each station.
3. Computations of diversity indices.
4. Within station variation as shown in duplicate samples.
5. Between station variation, including comparison with offshore benthos in other sampling areas of New York Bight.
6. Temporal variation as shown at resampled stations.

Geological - Sediments from Baltimore Canyon Trough Area and New Jersey Shoreline:

1. Provide standard geological analyses, including grain size distribution and percent organic matter, for sediment samples collected at benthic sampling sites.
2. Provide data on heavy metal burdens (Ag, Cr, Cu, Ni, Pb, Zn) in sediments collected at benthic sampling sites.
3. Correlate sediment types with benthic distribution and diversity data as well as distribution and levels of heavy metals as possible indication of present pollution levels.

Final Report - will summarize foregoing as baselines against which future change can be compared; data will also provide substantial input into Task # 2.

Report will emphasize possible effects of petroleum pollutants on benthic fauna.

E. Task # 6, Budget Summary

<u>Cost Items</u>	<u>FY '76</u>	<u>FY '77</u>
Direct Labor	60.8	32.9
Supplies, material, travel	6.0	3.0
(Federal Contract) ADP Services	9.6	9.6
Support	58.2	31.6
Total:	<u>\$134.6</u>	<u>\$77.1</u>