PROPOSAL -- SELECTED BIOLOGICAL BASELINES STUDIES OCS (BCT)

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

MIDDLE ATLANTIC COASTAL FISHERIES CENTER

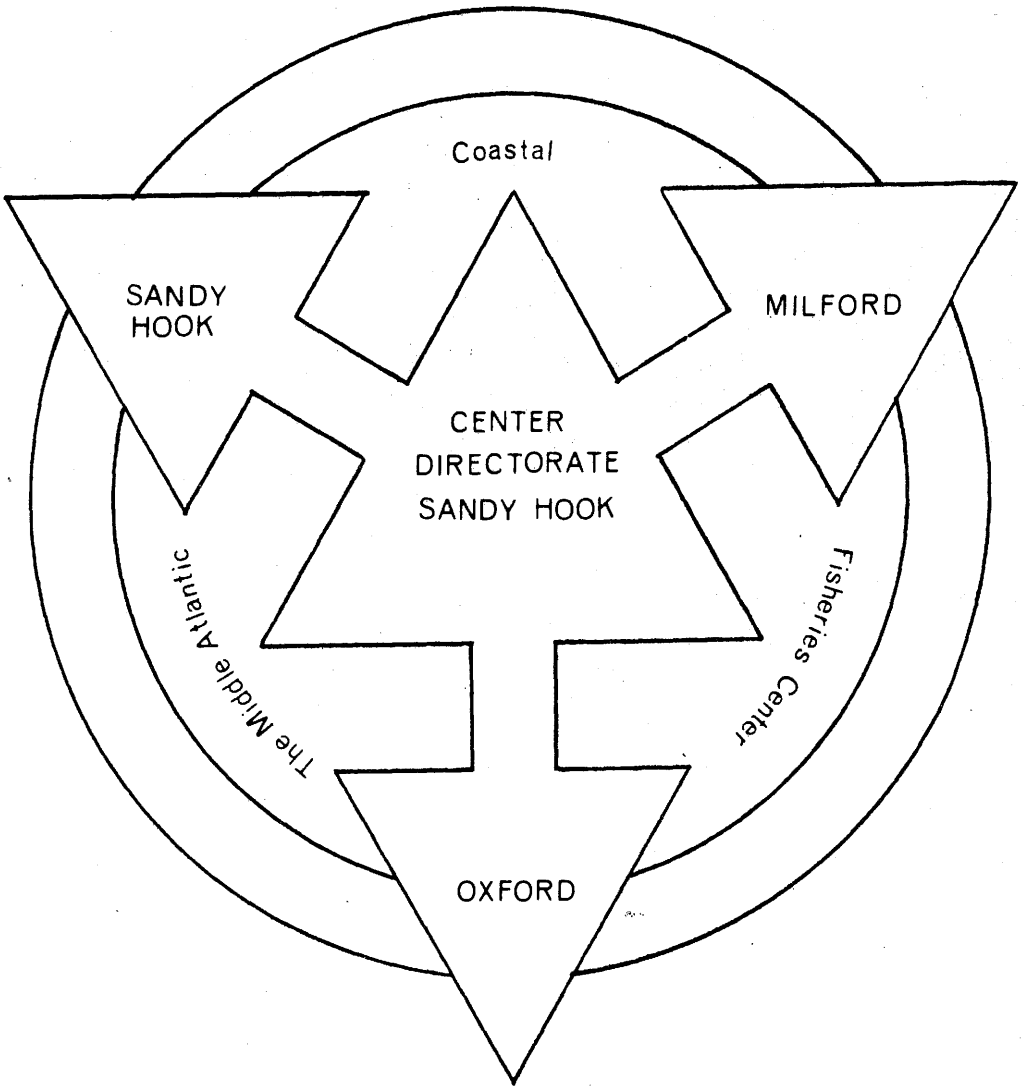

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Table of Contents

Proposal

Selected Biological Baselines Studies on the Outer Continental Shelf of the Middle Atlantic Bight

I. Introduction

Our national recognition of the extremely adverse socio-economic impacts of the recently developed but increasing constraints upon our supplies of inexpensive liquid fossil fuels has generated an enormous pressure to develop alternative energy sources or to develop to the utmost all domestic sources of liquid fossil fuels. This latter effort has led to a greatly increased interest in the development and utilization of offshore oil resources. Among such resources are those thought to exist beneath the oceanic waters of the Middle Atlantic Bight (MAB) and specifically in the Baltimore Canyon Trough (BCT) of the outer continental shelf (OCS). This area, organized and managed by the Federal Government's Bureau of Land Management (BLM) is being offered to entrepreneus, on a lease basis, for development. An ancillary and continuing responsibility developing upon BLM is that of protecting the quality of the oceanic waters, and habitat, the health of the indigenous living marine resources and aesthetic appeal of the contingent shoreline. A prerequisite for such protective activities is the attainment of pre-drilling baselines as to the present quality of the marine environment and of the indigenous marine resources. The Middle Atlantic Fisheries Service, NOAA, is, by virtue of its location and its history of resource- and habitat-oriented research, uniquely fitted for participation in the necessary research.

II. Structure of Proposal

The proposal, involving several disciplines and structured around the existing VIMS contract, as known to us, is arranged in a series of Tasks and Subtasks, each prioritized and costed out. Task numbering continues as in the original Work Estimate submissions in order to achieve continuity of thinking, to facilitate comparisons between the several submissions and to ensure against misunderstandings. Therefore:

Task #1 - Deferred
Task #2 - Deferred

Task #3 - Historical Fisheries/Ichthyoplankton/Shellfish Data
- Subtask #1 - Historical Trawl Survey Data and Analysis
- " #2 - Historical Recreational/Commercial Fisheries Interactions and Analysis
- " #3 - Historical Ichthyoplankton Data and Analysis
- " #4 - Historical Ocean Shellfish Data and Analysis

Task #4 - Historical and Contemporary Zooplankton and Neuston Data
Subtask #1 - Historical Zooplankton Analyses
" #2 - Historical Neuston Analyses
" #3 - Annual Zooplankton Analyses
" #4 - Annual Neuston Analyses
" #5 - Role of Zooplankton in the Mid-Atlantic Ecosystem

Task #5 - Contemporary Demersal Finfish/Ichthyoplankton/Ocean Shellfish Survey
Subtask #1 - Demersal Finfish Surveys
" #2 - Ichthyoplankton Surveys
" #3 - Ocean Shellfish Surveys
" #4 - Biological/Sportfish Interactions

Task #6 - Historical Benthic Macrofaunal Data and Analyses
Subtask #1 - Total New Jersey Coastal (NJC) and Baltimore Canyon Trough (BCT) Package
" #2 - Reduced NJC and BCT Package
" #3 - Much reduced NJC and BCT Package
" #4 - Reduced NJC Package
" #5 - Reduced BCT Package

Task #7 - Abnormalities in OCS Living Marine Resources
Subtask #1 - Historical Records of Diseases and Abnormalities
" #2 - Histopathological Surveys

III. Scope of Proposal

This proposal, involving many scientific disciplines, is also classifiable as to time. Thus, in the case of Tasks 3 and 5, baselines data from 1965 through 1978 will be available for ichthyoplankton, zooplankton, demersal finfishes and ocean shellfish; comprising for each very stable time-series-oriented baselines against which future fluctuations in the abundance and distributions of these organisms can be interpreted. The proposed histopathological studies will document the historic and contemporary incidence of diseases and parasitemias in the organisms indigenous to the OCS (BCT) study area. The proposed benthic macrofaunal studies will document the community structures, species diversities and dominant species of the inshore waters of the entire New Jersey coast which is obviously at risk in the event of any major incident in the study area. Implicit in all of these proposals is (1) a massive effort in sophisticated, real-time computerized analysis of a very great amount of data, (2) a massive ocean-oriented vessel program, and (3) a massive program involving the sorting and species identification of several totally different types of organisms.

While the historical studies will deal mainly with development and analysis of existing raw samples and/or with the retrieval and analysis of existing data in the Center's data banks, the contemporary work involves extensive ship-time. Thus, for Task #5, the Center will dedicate a total of 144 ship-days of FRS Delaware II to this task during each year of the proposal; this will represent, independent of the officers and crew, a total of 1152 man-days of scientific effort at sea each year. The ichthyoplankton data and histopathological data will be developed by piggyback operations on these trawl cruises. The duration of each task is stated in the task description.

IV. Priorities among Tasks and Subtasks

The Center is convinced, in view of the widespread and intensive usage of the OCS (BCT) area by both commercial and sport fishermen, that the highest priorities for baselines studies should be accorded to Tasks 3 and 5, as contained herein. Further, the Center believes that these tasks should be initiated immediately and in full, in order to build, prior to drilling operations, the stable time-series baselines necessary for assured (70-80%) detection of damage to fish populations. To this end, the Center will, at its own expense, expand its assessment efforts in related oceanic areas outside the OCS (BCT) area to bring its capability to detect changes in fish populations therin up from the 50% level, acceptable for assessment purposes, to the 70% level, deemed necessary for environmental studies. This special effort will extend BLM's ability to detect resource damage by hydrocarbons both within and outside the study area (see chart #). Two benefits accrue to BLM from this contribution: (1) regardless of where a petroleum-related incident may occur in the oceanic area from Block Island to Virginia, damage to the resource could be detected, and (2) data, gathered from this entire area on a bimonthly basis, on ichthyoplankton, zooplankton, finfish, etc., would enable BLM to assess with the greater certainty the biological significance of localized incidents.

Further, the Center is convinced that second priority should be given to Tasks 4 and 6 inasmuch as they directly measure the food supplies of the indigenous finfish resources of the Bight. Within Task #4, priorities should be given to Tasks #1 and 2 and they should be funded concurrently. Within Task #6, priority should be given to Subtask #1, inasmuch as it is clear that BLM's currently contracted benthic studies are inadequate in intensity and in scope to yield useful baselines.

Third priority should be given to Task #7 - solely because this originally was an unsolicited proposal. Nevertheless, we deem it essential that BLM's baselines studies include at least Subtask #1, in order to measure the historical evidence of the incidence of diseases and parasitemias in the living marine resources of the Middle Atlantic Bight.

V. Baselines-oriented Research Tasks

Task #3: Historical Fisheries/Ichthyoplankton/Shellfish Data

Subtask #1: Historical Trawl Survey Data and Analysis

As the lead agency within NOAA for fisheries matters, NMFS will assume responsibility for compiling and analyzing 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 survey data are available in this area from three basic sources: (1) a long-term semiannual offshore assessment study, (2) a medium term semiannual inshore assessment study and (3) 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 depths between 15 and 200 fathoms. The medium term inshore study conducted by MACFC includes six semiannual cruises from the fall of 1972 thru spring 1975. Inshore surveys were 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. Trawling is done at all depths to 200 fathoms and at an average density of one station per 150 sq. miles. A stratified random sampling plan is used on surveys. This method assures that every major depth zone or geographic region (important factors in species distribution) is sampled with equal intensity. The use of standard gear combined with the above methods is the best way to determine with reliable precision changes in finfish population abundance. Biological information is primarily fisheries oriented and includes, by species, total weight, total number and length frequencies. Additional observations or samples determined on a selected species basis include scales, otaliths, stomach contents, gonads and other special samples. The data format used is identical for all survey cruises conducted by MACFC and NEFC. All Middle Atlantic fisheries data generated during the three types of cruises documented above is now available from the MACFC. MACFC will provide summarizations and biological analyses and interpretations of the total data on trawl fisheries available for the Mid-Atlantic OCS area.

Work Products:

1. Species listings by station -- approximately 2800 stations.

2. Seasonal distribution and relative abundance (D&RA) of all species of finfish and additional D&RA of selected species by size group. Data will be presented in a tabulated and contoured format.

3. Estimated seasonal biomass of selected (trawl-vulnerable) species OCS (BCT) area; by use of area-swept method.

4. Definitions of spawning seasons through the analysis of monthly gonad-somatic indices for selected species. It is anticipated that at least 20 commercially or recreationally significant species will be analyzed.

Subtask #2: Historical Recreational/Commercial Fisheries Interactions and Analysis

The study objective is to document the recreational fishery; its effort, biological harvest and interaction with commercial fisheries from a recent survey in the southern BLM area. The BLM requires recent information on the interest and participation of coastal recreational resource pursuits. Shore based aquatic activities are a significant target for spill trajectories. The quality of sportfish, aesthetics of the sport and competitive interactions of economic interests are all relevant to the impacts of development.

The significance of the marine recreational fishery with respect to specific area components, i.e., seasonal catch of surf, shore, private and charter vessels has not been documented. Two recent (1965, 1970) surveys exist which summarize regional totals of catch in weight and numbers by species but these are not adequate to describe characteristics by state. No biological measure of size of species taken, seasonal variations, and the portion of discards is presently available.

We have in part remedied these omissions of timely information on the recreational harvest by conducting a pilot survey in the area of Ocean City, Maryland. This survey covered the estuarine bays, inlet, surf and ocean area harvests (Fig. 5). Estimates of angler effort in these areas seasonally and the characteristics of the catch (species, weight and size) will be derived from a series of interviews, questionnaires and boat counts. This field inventory is scheduled to terminate June 30, 1975. The information from this study will be limited to the southern quarter of the OCS (BCT) zone, a vulnerable trajectory area. The data will be based on stratified samplings by area over a set of 12-hour sample days and totals of effort and catch amplified for seasonal patterns and a yearly summary. MACFC proposes to provide a report to BLM based on data collected during a one-year pilot study of the Ocean City, Maryland, area. It will highlight the proportions of participants for the recreation harvest, seasonal and biological characteristics of the catch and competitive aspects of the local commercial fisheries.

Work Products:

1. Estimates of the harvest of fish and shellfish by sport and commercial fishermen in the lower OCS (BCT) area (by species, tonnage and landed value).

2. Participation in sportsfishing activities by numbers of vessels and fishermen by season.

3. Seasonality and biological characteristics of the recreational harvest.

4. Analysis of species composition of harvest to highlight competitive aspects of the resource between sport and commercial interests.

Subtask #3: Historical Ichthyoplankton Data and Analysis

Many of our most important marine fishes spawn in coastal waters off our Middle Atlantic states, some near shore, others in deeper water along the outer shelf of the continental shelf. Although fish eggs and larvae can be found year-round, spring, summer and fall are the seasons when most spawning occurs. The eggs of a few species remain on or near bottom until they hatch but most coastal fishes have pelagic eggs that float near the surface until embryonic development is complete and hatching occurs. Thereafter, the larvae, which acquire the ability to swim as they grow, remain in the water column until metamorphosis is complete. The time lapse for the transition from larva to juvenile varies between species. Successful metamorphosis is partially dependent on an unknown combination of environmental requirements, which differ between species, and includes such things as temperature, water quality, available food, etc.

Because life support requirements differ for the various growth stages of fishes, i.e., egg, larva, juvenile and adult, and because the success (Numbers of survivors) of each stage is dependent on the preceding stage, the MACFC recognizes the need for research on all stages of development. To that end we have been assembling life history information on coastal fishes found in the Middle Atlantic Bight since the mid 1960's. Ongoing research on the early life history of fishes continues to be an integral part of the Center's Resource Assessment Investigations (see Task #5).

Historical data are available on the seasonal distribution and abundance of eggs and larvae of many Middle Atlantic species from a series of comprehensive survey cruises conducted by MACFC personnel in 1965-66. Semiannual ichthyoplankton surveys in conjunction with the semiannual 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 1974. Standard MARMAP procedures, i.e., surface to bottom, smooth-oblique plankton tows with 60 cm bongo nets fitted with 0.505 and 0.333 mm mesh, have been used by MACFC personnel on semiannual inshore cruises and monthly corridor cruises since the fall of 1973 and July 1974, respectively. The MARMAP method allows both qualitative and quantitative assessment of ichthyoplankton catches. 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.

Work Products:

1. Distribution and abundance (D&A) tables, listing station location, hydrographic data, zooplankton volumes, catches of fish (mixed), larvae (by genus or species) from smooth-oblique, surface to bottom tows, and larvae and juveniles (by genus or species) from neuston (surface) tows, in OCS (BCT) area.

2. Geographic distribution and relative abundance figures (SYMAP reproductions) showing intra- and intercruise differences and shifts in occurrence of fish eggs (mixed), in OCS (BCT) area.

3. Geographic distribution and relative abundance figures (SYMAP reproductions) showing intra- and intercruise differences and shifts in occurrence of fish larvae (mixed), in OCS (BCT) area.

4. Geographic distribution and relative abundance figures (SYMAP reproductions) showing intra- and intercruise differences and shifts in occurrence of fish larvae (genus or species), in OCS (BCT) area. When feasible, we will show figuratively the distribution of larvae further separate into size categories, to illustrate the effects of dispersion on the early life stages of different genera or species.

5. Figures showing relative diversities of larvae (genus or species) by cruise, in OCS (BCT) area.

6. Initial data on vertical distribution and diel movements of larval fishes (by species). Initial data on diel movements will be supplemented under operations in Task #5. All tables and figures will be supplemented with narrative interpretations.

Subtask #4: Historical Ocean Shellfish Data and Analysis

Surf clams (Spisula solidissima) are used in over 60% of all clam products produced in the United States and much of the 96.1 million pounds of shucked meats landed in 1974 came from the BLM "area of interest". Surf clam cruises have been conducted periodically 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. Analysis would also include the distribution of other invertebrates which are recorded but not analyzed due to funding restrictions and low priority. The present form of the data, however, will make total analysis difficult and will require extensive reformatting and data processing.

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 with surf clam vessel operators since 1965. As with the surf clam cruise data only selected portions of the data has 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. This data will require revision for proper analysis.

Ocean quahogs (Arctica islandica) are an underutilized resource present in much of the OCS area. They exist primarily at greater depths than surf clams; but, extensive overlap occur in the depth ranges of the two species. Significant data on ocean quahogs have been collected during surf clam surveys and they will be tabulated and analyzed similarly to those of the surf clam.

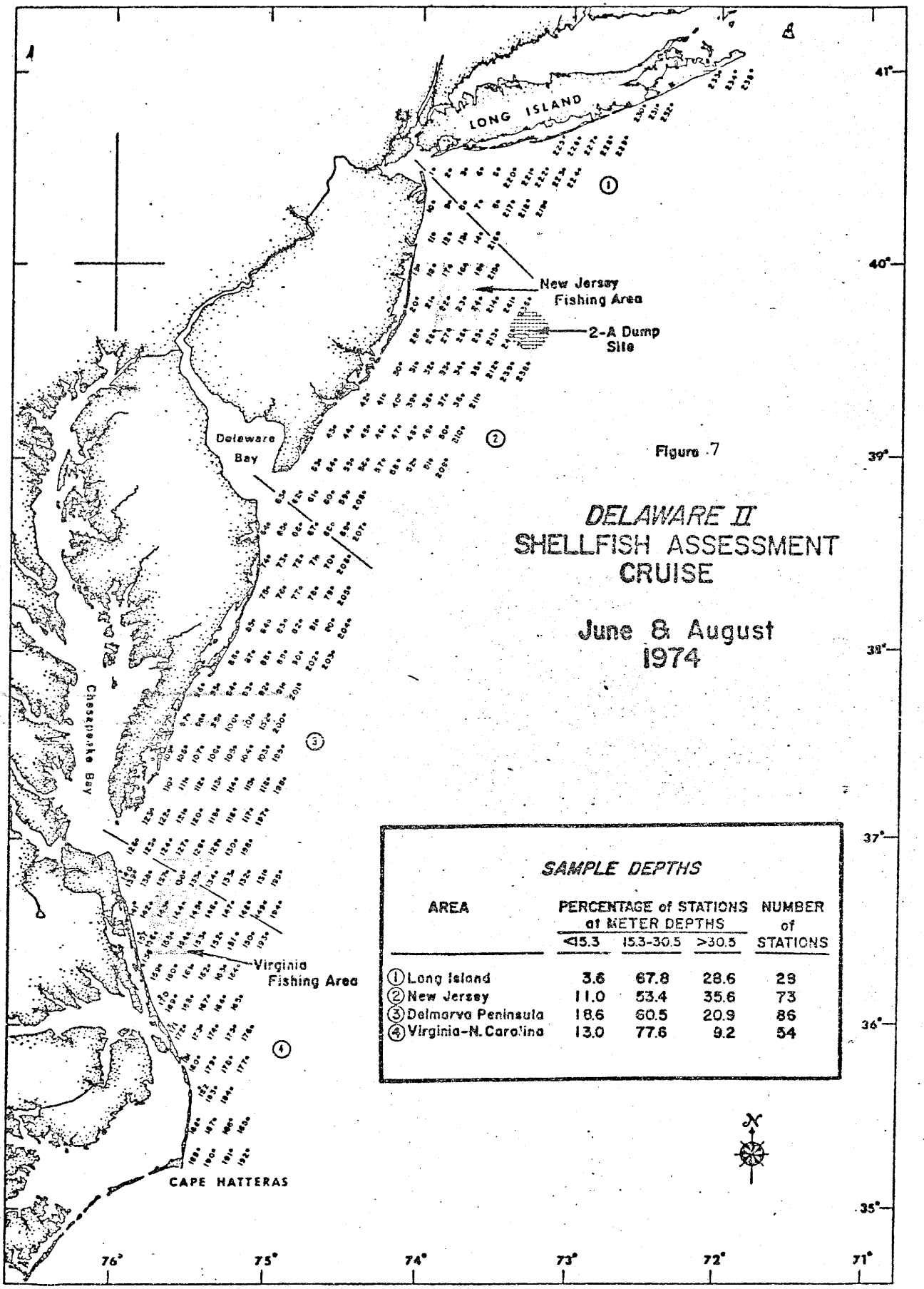
Sea scallops (Placopecten magellanicus) populations are found throughout much of the OCS area at depths of 20 to 80 fathoms. The last survey of sea scallops was conducted in 1960 by personnel of NMFS. These data are sufficient to delineate the general range of scallops over the study area even though population changes may have taken place in the intervening 15 years. As sea scallops are an important commercial fisheries resource of the area and in lieu of more recent survey data MACFC proposes to provide the historical survey cruise data for sea scallops in a format consistent with the other ocean shellfish data.

Work Products:

1. Distribution and abundance listings of surf clams, ocean quahogs, and sea scallops by station in the OCS (BCT) area. This includes SYMAP contours of shellfish concentration.

2. Tonnage and value of ocean shellfish resources in the OCS (BCT) area.

3. Analysis in changes in distribution and diversity in OCS (BCT) area derived from historical surveys.



SAMPLE DEPTHS

AREA	PERCENTAGE of STATIONS at METER DEPTHS			NUMBER of STATIONS
	<15.3	15.3-30.5	>30.5	
①Long Island	3.6	67.8	28.6	28
②New Jersey	11.0	53.4	35.6	73
③Delmarva Peninsula	18.6	60.5	20.9	86
④Virginia-N.Carolina	13.0	77.6	9.2	54

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.

Task #3: Historical Fisheries

SUBTASK #1: Historical Trawl Fisheries Surveys
(Budget for 12 months of a Subtask with an 18 month Duration)

Personal Service - Research

Supervisory Fishery Biologist	Dr. A. Merrill	GS-15	0.05MY	$1.9K
Fishery Biologist (Surveys)	Mr. A. Pacheco	GS-13	0.10	2.7
Fishery Biologist (Life Studies)	Mr. S. Wilk	GS-12	0.25	5.7
Physical Science Technician	Mr. C. Morrison	GS-09	0.10	1.3
Fishery Biologist	New Hire	GS-09	0.70	10.6
Project Coordinator	New Hire	GS-14	0.05	1.6
Data Manager	New Hire	GS-12	0.05	1.2
Technical Writer	New Hire	GS-09	0.05	0.8
Secretary	New Hire	GS-05	0.05	0.5

Personal Service - ADP

Computer Scientist	New Hire	GS-09	0.20	3.0
Total Personal Service				$29.3K

Operations

Travel	3.5K
Transportation of Things	0.5
Printing and Reproduction	0.3
Supplies and Expendables	3.5
Capital Equipment	0.5
ADP (Federal Contract)	2.2
Contracts	-
Total Operations	10.5

Support

Middle Atlantic Coastal Fisheries Center (59.1% of TDL)	$15.9K
Central Office (44.8% of TDL)	12.0
Department of Commerce (0.5% of Total Cost)	0.3
Total Support	28.2

Total Subtask Cost

68.0K

In-House (NOAA/NMFS) Contribution $ 73.8K

Task #3: Historical Fisheries

SUBTASK #1: Historical Trawl Fisheries Surveys
(Budget for Final 6 months of a Subtask with an 18 month Duration)

Personal Service - Research

Supervisory Fishery Biologist	Dr. A. Merrill	GS-15	0.05MY	$1.9K
Fishery Biologist (Surveys)	Mr. A. Pacheco	GS-13	0.05	1.3
Fishery Biologist (Life Studies)	Mr. S. Wilk	GS-12	0.10	2.3
Physical Science Technician	Mr. C. Morrison	GS-09	0.10	1.3
Fishery Biologist (2)	New Hires from Previous Year	GS-09	1.00	15.1
Biological Aide	New Hire	GS-03	0.50	4.0
Project Coordinator	New Hires from Previous Year	GS-14	0.05	1.6
Data Manager	New Hires from Previous Year	GS-12	0.05	1.2
Technical Writer	New Hires from Previous Year	GS-09	0.05	0.8
Secretary	New Hires from Previous Year	GS-05	0.05	0.5

Personal Service - ADP

Computer Scientist	New Hire from Previous Year	GS-09	0.30	4.5

Total Personal Service $34.5

Operations

Travel	4.0
Transportation of Things	0.2
Printing and Reproduction	0.3
Supplies and Expendables	4.5
Capital Equipment	-
ADP (Federal Contract)	4.0
Contracts	-
Total Operations	13.0

Support

Middle Atlantic Coastal Fisheries Center (59.1% of TDL)	18.7
Central Office (44.8% of TDL)	14.2
Deptartment of Commerce (0.5% of Total Cost)	0.4
Total Support	33.3

Total Subtask Cost 80.8

In-House (NOAA/NMFS) Contribution

Task #3: Historical Fisheries

Subtask #2: Sportfish/Commercial Fish Activities and Interactions
(Budget for 1 Year of a Subtask with a 1 Year Duration)

Personal Service - Research				
Fishery Biologist (Surveys)	Mr. A. Pacheco	GS-13	0.10MY	$2.7K
Fishery Biologist	New Hire	GS-09	0.60	9.0
Physical Science Technician	Mr. C. Morrison	GS-09	0.05	0.7
Project Coordinator	New Hire	GS-14	0.05	1.6
Data Manager	New Hire	GS-12	0.05	1.2
Technical Writer	New Hire	GS-09	0.05	0.8
Secretary	New Hire	GS-05	0.05	0.5
Personal Service - ADP				
Computer Science	New Hire	GS-09	0.10	1.5
Total Personal Service				$18.0K
Operations				
Travel				2.0
Transportation of Things				-
Printing and Reproduction				0.3
Supplies and Expendables				2.3
Capital Equipment				-
ADP (Federal Contract)				1.3
Contracts				-
Total Operations				5.9
Support				
Middle Atlantic Coastal Fisheries Center (59.1% of TDL)				9.7
Central Office (44.8% of TDL)				7.4
Department of Commerce (0.5% of Total Cost)				0.2
Total Support				17.3
Total Subtask Cost				$41.2K
In-House (NOAA/NMFS) Contribution				44.8K

Task #3: Historical Fisheries

SUBTASK #3: Historical Ichthyoplankton Surveys
(Budget for 12 months of a Subtask with an 18 month Duration)

Personal Service - Research

Supervisory Fishery Biologist	Dr. A. Merrill	GS-15	0.05MY	$1.9K
Fishery Biologist (Ichthyoplankton)	Mr. W. Smith	GS-12	0.25	5.9
Physical Science Technician	Mr. C. Morrison	GS-09	0.10	1.4
Fishery Biologist	New Hire	GS-09	0.70	10.6
Project Coordinator	New Hire	GS-14	0.05	1.6
Data Manager	New Hire	GS-12	0.05	1.2
Technical Writer	New Hire	GS-09	0.05	0.8
Secretary	New Hire	GS-05	0.05	0.5

Personal Service - ADP

Computer Scientist	New Hire	GS-09	0.10	1.5
Total Personal Service				$25.4K

Operations

Travel	3.0
Transportation of Things	0.5
Printing and Reproduction	0.3
Supplies and Expendables	3.0
Capital Equipment	0.5
ADP (Federal Contract)	1.9
Contracts	-
Total Operations	9.2

Support

Middle Atlantic Coastal Fisheries Center (59.1% of TDL)	13.8
Central Office (44.8% of TDL)	10.4
Department of Commerce (0.5% of Total Cost)	0.3
Total Support	24.5

Total Subtask Cost	$59.1K
In-House (NOAA/NMFS) Contribution	$64.2K

Task #3: Historical Fisheries

SUBTASK #3: Historical Ichthyoplankton Surveys
(Budget for Final 6 months of a Subtask with an 18 month Duration)

Personal Service - Research

Supervisory Fishery Biologist	Dr. A. Merrill	GS-15	0.05MY	$1.9K
Fishery Biologist (Ichthyoplankton)	Mr. W. Smith	GS-12	0.20	4.7
Physical Science Technician	Mr. C. Morrison	GS-09	0.10	1.3
Fishery Biologist (2)	New Hires from Previous Year	GS-09	1.00	15.1
Biological Aide	New Hire	GS-03	0.50	4.0
Project Coordinator	New Hire from Previous Year	GS-14	0.05	1.6
Data Manager	New Hire from Previous Year	GS-12	0.05	1.2
Technical Writer	New Hire from Previous Year	GS-09	0.05	0.8
Secretary	New Hire from Previous Year	GS-05	0.05	0.5

Personal Service - ADP

Computer Scientist	New Hire from Previous Year	GS-09	0.20	3.0
				$34.1

Operations

Travel	4.0
Transportation of Things	0.2
Printing and Reproduction	0.3
Supplies and Expendables	5.2
Capital Equipment	-
ADP(Federal Contract)	4.0
Contracts	-
Total Operations	13.7

Support

Middle Atlantic Coastal Fisheries Center (59.1% of TDL)	18.5
Central Office (44.8% of TDL)	14.0
Department of Commerce (0.5% of Total Cost)	0.4
Total Support	32.9

Total Subtask Cost $80.7

In-House (NOAA/NMFS) Contribution

Task #3: Historical Fisheries

SUBTASK #4: Historical Ocean-Shellfish Surveys
(Budget for 1 Year of a Subtask with a 1 Year Duration)

Personal Service - Research

Fishery Biologist (Surveys)	Mr. A. Pacheco	GS-13	0.05MY	$1.3K
Fishery Biologist (Shellfish)	Mr. J. Ropes	GS-12	0.25	6.0
Project Coordinator	New Hire	GS-14	0.05	1.6
Data Manager	New Hire	GS-12	0.05	1.2
Technical Writer	New Hire	GS-09	0.05	0.7
Secretary	New Hire	GS-05	0.05	0.5

Personal Service - ADP

Computer Scientist	New Hire	GS-09	0.10	1.5
Total Personal Service				$12.8K

Operations

Travel	1.5
Transportation of Things	-
Printing and Reproduction	0.3
Supplies and Expendables	1.7
Capital Equipment	-
ADP (Federal Contract)	0.9
Contracts	-
Total Operations	4.4

Support

Middle Atlantic Coastal Fisheries Center (59.1% of TDL)	6.9
Central Office (44.8% of TDL)	5.3
Department of Commerce (0.5% of Total Cost)	0.2
Total Support	12.4

Total Subtask Cost	$29.6K
In-House (NOAA/NMFS) Contribution	$32.2K

Task #4: Historical and Contemporary Zooplankton and Neuston Baselines

Introduction:

In the Middle Atlantic "lease" area the zooplankton provide the food base for all the important fish stocks of the region. Yields from these fish stocks are very significant; the annual catch averages 2 billion pounds, valued at $1.5 billion retail. Knowledge of the species composition, diversity, abundance, productivity, and condition of the zooplankton is needed to provide a data base against which future changes may be measured. First considerations in the descriptions of the zooplankton populations of the mid-Atlantic Bight should be in the form of review and analyses of existing data and information, and a definition of the contributions of zooplankton to the important fishery resources of the area. This information can be obtained by considering the historical data base in the form of a time-series of areal, seasonal and annual changes, and by augmenting these collections with pertinent spatial and temporal collections. Baseline information is useable in terms of possible environmental impact of offshore oil and gas development and operations only when the variations caused by natural environmental fluctuations or ongoing human activities are also considered. Historical baselines in the form of a time-series demonstrating trend lines, remain the only representative of the "before" situation, and can easily be compared to observations made during the monitoring of development and operations.

The proposed investigation represents a subset of the Middle Atlantic Coastal Fisheries Center's MARMAP Program and is designed to provide an initial zooplankton baseline. Many of the needs will be met by NMFS through ongoing activity. NMFS now has the only collections of zooplankton available to characterize the populations of the mid-Atlantic Bight region for at least two seasons of the year -- autumn and spring. These data can be readily supplemented with a proposed bimonthly time-series to be obtained during the next three years as outlined in Task #5.

Subtask #1: Historical Zooplankton Analyses and Baseline Report

During the first year sorting, identification, and analyses will be completed on 300 zooplankton samples collected in autumn 1973 and autumn and spring 1974 and 1975; outputs will include:

1. Quantification of zooplankton abundance indices of the central, eastern and western mid-Atlantic Bight in autumn and spring.

2. Inshore-offshore changes in distribution, abundance, species composition, diversity, and condition of zooplankton populations.

3. Between-year changes in zooplankton species abundance and composition in autumn and spring.

Subtask #2: Neuston Analyses and Baseline Report - Autumn 1975/Spring 1976

During the first year 100 neuston collections will be used to characterize the neuston in the mid-Atlantic Bight in autumn and spring; outputs will include:

1. Quantification of neuston abundance indices and tar and plastic contaminants of the central, eastern and western mid-Atlantic Bight in autumn and spring.

2. Inshore-offshore changes in neuston species and tar and plastic contaminants, abundance and composition in autumn and spring.

Subtask #3: Annual Zooplankton Analyses and Baseline Report 1975-78

During the first year a total of 246 zooplankton samples collected bimonthly as proposed in Task #5 will be used to establish the levels of seasonal changes in the abundance of zooplankton in the mid-Atlantic Bight; outputs will include:

1. Seasonal changes in biomass, species composition, distribution, abundance, and condition during an annual cycle of zooplankton production in the central, eastern and western mid-Atlantic Bight.

2. Inshore-offshore changes in distribution, abundance, and species composition, diversity and condition of zooplankton populations during an annual cycle.

Subtask #4: Annual Neuston Analyses and Baseline Report 1975-78

During the first year a total of 246 neuston samples collected bimonthly as proposed in Task #5 will be used to establish the levels of seasonal changes in the abundance of neuston, tar, and plastics in surface waters of the mid-Atlantic Bight; outputs will include:

1. Seasonal changes in biomass, species composition, distribution, abundance, condition, and in tar and plastics contamination during an annual cycle of neuston production in the central, eastern and western mid-Atlantic Bight.

2. Inshore-offshore changes in surface tar and plastics and neuston species composition, diversity, distribution, abundance and condition during an annual production cycle.

Subtask #5: Role of Zooplankton in the Mid-Atlantic Bight Ecosystem

A report will be prepared on the areal and spatial changes in zooplankton and neuston species composition, diversity, distribution, abundance, and conditions in waters of the mid-Atlantic Bight. The outputs will include descriptions and summaries of information obtained in Tasks #1, 2, 3, and 4. Abundance indices will be determined, and statistical limits to changes in zooplankton abundance between areas and seasons will be established.

TASK 5 -- 892 SAMPLES (TOTAL TASK)

Personal Service - Research

Supervisory Fishery Biologist	Mr. K. Sherman	GS-15	0.4 MY	13.2
Identifier - Analyst	New Hire	GS-12	1.0 MY	20.1
Identifier - Analyst	New Hire	GS-12	1.0 MY	20.1
Identifier - Analyst	New Hire	GS-12	1.0 MY	20.1
Identifier - Analyst	New Hire	GS-12	0.5 MY	10.1
Fishery Biologist	New Hire	GS-05	1.0 MY	9.3
Fishery Biologist	New Hire	GS-05	1.0 MY	9.3
Fishery Biologist	New Hire	GS-05	1.0 MY	9.3
Fishery Biologist	New Hire	GS-05	0.5 MY	4.7
Data Manager	New Hire	GS-12	0.4 MY	8.0
Draftswoman	New Hire	GS-06	0.4 MY	4.0
Typist	New Hire	GS-04	0.4 MY	3.2
				131.4

Personal services figures consist of Total Direct Labor and Benefits (9.1% of TDL).

Operations

Travel	1.5
Equipment	8.0
ADP	8.9
Sorting Contracts	53.6
	72.0

Support

NEFC (60.9% of TDL)	80.0
Central Office (44.8% of TDL)	58.9
	138.9

Total Cost	342.3
DOC Overhead (2.7%)	9.2
Total Task Cost	351.5

In-House (NOAA/NMFS) Contribution 570.0

Task Duration: 1 Year

TASK 4 -- 246 SAMPLES

Personal Service - Research

Supervisory Fishery Biologist	Mr. K. Sherman	GS-15	0.1 MY	3.3
Identifier - Analyst	New Hire	GS-12	1.0 MY	20.1
Fishery Biologist	New Hire	GS-05	1.0 MY	9.3
Data Manager	New Hire	GS-12	0.1 MY	2.0
Draftswoman	New Hire	GS-06	0.1 MY	1.0
Typist	New Hire	GS-04	0.1 MY	0.8
				36.5

Personal services figures consist of Total Direct Labor and Benefits (9.1% of TDL).

Operations

Travel	0.4
Equipment	2.0
ADP	2.5
Sorting Contract	14.8
	19.7

Support

NEFC (60.9% of TDL)	22.2
Central Office (44.8% of TDL)	16.4
	38.6

Total Cost	94.8
DOC Overhead (2.7%)	2.6
Total Task Cost	97.4

In-House (NOAA/NMFS) Contribution 140.0

Task Duration: 3 Years

Total Task Cost, second year 97.4

Total Task Cost, third year 97.4

TASK 3 -- 246 SAMPLES

Personal Service - Research

Supervisory Fishery Biologist	Mr. K. Sherman	GS-15	0.1 MY	3.3
Identifier - Analyst	New Hire	GS-12	1.0 MY	20.1
Fishery Biologist	New Hire	GS-05	1.0 MY	9.3
Data Manager	New Hire	GS-12	0.1 MY	2.0
Draftswoman	New Hire	GS-06	0.1 MY	1.0
Typist	New Hire	GS-04	0.1 MY	0.8
				36.5

Personal services figures consist of Total Direct Labor and Benefits (9.1% of TDL).

Operations

Travel	0.4
Equipment	2.0
ADP	2.5
Sorting Contract	14.8
	19.7

Support

NEFC (60.9% of TDL)	22.2
Central Office (44.8% of TDL)	16.4
	38.6

Total Cost	94.8
DOC Overhead (2.7%)	2.6
Total Task Cost	97.4

In-House (NOAA/NMFS) Contribution 140.0

Task Duration: 3 Years

Total Task Cost, second year 97.4

Total Task Cost, third year 97.4

TASK 2 -- 100 SAMPLES

Personal Service - Research

Supervisory Fishery Biologist	Mr. K. Sherman	GS-15	0.1 MY	3.3
Identifier - Analyst	New Hire	GS-12	0.5 MY	10.1
Fishery Biologist	New Hire	GS-05	0.5 MY	4.7
Data Manager	New Hire	GS-12	0.1 MY	2.0
Draftswoman	New Hire	GS-06	0.1 MY	1.0
Typist	New Hire	GS-04	0.1 MY	0.8
				21.9

Personal services figures consist of Total Direct Labor and Benefits (9.1% of TDL).

Operations

Travel	0.2
Equipment	2.0
ADP	1.0
Sorting Contract	6.0
	9.2

Support

NEFC (60.9% of TDL)	13.3
Central Office (44.8% of TDL)	9.8
	23.1

Total Cost	54.2
DOC Overhead (2.7%)	1.5
Total Task Cost	55.7

In-House (NOAA/NMFS) Contribution 70.0

Task Duration: 1 Year

C. Budget Summary:

TASK 1 -- 300 SAMPLES

Personal Service - Research

Supervisory Fishery Biologist	Mr. K. Sherman	GS-15	0.1 MY	3.3
Identifier - Analyst	New Hire	GS-12	1.0 MY	20.1
Fishery Biologist	New Hire	GS-05	1.0 MY	9.3
Data Manager	New Hire	GS-12	0.1 MY	2.0
Draftswoman	New Hire	GS-06	0.1 MY	1.0
Typist	New Hire	GS-04	0.1 MY	0.8
				36.5

Personal services figures consist of Total Direct Labor and Benefits (9.1% of TDL).

Operations

Travel	0.5
Equipment	2.0
ADP	3.0
Sorting Contract	18.0
	23.5

Support

NEFC (60.9% of TDL)	22.2
Central Office (44.8% of TDL)	16.4
	38.6

Total Cost	98.6
DOC Overhead	2.7
Total Task Cost	101.3

In-House (NOAA/NMFS) Contribution 360.0

Task Duration: 1 Year

Task #5: Contemporary Demersal Finfish/Ichthyoplankton/Ocean Shellfish

Subtask #1: Demersal Finfish Survey

As the lead agency in NOAA for fisheries matters, NMFS and the MACFC in particular, will expand in the Outer Continental Shelf area and related shoreward areas. The proposed expanded trawl survey 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 fish wintering and spawning zone which is referred to as the ICNAF "banana" (Figure 5-2). The ICNAF "banana" area is bounded by straight lines between points as follows:

North Latitude	West Latitude
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 statistical areas 6A and 6B.

The current semiannual groundfish trawl survey is designed to measure major stock changes of selected species. Other objectives although partially achieved with current methods would be greatly enhanced with expanded sampling. These include determining environmental conditions controlling distribution and abundance, gathering life history information essential to ecological understanding and the assessment of fish production potential. Additional sampling will permit the assessment of more subtle population changes which are significant both from the standpoint of fishery management and essential in determining effects of environmental impacts.

Increased sampling can be accomplished in two ways: one, to increase the sampling density of stations during existing semiannual cruises; the other, to increase the frequency of cruises. The present ± 50 percent precision is an acceptable standard for gross stock assessment in the Western Atlantic. Doubling the intensity of sampling from one trawl per 300 sq. miles to one per 150 sq. miles improves precision by 20 percent. Increasing the number of cruises seasonally would be a more effective method of increasing our assessment reliability. More frequent cruises will eliminate the obvious seasonal bias of semiannual sampling. In addition better estimates of

prerecruits for more species and more precise definition of their seasonal movements will be possible. Hydrographic data collected would be more meaningful in describing environmental changes and their effects. In FY's 76, 77, and 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 include 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. However, the proposed increased sampling area (Figure 5-4) would require a minimum total of 96 trawls to be comparable to the minimum number of stations occupied on the semiannual surveys. An increase of 40-50 more stations would be required to make the sampling intensity of the expanded study area comparable to the ongoing bimonthly study area. Expanding the study area will provide information on seasonal occurrences, juvenile abundance indices and migration patterns which is currently not available for the Mid-Atlantic OCS. Baseline biological data collected for key species include condition factors, gonad-somatic indices, and sex ratios. These data may provide evidence of response to environmental stress before measurable population changes occur.

Work Products:

1. Species listing by station -- approximately 300 stations.

2. Distribution and relative abundance (D&RA) of all finfish species and additional D&RA of selected species by size group. Data will be presented in a tabulated and contoured format.

3. Estimated seasonal biomass of selected (trawl-vulnerable) species - OCS (BCT) area; by use of area swept method.

4. Definition of spawning seasons through the analysis of monthly gonad-somatic indices for selected species.

5. Estimation of prerecruits of selected species.

6. Analysis of seasonal movements of dominant species (approximately 20 commercially or recreationally significant species).

Subtask #2: Ichthyoplankton Surveys

An established team of fishery scientists and technicians in the MACFC has been studying the early life history of coastal fishes since 1965. Research has encompassed both small-and large-scale surveys of the continental shelf to investigate the seasonality, distribution and abundance of constituents of the ichthyoplankton community, and species intensive studies of bluefish, Atlantic mackerel and yellowtail flounder larvae.

During FY 1975 field work included the continuation of semiannual surveys of the entire Middle Atlantic Bight, and monthly cruises in the New York Bight. In addition, a 72-hour study was completed on the diel movements of larval bluefish. Ongoing surveys are conducted in conjunction with assessments of adult spawning populations. To corroborate our ongoing research, the MACFC proposes to expand its ongoing ichthyoplankton field work. Sampling will continue to be concurrent with trawl surveys to assess adult populations. The proposed study will about double both the number of samples taken per cruise and the size of the sampling area. It will include bimonthly cruises in the northern BCT area. Both plankton tows and neuston tows will increase from 19 to 41 per cruise (Figures 5 and 6). Standard MARMAP procedures will be used for collecting samples. Fish eggs and larvae are collected with 60 cm bongos, fitted with 0.505 and 0.333 mm mesh nets. The tow profile at each station is smooth-oblique, surface to bottom, to sample equally the entire water column. This sampling scheme allows for quantitative assessments of the collections. Neuston (surface) tows are made at each station to assess the importance of the air-sea interface zone. 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.

Work Products:

1. Distribution and abundance (D&A) tables, listing station location, hydrographic data, zooplankton volumes, catches of fish eggs (mixed), larvae (by genus or species) from smooth-oblique, surface to bottom tows, and larvae and juveniles (by genus or species) from neuston (surface) tows, in OCS (BCT) area.

2. Geographic distribution and relative abundance figures (SYMAP reproductions) showing intra- and intercruise differences and shifts in occurrence of fish eggs (mixed), in OCS (BCT) area.

3. Geographic distribution and relative abundance figures (SYMAP reproductions) showing intra- and intercruise differences and shifts in occurrence of fish larvae (mixed), in OCS (BCT) area.

4. Geographic distribution and relative abundance figures (SYMAP reproductions) showing intra- and intercruise differences and shifts in occurrence of fish larvae (genus or species), in OCS (BCT) area. When feasible, we will show figuratively the distribution of larvae further separate into size categories, to illustrate the effects of dispersion on the early life stages of different genera or species.

5. Figures showing relative diversities of larvae (genus or species) by cruise, in OCS (BCT) area.

6. Initial data on vertical distribution and diel movements of larval fishes (by species). Initial data on diel movements will be supplemented under operations in Task #5. All tables and figures will be supplemented with narrative interpretations.

Subtask #3: Ocean Shellfish Surveys

The objectives of this task are to better define the offshore limits of surf clam (Spisula solidissima) populations and to assess the populations of the ocean quahog (Arctica islandica) and sea scallops (Placopecten magellanicus) which might be impacted by offshore oil development.

Surf clams are used in over 60% of all clam products produced in the United States and much of the 96.1 million pounds of shucked meats landed in 1974 came from the BLM "area of interest". Adequate surf clam survey data exist to assess the potential impact of oil development on most of the population. However, that portion of the population living at depths greater than 40 m has not been adequately surveyed. In addition, the ocean quahog population, an important latent marine resource existing at greater depths than surf clams, has been inadequately assessed. Improvements in harvesting technology and increased demands for clam products is stimulating the harvest of quahog as an alternate or supplemental resource for the surf clam industry.

MACFC proposes to extend sampling to greater depths than the depths sampled by the latest surf clam survey cruise. The sampling would include depths from 40 to 75 meters which should delineate the offshore extent of surf clams and sample the majority of the harvestable ocean quahog resource. Sampling will be conducted on a 10-mile by 5-mile grid pattern using the dredge used in recent historical surveys.

Sea scallops are an important resource of the OCS (BCT) area and are concentrated between 50 to 100 meters where they are likely to be directly affected by oil development. As no survey of sea scallops has been conducted since 1960, MACFC proposes to sample sea scallops in a manner consistent with the 1960 survey utilizing the same dredge and occupying the same transect stations within the OCS area. Major transects run perpendicular to the coast and stations are occupied at 10 fathom intervals from 20 to 80 fathoms. Additional transects and stations are sampled in areas of sea scallop abundance.

Work Products:

1. Distribution and abundance listings of surf clams, ocean quahogs, and sea scallops by station in the OCS (BCT) area. This includes SYMAP contours of shellfish concentration.

2. Tonnage and value of ocean shellfish resources in the OCS (BCT) area.

Subtask #4: Biological/Sportfish Interactions

The study objective is to document details of participation level, centers of activity and biological characteristics of harvest and competitive interactions with commercial fisheries from an area of dense human population in the BCT inner shelf of New Jersey.

The BLM requires current information on the status of activity and harvest of the recreational fishery. These shore based activities are a significant target for spill trajectories. The quality of sportfish, aesthetics of the experience and competitive interactions with commercial fisheries are all relevant to the impacts of shelf development of the petroleum resource.

A pilot recreational fishery survey at Ocean City, Maryland (Fig. 5) terminated June 30, 1975. Information from this study is relevant only to the southern quarter of the proposed study area. Projections of the data to more northern portions of the Mid-Atlantic OCS would be highly inaccurate because of population differences in both available fish and the concentrations of anglers. Since no recent sportfishing survey exists for most of the BLM area, MACFC proposes to produce a report of these activities in the New Jersey coastal area. Party and charter boat fleets equal to or greater than that of Ocean City are centered in at least five areas in New Jersey (Cape May, Atlantic City, Barnegat, Point Pleasant and Highlands). These fleets range considerably offshore and harvest a quantity of pelagic species as well as inshore demersal stocks. Some biological data from the 1974 commercial landings are also available to determine competitive interactions of the recreational and commercial fisheries. The sampling effort and encoding of catch records requires considerably more labor than that used for the pilot project at Ocean City, Maryland. The concentration of effort will lie with personal interviews, primarily at dockside and collection of biological data on pelagic species not taken during trawl surveys.

Work Products:

1. Estimates of the harvest of principal species by the charter, party and private boats fishing the shelf waters and landing in New Jersey ports -- by species, tonnage and value distribution and range of fisheries. Comparisons will be made to commercial harvest where data are available.

2. Impact in terms of numbers of anglers, vessels of New Jersey recreational fishing in the OCS (BCT) area.

3. Seasonality and biological characteristics of the recreational harvest.

NMFS contribution includes the investment in time of 6 port samplers, and supervisory personnel, also aerial count costs and experience gained from earlier surveys in design of log sheets and data processing formats. Utilization of commercial catch samples is available for the 1974 season.

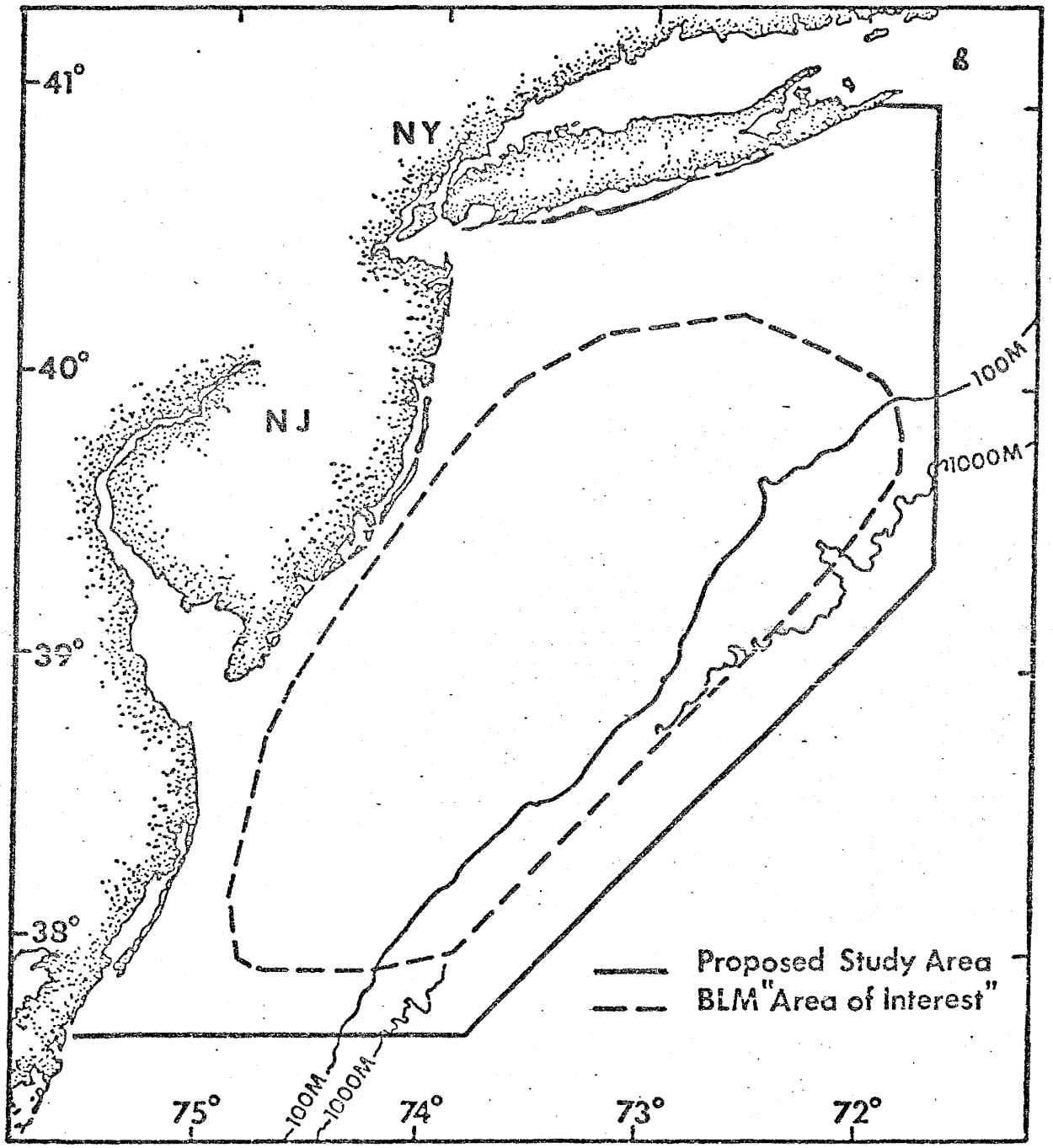


Figure 1. Location of Proposed Study Area

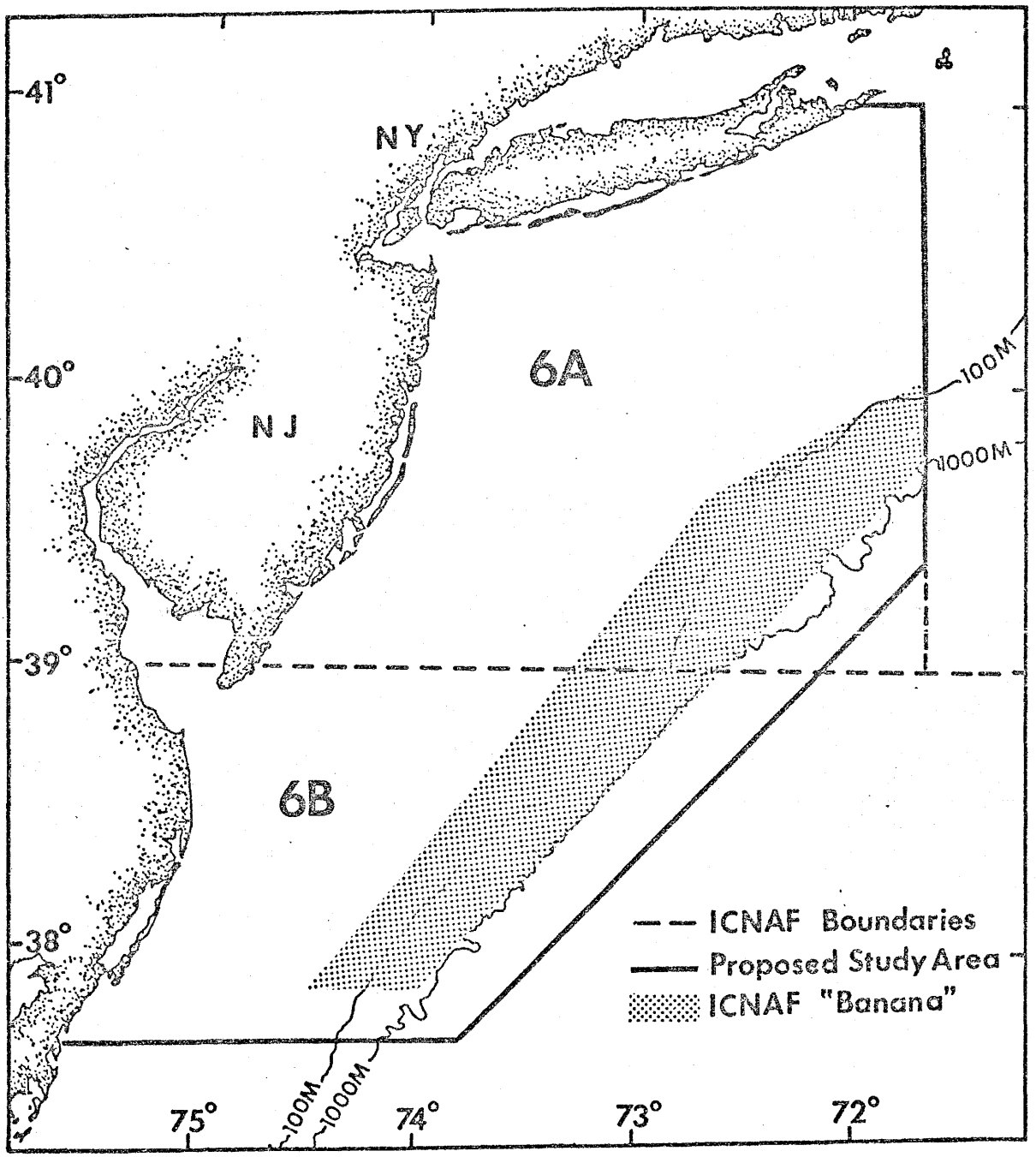


Figure 2. Relationship of ICNAF Areas 6A, 6B and ICNAF "Banana" to Proposed Study Area.

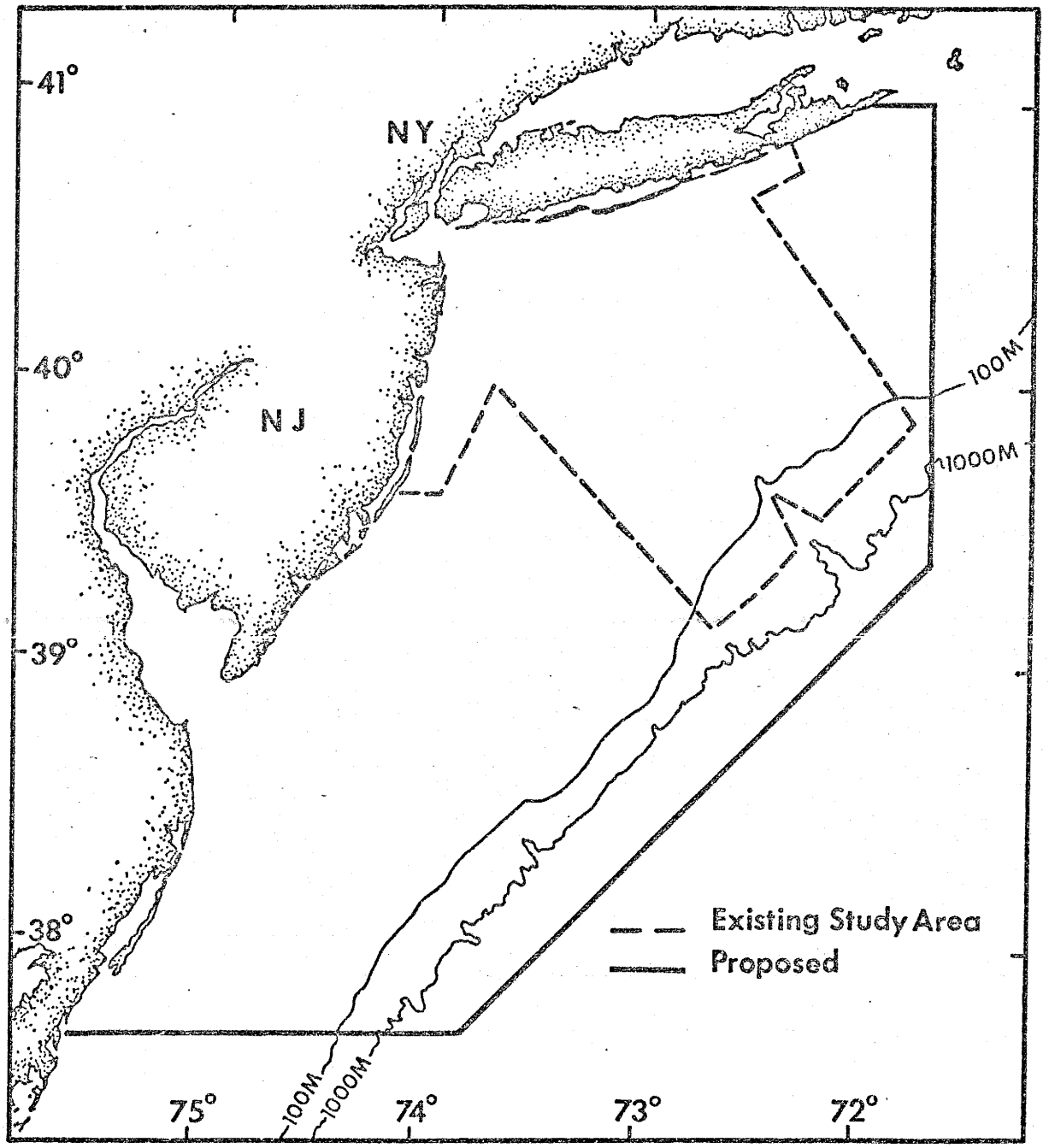


Figure 3. Existing and Proposed Groundfish Study Areas.

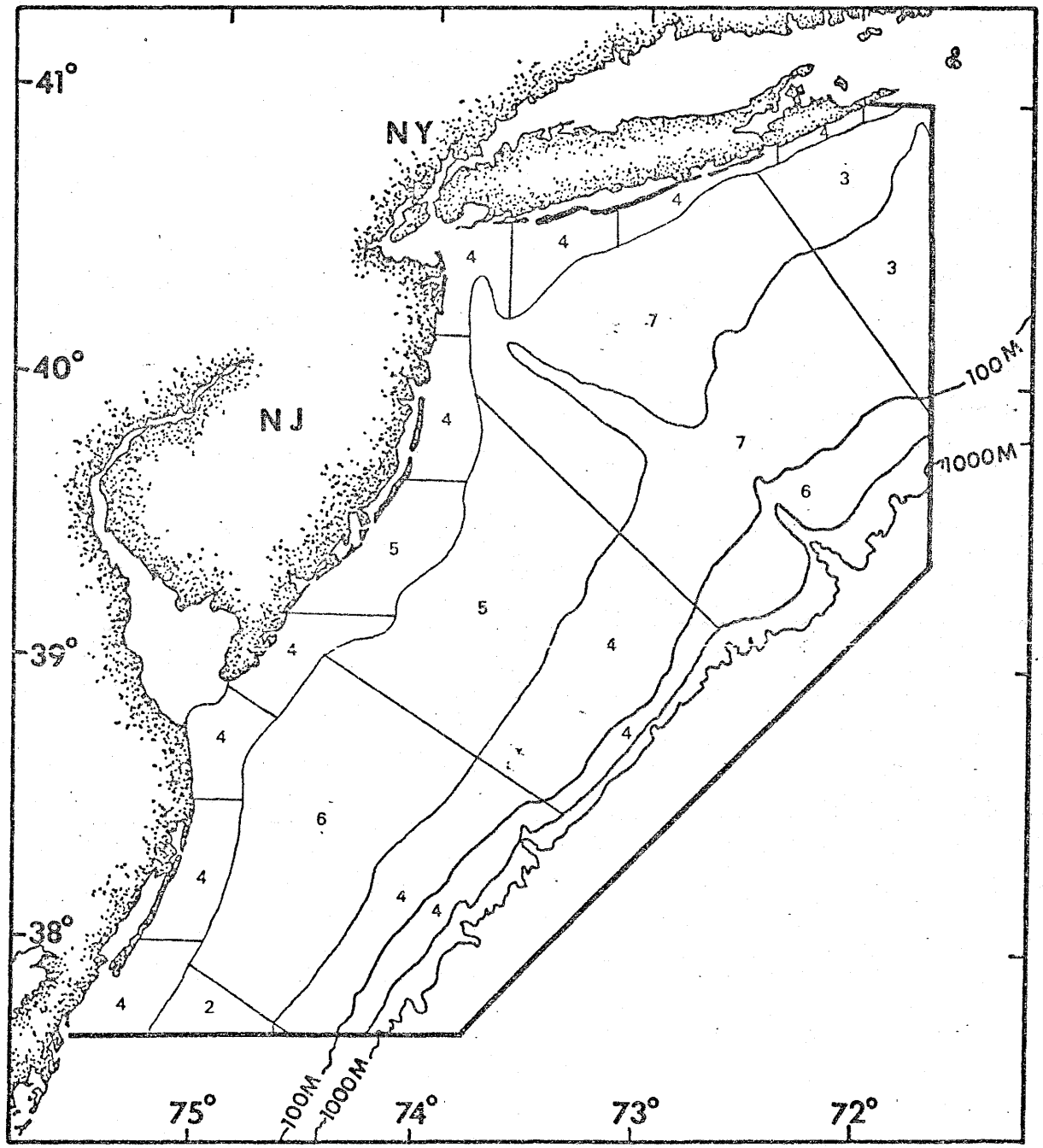


Figure 4. Existing Sampling Strata and Numbers of Stations per Strata.

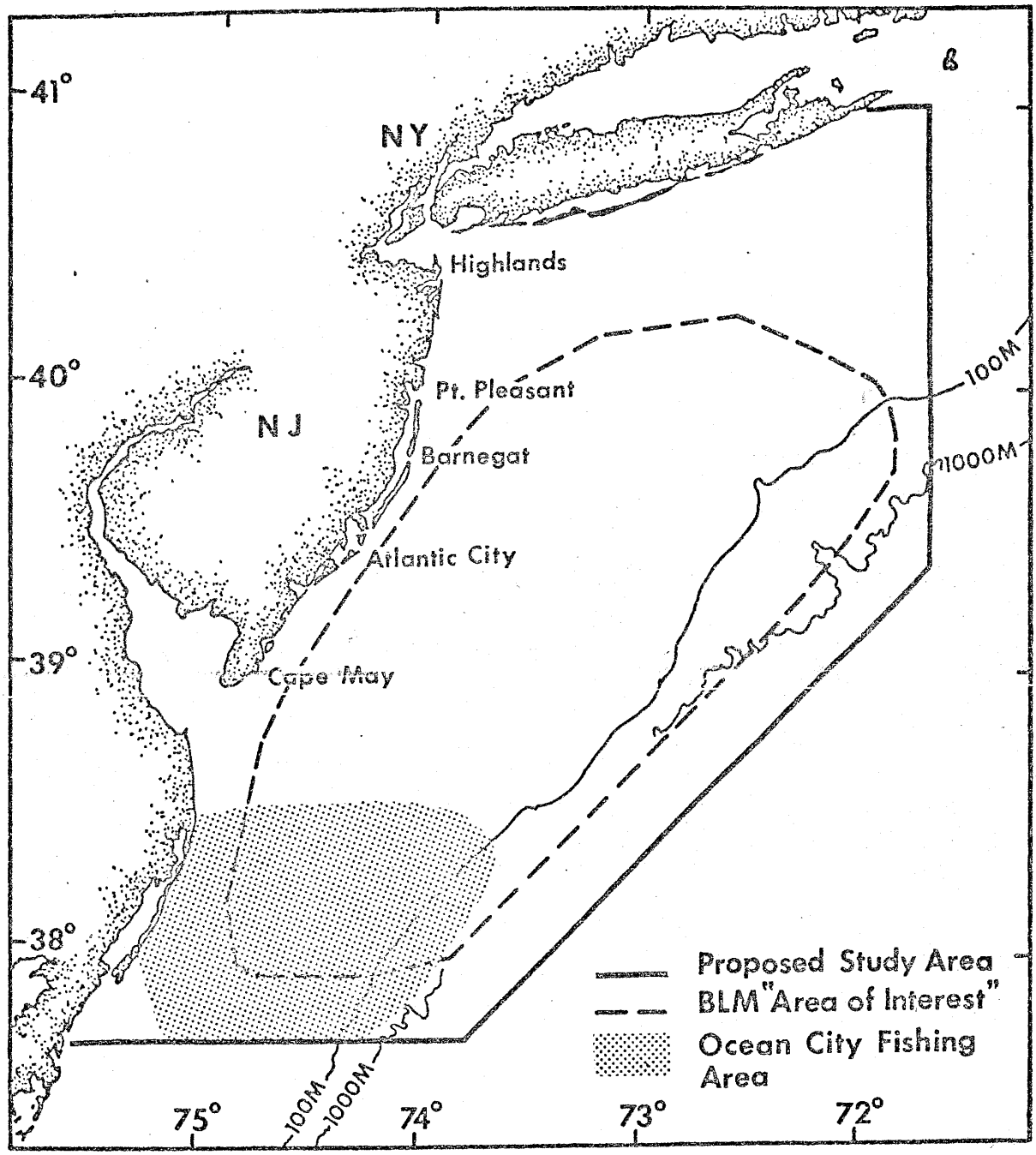


Figure 5. Location of Proposed Study Area Showing Areas Fished by Ocean City Fishermen and New Jersey Major Sport Fishing Ports.

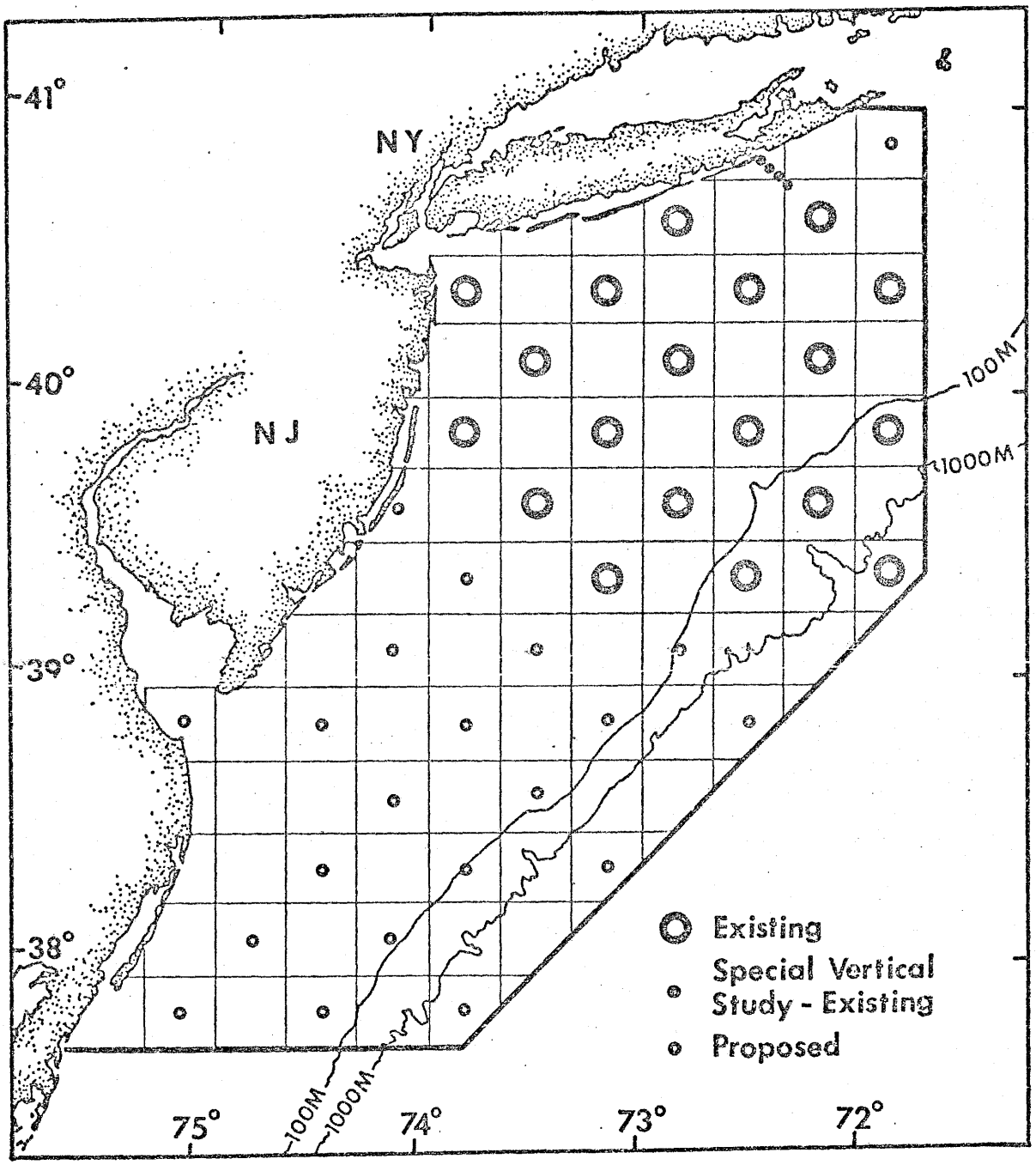


Figure 6. Existing and Proposed Ichtyoplankton Bi-Monthly Sampling Stations.

Task #5: Expansion of MARMAP SI and II Studies

SUBTASK #1: Biological-Finfish Surveys
(Budget for First Year of a Subtask with a 3 Year Duration)

Personal Service - Research

Supervisory Fishery Biologist	Dr. A. Merrill	GS-15	0.05MY	$ 1.9K
Biometrician	Dr. S. Chang	GS-12	0.20	4.5
Fishery Biologist	Mr. C. MacKenzie	GS-12	0.25	5.7
Fishery Biologist	New Hire	GS-07	0.50	6.3
Biological Aide (3)	New Hire	GS-03	2.50	20.2
Project Coordinator	New Hire	GS-14	0.15	4.8
Data Manager	New Hire	GS-12	0.15	3.4
Technical Writer	New Hire	GS-09	0.15	2.4
Secretary	New Hire	GS-05	0.15	1.7

Personal Service - ADP

Computer Scientist	New Hire	GS-09	0.65	9.8
Personal Service				60.7
Overtime				22.5
Total Personal Service				$83.2K

Operations

Travel	1.4
Transportation of Things	1.0
Printing and Reproduction	0.5
Supplies and Expendables	19.0
Capital Equipment	3.0
ADP (Federal Contract)	3.5
Contracts	
Vessel Charters	40.0
Total Operations	68.4

Support

Middle Atlantic Coastal Fisheries Center (59.1% of TDL)	46.2
Central Office (44.8% of TDL)	35.0
Department of Commerce (0.5% of Total Cost)	1.2
Total Support	82.4

Total Subtask Cost $234.0K

In-House (NOAA/NMFS) Contribution $153.4K

Task #5: Expansion of MARMAP SI and II Studies

SUBTASK #1: Biological-Finfish Surveys
(Budget for Second Year of a Subtask with a 3 Year Duration)

Personal Service - Research

Supervisory Fishery Biologist	Dr. A. Merrill	GS-15	0.05MY	$1.9K
Biometrician	Dr. S. Chang	GS-12	0.20	4.5
Fishery Biologist	Mr. C. MacKenzie	GS-12	0.25	5.7
Fishery Biologist	New Hire - Yr.1	GS-07	0.50	6.3
Fishery Technician	New Hire	GS-05	1.00	10.5
Biological Aide (3)	New Hire-Yr.1	GS-03	2.50	20.2
Project Coordinator	New Hire-Yr.1	GS-14	0.15	4.8
Data Manager	New Hire-Yr.1	GS-12	0.15	3.4
Technical Writer	New Hire-Yr.1	GS-09	0.15	2.4
Secretary	New Hire-Yr.1	GS-05	0.15	1.7

Personal Service-ADP

Computer Scientist	New Hire-Yr.1	GS-09	0.65	9.8
Personal Service				71.2
Overtime				22.5
Total Personal Service				$93.7

Operations

Travel	1.4
Transportation of Things	1.0
Printing and Reproduction	0.5
Supplies and Expendables	17.7
Captial Equipment	3.0
ADP(Federal Contract)	3.5
Contracts:	
Vessel Charters	40.0
Total Operations	67.1

Support

Middle Atlantic Coastal Fisheries Center (59.1% of TDL)	51.9
Central Office (44.8% of TDL)	39.3
Department of Commerce (0.5% of Total Cost)	1.3
Total Support	92.5

Total Subtask Cost $253.3

Task #5: Expansion of MARMAP SI and II Studies

SUBTASK #1: Biological-Finfish Surveys
(Budget for Third Year of a Subtask with a 3 Year Duration)

Personal Service - Research

Supervisory Fishery Biologist	Dr. A. Merrill	GS-15	0.05MY	$1.9K
Biometrician	Dr. S. Chang	GS-12	0.20	4.5
Fishery Biologist	Mr. C. MacKenzie	GS-12	0.25	5.7
Fishery Biologist	New Hire-Yr.1	GS-07	0.50	6.3
Fishery Technician	New Hire-Yr.2	GS-05	1.00	10.5
Biological Aide (3)	New Hire-Yr.1	GS-03	2.50	20.2
Biological Aide	New Hire	GS-03	1.00	8.0
Project Coordinator	New Hire-Yr.1	GS-14	0.15	4.8
Data Manager	New Hire-Yr.1	GS-12	0.15	3.4
Technical Writer	New Hire-Yr.1	GS-09	0.15	2.4
Secretary	New Hire-Yr.1	GS-05	0.15	1.7

Personal Service-ADP

Computer Scientist	New Hire-Yr.1	GS-09	0.65	9.8
Personal Service				79.2
Overtime				22.5
Total Personal Service				$101.7

Operations

Travel	2.9
Transportation of Things	1.5
Printing and Reproduction	1.0
Supplies and Expendables	26.0
Capital Equipment	3.0
ADP (Federal Contract)	6.0
Contracts:	
Vessel Charters	45.0
Total Operations	85.4

Support

Middle Atlantic Coastal Fisheries Center (59.1% of TDL)	56.2
Central Office (44.8% of TDL)	42.6
Department of Commerce (0.5% of Total Cost)	1.4
Total Support	100.2

Total Subtask Cost $287.3

Task #5: Expansion of MARMAP SI and II Studies

SUBTASK #2: Biological-Sportfish/Commercial Fish Interactions: OCS(BCT)Areas
(Budget for First Year of a Subtask with a 3 Year Duration)

Personal Service - Research

Supervisory Fishery Biologist	Dr. A. Merrill	GS-15	0.05MY	$1.9K
Biometrician	Dr. S. Chang	GS-12	0.10	2.2
Fishery Biologist	Mr. B. Freeman	GS-11	0.25	3.6
Fishery Biologist	New Hire	GS-07	0.50	6.2
Fishery Technician	Mr. G. Ward	GS-06	0.50	6.4
Fishery Technician	Mr. S. Turner	GS-04	0.80	5.6
Biological Aide (1)	New Hire	GS-03	1.00	8.0
Project Coordinator	New Hire	GS-14	0.10	3.2
Data Manager	New Hire	GS-12	0.10	2.3
Technical Writer	New Hire	GS-09	0.10	1.6
Secretary	New Hire	GS-05	0.10	1.1

Personal Service - ADP

Computer Scientist	New Hire	GS-09	0.40	6.0
Personal Service				48.1
Overtime				5.0
Total Personal Service				$53.1K

Operations

Travel	1.2
Transportation of Things	-
Printing and Reproduction	0.5
Supplies and Expendables	3.5
Capital Equipment	-
ADP (Federal Contract)	3.0
Contracts	-
Total Operations	8.2

Support

Middle Atlantic Coastal Fisheries Center (59.1% of TDL)	29.0
Central Office (44.8% of TDL)	22.0
Department of Commerce (0.5% of Total Cost)	0.6
Total Support	51.6

Total Subtask Cost	$112.9K
In-House (NOAA/NMFS Contribution	$ 74.0K

Task #5: Expansion of MARMAP SI and II Studies

SUBTASK #2: Biological-Sportfish/Commercial Fish Interactions: OCS(BCT)Area
(Budget for Second Year of a Subtask with a 3 Year Duration)

Personal Service - Research

Supervisory Fishery Biologist	Dr. A. Merrill	GS-15	0.05MY	$1.9K
Biometrician	Dr. S. Chang	GS-12	0.10	2.2
Fishery Biologist	Mr. B. Freeman	GS-11	0.25	3.6
Fishery Biologist	New Hire-Yr.1	GS-07	0.50	6.2
Fishery Technician	Mr. G. Ward	GS-06	0.50	6.4
Fishery Technician	Mr. S. Turner	GS-04	0.80	5.6
Biological Aide (1)	New Hire-Yr. 1	GS-03	1.00	8.0
Project Coordinator	New Hire-Yr.1	GS-14	0.10	3.2
Data Manager	New Hire-Yr.1	GS-12	0.10	2.3
Technical Writer	New Hire-Yr.1	GS-09	0.10	1.6
Secretary	New Hire-Yr.1	GS-05	0.10	1.1

Personal Service - ADP

Computer Scientist	New Hire-Yr.1	GS-09	0.40	6.0
Personal Service				48.1
Overtime				5.0
Total Personal Service				$53.1K

Operations

Travel	0.7
Transportation of Things	-
Printing and Reproduction	0.5
Supplies and Expendables	3.5
Capital Equipment	-
ADP (Federal Contract)	3.0
Contracts	-
Total Operations	7.7

Support

Middle Atlantic Coastal Fisheries Center (59.1% of TDL)	29.0
Central Office (44.8% of TDL)	22.0
Department of Commerce (0.5% of Total Cost)	0.6
Total Support	51.6

Total Subtask Cost $112.4K

Task #5: Expansion of MARMAP SI and II Studies

SUBTASK #2: Biological-Sportfish/Commercial Fish Interactions: OCS(BCT)Area
(Budget for Third Year of a Subtask with a 3 Year Duration)

Personal Service - Research

Supervisory Fishery Biologist	Dr. A. Merrill	GS-15	0.05MY	$1.9K
Biometrician	Dr. S. Chang	GS-12	0.10	2.2
Fishery Biologist	Mr. B. Freeman	GS-11	0.25	3.6
Fishery Biologist	New Hire-Yr.1	GS-07	0.50	6.2
Fishery Technician	Mr. G. Ward	GS-06	0.50	6.4
Fishery Technician	Mr.S. Turner	GS-04	0.80	5.6
Biological Aide (1)	New Hire-Yr.1	GS-03	1.00	8.0
Biological Aide (1)	New Hire-Yr.3	GS-03	1.00	8.0
Project Coordinator	New Hire-Yr.1	GS-14	0.10	3.2
Data Manager	New Hire-Yr.1	GS-12	0.10	2.3
Technical Writer	New Hire-Yr.1	GS-09	0.10	1.6
Secretary	New Hire-Yr.1	GS-05	0.10	1.1

Personal Service-ADP

Computer Scientist	New Hire-Yr.1	GS-09	0.40	6.0
Personal Service				56.1
Overtime				5.0
Total Personal Service				$61.1K

Operations

Travel	1.7
Transportation of Things	-
Printing and Reproduction	0.8
Supplies and Expendables	6.6
Capital Equipment	-
ADP (Federal Contract)	6.8
Contracts	-
Total Operations	15.9

Support

Middle Atlantic Coastal Fisheries Center (59.1% of TDL)	33.3
Central Office (44.8% of TDL)	25.3
Department of Commerce (0.5% of Total Cost)	0.7
Total Support	59.3

Total Subtask Cost $136.3K

Task #5: Expansion of MARMAP SI and SII Studies

SUBTASK #3: Biological - Ichthyoplankton
(Budget for First Year of a Subtask with a 3 Year Duration)

Personal Service - Research

Biometrician	Dr. S. Chang	GS-12	0.10 MY	2.2K
Fishery Biologist	Mr. P. Berrien	GS-11	0.25 MY	5.0
Fishery Biologist	Mr. M. Fahay	GS-11	0.25 MY	4.9
Biological Aid (2)	New Hire	GS-03	1.50 MY	12.0
Project Coordinator	New Hire	GS-14	0.10 MY	3.2
Data Manager	New Hire	GS-12	0.10 MY	2.3
Technical Writer	New Hire	GS-09	0.10 MY	1.6
Secretary	New Hire	GS-05	0.10 MY	1.1

Personal Service - ADP

Computer Scientist	New Hire	GS-09	0.10 MY	1.6
Personal Service				33.9
Overtime				6.5
Total Personal Service				40.4

Operations

Travel	0.8
Transportation of Things	0.5
Printing and Reproduction	0.5
Supplies & Expendables	5.3
Capital Equipment	-0-
ADP (Federal Contract)	2.0
Contracts:	
Sorting & Identification of ichthyoplankton samples	32.0
Total Operations	41.1

Support

Middle Atlantic Coastal Fisheries Center (59.1% of TDL)	22.2
Central Office (44.8% of TDL)	16.8
DOC (0.5% of Total Cost)	0.6
Total Support	39.6

Total Subtask Cost 121.1

In-House (NOAA/NMFS) Contribution 79.4

Task #5: Expansion of MARMAP SI and SII Studies

SUBTASK #3: Biological - Ichthyoplankton
(Budget for Second Year of a Subtask with a 3 Year Duration)

Personal Service - Research

Biometrician	Dr. S. Chang	GS-12	0.10 MY	2.2K	
Fishery Biologist	Mr. P. Berrien	GS-11	0.25 MY	5.0	
Fishery Biologist	Mr. M. Fahay	GS-11	0.25 MY	4.9	
Fishery Technician	New Hire	GS-05	1.00 MY	10.5	
Biological Aid (2)	New Hire - 1 yr.	GS-03	1.50 MY	12.0	
Project Coordinator	New Hire - 1 yr.	GS-14	0.10 MY	3.2	
Data Manager	New Hire - 1 yr.	GS-12	0.10 MY	2.3	
Technical Writer	New Hire - 1 yr.	GS-09	0.10 MY	1.6	
Secretary	New Hire - 1 yr.	GS-05	0.10 MY	1.1	
Personal Service - ADP					
Computer Scientist	New Hire - 1 yr.	GS-09	0.10 MY	1.6	
Personal Service				44.4	
Overtime				6.5	
Total Personal Service					50.9

Operations

Travel	0.8	
Transportation of Things	0.5	
Printing & Reproduction	0.5	
Supplies and Expendables	4.5	
Capital Equipment	-0-	
ADP (Federal Contract)	2.0	
Contracts:		
Sorting and Identification of ichthyoplankton samples	32.0	
Total Operations		40.3

Support

Middle Atlantic Coastal Fisheries Center (59.1% of TDL)	27.9	
Central Office (44.8% of TDL)	21.1	
DOC (0.5% of Total Cost)	0.7	
Total Support		49.7
Total Subtask Cost		140.9

Task #5: Expansion of MARMAP SI and SII Studies

SUBTASK #3: Biological - Ichthyoplankton
(Budget for Third Year of a Subtask with a 3 Year Duration

Personal Service - Research

Biometrician	Dr. S. Chang	GS-12	0.10 MY	2.2K	
Fishery Biologist	Mr. P. Berrien	GS-11	0.25 MY	5.0	
Fishery Biologist	Mr. M. Fahay	GS-11	0.25 MY	4.9	
Fishery Technician	New Hire - yr. 2	GS-05	1.00 MY	10.5	
Biological Aid (2)	New Hire - yr. 1	GS-03	1.50 MY	12.0	
Biological Aid (1)	New Hire	GS-03	1.00 MY	8.0	
Project Coordinator	New Hire - yr. 1	GS-14	0.10 MY	3.2	
Data Manager	New Hire - yr. 1	GS-12	0.10 MY	2.3	
Technical Writer	New Hire - yr. 1	GS-09	0.10 MY	1.6	
Secretary	New Hire - yr. 1	GS-05	0.10 MY	1.1	
Personal Service - ADP					
Computer Scientist	New Hire - yr. 1	GS-09	0.10 MY	1.6	
Personal Service				52.4	
Overtime				6.5	
Total Personal Service					58.9

Operations

Travel	1.8	
Transportation of Things	0.8	
Printing and Reproduction	0.9	
Supplies and Expendables	8.5	
Capital Equipment	-0-	
ADP (Federal Contract)	3.0	
Contracts:		
Sorting and Identification of ichthyoplankton samples	35.5	
Total Operations		50.5

Support

Middle Atlantic Coastal Fisheries Center (59.1% of TDL)	32.2	
Central Office (44.8% of TDL)	24.4	
DOC (0.5% of Total Cost)	0.8	
Total Support		57.4
Total Subtask Cost		166.8

Task #5: Expansion of MARMAP SI and SII Studies

SUBTASK #4: Biological Ocean-Shellfish
(Budget for First Year of a Subtask with a 3 Year Duration)

Personal Service - Research

Biometrician	Dr. S. Chang	GS-12	0.10 MY	2.2	
Fishery Biologist	Mr. C. MacKenzie	GS-12	0.25 MY	5.7	
Fishery Biologist	Mr. J. Ropes	GS-12	0.25 MY	6.0	
Biological Aid (1)	New Hire	GS-03	1.00 MY	8.0	
Project Coordinator	New Hire	GS-14	0.05 MY	1.6	
Data Manager	New Hire	GS-12	0.05 MY	1.2	
Technical Writer	New Hire	GS-09	0.05 MY	0.8	
Secretary	New Hire	GS-05	0.05 MY	0.5	
Personal Service - ADP					
Computer Scientist	New Hire	GS-09	0.10 MY	1.5	
Personal Service				27.5	
Overtime				6.0	
Total Personal Service					33.5K
Operations					
Travel				0.6	
Transportation of Things				-0-	
Printing and Reproduction				0.4	
Supplies and Expendables				4.8	
Capital Equipment				-0-	
ADP (Federal Contract)				1.6	
Contracts				-0-	
Total Operations					7.4K
Support					
Middle Atlantic Coastal Fisheries Center (59.1% of TDL)				18.4	
Central Office (44.8% of TDL)				13.9	
DOC (0.5% of Total Cost)				0.4	
Total Support					32.7
Total Subtask Cost					73.6K
In-House (NOAA/NMFS) Contribution					48.2K

Task #5: Expansion of MARMAP SI and SII Studies

SUBTASK #4: Biological Ocean-Shellfish
(Budget for Second Year of a Subtask with a 3 Year Duration)

Personal Service - Research

Biometrician	Dr. S. Chang	GS-12	0.10 MY	2.2K
Fishery Biologist	Mr. C. MacKenzie	GS-12	0.25 MY	5.7
Fishery Biologist	Mr. J. Ropes	GS-12	0.25 MY	6.0
Biological Aid (1)	New Hire - yr. 1	GS-03	1.00 MY	8.0
Project Coordinator	New Hire - yr. 1	GS-14	0.05 MY	1.6
Data Manager	New Hire - yr. 1	GS-12	0.05 MY	1.2
Technical Writer	New Hire - yr. 1	GS-09	0.05 MY	0.8
Secretary	New Hire - yr. 1	GS-05	0.05 MY	0.5

Personal Service - ADP

Computer Scientist	New Hire - yr. 1	GS-09	0.10 MY	1.5
Personal Service				27.5
Overtime				6.0
Total Personal Service				33.5

Operations

Travel	0.6
Transportation of Things	-0-
Printing and Reproduction	0.4
Supplies and Expendables	4.8
Capital Equipment	-0-
ADP (Federal Contract)	1.6
Contracts	-0-
Total Operations	7.4K

Support

Middle Atlantic Coastal Fisheries Center (59.1% of TDL)	18.4
Central Office (44.8% of TDL)	13.9
DOC (0.5% of Total Cost)	0.4
Total Support	32.7

Total Subtask Cost 73.0

In-house (NOAA/NMFS) Contribution 49.2

Task #5: Expansion of MARMAP SI and SII Studies

SUBTASK #4: Biological Ocean-Shellfish
(Budget for Third Year of a Subtask With a 3 Year Duration)

Personal Service - Research

Biometrician	Dr. S. Chang	GS-12	0.10 MY	2.2K	
Fishery Biologist	Mr. C. MacKenzie	GS-12	0.25 MY	5.7	
Fishery Biologist	Mr. J. Ropes	GS-12	0.25 MY	6.0	
Biological Aid (1)	New Hire - yr. 1	GS-03	1.00 MY	8.0	
Biological Aid (1)	New Hire	GS-03	1.00 MY	8.0	
Project Coordinator	New Hire - yr. 1	GS-14	0.05 MY	1.6	
Data Manager	New Hire - yr. 1	GS-12	0.05 MY	1.2	
Technical Writer	New Hire - yr. 1	GS-09	0.05 MY	0.8	
Secretary	New Hire - yr. 1	GS-05	0.05 MY	0.5	
Personal Service - ADP					
Computer Scientist	New Hire - yr. 1	GS-09	0.10 MY	1.5	
Personal Service				35.5	
Overtime				6.0	
Total Personal Service					41.5

Operations

Travel	1.6	
Transportation of Things	-0-	
Printing and Reproduction	0.3	
Supplies and Expendables	6.9	
Capital Equipment	-0-	
ADP (Federal Contract)	3.6	
Contracts	-0-	
Total Operations		12.4

Support

Middle Atlantic Coastal Fisheries Center (59.1% of TDL)	22.8	
Central Office (44.8% of TDL)	17.3	
DOC (0.5% of Total Cost)	0.5	
Total Support		40.6

Total Subtask Cost 94.5

Task # 6: Historical benthic macrofaunal data

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, 1972). Since the majority of benthic organisms are relatively immotile or move only short distances they are far superior indicators of pollution events than the planktonic or pelagic elements of the marine ecosystem. Where pollutants result either in a major change in community structure or are accumulated in the tissues in measurable amounts such "records" are likely to be reflected in elements of the benthic infauna.

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, 22 have been sorted to the 1 mm size fraction and 12 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. 6-3a and b).

an area likely to be affected by oil escaping from exploration and drilling activities. 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. Forty 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 318 samples to be sorted and identified. In addition, eighty 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. Justification:

New Jersey Coastline Stations: Numerous benthic grab samples collected during biotic censuses of the immediate sublittoral zone of the New Jersey Coastline as well as samples taken at stations in the so called Baltimore Canyon Trough are presently held at the Sandy Hook facility, Middle Atlantic Coastal Fisheries Center. The locations of stations off the New Jersey Coast which have been sampled are indicated on attached Fig. 6-3a and b. Stations not circled and all stations circled, except for 600 series, were collected from during a summer cruise completed in 1972. All stations circled, except for 600 series, were resampled in August 1973. Circled stations in the 600 series were collected from only in 1973.

In total, 246 stations were collected from in 1972 and 40 (each replicated) were resampled in 1973. In addition, 11 stations (600) series) were sampled once in 1973. All stations resampled in 1973 were located off and north of Barnegat Bay Inlet.

The majority of stations sampled in 1972 were located south of Atlantic City and in particular off Cape May, an important, relatively uncontaminated offshore environment.

These samples in toto represent an extremely important historical baseline. The collection made during 1972 extends along the entire New Jersey coastline, including those areas south of Atlantic City which are relatively uncontaminated by industrial or domestic pollutants.

Collections made in 1973 were concentrated in the area north of Barnegat Bay Inlet; this northern sector, in part, constitutes a portion of the New York Bight apex, an environment already impinged upon by a multiplicity of domestic and industrial wastes.

Studies projected by BLM under contract include benthic surveys of portions of the Baltimore Canyon and occasional stations located along a limited number of transects extending shoreward from offshore sites. These stations are to be occupied periodically over a period of one year, perhaps commencing in FY 76. The New Jersey Coast samples presently held by Middle Atlantic Coastal Fisheries Center will compliment the samples to be collected for BLM under contract; they will provide an historical baseline which will otherwise be unavailable for assessing possible impact of oil exploration and development. The samples taken in 1972 will provide information for the entire New Jersey sublittoral zone and the stations resampled in 1973 will provide an additional baseline for CY 73.

Comparison of data from stations north and south of Barnegat Bay Inlet will enable scientists to establish the degree of similarity between the two areas and, subsequently, to determine if the New Jersey sublittoral constitutes a single sampling strata. The large number of stations involved will permit the determination of intra-strata variability due to the well-documented ridge and swale topography characteristic of these coastal waters. Data resulting from these analyses should greatly reduce the level of future monitoring efforts required to assess change, if any, due to petroleum development.

Data resulting from analyses of samples collected at stations sampled in 1972 and 1973 will provide information important in assessing annual variation in benthic faunas north of Barnegat Bay Inlet. If it is determined that the benthic fauna are similar along the entire New Jersey shoreline then the observed variations can be used to extrapolate to other areas of the coast.

In total, the collections presently held will be of particular significance in terms of developing trajectory models and predicting those coastal zone resources likely to be impinged upon by oil exploration and development. These samples presently represent the only source of comprehensive benthic data for the sublittoral zones off the New Jersey coast.

Baltimore Canyon Trough (BCT) Stations: As per item B we presently hold 114 samples collected at stations selected by the U. S. Geological Survey in the BCT. As was indicated in the foregoing paragraphs on New Jersey Coastline samples, this material constitutes an extremely

important baseline which, in comparison with future collections, will provide baselines which reflect annual variation. If the general BCT area is to be sampled quarterly under contract with BLM our samples collected in CY 74 will provide data which can be used to develop a BCT sampling strata, greatly simplifying future collection activities. These samples will provide data which can also be used to assess intrastrata variation, both spatially and, as previously noted, temporally.

As noted in item B the MACFC holds numerous additional samples and data concerned with the distribution and abundance of benthic macrofaunal populations on the continental shelf, particularly to the north of the Hudson Shelf Valley and Canyon. The subject grab samples from the BCT would provide a comprehensive overview of the distribution of the benthos on the shelf and would allow the development of a baseline for CY 74 and 75, which, in conjunction with future samples, would permit the development of a predictive trajectory model useful in assessing potential or actual impact of petroleum contaminants which might result from oil exploration and development.

Plans for BLM supported research which have been available to this office will not provide information on annual variation nor sufficient data on spatial distribution of benthic assemblages on the shelf.

D. Work to be done:

In view of the foregoing we propose to: 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 are relatable to demersal fish data and would be of extreme importance in the development of a first-order pollutant trajectory model as has been previously proposed.

The work up of the total benthic 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.

It has been suggested in several meetings with NOAA and BLM personnel that it might not be necessary to develop the complete benthic packages as outlined in the foregoing sections. This office is therefore providing a number of subpackages which might provide information useful to BLM but at a reduced cost in regard to sample sorting, identification and analysis. The following options exist:

***1) The total number of samples would be analyzed and reported upon.

**2) One hundred New Jersey Coastline stations would be analyzed, emphasizing those stations which had been resampled in 1973 and the 21 stations within the BCT at which duplicate samples were collected.

*3) Only the stations for which duplicate samples exist would be processed. This would include the 40 New Jersey Coastline stations sampled in 1972 and 1973 and the 21 BCT stations at which duplicate samples were taken (note that this would limit coverage within the BCT and would yield data only on those New Jersey Coast samples taken north of Barnegat Bay Inlet).

4) Only the total Jersey Coastline "subpackage" would be provided (note that this would eliminate all historical data for the exploration and drilling sites).

5) Only the total BCT subpackage would be provided (note that this would eliminate all historical data for the New Jersey sublittoral section of any trajectory model).

E. Highest Priority 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.

*** - highest priority
** - next to highest priority
* - next to lowest priority
- - lowest priority

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 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 # 6.

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

REFERENCE

Sanders, H.L., J.F. Grassle and G.R. Hampson.
1972. The West Falmouth oil spill. I. Biology. Woods Hole Oceanogr. Inst. Tech. Rept. WHOI-72-20, unpublished ms.

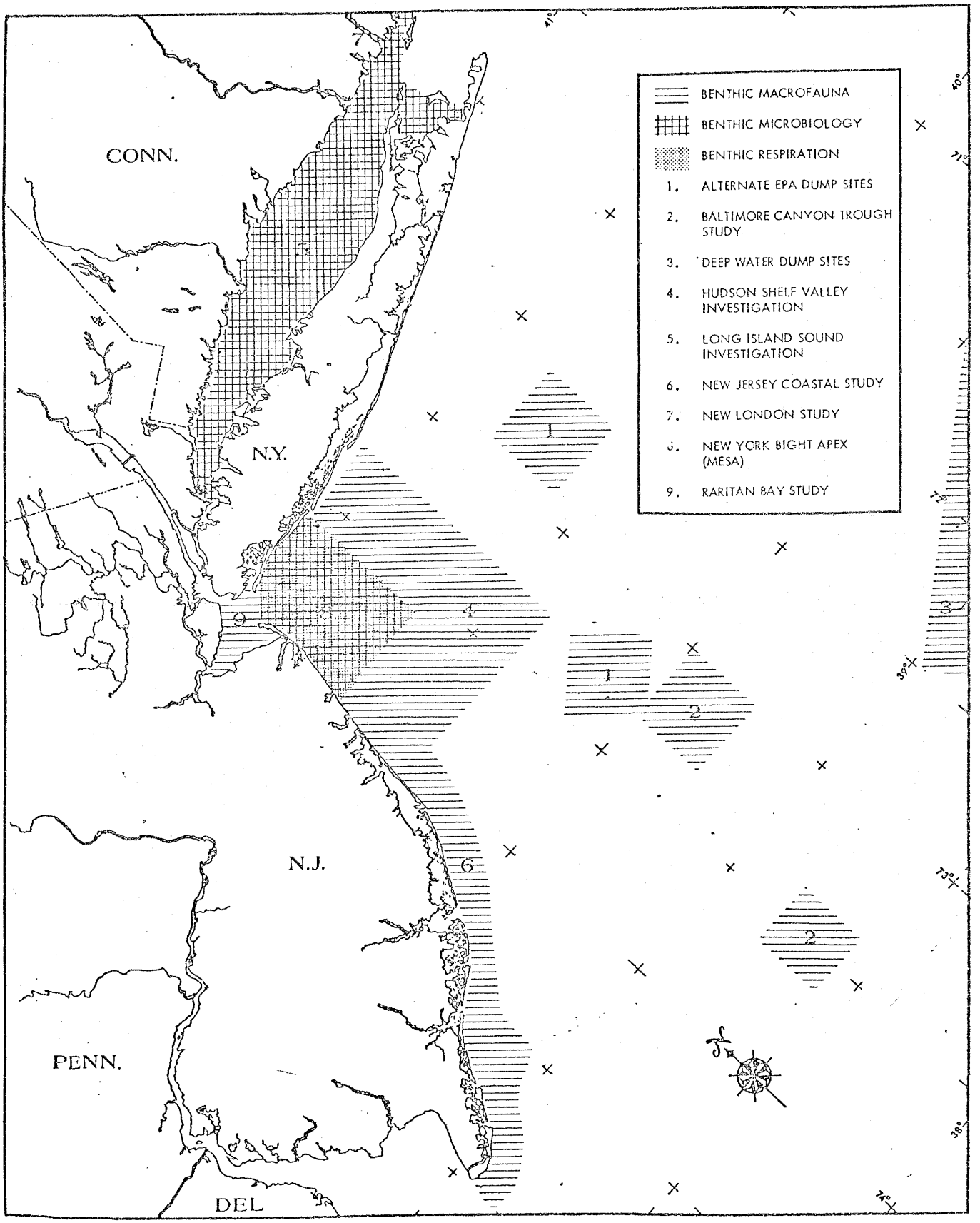


Figure 6-1. Coastal New York Bight showing areas where the Middle Atlantic Coastal Fisheries Center has research in progress.

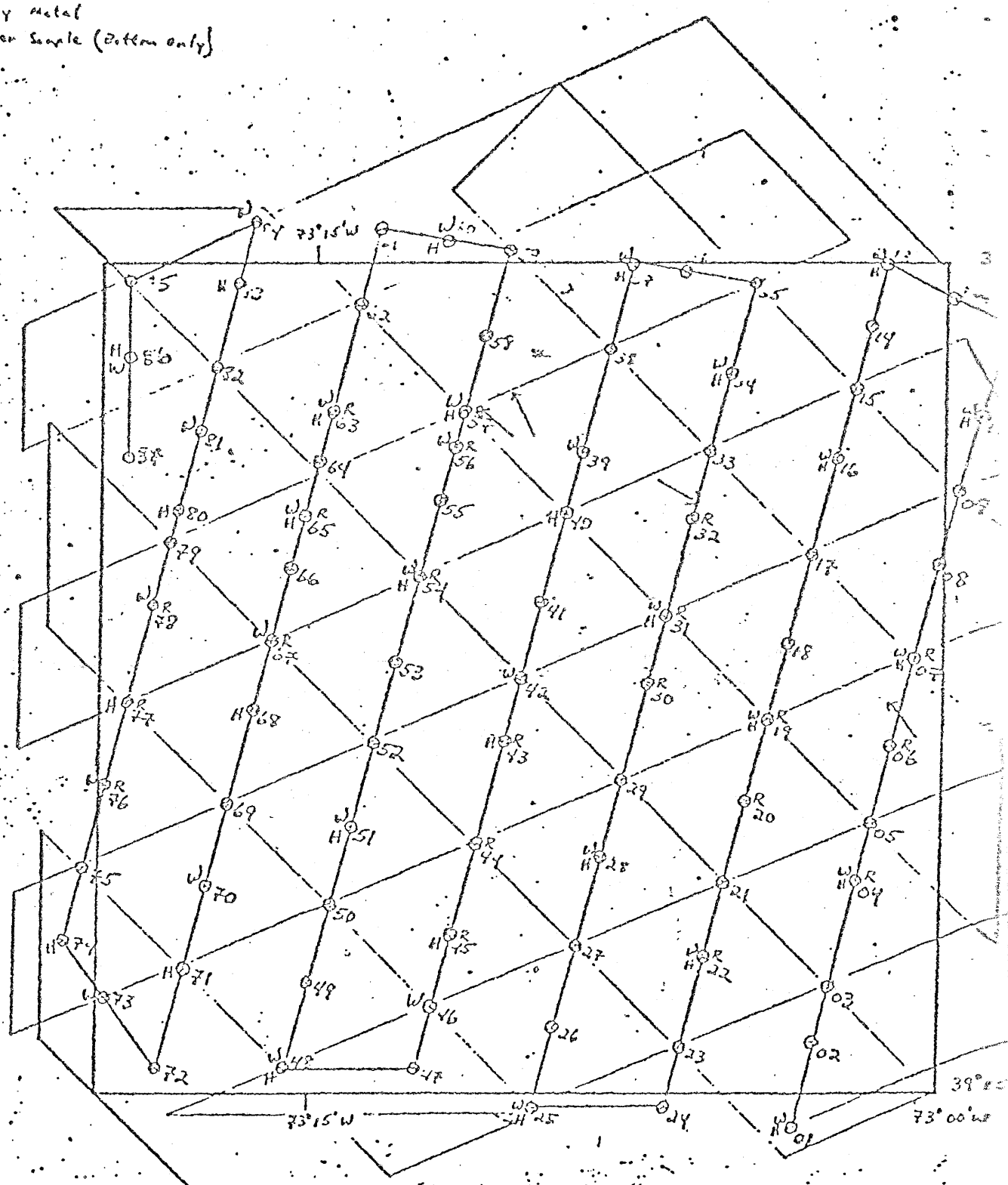


Figure 6-2. Baltimore Canyon Trough subarea.

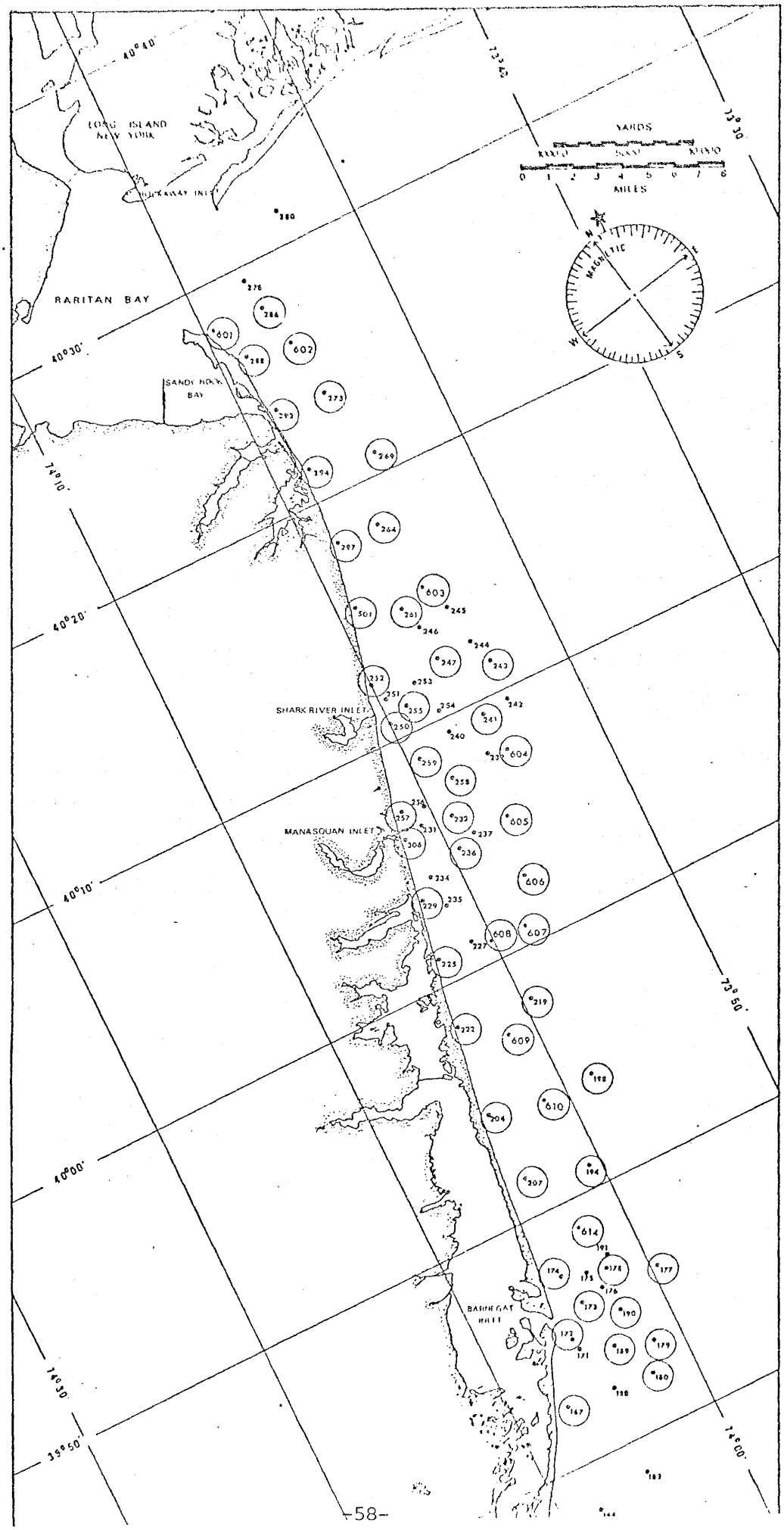


Figure 6-3a. Station locations of the New Jersey Coastline Study (see discussion in text).

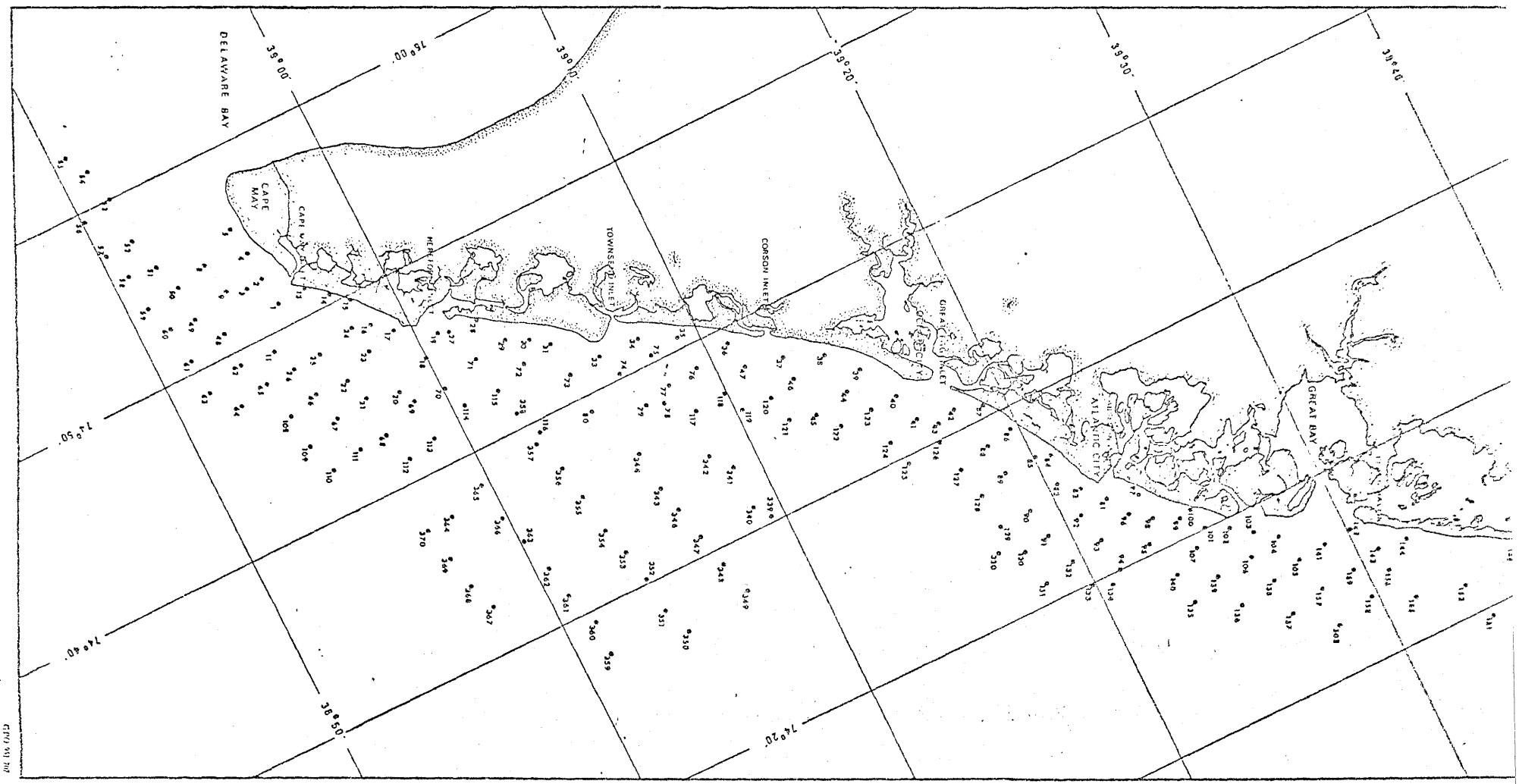


Figure 6-3b. Station locations of the New Jersey Coastline Study (see discussion in text).

Task #6: Historical Benthic Macrofaunal Data

SUBTASK #1: New Jersey Coastal (NJC) and Baltimore Canyon Trough (BCT) Package

(Budget for First 12 Months of an 18 Month Task)

Personal Service - Research					
Supervisory Fishery Biologist	Dr. J. Pearce	GS-15	0.10 MY	3.6K	
Fishery Biologist	Mr. D. Radosh	GS-09	1.00 MY	12.7	
Biological Technician	New Hire	GS-07	1.00 MY	12.4	
Biological Aid (4)	New Hire	GS-03	4.00 MY	32.1	
Project Coordinator	New Hire	GS-14	0.20 MY	6.2	
Data Manager	New Hire	GS-12	0.20 MY	4.4	
Technical Writer	New Hire	GS-09	0.20 MY	3.1	
Secretary	New Hire	GS-05	0.20 MY	2.1	
Personal Service - ADP					
Computer Scientist	New Hire	GS-09	0.25	3.8	
Total Personal Service					80.4K
Operations					
Travel				4.0	
Transportation of Things				0.4	
Printing and Reproduction				0.6	
Supplies and Expendables				7.5	
Capital Equipment				0.4	
ADP (Federal Contract)				2.1	
Contracts				-0-	
Total Operations					15.0
Support					
Middle Atlantic Coastal Fisheries Center (59.1% of TDL)				43.6	
Central Office (44.8% of TDL)				33.0	
DOC (0.5% of Total Cost)				0.9	
Total Support					77.5
Total Subtask Cost					172.9K
In-House (NOAA/NMFS) Contribution					292.8K

Task #6: Historical Benthic Macrofaunal Data

SUBTASK #2: Reduced NJC and BCT Package

(Budget for First 12 Months of an 18 Month Task)

Personal Service - Research					
Supervisory Fishery Biologist	Dr. J. Pearce	GS-15	0.10 MY	3.6	
Fishery Biologist	Mr. D. Radosh	GS-09	0.35 MY	4.5	
Biological Technician	New Hire	GS-07	0.35 MY	4.4	
Biological Aid (4)	New Hire	GS-03	1.80 MY	14.3	
Project Coordinator	New Hire	GS-14	0.20 MY	6.2	
Data Manager	New Hire	GS-12	0.20 MY	4.4	
Technical Writer	New Hire	GS-09	0.20 MY	3.1	
Secretary	New Hire	GS-05	0.20 MY	2.1	
Personal Service - ADP					
Computer Scientist	New Hire	GS-09	0.25 MY	3.8	
Total Personal Service					46.4
Operations					
Travel				2.3	
Transportation of Things				0.2	
Printing and Reproduction				0.3	
Supplies and Expendables				4.3	
Capital Equipment				0.2	
ADP (Federal Contract)				1.2	
Contracts				-0-	
Total Operations					8.5
Support					
Middle Atlantic Coastal Fisheries Center (59.1% of TDL)				25.1	
Central Office (44.8% of TDL)				19.1	
DOC (0.5% of Total Cost)				0.5	
Total Support					44.7
Total Subtask Cost					99.6
In-House (NOAA/NMFS) Contribution					168.5

Task #6: Historical Benthic Macrofaunal Data

SUBTASK #3: Much Reduced NJC and BCT Package

(Budget for First 12 Months of an 18 Month Task)

Personal Service - Research					
Supervisory Fishery Biologist	Dr. J. Pearce	GS-15	0.10 MY	3.6	
Fishery Biologist	Mr. D. Radosh	GS-09	0.30 MY	3.9	
Biological Technician	New Hire	GS-07	0.30 MY	3.8	
Biological Aid (4)	New Hire	GS-03	1.50 MY	12.3	
Project Coordinator	New Hire	GS-14	0.20 MY	6.2	
Data Manager	New Hire	GS-12	0.20 MY	4.4	
Technical Writer	New Hire	GS-09	0.20 MY	3.1	
Secretary	New Hire	GS-05	0.20 MY	2.1	
Personal Service - ADP					
Computer Scientist	New Hire	GS-09	0.25	3.8	
Total Personal Service					43.2
Operations					
Travel				2.1	
Transportation of Things				0.2	
Printing and Reproduction				0.3	
Supplies and Expendables				4.0	
Capital Equipment				0.2	
ADP (Federal Contract)				1.1	
Contracts				-0-	
Total Operations					7.9
Support					
Middle Atlantic Coastal Fisheries Center (59.1% of TDL)				23.4	
Central Office (44.8% of TDL)				17.7	
DOC (0.5% of Total Cost)				0.5	
Total Support					41.6
Total Subtask Cost					92.7
In-House (NOAA/NMFS) Contribution					156.9

Task #6: Historical Benthic Macrofuanal Data

SUBTASK #4: Reduced NJC Package

(Budget for First 12 Months of an 18 Month Task)

Personal Service - Research					
Supervisory Fishery Biologist	Dr. J. Pearce	GS-15	0.10 MY	3.6	
Fishery Biologist	Mr. D. Radosh	GS-09	0.25 MY	3.2	
Biological Technician	New Hire	GS-07	0.25 MY	3.1	
Biological Aid (4)	New Hire	GS-03	1.25 MY	10.1	
Project Coordinator	New Hire	GS-14	0.20 MY	6.2	
Data Manager	New Hire	GS-12	0.20 MY	4.4	
Technical Writer	New Hire	GS-09	0.20 MY	3.1	
Secretary	New Hire	GS-05	0.20 MY	2.1	
Personal Service - ADP					
Computer Scientist	New Hire	GS-09	0.25 MY	3.8	
Total Personal Service					39.6
Operations					
Travel				2.0	
Transportation of Things				0.2	
Printing and Reproduction				0.3	
Supplies and Expendables				3.7	
Capital Equipment				0.2	
ADP (Federal Contract)				1.0	
Contracts				-0-	
Total Operations					7.4K
Support					
Middle Atlantic Coastal Fisheries Center (59.1% of TDL)				21.5	
Central Office (44.8% of TDL)				16.3	
DOC (0.5% of Total Cost)				0.4	
Total Support					38.2K
Total Subtask Cost					85.2K
In-House (NOAA/NMFS) Contribution					144.2K

Task #6: Historical Benthic Macrofaunal Data

SUBTASK # 5: Reduced BCT Package

(Budget for First 12 Months of an 18 Month Task)

Personal Service - Research					
Supervisory Fishery Biologist	Dr. J. Pearce	GS-15	0.10 MY	3.6	
Fishery Biologist	Mr. D. Radosh	GS-09	0.10 MY	1.3	
Biological Technician	New Hire	GS-07	0.10 MY	1.3	
Biological Aid (4)	New Hire	GS-03	0.50 MY	4.2	
Project Coordinator	New Hire	GS-14	0.20 MY	6.2	
Data Manager	New Hire	GS-12	0.20 MY	4.4	
Technical Writer	New Hire	GS-09	0.20 MY	3.1	
Secretary	New Hire	GS-05	0.20 MY	2.1	
Personal Service - ADP					
Computer Scientist	New Hire	GS-09	0.25 MY	3.8	
Total Personal Service					30.0
Operations					
Travel				1.5	
Transportation of Things				0.1	
Printing and Reproduction				0.2	
Supplies and Expendables				2.9	
Capital Equipment				-0-	
ADP (Federal Contract)				0.8	
Contracts				-0-	
Total Operations					5.5
Support					
Middle Atlantic Coastal Fisheries Center (59.1% of TDL)				16.3	
Central Office (44.8% of TDL)				12.3	
DOC (0.5% of Total Cost)				-0.3	
Total Support					28.9
Total Subtask Cost					64.4
In-House (NOAA/NMFS) Contribution					109.0

Task #6: Historical Benthic Macrofaunal Data

Completion of Final Report
Subtasks #1 through #5
(Budget for Final 6 Months of an 18 Month Task)

Personal Service - Research					
Supervisory Fishery Biologist	Dr. J. Pearce	GS-15	0.10 MY	3.6	
Fishery Biologist	Mr. D. Radosh	GS-09	0.50 MY	6.4	
Biological Technician	New Hire - Yr. 1	GS-07	0.50 MY	6.2	
Project Coordinator	New Hire - Yr. 1	GS-14	0.20 MY	6.2	
Data Mangager	New Hire - Yr. 1	GS-12	0.20 MY	4.4	
Technical Writer	New Hire - Yr. 1	GS-09	0.20 MY	3.1	
Secretary	New Hire - Yr. 1	GS-05	0.20 MY	2.1	
Personal Service - ADP					
Computer Scientist	New Hire - Yr. 1	GS-09	0.25 MY	3.8	
Total Personal Service					35.8K
Operations					
Travel				2.0	
Transportation of Things				0.4	
Printing and Reproduction				2.0	
Supplies and Expendables				7.5	
Capital Equipment				-0-	
ADP (Federal Contract)				6.0	
Contracts				-0-	
Total Operations					17.9K
Support					
Middle Atlantic Coastal Fisheries Center (59.1% of TDL)				19.4	
Central Office (44.8% of TDL)				14.7	
DOC (0.5% of Total Cost)				0.4	
Total Support					34.5
Total Subtask Cost					88.2K

Task #7: Abnormalities in Living Resources of the Outer Continental Shelf

A. Compilation of Information on Abnormalities and Diseases of Marine Animals:

Despite the concern of environmentalists and governors of the eastern seaboard states over the hazards of onshore and offshore environmental degradation, early exploration and exploitations of petroleum resources of the east coast's outer continental shelf is inevitable. Two sites considered most promising by oil geologists lie in the Hudson and Baltimore Canyons, both of which are in the Middle Atlantic Coastal Fisheries Center's operational area.

As exploration, drilling and production occur, it is vitally important to have some means of detecting environmental changes (or "impacts") be they deleterious or beneficial. Among the most sensitive indices of deleterious environmental changes are abnormalities, distress, and disease among the biota. However, before changes can be evaluated, baseline information of conditions and the well being of the resources prior to the new impacts must be at hand. Few diseases are known and few, if any, comprehensive surveys have been recorded for diseases of marine life of the outer continental shelf. Soon, however, as essential but geographically divergent research activities are implemented and findings proliferate, it will become increasingly difficult, especially for new workers, to become familiar with already described or established clinical disease entities; and to effect accurate diagnoses of pathological conditions which may be unfamiliar to them, but which have been described and elucidated elsewhere.

While several institutions may contain miscellaneous accessions related to pathology in marine poikilothermic animals, no central systematic repository or reference collection committed to this end exists, except the National Registry recently established by the Middle Atlantic Coastal Fisheries Center's Pathobiology Investigations.

A major function of the Pathobiology Investigations of the Middle Atlantic Coastal Fisheries Center concerns the study, definition, and diagnosis of diseases of marine and estuarine poikilotherms. As a first phase in the study of abnormalities in living resources, it is proposed to initiate a major task directed toward a bibliographic search, compilation, and documentation of diseases and abnormalities of animals that inhabit or migrate through the areas of study. This information will be entered into the National Registry of Marine Pathology to serve as a central reference collection for clinical, illustrative, and published material related to diseases of marine and estuarine vertebrate and invertebrate fishes.

During the second phase, it is proposed that the Pathobiology Investigations, through the Middle Atlantic Coastal Fisheries Center, seek funding for a systematic and comprehensive survey of disease, abnormalities, and parasitemias now prevalent in the fish and shellfish of

the outer continental shelf, with emphasis on the New York Bight and the Hudson and Baltimore Canyons, and for continuing similar surveys during the first 3 years of drilling and recovery of fossil fuels which may be found in the target area. Future studies will concentrate on the impact of environmental change brought about by energy related development on living aquatic resources that inhabit or migrate through nearshore areas where off-loading, storage, refineries, and ancillary facilities are to be constructed, and associated activities are to be performed.

B. Proposed Research:

Phase I - Historical Records of Diseases and Abnormalities:

Several sources of information will be consulted and utilized for extraction, programming, and making entries into the Center's ADP system. These sources will include: 1) libraries of the Middle Atlantic Coastal Fisheries Center (Oxford, Sandy Hook, Milford); 2) National Library of Medicine; 3) Woods Hole Marine Biological Laboratory Library; 4) University Libraries of Johns Hopkins School of Medicine and School of Hygiene and Public Health, Georgetown, American, and George Washington Universities; 5) Federal and State libraries, such as University of Maryland, Schools of Medicine, Pharmacy, Dentistry; Department of Interior, Library of Congress, Department of Agriculture; 6) Registries, such as those maintained by the Smithsonian Institution, Tumor Registry of Lower Animals, the Armed Forces Institute of Pathology, American Type Culture Collection, Department of Agriculture Animal Parasitological Laboratory; 7) additional information will be solicited from Federal and State marine research laboratories, fishery centers, etc., engaged in work related to parasitologic, microbiologic, and chemical and pollution effects on marine organisms, particularly on species that inhabit the areas of concern (Middle Atlantic Bight).

Appropriate information will be extracted and entered onto computer cards using the Middle Atlantic Coastal Fisheries Center's SELGEM automatic data processing system. The acquisition of references and other pertinent source materials (slides, blocks, photographs, etc.) and the extraction of information and its entry into the ADP system will be done on a daily basis for at least 1½ years beginning immediately on award of the Interagency Agreement, and continuing into Phase II thereon as pertinent information is available. Ultimately, this system will be integrated with the National Oceanographic Data Center and its subsidiary components ENDEX and OASIS for correlation and retrieval of information.

Phase II - Histologic Surveys:

Emphasis will be placed on economically important recreational and commercial species which because of their numeric abundance in the study area may be used to provide meaningful baseline histology. The species of fish selected for examination are the silver hake, Merluccius bilinearis, the black sea bass, Centropristes striatus, the fluke, Paralichthys dentatus,

and the butterfish, Poronotus triacanthus. The species of shellfish selected for examination are the sea scallop, Placopecten magellanicus, (a bivalve mollusk) and the American lobster, Homarus americanus, (a crustacean).

All fish and shellfish selected are present in the study area throughout the year and can be sampled with an otter trawl. Samples from selected locations will be obtained during the conduct of fish assessment cruises. Ten fish of each of the selected species (size determined from variance in catch) from each trawl station the designated study areas will be obtained quarterly (spring, summer, fall, winter). Necropsies will be conducted on shipboard and tissues fixed in appropriate fixativies (10% seawater formalin, Davidsons, Bouins). Fish tissues to be examined are liver, epidermis (including underlying muscle), gill, gonad, olfactory epithelium and intestinal mucosa. Lobster tissues to be examined are hepatopancreas, gonad, antennal gland, and gill. All constiuent tissues of the sea scallop can be examined by removing a diagonal section of tissue through the visceral mass. Subsequent to adequate fixation all tissues will be blocked in paraffin, sectioned at 6 um, and stained with hematoxylin and eosin. If required, special stains will be employed. A minimum of two slides will be prepared from each tissue block.

Employing this essentially observational approach, the normal histology and presence of microscopic parasites will be determined. Although the intent of these examinations is to establish histologic norms for the species selected, any apparent histopathology from infectious or non-infectious agents will be described. Photographic documentation of gross and microscopic observations and systematic cataloguing of tissue blocks and prepared slides will provide a valuable reference collection of normal histology. When deemed appropriate, histochemical techniques and electron microscopy will be utilized to augment light microscopic observations.

C. Work Products:

1) A historical record of disease (infectious and noninfectious) and parasitemias affecting indigenous fish and shellfish of the Baltimore Canyon area.

2) Descriptions of normal and abnormal and cytology of selected species (6) of fish and shellfish from the Baltimore Canyon area.

Task #7: Abnormalities in Living Resources of the Outer Continental Shelf

SUBTASK #1: Historical Records of Diseases and Abnormalities
(Budget for First Year of a Subtask with a 3 Year Duration)

Personal Service - Research

Supervisory Fishery Biologist	Dr. A. Rosenfield	GS-14	0.05 MY	2.3K	
Fishery Biologist	Dr. R. Murchelano	GS-13	0.10 MY	2.9	
Biological Aid	Ms. S. MacLean	GS-04	0.20 MY	2.1	
Biological Aid (2)	New Hire	GS-03	2.00 MY	16.0	
Project Coordinator	New Hire	GS-14	0.10 MY	3.0	
Data Manager	New Hire	GS-12	0.10 MY	2.1	
Technical Writer	New Hire	GS-09	0.10 MY	1.5	
Secretary	New Hire	GS-05	0.10 MY	1.0	
Total Personal Service					30.9K

Operations

Travel	3.2	
Transportation of Things	0.5	
Printing and Reproduction	0.7	
Supplies and Expendables	12.4	
Capital Equipment	0.5	
ADP (Federal Contract)	7.0	
Contracts	-0-	
Total Operations		24.3K

Support

Middle Atlantic Coastal Fisheries Center (59.1% of TDL)	16.7	
Central Office (44.8% of TDL)	12.7	
DOC (0.5% of Total Cost)	0.4	
Total Support		29.8K

Total Subtask Cost 85.0K

In-House (NOAA/NMFS) Contribution 180.0K

Task #7: Abnormalities in Living Resources of the Outer Continental Shelf

SUBTASK #1: Historical Records of Diseases and Abnormalities
(Budget for Second Year of a Subtask with a 3 Year Duration)

Personal Service - Research

Supervisory Fishery Biologist	Dr. A. Rosenfield	GS-14	0.15 MY	6.7	
Fishery Biologist	Dr. R. Murchelano	GS-13	0.40 MY	11.6	
Project Coordinator	New Hire - Yr. 1	GS-14	0.05 MY	1.5	
Data Manager	New Hire - Yr. 1	GS-12	0.05 MY	1.0	
Technical Writer	New Hire - Yr. 1	GS-09	0.05 MY	0.8	
Secretary	New Hire - Yr. 1	GS-05	0.05 MY	0.5	
Total Personal Service					22.1

Operations

Travel	1.4	
Transportation of Things	0.2	
Printing and Reproduction	0.2	
Supplies and Expendables	4.3	
Capital Equipment	-0-	
ADP (Federal Contract)	2.4	
Contracts	-0-	
Total Operations		8.5

Support

Middle Atlantic Coastal Fisheries Center (59.1% of TDL)	12.0	
Central Office (44.8% of TDL)	9.1	
DOC (0.5% of Total Cost)	0.3	
Total Support		21.4

Total Subtask Cost 52.0

Task #7: Abnormalities in Living Resources of the Outer Continental Shelf

SUBTASK #1: Historical Records of Diseases and Abnormalities
(Budget for Third Year of a Subtask with a 3 Year Duration)

Personal Service - Research

Supervisory Fishery Biologist	Dr. A. Rosenfield	GS-14	0.10 MY	4.6	
Fishery Biologist	Dr. R. Murchelano	GS-13	0.20 MY	5.9	
Project Coordinator	New Hire - Yr. 1	GS-14	0.05 MY	1.5	
Data Manager	New Hire - Yr. 1	GS-12	0.05 MY	1.0	
Technical Writer	New Hire - Yr. 1	GS-09	0.05 MY	0.8	
Secretary	New Hire - Yr. 1	GS-05	0.05 MY	0.5	
Total Personal Service					14.3K

Operations

Travel	1.0	
Transportation of Things	0.1	
Printing and Reproduction	0.2	
Supplies and Expendables	3.3	
Capital Equipment	-0-	
ADP (Federal Contract)	1.9	
Contracts	-0-	
Total Operations		6.5

Support

Middle Atlantic Coastal Fisheries Center (59.1% of TDL)	7.7	
Central Office (44.8% of TDL)	5.9	
DOC (0.5% of Total Cost)	0.2	
Total Support		13.8

Total Subtask Cost 34.6

Task #7: Abnormalities in Living Resources of the Outer Continental Shelf

SUBTASK #2: Histopathologic Surveys and Disease Monitoring

(Budget for First Year (Starting in Year 2) of a Subtask with a 2 Year Duration)

Personal Service - Research

Supervisory Fishery Biologist	Dr. A. Rosenfield	GS-14	0.05 MY	2.3	
Fishery Biologist	Dr. R. Murchelano	GS-13	0.10 MY	2.9	
Fishery Technician	New Hire	GS-07	1.00 MY	12.4	
Biological Aid	Ms. S. MacLean	GS-04	0.20 MY	2.1	
Biological Aid (2)	New Hire - Yr. 1	GS-03	2.00 MY	16.0	
Project Coordinator	New Hire - Yr. 1	GS-14	0.05 MY	1.5	
Data Manager	New Hire - Yr. 1	GS-12	0.05 MY	1.1	
Technical Writer	New Hire - Yr. 1	GS-09	0.05 MY	0.7	
Secretary	New Hire - Yr. 1	GS-05	0.05 MY	0.5	
Total Personal Service					39.5

Operations

Travel	2.0	
Transportation of Things	0.3	
Printing and Reproduction	0.4	
Supplies and Expendables	8.0	
Capital Equipment	0.3	
ADP (Federal Contract)	4.4	
Contracts	-0-	
Total Operations		15.4

Support

Middle Atlantic Coastal Fisheries Center (59.1% of TDL)	21.4	
Central Office (44.8% of TDL)	16.2	
DOC (0.5% of Total Cost)	0.5	
Total Support		38.1

Total Subtask Cost 93.0

Task #7: Abnormalities in Living Resources of the Outer Continental Shelf

SUBTASK #2: Histopathologic Surveys and Disease Monitoring

(Budget for Second Year (Year 3 of Task) of A Subtask with a 2 Year Duration)

Personal Service - Research

Supervisory Fishery Biologist	Dr. A. Rosenfield	GS-14	0.05 MY	2.3	
Fishery Biologist	Dr. R. Murchelano	GS-13	0.10 MY	2.9	
Fishery Technician	New Hire - Yr. 2	GS-07	1.00 MY	12.4	
Biological Aid	Ms. S. MacLean	GS-04	0.20 MY	2.1	
Biological Aid (2)	New Hire - Yr. 1	GS-03	2.00 MY	16.0	
Project Coordinator	New Hire - Yr. 1	GS-14	0.05 MY	1.5	
Data Manager	New Hire - Yr. 1	GS-12	0.05 MY	1.1	
Technical Writer	New Hire - Yr. 1	GS-09	0.05 MY	0.7	
Secretary	New Hire - Yr. 1	GS-05	0.05 MY	0.5	
Total Personal Service					39.5K

Operations

Travel	2.3	
Transportation of Things	0.4	
Printing and Reproduction	0.5	
Supplies and Expendables	9.0	
Capital Equipment	0.5	
ADP (Federal Contract)	5.1	
Contracts	-0-	
Total Operations		17.8K

Support

Middle Atlantic Coastal Fisheries Center (59.1% of TDL)	21.4	
Central Office (44.8% of TDL)	16.2	
DOC (0.5% of Total Cost)	0.5	
Total Support		38.1K

Total Subtask Cost 95.4K

VI. Work Plan: Biological Baselines for OCS (BCT) Study Area

Task #3 (Finfish and Shellfish)

1. Immediate retrieval as computer-printed listings by year, by season, by station, by species, by numbers of individuals per species, by weight, by size, by sex, etc., of all data from all finfish surveys conducted in the Middle Atlantic Bight.

   a. Process data for information on spatial and temporal distributions and abundances of finfish by species and by biomass.

   b. Process data for information as community structures, for species dominance and diversities.

   c. Process data to obtain time-series-smoothed contoured "three-dimensional" maps of spatial and temporal distributions and abundances of finfish and shellfish.

   d. The final report will be prepared in the standard scientific format including an introduction, methods, material, results (figures, tables, text), discussion as to baselines usage, recommendations of value for the preparation of an Environmental Impact Statement, and pertinent literature. Raw data will be available as appendices if required. Expected results are faunal lists, distributional maps (qualitative and quantitative), statistical assessment of faunal distribution of dominant species, and general biological data in the form of tables and discussion.

Task #3 (Ichthyoplankton) and Task #4 (Zooplankton)

1. Immediate initiation of sorting and identification to species of raw samples of zooplankton.

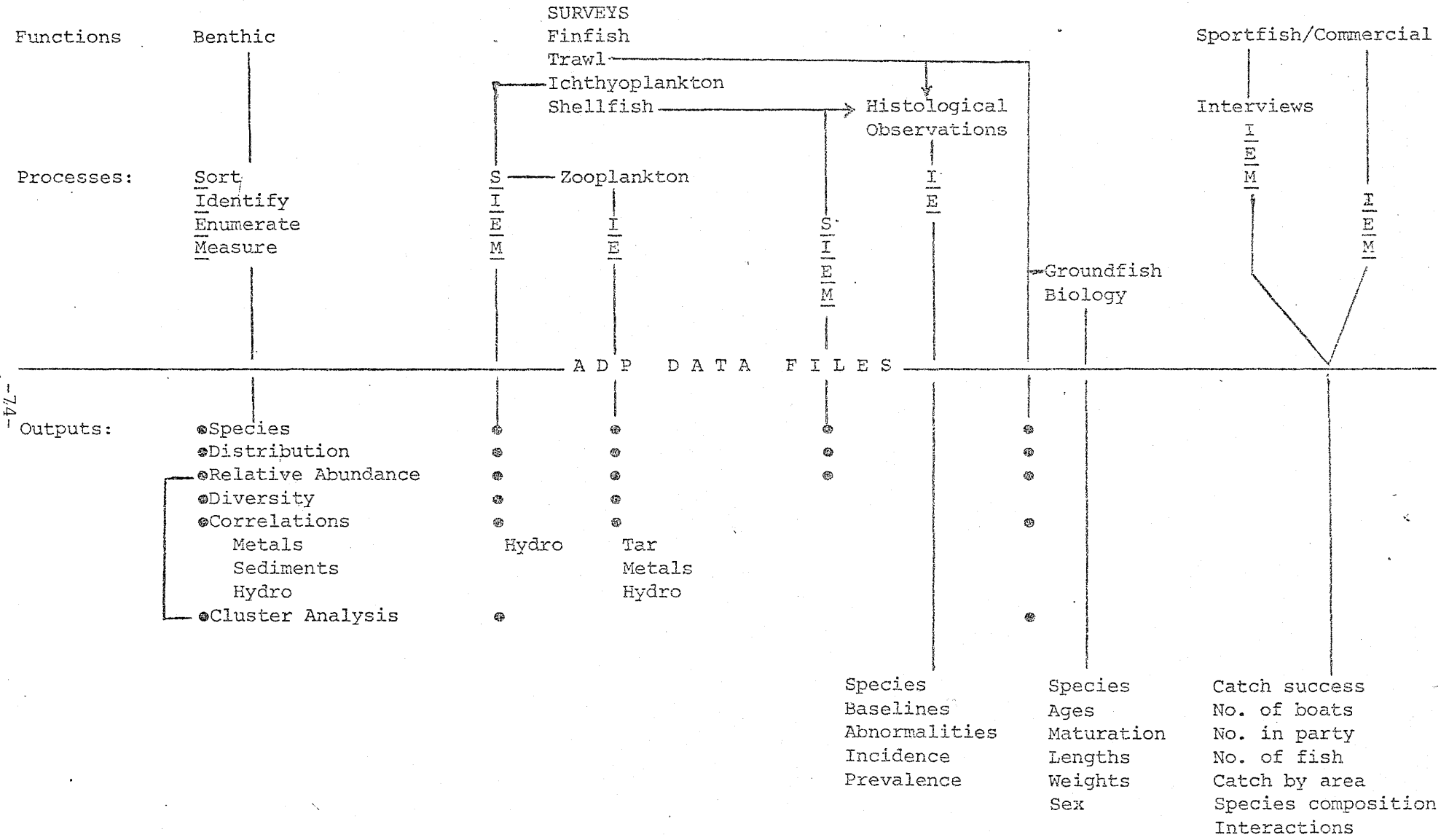
2. Immediate retrieval as computer-printed listings, by year, by cruise, by species, by numbers of individuals per species of all data on fish eggs, fish larvae (and later, zooplankton) collected during cruises in the Mid-Atlantic Bight.

   a. Process data for information on spatial and temporal distributions and abundances of finfish by species and by biomass.

   b. Process data for information as community structures, for species dominance and diversities.

   c. Process data to obtain time-series-smoothed contoured "three-dimensional" maps of spatial and temporal distributions and abundances of finfish and shellfish.

FRAMEWORK OF PROPOSED STUDIES



d. The final report will be prepared in the standard scientific format including an introduction, methods, material, results (figures, tables, text), discussion as to baselines usage, recommendations of value for the preparation of an Environmental Impact Statement, and pertinent literature. Raw data will be available as appendices if required. Expected results are faunal lists, distributional maps (qualitative and quantitative), statistical assessment of the distribution of dominant species, and general biological data to include: areas of high standing stocks of finfish and plankton; the gross seasonal differences in abundance of plankton; and the relation of areal and temporal distributions of plankton to water circulation and water properties for tracing their dispersion.

Task #5 (Demersal Finfish)

1. Plan, initiate and supervise six (6) bimonthly, 24-day cruises each year through the Mid-Atlantic Bight. Operate 24-hours per day.

2. Occupy randomly-selected trawl stations in each stratum at a level of intensity equal to one station in every 75 sqare miles of ocean. Perform all operations in standardized MARMAP routine. Perform all standard biological studies on catch.

3. Process all raw data into computer, after edits and audits.

4. Amalgamate computerized data, as developed into time-series data bank.

   a. Process data for information on spatial and temporal distributions and abundances of finfish by species and by biomass.

   b. Process data for information as community structures, for species dominance and diversities.

   c. Process data to obtain time-series-smoothed contoured "three dimensional" maps of spatial and temporal distributions and abundances of finfish and shellfish.

   d. The final report will be prepared in the standard scientific format including an introduction, methods, material, results (figures, tables, text), discussion as to baselines usage, recommendations of value for the preparation of an Environmental Impact Statement, and pertinent literature. Raw data will be available as appendices if required. Expected results are faunal lists, distributional maps (qualitative and quantitative), statistical assessment of the distribution of dominant species, and general biological data to include: areas of high standing stocks of finfish and shellfish, the gross seasonal differences in abundance of finfish; and the relation of aereal and temporal distributions of finfish to water circulation and water properties for tracing their dispersion.

Task #6 (Benthic Macrofauna)

1. Immediately initiate sorting and identification (to species) studies, as authorized, on existing raw samples taken from nearshore waters along the New Jersey coast and in offshore OCS (BCT) waters.

2. Assemble, analyze and prepare report on physical and chemical characteristics of sediments, as authorized, underlying the above waters.

3. Prepare report defining benthic strata along the New Jersey coast.

4. Process computerized benthic macrofaunal data, by station, by year, as faunal listings, distributional maps (qualitative and quantitative), statistical assessments of faunal distributions of dominant species,etc.

5. The final report will be prepared in the standard scientific format including an introduction, methods, material, results (figures, tables, text), discussion as to baselines usages, recommendations of value for the preparation of an Environmental Impact Statement,and pertinent literature. Raw data will be available as appendices. Expected results are taxa lists, distributional maps (qualitative and quantitative), statistical assessment of distribution of dominant species, and general biological data in the form of tables and discussion.

Task #7 (Abnormalities)

1. Immediately initiate comprehensive literature searches of all known domestic pathology registers to acquire an authoritative historical record of diseases and parasitemias of living marine organisms of the Middle Atlantic Bight.

2. Initiate "piggyback" sampling of fish catches (see Task #5) for studies of normal and abnormal histology of selected finfish and shellfish species.

3. Process all data into computerized registry form.

4. The final report will be prepared in a standard scientific format including an introduction, material-methods section, results (with illustrative materials), discussion necessary to the preparation of a historical and contemporary assessment of the incidence of disease and parasitemias in living marine organisms of the Middle Atlantic Bight.

VII. Contributions by the National Marine Fisheries Service

We have been asked to document the contributions of the NMFS and, specifically, of this Center to this proposal. Such contributions have been estimated, without detail, in the budget estimates of each of the proposed Tasks. Such figures represent very crude estimates of past, current and future expenditures by MACFC in data acquisition effort, in absorption of costs, at prior levels of effort, of expanded activities, etc. Some detailed examples of such contributions follow:

1. Absorption of all costs of two of the six bimonthly cruises proposed in Task #5.

2. Absorption of all costs of scientist-overtime at sea for two of the six bimonthly cruises proposed in Task #5.

3. Availability of all previously developed but related data in the possession of the Center, i.e., data on the physical and chemical characteristics of sediments, on sedimentary heavy metals burden, etc.

4. Dedication of FRS Delaware II, valued for chartering purposes at $3.0K per day, to BLM needs, without cost, for a total of 144 days per year.

5. Cooperation and assistance of all professional MACFC staff members in facilitating the work of BLM-supported staff members.

6. Past expenditures in collecting and maintaining samples to be analyzed under Tasks #4 and #6.

VIII. Project Management

The Middle Atlantic Coastal Fisheries Center (MACFC) will dedicate the full-time services of the proposed Project Management Group to the interests of BLM. Costs for the group, 90% of salaries, have been prorated and distributed across all of the proposed Tasks; 10% of the salaries of the group will be contributed by the Center in view of the fact that, indirectly, the Center itself will benefit from their activities.

The group, as proposed, consists of:

Project Coordinator	GS-14	(new hire)
Data Manager	GS-12	(new hire)
Technical Writer	GS-09	(new hire)
Secretary	GS-05	(new hire)
Computer Scientists	(GS-09	(new hire; up to 3.75 man-years)

Project Manager, at all times, will be the technical point of contact for the BLM/COTR and for other interested parties in BLM and in NOAA. The Project Manager will submit summary quarterly progress reports, and, annually, a critical, interpretive report on the biological significance discerned in the progressing studies. He will also conduct biannual, in-depth reviews of the efficiency, effectiveness and biological competency with which each Task is being conducted.

Data Manager bears also responsibility for (1) development and implementation of a detailed data management plan, (2) for oversight in ensuring rapid, real-time development of computer-printed faunal listings, and for appropriate statistical and biological analyses, (3) for preparation and submission of data reports and (4) for early archiving of data in EDS, and for supervision of up to four computer scientists (programmers (3) and a systems analyst).

IX. Biographical Vitae of Major Scientist-Participants in the BLM-sponsored OCS (BCT) Studies

SINDERMANN, CARL J.

Professional Experience:

Center Director, Middle Atlantic Coastal Fisheries Center, National Marine Fisheries Service, Highlands, N. J., 1971-

Adjunct Professor, Department of Biology, Lehigh University, Bethlehem, Pennsylvania, 1973 to present.

Laboratory Director, Tropical Atlantic Biological Laboratory, Bureau of Commercial Fisheries, Miami, Florida, April 1968 to October 1971.

Adjunct Professor, Division of Fisheries Science, School of Marine and Atmospheric Sciences, University of Miami, and a member of Affiliate Faculty in Biology, Florida Atlantic University, 1968 to 1972.

Laboratory Director, Bureau of Commercial Fisheries Biological Laboratory, Oxford, Maryland, 1963 to April 1968.

Visiting Professor of Biology, Georgetown University, 1965-1968.

Program Coordinator, Atlantic Herring Programs, Bureau of Commercial Fisheries, Boothbay Harbor, Maine, 1962-1963.

Program Leader, Atlantic Herring Programs, Bureau of Commercial Fisheries, 1959-1962.

Research Biologist, Fish and Wildlife Service (Immunogenetics, Biochemistry, and Pathology of Marine Organisms), 1954-1959.

Assistant Professor of Biology and member of Graduate Faculty in Microbiology, Brandeis University, 1953-1956.

Chief, North Atlantic Herring Investigations (a joint investigation of the Maine Department of Sea and Shore Fisheries, U. S. Fish and Wildlife Service and the Maine Sardine Industry), 1952-1954.

Assistant in Parasitology and Tropical Public Health, Harvard Medical School, 1952.

Instructor in Biology, Brandeis University, 1951-1953.

Parasitologist, Biology Survey, Massachusetts Department of Natural Resources, 1950.

SINDERMANN, CARL J. (cont.)

Degrees:

Ph. D. in Biology, Harvard University, 1953
A.M. in Biology, Harvard University, 1951
B.S. in Zoology, University of Massachusetts, 1949

Administrative Experience:

Center Director, Middle Atlantic Coastal Fisheries Center, National Marine Fisheries Service, Highlands, N. J., 1971-to present.

Laboratory Director, Tropical Atlantic Biological Laboratory, Miami, Florida, 1968 to 1971.

Laboratory Director, USBCF Biological Laboratory, Oxford, Maryland, 1963-1968.

Program Coordinator, USBCF Biological Laboratory, Boothbay Harbor, Maine, 1962-1963.

Symposium and special session chairman and organizer, several scientific meetings, 1963 to present.

Scientific advisor to U. S. delegations, two international fisheries commissions.

Member, organizing and other administrative committees, several scientific societies.

Member, evaluation panels, NSF research grant and sea grant programs.

Member, oceanographic advisory committee, City of Miami and Dade County, Florida.

SINDERMANN, CARL J. (cont.)

Society Memberships and Offices Held:

Sigma Xi, American Society of Parasitologists, Wildlife Disease Association, American Institute of Fishery Research Biologists, National Shellfisheries Association, American Fisheries Society, Society for Invertebrate Pathology.

Member, Divisions Committee, Society for Invertebrate Pathology, 1969-1970.
Member, Fish Disease Committee, American Fisheries Society, 1968-
Member, Publications Award Committee, American Institute of Fishery Research Biologists, 1968-1970.
Member, Organizing Committee, Society for Invertebrate Pathology, 1967-1968.
Chairman, W. F. Thompson Award Committee, American Institute of Fishery Research Biologists, 1965-1967.
Co-chairman, Symposium on Fish Diseases, American Fisheries Society, 1969.
Co-chairman, American Society of Parasitologists, International Biological Program Committee on Parasites as Biological Tags, 1969-1972.
Member, Marine Biological Resource Committee, Marine Technology Society, 1972-.
Chairman, Committee on International Parasitology, American Society of Parasitologists, 1972 to present.

Academic and Professional Honors:

Members, Fisheries Improvement Committee, International Council for the Exploration of the Sea, 1973-.
Member, UJNR (United States-Japan Cooperation in Development and Utilization of Natural Resources) Panel on Aquaculture, 1974-.
Section Chairman, Third International Congress of Parasitology, Munich 1974.
Participant, First Caribbean Oceaneering Conference, Puerto Rico, Feb., 1973.
Member, Marine Biological Resources Committee, Marine Technology Society, 1972-.
Luncheon Speaker, Food-Drugs from the Sea Conference, University of Rhode Island, 1972.
Session Chairman, Third World Mariculture Conference, St. Petersburg, Florida, January 1972.
U. S. Alternate Delegate, FAO Committee for the East Central African Fisheries (CECAF), Casablanca, Morocco, 1971.
Scientific Adviser, U. S. Delegation, Cooperative Investigations of the Northern Part of the eastern Central Atlantic (CINECA), Casablanca, Morocco, 1971.
Organizer and Chairman, American Fisheries Society Session on Living Marine Resources, Second National Biological Congress, Miami Beach, Fla., 1971.

Session Chairman and Banquet Speaker, International Association for Aquatic Animal Medicine, Canada, 1971.

Wildlife Society of America, 1971 award for best scientific publication in fisheries for 1970.

Session Keynote Speaker, World Mariculture Society, Galveston, Texas, 1971.

Session Organizer, Second Biological Congress, AIBS-American Fisheries Society, Miami, 1971.

Session Chairman, 50th Anniversary Celebration Symposium, University of Washington College of Fisheries, 1970

Colloquium Chairman, Second International Congress of Parasitology, Washington, D. C. 1970.

Member, American Society of Parasitologists Committee on the International Biological Program, 1969 to present.

Scientific Advisor, U. S. Delegation, International Commission for the Conservation of Atlantic Tunas, Rome, 1969.

Member, Advisory Committee on Marine Sciences, City of Miami and Dade County, Florida, 1969-.

Member, U. S. Delegation to FAO Committee for the Eastern Central Atlantic Fisheries, Accra, Ghana, 1969.

Antarctic Observer, U. S. Department of State, 1966 to present.

Member, Evaluation Panel, Sea Grant Program, NSF, 1968, 1969.

Member, Bureau of Commercial Fisheries advisory group to NASA on back contamination from lunar exploration, 1967.

Participant, 11th Pacific Science Congress, Tokyo, Japan, August 22 - September 3, 1966. Chairman, Divisional Session in Fishery Sciences at this Congress.

Member or former member, Editorial Boards of the journals, AQUACULTURE, PROCEEDINGS OF THE NATIONAL SHELLFISHERIES ASSOCIATION, CHESAPEAKE SCIENCE, and JOURNAL OF FISH BIOLOGY.

Manuscript referee. JOURNAL OF PARASITOLOGY, COPEIA, and JOURNAL OF THE FISHERIES RESEARCH BOARD OF CANADA.

Participant, First International Congress of Parasitology, Rome, 1964.

Participant, XVI International Congress of Zoology, Washington, 1963.

Member, Oceanographic Planning Committee, Bureau of Commercial Fisheries, 1962.

SINDERMANN, CARL J. (cont.)

Symposium participant, 10th Pacific Science Congress, Honolulu, 1961.
National Science Foundation, travel grant for participation in 10th Pacific Congress, 1961.
Member, Grant Evaluation Panel, National Science Foundation, 1961, 1962.
Symposium participant, International Council for the Exploration of the Sea, Copenhagen, 1959.
National Microbiological Institute, National Institute of Health, U. S. Public Health Service, research grant for a 3-year study of marine dermatitis producing schistosomes (1955 to 1957).
Sigma Xi, Harvard Chapter, 1953.
University of Massachusetts grant for study of marine invertebrates, Marine Biological Laboratory, Woods Hole, Massachusetts, 1949.

Research Interests:

1. Ecology, particularly the effects of pollution on living marine resources, and role of disease in the marine environment.

2. Parasitology, particularly the biology of parasites and diseases of marine organisms.

3. Immunogenetics, particularly as related to subpopulations of marine organisms, and including biochemical identification of infra-species groups.

Publications:

Since 1953 I have published over 80 scientific papers and review articles, principally in the fields of parasitology and immunogenetics. I have published (1970) two books, "Principal Diseases of Marine Fish and Shellfish," (Academic Press) and "Diseases of Marine Fishes" (T.F.H. Publications). I have in preparation a third book, "The Sea Might not Provide."

SINDERMANN, CARL J. (cont.)

Teaching Responsibilities:

From 1951 through 1956 I was a member of the faculty at Brandeis University, Waltham, Massachusetts, where I offered courses in General Education Biology, Invertebrate Zoology, Parasitology and Ecology.

In 1965 I was appointed Visiting Professor of Biology, Georgetown University, Washington, D. C., where I offered graduate courses titled "Problems in Invertebrate Zoology" and "Problems in Marine Biology," in 1966 and 1967.

In 1968 I was appointed Admunct Professor, Division of Fisheries Science, School of Marine and Atmospheric Sciences, University of Miami; and Member of the Affiliate Faculty in Biology, Florida Atlantic University. I have participated as a visiting lecturer in a course "Ecology of Marine Parasites" at the University of Miami, 1968 to 1971.

In 1973 I was appointed Adjunct Professor, Department of Biology, Lehigh University.

Publications:

Sindermann, C., and R. Gibbs. 1953. A dermatitis-producing schistosome that causes "clam-diggers itch" along the central Maine coast. Maine Dept. Sea and Shore Fish., Res. Bull. No. 12:1-20.

Sindermann, C. 1953. Parasites of fishes of north central Massachusetts. Mass. Div. Fish and Game, Fisheries Report for Lakes of North Central Massachusetts 1950 (1953): 4-28.

Sindermann, C. and A. Rosenfield. 1954a. Diseases of fishes of the western North Atlantic. I. Diseases of the sea herring (Clupea harengus). Maine Dept. Sea and Shore Fish., Res. Bull. No. 18: 1-23.

Sindermann, C. and A. Rosenfield. 1954b. Diseases of fishes of the western North Atlantic. III. Mortalities of sea herring caused by larval trematode invasion. Maine Dept. Sea and Shore Fish., Res. Bull. No. 21: 1-16.

SINDERMANN, CARL J. (cont.)

Sindermann, C. and L. Scattergood. 1954. Diseases of fishes of the western North Atlantic. II. Ichthyosporidium disease of sea herring. Maine Dept. Sea and Shore Fish., Res. Bull. No. 19: 1-40.

Sindermann, C. 1956. Diseases of fishes of the western North Atlantic. IV. Fungus disease and resultant mortalities of sea herring in the Gulf of Saint Lawrence in 1955. Maine Dept. Sea and Shore Fish., Res. Bull. No. 25: 1-23.

Sindermann, C. 1956. The ecology of marine dermatitis producing schistosomes. I. Seasonal variation in infection of mud snails by larvae of Austrobilharzia variglandis. Jour. Parasitol. 42 (suppl.): 27.

Scattergood, L. and C. Sindermann. 1956. Problems of herring biology. Proc. Northeast Sec., American Fish. Soc., Pittsburgh, Pennsylvania, 1956.

Sindermann, C., A. Rosenfield, and L. Strom. 1957. The ecology of marine dermatitis producing schistosomes. II. Effects of certain environmental factors on emergence of cercariae of Austrobilharzia variglandis. Jour. Parasitol. 43: 382.

Sindermann, C., and A. Rosenfield. 1957. The ecology of marine dermatitis producing schistosomes. III. Oxygen consumption of normal and parasitized Nassarius obsoletus under varying conditions of salinity. Jour. Parasitol. 43 (suppl.): 28.

Sindermann, C. 1957. Diseases of fishes of the western North Atlantic. V. Parasites as indicators of herring movements. Maine Dept. Sea and Shore Fish., Res. Bull. No. 27: 1-30.

Sindermann, C. 1957. Mass mortalities of marine fishes in the Gulf of Saint Lawrence 1954-1956. Anat. Rec. 128: 622.

SINDERMANN, CARL J. (cont.)

Sindermann, C. 1957. Studies on the pathogenicity of Ichthyosporidium hoferi, fungus parasite of fishes. Jour. Parasitol. 43: 42.

Sindermann, C. 1957. Myxosporidiosis in immature sea herring from the Gulf of Maine. Jour. Parasitol. 43: 43.

Farrin, A., L. Scattergood, and C. Sindermann. 1957. Maintenance of immature sea herring in captivity. Prog. Fish. Cult. 19:188-189.

Sindermann, C. 1957. Diseases of fishes of the western North Atlantic VI. Geographic discontinuity of myxosporidiosis in immature sea herring. Maine Dept. Sea and Shore Fish., Res. Bull. No. 29: 1-20.

Sindermann, C. 1958. An epizootic in Gulf of Saint Lawrence fishes. Trans. 23rd North American Wildlife Conference: 349-360.

Sindermann, C. 1958. Anti-mammalian erythrocyte properties of sea herring serum. Anat. Rec. 131: 599.

Sindermann, C. and Donald Mairs. 1958. Serum protein changes in diseased sea herring. Anat. Rec. 131: 599-600.

Sindermann, C. 1959. Zoogeography of sea herring parasites. Jour. Parasit. 45(4): 34.

Sindermann, C., and A. Farrin. 1959. Ecological studies of Cryptocotyle lingua (Trematoda: Heterophyidae) whose larvae cause "pigment spots" of marine fish. Jour. Parasit. 45(4): 21-22.

Sindermann, C., and D. Mairs. 1959. The C blood group system of Atlantic sea herring. Anat. Rec. 134(3): 640.

Sindermann, C., and D. Mairs. 1959. Blood properties of pre- and post-spawning anadromous alewives. Anat. Rec. 134(3): 639-640.

SINDERMANN, CARL J. (cont.)

Sindermann, C., and D. Mairs. 1959. A major blood group system in Atlantic sea herring. Copeia 1959(3): 228-232.

Boyar, H., and C. Sindermann. 1959. Additional notes on the maintenance of immature sea herring in captivity. Prog. Fish. Cult. 21: 185-187.

Scattergood, L., C. Sindermann, and B. Skud. 1959. Spawning of North American herring. Trans. Am. Fish. Soc. 88: 164-168.

Mairs, D., and C. Sindermann. 1960. Intraspecies variability in electrophoretic patterns of fish serum. Anat. Rec. 137: 377-378.

Sindermann, C., and D. Mairs. 1960. Comparative serology of five species of Atlantic clupeoid fishes. Anat. Rec. 137: 393.

Sindermann, C. 1960. Ecological studies of marine dermatitis producing schistosome larvae in northern New England. Ecol. 41: 678-684.

Sindermann, C. 1961. Parasite tags for marine fish. J. Wildl. Mgmt. 25: 41-47.

Sindermann, C., and D. Mairs. 1961. A blood group system for spiny dogfish. Biol. Bull. 120(3):401-410.

Sindermann, C. 1961. Isoagglutination in elasmobranch fishes. Amer. Zool. 1(3): 390.

Sindermann, C. 1961. The effect of larval trematode parasites on snail migrations. Amer. Zool. 1(3): 389.

Sindermann, C. 1961. Sporozoan parasites of sea herring. J. Parasit. 47(4), Sec. 2: 34.

Sindermann, C. 1961. Serology of Atlantic clupeoid fishes. 10th Pacific Science Congress, Abstracts of Symposium Papers, pp. 185-186.

SINDERMANN, CARL J. (cont.)

Sindermann, C. 1961. Serological techniques in fishery research. Trans. 26th N. Amer. Wildl. Conf.: 298-309.

Sindermann, C., and D. Mairs. 1961. Blood properties of pre- and post-spawning anadromous alewives, Alosa pseudoharengus. Fishery Bulletin of the U. S. Fish and Wildlife Service 61: 145-151.

Sindermann, C. 1961. Parasitological tags for redfish of the western North Atlantic. Cons. Internat. Explor. de la Mer, Rapp. et Proc.-Verb. 150: 111-117.

Sindermann, C. 1961. Serological studies of Atlantic redfish, Sebastes marinus. Fishery Bulletin of the U. S. Fish and Wildlife Service 61: 351-354.

Mead, G. W., and C. J. Sindermann. 1961. Systematics and natural marks. Cons. Internat. Explor. de la Mer, Rapp. et Proc.-Verb. 150: 9-11.

Sindermann, C., and A. Farrin. 1962. Ecological studies of Cryptocotyle lingua (Trematoda: Heterophyidae) whose larvae cause "pigment spots" of marine fish. Ecology 43(1): 69-75.

Mairs, D. F., and C. J. Sindermann. 1962. A serological comparison of five species of Atlantic clupeoid fishes. Biol. Bull. 123(2): 330-343.

Hoffman, G. L., and C. J. Sindermann. 1962. Common parasites of fishes. U. S. Fish and Wildlife Service, Fishery Circular 144: 1-17.

Sindermann, C. J. 1962. Serology of Atlantic clupeoid fishes. American Naturalist 96(889): 225-231.

Sindermann, C. J. 1963. Use of plant hemagglutinins in serological studies of clupeoid fishes. Fishery Bulletin of the U. S. Fish and Wildlife Service 63(1): 137-141.

Sindermann, C. J. 1963. Disease in marine populations. Trans. 28th N. Amer. Wildl. Conf.: 336-356.

SINDERMANN, CARL J. (cont.)

Sindermann, C. J. 1963. Immunogenetic studies of elasmobranch fishes. Proc. XVI Internat. Cong. Zool. 2: 210.

Sindermann, C. J., and K. A. Honey. 1963. Electrophoretic analysis of the hemoglobins of Atlantic clupeoid fishes. Copeia 1963(3): 534-537.

Sindermann, C. J., and K. A. Honey. 1964. Serum hemagglutinins of the winter skate (Raja ocellata) from the western North Atlantic. Copeia 1964: 139-144.

Sindermann, C. J. 1964. Effects of environment on several diseases of herring from the western North Atlantic. ICNAF Envir. Sympos. Rome, Serial No. 1241, Contrib. No. E-5, pp. 1-17. (Also published as Spec. Publ. Int. Comm. Northw. Atlant. Fish. No. 6, p. 603-610 (1965).

Sindermann, C. J. 1964. Immunogenetic and biochemical approaches to the identification of marine subpopulations. Proc. Sympos. on Exper. Mar. Ecol., Occas. Pub. No. 2, Graduate School of Oceanography, Univ. Rhode Island, pp. 33-38.

Sindermann, C. J. 1964. BCF Biological Laboratory at Oxford: Present and Future. USDI FWS Circular 200, pp. 8-17.

Rosenfield, A., and C. Sindermann, 1965. Starch-gel electrophoresis of oyster serum. Amer. Malacological Union Bull. 32: 8-9.

Sindermann, C. J. 1966. Larval ecology of the trematode Cryptocotyle lingua. Proc. First Internat. Cong. Parasit. (Rome) 1964, vol. 1, pp. 12-13.

Sindermann, C. J. 1966. Parasites of oysters, Crassostrea virginica, from the east coast of North America. Proc. First Internat. Cong. Parasit. (Rome) 1964, vol. 1, pp. 585-586.

Sindermann, C. J. 1966. Epizootics in oyster populations. Proc. 11th Pacific Science Cong. (Tokyo), vol. 2, pp. 10-11.

SINDERMANN, CARL J. (cont.)

Sindermann, C. J. 1966. Diseases of marine fishes: A review, Advances in Marine Biology 4: 1-89.

Sindermann, C. J. 1967. Blood types in fish. Am. Biol. Teacher 29(6): 439-441.

Sindermann, C. J. 1967. Recent advances in oyster culture in the Far East. Amer. Malacol. Union, Ann. Repts. for 1967: 52-53.

Sindermann, C. J., and A. Rosenfield. 1967. Principal diseases of commercially important marine bivalve Mollusca and Crustacea. USFWS Fish. Bull. 66: 335-385.

Sindermann, C. J. 1968. Bibliography of oyster parasites and diseases. USDI FWS SSR-Fish. No. 563, 13 pp.

Sindermann, C. J., and G. E. Krantz. 1968. Erythrocyte antigens and natural isoagglutinins of the American eel, Anguilla rostrata, from Chesapeake Bay. Chesa. Sci., 9: 94-98.

Sindermann, C. J. 1968. Mortalities of oysters, with particular reference to Chesapeake Bay and the Atlantic coast of North America. USFWS SSR-Fish. No. 569, 10 p.

Sindermann, C. J. 1970. Principal Diseases of Marine Fish and Shellfish. Academic Press, New York. 369 pp.

Sindermann, C. J. 1970. Diseases of Marine Fishes. T. F. H. Publications, Jersey City, N. J. 89 pp.

Sindermann, C. J. 1970. Bibliography of diseases and parasites of marine fish and shellfish. Tropical Atlantic Biological Laboratory, Miami, Florida, Informal Report No. 11, 440 pp.

Sindermann, C. J. 1970. The role and control of diseases and parasites in mariculture. Proc. 2nd Conf. Food-Drugs from the Sea, Univ. Rhode Island, 1969. pp. 145-173.

SINDERMANN, CARL J. (cont.)

Sindermann, C. J. 1970. Diseases of marine animals transmissible to man. Laboratory Medicine 1(1): 50-54.

Sindermann, C. J. 1970. Disease and parasite problems in marine aquiculture. In "Marine Aquiculture" (W.J. McNeil, Ed.) pp. 103-134. Oregon State Univ. Press, Corvallis.

Villella, J. B., E. S. Iversen, and C. J. Sindermann. 1970. Comparison of the parasites of pond-reared and wild pink shrimp (Penaeus duorarum Burkenroad) in south Florida. Trans. Amer. Fish. Soc. 99(4): 789-794.

Sindermann, C. J. 1970. Predators and diseases of commercial marine Mollusca of the United States. A.M.U. Bulletin (Abstract).

Sindermann, C. J. 1971. Use and potential of bioresources: Harvesting the hydrosphere. Proc. Natl. Symp. on Hydrobiology, pp. 16-18.

Sindermann, C. J. 1971. Our aquatic legacy -- can we save it? The Exchangite, June 1971, pp. 6-10.

Sindermann, C. J. 1971. Internal defenses of Crustacea: A review. Fish. Bull. 69(3): 455-489.

Sindermann, C. J. 1971. Disease-caused mortalities in mariculture -- status and predictions. Proc. World Mariculture Society, 2nd Ann. Workshop, Jan. 28-29, 1971, Galveston, Texas, pp. 69-74.

Sindermann, C. J. 1972. Some biological indicators of marine environmental degradation. Proc. Wash. Acad. Sci. Symposium "The Fate of the Chesapeake Bay". J. Wash. Acad. Sci. 62(2): 184-189.

Sindermann, C. J. 1973. Disease problems in mariculture: ghosts, dragons or Rumpelstiltskins. Proc. World Mariculture Society, 3rd Annual Meeting (in press). 1973, pp. 31

Sindermann, C. J. (in press). Fisheries implications in planning offshore ports. MTS Short Course in Planning Offshore Ports (1973).

Sindermann, C. (in press). The role of environmental contaminants in open system mariculture. Proc. First Caribbean Oceaneering Conf. Feb. 73.

Sindermann, C. 1973. A biologist's view of the Stockholm Conference on the Human Environment. Proc. Fourth Food-Drugs from the Sea Conf. URI, Jan. 73. pp. 11-16.

Name: Arthur S. Merrill

Place and Date of Birth: Savannah, Georgia, April 15, 1916

1. Education and Training

a. Degrees

B.S., 1952 - University of Miami (Zoology, Botany)
M.A., 1961 - Harvard University (Biology)
Ph.D., 1970 - University of Delaware (Biology)

b. Other courses

One-day training courses at Management Center of Cambridge in Technical Writing, Washington, D. C.; Technical Editing, Philadelphia, Pennsylvania; and Understanding and Motivating Employees, Washington, D. C.

Executive School course, National Training Center, Charlottesville, Virginia, March 2-14, 1969

c. Special scientific or technical skills acquired not indicated by above

None

2. Experience

September 1969 to present - Laboratory Director, National Marine Fisheries Service (Bureau of Commercial Fisheries), Oxford, Maryland

April 1968 to September 1969 - Acting Laboratory Director, Bureau of Commercial Fisheries, Oxford, Maryland

May 1964 to April 1968 - Assistant Laboratory Director, Bureau of Commercial Fisheries, Oxford, Maryland

June 1959 to May 1964 - Fishery Biologist (Research), Bureau of Commercial Fisheries, Woods Hole, Massachusetts

February 1958 to June 1959 - Fishery Research Biologist (Marine) (temporary), Bureau of Commercial Fisheries, Woods Hole, Massachusetts

January 1954 to September 1957 - President, Tri-Beta Construction Co., Inc., 25 Rhode Avenue, North Merrick, New York

3. Publications

See attached list

4. Scientific Honors and Awards

Member - Beta Beta Beta, Phi Eta Sigma, Sigma Xi

Listed in Vetter's "An International Directory of Oceanographers" (fourth edition) and Blackwelder's "Directory of Zoological Taxonomists of the World"

Editor, Proceedings of the National Shellfisheries Association, 1965-68; Co-Editor, 1968-70

Associate Editor, Fishery Bulletin, 1970 to present

Bureau of Commercial Fisheries citation for outstanding performance on August 4, 1966; cash award for outstanding performance on July 5, 1968

5. Paper Presentations before Scientific Societies

American Malacological Union:

1960 - "Remarks concerning the benefits of systematic and repetitive collecting from navigation buoys"

1961 - "Some observations on the growth and survival of organisms on the shell of Placopecten magellanicus;" "The sea scallop fishery"

1962 - "Nest building in Musculus"

1964 - "Observations on adverse relations between the hydroid, Hydractinia echinata, and certain mollusks"

1965 - "Benthic ecology and faunal change in the estuary of the Patuxent River;" "The surf clam fishery"

1966 - "Method of shell repair in the sea scallop"

1967 - "Techniques for obtaining growth rates of offshore commercially important bivalves"

1968 - "Distribution and density of the surf clam"

1970 - Convener of Symposium on Commercial Marine Mollusks of the United States and presented two papers entitled "The North Atlantic sea scallop" and "Pollution problems in commercial mollusks"

National Shellfisheries Association:

1960 - "Abundance and distribution of sea scallops off the middle Atlantic coast"

1965 - "Setting and growth of the American oyster, Crassostrea virginica, on navigation buoys in the Chesapeake Bay"

International Commission for the Northwest Atlantic Fisheries:

1960 - "Middle Atlantic scallop density and abundance"

1963 - "Natural mortality estimates for the sea scallop"

Harvard Natural History Society:

1963 - "The sea scallop industry"

Atlantic States Marine Fisheries Commission:

1967 - "Surf clam program"

1968 - "Blue crab research and oyster disease problems"

American Littoral Society:

1971 - "Your future in the sea--1971"

6. Affiliation in Scientific Organizations and Offices Held

Society of Systematic Zoology
American Malacological Union (Executive Committee Councillor at Large, 1962-66; Vice President, 1969-70; President Elect, 1970-71; President, 1971-72)
National Shellfisheries Association (Editor of Proceedings, 1965-68; Co-Editor, 1968-70)
California Malacozoological Society, Inc.
Malacological Society of London
Malacological Society of Australia
American Littoral Society
Atlantic Estuarine Research Society
Atlantic Fisheries Biologists

7. Consulting Activities

Consulted regularly with Canadian biologists regarding cooperative offshore sea scallop studies (1960-63)

Cooperated with the Maine Department of Natural Resources in studies pertaining to inshore sea scallops (1962)

Advised members of the sea scallop industry on progress in sea scallop research (1960-63)

Advised members of the surf clam industry on progress in surf clam research (1964-71)

8. Special Professional Assignments

Special advanced research study at Harvard University under employee training program (1962-63)

Assignment to evolve a special program in connection with a quantitative and qualitative study of the offshore benthic fauna along the east coast of the United States. The program involved blending the efforts of personnel in three institutions (Bureau of Commercial Fisheries, Woods Hole Oceanographic Institution, and U.S. Geological Survey) into a cooperative working unit (1963-64)

Assignment to supervise preparation of a brochure of programs and perspectives of the Bureau of Commercial Fisheries Biological Laboratory at Oxford, Maryland, for publication (1964)

Prepared with Chief of Shellfish Advisory Service, Mr. James Engle, a comprehensive report on Potomac River shellfisheries--a special assignment from Division of Biological Research (1965)

Division trainee as Acting Deputy Assistant Director for Biological Research, Washington, D. C. (July-September 1965)

Training assignment at National Museum, Department of Mollusks, Washington, D. C., for molluscan research (October 1968-April 1969)

Member, Chesapeake Bay Crab Research Advisory Board (1969 to present)--to assist recovery of a commercial fishery which had failed due to a resource disaster

Chairman, Thermal Research Advisory Committee (1969)--to assist Maryland Department of Water Resources in better understanding problems relating to present and potential conflicts from power plant use of public waters.

Member of task force for Sandy Point, Maryland, Waste Treatment Study--to determine the effectiveness of the treatment facility's ability to provide adequate protection of the shellfish beds (1969)

Training assignment at Bureau of Commercial Fisheries Ichthyological Laboratory, Washington, D. C. (September 1969-July 1970)

Member of Review Panel for Chesapeake Bay Biological Research Planning Conference (1970)

Pro Tem Project Manager to develop the National Oceanic and Atmospheric Administration's comprehensive five-year Environmental Quality Plan in the New York Bight (1971)

RECORD OF EDUCATION AND SCIENTIFIC ACCOMPLISHMENTS
THROUGH JUNE 1970

ARTHUR S. MERRILL

Degrees

University of Miami, Miami, Fla.	B.S.	1952
Harvard University, Cambridge, Mass.	M.A.	1961
University of Delaware, Newark, Del.	Ph.D.	1970

Publications (*papers presented before scientific societies have been published in abstract form or in full)

Merrill, Arthur S. 1959. An unusual occurrence of Mya arenaria L. and notes on other marine mollusks. Nautilus, 73(2): 39-43.

Merrill, Arthur S. 1959. A comparison of Cyclopecten nanus Verrill & Bush and Placopecten magellanicus (Gmelin). Occasional Papers on Mollusks, Museum of Comparative Zoology, Harvard, 2(25): 209-228.

Merrill, Arthur S. 1960. Living inclusions in the shell of the sea scallop Placopecten magellanicus. Ecology, 41(2): 385-386.

Merrill, Arthur S. and John B. Burch. 1960. Hermaphroditism in the sea scallop, Placopecten magellanicus (Gmelin). Biological Bulletin, 119(2): 197-201.

Merrill, Arthur S. 1961. *Remarks concerning the benefits of systematic and repetitive collecting from navigation buoys. American Malacological Union Bulletin, No. 27, p. 26. (Abstract)

Merrill, Arthur S. 1961. Shell morphology in the larval and postlarval stages of the sea scallop, Placopecten magellanicus (Gmelin). Bulletin of the Museum of Comparative Zoology at Harvard College, 125(1): 1-20.

Merrill, Arthur S. 1961. *Some observations on the growth and survival of organisms on the shell of Placopecten magellanicus. American Malacological Union Bulletin, No. 28, pp. 4-5. (Abstract)

Merrill, Arthur S. 1961. *The sea scallop fishery. American Malacological Union Bulletin, No. 28, p. 14. (Abstract)

Merrill, Arthur S. 1962. Range extension for Cymatium caribbaeum with a note on adventitious dispersal. Nautilus, 75(3): 94-95.

Merrill, Arthur S. 1962. Variation and change in surface sculpture in Anomia aculeata. Nautilus, 75(4): 131-138.

Merrill, Arthur S. 1962. *Abundance and distribution of sea scallops off the middle Atlantic coast. Proceedings of the National Shellfisheries Association for 1960, 51: 74-80.

Merrill, Arthur S. 1962. *Nest building in Musculus. American Malacological Union Bulletin, No. 29, pp. 11-12. (Abstract)

Galtsoff, Paul S. and Arthur S. Merrill. 1962. Notes on shell morphology, growth and distribution of Ostrea equestris Say. Bulletin of Marine Science of the Gulf and Caribbean, 12(2): 234-244.

Merrill, Arthur S. 1963. Mollusks from a buoy off Georgia. Nautilus, 77(2): 68-70.

Merrill, Arthur S. and Ruth D. Turner. 1963. Nest building in the bivalve genera, Musculus and Lima. Veliger, 6(2): 55-59.

Clench, William J. and Arthur S. Merrill. 1963. Some shell malformations. Shells and Their Neighbors, No. 16, pp. 1-2.

Robertson, Robert and Arthur S. Merrill. 1963. Abnormal dextral hyperstrophy of post-larval Heliacus (Gastropoda: Architectonicidae). Veliger, 6(2): 76-79.

Merrill, Arthur S. 1964. *Observations on adverse relations between the hydroid, Hydractinia echinata, and certain mollusks. American Malacological Union Bulletin, No. 31, p. 2. (Abstract)

Merrill, Arthur S. and Julius A. Posgay. 1964. Estimating the natural mortality rate of the sea scallop (Placopecten magellanicus). International Commission for the Northwest Atlantic Fisheries Research, Bulletin No. 1, pp. 88-106.

Merrill, Arthur S. and Kenneth J. Boss. 1964. Reactions of hosts to proboscis penetration by Odostomia seminuda (Pyramidellidae). Nautilus, 78(2): 42-45.

Merrill, Arthur S. and John R. Webster. 1964. Progress in surf clam biological research. In The Bureau of Commercial Fisheries Biological Laboratory, Oxford, Maryland: Programs and Perspectives. U.S. Fish and Wildlife Service, Circular 200, pp. 38-47.

Emery, K. O. and Arthur S. Merrill. 1964. Combination camera and bottom grab. Oceanus, 10(4): 2-7.

Merrill, Arthur S. 1965. The benefits of systematic biological collecting from navigation buoys. Association of Southeastern Biologists Bulletin, 12(1): 3-8.

Merrill, Arthur S., K. O. Emery, and Meyer Rubin. 1965. Ancient oyster shells on the Atlantic continental shelf. Science, 147(3655): 398-400.

Emery, K. O., Arthur S. Merrill, and James V. A. Trumbull. 1965. Geology and biology of the sea floor as deduced from simultaneous photographs and samples. Limnology and Oceanography, 10(1): 1-21.

Boss, Kenneth J. and Arthur S. Merrill. 1965. The family Pandoridae in the western Atlantic. Johnsonia, 4(44): 181-215.

Boss, Kenneth J. and Arthur S. Merrill. 1965. Degree of host specificity in two species of Odostomia (Pyramidellidae: Gastropoda). Proceedings of the Malacological Society of London, 36(6): 349-355.

Baker, Emmett, B. and Arthur S. Merrill. 1965. An observation of Laevicardium mortoni actually swimming. Nautilus, 78(3): 104.

Merrill, Arthur S. and Richard E. Petit. 1965. Mollusks new to South Carolina. Nautilus, 79(2): 58-66.

Merrill, Arthur S. 1965. *The surf clam fishery. American Malacological Union Bulletin, No. 32, pp. 4-5. (Abstract)

Boss, Kenneth J. and Arthur S. Merrill. 1965. *Benthic ecology and faunal change in the estuary of the Patuxent River. American Malacological Union Bulletin, No. 32, p. 17. (Abstract)

Ropes, John W. and Arthur S. Merrill. 1966. The burrowing activities of the surf clam. Underwater Naturalist, 3(4): 1-7.

Merrill, Arthur S. 1966. Collecting from navigation buoys. In How to Collect Shells, A Symposium. American Malacological Union. pp. 54-55.

Edwards, Robert L. and Arthur S. Merrill. 1966. *Seasonal cycle of temperature in the Middle Atlantic. Proceedings of the Second International Oceanographic Congress, Moscow, No. 113-S1b.

Merrill, Arthur S., Julius A. Posgay, and Fred E. Nichy. 1966. Annual marks on shell and ligament of sea scallop (Placopecten magellanicus). U.S. Fish and Wildlife Service, Fishery Bulletin, 65(2): 299-311.

Merrill, Arthur S. and Kenneth J. Boss. 1966. *Benthic ecology and faunal change relating to oysters from a deep basin in the lower Patuxent River, Maryland. Proceedings of the National Shellfisheries Association for 1965, 56: 81-87.

Shaw, William N. and Arthur S. Merrill. 1966. *Setting and growth of the American oyster, Crassostrea virginica, on navigation buoys in the lower Chesapeake Bay. Proceedings of the National Shellfisheries Association for 1965, 56: 67-72.

Merrill, Arthur S. and Hugh S. Porter. 1966. Further note on distribution of Cymatiidae in western Atlantic. Nautilus, 80(1): 31-32.

Merrill, Arthur S. 1966. *Shell repair in the sea scallop, Placopecten magellanicus. American Malacological Union Bulletin, No. 33, pp. 35-36. (Abstract)

Merrill, Arthur S. 1967. Shell deformity of mollusks attributable to the hydroid, Hydractinia echinata. U.S. Fish and Wildlife Service, Fishery Bulletin, 66(2): 273-279.

Merrill, Arthur S. 1967. Offshore distribution of Hydractinia echinata. U.S. Fish and wildlife Service, Fishery Bulletin, 66(2): 281-283.

Merrill, Arthur S. and John W. Ropes. 1967. Distribution of southern quahogs off the middle Atlantic coast. Commercial Fisheries Review, 29(4): 62-64.

Ropes, John W., Arthur S. Merrill, and Thomas M. Groutage. 1967. *Marking surf clams for growth studies. Proceedings of the National Shellfisheries Association for 1966, 57: 4. (Abstract)

Ropes, John W., Robert M. Yancey, and Arthur S. Merrill. 1967. *The growth of juvenile surf clams at Chincoteague Inlet, Virginia. Proceedings of the National Shellfisheries Association for 1966, 57: 5. (Abstract)

Barker, Allan M. and Arthur S. Merrill. 1967. Total solids and length-weight relation of the surf clam, Spisula solidissima. Proceedings of the National Shellfisheries Association for 1966, 57: 90-94.

Engle, James B. and Arthur S. Merrill. 1967. The surf clam -- New Jersey's most valuable seafood resource. New Jersey Nature News, 22(4): 148-153.

Ropes, John W. and Arthur S. Merrill. 1967. Malacobdella grossa in Pitar morrhuana and Mercenaria campechiensis. Nautilus, 81(2): 37-40.

Merrill, Arthur S. and Julius A. Posgay. 1967. *Juvenile growth of the sea scallop, Placopecten magellanicus. American Malacological Union Bulletin, No. 34, pp. 51-52. (Abstract)

Merrill, Arthur S. and Haskell S. Tubiash. 1968. Commercial molluscs of the Atlantic coast of the United States. Symposium on Mollusca, Mandapam, 1968. Marine Biological Association of India. Abstracts of Papers, pp. 76-77. (Abstract)

Merrill, Arthur S. and Robert W. Hanks. 1969. The Bureau of Commercial Fisheries Biological Laboratory at Oxford, Maryland, meeting the problems of the shellfisheries. Association of Southeastern Biologists Bulletin, 16(4): 103-106.

Merrill, Arthur S. and Richard E. Petit. 1969. Mollusks new to South Carolina: II. Nautilus, 82(4): 117-122.

Merrill, Arthur S. and John W. Ropes. 1969. *The distribution and density of the ocean quahog, Arctica islandica. American Malacological Union Bulletin, No. 36, p. 19. (Abstract)

Ropes, John W. and Arthur S. Merrill. 1969. *The distribution and density of the surf clam, Spisula solidissima. American Malacological Union Bulletin, No. 36, p. 20. (Abstract)

Ropes, John W., J. Lockwood Chamberlin, and Arthur S. Merrill. 1969. Surf clam fishery. In F. E. Firth, ed., The Encyclopedia of Marine Resources. Van Nostrand Reinhold Co., New York. pp. 119-125.

Merrill, Arthur S., J. Lockwood Chamberlin, and John W. Ropes. 1969. Ocean quahog fishery. In F. E. Firth, ed., The Encyclopedia of Marine Resources. Van Nostrand Reinhold Co., New York. pp. 125-129.

Merrill, Arthur S. and John W. Ropes. 1969. The general distribution of the surf clam and ocean quahog. Proceedings of the National Shellfisheries Association for 1968, 59: 40-45.

Ropes, John W. and Arthur S. Merrill. 1970. Marking surf clams. Proceedings of the National Shellfisheries Association for 1969, 60: 99-106.

Merrill, Arthur S. 1970. Fluxina Dall is a Calliostoma Swainson. Nautilus, 84(1):

Merrill, Arthur S. and Haskell S. Tubiash. In Press. Commercial molluscs of the Atlantic and Gulf coasts of the United States. Symposium on Mollusca, Mandapam, 1968. Marine Biological Association of India.

December 1974

NAME: John (Jack) B. Pearce

BIRTHPLACE AND DATE: Dearborn, Michigan; 20 September 1930

PERSONAL INFORMATION: Married; two children, 18 and 20.

MILITARY SERVICE: Sgt., Tank Co. - 158th regimental combat team,
Arizona National Guard, 1951-1953
Motor Sgt., Co. B - 95th Combat Engr. Bn.,
Camp Desert Rock, Nev. 1953-1955

NON-ACADEMIC EMPLOYMENT: Arizona Fish and Game Commission
Migratory waterfowl program, 1950-51,
Summer 1955

EDUCATION:

High School: Wayne, Michigan - 1944-1948

College: Henry Ford Community College,
Dearborn, Michigan
1948-49

University of Arizona, Tucson
1949-50, 1952-53 - Wildlife Mgmt.

Humboldt State College, Arcata, California
1955-57 - B.A. degree in Conservation Education
and General Biology

University of Washington, Seattle
1957-1962 - M.S. and Ph.D. degrees in Zoology

Thesis Research:

M.S. degree - The biology of the mussel crab, Fabia subquadrata, from the waters of the San Juan Archipelago. 1960. 103 pp.

Ph.D. degree - The biology of some pinnotherid crabs from the waters of Puget Sound and the San Juan Archipelago. 1962. 279 pp.

Four summers in residence at the Friday Harbor Marine Laboratory, Friday Harbor, Washington.

COURSE WORK:

Undergraduate:

General Zoology
Herpetology
Ornithology
Mammalogy
Comparative Anatomy
Embryology
General Ecology
Marine Ecology
Mammalian Physiology
Wildlife Management
Uplant Game Bird Management
Forestry and Lumbering
Soil Science
Plant Ecology
Microtechnique
General Chemistry
Organic Chemistry
General Geology
Plant Taxonomy

Graduate:

Invertebrate Zoology
Advanced Invertebrate Embryology
General Physiology
Advanced Invertebrate Zoology (C.M. Yonge on Mollusca)
Systematic Zoology
History of Zoology
Advanced Mammalian Physiology
Microscopic Anatomy (Medical School)
Advanced Comparative Histology
Physical Oceanography
Advanced Ecology
Limnology
Cellular Physiology
Genetics
Microbiology
Advanced Phytoplankton Ecology
Biochemistry
Mycology
Seminar
Research
Thesis

HONORS, ASSISTANTSHIPS AND FELLOWSHIPS:

Belle Vista Rod and Gun Club Fellowship, HSC, 1956-67

Hunt Fellowship, HSC, 1957
Chi Sigma Epsilon, Scholastic Honorary, 1957

Valedictorian, HSC Graduating Class, 1957

Teaching Assistantship, University of Washington, 1957-1959

HONORS, ASSISTANTSHIPS AND FELLOWSHIPS - Continued

Research Assistantship, Dr. Paul Illg,
University of Washington, 1959

National Science Foundation Summer
Cooperative Fellowship, Friday Harbor
Marine Laboratories, 1959

National Institute of Health Predoctoral
Fellowship, University of Washington, 1960-1962

National Institutes of Health Postdoctoral
Fellowship, The University of Copenhagen's
Marine Laboratory, Helsingor, Denmark,
August 1962-August 1963

Research Associate, Systematics-Ecology Program,
Marine Biological Laboratory, Woods Hole, Mass.,
September 1963-June 1965

Advisory Council, American Littoral Society,
June 1970-present

TEACHING EXPERIENCE:

Arcata, California, High School - General Biology and Education,
1957; supervising teacher, Mr. Wally Padratti

University of Washington - Laboratory instructor:

General Biology, 1957-58; lecturers, Drs. Robert Fernald
and Paul Illg

Embryology, 1958; lecturer Dr. Robert Fernald

General Zoology, 1958-59; lecturers, Drs. K. Osterud
and Arthur Whitely

General Physiology; 1959; lecturer, Dr. Ernst Florey

Evolution; 1959; lecturer, Dr. Melville Hatch

Marine Biology; 1959; lecturer, Dr. Dixy L. Ray

Invertebrate Zoology, Summer, 1960; lecturers,
Drs. Demorest Davenport and Pat Dudley

TEACHING EXPERIENCE - Continuted

Woods Hole, Massachusetts - guest lecturer in Marine Ecology, a summer session

Humboldt State College - instructor (assistant professor) in:

General Biology, fall semester, 1965 and 1966

Invertebrate Zoology, fall semester, 1965

Marine Biology (for non-majors), spring semester, 1966

Ecology of Marine Animals, spring semester, 1966; this course was also given in an eight week long NSF supported Institute in Marine Science for high school and junior college instructors, summer sessions, 1965 and 1966

Marine Benthic Ecology, a graduate course offered fall semester, 1966

Advanced Marine Biology, a graduate course offered summer session, 1966

Graduate Seminar in Biology, offered spring semester, 1966 and summer sessions, 1965 and 1966

Nassau College - lecturer in biological oceanography; ecology of the continental shelf and ecology of estuaries

Lehigh University - adjunct associate professor

Rutgers University, Livingston College - adjunct associate professor - marine ecology and nematology
Ecology of Marine Animals, fall semester, 1970

Man and his Environment, 1970-1973 (guest lecturer)

ADMINISTRATIVE EXPERIENCE:

Project Leader, Sandy Hook Sport Fisheries Marine Laboratory - March 1967 to February 1971

Assistant Laboratory Director - February 1971 to May 1971

Acting Laboratory Director - May 1971 to August 1971

Officer-in-Charge, Sandy Hook Laboratory and Director of Ecosystems Investigation, Middle Atlantic Coastal Fisheries Center - August 1971 to present

Coordinator, Theme B (Effects of Man's Activities on the Marine Environment, February 1969 to present

NATIONAL AND INTERNATIONAL COMMITTEES:

Coordinator, International Biological Program (IBP) - Theme B - The Effects of Man's Activities on the Marine Environment, 1969 to present. Editor, IBP - Theme B Synthesis Volume.

Member, Advisory Board, American Littoral Society, 1971-present.

Committee member, National Academy of Science, Committee on Aquatic Animal Health, 1972 to present.

Subcommittee member and Chairman, Interagency Scientific Advisory Subcommittee on Ocean Dredging and Spoiling, 1973 to present.

Committee member, Hudson River Interagency Policy Committee, 1972 to 1973.

Member, Institut de la Vie committee on Thermal Additions and the Aquatic Ecosystem, Paris, 1973 to present; participated in Institut de la Vie symposiums, 1973 and September 1974.

Member, Board of Directors, Hudson River Environmental Society, January 1974 to present.

AFFILIATIONS:

American Association for the Advancement of Science

Atlantic Estuarine Research Society

Marine Biological Association of Scotland

Marine Biological Association of the U.K.

Phi Sigma Society - biological honorary

Systematics Society, London

Western Society of Naturalists

American Littoral Society (member Board of Directors)

International Biological Program (IBP) (PM) - coordinator
Theme B, "Effects of Man's Activities on the Marine Environment"

MAJOR ORAL PRESENTATIONS:

1959 - Western Society of Naturalists; Biology of Pinnotherid Crabs

1961 - Friday Harbor Marine Labs; The Biology of Symbiotic Relationships

1962 - Danish Natural History Society; Biology of Pinnotherid Crabs

1963-65 - Systematics-Ecology Program (4) on Pinnotherid Crabs and Woods Hole Oceanographic Institution (2) Pinnotherid Benthic Ecology
Bureau of Commercial Fisheries (W.H.) Pinnotherid Benthic Ecology
Conference on Estuaries, Jekyll Isl., Ga.
(panel discussion of benthos)

1964 - Marine Biological Lab joint meeting
Invited participant in 3rd AIBS Interdisciplinary Conference on Marine Biology, Princeton, New Jersey

1965 - AAAS Meeting, San Francisco, California; The Effects of Pulp Mill Effluents on Marine Benthic Communities

1967 - Chairman of meeting on thermal pollution, held at Sandy Hook Sport Fisheries Marine Laboratory under aegis of International Biological Program, National Academy of Sciences

MAJOR ORAL PRESENTATIONS - Continued

1968 - Co-chairman of Second Workshop on thermal addition, held at Chesapeake Biological Laboratory, Solomons, Md., 4-7 Nov.; presented paper concerning the effects of thermal additions on benthic fauns of Cape Cod Canal

1969 - Co-coordinator of International Biological Program (IBP): "Impact of Man's Activities on the Marine Environment"

Invited participant in the National Academy of Sciences workshop on coastal wastes management, 6-12 July

1969 - Presented a paper on the zoogeographic distribution of epibenthic communities at the IV European Symposium on Marine Biology, Bangor, Wales, Gt. B., Sept. 1969

Presented papers on the effects of solid waste disposal practices in the New York Bight at the International Biological Program Symposium, "Effects of Man's Activities on the Environment; Royal Society, London, Sept. 1969

Presented seminar on solid waste disposal at the Woods Hole Oceanographic Institution evening seminar program, Oct. 1969

1970 - Presented paper, "Effects of solid waste disposal on benthic communities in the New York Bight" to Naval Research Laboratory (Nov., 1970) and UN-FAO Conference on Marine Pollution, Rome, Italy (Dec., 1970)

1971 - Invertebrate Resources of the New York Metropolitan area; seminar presented to Mayor's Oceanographic Advisory Committee and New York Institute of Ocean Resources, Nov., 1971

1972 - Invertebrates of the Hudson River Estuary; seminar presented to New York City College, March, 1972

Practices, effects and impact of ocean dumping in the New York Bight; presentation to the President's Water Quality Advisory Council, Sept., 1972

Ocean Disposal in the New York Bight; seminar presented to Dept. of Geological and Geophysical Sciences, Princeton University, Nov. 1972

1973-4 Effects of thermal-nuclear power plants on the marine environment. Institut de la Vie Symposium, Versailles, France, Oct., 1973. (paper to be printed in proceedings).

PUBLICATIONS:

1962 - Adaptation in symbiotic crabs of the family Pinnotheridae. The Biologist, 45(1):11-15.

1964 - On reproduction in Pinnotheres maculatus (Decapoda); (Pinnotheridae). Biol. Bull. 127(2):384.

1965 - On the distribution of Tresus capax and Tresus nuttalii in waters of Puget Sound and the San Juan Archipelago (Pelecypoda; Mactridae). The Veliger, 7(3):166-170.

1966 - Marine Biology, vol. 3. Ecology of the Invertebrates. W. T. Edmondson, ed. N. Y. Acad. Sciences, N. Y. C. 313 p.

The biology of the mussel crab, Fabia subquadrata, from the waters of the San Juan Archipelago, Washington. Pacific Sci., 20(1):3-35.

On Pinnixa faba and Pinnixa littoralis (Decapoda; Pinnotheridae) symbiotic with the clam, Tresus capax (Pelecypoda: Mactridae). In: Some contemporary studies in Marine Science, Harold Barnes, ed. George Allen and Unwin Ltd., Lond., pp. 565-589.

On Lora trevelliana (Turton) (Gastropoda: Turridae). Ophelia, 3:81-91.

1967 - The feeding and reproductive biology of the red whelk, Neptunea antiqua (L.) (Gastropoda, Prosobranchia), with Prof. Gunnar Thorson. Ophelia, 4:277-314.

1968 - Saucers in the sea; how do reefs increase productivity. Underwater Naturalist, 5(1):14-19.

Oil pollution - a threat to marine resources and recreation. Underwater Naturalist, 5(2):6-10.

Laboratory Investigation of the Effects of Thermal Additions on Marine Organisms Characteristic of Cape Cod Canal. Special Report to BSFW and New England Gas and Electric Assoc.

1969 - Marine Biology. In: Colliers Encyclopedia, Crowell-Collier Corp., New York, 33 pp.

Several articles on invertebrates. In: Collier Encyclopedia, Crowell-Collier Corp., New York, approx. 40 pp.

PUBLICATIONS - Continued

1969 - Marine Biology. In: Colliers Merit Student Encyclopedia, Crowell-Collier Corp. 17 pp.

Investigations of effects of sewage sludge and acid wastes on offshore marine environments. Marine Pollution Bulletin, 7:5.

1970 - Thermal addition and the benthos, Cape Cod Canal. Chesapeake Sci., 10(3-4):227-233.

Marine Biogeography and Change. Ward's Bulletin 9(67):1-7.

Index to Issues 1-18 (old series) Marine Pollution Bulletin. Spec. Publication, Theme B, IBP-PM, 17 pp.

The effects of solid waste disposal on benthic communities in the New York Bight. Paper E-99, FAO Technical Conference on Marine Pollution and its effects on living resources, 12 pp.

IBP Report: Activities of Theme B, "The Effects of Man's Activities on the Marine Environment," 1969-70. Marine Pollution Bulletin, N.S.1(12):182.

1971 - Comparative investigations of the development of epibenthic communities from Gloucester, Massachusetts to St. Thomas, Virgin Islands. In: Proceedings, IV European Symposium on Marine Biology, Univ. North Wales, Bangor, ed. D. J. Crisp, Cambridge University Press, pp. 55-61.

The use of certain worm tubes and human artifacts as indicators of pollution by solid wastes. Marine Pollution Bulletin, N. S. 2(1):2 pp.

Analysis of larval settlement and succession. In: Studies on the effects of a steam-electric generating plant on the marine environment at Northport, New York. Technical Report #9, Marine Sciences Research Center, SUNY, Stony Brook, N. Y. pp. 75-79.

1972 - Marine Biology. In: Encyclopedia Americana Year Book, pp. 435-436.

Biological Survey of Submerged Refuse. Mar. Poll. Bull., 3(10):157-159.

Invertebrate Resources; available forms and potentials. In: Resources of the World's Oceans, ed. Henry R. Frey, New York Institute of Ocean Resources, Inc., N. Y., pp. 75-90.

PUBLICATIONS - Continued

1973 - Marine Biology. 1973 Encyclopedia Americana Yearbook.

Trace metals in sediments of New York Bight. Marine Pollution Bulletin, 4: 132-5 (with D. Carmody and W. Yasso).

1974 - Invertebrates of the Hudson River Estuary. Ann. New York Acad. Sci. 250: 137-143.

Environmental impact of the construction phase of offshore floating or barge mounted nuclear power plants to be sited between Sandy Hook and Atlantic City, New Jersey. In: Biological Balance and Thermal Modifications. Institut de la Vie, Paris. pp. 83-96.

Regional coastal environmental consideration for offshore power plants; Sandy Hook to Atlantic City, New Jersey. In: Biological Balance and Thermal Modifications. Institut de la Vie, Paris. pp. 97-165.

1975 - Shell disease in crabs and lobsters from New York Bight. Mar. Poll. Bull. 6(7): 101-5 (with J. Young).

Benthic assemblages in the deeper continental shelf waters of the Middle Atlantic Bight. Proc. Estuarine Res. Fed. Outer Continental Shelf Conf., Dec. 2-4, 1974, College Pk., Md. pp. 297-318.

PAPERS IN PRESS:

Temperature and the distribution of Mytilus edulis. Prepared for submission to the Journal of Experimental Marine Ecology. ed. Harold Barnes.

RECENT AND CURRENT RESEARCH:

Denmark	-	Biology of marine benthic communities. Biology of the gastropods, Lora trevelliana and Neptunea antiqua.
Scotland	-	Comparative biology and marine benthic communities.
Woods Hole	-	Biology of the pinnotherid crab, Pinnotheres maculatus. An investigation of an epibenthic mussel community in Quicks Hole, Elizabeth Islands, Mass.
Humboldt College, California	-	An investigation of the effects of pulp mill effluent on offshore marine contaminants; a contract between the Georgia-Pacific Co., Crown-Zellerbach Corp. and Humboldt State College.
		Biology of pinnotherid crabs

Sandy Hook Laboratory, Highlands, New Jersey

1) The effects of temperature on the behavior, distribution, and reproduction of marine organisms.

2) The distribution of sessile and semi-motile epibenthic fauna. Consideration of larval ecology. Colonication, succession, and productivity in epibenthic ecosystem. Interactions of benthic invertebrates and fishes.

3) The effects of solid waste disposal on offshore benthic communities.

4) Comparative studies of selected estuaries.

COMMUNITY ACTIVITIES:

Member, Fair Haven, N. J., Conservation Commission, 1969-72.

Advisor and instructor for Liberal Relegious Youth (LRY), Unitarian Church of Monmouth County, N.J.

Instructor in Limnology (pond ecology) for the annual Fair Haven, N.J. public school outdoor education program held at Stokes Forest 4H camp. This is a one-week program for 6th grade students.

Guest lecturer at Brookdale Community College and the Sandy Hook State Park Nature Interpretive Center.

Merit badge advisor (Oceanography) for Boy Scout troops 24 and 25, Fair Haven, N.J.

Appointed member of Rumson-Fair Haven Regional High School Board. June 1971 to 1973.

PERSONNEL RESUME

Name: Aaron Rosenfield

Place and Date of Birth: Boston, Massachusetts, October 14, 1924

1. Education and Training

a. Degrees

B.S., 1950 - University of Massachusetts at Amherst; Microbiology, Public Health
M.S., 1951 - University of Massachusetts at Amherst; Microbiology, Food Technolog
Ph.D., 1960 - University of Texas; Plant Physiology, Biochemistry

b. Other courses

Boston University, 1952-56, Part-time, Zoology (24 credit hours)
University of Wisconsin, summer 1962, Tissue Culture Course
U. S. Civil Service Commission, 1965, Supervision and Management Course
Georgetown University, spring 1968, Electron Microscopy Course
U.S. Bureau of Commercial Fisheries, December 1968, Executive Training School
U.S. Bureau of Commercial Fisheries, 11/4/68-4/1/69, Central Office Training Assignment, Acting Branch Chief-Shellfisheries, Washington, D. C.
University of Colorado, Aspen, Colorado, August 1969, Comparative Pathobiology
U.S. Bureau of Commercial Fisheries, Oxford, Maryland, January 1970, Supervisors and Managers Training Course

2. Experience

Oct. 1969-Present	U.S. Bureau of Commercial Fisheries and National Marine Fisheries Service, Oxford, Maryland, GS-14, Assistant Laboratory Director
Jan. 1965-Oct. 1969	U.S. Bureau of Commercial Fisheries, Oxford, Maryland, GS-13, Program Leader, Shellfish Mortality
Oct. 1962-Jan. 1965	U.S. Bureau of Commercial Fisheries, Oxford, Maryland GS-12, Program Leader, Shellfish Mortality
Dec. 1960-Oct. 1962	U.S. Bureau of Commercial Fisheries, Boothbay Harbor, Maine GS-11, Project Leader, Invertebrate Tissue Culture, Serology
June 1960-Dec. 1960	Post Doctoral Research Fellow, University of Texas, Austin, Texas
1956-1960	Graduate Teaching Fellow, University of Texas, Austin, Texas
1953-1956	Research Associate in Microbiology, Parasitology, Maine Department of Sea and Shore Fisheries, Boothbay Harbor, Maine, summer of 1953, 1954, and 1956
1951-1956	Biology Instructor, Brandeis University, Waltham, Massachusetts
June 1951-Sept. 1951	Chemist, Multiple Breaker Company, Malden, Massachusetts
1943-1946	U.S. Navy, QM3/C, Motor Torpedo Boat Squadrons, Panama, South Pacific, Philippine Islands

3. Chronological Listing of Publications

a. Published

Rosenfield, A. 1951. Bacterial spoilage of home canned foods. M.S. Thesis, University of Massachusetts at Amherst, Mass.

Sindermann, C. and A. Rosenfield. 1954. Diseases of fishes of the western North Atlantic. I. Diseases of the sea herring (Clupea harengus). Maine Dep. Sea and Shore Fish. Res. Bull. No. 18: 1-23.

Sindermann, C. and A. Rosenfield. 1954. Diseases of fishes of the western North Atlantic. III. Mortalities of sea herring caused by larval trematode invasion. Maine Dep. Sea and Shore Fish. Res. Bull. No. 21: 1-16.

Sindermann, C., A. Rosenfield, and L. Strom. 1957. The ecology of marine dermatitis-producing schistosomes. II. Effects of certain environmental factors on emergence of cercariae of Austrobilharzia variglandis. J. Parasitol. 43: 382.

Sindermann, C. and A. Rosenfield. 1957. The ecology of marine dermatitis-producing schistosomes. III. Oxygen consumption of normal and parasitized Nassarius obsoletus (Nassa obsoleta) under varying conditions of salinity. Abstract. J. Parasitol. 43(5, Sect. 2, Suppl.): 28.

Rosenfield, A. 1960. Respiration, growth and development in the maize root apex. Ph.D. Dissertation, University of Texas, Austin, Texas. Dissertation Abstracts.

Engle, J. B. and A. Rosenfield. 1963. Progress on oyster mortality studies. Proc. Gulf Carib. Fish. Inst. 15th Annu. Sess: 116-124.

Rosenfield, A. 1964. Studies of oyster microparasites. U. S. Fish & Wildl. Serv., Cir. 200: 30-37.

Rosenfield, A. 1965. Maintenance of oyster tissue in vitro. Amer. Malacol. Union Annu. Bull. 32: 30.

Rosenfield, A. and C. J. Sindermann. 1965. Starch-gel electrophoresis of oyster serum. Amer. Malacol. Union Annu. Bull. 32: 8-9.

Couch, J. A., C. A. Farley, and A. Rosenfield. 1966. Sporulation of Minchinia nelsoni (Haplosporida, Haplosporidiidae) in Crassostrea virginica (Gmelin). Science 153: 1529-1531.

Otto, Sara V., H. S. Tubiash, and A. Rosenfield. 1966. Improved destaining tube for use in disk electrophoresis. Chemical Analyst 55: 93.

Rosenfield, A. and C. J. Sindermann. 1966. The distribution of "MSX" in middle Chesapeake Bay. Abstract. Proc. Nat. Shellfish. Ass. 56: 6.

Sindermann, C. J. and A. Rosenfield. 1967. Diseases in marine mollusca and crustacea. U. S. Fish Wildl Serv. Fish. Bull. 66: 335-385.

Eble, A. F. and A. Rosenfield. 1968. The enzyme histochemistry of the sporulation of Minchina nelsoni in Crassostrea virginica. Abstract. Proc. Nat. Shellfish. Ass. 58: 3.

Couch, J. A. and A. Rosenfield. Epizootiology of Minchinia costalis and Minchinia nelsoni in oysters introduced into Chincoteague Bay, Virginia. Proc. Nat. Shellfish. Ass. 58: 51-59.

Rosenfield, A., L. R. Buchanan, and G. W. Chapman. 1969. Comparison of the fine structure of three species of Minchinia spores. (Haplosporida, Haplosporidiidae). J. Parasitol. 55: 921-941.

Sieling, F. W., S. V. Otto, and A. Rosenfield. 1969. Distribution of some microparasites in oysters from Chesapeake Bay, 1963-1968. Abstract. Proc. Nat. Shellfish. Ass. 59: 8-9.

Rosenfield, A. 1971. Oyster diseases in North America and some methods for their control. In Symposium, 1969, Artificial Propagation of Commercially Valuable Shellfish, University of Delaware, p. 67-78.

b. In Press

None

c. In Preparation

Eble, A. F. and A. Rosenfield. Enzyme histochemistry of sporulation of Minchinia nelsoni in the American oyster. J. Invertebr. Pathol.

4. Scientific Honors and Awards

Society of Sigma Xi (Honorary Scientific Society)
Listed - American Men of Science
U. S. Bureau of Commercial Fisheries - Incentive Award $100, 1966
U. S. Bureau of Commercial Fisheries - Incentive Award 10 year service, 1967
Member Editorial Board - Proceedings National Shellfisheries Association
Selected as Program Chairman, Wildlife Disease Association, AIBS meeting 1966
Selected to organize and chair special symposium - Invertebrate Defense Mechanisms - Society of Invertebrate Pathology, AIBS meeting 1968.
Commendation - Honorable Rogers C. Morton - assistance rendered to the oyster industry, 1965

Selected as program chairman - International Symposium on Tumors in Lower Animals - Smithsonian Institute 1968
Selected to organize and chair Molluscan and Crustacean Disease Workshop, Society of Invertebrate Pathology, AIBS meeting 1970
Commendation - Regional Director - Committee on Scientific Contributions 1971
Selected as member of Committee on Comparative Oncology, Union Internationale Contre Le Cancer, 1970-71
Listed F.A.O. of U.N. as expert on aquaculture and marine fish diseases.

5. Paper Presentations before Scientific Societies

"Some chemical and cytological characteristics of the Ostriidae", National Shellfisheries Association, 1963
"U.S. Bureau of Commercial Fisheries oyster mortality studies", National Shellfisheries Association, 1963
"Shellfish disease studies - a demonstration", International Congress of Zoology, 1963
"Some biochemical approaches to oyster taxonomy", Atlantic Estuarine Research Society, 1964
"The distribution of 'MSX' in middle Chesapeake Bay", National Shellfisheries Association, 1965
"Maintenance of oyster tissue in vitro", American Malacological Union, 1965
"Starch-gel electrophoresis of oyster serum", American Malacological Union, 1965
"Diseases in commercially important mollusca and crustacea", Wildlife Disease Association, 1966
"Uses of aquatic animals in research, tissue culture and genetic aspects", American Association Laboratory Animal Science, 1967
"Distribution of some microparasites in oysters from Chesapeake Bay", National Shellfisheries Association, 1968
"Minchinia spores in mud crabs", Atlantic Estuarine Research Society, 1968
"Shellfish diseases in North America and some methods for their control", Invited Paper, University of Delaware Symposium on Aquaculture, 1969
"Microparasites of commercially important shellfish", Helminthological Society, Washington, D. C., 1969
"The control of shellfish diseases", Invited Paper, University of Washington Symposium on Mariculture, 1970
"Infectious and non-infectious diseases of shellfish", Atlantic Fisheries Biologists, 1970
"Parasite tags of marine invertebrates", International Congress of Protozoology, 1970

6. Affiliation in Scientific Organizations and Offices Held

Tissue Culture Association, Special Education Committee, 1969-70
Atlantic Estuarine Research Society
Atlantic Fisheries Biologists
Sigma Xi
Society for Invertebrate Pathology, Organization Committee
National Shellfisheries Association, Editorial Board
International Union Against Cancer, Committee on Comparative Oncology

7. Consulting Activities

Adjunct Associate Professor, Biology, Georgetown University, Washington, D. C., present lectures, classroom exercises, serve on thesis committees

Review, evaluate, recommend action on non-laboratory contract and grant proposals and progress reports (Ex., National Science Foundation Sea Grant, National Institute of Health, National Cancer Institute, North Atlantic Treaty Organization, Corps of Engineers, Atomic Energy Commission, Federal Aid.)

Serve as consultant to university investigators and conservation agents in areas where mass mortalities of marine organisms occur and advise course of action and types of cooperative research (Ex., with Massachusetts, New York, Connecticut, Maryland, Virginia, North Carolina, South Carolina, Georgia, Florida, Alabama, California, Oregon, Washington, British Columbia, Armed Forces Institute of Pathology, National Cancer Institute, etc.)

Serve on editorial boards and as a reviewer for scientific journals; such as, Science, Journal of Parasitology, Journal of Protozoology, Proceedings of National Shellfisheries Association, Proceedings of American Malacological Union.

Plan, organize, chair, and present lectures and seminars; otherwise participate in scientific symposia, meetings, workshops, and conferences as may be associated with professional societies, Federal and State agencies, universities, research institutions, and foundation laboratories.

8. Special Professional Assignments

Current position - Assistant Laboratory Director with duties and responsibilities incumbent, 1969-present.

Acting Laboratory Director, unofficial, intermittent basis 1969-71 with duties and responsibilities incumbent.

Plan, organize, write, edit and otherwise prepare in-house laboratory research and administrative reports, program review and briefing documents, annual and biennial reports and brochures.

Formulate and prepare research proposals and cooperative study project documents for contract and grant support (Ex., laboratory contracts to Hiram College, Howard University, Georgetown University, Brooklyn College, Trenton State College, University of Washington, and University of Delaware).

Prepare laboratory budgets, summaries of activities and progress, justifications for laboratory programs and projects.

Plan, conduct, supervise, evaluate, and expedite broad studies of research in comparative and experimental pathology of marine poikilotherm organisms.

Organize, arrange, serve on committees and host scientific workshops, conferences and meetings held at the laboratory or at nearby institutions (Ex., Atlantic Estuarine Research Society, Shellfish Pathology Conference, Federal Aid Workshops, Helminthological Society, Society of Invertebrate Pathology).

Present lectures, tours, hold consultations and discussion sessions with members of academic, school, industry, civic, conservation, foundation, and museum organizations.

Serve as a member on Central Office, Center, and Regional Office committees and task forces; such as, Scientific Contribution Review Committee, Aquaculture Issue Paper Group, Special Study Unit Group.

DR. J. KNEELAND MCNULTY

Born: Alamosa, Colorado. May 14, 1923.

Married: June 24, 1950.

Children: Three

1. Brief educational background and work experiences or employment history.

Education:

1935-1937	St. Thomas's Choir School, New York, New York
1937-1941	The Choate School, Wallingford, Connecticut
1941-1943	Trinity College, Hartford, Connecticut
1943-1944	University of Pennsylvania, Philadelphia, Pennsylvania (Navy V-12)
1945	Cornell University Midshipmen's School, Ithaca, New York (ENS USNR)
1948-1950	Trinity College, Hartford, Connecticut - B.S. General Science
1950-1952	University of Connecticut, Storrs, Connecticut - M.S. Zoology
1959-1961 & 1965-1966	University of Miami, Coral Gables, Florida - Ph. D. Marine Sciences

Employment:

1943-1947	U.S. Navy (A.S., S2/C, ENS)
1947-1948	Reporter, New Haven Journal Courier, New Haven, Connecticut
1948-1950	Part-time reporter, Hartford Courant, Hartford, Connecticut
1952-1953	Research Assistant, Bears Bluff Laboratories, Wadmalaw Island, South Carolina
1953-1961	Research Instructor, Institute of Marine Science, Miami, Florida
1961-1965	Fishery Biologist (General), Bureau Sport Fish. & Wildl. (River Basins), Vero Beach, Florida.
1966-1971	Fishery Biologist (Research) and since July 1969 Supervisory Fishery Biologist (Research), NMFS Biological Laboratory, St. Petersburg Beach, Florida
1971	Acting Officer in Charge, NMFS Biological Laboratory, St. Petersburg Beach, Florida

2. Brief narrative account of research accomplishments.

Dr. McNulty published the first account of the seasonality of oyster spawning in South Carolina while working under Dr. G. Robert Lunz at Bear Bluff Laboratories. Under Dr. Hilary B. Moore at the University of Miami, Dr. McNulty published several papers on the effects of domestic sewage pollution on the benthos, zooplankton, and fouling organisms of Biscayne Bay, and also papers on the benthos of south Florida estuaries generally. His dissertation on pollution was published as a book in the Studies in Tropical Oceanography, University of Miami Press, in 1970, and has subsequently been reviewed in most fisheries and oceanographic journals. He has been project leader and more recently program leader of studies that include the Gulf of Mexico Estuarine Inventory (Florida portion) while at the St. Petersburg Beach Biological Laboratory, and is preparing the studies for publication at present. He has held the position of Acting Officer in Charge since August 1971.

3. Chronological listing of publications.

McNulty, J. Kneeland
1953. Seasonal and vertical patterns of oyster settlement off Wadmalaw Island, South Carolina. Bears Bluff Laboratory Contribution Number 15, 17 p.

Hela, Illmo, Clarence A. Carpenter, Jr., and J. Kneeland McNulty
1957. Hydrography of a positive, shallow, tidal bar-built estuary (Report on the hydrography of the polluted area of Biscayne Bay). Bull. Mar. Sci. Gulf & Carib., 7(1): 47-99.

McNulty, J. Kneeland, E. S. Reynolds, and S. M. Miller
1960. Ecological effects of sewage pollution in Biscayne Bay, Florida: distribution of coliform bacteria, chemical nutrients, and volumes of zooplankton. Trans. 2nd Seminar on Biological Problems in Water Pollution, C. M. Tarzwell, ed., p. 189-202, 10 figs.

McNulty, J. Kneeland
1961. Ecological effects of sewage pollution in Biscayne Bay, Florida: sediments and the distribution of benthic and fouling macro-organisms. Bull. Mar. Sci. Gulf & Carib., 11(3): 394-447, 17 figs.

McNulty, J. Kneeland
1962a. Level sea bottom communities in Biscayne Bay and neighboring areas. Bull. Mar. Sci. Gulf & Carib., 12(2): 204-233, 14 figs.

McNulty, J. Kneeland, Robert C. Work, and Hilary B. Moore.
1962b. Some relationships between the infauna of the level bottom and the sediment in south Florida. Bull. Mar. Sci. Gulf & Carib., 12(3): 322-332, 4 figs.

McNulty, J. Kneeland, and Nelia Lopez
1969. Year-round production of ripe gametes by benthic polychaetes in Biscayne Bay, Florida. Bull. Mar. Sci., 19(4): 945-954.

McNulty, J. Kneeland
1970. Effects of abatement of domestic sewage pollution on the benthos, volumes of zooplankton, and the fouling organisms of Biscayne Bay, Florida. Stud. Trop. Oceanogr. 9, Univ. of Miami Press, Coral Gables, Fla. 128 p.

McNulty, J. Kneeland, and Lucius Johnson
1971. Automated Determination of Total Phosphorus in Estuarine Water. Proc. of the Fifth Technicon International Congress, 1970, Vol. 2: 353-355.

McNulty, J. Kneeland, William N. Lindall, Jr., and James E. Sykes
In Press. Description of estuarine areas of the west coast of Florida--cooperative Gulf of Mexico estuarine inventory. NMFS Circular Series.

4. Scientific honors and awards received.

Sigma Xi (1952)
Outstanding Performance Rating (1968-1969)

5. Presentation of technical papers before scientific societies.

A.I.B.S., University of Florida, August, 1954; Effects of pollution on benthos, boring organisms and fouling organisms of Biscayne Bay, Florida. (Unpublished)

A.W.W.A., Jacksonville, Florida, November, 1957: Pollution studies in Biscayne Bay, Florida (Unpublished).

Second Seminar on Biological Problems in Water Pollution held at the Robert A. Taft Sanitary Engineering Center, Cincinnati, Ohio, April, 1959: Ecological effects of sewage pollution in Biscayne Bay, Florida: Distribution of coliform bacteria, chemical nutrients, and volumes of Zooplankton. (Published)

Ecol. Soc. America, Oklahoma State University of Agriculture and Applied Science, Stillwater, Oklahoma, September 1960; Animal-sediment relationships. (Unpublished as given--a revision later published)

Conference on Estuaries, Jekyll Island, Georgia, April 1964: Ecological effects of domestic sewage pollution in Biscayne Bay, Florida. (Unpublished as given--taken from parts of dissertation)

1970 Technicon International Congress, November 2-4, 1970, at New York Hilton.

6. Specific participation in scientific conferences and workshops.

First Seminar on Biological Problems in Water Pollution held at the Robert A. Taft Sanitary Engineering Center, Cincinnati, Ohio, April 1956.

Second Seminar on Biological Problems in Water Pollution held at the Robert A. Taft Sanitary Engineering Center, Cincinnati, Ohio, April 1959.

First International Conference on Waste Disposal in the Marine Environment, University of California, Berkeley, California, July 1959.

Conference on Estuaries, Jekyll Island, Georgia, April 1964.

Technical Coordinating Committee, Gulf States Marine Fisheries Commission--numerous sessions, 1966-1969.

7. Consultant-type functions.

Assisted Wallis Associates, Inc., West Palm Beach, Florida, with literature survey and analysis of conclusions, March-June 1966, on Biscayne Bay, Florida (free of charge).

Assisted Navy Mine Defense Lab., Panama City, Florida, offices in Naval Intelligence, Washington, D.C., and the Scientific and Technical Intelligence Center, Washington, D.C., with problems relating to marine biology while on two-week tours of active duty for training, Naval Reserve, 1959-1970.

8. Special assignments.

Member of Departmental Study Team to evaluate plans of the Virgin Islands government to construct an airport at Mangrove Lagoon, Jersey Bay, St. Thomas, V.I., 1968 and 1970. Report: McNulty, J. Kneeland, Robertson, William B., Jr., and Horton, Billy F., 1958. Departmental study team report and recommendations on proposed new jet airport, St. Thomas, Virgin Islands. 39 p., 12 figs. (Mimeogr.)

Conducted special investigation for NMFS of the causes of the decline in the catch of white shrimp in Escambia Bay, February-March 1972.

Participated in drafting the MESA proposal for the New York Bight study sponsored by NOAA, March-April 1972.

9. Other information.

Holds SCUBA diving certification.

Holds rank CDR USNR (Retired).

Taught teen-age church school classes, St. Peter's Cathedral (Episcopal) 1967-1971, and is a member of the Cathedral choir at present.

Participant in several distance-running marathons (5-8 miles), 1967 to present.

May, 1975

Personnel Resume

Name: Robert A. Murchelano
Place and Date of Birth: Providence, R. I., February 7, 1934

Education and Training:

1. Degrees

B.A., 1955, Brown University/Biology
M.S., 1957, University of Rhode Island/Microbiology
Ph.D., 1967, University of Rhode Island/Biological Oceanography

2. Other Courses

Commerce Managerial Course, February 5-9, 1973
Supervision and Group Performance (CSC), October 14-20, 1973

Positions Held:

July 10, 1967 Fishery Biologist (Res.) GS/11, BCF, Biological Laboratory, Milford, Connecticut
July 13, 1969 Fishery Biologist (Res.) GS/12, BCF, Biological Laboratory, Milford, Connecticut
October 11, 1970 Supervisory Fishery Biologist (Res.) GS/13, NMFS, Oxford Laboratory, Oxford, Maryland
(See Attachment # 1)

Chronological Listing of Publications: (See Attachment # 2)

Scientific Honors and Awards:

Tuition Scholarship - Brown University
Phi Sigma Society
Society of Sigma Xi

Paper Presentations Before Scientific Societies:

1. American Society of Limnology and Oceanography, La Jolla, California, September 11, 1969, "Heterotrophic Bacteria in Long Island Sound"
2. National Shellfisheries Association, Seattle, Washington, June 22, 1971, "Bivalve Larval Culture at the NMFS, Milford Laboratory, Milford, Connecticut" and Member, Oyster Mortality Panel
3. International Association for Aquatic Animal Medicine, Orlando, Florida, April 30, 1974, "Fin Rot - A Possible Symptom of Environmental Deterioration"
4. Wildlife Disease Association, Pacific Grove, California, August 1, 1974, "A Fin Rot Disease of Winter Flounder"

Seminars Presented:

1. Systematics Ecology Program, Marine Biological Laboratory, Woods Hole, Massachusetts, February 18, 1969, "Bacteriological Aspects of Bivalve Larval Culture"

2. College of Marine Studies, University of Delaware; Lewes, Delaware, March 21, 1973, "Disease Research at the Oxford Laboratory, NMFS, Oxford, Maryland"

3. Southern California Coastal Water Research Project, Los Angeles, California, August 5, 1974, "Studies of the Prevalence, Histopathology, Bacteriology, and Immunology of Fin Rot Disease of Winter Flounder, Pseudopleuronectes americanus, from the New York Bight"

4. Helminthological Society of Washington, Beltsville, Maryland, December 13, 1974, "Fin Rot Disease in Winter Flounder, Pseudopleuronectes americanus, from the New York Bight"

nsulting Activities:

1. Consultant, Shelter Island Oyster Co., Greenport, Long Island, New York, February 23-24, 1972 (To advise on methods to control mortalities in cultures of bivalve mollusks)

2. Consultant, NOAA, Office of Sea Grant, Orono, Maine, October 7-10, 1974, (Sea Grant Review - University of Maine)

3. Consultant, EPA, Gulf Breeze, Florida, January 6-8, 1975 (To prepare a RFP on biologic research with dimethylnitrosamine)

ecial Professional Assignments:

1. Organizational meeting for Cooperative Contaminants Study, Ann Arbor, Michigan, February 17-19, 1971

2. Task force on physiologic effects of marine contaminants, Baltimore, Maryland, April 13-14, 1971

3. Steering Committee Meeting, Pacific Coast Oyster Mortality Investigations, Menlo Park, California, November 30-December 3, 1971

4. Task Development Plan Review, Office of Resource Research, NMFS, Washington, D.C., January 3-11, 1973

5. Ph.D. dissertation defense of Mr. John Manzi (as committee member), Virginia Institute of Marine Science, Gloucester Point, Virginia, August 13, 1973

6. Inshore Ecology Workshop, Northwest Fisheries Center, Seattle, Washington, June 10-12, 1974

rch Cruises (Major):

1. R/V Albatross IV, July 30-August 2, 1973
2. R/V Albatross IV, February 1-7, 1974
3. R/V Delaware II, September 9-13, 1974 (Chief Scientist)

Special Administrative Assignments:

1. Acting Director, Pathobiology Investigations, September 6-October 13, 1973.
2. Acting Director, Pathobiology Investigations, January 20-April 19, 1974.
3. Intermittently as Acting Director, Pathobiology Investigations and Officer in Charge, Oxford Laboratory

Special Research Assignments:

1. Cooperative Contaminants Study, MACFC, February 17, 1971 - Present
2. Fin Rot Task Force, MACFC, June 15, 1973-July 1, 1974

ervisory Duties and Responsibilities:

Oxford Laboratory:

1. Dr. Thomas Sawyer (PCN 003) Fishery Biologist (Res.)
2. Mr. Haskell Tubiash (PCN 006) Microbiologist (Res.)
3. Mr. Austin Farley (PCN 004) Fishery Biologist (Res.)
4. Dr. Phyllis Johnson (PCN 005) Biologist (Res.)
5. Mr. Martin Newman (PCN 008) Fishery Biologist (Res.)
6. Dr. Joel Bodammer (PCN 009) Physiologist (Res.)
7. Mr. Frederick Kern (PCN 010) Fishery Biologist (Res.)
8. Ms. Jane Wade (PCN 011) Biological Laboratory Technician
9. Ms. Ceil Smith (PCN 012) Biological Laboratory Technician
10. Ms. Dorothy Wright (PCN 016) Biological Laboratory Technician
11. Ms. Sharon MacLean (PCN 027) Biological Laboratory Technician

Milford Laboratory:

1. Dr. Richard Robohm (PCN 052) Microbiologist (Res.)
2. Dr. Walter Blogoslawski (PCN 006) Microbiologist (Res.)
3. Ms. Carolyn Brown (PCN 011) Biologist (Res.)
4. Work/Study Students (2)

Sandy Hook Laboratory:

1. Mr. John Ziskowski (PCN 023) Fishery Biologist (Gen.)
2. Work/Study Students (1)

mbent exercises supervision (direct, first line) over the largest investigative
it in MACFC. Supervision of staff at Milford and Sandy Hook is not reflected in
current position description and necessitates frequent travel to accomplish
sfactorily.

PUBLICATIONS

Cleverdon, R. C., Leifson, E. and R. Murchelano. 1961. Morphological and physiological types of Gram negative stenohaline marine bacteria. In Proceedings of the First National Coastal and Shallow Water Research Conference, ed. by D. S. Gorsline, pp. 127-130.

Leifson, E., Cosenza, B. J., Murchelano, R. and R. C. Cleverdon. 1964. Motile marine bacteria. I. Techniques, ecology, and general characteristics J. Bacteriol. 87: 652-666.

1. Murchelano, R. A. and C. Brown. 1968. Bacteriological study of the natural flora of the Eastern oyster, Crassostrea virginica. J. Invertebr. Pathol. 11: 520-521.

2. Murchelano, R. A. and J. L. Bishop. 1969. Bacteriological study of laboratory-reared juvenile American oysters, Crassostrea virginica. J. Invertebr. Pathol. 14: 321-327.

3. Murchelano, R. A. and C. Brown. 1969. Bacteriological flora of some algal foods used for rearing bivalve larvae. J. Fish. Res. Board Can. 26: 2760-2764.

4. Murchelano, R. A. and C. Brown. 1970. Heterotrophic bacteria in Long Island Sound. Marine Biology 7: 1-6.

5. Combs, T. J., Murchelano, R. A. and F. Jurgen. 1971. Yeasts isolated from Long Island Sound. Mycologia 63: 178-181.

6. Murchelano, R. A. 1971. Diseases of Marine Animals. Maritimes 15: 7-9.

7. Ziskowski, J. and R. Murchelano. 1975. Fin erosion in winter flounder, Pseudopleuronectes americanus, from the New York Bight. Marine Pollution Bulletin (In press, February, 1975).

8. Murchelano, R. 1975. The histopathology of fin rot disease in the winter flounder, Pseudopleuronectes americanus, from the New York Bight. J. Wildl. Dis. (In press, April, 1975).

9. Murchelano, R. A., Brown, C. and J. Bishop. 1975. Quantitative and qualitative studies of bacteria isolated from seawater utilized in the laboratory-culture of the American oyster, Crassostrea virginica. J. Fish. Res. Board Can. (In press, July, 1975).

10. Murchelano, R. A. Histopathology of an acute fin lesion in the summer flounder, Paralichthys dentatus and some etiologic implications. In preparation (1st draft written, revised, and photomicrographs complete).

11. Wolke, R. E. and R. A. Murchelano. A hyperplastic epidermal lesion in smooth dogfish, Mustelus canis. In preparation (1st draft written, photomicrographs complete).

12. Bridges, D. W. and R. A. Murchelano. Lymphocystis disease in winter flounder, Pseudopleuronectes americanus, from Casco Bay, Maine. In preparation (text and photomicrographs).

SUKWOO CHANG DATE OF BIRTH: September 30, 1936

EDUCATION AND TRAINING:

High School	-	Kyung-Gi Boys High School, graduated 1955 Seoul, Korea
Undergraduate	-	Seoul National University, College of Liberal Arts and Science, 1955-59, B.S., Mathematics
Graduate	-	Stamford University, 1962-1963, Stamford, Calif. M.S. statistics.
	-	Michigan State University, 1963-68, East Lansing, Michigan Post-graduate study in Statistics and Probability
	-	University of Washington, 1968-74, Seattle, Washington Post-graduate study in Biomathematics and Fisheries Science Ph.D., Fisheries Science

EXPERIENCE:

4/59 - 3/62	-	Surveyor, Korean Army
9/63 - 6/67	-	Teaching Assistant and Statistical Laboratory Instructor, Department of Statistics and Probability, Michigan State University, East Lansing, Michigan.
6/67 - 9/67	-	Statistician, Center for Health Statistics, State of Michigan, Lansing, Michigan.
10/67 - 9/68	-	Statistical Consultant, Department Chemical Engineering, Michigan State University, East Lansing, Michigan.
9/68 - 6/71	-	Teaching Associate, Center for Quantitative Science in Forestry, Wildlife and Fisheries, University of Washington, Seattle, Washington.
6/71 - 8/74	-	Research Associate, NORFISH (Sea Grant funded), Center for Quantitative Science in Forestry, Wildlife, and Fisheries, University of Washington, Seattle, Washington.
11/74 - 4/75	-	Biometry and fisheries Management Consultant to MACFC, NMFS, NOAA through the American Littoral Society, Highlands, N.J.
5/75 - Present	-	Supervisory Fishery Biologist, MACFC, NMFS, NOAA, Dept. of Commerce, Sandy Hook Laboratory, Highlands, N. J.

CONSULTING ACTIVITIES:

Biometrician, MACFC, 1974.
Chairman, MACFC, Automatic Data Processing (ADP) Improvement Committee, 1974.
Member, State-Federal Stock Assessment Committee, 1975.
Member, U. S. Scientific Advisory Delegation to ICNAF, 1975.
Member, U. S. Scientific Advisory Delegation to Bilateral Meetings, 1975.

PUBLICATIONS:

S. Chang. 1968. Stochastic model for estimating population fluctuation. Tech. Report, Center for Health Statistics, State of Michigan, Lansing Michigan.

PUBLICATIONS (Continued):

B. W. Mar and S. Chang, et al. 1971. Washington State otter trawl fishery - Linear programming model, NORFISH, Center for Quantitative Science, Univ. of Washington, 48 pp.

S. Chang. 1971. Linear programming for all groundfish species lumped together separated by seasons, areas with an additional constraint of processor's capacity. NORFISH Document, NP08, Center for Quantitative Science, Univ. of Washington, 8 pp.

S. Chang. 1971. A summary of Alaska (walleye) pollock (Theragra chalcogramma Pollas) studies -- Life history synopsis and fisheries, NORFISH document, NL07, Center for Quantitative Science, Univ. of Washington, 47 pp.

S. Chang. 1972. A systems view -- Alaska pollock fisheries management, NORFISH document, NL09, Center for Quantitative Science, Univ. of Washington, 24 pp.

S. Chang. 1972. Multi-species and multi-gear fisheries problems. NORFISH document, NM09, Center for Quantitative Science, Univ. of Washington, 34 pp.

S. Chang. 1973. Alaska pollock fisheries. (In) Northeast Pacific Fisheries (NEPAC), NORFISH, Center for Quantitative Science, Univ. of Washington, 61 pp.

S. Chang. 1974. An evaluation of the eastern Bering Sea fisheries for Alaska pollock -- population dynamics. Ph.D. Dissertation, College of Fisheries, Univ. of Washington, 281 pp.

S. Chang and A. L. Pacheco. 1975. An evaluation of the summer flounder population in Subarea 5 and Statistical area 6. ICNAF Res. Doc. 75/69, June 1975 Annual Meeting, ICNAF. 25 pp.

In Preparation:

S. Chang. An evaluation of butterfish population in the Middle Atlantic Bight.

S. Chang. An evaluation of scup populations in the Middle Atlantic Bight.

S. Chang. An evaluation of the mixed fisheries in ICNAF Subarea 5 and Statistical area 6 - optimization of fishing effort in multi-nation, multi-gear and multi-species resource allocation problems.

ANTHONY L. PACHECO DATE OF BIRTH: September 12, 1923

EDUCATION AND TRAINING:

High School -	Dartmouth High School - graduated 1950 Dartmouth, Massachusetts
Undergraduate -	University of Massachusetts 1950-1954 - B.S., Zoology and Chemistry
Graduate -	College of William and Mary 1954-1956 - M.A., 1957 Aquatic Biology

EXPERIENCE BEFORE JOINING NMFS (BCF):

9/54 - 8/56	Graduate Assistant, Virginia Inst. of Marine Science, Gloucester Point, Virginia
8/56 - 7/59	Aquatic Biologist B., Virginia Inst. of Marine Science, Gloucester Point, Virginia
(Federal Service)	
7/59 -11/62	Fishery Research Biologist, BCF, Biological Laboratories, Beaufort, North Carolina. Duty station: Millville, Del.
11/62-10/66	Fishery Research Biologist, Bureau of Commercial Fisheries, Biological Laboratory, Beaufort, North Carolina
10/66-73	Fishery Biologist (Research) NMFS, Dept. of Commerce, NOAA, Sandy Hook Laboratory, Highlands, N. J.
7/73-Present	Fishery Biologist, Supervisory, NMFS, Dept. of Commerce, NOAA, MACFC, Sandy Hook Laboratory, Highlands, N. J.

LISTING OF PUBLICATIONS:

Published

A. L. Pacheco. 1957. The length and age composition of spot, Leiostomus xanthurus, in the pound net fishery of lower Chesapeake Bay. Unpubl. M.A. Thesis, College of William and Mary. 34 pp.

William H. Massmann and Anthony L. Pacheco. 1957. Shad catches and water temperature in Virginia. The Journal of Wildlife Management, Vol. 21 (3): 351-352.

W. H. Massmann, J. P. Whitcomb, and A. L. Pacheco. 1958. Distribution and abundance of gray weakfish in the York River System, Virginia. Trans. of the 23rd North Atlantic Wildl. Conference, pp. 361-369.

J. L. McHugh, R. T. Oglesby, and A. L. Pacheco. 1959. Length, weight, and age composition of the menhaden catch in Virginia. Limnol. and Oceanogr. Vol. 4(3): 145-162.

William H. Massmann and A. L. Pacheco. 1960. Disappearance of young Atlantic croakers from the York River, Virginia. Trans. of Am. Fish. Soc., Vol. 89 (2): 154-159.

William H. Massmann and A. L. Pacheco. 1961. Movements of striped bass tagged in Virginia waters of Chesapeake Bay. Chesapeake Sci., Vol. 2 (1-2): 37-44.

ANTHONY L. PACHECO

Published (Continued)

Anthony L. Pacheco and George C. Grant. 1961. A-frame used as a towing aid for small boats. Progressive Fish-Culturist, Vol. 23(4): 161.

Anthony L. Pacheco. 1962. Age and growth of spot in Lower Chesapeake Bay with notes on distribution and abundances of juveniles in the New York River System. Chesapeake Sci. Vol. 3(1): 18-28.

Anthony L. Pacheco. 1962. Movements of spot, Leiostomus xanthurus, in the Lower Chesapeake Bay. Chesapeake Sci. 3(4): 256-257.

Anthony L. Pacheco. 1963. Menhaden Program: Estimation of juvenile abundan In: Annual Report of the Bureau of Commercial Fisheries Biological Laboratory, Beaufort, North Carolina, for F.Y. 1962. U. S. Fish Wildl. Serv., Bur. Comm. Fish. Circ. 148-17.

Anthony L. Pacheco. 1964. Menhaden Program: Estimation of juvenile abundance. In: Annual Report of the Bureau of Commercial Fisheries Biolpgical Laboratory, Beaufort, North Carolina for F.Y. 1963. U. S. Fish Wildl. Serv., Bur. Comm. Fish. Circ. 184: 10-11.

Anthony L. Pacheco. 1954. Menhaden Program: Estimation of juvenile abundance. In: Annual Report of the Bureau of Commercial Fisheries Biological Laboratory, Beaufort, North Carolina for F.Y. 1963. U. S. Fish Wildl. Serv., Bur. Comm. Fish. Circ. 198: 12.

Anthony L. Pacheco and George C. Grant. 1965. Studies of the early life history of Atlantic menhaden in estuarine nurseries. Part 1 - Seasonal occurrence of juvenile menhaden and other small fishes in a tributary creek of Indian River, Delaware, 1947-1958. U. S. Fish Wildl. Serv., Spec. Sci. Report -- Fish. No. 504: iii, 1-32.

Anthony L. Pacheco. 1966. Menhaden Program: Estimation of juvenile abundance. In: Annual Report of the Bureau of Commercial Fisheries Biological Laboratory, Beaufort, North Carolina for F.Y. 1965. U. S. Fish Wildl. Serv., Bur. Comm. Fish. Circ. 240: 19-21.

John W. Reintjes and Anthony L. Pacheco. 1966. The relation of menhaden to estuaries. Symposium on Estuaries and Estuarine Animals. Am. Fish. Soc., Spec. Publ. 3: 50-58.

Anthony L. Pacheco. 1967. Menhaden Program: Estimation of juvenile abundance. In: Annual Report of the Bureau of Commercial Fisheries Biological Laboratory, Beaufort, North Carolina for F.Y. 1966. U. S. Fish Wildl. Serv., Bur. Comm. Fish. Circ. 264: 19-20.

Anthony L. Pacheco. (ed.). 1973. Proceedings of a Workshop on Eggs, Larvae and juvenile stages of Fishes in Atlantic Coast estuaries. June 1968, U. S. Dept. of Comm., NOAA, NMFS, MACFC., Tech. Publ. 1. 338 p.

ANTHONY L. PACHECO

Published (Continued)

Anthony L. Pacheco. 1973. Alewife, blueback herring and American shad. In: Proceedings of a workshop on eggs, larvae and juvenile stages of fishes in Atlantic coast estuaries. U. S. Dept. of Comm, NOAA, NMFS, MACFC Tech. Publ. 1., June 1968.p. 266, 292-295.

Anthony L. Pacheco. 1973. Striped mullet and white mullet. In: Proceedings of a workshop on eggs, larvae and juvenile stages of fishes in Atlantic coast estuaries. U. S. Dept. of Comm., NOAA, NMFS, MACFC Tech. Publ. 1., June 1968. p. 267.

Anthony L. Pacheco and George C. Grant. 1973. Immature fishes associated with larval Atlantic menhaden at Indian River Inlet, Delaware, 1958-61. In: Proceedings of a workshop on eggs, larvae and juvenile stages of fishes in Atlantic coast estuaries. U. S. Dept. of Comm., NOAA, NMFS, MACFC Tech. Publ. 1, June 1968. p. 78-117.

Co-compiler of Contributions to "The United States Marine Fisheries Resource, 1971", Wise, John P. (ed.). MARMAP Contrib. 1, 1974.

Anthony L. Pacheco. 1975. Ichthyoplankton, finfish and shellfish surveys. (In): Marine Environmental Implications of Offshore Oil and Gas Development in the Baltimore Canyon Region of the Mid-Atlantic Coast. Proceedings of Estuarine Research Federation - Outer Continental Shelf Conference and Workshop. Dec. 2-4, 1974. p. 291-296.

Chang, S. and A. L. Pacheco. 1975. An evaluation of the summer flounder population in Subarea 5 and Statistical Area 6. ICNAF Res. Doc. 75/69, June 1975, Ann. Meeting, ICNAF.

Publications in Preparation:

Pacheco, A. L., Kroger, R. L., and J. Guthrie. Evolution of survey methods for estimating the abundance of juvenile menhaden. Fish. Bull. U. S. Fish Wildl. Serv.

Anthony L. Pacheco and George C. Grant. Distribution, growth and numbers of juvenile menhaden in White Creek, Delaware.

Anthony L. Pacheco and Cynthia Joyner. Distribution of juvenile fish in estuarine waters of the United States Atlantic Coast.

PRESENTATIONS BEFORE SCIENTIFIC SOCIETIES:

Atlantic Estuarine Res. Society: Age and growth of the spot, Leiostomus xanthurus, in lower Chesapeake Bay. 1956.

AERS: Relation of low water temperature to the catch of young Atlantic croakers in exploratory trawls in Chesapeake Bay. 1957.

AERS: Results of tagging croakers, spot and sea trout in lower Chesapeake Bay. 1958.

American Fisheries Society: Estimating relative abundance of juvenile menhaden. (Symposium on Estimation Techniques): 1965.

PRESENTATIONS BEFORE SCIENTIFIC SOCIETIES (Continued):

ASMFC: Symposium of estuarine fishes: Seasonal and annual variations in catch of larval fishes at Indian River, Delaware. 1969.

Estuarine Research Federation: Ichthyoplankton, Finfish and Shellfish Survey. 1974.

AFFILIATION IN SCIENTIFIC ORGANIZATIONS AND OFFICES HELD:

(Member)

Atlantic Estuarine Research Society, Sec.-Tres., 1958
American Institute of Fishery Research Biologists
American Fisheries Society (Cert. Fishery Scientist)
Atlantic Fisheries Biologists
Gulf and Caribbean Fisheries Institute
American Littoral Society

CONSULTING ACTIVITIES:

Research Editor, Grolier, Inc.
Preparation of "learning packages" in marine science, Brookdale Community College

SPECIAL PROFESSIONAL ASSIGNMENTS:

Member, NMFS Status-of-Stocks Committee, Assignment April-June, 1971, Washington, D. C.
Member, American Fisheries Society: Committee on Conservation of Estuaries, 1971.
Member, Hudson River Technical Committee, 1973 -
Member, Central Office - Biostatistical Needs Committee
Reviewer, Fishery Bulletin, Chesapeake Science
Member, Regional Office - Program Integrations and Operations Committee, 1975.

WALLACE G. SMITH

BIRTH DATE: September 24, 1936
Lock Haven, Pennsylvania

EDUCATION:

Susquehanna University, Selinsgrove, Pa. 1955-58.
B. S. Biology 1962, Arizona State University, Tempe, Arizona
M. S. Marine Science 1965, College of William & Mary, Williamsburg, Virginia.

TRAINING:

Effective Supervision. NOAA, March 1973

(Special Scientific or Technical Skills)

Design and implementation of field studies pertaining to collection of planktonic fishes and related hydrographic data.
Acquired skill for identifying larval fishes, especially flatfishes (Pleuronectiformes), from Atlantic coastal waters.

EXPERIENCE BEFORE JOINING NMFS (BCF):

1963 - 1965	Research Assistant, Virginia Inst. of Marine Sciences
1965 - 1971	Fishery Biologist, Bureau of Sport Fisheries & Wildlife
1972 -	Chief, Resource Assessment Investigations (Ichthyoplankton) NMFS, Sandy Hook Laboratory, Highlands, N. J.

LISTING OF PUBLICATIONS:

Published

Smith, W. G. 1965. A study of the scup (Stenotomus chrysops) based on data obtained from catches of the 1963-64 winter trawl fishery. M. A. Thesis. College of William & Mary, Williamsburg, Va., 42 p.

Smith, W. G. 1968. A neonate Atlantic loggerhead turtle, Caretta caretta caretta (L.), captured at sea. Copeia 4: 880-881.

Smith, W. G. and J. J. Norcross. 1968. The status of the scup (Stenotomus chrysops) in winter trawl fishery. Ches. Sci. 9(4): 207-216.

Clark, J. R., W. G. Smith, A. W. Kendall, Jr., and M. P. Fahay. 1969. Studies of estuarine dependence of Atlantic coastal fishes. Data Report I: Northern Section, Cape Cod to Cape Lookout. R. V. Dolphin cruises 1965-66: Zooplankton volumes, midwater trawl collections, temperatures and salinities. Bureau of Sport Fisheries and Wildlife. Technical Paper 28: 132 pp.

Clark, J. R., W. G. Smith, A. W. Kendall, Jr., and M. P. Fahay. 1970. Studies of estuarine dependence of Atlantic coastal fishes. Data Report II: Southern Section, New River, N. C. to Palm Beach, Fla. R. V. Dolphin cruises 1967-68: Zooplankton volumes, surface-meter net collections, temperatures and salinities. Bureau of Sport Fisheries and Wildlife. Technical Paper 59: 97 pp.

(Published - Cont.)

Smith, W. G. and M. P. Fahay. 1970. A description of eggs and larvae of the summer flounder, Paralichthys dentatus (Linnaeus). Bur of Sport Fish. and Wildl. Research Report.75: 21 p.

Smith, W. G. 1973. The distribution of summer flounder, Paralichthys dentatus eggs and larvae on the continental shelf Cape Cod and Cape Lookout, 1965-66. Fish. Bull., U. S. 72(2): 527-548.

Smith, W. G. 1973. The range and distribution of some estuarine fishes -- winter flounder. In: Proceedings of a Workshop on Egg, Larval and Juvenile Stages of Fish in Atlantic Coast Estuaries. MACFC. Tech. Publ. 1. (Abstract).

Smith, W. G. 1973. The range and distribution of some estuarine fishes -- summer flounder. In: Proceedings of a Workshop on Egg, Larval and Juvenile Stages of Fish in Atlantic Coast Estuaries. MACFC. Tech. Publ. 1. (Abstract).

Smith, W. G., J. D. Sibunka, and A. Wells. 1975. Seasonal distributions of larval flatfishes (Pleuronectiformes) on the continental shelf between Cape Cod, Massachusetts and Cape Lookout, North Carolina, 1965-66. NOAA, Tech. Report, SSR-F #691.

In Preparation

Smith, W. G., J. D. Sibunka and A. Wells. The diel movements of larval yellowtail flounder, Limanda ferruginea (Storer), as determined from discrete depth sampling.

Berrien, P. B., M. P. Fahay, A. W. Kendall, Jr., and W. G. Smith. Atlas of the seasonal occurrence of fish larvae of the Middle Atlantic Bight. NOAA Technical Report, SSR-F.

Smith, W. G. Synopsis of the life history and population dynamics of the striped bass, Morone saxatilis (Walbaum). In: Atlas of Mar. Resources of the New York Bight. MESA Spec. Publ.

HONORS AND AWARDS:

1967 - BSF&W Incentive Award

PAPER PRESENTATIONS BEFORE PROFESSIONAL OR SCIENTIFIC SOCIETIES:

1966 - Atlantic States Marine Fisheries Commission - Summer flounder Committ
1968 - Atlantic States Marine Fisheries Commission - Egg, Larval & Juvenile Fish Workshop
1970 - Atlantic States Marine Fisheries Commission - Summer Flounder Committ
1974 - Martin Marietta Laboratories - The identification of fish eggs and larvae of Chesapeake Bay
1975 - Brookhaven National Laboratory - The seasonal distribution of yellowtail flounder larvae in the Middle Atlantic Bight, with comments on their diurnal activties.

C. Publications

1. Sexual dichromatism in the Tautog, Tautoga onitis (Linnaeus), with an observation of possible courtship behavior, 1968. By David W. Bridges and Michael P. Fahay. Trans. of Am. Fish. Soc., Vol. 97, No. 2, pp. 208-20

2. Studies of Estuarine Dependence of Atlantic Coastal Fishes. Data Report I: Northern Section, Cape Cod to Cape Lookout. R/V Dolphin cruises 1965-66: Zooplankton volumes, midwater trawl collections, temperature and salinities. 1969. By John Clark, W. G. Smith, Arthur W. Kendall, Jr., and Michael P. Fahay. Technical Papers of the Bur. of Sport Fish. Wildl. No. 28, pp. 1-13

3. Description of Eggs and Larvae of the Summer Flounder, Paralichthys dentatus. 1970. By W. G. Smith and Michael P. Fahay. Bur. of Sport Fish. Wildl. Research Report 75, pp. 1-21.

4. Studies of Estuarine Dependence of Atlantic Coastal Fishes. Data Report II: Southern Section, New River Inlet, N. C. to Palm Beach, Fla. R.V. Dolphin cruises 1967-68: Zooplankton volumes, surface meter-net collections, temperatures and salinities. 1971. By John Clark, W. G. Smith, Arthur W. Kendall, Jr., and Michael P. Fahay. Technical Papers of the Bur. of Sport Fish. Wildl. No. 59, pp. 1-97.

5. Occurrence of silver hake, Merluccius bilinearis, eggs and larvae along the Middle Atlantic continental shelf during 1966. 1974. By Michael P. Fa Fish. Bull., Vol. 72, No. 3, pp. 813-834.

6. An annotated list of larval and juvenile fishes captured with surface-towed meter net in the South Atlantic Bight during four R/V Dolphin cruises between May 1967 and February 1968. 1975. By Michael P. Fahay. NOAA Techn. Report NMFS SSRF-685, pp. 1-39.

7. Paraxenomystax sp., A muraenesocid leptocephalus, in the western North Atlantic. 1976. By Michael P. Fahay. Copeia, No. 1, In Press.

8. Inshore and estuarine occurrences of juvenile fishes of the families Albulidae and Elopidae. In: Proceedings of A Workshop on Egg, Larval and Juvenile Stages of Fish in Atlantic Coast Estuaries. 1973. Edited by Anthony L. Pacheco. 338 pp.

D. Scheduled Publications

9. Ophichthid leptocephali on the Atlantic continental shelf of the United States. By Michael P. Fahay and Cinda L. deGorgue. Bull. Mar. Sci. Manuscript under review

10. Methods of distinguishing the postlarvae of two sympatric species of Merluccius in the western North Atlantic. Manuscript in preparation.

11. A description of the eggs and larvae of tilefish, Lopholatilus chamaeleont By Peter L. Berrien and Michael P. Fahay. Manuscript in preparation.

12. Distribution of larval cod, pollock and haddock along the Middle Atlantic Continental shelf. By Michael P. Fahay. Manuscript outlined.

13. Description and distribution of larvae of the genera Phycis, Urophycis and Enchelyopus along the Middle Atlantic Continental shelf. Research begun and manuscript outlined,

E. Informal Documents

14. Provisional synopsis of ophichthid leptocephali in the Sandy Hook collection. By Michael P. Fahay.

15. Synopsis of biological data on the American eel, Anguilla rostrata (LeSeuer By Michael P. Fahay.

STUART J. WILK

DATE OF BIRTH: June 6, 1942
Passaic, N. J.

EDUCATION AND TRAINING:

B.S. Degree - Biology, Delaware Valley College of Science and Agriculture, Doyles Town, Pa., 1965.

Other courses- Graduate studies in microbiology, oceanology, and marine and freshwater ecology, Fordham University, N.Y., 1966 and 1967.

- Supervisory Training Course (Oct., 1973).

Special scientific or technical skills not indicated by above:

Ecological Techniques - received six weeks (daily) accelerated training and practical applications, 1962.

Histological Techniques - one year of training in practical applications, 1963.

Serological Techniques - one year accelerated training in practical applications, 1964.

Microbiological Techniques - one year accelerated training, 1965.

Biological Aid (summer student) U. S. Dept. of Interior, BSF, Sandy Hook Marine Laboratory, 12 weeks each in 1963 and 1964.

SCUBA diver certification, BSF, 1963-1970.

EXPERIENCE:

Natural History Studies of the bluefish, Pomatomus saltatrix (L.) along the Atlantic coast (1963-):

Designed and participated in the field collection program of bluefish along the Atlantic coast.

Designed and conducted bluefish "Return-a-Scale" tagging experiments for validation of annualr marks.

Designed and applied indexing formats to bluefish data files.

Analyzed 35,000 bluefish for size and age composition, growth pattern, gonadal maturation, food habits and anatomical characteristics.

Designed automatic data processing techniques and procedures for use in analysis of bluefish body proportion data, in order that discriminant function analysis statistics could be employed to describe population and racial differences.

EXPERIENCE (Continued):

Designed and applied photographic techniques to be used in collecting permanent records of fish body proportions for use in discriminant function analysis.

Ecological and Behavioral Studies (1963-68).

Participated in ecological surveys of natural reefs (1963-1966).

Participated in underwater surveys to recommend future outfall locations off Long Island, N.Y. (1966).

Designed experiments and equipment to test the effect of artificial light on marine fish (1967).

Participated in survey cruises to establish temperature range preferences of marine benthic species and analyzed age and size data relative to depth, salinity, temperature, and distances offshore (1968).

Aided in design and participated in underwater experiments relative to the behavior of the winter flounder, Pseudopleuronectes americanus (Walbaum) (1968).

Underwater Equipment Design and Development:

Participated in sea tests and made modifications to the submerged vehicle Sea-Kite (1965-1966).

Aided in design, construction and placement of assorted anchoring devices, for constant recording temperature and current units (1966-1967).

Natural History Studies of Sciaenids and Related Species (1968-):

Designed, developed and applied automatic data processing techniques to facilitate natural history and assessment studies of marine species in the following areas:

1) Age and growth based on scale analysis.
2) Distribution of species based on geographical and physical parameters of their environment.
3) Migrations based on tagging experiments and field surveys.
4) Racial and population structure of coastal stocks based on discriminant function analysis of measured and photographed morphometric and meristic materials.

Designed and conducted trawl surveys from New York to Florida to collect data pertinent to the life history and assessment studies of weakfish (Cynoscion regalis), spot (Leiostomus xanthurus), Atlantic croaker (Micropogan undulatus), Northern kingfish (Menticirrhus saxatilis), and southern kingfish (Menticirrhus americanus) (1968-1972).

EXPERIENCE (Continued):

Monmouth Medical Center - Dept. of Pathology (1968-1969): Conducted clinical bacteriology studies at night and on weekends for one and one-half years.

Biology of Marine Fishes of the N. Y. Bight (1974-):

Designed program to collect basic biological information from all finfishes occurring in the N.Y. Bight.

PUBLICATIONS:

Published

Wilk, S. J. 1966. Sighting of the black rudderfish, Underwater Naturalist, 3(4): 23.

Wilk, S. J. 1967. Two observations of predator avoidance. I. Striped mullet, Mugil cephalus. II. Silverside, Menidia menidia. Underwater Naturalist, 4(2): 27-28.

Wicklund, R., S. Wilk, and L. Ogren. 1968. Observations on wintering locations of the northern pipefish and spotted seahorse. Underwater Naturalist, 5(2): 26-28.

Olla, B., R. Wicklund, and S. J. Wilk. 1969. Behavior of winter flounder in a natural habitat. Trans. Am. Fish. Soc., 98(4): 717-720.

S. J. Wilk and R. Schmidt. 1971. A note on the capture of the black ruff, Centrolophus niger (Gmelin), in New Jersey waters. Chesapeake Sci., 12(3): 185.

In Press

Walford, L. A., S. J. Wilk, B. Olla, A. Kendall, B. Freeman, D. Deuel, and M. Silverman. The bluefish (Pomatomus saltatrix); A synoptic review of its biology. NMFS Fish Facts and ASMFC Leaflet.

Wilk, S. J. 1975. The weakfish (Cynoscion regalis), a review of its biology and present research. Proc. 1973. Annual Meeting ASMFC.

Wilk, S. J. 1975. Weakfish -- A wide ranging species. ASMFC Leaflet.

Wilk, S. J. and M. Silverman. Summer benthic fish fauna of Sandy Hook Bay, New Jersey. U. S. Dept. Comm., NMFS, Spec. Sci. Rep. Fish.

Wilk, S. J. and M. Silverman. Fish and hydrographic collections made by the research vessels Dolphin and Delaware II during 1968-72 from New York to Florida. U. S. Dept. Comm., NMFS, Spec. Sci. Rep. Fish.

PUBLICATIONS (Continued):

In Preparation

Walford, L. A., S. J. Wilk, and M. Silverman. Age and growth patterns of the bluefish, Pomatomus saltatrix, on the east coast of the United States.

Wilk, S. J. Annotated bibliography of bluefish, Pomatomus saltatrix.

Wilk, S. J. and L. A. Walford. A morphometric study of the bluefish, Pomatomus saltatrix on the east coast of the United States.

Walford, L. A., B. Freeman, and S. J. Wilk. Theoretical distribution of the bluefish, Pomatomus saltatrix, based on temperature.

Wilk, S. J. Annotated list of bluefish, Pomatomus saltatrix, food items.

Wilk, S. J. The bluefish. In: MESA New York Bight Atlas Monograph 15 - Fish Distribution.

Wilk, S. J. The weakfish. In: MESA New York Bight Atlas Monograph 15 - Fish Distribution.

Reports

Wilk, S. J., W. W. Morse, D. E. Ralph, and E. J. Steady. 1974. Semi-annual Report -- Life history aspects of the New York Bight finfishes. (June - November 1974). 125 pp.

Wilk, S. J. 1968. Cruise Report -- Dolphin 68-7 (July 30-August 2, 1968); Moriches Inlet, N. Y., to Shark River Inlet, N. J. Mimeo.

Wilk, S. J. 1968. Cruise Report -- Dolphin 68-13 (October 29-November 8, 1968); Oregon Inlet, N. C. to Bogue Inlet, N. C. Mimeo.

Wilk, S. J. 1969. Cruise Report -- Dolphin 69-9 (April 15-25, 1969); Cape May, N. J. to Cape Lookout area of N. C. Mimeo.

Wilk, S. J. 1969. Cruise Report -- Dolphin 69-15 (June 25-30, 1969); Sea Bright, N. J. to Ocean City, Md. Mimeo.

Wilk, S. J. 1969. Cruise Report -- Dolphin 69-21 (August 19-21, 1969); A single transect off Ocean City, Md. Mimeo.

Wilk, S. J. 1969. Cruise Report -- Dolphin 69-23 (September 10-18, 1969); Barnegat Inlet, N. J. to Cape Fear, N. C. Mimeo.

Wilk, S. J. 1969. Cruise Report -- Dolphin 69-25 (September 30-October 1, 1969); Shinnecock Inlet, N. Y., to Jones Inlet, N. Y. Mimeo.

Wilk, S. J. 1969. Cruise Report -- Dolphin 69-29 (October 28-November 6, 1969); Ocracoke Inlet, N. C., to Charleston, S. C. Mimeo.

Reports (Continued)

Wilk, S. J. 1970. Cruise Report -- Dolphin 70-7 (May 6-7, 1970); A single transect off Great Egg Harbor, N. J. Mimeo

Wilk, S. J. 1970. Cruise Report -- Dolphin 70-16 (July 6-10, 1970); Fire Island Inlet, N. Y., to Ocean City, Md. Mimeo.

Wilk, S. J. 1970. Cruise Report -- Dolphin 70-19 (August 3-7, 1970); Fire Island Inlet, N. Y. to Ocean City, Md. Mimeo.

Wilk, S. J. 1970. Cruise Report -- Dolphin 71-3 (March 29-April 9, 1970); Barnegat Inlet, N. J., to New Smyrna Beach, Fla. Mimeo.

Wilk, S. J. 1971. Cruise Report -- Dolphin 71-11 (July 12-23, 1971); Barnegat Inlet, N. J., to Ponce de Leon Inlet, Fla. Mimeo.

Wilk, S. J. 1971. Cruise Report -- Dolphin 71-14 (August 23-27, 1971). Fire Island, N.Y. to Ocean City, Md. Mimeo.

Wilk, S. J. 1971. Cruise Report -- Delaware 71-2 (November 2-3, 1971); Fire Island, N. Y., to Barnegat Inlet, N. J. Mimeo.

Wilk, S. J. 1971. Cruise Report -- Delaware 71-3 (November 8-19, 1971); Assateague Island, Va., to Cape Kennedy, Fla. Mimeo.

Wilk, S. J. 1972. Cruise Report -- Delaware 72-8 (March 20-31, 1972); Oregon Inlet, N. C., to Cape Kennedy, Fla. Mimeo.

Wilk, S. J. 1972. Cruise Report -- Delaware 72-15 (May 15-26, 1972); Oregon Inlet, N. C., to Cape Kennedy, Fla. Mimeo.

AFFILIATION IN SCIENTIFIC ORGANIZATIONS:

American Fishery Society
American Littoral Society
American Geographical Society
American Society of Ichthyologists and Herpetologists
Atlantic Estuarine Research Society
Northeast Fishing Biologists

CONSULTING ACTIVITIES:

Acted as Consultant for the "University Sealab" in conjunction with the Engineering Design and Analysis Laboratory of the University of New Hampshire. Included were site surveys and inspections of the underwater habitat (EDALHAB).

Acted as Consultant to the New Jersey Power & Light Company and Westinghouse Company as to the attraction power of underwater lighting systems.

STUART J. WILK

SPECIAL PROFESSIONAL ASSIGNMENTS:

Assigned to Washington, D. C. as aid to the Office of the Director (BSF - Interior) with regard to the resources of the Atlantic Outer Continental Shelf and the possibility of offshore drilling of oil.

Acted as Vessel Supervisor-Port Captain for the Sandy Hook Marine Laboratory (Approx. 2 years).

Acted as safety officer for the Sandy Hook Laboratory (3 years) during which time I represented the laboratory at Regional and National Safety Meetings.

Appointed as Middle Atlantic Coastal Fisheries Center's Coordinator for MARMAP - Phase III.

CLYDE L. MACKENZIE

June 4, 1931
Oak Bluffs, Mass.

PERSONAL DATA

Height - 6'3"

Weight - 195 lbs.

Marital status - Married - December 25, 1965
Spouse - Natalie MacKenzie
Children - Natalie - born September 1, 1968

EDUCATION

	Years	Degree	Major	Minor
Secondary				
Edgartown High School Edgartown, Mass.	1945-1949	Diploma		
College				
University of Massachusetts Amherst, Mass.	1952-1955	B.S.	Zoology	Wildlife Management
College of William & Mary Williamsburg, Va.	1955-1958	M.A.	Aquatic Biology	
University of Bridgeport Bridgeport, Conn.	1959-1961	(3 courses)		
U. S. Navy SCUBA School Key West, Fla.	1959	Certificate		

MILITARY SERVICE

None

PROFESSIONAL EXPERIENCE

1955-1958	Half-time Research Assistant, Marine Biology, Virginia Fisheries Laboratory, Gloucester Point, Va. Laboratory and field experiments concerning general biology and methods for control of Urosalpinx and Eupleura.
1958-1972	Fishery Biologist (Research), NMFS, Milford, Conn. (GS 11) Project and Program Leader for development of control methods of shellfish predators and benthic ecology studies.
1972-1973 (1 year)	Oyster consultant to Provincial Department of Fisheries, Prince Edward Island, Canada. Developed and implemented a program to increase production and earnings in the oyster industry on the Island.
1973-Present	Fishery Biologist, NMFS, MACFC, Sandy Hook, N. J. Resource Assessment Investigations

PUBLICATIONS

1960 LOOSANOFF, V. L., C. L. MACKENZIE, JR., AND L. W. SHEARER
Use of chemical barriers to protect shellfish beds from predators. Fisheries, Vol. III, Washington State Dept. of Fisheries, pp. 86-90.

1960 LOOSANOFF, V. L., C. L. MACKENZIE, JR., AND L. W. SHEARER
Use of chemicals to control shellfish predators. Science, Vol. 131, No. 3412, pp. 1522-1523.

1960 MACKENZIE, C. L., JR.
Interpretation of varices and growth ridges on shells of Eupleura caudata. Ecology, Vol. 41, No. 4, pp. 783-784.

1960 LOOSANOFF, V. L., C. L. MACKENZIE, JR., AND H. C. DAVIS
Progress report on chemical methods of control of molluscan enemies. U. S. Bureau Commer. Fish., Biol. Lab., Milford, Conn., Bull. No. 8, Vol. 24, pp. 1-20.

1961 SHEARER, L. W., AND C. L. MACKENZIE, JR.
The effects of salt solutions of different strengths on oyster enemies. Proc. Natl. Shellfish. Assoc., Vol. 50, pp. 97-103.

1961 MACKENZIE, C. L., JR., AND L. W. SHEARER
Chemical control of Polydora websteri and other annelids inhabiting oyster shells. Proc. Natl. Shellfish. Assoc., Vol. 50, pp. 105-111.

1961 MACKENZIE, C. L., JR.
Growth and reproduction of the oyster drill Eupleura caudata (Say) in the York River, Virginia. Ecology, Vol. 42, No. 2 pp. 317-338.

PUBLICATIONS (Cont'd)

1961 MACKENZIE, C. L., JR.
A practical chemical method for killing mussels and other oyster competitors. Commer. Fish. Rev., Vol. 23, No. 3, pp. 15-19.

1961 HARGIS, W. J., JR., AND C. L. MACKENZIE, JR.
Sexual behavior of the oyster drills: Eupleura caudata and Urosalpinx cinerea. Nautilus, Vol. 75, No. 1 pp. 7-16.

1961 DAVIS, H. C., V. L. LOOSANOFF, AND C. L. MACKENZIE, JR.
Field tests of a chemical method for the control of marine gastropods. U. S. Bureau Commer. Fish., Biol. Lab., Milford Conn., Bull. No. 5, Vol. 25, pp. 1-9.

1961 MACKENZIE, C. L., JR., V. L. LOOSANOFF, AND W. T. GNEWUCK
Use of chemically-treated cultch for increased production of seed oysters. U. S. Bureau Commer. Fish., Biol. Lab., Milford, Conn., Bull. No. 5, Vol. 25, pp. 1-9.

1962 MACKENZIE, C. L., JR.
Transportation of oyster drills by horseshoe "crabs". Science, Vol. 137, No. 3523, pp. 36-37.

1969 MACKENZIE, CLYDE L., JR.
Feeding rates of starfish, Asterias forbesi (Desor), at controlled water temperatures and during different seasons of the year. U. S. Fish Wildl. Serv., Fish. Bull. 68, No. 1, pp. 67-72.

1970 MACKENZIE, CLYDE L., JR.
Oyster culture in Long Island Sound 1966-69. Commer. Fish. Rev., Vol. 32, No. 1, pp. 27-40

1970 MACKENZIE, CLYDE L., JR.
Causes of oyster spat mortality, conditions of oyster setting beds, and recommendations for oyster bed management. Proc. Natl. Shellfish. Assoc., Vol. 60, pp. 59-67.

1970 MACKENZIE, CLYDE L., JR.
Control of oyster drills, Eupleura caudata and Urosalpinx cinerea, with the chemical Polystream. U. S. Fish Wildl. Serv., Fish. Bull., Vol. 68, No. 2, pp. 285-297.

1970 MACKENZIE, CLYDE L., JR.
Oyster culture modernization in Long Island Sound. The American Fish Farmer, Vol. No. 6, pp. 7-10.

PUBLICATIONS (Cont'd)

1973 MACKENZIE, CLYDE L., JR.
A management program for rehabilitating the oyster industry with descriptions of the biology of oysters the ecology of grounds, and the oyster industry on Prince Edward Island. Queen's Printer. Charlottetown. 85 pages (limited distribution).

1975 MACKENZIE, CLYDE L., JR.
Development of a program to rehabilitate the oyster industry of Prince Edward Island. Mar. Fish. Rev. Vol. 37, No. 3, p. 21-35. Mar. 1975.

In Preparation

An approach for increasing earnings and production in a traditional shellfishery

Biology of rock crabs (Cancer irroratus): Part I, Importance in ecosystem; and Part II, Reproduction and growth.

Sea anemone control of oyster populations in Maryland.

Use of quicklime to increase oyster seed production.

Population biology and role in the marine ecosystem of Cancer irroratus (Crustacea: decapoda)

Impact of predators on commercial hard clam populations

Similar annual oyster setting levels in New Jersey and Connecticut

Functional ecology of oyster populations under an improving cultivation system.

PROFESSIONAL SOCIETIES

National Shellfisheries Association
American Institute of Biological Sciences
New England Estuarine Research Society

THOMAS R. AZAROVITZ

DATE OF BIRTH: April 3, 1942
Detroit, Michigan

EUDCATION AND TRAINING:

High School - Linden, New Jersey
B.S. Degree - Monmouth College, West Long Branch, N. J., 1965
Biology.

Special Scientific or Technical Skills:

NOAA Training Course - Effective Supervision

Totally versed in the use of infrared remote sensing instruments and data applications of these devices to fishery and population monitoring research.

Experienced in methodology of groundfish population sampling. Also knowledge of groundfish sampling technique including research vessels and gear.

EXPERIENCE:

Aug. 1964 - April 1966	U. S. Dept. of the Interior, BSFW, Sandy Hook Marine Laboratory, Highlands, N. J., Biological Technician.
April 1966 - July 1968	Sandy Hook Laboratory, Highlands, N. J., Fishery Biologist (General).
July 1968 - to Present	U.S. Dept. of Comm., NOAA, NMFS. MACFC, Sandy Hook Laboratory, Fishery Biologist (Research) Supervisory.

AFFILITATION IN SCIENTIFIC ORGANIZATIONS AND OFFICES HELD:

American Society of Limnology and Oceanography
The American Fisheries Society
Atlantic Estuarine Research Society

SPECIAL PROFESSIONAL ASSIGNMENTS:

Member, of the Panel on Oceanography and Marine Resources of the Committee on Space Programs for Earth Observations, Advisory to the Dept. of Interior.

Chairman, Safety Committee - Sandy Hook Laboratory, 1972-73.

HONORS AND AWARDS:

May 6, 1974, Superior Performance Award - for planning, coordination and successful completion of the first coastal resource assessment survey.

THOMAS R. AZAROVITZ

PUBLICATIONS:

Published

Richard B. Stone and Thomas R. Azarovitz. 1968. An occurrence of unusually cold water off the Florida Coast. Underwater Naturalist 5(2): 14-17.

Monthly temperature and animal observation charts printed and distributed by G.P.O., January 1966 - June 1969 inclusive.

Williams, R. G., J. E. Lamoureux and Thomas R. Azarovitz. 1971. Seasonal variations of temperature and sound speed in Block Island Sound. Naval Underwater Systems Center.

Azarovitz, T. R. 1973. Cruise Report - Gear Testing Cruise, Delaware II/ Atlantic Twin (Mar. 31 - Apr. 3, 1973).

Azarovitz, T. R. 1973. Cruise Report - Coastal Groundfish Survey, Atlantic Twin (May 8 - June 4, 1973).

Azarovitz, T. R. 1973. Cruise Report - Coastal Groundfish Survey, Atlantic Twin (Oct. 1 - Nov. 7, 1973).

Azarovitz, T. R. 1974. Cruise Report - N. Y. Bight - MESA, Albatross IV (Feb. 2-5, 1974).

Azarovitz, T. R. 1974. Cruise Report - Nantucket Shoals to Jacksonville, Fla Atlantic Twin/Delaware II (April 1 - May 9, 1974).

Azarovitz, T. R. 1974. Cruise Report - Monthly Groundfish Survey, New York Bight, Delaware II (June 3-7, 1974).

Azarovitz, T. R. 1974. Cruise Report - Monthly Groundfish Survey, New York Bight, Delaware II (July 24-29, 1974).

Azarovitz, T. R. 1974. Cruise Report - Monthly Groundfish Survey, New York Bight, Delaware II (Aug. 16-21, 1974).

Azarovitz, T. R. 1974. Cruise Report - Monthly Groundfish Survey, New York Bight, Delaware II (Sept. 23-29, 1974.

Azarovitz, T. R. 1974. Cruise Report - Monthly Groundfish Survey, New York Bight, Delaware II (Oct. 22-28, 1974).

Azarovitz, T. R. 1974. Cruise Report - Monthly Groundfish Survey, New York Bight, Delaware II (Nov. 18-25, 1974).

Azarovitz, T. R. 1974. Cruise Report - Catch of Albatross IV and Delaware II on Groundfish Survey, Sept. 23 - October 4, 1974 (Part I, Covering Mid-Atlantic Shelf).

AZAROVITZ, THOMAS R.

PUBLICATIONS (Continued):

Published

Azarovitz, T. R. 1975. Cruise Report - Monthly Groundfish Survey, New York Bight, Delaware II (Jan. 31 - Feb. 6, 1975).

Azarovitz, T. R. 1975. Cruise Report - Mid-Atlantic Groundfish Survey, Albatross IV (March 4-21, 1975).

Azarovitz, T. R. 1975. Cruise Report - Coastal Groundfish Survey, Atlantic Twin (March 18-24, 1975).

Azarovitz, T. R. 1975. Cruise Report - Block Island Sound, Atlantic Twin (March 25, 1975.).

Azarovitz, T. R. 1975. Cruise Report - Monthly Groundfish Survey, New York Bight, Albatross IV (April 1-10, 1975).

Azarovitz, T. R. 1975. Cruise Report - Catch of Albatross IV on Groundfish Survey 75-3, Part I, March 14-18, 1975 and Part II, March 20-29, 1975 (Covering Mid-Atlantic Shelf and Lower Georges Bank).

In Preparation

Azarovitz, T. R. and Marvin Grosslein. New York Bight Atlas - Monograph 15 Fish Distribution.

Azarovitz, T. R. Effects on wind and tide on a thermal plume in Barnegat Bay, New Jersey.

Azarovitz, Seasonal Distribution loggerhead turtle - Atlantic coast.

Azarovitz, T. R. Groundfish Survey Cruise - Catch Results.

Azarovitz, T. R., M. Silverman, V. Anderson, A. Thoms, and C. Aussicker. MESA Report - Groundfish Survey Results, Report #1, Oct. 31 - Dec. 5, 1972

Azarovitz, T. R., M. Silverman, V. Anderson, A. Thoms, and C. Aussicker. MESA Report - Groundfish Survey Results, Report #2, May 8 - June 4, 1973.

Azarovitz, T. R., M. Silverman, V. Anderson, A. Thoms, and C. Aussicker. MESA Report - Groundfish Survey Results, Report #3, Oct. 1 - Nov. 7, 1973.

Azarovitz, T. R., M. Silverman, V. Anderson, A. Thoms, and C. Aussicker. MESA Report - Groundfish Survey Results, Report #4, Apr. 1 - May 2, 1974.

Azarovitz, T. R., M. Silverman, V. Anderson, A. Thoms, and C. Aussicker. MESA Report - Groundfish Survey Results, Report #5, Sept. 23 - Oct. 4, 1974.

Azarovitz, T. R., M. Silverman, V. Anderson, A. Thoms, and C. Aussicker. MESA Report - Groundfish Survey Results, Report #6, March 4-24, 1975.

JOHN W. ROPES

DATE OF BIRTH: May 17, 1927
Salem, Massachusetts

EDUCATION AND TRAINING:

B.A. Degree, 1953 - Alfred University, Biology, Chemistry

Other Courses - Summer courses at Ohio University, 1952
University of Delaware, 1952-53
University of Maine, 1962

University of Delaware - 1972-73, NMFS Training Assignment

Special Scientific or Technical Skills Acquired not Indicated by Above

I have participated as Chief Scientist and member of a team to sample commercial bivalves on numerous ocean cruises and field trips in bays and estuaries of New England and along the Middle Atlantic coast. Through research projects I have developed techniques to mark bivalves and crustacea, and determined the reproductive cycle of several bivalves. Manuscripts on these efforts are included in the list of publications below.

EXPERIENCE:

1971 to present - Fishery Biologist (Research) Resource Assessment Program. National Marine Fisheries Service, Oxford, Maryland
1964 to 1971 - Fishery Biologist (Research), Surf Clam Program, Bureau of Commercial Fisheries (NMFS), Oxford, Maryland.
1963 to 1964 - Fishery Biologist (Research), Surf Clam Program, Bureau of Commercial Fisheries, Franklin City Substation, Franklin City, Virginia
1959 to 1963 - Fishery Biologist (Research), Clam Investigations, Bureau of Commercial Fisheries, Biological Laboratory, West Boothbay Harbor, Maine
1955 to 1959 - Fishery Biologist (Research), Clam Investigations, Bureau of Commercial Fisheries, Kingston, Rhode Island
1954 to 1955 - Fishery Aid, Clam Investigations, Bureau of Commercial Fisheries, Newburyport, Massachusetts.

SCIENTIFIC HONORS AND AWARDS:

Cash incentive awards, Bureau of Commercial Fisheries, 1959, 1966, 1968
Surf Clam Program Award, Oyster Institute of North America, 1967
Certification as a Fishery Biologist, American Fisheries Society, 1969

JOHN W. ROPES

PAPER PRESENTATION BEFORE SCIENTIFIC SOCIETIES:

National Shellfisheries Association - many of the subjects in the list of publications were presented at meetings of this association.

American Institute of Biological Sciences (Ecological Society), "Reproductive Cycle of the surf clam, Spisula solidissima, in offshore New Jersey".

American Institute of Biological Sciences (Limnology and Oceanography), "Reproductive cycle of the surf clam, Spisula solidissima, in offshore New Jersey".

Atlantic Estuarine Research Society, "Reproductive cycle of the surf clam, Spisula solidissima, in offshore New Jersey"

American Malacological Union, 1969 and 1970, results of surveys for surf clams and ocean quahogs.

AFFILIATION IN SCIENTIFIC ORGANIZATIONS AND OFFICES HELD:

Atlantic Estuarine Research Society
American Fisheries Society
American Institute of Biological Sciences
American Malacological Union
American Society for Ichthyologists and Herpetologists
American Society of Limnology and Oceanography
American Institute of Fishery Biologists
Ecological Society of America
National Shellfisheries Association

CONSULTING ACTIVITIES:

Consultation with officials of the U. S. Army Corps of Engineers to discuss surf clam resources off Chincoteague, Virginia.

Consultation with officials of the town of Chincoteague, Virginia, and presentation of data on surf clam resources to them and residents of the town.

Various meetings with surf clam industry representatives at their offices, in our laboratory, and at the Sea Clam Packers Committee meetings.

JOHN W. ROPES

SPECIAL PROFESSIONAL ASSIGNMENTS:

Custodian of records and publications of the National Shellfisheries Association, 1967-70.

Chairman, Seminar Committee, Oxford Laboratory, 1969-70.

Assisted Mr. William N. Shaw, Editor of the Proceedings of the National Shellfisheries Association, with the publication of Volume 61 during 1970-71.

Temporary assignment in the Washington, D. C. Central Office of NMFS (May - July 1971) to prepare justifications for adding surf clams, ocean quahogs, and other marine animals to the list of Creatures of the Continental Shelf under Public Law 88-308.

Assignment as NMFS representative on a Technical Committee for a State-Federal Cooperative Fisheries Management Program on surf clams (June 1973 to present). Appointed interim Project Manager in March 1974.

JOHN W. ROPES

CHRONOLOGICAL LISTING OF PUBLICATIONS:

Published:

Ropes, John W. 1957. The blue crab. R. I. Maritimes 1(2): 6-7.

Baptist, John P., Osgood R. Smith and John W. Ropes. 1957. Migrations of the horseshoe crab, Limulus polyphemus, in Plum Island Sound, Massachusetts. U. S. Fish. Wildl. Serv., Spec. Sci. Rep., Fish. No. 220, 15 p.

Ropes, John W. and Charles E. Martin. 1960. The abundance and distribution of hard clams in Nantucket Sound, Massachusetts, 1958. U. S. Fish. Wildl. Serv., Spec. Sci. Rep. Fish. No. 354, 12 p.

Ropes, John W. 1961. Longevity of the horseshoe crab, Limulus polyphemus (L.). Trans. Am. Fish. Soc. 90(1): 79-80.

Ropes, John W. 1963. The incidence of Malacobdella grossa in hard clams from Nantucket Sound, Massachusetts. Limnol. Oceanogr. 8(3): 353-355.

Ropes, John W. 1964. Tests of internal tags for green crabs (Carcinus maenas) Proc. Nat. Shellfish. Assoc. 53: 147-159.

Ropes, John W. and Alden P. Stickney. 1965. Reproductive cycle of Mya arenaria in New England. Biol. Bull. 128(2): 315-327.

Ropes, John W. 1966. Pitar morrhuana, new host for Malacobdella grossa. Nautilus 79(4): 129-131.

Ropes, John W. 1966. Hermaphroditism in the surf clam, Spisula solidissima. Abstract. Annu. Rep. Amer. Malacol. Union., Bull. No. 33, p. 26.

Ropes, John W. and Arthur S. Merrill. 1966. The burrowing activities of the surf clam. Underwater Natur. 3(4): 11-17.

Ropes, John W. 1967. The locomotion and behavior of surf clams, Spisula solidissima. Abstract. Proc. Nat. Shellfish. Ass. 57: 4.

Ropes, John W. 1967. Surf clamming -- a growing fishery. Fish. News Int. 6(8): 58-60.

Ropes, John W. and Arthur S. Merrill. 1967. Malacobdella grossa in Pitar morrhuana and Mercenaria campechiensis. Nautilus 81(2): 37-40.

Merrill, Arthur S. and John W. Ropes. 1967. Distribution of southern quahogs off the middle Atlantic coast. Commer. Fish. Rev. 29(4): 62-64.

Ropes, John W., Arthur S. Merrill and Thomas M. Creutage. 1967. Marking surf clams for growth studies. Abstract. Proc. Nat. Shellfish. Ass. 57: 4.

Ropes, John W., Robert M. Yancey and Arthur S. Merrill. 1967. The growth of juvenile surf clams at Chincoteague Inlet, Virginia. Abstract. Proc. Nat. Shellfish. Ass. 57: 5.

Published: Cont.

Ropes, John W. 1968. Hermaphroditism in the surf clam, Spisula solidissima. Proc. Nat. Shellfish. Ass. 58: 63-65.

Ropes, John W. 1968. Reproductive cycle of the surf clam, Spisula solidissima, in offshore New Jersey. Biol. Bull. 135(2): 349-365.

Ropes, John W. 1968. The feeding habits of the green crab, Carcinus maenas (L.). U. S. Fish Wildl. Serv., Fish. Bull. 67(2): 183-203.

Ropes, John W. 1968. Data on the feeding habits of the green crab, Carcinus maenas (L.). U. S. Fish Wildl. Serv., Data Rep. No. 29.

Ropes, John W. 1968. The reproductive cycle of surf clams in offshore New Jersey. Abstract. Proc. Nat. Shellfish. Ass. 58: 8-9.

Ropes, John W. 1968. Soft-shell clams found in Chincoteague Inlet. Ches. Bay Affairs, Commer. Fish. News 1(3): 2-3.

Ropes, John W. 1968. Maryland surf clam industry shows increase. Ches. Bay Affairs, Commer. Fish. News 1(6): 1-3.

Ropes, John W. 1968. The reproductive cycle of surf clams in offshore New Jersey. Abstract. Proc. Nat. Shellfish. Ass. 58: 8-9.

Ropes, John W. 1968. The reproductive cycle of surf clams in offshore New Jersey. Program Abstr., Amer. Soc. Limnol. Oceanogr., 31st Annu. Meeting, Madison, Wis., June 17-21, 1968.

Merrill, Arthur S. and John W. Ropes. 1969. The general distribution of the surf clam and ocean quahog. Proc. Nat. Shellfish. Ass. 59: 40-45.

Merrill, Arthur S. and John W. Ropes. 1969. The distribution and density of the ocean quahog, Arctica islandica. Abstract. Annu. Rep. Amer. Malacol. Union, Bull. No. 36: 19.

Ropes, John W. and Arthur S. Merrill. 1969. The distribution and density of the surf clam, Spisula solidissima. Abstract. Annu. Rep. Amer. Malacol. Union, Bull. No. 36: 20.

Ropes, John W., J. L. Chamberlin and Arthur S. Merrill. 1969. Surf clam fishery. In F. E. Firth (ed.), the Encyclopedia of Marine Resources. Van Nostrand Reinhold Co., New York. p. 119-125.

Merrill, Arthur S., J. L. Chamberlin and John W. Ropes. 1969. Ocean quahog fishery. In F. E. Firth (ed), The Encyclopedia of Marine Resources. Van Nostrand Reinhold Co., New York. p. 125-129.

Ropes, John W. 1969. The surf clam fishery. N. Y. Shell Club Notes, No. 100: 11-13.

Ropes, John W. 1970. Maryland surf clam landings increase. Ches. Bay Affairs, Commer. Fish. News 3(2): 3-4.

Published: Cont.

Ropes, John W. 1970. Surf clam growth being studied by BCF. Ches. Bay Affairs, Commer. Fish. News 3(4): 3-4.

Ropes, John W. 1970. Clam parasites being studied. Ches. Bay Affairs, Commer. Fish. News 3(6): 4.

Ropes, John W. and Arthur S. Merrill. 1970. Marking surf clams. Proc. Nat. Shellfish. Ass. 60: 99-106.

Ropes, John W. 1970. Surf clams and ocean quahogs. Annu. Rep. Amer. Malacol. Union, Bull. No. 37: 22-23.

Ropes, John W. 1971. Percentage of solids and length-weight relationship of the ocean quahog. Proc. Nat. Shellfish. Ass. 61: 88-90.

Ropes, John W. and Arthur S. Merrill. 1971. Data on samples for surf clams and ocean quahogs. U. S. Dept. Commer., Nat. Oceanic Atmos. Admin., Nat. Mar. Fish. Serv., Data Rep. 57: 43 on 1 microfiche.

Ropes, John W. and Arthur S. Merrill. 1971. LP® polysulfide proves No. 1 — even with surf clams. Materially Speaking No. 12, Thiokol Chem. Corp., p. 7-11.

Barker, Allan M. and John W. Ropes. 1971. The Atlantic surf clam fishery - 1969. Commer. Fish. Rev. 33(6): 35-42.

Ropes, J. W. 1971. Maryland's hard clam studied at Oxford Laboratory. Ches. Bay Affairs, Commer. Fish. News 4(6): 2-3.

Ropes, John W. 1972. Chromosome number of the surf clam, Spisula solidissima. Nautilus 85(3): 93-95.

Ropes, John W. and Allan M. Barker. 1972. The Atlantic surf clam fishery -- 1970. Mar. Fish. Rev. 34(9-10): 36-44.

Ropes, John W. 1972. The Atlantic coast surf clam fishery 1965-69. Mar. Fish. Rev. 34(7-8): 20-29.

Ropes, J. W., A. M. Barker, and G. E. Ward, Jr. 1972. The Atlantic coast surf clam fishery - 1971. NOAA, Natl. Mar. Fish. Serv., Mar. Fish. Rev. 34(11-12): 48-54.

Ropes, J. W. and A. S. Merrill. 1973. To what extent do surf clams move? Nautilus 87(1): 19-21.

In Press:

Merrill, A. S. and J. W. Ropes. Important edible mollusks of the United States. CCA Bulletin.

Ropes, J. W. and A. S. Merrill. Shellfish Beds. In: Odum, H. T., B. G. Copeland, and E. MacMahan (ed.), Coastal Ecological Systems of the United States. The Conservation Foundation.

Ropes, J. W. A management program for surf clams. Chesapeake Bay Affairs, Commer. Fish. News.

In Preparation:

Ropes, John W. and Arthur S. Merrill. The distribution and density of surf clams.

Merrill, Arthur S. and John W. Ropes. The distribution and density of ocean quahogs.

Ropes. J. W. The speed of burrowing by surf clams, Spisula solidissima.

Ropes, J. W., A. M. Barker, and G. E. Ward, Jr. The Atlantic coast surf clam fishery -- 1972.

Ropes, J. W. and G. E. Ward, Jr. The Atlantic coast surf clam fishery -- 1973.

BRUCE L. FREEMAN DATE OF BIRTH: 5/5/1940

EDUCATION:

Associate in Applied Science, Forestry (graduated with honors), 1960.
Paul Smith's College, Paul Smith, N. Y.

Bachelor of Science, Zoology (graudated with honors), 1963.
North Carolina State University, Raleigh, N. C.

Graduate study (Marine Fisheries) at North Carolina State Univ., 1963.

Master of Science, Fishery Science, 1970.
University of Massachusetts, Amherst, Mass.

TRAINING:

Certified to use SCUBA to depths not to exceed 120 feet.

EMPLOYMENT BEFORE JOINING NMFS:

Joined the staff at Sandy Hook Laboratory in the summer of 1966, after completing course work in the Master's program at the University of Massachusetts.

PUBLICATIONS:

Anglers' Guide of the United States Atlantic Coast, Fish, Fishing Grounds and Fishing Facilities. (Published by the National Marine Fisheries Service, Seattle, Washington), 1974.

Section I - Passamaguoddy Bay, Maine to Cape Cod. 17 pp.
Section II - Nantucket Shoals to Long Island Sound. 17 pp.
Section III - Block Island to Cape May, New Jersey. 22 pp.
Section IV - Delaware Bay to False Cape, Virginia. 18 pp.

IN PRESS:

Anglers' Guide to the United States Atlantic Coast, Fish, Fishing Grounds and Fishing Facilities. (Published by the National Marine Fisheries Service, Seattle, Washington).

Section V - Chesapeake Bay. 20 pp.
Section VI - False Cape, Virginia to Altamaha Sound, Georgia. 24 pp.
Section VII - Altamaha Sound, Georgia to Fort Pierce Inlet, Florida. 26 pp.
Section VIII - St. Lucie Inlet, Florida to the Dry Tortugas. 28 pp.

The Bluefish (Pomatomus saltatrix), A synoptic review of its biology. (Eds.) L. A. Walford, S. Wilk, B. Olla, A. Kendall, B. Freeman, D. Deuel, and M. Silverman. 15 pp.

BRUCE L. FREEMAN

IN PREPARATION:

The tilefish fishery of the Middle Atlantic Coast. Bruce Freeman and Chester Buchanan.

An annotated list of the tilefish references. B. L. Freeman, S. Turner, and Michele Cox.

AFFILIATION IN SCIENTIFIC ORGANIZATIONS:

American Fishery Society
Atlantic Fisheries Biologists
National Oceanographic Foundation

PUBLIC PRESENTATIONS:

Represented the Middle Atlantic Coastal Fisheries Center at the National Fishery Exposition, Norfolk, Va., 1974.

Panelist on KYW-TV News Program, "Sorting it Out", Philadelphia, Pa., 1974.

Speaker at the organizational meeting of Fishing Coalition, Atlanta, Ga., 1972.

Speaker at Fishing Expo, Ocean City, Md., 1972.

Chairman of a panel composed of people from industry, university and government, discussing the marine environment in the New York-New Jersey area. New York University, 1971.

Speaker at meetings of research engineers at Bell Telephone Laboratories in Homdel and in Cranford, N. J. 1970-71.

During the past several years I have spoken at some 15 Angling and Sportfishing Clubs in the New Jersey and New York area.

CONSULTING ACTIVITIES:

Organizations, groups and individuals have contacted me for information or advice on various fishery problems. Among them have been:

U. S. Army Corps of Engineers, New York Office (three separate requests for information).

U. S. Dept. of the Interior, Bureau of River Basins, Upper Darby, Pa. (four separate requests for information).

Engineering consulting firms contracted by Public Service Electric and Gas Co., N. J. Central Power and Light Co., and the New Jersey Highway Authority. (three separate requests for information).

CONSULTING ACTIVITIES (cont.)

Outdoor columnist and writers for Sports Illustrated, Philadelphia Daily Journal, Asbury Park Press, Red Bank Register, and three independent authors. (nine requests for information).

U. S. Dept. of Commerce, NMFS.
Northeast Regional Office - Requested information about tilefish, 1974.
Southeast Fisheries Center - Requested information about bluefin tuna, 1974-75.

SPECIAL PROFESSIONAL ASSIGNMENTS:

Was a member of the "Committee On Data Needs", organized by Philip Roedel, Director, NMFS, 1972.

Key man from the Middle Atlantic Coastal Fisheries Center to the Fishery Extension Program, NOAA, Marine Advisory Service.

OTHER PROFESSIONAL ACTIVITIES:

Member Executive Committee of Schaefer Salt Water Fishing Contest. This contest covers eight states with over 20,000 contestants.

Initiated the F & M Schaefer Rare Book Collection, a collection of rare books and classical works in marine fisheries. The original gift of $2,500 was given by the F & M Schaefer Brewing Co., N. Y.

Instrumental in obtaining the 34-foot, diesel powered, sportfishing boat, Gladius X, for Sandy Hook Laboratory as a gift.

PETER L. BERRIEN

BIRTH DATE: March 15, 1941
Milford, Connecticut

EDUCATION AND TRAINING:

B. S. University of Connecticut, 1965 - Fisheries Management
M. S. University of Connecticut, 1968 - Fishery Biology

EXPERIENCE BEFORE JOINING NMFS (BCF):

May - June 1959 to 1965 Service yard for boats in Milford, Conn.
11/61 - 3/62 Botany Department University of Conn., Storrs, Conn.
10/63 - 5/64 Plant Science Department, Univ. of Conn., Storrs, Conn.
6/64 - 8/64 Fishery Aids, State Board of Fisheries and Game, Conn. State Office Building, Hartford, Conn.
6/65 - 6/67 Research Assistant, Plant Science Department, Univ of Conn., Storrs, Conn.
7/67 - to present: Fishery Biologist, National Marine Fisheries Service, Sandy Hook Laboratory, Highlands, N. J.

LISTING OF PUBLICATIONS:

Whitworth, W. R., P. L. Berrien, and W. T. Keller. 1968. Freshwater fishes of Connecticut.

Berrien, P. L. 1975. A description of Atlantic mackerel, Scomber scombrus, eggs and early larvae. Fish. Bull. 73(1): 186-192.

In preparation

Berrien, P. L. A comparison of larval Scomber scombrus and S. japonicus; and the occurrence of their eggs and larvae in continental shelf waters between Massachusetts and Florida.

Berrien, P. L. and M. P. Fahay. A description of the eggs, larvae and juveniles of the tilefish, Lopholatilus chamaeleonticeps.

Berrien, P. L. Vertical distribution of Scomber scombrus eggs and larvae.

Berrien, P. L., M. P. Fahay, A. W. Kendall, Jr., and W. G. Smith. Atlas on the seasonal occurrence and distribution of fish eggs and larvae in the Middle Atlantic Bight.

SCIENTIFIC HONORS AND AWARDS:

AFFILIATION IN SCIENTIFIC ORGANIZATIONS AND OFFICES HELD:

(Member of)
American Fisheries Society
American Society of Ichthyologists and Herpetologists

PETER L. BERRIEN

CONSULTING ACTIVITIES:

Served as consultant for various educational, private, and state institutions regarding identification of larval fishes.

SPECIAL PROFESSIONAL ASSIGNMENTS:

MICHAEL P. FAHAY

BIRTH DATE: February 9, 1941
Hollister, California

EDUCATION AND TRAINING:

High School - Menlo Atherton, Menlo Park, California, 1956-59
College - University of California, Riverside, Calif., 1959-61
Major, Life Science
B.A. - University of California, Los Angeles, Calif., 1961-64
Degree in Biological Illustration, Jan. 1964.

Course work included comparative anatomy, invertebrate zoology, vertebrate paleontology, biology of vertebrates, ichthyology, scientific illustration, technical writing, and 44 units of art, design and photography.

EXPERIENCE BEFORE JOINING NMFS (BCF):

Biological illustrator, self-employed, Los Angeles, California, Jan. 1964-Dec. 1965. Rendered scientific illustrations persuant to directions of zoologists for papers, theses, books.

Biologist - Diver; Pacific Bio-Marine Supply Company, Venice, Calif., May 1965-July 1965. Collected and maintained living marine animals for supply to researchers and educational institutions. Most collections made while SCUBA-diving; also tide pool collecting and beach seining.

December 1965 to Present - Sandy Hook Laboratory, Middle Atlantic Coastal Fisheries Center, Highlands, N. J., Fishery Biologist, Project Leader and Supervisor since 1969.

(Recent and Current Research)
Ichthyoplankton: Taxonomy and seasonal distribution with emphasis on the families Gadidae, Coryphaenidae, Albulidae, Elopidae and the order Anguilliformes (leptocephali); Descriptions of embryological and larval development with emphasis on families Bothidae and Branchiostegidae; studies of phototropic and feeding behavior and vertical distribution with emphasis on the family Gadidae.

LISTING OF PUBLICATIONS:

Cannon, Ray. 1966. The Sea of Cortez. Lane Magazine & Book Company, Menlo Park, Calif. 284 pp. Co-cartographer and Marine Life Illustrator.

Bridges, David W. and Michael P. Fahay. 1968. Sexual Dichromatism in the Tautog, Tautoga onitis (Linnaeus), with an observation of possible courtship behavior. Trans. Am. Fish. Soc. 97(2): 208-209.

Clark, J., W. G. Smith, A. W. Kendall, Jr., and M. P. Fahay. 1969. Studies of estuarine dependence of Atlantic coastal fishes. Data Report I: Northern Section, Cape Cod to Cape Lookout, R/V Dolphin Cruises 1965-66: Zooplankton volumes, midwater trawl collections, temperatures, and salinities. U. S. Bur. of Sport Fish. Wildl., Tech. Paper 28: 132 p.

PUBLICATIONS (CONT.)

Smith, W. G. and Michael P. Fahay. 1970. Description of eggs and larvae of the summer flounder, Paralichthys dentatus. U. S. Bur. of Sport Fish. Wildl., Res. Rept. 75, 21 pp.

Clark, J., W. G. Smith, A. W. Kendall, Jr., and M. P. Fahay. 1970. Studies of estuarine dependence of Atlantic coastal fishes. Data Report II: Southern Section, New River, N. C., to Palm Beach, Fla. R/V Dolphin Cruises 1967-68: Zooplankton volumes, surface meter net collections, temperatures, and salinities. U. S. Bur. of Sport Fish. Wildl., Tech. Paper 59, 97 pp.

Fahay, M. P. 1974. Occurrence of silver hake, Merluccius bilinearis, eggs and larvae along the Middle Atlantic continental shelf during 1966. Fish. Bull. 72(3): 22 pp.

Fahay, Michael P. 1975. An annotated list of larval and juvenile fishes captured with surface-towed meter net in the South Atlantic Bight during four R/V Dolphin cruises between May 1967 and February 1968. NOAA Tech. Report, NMFS SSRF-685, pp. 1-39.

Fahay, Michael P. (In Press). Paraxenomystax sp., A muraenesocid leptocephali in the Western North Atlantic. Copeia,1976, No. 1.

(In Preparation)

Ophichthid leptocephali on the Atlantic continental shelf of the United States. By Michael P. Fahay and Cindy L. deGorgue. Bull. Mar. Sci. (Manuscript under Review).

Methods of distinguishing the postlarvae of two sympatric species of Merluccius in the Western North Atlantic. Manuscript in preparation.

A description of the eggs and larvae of tilefish, Lopholatilus chamaeleonticeps. By Peter L. Berrien and Michael P. Fahay. Manuscript in preparation.

Distribution of larval cod, pollock and haddock along the Middle Atlantic continental shelf. By Michael P. Fahay. Manuscript outlined.

Description and distribution of larvae of the genera Phycis, Urophycis and Enchelyopus along the Middle Atlantic continental shelf. Research begun and manuscript outlined.

INFORMAL DOCUMENTS

Provisional synopsis of ophichthid leptocephali in the Sandy Hook collection. By Michael P. Fahay.

Synopsis of biological data on the American eel, Anquilla rostrata (LeSueur). by Michael P. Fahay.

PAPER PRESENTATIONS BEFORE SCIENTIFIC SOCIETIES:

Inshore and estuarine occurrences of juvenile fishes of the families Albulidae and Elopidae. Egg, larval and juvenile stages of fish workshop, Charleston, S. C., June 10-12, 1968.