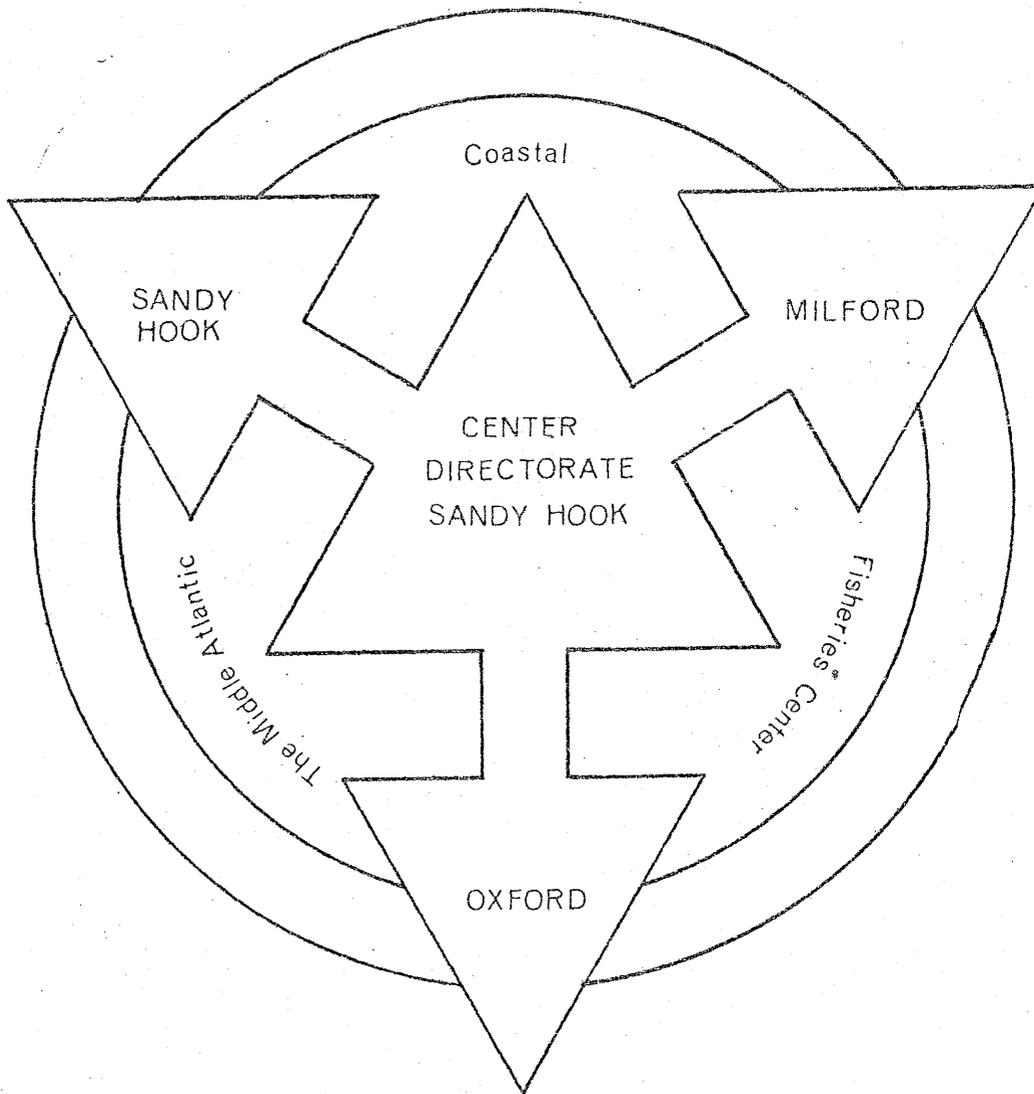




U.S. DEPARTMENT OF COMMERCE  
National Oceanic and Atmospheric Administration  
National Marine Fisheries Service  
Northeast Region

MIDDLE ATLANTIC COASTAL FISHERIES CENTER



TASK DEVELOPMENT PLANS - FY 1976  
(Submitted December 28, 1973)

Informal Report No. 18

MIDDLE ATLANTIC COASTAL  
FISHERIES CENTER

TASK DEVELOPMENT PLANS  
FY 1976

Submitted December 28, 1973

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## INTRODUCTION

This document contains our task development plans for FY 1976, as projected from the perspective available to us in December, 1973. There are three significant areas of change that are approached here: (1) reentry of this Center into molluscan aquaculture, beginning in the second half of FY 1975; (2) possible increases in resource assessment funding, following instruction received from the Associate Director for Resource Research for FY 1975 and FY 1976, and (3) potential but as yet unspecified increases in NOAA-MESA-N. Y. Bight funding for FY 1975 and FY 1976.

Concerning Molluscan Aquaculture, we have submitted TDP's showing reprogramming in the second half of FY 1975 of \$87.2K into Aquaculture. This amount of reprogrammed money will be increased to \$174.4K in FY 1976, when it will augment the \$300K for Aquaculture specified in the FY 1976 P. E. D.

For the second half of FY 1975 reprogrammed funds for Aquaculture would be as follows:

\$16.8K from "Contaminant Effects on Algae" (MAC013) to  
"Nutrition of Shellfish" (MAC057).

\$19.0K from "Mutagenesis" (MAC014) to  
"Genetics of Shellfish" (MAC056).

\$21.6K from "Comparative Pathobiology" (MAC016) to  
"Control of Disease" (MAC058)

\$29.8K from "Rearing of Indicator Organisms" (MAC012) to  
"Spawning and Rearing of Shellfish" (MAC059).

For FY 1976 this extent of reprogramming would continue, but for the full fiscal year, so the amounts would be doubled. The \$300.0K increase for Aquaculture for FY 1976 would augment the reprogrammed amount of \$174.4K in the following areas:

	FY'76 reprogrammed	FY'76 Increase	Total
MAC-057 (Nutrition)	\$33.6K	\$ 45.5K	\$ 79.1K
MAC-056 (Genetics)	38.1	102.3	140.4
MAC-058 (Control of Disease)	43.2	83.2	126.4
MAC-059 (Spawning and Rearing)	59.5	69.0	128.5
Totals:	\$174.4	\$300.0	\$474.4

Concerning Resource Assessment, we have received notice in Program Emphasis Documents to plan for an increase in FY 1975 of \$53.0K for Fishery Analysis, Sportfish. For FY 1976 we are planning for two potential levels of increases (\$4.0KK and \$2.34KK). Dr. Royce' PED instructions provide for increases of \$250.0K or \$60.0K in MAC-002 task to supplement survey cruises under subobjective code II-C-2; increases of \$10.0K in MAC-002 for surveys related to pollutant effects under subobjective II-C-4, and \$90.0K or \$80.0K in MAC-005 for assessment of sportfish under subobjective II-C-5. Separate TDP's have been prepared for the two potential levels of funding in these tasks (MAC-002 and MAC-005) for FY 1976. We are also submitting separate TDP's (MAC-063, Multispecies, Estuarine Assessment and MAC-064, Fisheries Analyses) which are outside PED guidelines, but which we feel will be important to initiate in FY 1976. Additionally, we are submitting a TDP (MAC-065) for reimbursable larval fish studies beginning in FY 1975 with AEC funding. This TDP was prepared at the specific request of the Central Office (RR).

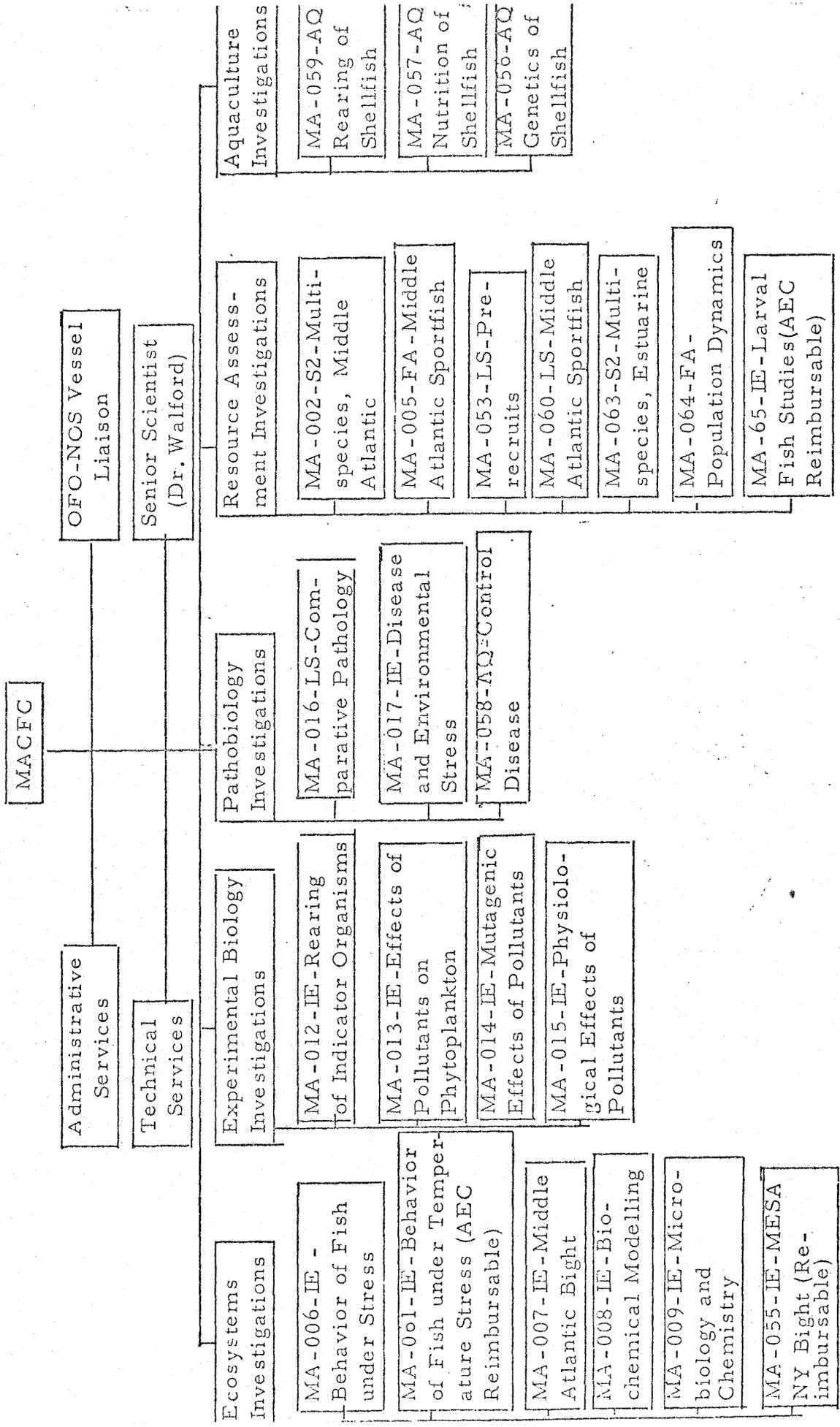
Concerning the NOAA-MESA-N. Y. Bight project funds assigned to this Center (\$279.0K for FY 1974) we have not yet received specific guidelines from the project office for increases in FY 1975 or FY 1976, but we have been informed of substantial increases in project funding expected in FY 1975. We have therefore projected in the task (MAC-055) an increase of \$100.0K for FY 1975 and an additional \$100.0K in FY 1976. This TDP may have to be modified substantially in program emphasis and funding when guidelines are received from the MESA-N. Y. Bight project office. We are listing this task as a reimbursable (R) even though the source of funds is NOAA.

Concerning Item 3 on page 1 of the TDP form (Relative ranking of task within FMC) we have not ranked reimbursables, since funding is external, and we have not ranked support tasks. Ranking of other tasks assumes that projected funding for FY 1976 will be realized.

We have included a TDP for construction of a new laboratory complex and wharf at Sandy Hook. With the activation of the Gateway National Seashore, of which Sandy Hook is a part, and with reactivation of Delaware II, these construction items become of increasing importance. This TDP would be in the category of requested increases beyond PED instructions.

All reimbursable tasks have been prepared to meet guidelines established for acceptance of reimbursable funds.

A few words may be necessary as to our manpower projections. We will complete fiscal '74 with a manpower distribution of 123 FTP personnel. These are distributed as follows: (1) Research (including MESA): 93, and (2) Support: 30. For fiscal '75, we project the following: (1) Research (including MESA): 85, and (2) Support: 30. For fiscal '76, we project a total of 96 in Research and 30 in Support. Three of the additional 11 ceilings were included in your PED. The additional 8 ceilings reflect our recognition of our needs for a full-scale aquaculture effort beginning in fiscal '76.



I/ Assumes full funding of all indicated FY'76 increases

MIDDLE ATLANTIC COASTAL FISHERIES CENTER

RELATIVE RANKING OF FY 1976 RESEARCH TASKS  
(EXCLUDING REIMBURSABLES)

1. MA-002-S2 - Multispecies, Middle Atlantic
2. MA-064-FA - Population Dynamics
3. MA-005-FA - Fishery Analysis; Middle Atlantic Sportfish
4. MA-007-IE - Impact of Environmental Change, Middle Atlantic
5. MA-012-IE - Rearing of Indicator Organisms
6. MA-015-IE - Physiological Effects of Pollutants
7. MA-017-IE - Disease of Environmental Stress
8. MA-009-IE - Microbiology and Chemistry
9. MA-056-AQ - Genetics of Shellfish
10. MA-014-IE - Mutagenic Effects of Pollutants
11. MA-058-AQ - Control of Disease
12. MA-016-LS - Comparative Pathobiology
13. MA-057-AQ - Nutrition of Shellfish
14. MA-013-IE - Pollutants & Phytoplankton Food-Chain Species
15. MA-006-IE - Behavior of Fish under Pollutant Stress
16. MA-053-LS - Prerecruits, Middle Atlantic Bight
17. MA-059-AQ - Spawning and Rearing of Shellfish
18. MA-060-LS - Life Studies, Sportfish
19. MA-008-IE - Biochemical Modelling
20. MA-063-S2 - Multispecies, Estuarine Assessment

Program Cross-walk: Reprogramming and Increases in Funds: FY'74 to FY'75 to FY'76

Fiscal Year 1974				Fiscal Year 1975				Fiscal Year 1976			
TDP #	Task #	Title	Increases Reprogramming	TDP #	Task #	Title	Increases Reprogramming	TDP #	Task #	Title	Increases Reprogramming
MA-02-74	2812P1	SH Multispecies, MAB <sup>1</sup> / <sub>1</sub>		MA-02-75	2812P1	SII Multispecies, MAB	Reprogram: Split Survey fr. Life History	MA-002-76	2812P1	SII Multispecies, MAB	
								MA-060-76		Life Studies: Sportfish	
MA-05-74	2813P1	FA Mid-Atlantic Sportfish	Increased funding	MA-05-75	2813P1	FA Mid-Atlantic Sportfish	Increased funding	MA-005-76	2813P1	FA Mid-Atlantic Sportfish	
MA-06-74	2818P1	Behavior of Fishes under Pollutant Stress	Reprogram: Split	MA-06-75	2818P1	Behavior of Fishes under Pollutant Stress		MA-006-76	2818P1	Behavior of Fishes under Pollutant Stress	
MA-61-74		Behavior of Fishes under Temperature Stress	AEC reimbursable	MA-61-75		Behavior of Fishes under Temperature Stress		MA-061-76		Behavior of Fishes under Temperature Stress	
MA-07-74	2818P2	IEC; Mid-Atlantic Bight		MA-07-75	2818P2	IEC; Mid-Atlantic Bight		MA-007-76	2818P2	IEC; Mid-Atlantic Bight	
MA-08-74	2818P3	Biochemical Modelling, MAB <sup>1</sup> / <sub>1</sub>		MA-08-75	2818P3	Biochemical Modelling, MAB		MA-008-76	2818P3	Biochemical Modelling, MAB	
MA-09-74	2818P4	Microbiology & Chemistry		MA-09-75	2818P4	IEC; Microbiology & Chemistry, MAB					
MA-12-74	2818P5	Rearing of Indicator Organisms	Reprogram % of effort to Aquaculture	MA-12-75	2818P5	Rearing of Indicator Organisms		MA-012-76	2818P5	Rearing of Indicator Organisms	
				MA-59-75	2826--	Aquaculture, Rearing of Shellfish	Increased funding	MA-059-76	2826--	Aquaculture, Rearing of Shellfish	
MA-13-74	2818P6	Pollutants & Phytoplankton Food-Chain Species	Reprogram % of effort to Aquaculture	MA-13-75	2818P6	Pollutants & Phytoplankton Food-Chain Species		MA-013-76	2818P6	Pollutants & Phytoplankton Food-Chain Species	
				MA-57-75	2826--	Aquaculture; Nutrition of Shellfish	Increased funding	MA-057-76	2826--	Aquaculture; Nutrition of Shellfish	
MA-14-74	2818P7	Mutagenic Effects of Pollutants	Reprogram % of effort to Aquaculture	MA-14-75	2818P7	Mutagenic Effects of Pollutants		MA-014-76	2818P7	Mutagenic Effects of Pollutants	
				MA-56-75	2826--	Aquaculture; Genetics of Shellfish	Increased funding	MA-056-76	2826--	Aquaculture; Genetics of Shellfish	
MA-15-74	2818P8	Physiol. Effects of Pollutant Stresses		MA-15-75	2818P8	Physiol. Effects of Pollutant Stresses		MA-015-76	2818P8	Physiol. Effects of Pollutant Stresses	
MA-16-74	2817P1	LS Comparative Pathobiology	Reprogram % of effort to Aquaculture	MA-16-75	2817P1	LS Comparative Pathobiology		MA-016-76	2817P1	LS Comparative Pathobiology	
				MA-58-75	2826--	Aquaculture; Control of Disease	Increased funding	MA-058-76	2826--	Aquaculture; Control of Disease	
MA-17-74	2818P9	Disease and Env. Stress		MA-17-75	2818P9	Disease and Env. Stress		MA-017-76	2818P9	Disease and Env. Stress	
MA-24-74	900040	Support (MACFC)	Reprogram MA-51-74	MA-24-75	900040	Support (MACFC)		MA-024-76	900040	Support (MACFC)	
MA-51-74	900040	Library (MACFC)	& MA-54-74 to Support								
MA-54-74	2817PE	MACFC, Collecting Task									
MA-50-74	2817PA	MACFC; ADP Collecting Task		MA-50-75	2817PA	MACFC; ADP Collecting Task		MA-050-76	2817PA	MACFC; ADP Collecting Task	
MA-52-74	2817PC	MACFC; Small Vessel Operations		MA-52-75	2817PC	MACFC; Small Vessel Operations		MA-052-76	2817PC	MACFC; Small Vessel Operations	
MA-55-74	281217	MESA (Reimbursable)-NYB	Increased funding	MA-55-75	271217	MESA (Reimbursable)-NYB		MA-055-76	271217	MESA (Reimbursable)NYB	
MA-53-74		LS Prerecruits, MAB		MA-53-75		LS Prerecruits, MAB		MA-053-76		LS Prerecruits, MAB	
								MA-063-76		MARMAP, Multi-Species; Estuarine Assessment	
								MA-064-76		FA Population Dynamics-MA Group	
				MA-65-75		Larval Fish Studies (AEC/Reimbursable)		MA-065-76		Larval Fish Studies (AEC-Reim	

NMFS TASK DEVELOPMENT PLAN  
SUMMARY SHEET

DATE PREPARED  
12/28/1973

TDP NUMBER/TASK TITLE	CURRENT YEAR FY 1974		BUDGET YEAR FY 1975		BUDGET YEAR +1 FY 1976	
	TARGET ALLOWANCE	INCREASE	TARGET ALLOWANCE	INCREASE	TARGET ALLOWANCE	INCREASE
	A	B	C	D	E	F
MA-002-76-SII-A Multi-Species - MAB	386.6	-	370.5	1/	192.9	259.6 69.8
MAC-060-76-LS-A Life History - Multispecies	-	-	-	-	118.3	10.0
MAC-005-76-FA-A Middle Atlantic Sportfish	32.7	-	75.7	53.0	155.8	90.4 82.6
MAC-006-76-IE-A Behavior of Fishes under Stress	124.9	2/	130.7	-	132.1	-
MAC-061-76-IE-R Behavior of Fishes under Temperature Stress			2/ (40.0)	-	(40.6)	-
MAC-007-76-IE-A IEC, Middle Atlantic Bight	(18.4)	-	73.8	-	75.2	-
MAC-008-76-IE-A Biochemical Modelling, MAB <sup>2/</sup>	128.0	-	✓ 135.8	-	137.1	-
MAC-009-76-IE-A Microbiology and Chemistry, MAB	261.3	-	✓ 271.1	-	270.9	-
MAC-012-76-IE-A Rearing of Indicator Organisms	201.8	3/	✓ 181.5	-	145.8	-
MAC-059-76-AQ-A Rearing of Shellfish	-	-	29.8	-	59.5	69.0
MAC-013-76-IE-A Pollutants & Phytoplankton Food-Chain Species	81.5	3/	✓ 68.4	-	45.2	-
MAC-057-76-AQ-A Nutrition of Shellfish			16.8	-	33.6	45.5
		(7)				

NMFS TASK DEVELOPMENT PLAN  
SUMMARY SHEET

DATE PREPARED  
12/28/1973

TDP NUMBER/TASK TITLE	CURRENT YEAR FY 1974		BUDGET YEAR FY 1975		BUDGET YEAR +1 FY 1976	
	TARGET ALLOWANCE	INCREASE	TARGET ALLOWANCE	INCREASE	TARGET ALLOWANCE	INCREASE
	A	B	C	D	E	F
MAC-014-76-IE-A Mutagenic Effects of Pollutants.	81.5	<u>3/</u> →	✓ 68.4	-	45.2	-
MAC-056-76-AQ-A Genetics of Shellfish	-	↘	19.0		38.1	102.3
MAC-015-76-IE-A Physiological Effects of Pollutant Stress	203.6		✓ 214.7		214.5	-
MAC-016-76-LS-A Comparative Pathobiology	184.1	<u>3/</u> →	159.8	-	159.7	-
MAC-058-76-AQ-A Control of Disease	-	↘	21.6	-	43.2	83.2
MAC-016-76-IE-A Disease & Environmental Stress	118.1	-	109.9	-	129.9	-
MAC-024-76-00-A Support (MACFC)	-		-		-	-
MAC-057-76-00-A Libraries (MACFC)	-	<u>4/</u> ↘	Terminated		-	-
MAC-050-76-00-A MACFC: ADP; Collecting Task	42.8	-	45.2	-	45.2	-
MAC-055-76-IE-R Biological Oceanography: MESA -NYB (Reimbursable)	<u>5/</u> (309.3)	-	<u>5/</u> (309.3)	<u>5/</u> (409.3)	<u>5/</u> (409.3)	<u>5/</u> (100.0)
MAC-053-76-LS-A Prerecruits, MAB	213.0	-	178.9	-	178.7	-
MAC-063-76-S2-A Multispecies; Estuarine Assessment	-	-	-	-	-	<u>6/</u> 225.0
		(C)				



NMFS TASK DEVELOPMENT PLAN

(See Detailed Instructions)

1. DATE PREPARED

Dec. 20, 1973

(Submit five copies by Jan. 2, 1974.)

To: Director, National Marine Fisheries Service, ATTN: Fx5 National Oceanic and Atmospheric Administration Washington, D.C. 20235

FMC's - Submit a separate Task Development Plan for each task beginning, continuing, or ending in FY 1974, FY 1975, or FY 1976. Total funding in each category must equal your PED specific total funding guidance. Reimbursable funds are not to be mingled with appropriated funds on any programmatic TDP; separate TDP's must be prepared. Submit one Support TDP itemizing the administrative support cost (Management Fund) for the FMC.

TOP NUMBER AC-002-76-SII-A	3. SUB-OBJECTIVE CODE II-C-2	4. RANK (To be completed only by FMC's and NMFS Hdqrs.) 1	FMC	NMFS HDQRS.
TASK NUMBER B12P1	6. TASK TITLE MARMAP II: Multispecies, Middle Atlantic Bight (High Increase)			
ORGANIZATION CODE 33000	8. ORGANIZATION TITLE (Responsible for execution of this task) Resource Assessment Investigations		9. PRINCIPLE LOCATION City: Sandy Hook Lab. State: N. J.	

OBJECT CLASS <small>Lines 10-19. Enter all dollar values as thousands and tenths of thousands. Lines 22-23. Enter as man-years and tenths of man-years.</small>	UNJ PROG CO	CURRENT YEAR FY 19 <sup>74</sup>		BUDGET YEAR FY 19 <sup>75</sup>		BUDGET YEAR + 1 FY 19 <sup>76</sup>	
		TARGET ALLOWANCE A	INCREASE B	TARGET ALLOWANCE C	INCREASE D	TARGET ALLOWANCE E	INCREASE F
Total Direct Labor	15	210.7		209.2		99.9	61.7
Travel	19	7.0		9.0		6.0	6.2
Rents, Communications, Utilities	21	1.0		1.0		1.0	3.2
Contracts <input type="checkbox"/> (To be let)	51 52	28.0		3.0		20.0	103.8
Grants <input type="checkbox"/> (Funds obligated)	58						
Supplies	53	9.1		15.3		4.7	25.0
Capital Equipment	54	10.0		14.0		4.0	30.0
Other (Estimated cost of all other direct cost not included above.)		18.5		16.3		8.3	5.7
Total Direct Funds (Add lines 10 through 16 above.)		284.3		267.8		143.9	235.6
Support Cost		102.3		102.7		49.0	24.0
Total Funds (Add lines 17 and 18.)		386.6		370.5		192.9	259.6
Positions, Full-time permanent (Number applicable to this Task. Also, complete NOAA Form 32-14C.)		11		10		5	2
Positions, Other (Number applicable to this Task)		8		10		5	5
Man-years, Permanent		8.8		8.0		3.8	1.6
Man-years, Other		4.4		5.2		1.9	4.0
Reimbursable Support (Reimbursable agreements only)							

OFFICIAL PREPARING REPORT (Signature) <i>Arthur Merrill</i>	26. CENTER DIRECTOR OR DESIGNATED REPRESENTATIVE (Sig.) <i>John C. Holston</i>
----------------------------------------------------------------	-----------------------------------------------------------------------------------

NMFS VESSEL REQUIREMENTS FY 1976

1. Date: Dec. 28, 1973      2. TDP No.: MAC-002-76-IE-A      3. Prepared by: John Holston

4. Task Title: Multispecies; Middle Atlantic Bight

SEA TIME - DAYS	CY (a)	BY		BY+1	
		(b) T.A.	(c) Incr.	(d) T.A.	(e) Incr.
5. R. V. Delaware II	50	60	-	60	20
6. R. V. Rorqual	30 <sup>1/</sup>	60	-	60	-
7. R. V. Delaware II (Ocean Shellfish)	-	25	-	25	-
8. Trawler (catamaran)	25 <sup>2/</sup>	25 <sup>2/</sup>	-	25 <sup>2/</sup>	20 <sup>2/</sup>
9.					
<b>TOTAL SEA DAYS</b>	<b>80 (55)</b>	<b>145 (75)</b>	<b>-</b>	<b>145 (75)</b>	<b>20 (20)</b>
11. Maximum	12	12	-	12	12
12. Minimum	8	8	-	8	8
13. Anticipated	10-12	10-12	-	10-12	10-12
14. 1st.	Mar/Apr. May	Sept. thru Nov.		Sept. thru Nov.	
15. 2nd.	-	Mar. thru May	-	Mar. thru May	
16. 3rd.					
17. 4th.					

Vessel Priority:

a. NOAA FRV (NOS)	<u>(1)</u>	d. Univ. RV Charter	<u>4</u>
b. NOAA RV (NOS)	<u>N/A</u>	e. Existing NMFS Small Boat	<u>(1)</u>
c. Commercial Charter	<u>3</u>	f. New, Specialized NMFS Small Boat	<u>2</u>

Remarks:  
 1/ For estuarine and shallow water assessment. Initial pilot studies to be done in FY'74 & '75 on transect through Raritan Bay and Hudson Canyon - Planning for FY'76 program.  
 2/ Charter envisioned in event that R. V. Delaware II not reactivated, with Rorqual for assessment work in waters less than three fathoms in depth. These cruises service many other Center activities, both in-house and contractual thru piggy-backing.



**NMFS TASK DEVELOPMENT PLAN**  
**29. FULL-TIME PERMANENT POSITIONS**

TDP NUMBER

MA-02

Reference NOAA Form 32-14A, Item 20. Identify all full-time permanent positions related to this Task for the budget year only. Do not include support personnel; they should appear in the appropriate support Task Development Plan.

POSITION TITLE	GS LEVEL	NAME OF INCUMBENT <i>(If no Incumbent, enter "Vacant")</i>	% OF TIME SPENT ON THIS TASK
Fishery Biologist (Administration)	15/4	Merrill, Arthur	100
Fishery Biologist (Research)	12/5	Ropes, John	100
Fishery Biologist (Research)	12/1	Wilk, Stuart	100
Fishery Biologist	11/1	Azarovitz, Thomas	100
Fishery Biologist	7/4	Morse, Wallace	100
Fishery Biologist	7/4	Silverman, Myron	100
Biological Aid	4/3	Roberts, Susan	100
Fishery Biologist	11/3	Christensen, Darryl	100
Secretary Stenographer	5/5	Swann, Jane	100
Biological Laboratory Technician (Fisheries)	5/9	Silverman, Malcolm	100

CONTINUE on plain 8x10½ paper. Identify "Page of Pages" and "TDP Number" in upper right corner. Comment on each of the following items, identifying by number. If item is not applicable, so indicate by entering "NA":

- 30. STATEMENT OF NEED
- 31. TASK OUTPUT
  - a. Significant Output
  - b. Termination Criteria
- 32. BENEFITS
- 33. ACTIVITY PLAN
- 34. MILESTONES

- 35. IMPACT OF TASK AUGMENTATION
  - a. Current Year
  - b. Budget Year
  - c. Budget Year + 1
- 36. BACK-UP DOCUMENTATION

- a. Detail Documentation *(Provide one sentence description.)*
- b. Related tasks and research presently being conducted.
- c. Indicate the Congressional legislative requirements.
- d. Indicate the Environmental Impact Statement (EIS) requirements.

(12)

### 30 - STATEMENT OF NEED

In order to efficiently and effectively utilize the fishery resources of the middle Atlantic, an adequate data base for management decisions must be established. Resource assessment data, supplemented by existing sources, including commercial fishery statistics, can provide accurate information to accomplish this objective.

Fishery stocks in the middle Atlantic are subjected to a combined influence of increasing fishing pressures and environmental extremes. Fishing pressures have changed drastically in recent years with the influence of foreign fleets offshore and with the recent and rapid development of inshore recreational fishing. Stresses of normal environmental extremes of temperature and salinity have been compounded by a reduction in quality and area of estuarine nursery zones.

In recent years the above factors have decreased the yield or catch rate of a number of our utilized fishery resources and in unrealized ways affected unexploited stocks. Many of these fishes migrate not only within the middle Atlantic area but range along the shelf waters of the entire Atlantic coast. These facts demonstrate why a strict regional approach is not practical, and show the need for a cooperative coastwise program utilizing a joint data bank for storage of information.

Primary recipients of these data will be Federal groups and in-house personnel developing ICNAF and bilateral policies. State agencies and industry representatives (commercial and recreational) will be given requested information to assist in management decisions.

### 31 - TASK OUTPUTS

- 1) Within a short time after each cruise, we will have target species information (e.g. relative abundance and distribution estimates) available for user groups. Special real-time reports will be released to users after monthly cruises in the coastal and offshore waters of the New York Bight.
- 2) Briefing books by species presenting a bibliography and summary of current knowledge to be used as a reference for ICNAF, bilateral, or State-Federal needs.
- 3) Comprehensive papers and data reports showing distribution and abundance of exploited fish. These data will be prepared on a regular basis to aid in developing sound NMFS management policies.

- 4) Estimates of potential yield from distribution and abundance data of unexploited fish stocks will be made available on request to industry representatives and State agencies. These are of particular interest in the development of the fishery between Capes Hatteras and Canaveral.
- 5) Reports and research papers are planned describing environmental factors and their effect on fish distribution and year-class success.
- 6) Once a data base is established, predictive models will be developed. These models will be continually refined with cruise and life history input.

### 32 - BENEFITS

The long-range benefit is a reliable assessment capability permitting the development of predictive models for middle Atlantic coastal resources. The results of this program integrated with those of sister laboratories or State agencies will provide data enabling management decisions for the entire coastal range of exploited and unexploited species. Using standard collecting gear, over enough years, normal fluctuations in specific fish populations can be compared with variations attributed to impact of natural or man-made stresses.

Information collected will be placed on request at the disposal of State, Federal, or international units in charge of preparing management recommendations.

Catch material from standard trawl hauls not used for assessment investigations will be forwarded upon request to colleagues in NMFS, State agencies, and universities for additional study. Included in these collections are tissue samples for contaminant studies and preserved diseased fish for Ecosystems Investigations.

Special collections and measurements are made in addition to the trawl hauls. Included are neuston and bongo tows for ichthyoplankton studies and standard hydrocasts for NMFS-AEG.

### 33 - ACTIVITIES PLAN

Using standard trawl gear, we will continue our sampling pattern in order to estimate and monitor numbers and distribution of all benthic fish species in the coastal Atlantic south to Cape Canaveral. Since the life pattern of many inshore finfish incur migrations of not only on a coastal scale but to the offshore waters, we will continue to coordinate and refine sampling systems carried on by Federal and State fishery laboratories both north and south of the region (from Nantucket to Cape Canaveral).

Assessment of groundfish will be based on fall and spring surveys, coast-wide in concept, particularly to monitor juvenile and adult components. Input statements on age, fecundity, growth, and stock identification will derive from other task units working on these species groups of special interest (i.e. drums, porgies, flounders). As a data base of life history information builds up, we will begin biometrical analysis to estimate the potential yield and harvestable fractions of particular stocks.

During spring and autumn assessment cruises, extra stations are made in the MESA grid study area between Montauk Point, N. Y., and Cape May, N. J. Data from these stations are for use within the MESA investigations but are also valuable supplements to assessment studies. Summer and winter MESA cruises are made in the same MESA grid area, and these data also supplement our routine assessment collections.

To supplement the basic collections of coastal assessment data, we plan to conduct a monthly survey of the finfish population in the Middle Atlantic Bight. These surveys extending east to Hudson Canyon will provide essential information on species composition, relative abundance, and life history features to both ongoing resource assessment and MESA programs. Use of standard gear and methods will allow the results to be directly comparable to semiannual survey data in MACFC-NEFC storage.

A data handling and processing system in common with NEFC has been developed and implemented at Sandy Hook. All coastal assessment data, after complete processing at Sandy Hook, are forwarded to NEFC, Woods Hole, for direct incorporation into the common data bank.

#### 34 - MILESTONES

FY 74:

- 1) Organize and conduct comprehensive and coordinated spring and autumn demersal fish assessment surveys of coastal waters between Nantucket and Cape Canaveral.
- 2) Conduct supplemental MESA cruises; winter and summer.
- 3) Compile briefing books on Atlantic coast species of major commercial and recreational interest.
- 4) Develop common data handling and processing system between NEFC, MACFC, and cooperating States, utilizing established programs for reporting data on a real-time basis.

FY 75:

- 1) Continuing -- Organize and conduct comprehensive and coordinated spring and autumn assessment surveys of coastal waters between Nantucket and Cape Canaveral.
- 2) Continue to conduct supplemental MESA cruises; winter and summer.
- 3) Compile briefing books on species of major commercial and recreational interest along the Atlantic coast.
- 4) Complete the development of a common data handling and processing system between NEFC, MACFC, and cooperating States.

FY 76:

- 1) Develop analysis capabilities with NEFC-MACFC assessment data.
- 2) Continuing -- Conduct monthly assessment surveys in the New York Bight from the coast to Hudson Canyon and supply user groups with real-time catch information from these cruises.
- 3) Continuing -- Update and add new major species to the briefing book series.
- 4) Begin data retrieval and analysis for special reports and publications.

35 - IMPACT OF TASK AUGMENTATION - \$250 k

- 1) CY -- No increases anticipated.
- 2) BY -- No increases anticipated.
- 3) BY + 1 -- FY 76 autumn and spring cruises will be extended to fully cover the Atlantic coastal waters south of Cape Hatteras to Cape Canaveral. This extension will permit assessments of unexploited fishes off our southeast coast and determine the movements and distribution of finfish resources (especially juveniles) when they migrate from the northern fishery.

A monthly New York Bight survey will be initiated in coastal waters of <15 fm to the edge of the shelf to include the Hudson Canyon region. This study will increase the accuracy of our coastwide assessment program and provide users in this heavily fished area with regular real-time distribution information. Data for contaminant and fish disease studies will be collected and forwarded to assigned NMFS study units.

36 - BACKUP DOCUMENTATION

Legislative program and Environmental Impact

A.

- 1) Cruise Report, R/V Atlantic Twin, May 7-June 14, 1973 -- preliminary results of coastal assessment and quarterly MESA cruise.
- 2) Cruise Report, Albatross IV, July 29-August 6, 1973 -- preliminary results MESA cruise.

B.

- 1) MACFC programs and tasks
  - a) Life History Investigation
  - b) Ichthyoplankton Investigation
  - c) Ecosystems Investigations
- 2) Other NMFS programs
  - a) NEFC groundfish survey
  - b) MARMAP
  - c) EDS
- 3) South Carolina - MARMAP

C. None

D. None

# NMFS TASK DEVELOPMENT PLAN

(See Detailed Instructions)

1 | 8

1. DATE PREPARED  
Dec. 20, 1973

(Submit five copies by Jan. 2, 1974.)

TO: Director, National Marine Fisheries Service, ATTN: Fx5 National Oceanic and Atmospheric Administration Washington, D.C. 20235

FMC's - Submit a separate Task Development Plan for each task beginning, continuing, or ending in FY 1974, FY 1975, or FY 1976. Total funding in each category must equal your PED specific total funding guidance. Reimbursable funds are not to be mingled with appropriated funds on any programmatic TDP; separate TDP's must be prepared. Submit one Support TDP itemizing the administrative support cost (Management Fund) for the FMC.

2. TDP NUMBER <b>MAC-002-76-SII-A</b>	3. SUB-OBJECTIVE CODE <b>II-C-2</b>	4. RANK (To be completed only by FMC's and NMFS Hdqrs.) <b>1</b>	FMC	NMFS HDQRS.
5. TASK NUMBER <b>2812P1</b>		6. TASK TITLE <b>MARMAP II: Multispecies, Middle Atlantic Bight (Low/INCREASE)</b>		
7. ORGANIZATION CODE <b>F33000</b>		8. ORGANIZATION TITLE (Responsible for execution of this task) <b>Resource Assessment Investigations</b>		9. PRINCIPLE LOCATION <b>City: Sandy Hook Lab. N.J. State: N.J.</b>

OBJECT CLASS <small>Lines 10-19. Enter all dollar values as thousands and tenths of thousands. Lines 22-23. Enter as man-years and tenths of man-years.</small>	UNIT R O O	CURRENT YEAR FY 19 <sup>74</sup>		BUDGET YEAR FY 19 <sup>75</sup>		BUDGET YEAR + 1 FY 19 <sup>76</sup>	
		TARGET ALLOWANCE A	INCREASE B	TARGET ALLOWANCE C	INCREASE D	TARGET ALLOWANCE E	INCREASE F
10. Total Direct Labor	15	210.7		209.2		99.9	49.0
11. Travel	19	7.0		9.0		6.0	
12. Rents, Communications, Utilities	21	1.0		1.0		1.0	
13. Contracts <input type="checkbox"/> (To be let) Grants <input type="checkbox"/> (Funds obligated)	51 52 58	28.0		3.0		20.0	
14. Supplies	53	9.1		15.3		4.7	3.0
15. Capital Equipment	54	10.0		14.0		4.0	
16. Other (Estimated cost of all other direct cost not included above.)		18.5		16.3		8.3	3.8
17. Total Direct Funds (Add lines 10 through 16 above.)		284.3		267.8		143.9	55.8
18. Support Cost		102.3		103.7		49.0	24.0
19. Total Funds (Add lines 17 and 18.)		386.6		370.5		192.9	79.8
20. Positions, Full-time permanent (Number applicable to this Task. Also, complete NOAA Form 32-14C.)		11		10		5	2
21. Positions, Other (Number applicable to this Task)		8		10		5	2
22. Man-years, Permanent		8.8		8.0		3.8	1.6
23. Man-years, Other		4.4		5.2		1.9	.8
24. Reimbursable Support (Reimbursable agreements only)							

OFFICIAL PREPARING REPORT (Signature)

25. CENTER DIRECTOR OR DESIGNATED REPRESENTATIVE (Sig.)

*Arthur Merrill*

*John Holsten*

### 30 - STATEMENT OF NEED

In order to efficiently and effectively utilize the fishery resources of the middle Atlantic, an adequate data base for management decisions must be established. Resource assessment data, supplemented by existing sources, including commercial fishery statistics, can provide accurate information to accomplish this objective.

Fishery stocks in the middle Atlantic are subjected to a combined influence of increasing fishing pressures and environmental extremes. Fishing pressures have changed drastically in recent years with the influence of foreign fleets offshore and with the recent and rapid development of inshore recreational fishing. Stresses of normal environmental extremes of temperature and salinity have been compounded by a reduction in quality and area of estuarine nursery zones.

In recent years the above factors have decreased the yield or catch rate of a number of our utilized fishery resources and in unrealized ways affected unexploited stocks. Many of these fishes migrate not only within the middle Atlantic area but range along the shelf waters of the entire Atlantic coast. These facts demonstrate why a strict regional approach is not practical; and show the need for a cooperative coastwise program utilizing a joint data bank for storage of information.

Primary recipients of these data will be Federal groups and in-house personnel developing ICNAF and bilateral policies. State agencies and industry representatives (commercial and recreational) will be given requested information to assist in management decisions.

### 31 - TASK OUTPUTS

- 1) Within a short time after each cruise, we will have target species information (e.g. relative abundance and distribution estimates) available for user groups.
- 2) Briefing books by species presenting a bibliography and summary of current knowledge to be used as a reference for ICNAF, bilateral, or State-Federal needs.
- 3) Comprehensive papers and data reports showing distribution and abundance of exploited fish. These data will be prepared on a regular basis to aid in developing sound NMFS management policies.

- 4) Estimates of potential yield from distribution and abundance data of unexploited fish stocks will be made available on request to industry representatives and State agencies. These are of particular interest in the development of the fishery between Capes Hatteras and Canaveral.
- 5) Reports and research papers are planned describing environmental factors and their effect on fish distribution and year-class success.
- 6) Once a data base is established, predictive models will be developed. These models will be continually refined with cruise and life history input.

### 32 - BENEFITS

The long-range benefit is a reliable assessment capability permitting the development of predictive models for middle Atlantic coastal resources. The results of this program integrated with those of sister laboratories or State agencies will provide data enabling management decisions for the entire coastal range of exploited and unexploited species. Using standard collecting gear, over enough years, normal fluctuations in specific fish populations can be compared with variations attributed to impact of natural or man-made stresses.

Information collected will be placed on request at the disposal of State, Federal, or international units in charge of preparing management recommendations.

Catch material from standard trawl hauls not used for assessment investigations will be forwarded upon request to colleagues in NMFS, State agencies, and universities for additional study. Included in these collections are tissue samples for contaminant studies and preserved diseased fish for Ecosystems Investigations.

Special collections and measurements are made in addition to the trawl hauls. Included are neuston and bongo tows for ichthyoplankton studies and standard hydrocasts for NMFS-AEG.

### 33 - ACTIVITIES PLAN

Using standard trawl gear, we will continue our sampling pattern in order to estimate and monitor numbers and distribution of all benthic fish species in the coastal Atlantic south to Cape Canaveral. Since the life pattern of many inshore finfish incur migrations of not only on a coastal scale but to the offshore waters, we will continue to coordinate and refine sampling systems carried on by Federal and State fishery laboratories both north and south of the region (from Nantucket to Cape Canaveral).

Assessment of groundfish will be based on fall and spring surveys, coast-wide in concept, particularly to monitor juvenile and adult components. Input statements on age, fecundity, growth, and stock identification will derive from other task units working on these species groups of special interest (i.e. drums, porgies, flounders). As a data base of life history information builds up, we will begin biometrical analysis to estimate the potential yield and harvestable fractions of particular stocks.

During spring and autumn assessment cruises, extra stations are made in the MESA grid study area between Montauk Point, N. Y., and Cape May, N. J. Data from these stations are for use within the MESA investigations but are also valuable supplements to assessment studies. Summer and winter MESA cruises are made in the same MESA grid area, and these data also supplement our routine assessment collections.

A data handling and processing system in common with NEFC has been developed and implemented at Sandy Hook. All coastal assessment data, after complete processing at Sandy Hook, are forwarded to NEFC, Woods Hole, for direct incorporation into the common data bank.

#### 34 - MILESTONES

##### FY 74:

- 1) Organize and conduct comprehensive and coordinated spring and autumn demersal fish assessment surveys of coastal waters between Nantucket and Cape Canaveral.
- 2) Conduct supplemental MESA cruises; winter and summer.
- 3) Compile briefing books on Atlantic coast species of major commercial and recreational interest.
- 4) Develop common data handling and processing system between NEFC, MACFC, and cooperating States, utilizing established programs for reporting data on a real-time basis.

##### FY 75:

- 1) Continue to organize and conduct comprehensive and coordinated spring and autumn assessment surveys of coastal waters between Nantucket and Cape Canaveral.
- 2) Continue to conduct supplemental MESA cruises; winter and summer.

- 3) Compile briefing books on species of major commercial and recreational interest along the Atlantic coast.
- 4) Complete the development of a common data handling and processing system between NEFC, MACFC, and cooperating States.

FY 76:

- 1) Develop analysis capabilities with NEFC-MACFC assessment data.
- 2) Continue to update and add new major species to the briefing book series.
- 3) Begin data retrieval and analysis for special reports and publications.

35 - IMPACT OF TASK AUGMENTATION - \$60 k

- 1) CY -- no increases anticipated.
- 2) BY -- no increases anticipated.
- 3) BY + 1 -- FY 76 autumn and spring cruises will be extended to fully cover the Atlantic coastal waters south of Cape Hatteras to Cape Canaveral. This extension will permit assessments of unexploited fishes off our southeast coast and determine the movements and distribution of finfish resources (especially juveniles) when they migrate from the northern fishery.

A New York Bight survey will be conducted in the coastal waters.

36 - BACKUP DOCUMENTATION

Legislative program and Environmental Impact

A.

- 1) Cruise Report, R/V Atlantic Twin, May 7-June 14, 1973 -- preliminary results of coastal assessment and quarterly MESA cruise.
- 2) Cruise Report, Albatross IV, July 29-August 6, 1973 -- preliminary results MESA cruise.

B.

- 1) MACFC programs and tasks
  - a) Life History Investigation
  - b) Ichthyoplankton Investigation
  - c) Ecosystems Investigations
- 2) Other NMFS programs
  - a) NEFC groundfish survey
  - b) MARMAP
  - c) EDS
- 3) South Carolina - MARMAP

C. None

D. None

NMFS TASK DEVELOPMENT PLAN

(See Detailed Instructions)

1. DATE PREPARED  
Dec. 20, 1973

(Submit five copies by Jan. 2, 1974.)

TO: Director, National Marine Fisheries Service, ATTN: Fx5 National Oceanic and Atmospheric Administration Washington, D.C. 20235

FMC's - Submit a separate Task Development Plan for each task beginning, continuing, or ending in FY 1974, FY 1975, or FY 1976. Total funding in each category must equal your PED specific total funding guidance. Reimbursable funds are not to be mingled with appropriated funds on any programmatic TDP; separate TDP's must be prepared. Submit one Support TDP itemizing the administrative support cost (Management Fund) for the FMC.

2. TDP NUMBER MAC-005-76-FA-A	3. SUB-OBJECTIVE CODE II-C-2	4. RANK (To be completed only by FMC's and NMFS Hdqrs.) 3	FMC	NMFS HDQRS.
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5. TASK NUMBER 2813P1	6. TASK TITLE Fishery Analysis, Middle Atlantic Sportfish (HIGH INCREASE)
--------------------------	------------------------------------------------------------------------------

7. ORGANIZATION CODE F33800	8. ORGANIZATION TITLE (Responsible for execution of this task) Resource Assessment Investigations	9. PRINCIPLE LOCATION City: Sandy Hook Lab. State: N.J.
--------------------------------	------------------------------------------------------------------------------------------------------	------------------------------------------------------------

OBJECT CLASS <small>Lines 10-19. Enter all dollar values as thousands and tenths of thousands. Lines 22-23. Enter as man-years and tenths of man-years.</small>	NOAA	CURRENT YEAR FY 1974		BUDGET YEAR FY 1975		BUDGET YEAR +1 FY 1976	
		TARGET ALLOWANCE A	INCREASE B	TARGET ALLOWANCE C	INCREASE D	TARGET ALLOWANCE E	INCREASE F
10. Total Direct Labor	15	19.8		47.2	16.4	78.5	17.6
11. Travel	19	.2		.2	7.5	7.7	2.5
12. Rents, Communications, Utilities	21						
13. Contracts <input type="checkbox"/> (To be let) Grants <input type="checkbox"/> (Funds obligated)	51 52 58	.3		.3	15.0	15.3	59.4
14. Supplies	53	.8		.8	7.9	8.7	3.9
15. Capital Equipment	54						
16. Other (Estimated cost of all other direct cost not included above.)		2.0		4.0	1.8	7.2	1.3
17. Total Direct Funds (Add lines 10 through 16 above.)		23.1		52.5	48.6	117.4	48.7
18. Support Cost		9.6		23.2	8.1	38.4	5.7
19. Total Funds (Add lines 17 and 18.)		32.7		75.7	56.7	155.8	90.4
20. Positions, Full-time permanent (Number applicable to this Task. Also, complete NOAA Form 32-14C.)		1		4	2	6	1
21. Positions, Other (Number applicable to this Task)		2		0	0	0	1
22. Man-years, Permanent		.8		2.8	1.6	5.6	.8
23. Man-years, Other		1.3		0	0	0	.4
24. Reimbursable Support (Reimbursable agreements only)							

25. OFFICIAL PREPARING REPORT (Signature) <i>William Merrill</i>	26. CENTER DIRECTOR OR DESIGNATED REPRESENTATIVE (Sig.) <i>John Holsten</i>
---------------------------------------------------------------------	--------------------------------------------------------------------------------

(2)



NMFS TASK DEVELOPMENT PLAN  
29. FULL-TIME PERMANENT POSITIONS

TDP NUMBER

MA-05

Reference NOAA Form 32-14A, Item 20. Identify all full-time permanent positions related to this Task for the budget year only. Do not include support personnel; they should appear in the appropriate support Task Development Plan.

POSITION TITLE	GS LEVEL	NAME OF INCUMBENT <i>(If no incumbent, enter "Vacant")</i>	% OF TIME SPENT ON THIS TASK
Fishery Biologist (Research)	13/2	Pacheco, Anthony	100
Fishery Biologist (Research)	9/5	Freeman, Bruce	50
Biological Laboratory Technician	7/6	Ward, George	100
Biological Aid	4/2	Farmen, Anton	100
Fishery Biologist (Research)	7/1	Vacant	100
Biological Aid	4/1	Vacant	100

CONTINUE on plain 8x10 1/2 paper. Identify "Page of Pages" and "TDP Number" in upper right corner. Comment on each of the following items, identifying by number. If item is not applicable, so indicate by entering "NA":

- 30. STATEMENT OF NEED
- 31. TASK OUTPUT
  - a. Significant Output
  - b. Termination Criteria
- 32. BENEFITS
- 33. ACTIVITY PLAN
- 34. MILESTONES
- 35. IMPACT OF TASK AUGMENTATION
  - a. Current Year
  - b. Budget Year
  - c. Budget Year + 1
- 36. BACK-UP DOCUMENTATION
  - a. Detail Documentation *(Provide one sentence description.)*
  - b. Related tasks and research presently being conducted.
  - c. Indicate the Congressional legislative requirements.
  - d. Indicate the Environmental Impact Statement (EIS) requirements.

### 30 - STATEMENT OF NEED

The NMFS has the responsibility to produce the knowledge required to maintain and utilize marine resources for the perpetual benefit of the nation. While provisions towards an understanding of the resource assessment aspects are provided for by ongoing research in the Middle Atlantic Bight, no complete measurement of the impact of the greatest predator -- man -- on the sport fish stocks is presently being made, although such measurements of removals are vital to a successful understanding and management of this portion of the living marine resources.

The NMFS must be involved with development of source information to insure a unified data base. In essence, the proportion of recreational harvest to total harvest must be determined. Since most of the stocks entering the fishery migrate across several State boundaries, comparability of information must be assured. Such assurance can be obtained by maintaining a central data bank with all inputs evaluated by a small responsible group within NMFS. Internally, we need this information for a better understanding of the population dynamics of the principally utilized stocks. This will satisfy our need to supply best estimates of the present and future status of the stocks so that international, national, and State conservation groups may develop management schemes.

### 31 - TASK OUTPUTS

- 1) Summary data which as a minimum must consist of (a) fishing area, (b) catch by species and by number of each species, (c) effort by fishery component and vessel characteristics, capacity, endurance, etc., and (d) biological samples of individual fish. With the initiation of routine resource assessment cruises by MACFC, the implementation now of concurrent collection of biostatistics in the Bight, even if on an interim basis, is vitally needed. Estimates of total harvest for the region and for sub-areas within the area are the primary output.
- 2) Requirements of biostatistical analysis are long-term. Changes in harvest will occur from variations of year-class success, fishing pressure, or environmental degradation. The impact of each of these elements is presently speculative. Catch analysis of local stocks to determine degree of mixing, growth rates, and age composition will allow predictions of yield and development of management strategies if necessary for coastal species.

### 32 - BENEFITS

The task will provide statistically reliable indices to establish a base line level and subsequent variations from base line of the sport fish harvest. Accuracy of estimates will depend on degree of cooperation and coverage possible with available work force.

### 33 - ACTIVITIES PLAN

Successful management of commercial and sport fish resources requires the systematic collection and analysis of commercial and sport fish catch data. This need can be most effectively answered, pending development of a formal program development plan, by use of contract reporters located at strategic ports at the periphery of the Middle Atlantic Bight. Such reporters, working several hours per day, are necessary since sport fish catch data must be collected at the dock immediately after the arrival of the vessel.

A significant portion of the data will be fed to us through services contracted with several States. Rhode Island, Connecticut, New York, and New Jersey have expressed a willingness to embark on surveys to assess their sport fish resource with Federal support.

### 34 - MILESTONES

#### FY 74:

Develop liaison and contacts to determine sampling strategy, design programmatic operations, and formulate contract specifications.

#### FY 75:

Conduct a pilot study of sport fishing in New Jersey in a State-Federal study. Supportive sampling by MACFC staff in Delmarva selected sites for comparative biosamples of catch.

#### FY 76:

Expand evolved technique of data acquisition and processing into contracted input from Rhode Island, Connecticut, New York, and New Jersey. Analyze and prepare report for publication.

Additional funds: (\$10 k) will augment development of a system of incorporating cruise findings with statistical technician interviews and sport fish biodata for real-time reporting to sport fish community and other interested groups.

35 - IMPACT OF TASK AUGMENTATION

- 1) CY - \$43 k reprogrammed to augment study. Develop contacts, formats, and liaison.
- 2) BY - \$53 k increase and two positions to initiate pilot contract study and NMFS staff involvement to supplement and coordinate.
- 3) a. BY + 1 - \$90 k increase and one position to expand contractual services and to coordinate input facility for biological summaries of regional sport fish impact.  
b. Augment development of information feedback system to users.

36 - BACKUP DOCUMENTATION

- A. Deuel, D. G. 1970. The 1970 salt-water angling survey. U.S. Dept. Commerce, NOAA, Natl. Mar. Fish. Serv., Curr. Fish. Statist. No. 6200, 54 pp.  
Deuel, D. G. and J. R. Clark. 1968. The 1965 salt-water angling survey. U.S. Dept. Interior, Bur. Sport Fish. Wildl. Resour. Publ. 67, 51 pp.  
U.S. Dept. Interior, Bur. Sport Fish. Wildl. Resour. Publ. 67, 51 pp. 1968.  
1955 national survey of fishing and hunting. U.S. Dept. Interior, Bur. Sport Fish. Wildl. Circ. 44, 50 pp. 1956.  
1970 national survey of fishing and hunting. U.S. Dept. Interior, Bur. Sport Fish. Wildl. Resour. Publ. 95, 106 pp. 1972.  
Wheatland, H. A. 1973. Developing a marine sport fish statistics program. Proc. Gulf Caribb. Fish. Inst., 25th Annu. Sess., 181-184 p.
- B. Beaufort laboratory studies on south Atlantic charter boat fishery and artificial reefs. Central Office survey plans for telephone survey of sport fish statistics.
- C. None
- D. None

# NMFS TASK DEVELOPMENT PLAN

(See Detailed Instructions)

1 | 6

1. DATE PREPARED  
Dec. 20, 1973

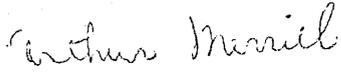
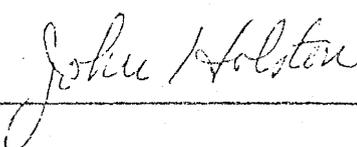
(Submit five copies by Jan. 2, 1974.)

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2. TOP NUMBER	3. SUB-OBJECTIVE CODE	4. RANK (To be completed only by FMC's and NMFS Hdqrs.)	FMC	NMFS HDQRS.
MAC-005-76-FA-A	II-C-2		3	
5. TASK NUMBER	6. TASK TITLE			
2813P1	Fishery Analysis; Middle Atlantic Sportfish (Low Increase)			
7. ORGANIZATION CODE	8. ORGANIZATION TITLE (Responsible for execution of this task)		9. PRINCIPLE LOCATION	
F33800	Resource Assessment Investigations		City: Sandy Hook Lab. State: N.J.	

OBJECT CLASS	ENJ PROG	CURRENT YEAR FY 19 <sup>74</sup>		BUDGET YEAR FY 19 <sup>75</sup>		BUDGET YEAR +1 FY 19 <sup>76</sup>	
		TARGET ALLOWANCE A	INCREASE B	TARGET ALLOWANCE C	INCREASE D	TARGET ALLOWANCE E	INCREASE F
10. Total Direct Labor	15	19.8		47.2	16.4	78.5	11.6
11. Travel	19	.2		.2	7.5	7.7	2.5
12. Rents, Communications, Utilities	21						
13. Contracts <input type="checkbox"/> (To be let)	51	.3		.3	15.0	15.3	60.0
Grants <input type="checkbox"/> (Funds obligated)	52						
	58						
14. Supplies	53	.8		.8	7.9	8.7	1.5
15. Capital Equipment	54						
16. Other (Estimated cost of all other direct cost not included above.)		2.0		4.0	1.8	7.2	1.3
17. Total Direct Funds (Add lines 10 through 16 above.)		23.1		52.5	48.6	117.4	76.9
18. Support Cost		9.6		23.2	4.4	38.4	5.7
19. Total Funds (Add lines 17 and 18.)		32.7		75.7	53.0	155.8	82.6
20. Positions, Full-time permanent (Number applicable to this Task. Also, complete NOAA Form 32-14C.)		1		4	2	6	1
21. Positions, Other (Number applicable to this Task)		2		0	0	0	0
2. Man-years, Permanent		.8		2.8	1.6	5.6	.8
3. Man-years, Other		1.3		0	0	0	0
4. Reimbursable Support (Reimbursable increments only)							

23. OFFICIAL PREPARING REPORT (Signature)	26. CENTER DIRECTOR OR DESIGNATED REPRESENTATIVE (Sig.)
 (32)	

NMFS TASK DEVELOPMENT PLAN  
29. FULL-TIME PERMANENT POSITIONS

3 6  
TDP NUMBER  
MA-05

Reference NOAA Form 32-14A, Item 20. Identify all full-time permanent positions related to this Task for the budget year only. Do not include support personnel; they should appear in the appropriate support Task Development Plan.

POSITION TITLE	GS LEVEL	NAME OF INCUMBENT <i>(If no Incumbent, enter "Vacant")</i>	% OF TIME SPENT ON THIS TASK
Fishery Biologist (Research)	13/2	Pacheco, Anthony	100
Fishery Biologist (Research)	9/5	Freeman, Bruce	50
Biological Laboratory Technician	7/6	Ward, George	100
Biological Aid	4/2	Farmen, Anton	100
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CONTINUE on plain 8x10½ paper. Identify "Page of Pages" and "TDP Number" in upper right corner. Comment on each of the following items, identifying by number. If item is not applicable, so indicate by entering "NA":

- 30. STATEMENT OF NEED
- 31. TASK OUTPUT
  - a. Significant Output
  - b. Termination Criteria
- 32. BENEFITS
- 33. ACTIVITY PLAN
- 34. MILESTONES
- 35. IMPACT OF TASK AUGMENTATION
  - a. Current Year
  - b. Budget Year
  - c. Budget Year + 1
- 36. BACK-UP DOCUMENTATION
  - a. Detail Documentation *(Provide one sentence description.)*
  - b. Related tasks and research presently being conducted.
  - c. Indicate the Congressional legislative requirements.
  - d. Indicate the Environmental Impact Statement (EIS) requirements.

(34)

### 30 - STATEMENT OF NEED

The NMFS has the responsibility to produce the knowledge required to maintain and utilize marine resources for the perpetual benefit of the nation. While provisions towards an understanding of the resource assessment aspects are provided for by ongoing research in the Middle Atlantic Bight, no complete measurement of the impact of the greatest predator -- man -- on the sport fish stocks is presently being made, although such measurements of removals are vital to a successful understanding and management of this portion of the living marine resources.

The NMFS must be involved with development of source information to insure a unified data base. In essence, the proportion of recreational harvest to total harvest must be determined. Since most of the stocks entering the fishery migrate across several State boundaries, comparability of information must be assured. Such assurance can be obtained by maintaining a central data bank with all inputs evaluated by a small responsible group within NMFS. Internally, we need this information for a better understanding of the population dynamics of the principally utilized stocks. This will satisfy our need to supply best estimates of the present and future status of the stocks so that international, national, and State conservation groups may develop management schemes.

### 31 - TASK OUTPUTS

- 1) Summary data which as a minimum must consist of (a) fishing area, (b) catch by species and by number of each species, (c) effort by fishery component and vessel characteristics, capacity, endurance, etc., and (d) biological samples of individual fish. With the initiation of routine resource assessment cruises by MACFC, the implementation now of concurrent collection of biostatistics in the Bight, even if on an interim basis, is vitally needed. Estimates of total harvest for the region and for sub-areas within the area are the primary output.
- 2) Requirements of biostatistical analysis are long-term. Changes in harvest will occur from variations of year-class success, fishing pressure, or environmental degradation. The impact of each of these elements is presently speculative. Catch analysis of local stocks to determine degree of mixing, growth rates, and age composition will allow predictions of yield and development of management strategies if necessary for coastal species.

### 32 - BENEFITS

The task will provide statistically reliable indices to establish a base line level and subsequent variations from base line of the sport fish harvest. Accuracy of estimates will depend on degree of cooperation and coverage possible with available work force.

### 33 - ACTIVITIES PLAN

Successful management of commercial and sport fish resources requires the systematic collection and analysis of commercial and sport fish catch data. This need can be most effectively answered, pending development of a formal program development plan, by use of contract reporters located at strategic ports at the periphery of the Middle Atlantic Bight. Such reporters, working several hours per day, are necessary since sport fish catch data must be collected at the dock immediately after the arrival of the vessel.

A significant portion of the data will be fed to us through services contracted with several States. Rhode Island, Connecticut, New York, and New Jersey have expressed a willingness to embark on surveys to assess their sport fish resource with Federal support.

### 34 - MILESTONES

#### FY 74:

Develop liaison and contacts to determine sampling strategy, design programmatic operations, and formulate contract specifications.

#### FY 75:

Conduct a pilot study of sport fishing in New Jersey in a State-Federal study. Supportive sampling by MACFC staff in Delmarva selected sites for comparative biosamples of catch.

#### FY 76:

Expand evolved technique of data acquisition and processing into contracted input from Rhode Island, Connecticut, New York, and New Jersey. Analyze and prepare report for publication.

35 - IMPACT OF TASK AUGMENTATION

- 1) CY - \$43 k reprogrammed to augment study. Develop contacts, formats, and liaison.
- 2) BY - \$53 k increase and two positions to initiate pilot contract study and NMFS staff involvement to supplement and coordinate.
- 3) BY + 1 - \$80 k increase and one position to expand contractual services and to coordinate input facility for biological summaries of regional sport fish impact.

36 - BACKUP DOCUMENTATION

- 1) Deuel, D. G. 1970. The 1970 salt-water angling survey. U.S. Dept. Commerce, NOAA, Natl. Mar. Fish. Serv., Curr. Fish. Statist. No. 6200, 54 pp.
- Deuel, D. G., and J. R. Clark. 1968. The 1965 salt-water angling survey. U.S. Dept. Interior, Bur. Sport Fish. Wildl. Resour. Publ. 67, 51 pp.
- U.S. Dept. Interior, Bur. Sport Fish. Wildl. Resour. Publ. 67, 51 pp. 1968.
- 1955 national survey of fishing and hunting. U.S. Dept. Interior, Bur. Sport Fish. Wildl. Circ. 44, 50 pp. 1956.
- 1970 national survey of fishing and hunting. U.S. Dept. Interior, Bur. Sport Fish. Wildl. Resour. Publ. 95, 106 pp. 1972.
- Wheatland, H. A. 1973. Developing a marine sport fish statistics program. Proc. Gulf Caribb. Fish. Inst., 25th Annu. Sess., 181-184 p.
- 2) Beaufort laboratory studies on south Atlantic charter boat fishery and artificial reefs. Central Office survey plans for telephone survey of sport fish statistics.
- 3) None
- 4) None

# NMFS TASK DEVELOPMENT PLAN

(See Detailed Instructions)

I. DATE PREPARED

Dec. 20, 1973

(Submit live copies by Jan. 2, 1974.)

TO: Director, National Marine Fisheries Service, ATTN: Fx5 National Oceanic and Atmospheric Administration Washington, D.C. 20235

FMC's - Submit a separate Task Development Plan for each task beginning, continuing, or ending in FY 1974, FY 1975, or FY 1976. Total funding in each category must equal your PED specific total funding guidance. Reimbursable funds are not to be mingled with appropriated funds on any programmatic TDP; separate TDP's must be prepared. Submit one Support TDP itemizing the administrative support cost (Management Fund) for the FMC

2. TDP NUMBER MAC-006-76-IE-A	3. SUB-OBJECTIVE CODE IV-A-3	4. RANK (To be completed only by FMC's and NMFS Hdqrs.) 15	FMC	NMFS HDQRS.
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5. TASK NUMBER 2818P1	6. TASK TITLE Behavior of Fishes under Environmental Stress
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7. ORGANIZATION CODE F33800	8. ORGANIZATION TITLE (Responsible for execution of this task) Ecosystems Investigations	9. PRINCIPLE LOCATION City: Sandy Hook Lab. State: N.J.
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OBJECT CLASS	E Z J P R O O	CURRENT YEAR FY 19 <sup>74</sup>		BUDGET YEAR FY 19 <sup>75</sup>		BUDGET YEAR +1 FY 19 <sup>76</sup>	
		TARGET ALLOWANCE A	INCREASE B	TARGET ALLOWANCE C	INCREASE D	TARGET ALLOWANCE E	INCREASE F
10. Total Direct Labor	15	70.1		74.4		75.4	
11. Travel	19	2.9		2.9		2.9	
12. Rents, Communications, Utilities	21						
13. Contracts <input type="checkbox"/> (To be let) Grants <input type="checkbox"/> (Funds obligated)	51 52 58	1.5		1.5		1.5	
14. Supplies	53	4.7		4.7		4.7	
15. Capital Equipment	54						
16. Other (Estimated cost of all other direct cost not included above.)		10.8		10.8		10.8	
7. Total Direct Funds (Add lines 10 through 16 above.)		90.0		94.3		95.3	
8. Support Cost		34.0		36.4		36.8	
9. Total Funds (Add lines 17 and 18.)		124.0		130.7		132.1	
0. Positions, Full-time permanent (Number applicable to this Task. Also, complete NOAA Form 32-14C.)		5		5		5	
1. Positions, Other (Number applicable to this Task)		1		1		1	
2. Man-years, Permanent		4.0		4.0		4.0	
3. Man-years, Other		.4		.4		.4	
4. Reimbursable Support (Reimbursable agreements only)							

5. OFFICIAL PREPARING REPORT (Signature) <i>John B Pearce</i> (38)	26. CENTER DIRECTOR OR DESIGNATED REPRESENTATIVE (SIGN) <i>John A. Holton</i>
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## NMFS VESSEL REQUIREMENTS FY 1976

1. Date: Dec. 28, 1973      2. TDP No.: MAC-006-76-IE-A      3. Prepared by: John Holston

4. Task Title: Behavior of Fishes Under Environmental Stress

SEA TIME - DAYS	CY (a)	BY		BY+1	
		(b) T.A.	(c) Incr.	(d) T.A.	(e) Incr.
NMFS 5. 15' Motor boat	30	30	-	30	-
Vessel 6. -					
(Name) 7. -					
Charter 8. -					
Vessel 9. -					
(type)					
10. TOTAL SEA DAYS	30	30	-	30	-
Scientists 11. Maximum	2	2	-	2	-
per 12. Minimum	2	2	-	2	-
cruise (Average) 13. Anticipated	2	2	-	2	-
14. 1st.	May '74	May '75	-	May '76	-
15. 2nd.	-	-	-	-	-
Cruise 16. 3rd.	-	-	-	-	-
Months 17. 4th.					

18. Vessel Priority:

- |                       |            |                                     |            |
|-----------------------|------------|-------------------------------------|------------|
| a. NOAA FRV (NMFS)    | <u>N/A</u> | d. Univ. RV Charter                 | <u>N/A</u> |
| b. NOAA RV (NOS)      | <u>N/A</u> | e. Existing NMFS Small Boat         | <u>(1)</u> |
| c. Commercial Charter | <u>3</u>   | f. New, Specialized NMFS Small Boat | <u>(2)</u> |

19. Remarks:

Field Studies: Behavioral Characteristics of Fishes



NMFS TASK DEVELOPMENT PLAN  
29. FULL-TIME PERMANENT POSITIONS

TDP NUMBER

MAC-006-76-IE-

Reference NOAA Form 32-14A, Item 20. Identify all full-time permanent positions related to this Task for the budget year only. Do not include support personnel; they should appear in the appropriate support Task Development Plan.

POSITION TITLE	GS LEVEL	NAME OF INCUMBENT <i>(If no Incumbent, enter "Vacant")</i>	% OF TIME SPENT ON THIS TASK
Fishery Biologist (Res.)	13/3	Olla, Bori	80
Fishery Biologist (Res.)	9/4	Samet, Carol	80
Fishery Biologist (Res.)	9/3	Martin, Allan	100
Fishery Biologist (Res.)	7/3	Bejda, Allan	100
Biological Technician	9/4	Studholme, Anne	80

CONTINUE on plain 8x10 1/2 paper. Identify "Page of Pages" and "TDP Number" in upper right corner. Comment on each of the following items, identifying by number. If item is not applicable, so indicate by entering "NA":

30. STATEMENT OF NEED

31. TASK OUTPUT

- a. Significant Output
- b. Termination Criteria

32. BENEFITS

33. ACTIVITY PLAN

34. MILESTONES

35. IMPACT OF TASK AUGMENTATION

- a. Current Year
- b. Budget Year
- c. Budget Year + 1

36. BACK-UP DOCUMENTATION

- a. Detail Documentation *(Provide one sentence description.)*
- b. Related tasks and associated responsibility

(40)

30. STATEMENT OF NEED:

Knowledge of the ways in which alterations in the marine environment may affect natural populations of fish is essential if rational and effective schemes of resource management and conservation are to be obtained. One important step in realizing these goals is to increase the level of competence in the ability to realistically predict detrimental changes within marine communities before the fact. This requires both field and laboratory studies aimed at determining normal environmental requirements of individual fish species as well as of the communities in which they reside. A relatively new but already proven approach to this problem has been to define the natural life habits and behaviors of selected species which are then used as baseline measures of normality in predicting the impact of particular environmental alterations on populations. Further, through the selection of specific quantifiable behaviors of an animal, the effect of given levels of potentially detrimental stresses can be measured. This information can subsequently be extrapolated to predict the impact on, or degree of change within, a given natural community.

There is a critical need for providing information concerning the life habits, behaviors and habitat requirements of marine species residing in environments which are potentially susceptible to man-induced change. Environmental modeling and EIS ultimately require information of this kind, since realistic models or predictions cannot be developed if there is insufficient or no data from the natural environment. In addition, there is considerable interest in developing behavioral baseline measures of normality for species used as indicator organisms in contaminant testing by a variety of industrial, state and federal agencies including EPA, AEC and CEQ. Behavioral measures, since they are overt manifestations or integrations of a complex of internal processes, will provide an invaluable diagnostic tool in all aspects of research concerned with the effects of marine contaminants including thermal additions, toxins and excessive nutrients.

31. TASK OUTPUTS (SPECIFIC):

- a) Laboratory studies will quantitatively measure specific behaviors such as feeding, activity and social interactions (e.g., schooling, aggression) of selected marine fish species to establish normal baseline data. Significant departures from these normal levels when a selected environmental stress, e.g. temperature, is applied will reflect the sensitivity of the fish to this stress. Since the types of behaviors selected reflect the natural life habits of the animal, it will be possible to determine and predict what effect any change or alteration in behavior may have on natural populations.

Field studies will center on defining the life habits and behavior of selected species within their natural habitat. Feeding habits and food requirements, daily and seasonal movements, home range and interspecific relationships within the community will be established for both juveniles and adults whenever possible. These in situ measures will

aid in defining normal environmental requirements and serve as a basis for predictive models applicable to population assessment as well as to the potentially detrimental effects of man-induced change. Whenever applicable, the findings of laboratory and field research will be compared and integrated to give the most comprehensive view possible.

- b) Termination of laboratory studies for each species within the task depends upon the successful determination and quantification of specific behaviors, especially feeding and feeding motivation, day-night activity cycles (in some cases seasonal cycles) and where possible, social interactions (e.g., schooling) and how these baseline behavioral patterns depend upon, and are affected by, selected environmental inputs. This baseline information may then be applied in determining the possible effects of a variety of potential environmental stresses.

Termination of field studies for each species within the Task depends upon the successful definition of principal environmental requirements, life habits, and the role of a species as a component of a community and the way in which potential alterations may affect populations of species and the community.

### 32. BENEFITS:

The primary benefit of this Task would be the comprehensive definition of normal life habits and requirements (including factors relating to the physical environment, nutrition, and habitat) of representative marine fish species. From this information definitive guidelines can be derived to be used in determining the effects of applied environmental stresses on tolerance limits of fish. The need for such guidelines is exemplified by the organization of a workshop on Behavioral Measures of Environmental Stress under the auspices of the Marine Technological Society (MTS). The program is to be chaired by the principal investigator of this Task, with participants representing several federal agencies and universities. The results of the panel will be subsequently published and will specify behavioral guidelines and recommendations for testing procedures.

Other benefits of the Task would result in the capability to determine the effects of engineering activities on the ecosystem and in the management of finfish resources and environments for user groups.

### 33. ACTIVITIES PLAN:

~~The activities are divided into laboratory and field studies.~~

- a) Laboratory activities.

Laboratory studies conducted under controlled conditions will center mainly on the measurement of normal behavioral responses

of fish and how these behaviors are affected by environmental conditions which are potentially stressful. Temperature is presently the stimulus of major concern. The techniques developed in these studies are readily applicable to investigations concerning other potential contaminants.

The focal point of the laboratory studies is a 32,000 gal (121 kiloliter) experimental aquarium with controlled light and temperature and a specialized filtration system. A small group of a given fish species is captured at sea and then introduced to and maintained in this facility throughout the study.

The initial phase of the study will establish, for a selected species, norms of behavior at preferred temperatures, salinity and light cycles. The behaviors will be quantified so that they may be readily used to compare with behaviors observed during periods of induced stress. To establish behavioral norms, measurements will be made throughout the day and night on swimming speed, movements and aggregation patterns. These data, analyzed daily by statistical methods developed specifically for the program, will afford the continual macroscopic view necessary for making day-to-day decisions on the course of the experiment.

Feeding observations are also expressed in quantitative terms, with measurements reflecting changes in feeding motivation, such as time to satiation, amounts ingested per fish, and speeds attained during different periods of a feeding session. These norms of feeding are compared with feeding under stress and permit the detection of metabolic imbalances caused by the stress.

#### CY Activity (FY 74)

To complete investigations on the responses, behavioral thermoregulation and tolerance limits of Atlantic mackerel (Scomber scombrus) to temperature, a study will be undertaken to measure the responses (as outlined above) of a small school of adults to a gradual decrease in temperature. A literature search will be initiated to define the normal environmental requirements of weakfish (Cynoscion regalis) prior to laboratory investigations scheduled for BY (FY 75).

#### BY Activity (FY 75)

Studies will establish behavioral norms (as outlined above) in weakfish to be used in subsequent studies examining their behavioral responses to thermal stress.

#### FY 1 (FY 76)

Studies will determine (as outlined above) the effects of thermal stress on the behavioral responses of the weakfish.

Information derived from laboratory and field studies and the literature has shown that species categories (e.g., pelagic, benthic, and demersal) differ in their susceptibility and response to stress. A natural extension of the present studies is the definition and comparison of the species-category responses. The results obtained from these studies will provide not only needed baseline measures, but will also offer the potential for setting standards for diagnostic indicators of stress in natural communities.

These comparative studies center around a 400 gal. (1.5 kiloliter) aquarium with controlled light and temperature systems and a specialized filtration system. An additional feature, essential to this type of investigation, is the reproduction of the physical environmental requirements of each species category, i.e., substrate, topography, etc.

The initial phase of this study is to establish, for selected species, norms of behavior (e.g., feeding, activity, and social interactions) under preferred conditions of light, temperature and salinity. Quantitative measurements of these behaviors and their subsequent analysis will proceed as described above. After normal behaviors have been established, the selected stress (currently temperature) is applied, and its effects analyzed. Application of the stress during different periods in the day and night as well as during different seasons will provide specific criteria about differential susceptibility and responsiveness to stress both within and between species categories.

#### BY Activity (FY 75)

Studies will establish behavioral norms (as outlined above) in selected pelagic species (juvenile bluefish, Pomatomus saltatrix and striped mullet, Mugil cephalus and demersal species (cunner, Tautoglabrus adspersus, and tautog, Tautoga onitis) to determine and compare the effects of thermal stress on the behavioral response of each category.

#### BY 1 Activity (FY 76)

Continue BY activity and expand it to include a benthic species, winter flounder (Pseudopleuronectes americanus) and certain important forage species.

#### b) Field studies.

Because of the myriad of variables present in the natural environment, studies conducted in the field necessitate a different approach than in the laboratory. A more "gestalt" approach is required, with comprehensive measurements of physical parameters continually made for correlation with selected biographical phenomena. Also important, the investigation must proceed with a definition of the particular environment in terms of interspecific and species-topography relationships. Field studies are concentrated on benthic and demersal species and on inshore regions, currently Fire Island, N. Y., an area of high biological productivity.

The study begins with a quantitative measurement of the resident populations of fish species, the focal point being a subsurface habitat. Within this community the species to be studied are then selected. Direct underwater observations are made at different times of the day and night. The data are analyzed for activity trends, i.e., whether the animal is active or inactive by day or night. The relative degree of unresponsiveness during quiescent periods is also measured, e.g., for diurnally active animals, the nighttime state. The day-night relationship of the fish to the physical characteristics of the bottom structure is described. The seasonal effects on these behaviors is also examined. These data provide needed baseline information for the prediction of the impact of environmental changes on the animal's capacity for survival as related to levels of activity, responsiveness and the dependence of the animal on bottom structures for protection and food.

The feeding behavior of selected species of fish is also observed and described with regard to periodicity, method and forage species. These observations are correlated with quantitative and qualitative data on the contents of digestive tracts from animals sampled at different times of the day and night. These data are also analyzed for the extent of diversity in food habits of the fish, both by species and size. Such a description of feeding and food habits also allows the prediction of the ultimate effect of environmental changes affecting the forage species in particular, rather than solely the immediate species under investigation.

An additional measure correlated with direct observations is the use of ultrasonic tracking. Movements of individuals are monitored both day and night over several days to provide information on normal daily and seasonal movements, home range and spatial requirements of the selected species.

#### CY Activity (FY 74)

Studies to describe and define the life habits and environmental requirements (as outlined above) of the cunner (Tautocolabrus adspersus) will be undertaken, as well as an initial comparison of these with the previously documented habits and requirements of the tautog (Tautoga onitis) found in the same habitat.

#### BY Activity (FY 75)

The study of the interspecific relationship between tautog and cunner initiated in CY will be continued.

#### BY + 1 Activity (FY 76)

A study to describe and define the life habits, environmental requirements, and interspecific relationships (as outlined above) of the winter flounder (Pseudopleuronectes americanus) will be initiated.

34. MILESTONES:

CY (FY 74)

Completion of studies on effects of temperature on established normal behaviors of activity, feeding, and schooling in Atlantic mackerel (Scorpaenopsis) will result in significant contributions to an understanding of the comparative aspects of behavioral thermoregulation in marine species and how this affects migration and distribution.

BY and BY + 1 (FY 75-76)

Completion of the comparative field study on the environmental requirements and interspecific relationships between two important inshore demersal species, cunner (Tautoglabrus adspersus) and tautog (Tautoga onitis), will enable us to predict the effects of a variety of environmental alterations, not only on individual species, but also on natural populations within a given community.

BY + 1 (FY 76)

Basic knowledge of the diverse life habits and normal behaviors of different species categories (e.g., pelagic, demersal and benthic) will be utilized to evaluate response capability and probability of survival under conditions of environmental stress.

35. IMPACT OF TASK AUGMENTATION:

No potential increases, outside of the 5% per year suggested for planning purposes, are anticipated.

36. BACK-UP DOCUMENTATION, LEGISLATIVE PROGRAM AND ENVIRONMENTAL IMPACT:

a) Coutant, C.C. 1970. Biological aspects of thermal pollution. I. Entrainment and discharge canal effects. Publ. No. 383, Ecol. Sci. Div. Oak Ridge Nat. Lab.: 341-381. This article reviews and evaluates the effects of thermal discharges on biological processes.

Krenkel, P.A. and F.L. Parker (Eds.) 1969. Biological aspects of thermal pollution; proceedings. Vanderbilt University Press, Nashville, Tenn. 407 p.

This paper reviews the various sources of thermal pollution and the resulting problems in the environment.

Olla, B.L. I. The effect of temperature on the activity of adult Atlantic mackerel, Scorpaenopsis. AEC Report (49-7) 3045: 1971. This report summarizes the effects of rapid continual increases of temperature to lethal levels as well as several gradual step increases.

Olla, B.L. II. The effect of temperature on the activity of adult Atlantic mackerel, Scorpaenopsis. AEC Report (49-7) 3045: 1972. This report summarizes the effects of high temperature acclimation followed by two gradual step increases to upper incipient lethal levels and the resultant changes in feeding levels.

Olla, B.L. III. The effect of temperature on the activity and feeding of adult Atlantic mackerel, Scomber scombrus. 1973. Some Factors to be considered in the Conduct of Finfish Bioassays. AEC Report (49-7) 3045. of Finfish Bioassays.

This study reports 1) the effects of identical temperature increases within preferred ranges on activity and feeding patterns at different seasons and 2) summarizes the experimental study of behavior in light of the need for changes in bioassay methodology.

Olla, B.L., A.J. Bejda, and A.D. Martin. 1974. Daily activity, movements, feeding and seasonal occurrence in the tautog, Tautoga onitis (L.). Fish. Bull., U.S. 72(1): In press. This paper describes the life habits and environmental requirements, derived from in situ observations, of the tautog.

Olla, B.L., H.M. Katz, and A.L. Studholme. 1970. Prey capture and feeding motivation in the bluefish, Pomatomus saltatrix. Copeia 1970: 360-362.

This study describes the different phases of the feeding response and the effect of prey size on feeding motivation.

Olla, B.L., C.E. Samet, and A.L. Studholme. 1972. Activity and feeding behavior of the summer flounder (Paralichthys dentatus) under controlled laboratory conditions. Fish. Bull., U.S. 70: 1127-1136.

This paper describes activity cycles, feeding and swimming patterns of adult flounder under controlled laboratory conditions.

Olla, B.L. and A.L. Studholme. 1971. The effect of temperature on the activity of bluefish, Pomatomus saltatrix L. Biol. Bull. 141: 337-349.

This paper describes the effects of thermal stress on activity, feeding, and schooling in bluefish.

Olla, B.L. and A.L. Studholme. 1972. Daily and seasonal rhythms of activity in the bluefish (Pomatomus saltatrix). In H.E. Winn and B.L. Olla (Eds.) Behavior of Marine Animals: Current Perspectives in Research. Vol. 2 p. 305-325. Plenum Press, New York.

This paper describes the normal daily and seasonal activity, feeding and schooling behavior of bluefish under controlled laboratory conditions.

Olla, B.L., R. Wicklund and S. Wilk. 1969. Behavior of winter flounder in a natural habitat. Trans. Amer. Fish. Soc. 98: 717-720.

This study describes field observations of winter flounder activity and feeding at different times of the day and at different ambient temperatures.

Parker, F.L. and P.A. Krenkel. 1970. Physical and engineering aspects of thermal pollution. CRC. Press, Cleveland, Ohio. This paper reports specific demand on aquatic environments due to the increased cooling water requirements for both thermonuclear and fossil-fueled steam electric power plants.

Sprague, J.B. 1971. Measurement of pollutant toxicity to fish III. Sublethal effects and "safe" concentrations. Water Research 1971. 5: 245-266. This paper points up need for change in bioassay methodol particularly with respect to incorporating behavioral measures. Thermal pollution of water. Panel discussion, Fourteenth Annual Conservation Conference, National Wildlife Federation, Washington, D.C. December 1967. This paper is an analysis of problems imposed upon different environmental communities from effects of thermal additions.

U. S. Atomic Energy Commission. Nuclear reactors built, being built or planned in the United States as of June 30, 1968. This study reports the status of thermonuclear power plants, both established and anticipated.

- b) There is presently little ongoing research which either defines normal behavior in marine fishes or utilizes behavioral measures as indicators of environmental stresses. Need for this kind of experimentation has been detailed above.
- c) No additional legislation is required to carry out the proposed task in the BY and BY + 1.
- d) No Environmental Impact Statement is required to carry out the proposed task in the BY and BY + 1.

# NMFS TASK DEVELOPMENT PLAN

(See Detailed Instructions)

1. DATE PREPARED  
Dec. 14, 1973

(Submit five copies by Jan. 2, 1974.)

TO: Director, National Marine Fisheries Service, ATTN: Fx5 National Oceanic and Atmospheric Administration Washington, D.C. 20235

FMC's - Submit a separate Task Development Plan for each task beginning, continuing, ending in FY 1974, FY 1975, or FY 1976. Total funding in each category must equal YPED specific total funding guidance. Reimbursable funds are not to be mingled with appropriated funds on any programmatic TDP; separate TDP's must be prepared. Submit one Support TDP itemizing the administrative support cost (Management Fund) for the F

2. TDP NUMBER MAC-007-76-IE-A	3. SUB-OBJECTIVE CODE IV-A-3	4. RANK (To be completed only by FMC's and NMFS Hdqrs.) 4	FMC NMFS HQRS. 1
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5. TASK NUMBER 2818P2	6. TASK TITLE Impact of Environmental Change; Middle Atlantic
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7. ORGANIZATION CODE F33800	8. ORGANIZATION TITLE (Responsible for execution of this task) Ecosystems Investigations	9. PRINCIPLE LOCATION City: Sandy Hook Lab. State: N.J
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OBJECT CLASS <small>Lines 10-19. Enter all dollar values as thousands and tenths of thousands. Lines 22-23. Enter as man-years and tenths of man-years.</small>	UNIT R P O O C	CURRENT YEAR FY 19 <sup>74</sup>		BUDGET YEAR FY 19 <sup>75</sup>		BUDGET YEAR + 1 FY 19 <sup>76</sup>	
		TARGET ALLOWANCE A	INCREASE B	TARGET ALLOWANCE C	INCREASE D	TARGET ALLOWANCE E	INCREASE F
10. Total Direct Labor	15	64.6		37.8		38.8	
11. Travel	19	.6		.6		.6	
12. Rents, Communications, Utilities	21						
13. Contracts <input type="checkbox"/> (To be let) Grants <input type="checkbox"/> (Funds obligated)	51 52 58						
14. Supplies	53	9.1		9.1		9.1	
15. Capital Equipment	54	1.3		1.3		1.3	
16. Other (Estimated cost of all other direct cost not included above.)		6.4		6.4		6.4	
17. Total Direct Funds <small>(Add lines 10 through 16 above.)</small>		82.0		55.2		56.2	
18. Support Cost		31.4		18.6		19.0	
19. Total Funds <small>(Add lines 17 and 18.)</small>		113.4		73.9		75.2	
20. Positions, Full-time permanent <small>(Number applicable to this Task. Also, complete NOAA Form 32-14C.)</small>		3		3		3	
21. Positions, Other <small>(Number applicable to this Task)</small>				1		1	
22. Man-years, Permanent		3		2.4		2.4	
23. Man-years, Other				.7		.7	
24. Reimbursable Support <small>(Reimbursable agreements only)</small>							

25. OFFICIAL PREPARING REPORT (Signature)  <i>John B Peace</i> (49)	26. CENTER DIRECTOR OR DESIGNATED REPRESENTATIVE (Sig.)  <i>John Holton</i>
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## NMFS VESSEL REQUIREMENTS FY 1976

1. Date: Dec. 28, 1973      2. TDP No.: MAC-007-76-IE-A      3. Prepared by: J. Holston

4. Task Title: Impact of Environmental Change, Middle Atlantic (Coastal Ecosystems)

SEA TIME - DAYS	CY	(a)	BY		BY+1	
			(b) T.A.	(c) Incr.	(d) T.A.	(e)
NMFS 5. R. V. Rorqual	30		60	-	60	
Vessel 6. R. V. Delaware II	-		30	-	25	
(Name) 7. -						
Charter 8. -						
Vessel 9. -						
(type)						
10. TOTAL SEA DAYS	30		90	-	85	-
Scientists 11. Maximum	3		3	-	3	-
per 12. Minimum	2		2	-	2	-
cruise 13. Anticipated	3		3	-	3	-
(Average)						
14. 1st. Monthly-5 days						
per month						
15. 2nd.						
Cruise 16. 3rd.						
Months						
17. 4th.						

18. Vessel Priority:

a. NOAA ERV (NMFS)	N/A	d. Univ. RV Charter	N/A
b. NOAA RV (NOS)	(2)	e. Existing NMFS Small Boat	(1)
c. Commercial Charter	N/A	f. New, Specialized NMFS Small Boat	(3)

19. Remarks:

1/ Follow-up field surveys: Long Island Sound, New Jersey coast (Raritan Bay) ecological baseline.  
 Piggy-back: Marine nutrients; sewage/thermal addition effects; effects of dredging (onshore areas) pre-and post-; surf clam gametogenesis studies. Integrate with Biochemical Modelling (MAC-008) and MESA (MAC-055).

2/ R. V. Delaware II: Pre-and post-ocean dumping studies -offshore alternate dump site.

(45-A)

NMFS TASK DEVELOPMENT PLAN  
27. ACTIVITY SCHEDULE AND EVENTS

TDP NUMBER

MAC-007-76-IE-A

NUMBER EACH ACTIVITY OR EVENT. PLANNING PERIOD - Indicate by entering an "X" the beginning and completion of subtask or selected operational activities that collectively define the task for the 7 year planning period. Connect "X's" with a solid bar. "Events" occur at specific points in time. Indicate these significant achievements by placing an "X" in a single column.

NUMBER	ACTIVITY OR EVENT	CY	BY	BUDGET YEAR													
				+1		+2		+3		+4		+5					
				1	2	1	2	1	2	1	2	1	2	1	2	1	2
		A	B	C	D	E	F	G	H	I	J	K	L	M			
1	A Long Island Sound: baseline field work.	X															
2	E Interim baseline report to NEREC.		X														
3	A Final data analysis and baseline report.			X		X											
4	A Follow-up field surveys.			X		X		X		X		X		X			
5	E Raritan Bay: field benthic census completed, preliminary manuscript published.		X														
6	A Benthic census - final data analysis and report.		X			X											
7	A Field work, effects of dredging (pre- and post-survey).	X				X											
8	A Hard clam gametogenesis and population study.		X			X											
9	A EPA experimental site study.					X											
10	A Monitor selected benthic census stations.					X		X									
11	A Lab studies - environmental parameters on indicator species and communities.							X		X		X		X			
2	A New Jersey coastline: baseline field work.			X													
3	A Chromatographic and ADP nutrient analysis.					X											
4	E Report on New Jersey coastal nutrients.					X											
5	A Analysis of benthic samples.									X							
6	E Report on sewage-thermal addition effects.											X					

OUT YEAR COMMENTS

(Check appropriate boxes and enter applicable percentage.)

\*Increases usually come from reprogramming within your FMC.)

- a. Continued at same level
- b. Increase of 5% \*
- c. Reduction of     %
- d. Termination

"X" APPROPRIATE COLUMN

REMARKS

NMFS TASK DEVELOPMENT PLAN  
29. FULL-TIME PERMANENT POSITIONS

TDP NUMBER  
MAC-007-76-IE

Reference NOAA Form 32-14A, Item 20. Identify all full-time permanent positions related to this Task for the budget year only. Do not include support personnel; they should appear in the appropriate support Task Development Plan.

POSITION TITLE	GS LEVEL	NAME OF INCUMBENT <i>(If no Incumbent, enter "Vacant")</i>	% OF SPEN THIS
Fishery Biologist (Res.)	9/1	Reid; Robert	100
Fishery Biologist (Gen.)	7/1	McGrath, Richard	100
Fishery Biologist	5/1	Radosh, David	100

CONTINUE on plain 8x10 1/2 paper. Identify "Page of Pages" and "TDP Number" in upper right corner. Comment on each of the following items, identifying by number. If item is not applicable, so indicate by entering "NA":

- STATEMENT OF NEED
- TASK OUTPUT
  - a. Significant Output
  - b. Termination Criteria
- BENEFITS
- ACTIVITY PLAN
- MILESTONES

- 35. IMPACT OF TASK AUGMENTATION
  - a. Current Year
  - b. Budget Year
  - c. Budget Year + 1

- 36. BACK-UP DOCUMENTATION
  - a. Detail Documentation *(Provide one sentence description.)*
  - b. Budget rolls and *...*

(51)

30. STATEMENT OF NEED:

Coastal and estuarine waters are of critical importance as a source of nutrients and as spawning and/or nursery areas for 60-70% of our fisheries' resource species; biologists now know that 90% of all marine production occurs over the continental shelf. These waters also provide the large majority of our potential shellfish habitats. Their aesthetic and recreational value assumes ever-increasing importance as our population and leisure time increase.

At the same time, man-induced environmental change is impinging to an increasing extent on these resources. In the summer of 1972, 75,000 acres of shellfish beds in Long Island Sound (LIS) were closed because of pollution. Along the Connecticut shore, oyster production has fallen from more than 5,000,000 pounds in the 1930s to less than 500,000 today. Decline in soft clam populations is also traced to environmental degradation. (Urban Sea, 1973).

Raritan Bay's (RB) commercial finfishery has declined in value from an estimated \$2,000,000/year at the turn of the century to the present \$200,000. Diminishing fish populations, due to the ... "destruction of habitat, pollution and overfishing," have forced changes in harvesting methods. Water quality also limits sportfishing potential in Raritan Bay; recreation fishing and associated revenues could triple in value if present pollution control programs are effective (U. S. Department of the Interior, FWPCA, 1967).

If the environmental quality of these ecosystems is to be preserved or restored, future management and allocation practices must be based on increased knowledge of present conditions of the ecosystems and the dynamics involved. Effects of man's activities must be more thoroughly understood. These information requirements are mirrored in Goal IV of the PED, "Ensure that Adequate Consideration and Protection are Given to Living Marine Resources Requirements in Proposed Environmental Alterations." Subobjectives of this goal which specifically pertain to the present task are the following: IV-A-2, Determine the effects of various contaminants on marine life; IV-A-3, Determine the effects of man-induced changes on marine life; IV-B-2, Produce major issue papers for guidance of Regional Water Resources personnel; and IV-C-5, Provide the technical information necessary for review of Environmental Impact Statements. All these subobjectives reflect the need for comprehensive study of local ecosystem characteristics, particularly the biota.

Another PED requirement is closer coordination with other groups and agencies, including Water Resources Offices, Sea Grant Programs, State/Federal cooperative work and programs such as MESA. This task contributes directly to these coordination efforts, as well as to fulfilling the above Goal and Subobjectives, in a manner detailed in TDP items 31, Task Outputs, and 32, Benefits.

Ecosystems Investigations, MACFC, NMFS, is uniquely qualified to carry out ecosystem studies in the metropolitan coastal and estuarine waters of the Middle Atlantic Bight. The areas in question border on four states, and many more counties and municipalities. A unified interstate approach to studies will be more effective than would a fragmented, overlapping effort that these latter groups (or universities) could probably undertake. A report prepared by Cornell University (Francis and Busch, 1973) which documents the decline in New York State commercial fisheries, discusses this problem and concludes: "It is unlikely that anything, short of massive government intervention at the federal level to limit access, control overfishing and pollution, and/or subsidization of the fisheries, can stop their demise."

The Sandy Hook, New Jersey and Milford, Connecticut laboratories of the MACFC have most suitable locations and existing facilities to carry out the proposed task. Information generated by this task will be instrumental in improving management and allocation procedures to restore or protect environmental quality in these areas. Given the highly urbanized nature of the region and the demand for recreational and aesthetic resources, the chief recipient or beneficiary of improved environmental quality would be the general public. Commercial and sportfishing industries will benefit in those specific instances in which populations increase due to preservation of spawning areas, food sources, and other factors important to population dynamics.

31. TASK OUTPUTS (SPECIFIC):

These will include: 1) data reports based on information gathered and observations made during individual cruises or intensive periods of field study. Many of these data are immediately available for use in assessing EIS and preparing periodic reports on short-term phenomena; 2) interim and final reports which summarize and synthesize field data collected over periods of at least 6-12 months; 3) comprehensive atlas compilations which indicate the existing state of the biota and associated physical factors in Long Island Sound, Raritan Bay and along the New Jersey coastline and 4) publications on aspects of task investigations which will increase scientific understanding of coastal ecosystems.

32. BENEFITS:

Baseline studies in the three project areas will provide much of the technical information called for in Subobjective IV-C-5 to enable review or preparation of Environmental Impact Statements and position papers, e.g., preliminary New Jersey Coast (NJC) sediment and benthic macrofauna data contributed to a recent paper prepared for the Council of Environmental Quality on proposed offshore floating nuclear power plants.

Establishment of these baselines is also essential for determination of the effects of future man-induced changes (Subobjective IV-A-3). Results of follow-up surveys in LIS and RB will be compared to existing data to measure the nature and degree of change from baseline conditions as a

result of known and proposed environmental alterations. The RB survey will more directly contribute to this subobjective through intensive sampling of dredging and power plant sites.

The LIS project may be considered as fulfilling Subobjective IV-B-2, since a major emphasis of this study is a series of reports to the New England River Basins Commission of Water Resources, and other user and management groups, on ecological parameters throughout LIS. This information will be of importance in enabling NEREC to manage waters of the Sound. It will also be of utmost significance in establishing priorities for multiple use concepts in the Sound. The three studies will also play a role in meeting Subobjective IV-A-2, "Determining effects of contaminants on marine life." All projects measure concentrations of such pollution indicators as dissolved oxygen, nutrients and heavy metals. These parameters will be compared with distributions of benthic fauna throughout the study areas to examine correlations between environmental quality and distributions, standing crops, diversities and community structure of benthic fauna.

The baseline projects will meet the above subobjectives still more effectively when their information is integrated with that of other Tasks within the MACFC. The Biochemical Modeling Task includes investigations of concentrations and forms of contaminants in the marine environment, as well as their specific modes of action and physiological effects on organisms. Both this knowledge and data on distributions of contaminants and the organisms concerned are necessary to predict effects on ecosystems or to model "real world situations." Coastal ecosystems information will also integrate well with MESA data and will form the baselines for expanded MESA-type research in the mid-Atlantic.

This task supports several aspects of the coordination effort called for in the PED. Data has already been requested by states and industry and forthcoming syntheses of data will be of continuing importance to management. The task currently includes contracts with academia to provide information on sediment characteristics and benthic meiofauna. These data will form the basis for future Sea Grant studies and programs.

### 33. ACTIVITIES PLAN:

Baseline sampling for RB benthic census was completed in October 1973 with the last of four seasonal samplings of 88 stations throughout RB. Field work will continue at reduced level through the first half of FY 77 to study hard clam populations, investigate the site of a proposed EPA experimental station, and monitor any changes in RB benthos. Also planned is a post-dredging survey of Ambrose Channel in 1978-79.

LIS baseline field activities terminated after the sampling of 142 stations in July-August 1972, 72 in April 1973, and 103 in September 1973.

Plans call for resampling 50-60 of these stations each September through 1981 in an attempt to detect changes from baseline conditions, distinguish between natural fluctuations and persistent man-induced alterations, and study sites of proposed and existing new activities. These long-term "monitoring" proposals comply with the stated NMFS desire for follow-up research to establish the effects of previous recommendations or decisions.

NJC field work to date has included up to 246 stations, sampled during the summer of 1972 and again in August 1973. The sampling phase will terminate upon completion of cruises in February and August 1974. Sampling emphasis on these upcoming cruises will change somewhat to concentrate on 74 stations in sewage outfall areas from Sandy Hook to Great Bay. Further planning on this survey depends on the future availability of resources from RB and LIS, which currently have higher priority. MESA funds may be available to complete the New Jersey shore work.

Operations in RB, NJC and LIS all have a common approach. Benthic sampling is based on the collection of two Smith-McIntyre grabs per station. Both samples are washed through a 4-2-1mm sieve series for macrofaunal analysis after subsamples have been taken for meiofauna, sediment type, organic carbon, carbonate and heavy metals content. Surface and bottom water temperature, salinity and dissolved oxygen are measured at each station. Samples of water for the analyses of nitrates, nitrites, ammonia and orthophosphorus are collected at predetermined stations for colorimetric analysis. RB procedures include dredge sampling for qualitative information on the epibenthic macrofauna. Zooplankton samples have been taken at selected stations in RB and LIS. The LIS project has included an analysis of the distribution of fecal coliform and *Vibrio* bacteria. Fecal and total coliform counts have been taken by U. S. Public Health Service personnel in conjunction with NJC cruises.

In the laboratory macrofauna samples are sorted and identified to species level whenever possible, using dissecting microscopes. Sediment grain sizes are determined by sieve and pipette analysis; organic content is measured by hydrogen peroxide oxidation and calcium carbonate by hydrochloric acid digestion. All these sediment analyses are performed under contract by Dr. James Parks of Lehigh University. Heavy metals content of sediments is measured by atomic absorption spectroscopy at MACFC, Milford Biological Laboratory. Meiofaunal analysis, to species where possible, using compound microscopes and staining techniques, is handled through a contract with Dr. John Tietjen of CUNY. This analysis is done only on LIS samples.

All data are being reduced to a single logsheet format for direct keypunching and ADP storage. Computer-plotted SYMAPs are being drawn of distributions of all parameters throughout the study areas. Population densities, diversities and community structures of benthic macrofauna are being investigated. Multivariate analysis will be used to establish correlations between macrofauna and meiofauna, sediment characteristics and such indices of contamination as heavy metals, nutrients and dissolved oxygen.



- 2) Nutrient report: analysis of distribution patterns of coastal nutrients, especially as related to sewage outfalls; December 1975.
- 3) Sewage-thermal report: compilation of all baseline data to indicate possible effects of present and proposed sewage and thermal additions from offshore floating nuclear power plants; completed by end of 1978.

35. IMPACT OF TASK AUGMENTATION:

No potential increases, outside of the 5% per year suggested for planning purposes, are anticipated.

36. BACK-UP DOCUMENTATION, LEGISLATIVE PROGRAM AND ENVIRONMENTAL IMPACT:

a) Documentation.

1) Cited in Narrative:

Blake, N.J. and H.P. Jeffries. 1971. The structure of an experimental infaunal community. J. exp. mar. Biol. Ecol. 6: 1-14.

Francis, J.D. and L. Busch. 1973. New York State's Commercial Fisheries: Industry and manpower projections. New York's Food and Life Sciences Bulletin. No. 28, June 1973. 14 pp.

U. S. Department of the Interior, Federal Water Pollution Control Administration. 1967. Proceedings Conference on Pollution of Raritan Bay and Adjacent Interstate Waters. Third Session. N.Y.C., June 13-14, 1967. Vol. 2. 969 pp.

Urban Sea (Long Island Sound Regional Study newsletter) No. 1, Summer 1973.

2) Background materials concerned with pollution and deterioration in coastal and estuarine water including Long Island Sound, Raritan Bay and the New York Bight:

Austin, H.M., J. Dickinson and C. Hickey. 1973. An ecological study of the ichthyofauna at the Long Island Lighting Company (LILCO) Fossil Fuel Power Generating Facility at Northport, Long Island, New York, 1972. Prepared for LILCO by the Fisheries Oceanography Department of the New York Ocean Science Laboratory (NYOSL). Final Report. Contract No. SR 72-23F. 248 pp.

Bloom, S., A. Levni, and G. Raines. 1969. Mathematical Simulation of Ecosystems. A preliminary model applied to a lotic freshwater environment. Battelle Memorial Institute, Columbus, Ohio. 23 pp.

D'Agostino, A.D. and W.A. Colgate. 1973. Infaunal Invertebrates in the Near Shore Waters of Long Island Sound. Final Report. Contract SR 72-22 (LILCO). 23 pp.

Dehlinger, P., W.F. Fitzgerald, S.Y. Feng, D.F. Paskausky, R.W. Garvine, and W.F. Bohlen. 1973. A Determination of Budgets of Heavy Metal Wastes in Long Island Sound. First Annual Report. Univ. of Connecticut; submitted to Office of Sea Grant Programs, NOAA.

Federal Water Pollution Control Administration. 1967. Proceedings: Conference on Pollution of Raritan Bay and adjacent interstate waters, Vols. 1-3. FWPCA.

Haskin, H.H. and A.S. Merrill. 1973. Preliminary Report under Cooperative Agreement dated June 15, 1972 between National Marine Fisheries Service and Rutgers the State University to Conduct an Inshore Inventory of Surf Clams along the New Jersey Coast. Sandy Hook Laboratory. Unpublished Report. 11 pp.

Holme, N. and A. McIntyre. 1971. Methods for the study of marine benthos. IBP Handbook No. 16. Blackwell Scientific Publ. Oxford. 334 pp.

Jansson, B. and H. Odum. 1972. Ecosystem approach to the Baltic problem. Bulletins from the Ecological Research Committee, No. 16. Swedish Natural Science Research Council, Stockholm. 82 pp.

Marine Sciences Research Center, State University of New York. Technical Report Series, Nos. 2-17 concern various investigations of Long Island Sound and the nature of dredged wastes.

National Academy of Sciences. 1970. Wastes Management Concepts for the Coastal Zone: Requirements for Research and Investigation. NAS, Washington. 126 pp. In particular note chapters 5 (Biological Effects), 6 (Recommended research and investigation for effective coastal wastes management), and 7 (Suggested priorities and estimated minimum effort required).

National Academy of Sciences. 1971. Marine Environmental Quality: Suggested Research Programs for Understanding Man's Effect on the Oceans. NAS, Washington. 107 pp. In particular note chapter 5 (The effects on marine organisms; selecting organisms and systems for study, p. 66; importance of a conceptual framework, p. 67).

National Marine Fisheries Service. 1972. NMFS, Ocean Fisheries and Living Marine Resources, Program Memorandum, FY 1974-1978.

New England River Basins Commission. 1971. Plan of Study: Long Island Sound Regional Study. 92 pp. plus Appendix of 201 pp.

New Jersey Department of Environmental Protection. 1971. Studies of the Mullica River - Great Bay Estuary. Misc. Report No. 6M (Completion Report for Project 3-78-R-1 and 2 under the Commercial Fisheries Research and Development Act). 62 pp. plus numerous figures and tables. One of very few reports on Jersey coastal waters.

Sandy Hook Sport Fisheries Marine Laboratory, NMFS. 1971. Review of aquatic resources and hydrographic characteristics of Raritan, Lower New York and Sandy Hook Bays. A Report Prepared for Battelle NW. Highlands, 71 pp.

Sandy Hook Laboratory, National Marine Fisheries Service. 1972. The effects of waste disposal in the New York Bight. Final Report.

Sandy Hook Laboratory, National Marine Fisheries Service. 1972. Davids Island Phase I: A short-term ecological survey of western Long Island. A Report Prepared for Battelle NW. Highlands. 33 pp. plus 25 figs. and 65 tables.

U. S. Environmental Protection Agency. 1971. Proceedings Conference in the Matter of Pollution of the Interstate Waters of Long Island Sound and its Tributaries - Connecticut, New York. April 13-14, 1971. New Haven, Ct.

Westinghouse Electric Corporation. 1972. Final Program Report: Program Development Plan for the MESA-New York Bight Regional Project.

b) Related activities.

- 1) Tasks in NMFS: Biochemical modeling (Sandy Hook); Environmental Chemistry and Microbiology (Milford); IEC M&E contaminants analysis, Biological Oceanography (Sandy Hook) and Pathology (Oxford).
- 2) Research Outside NMFS: This entire task is directly related to the NOAA-MESA Program. Raritan Bay sub-task is directly related to EPA research in RB and Long Island subtask is responsive to New England River Basins Commission and its formal investigations.

In LIS, the University of Connecticut is conducting work on heavy metal budgets, circulation and transport of suspended materials under Sea Grant. Yale University is studying effects of dumping dredge spoils from New Haven Harbor. State Univ. of N.Y., Stony Brook, and SUNY-Maritime College, Fort Schuyler, N.Y. are investigating circulation phenomena. The New York Ocean Science Laboratory,

Montauk, N.Y. is involved in research on water movements, heavy metals in waters and organisms, and effects of power plants, all in eastern LIS.

- c) No additional congressional legislation or extension of current authorizing legislation is required to carry out proposed task in BY and BY +1.
- d) The proposed Task has no direct impact on the environment, and no Environmental Impact Statement is required.

VESSEL REQUIREMENTS:

Operations are normally conducted from small vessels, i.e., under 65 feet operated by the Middle Atlantic Coastal Fisheries Center and scheduled as needed by the Officer-in-Charge, Sandy Hook and Oxford Laboratories.

# NMFS TASK DEVELOPMENT PLAN

(See Detailed Instructions)

1. DATE PREPARED

Dec. 20, 1973

(Submit five copies by Jan. 2, 1974.)

TO: Director, National Marine Fisheries Service, ATTN: Fx5 National Oceanic and Atmospheric Administration Washington, D.C. 20235

FMC's - Submit a separate Task Development Plan for each task beginning, continuing, or ending in FY 1974, FY 1975, or FY 1976. Total funding in each category must equal your PED specific total funding guidance. Reimbursable funds are not to be mingled with appropriated funds on any programmatic TDP; separate TDP's must be prepared. Submit one Support TDP itemizing the administrative support cost (Management Fund) for the FMC.

2. TDP NUMBER MAC-008-76-IE-A	3. SUB-OBJECTIVE CODE IV-A-2	4. RANK (To be completed only by FMC's and NMFS Hdqrs.) 19	FMC	NMFS HDQRS.
----------------------------------	---------------------------------	---------------------------------------------------------------	-----	-------------

5. TASK NUMBER 2818P3	6. TASK TITLE Biochemical Modelling, Middle Atlantic
--------------------------	---------------------------------------------------------

7. ORGANIZATION CODE F33800	8. ORGANIZATION TITLE (Responsible for execution of this task) Ecosystems Investigations	9. PRINCIPLE LOCATION City: Sandy Hook Lab. State: N.J.
--------------------------------	---------------------------------------------------------------------------------------------	------------------------------------------------------------

OBJECT CLASS <i>Lines 10-19. Enter all dollar values as thousands and tenths of thousands. Lines 22-23. Enter as man-years and tenths of man-years.</i>	NMFS PROGRAM	CURRENT YEAR FY 19 <sup>74</sup>		BUDGET YEAR FY 19 <sup>75</sup>		BUDGET YEAR + 1 FY 19 <sup>76</sup>	
		TARGET ALLOWANCE A	INCREASE B	TARGET ALLOWANCE C	INCREASE D	TARGET ALLOWANCE E	INCREASE F
10. Total Direct Labor	15	74.2		79.2		80.2	
11. Travel	19	.6		.6		.6	
12. Rents, Communications, Utilities	21						
13. Contracts <input type="checkbox"/> (To be let) Grants <input type="checkbox"/> (Funds obligated)	51 52 58						
14. Supplies	53	9.1		9.1		9.1	
15. Capital Equipment	54	1.3		1.3		1.3	
16. Other (Estimated cost of all other direct cost not included above.)		6.7		6.7		6.7	
17. Total Direct Funds (Add lines 10 through 16 above.)		91.9		96.9		97.9	
18. Support Cost		36.1		38.9		39.2	
19. Total Funds (Add lines 17 and 18.)		128.0		135.8		137.1	
20. Positions, Full-time permanent (Number applicable to this Task. Also, complete NOAA Form 32-11C.)		6		6		6	
21. Positions, Other (Number applicable to this Task)		1		1		1	
2. Man-years, Permanent		4.8		4.8		4.8	
3. Man-years, Other		.4		.4		.4	
4. Reimbursable Support (Reimbursable agreements only)							

5. OFFICIAL PREPARING REPORT (Signature) <i>John B. Pearce</i> (61)	25. CENTER DIRECTOR OR DESIGNATED REPRESENTATIVE (Sig.) <i>John A. Holston</i>
---------------------------------------------------------------------------	-----------------------------------------------------------------------------------

## NMFS VESSEL REQUIREMENTS FY 1976

1. Date: Dec. 28, 1973      2. TDP No.: MAC-008-76-IE-A      3. Prepared by: J. Holston

4. Task Title: Biochemical Modelling, Middle Atlantic

SEA TIME - DAYS	CY	(a)	BY		BY+1	
			(b) T.A.	(c) Incr.	(d) T.A.	(e) Inc
NMFS 5. R. V. Rorqual	-		--	--	(60)	-
Vessel 6.						
(Name) 7.						
Charter 8.						
Vessel 9.						
(type)						
10. TOTAL SEA DAYS					(60)	
Scientists 11. Maximum					2	
per 12. Minimum					2	
cruise 13. Anticipated					2	
(Average)						
14. 1st. Monthly 5-day/month						
15. 2nd.						
Cruise 16. 3rd.						
Months 17. 4th.						

18. Vessel Priority:
- |                                  |                                 |
|----------------------------------|---------------------------------|
| a. NOAA ERV (NOPS) <u>N/A</u>    | d. Univ. RV Charter <u>N/A</u>  |
| b. NOAA RV (NOS) <u>N/A</u>      | e. Existing NMFS <u>1</u>       |
| c. Commercial Charter <u>N/A</u> | Small Boat <u>2</u>             |
|                                  | f. New, Specialized <u>    </u> |
|                                  | NMFS Small Boat                 |

19. Remarks:  
 Piggy-back studies initiated on R. V. Rorqual with MAC-007 in fiscal '76

NMFS TASK DEVELOPMENT PLAN  
27. ACTIVITY SCHEDULE AND EVENTS

TOP NUMBER  
MAC-008-76-IE-A

NUMBER	A O R E	NARRATIVE <i>(Brief descriptive phrase of activity or event)</i>	CY		BY		BUDGET YEAR									
							+1		+2		+3		+4		+5	
			1	2	1	2	1	2	1	2	1	2	1	2	1	2
		A	B	C	D	E	F	G	H	I	J	K	L	M	N	
1	A	Characterize crab gill ion transport systems and test <i>in vitro</i> effects of metals on them.			X											
2	A	Assay metal effects and synergisms with natural environmental stresses on various physiological parameters of experimental animals, (including respiration, metabolism, permeability, nervous and hormonal integration, energy and redox pathways, etc.)					X									
3	A	Develop semi-automatic larval culture procedures and rear larvae for assay.			X											
4	A	Develop modelling format, establish sampling procedures for organically bound metals, and carry out sampling in Raritan Bay.							X							
5	A	Develop analytical techniques for metal analysis (polarography) and for environmental organics (chromatography, etc).			X											
6	A	Carry out laboratory investigations of metal-organic interactions.			X		X									
7	A	Assay physiological effects of organically bound metals on previously characterized biological systems.				X		X								
8	E	Present model of effects of metal-organic interactions on biological systems.							X							
9	A	Carry out environmental studies of settling and distribution of natural and man induced metal-organic complexes.				X				X						
10	A	Extend laboratory studies of effects of complexes on animals to field, with emphasis on trophic interactions.				X				X						
11	E	Present environmental model of metal-organic interactions (incorporating information from previous model).										X				

28. OUT YEAR COMMENTS

(Check appropriate boxes and enter applicable percentage.)

\*Increases usually come from reprogramming within your FIMC.)

- a. Continued at same level
- b. Increase of 5 % \*
- c. Reduction of      %
- d. Termination

"X" APPROPRIATE COLUMN

REMARKS

NMFS TASK DEVELOPMENT PLAN  
29. FULL-TIME PERMANENT POSITIONS

TDP NUMBER

MAC-008-IE-A

Reference NOAA Form 32-14A, Item 20. Identify all full-time permanent positions related to this Task for the budget year only. Do not include support personnel; they should appear in the appropriate support Task Development Plan.

POSITION TITLE	GS LEVEL	NAME OF INCUMBENT (If no incumbent, enter "Vacant")	% OF TIME SPENT ON THIS TASK
Supv. Fishery Biologist (Res.)	14/3	Pearce, John	100
Fishery Biologist (Res.)	11/3	Tucker, Robert	100
Fishery Biologist	9/3	Young, James	100
Oceanographer	5/2	Matte, Albert	100
Chemist	5/3	Draxler, Andrew	100
Clerk-Typist	3/1	Boeckel, Virginia	100

CONTINUE on plain 8x10 1/2 paper. Identify "Page of Pages" and "TDP Number" in upper right corner. Comment on each of the following items, identifying by number. If item is not applicable, so indicate by entering "NA":

- 1. STATEMENT OF NEED
- 2. TASK OUTPUT
  - a. Significant Output
  - b. Termination Criteria
- 3. BENEFITS
- 4. ACTIVITY PLAN
- 5. MILESTONES

35. IMPACT OF TASK AUGMENTATION

- a. Current Year
- b. Budget Year
- c. Budget Year + 1

36. BACK-UP DOCUMENTATION

- a. Detail Documentation (Provide one sentence description.)
- b. Related tasks and one (1) representative file

(64)

30. STATEMENT OF NEED:

In order to protect and manage the fisheries for which NMFS is responsible, it is imperative that an understanding be gained of the effects of pollutants as they actually exist in the natural environment. For metals, little data is available about valence states or solubilities under complex environmental conditions, and particularly about the extent of binding or chelation to natural or pollution related organic compounds. In addition it is becoming evident that a combination of stresses can produce synergistic effects on organisms much greater than the additive effects of the individual challenges to the physiological well-being of the animal. In coastal and estuarine waters, metal and organic pollutants are often likely to exist together, as with sewage sludge and dredge spoil in the New York Bight, or where multiple contamination sources and events exist, and the future likelihood of hydrocarbon spills is increasing. It is in these areas as well, that animals are exposed to additional stresses, such as salinity or temperature gradients, whether natural or man-induced, that increase the likelihood of adverse synergistic interactions. Since this task seeks to determine actual forms of metal-organic pollutants, the information generated will contribute to an understanding of pollutant cycling through the marine ecosystem, thus contribution to subobjective 1 of IV-A. In addition, effects of the pollutants on marine organisms will be determined, thus it is applicable to subobjective 2 of IV-A. And since synergisms with other stresses, potentially man induced, will also be examined, the task contributes to subobjective 3 of IV-A. The information gained from this task can be used in managing marine coastal and estuarine ecosystems important to sport, commercial and forage species. Data generated will contribute to other tasks within MACFC and to MESA, and will be of particular use to such groups as the Tri-State Planning Commission, the New England River Basins Commission, to utilities and the petrochemical industry, as well as to those concerned with recreational and commercial fisheries.

31. TASK OUTPUTS (SPECIFIC):

- a) Significant outputs of this task will be physiological-ecological models generated from data of investigations of metal-organic interactions, effects of these combinations on physiological parameters of marine organisms, environmental distribution and behavior of metal-organic complexes, and effects on animals in the the natural environment. These models will serve the purpose of generalizing the data developed from the study, making possible extrapolation (with verification, of course) to other similar conditions. Such models will contribute to an understanding of contaminant cycling in the marine ecosystems, of effects of contaminants on marine life, and of effects of man induced changes on marine life, thus directly meeting needs expressed in subobjectives 1, 2, and 3 of goal IV-A. Outputs will also consist of written reports for inclusion in MESA type atlases, and reports and papers for scientific journals.

- b) Development of adequate models for effects of organically bound metals (Pb, Cd, Zn, Cu, Ni) on marine organisms under field conditions will serve as criteria for task accomplishment.

However, additional testing of the models under differing conditions, consideration of different pollutants, of additional physiological parameters, of additional species, and of combinations of synergistic stresses, provide possibilities for continuation of this task or similar studies.

32. BENEFITS:

Six or seven metals, including Cd, Pb, Zn, Cu, will be investigated in detail for their interactions with a range of organics (20-30) identified as occurring in the natural environment, and a model developed for the cycling of these combinations in the ecosystem. Effects of the pollutants will be determined on a range of physiological parameters, enzyme systems, etc. in several species of marine animals at different points in their life cycle, including larval stages. Combined effects of pollutants and other stresses will be investigated under laboratory and field conditions.

These studies will produce data for quantitative models of contaminant and stress effects on the marine organisms investigated.

33. ACTIVITIES PLAN:

This task requires the development of several initially discrete subunits including the biochemical and physiological characterization of the assay systems, larval culture, environmental sampling, and analytical techniques for metals and organics. These subunits will then be combined to generate data to construct a quantitative model of effects of organically bound metals on marine animals in the ecosystem. Sampling will be three-dimensional with particular emphasis on surface layers and on interactions with bottom sediments. Analytical techniques for metals will include UV irradiation to distinguish between organically bound and free ions and pulsed anodic stripping polarography, a method sensitive in the parts per billion range and having the capability of distinguishing binding and valence states. Chromatographic, electrophoretic, and spectrophotometric methods will be used for analyzing organics. Equilibrium dialysis, linked substrate chromatography, centrifugation and other relevant techniques will be used in conjunction with polarography to determine binding interactions of metals and organics.

Larval rearing will be adapted from methods developed by Costlow and Bookhout at Duke Marine Laboratory with the culture methods partially automated. Laboratory investigations of shrimp will be undertaken in a system in which several environmental parameters, including

temperature, light, salinity, oxygen levels and contaminant concentrations can be simultaneously controlled.

Physiological and biochemical parameters to be assayed will be chosen on the basis of expected sensitivity to environmental influences. Ion transport, being a membrane phenomenon, is particularly exposed to metal contaminant perturbations; enzymes, such as the Na<sup>+</sup>K<sup>+</sup>ATPase, and amino acid metabolism, important in osmoregulation in marine invertebrates, will be investigated as assay systems. Respiration, measured in a Gilson Respirometer, growth and molting of larvae are among other parameters on which metal-organic contaminant effects will be studied.

Data from field environmental sampling and analysis, binding studies, and assays of effects on organisms, will be used to generate an ecosystem model for the interactions of metals with organics and their effects on living marine resources.

34. MILESTONES:

- a) Model of effects of metal-organic complexes on biological systems. A quantitative model providing predictive capacity for effects on organisms of metals as they actually exist in the marine environment.
- b) Model of ecosystem interactions of metals and organics. A quantitative model for cycling of metals and organics in the marine environment.

35. IMPACT OF TASK AUGMENTATION:

N/A; no additional funds projected beyond 5% annual increment.

36. BACK-UP DOCUMENTATION, LEGISLATIVE PROGRAM AND ENVIRONMENTAL IMPACT:

- a) Informal Report No. 4 - MACFC, NMFS: summaries of investigations within the Center, some of which relate to this task.

Informal Report No. 5 - MACFC, NMFS: summary report, 1971-72, of cooperative contaminant program within the Center.

Effects of Waste Disposal in the New York Bight: report of Sandy Hook Laboratory, MACFC, NMFS, to U. S. Army Corps of Engineers; indicates extent of heavy metal accumulations in waste disposal areas of New York Bight.

- b) Portions of the tasks within MACFC: Impact of Environmental Change on New York Bight (MESA); Ecosystems Analysis Coastal Ecosystems; and Environmental Effects on Behavior are related to the present task. Considerable research on effects of metals is being carried out under state, university and private auspices, but relatively little involves organically complexed metals.

- c) No additional congressional legislation is required to carry out this task; the task can be done within existing legislation.
- d) No Environmental Impact Statement will be required for this task as the task, per se, will not affect the environment.

# NMFS TASK DEVELOPMENT PLAN

(See Detailed Instructions)

1. DATE PREPARED

December 20, 1973

(Submit five copies by Jan. 2, 1974.)  
 TO: Director, National Marine Fisheries Service, ATTN: Fx5 National Oceanic and Atmospheric Administration Washington, D.C. 20235

FMC's - Submit a separate Task Development Plan for each task beginning, continuing, or ending in FY 1974, FY 1975, or FY 1976. Total funding in each category must equal your PED specific total funding guidance. Reimbursable funds are not to be mingled with appropriated funds on any programmatic TDP; separate TDP's must be prepared. Submit one Support TDP itemizing the administrative support cost (Management Fund) for the FMC

2. TOP NUMBER FMC-009-76-IE-A	3. SUB-OBJECTIVE CODE IV-A-3	4. RANK (To be completed only by FMC's and NMFS Hdqrs.) 8	FMC	NMFS HQRS.
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5. TASK NUMBER 2818P4	6. TASK TITLE Microbiology and Chemistry, Middle Atlantic
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7. ORGANIZATION CODE F33300	8. ORGANIZATION TITLE (Responsible for execution of this task) Ecosystems Investigations	9. PRINCIPLE LOCATION City: Milford Lab. State: Conn.
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OBJECT CLASS <small>Lines 10-19. Enter all dollar values as thousands and tenths of thousands. Lines 22-23. Enter as man-years and tenths of man-years.</small>	W N J P R O O	CURRENT YEAR FY 19		BUDGET YEAR FY 19		BUDGET YEAR + 1 FY 19	
		TARGET ALLOWANCE A	INCREASE B	TARGET ALLOWANCE C	INCREASE D	TARGET ALLOWANCE E	INCREASE F
10. Total Direct Labor	15	152.1		158.1		158.1	
11. Travel	19	2.2		2.2		2.2	
12. Rents, Communications, Utilities	21						
13. Contracts <input type="checkbox"/> (To be let) Grants <input type="checkbox"/> (Funds obligated)	51 52 58						
14. Supplies	53	17.3		17.3		17.3	
15. Capital Equipment	54	2.3		2.3		2.3	
16. Other (Estimated cost of all other direct cost not included above.)		13.6		13.6		13.6	
17. Total Direct Funds <small>(Add lines 10 through 16 above.)</small>		187.5		193.5		193.5	
18. Support Cost		73.3		77.6		77.4	
19. Total Funds <small>(Add lines 17 and 18.)</small>		261.3		271.1		270.9	
20. Positions, Full-time permanent <small>(Number applicable to this Task. Also, complete NOAA Form 32-14C.)</small>		10		10		10	
21. Positions, Other <small>(Number applicable to this Task)</small>		6		6		6	
22. Man-years, Permanent		8.0		8.0		8.0	
23. Man-years, Other		2.4		2.4		2.4	
24. Reimbursable Support <small>(Reimbursable agreements only)</small>							

25. OFFICIAL PREPARING REPORT (Signature) <div style="font-family: cursive; font-size: 1.2em; text-align: center;">John B. Pease</div>	26. CENTER DIRECTOR OR DESIGNATED REPRESENTATIVE (Sig.) <div style="font-family: cursive; font-size: 1.2em; text-align: center;">John A. Holsten</div>
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## NMFS VESSEL REQUIREMENTS FY 1976

1. Date: Dec. 28, 1973      2. TDP No.: MAC-009-76-IE-A      3. Prepared by: J. Holston

4. Task Title: Microbiology and Chemistry, Middle Atlantic

SEA TIME - DAYS	CY (a)	BY		BY+1	
		(b) T.A.	(c) Incr.	(d) T.A.	(e) In
NMFS 5. R. V. Delaware II	(30)	(60)	-	(60)	-
Vessel 6. R. V. Rorqual	(30)	(50)	-	(50)	-
(Name) 7.					
Charter 8. Trawler (catamaran)	(25)	(25)	-	(25)	-
Vessel (type) 9.					
10. TOTAL SEA DAYS	(55) (55)	(110) (75)	-	(110) (75)	
Scientists 11. Maximum	(4)	(4)	-	(4)	
per 12. Minimum	(2)	(2)	-	(2)	
cruise (Average) 13. Anticipated	(4)	(4)	-	(4)	
14. 1st.					
(as in MAC-002 and MAC-055)					
15. 2nd.					
Cruise 16. 3rd.					
Months 17. 4th.					

18. Vessel Priority:

a. NOAA FRV (NMFS) <u>N/A</u>	d. Univ. RV Charter <u>N/A</u>
b. NOAA RV (NOS) <u>(1)</u>	e. Existing NMFS Small Boat <u>(2)</u>
c. Commercial Charter <u>(4)</u>	f. New, Specialized NMFS Small Boat <u>      </u>

19. Remarks: Microbiological and chemical samples derived from piggy-back operations conducted thru MAC-002 and MAC-055. Fin rot environmental microbiology samples obtained through MAC-002.

NMFS TASK DEVELOPMENT PLAN  
27. ACTIVITY SCHEDULE AND EVENTS

TOP NUMBER  
MAC-009-76-IE-a

NUMBER EACH ACTIVITY OR EVENT.

PLANNING PERIOD - Indicate by entering an "X" the beginning and completion of subtask or selected operational activities that collectively define the task for the 7 year planning period. Connect "X's" with a solid bar. "Events" occur at specific points in time. Indicate these significant achievements by placing an "X" in a single column.

IDENTIFY BY ENTERING "A" FOR ACTIVITY OR "E" FOR EVENT.

A O R E	NARRATIVE (Brief descriptive phrase of activity or event)	CY		BY		BUDGET YEAR									
						+1		+2		+3		+4		+5	
		1	2	1	2	1	2	1	2	1	2	1	2	1	2
		A	B	C	D	E	F	G	H	I	J	K	L	M	N
A	Long Island Sound Research-Survey	X	X	X	X										
A	Long Island Sound Research - in-situ studies	X	X	X	X	X	X	X	X	X	X	X	X	X	X
A	Complete New York Bight - Chem. & Micro. Survey	X	X	X	X										
A	New Jersey Coast-Chesapeake Bay survey		X		X										
A	Close system analysis pollutant uptake bacterial growth immune response	X	X	X	X	X	X	X	X	X	X	X	X	X	X
A	Hydro-carbon - PCB analysis	X	X	X	X	X	X	X	X	X					
A	Cooperative support Center Tasks	X	X	X	X	X	X	X	X	X	X	X	X	X	X
E	Report - Long Island Sound Interim		X												
E	Final			X											
E	Report - Fin Rot - NPB	X													
E	Report - New York Bight - Chem-microbiology	X		X		X									

OUT YEAR COMMENTS

(Check appropriate boxes and enter applicable percentage.)

\*Increases usually come from reprogramming within your FMC.)

- a. Continued at same level
- b. Increase of 5 % \*
- c. Reduction of      %
- d. Termination

"X"  
APPROPRIATE  
COLUMN

REMARKS

NMFS TASK DEVELOPMENT PLAN  
29. FULL-TIME PERMANENT POSITIONS

3 | 7  
TDP NUMBER  
MAC-009-76-IE-A

Reference NOAA Form 32-14A, Item 20. Identify all full-time permanent positions related to this Task for the budget year only. Do not include support personnel; they should appear in the appropriate support Task Development Plan.

POSITION TITLE	GS LEVEL	NAME OF INCUMBENT <i>(If no Incumbent, enter "Vacant")</i>	% OF TIME SPENT ON THIS TASK
Superv. Microbiologist	13-5	Graikoski, John	100
Chemist	12-5	Greig, Richard	100
Microbiologist	12-5	Robohm, Richard	50
Microbiologist	11-4	Babinchak, John	100
Biologist	11-2	Dudley, Shearon	100
Chemist	9-5	Shelpuk, Christopher	100
Microbiologist	7-4	Nitkowski, Maureen	100
Chemist	7-2	Wenzloff, Douglas	100
Physical Science Aid	4-2	Adams, Albert	100
Physical Science Aid	4-2	Nelson, Betty Ann	100

CONTINUE on plain 8x10 1/2 paper. Identify "Page of Pages" and "TDP Number" in upper right corner. Comment on each of the following items, identifying by number. If item is not applicable, so indicate by entering "NA":

- 0. STATEMENT OF NEED
- 1. TASK OUTPUT
  - a. Significant Output
  - b. Termination Criteria
- 2. BENEFITS
- 3. ACTIVITY PLAN
- 4. MILESTONES
- 35. IMPACT OF TASK AUGMENTATION
  - a. Current Year
  - b. Budget Year
  - c. Budget Year + 1
- 36. BACK-UP DOCUMENTATION
  - a. Detail Documentation *(Provide one sentence description.)*
  - b. Related risks and recovery strategy

(7)

30. STATEMENT OF NEED:

The present Task is concerned with the effects of man-induced pollution, both chemical and microbial, on living marine resources and their environment. As examples, microbial species belonging to the genus Clostridium, Aeromonas, Vibrio, Yesenia, Gaffkya, Prorocentrum, Gonyaulax, Gyrodinium, and the chemicals, mercury, DDT as well as a wide range of petrochemicals have been identified in regards to diseases of the fishery resource; food poisoning outbreaks in man has restricted use of the resources and places limitations on the use of the marine environment. We must determine the persistence of pollutant chemicals and disease-producing microbes in the environment, their cycling through food-chain organisms and the possible inter-related microbial and chemical effects which act to the detriment of the marine animals, their habitat and the use of the resource.

The National Marine Fisheries Service involvement in this Task relates to its responsibility to predict the state and potential of the living fishery resources and to improve and wisely manage marine ecosystems. Any limitations, which pollutants can effect, of these resources must be reported to the primary beneficiaries, i.e. the industry and user groups including consumers, sportsmen and the general public.

31. TASK OUTPUTS:

Specific Task outputs expected as related to the needs presented will be data (qualitative and quantitative) on the types of disease-producing microorganisms, heavy metals and other chemical pollutants (PCB's, hydrocarbons, etc.) present in the fisheries and the environment in those areas under study. Further information will be developed to determine the ability of the marine animals to survive microbial and chemical environmental pollutants and the often subtle effects of these on fishery resources. The data generated under this Task will be in the form of Center reports, publications, and data reports to the user groups. Data from various reports will be incorporated into management documents, special atlases and synthesis reports which bring the data to bear on specific problems.

The criteria for determining the termination of a particular element of the Task (the Task by its nature is continuous - assuming persistent environmental contamination) will be when sufficient data, after a cycle of sampling, are obtained to make a judgement on whether any particular microbial and chemical species can constitute a hazard and whether the fisheries and associated environment show some degree of degradation.

32. BENEFITS:

Information developed under the present Task will allow judgments to be made on limitations of the fishery resource and the environment. Information will be developed to predict problem areas for corrective action. These reports will emphasize the need to anticipate problems before they become too difficult to solve or require inordinate funds to correct.

33. ACTIVITIES PLAN:

The activities of the Task are to establish baseline data, both qualitatively and quantitatively, on chemical and microbial (aerobic and anaerobic) levels in the various elements of the ecosystem (animals, waters, sediments) in the specific coastal areas under consideration, and to examine the cycling of man-induced pollutants (microbial and chemical) through the biomass with emphasis on (1) concentrations of microorganisms and toxicants, (2) the influence of pollutants (nutritive and chemical) on microbial growth and types, (3) microbial conversion and degradation mechanisms of pollutants, and (4) the synergistic effects of microorganisms and pollutants on marine animals. Basic to the attainment of the objective is the development of sensitive and specific methodology for the rapid and positive identification of marine microbes and chemical pollutants. The development of baseline data in the environment requires an 18-month cycle of sampling and analysis for specific areas in order to determine variations in regards to time and season. Once identified, specific areas will be selected for more in-depth investigations using in-situ experiments.

Samples for both microbiological and chemical evaluation will be obtained concurrently from those areas listed in Item 29, Activities and Events. The field work will concentrate on those areas that show a potential degradation or contamination of the environment, as evidenced by the presence of disease and abnormalities in animals, mortalities, unusual sediments, etc. Areas of sampling will be included for control purposes. Animals selected as target species for the Long Island Sound area for chemical analysis include channeled whelk, flounder and striped bass.

Materials will be examined for trace metals by atomic absorption spectroscopy and neutron activation analysis (contractual effort). In-house capability includes analysis for As, Ag, Cd, Dr, Cu, Hg, Mn, Ni, Pb and Zn. Potential capability would include nine additional elements. Present neutron activation capabilities include Ag, Cr, Zn, Sb, Se, Co, Rb, Mn and Hg, with additional capabilities for eight other elements plus 10 rare earth metals. Ideally, current metal analysis techniques would require the employment of the two complementary techniques of analysis for comparative purposes.

Analysis of select samples for PCB's (polychlorinated biphenyls) and groups of hydrocarbons of select samples from Long Island Sound and New York Bight will be initiated in late FY 74 and early FY 75. Budget restrictions would preclude a major thrust in this area for the current fiscal year.

Identification of specific microbes will be by 1) biochemical, 2) serological and chromatographic procedures and 3) characterization of their capabilities for disease production.

Initial emphasis in our studies will be placed on the members of the Vibrio group of bacteria, which are implicated in diseases of fish (fin rot) and shellfish (shellerosion), and man, as well as the toxin producing Clostridia. Where necessary distribution of fecal organisms will be used to outline areas of sewage contamination in sediments. The morphologically unique prosthecate bacteria will be used as indicators of certain environmental conditions because they are easily identified in mixed microbial populations.

Evidence of previous exposure of marine animals to specific environmental bacteria will be examined using serological methods.

In addition to field environmental studies, support studies to establish possible mechanisms will be performed in the laboratory and in situ. Immune responses against selected environmental bacteria will be examined in marine animals that have been exposed to pollutants.

The cycling and persistence of selected heavy metals will be examined in marine animals after prior exposures to known metal concentrations.

As select bacterial isolates are obtained from the environment, their physiological characteristics will be determined in order to obtain a proper understanding of their responses under environmental conditions and their effects on marine animals.

In part, the later mentioned activities will be a cooperative effort with other Task activities within the Center.

34. MILESTONES:

The milestones of this Task are reached when information has been developed to predict (1) the effect of microbial and chemical pollutants on specific aspects of the fishery; (2) the degradation of the fisheries environment for future harvest, and (3) viability of the animals after exposure to specific chemical and microbial pollutants.

Tangible evidence of the milestones would include data reports, published reports, and synthesis of data and reports into comprehensive atlases and guides useful to environmental managers, the fishing industry and sports fishermen.

35. IMPACT OF TASK AUGMENTATION:

The current Task is such that increased funding will result in increased speed of analysis and an increase in the numbers of samples that can be tested.

(a) FY 75 - Increased funds would broaden base for types of additional pollutants to be tested, i.e., PCB's, hydrocarbons, other microbial types, etc., as well as allow more rapid and specific identification and quantification of species.

(b) FY 76 (BY +1) as above.

(c) FY 77 (BY +2) as above.

36. BACK-UP DOCUMENTATION:

- (a) 1. Center Contaminants Report No. 5 - 1972.  
2. Center Contaminants Report. In preparation.  
3. Physiological Response of runner to Cadmium. In Press.

(b) The present Task relates to those of other agencies. It does not conflict but is complementary with other activities since the Task is concerned with areas of the mid-Atlantic region.

(c) Current Task can be performed under current legislation.

(d) An Environmental Impact Statement will not be required for the current Task.

# NMFS TASK DEVELOPMENT PLAN

(See Detailed Instructions)

1. DATE PREPARED  
December 20, 1973

(Submit five copies by Jan. 2, 1974.)

TO: Director, National Marine Fisheries Service, ATTN: F&S National Oceanic and Atmospheric Administration Washington, D.C. 20235

FMC's - Submit a separate Task Development Plan for each task beginning, continuing, or ending in FY 1974, FY 1975, or FY 1976. Total funding in each category must equal your PED specific total funding guidance. Reimbursable funds are not to be mingled with appropriated funds on any programmatic TDP; separate TDP's must be prepared. Submit one Support TDP itemizing the administrative support cost (Management Fund) for the FMC.

2. TDP NUMBER MAC-012-76-IE-A	3. SUB-OBJECTIVE CODE IV-A-2	4. RANK (To be completed only by FMC's and NMFS Hdqrs.) 5	FMC	NMFS HDQRS.
5. TASK NUMBER 2818P5	6. TASK TITLE Contaminant Analysis - Rearing of Indicator Organisms			
7. ORGANIZATION CODE F33000	8. ORGANIZATION TITLE (Responsible for execution of this task) Experimental Biology Investigations		9. PRINCIPLE LOCATION City Milford Lab. State Conn.	

OBJECT CLASS <small>Lines 10-19. Enter all dollar values as thousands and tenths of thousands. Lines 22-23. Enter as man-years and tenths of man-years.</small>	WZJ R L O O	CURRENT YEAR FY 1974		BUDGET YEAR FY 1975		BUDGET YEAR + 1 FY 1976	
		TARGET ALLOWANCE A	INCREASE B	TARGET ALLOWANCE C	INCREASE D	TARGET ALLOWANCE E	INCREASE F
10. Total Direct Labor	15	121.9		112.5		92.0	
11. Travel	19	3.0		1.5			
12. Rents, Communications, Utilities	21						
13. Contracts <input type="checkbox"/> (To be let) Grants <input type="checkbox"/> (Funds obligated)	51 52 58						
14. Supplies	53	6.8		4.8		2.8	
15. Capital Equipment	54	2.0					
16. Other (Estimated cost of all other direct cost not included above.)		9.0		7.5		6.0	
17. Total Direct Funds (Add lines 10 through 16 above.)		142.7		126.3		100.8	
18. Support Cost		59.1		55.2		45.0	
19. Total Funds (Add lines 17 and 18.)		201.8		181.5		145.8	
20. Positions, Full-time permanent (Number applicable to this Task. Also, complete NOAA Form 32-14B.)		7		7		5	
21. Positions, Other (Number applicable to this Task)		2		2		2	
22. Man-years, Permanent		5.0		4.4		1.6	
23. Man-years, Other		1.2		1.2		.8	
24. Reimbursable Support (Reimbursable agreements only)							

5. OFFICIAL PREPARING REPORT (Signature) <i>James Hanks</i> (76)	26. CENTER DIRECTOR OR DESIGNATED REPRESENTATIVE (SIGN.) <i>John A. Holton</i>
------------------------------------------------------------------------	-----------------------------------------------------------------------------------

28. PROJECT NO.	ACTIVITY SCHEDULE & EVENTS	CY		FY		FY-1		FY-2		FY-3		FY-4		FY-5	
		1	2	1	2	1	2	1	2	1	2	1	2	1	2
	DESCRIPTIVE	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	A Developing culture method for the surf clam	←		X											
2	A Developing culture method for a marine crab	←											X		
3	A Developing culture method for a marine finfish				X										→
4	A Ozone gas depuration of paralytic shellfish poisons in bivalves	←					X								
5	A Prophylactic treatments of seawater to improve water quality	←													→
6	A Seawater sterilization to kill pathogens and sex products from exotic species held in the laboratory					X									→
7	A Testing the biological effects of crude and refined oil products decomposed by marine microorganisms on marine animals							X							→
8	E Surf clam culture method			X											
9	E Marine crab culture method												X		
10	E On-line treatment facility for sterilizing seawater									X					
11	E Effects of ozone disinfected seawater on marine organisms				X										
12	E Shellfish depuration process using ozone gas to eliminate paralytic shellfish poison							X							

29. OUT YEAR COMMENTS:

CONTINUE AT SAME LEVEL  
 INCREASE OF \_\_\_\_\_ %  
 REDUCTION OF \_\_\_\_\_ %  
 TERMINATION

REMARKS:

NMFS TASK DEVELOPMENT PLAN  
29. FULL-TIME PERMANENT POSITIONS

TDP NUMBER  
MAC-012-76-IE-A

Reference NOAA Form 32-14A, Item 20. Identify all full-time permanent positions related to this Task for the budget year only. Do not include support personnel; they should appear in the appropriate support Task Development Plan.

POSITION TITLE	GS LEVEL	NAME OF INCUMBENT <i>(If no Incumbent, enter "Vacant")</i>	% OF TIME SPENT ON THIS TASK
Fishery Biologist (Research)	13-5	Landers, Warren	50
Fishery Biologist	9-3	Rhodes, Jr., Edwin	100
Fishery Biologist	7-3	Cable, Wayne	100
Student Trainee (Biological Science)	3-1	Bohran, Charles	75
Student Trainee (Biological Science)	5-1	Crouch, Gene	75

CONTINUE on plain 8x10 1/2 paper. Identify "Page of Pages" and "TDP Number" in upper right corner. Comment on each of the following items, identifying by number. If item is not applicable, so indicate by entering "NA":

- 0. STATEMENT OF NEED
- 1. TASK OUTPUT
  - a. Significant Output
  - b. Termination Criteria
- 2. BENEFITS
- 3. ACTIVITY PLAN
- 4. MILESTONES.

35. IMPACT OF TASK AUGMENTATION

- a. Current Year
- b. Budget Year
- c. Budget Year + 1

36. BACK-UP DOCUMENTATION

- a. Detail Documentation *(Provides one sentence description.)*
- b. Related tasks and resources currently being...

(72)

30. Statement of Need:

The continual introduction of pollutants into the marine environment has become a problem of major concern to marine biologists and others who recognize the vulnerability of marine communities to the effects of these contaminants. Within a species, the stages of development most sensitive to their environment are usually the embryonic and larval; consequently, it is here that the most serious and far-reaching damage occurs, not only to the young organisms directly but also to the continuity of the adult populations which they represent. The aquatic environment is a resource with a number of competing users, many of whom alter the environment to the detriment of the living marine resource. The effects of these changes on the resource animals must be understood and it is necessary to rear these animals in the laboratory year-round in order to provide the researcher the necessary material with which he can fully reach this understanding.

The intent of this Task is to develop laboratory techniques for maintaining adult marine organisms and rearing the embryos, larvae and juveniles of these animals, from one generation to the next if possible, in the laboratory. These life studies investigations will be directed toward the specific problem of providing bioassay researchers with material for studying the effect of environmental pollution on living resources. This knowledge will not only provide support for the review of Environmental Impact Statements and improve our understanding of marine ecosystems, but will provide information usable in developing State/Federal management agreements for specific organisms.

It is absolutely essential that this work be conducted if any further bioassay work is to be continued on the embryonic and larval stages of marine organisms at the MACFC/Milford Laboratory. The only continuous, year-round culture systems that now exist are for the oyster, Crassostrea virginica, and the hard clam, Mercenaria mercenaria. All other bioassay work being conducted in the U. S. by State, academic and Federal groups is dependent on obtaining embryonic and larval stages during the normal reproductive period of the organism and is thus haphazard and seasonal both in workload and results. In addition, with rare exceptions, methodology for rearing organisms from one generation to the next is absent even though the early developmental stages may be readily available.

3l. Task Outputs (Specific):

a) Determine the reproductive habits and early development of ecologically and/or commercially important species in the New York Bight about which little is known. These studies will continue for 8-10 years. Criteria for Task termination is the development of techniques for maintaining, conditioning, spawning and rearing a variety of ecologically and/or commercially important marine organisms in the laboratory.

b) Create in the laboratory environments in which various marine organisms can be spawned and their life stages reared in good physiological condition. These studies will continue for 8-10 years. Criteria for Task termination will be such time as techniques are developed for a variety of ecologically and/or commercially important species.

c) Study water quality and the effects of deleterious materials in the water on the well-being of all classes of organisms being reared. This must accompany the life history studies if dependable culture methods are to be developed. These studies will continue for 8-10 years concurrently with C. 1. a. and b. above.

d) Study the susceptibility of all species selected to disease in the unnatural environment in the laboratory and develop controls for these diseases. The studies will continue for 8-10 years concurrently with C. 1. a. and b. above.

### 32. Benefits:

The knowledge gained from these experiments will allow us to assess the damage caused by pollutants on marine organisms by providing the methodology for controlled studies. We will learn more about the life histories of marine organisms in the New York Bight which is essential in developing State/Federal management agreements for specific organisms. The knowledge gained will also aid in the development of aquaculture. Water quality studies will improve the culture environment and increase the survival and growth of laboratory-reared organisms.

### 33. Activities Plan:

Standard methods available at this laboratory and in the literature will be used in an attempt to culture estuarine and offshore marine species. It is apparent, however, that in some cases these methods will have to be modified and/or new technical approaches developed. Since so little is known about rearing marine organisms on a continual basis throughout the year in the laboratory, the function of this Task is to develop the technical approach for a variety of animals representing a number of ecological niches.

To improve water quality, different methods of seawater disinfection will be used such as ozone gas, antibiotics, and selective ultrafiltration. Trace metal analysis, vitamin assays, and organic matter tests will be performed on treated waters. In conjunction, genetic, biochemical, and physiological tests will determine any adverse effects such treated water may have over long-term use.

34. Milestones:

Development of a method for rearing all stages in the life-history of the surf clam, Spisula solidissima, a commercially valuable species representative of bivalve communities in the open coastal waters of the Middle Atlantic Bight.

Development of a method for rearing all stages in the life-history of a marine crab.

Determination of the effects of ozone-sterilized seawater on selected marine organisms.

Development of a method for sterilizing large volumes of seawater containing mollusk pathogens before it is discharged to the wild.

Development of ozone gas depuration of paralytic shellfish poisons in contaminated mollusks.

35. Impact of Task Augmentation:

N/A

36. Back-up Documentation, Legislative Program and Environmental Impact:

a) Informal Report No. 3 - Middle Atlantic Coastal Fisheries Center, NMFS - A proposed five-year study of biological and chemical baselines and effects of environmental changes on marine organisms in the New York Bight.

Informal Report No. 4 - Middle Atlantic Coastal Fisheries Center, NMFS - Investigation Summaries - A summary of research in on-going programs within the Middle Atlantic Coastal Fisheries Center.

Informal Report No. 5 - Middle Atlantic Coastal Fisheries Center, NMFS - Cooperative study of contaminants in the coastal environment and their effects on living marine resources: Summary Report, 1971-1972.

Supportable by Dr. Allan Hirsch, Program Manager of the NOAA/MESA Program.

- b) Sea Grant supporting studies on rearing of organisms at various universities.

1831

# NMFS TASK DEVELOPMENT PLAN

(See Detailed Instructions)

1. DATE PREPARED

December 20, 1973

*(Submit five copies by Jan. 2, 1974.)*

TO: Director, National Marine Fisheries Service, ATTN: Fx5 National Oceanic and Atmospheric Administration Washington, D.C. 20235

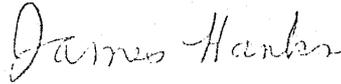
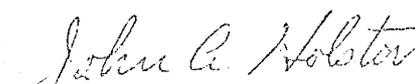
FMC's - Submit a separate Task Development Plan for each task beginning, continuing, or ending in FY 1974, FY 1975, or FY 1976. Total funding in each category must equal your FED specific total funding guidance. Reimbursable funds are not to be mingled with appropriated funds on any programmatic TDP; separate TDP's must be prepared. Submit one Support TDP itemizing the administrative support cost (Management Fund) for the FMC.

TDP NUMBER <b>MAC-013-76-IE-A</b>	3. SUB-OBJECTIVE CODE <b>IV-A-2</b>	4. RANK <i>(To be completed only by FMC's and NMFS Hdqrs.)</i>	FMC <b>14</b>	NMFS HDQRS.
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5. TASK NUMBER <b>2818P6</b>	6. TASK TITLE <b>Pollutants &amp; Phytoplankton Food-Chain Species</b>
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7. ORGANIZATION CODE <b>F33300</b>	8. ORGANIZATION TITLE <i>(Responsible for execution of this task)</i> <b>Experimental Biology Investigations</b>	9. PRINCIPLE LOCATION City: <b>Milford Lab.</b> State: <b>Conn.</b>
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OBJECT CLASS <small>Lines 10-19. Enter all dollar values as thousands and tenths of thousands. Lines 22-23. Enter as man-years and tenths of man-years.</small>	FUNDS PROGRAM	CURRENT YEAR FY 1974		BUDGET YEAR FY 1975		BUDGET YEAR +1 FY 1976	
		TARGET ALLOWANCE A	INCREASE B	TARGET ALLOWANCE C	INCREASE D	TARGET ALLOWANCE E	INCREASE F
10. Total Direct Labor	15	50.6		42.7		30.8	
11. Travel	19	.7		.5		.3	
12. Rents, Communications, Utilities	21						
13. Contracts <input type="checkbox"/> <i>(To be let)</i> Grants <input type="checkbox"/> <i>(Funds obligated)</i>	51 52 58						
14. Supplies	53	1.1		.8		.5	
15. Capital Equipment	54						
16. Other <i>(Estimated cost of all other direct cost not included above.)</i>		4.5		3.4		2.3	
17. Total Direct Funds <i>(Add lines 10 through 16 above.)</i>		56.9		47.4		33.9	
18. Support Cost		24.6		21.0		15.0	
19. Total Funds <i>(Add lines 17 and 18.)</i>		81.5		68.4		48.9	
20. Positions, Full-time permanent <i>(Number applicable to this Task. Also, complete NOAA Form 32-15C.)</i>		2		2		2	
21. Positions, Other <i>(Number applicable to this Task)</i>		2		2		2	
22. Man-years, Permanent		1.6		1.2		.8	
23. Man-years, Other		.6		.4		.2	
24. Reimbursable Support <i>(Reimbursable agreements only)</i>							

25. OFFICIAL PREPARING REPORT <i>(Signature)</i> 	26. CENTER DIRECTOR OR DESIGNATED REPRESENTATIVE <i>(Sig.)</i> 
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28. ACTIVITY SCHEDULE & EVENTS			FY		FY-1		FY-2		FY-3		FY-4		FY-5			
			1	2	1	2	1	2	1	2	1	2	1	2		
DATE	DESCRIPTIVE		A	B	C	D	E	F	G	H	I	J	K	L	M	N
1.	A	Maintenance of Culture Collection.	<													>
2.	A	Maintenance of Mass Culture	<													>
3.	A	Nutritional Biochemistry	<													>
4.	A	Nutritional Physiology	<													>
5.	A	Cytology		X												>
6.	E	Effects of Metabolites on Phytoplankton Growth			X											
7.	E	Effects of Organic Pollutants on Nutrition.						X								

29. OUT YEAR COMMENTS:

CONTINUE AT SAME LEVEL  
 INCREASE OF \_\_\_\_\_ %  
 REDUCTION OF \_\_\_\_\_ %  
 TERMINATION

REMARKS:

NMFS TASK DEVELOPMENT PLAN  
29. FULL-TIME PERMANENT POSITIONS

TDP NUMBER

MAC-013-76-IE-a

Reference NOAA Form 32-14A, Item 20. Identify all full-time permanent positions related to this Task for the budget year only. Do not include support personnel; they should appear in the appropriate support Task Development Plan.

POSITION TITLE	GS LEVEL	NAME OF INCUMBENT <i>(If no incumbent, enter "Vacant")</i>	% OF TIME SPENT ON THIS TASK
Research Microbiologist Microbiologist	13-4 7-1	Ukeles, Ravenna Rose, William	50 60

CONTINUE on plain 8x10 1/2 paper. Identify "Page of Pages" and "TDP Number" in upper right corner. Comment on each of the following items, identifying by number. If item is not applicable, so indicate by entering "NA":

- 30. STATEMENT OF NEED
- 31. TASK OUTPUT
  - a. Significant Output
  - b. Termination Criteria
- 32. BENEFITS
- 33. ACTIVITY PLAN
- 34. MILESTONES
- 35. IMPACT OF TASK AUGMENTATION
  - a. Current Year
  - b. Budget Year
  - c. Budget Year + 1
- 36. BACK-UP DOCUMENTATION
  - a. Detail Documentation *(Provide one sentence description.)*
  - b. Related tasks and resources currently...

(86)

### 30. Statement of Need:

Phytoplankters, the lowest element in the energy transformation chain, and the major source of the world's oxygen supply, play a role in the maintenance of an adequate fishery that cannot be overemphasized. The factors that limit marine phytoplankton productivity and species distribution must be understood. A rapidly expanding population will require increasing industrialization with the consequent continuing accumulation of contaminants in the marine environment. Contaminants arise from direct ocean dumping of waste, as well as from pollutants in rivers, lakes, and soils that find their way into coastal and open ocean waters. These pollutants may be directly toxic to phytoplankters, hence directly affect total productivity, or may be harmful to only certain species and affect species composition. The loss of phytoplankton species that are at the base of a food chain will ultimately affect the productivity of commercially valuable species. Some pollutants stimulate growth of phytoplankton, the overabundance of which can also adversely affect commercially valuable species. Many phytoplankters have the capacity to concentrate and store large amounts of a pollutant which can then be passed along the food chain with potentially harmful effects to the fishery and ultimately to human beings. The information developed by this Task will provide guidelines for the long-range management of fisheries relative to the introduction of industrial waste material and other pollutants in the aquatic environment.

### 31. Task Outputs (Specific):

a) 1. Maintain stock culture collection, purify strains, make preliminary identifications of unclassified species and provide a source of pure cultures to other investigators.

2. Maintain mass cultures of marine phytoplankton for production of foods as a support service for all Experimental Biology Investigations.

3. Conduct studies on the comparative effects of the significant nutritional components for phytoplankton growth and the role of various pollutants in normal nutrition. The study will encompass effects on cell reproduction, growth kinetics and cell composition, and metabolic pathways.

4. Conduct studies on the uptake and storage of metal ions by phytoplankton.

5. Conduct studies on cytological effects of marine pollutants to determine if there is a possibility of obtaining an indicator species with cytological evidence of contamination.

6. Conduct studies on the production of extracellular metabolic substances by phytoplankton and their effect on other species. These biological metabolites can also be a causative factor in environmental pollution. These studies will require 7-8 years.

b) 1. Refers to 31: a) 1. above. This Sub-task will continue for the duration of the Task.

2. Refers to 31: a) 2. above. This Sub-task will continue for the duration of the Task.

3. Refers to 31: a) 3. above. These studies will continue for 8-10 years. Criterion for Sub-task termination will be determined on the basis of scientific information.

4. Refers to 31: a) 4. above. These studies will continue for 5-6 years. See #3 for criterion of Task termination.

5. Refers to 31: a) 5. above. These studies will require 5-6 years. See #3 for criterion of Task termination.

6. Refers to 31: a) 6. above. These studies will require 8-10 years. See #3 for criterion of Task termination.

32. Benefits:

1. The TDP outputs will be distributed to the beneficiaries through publication in scientific journals. Information will also be distributed through numerous "in-house" reports and both oral and written communications to the interested parties who call upon the Center for information.

2. The information gained from this Task can be applied by NMFS and other state and federal agencies in managing our living marine resources.

3. The particular beneficiary of the Task would be the coastal and offshore fisheries who would have available to them experimental information with which to evaluate the potential or existing damage to a fishery from an industrial effluent through the indirect effect on the food supply.

4. The Task will also provide information to coastal and brackish water fisheries and the possibility of industrial effluents resulting in eutrophication and some approaches to avoiding or controlling this occurrence.

33. Activities Plan:

This Task will utilize several methods in the study of marine food-chain phytoplankton species. The technical approaches for studying the effects of marine contaminants on these species must be developed as the progress of the Task dictates. The basic plan is to employ pure cultures (axenic) of marine unicellular algae in laboratory experimental investigations. The factors that

are involved in affecting the nutrition, physiology and cytology of the species will be investigated through several approaches. These will be largely microscopic studies, growth and population measurements, and analytical evaluation through chemical determination.

34. Milestones:

The determination of the effect of selective pollutants on the nutrition of food-chain phytoplankters.

The determination of the productive extracellular metabolites by selected phytoplankters.

35. Impact of Task Augmentation:

N/A

36. Back-up Documentation, Legislative Program and Environmental Impact:

a) Informal Report No. 3 - Middle Atlantic Coastal Fisheries Center, NMFS - A proposed five-year study of biological and chemical baselines and effects of environmental changes on marine organisms in the New York Bight.

Informal Report No. 4 - Middle Atlantic Coastal Fisheries Center, NMFS - Investigation Summaries - A summary of research in ongoing programs within the Middle Atlantic Coastal Fisheries Center.

Informal Report No. 5 - Middle Atlantic Coastal Fisheries Center, NMFS - Cooperative study of contaminants in the coastal environments and their effects on living marine resources.

NOAA Document - Marine Pollution Monitoring: Strategies for a National Program.

Supportable by Dr. A. Hirsch, Program Manager, NOAA/MESA Program.

Related NMFS publications:

A monograph on Nutritional Requirements in Shellfish Culture, by Dr. Ukeles in Proceedings of the Conference on Artificial Propagation of Commercially Valuable Shellfish.

A monograph on Continuous Culture: A method for the production of unicellular algal foods, by Dr. Ukeles in Handbook of Phycological Methods, J. Stein (ed), published by Cambridge University Press.

A monograph on Cultivation of Unicellular Algae, by Dr. Ukeles, will appear in a five-volume series in Marine Ecology, O. Kinne (ed).

Ukeles, R. Inhibition of unicellular algae by syntehtic surface-active agents.

Ukeles, R. Growth of pure cultures of marine phytoplankton in the presence of toxicants.

Ukeles, R. Effect of hexose analogs on growth of Chilomonas paramecium.

Ukeles, R. Sulfonamide inhibition in Monochrysis lutheri.

b) Related NMFS Tasks:

MA-15

NSF sponsoring related but not identical Tasks in its IDOE Project.

c) N/A

d) This Task has no adverse impact on the environment. Chemical contaminated water will be treated in waste treatment system. Toxic microorganisms are killed in sterilizer.

# NMFS TASK DEVELOPMENT PLAN

(See Detailed Instructions)

1. DATE PREPARED  
December 20, 1973

(Submit five copies by Jan. 2, 1974.)

TO: Director, National Marine Fisheries Service, ATTN: Fx5 National Oceanic and Atmospheric Administration Washington, D.C. 20235

FMC's - Submit a separate Task Development Plan for each task beginning, continuing, or ending in FY 1974, FY 1975, or FY 1976. Total funding in each category must equal your PED specific total funding guidance. Reimbursable funds are not to be mingled with appropriated funds on any programmatic TDP; separate TDP's must be prepared. Submit one Support TDP itemizing the administrative support cost (Management Fund) for the FMC.

2. TDP NUMBER MAC-014-76-IE-A	3. SUB-OBJECTIVE CODE IV-A-2	4. RANK (To be completed only by FMC's and NMFS Hdqrs.) 10	FMC	NMFS HDQRS.
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5. TASK NUMBER 2818P7	6. TASK TITLE Mutagenic Effects of Pollutants
--------------------------	--------------------------------------------------

7. ORGANIZATION CODE F33300	8. ORGANIZATION TITLE (Responsible for execution of this task) Experimental Biology Investigations	9. PRINCIPLE LOCATION City: Milford Lab. State: Conn.
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OBJECT CLASS <small>Lines 10-19. Enter all dollar values as thousands and tenths of thousands. Lines 22-23. Enter as many years and tenths of man-years.</small>	W Z I R O O	CURRENT YEAR FY 1974		BUDGET YEAR FY 1975		BUDGET YEAR +1 FY 1976	
		TARGET ALLOWANCE A	INCREASE B	TARGET ALLOWANCE C	INCREASE D	TARGET ALLOWANCE E	INCREASE F
10. Total Direct Labor	15	50.6		42.7		27.3	
11. Travel	19	.5		.4		.5	
12. Rents, Communications, Utilities	21						
13. Contracts <input type="checkbox"/> (To be let) Grants <input type="checkbox"/> (Funds obligated)	51 52 58						
14. Supplies	53	1.5		2.0		2.0	
15. Capital Equipment	54	1.0					
16. Other (Estimated cost of all other direct cost not included above.)		3.3		2.3		2.0	
7. Total Direct Funds (Add lines 10 through 16 above.)		56.9		47.4		31.8	
8. Support Cost		24.6		21.0		13.4	
9. Total Funds (Add lines 17 and 18.)		81.5		68.4		45.2	
0. Positions, Full-time permanent (Number applicable to this Task. Also, complete NOAA Form 32-14C.)		3		3		3	
1. Positions, Other (Number applicable to this Task)		1		1		1	
2. Man-years, Permanent		2.2		2.0		1.8	
3. Man-years, Other		.6		.6		.6	
4. Reimbursable Support (Reimbursable agreements only)							

5. OFFICIAL PREPARING REPORT (Signature) <i>James Hanks</i> (92)	26. CENTER DIRECTOR OR DESIGNATED REPRESENTATIVE (SIGN.) <i>John C. Holsten</i>
------------------------------------------------------------------------	------------------------------------------------------------------------------------

28. ACTIVITY SCHEDULE & EVENTS			CY		BY-1		BY-2		BY-3		BY-4		BY-5			
			1	2	1	2	1	2	1	2	1	2	1	2		
NO./E	NARRATIVE		A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	A	Dominant lethal test on contaminant-exposed animals.			X							X				
2	A	Cytogenetic tests following gamete-zygote exposure to contaminants.	X					X								
3	A	Cytogenetic study of contaminant-exposed gonads.	X							X						
4	A	Cytogenetic study of gonads of ground fish and marine mammals.	X													X
5	A	Complete studies on genetic radiosensitivity of commercial oysters.	X			X										
6	A	Genetic analyses of F <sub>1</sub> -F <sub>3</sub> offspring of shellfish exposed to mutagenic contaminants.			X									X		
7	A	Management, breeding, and testing of contaminant-exposed experimental fish populations.			X											→
8	A	Study of genetic effects of synergism of major contaminants.							X							→

29. OUT YEAR COMMENTS:

CONTINUE AT SAME LEVEL  
 INCREASE OF \_\_\_\_\_ %  
 REDUCTION OF \_\_\_\_\_ %  
 TERMINATION

REMARKS:

28. ACTIVITY SCHEDULE & EVENTS	PC/VE	NARRATIVE	CY		FY-1		FY-2		FY-3		FY-4		FY-5						
			1	2	1	2	1	2	1	2	1	2	1	2					
			A	B	C	D	E	F	G	H	I	J	K	L	M	N			
9	A	Genetic effects of acute exposures to "new" and new classes of marine contaminants.							X										
10	A	Analyses of genetic sensitivity of major food chains species to contaminants.							X										
11	E	Determination of degree of mutagenicity of two major types of marine pollutants for gametes and zygotes of commercial fish.							X										
12	E	Evaluation of the seriousness of two major type marine contaminants as mutagens on chronic low-dose exposure.									X								
13	E	An estimation of genetic damage already sustained in some marine resources by mutagenic pollutants.																	X
14	E	Appraisal of genetic radiosensitivity of wild commercial shellfish stocks.				X													
15	E	Elucidation of the role of natural selection for genetic resistance to contaminants in sustaining important commercial fish																	X

29. OUT YEAR COMMENTS:

CONTINUE AT SAME LEVEL  
 INCREASE OF \_\_\_\_\_ %  
 REDUCTION OF \_\_\_\_\_ %  
 TERMINATION

REMARKS:

			CY		BY-1		BY-2		BY-3		BY-4		BY-5			
NO.	ACTIVITY	SCHEDULE & EVENTS	1	2	1	2	1	2	1	2	1	2	1	2		
NO./E	NARRATIVE		A	B	C	D	E	F	G	H	I	J	K	L	M	N
		stock.														
16	E	Evaluation of the role of synergism of different major pollutants in enhancing their potential for genetic damage to wild resources.														X
17	E	Evaluation of the role of major food chain species especially genetic sensitivity to mutagenic pollutants in reducing recruitment of genetically commercial species.														X

29. OUT YEAR COMMENTS:

CONTINUE AT SAME LEVEL  
 INCREASE OF \_\_\_\_\_ %  
 REDUCTION OF \_\_\_\_\_ %  
 TERMINATION

REMARKS:

NMFS TASK DEVELOPMENT PLAN  
29. FULL-TIME PERMANENT POSITIONS

TDP NUMBER  
MAC-014-76-IE-A

Reference NOAA Form 32-14A, Item 20. Identify all full-time permanent positions related to this Task for the budget year only. Do not include support personnel; they should appear in the appropriate support Task Development Plan.

POSITION TITLE	GS LEVEL	NAME OF INCUMBENT <i>(If no incumbent, enter "Vacant")</i>	% OF TIME SPENT ON THIS TASK
Research Geneticist	13-3	Mazzone, Arlene	50
Fishery Biologist	9-4	Stiles, Sheila	50
Fishery Biologist (GEN)	5-3	Hughes, James	50

CONTINUE on plain 8x10 1/2 paper. Identify "Page of Pages" and "TDP Number" in upper right corner. Comment on each of the following items, identifying by number. If item is not applicable, so indicate by entering "NA":

- 30. STATEMENT OF NEED
- 31. TASK OUTPUT
  - a. Significant Output
  - b. Termination Criteria
- 32. BENEFITS
- 33. ACTIVITY PLAN
- 34. MILESTONES
- 35. IMPACT OF TASK AUGMENTATION
  - a. Current Year
  - b. Budget Year
  - c. Budget Year + 1
- 36. BACK-UP DOCUMENTATION
  - a. Detail Documentation *(Provide one sentence description.)*
  - b. Related tasks and personnel

(56)

30. Statement of Need:

Included in the long-term, difficult-to-measure, and surely most important effects of marine pollutants must be changes in the hereditary material. Like radiation, many chemicals can induce harmful mutations. Some marine contaminants, as heavy metals, belong to classes of substances known to be mutagenic a mutagenic action of others can be suspected, and others invite testing of their mutagenicity by the seriousness of their widespread occurrence in the marine environment. The immediate effects of hereditary, mutagenic changes are lethal mutations, broken and rearranged chromosomes, abnormal mitotic cell divisions in somatic and premeiotic tissues and in zygotes and embryos, and finally abnormal meiotic divisions in the gonads. These effects lead directly to reduced to near complete sterility, reduced fecundity, abnormal zygotes and dead larvae. These effects, in turn, can be the bases for carcinogenesis, teratogenesis, and degenerative cellular changes. Degenerative cellular changes, in turn, lead to a variety of diseases of otherwise unclear etiology. In the broad sense mutagenic effects clearly are of central importance.

Initial analyses of the effects of five different heavy metals on shellfish have shown already a radiomimetic type of mutagenicity (see FY 74 July-Jan. Subtask Report on Mutagenic Effects of Pollutants). Results are supported by already known mutagenic effects of heavy metals on higher terrestrial plants, as well as some reports on mammals, microorganisms and man.

In a natural resource as the fisheries, breeding occurs uncontrolled in the wild, and is followed by an uncontrollable life history. (Contrast this to the farmer carefully selecting the strain of cereal crop he will sow a particular year, making a decision as to whether he will spray with this or that insecticide

or herbicide.). There is now relatively no knowledge on mutagenic effects of major chemical marine contaminants for species of commercial fish. There is little, often conflicting information on chronic low-dose radiation effects on marine species. It is in just such a situation - uncontrolled breeding and no knowledge of genetic effects of ubiquitous contaminants - that insidious genetic damage could significantly reduce important populations or an entire resource, thereby destroying a fishery before the real nature of the damage came to light. Recruitment into the fishery would simply be less and less with no obvious explanation until the resource recovered genetically, or was for all practical purposes destroyed for commercial exploitation. How much genetic damage has contributed already to the demise of commercial stocks can only be surmised.

There is so a need to determine which of the important marine pollutants are mutagenic to commercial fish; to know at what level of various mutagenic pollutants mutations are increased significantly above background spontaneous occurrences; to know how this ultimately affects the resource, industry and finally consumer.

The commercial fisheries have a right to and NMFS a need for sound scientific assessment of the effects of mutagenic marine contaminants on the recruitment of a variety of shellfish and groundfish into our commercial fisheries. Deleterious genetic effects of contaminants are important to the traditional industry and newly developing aquaculture industry alike.

The assessment must be broad enough in scope of pollutants studied and of sufficient depth to serve as a barometer of probable damage from new classes of contaminants or higher concentrations of old ones, and new mixtures of pollutants with new synergistic effects. There must be some appraisal of the potential of

important fishery species to develop genetic resistance to prevailing levels of mutagenic contaminants at the same time there is the stress of commercial exploitation or over-exploitation. Also, whether at low levels of chronic exposure there is some compensation for lethal gene effects by way of stepped-up gametogenesis, or whether genetic damage is enhanced in terms of recruitment by a reduction in gametogenesis in the presence of the chronic low-levels of chemical mutagens existing in the marine environment. There is an additional need to study a variety of type species in the food chain since a particularly genetic-sensitive group could offset the genetic resistance of a commercial species.

31. Task Outputs (Specific):

1. (a) Determination by dominant lethal gene test of the mutagenicity of low-dose chronic exposure of adult commercial American oysters and/or wild mussels to either silver or lead, and to a pesticide. Such test data should corroborate cytogenetic test data (see Semi-annual Subtask report for FY 74 July-Jan.) Relate the lethality of larvae from dominant lethals to recruitment of the oyster into the fishery.

(b) These studies should continue for 4 years. They will be terminated when significant genetic effects of low-levels of chronic exposure are proved or disclaimed. Levels should be akin to those prevailing in nature so that they have predictive value for effects in nature.

2. (a) Appraisal by cytogenetic methods of the probable genetic damage sustained to embryos of commercial oysters and to clams by exposure of their spawned gametes to (also completion of prior year's study on lead), dieldrin and a polychlorinated biphenyl.

(b) Criterion for Task termination will be the accumulation of sufficient information to relate loss of experimental zygotes to recruitment in the wild resource or fishery. Expect to terminate in 2 years.

3. (a) Complete the determination of whether genetic damage is done to the reproductive tissue of commercial oysters by exposure to low levels of toxaphene during gametogenesis, and to the reproductive tissue of wild mussels or clams by similar low-level exposure to lead.

(b) Criterion for Task termination will be the accumulation of sufficient information to relate germ-line mutations affecting sterility, fecundity and zygote and larval viability to recruitment in the natural resource or fishery. Expect to terminate in 3 years.

4. (a) Some sound estimations of the extent of pollution-related genetic damage already detectable at the cytogenetic level in the meiotic gonads of some groundfish and marine mammals; or resistance of these organisms to such genetic damage at prevailing levels of chronic pollution.

(b) Criterion for Task termination will be the accumulation of sufficient information to relate germ-line mutations affecting sterility, fecundity and zygote and embryo viability to recruitment in the natural resource or fishery. Expect to terminate in 6 years.

5. (a) Completion of data analyses and two manuscripts on the genetic effects of ionizing radiation on the American oyster. Study employed radiation of eggs, sperm, and whole-body radiation of juveniles, as well as adults. Appraisal of the general radiosensitivity of this commercial species in terms of these experimental findings.

(b) Will be finished within the Budget year as already collected data are interpreted, and writing completed.

6. (a) More thorough definition of the genetic effects for shellfish of long-term, whole-body chronic exposure to chemical contaminants, as opposed

to initial emphasis on the genetic effects of direct exposure of the genetically-sensitive, short-lived gametes, zygotes and embryos. Genetic effects tested will be dominant lethal mutations, random cytogenetic damage, and genetic-related partial sterility. These are the important limiting factors in the extent to which wild populations may overcome the genetic damage resulting from chronic exposure.

(b) Criterion for Task accomplishment in about 5 years will be the genetic analysis of  $F_1$ ,  $F_2$  and  $F_3$  animals developed from founding stock under continuous low-dose exposure to a heavy metal and pesticide from the time of gamete primordial mitoses to spawning and fertilization.

7. (a) First determination of whether important commercial fish can and will or will not through the process of natural selection make themselves genetically resistant to prevailing levels of marine pollutants. Do this by means of experimentally treated groups of animals held and bred as populations, instead of as individuals, and in the presence of specific contaminants. Testing for level of resistance to specific mutagenic marine contaminants would begin in the  $F_3$  generation. Control populations would also be held similarly in especially designed "population" trays.

(b) Criterion for Task accomplishment in 8 years will be the successful genetic testing of  $F_4$ ,  $F_5$  and  $F_6$  generations for genetic resistance to the specific contaminants.

8. (a) For direct genetic effects of mutagenic marine contaminants on exposed gametes - determination of the ameliorative, additive or multiplicative effects of heavy metals with one another, with pesticides and with irradiation - on shellfish.

(b) Criterion for Task accomplishment will be the development of sufficient information on synergistic genetic effects of mutagenic marine contaminants to make possible reasonable predictions on effects of contaminant combinations in nature on natural marine fish resources. Expect to take about 8 years with work pace planned so as to accumulate in-depth information of single contaminants first.

9. (a) For direct genetic effects on exposed gametes - extend the classes of pollutants studied on shellfish so as to obtain results on other important and new marine contaminants.

(b) This is expected to be accomplished in phases over an 8-year period. Criterion for Task accomplishment will be the formulation of sufficient information to satisfy those charged with protecting the resources, and to satisfy the fishing industry and the public that reasonably good decisions can be made about protecting the germ plasm of our marine resource animals.

10. (a) Analyses of mutagen sensitivity of appropriate test species all along selected food chains. (Although acute toxicity studies have been conducted for several decades, little is known of the sensitivity levels of the least resistant species so results do not indicate "safe" levels for the biota even for acute, short-term exposures.).

(b) Criterion for Task accomplishment in about 9 years will be some information on the levels of genetic sensitivity to mutagenic marine contaminants along the food chain up to those commercial fish highest in the chain. Information must be sufficient to allow some estimate of the risk to fishery resources of different contaminant levels as based on the most mutation-susceptible links in the food chain.

### 32. Benefits:

The knowledge gained from these studies will, by including genetic parameters that affect eventual recruitment, help in assessing the total long-term damage that can be caused in a marine ecosystem by the dumping of pollutants into that system. This is ultimately of undisputed benefit to the commercial fisheries (traditional and aquaculture alike) and consumers. Genetic tests provide an especially sensitive means of measuring presence or absence of low-dose effects where these would otherwise remain questionable. Studies proposed here would determine what levels of pollutants do significant genetic damage to be reflected in recruitment into the fisheries, and also adversely affect costly hatchery production. Multi-species are affected - chiefly shellfish; secondly groundfish; lastly marine mammals.

Information developed can be applied by NMFS/NOAA and other agencies in managing and protecting our living marine resources for which they are responsible. They provide support for the review of Environmental Impact Statements and development of state/federal management agreements.

Evidence of mutagenicity of marine contaminants for commercial fish can further be passed on to the FDA for checks on mammalian mutagenicity if high body levels persist raising questions regarding human consumption providing, of course, suitable mammalian tests have not already been made.

### 33. Activities Plan:

Genetic tests employed for assaying the mutagenicity of selected contaminants will be: (1) a breeding-type test necessitating laboratory spawning and specific crosses, the standard dominant lethal test; (2) cytogenetic tests for chromosome aberrations; and (3) cytological tests for abnormalities of meiosis,

mitoses, fertilization and cleavage that lead to genetic damage. Tissues and cells employed will be: eggs, sperm, zygotes, larvae, gonad primordia, spermatocytes, oocytes and gill tissue. There will be breeding and genetic testing of  $F_3$ ,  $F_4$ ,  $F_5$  and  $F_6$  animals as populations held and bred in specially designed holding tanks (and given chronic low doses of contaminants).

Exposures to contaminants will be chronic, low-dose, whole-body type; and short-term exposures to the short-lived gametes, zygotes and early embryos. Genetic damage will be appraised in the small laboratory-held populations, as well as in individuals. All genetic damage so obtained will be related to recruitment into the fisheries when wild parent stocks, their spawned gametes, zygotes or embryos are exposed in nature to effective levels of a potentially mutagenic marine contaminant. Level of probable damage already sustained by some populations of groundfish and marine mammals will be appraised by spot-checking of meiosis in animals sampled on cruises. This will be related to body and gonad levels of the contaminant, and past exposure history insofar as possible.

#### 34. Milestones:

1. Establishment of extent of mutagenicity of heavy metal contaminants and pesticides for gametes and zygotes of important commercial fish.
2. Determination of the seriousness of the mutagenicity of heavy metal and pesticide contaminants to marine fish on low-level chronic exposure to their gonads.
3. Estimation of probable amount of genetic damage already sustained in some groundfish and marine mammals by prevailing levels of contaminants in nature.
4. Appraisal of general genetic radiosensitivity of commercial shellfish.
5. Some estimation of the likelihood of a build-up in important fishery resources of genetic resistance to major contaminants.

6. Appraisal of the synergism of different mutagenic marine contaminants in enhancing or reducing the lethal genetic effects of one another.

7. An estimation of the importance of food-chain species very genetically susceptible to mutagenic marine contaminants in reducing the recruitment of more genetically resistant commercial ones.

35. Impact of Task Augmentation:

N/A

36. Back-up Documentation, Legislative Program and Environmental Impact

(a) 1. Informal, in-house report by A. Crosby Longwell - Evaluation of the mutagenicity of marine contaminants for marine species as affecting in-shore and off-shore fisheries. October 1973.

2. Several research papers from the Milford Genetics Program dealing with genetic work that forms a background for studying mutagenic effects of certain contaminants on marine species and commercial fish. See bibliography of Report listed under 1. above.

3. Longwell, A. Crosby, D. A. Nelson, J. R. MacInnes and A. Calabro - Mutagenic effects of heavy metals on zygotes of the commercial American oyster, Crassostrea virginica. In preparation for publication in a scientific journal.

4. Longwell, A. Crosby, S. S. Stiles and J. B. Hughes - Breeding response of the commercial American oyster to ionizing radiation. In preparation for publication in a scientific journal.

5. Longwell, A. Crosby, and S. S. Stiles - Oyster genetics and the probable future role of genetics in aquaculture. In press, Malacological Review.

(105)

6. Longwell, A. Crosby - Some impressions regarding genetics and the fisheries of Japan. In press. Special Scientific Report-Fisheries. Part of the Proceedings of the 1st Meeting of the Aquaculture Panel of the UJNR, Tokyo, Japan, November 1971 - Japan has a mammoth pollution problem.

7. Informal Report No. 3 - Middle Atlantic Coastal Fisheries Center, NMFS - A proposed five-year study of biological and chemical baselines and effects of environmental changes on marine organisms in the New York Bight.

Informal Report No. 4 - Middle Atlantic Coastal Fisheries Center, NMFS - Investigation Summaries - A summary of research of on-going programs within the Middle Atlantic Coastal Fisheries Center.

NOAA Document - Marine Pollution Monitoring: Strategies for a National Program.

NSF National Project - IDOE (International Decade of Ocean Exploration).

8. Supportable by Dr. Allan Hirsch, Program Manager of the NOAA/MESA Program.

(b) Mutagenicity of marine contaminants for marine species as affecting in-shore and off-shore fisheries is not currently being pursued by any other group in or outside government laboratories except perhaps as isolated projects here and there. No other than above cited coherent report has been prepared on the subject. Environmental mutagenesis is, however, a large field in regard to human safety with most tests conducted on mammalian systems. The artificial breeding systems of land agriculture can protect against untoward effects of environmental mutagens at the level of entire industries. A natural resource as a fishery is by contrast vulnerable. No doubt, the failure of the marine and

fishery fields to research the risk of contaminant mutagenicity along with other effects of toxic pollutants results in part from the very limited impact any aspect of genetic research has had to date on the fisheries. This is, however, bound to change and is, in fact, already changing with the advent of aquaculture and the somewhat new field of ecological genetics.

(c) Genetically related NMFS Tasks are the following: NW-31, NW-32, NW-33, AE-05, MA-13, MA-14, TL-02 and AB-07. NSF sponsoring similar studies in its IDOE Project.

(d) N/A

(e) This Task will have no adverse impact on the environment. Contaminated water used in this Task will be waste treated in a waste treatment system which has been constructed at this facility.

NMFS TASK DEVELOPMENT PLAN

(See Detailed Instructions)

1. DATE PREPARED

December 20, 1974

(Submit five copies by Jan. 2, 1974.)

TO: Director, National Marine Fisheries Service, ATTN: Fx5 National Oceanic and Atmospheric Administration Washington, D.C. 20235

FMC's - Submit a separate Task Development Plan for each task beginning, continuing in FY 1974, FY 1975, or FY 1976. Total funding in each category must equal PED specific total funding guidance. Reimbursable funds are not to be mingled with appropriated funds on any programmatic TDP; separate TDP's must be prepared. Submit one Support TDP itemizing the administrative support cost (Management Fund) for the

2. TDP NUMBER MAC-015-76-IE-A	3. SUB-OBJECTIVE CODE IV-A-2	4. RANK (To be completed only by FMC's and NMFS Hdqrs.) 6	FMC	NMFS HDQR
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5. TASK NUMBER 2818P8	6. TASK TITLE Physiological Effects of Pollutant Stress
--------------------------	------------------------------------------------------------

7. ORGANIZATION CODE F33000	8. ORGANIZATION TITLE (Responsible for execution of this task) Experimental Biology Investigations	9. PRINCIPLE LOCATION City: Milford Lab. State: Con
--------------------------------	-------------------------------------------------------------------------------------------------------	--------------------------------------------------------

OBJECT CLASS <i>Lines 10-19. Enter all dollar values as thousands and tenths of thousands. Lines 22-23. Enter as man-years and tenths of man-years.</i>	UNIT BOOK	CURRENT YEAR FY 1974		BUDGET YEAR FY 1975		BUDGET YEAR + 1 FY 1976	
		TARGET ALLOWANCE A	INCREASE B	TARGET ALLOWANCE C	INCREASE D	TARGET ALLOWANCE E	INCREASE F
10. Total Direct Labor	15	123.2		130.2		130.2	
11. Travel	19	1.5		1.5		1.5	
12. Rents, Communications, Utilities	21						
13. Contracts <input type="checkbox"/> (To be let) Grants <input type="checkbox"/> (Funds obligated)	51 52 58						
14. Supplies	53	5.6		5.6		5.6	
15. Capital Equipment	54	1.5		1.5		1.5	
16. Other (Estimated cost of all other direct cost not included above.)		12.0		12.0		12.0	
17. Total Direct Funds (Add lines 10 through 16 above.)		143.8		150.8		150.8	
18. Support Cost		59.8		63.9		63.7	
19. Total Funds (Add lines 17 and 18.)		203.6		214.7		214.5	
20. Positions, Full-time permanent (Number applicable to this Task. Also, complete NOAA Form 32-14C.)		8		8		8	
21. Positions, Other (Number applicable to this Task)		4		4		4	
22. Man-years, Permanent		6.2		6.2		6.2	
23. Man-years, Other		3.0		3.0		3.0	
24. Reimbursable Support (Reimbursable agreements only)							

25. OFFICIAL PREPARING REPORT (Signature) <i>James Hanks</i> (108)	26. CENTER DIRECTOR OR DESIGNATED REPRESENTATIVE (Sig.) <i>John A. Holbert</i>
-----------------------------------------------------------------------	-----------------------------------------------------------------------------------

See attached

28. ACTIVITY SCHEDULE & EVENTS	CY	FY		FY-1		FY-2		FY-3		FY-4		FY-5			
		1	2	1	2	1	2	1	2	1	2	1	2		
		A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	A	Collection and Maintenance of test organisms												<	>
2	A	Acute exposure tests												<	>
3	A	Chronic exposure tests												<	>
4	A	Respiratory physiology												<	>
5	A	Osmoregulatory physiology												<	>
6	A	Neuromuscular physiology												X	>
7	A	Blood biochemistry												<	>
8	A	Tissue biochemistry												<	>
9	E	Effects of cadmium on marine animals													X
10	E	Effects of silver on marine animals													X
11	E	Effects of mercury on marine animals													X

29. OUT YEAR COMMENTS:

CONTINUE AT SAME LEVEL  
 INCREASE OF \_\_\_\_\_ %  
 REDUCTION OF \_\_\_\_\_ %  
 TERMINATION:

REMARKS:

(109)

NMFS TASK DEVELOPMENT PLAN  
29. FULL-TIME PERMANENT POSITIONS

3 | 7  
TOP NUMBER  
MAC-015-76-IE-

Reference NOAA Form 32-14A, item 20. Identify all full-time permanent positions related to this Task for the budget year only. Do not include support personnel; they should appear in the appropriate support Task Development Plan.

POSITION TITLE	GS LEVEL	NAME OF INCUMBENT (If no Incumbent, enter "Vacant")	% OF SPEN THIS
Fishery Biologist	13-1	Clabrese, Anthony	80
Physiologist	11-3	Thurberg, Frederick P.	100
Biochemist	12-6	Could, Edith	80
Fishery Biologist	9-1	Collier, Ries S.	100
Physiologist	7-3	Dawson, Margaret A.	100
Biologist	7-5	Miller, James E.	100
Fishery Biologist	7-4	MacInnes, John R.	100
Fishery Biologist	7-1	Nelson, David A.	100

CONTINUE on plain 8x10 1/2 paper. Identify "Page of Pages" and "TDP Number" in upper right corner. Comment on each of the following items, identifying by number. If item is not applicable, so indicate by entering "NA":

- 30. STATEMENT OF NEED
- 31. TASK OUTPUT
  - a. Significant Output
  - b. Termination Criteria
- 32. BENEFITS
- 33. ACTIVITY PLAN
- 34. MILESTONES

- 35. IMPACT OF TASK AUGMENTATION
  - a. Current Year
  - b. Budget Year
  - c. Budget Year + 1
- 36. BACK-UP DOCUMENTATION
  - a. Detail Documentation (Provide one sentence description.)
  - b. Related tasks and research currently being

30. Statement of Need:

There exists, at all levels of both the public and the private sector, considerable alarm that the living marine resources of our estuarine, coastal and oceanic ecosystems are being adversely affected by extensive dumping of untreated wastes and by run-offs of highly polluted waters. The modes and intensities of such adverse effects are largely unknown. Baseline findings of marine environmental quality cannot be interpreted without such knowledge. Similarly, rational resource-oriented water quality standards cannot be established and enforced by cooperating federal and state regulatory agencies when such knowledge is lacking or fragmentary.

To provide a basis for environmental management, it is necessary to establish the precise levels of pollutants that can cause mortalities, as well as the differential responses of marine organisms, at each stage in their life history, held in static systems. Probably of even greater importance is the long-term effect of exposure to sublethal (stress) levels. Such exposure may limit or alter development, growth, reproduction, metabolism, or other physiological and biochemical processes.

The intent of this Task is to examine in the laboratory, using physiological and biochemical techniques, a selected group of animals which are common to the Middle Atlantic Bight and determine the effect of contaminants on their normal life functions. These laboratory experiments, when correlated with contaminant levels in the environment, will indicate that some marine animals are extremely sensitive to minute amounts of pollutants or that certain animals or communities will flourish where specific contaminants are available at

trace levels. This knowledge will provide support for the review of Environmental Impact Statements, and in the planning and approval of federally constructed, permitted or licensed environmental alterations.

31. Task Outputs (Specific):

a) 1. Determine the lethal effects of a variety of heavy metals, individually and in combination, on the embryonic and larval stages of some mollusks and crustaceans in acute static systems. }

2. Determine the long-term sublethal effects of exposure to a large variety of pollutants on the larval, juvenile and adult stages of mollusks, crustaceans and finfish in chronic, long-term exposure systems.

3. Define the physiological and biochemical pathways affected and relate them to the metabolic disorders, which result in death or permanent damage to the living marine organism.

b) 1. Refers to 31: a) 1. above. These studies will continue for 6-8 years. Criterion for Task termination will be the establishment of the effects of these metals on these most sensitive life stages of the species being tested in short-term tests (24-96 hours).

2. Refers to 31: a) 2. above. These studies will continue for 10-12 years. Criterion for Task termination will be the assessment of damage caused by the pollutants on growth, reproduction, metabolism, mutagenic effects and other physiological responses of the various organisms being tested.

3. Refers to 31: a) 3. above. These studies will continue for 8-12 years. Criterion for Task termination will be the assessment of damage caused by pollutants on biochemical pathways of the organisms being tested.

32. Benefits:

Environmental Impact Statements can be reviewed and evaluated with the necessary scientific background information that is collected by this Task. This information is a prerequisite for Regional Water Resources personnel in evaluating Environmental Impact Statements which will lead to maximum protection and conservation of the resources which NMFS and NOAA are responsible for. This information can thus be applied by NMFS and other federal and state natural resource agencies in managing and protecting our living marine resources.

33. Activities Plan:

Depending on the availability of various marine organisms and their life stages, tests will be set up seasonally. Animals will be exposed to various levels of contaminants in test containers (jars, aquaria, fiber glass tanks) in short-term tests (96 hours or less) for studies of mortality and physiological effects. When attempting to study the long-term effects of pollutants on marine life, various organisms will be placed in fiber glass tanks or glass aquaria and will receive a continuous exposure to the pollutant in a flow-through system by delivery from a proportional diluter. When needed, these organisms will be removed from the test system and studied for physiological changes. These changes will be determined specifically by physiological and biochemical techniques in the laboratory using appropriate instrumentation.

34. Milestones:

Determination of physiological effects of silver on selected commercially and ecologically important invertebrate and vertebrate species.

Determination of physiological effects of cadmium on selected commercially and ecologically important invertebrate and vertebrate species.

Determination of physiological effects of mercury on selected commercially and ecologically important invertebrate and vertebrate species.

35. Impact of Task Augmentation:

N/A

36. Back-up Documentation, Legislative Program and Environmental Impact:

a) Informal Report No. 3 - Middle Atlantic Coastal Fisheries Center, NMFS - A proposed five-year study of biological and chemical baselines and effects of environmental changes on marine organisms in the New York Bight.

Informal Report No. 4 - Middle Atlantic Coastal Fisheries Center, NMFS - Investigation Summaries - A summary of research in ongoing programs within the Middle Atlantic Coastal Fisheries Center.

Informal Report No. 5 - Middle Atlantic Coastal Fisheries Center, NMFS - Cooperative study of contaminants in the coastal environment and their effects on living marine resources: Summary Report, 1971-1972.

Informal Report No. 17 - Middle Atlantic Coastal Fisheries Center, NMFS - The acute and chronic exposure facility: Milford Laboratory, Experimental Biology Investigations.

NOAA Document - "Marine Pollution Monitoring: Strategies for a National Program".

NSF National Project - IDOE (International Decade of Ocean Exploration)

b) Related NMFS Tasks are the following:

NW-31, NW-32, NW-33, AE-05, MA-13, MA-14, TL-02 and AB-07.

NSF sponsoring similar studies in its IDOE Project.

c) N/A

d) This Task will have no adverse impact on the environment. Contaminated water used in this Task will be waste treated in a waste treatment system which has been constructed at this facility.

**NMFS TASK DEVELOPMENT PLAN**

(See Detailed Instructions)

1. DATE PREPARED  
December 20, 1974

(Submit five copies by Jan. 2, 1974.)

TO: Director, National Marine Fisheries Service, ATTN: Fx5 National Oceanic and Atmospheric Administration Washington, D.C. 20235

FMC's - Submit a separate Task Development Plan for each task beginning, continuing, ending in FY 1974, FY 1975, or FY 1976. Total funding in each category must equal year specific total funding guidance. Reimbursable funds are not to be mingled with appropriated funds on any programmatic TDP; separate TDP's must be prepared. Submit one Support TDP itemizing the administrative support cost (Management Fund) for the FMC's.

2. TOP NUMBER: MAC-016-76-LS-A  
3. SUB-OBJECTIVE CODE: II-E-3  
4. RANK (To be completed only by FMC's and NMFS Hqrs.): 12  
FMC: \_\_\_\_\_  
NMFS HQRs.: \_\_\_\_\_

5. TASK NUMBER: 2817P1  
6. TASK TITLE: Life Studies: Comparative Pathobiology

7. ORGANIZATION CODE: F33400  
8. ORGANIZATION TITLE (Responsible for execution of this task): Pathobiology Investigations  
9. PRINCIPLE LOCATION: City: Oxford, Md. State: Md.

OBJECT CLASS <i>Lines 10-19. Enter all dollar values as thousands and tenths of thousands. Lines 22-23. Enter as man-years and tenths of man-years.</i>	E N J R O O	CURRENT YEAR FY 1974		BUDGET YEAR FY 1975		BUDGET YEAR + 1 FY 1976	
		TARGET ALLOWANCE A	INCREASE B	TARGET ALLOWANCE C	INCREASE D	TARGET ALLOWANCE E	INCREASE F
10. Total Direct Labor	15	108.5		95.1		95.1	
11. Travel	19	7.4		6.4		6.4	
12. Rents, Communications, Utilities	21						
13. Contracts <input type="checkbox"/> (To be let) Grants <input type="checkbox"/> (Funds obligated)	51 52 58						
14. Supplies	53	4.4		2.5		2.5	
15. Capital Equipment	54	1.2		1.2		1.2	
16. Other (Estimated cost of all other direct cost not included above.)		10.0		7.9		7.9	
17. Total Direct Funds (Add lines 10 through 16 above.)		131.5		113.1		113.1	
18. Support Cost		52.6		46.7		46.6	
19. Total Funds (Add lines 17 and 18.)		184.1		159.8		159.7	
20. Positions, Full-time permanent (Number applicable to this Task. Also, complete NOAA Form 32-14C.)		9		8		8	
21. Positions, Other (Number applicable to this Task)		0		0		0	
22. Man-years, Permanent		6.4		5.2		5.2	
23. Man-years, Other		0		0		0	
24. Reimbursable Support (Reimbursable agreements only)							

25. OFFICIAL PREPARING REPORT (Signature)  
*Carol Rosenfield*  
(1114)

26. CENTER DIRECTOR OR DESIGNATED REPRESENTATIVE (SIG.)  
*John A. Holton*

## NMFS VESSEL REQUIREMENTS FY 1976

1. Date: Dec. 28, 1973      2. TDP No.: MAC-016-76-IE-A      3. Prepared by: J. Holston

4. Task Title: Life Studies: Comparative Pathobiology

SEA TIME - DAYS	CY (a)	BY		BY+1	
		(b) T.A.	(c) Incr.	(d) T.A.	(e) I
NMFS 5. R. V. Delaware II	(50)	(60)	-	(60)	
Vessel 6. Small boat (15')	12	24	-	24	
(Name) 7. -					
Charter 8. -					
Vessel 9. -					
(type)					
10. TOTAL SEA DAYS	12 (62)	24 (84)	-	24 (84)	
Scientists 11. Maximum	2	2	-	2	-
per 12. Minimum	1	1	-	1	-
cruise 13. Anticipated	2	2	-	2	-
(Average)					
14. 1st. (1) As in MAC-002					
15. 2nd. (2) Two days each month - study disease "control) for fin rot disease					
Cruise 16. 3rd.					
Months 17. 4th.					

18. Vessel Priority:

- |                       |             |                                     |            |
|-----------------------|-------------|-------------------------------------|------------|
| a. NOAA FRV (MOS)     | <u>N/A</u>  | d. Univ. RV Charter                 | <u>N/A</u> |
| b. NOAA RV (NOS)      | <u>(11)</u> | e. Existing NMFS Small Boat         | <u>(2)</u> |
| c. Commercial Charter | <u>N/A</u>  | f. New, Specialized NMFS Small Boat | <u>(3)</u> |

19. Remarks:

28. ACTIVITY SCHEDULE & EVENTS		CY		BY		BY-1		BY-2		BY-3		BY-4		BY-5	
		1	2	1	2	1	2	1	2	1	2	1	2	1	2
NOA/E	NARRATIVE	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	A Diagnostic Services	X													X
2	A Experimental histology - mollusks			X				X							
	E Publish results								X						
3	A Experimental histology - crustaceans		X				X								
	E Publish results							X							
4	A Prepare atlas			X							X				
5	A Histology - aquacultured fish			X				X							
	E Publish results								X						

29. OUT YEAR COMMENTS:

CONTINUE AT SAME LEVEL  
 INCREASE OF \_\_\_\_\_ %  
 REDUCTION OF \_\_\_\_\_ %  
 TERMINATION

REMARKS:

NMFS TASK DEVELOPMENT PLAN  
29. FULL-TIME PERMANENT POSITIONS

TDP NUMBER  
MAC-016-76-LS-A

Reference NOAA Form 32-14A, Item 20. Identify all full-time permanent positions related to this Task for the budget year only. Do not include support personnel; they should appear in the appropriate support Task Development Plan.

POSITION TITLE	GS LEVEL	NAME OF INCUMBENT (If no incumbent, enter "Vacant")	% OF Y SPENT THIS Y
Fishery Biologist	13-3	Murchelano, Robert	100
Fishery Biologist	12-3	Farley, Austin	100
Histologist	12-2	Johnson, Phyllis	100
Fishery Biologist (Research)	11-3	Newman, Martin	100
Fishery Biologist (GEN)	7-1	Kern, Frederick	100
Biol. Lab Tech.	4-7	Wade, Jane	100
Biol. Lab Tech.	6-3	Smith, Cecelia	100
Biological Aid (Fisheries)	4-4	Wright, Dorothy	50
Fishery Biologist (Research)	13-4	Sawyer, Thomas	50

CONTINUE on plain 8x10 1/2 paper. Identify "Page of Pages" and "TDP Number" in upper right corner. Comment on each of the following items, identifying by number. If item is not applicable, so indicate by entering "NA":

- 0. STATEMENT OF NEED
- 1. TASK OUTPUT
  - a. Significant Output
  - b. Termination Criteria
- 2. BENEFITS
- 3. ACTIVITY PLAN
- 4. MILESTONES

35. IMPACT OF TASK AUGMENTATION

- a. Current Year
- b. Budget Year
- c. Budget Year + 1

36. BACK-UP DOCUMENTATION

- a. Detail Documentation (Provide one sentence description.)
- b. Related tasks and components currently in

(156)

## F33400 - LIFE STUDIES - COMPARATIVE PATHOBIOLOGY - FY-75

30. Statement of Need

Until recently, the role of disease in the ecology of marine poikilotherms has been virtually ignored. Information is still woefully inadequate of how disease operates in aquatic environments. Yet, disease and parasite induced mortalities are paramount factors limiting the abundance of marine fish, crustaceans, and mollusks. Furthermore, mass mortalities of aquatic animals grown under intensive culture conditions are often a consequence of disease. The indiscriminate transfer of marine organisms from one location to another without regard to the disease entities they harbor is a particularly dangerous practice, the importance of which has not been adequately recognized. Consequently, adequate knowledge of disease whether infectious, nutritional, genetic, or environmentally induced is essential and application of this knowledge is fundamental for successful management of fishery resources. The primary recipients of the services produced by the task are industry, the states, and the general public.

31. Task Outputs

1. Establish a national diagnostic laboratory to identify, classify, and describe infectious and noninfectious diseases of marine feral and cultured fish and shellfish. This objective is a continuing process and, as such, has no finite termination.
2. Develop histological and histochemical techniques appropriate for the diagnosis of disease in estuarine and marine fish, crustaceans, and mollusks. The approximate duration of the task would be 5 years.
3. Develop electron microscope techniques permitting the study of cellular ultrastructure in estuarine and marine fish and shellfish. The approximate duration of the task would be 5 years.

32. Benefits

Accomplishment of task objectives both 1) establishes causes of disease and mortality of fish, crustaceans, and mollusks and 2) provides available diagnostic services for various State, Federal, and industry user groups. This information is needed for the rational, long-term exploitation of natural resources. Disease diagnosis will play an increasingly important role in abating the promiscuous domestic transfer and foreign importation of exotic species. In aquaculture, the output could provide the means for controlling disease, an almost universal limiting factor.

### 33. Activities Plan

The approach to be used in achieving the task objective is primarily histological. Appropriate sections of animal tissues (paraffin and epon embedded) are prepared for examination with light and electron microscopy. Employing an essentially observational approach, the presence of microscopic parasites is determined and the apparent histopathology described. When deemed necessary, histochemical techniques and electron microscopy are utilized.

### 34. Milestones

1. Provide diagnostic services in histopathology to State and foreign governments, commercial and sport fisheries, seafood growers and processors.
2. Develop the competency to rapidly and accurately diagnose infectious and noninfectious diseases of marine fish, crustaceans, and mollusks.
3. Compile an atlas of pathobiology of marine poikilotherms.

### 35. Impact of Task Augmentation

No potential increase anticipated.

### 36. Back-up Documentation

- a.
  1. Public Law 92-583 Title III - Management of the Coastal Zone (fish and shellfish harvesting, habitat destruction, demands of coastal zone).
  2. Public Law 92-500 Title I - Research and Related Programs (amendment of Federal Water Pollution Control Act).
  3. Public Laws of the State of Maine relating to sea and shore fisheries (importation of marine species).
  4. Lacey Act Title 18, Amendments (transportation, importation, animals, birds, fish, plants in violation of State, National, foreign laws).
  5. H.R. 695, 92nd Congress (protection fish resources).
  6. S. 2764, 92nd Congress (fish disease control).

7. H.R. 6861, 92nd Congress (advance scientific knowledge fish diseases and relation to pollution).
8. Public Law 92-532 - Ocean Dumping Act.
9. Informal Reports #1, 3, 4, Middle Atlantic Coastal Fisheries Center, NMFS, NOAA, U.S. Department of Commerce.

b. None.

c. None

d. None

# NMFS TASK DEVELOPMENT PLAN

(See Detailed Instructions)

1. DATE PREPARED

Dec. 20, 1973

(Submit five copies by Jan. 2, 1974.)

TO: Director, National Marine Fisheries Service, ATTN: Fx5 National Oceanic and Atmospheric Administration Washington, D.C. 20235

FMC's - Submit a separate Task Development Plan for each task beginning, continuing, or ending in FY 1974, FY 1975, or FY 1976. Total funding in each category must equal your PED specific total funding guidance. Reimbursable funds are not to be mingled with appropriated funds on any programmatic TDP; separate TDP's must be prepared. Submit one Support TDP itemizing the administrative support cost (Management Fund) for the FMC.

2. TDP NUMBER MAC-017-76-IE-A	3. SUB-OBJECTIVE CODE IV-A-3	4. RANK (To be completed only by FMC's and NMFS Hdqrs.) 7	FMC	NMFS HDQRS.
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5. TASK NUMBER 2818P9	6. TASK TITLE Disease and Environmental Stress
--------------------------	---------------------------------------------------

7. ORGANIZATION CODE F33400	8. ORGANIZATION TITLE (Responsible for execution of this task) Pathobiology Investigations	9. PRINCIPLE LOCATION City: Oxford Lab. State: Md.
--------------------------------	-----------------------------------------------------------------------------------------------	-------------------------------------------------------

OBJECT CLASS <small>Lines 10-19. Enter all dollar values as thousands and tenths of thousands. Lines 22-23. Enter as many years and tenths of many years.</small>	B I N D I C E	CURRENT YEAR FY 1974		BUDGET YEAR FY 1975		BUDGET YEAR + 1 FY 1976	
		TARGET ALLOWANCE A	INCREASE B	TARGET ALLOWANCE C	INCREASE D	TARGET ALLOWANCE E	INCREASE F
10. Total Direct Labor	15	70.3		66.8		76.8	
11. Travel	19	3.8		3.9		4.4	
12. Rents, Communications, Utilities	21						
13. Contracts <input type="checkbox"/> (To be let) Grants <input type="checkbox"/> (Funds obligated)	51 52 58	1.0		.8		.8	
14. Supplies	53	2.8		1.2		3.3	
15. Capital Equipment	54						
16. Other (Estimated cost of all other direct cost not included above.)		6.0		4.4		7.0	
7. Total Direct Funds (Add lines 10 through 16 above.)		83.9		77.1		92.3	
8. Support Cost		34.2		32.8		37.6	
9. Total Funds (Add lines 17 and 18.)		113.1		109.9		129.9	
0. Positions, Full-time permanent (Number applicable to this Task. Also, complete NOAA Form 32-14C.)		4		4		4	
1. Positions, Other (Number applicable to this Task)		1		1		1	
2. Man-years, Permanent		3.2		2.8		2.2	
3. Man-years, Other		.8		.6		.4	
4. Reimbursable Support (Reimbursable agreements only)							

OFFICIAL PREPARING REPORT (Signature)

*Aaron Rosenfeld*

(120)

26. CENTER DIRECTOR OR DESIGNATED REPRESENTATIVE (Sig.)

*John A. Holton*

28. ACTIVITY SCHEDULE & EVENTS			CY		EY		EY-1		EY-2		EY-3		EY-4		EY-5	
			1	2	1	2	1	2	1	2	1	2	1	2	1	2
NO/A/E	NARRATIVE		A	S	C	D	E	F	G	H	I	J	K	L	M	N
1	A	Menhaden mortalities - Chesapeake Bay				X										X
2	A	Diseases of Macrobrachium			X				X							
	E	Publish Results								X						
3	A	NY Bight fin rot - prevalence	X			X										
	E	Publish Results				X										
4	A	NY Bight fin rot - histopathology			X		X									
	E	Publish Results						X								
5	A	Protozoa - NY Bight benthos	X				X									
	E	Publish Results						X								
6	A	Experimental histology - fish	X			X										
	E	Publish Results					X									

29. OUT YEAR COMMENTS:

CONTINUE AT SAME LEVEL  
 INCREASE OF \_\_\_\_\_ %  
 REDUCTION OF \_\_\_\_\_ %  
 TERMINATION

REMARKS:

NMFS TASK DEVELOPMENT PLAN  
29. FULL-TIME PERMANENT POSITIONS

TDP NUMBER

MAC-017-76-IE

Reference NOAA Form 32-14A, Item 20. Identify all full-time permanent positions related to this Task for the budget year only. Do not include support personnel; they should appear in the appropriate support Task Development Plan.

POSITION TITLE	GS LEVEL	NAME OF INCUMBENT <i>(If no incumbent, enter "Vacant")</i>	% OF TIME SPENT THIS YEAR
Fishery Biologist	14/4	Rosenfield, Aaron	75
Research Microbiologist	12/8	Tubiash, Haskell	80
Physiologist	11/1	Bodammer, Joel	75
Clerk-Typist	4/2	Wheatley, Nadine	80

CONTINUE on plain 8x10 1/2 paper. Identify "Page of Pages" and "TDP Number" in upper right corner. Comment on each of the following items, identifying by number. If item is not applicable, so indicate by entering "NA":

- 1. STATEMENT OF NEED
- 2. TASK OUTPUT
  - a. Significant Output
  - b. Termination Criteria
- 3. BENEFITS
- 4. ACTIVITY PLAN
- 5. MILESTONES

35. IMPACT OF TASK AUGMENTATION

- a. Current Year
- b. Budget Year
- c. Budget Year + 1

36. BACK-UP DOCUMENTATION

- a. Detail Documentation *(Provide one sentence description.)*
- b. Related tasks and resources

(122)

## F33400 - INSHORE ECOLOGY - DISEASE IN STRESSED ENVIRONMENTS - FY-75

30. Statement of Need

Susceptibility of aquatic poikilotherms to disease is directly influenced by environmental factors and biotic and abiotic stresses. There are no ways of knowing what stresses are significant in limiting population size, viability, and behavior, without studying the direct and interrelated effects on the animals themselves. The fishing industry, both commercial and recreational, requires research support both short and long term to provide real information for understanding and controlling mass mortalities and the causes of diseases in marine animals. This support should include studies of disease as it: 1) limits the abundance of feral mollusks, crustaceans, and fish; 2) limits the intensive artificial culture and transfer of marine animals in aquaculture; and 3) is a consequence of the man-induced degradation of aquatic environments. Experimental research to test and/or substantiate hypotheses is a necessary requisite to the primarily observational initially diagnostic study of disease. The primary recipients of the services produced by the task are industry, the states, and the general public.

31. Task Outputs

1. 1. Establish a national diagnostic laboratory to identify, classify, and describe infectious and noninfectious diseases of marine feral and cultured fish and shellfish. This objective is a continuing process and, as such, has no finite termination.
2. Apply microbiological (bacteriological, virological) procedures to the study of disease and mortality in marine fish, crustaceans, and mollusks. The approximate duration of this task would be from 5-10 years.
3. Develop immunological and serological procedures for diagnosis of disease and for the assessment of environmental stress in marine fish and shellfish. The approximate duration of this task would be from 5-10 years.
4. Utilize available techniques in quantitative and qualitative biochemistry to assess the physiological condition of marine fish, crustaceans, and mollusks. Develop appropriate biochemical techniques where available ones are not suitable. The appropriate duration of this task would be from 5-10 years.

Criteria for task termination for the above would be the proven utility of a particular procedure for the objective in question.

### 32. Benefits

Accomplishment of task objectives both 1) establishes causes of disease and mortality and 2) defines the impact of environmental stress on marine fish, crustaceans, and mollusks. The information obtained is necessary for the rational, long-term exploitation of natural resources.

### 33. Activities Plan

The approach to be used in achieving the task objective is primarily experimental and involves the disciplines of bacteriology, parasitology, and virology. On the basis of initial histological findings, attempts are made to culture and identify microbial agents suspected of being the pathogens responsible for the observed pathology. Subsequent to successful culture of a potential pathogen, experimental studies are conducted under appropriate laboratory conditions to confirm the virulence of the pathogen for the susceptible host to determine the nature of the host's response.

### 34. Milestones

1. Demonstrate the association between a degraded environment and a higher prevalence of disease in marine fish and crustaceans.
2. Utilize histopathology and histochemistry to demonstrate the effects of toxicants (heavy metals, pesticides, petrochemicals) on marine fish, crustaceans, and mollusks.
3. Assess the effects of subtle environmental stresses by electron microscopy of appropriate tissues.

### 35. Impact of Task Augmentation

No potential increase anticipated.

### 36. Back-up Documentation

- a. 1. Public Law 92-583 Title III - Management of the Coastal Zone (fish and shellfish harvesting, habitat destruction, demands of coastal zone).
2. Public Law 92-500 Title I - Research and Related Programs (amendment to Federal Water Pollution Control Act).
3. Public Laws of the State of Maine relating to sea and shore fisheries (importation of marine species).
4. Lacey Act Title 18, Amendments (transportation, importation, animals, birds, fish, plants in violation of State, National, foreign laws).

5. H.R. 695, 92nd Congress (protection fish resources).
6. S. 2764, 92nd Congress (fish disease control).
7. H.R. 6861, 92nd Congress (advance scientific knowledge fish diseases and relation to pollution).
8. Public Law 92-532 - Ocean Dumping Act.
9. Informal Reports #1, 3, 4, Middle Atlantic Coastal Fisheries Center, NMFS, NOAA, U.S. Department of Commerce.

b. None

c. None

d. None

# NMFS TASK DEVELOPMENT PLAN

(See Detailed Instructions)

1. DATE PREPARED  
Dec. 20, 1973

(Submit five copies by Jan. 2, 1974.)

To: Director, National Marine Fisheries Service, ATTN: Fx5 National Oceanic and Atmospheric Administration Washington, D.C. 20235

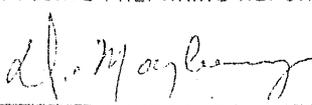
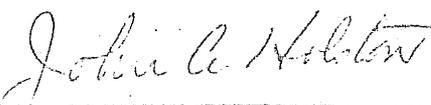
FMC's - Submit a separate Task Development Plan for each task beginning, continuing, or ending in FY 1974, FY 1975, or FY 1976. Total funding in each category must equal your PED specific total funding guidance. Reimbursable funds are not to be mingled with appropriated funds on any programmatic TDP; separate TDP's must be prepared. Submit one Support TDP itemizing the administrative support cost (Management Fund) for the FMC.

TDP NUMBER AC-024-76-00-A	3. SUB-OBJECTIVE CODE N/A	4. RANK (To be completed only by FMC's and NMFS Hdqrs.) N/A	FMC	NMFS HDQRS.
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TASK NUMBER 0040	6. TASK TITLE Support, MACFC
---------------------	---------------------------------

ORGANIZATION CODE 33000	8. ORGANIZATION TITLE (Responsible for execution of this task) Middle Atlantic Coastal Fisheries Center	9. PRINCIPLE LOCATION City: Highlands, State: N.J.
----------------------------	------------------------------------------------------------------------------------------------------------	-------------------------------------------------------

OBJECT CLASS <small>Lines 10-19. Enter all dollar values as thousands and tenths of thousands. Lines 22-23. Enter as man-years and tenths of man-years.</small>	LINE NUMBER	CURRENT YEAR FY 1974		BUDGET YEAR FY 1975		BUDGET YEAR + 1 FY 1976	
		TARGET ALLOWANCE A	INCREASE B	TARGET ALLOWANCE C	INCREASE D	TARGET ALLOWANCE E	INCREASE F
Total Direct Labor	15	318.4		376.9		375.2	11.5
Travel	19	16.2		16.2		16.2	2.5
Rents, Communications, Utilities	21	118.8		108.8		108.8	21.5
Contracts <input type="checkbox"/> (To be let)	51	30.2		30.2		30.2	4.5
Grants <input type="checkbox"/> (Funds obligated)	52						
	58						
Supplies	53	95.2		70.2	4.4	70.2	34.0
Capital Equipment	54	8.5		6.4		6.4	10.0
Other (Estimated cost of all other direct cost not included above.)		49.9		39.5		39.9	12.5
Total Direct Funds (Add lines 10 through 16 above.)		637.2		648.2		646.9	96.5
Support Cost							
Total Funds (Add lines 17 and 18.)		637.2		649.2	652.6	646.9	96.5
Positions, Full-time permanent (Number applicable to this Task. Also, complete NOAA Form 32-14C.)		28		31	0	30	0
Positions, Other (Number applicable to this Task)		13		13	0	13	2
Man-years, Permanent		22.8		22.8	0	22.8	
Man-years, Other		4.2		4.2	0	4.2	.4
Reimbursable Support (Reimbursable agreements only)		8.7		8.9	31.0	35.6	31.0

OFFICIAL PREPARING REPORT (Signature) 	26. CENTER DIRECTOR OR DESIGNATED REPRESENTATIVE (Signature) 
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NMFS TASK DEVELOPMENT PLAN  
29. FULL-TIME PERMANENT POSITIONS

TDP NUMBER  
MAC-024-76-00-

Reference NOAA Form 32-14A, Item 20. Identify all full-time permanent positions related to this Task for the budget year only. Do not include support personnel; they should appear in the appropriate support Task Development Plan.

POSITION TITLE	GS LEVEL	NAME OF INCUMBENT (If no incumbent, enter "Vacant")	% OF TIME SPENT ON THIS TASK
TDP # MAC-024-76-00-A Task # 90040 Title: Support, MACFC			
Sub-task #: MAC-024-1 MACFC - Center - F33000			
Center Director	15/6	Sindermann, Carl J.	100
Deputy Center Director	15/7	Holston, John A.	100
Administrative Officer	12/1	Mayberry, Daryl L.	100
Secretary (Typing)	6/5	Melkers, Kathe	100
Gen. Acctg. Tech.	5/2	Morton, Betty J.	100
Prop. and Procurement Tech.	5/1	Vacant	100
Sub-task #: MAC-024-2 Milford Laboratory - F33300			
Administrative Assistant	9/1	Lanyon, W.	100
Adm. Clerk	5/3	Frauenberger, Estelle	100
Clerk-Typist	4/3	Bridges, JoAnn	100
Maintenanceman	WG9-04	Provost, Kenneth S.	100
Janitor	WG2-03	Onofrey, Andrew	100
Sub-task #: MAC-024-3 Oxford Laboratory - F33400			
Administrative Officer	11/4	O'Connell, William A.	100
Adm. Clerk	5/3	Smith, MaryAnn	100
Secretary-Stenographer	5/5	Vacant	100
Building Repairman	WG10-03	Heister, Paul J.	100
Maintenanceman	WG8-03	James, Solomon	100
Laborer	WG3-03	Brocks, Barney L.	100

CONTINUE on plain 8x10 1/2 paper. Identify "Page of Pages" and "TDP Number" in upper right corner. Comment on each of the following items, identifying by number. If item is not applicable, so indicate by entering "NA":

- 31. STATEMENT OF NEED
- 32. TASK OUTPUT
  - a. Significant Output
  - b. Evaluation Criteria
- 33. BENEFITS
- 34. ACTIVITY PLAN
- 35. PERSONNEL

35. IMPACT OF TASK AUGMENTATION

- a. Current Year
- b. Budget Year
- c. Budget Year + 1

36. BACK-UP DOCUMENTATION

- a. Detail Documentation (Provide one sentence description.)

(127)

## 30 - STATEMENT OF NEEDS

The performance of successful research requires a host of support services, each of which facilitates the performance of one or more aspects of the research. The Middle Atlantic Coastal Fisheries Center, composed of three geographically separated facilities, each with Center-integrated missions but with differing research skills and support needs, poses special problems in administration, ADP and library support, in custodial and maintenance services and in general research supervision.

The concept of a Task, i. e., the initiation and completion of a research problem, implies that the ancillary services necessary to complete the work will be made available.

## 31 - TASK OUTPUTS

### 1. Long-Range

- a. To facilitate the attainment of research objectives through relieving researchers of responsibilities for (1) administrative functions (personnel, procurement, finances, accounting, etc.), (2) library services, (3) facility maintenance and equipment repair, (4) custodial help, and (5) overall research supervision, guidance and integration.
- b. Criteria for Task termination are not quantifiable; size of support group determined by Task definitions. Support needs will continue as long as facility is active in research. Mix of support needs and personnel will be evaluated annually to assure maximum responsiveness to needs of researchers.

### 2. Short-term

- a. Provides executive management and direction for the principal investigations teams of the Middle Atlantic Coastal Fisheries Center. Serve as focal point for planning, reprogramming, budget development and utilization of Center personnel, funds, physical facilities, supplies, and equipment.

- b. Administrative personnel are assigned to the Center and to each of three geographically separated research facilities to provide a variety of administrative services in personnel, property, travel, and facility management.
- c. They also assist the Director of Investigations and Officer-In-Charge of the facilities to insure that required records are maintained and that policies, regulations, and procedures of the Center and higher authority are being complied with.
- d. Provide equipment repair and maintenance service as well as technical illustrational and reproductive services to the staffs at the three Center facilities. Provide for electrical and electronic trouble-shooting needs and periodic tune-up services to all scientific equipment and built-in facility services. In concert with authors, prepare realistic drawings of all stages in the life history of living marine organisms and graphs of scientific findings.

## 32 - BENEFITS

The manifold administrative, custodial, maintenance and other technical support activities, if not handled by the support staff, would, if they were capable of doing them, have to be done by the research staff - to the detriment of their progress in research. Research supervision and guidance is necessary to integrate and coordinate disparate research activities at the three geographically separate research facilities.

Benefits (outputs) are indirect but, inasmuch as the completion of separate Tasks is facilitated, the benefits derived from such Tasks also apply to the Support Task.

NMFS TASK DEVELOPMENT PLAN

(See Detailed Instructions)

1. DATE PREPARED

Dec. 20, 1973

Submit five copies by Jan. 2, 1974.)

Director, National Marine Fisheries Service, ATTN: Fx5 National Oceanic and Atmospheric Administration Washington, D.C. 20235

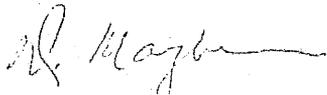
FMC's - Submit a separate Task Development Plan for each task beginning, continuing, or ending in FY 1974, FY 1975, or FY 1976. Total funding in each category must equal your PED specific total funding guidance. Reimbursable funds are not to be mingled with appropriated funds on any programmatic TDP; separate TDP's must be prepared. Submit one Support TDP itemizing the administrative support cost (Management Fund) for the FMC.

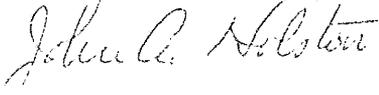
DP NUMBER MAC-050-76-00-A	3. SUB-OBJECTIVE CODE N/A	4. RANK (To be completed only by FMC's and NMFS Hdqrs.) N/A	NMFS HDQRS.
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TASK NUMBER 817PA	5. TASK TITLE MACFC; ADP
----------------------	-----------------------------

ORGANIZATION CODE 33000	6. ORGANIZATION TITLE (Responsible for execution of this task) Middle Atlantic Coastal Fisheries Center	9. PRINCIPLE LOCATION City: Highlands State: N. J.
----------------------------	------------------------------------------------------------------------------------------------------------	-------------------------------------------------------

OBJECT CLASS <small>Lines 10-19. Enter all dollar values as thousands and tenths of thousands. Lines 22-23. Enter as man-years and tenths of man-years.</small>	BUDGET CATEGORY	CURRENT YEAR FY 1974		BUDGET YEAR FY 1975		BUDGET YEAR + 1 FY 1976	
		TARGET ALLOWANCE A	INCREASE B	TARGET ALLOWANCE C	INCREASE D	TARGET ALLOWANCE E	INCREASE F
Total Direct Labor	15	23.3		27.1		27.1	
Travel	19	.1		.1		.1	
Rents, Communications, Utilities	21						
Contracts <input type="checkbox"/> (To be let)	51	2.3		2.3		2.3	
Grants <input type="checkbox"/> (Funds obligated)	52						
	58						
Supplies	53	.3		.3		.3	
Capital Equipment	54						
Other (Estimated cost of all other direct cost not included above.)		2.5		2.1		2.1	
Total Direct Funds (Add lines 10 through 16 above.)		30.5		31.9		31.9	
Support Cost		12.3		13.3		13.3	
Total Funds (Add lines 17 and 18.)		42.8		45.2		45.2	
Positions, Full-time permanent <small>Number applicable to this Task. Also, complete NOAA Form 32-14C.</small>		1		1		1	
Positions, Other <small>Number applicable to this Task</small>		2		2		2	
Man-years, Permanent		.8		.8		.8	
Man-years, Other		1.4		1.4		1.4	
Reimbursable Support <small>Reimbursable agreements only</small>							

OFFICIAL PREPARING REPORT (Signature)  
  
 (131)

26. CENTER DIRECTOR OR DESIGNATED REPRESENTATIVE (SIGN.)  


NMFS TASK DEVELOPMENT PLAN  
29. FULL-TIME PERMANENT POSITIONS

TDP NUMBER  
MAC-050-76-00-

Reference NOAA Form 32-14A, Item 20. Identify all full-time permanent positions related to this Task for the budget year only. Do not include support personnel; they should appear in the appropriate support Task Development Plan.

POSITION TITLE	GS LEVEL	NAME OF INCUMBENT <i>(If no incumbent, enter "Vacant")</i>	% OF TIME SPENT ON THIS TASK
Physical Science Technician	9/8	Morrison, Charles	100

CONTINUE on plain 8x10 1/2 paper. Identify "Page of Pages" and "TDP Number" in upper right corner. Comment on each of the following items, identifying by number. If item is not applicable, so indicate by entering "NA":

- 1. STATEMENT OF NEED
- 2. TASK OUTPUT
  - a. Significant Output
  - b. Termination Criteria
- 3. BENEFITS
- 4. ACTIVITY PLAN
- 5. MILESTONES
- 35. IMPACT OF TASK AUGMENTATION
  - a. Current Year
  - b. Budget Year
  - c. Budget Year + 1
- 36. BACK-UP DOCUMENTATION
  - a. Detail Documentation *(Provide one sentence description.)*
  - b. Budget tasks and...

(12)

30 - STATEMENT OF NEED

The performance of successful research requires a host of support services, each of which facilitates the performance of one or more aspects of the research. The Middle Atlantic Coastal Fisheries Center, composed of three geographically separated facilities, each with Center-integrated missions but with differing research skills and support needs, poses special problems in providing automated data processing services, including design of research, statistical test programs, and in editing and interpreting results.

31 - TASK OUTPUTS1. Long-Range

- a. To facilitate the attainment of research objectives through relieving researchers of responsibilities for all aspects of ADP services.
- b. Criteria for task termination are not quantifiable; size of support group determined by task definitions. Support needs will continue as long as facility is active in research. Mix of ADP support needs and personnel will be evaluated annually to assure maximum responsiveness to needs of researchers.

2. Short-term

- a. Provides ADP management services for the principal investigations teams of the Middle Atlantic Coastal Fisheries Center. Serves as focal point for planning.

32 - BENEFITS

The manifold ADP activities, if not handled by the ADP support staff, would, if they were capable of doing them, have to be done by the research staff - to the detriment of their progress in research.

Benefits (outputs) are indirect but, inasmuch as the completion of separate tasks is facilitated, the benefits derived from such tasks also apply to the ADP task.

# NMFS TASK DEVELOPMENT PLAN

(See Detailed Instructions)

1	4
1. DATE PREPARED	
Dec. 20, 1973	

Submit five copies by Jan. 2, 1974.)  
 Director, National Marine Fisheries Service, ATTN: Fx5 National Oceanic and Atmospheric Administration Washington, D.C. 20235

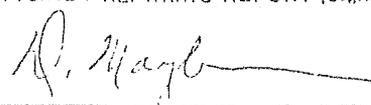
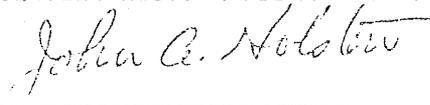
FMC's - Submit a separate Task Development Plan for each task beginning, continuing, or ending in FY 1974, FY 1975, or FY 1976. Total funding in each category must equal your PED specific total funding guidance. Reimbursable funds are not to be mingled with appropriated funds on any programmatic TDP; separate TDP's must be prepared. Submit one Support TDP itemizing the administrative support cost (Management Fund) for the FMC.

2. DP NUMBER	3. SUB-OBJECTIVE CODE	4. RANK (To be completed only by FMC's and NMFS Hdqrs.)	FMC	NMFS HDQRS.
MAC-052-76-00-A	N/A		N/A	

5. TASK NUMBER	6. TASK TITLE
817PC	Small Vessel Operations

7. ORGANIZATION CODE	8. ORGANIZATION TITLE (Responsible for execution of this task)	9. PRINCIPLE LOCATION
33000	Middle Atlantic Coastal Fisheries Center	City: Highlands, State: N. J.

OBJECT CLASS <small>a 10-19. Enter all dollar values as thousands and tenths of thousands. s 22-23. Enter as man-years and tenths of man-years.</small>	UNIT NUMBER	CURRENT YEAR FY 1974		BUDGET YEAR FY 1975		BUDGET YEAR +1 FY 1976	
		TARGET ALLOWANCE A	INCREASE B	TARGET ALLOWANCE C	INCREASE D	TARGET ALLOWANCE E	INCREASE F
Total Direct Labor	15	46.4		51.4		51.4	
Travel	19	.5		.5		.5	
Rents, Communications, Utilities	21						
Contracts <input type="checkbox"/> (To be let)	51	5.0		2.5		2.5	
Grants <input type="checkbox"/> (Funds obligated)	52						
	58						
Supplies	53	7.4		5.4		5.4	
Capital Equipment	54	3.9		1.5		1.5	
Other (Estimated cost of all other direct cost not included above.)		4.3		4.3		4.3	
Total Direct Funds (Add lines 10 through 16 above.)		67.5		65.6		65.6	
Support Cost		22.5		25.2		25.2	
Total Funds (Add lines 17 and 18.)		90.0		90.8		90.8	
Positions, Full-time permanent (Number applicable to this Task. Also, complete NOAA Form 32-11C.)		4		4		4	
Positions, Other (Number applicable to this Task)		1		1		1	
Man-years, Permanent		2.4		2.4		2.4	
Man-years, Other		.2		.3		.3	
Reimbursable Support (Reimbursable agreements only)							

25. OFFICIAL PREPARING REPORT (Signature)	26. CENTER DIRECTOR OR DESIGNATED REPRESENTATIVE (Sig.)
	
(134)	

NMFS TASK DEVELOPMENT PLAN  
29. FULL-TIME PERMANENT POSITIONS

TOP NUMBER

MAC-052-76-00-1

Reference NOAA Form 32-14A, Item 20. Identify all full-time permanent positions related to this Task for the budget year only. Do not include support personnel; they should appear in the appropriate support Task Development Plan.

POSITION TITLE	GS LEVEL	NAME OF INCUMBENT (If no incumbent, enter "Vacant")	% OF TIME SPENT ON THIS TASK
Captain Deckhand-Cook Boat Operator Boat Operator	WG-10 WG-05 WG-09 WG-09	Wicklund, I. King, E. Fisler, H. Vacant	100 100 100 100

CONTINUE on plain 8x10 1/2 paper. Identify "Page of Pages" and "TDP Number" in upper right corner. Comment on each of the following items, identifying by number. If item is not applicable, so indicate by entering "NA":

- STATEMENT OF NEED
- TASK OUTPUT
- Significant Output
- Termination Criteria
- DEFITS
- ACTIVITY PLAN
- RESTRICTIONS

35. IMPACT OF TASK AUGMENTATION

- a. Current Year
- b. Budget Year
- c. Budget Year + 1

36. BACK-UP DOCUMENTATION

- a. Detail Documentation (Provide one sentence description.)
- b. Related books and reports (Identify title)

(135)

30 - STATEMENT OF NEEDS

The performance of successful research requires a host of administrative and technical support services, each of which facilitates the performance of one or more aspects of the research. The Middle Atlantic Coastal Fisheries Center, composed of three geographically separated facilities, each with Center-integrated missions but with differing research skills and support needs, poses special problems in providing research vessel support, especially in synoptic, multi-vessel operations. The concept of a Task, i. e., the initiation and completion of a research problem, implies that the ancillary services, including small vessel services, necessary to complete the work, will be made available.

31 - OUTPUTS1. Long-Range

- a. To facilitate the attainment of research objectives through relieving researchers of responsibilities for vessel operation and maintenance.
- b. Criteria for Task termination are not quantifiable; size of support group determined by Task definitions. Support needs will continue as long as facility is active in research. Mix of support needs and personnel will be evaluated annually to assure maximum responsiveness to needs of researchers.

2. Short-term

- a. Preserve, maintain and operate the small vessel fleet (9 vessels from 16' to 65' LOA), providing at-sea services for professional personnel at all three facilities of the Center. Operate vessels in such manner (12-hour day; up to 200 sea-days per year) as to facilitate achievement of cruise objectives.
- b. Plan, schedule and supervise complex maintenance and servicing of vessels.
- c. Recognize and be responsive to vessel scheduling, assuring that equipment necessary for scheduled cruises is onboard and vessel is ready to sail at appointed time. Provide simple maintenance and all housekeeping services.

32 - BENEFITS

The manifold administrative, custodial, maintenance and other technical support activities associated with vessel operations, if not handled by the small vessel support staff, would, if they were capable of doing them, have to be done by the research staff - to the detriment of their progress in research. Benefits (outputs) are indirect but, inasmuch as the completion of separate Tasks is facilitated, the benefits derived from such Tasks also apply to the Support Task.

NMFS TASK DEVELOPMENT PLAN

(See Detailed Instructions)

1. DATE PREPARED  
December 20, 1973

(Submit five copies by Jan. 2, 1974.)

TO: Director, National Marine Fisheries Service, ATTN: Fx5 National Oceanic and Atmospheric Administration Washington, D.C. 20255

FMC's - Submit a separate Task Development Plan for each task beginning, continuing, or ending in FY 1974, FY 1975, or FY 1976. Total funding in each category must equal your PED specific total funding guidance. Reimbursable funds are not to be mingled with appropriated funds on any programmatic TDP; separate TDP's must be prepared. Submit one Support TDP itemizing the administrative support cost (Management Fund) for the FMC.

2. TDP NUMBER MAC-053-76-IS-A	3. SUB-OBJECTIVE CODE II-C-2	4. RANK (To be completed only by FMC's and NMFS Hdqrs.) FMC 16	NMFS HDQRS.
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5. TASK NUMBER 2817P2	6. TASK TITLE Life Studies: Prerecruit, Middle Atlantic
--------------------------	------------------------------------------------------------

7. ORGANIZATION CODE F33800	8. ORGANIZATION TITLE (Responsible for execution of this task) Resource Assessment Investigations	9. PRINCIPLE LOCATION City: Sandy Hook Lab. State: N.J.
--------------------------------	------------------------------------------------------------------------------------------------------	------------------------------------------------------------

OBJECT CLASS <small>Lines 10-19. Enter all dollar values as thousands and tenths of thousands. Lines 22-23. Enter as man-years and tenths of man-years.</small>	COP LINE	CURRENT YEAR FY 1974		BUDGET YEAR FY 1975		BUDGET YEAR +1 FY 1976	
		TARGET ALLOWANCE A	INCREASE B	TARGET ALLOWANCE C	INCREASE D	TARGET ALLOWANCE E	INCREASE F
10. Total Direct Labor	15	124.1		106.1		106.1	
11. Travel	19	2.8		2.1		2.1	
12. Rents, Communications, Utilities	21						
13. Contracts <input type="checkbox"/> (To be let)	51	8.7		6.0		6.0	
Grants <input type="checkbox"/> (Funds obligated)	52 58						
14. Supplies	53	3.0		2.5		2.5	
15. Capital Equipment	54						
16. Other (Estimated cost of all other direct cost not included above.)		14.1		10.0		10.0	
17. Total Direct Funds (Add lines 10 through 16 above.)		152.7		126.7		126.7	
18. Support Cost		60.3		52.2		52.0	
19. Total Funds (Add lines 17 and 18.)		213.0		178.9		178.7	
20. Positions, Full-time permanent (Number applicable to this Task. Also, complete NOAA Form 32-14C.)		7		7		7	
21. Positions, Other (Number applicable to this Task)		3		3		3	
22. Man-years, Permanent		7.2		5.4		5.4	
23. Man-years, Other		0		1.5		1.5	
24. Reimbursable Support (Reimbursable agreements only)							

25. OFFICIAL PREPARING REPORT (Signature) <i>Arthur Merrill</i> (138)	26. CENTER DIRECTOR OR DESIGNATED REPRESENTATIVE (Sig.) <i>John A. Holston</i>
-----------------------------------------------------------------------------	-----------------------------------------------------------------------------------

## NMFS VESSEL REQUIREMENTS BY 1976

1. Date: Dec. 28, 1973      2. TD2 No.: MAC-053-76-IE-A      3. Prepared by: J. Holston

4. Task Title: Life Studies: Prerecruits, Middle Atlantic

SEA TIME - DAYS	CY (a)	BY		BY+1	
		(b) T.A.	(c) Incr.	(d) T.A.	(e) In
NMFS 5. R. V. Delaware II	(50)	(60)	-	(60)	(20)
Vessel 6. R. V. Delaware II	10	10	-	10	-
(Name) 7.					
Charter 8.					
Vessel 9.					
(type)					
10. TOTAL SEA DAYS	10	10	-	10	-
Scientists 11. Maximum	(4)	(4)	-	(4)	-
per 12. Minimum	(2)	(2)	-	(2)	-
cruise 13. Anticipated	(4)	(4)	-	(4)	-
(Average)					
14. 1st.	Apr. '74	Apr. '75	-	Apr. '76	
15. 2nd.		Oct. '75	-	Oct. '76	
Cruise 16. 3rd.					
Months 17. 4th.					

18. Vessel Priority:
- |                                |                                                |
|--------------------------------|------------------------------------------------|
| a. NOAA FRV (NMFS) <u>N/A</u>  | d. Univ. RV Charter <u>N/A</u>                 |
| b. NOAA RV (NOS) <u>(1)</u>    | e. Existing NMFS Small Boat <u>N/A</u>         |
| c. Commercial Charter <u>2</u> | f. New, Specialized NMFS Small Boat      _____ |

19. Remarks: Diurnal movements studies on eggs and larvae.  
Item #5 - SI (egg and larvae) work done piggy-back on MAC-002 Survey II cruises.



NMFS TASK DEVELOPMENT PLAN  
29. FULL-TIME PERMANENT POSITIONS

TDP NUMBER  
MAC-053-76-LS-A

Reference NOAA Form 32-14A, Item 20. Identify all full-time permanent positions related to this Task for the budget year only. Do not include support personnel; they should appear in the appropriate support Task Development Plan.

POSITION TITLE	GS LEVEL	NAME OF INCUMBENT <i>(If no incumbent, enter "Vacant")</i>	% OF TIME SPENT ON THIS TASK
Fishery Biologist (RES)	12-2	Smith, Wallace G.	100
Fishery Biologist (RES)	11-3	Berrien, Peter	100
Fishery Biologist (GEN)	11-2	Fahay, Michael P.	100
Fishery Biologist (RES)	12-1	Kendall, Arthur W.	100
Biological Tech.	6-4	Sibunka, John D.	100
Biological Aid	4-3	DeGorgue, Cindy L.	100
Biological Lab Tech.	6-5	McQuay, David L.	100

CONTINUE on plain 8x10 1/2 paper. Identify "Page of Pages" and "TDP Number" in upper right corner. Comment on each of the following items, identifying by number. If item is not applicable, so indicate by entering "NA":

- 30. STATEMENT OF NEED
- 31. TASK OUTPUT
  - a. Significant Output
  - b. Termination Criteria
- 32. BENEFITS
- 33. ACTIVITY PLAN
- 34. MILESTONES
- 35. IMPACT OF TASK AUGMENTATION
  - a. Current Year
  - b. Budget Year
  - c. Budget Year + 1
- 36. BACK-UP DOCUMENTATION
  - a. Detail Documentation *(Provide one sentence description.)*
  - b. Related tasks and use of resources

(140)

## 30 - STATEMENT OF NEED

The increased fishing pressures, both foreign and domestic, and the apparent diminution of suitable spawning and nursery grounds have combined to jeopardize our coastal fishery resources to the extent that some are on the brink of being depleted. Unfortunately, our knowledge of coastal fishes is inadequate for recommending immediate and sound management policies. We are not in a position to predict recruitment, optimum levels of exploitation, or the impact of long-term natural fluctuations and man-made changes in the environment upon our commercial and sport fishery resources. It is essential that the assessment of fishery stocks along the Atlantic coast and adjacent estuaries be augmented in order that proper management policies can be established to save these important marine resources. To acquire the scientific and technical base to construct sound management policies, we must obtain information about living marine resources that will permit meaningful predictions of distribution, abundance, condition; and availability of these resources. Primary recipients of this information include:

- ICNAF
- ASMFC
- Commercial fisheries
- Sport fisheries
- Scientific community user groups
  - a) State conservation agencies
  - b) pollution investigations
  - c) private research organizations
  - d) university researchers

## 31. TASK OUTPUTS

- 1) Emphasizing those species that are found nearshore, fieldwork during the next 3 to 5 years will center around:
  - a) continued investigations of the diurnal activities of young planktonic fishes to acquire an understanding of their associations with such environmental parameters as photoperiod, depth, temperature, salinity, and seasonal thermocline, and to estimate their dispersion rates on the basis of known coastal circulation;
  - b) surveys of selected coastal areas, designed to monitor fluctuations in abundance of larval fishes, to determine their distribution in coastal waters, to attempt to correlate fluctuations in abundance and distribution with hydrographic features, and to learn more about environmental needs of specific fishes.

We will continue to produce and maintain a data management system adequate to acquire, process, and store information needed to support resource assessment research; provide outputs from the data bank to various users, including industry, sportsmen, population and environmental analysts, other NMFS research groups, and management and regulatory bodies; and adopt additional, new, and more efficient sampling gear, provided correction factors can be determined for our entire data series.

- 2) We will operate with standard gear (as adapted for Survey I operations) over enough years so that normal fluctuations and cycles in abundance and distribution of the species and also fluctuations in the natural environment of these species can be ascertained. This information is essential to determine the causes of population fluctuations or declines.

## 32 - BENEFITS

Provide a data base for annual and long-term assessments of the distribution and abundance of utilized and latent resource populations subject to management under international agreements, and actual or planned State-Federal management of stocks of interest to the United States in coastal waters.

Provide better understanding of resources and factors affecting them by comparing known aquatic circulation patterns with diurnal activities of larval fishes and interpreting the results to effects on larval transport and the distribution of juvenile stages.

Improve assessment capabilities by understanding diel movements of larval fishes and how environment may affect their dispersal, survival, and recruitment potential.

Strengthen potential for forecasting and predicting abundance and distribution, and the effects of further environmental variation upon resources by increasing knowledge of relation between fishery resources and several environmental parameters.

Develop specialized information to support policy decisions concerning the impact of man-induced environmental changes on marine resource populations.

Provide data on which to base management decisions involving user groups and national interests by showing seasonal and spatial importance of marine environment to well being of commercial and recreational fishes.

### 33 - ACTIVITIES PLAN

Six cruises (beginning in FY 72) were planned to study diurnal activities of young fishes. Collections from these cruises will contain young of the most important commercial and recreational fishes that spawn in the bight. Of the 10 most important coastal species in terms of total combined sport and commercial catch between New York and Cape Hatteras, only Atlantic mackerel and possibly bluefish are not dependent on the shallow coastal areas. The other species depend on the subtidal zone for spawning and/or nursery areas, and even young bluefish and mackerel utilize this area for foraging to some extent.

We will conduct spring and fall coastal surveys to monitor fluctuations in abundance and distribution of young fishes in conjunction with ongoing finfish assessment surveys. Plankton collections will be taken at pre-selected stations in the Middle Atlantic-Bight, chosen on the basis of previous cruises designed to study the seasonal distribution of fish eggs and larvae. We will record concomitant measurements of the marine environment on the above cruises and subsequently incorporate pertinent physical data from other sources to establish norms and ranges of variability. These data will be integrated with all available biological data to evaluate the role of the environment in terms of its effect on larval transport, geographic distribution, year-class success and, ultimately, to establish the actual role of the coastal zone in the early life history of economically important fishes.

We will continue to utilize ADP to investigate the relation of inter-specific distributions of fishes and to relate their distributions to several environmental parameters, and to maintain a current data management system, providing outputs to various user groups.

### 34 - MILESTONES

FY 74:

- 1) In conjunction with coastal finfish assessment task, collect plankton samples, sort and identify ichthyoplankton components, compile and provide distribution and relative abundance summaries to user groups.
- 2) Conduct summer cruise to study diurnal activity and larval transport of selected species of ichthyoplankton of major importance to commercial and recreational fisheries.
- 3) Provide information summarizing results and interpretations of historical ichthyoplankton collections of selected species.

FY 75:

- 1) Plan and conduct a field experiment in the Middle Atlantic Bight to study diurnal activities of larval fishes and investigate the transport mechanisms that relate spawning grounds to nursery grounds.
- 2) In conjunction with coastal finfish assessment task, plan and conduct fall and spring survey cruises in Middle Atlantic Bight comparable to FY 74.
- 3) Provide information on seasonal distribution and diurnal activities of miscellaneous species of larva to user groups through continued analysis and publication of in-house data.

FY 76:

- 1) Plan and conduct a field experiment in the Middle Atlantic Bight to study diurnal activities of larval fishes and investigate the transport mechanisms that relate spawning grounds to nursery grounds.
- 2) In conjunction with coastal finfish assessment task, plan and conduct fall and spring survey cruises in Middle Atlantic Bight comparable to FY 74.
- 3) Provide information on seasonal distribution and diurnal activities of miscellaneous species of larva to user groups through continued analysis and publication of in-house data.

35 - IMPACT OF TASK AUGMENTATION

Task funded entirely from Estimated Target Allowance.

36 - BACKUP DOCUMENTATION

- A. Hempel, G. 1965. On the importance of larval survival for the population dynamics of marine food fish. CALCOFI Reports, Vol. X. pp. 13-23.

Ahlstrom, E. H. 1965. Kinds and abundance of fishes in the California Current Region based on egg and larval surveys. CALCOFI Reports, Vol. X. pp. 31-52.

Walford, L. A. 1955. New directions in fishery research. Deep Sea Research. Suppl. to Vol. 3. pp. 471-473.

Smith, W. G. 1973. The distribution of summer flounder, Paralichthys dentatus, eggs and larvae on the continental shelf between Cape Cod and Cape Lookout, 1965-66. Fish. Bull. 71(2): 527-548.

Kendall, A. W., Jr. 1972. Description of black seabass, Centropristis striata (Linnaeus) larvae and their occurrences north of Cape Lookout, North Carolina, in 1966. Fish. Bull. 70(4): 1243-60.

Richards, S. W., and A. W. Kendall, Jr. 1973. Distribution of sand lance, Ammodytes sp., larvae on the continental shelf from Cape Cod to Cape Hatteras from R.V. Dolphin surveys in 1966. Fish. Bull. 71(2): 371-386.

B. Related research

Coastal finfish assessment, MACFC

MESA

MARMAP

NMFS, Beaufort, N. C. -- advective mechanisms responsible for the seasonal influx of larval menhaden in Onslow Bay

Long Island Sound benthic studies, MACFC

Ichthyological Associates -- ichthyoplankton studies of southern New Jersey estuaries

Boyce Thompson Institute for Plant Research, Inc. -- ichthyoplankton studies of the lower Hudson River

C. N/A

# NMFS TASK DEVELOPMENT PLAN

(See Detailed Instructions)

1. DATE PREPARED

Dec. 20, 1973

(Submit five copies by Jan. 2, 1974.)

TO: Director, National Marine Fisheries Service, ATTN: Fx5 National Oceanic and Atmospheric Administration Washington, D.C. 20235

FMC's - Submit a separate Task Development Plan for each task beginning, continuing, or ending in FY 1974, FY 1975, or FY 1976. Total funding in each category must equal your PED specific total funding guidance. Reimbursable funds are not to be mingled with appropriated funds on any programmatic TDP; separate TDP's must be prepared. Submit one Support TDP itemizing the administrative support cost (Management Fund) for the FMC

2. TOP NUMBER	3. SUB-OBJECTIVE CODE	4. RANK (To be completed only by FMC's and NMFS Hdqrs.)	NMFS HOURS.
MAC-055-76-IE-R	IV-A-3	N/A	4

5. TASK NUMBER	6. TASK TITLE
281217	MESA-NYB-Biological Oceanography

7. ORGANIZATION CODE	8. ORGANIZATION TITLE (Responsible for execution of this task)	9. PRINCIPLE LOCATION
F33800	Ecosystems Investigations	City: Sandy Hook Lab. State: N.J.

OBJECT CLASS	W/LINE PROGRAM	CURRENT YEAR FY 19 <sup>17</sup>		BUDGET YEAR FY 19 <sup>18</sup>		BUDGET YEAR + 1 FY 19 <sup>19</sup>	
		TARGET ALLOWANCE A	INCREASE B	TARGET ALLOWANCE C	INCREASE D	TARGET ALLOWANCE E	INCREASE F
10. Total Direct Labor	15	156.8		156.8	48.7	205.5	
11. Travel	19	3.6		3.6	1.9	5.5	6.5
12. Rents, Communications, Utilities	21						
13. Contracts <input type="checkbox"/> (To be let)	51	115.1		115.1	8.8	123.9	40.5
Grants <input type="checkbox"/> (Funds obligated)	58						
14. Supplies	53	13.6		13.6	6.2	19.8	15.5
15. Capital Equipment	54						3.5
16. Other (Estimated cost of all other direct cost not included above.)		15.6		15.6	3.4	19.0	3.0
7. Total Direct Funds (Add lines 10 through 16 above.)		304.7		304.7	69.0	373.7	
8. Support Cost		4.6		4.6	31.0	35.6	31.0
9. Total Funds (Add lines 17 and 18.)		309.3		309.3	100.0	409.3	100.0
10. Positions, Full-time permanent (Number applicable to this Task. Also, complete NOAA Form 32-14C.)		10		10	--	10	--
11. Positions, Other (Number applicable to this Task)		12		12	24	24	0
2. Man-years, Permanent		7.6		7.6	.4	8.0	0
3. Man-years, Other		4.9		4.9	4.8	9.7	0
4. Reimbursable Support (Reimbursable agreements only)							

5. OFFICIAL PREPARING REPORT (Signature)	26. CENTER DIRECTOR OR DESIGNATED REPRESENTATIVE (SIG.)
John B. Pearce  (1146)	John A. Holston

## NMFS VESSEL REQUIREMENTS BY 1976

1. Date: Dec. 28, 1973      2. ID# No.: MAC-055-76-IE-R      3. Prepared by: J. Holston

4. Task Title: Biological Oceanography (MESA-NYB)

SEA TIME - DAYS	CY	BY		BY+1		
		(a)	(b) T.A.	(c) Incr.	(d) T.A.	(e) Incr.
5. R.V. Delaware II	30		60	-	60	-
6. R.V. Albatross IV	15 <sup>1/2</sup>		-	-	-	-
7. R.V. Oregon II	15 <sup>1/2</sup>		-	-	-	-
8. Trawler (catamaran) <sup>2/</sup>	(25)		-	-	-	-
9.						
10. TOTAL SEA DAYS	10		10	-	10	-
11. Maximum	8		8	-	8	-
12. Minimum	9-10		9-10	-	9-10	-
13. Anticipated	Jan. '74		July '74	-	July '75	-
14. 1st.	Apr. '74		Oct. '74	-	Oct. '75	-
15. 2nd.	-		Jan. '75	-	Jan. '76	-
16. 3rd.	-		Apr. '75	-	Apr. '76	-
17. 4th.						

18. Vessel Priority:

a. NOAA ERV (NMFS)	<u>N/A</u>	d. Univ. RV Charter	<u>N/A</u>
b. NOAA RV (NOS)	<u>(1)</u>	e. Existing NMFS Small Boat	<u>N/A</u>
c. Commercial Charter	<u>(2)</u>	f. New, Specialized NMFS Small Boat	<u>N/A</u>

19. Remarks:

1/ In event R.V. Delaware II not reactivated this fiscal year, MESA has arranged for 30 days usage of R.V.'s Albatross IV and Oregon II.

2/ MESA contributes 50% of cost of charter for fin rot disease piggy-back studies on MAC-002.

Piggy-backing: (1) Sediment Composition; Sediment Chemistry (heavy metals); Sediment Microbiology; Nutrients; Meiofauna (Amoeba, Ciliates, Nematodes); Fin Rot Disease, etc.

NMFS TASK DEVELOPMENT PLAN  
27. ACTIVITY SCHEDULE AND EVENTS

TOP NUMBER  
MAC-055-76 -IE-R

NUMBER	CORE	NARRATIVE (Brief descriptive phrase of activity or event)	CY		BY		BUDGET YEAR														
							+1		+2		+3		+4		+5						
			1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2			
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q					
1	A	Reconnaissance sampling macrofauna - apex.	X																		
2	A	Sampling macrofauna - apex.	X	X	X																
3	A	Reconnaissance work up.	X	X																	
4	A	Macrofauna - apex - work up.			X	X	X	X													
5	E	Historical - reconnaissance report.		X																	
6	E	SWAPs - apex - macrofauna.						X													
7	A	Monitor apex - macrofauna.				X	X	X													
8	A	Sampling macrofauna - Bight.				X	X	X													
9	A	Work up macrofauna - Bight.				X	X	X	X												
10	E	SWAPs - Bight - macrofauna.						X													
11	E	Report macrofauna.							X												
12	A	Monitor macrofauna - Bight.								X	X	X	X	X	X	X	X				
13	A	Sampling Raritan Bay - phytoplankton.		X	X																
14	A	Work up Raritan Bay - phytoplankton.		X	X	X															
15	E	SWAPs - Raritan Bay - phytoplankton.				X															
16	E	Report - Raritan Bay - phytoplankton.				X															
17	A	Sampling - Raritan Bay - respiration.				X	X	X													
18	A	Work up - Raritan Bay - respiration.				X	X	X													
19	E	SWAPs - Raritan Bay - respiration.						X													
20	E	Report - Raritan Bay - respiration.						X													
21	A	Testing and building - oxygen consumption.	X																		
22	A	Oxygen consumption - apex - sampling.		X	X																
23	A	Work up oxygen consumption - apex.			X	X															
24	E	SWAPs - oxygen consumption - apex.				X															
25	E	Report - oxygen consumption - apex.				X															
26	A	Monitor oxygen consumption - apex.				X	X	X													
27	A	Oxygen consumption - Bight - sampling.				X	X	X													
28	A	Work up - oxygen consumption - Bight.				X	X	X													
29	E	SWAPs oxygen consumption - Bight.						X													
30	E	Report - oxygen consumption - Bight.						X													
31	A	Sample water column respiration: - apex.						X	X												
32	A	Work up water column respiration - apex.																			
33	E	SWAP water column respiration - apex.									X										

28. OUT YEAR COMMENTS

(Check appropriate boxes and enter applicable percentage.)

\*Increases usually come from reprogramming within your FSC.)

a. Continued at same level

b. Increase of 5 % \*

c. Reduction of      %

d. Termination

APPROPRIATE COLUMN

REMARKS

(1477)



NMFS TASK DEVELOPMENT PLAN  
29. FULL-TIME PERMANENT POSITIONS

TDP NUMBER

MAC-055-76-IE

Reference NOAA Form 32-14A, Item 20. Identify all full-time permanent positions related to this Task for the budget year only. Do not include support personnel; they should appear in the appropriate support Task Development Plan.

POSITION TITLE	GS LEVEL	NAME OF INCUMBENT (If no Incumbent, enter "Vacant")	% OF TIME SPENT THIS YEAR
Fishery Biologist	12/2	Thomas, James	100
Fishery Biologist (Res.)	11/4	Mahoney, John	100
Fishery Biologist (Gen.)	9/5	Phoel, William	100
Botanist	7/1	Evans, Christine	100
Fishery Biologist (Gen.)	7/3	O'Reilley, John	100
Fishery Biologist (Gen.)	5/2	Steimle, Frank	100
Biological Technician (Fisheries)	5/4	Rogers, Leslie	100
Fishery Biologist (Res.)	5/2	Ziskowski, John	100
Fishery Biologist (Res.)	11/7	MacKenzie, Clyde	100
Fishery Biologist Res. (Quant. Ecol)	14/2	McNulty, John	100

CONTINUE on plain white paper. Identify "Page of Pages" and "TDP Number" in upper right corner. Comment on each of the following items, identifying by number. If item is not applicable, so indicate by entering "NA":

- 0. STATEMENT OF NEED
- 1. TASK OUTPUT
  - a. Significant Output
  - b. Termination Criteria
- 2. BENEFITS
- 3. ACTIVITY PLAN
- 4. MILESTONES

35. IMPACT OF TASK AUGMENTATION

- a. Current Year
- b. Budget Year
- c. Budget Year + 1

36. BACK-UP DOCUMENTATION

- a. Detail Documentation (Provide one sentence description.)
- b. Budgeted costs and resources

(119)

29. OUT YEAR COMMENTS:

Increased funding contingent upon favorable review of future TDP proposals and increased funding by NOAA-MESA program; 50-100% increase necessary to carry planned biological components of MESA to a favorable conclusion.

30. STATEMENT OF NEED:

The waters of the New York Bight are subject to the demands of many competing users. The general public, sport and commercial fishermen and others utilize these waters for their recreational activities as well as for their livelihood. They require a relatively clean environment with waters in which they can swim safely and which will also support a sufficient quantity and quality of life to make sport and commercial fishing worthwhile. In addition, industries and municipalities utilize these waters to dispose of their waste products. They require only that these waters assimilate or carry away the wastes dumped into them. Between these two ends of a spectrum are individuals regulating the activities of each. These individuals are the policy makers, grantors of licenses and permits, etc., and they must be concerned about the rights and needs of both ends of the spectrum. These policy makers and managers require precise quantitative information about the environment on which to base their decisions in regulating the various user groups of the New York Bight.

It appears that an imbalance has already occurred in certain portions of the apex of the New York Bight as evidenced by values of low diversity and low biomass. Policy makers need to know how much waste material should be allowed to enter the New York Bight on an area by area basis per unit time at different seasons of the year to ensure that adequate consideration and protection are given to the requirements of living marine resources as well as aesthetics and human needs in environmental alterations proposed for the future. This requires that a broad knowledge be acquired on the distributions and biomasses of the communities presently living in the New York Bight, and of the fluxes of materials passing through them, so that the effects of man-induced changes on the marine life can be determined.

31. TASK OUTPUTS (SPECIFIC):

a) Measurements and SYMAPs of the distributions (seasonally) and magnitudes of:

- 1) Oxygen consumption by the planktonic organisms in the water column of Paritan, Lower, Upper, and Sandy Hook Bays compared with standing stocks and inputs of organic matter into the system and heavy metals associated with particulate matter and zooplankton.
- 2) Oxygen consumption by the seabed in the New York Bight compared with the distributions and quantities of macrofauna, heavy metals, organic carbon, redox potential and reduced substances.
- 3) Macrofauna in the New York Bight compared with the distributions and concentrations of heavy metals, and the distribution of sediment parameters.

These activities will provide information which will be used to:

- 1) determine whether or not the planktonic system (Raritan, Lower, Upper and Sandy Hook Bays) is capable of assimilating present levels of dissolved and suspended organic input for each season of the year.
- 2) determine assimilation capacity of the benthos of the New York Bight for waste materials on an area by area basis per unit time for each season of the year.
- 3) provide baseline data describing the present situation in the New York Bight area so that the effect of future man-made events on the marine organism can be determined.

Measurements as data and SYMAPs will be incorporated into periodic and topical data reports, and formal publications concerned with rigorously analyzed data and observations and special atlases and publications which graphically indicate baselines and temporal changes observed in the Bight and adjunct waters.

- b) The termination date of the task will be predicted on the ability to obtain enough successful measurements of benthic respiration, redox potential, and distribution and biomass of macrofauna to adequately describe present conditions in the New York Bight. Dr. Cok of Adelphi University has recently produced maps showing the sediment types in the New York Bight. His maps in addition to previous geological and biological data from the New York Bight has been used to determine the position of biological sampling stations. The number of samples taken will ultimately vary according to the variance associated with each sediment type. The overall objective must be accomplished by the end of FY 77, the termination of the MESA Program. If this objective of describing the entire Bight proves to be impossible within the time limits set by the MESA Program, then the biologically and economically more important areas of the Bight will be concentrated upon and described. These more important areas would include the apex of the Bight and more specifically the dump sites for dredge spoil, sewage sludge, and chemical-acid wastes as well as coastal areas to which wastes might be transported by currents.

Studies in Raritan, Lower, Upper and Sandy Hook Bays in which we are measuring oxygen consumption by planktonic organisms in the water column will be terminated when enough successful measurements are obtained to adequately describe conditions over an annual cycle and determine whether or not the system is capable of assimilating present or increased levels of organic loading.

32. BENEFITS:

The Task outputs will provide the quantitative information required by policy makers to: 1) make decisions, 2) educate the public to support their decisions, and 3) allow them to originate legislation to regulate the many competing activities in the New York Bight area, so that not only would the environment for marine life be prevented from being degraded further, but also that it would be improved and protected.

User groups for this information would include: New York City Commission of Water Resources; various metropolitan municipalities including Passaic Valley Sewer Authority; state agencies including the New York, New Jersey, Connecticut and Rhode Island conservation and fishery organizations; U. S. Environmental Protection Agency; and other user-management groups including organizations with interests in recreational and commercial fisheries.

33. ACTIVITIES PLAN:

Subtask: Phytoplankton, primary productivity and water column respiration in Raritan, Lower, Upper and Sandy Hook Bays.

Pollutants enter the waters of the New York Bight areas as both particulate and dissolved material. Thus particulates that remain suspended in the water column and the dissolved substances that remain in solution have the potential to affect planktonic marine resources (including larval stages of sport and commercial species as well as their food sources) as well as taxa at higher trophic levels. Ultimately, man or his domestic animals could be affected through the transfer and concentration of pollutants throughout the food web.

Many of the pollutants that enter the New York Bight are highly organic (petrochemicals, pesticides, sewage wastes, etc.). As such they may provide an additional food source for certain organisms. However, they may instead inhibit the growth and development of these organisms. One of several parameters that should indicate the effect of these compounds on the living system is the measurement of the consumption of oxygen by planktonic organisms living in the water column. In areas where there is a high organic input and respiration is high, oxidizing nearly all the incoming organic matter, we know that such systems are capable of handling high organic loads. Where, however, an imbalance occurs between inputs of organic matter and the oxidation of that matter we know that the system may be receiving too much organic matter. Depressed oxygen values in the water column would indicate that the system is operating at or near capacity; such low DO values are frequently observed in metropolitan waters. In any case ecosystems that are not overloaded should respond actively to increases in the supply of organic matter and ecosystems that are overloaded should not longer respond to additional inputs. In addition, Japanese researchers (Ori, et al., personal communication) report that eutrophication has direct effects on many marine organisms, i.e., interfere with normal reproduction in forms such as oysters.

To this end this subtask proposes to investigate the 1) seasonal variations in the distribution and magnitude of oxygen consumption in the water column, 2) standing stocks of organic matter, and 3) inputs of organic matter to the system, to determine whether the plankton ecosystems are capable of assimilating the present levels of dissolved and particulate organic matter entering the system. The following parameters will be measured: water column respiration rates (Peckard and Richards, 1971) net zooplankton carbon, particulate organic carbon (Leco Carbon Analyzer), particulate inorganic material, primary productivity - particulate and dissolved, phytoplankton-species volume and number, ratio of detritus to phytoplankton, heavy metal in suspended particulate material, dissolved organic carbon (Menzel and Vaccaro, 1964), and, if present data demonstrates the importance of dissolved organic matter, we will measure assimilation and oxidation rates of dissolved organic matter as well as salinity, temperature, pH, and dissolved oxygen. (See Hobbie, et al., 1972. A study of the distribution and activity of microorganisms in ocean water. *Limnol. Oceanogr.* 17(4): 544-555).

Subtask: Seabed oxygen consumption - New York Bight.

This subtask is proposed to measure seabed oxygen consumption and map the present rates of decomposition of organic wastes occurring as a result of biological and non-biological processes in the New York Bight. Particular emphasis will be placed on measurements in and around the waste disposal areas in the apex. Comparisons will also be made between seabed oxygen consumption values in the Hudson Shelf Valley and neighboring Continental Shelf, and between the Hudson Canyon delta and the neighboring Continental Rise and Abyssal Plain to see if there is any indication that organic wastes are affecting the deep sea by being transported down the Hudson Shelf Valley and Canyon.

From the results of this study and additional information concerning the extent of organic wastes in the Bight and the rates of input and export by physical means, the following will be determined: 1) the rate at which organic wastes are accumulating or disappearing in certain areas, 2) the quantity of organic input various areas of the New York Bight can accommodate without deleterious effects to the living marine resources, and 3) the time required for the sediments to return to a homeostatic condition capable of accommodating predictable, but as yet unknown, quantities of organic matter. Baseline decomposition rates will be mapped to monitor the spread of pollutants in the future and to provide policy makers with usable information on quantities of organic matter that delineated areas of the Bight could accommodate temporarily without deleterious effects.

The following parameters will be measured: seabed oxygen consumption (Paratnat, 1971a, b), redox potential, reduced substances, dehydrogenase assay (Lenhard, et al., 1965), particulate carbon and nitrogen, dissolved oxygen, pH, salinity and temperature.

Subtask: Benthic meio- and macrofauna.

Waste materials, including solid wastes barged to sea for dumping and effluents from point sources, have been shown to affect benthic dwelling organisms. Benthic macrofauna taxa have been severely affected by ocean disposal of sewage sludge and dredging spoils in the Bight; many components of the macrofauna are commercially important or have great significance in marine food chains. There are also indications that the meiofauna has been affected.

The Smithsonian Advisory Committee (1972) recommended that future research efforts "should be directed to evaluate statistically the effects of ocean dumping on benthic macrofauna, particularly those species important commercially either directly to man or by serving as food for finfish." It also stated the importance and need for studies of the meiofauna.

Our proposed field research on the macrofauna is related to earlier research at SHL and will consider: 1) change in species diversity within macrofaunal communities relative to sources of pollution, 2) change in total biomass and standing stocks of benthic species relative to sources of pollution and ecotones, or zones of transition in physical ecological parameters, and 3) change in the distribution and biology of individual species.

Particular emphasis will be placed on investigating areas over and around the waste disposal areas in the apex. Comparisons will also be made between the distribution, biomass, species diversity and heavy metals in the Hudson Shelf Valley and neighboring Continental Shelf, and between the Hudson Canyon delta and the neighboring Continental Rise and Abyssal Plain to: 1) provide baseline data and 2) determine if there is any indication that pollutants (heavy metals, coliforms, organic wastes, etc.) are affecting deep sea marine life by being transported down the Hudson Shelf Valley and Canyon. This data would have a direct bearing on any decision to move the locations of the present waste disposal areas. The change in location of the present disposal areas could have a real effect on local sport and commercial fisheries as well as migratory species which normally habituate distant waters.

The objectives of this subtask are to: 1) establish baselines for benthic communities which can be analyzed statistically, 2) provide data on biomass community or species diversity and individual species, particularly those with commercial value, which are affected by pollutants, 3) determine the possibility of specific macrofaunal species serving as "indicator organisms" in the Bight, 4) determine if changes in single major taxa or biomass, rather than changes in total community structure, can be used to assess change due to man-induced environmental perturbations and 5) provide the above information in the form of a subunit of a predictive model.

The products of this subtask will be: 1) a series of charts indicating the distribution of individual species, biomass and species diversity in the apex of the Bight, 2) correlations between the distribution of macrofauna and sediment type, and distributions of toxins and artifacts associated with bed deposits of sewage sludge and dredging spoils, 3) statistical correlations between species diversity, standing stocks of individual taxa (as biological indicators) and biomass and decisions as to the suitability of these data for management purposes and 4) a subunit of a predictive model suitable for inclusion in the overall NOAA-MESA modeling program.

The first effort in this subtask has been to develop a sampling program which has a great degree of statistical validity.

Several facets of research of direct interest to the NOAA-MESA program have not been funded or have inadequate financial resources available to develop them to their full potential. For instance, a greater effort should be made in environmental microbiology and chemistry, particularly as these disciplines relate to the benthic meio-macrofauna studies and resource assessment research on demersal finfish.

Greater support should also be given to the problem of fish disease and its distribution and prevalence within the greater New York Bight.

34. MILESTONES:

Completion of field sampling for MESA Program in the Apex of the New York Bight.

SYMAPS and reports on data collected in the New York Bight Apex.

- a) Seabed oxygen consumption.
- b) Distributions and biomass of benthic meio- and macrofauna as related to sediments, heavy metals and specific toxins.

SYMAPS and report on primary productivity and phytoplankton distributions and magnitudes in Raritan, Lower, and Sandy Hook Bays.

Completion of field sampling for MESA Program in the greater New York Bight.

SYMAPS and reports on data collected from the greater New York Bight.

- a) Seabed oxygen consumption.
- b) Distributions and biomass of macrofauna related to sediments and heavy metals.

SYMAPS and reports on oxygen consumption by plankton in the water column of Raritan, Lower, Upper and Sandy Hook Bays.

35. IMPACT OF TASK AUGMENTATION:

No potential increases, outside of the 5% per year suggested for planning purposes, are anticipated.

36. BACK-UP DOCUMENTATION, LEGISLATIVE PROGRAM AND ENVIRONMENTAL IMPACT:

Hobbie, J.E., O. Holm-Hansen, T.T. Packard, L.R. Pomeroy, R.W. Sheldon, J.P. Thomas, and W.J. Wiebe. 1972. A study of the distribution and activity of microorganisms in ocean water. *Limnol. Oceanogr.* 17(4): 544-555.

Holme, N. and A. McIntyre. 1971. Methods for the study of marine benthos. IBP Handbook No. 16. Blackwell Scientific Publ., Oxford. 334 pp.

Jansson, B. and H. Odum. 1972. Ecosystem approach to the Baltic problem. *Bulletins from the Ecological Research Committee*, No. 16. Swedish Natural Science Research Council, Stockholm. 82 pp.

Lenhard, G., L.D. Nourse, and H.M. Schwartz. 1965. The measurement of dehydrogenase activity of activated sludge, p. 105-127. In J.K. Boars (Ed.), *Advan. Water Pollut. Res. (Proc. Int. Water Pollut. Res Conf., Tokyo, 1964)*, v. 2.

Menzel, D.W. and R.T. Vaccaro. 1964. The measurement of dissolved organic and particulate carbon in seawater. *Limnol. Oceanogr.* 9: 138-142.

Middle Atlantic Coastal Fisheries Center, National Marine Fisheries Service. 1972. *Cooperative Study of Contaminants in the Coastal Environment and their Effect on Living Marine Resources: Summary Report, 1971-1972.*

National Academy of Sciences. 1970. *Wastes management concepts for the coastal zone: Requirements for research and investigation.* NAS, Washington. 126 pp.

In particular note chapters 5 (Biological effects), 6 (Recommended research and investigation for effective coastal wastes management) and 7 (Suggested priorities and estimated minimum effort required).

National Academy of Sciences. 1971. *Marine environmental quality: Suggested research programs for understanding man's effect on the oceans.* NAS, Washington. 107 pp.

In particular note chapter 5 (The effects on marine organisms; selecting organisms and systems for study, p. 66; importance of a conceptual framework, p. 67).

National Marine Fisheries Service. 1972. *Ocean fisheries and living marine resources, Program memorandum FY 1974 - 1978.*

In particular see pp. II: 3 - 9.

Packard, T.T. and F.A. Richards. 1971. Vertical distribution of the respiratory electron transport system in marine plankton. *Limnol. Oceanogr.* 16: 60-70.

Pamatmat, M.M. 1971a. Oxygen consumption by the seabed, IV. *Limnol. Oceanogr.* 16: 536-550.

Pamatmat, M.M. 1971b. Oxygen consumption by the seabed, VI. *Int. Rev. Gesamten Hydrobiol.* 56: 675-699.

Sandy Hook Laboratory, National Marine Fisheries Service. 1972. The effects of waste disposal in the New York Bight, Final Report.

b) Significant related tasks.

1. Statistical analysis of data from New York Bight - University of Rhode Island.
2. Baseline meiofauna (nematodes) New York Bight - C.C.N.Y.
3. Baseline meiofauna (foraminifera) New York Bight - C.C.N.Y.
4. Baseline meiofauna (ciliates) New York Bight - U. of Md.
5. Baseline meiofauna (amoeba) New York Bight - NMFS/MACFC, Oxford.
6. Microbiology (fish disease) New York Bight - NMFS/MACFC, Milford, Oxford.
7. Phytoplankton and primary productivity New York Bight, C.C.N.Y.
8. Baseline finfish distribution - New York Bight - MACFC/Sandy Hook.
9. Baseline contaminants (heavy metals) New York Bight - NMFS/MACFC, Milford.
10. Baseline sediment analyses New York Bight - Adelphi U.
11. Meiofauna (amoeba) New York Bight - U. of Kansas.
12. Marine bacteria and heavy metal findings - New York Bight - Columbia U.
13. *Vibrio* bacteria - New York Bight - Rutgers U.
14. Water mass transport and vertical circulation - New York Bight - Lamont-Doherty Geol. Observatory.
15. Substrate monitoring program - New York Bight - AOML, Miami.
16. Substrate variability program - New York Bight - AOML, Miami.
17. Suspended sediments program - New York Bight - AOML, Miami.
18. Sediments chemistry program - New York Bight - AOML, Miami.
19. Substrate inventory program - New York Bight - AOML, Miami.
20. Cyclesonde study - New York Bight - AOML, Miami.
21. Boundary layer study - New York Bight - AOML, Miami.
22. Radioisotope tracer study - New York Bight - AOML, Miami.
23. Physical oceanography program - New York Bight - AOML, Miami.
24. EPA
25. U. S. Army Corps of Engineers

c) Current task can be accomplished under existing legislation (see below) providing that the NESA Program in the New York Bight is adequately funded.

1. Coastal Zone Management Act of 1972.
2. Marine Protection Research and Sanctuaries Act of 1972.

- d) This TDP will not affect the environment and no Environmental Impact Statement is needed.

(161)

VESSEL REQUIREMENTS:

1. Date: December 20, 1973
2. TDP No.:
3. Prepared By: James P. Thomas
4. Task Title: IEC; M&E Contaminants Analysis, Biological Oceanography
- 5-7. NMFS Vessel (Name): R/V Oregon II, Albatross IV, Delaware II.
- 8-9. Charter Vessel (type): Charter R/V Atlantic Twin
10. Total Sea Days: 15 days per quarter = 60 days per yr.

Scientists Per Cruise:

11. Maximum: 15
12. Minimum: 12
13. Anticipated: 12 - 15
- 14-17. Cruise Months: July 6-21, October 19 - November 4,  
January 22 - February 6, March 12-27.
18. Vessel Priority: Albatross IV, Oregon II, Delaware II.
19. Remarks: MESA Program New York Bight

# NMFS TASK DEVELOPMENT PLAN

(See Detailed Instructions)

1. DATE PREPARED

December 20, 1973

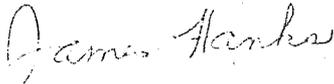
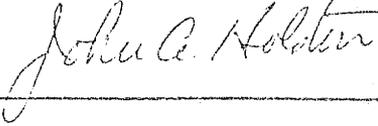
(Submit five copies by Jan. 2, 1974.)

TO: Director, National Marine Fisheries Service, ATTN: F&S National Oceanic and Atmospheric Administration Washington, D.C. 20235

FMC's - Submit a separate Task Development Plan for each task beginning, continuing, or ending in FY 1974, FY 1975, or FY 1976. Total funding in each category must equal your PED specific total funding guidance. Reimbursable funds are not to be mingled with appropriated funds on any programmatic TDP; separate TDP's must be prepared. Submit one Support TDP itemizing the administrative support cost (Management Fund) for the FMC.

2. TDP NUMBER MAC-056-76-AQ-A	3. SUB-OBJECTIVE CODE II-A-3	4. RANK (To be completed only by FMC's and NMFS Hdqrs.)	FMC 9	NMFS HDQRS.
5. TASK NUMBER 2826	6. TASK TITLE Aquaculture - Genetics			
7. ORGANIZATION CODE F33300	8. ORGANIZATION TITLE (Responsible for execution of this task) Aquaculture Investigations		9. PRINCIPLE LOCATION City: Milford Lab. State: Conn.	

OBJECT CLASS <small>Lines 10-19. Enter all dollar values as thousands and tenths of thousands. Lines 22-23. Enter as man-years and tenths of man-years.</small>	UNIT C O O	CURRENT YEAR FY 19____		BUDGET YEAR FY 19_75		BUDGET YEAR +1 FY 1976	
		TARGET ALLOWANCE A	INCREASE B	TARGET ALLOWANCE C	INCREASE D	TARGET ALLOWANCE E	INCREASE F
10. Total Direct Labor	15			7.0		14.0	32.5
11. Travel	19			.8		1.6	2.5
12. Rents, Communications, Utilities	21						
13. Contracts <input type="checkbox"/> (To be let) Grants <input type="checkbox"/> (Funds obligated)	51 52 58						25.0
14. Supplies	53			2.6		5.2	12.5
15. Capital Equipment	54			3.5		7.0	8.4
16. Other (Estimated cost of all other direct cost not included above.)				1.7		3.4	5.5
17. Total Direct Funds <small>(Add lines 10 through 16 above.)</small>				15.6		31.2	86.4
18. Support Cost				3.4		6.9	15.9
19. Total Funds <small>(Add lines 17 and 18.)</small>				19.0		38.1	102.3
20. Positions, Full-time permanent <small>(Number applicable to this Task. Also, complete NOAA Form 32-100.)</small>				0		0	2
21. Positions, Other <small>(Number applicable to this Task)</small>				0		1	3
22. Man-years, Permanent				.8		1.0	1.6
23. Man-years, Other				.2		.8	1.4
24. Reimbursable Support <small>(Reimbursable agreements only)</small>							

25. OFFICIAL PREPARING REPORT (Signature) 	26. CENTER DIRECTOR OR DESIGNATED REPRESENTATIVE (Sig.) 
---------------------------------------------------------------------------------------------------------------------------------	-------------------------------------------------------------------------------------------------------------------------------------------------



FY	ACTIVITY SCHEDULE & EVENTS	FY-1		FY-2		FY-3		FY-4		FY-5	
		1	2	1	2	1	2	1	2	1	2
12.	A Experimental mutation breeding	✓	✓*			✗	✗	✗	✗		
13.	A Isolation of useful induced mutations					✗	✗	✗	✗		
14.	E Demonstrations of usefulness of mutation breeding							✗	✗	✗	✗
15.	A Research on experimental cryopreservation of male and female shellfish gametes					✗	✗				
16.	A Development of gamete cryopreservation techniques suitable for commercial use							✗	✗		
17.	E Conservation of important wild gene pools for future use.							✗	✗	✗	✗

29. OUT YEAR COMMENTS:

CONTINUE AT SAME LEVEL  
 INCREASE OF \_\_\_\_\_ %  
 REDUCTION OF \_\_\_\_\_ %  
 TERMINATION

REMARKS:

(\* Current year work on experimental mutation breeding concerns data analysis and publication of work accomplished under prior research support for aquaculture.

1/2/75

NMFS TASK DEVELOPMENT PLAN  
29. FULL-TIME PERMANENT POSITIONS

TOP NUMBER  
MAC-056-76-AD-A

Reference NOAA Form 32-14A, Item 20. Identify all full-time permanent positions related to this Task for the budget year only. Do not include support personnel; they should appear in the appropriate support Task Development Plan.

POSITION TITLE	GS LEVEL	NAME OF INCUMBENT (If no incumbent, enter "Vacant")	% OF TIME SPENT THIS YEAR
Research Geneticist	13-3	Mazzone, Arlene	50
Fishery Biologist	9-4	Stiles, Sheila	50
Fishery Biologist	5-3	Hughes, James	50
	3-1		
In Fiscal Year 1976 add two FTP Personnel:			
Geneticist (Research)	11-1	Vacant	100
Fishery Biologist (Research)	9-1	Vacant	100

CONTINUE on plain 8x10 1/2 paper. Identify "Page of Pages" and "TDP Number" in upper right corner. Comment on each of the following items, identifying by number. If item is not applicable, so indicate by entering "NA":

- 30. STATEMENT OF NEED
- 31. TASK OUTPUT
  - a. Significant Output
  - b. Termination Criteria
- 32. BENEFITS
- 33. ACTIVITY PLAN
- 34. MILESTONES
- 35. IMPACT OF TASK AUGMENTATION
  - a. Current Year
  - b. Budget Year
  - c. Budget Year + 1
- 36. BACK-UP DOCUMENTATION
  - a. Detail Documentation (Provide one sentence description.)
  - b. Prepared by and on

1167

30. Statement of Need:Private Aquaculture

A general conclusion of the 1972 NOAA Aquaculture Survey (by Mardela Corporation), the Section on Economics, was that "economic factors in the U.S., combined with legal and technical inhibitions indicate that technologically intensive closed-cycle systems would eventually provide the best chance for U.S. aquaculture operations". To various degrees this conclusion might be argued. However, that the shellfish industry will be moving in this direction in regard to hatchery production is certain. Rearing successfully the oyster, other shellfish, any animal, under intensive, artificial conditions necessitates considerable alteration of the wild genotype. Part of the reason commercial shellfish hatcheries make no profit, even though basic hatchery techniques are well worked out, is the lack of organisms truly suited to artificial production. Applied genetic research could well aid industrial initiatives in their development of hatchery profitable strains. This work, however, must be supported and conducted along with applied work on nutrition and disease. Its success will be limited by advances in these other two areas. Along with the applied genetic work must be the advance of basic genetic knowledge about shellfish. The idea of continued successful application of the fruits of mission-oriented research to the fish industry without an increase in the base of the present limited genetic knowledge about fish is simply wishful thinking. Contrast all we know about plants and mammals, cereal, and poultry to what is known

about fish to realize why fish breeders have a need to enlarge the base of information on which they operate - why indeed a right to have this work supported.

### Public Aquaculture

Far too little is known about the genetics of shellfish for management of public beds to be conducted in such a way as to make maximum use of the full genetic potential of various commercial species. (Fishing these beds is still the main profitable enterprise of the industry.) This lack of knowledge makes for over-conservatism in attempts at improving wild stock beds, or results in simple neglect of presumed spawning beds. At the same time many of the wild gene pools that breeders will need to call upon for continued domestication of hatchery strains will probably risk loss in the future.

### Specific Needs

Specific genetic needs of the shellfish industry then can be broken down as follows:

(1) Development of those areas of applied genetic research on shellfish (and other fish as the program evolves) that commercial hatchery producers will require in selecting their own hatchery strains - strains which will enable them to realize a profit from their hatchery enterprises. Just what will be required here has been determined on the basis of (a) what was required for the development of profitable agricultural plants and animals allowing for historic differences in agriculture and fisheries; (b) what sort of information

is necessary to answer industry's specific request for information regarding their breeding endeavors.

Commercial producers are presently mostly concerned about problems regarding selection and inbreeding. A shellfish industry relatively unsophisticated in genetics, remains un-enthusiastic about any use of hybrids at all. Most attention accordingly would focus on selection and inbreeding. Some attention though must be given to wide hybridization. NMFS would be in error to follow industry's mood on hybrids. Almost all of our highly profitable food species in the U.S. derived from some original wide hybrid crosses which brought together the gene combinations necessary for their successful commercial exploitation, genes highly important as the species passed from wild to domesticated or cultivated state. (Moreover, hybrids are invariably what attracts most scientific, popular and sometimes new market attention.) Also an applied program of interspecies hybridization would certainly lead to the uncovering of much basic information on shellfish species of yet unpredictable but certain practical application in other breeding studies, as well as in industry.

(2) Concomitant with this required development of practical information is the need to enlarge the background base of genetic knowledge about shellfish essential to the long-range success of commercial breeding.

(3) There is a further need to understand the genetics of wild shellfish populations to open the possibility of maximizing profit from resource management that takes into full consideration the genetic potential of different wild populations.

(4) Lastly there is the need to promote the conservation of wild gene pools of shellfish that will become increasingly valuable in the future as sources of needed genes for hatchery strains. For example, genes to yet unknown hatchery diseases that will surely find expression as domestication advances and hatchery production takes precedence over the wild fisheries.

31. Task Outputs (Specific):

1. Information on and demonstrations of progress by selective breeding - mostly oysters; other shellfish

(a) For a large variety of commercially important traits (including possibly disease resistance) sound information would be developed for hatchery breeders regarding the likelihood of improvement by private selection programs within commercial hatcheries. This information would relate to different founding individuals, various degrees of inbreeding, and different selection potentials. Once set up, experiments would be continued from generation to generation to obtain continuous information on the presumed limits of improvement by selective breeding. There would also be test hybridizations of selected lines for superior market oysters. Such mass selection experiments with random breeding controls would serve as a continuous source of information to industry, provide scientific data on the oyster, and at the same time be a very visible demonstration of science at work for the fishery industry.

(b) Criterion for Task termination in toto would be accumulation of sufficient information on all the parameters involved in scientifically based

selective breeding so that industry can be advised on their breeding problems without having to resort to new research except in limited instances; also enough information on selective breeding of shellfish for industry to plan more knowledgeably their own new breeding programs. This should take about 10 years with important milestones reached every other year on the average along the way. Advisory work based on the information developed and demonstrations could continue for years past termination of most of the experimental work on this Specific Task Output.

2. Information on and inbreeding demonstrations for industry application; also fundamental genetic information on results of inbreeding - mostly oysters; other shellfish.

(a) Inbreeding, both severe and rapid and mild and slow, of several lines would be conducted for various purposes. One of these would be to estimate how well shellfish that are natural outbreeders can tolerate inbreeding; how severe and what form inbreeding depression takes in pelecypod molluscs. Another purpose would be to appraise for industry the feasibility of producing superior hatchery lines by intensive inbreeding followed by cross-breeding of select inbred strains. Finally, inbreeding should result in the "surfacing" of genes useful in basic work and as genetic tags for other applied research. Also, it would make possible an in-depth study of cross-incompatibility genes which can determine the level of crossability in hatchery bred animals, and between different populations and species.

(171)

(b) Criterion for Task termination should be sufficient information to evaluate for industry the usefulness and cost of inbreeding programs for eventual production of hybrids between inbred lines for market. This should take about seven years to complete, but benefits will accrue along the way. Advisory work based on the information developed, and demonstrations could continue for years past termination of the experimental part of this Specific Task Output.

3. Information on and demonstrations of the results of within species hybridization of natural oyster populations - mostly oysters; other shellfish

(a) Different geographic populations of oysters within any one species would be collected and test hybridized with one another, then the hybrids experimentally or field-tested for specific uses. The purpose of this would be the combination of particular traits in the hybrid that could result in superior hybrid types for re-stocking on wild beds or growing for aquaculture. This could include hybrids with increased environmental range or adaptability, hybrids that will thrive better under stress of heavy pollution, particularly the larval phase, because of heterosis. Also, these hybrids would serve as seed stock for mass selection programs in which it was deemed best or was necessary to include an assortment of genes from a wide area, as for example genes for disease resistance. As the applied aspects of this program develop, it can be expected that considerable basic genetic information on different wild populations would be uncovered of practical use in other aspects of the genetics program.

(177)

(b) Criterion for Task termination in six years should be the development of sufficient information to advise industry on value of hybrid crosses of wild stocks in hatchery breeding programs, also to advise managers of the wild resource about use of such hybrids on natural beds. Demonstrations and limited information would be presented before the six years ended. Advisory work based on the information developed, and demonstrations could continue for years past termination of the experimental part of this Specific Task Output.

4. Information on, demonstration of, and production of inter-species hybrids of oysters - mostly oysters - include genera other than Crassostrea; other shellfish

(a) Inter-species hybrids would be experimentally produced, studied and tested for commercial value. This work would involve a wide variety of species of different genera, some distantly related, others suspect of not having a true species rank being merely genetically distinct populations of the same species. Commercial and non-commercial types alike would be explored. Information resulting should be of use to commercial hatcheries, and also for management and stocking of wild beds, and for the opening up of new beds. Probably greatest use of the hybrids would be in backcrossing programs with the favored prevalent commercial type. Backcrossing would lead to the incorporation of desirable genes (as for example resistance to larval diseases) from a generally less desirable non-commercial or unadapted species into the popular commercial type. The possibility even cannot be excluded that some  $F_1$  hybrid would itself be a superior market

type under many circumstances. Some small amounts of especially difficult-to-come-by hybrid seed might be distributed to industry for experimental purposes.

(b) Criterion for Task accomplishment - part in six years, another projecting two years past this - should be the development of commercially practical methods to achieve wide species hybridization which cannot occur under normal conditions of laboratory or hatchery fertilization; the testing of a large enough number of hybrid combinations to get a good enough evaluation of such hybrid usefulness; demonstration of the role of wide hybrids as one step in a hatchery program involving backcrosses of  $F_1$  hybrids to local types with selection; the production of some initial hard-to-come-by seed for industry. Advisory work and demonstrations could continue for years after experimental portion of this Specific Task Output is completed.

5. Studies on experimental mutation breeding as applicable to unique problems of shellfish breeding - mostly oysters; other shellfish

(a) Evaluation of the usefulness for applied breeding programs of inducing mutations in shellfish by ionizing radiation and recognized chemical mutagens. At the same time develop a basic understanding of mutations in these groups. Preserve any basically useful genetic markers that are induced. (Also use radiation as a means of inducing parthenogenesis by induction of lethal mutations in sperm.) While this is a more radical approach than the ones just listed above, it is justified by the primitive nature of shellfish, their enormous fecundity, and paucity of easily handled marker genes.

Also, a very rapid domestication of the oyster in the genetic sense could probably well utilize genes readily available now in these species only through mutation. For example, a mutation expressing itself in some aspect of larval morphology or physiology might broaden the spectrum of micro-algae on which fastidious larvae must be fed in commercial hatcheries. (Such an approach - induced mutagenesis - has broad public and scientific visibility.)

(b) Criterion for the termination of this Task will be sufficient knowledge to evaluate mutation breeding as an approach to rapid domestication of wild shellfish for intensive, artificial culture; isolation of some induced mutations for commercial use and for basic research. Task should be completed four additional years after the FY 76. Advisory work and demonstrations could continue for years after this Specific Task Output is terminated.

6. Cryopreservation of male and female gametes of shellfish

(a) Research would be conducted on experimental cryopreservation and live recovery of both male and female gametes of the shellfish. There would be work on the development of gamete preservation techniques suitable for commercial use.

(b) Criterion for Task accomplishment in five years would be sufficient information to conclude whether such methods are at the present state of the science of cryopreservation feasible for commercial use.

7. Conservation of important wild gene pools of shellfish for future commercial use

(a) First the more important gene pools needing conservation would be identified in part from results of selection experiments, studies of hybrids between different geographic populations within a species, and of inter-species hybrids. Conservation would be by information disseminated to those responsible for the wild resources; by active collection and breeding of specimen groups; lastly possibly by cryopreservation methods.

(b) Criterion for Task termination some time after eight years would be either the accomplishment of the goals stated in (a) above, or the handing over of this responsibility to the states, private industry or other agencies.

32. Benefits:

This Task will develop the kind of genetic information NMFS needs to answer the specific questions industry poses concerning the development of their own hatchery strains - strains which will enable them to realize a profit from their hatchery enterprises. Such information will also enable NMFS to take the initiative in advising industry on certain aspects of breeding in advance of industry's request for such. Special gene pools conserved in NMFS laboratories or under the Service's auspices would directly benefit industry. Industry and consumer alike would benefit from the improved management of wild shellfish beds that would be possible with increased knowledge of the genetic potential of different wild shellfish populations.

(1761)

As well as aid in future hatchery production, the information gained from the Task can so be applied by commercial shellfish growers, NMFS, and other Federal agencies and state agencies in managing and protecting economically valuable shellfish resources.

33. Activities Plans:

Methods employed will be those standard for mass selection programs, selection in two directions with randomly breeding control. Attention to population size, inbreeding intensity and selection intensity; computations of selection progress by standard genetic methods. Inbreeding by full-sib crosses, and in small closed populations. Also by induced parthenogenesis by radiation followed by experimental doubling of chromosome numbers. Hybridization, by necessity, by large numbers of single crosses. Some research on fertilization inhibition as a means of obtaining large-scale mass hybridizations. Experimental work aimed at forcing otherwise incompatible inter-species crosses. Backcrosses of wide hybrids to local commercial adapted types. Some use of special reciprocal recurrent selection program in inbreeding and hybridization work. Mutagenesis by gamma- and X-irradiation and with mutagenic alkylating agents. Some work on cryopreservation of live gametes as a means of facilitating genetic progress. Cytogenetics to be employed in appraising cross results, as in inter-species hybrids and intense inbreeding and sterility effects. Species, mostly oysters; also some other shellfish, possibly other fish as program evolves.

34. Milestones:

1. Periodic (about yearly) development of experimental information on the following of use to industry regarding their hatchery selection; heritability estimates; duration of response to selection; inbreeding in selection; hybridization of selected lines for market.
2. Demonstrations of 2-way model selection experiments.
3. Regular (upon request) dissemination of information regarding effects of inbreeding in private selection programs in commercial hatcheries.
4. Dissemination to industry of experimental information regarding radical inbreeding followed by hybridization; evaluation of usefulness of such as a commercial technique for shellfish.
5. Demonstrations of inbreeding and hybridization of inbreds.
6. Demonstration of results of hybridization of different geographic populations; dissemination of information on and usefulness of to industry.
7. Production of wide hybrid seed for industry; demonstration of; dissemination of information on and usefulness of.
8. Isolation of beneficial mutations induced by ionizing radiation and chemical mutagens.
9. Demonstration to industry of use of mutation breeding; dissemination to industry of information on and usefulness of.
10. Successful freezing and live recovery of male and female shellfish gametes.

11. Development of commercially suitable methods for cryopreservation of shellfish male and female gametes.

12. Several separate instances of successful conservation of important wild gene pools for future commercial use.

35. Impact of Task Augmentation:

N/A

36. Back-up Documentation, Legislative Program and Environmental Impact:

(a) 1. NOAA Aquaculture Survey, 1972. Report to Participants.

Mardela Corporation, Burlingame, California.

2. Oyster genetics and future role of genetics in aquaculture - a manuscript by A. Longwell to appear in Malacological Review in January 1974.

3. The genetic system and breeding potential of the commercial American oyster - A review by A. Longwell and S. Stiles which appeared in Endeavour, 29 (107): May 1970.

4. Some impressions regarding genetics and the fisheries of Japan - a manuscript by A. Longwell - to be published in a NMFS Circular as part of the Proceedings of the First US/Japan Aquaculture Panel of the Natural Resources Council, Tokyo, Japan, November 1971.

5. Oyster Genetics: Research and commercial application. Review by A. Longwell and S. Stiles. Proc. Conf. Shellfish Culture. Selden, Long Island, April 1968, p. 91-104.

6. FAO Fisheries Report No. 119. Report of the first meeting FAO ad hoc working party on genetic selection and the conservation of genetic resources of fish. Rome, Italy, December 7-10, 1972; Food and Agriculture Organization of the United Nations, Rome.

(b) Some genetic research is being supported by Sea Grant in a few state universities, and hopefully more will be stimulated. No conflicts are envisaged as the present stage of so little knowledge necessitates so much work. Also NMFS programs can afford the continuity and provide the essential contact with industry that other programs by their nature will not be able to guarantee to the same extent.

(c) N/A

(d) This Task will have no adverse impact on the environment.

# NMFS TASK DEVELOPMENT PLAN

(See Detailed Instructions)

1. DATE PREPARED  
December 20, 1973

(Submit five copies by Jan. 2, 1974.)

TO: Director, National Marine Fisheries Service, ATTN: Fx5 National Oceanic and Atmospheric Administration Washington, D.C. 20235

FMC's - Submit a separate Task Development Plan for each task beginning, continuing, or ending in FY 1974, FY 1975, or FY 1976. Total funding in each category must equal your FED specific total funding guidance. Reimbursable funds are not to be mingled with appropriated funds on any programmatic TDP; separate TDP's must be prepared. Submit one Support TDP itemizing the administrative support cost (Management Fund) for the FMC.

2. TOP NUMBER <b>MAC-057-76-AQ-A</b>	3. SUB-OBJECTIVE CODE <b>III-A-3</b>	4. RANK (To be completed only by FMC's and NMFS Hdqrs.) <b>13</b>	FMC	NMFS HDQRS.
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5. TASK NUMBER <b>2826</b>	6. TASK TITLE <b>Aquaculture - Nutrition of Molluscs</b>
-------------------------------	-------------------------------------------------------------

7. ORGANIZATION CODE <b>F33000</b>	8. ORGANIZATION TITLE (Responsible for execution of this task) <b>Aquaculture Investigations</b>	9. PRINCIPLE LOCATION City: <b>Milford Lab.</b> State: <b>Conn.</b>
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OBJECT CLASS <small>Lines 10-19. Enter all dollar values as thousands and tenths of thousands. Lines 22-23. Enter as man-years and tenths of man-years.</small>	UNIT C O O	CURRENT YEAR FY 1974		BUDGET YEAR FY 1975		BUDGET YEAR +1 FY 1976	
		TARGET ALLOWANCE A	INCREASE B	TARGET ALLOWANCE C	INCREASE D	TARGET ALLOWANCE E	INCREASE F
10. Total Direct Labor	15			6.7		13.4	23.0
11. Travel	19			.8		1.6	1.3
12. Rents, Communications, Utilities	21						
13. Contracts <input type="checkbox"/> (To be let) Grants <input type="checkbox"/> (Funds obligated)	51 52 58						
14. Supplies	53			1.5		3.0	2.5
15. Capital Equipment	54			3.0		6.0	5.0
16. Other (Estimated cost of all other direct cost not included above.)				1.5		3.0	2.5
17. Total Direct Funds <small>(Add lines 10 through 16 above.)</small>				13.5		27.0	34.3
18. Support Cost				3.3		6.6	11.2
19. Total Funds <small>(Add lines 17 and 18.)</small>				16.8		33.6	45.5
20. Positions, Full-time permanent <small>(Number applicable to this Task. Also, complete NOAA Form 32-14C.)</small>				0		0	2
21. Positions, Other <small>(Number applicable to this Task)</small>				1		1	2
22. Man-years, Permanent				.2		.7	1.6
23. Man-years, Other				.4		.6	1.0
24. Reimbursable Support <small>(Reimbursable agreements only)</small>							

25. OFFICIAL PREPARING REPORT (Signature) <i>James Harbo</i>	26. CENTER DIRECTOR OR DESIGNATED REPRESENTATIVE (Sig.) <i>John A. Holbert</i>
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27. TSP TO. MAC- -76-AQ-A TASK DEVELOPMENT PLAN

28. ACTIVITY SCHEDULE & EVENTS			CY		BY-1		BY-2		BY-3		BY-4		BY-5			
			1	2	1	2	1	2	1	2	1	2	1	2		
PCA/E	NARRATIVE		A	B	C	D	E	F	G	H	I	J	K	L	M	N
1.	A	Maintenance of stock culture collection	<													>
2.	A	Maintenance mass culture	<													>
3.	A	Studies harvesting, storing, preserving of phytoplankton	<													>
4.	A	Phytoplankton growth	<													>
5.	A	Evaluation of molluscan nutrients	<													>
6.	A	Studies of synthetic diets for molluscs	<													>
7.	E	Phytoplankton storage and preservation								X						
8.	E	High cost efficiency of phytoplankton culture											X			

29. OUT YEAR COMMENTS:

CONTINUE AT SAME LEVEL  
 INCREASE OF \_\_\_\_\_ %  
 REDUCTION OF \_\_\_\_\_ %  
 TERMINATION

REMARKS:

NMFS TASK DEVELOPMENT PLAN  
29. FULL-TIME PERMANENT POSITIONS

TDP NUMBER  
MAC-057-76-AQ-A

Reference NOAA Form 32-14A, Item 20. Identify all full-time permanent positions related to this Task for the budget year only. Do not include support personnel; they should appear in the appropriate support Task Development Plan.

POSITION TITLE	GS LEVEL	NAME OF INCUMBENT <i>(If no incumbent, enter "Vacant")</i>	% OF TIME SPENT ON THIS TASK
Research Microbiologist Microbiologist Biological Lab Tech.	13-4 7-1 7-3	Ukeles, Ravenna Rose, William Bishop, Jeane	50 40 50
For Fiscal 76 add two personnel: Microbiologist (Research) Fishery Biologist	9-1 7-1	Vacant Vacant	100 100

CONTINUE on plain 8x10 1/2 paper. Identify "Page of Pages" and "TDP Number" in upper right corner. Comment on each of the following items, identifying by number. If item is not applicable, so indicate by entering "NA":

- 30. STATEMENT OF NEED
- 31. TASK OUTPUT
  - a. Significant Output
  - b. Termination Criteria
- 32. BENEFITS
- 33. ACTIVITY PLAN
- 34. MILESTONES

35. IMPACT OF TASK AUGMENTATION

- a. Current Year
- b. Budget Year
- c. Budget Year + 1

36. BACK-UP DOCUMENTATION

- a. Detail Documentation *(Provide one sentence description.)*
- b. Published works and other documents presently being

(182)

30. Statement of Need:

Population pressures on land food resources and demands for more varied diets indicate that in the near future there will be an increasing need of foods that originate in aquatic environments. Aquaculture is an ancient practice that can expand these food supplies but its potential for the culture of marine and brackish water species has remained largely untapped. Present efforts in the area of molluscan aquaculture have been developed along the lines suggested by the past work of NMFS and are beginning to be commercially profitable. Many problems still remains to be explored. A fundamental problem area that needs solution for the success of aquaculture is that of understanding nutritional requirements of the cultured species and the methodology by which to supply this required nutrition. Commercial operators consistently urge that priority emphasis be placed on this problem, (see Mardela Report). Although the cultivation of phytoplankton foods has reached an acceptable level of productivity many improvements are still possible and could present an immediate benefit to the industry while the "ideal" food source is being sought. Many commercial enterprises are of the belief that the most ideal food would be an "artificial food." The term has not been properly defined, but what is implied is a hatchery food that can be assembled from natural or synthetic ingredients. Allied to the basic solution of this problem are other factors such as cost, appropriate engineering of feeding systems, relative productivity as compared to living foods, acceptability at different stages of the life cycle, and the danger of introducing diseases.

The intent of this task is to conduct research on the chemical and physical requirements of marine phytoplankton in order to develop information on methods by which to obtain the greatest productivity of phytoplankton food organisms in culture. The nutritional

requirements of molluscs at different stages of the life cycle will also need to be investigated in order to determine how they can best be fulfilled and if a synthetic diet can be satisfactory.

31. Task Outputs (Specific):

(a) 1. Maintenance of stock culture collection, purify strains, and operation of mass cultivation of algae as food for invertebrates. As this is basically a service function this phase of the Task will operate continually.

2. Develop techniques for harvesting, storing and preserving large quantities of phytoplankton which will be useful for aquaculture purposes.

3. Continue studies in nutrition and physiology of phytoplankton relative to algae growth productivity.

4. Develop critical methods for the study of food preferences and uptake of algae and other foods by molluscs in aquaculture at different stages of the life cycle.

5. Initiate studies on the effects of algal nutrition on cell composition and the consequent result on utilization as food by molluscs.

6. Study food uptake and utilization of synthetic nutritional formulations.

(b) 1. Refers to 31:a) 1. above. These studies will be conducted for the duration of the task.

2. Refers to 31:a) 2. above. These studies will continue for 3-5 years.

Criterion for task termination will be the development of methods for the efficient harvesting and long term storage of phytoplankton foods without loss of efficiency in utilization.

3. Refers to 31:a) 3. above. This task will continue for 8-10 years. Criterion for task termination will be the collection of sufficient information on nutrition and physiology of phytoplankton food chain species to provide the highest reliability and cost efficiency of phytoplankton cultivation.

4. Refers to 31:a) 4. above. This task will continue for 5-8 years. Criterion for task termination will be the completion of studies on methods for critical evaluation of food preferences in commercially valuable species at different stages in the life cycle.

5. Refers to 31:a) 5. above. This task will continue for 8-10 years. Termination of task will be dictated by scientific results of experimentation to determine if molluscs growth can be influenced by controlling the nutrition of the phytoplankton food sources.

6. Refers to 31:a) 6. above. This task will continue for 8-10 years. Criteria for termination will be determined by experiment evidence that a synthetic formulation can or cannot provide nutritional support to molluscs in small scale and then large scale culture.

### 32. Benefits:

1. The information gained from this task will be used by commercial shellfish growers as well as NMFS and other State and Federal agencies who are working in aquaculture and consider solution of nutritional problems of first priority to the success of their projects.

2. The commercial shellfish industry will be particularly affected since they will have a source from which to draw upon for phytoplankton food cultures, information on the best methods of cultivation, and latest developments in studies of synthetic diets.

3. The knowledge gained from these studies will better allow us to understand and assess the dependency of marine fish and shellfish populations on phytoplankton food chain

organisms thus giving some insight into the cause of phytoplankton as well as fishery population fluctuations.

4. Support life studies and aquaculture problems world wide. Resource management. Knowledge.

33. Activities Plan:

This task will utilize basic methods for studying the nutrition and physiology of marine phytoplankton food chain organisms. This information will be applied to the development and improvement of existing large scale culture methods. Methods for efficient harvesting and for long term storage of this product will be sought. Activities will then proceed to experiments on replacing the living food with a partially or wholly synthetic food product. Simultaneously a critical system for evaluation the value of nutritional supplements will need to be developed.

34. Milestones:

1. Method of harvesting, storing, and preserving phytoplankton foods.
2. High yield productivity of phytoplankton food cultures.

35. Impact of Task Augmentation:

N/A

36. Back-up Documentation, Legislative Program and Environmental Impact:

- a. NOAA Regional Aquaculture Workshop Project #A/a-01, Mardela Corp.

Report.

b. Informal Report #4 Middle Atlantic Coastal Fisheries Center, NMFS--  
Investigation summaries--A summary of research of ongoing programs within the Middle  
Atlantic Coastal Fisheries Center.

Related Publications:

A monograph on "Continuous Culture. A method for the production of unicellular algal foods" by Dr. R. Ukeles, published in a Handbook of Phycological Methods, J. B. Stein, Ed.

A monograph on "Cultivation of unicellular algae" by Dr. R. Ukeles, to appear in a five volume series in marine ecology.

A monograph on Nutritional Requirements in shellfish culture by Dr. R. Ukeles in Proceedings of the conference on Artificial Propagation of Commerically Valuable Shellfish.

Ukeles, R. and Davis, H. Mass Culture of Phytoplankton as Foods for Metazoans.

Ukeles, R. and Hidu, H. Dried Unicellular algae as food for larvae of the hard shell clam, Mercenaria mercenaria.

Ukeles, R. A simple method for the mass culture of marine algae.

Ukeles, R. and Sweeney, B. Influence of trichocysts and other factors on the feeding of Crassostrea virginica larvae on Monochrysis lutheri.

c. N/A

d. This task will have no adverse impact on the environment.

(1881)

**NMFS TASK DEVELOPMENT PLAN**

(See Detailed Instructions)

1. DATE PREPARED

December 20, 1973

(Submit five copies by Jan. 2, 1974.)

TO: Director, National Marine Fisheries Service, ATTN: Fx5 National Oceanic and Atmospheric Administration Washington, D.C. 20235

FMC's - Submit a separate Task Development Plan for each task beginning, continuing, or ending in FY 1974, FY 1975, or FY 1976. Total funding in each category must equal your PED specific total funding guidance. Reimbursable funds are not to be mingled with appropriated funds on any programmatic TDP; separate TDP's must be prepared. Submit one Support TDP itemizing the administrative support cost (Management Fund) for the FMC.

2. TDP NUMBER MAC-058-76-AQ-A	3. SUB-OBJECTIVE CODE II-A-3	4. RANK (To be completed only by FMC's and NMFS Hdqrs.) 11	FMC	NMFS HDQRS.
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5. TASK NUMBER 2826	6. TASK TITLE Aquaculture - Control of Diseases
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7. ORGANIZATION CODE F33300	8. ORGANIZATION TITLE (Responsible for execution of this task) Aquaculture Investigations	9. PRINCIPLE LOCATION City Oxford Lab. State Md.
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OBJECT CLASS <small>Lines 10-19. Enter all dollar values as thousands and tenths of thousands. Lines 22-23. Enter as man-years and tenths of man-years.</small>	LINE PROPO	CURRENT YEAR FY 19		BUDGET YEAR FY 19 <sup>75</sup>		BUDGET YEAR + 1 FY 19 <sup>76</sup>	
		TARGET ALLOWANCE A	INCREASE B	TARGET ALLOWANCE C	INCREASE D	TARGET ALLOWANCE E	INCREASE F
10. Total Direct Labor	15			11.0		22.0	49.2
11. Travel	19			.5		1.0	2.5
12. Rents, Communications, Utilities	21						
13. Contracts <input type="checkbox"/> (To be let)	51						
Grants <input type="checkbox"/> (Funds obligated)	52 58						
14. Supplies	53			2.1		4.2	6.0
15. Capital Equipment	54						
16. Other (Estimated cost of all other direct cost not included above.)				2.6		5.2	1.5
17. Total Direct Funds (Add lines 10 through 16 above.)				16.2		32.4	59.2
18. Support Cost				5.4		10.8	24.0
19. Total Funds (Add lines 17 and 18.)				21.6		43.2	83.2
20. Positions, Full-time permanent (Number applicable to this Task. Also, complete NOAA Form 32-1MC.)				0		0	2
21. Positions, Other (Number applicable to this Task)				1		2	6
22. Man-years, Permanent				1.2		2.4	1.6
23. Man-years, Other				.2		.6	5.4
24. Reimbursable Support (Reimbursable agreements only)							

25. OFFICIAL PREPARING REPORT (Signature) <i>Clara Rosenfield</i>	26. CENTER DIRECTOR OR DESIGNATED REPRESENTATIVE (Sig.) <i>John A. Holter</i>
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28. ACTIVITY SCHEDULE & EVENTS			CY		BY-1		BY-2		BY-3		BY-4		BY-5			
			1	2	1	2	1	2	1	2	1	2	1	2	1	2
NOA/E		NARRATIVE	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	A	Ciliate isolations from Milford hatchery	X				X									
1a	A	Identification ciliates		X					X							
1b	E	Publish results 1, 2						X		X						
2	A	Amoeba isolations from Milford hatchery	X				X									
2a	A	Identification amoeboid organisms		X				X								
2b	E	Publish Results						X	X							
3	A	Bacterial isolations - Milford hatchery		X						X						
3a	A	Characterization Bact.		X						X						
3b	E	Publication results					X				X					
3c	A	Conduct protozoan bacterial virulence studies				X						X				
3d	E	Publication results								X			X			
3e	A	Develop methods to reduce microbial effects on larvae and nursery stocks				X					X					
3f	E	Implement above and continue above							X							X
4	A	Routine histological screening for larval pathogens from hatchery systems	X								X					

29. OUT YEAR COMMENTS:

CONTINUE AT SAME LEVEL  
 INCREASE OF \_\_\_\_\_ %  
 REDUCTION OF \_\_\_\_\_ %  
 TERMINATION

REMARKS:

MMFS TASK DEVELOPMENT PLAN  
29. FULL-TIME PERMANENT POSITIONS

TOP NUMBER

MAC-058-76-AQ-A

Reference NOAA Form 32-14A, Item 20. Identify all full-time permanent positions related to this Task for the budget year only. Do not include support personnel; they should appear in the appropriate support Task Development Plan.

POSITION TITLE	GS LEVEL	NAME OF INCUMBENT <i>(If no Incumbent, enter "Vacant")</i>	% OF TIME SPENT ON THIS TASK
Fishery Biologist (Research)	13-4	Sawyer, Thomas	50
Research Microbiologist	11-3	Blogoslawski, Walter	100
Biologist	9-1	Brown, Carolyn	100
Microbiologist	12-4	Robohn, Richard	50
Biological Aid (Fisheries)	4-4	Wright, Dorothy	50
Fiscal Year 76 add two Personnel:			
Microbiologist Research	13-1	Vacant	100
Fishery Biologist	12-1	Vacant	100

CONTINUE on plain 8x10 1/2 paper. Identify "Page of Pages" and "TDP Number" in upper right corner. Comment on each of the following items, identifying by number. If item is not applicable, so indicate by entering "NA":

- 30. STATEMENT OF NEED
- 31. TASK OUTPUT
  - a. Significant Output
  - b. Termination Criteria
- 32. BENEFITS
- 33. ACTIVITY PLAN
- 34. MILESTONES

35. IMPACT OF TASK AUGMENTATION

- a. Current Year
- b. Budget Year
- c. Budget Year + 1

36. BACK-UP DOCUMENTATION

- a. Detail Documentation (Provide one sentence description)
- b. Related tasks and resources

(101)

30. Statement of Need

Increased exploitation of the nation's estuaries and coastal zones for industrial and residential development and recreational activities has markedly reduced the areas available for the production and harvest of fish and shellfish. More efficient and effective means to enhance U.S. seafood production must be found. Aquaculture methods require: 1) an adequate supply of genetically desirable brood stocks; 2) methods to increase larval survival and normal development; 3) methods to promote rapid growth. Disease is often a limiting factor to successful aquaculture operations. With increasing interest in aquaculture, where populations reach maximum density and the transfer of susceptible stocks (as eggs, larvae, fry, fingerlings) becomes a routine procedure, it is necessary to conduct scientific studies on the role of disease so that its effects can be prevented, minimized, or eliminated.

The successful application of disease research to the intensive propagation of fish and shellfish in controlled environments would increase industrial initiatives for commercial aquaculture. A program of disease research would involve: 1) the development and implementation of a research program for disease prevention and control, particularly in hatchery and nursery systems; 2) the development and implementation of an inspection system for routine diagnosis and identification of infectious agents; 3) contracts and interdisciplinary research projects in collaboration with industry, universities, State, and Federal agencies and other research institutions; 4) legislation providing a favorable climate for aquaculture research; e.g., specific NOAA appropriations, "coastal zone legislation," "ocean dumping act," and fish disease legislation, thus leading to coordinated programs with other NOAA elements such as Sea Grant and Federal Aid (88-309) projects. Information generated would be disseminated to all user groups and others interested in aquaculture operations, particularly industry, state, and some university laboratories who cannot do the work themselves.

31. Task Outputs

- a. Successful implementation of this task and consequent productivity therefrom will permit us to serve as a national and international clearing house and disseminator of technical information on disease control in aquaculture systems, including establishment of disease registries and publication of manuals, bulletins, brochures on diseases encountered in aquaculture and methods for disease control and prevention. It will permit us to integrate inhouse research projects with Federal, State, university, and other research laboratories in order to provide training facilities and to implement and augment programs to prevent diseases in hatchery and nursery systems.

- b. Research productivity and termination of task elements will be measured through successful operation of aquaculture programs of cooperating units and through communication of results in the scientific literature and in industry publications.

### 32. Benefits

Task outputs would substantially benefit those user groups whose success in various aquaculture operations are precluded because of problems related to disease. Examples are: inability to bring molluscan species through larval and juvenile stages on a mass scale to a point where they can be transplanted successfully; spread of diseases through indiscriminate transfer of animals for farming or for use as brood stocks which may harbor infectious agents; inability to recognize signs of stress conditions or the presence of infectious disease entities in the environment in which the animals are grown and inability to distinguish these organisms from innocuous ones; lack of reliable, objective, readily usable information for solving problems in disease related molluscan aquaculture.

### 33. Activities Plan

As far as possible, research will supplement ongoing Pathobiology Investigations now dealing primarily with diseases of wild fish and shellfish. Research emphasis first will focus on infectious diseases and pathology of larvae and juveniles of selected shellfish species produced under controlled hatchery systems. Subsequently, diseases occurring in nursery systems and in adult and reproducing populations, both foreign and domestic, will be studied. Field and laboratory experiments will be implemented to test hypotheses on disease control and to test fishery management practices as they apply to various phases of aquaculture operations. Techniques will be developed to: 1) monitor, isolate, identify, culture, and diagnose micropathogen presence; 2) determine the mechanisms of micropathogen transmission, penetration, infectivity, host specificity; 3) qualitatively and quantitatively measure micropathogen activity and host responses via biochemical, cytological, physiological, immunological, and biophysical studies.

Long-range plans call for implementing research activities as described above to include species of crustaceans and finfish.

### 34. Milestones

1. Disease abatement in commercial hatchery and nursery marine aquaculture systems.
2. Preservation and effective management of living resources through prevention and spread of diseases in aquaculture and farming operations.

3. Direct application of research finding to international negotiations and interstate relations.
4. Significant contributions to the fund of knowledge in the direct study of disease processes in poikilotherms or indirectly as models in studies of disease mechanisms in aquatic and terrestrial homeotherms.

35. Impact of Task Augmentation

1. FY 74 (CY)

This TDP represents a modified submission in which funds for FY 74-75 are to be reprogrammed. Specific actions for FY 74 include reprogramming part of the current Comparative Pathobiology task at Oxford to the control of aquaculture diseases. The total FY 74 funding for this task is 161.7K. Of this 25.0K and 1/2 man year will be reprogrammed beginning January 1, 1974. This will obviously reduce the amount of activity and output for Comparative Pathobiology Investigation.

2. FY 75 (BY)

Specific reprogramming action for FY 75 include the same proportion of fund and personnel reprogrammed the previous year; i.e., 50K and 1 man year. The Comparative Pathobiology Investigation will decrease correspondingly in terms of funds, personnel, and output. It is anticipated that an increase of 75K will be granted for this task with the addition of 1 new ceiling.

3. FY 76 (BY + 1)

The above will maintain but will now be part of the base for this task. An additional 100K increase for this task is anticipated along with 3 new ceilings.

36. Back-up Documentation

- a. 1. Shellfish Institute of North America - resolution to reactivate molluscan aquaculture studies - genetics, disease, nutrition.
2. Mardela Corporation report to NOAA - includes NMFS needs to study molluscan aquaculture - disease, nutrition, genetics.

b. Related tasks - none on diseases

Inhouse (NMFS) aquaculture (hatcheries, nurseries)

Center, Milford, Conn. - Oxford to do cooperative disease studies

Sea Grant-University of Delaware - Oxford to do cooperative disease studies

88/309/Federal Aid-State of Maryland - Oxford to do cooperative disease studies.

c. Legislation no required

d. No environmental impact statement needed.

NMFS TASK DEVELOPMENT PLAN

(See Detailed Instructions)

1. DATE PREPARED

December 20, 1973

(Submit five copies by Jan. 2, 1974.)

TO: Director, National Marine Fisheries Service, ATTN: Fx5 National Oceanic and Atmospheric Administration Washington, D.C. 20255

FMC's - Submit a separate Task Development Plan for each task beginning, continuing, or ending in FY 1974, FY 1975, or FY 1976. Total funding in each category must equal your PED specific total funding guidance. Reimbursable funds are not to be mingled with appropriated funds on any programmatic TDP; separate TDP's must be prepared. Submit one Support TDP itemizing the administrative support cost (Management Fund) for the FMC.

2. TDP NUMBER MAC-059-76-AQ-A	3. SUB-OBJECTIVE CODE III-A-3	4. RANK (To be completed only by FMC's and NMFS Hdqrs.) 17	FMC	NMFS HDQRS.
5. TASK NUMBER 2826	6. TASK TITLE Aquaculture - Rearing of Shellfish			
7. ORGANIZATION CODE F33300	8. ORGANIZATION TITLE (Responsible for execution of this task) Aquaculture Investigations		9. PRINCIPLE LOCATION City: Milford Lab. State: Conn.	

OBJECT CLASS <small>Lines 10-19. Enter all dollar values as thousands and tenths of thousands. Lines 22-23. Enter as man-years and tenths of man-years.</small>	UNIT C O D E	CURRENT YEAR FY 1974		BUDGET YEAR FY 1975		BUDGET YEAR +1 FY 1976	
		TARGET ALLOWANCE A	INCREASE B	TARGET ALLOWANCE C	INCREASE D	TARGET ALLOWANCE E	INCREASE F
10. Total Direct Labor	15			15.0		30.0	32.0
11. Travel	19			1.5		3.0	3.7
12. Rents, Communications, Utilities	21						
13. Contracts <input type="checkbox"/> (To be let)	51						
Grants <input type="checkbox"/> (Funds obligated)	52 58						
14. Supplies	53			2.0		4.0	8.4
15. Capital Equipment	54			2.4		4.8	4.8
16. Other (Estimated cost of all other direct cost not included above.)				1.5		3.0	4.4
17. Total Direct Funds <small>(Add lines 10 through 16 above.)</small>				22.4		44.8	53.3
18. Support Cost				7.4		14.7	15.7
19. Total Funds <small>(Add lines 17 and 18.)</small>				29.8		59.5	69.0
20. Positions, Full-time permanent <small>(Number applicable to this Task. Also, complete NOAA Form 32-10C.)</small>				0		0	2
21. Positions, Other <small>(Number applicable to this Task)</small>				1		2	3
22. Man-years, Permanent				.2		.8	1.4
23. Man-years, Other				.2		.8	2.0
24. Reimbursable Support <small>(Reimbursable agreements only)</small>							

25. OFFICIAL PREPARING REPORT (Signature) <i>James Harbo</i> (196)	26. CENTER DIRECTOR OR DESIGNATED REPRESENTATIVE (Sig.) <i>John L. Holston</i>
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27. T.D. MAC- -76-A-A TASK DEVELOPMENT PLAN

NO.	ACTIVITY SCHEDULE & EVENTS	BY 1		BY 1		BY 2		BY 3		BY 4		BY 5		
		1	2	1	2	1	2	1	2	1	2	1	2	
		A	B	C	D	E	F	G	H	I	J	K	L	M
1	A Developing culture method for the surf clam					X								
2	A Developing culture method for the bay scallop			X					X					
3	A Developing culture method for the calico scallop						X					X		
4	A Developing culture method for the sea scallop								X					
5	A Determining relationship between disease in marine molluscs and environmental stress													
6	A Identification and control of marine mollusc pathogens													
7	A Determination of pollution-related microorganisms as potential causes of molluscan diseases							X						
8	E Surf clam culture method					X								
9	E Flow-through larval culture system			X										
10	E Bay scallop culture system								X					
11	E Development of water quality techniques to reduce stress-related disease			X										
12	E Elimination of pathogens from culture systems							X						
13	E Screening of inkknown microorganisms for pathogenicity												X	

28. OUT YEAR COMMENTS: N/A

CONTINUE AT SAME LEVEL  
 INCREASE OF \_\_\_\_\_ %  
 REDUCTION OF \_\_\_\_\_ %  
 TERMINATION

REMARKS:

(1971)

NMFS TASK DEVELOPMENT PLAN  
29. FULL-TIME PERMANENT POSITIONS

TDP NUMBER  
MTC-059-76-AQ-A

Reference NOAA Form 32-14A, Item 20. Identify all full-time permanent positions related to this Task for the budget year only. Do not include support personnel; they should appear in the appropriate support Task Development Plan.

POSITION TITLE	GS LEVEL	NAME OF INCUMBENT <i>(If no Incumbent, enter "Vacant")</i>	% OF TIME SPENT ON THIS TASK
Director of Investigations Tech. Publ. Editor (Fish. Biol.) Fish. Biologist (Research)	15-5 9-7 13-5	Hanks, James Riccio, Rita Landers, Warren	100 100 50
For Fiscal 76 add two FTP personnel: Fishery Biologist (Research) Fishery Biologist	12-1 7-1	Vacant Vacant	100 100

CONTINUE on plain 8x10 1/2 paper. Identify "Page of Pages" and "TDP Number" in upper right corner. Comment on each of the following items, identifying by number. If item is not applicable, so indicate by entering "NA":

- 30. STATEMENT OF NEED
- 31. TASK OUTPUT
  - a. Significant Output
  - b. Termination Criteria
- 32. BENEFITS
- 33. ACTIVITY PLAN
- 34. MILESTONES

- 35. IMPACT OF TASK AUGMENTATION
  - a. Current Year
  - b. Budget Year
  - c. Budget Year + 1
- 36. BACK-UP DOCUMENTATION
  - a. Detail Documentation *(Provide one sentence description.)*
  - b. Related tasks and *(Provide one sentence description.)*

(172)

30. Statement of Need:

As the world demand for food, including that from the sea, increases, it becomes apparent that the contribution from the wild stocks of marine fish and shellfish is limited by natural restrictions on the populations over which man has little control. A new approach to fish and shellfish production which will supplement the wild harvest must be developed. The most promising appears to be aquaculture - the rearing of aquatic animals for human consumption under the complete control of the culturist. To be successful, the life history of the species being considered for commercial culture must be completely understood and the physiological, nutritional and ecological requirements of each stage of development determined and satisfied.

The intent of this Task is to develop laboratory techniques for maintaining and spawning commercially valuable and potentially valuable marine molluscs and rearing their embryos, larvae and juveniles in the laboratory. These investigations will be directed toward the development of aquaculture systems.

The most dependable, year-round culture systems that now exist are for several species of oysters and the hard clam, Mercenaria mercenaria; but even with these species, there are aspects of their early life history, such as nutritional requirements and susceptibility to disease, that are not fully understood. With other species such as the bay scallop, much more life history work is needed.

31. Task Outputs (Specific):

(a) Determine the reproductive habits and early development of commercially or potentially commercially valuable marine molluscs. These studies will continue for 8-10 years. Criteria for Task termination is complete familiarity with the reproductive mechanics and developmental stages of marine molluscs of commercial or potential commercial value.

(b) To create in the laboratory environments in which various marine molluscs can be spawned and their embryos, larvae and juveniles reared in good health. These studies will continue for 8-10 years. Criteria for Task termination will be such time when techniques for accomplishing the successful culture of a variety of marine molluscs have been developed.

(c) Study disease problems associated with holding and rearing marine molluscs in the Milford Laboratory hatchery. Monitor water quality to correlate changes with incidences of disease conditions. These studies will continue for 8-10 years. Criteria for Task termination is the development of laboratory and commercial scale water quality control techniques to reduce the chance for hatchery disease.

(d) Identify marine mollusc pathogens found in laboratory and commercial hatcheries, control disease by using appropriate treatment methods and monitor pathogen control to prevent development of treatment-resistant species. These studies will continue for 8-10 years. Criteria for Task termination is the control of disease in artificially cultured bivalve molluscs.

(c) Determine microbial changes in the natural seawater supply related to the degradation of the marine environment by pollution. Test these micro-organisms to assess their potential pathogenesis on mollusc larvae and adults. These studies will continue for 8-10 years concurrently with (a) and (b) above. Criteria for Task termination is the identification and control of undescribed mollusc pathogens.

32. Benefits:

The information obtained from this Task will be of direct benefit to the development of aquaculture in general in the United States and to molluscan aquaculture in particular. Life history data will be useful in the management of wild stocks of the species involved and will be an aid to the nationwide NMFS effort to protect our living marine resources.

The knowledge gained from these experiments will allow us to improve yields of hatchery reared molluscs by eliminating disease incidence which reduces that yield. We will recommend disinfection techniques to the shellfish industry in order to prevent hatchery disease from causing severe economic losses. The knowledge gained will also have public health significance by providing methods to rear molluscs free of infectious micro-organisms. By understanding the development of mollusc disease in the laboratory and commercial hatchery, we will learn more about life cycles and control of disease in the wild.

33. Activities Plan:

Standard methods available at this laboratory and in the literature which have proven successful for culturing the oyster and the hard clam will be used in attempts to develop hatchery culture methods for other bivalve species of known or potential commercial value. Because each species has certain unique requirements, these methods will have to be modified or new technical approaches developed. Attempts will be made in logical sequence (inducing gametogenesis, spawning the adults, rearing the larval stages, growing the post-set stage immediately after metamorphosis and finally growing the juveniles to market size) to adapt proven techniques to the culture of new aquaculture candidates, modifying these techniques when necessary.

Standard methods derived from the scientific literature will be used in the identification and culture of marine pathogenic microorganisms. As required, modifications of these generally accepted methods will be employed to increase accuracy and interpretation of results. Specifically, in controlling pathogens in seawater different methods of disinfection will be tested such as ozone gas, chlorine gas, antibiotics, and ultrafiltration. Seawater quality will be monitored by trace metal analysis, vitamin assays, and organic matter tests. In conjunction, genetic, biochemical, and physiological analysis will determine any adverse effects such treated water may have over long-term use.

34. Milestones:

Development of a method for rearing all stages of the surf clam in the laboratory leading to the production of a small "bite-size" specialty product on a commercial scale in a hatchery.

Development of a method for rearing all stages of the bay scallop through to market size in laboratory and field environments.

Development of a flow-through culture system for rearing the early free-swimming stages of bivalves. This should be a significant improvement over standing-water systems which involve much labor and the biological uncertainties of rearing living animals in stagnant water.

Identification and control of certain marine diseases associated with molluscan aquaculture.

Determination of the relation of stress and water quality on the causes of mollusc hatchery disease.

Development of an immune system for shellfish in order to reduce the incidence of disease.

35. Impact of Task Augmentation:

N/A

36. Back-up Documentation, Legislative Program and Environmental Impact

(a) Informal Report No. 4 - Middle Atlantic Coastal Fisheries Center, NMFS - Investigation Summaries.

Report of the Mardela Corporation, January 1973.

Sea Grant studies on rearing of marine organisms at numerous

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

- (b) No related NMFS Tasks. Sea Grant sponsoring related research.
- (c) N/A
- (d) This Task will have no adverse impact on the environment.

(204)

### NMFS TASK DEVELOPMENT PLAN

(See Detailed Instructions)

1. DATE PREPARED  
Dec. 20, 1973

(Submit five copies by Jan. 2, 1974.)

TO: Director, National Marine Fisheries Service, ATTN: Fx5 National Oceanic and Atmospheric Administration Washington, D.C. 20235

FMC's - Submit a separate Task Development Plan for each task beginning, continuing, or ending in FY 1974, FY 1975, or FY 1976. Total funding in each category must equal your PED specific total funding guidance. Reimbursable funds are not to be mingled with appropriated funds on any programmatic TDP; separate TDP's must be prepared. Submit one Support TDP itemizing the administrative support cost (Management Fund) for the FMC.

2. TOP NUMBER MAC-060-76-LS-A	3. SUB-OBJECTIVE CODE II-E-1	4. RANK (To be completed only by FMC's and NMFS Hdqrs.) 18	FMC	NMFS HDQRS.
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5. TASK NUMBER N/A	6. TASK TITLE Life Studies; Sportfish
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7. ORGANIZATION CODE F33800	8. ORGANIZATION TITLE (Responsible for execution of this task) Resource Assessment Investigations	9. PRINCIPLE LOCATION City: Sandy Hook Lab. State: N.J.
--------------------------------	------------------------------------------------------------------------------------------------------	------------------------------------------------------------

OBJECT CLASS <small>Lines 10-19. Enter all dollar values as thousands and tenths of thousands. Lines 22-23. Enter as man-years and tenths of man-years.</small>	LINE NUMBER	CURRENT YEAR FY 19 <sup>74</sup>		BUDGET YEAR FY 19 <sup>75</sup>		BUDGET YEAR + 1 FY 19 <sup>76</sup>	
		TARGET ALLOWANCE A	INCREASE B	TARGET ALLOWANCE C	INCREASE D	TARGET ALLOWANCE E	INCREASE F
10. Total Direct Labor	15					74.0	5.9
11. Travel	19					.3	.5
12. Rents, Communications, Utilities	21						
13. Contracts <input type="checkbox"/> (To be let)	51						
Grants <input type="checkbox"/> (Funds obligated)	52						
	58						
14. Supplies	53					1.5	1.5
15. Capital Equipment	54						
16. Other (Estimated cost of all other direct cost not included above.)						6.2	.5
17. Total Direct Funds (Add lines 10 through 16 above.)						82.0	8.4
18. Support Cost						36.3	1.6
19. Total Funds (Add lines 17 and 18.)						118.3	10.0
20. Positions, Full-time permanent (Number applicable to this Task. Also, complete NOAA Form 37-14C.)						4	0
21. Positions, Other (Number applicable to this Task)						8	1
22. Man-years, Permanent						3.4	0
23. Man-years, Other						3.3	.8
24. Reimbursable Support (Reimbursable agreements only)							

25. OFFICIAL PREPARING REPORT (Signature) <i>Arthur Merrill</i>	26. CENTER DIRECTOR OR DESIGNATED REPRESENTATIVE (SIG.) <i>John A. Hobbs</i>
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## NMFS VESSEL REQUIREMENTS BY 1976

1. Date: Dec. 28, 1973		2. TDP No.: MAC-060-76-LS-A		3. Prepared by: J. Holston	
4. Task Title: Life Studies. Sportfish					
SEA TIME - DAYS	CY	BY		BY+1	
		(a)	(b) T.A.	(c) Incr.	(d) T.A.
NMFS 5. R. V. Delaware II	-	-	-	(60)	(20)
Vessel 6. R. V. Rorqual	-	-	-	(60)	-
(Name) 7.				-	-
Charter 8.				-	-
Vessel 9.				-	-
(type)				-	-
10. TOTAL SEA DAYS				(0)	(0)
Scientists per cruise	11. Maximum				
	12. Minimum				
(Average)	13. Anticipated				
	14. 1st.				
	15. 2nd.				
Cruise Months	16. 3rd. Rorqual: Monthly cruises (5 days/month)			Nov. '75	Nov. '76
	17. 4th.			May '76	May '77
18. Vessel Priority:					
a. NOAA ERV (NOS)	<u>N/A</u>	d. Univ. RV Charter	<u>(3)</u>		
b. NOAA RV (NOS)	<u>(1)</u>	e. Existing NMFS Small Boat	<u>N/A</u>		
c. Commercial Charter	<u>(2)</u>	f. New, Specialized NMFS Small Boat	<u>(4)</u>		

19. Remarks:  
 Life Studies of Sportfish: samples derived from piggy-back operations on R. V. Delaware II and R. V. Rorqual (or replacement). Work is directly supportive of SII operations.

(205-1)

# NMFS TASK DEVELOPMENT PLAN

## 27. ACTIVITY SCHEDULE AND EVENTS

TDP NUMBER

MA-60

PLANNING PERIOD - Indicate by entering an "X" the beginning and completion of subtask or selected operational activities that collectively define the task for the 7 year planning period. Connect "X's" with a solid bar. "Events" occur at specific points in time. Indicate these significant achievements by placing an "X" in a single column.

NUMBER EACH ACTIVITY OR EVENT.

IDENTIFY BY ENTERING "A" FOR ACTIVITY OR "E" FOR EVENT.

NUMBER

A OR E

NARRATIVE  
(Brief descriptive phrase of activity or event)

CY	BY	BUDGET YEAR										
		+1		+2		+3		+4		+5		
1	2	1	2	1	2	1	2	1	2	1	2	
A	B	C	D	E	F	G	H	I	J	K	L	M

- 1 AE Prepare and complete groundfish historic cruise data analyses report
- 2 AE Analyze and complete flatfish racial studies
- 3 A Analyze data for bluefish studies
- 4 I Complete bluefish compendium
- 5 AE Conduct and complete life studies on age, food habits, fecundity of selected fish species
- 6 AE Conduct and complete special shellfish studies
- 7 A Prepare environmental impact summaries.

	X							X						
X				X										
X		X												
				X										
X														
X														
				X										

### 28. OUT YEAR COMMENTS

(Check appropriate boxes and enter applicable percentage.)  
\*Increases usually come from reprogramming within your FMC.)

- a. Continued at same level
- b. Increase of \_\_\_% \*
- c. Reduction of \_\_\_%
- d. Termination

"X"  
APPROPRIATE  
COLUMN

REMARKS This task is a part of MA-02 during FY 74, FY 75. The task will split from MA-02 in FY 76 and has a task funding increase of \$10 k in FY 76.

AE = Any portion of a task which consumes time or resources, but marks a significant point of progress and identifies specific accomplishments.

(206)

NMFS TASK DEVELOPMENT PLAN  
29. FULL-TIME PERMANENT POSITIONS

TDP NUMBER

MA-60

Reference NOAA Form 32-14A, Item 20. Identify all full-time permanent positions related to this Task for the budget year only. Do not include support personnel; they should appear in the appropriate support Task Development Plan.

POSITION TITLE	GS LEVEL	NAME OF INCUMBENT <i>(If no Incumbent, enter "Vacant")</i>	% OF TIME SPENT ON THIS TASK
<p>MA-60 will be established by splitting MA-02 in FY 76 at which time permanent positions will be listed.</p>			

CONTINUE on plain 8x10 1/2 paper. Identify "Page of Pages" and "TDP Number" in upper right corner. Comment on each of the following items, identifying by number. If item is not applicable, so indicate by entering "NA":

- 30. STATEMENT OF NEED
- 31. TASK OUTPUT
  - a. Significant Output
  - b. Termination Criteria
- 32. BENEFITS
- 33. ACTIVITY PLAN
- 34. MILESTONES
- 35. IMPACT OF TASK AUGMENTATION
  - a. Current Year
  - b. Budget Year
  - c. Budget Year + 1
- 36. BACK-UP DOCUMENTATION
  - a. Detail Documentation *(Provide one sentence description.)*
  - b. Related tasks and research presently being conducted.
  - c. Indicate the Congressional legislative requirements.
  - d. Indicate the Environmental Impact Statement (EIS) requirements.

(207)

### 30 - STATEMENT OF NEED

Fish populations of the Middle Atlantic Bight have been subjected to encroachment of massive foreign fleets offshore, increased U. S. commercial and sport fisheries inshore, and reduction in quality and area of suitable spawning and nursery grounds. These forces have combined with natural fluctuations, in varying proportions, to jeopardize our coastal fishery resources to the extent that some are on the verge of depletion. Unfortunately, our basic biological knowledge of the life histories of coastal fishes is inadequate for recommending immediate and sound national (i.e. State, industry, sportsmen) and international (i.e. ICNAF, bilaterals) management policies. We are not in a position to determine recruitment, optimum levels of exploitation, or the impact of long-term natural fluctuations and man-made changes in the environment upon our fishery resources. The scientific and technical base needed to properly manage our coastal fisheries and to encourage industrial initiatives will incorporate the understanding of basic biological components that make up the life history patterns of the several species. It is essential that the assessment of fishery stocks along the Atlantic coast be augmented in order that proper management policies can be established to insure the maximum sustainable yield of important marine resources.

### 31 - TASK OUTPUTS

- 1) The life history studies program will provide input material relevant to growth rates, age composition, spawning seasons, fecundity, migrations, food and feeding habits, and other factors affecting the abundance and distribution of important commercial and sport fish. Such studies of the life history of fish are essential for the development of population models which will lead to better predictions of future abundance and as a basis for sound management decisions.
- 2) Establish means to identify geographic races or unit stocks of those species that contribute to the commercial and sport fisheries. These stocks may differ in distribution, growth, fecundity, and survival. Accurate assessment and management of those species where separate coastal units exist must be based on a knowledge of their stock structure. The task initially will:
  - a) Contribute life history data (i.e. length-age, length-weight) in cooperation with NEFC and contracting State agencies to a common input program which will incorporate material from Block Island to Cape Canaveral.

- b) Provide analyses of materials collected during cruises or by means of port sampling to population dynamics group. These inputs will initially provide a data base and subsequently improve the accuracy of biometric models of population structure.
- c) Provide outputs from the life history data bank to various users, including industry, sportsmen, population and environmental analysts, other NMFS research groups, and management and regulatory bodies.
- d) Be prepared to furnish or synthesize data pertinent to man-induced impact on the environment.

### 32 - BENEFITS

The long-range benefit of this task will be the ability to provide, on a regular and timely basis, life history information essential for assessment predictions and management policies pertinent to selected middle Atlantic coastal sport and commercial species.

Using standard collecting and analyses procedures, over enough years, will enable valid comparison of normal fluctuations in specific fish populations and variations from the normal attributed to the impact of natural or man-made stresses.

Information collected will, upon request, be made available to State, Federal, or international units in charge of management recommendations.

Upon request, additional life history materials will be collected and forwarded to colleagues in other investigations, State agencies, and universities.

### 33 - ACTIVITIES PLAN

- 1) Collect life history materials pertinent to selected Atlantic coast sport and commercial species such as drums, flounders, porgies, sea basses during spring and fall groundfish cruises, localized monthly cruises, and routine port sampling.
- 2) Analyze life history materials to determine one or more of the following:

- a) Age composition and growth rates (analysis of scales and otoliths).
  - b) Sexual development, spawning season, and fecundity (macro- and microscopic gonadal examination).
  - c) Food and feeding habits (stomach content studies).
- 3) Conduct stock and racial identification studies of selected species by means of:
    - a) Discriminant function analysis of morphometric and meristic variates.
    - b) Analysis of scale structure peculiarities.
  - 4) Record all data collected on the appropriate automatic data processing forms, transfer to punch cards, and incorporate into sorting, listing, and statistical systems.
  - 5) Retrieve and analyze data for use in technical reports, scientific publications, and special problem areas, such as EIS.
  - 6) Retrieve data requested by various user groups such as population and environmental analysts, NMFS research, industry, sportsmen, management and regulatory agencies.

#### 34 - MILESTONES

FY 74:

- 1) Develop historical finfish data into ADP formats for inhouse reports, archiving, and published summary.
- 2) Complete collections and ADP processing of data for racial analysis of flatfish species.
- 3) Continue preparation of bluefish compendium contributions. Included are completion of age, growth, morphometric, and bibliographic material.
- 4) Continue age and growth studies of selected sciaenid species and initiate special studies on fecundity, food habits, and racial separation.

FY 75:

- 1) Complete data report pertaining to 1968-72 Dolphin and Delaware II cruises.
- 2) Complete stock and racial studies of three species of flatfish (Paralichthys dentatus, P. albigutta, P. lethostigma).
- 3) Continue preparation of bluefish compendium contributions.
- 4) Continue studies of selected sciaenid species.

FY 76:

- 1) Complete bluefish compendium.
- 2) Complete life history synopses for five species of the drum family (Sciaenidae); to include age composition, growth rates, spawning seasons, fecundity, food and feeding habits, and identification of stock and/or racial units.

35 - IMPACT OF TASK AUGMENTATION

- 1) CY -- no increases anticipated.
- 2) BY -- no increases anticipated.
- 3) BY + 1 FY 76 -- With increased funding, be prepared to furnish data reports to or resynthesize data appropriately for user groups evaluating man's impact on selected areas of the marine environment.

36 - BACKUP DOCUMENTATION

A.

- 1) Cruise Reports, R/V Dolphin, 1968-71.
- 2) Cruise Reports, R/V Delaware II, 1971-72.
- 3) The bluefish (Pomatomus saltatrix). A synoptic review of its biology. Spec. Rept. Director, NMFS.
- 4) The weakfish (Cynoscion regalis). A review of its biology and present research. Spec. Rept. ASMFC, 1973.
- 5) Summer benthic fish populations of Sandy Hook Bay, New Jersey. (Draft manuscript)
- 6) Fish and hydrographic collections made by the research vessels Dolphin and Delaware II during 1968-72 from New York to Florida. (Draft manuscript)

- B.
  - 1) MACFC programs and tasks
    - a) Multispecies task
    - b) Ichthyoplankton task
    - c) Ecosystems Investigations
  - 2) Other NMFS programs
    - a) NEFC groundfish survey
    - b) MARMAP
    - c) AEG
  - 3) South Carolina - MARMAP
- C. None
- D. None

# NMFS TASK DEVELOPMENT PLAN

(See Detailed Instructions)

1. DATE PREPARED  
Dec. 19, 1973

(Select task number by Jan. 2, 1974.)  
TO: Director, National Marine  
Fisheries Service, ATTN: Fx5  
National Oceanic and  
Atmospheric Administration  
Washington, D.C. 20235

FMC's - Submit a separate Task Development Plan for each task beginning, continuing, or ending in FY 1974, FY 1975, or FY 1976. Total funding in each category must equal your PED specific total funding guidance. Reimbursable funds are not to be mingled with appropriated funds on any programmatic TDP; separate TDP's must be prepared. Submit one Support TDP itemizing the administrative support cost (Management Fund) for the FMC.

2. TDP NUMBER MAC-061-76-IE-2	3. SUB-OBJECTIVE CODE IV-A-3	4. RANK (To be completed only by FMC's and NMFS Hdqrs.) N/A	FMC	NMFS HDQRS.
----------------------------------	---------------------------------	----------------------------------------------------------------	-----	-------------

5. TASK NUMBER R81701	6. TASK TITLE The Effect of Temperature Change on Schooling and Feeding Behavior in Juvenile Mullet and Bluefish - <del>AEC</del> Reimbursable
--------------------------	---------------------------------------------------------------------------------------------------------------------------------------------------

7. ORGANIZATION CODE F33000	8. ORGANIZATION TITLE (Responsible for execution of this task) Ecosystems Investigations	9. PRINCIPLE LOCATION City: Sandy Hook Lab., N. J. State:
--------------------------------	---------------------------------------------------------------------------------------------	-----------------------------------------------------------------

OBJECT CLASS	W I N T E R Y E A R	CURRENT YEAR FY 19 <u>74</u>		BUDGET YEAR FY 19 <u>75</u>		BUDGET YEAR + 1 FY 19 <u>76</u>	
		TARGET ALLOWANCE A	INCREASE B	TARGET ALLOWANCE C	INCREASE D	TARGET ALLOWANCE E	INCREASE F
10. Total Direct Labor	15	11.4		12.0			
11. Travel	19	2.5		2.8			
12. Rents, Communications, Utilities	21	2.0		2.1			
13. Contracts <input type="checkbox"/> (To be let)	51						
Grants <input type="checkbox"/> (Funds obligated)	52 58	2.2					
14. Supplies	53	14.0		16.7			
15. Capital Equipment	54						
16. Other (Estimated cost of all other direct cost not included above.)		1.0		1.2			
17. Total Direct Funds (Add lines 10 through 16 above.)		33.1		34.8			
18. Support Cost		6.9		7.2			
19. Total Funds (Add lines 17 and 18.)		40.0		42.0			
20. Positions, Full-time permanent (Number applicable to this Task. Also, complete NOAA Form 32-14C.)		0		0			
21. Positions, Other (Number applicable to this Task)		0		0			
22. Man-years, Permanent		.6		.6			
23. Man-years, Other		.2		.2			
24. Reimbursable Support (Reimbursable agreements only)		4.1		4.3			

25. OFFICIAL PREPARING REPORT (Signature)

*John B. Pearce*

26. CENTER DIRECTOR OR DESIGNATED REPRESENTATIVE (SIGN)

*John A. Holbert*

(11/13)

# NMFS TASK DEVELOPMENT PLAN

## 27. ACTIVITY SCHEDULE AND EVENTS

TDP NUMBER  
MDG-061-76-IE-R

NUMBER EACH ACTIVITY OR EVENT.

PLANNING PERIOD - Indicate by entering an "X" the beginning and completion of subtask or selected operational activities that collectively define the task for the 7 year planning period. Connect "X's" with a solid bar. "Events" occur at specific points in time. Indicate these significant achievements by placing an "X" in a single column.

IDENTIFY BY ENTERING "A" FOR ACTIVITY OR "E" FOR EVENT.

NUMBER	A OR E	NARRATIVE <i>(Brief descriptive phrase of activity or event)</i>	CY		BY		BUDGET YEAR									
							+1		+2		+3		+4		+5	
			1	2	1	2	1	2	1	2	1	2	1	2	1	2
		A	B	C	D	E	F	G	H	I	J	K	L	M	N	
1	A	Thermal stress effects on mullet schooling				X-X										
2	A	Thermal stress effects on mullet feeding patterns.					X-X									
3	E	Completion: thermal stress effects on mullet social interactions and manuscript preparation.					X									
4	A	Normal social and schooling responses of bluefish.	X	X	X											
5	A	Thermal stress effects on bluefish schooling.				X-X										

### 28. OUT YEAR COMMENTS

(Check appropriate boxes and enter applicable percentages.)

\*Increases usually come from reprogramming within your FMC.)

- a. Continued at same level
- b. Increase of 5% \*
- c. Reduction of     %
- d. Termination

"X"  
APPROPRIATE  
COLUMN

REMARKS

(214)

NMFS TASK DEVELOPMENT PLAN  
29. FULL-TIME PERMANENT POSITIONS

TDP NUMBER

MAC-061-76-BE

Reference NOAA Form 32-14A, Item 20. Identify all full-time permanent positions related to this Task for the budget year only. Do not include support personnel; they should appear in the appropriate support Task Development Plan.

POSITION TITLE	GS LEVEL	NAME OF INCUMBENT <i>(If no incumbent, enter "Vacant")</i>	% OF TIME SPENT THIS YEAR
<p>Temporary Positions Only</p>			

CONTINUE on plain 8x10 1/2 paper. Identify "Page of Pages" and "TDP Number" in upper right corner. Comment on each of the following items, identifying by number. If item is not applicable, so indicate by entering "NA":

- 30. STATEMENT OF NEED
- 31. TASK OUTPUT
  - a. Significant Output
  - b. Termination Criteria
- 32. BENEFITS
- 33. ACTIVITY PLAN
- 34. MILESTONES

35. IMPACT OF TASK AUGMENTATION

- a. Current Year
- b. Budget Year
- c. Budget Year + 1

36. BACK-UP DOCUMENTATION

- a. Detail Documentation *(Provide one sentence description.)*

30. STATEMENT OF NEED:

Knowledge of the ways in which alterations in the marine environment may affect natural populations of fish is essential if rational and effective schemes of resource management and conservation are to be obtained. One important step in realizing these goals is to increase the level of competence in our ability to realistically predict detrimental change in selected marine species before the fact.

While the natural life habits of some fish do not readily allow that species to be studied in the field, it is possible to comprehensively examine, in the laboratory, selected behaviors critical to survival of the fish. Information of this kind can be analyzed and interpreted to further define the natural habits and requirements of a species, and can then be used as baseline information from which we can predict the impact of a particular environmental alteration on a species. Further, through the selection of specific quantifiable behaviors of an animal, the effect of given levels of potentially detrimental stresses can be measured. This information can subsequently be extrapolated to predict the impact on, or degree of change within, a given natural community.

There is a critical need for providing information concerning the life habits and behaviors of marine species residing in environments which are potentially susceptible to man-induced changes. Environmental modeling and impact statements are dependent on this kind of information, since realistic models or predictions cannot be developed if there is insufficient data about the natural life history of finfish species. In addition, there is considerable interest in developing behavioral baseline measures of normality for species used as indicator organisms in contaminant testing by a variety of industrial, state and federal agencies. Behavioral measures, since they are overt manifestations of a complex of integrated internal processes, provide an invaluable diagnostic tool in all aspects of contaminant research.

31. TASK OUTPUTS (SPECIFIC):

- a) Laboratory studies will quantitatively measure social interactions (e.g., schooling responses) and feeding of juvenile mullet and bluefish to establish normal baseline data. Significant departures from these normal levels, when a selected environmental stress such as temperature is applied, will indicate the sensitivity of the fish to stress. Since the types of behaviors selected reflect the natural life habits of the animal, it is possible to determine and predict what effect any change or alteration in behavior resulting from the stress may have on a natural population.
- b) Termination of laboratory studies for these species will occur when the effects of temperature on feeding and schooling are determined.

32. BENEFITS:

The primary benefits of the task will be the development of experimental techniques for providing definitive criteria about the effect of temperature on two important juvenile marine species that reside in areas in which there is a potential for thermal overloading. From this information, guidelines can be developed to be used in determining the mode of action, tolerance limits and the ultimate effects of applied environmental stresses. In addition to these guidelines, principles can be established that describe the relationship between biological processes and their behavioral expression and will be applicable to a wide spectrum of marine fish species.

The need for such guidelines and principles is exemplified by the organization of a workshop on Behavioral Measures of Environmental Stress under the auspices of the Marine Technological Society. The program is to be chaired by the principal investigator of this Task, with participants representing several federal agencies, industry and universities. The results of the panel will subsequently be published and will specify behavioral guidelines and recommendations for their use in testing procedures.

33. ACTIVITIES PLAN:

Laboratory Studies.

Laboratory studies conducted under controlled conditions will center on the measurement of normal behavioral responses of fish and how these behaviors are affected by temperature.

The focal point of the laboratory studies is an 180-liter tank, constructed from non-reflective glass, which is surrounded by 4 adjacent tanks of similar size. This entire experimental system is equipped with controlled light and temperature regimes as well as a specialized filtration system.

In the experimental procedure a single fish located in the central tank is allowed visual contact with a group of fish in one of the adjacent tanks, although it is physically separated from them and hence is deprived of all other sensory stimuli. The initial phase of the study will establish norms of behavior under preferred conditions of light, temperature and salinity. Quantitative measurements are made on a single fish as it responds to its species mates or to a different species group in an adjacent tank. Data of this kind affords specific baseline information on the strength of the motivation of fish to aggregate during short and long term exposures, and can be readily compared to any deviations in the normal schooling responses occurring during periods of induced stress.

Feeding behavior is also tested in the same experimental apparatus and quantitative measurements are made on the readiness to feed and long term feeding motivation of test fish, which again are receiving only visual cues from their species mates. Through this system of testing, an analysis and quantification of normal feeding behavior will provide the capability to detect changes in feeding motivation and in potential metabolic imbalances caused by temperature.

CY Activity (FY 74).

Juvenile striped mullet (Mugil cephalus), representative of highly social schooling fish, is under investigation to quantify normal schooling and feeding responses under stable environmental conditions. Additional tests will utilize juvenile bluefish (Pomatomus saltatrix).

BY Activity (FY 75).

To examine both subtle and gross changes in aggregating responses, tests will be conducted on mullet to study the effect of rapid temperature rises to both sublethal and lethal levels. Comparison of the results with the responses of juvenile bluefish subjected to similar temperature rises will be made.

BY + 1 Activity (FY 76).

As an extension of the BY program, studies will commence to measure alterations in normal feeding behavior in mullet resulting from thermal stresses.

34. MILESTONES:CY (FY 74).

Studies to examine schooling and feeding behaviors in striped mullet Mugil cephalus, and bluefish, Pomatomus saltatrix, under preferred conditions will result in the establishment of techniques to quantitatively define normal baseline measures of these social responses. An analysis and interpretation of the information will provide needed principles and guidelines for predicting and assessing the effects of temperature increases and thermal additions in the natural environment.

BY (FY 75).

Completion of studies on the effects of thermal stress on previously established normal schooling responses of mullet will result in a significant increase in our understanding of how temperature changes not only disrupt schooling, but also potentially alter or inhibit other related social patterns dependent on this basic stereotyped response, e.g., migration, reproduction.

BY + 1 (FY 76).

Completion of studies on feeding success and motivation of mullet during and following thermal stress will provide additional sources of information and guidelines to predict the capability of this species to respond to thermal stresses and other potential contaminants in the natural environment.

35. IMPACT OF TASK AUGMENTATION:

No potential increases, outside of the 5% per year suggested for planning purposes, are anticipated.

36. BACK-UP DOCUMENTATION, LEGISLATIVE PROGRAM AND ENVIRONMENTAL IMPACT:

a) Coutant, C.C. 1970. Biological aspects of thermal pollution. I. Entrainment and discharge canal effects. Publ. No. 383, Ecol. Sci. Div. Oak Ridge Nat. Lab.: 341-381.  
This article reviews and evaluates the effects from thermal discharges on biological processes.

Krenkel, P.A. and F.L. Parker (Eds.) 1969. Biological aspects of thermal pollution; proceedings. Vanderbilt University Press, Nashville, Tenn. 407 p.

This paper reviews the various sources of thermal pollution and the resulting problems in the environment.

Olla, B.L. I. The effect of temperature on the activity of adult Atlantic mackerel, Scorber scombrus. AEC Report (49-7) 3045: 1971.  
This report summarizes the effects of rapid continual increases of temperature to lethal levels as well as several gradual step increases.

Olla, B.L. II. The effect of temperature on the activity of adult Atlantic mackerel, Scorber scombrus. AEC Report (49-7) 3045: 1972.  
This report summarizes the effects of high temperature acclimation followed by two gradual step increases to upper incipient lethal levels and the resultant changes in feeding levels.

Olla, B.L. III. The effect of temperature on the activity and feeding of adult Atlantic mackerel, Scorber scombrus. Some Factors to be Considered in the Conduct of Finfish Bioassays. AEC Report (49-7) 3045: 1973.

This study 1) reports the effects of identical temperature increases within preferred ranges on activity and feeding patterns at different seasons and 2) summarizes the experimental study of behavior in light of the need for changes in bioassay methodology.

Olla, B.L., A.J. Pejda, and A.D. Martin. 1974. Daily activity, movements, feeding and seasonal occurrence in the tautog, Tautoga onitis (L.). Fish. Bull., U.S. 72(1): In press.  
This paper describes the life habits and environmental requirements, derived from in situ observations of the tautog.

Olla, B.L., H.M. Katz, and A.L. Studholme. 1970. Prey capture and feeding motivation in the bluefish, Pomatomus saltatrix. Copeia 1970: 360-362.

This study describes the different phases of the feeding response and the effect of prey size on feeding motivation.

Olla, B.L., C.E. Samet, and A.L. Studholme. 1972. Activity and feeding behavior of the summer flounder (Paralichthys dentatus) under controlled laboratory conditions. Fish. Bull., U.S. 70: 1127-1136.

This paper describes activity cycles, feeding and swimming patterns of adult summer flounder under controlled laboratory conditions.

Olla, B.L. and A.L. Studholme. 1971. The effect of temperature on the activity of bluefish, Pomatomus saltatrix L. Biol. Bull. 141: 337-349.

This paper describes the effects of thermal stress on activity, feeding, and schooling in bluefish.

Olla, B.L. and A.L. Studholme. 1972. Daily and seasonal rhythms of activity in the bluefish (Pomatomus saltatrix). In H.E. Winn and B.L. Olla (Eds.). Behavior of Marine Animals: Current Perspectives in Research. Vol. 2. p. 305-325. Plenum Press, New York. This paper describes the normal daily and seasonal activity, feeding and schooling behavior of bluefish under controlled laboratory conditions.

Olla, B.L., R. Wicklund and S. Wilk. 1969. Behavior of winter flounder in a natural habitat. Trans. Amer. Fish. Soc. 98: 717-720. This study describes field observations of winter flounder activity and feeding at different times of the day and at different ambient temperatures.

Parker, F.L. and P.A. Krenkel. 1970. Physical and engineering aspects of thermal pollution. CRC. Press, Cleveland, Ohio. This paper reports specific demand on aquatic environments due to the increased cooling water requirements for both thermonuclear and fossil-fueled steam electric power plants.

Sprague, J.B. 1971. Measurement of pollutant toxicity to fish III. Sublethal effects and "safe" concentrations. Water Research. 1971. 5: 245-266.

This paper points up the needs for changes in bioassay methodology, particularly with respect to incorporating behavioral measures.

Thermal pollution of water. Panel discussion, Fourteenth Annual Conservation Conference, National Wildlife Federation, Washington, D.C., December 1967.

This paper is an analysis of problems imposed upon different environmental communities from effects of thermal additions.

U. S. Atomic Energy Commission. Nuclear reactors built, being built or planned in the United States as of June 30, 1968.

This study reports the status of thermonuclear power plants, both established and anticipated.

- b) There is presently little ongoing research which either defines normal behavior in marine fishes or utilizes behavioral measures as indicators of environmental stresses. Need for this kind of experimentation has been detailed above.
- c) No additional legislation is required to carry out the proposed task in the BY and BY + 1.
- d) No Environmental Impact Statement is required to carry out the proposed task in the BY and BY + 1.

(Submit five copies by Jan. 2, 1974.)  
 TO: Director, National Marine Fisheries Service, ATTN: Fx5 National Oceanic and Atmospheric Administration Washington, D.C. 20235  
 FMC's - Submit a separate Task Development Plan for each task beginning, continuing, or ending in FY 1974, FY 1975, or FY 1976. Total funding in each category must equal your PED specific total funding guidance. Reimbursable funds are not to be mingled with appropriated funds on any programmatic TDP; separate TDP's must be prepared. Submit one Support TDP itemizing the administrative support cost (Management Fund) for the FMC.

2. TDP NUMBER: MAC-063-76-SII-A  
 3. SUB-OBJECTIVE CODE: II-C-2  
 4. RANK (To be completed only by FMC's and NMFS Hdqrs.): 20  
 5. FMC: \_\_\_\_\_  
 6. NMFS HDQRS.: \_\_\_\_\_

5. TASK NUMBER: N/A  
 6. TASK TITLE: MARMAP: Multispecies; Estuarine Assessment

7. ORGANIZATION CODE: F33800  
 8. ORGANIZATION TITLE (Responsible for execution of this task): Resource Assessment Investigations  
 9. PRINCIPLE LOCATION: City: Sandy Hook Lab, N. J. State: \_\_\_\_\_

OBJECT CLASS	UNIT QUANTITY	CURRENT YEAR FY 1974		BUDGET YEAR FY 1975		BUDGET YEAR +1 FY 1976	
		TARGET ALLOWANCE A	INCREASE B	TARGET ALLOWANCE C	INCREASE D	TARGET ALLOWANCE E	INCREASE F
10. Total Direct Labor	15						39.0
11. Travel	19						7.5
12. Rents, Communications, Utilities	21						
13. Contracts <input type="checkbox"/> (To be let)	51						160.0
Grants <input type="checkbox"/> (Funds obligated)	52						
	58						
14. Supplies	53						4.3
15. Capital Equipment	54						
16. Other (Estimated cost of all other direct cost not included above.)							3.6
17. Total Direct Funds (Add lines 10 through 16 above.)							214.4
18. Support Cost							10.6
19. Total Funds (Add lines 17 and 18.)							225.0
20. Positions, Full-time permanent (Number applicable to this Task. Also, complete NOAA Form 12-146.)							4
21. Positions, Other (Number applicable to this Task)							
22. Man-years, Permanent							3.2
23. Man-years, Other							
24. Reimbursable Support (Reimbursable agreements only)							

25. OFFICIAL PREPARING REPORT (Signature): Arthur Merrill (222)  
 26. CENTER DIRECTOR OR DESIGNATED REPRESENTATIVE (SIC): John A. Holsten

NMFS VESSEL REQUIREMENTS FY 1976

1. Date:  
Dec. 28, 1973

2. TDY No.:  
MAC-063-76-SII-A

3. Prepared by:  
J. Holston

4. Task Title:  
MARMAP; Multispecies, Estuarine Assessment

SEA TIME - DAYS	CY (a)	BY		BY+1	
		(b) T.A.	(c) Incr.	(d) T.A.	(e) Incr.
NMFS 5. R.V. Rorqual	-	-	-	-	-
Vessel 6.				-	
(Name) 7.				-	
Charter 8. Trawler (3)				60	
Vessel 9.				-	
(type)					
10. TOTAL SEA DAYS				60	
Scientists 11. Maximum				2	
per 12. Minimum				2	
cruise 13. Anticipated				2	
(Average)					
14. 1st.					
15. 2nd.					
Cruise 16. 3rd.					
Months 17. 4th.					

18. Vessel Priority:

- |                       |            |                                     |            |
|-----------------------|------------|-------------------------------------|------------|
| a. NOAA FRV (NMFS)    | _____      | d. Univ. RV Charter                 | <u>(1)</u> |
| b. NOAA RV (NOS)      | <u>(4)</u> | e. Existing NMFS Small Boat         | <u>(3)</u> |
| c. Commercial Charter | <u>2</u>   | f. New, Specialized NMFS Small Boat | <u>(4)</u> |

19. Remarks:

State-generated assessment information on estuarine-marine fish resources - supportive of MAC-002, MAC-060, and MAC-064. To extent possible, contingent upon in-house program demands, R.V. Rorqual will be made available to one or more States to reduce charter costs.



NMFS TASK DEVELOPMENT PLAN  
29. FULL-TIME PERMANENT POSITIONS

TDP NUMBER

MA-63

Reference NOAA Form 32-14A, Item 20. Identify all full-time permanent positions related to this Task for the budget year only. Do not include support personnel; they should appear in the appropriate support Task Development Plan.

POSITION TITLE	GS LEVEL	NAME OF INCUMBENT <i>(If no Incumbent, enter "Vacant")</i>	% OF TIME SPENT ON THIS TASK
New task F/Y 76			

CONTINUE on plain 8x10 1/2 paper. Identify "Page of Pages" and "TDP Number" in upper right corner. Comment on each of the following items, identifying by number. If item is not applicable, so indicate by entering "NA":

- 30. STATEMENT OF NEED
- 31. TASK OUTPUT
  - a. Significant Output
  - b. Termination Criteria
- 32. BENEFITS
- 33. ACTIVITY PLAN
- 34. MILESTONES

35. IMPACT OF TASK AUGMENTATION

- a. Current Year
- b. Budget Year
- c. Budget Year + 1

36. BACK-UP DOCUMENTATION

- a. Detail Documentation *(Provide one sentence description.)*
- b. Related tasks and research presently being conducted.
- c. Indicate the Congressional legislative requirements.
- d. Indicate the Environmental Impact Statement (EIS) requirements.

(234)

### 30 - STATEMENT OF THE NEED

Estuaries are the semienclosed coastal bodies of water which have free connection with the open sea and where seawater is measurably diluted with freshwater derived from land drainage. Estuaries and lagoons with their extensive marsh or wetland shorelines constitute a high percentage of the world's coasts. Approximately 80 to 90 percent of the Atlantic and Gulf of Mexico coastline consists of estuaries and tidal lagoons.

Unfortunately, our estuaries, especially along the Middle Atlantic Bight, are steadily being devastated by man's encroachment. Shoreline developments, dredge and fills, dumping of domestic and industrial wastes, and dumping of millions of gallons of heated water from electric power plants are just a few examples of some of the impingements that are destroying these areas.

Functionally, our estuaries are major spawning and nursery grounds for many commercial and sport fishes. The estuaries are typically highly fertile and support large phytoplankton populations necessary for filter feeding organisms like clams and oysters and forage fishes. It is, therefore, urgent that we initiate an intensive assessment of estuarine finfish and shellfish populations to evaluate the effects of continuing lower water quality on commercial and sport fishing stocks.

Such activity serves State and Federal agencies in providing a data base obtained with standardized techniques and helps delimit factors affecting abundance and distribution of renewable estuarine resources, including effects of man-induced change in the environment. It is of particular use in developing and evaluating environmental impact reports.

### 31 - TASK OUTPUTS

The intent of this task is to assess the stocks of important sport and commercial species, such as spot, weakfish, winter flounder, and crabs; to obtain pertinent environmental data; and to produce an efficient data management system which will permit quick retrieval and appropriate statistical analyses of the data. A large number of species which occur in coastal and offshore water spend critical periods of their life cycles in estuarine waters. For a better understanding of the population dynamics of these species, it becomes imperative to integrate coastal and offshore studies with estuarine research. Further, these studies will lead to more intelligent approaches in solving the problems which are emerging along the coastal zone and provide support for the review of Environmental Impact Statements. Finally, the knowledge gained from these studies will improve our understanding of estuarine systems and the effects of man-made stresses.

- 1) The proposed task will monitor and assess the finfish and invertebrate stocks in the major estuaries along the Mid-Atlantic Bight, Long Island Sound, Delaware Bay, Chesapeake Bay, and Pamlico Sound through contracted research studies. The task will be a continuous one, in order that changes in available stocks, as a result of fishing, natural disasters, and man-made stresses, will be known for effective management. A NMFS study unit will evaluate estuarine input data and correlate them with information from inshore and offshore research cruises.
- 2) Since much of this task is to be accomplished by issuing contracts with universities and State agencies, parts of the task could be terminated if contractee fails to meet obligations or there is a reduction of funds. Each contractee will be required to put information he has collected into a common data bank annually. Each contractee will be required to retrieve and interpret data from the bank relative to his specific area and relate it to past history of the area. Each contractee will undertake special life history studies on the most important finfish or shellfish species of his area.

### 32 - BENEFITS

The task serves the needs of conserving estuarine habitat and maximizing the use for resident stock culture by documenting species, sizes, numbers, and distribution. Annual variations in availability of juveniles provide a forecasting tool useful to conservation managers and industry groups. Task output showing extent of variations within survey areas between areas, and from year to year will be made available for broad-base evaluation and planning. The achievement of task objectives will contribute to:

- Developing a consistent system to estimate and monitor living estuarine resources,
- Obtaining environmental and hydrographic measurements for the purpose of integrating climatological analysis and environmental interactions with the development of an environmental monitoring system for NARMAP estuarine areas,
- Incorporating other sources of data on estuarine species, and developing a data management system.

### 33 - ACTIVITIES PLAN

Since this is a new task, being initiated in FY 76, it will be necessary to establish representative stations in estuaries under investigation. Using a standard estuarine otter trawl, finfish samples will be taken semiannually at the selected stations in each nursery. Yearly, using surf clam and scallop dredges, invertebrate stocks will be sampled, if possible, at the same stations. Temperature, salinity, amount of dissolved oxygen, pH, and any other necessary water parameters will be measured at each station. Observations will be prepared in such a way that they can be entered in a common data bank maintained at a Federal facility.

### 34 - MILESTONES

BY + 1 -- Initial 1976 Submission

- 1) Two finfish surveys and one invertebrate survey will be completed in the following estuaries: Long Island Sound, Delaware Bay, Chesapeake Bay, and Pamlico Sound.
- 2) The resultant data will be processed and stored in data bank.
- 3) Preliminary results reports will be prepared.

### 35 - IMPACT OF TASK AUGMENTATION

Initiation of task as described above.

### 36 - BACKUP DOCUMENTATION

- 1) Informal Report No. 4 - Middle Atlantic Coastal Fisheries Center, NMFS - Investigation Summaries -- a summary of research in ongoing programs within the Middle Atlantic Coastal Fisheries Center.
- 2) Program Review - Oxford Laboratory, NMFS, February 9, 1972 -- a summary of research in ongoing programs at the Oxford Laboratory.
- 3) Various Federal Aid and Sea Grant Programs -- universities and State agencies are conducting related supported research.

# NMFS TASK DEVELOPMENT PLAN

(See Detailed Instructions)

1. DATE PREPARED

Dec. 20, 1973

(Submit five copies by Jan. 2, 1974.)

TO: Director, National Marine Fisheries Service, ATTN: Fx5 National Oceanic and Atmospheric Administration Washington, D.C. 20235

FMC's - Submit a separate Task Development Plan for each task beginning, continuing, or ending in FY 1974, FY 1975, or FY 1976. Total funding in each category must equal your PED specific total funding guidance. Reimbursable funds are not to be mingled with appropriated funds on any programmatic TDP; separate TDP's must be prepared. Submit one Support TDP itemizing the administrative support cost (Management Fund) for the FMC.

2. TOP NUMBER

MAC-064-76-FA-A

3. SUB-OBJECTIVE CODE

II-C-6

4. RANK (To be completed only by FMC's and NMFS Hdqrs.)

2

NMFS HDQRS.

5. TASK NUMBER

N/A

6. TASK TITLE

MARMAP FA; Population Dynamics

7. ORGANIZATION CODE

F33800

8. ORGANIZATION TITLE (Responsible for execution of this task)

Resource Assessment Investigations

9. PRINCIPLE LOCATION

City: Sandy Hook Lab. State: N.J.

OBJECT CLASS <i>Lines 10-19. Enter all dollar values as thousands and tenths of thousands. Lines 22-23. Enter as man-years and tenths of man-years.</i>	W L L O O	CURRENT YEAR FY 1974		BUDGET YEAR FY 1975		BUDGET YEAR + 1 FY 1976	
		TARGET ALLOWANCE A	INCREASE B	TARGET ALLOWANCE C	INCREASE D	TARGET ALLOWANCE E	INCREASE F
10. Total Direct Labor	15						49.9
11. Travel	19						3.2
12. Rents, Communications, Utilities	21						
13. Contracts <input type="checkbox"/> (To be let)	51						45.0
Grants <input type="checkbox"/> (Funds obligated)	52						
	58						
14. Supplies	53						9.3
15. Capital Equipment	54						
16. Other (Estimated cost of all other direct cost not included above.)							4.3
17. Total Direct Funds (Add lines 10 through 16 above.)							111.7
18. Support Cost							13.3
19. Total Funds (Add lines 17 and 18.)							125.0
20. Positions, Full-time permanent (Number applicable to this Task. Also, complete NOAA Form 32-14C.)							4
21. Positions, Other (Number applicable to this Task)							
22. Man-years, Permanent							3.2
23. Man-years, Other							
24. Reimbursable Support (Reimbursable agreements only)							

25. OFFICIAL PREPARING REPORT (Signature)

Arthur Merrill

(228)

26. CENTER DIRECTOR OR DESIGNATED REPRESENTATIVE (Sig.)

John A. Holsten



NMFS TASK DEVELOPMENT PLAN  
29. FULL-TIME PERMANENT POSITIONS

TDP NUMBER

MA-64

Reference NOAA Form 32-14A, Item 20. Identify all full-time permanent positions related to this Task for the budget year only. Do not include support personnel; they should appear in the appropriate support Task Development Plan.

POSITION TITLE	GS LEVEL	NAME OF INCUMBENT <i>(If no incumbent, enter "Vacant")</i>	% OF TIME SPENT ON THIS TASK
F/Y 76 increase			

CONTINUE on plain 8x10 1/2 paper. Identify "Page of Pages" and "TDP Number" in upper right corner. Comment on each of the following items, identifying by number. If item is not applicable, so indicate by entering "NA":

- 30. STATEMENT OF NEED
- 31. TASK OUTPUT
  - a. Significant Output
  - b. Termination Criteria
- 32. BENEFITS
- 33. ACTIVITY PLAN
- 34. MILESTONES

35. IMPACT OF TASK AUGMENTATION

- a. Current Year
- b. Budget Year
- c. Budget Year + 1

36. BACK-UP DOCUMENTATION

- a. Detail Documentation *(Provide one sentence description.)*
- b. Related tasks and research presently being conducted.
- c. Indicate the Congressional legislative requirements.
- d. Indicate the Environmental Impact Statement (EIS) requirements.

(230)

### 30 - STATEMENT OF NEED

Population dynamics analyses are required for providing management advice to industry, State, and international groups charged with conservation and allocation of renewable marine resources.

The middle Atlantic shelf is populated by a set of exploited and unexploited fish stocks. Catch trends of many of the exploited species show drastic declines in yield and relative abundance over the last 15 years. These reductions have been attributed to overfishing, environmental degradation, or natural fluctuations. Presently, man's activities are the only manipulative factor for controlling abundance. NMFS must be involved in analyses of marine resources because stocks are migrating along several seaboard states or exhibit movements from inshore to offshore where they enter waters available to foreign fleets.

With increasing demands for commercial and recreational harvest, a population dynamics program is essential for developing management strategy.

### 31 - OUTPUTS

- 1) Biometrical analyses integrate information on distribution, recruitment, and mortality to provide developing fisheries with information on magnitude of the resource, potential yield, and decreases in catch per effort caused by projected increases in effort. More precise estimates will be generated for existing fisheries to determine at which point more expansion in effort will produce negligible increase in catch. Such knowledge may discourage wasteful expansion or perhaps encourage some form of regulation.
- 2) The task is continuous and will reach objectives when input parameters are adequate to generate a reliable prediction of stock changes with changes in harvest rate. Predictive models will grow in sophistication in several stages, first based on cruise estimates of standing crop versus catch/effort relationships in the fisheries, to involvement of species growth and mortality rates, and finally to integration of our understanding of ecological factors and population processes. For most middle Atlantic stocks we have only some first and, for a few, second level parameters available for analyses.

The requirements for accuracy will be fed back to control intensity of sampling. Yield-effort models will be made available to university, State, and Federal agencies concerned with developing fishery policy and negotiations.

### 32 - BENEFITS

Our task effort will be addressed to information on the biological status of stocks and projected impacts principally incurred by fishing. Biological facts will be integrated with economic and sociologic effects in development of management strategies and international negotiations. Reliability statements will be available, based on quality and quantity of input data. Policymakers and researchers will receive both a timely and historical reference of fish population levels and relationships for fish policy recommendations, negotiations, environmental impact evaluation, and ecosystem modeling.

### 33 - ACTIVITIES PLAN

Results of cruise surveys, harvest rates of fishery components and biological studies estimating growth and recruitment from data banks and scientific literature (maintained or available to NMFS) provide the necessary input for developing models of species isopleth curves. Locating data, analyzing, and generating parameter estimates are the first study need. In the middle Atlantic area, attempts must be made into yield estimates of mixed species fisheries, an area of research which is essentially undeveloped. Excursions into this necessary line of study will not only point to deficiencies in our information base but will lead to a functional fishery exploitation policy, particularly for harvesting seasonally available demersal fish populations.

### 34 - MILESTONES

BY + 1 -- Initial 1976 Submission

- 1) Evaluation of data sources.
- 2) Definition of unit stocks. Establishing limits of range for which estimates will prevail. Target species will be scup, weakfish, spot, croaker, sea bass, and fluke, species exploited by both commercial and recreational fisheries.
- 3) Definition of mixed stocks. Preliminary formats for establishing the treatment of situations where fishing mortality of several species has common elements but where none can be treated as a unit.

### 35 - IMPACT OF TASK AUGMENTATION

Budget year -- initial funding.

Primary staffing would require one biometrician, one programmer.

36 - BACKUP DOCUMENTATION

- A. Gulland, J. A. 1969. Manual of Methods for Fish Stock Assessment. Part 1. Fish Population Analysis. FAO Manual in Fisheries Science No. 4, 154 p. Rome.

Nikolski, G. V. 1969. Theory of fish population dynamics as the biological background for rational exploitation and management of fishery resources. Oliver and Boyd. Edinburgh. 323 p.

Davis, J., et al. Investigation of potential for expansion of the industrial fishery of the Mid-Atlantic Bight. Completion Report, Virginia 3-5-D. Comm. Fish. Res. Dev. Act., July 1, 1965 - June 30, 1970.

- B. Ongoing biostatistical analyses and population studies are being conducted at NEFC. The species under intensive study are principally boreal and offshore. Some of their stocks under study have southern contingents in middle Atlantic coast waters.
- C. No congressional legislation is required to carry out proposed tasks.
- D. The proposed studies will not require an EIS; they will, in fact, be valuable adjuncts to preparation of future environmental statements because status of population levels will have better estimators.

# NMFS TASK DEVELOPMENT PLAN

(See Detailed Instructions)

1 | 8

1. DATE PREPARED

Dec. 20, 1973

*(Submit two copies by Jan. 2, 1974.)*

TO: Director, National Marine Fisheries Service, ATTN: Fx5 National Oceanic and Atmospheric Administration Washington, D.C. 20255

FMC's - Submit a separate Task Development Plan for each task beginning, continuing, or ending in FY 1974, FY 1975, or FY 1976. Total funding in each category must equal your PED specific total funding guidance. Reimbursable funds are not to be mingled with appropriated funds on any programmatic TDP; separate TDP's must be prepared. Submit one Support TDP itemizing the administrative support cost (Management Fund) for the FMC.

2. TDP NUMBER MAC-065-76-IE-R	3. SUB-OBJECTIVE CODE IV-A-3	4. RANK (To be completed only by FMC's and NMFS Hdqrs.) N/A	FMC	NMFS HDQRS.
----------------------------------	---------------------------------	----------------------------------------------------------------	-----	-------------

5. TASK NUMBER N/A	6. TASK TITLE MARMAP: Larval Fish Studies -- AEC Reimbursable
-----------------------	------------------------------------------------------------------

7. ORGANIZATION CODE F33800	8. ORGANIZATION TITLE (Responsible for execution of this task) Resource Assessment Investigations	9. PRINCIPLE LOCATION City: Sandy Hook Lab. State: N. J.
--------------------------------	------------------------------------------------------------------------------------------------------	-------------------------------------------------------------

OBJECT CLASS <small>Lines 10-19. Enter all dollar values as thousands and tenths of thousands. Lines 22-23. Enter as man-years and tenths of man-years.</small>	L I N E S	CURRENT YEAR FY 1974		BUDGET YEAR FY 1975		BUDGET YEAR + 1 FY 1976	
		TARGET ALLOWANCE A	INCREASE B	TARGET ALLOWANCE C	INCREASE D	TARGET ALLOWANCE E	INCREASE F
10. Total Direct Labor	15				37.0	37.0	
11. Travel	19				3.2	3.2	
12. Rents, Communications, Utilities	21						
13. Contracts <input type="checkbox"/> (To be let)	51				97.0	105.0	
Grants <input type="checkbox"/> (Funds obligated)	52 58						
14. Supplies	53				14.9	16.7	
15. Capital Equipment	54				15.0	5.2	
16. Other (Estimated cost of all other direct cost not included above.)					3.0	3.0	
17. Total Direct Funds (Add lines 10 through 16 above.)					170.1	170.1	
18. Support Cost					9.9	9.9	
19. Total Funds (Add lines 17 and 18.)					180.0	180.0	
20. Positions, Full-time permanent (Number applicable to this Task. Also, complete NOAA Form 32-14C.)							
21. Positions, Other (Number applicable to this Task)					4	4	
22. Man-years, Permanent							
23. Man-years, Other					3.2	3.2	
24. Reimbursable Support (Reimbursable agreements only)					20.0	20.0	

25. OFFICIAL PREPARING REPORT (Signature) <i>Arthur Merrill</i>	26. CENTER DIRECTOR OR DESIGNATED REPRESENTATIVE (SIGN) <i>John A. Holston</i>
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234

NAFMS TASK DEVELOPMENT PLAN  
27. ACTIVITY SCHEDULE AND EVENTS

TDP NUMBER

MA-65

NUMBER	A C R E	NARRATIVE <i>(Brief descriptive phrase of activity or event)</i>	CY		BUDGET YEAR												
			BY		+1		+2		+3		+4		+5				
			1	2	1	2	1	2	1	2	1	2	1	2			
				A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	A	Sort plankton samples collected on cruises designed to study diurnal activities of larval fishes															
2	AE	Identify, count, and measure larval fishes collected during diurnal migration studies							X								
3	AE	Publish data on diurnal activities of larval fishes															
4	AE	Prepare atlas from in-house data on distribution and abundance of ichthyoplankton collected in Middle Atlantic Bight															
5	A	Conduct monthly cruises near proposed nuclear power plant sites to study inshore-offshore distribution of larval fishes. Prepare cruise reports.															
6	AE	Sort, identify, count, and measure larval fishes from monthly cruises															
7	AE	Prepare manuscripts on results of data collected from monthly cruises															

26. OUT YEAR COMMENTS

*(Check appropriate boxes and enter applicable percentage.)*

*\*Increases usually come from reprogramming within your FMC.\**

a. Continued at same level

b. Increase of \_\_\_% \*

c. Reduction of \_\_\_%

d. Termination

REMARKS Special new FY 75 initiative requested by Central Office.

AE = Any portion of a task which assumes time or resources, but marks a significant point of progress and identifies specific accomplishments.

(235)

NMFS TASK DEVELOPMENT PLAN  
29. FULL-TIME PERMANENT POSITIONS

TDP NUMBER  
NA-05

Reference NOAA Form 32-14A, Item 20. Identify all full-time permanent positions related to this Task for the budget year only. Do not include support personnel; they should appear in the appropriate support Task Development Plan.

POSITION TITLE	GS LEVEL	NAME OF INCUMBENT <i>(If no incumbent, enter "Vacant")</i>	% OF TIME SPENT ON THIS TASK
Temporary positions only.			

CONTINUE on plain 8x10 1/2 paper. Identify "Page of Pages" and "TDP Number" in upper right corner. Comment on each of the following items, identifying by number. If item is not applicable, so indicate by entering "NA":

- 30. STATEMENT OF NEED
- 31. TASK OUTPUT
  - a. Significant Output
  - b. Termination Criteria
- 32. BENEFITS
- 33. ACTIVITY PLAN
- 34. MILESTONES
- 35. IMPACT OF TASK AUGMENTATION
  - a. Current Year
  - b. Budget Year
  - c. Budget Year + 1
- 36. BACK-UP DOCUMENTATION
  - a. Detail Documentation *(Provide one sentence description.)*
  - b. Related tasks and research presently being conducted.
  - c. Indicate the Congressional legislative requirements.
  - d. Indicate the Environmental Impact Statement (EIS) requirements.

30 - STATEMENT OF NEED

The aquatic environment is a resource with an ever-increasing number of competing users, many of whom alter the environment to the detriment of our living marine resources. The effects of man's changes on the marine environment and its constituent animal populations must be understood to determine the full costs involved. We must obtain information on compositions, extent, and conditions of living marine resources, predict the distribution, abundance, condition and availability of these resources, and prepare analyses adequate to support policy decisions concerning the impact of man-induced environmental changes on marine populations.

Primary recipients of this information include:

AEC	Scientific Community
ICNAF	a) State conservation agencies
ASMFC	b) Population Investigations
Commercial Fisheries	c) Private Research Organizations
	d) University Researchers

31 - TASK OUTPUTS

- 1) Emphasizing those species that are found near shore, field work during the next three to five years will center around; (1) Work-up and analysis of data collected to investigate the diurnal activities of young planktonic fishes and to relate these activities to environmental parameters such as photoperiod, depth, temperature, salinity, and seasonal thermocline, and to estimate their dispersion rates on the basis of known coastal circulation; (2) Develop an experiment to measure monthly changes in inshore-offshore distribution of larval fishes; (3) Collate and synthesize in-house information on seasonal distribution and abundance of larval fishes, emphasizing work on nearshore species found near proposed sites of offshore nuclear power plants.

We will continue to: (1) produce and maintain a Data Management System adequate to acquire, process and store information needed to support Resource Assessment Research; (2) Provide outputs from the data bank to various user groups, including AEC, commercial fishing industry, sportsmen, population and environmental analysts, other NMFS research groups and management and regulatory bodies and; (3) Adopt additional, new and more efficient sampling gear, provided correction factors can be determined for our entire data series.

2. We will operate with standard sampling equipment over enough years so that normal fluctuations in life cycles of the species, and also fluctuations in the natural environment of these species, can be ascertained.

### 32 - BENEFITS

Develop specialized information to support policy decisions concerning the impact of man-induced environmental changes on our marine fishery resources by determining seasonal and spatial importance of the near-shore marine environment to the wellbeing of larval stages of commercial and recreational fishes.

Describe the variations of the marine environment and the bioenvironmental interactions of ichthyoplankton in the Middle Atlantic Bight by comparing known and newly acquired circulation data with diurnal activities of larval fishes and equating the results to their transport, dispersion and survival.

Strengthen potential for forecasting and predicting abundance and distribution, and the effects of further environmental variations upon resources by increasing knowledge of the relation between fishery resources and several environmental parameters.

### 33 - ACTIVITIES PLAN

Analyze and prepare for publication data, collection on our series of cruises designed to study diurnal activities of young fishes. Collections from these cruises will contain young of the most important commercial and recreational fishes that spawn in the Middle Atlantic Bight. Of the 10 most important coastal species in terms of total combined sport and commercial catch in the Middle Atlantic Bight, only Atlantic mackerel and possibly fluke are not dependent on the shallow coastal areas. The other species depend on the subtidal zone for spawning and/or nursery grounds, and even young bluefish and mackerel utilize this area to some extent.

In conjunction with ongoing diffusion, productivity, and finfish assessment studies, we will design an experiment to measure monthly changes in the inshore-offshore distribution and abundance of larval fishes, concentrating on those areas near proposed nuclear power plant sites. Concomitant measurements of the marine environment and pertinent physical data from other sources will be incorporated to establish norms and ranges of variability. These data will be integrated with all available biological data to evaluate the role of the environment and additional man-induced changes on the environment in terms of their effect on spawning, larval transport, geographical distribution, and year-class success.

We will continue to utilize ADP to: (1) Develop a program that will also allow us to produce an atlas from in-house data on the seasonal distribution of larval fishes in the Middle Atlantic Bight; (2) Investigate the reaction of interspecific distribution of larval fishes, and to relate their distributions to several environmental parameters; (3) Maintain a current Data Management System and; (4) Provide outputs to various user groups.

#### 34 - MILESTONES

##### FY 74

- 1) Design experiment to measure monthly changes in the inshore-offshore distribution and abundance of larval fishes, concentrating on those areas near proposed nuclear power plant sites.
- 2) Complete identification, counts and measurements of young yellowtail flounder and Atlantic mackerel larvae collected in spring FY 72 and be in analysis of data for publication.
- 3) Begin assembling an atlas from in-house data on the seasonal distribution of larval fishes in the Middle Atlantic Bight.

##### FY 75

- 1) Conduct monthly cruises in Middle Atlantic Bight to measure changes in the inshore-offshore distribution and abundance of larval fishes, concentrating of those areas near proposed nuclear power plant sites. Begin sort and identification of larval fishes from monthly samples.

- 2) Work actively toward completion of manuscripts on diurnal activities of larval yellowtail flounder and Atlantic mackerel.
- 3) Complete atlas on the seasonal distribution of larval fishes in the Middle Atlantic Bight.

FY 76:

- 1) Conduct monthly cruises in Middle Atlantic Bight to measure changes in the inshore-offshore distribution and abundance of larval fishes, concentrating on those areas near proposed nuclear power plant sites.
- 2) Publish manuscripts on diurnal activities of larval yellowtail flounder and Atlantic mackerel. Complete counts and measurements of larvae collected during FY 75 diurnal activities study. Begin work-up of data for publication.
- 3) Provide preliminary results from monthly cruises conducted in FY 75.

### 35 - IMPACT OF TAS AUGMENTATION

- 1) Task in planning stages, no funding required in Current Year.
- 2) All research activities described herein will be funded from Estimated Potential Increases for Budget Year (FY 75).
- 3) All research activities described herein will be funded from estimated potential increases for BY + 1.

### 36 - BACKUP DOCUMENTATION

Legislative program and Environmental Impact

A.

- 1) Hempel, G. 1965. On the importance of larval survival for the population dynamics of marine food fish. CALCOFI Reports Vol. X. pp. 13-23.
- 2) Ahlstrom, E. H. 1965. Kinds and abundance of fishes in the California Current Region based on egg and larval surveys. CALCOFI reports, Vol. X. pp. 31-52.

- 3) Walford, L. A. 1955. New directions in fishery research. Deep Sea Research. Suppl. to Vol. 3. pp. 471-473.
- 4) Smith, W. G. 1973. The distribution of summer flounder, Paralichthys dentatus, eggs and larvae on the continental shelf between Cape Cod and Cape Lookout, 1965-66. Fish. Bull. 71(2): 527-548.
- 5) NMFS Memo. 11 Dec. 73. To: FNE1 - Center Director, Highlands, N.J. From: Wm. F. Royce. Subject: Request for TDP to Support the Atlantic Estuarine Fisheries Center. Environmental Studies for Offshore Nuclear Power Plant Site.
- 6) Kendall, A. W., Jr. 1972. Description of black seabass, Centropristis striata (Linnaeus) larvae and their occurrences north of Cape Lookout, North Carolina in 1966. Fish. Bull. 70(4): 1243-60.
- 7) Richards, Sarah W. and A. W. Kendall, Jr. 1973. Distribution of sand lance, Ammodytes sp., larvae on the continental shelf from Cape Cod to Cape Hatteras from R. V. Dolphin surveys in 1966. Fish. Bull. 71(2): 371-386.

B. Related Research

Coastal Finfish Assessment, MACFC

MESA

MARMAP

NMFS, Beaufort, N. C. Advective Mechanisms Responsible for the Seasonal Influx of larval Menhaden in Onslow Bay

Long Island Sound Benthic Studies, MACFC

Ichthyoplankton Associates - Ichthyoplankton studies of southern New Jersey Estuaries

Boyce Thompson Institute for Plant Research, Inc. - Ichthyoplankton Studies of the Lower Hudson River.

C. N/A

D. N/A

# NMFS TASK DEVELOPMENT PLAN

(See Detailed Instructions)

FEDERAL ADMINISTRATION

1 | 3

1. DATE PREPARED  
Dec. 20, 1973

(Submit five copies by Jan. 2, 1974.)

O: Director, National Marine Fisheries Service, ATTN: Fx5 National Oceanic and Atmospheric Administration Washington, D.C. 20235

FMC's - Submit a separate Task Development Plan for each task beginning, continuing, or ending in FY 1974, FY 1975, or FY 1976. Total funding in each category must equal your FED specific total funding guidance. Reimbursable funds are not to be mingled with appropriated funds on any programmatic TDP; separate TDP's must be prepared. Submit one Support TDP itemizing the administrative support cost (Management Fund) for the FMC.

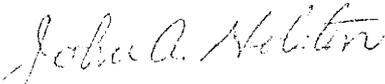
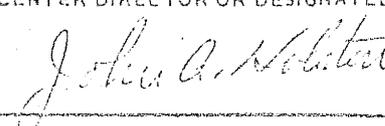
2. TOP NUMBER	3. SUB-OBJECTIVE CODE	4. RANK (To be completed only by FMC's and NMFS Hdqrs.)	FMC	NMFS HDQRS.
MAC-066-76-00-A	N/A	N/A		

5. TASK NUMBER	6. TASK TITLE
N/A	Construction of New Laboratory Building at Sandy Hook, N. J.

7. ORGANIZATION CODE	8. ORGANIZATION TITLE (Responsible for execution of this task)	9. PRINCIPLE LOCATION
F33000	Middle Atlantic Coastal Fisheries Center	City: Highlands, State: N. J.

OBJECT CLASS	ENTIRE PROGRAM	CURRENT YEAR FY 19		BUDGET YEAR FY 19		BUDGET YEAR + 1 FY 19	
		TARGET ALLOWANCE	INCREASE	TARGET ALLOWANCE	INCREASE	TARGET ALLOWANCE	INCREASE
		A	B	C	D	E	F
10. Total Direct Labor	15						
11. Travel	19						
12. Rents, Communications, Utilities	21						
13. Contracts <input type="checkbox"/> (To be let)	51						
Grants <input type="checkbox"/> (Funds obligated)	52						500.01/
	58						
14. Supplies	53						
15. Capital Equipment	54						
16. Other (Estimated cost of all other direct cost not included above.)							
17. Total Direct Funds (Add lines 10 through 16 above.)							
18. Support Cost							
19. Total Funds (Add lines 17 and 18.)							500.0
20. Positions, Full-time permanent (Number applicable to this Task. Also, complete NOAA Form J2-14C.)							
21. Positions, Other (Number applicable to this Task)							
22. Man-years, Permanent							
23. Man-years, Other							
24. Reimbursable Support (Reimbursable agreements only)							

1/ Contraction cost-item will be formally submitted at time of fiscal '77 budget call.

25. OFFICIAL PREPARING REPORT (Signature)	26. CENTER DIRECTOR OR DESIGNATED REPRESENTATIVE (Sig.)
 (297)	

NMFS TASK DEVELOPMENT PLAN

27. ACTIVITY SCHEDULE AND EVENTS

TDF NUMBER

MAC-006-76-00-A

NUMBER EACH ACTIVITY OR EVENT.

PLANNING PERIOD - Indicate by entering an "X" the beginning and completion of subtask or selected operational activities that collectively define the task for the 7 year planning period. Connect "X's" with a solid bar. "Events" occur at specific points in time. Indicate these significant achievements by placing an "X" in a single column.

IDENTIFY BY ENTERING "A" FOR ACTIVITY OR "E" FOR EVENT.

NUMBER

A C R E

NARRATIVE

(Brief descriptive phrase of activity or event)

CY	BY	BUDGET YEAR											
		+1		+2		+3		+4		+5			
		1	2	1	2	1	2	1	2	1	2		
A	B	C	D	E	F	G	H	I	J	K	L	M	N
						X	-						
								X	-				

1  
2

A FY 1976 - Design and specifications

A FY 1977 - Construction

28. OUT YEAR COMMENTS

(Check appropriate boxes and enter applicable percentage.)

\*Increases usually come from reprogramming within your FMC.)

- a. Continued at same level
- b. Increase of \_\_\_% \*
- c. Reduction of \_\_\_%
- d. Termination

"X"  
APPROPRIATE  
COLUMN

REMARKS

## CONSTRUCTION OF NEW RESEARCH FACILITY AT SANDY HOOK

### JUSTIFICATION

The bill authorizing establishment of the Gateway National Seashore has become law, and the National Park Service has begun the acquisition of land and the final planning of the Park. Sandy Hook forms a major component of that Seashore Park, and an integral part of the overall plan is a marine science complex to be located at Sandy Hook. With projections of up to two million visitors a year to the new park, the development of a federal marine science center which includes public display and teaching areas, could be an important ingredient. The new building complex would include federal research facilities, public display and meeting facilities, public aquarium, research facilities for state and university groups, living accommodations for short-term occupancy by visiting scientists, and dock facilities. The complex would include a main building with some 100,000 square feet of floor space, with two adjacent buildings -- one for shop, garage, sea water facilities, and one as a dormitory facility.

The Coast Guard has underway an extensive (reported at 2.5 million) shorefront and wharf development at Sandy Hook. It would be expedient to berth our NOAA vessels in adjacent expanded wharf facilities. Early relation of NOAA construction plans with Coast Guard plans would be desirable.

The building complex, including wharf, would probably cost in the vicinity of five million dollars with a proportionate smaller amount for architects costs.

The long-term nature of environmental and resource problems in the Middle Atlantic Bight, and the growing human population pressure on inshore waters and resources (particularly acute in this area) dictate that a major research facility continue to be located at Sandy Hook. Furthermore the possibilities for interactions with the public, as well as with state and university groups at this location are enormous, since some 11 million people live in the greater New York area. The present facility at Sandy Hook is inadequate for the broader potential presented by the Gateway National Seashore.

The following schedule and estimated costs are proposed:

FY 1976 -- Architects and engineering (building and wharf)	\$ 500,000
FY 1977 -- Construction (building and wharf)	\$5,000,000