

FINAL ENVIRONMENTAL IMPACT STATEMENT/FISHERY MANAGEMENT PLAN

FOR THE

ATLANTIC MACKEREL FISHERY OF THE NORTHWEST ATLANTIC OCEAN

SUPPLEMENT NUMBER 1

November, 1978

Mid-Atlantic Fishery Management Council

in cooperation with

New England Fishery Management Council

South Atlantic Fishery Management Council

National Marine Fisheries Service



UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
Washington, D.C. 20235

PROPOSED FISHERY MANAGEMENT ACTIONS
for the
ATLANTIC MACKEREL FISHERY

Decision Rationale

(For the 1978 Atlantic Mackerel FMP/EIS)

The proposed actions to implement recommendations resulting from the Fishery Management Plan for the Atlantic Mackerel fishery are as follows:

1. Restrict the harvest of Atlantic Mackerel in the Fishery Conservation Zone (FCZ) to a total of 9,200 mt. The total harvest level is to be further allocated as follows: 3,500 mt to domestic commercial fishers, 4,500 mt to the recreational sector and 1,200 mt (as incidental catch only) to foreign fishing interests.
2. Require licensing of all commercial fishing vessels, including head and charter boats, that fish for or are expected to have incidental catches of mackerel in the FCZ.
3. Require licensed vessels to file mackerel catch reports monthly.

Since the Atlantic Mackerel is an overfished stock, the environmentally preferable action of the available set of alternative actions would be to prohibit the taking of the stock, incidentally or as the result of directed fishing. Under such a prohibition, it is estimated that 1979 spawning stock would be 6 percent greater than that which would result with fishing at the proposed 1978 levels. A no fishing rule would, however, result in unwarranted adverse economic and social consequences and is therefore not considered to be an acceptable option.

The proposed harvest levels are not expected to cause a decrease in 1979 spawning stock levels relative to levels in 1978. The allocations to the various sectors will provide for some anticipated growth in the domestic commercial mackerel fishery thereby possibly providing relief to other fisheries having reduced stock abundance, and allow recreational and sport sectors of the fishery to continue their activity at past levels. To obtain the above, it is necessary to maintain a reduced level of foreign fishing.

Licensing of vessels, and the filing of mackerel catch reports by licensed vessels, would strengthen the National Marine Fisheries Service's ability to collect much needed data on the state of the fishery.

We believe that the proposed actions constitute a reasonable compromise between the objective of stock rebuilding at any cost and the total satisfaction of the desires of the competing harvesting sectors.





UNITED STATES DEPARTMENT OF COMMERCE
The Assistant Secretary for Science and Technology
Washington, D.C. 20230

21 DEC 1976

Dear Reviewer:

In accordance with the provisions of Section 102(2)(C) of the National Environmental Policy Act of 1969, we are enclosing for your review and consideration the final environmental impact statement (supplement #1) prepared by the National Marine Fisheries Service of the National Oceanic and Atmospheric Administration and the Mid-Atlantic Fishery Management Council, in cooperation with the New England and South Atlantic Fishery Management Councils on the fishery management plan for the Atlantic Mackerel Fishery of the Northwest Atlantic Ocean.

If you have any questions about the enclosed statement, please feel free to contact:

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Executive Director
Mid-Atlantic Fishery Management Council
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Thank you for your cooperation in this matter.

Sincerely,

Sidney R. Galler
Deputy Assistant Secretary
for Environmental Affairs

Enclosure

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Abbreviations and Definitions Of Terms Used In This Document

cm = centimeter
EIS = Environmental Impact Statement
fathom = 6 feet
FCZ = Fishery Conservation Zone
fishing year = the 12 month period beginning April 1
FMP = Fishery Management Plan
fork length = length of a fish measured from the most anterior point to
the end of the median ray of the tail
FRG = Federal Republic of Germany
GDR = German Democratic Republic
GIFA = Governing International Fishery Agreement
ICNAF = International Commission for the Northwest Atlantic Fisheries
km = kilometer
knot = a unit of speed equal to one nautical mile (1.15 miles) per hour
metric ton = 2204.5 pounds
MSY = maximum sustainable yield
NMFS = National Marine Fisheries Service
NOAA = National Oceanic and Atmospheric Administration
OY = optimum yield
PMP = Preliminary Fishery Management Plan
Secretary = Secretary of Commerce
TAC = Total Allowable Catch
TALFF = Total Allowable Level of Foreign Fishing

SUMMARY

() Draft (X) Final Supplemental Environmental Impact Statement/Fishery Management Plan for the Mackerel Fishery of the Northwestern Atlantic Ocean.

II-1. Responsible Federal Agency

US Department of Commerce
National Oceanic and Atmospheric Administration
National Marine Fisheries Service

II-2. Name of Action

(X) Administrative () Legislative

II-3. Description of the Action

The Fishery Conservation and Management Act of 1976 (FCMA), enacted and signed into law on April 13, 1976, established a fishery conservation zone and provided for exclusive US regulation over all fishery resources except highly migratory species (i. e., tuna) within the Zone. This management plan for the mackerel fishery of the northwestern Atlantic Ocean was prepared by the Mid-Atlantic Fishery Management Council in consultation with the New England and South Atlantic Fishery Management Councils in accordance with the FCMA. It replaces the Preliminary Fishery Management Plan currently in effect. A Fishery Management Plan for Atlantic Mackerel for 1978 was prepared by the Mid-Atlantic Fishery Management Council during the fall of 1977. The Draft EIS/FMP was taken to public hearings and was reviewed pursuant to the NEPA process. A Final EIS/FMP for 1978 was submitted to NMFS for review and was approved for printing in May, 1978. Copies of the Final EIS/FMP were distributed for review and comment pursuant to NEPA. Because of this recent review of the proposed action, that is, the adoption of an FMP for Atlantic mackerel, it is felt that the review procedures for a supplemental EIS are adequate to insure public review and comment. This Draft Supplemental Environmental Impact Statement/Fishery Management Plan for 1979 incorporates the revisions to the 1978 EIS/FMP proposed during the review process and incorporates the same basic data and policy recommendations as the 1978 plan. There is one significant difference between the two plans. This difference involves the management unit for the plan. The 1978 plan did not explicitly define a management unit but implicitly used as a management unit all Atlantic mackerel throughout the range of the stock. The management unit for this plan for 1979 is defined as all Atlantic mackerel under US jurisdiction. A discussion of the alternative management units considered and the reasons for selecting the management unit selected are set forth in Section XII. The objectives of the plan are to:

1. Provide opportunity for increased domestic recreational and commercial catch;
2. Maximize the contribution of recreational fishing for Atlantic mackerel to the national economy;
3. Maintain the spawning stock size of Atlantic mackerel at or above its size in 1978;
4. Achieve efficient allocation of capital and labor in the mackerel fishery; and

5. Minimize costs to taxpayers of development, research, management, and management, and enforcement in achieving these objectives.

The natural range of, and fishery for, Atlantic mackerel extends from approximately Cape Hatteras, North Carolina, to Labrador, Canada. Within US waters this resource and its harvest are found both in the territorial sea and the FCZ.

The management unit of this FMP is all Atlantic mackerel under US jurisdiction. This unit was so defined because of uncertainty concerning the possibility of a US/Canadian bilateral fishing agreement and the need to develop an FMP that would be valid with or without such an agreement. A discussion of this issue, possible alternative management units, and the specification of the optimum yield (OY) for this management unit and FMP are set forth in Section XII.

It is recommended that the following measures be adopted to achieve the objectives:

1. Restrict US Atlantic mackerel catches in the FCZ so that the total domestic catch from the territorial sea and the FCZ does not exceed 14,000 metric tons for the 1979 - 1980 fishing year, allocating 9,000 metric tons to the sport fishery and 5,000 metric tons to the domestic commercial fishery. The Council will reevaluate these allocations in October, 1979, or at capture of 5,000 tons of mackerel in either the sport or commercial fishery, or when 70% of either allocation has been taken in the FCZ, whichever comes first. The Regional Director of the NMFS, with the concurrence of the Council, may then redistribute these allocations between the US recreational and commercial fisheries for the balance of the fishing year.
2. Restrict accumulative foreign Atlantic mackerel harvest to 1,200 metric tons for the 1979 - 1980 fishing year. This amount is intended to provide only for incidental foreign catches of mackerel. At such time as a foreign nation takes its allocation of Atlantic mackerel, it will be required to cease fishing operations that would lead to an additional catch of Atlantic mackerel.
3. That all vessels fishing commercially for Atlantic mackerel, either directly or as a by-catch from other fisheries, be registered. This provision shall also apply to all vessels for hire for fishing recreationally directly or indirectly for mackerel.
4. That weekly reports on mackerel catches be filed by foreign and domestic fishermen and that domestic dealers and processors submit weekly reports on any transactions involving mackerel.

Implementation of FMPs by the Secretary of Commerce have been defined as major Federal actions significantly affecting the environment.

II-4. Summary of Impact

The basic purpose of this FMP is to manage the Atlantic mackerel fishery off the east coast of the US for optimum yield, and to conserve, protect, and rebuild this fishery resource for future generations.

This plan favors recreational interests and seeks to restore domestic fishing opportunities to levels of catch per effort experienced in the past. The

quota set for commercial interests exceeds the annual level of harvest experienced in the past and is, therefore, nonrestrictive. The plan discourages the expansion and development of the fishery in the near future so that the resource can repopulate to a more desirable level of abundance.

The proposed action recommended herein should have no adverse impact on the environment.

II-5. Alternatives

Alternatives for which comments are desired are:

1. No Action - No action to limit the catches of Atlantic mackerel could result in an acceleration in the rate of decline of Atlantic mackerel stocks. The destruction of this resource would seriously affect the long-range viability of this fishery, both commercial and recreational, domestic and foreign.

2. Changes in Optimum Yield - This Fishery Management Plan proposes an optimum yield based upon the best scientific evidence currently available, estimated economic and social impact of the catch level to the US fishing industry and affected communities, possible interim and/or long-term bilateral agreements with Canada for management of this transboundary stock, the possibility of the growth of the Canadian mackerel fishery beyond that level judged most desirable by the US to achieve the objectives of this FMP, analysis of historical incidental catches of mackerel by foreign fisheries for other species, and environmental considerations. Stock rebuilding would be accelerated by closing the fishery or significantly reducing the catch in the US FCZ. However, an evaluation of the impact of the size of the anticipated commercial and recreational catch on the total stock as compared to the cost of enforcing a closure or a reduction makes this alternative unacceptable at this time. If the stocks do not rebuild as anticipated with curtailment of only the directed foreign fishery, further domestic controls will be necessary.

3. Reporting by Private Boat Owners - The Mackerel Advisory Subpanel suggested that the reporting requirements be expanded to include private boat owners. The Council did not include this provision in the proposed plan because of the complexity of the issue and the cost of enforcing such a provision and of processing the information that would be supplied.

II-6. List of Agencies From Which Comments Have Been Requested

<u>Agency</u>	<u>Comment Received</u>	
	<u>Original</u>	<u>Supplemental</u>
Senate Commerce Committee		
House Merchant Marine & Fisheries Committee		
Department of State	X	
Department of Commerce		
National Marine Fisheries Service - NOAA	X	
Office of Coastal Zone Management - NOAA		
Department of the Interior		
US Fish and Wildlife Service		
Bureau of Land Management		
US Dept. of Transportation, US Coast Guard	X	X
Environmental Protection Agency	X	
The States of Maine through North Carolina		
New England Fishery Management Council		X
South Atlantic Fishery Management Council		

II-7. Dates

Hearings:

Pt. Judith, RI	12/1/77, 10/3/78
Portland, ME	12/2/77, 10/5/78
Hyannis, MA	12/5/77
Gloucester, MA	12/6/77, 10/4/78
Manteo, NC	12/6/77
Norfolk, VA	12/7/77, 9/20/78
Ocean City, MD	12/8/77, 9/21/78
Cape May, NJ	12/9/77, 9/26/78
Riverhead, NY	12/12/77
Redbank, NJ	12/14/77
Asbury Park, NJ	9/27/78
Centerreach, NY	9/28/78

Draft statement to Environmental Protection Agency: Nov. 7, 1977

Final supplemental statement to Environmental Protection Agency:
August 28, 1978

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IV. INTRODUCTION

IV-1. Development of the Plan

This management plan for mackerel was prepared by the Mid-Atlantic Fishery Management Council in cooperation with the New England and South Atlantic Fishery Management Councils. It contains management measures to regulate fishing for mackerel and an environmental impact statement (EIS) prepared in accordance with the National Environmental Policy Act of 1969 (P.L. 91-190). Section 102(2) of P.L. 91-190 requires the preparation of an EIS in the case of major Federal actions that may significantly affect the quality of the human environment. Implementation by the Secretary of Commerce or her delegate of the management measures contained in this plan to regulate the foreign and domestic harvesting of mackerel will constitute such a major Federal action.

This fishery management plan, once approved and implemented by the Secretary of Commerce, will establish regulations on both foreign and domestic fleets harvesting mackerel within the FCZ and will supercede the PMP currently in effect.

IV-2. Overall Management Objectives

The Mid-Atlantic Council adopted the following goals to guide management and development of the mackerel fishery in the northwestern Atlantic. They are:

1. Provide opportunity for increased domestic recreational and commercial catch;
2. Maximize the contribution of recreational fishing for Atlantic mackerel to the national economy;
3. Maintain the spawning stock size of Atlantic mackerel at or above its size in 1978.
4. Achieve efficient allocation of capital and labor in the mackerel fishery.
5. Minimize costs to taxpayers of enforcement and management of the resource; and
6. Maximize marine food resources.

V. DESCRIPTION OF THE STOCKS

V-1. Species Or Group Of Species And Their Distribution

Atlantic mackerel (Scomber scombrus) ranges from Labrador and the Gulf of St. Lawrence (Parsons, 1970) to North Carolina (Anderson, 1976). The existence of separate northern and southern contingents was first proposed by Sette (1950). The northern contingent overwinters at the edge of the continental shelf off Long Island and east, and the southern from Long Island southward. The overwintering distribution of mackerel ranges from Sable Island to Cape Hatteras, North Carolina (Anderson, 1976).

The southern contingent begins its spring spawning migration by arriving offshore of North Carolina and Virginia in April, and moving steadily northward, reaching New Jersey and Long Island usually by May, where spawning occurs. These fish may spend the summer as far north as the Maine coast. In autumn this contingent moves southward toward Cape Cod and returns to deep offshore water near Block Island after October (Hoy and Clark, 1967).

The northern contingent arrives off southern New England in late May, and moves north to Nova Scotia and the Gulf of St. Lawrence where spawning occurs usually in July (Hoy and Clark, 1967; Bigelow and Schroeder, 1953). This contingent begins its southerly autumn migration in November and December and disappears into deep water off Cape Cod.

Thus, these two contingents intermingle off southern New England in spring and autumn (Sette, 1950). Tagging studies reported by Becket et al. (1974), Parsons and Moores (1974) and Moores et al. (1975) indicate that some mackerel that summer at the northern extremity of the range overwinter south of Long Island. On the basis of observed growth rate similarities, length-at-age, and age composition data from sampling in ICNAF Subareas (SA) 3 and 4 in summer and Subarea 5 and Statistical Area (SA) 6 (Figure 1) in winter, Moores et al. (1975) suggested that the northern contingent has been the dominant of the two groups in recent years and has supported the bulk of the SA 5 and SA 6 catch. However, precise estimates of the relative contributions of the two contingents cannot be made at present (ICNAF, 1975). Both contingents have been fished by the foreign winter fishery and no attempt has been made to separate these populations for assessment purposes by the International Commission for the Northwest Atlantic Fisheries (ICNAF), although separate TACs (Total Allowable Catch) were in effect for SA 5 and SA 6 and for areas to the north since 1973. Thus, Atlantic mackerel may be considered to consist of one stock for fishery management purposes.

V-2. Abundance and Present Condition*

Figure 2 gives Atlantic mackerel spawning stock size and recruitment in ICNAF Subareas (SA) 3 - 5 and Statistical Area (SA) 6 in 1962 - 1978. Total stock biomass (age 1+) increased from about 600,000 metric tons in 1962 - 1966 to about 2.4 million tons in 1969, and then declined to 525,000 tons in 1977 (approximately 2.2 billion fish). Assuming that 50% of age 2 fish and 100% of age 3+ fish are mature, the spawning stock size in 1977 has been predicted to

*This section was taken from Anderson (1977).

Table 1. Atlantic Mackerel Catch from ICNAF Subareas 3 - 5
and Statistical Area 6, 1961 - 1977
(metric tons)

Year	United States		Canada	Other Countries	Total
	Commercial	Recreational			
1961	1,361	6,828	5,459	11	13,659
1962	938	8,698	6,801	175	16,612
1963	1,320	8,348	6,363	1,299	17,330
1964	1,644	8,486	10,786	801	21,717
1965	1,998	8,583*	11,185	2,945	24,711
1966	2,724	10,172	11,577	7,951	32,424
1967	3,891	13,527	11,181	19,048	47,647
1968	3,929	29,130	11,134	65,747	109,940
1969	4,364	33,303	13,257	114,189	165,113
1970	4,049	32,078*	15,690	210,864	262,681
1971	2,406	30,642	14,735	355,892	403,675
1972	2,006	21,882	16,254	391,464	431,606
1973	1,336	9,944	21,247	396,723	429,250
1974	1,042	7,640*	16,701	321,837	347,220
1975	1,974	6,503	13,544	271,719	293,740
1976	2,345	4,947*	15,744	219,997	243,033
1977	3,000#	5,000#	20,000#	64,000#	92,000#

* From angler surveys. Catches in intervening years estimated by assuming that the ratio between catch and stock biomass in the years of the surveys was the same in the two years preceding and succeeding each survey.

Estimated. Revised since this assessment was performed. See "Condition of the Stock in 1979".

Table 2. Foreign Mackerel Allocations and Catches in 1977
(metric tons)

Country	1977 Allocation ¹	Catch Before March 1, 1977	Catch After March 1, 1977	Total 1977 Catch
Bulgaria	4,000	3,100	2	3,112
Cuba	-	683	-	683
FRG	1,100	-	-	-
GDR	12,400	7,981	-	7,981
Italy	300	50	342	392
Poland	20,200	17,167	-	17,167
Romania	1,100	900	-	900
Spain	-	-	82	82
USSR	22,800	22,800	3	22,803
Japan	-	-	82	82
Total	61,900	52,691	444	53,135

1. Total 1977 allocations included catches taken from ICNAF Subarea 5 & Statistical Area 6 before enforcement of the FCMA on March 1, 1977, i.e., catches during January and February were subtracted from each nation's allocation for 1977.

Catch Composition

Table 3 contains estimates of the mackerel catch in numbers at age during 1962 - 1977. The 1962 - 1975 numbers at age for the commercial fishery were taken from Anderson *et al.* (1976a). The 1976 numbers at age were revised from those used in the December, 1976, mackerel assessment for ICNAF (ICNAF, 1977). The general procedure used previously was (1) to apply length frequencies and age-length keys reported by individual countries to their catches to obtain numbers at age by country; (2) combine all such numbers at age for respective countries; and (3) prorate the summed numbers at age upwards to include catches from countries lacking sampling data. Significant differences were evident, however, among age-length keys submitted by different countries for 1976 (Anderson *et al.*, 1976b). Consequently, it was decided to combine country age-length keys by quarter for 1976 and 1977. The procedure used for the 1976 and 1977 data was to (1) determine numbers at length by country by month from available length frequencies and corresponding catches; (2) combine the numbers at length within quarters and prorate upwards to include countries lacking sampling data; (3) apply the combined quarterly age-length key to the quarterly numbers at length to obtain quarterly numbers at age, and (4) combine the quarterly numbers at age to obtain the annual numbers at age. The estimated numbers at age for 1977 were determined by applying the above procedure to the available January - March catch and sampling data and then prorating the results upwards to include the catch expected to be taken during the remainder of the year. Numbers at age for the 1962 - 1977 commercial catches were prorated upwards to include the added US recreational catches.

Mean weights at age used in previous assessments (Table 4) were applied to the numbers at age to obtain calculated catches for comparison with observed catches. Ratios between observed and calculated catches varied from 0.906 to 1.302 and averaged 1.015.

Table 4. Mean Weights At Age (Kg) For Mackerel

Age	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>8</u>	<u>9</u>	<u>10+</u>
Kg	.095	.175	.266	.350	.432	.506	.564	.615	.659	.693

Table 5. Stratified Mean Catch (Kg) Per Tow (\log_e And Retrtransformed) of Mackerel From USA Bottom Trawl Surveys In The Spring (Strata 1-25, 61-76) And Autumn (Strata 1-2, 5-6, 9-10, 13, 16, 19-21, 23, 25-26).

Year	Spring ¹		Autumn ²	
	\log_e	retransformed	\log_e	retransformed
1963	---	---	.013	.016
1964	---	---	<.001	<.001
1965	---	---	.046	.073
1966	---	---	.057	.085
1967	---	---	.195	.372
1968	.575	3.998	.117	.217
1969	.029	.065	.154	.459
1970	.471	2.039	.068	.099
1971	.425	1.969	.052	.073
1972	.354	1.332	.070	.107
1973	.228	.748	.034	.043
1974	.277	.769	.046	.108
1975	.121	.255	.010	.016
1976	.144	.317	.028	.039
1977	.118	.199	---	---

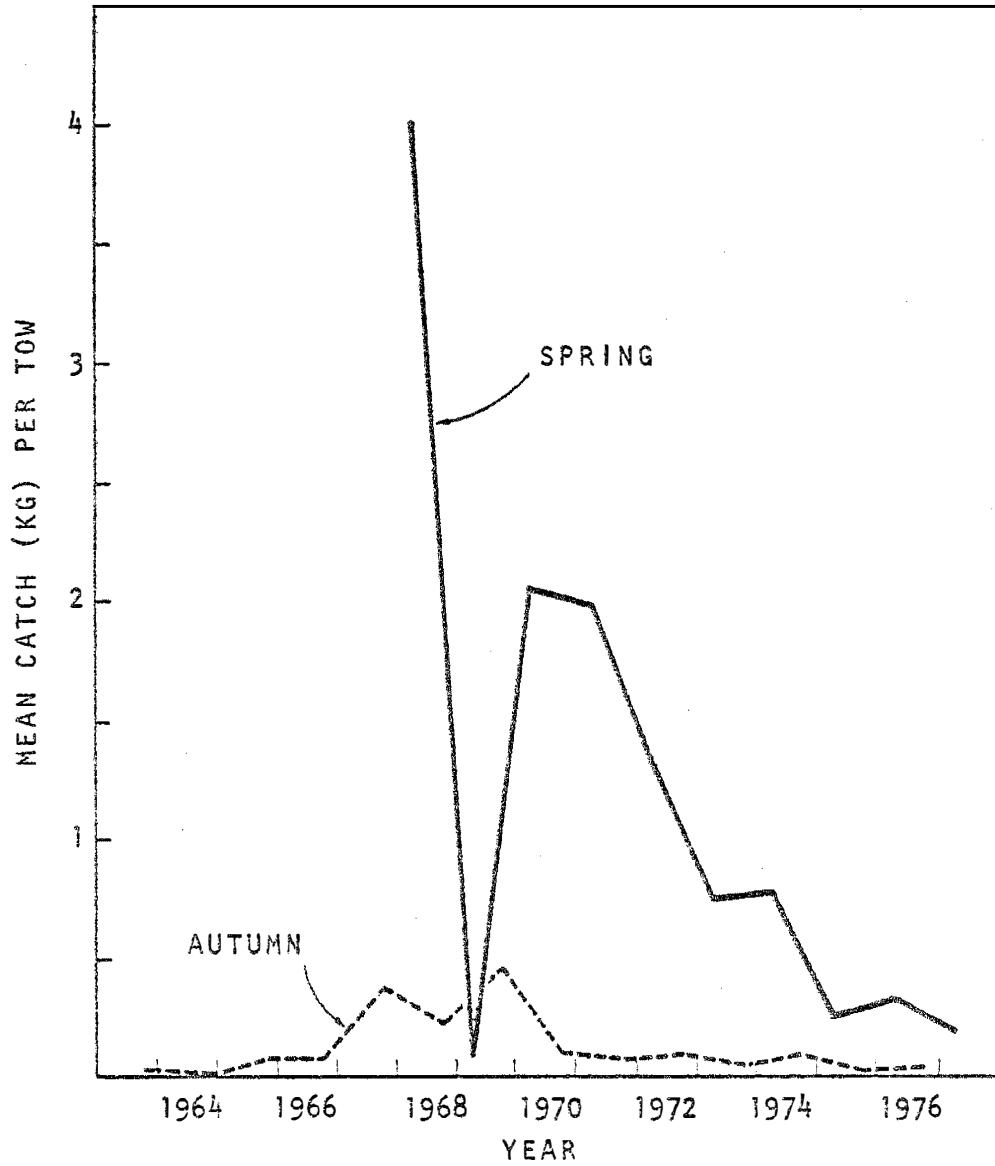
(1) Based on catches with No. 41 trawls; 1968-72 catches were with No. 36 trawl and were adjusted to equivalent No. 41 catches using a 3.25:1 ratio (41/36).

(2) Based on catches with No. 36 trawl.

Abundance Indices

US research vessel bottom trawl survey catch-per-tow data (Table 5) indicate a continued decline in mackerel abundance. The spring survey catch-per-tow (kg) index decreased 37% from 1976 to 1977. Both the spring and autumn indices have demonstrated a continuous biomass decline since 1968 - 1969 (Figure 3). The spring survey average catch-per-tow in numbers has also declined continuously (Table 6), and has shown a marked decrease in the number of age 1 mackerel in 1976 and 1977. The standardized US commercial catch-per-day index (Table 7) (Anderson, 1976) has usually been consistent with estimates of abundance from survey data and with stock biomass estimates obtained from cohort analysis (Table 8) but it increased in 1975 and 1976 while the other indices continued to decrease. The US commercial index is limited in that it is based on inshore catches comprising less than 1% of the international catch, and it is likely that the recent increases in that index are merely a reflection of localized changes in availability rather than overall stock abundance.

Catch-per-effort data from distant water fleets are not available for 1977, but 1976 data indicated increases for certain Bulgarian, GDR, and Polish vessel-classes and decreases for some USSR vessels. Previous analyses (Anderson, 1976) suggested, however, that changes in vessel efficiency invalidate distant water fleet catch-per-effort as a reliable measure of mackerel abundance. This was recognized at the time of the last assessment (ICNAF, 1977) as well as the possibility of continued accessibility of schooling species like mackerel to fishing gear, even at low abundance levels.



Stratified Mean Catch (kg) Per Tow Of Mackerel
 From US Spring (1968-77) And Autumn
 (1963-76) Bottom Trawl Surveys

Figure 3

Table 6. Stratified Mean Catch (Number) Per Tow of Mackerel by Year-Class from the 1973 - 1976 US Spring Bottom Trawl Surveys in ICNAF Subarea 5 and Statistical Area 6, Strata 1-25, 61-76

Number by Year- Class	YEAR				
	<u>1973</u>	<u>1974</u>	<u>1975</u>	<u>1976</u>	<u>1977</u>
1976					0.043
1975				0.447	0.254
1974			5.330	4.928	0.340
1973		2.067	1.101	0.365	0.153
1972	1.949	0.749	0.141	0.070	0.050
1971	6.683	1.347	0.128	0.014	0.017
1970	8.188	0.185	0.030	0.006	0.010
1969	15.957	0.492	0.028	0.009	0.024
1968	3.669	0.249	0.020		0.011
1967	21.081	1.401	0.014	0.004	0.018
1966	6.309	0.440	0.001		0.007
1965	3.319	0.237			0.019
1964	0.365	0.017			
1963	<u>0.574</u>				
Total	68.094	7.274	6.793	5.843	0.946

Table 7. Atlantic Mackerel Catch Per Standardized US Day Fished

<u>Year</u>	<u>Catch-Per-Day (metric tons)</u>
1964	0.43
1965	0.49
1966	0.84
1967	1.75
1968	2.80
1969	1.92
1970	2.07
1971	1.29
1972	0.84
1973	0.53
1974	0.17
1975	0.53
1976	0.59

Assessment Parameters

In addition to catch (numbers) at age data, parameters essential for the projection of catches in 1978 include fishing mortality in 1977, size of incoming year-classes, and estimates of partial recruitment.

Fishing Mortality In 1977 - Fishing mortality in 1977 was estimated using a technique developed by Anderson *et al.* (1976a) which assumes a linear relationship between fishing effort and fishing mortality. The absence of an adequate measure of commercial catch-per-effort prevented calculation of actual fishing effort. Instead, an annual fishing effort index was determined by dividing total catch by the spring survey catch-per-tow (Table 9). Because of the aberrant 1969 spring value and the year-to-year fluctuations in the remaining values, the 1968 - 1977 time-series was smoothed by calculating an exponential curve through the actual points (Figure 4), and the predicted values calculated from the curve were used in place of the actual values to determine the fishing effort index. Cohort analysis was performed using $F = 0.30$ for ages 4 and older in 1977 with $M = 0.30$ for all ages. This level of F was chosen as a first approximation since the fishing effort index in 1977 was about half the 1976 index, implying a similar reduction in fishing mortality from earlier estimates for 1976 of about 0.60 - 0.70. A linear regression between the 1968 - 1975 fishing effort indices and the mean fishing mortality rates (F) for ages 3 and older from the cohort analysis predicted an F of 0.374 for 1977 based on the fishing effort index for 1977. A second cohort analysis was run using 0.38 as the terminal F in 1977. A second linear regression using the revised F values from this cohort analysis predicted $F = 0.389$ for 1977. A third and final cohort analysis was run using $F = 0.39$ for 1977 (Table 10). A final linear regression predicted $F = 0.391$ for 1977 (Table 9, Figure 5); therefore, $F = 0.39$ was accepted as the best estimate.

Recruitment Estimates - Estimates of the size of the 1974 - 1976 year-classes at age 1 were obtained from power curve relationships of survey catch-per-tow (numbers) of (1) age 0 fish from autumn surveys, and (2) age 1 fish from spring surveys versus year-class size at age 1 from the cohort analysis (Tables 11 and 12, Figures 6 and 7). Estimates of the size of the 1974 - 1975 year-classes at age 2 were also obtained from power curve relationships between spring survey catch-per-tow of age 2 fish and year-class size at age 2 from cohort analysis (Table 11, Figure 8).

The size of the 1974 year-class at age 1 was estimated to be 2516 million fish based on the autumn survey age 0 index and 2104 million fish based on the spring survey age 1 index. The year-class at age 2 was estimated to be 1488 million fish based on the spring survey age 2 index. Given the reported catch of 349.5 million fish at age 2 in 1976 (Table 3) and assuming a year-class size of 1488 million fish at age 2, implies an F of 0.314. Assuming this F in 1976 for the 1974 year-class, the size of the year-class at age 1 from cohort analysis would be 2447 million fish. The mean of these three different year-class estimates at age 1 was 2335 million fish. The reported catch of 375.4 million fish at age 1 in 1975 (Table 3) applied to the year-class estimates of 2516 and 2104 million fish at age 1 implies year-class sizes at age 2 of 1543 and 1238 million fish respectively. The mean of the three different year-class estimates at age 2 was 1423 million fish. The reported catch of 349.5 million fish at age 2 applied to a year-class size of 1423 million fish implies an F of 0.331. Cohort analysis starting with this F at age 2 in 1976 gives a year-class size of 2358 million fish at age 1 in 1975. In view of

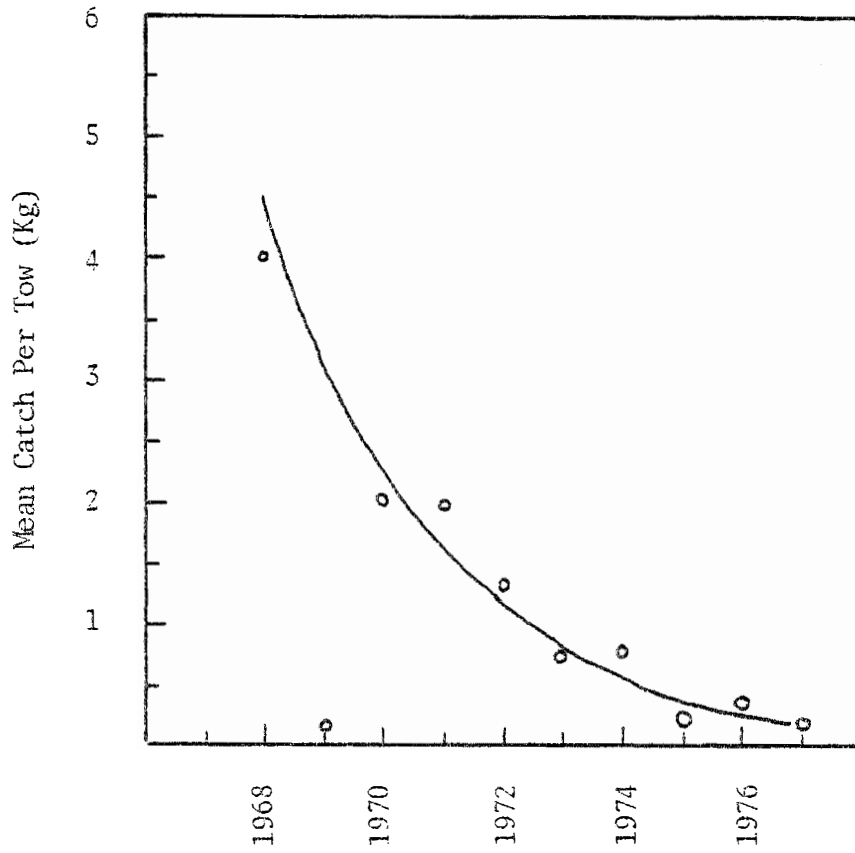
these various estimates, the 1974 year-class at age 1 was set at 2360 million fish.

Table 9. Estimation of Fishing Mortality in 1977 for ICNAF Subareas 3 - 5 and Statistical Area 6 Atlantic Mackerel Fishery

Year	Spring Survey Catch/Tow		Catch ³ (Tons)	Fishing Effort Index ⁴	Mean F ⁵ Age 3+
	Actual ¹	Calculated ²			
1968	3.998	4.518	109,940	24,334	.155
1969	.065	3.199	165,113	51,614	.144
1970	2.039	2.265	262,681	115,974	.185
1971	1.969	1.604	403,675	251,668	.268
1972	1.332	1.135	431,606	380,270	.316
1973	.748	.804	429,250	533,893	.451
1974	.769	.569	347,220	610,228	.515
1975	.255	.403	293,740	728,883	.532
1976	.317	.285	243,033	852,747	(.626) ^{6,7}
1977	.199	.202	92,000	455,446	(.391) ⁶

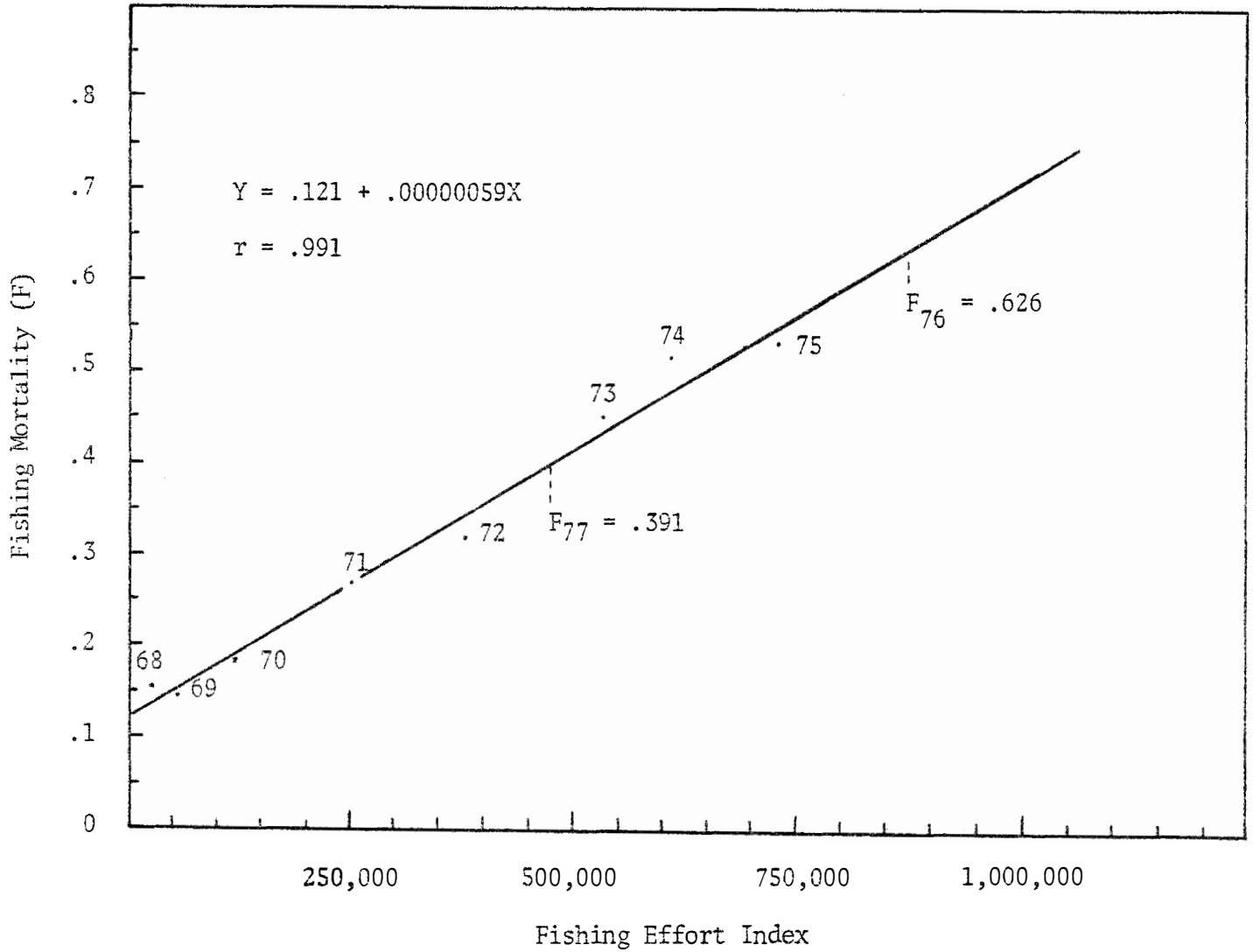
- (1) Stratified mean catch (kg) per tow (retransformed from \log_e to linear scale).
- (2) Values predicted from exponential curve calculated using actual values for 1968-77 (except 1969). See Figure 3.
- (3) Includes commercial and recreational catch.
- (4) Catch divided by calculated spring survey catch/tow.
- (5) Obtained from cohort analysis assuming $F = 0.39$ in 1977.
- (6) Calculated from regression of fishing effort index on mean F for 1968-75: $Y = 0.121 + 0.00000059X$, $r = 0.991$.
- (7) Actual value calculated from cohort analysis was 0.745, assuming $F = 0.39$ in 1977.

Figure 4



Exponential Curve Calculated Through 1968-77 Time-Series
(1969 Point Omitted From Calculation Of Curve)
Of Spring Survey Catch-Per-Tow (Kg) Indices For Mackerel

Figure 5



Relationship Between Fishing Mortality From Cohort Analysis And Fishing Effort Derived From Spring Survey Catch-Per-Tow And Total Catch

Table 11. Catch Per Tow (Number) of Ages 1 and 2 Mackerel from US Spring Bottom Trawl Surveys (Strata 1-25, 61-76) and Year-Class Size (Millions of Fish) at Ages 1 and 2 from Cohort Analysis

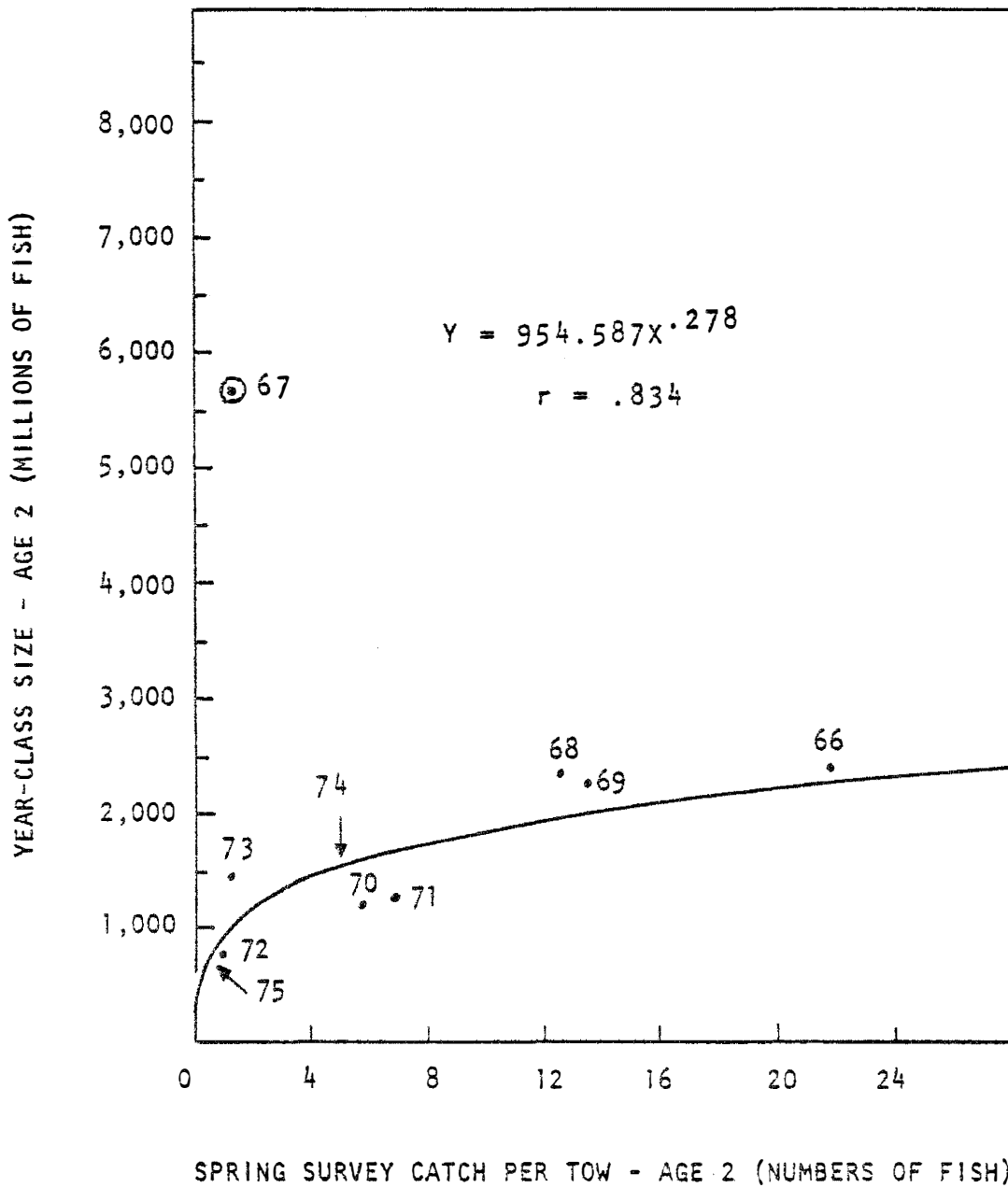
<u>Year-Class</u>	<u>Age 1</u>		<u>Age 2</u>	
	<u>Spring Survey</u>	<u>Cohort Analysis</u>	<u>Spring Survey</u>	<u>Cohort Analysis</u>
1966		3165.3	21.661	2344.1
1967	197.993	7786.5	1.190 ¹	5617.3
1968	.299	3114.3	12.435	2300.1
1969	6.208	3244.9	13.390	2226.5
1970	2.954	1657.5	5.545	1161.4
1971	12.093	1711.9	6.683	1248.9
1972	1.949	1212.6	.749	759.4
1973	2.067	1981.2	1.101	1385.1
1974	5.330	(2103.9) ²	4.928	(1488.3) ²
1975	.447	(915.3) ²	.254	(651.8) ²
1976	.043	(416.9) ²		

1. Not used.
2. Calculated.

Table 12. Catch Per Tow (Number) Of Age 0 Mackerel From US Autumn Bottom Trawl Surveys (Strata 1-2, 5-6, 9-10, 13, 16, 19-21, 23, 25-26) And Year-Class Size (Millions Of Fish) At Age 1 From Cohort Analysis

<u>Year-Class</u>	<u>Autumn Survey Age 0</u>	<u>Cohort Analysis Age 1</u>
1963	0.087	429.5
1964	0.022	542.2
1965	0.134	1212.9
1966	0.170	3165.3
1967	15.709	7786.5
1968	0.215	3114.3
1969*	38.504	3244.9
1970	0.027	1657.5
1971	0.517	1711.9
1972	0.119	1212.6
1973	0.339	1981.2
1974	0.648	(2515.6)#
1975	0.012	(614.3)#
1976	0.000	(0.0)#

- * Not Used
Calculated



Power Curve Relationship Between Mackerel Year-Class Size At Age 2 And Spring Survey Catch Per Tow At Age 2. The 1967 Point Was Not Used In Calculating The Curve.

Figure 8

The 1975 year-class at age 1 was estimated to be 614 million fish based on the autumn survey age 0 index and 915 million fish based on the spring survey age 1 index. This year-class at age 2 was estimated to be 652 million fish based on the spring survey age 2 index. The assumed catch of 33.0 million fish at age 2 in 1977 (Table 3) applied to a year-class size of 652 million fish gives an F of 0.060. Cohort analysis starting with $F = 0.060$ at age 2 in 1977 results in a year-class size of 898 million fish at age 1 in 1976. The mean of these three estimates of year-class size at age 1 was 809 million fish. Applying the reported catch of 12.3 million fish at age 1 in 1976 (Table 3) to the year-class estimates of 614 and 915 million fish at age 1 implies year-class sizes at age 2 of 444 and 667 million fish, respectively. The mean of the three year-class estimates at age 2 was 588 million fish. Given the reported catch of 12.3 million at age 2 from a year-class of 588 million fish implies an F of 0.067. Cohort analysis starting with this F at age 2 in 1977 gives a year-class size of 809 million fish at age 1 in 1976. The size of the 1975 year-class at age 1 was, therefore, set at 810 million fish.

The 1976 year-class at age 1 was estimated to be 417 million fish based on the spring survey age 1 index. Fish of this year-class were not caught at age 0 during the 1976 autumn survey. The survey catch-per-tow of this year-class at both ages 0 and 1 was the poorest of any year-classes during 1963 - 1977 (Tables 11 and 12). It appears, therefore, that this year-class is very poor. The poorest year-classes observed since 1961 were in 1962 - 1963 (429.5 million fish at age 1). The size of the 1976 year-class at age 1 was set at 415 million, based on the single estimate from the 1977 spring survey data, which is about the size of the poorest year-classes observed.

There are presently no estimates available concerning the size of the 1977 year-class. Since the contribution of age 1 fish to the 1978 catch is expected to be minimal, the estimation of the size of the 1977 year-class is not particularly critical to the results of the assessment. However, the consequences of overestimating the size of this year-class are much greater than of underestimating it. If the year-class is underestimated, then any losses in catch at age 1 will be regained in later years since yield-per-recruit is maximized at about age 4 (ICNAF, 1973). If the year-class is overestimated, then the 1979 stock size is driven below projected levels. The 1977 year-class at age 1 was, therefore, set at the level of the poor 1976 year-class.

Partial Recruitment - Mackerel are considered to be fully recruited to the fishery at age 3 and older, based on age-specific fishing mortality rates (Table 10). Partial recruitment at ages 1 and 2 (the percentage of fishing mortality at those ages compared with the mean for ages 3 and older) varied considerably during 1962 - 1977 (Table 13). Partial recruitment at age 1 ranged from 0.9 to 112.8% and at age 2 from 15.8 to 89.9%. The values prior to 1968 are less precise than those since then because the numbers-at-age data for 1962 - 1967 were based on very limited data (Anderson et al., 1976a). Partial recruitment at ages 1 and 2 in 1977 was calculated to be near the low end of the range of values. In view of the wide fluctuations evident in previous years, it was felt that the use of the 1977 partial recruitment coefficients in 1978 may not necessarily reflect the probable situation. For age 1, an average of the 1968 - 1977 values (except 1970, 1973 and 1975) was used for 1978 (9%). The high values in 1970 and 1975 were excluded because they occurred when large catches were taken from strong incoming year-classes, and this did not appear to represent the expected situation in 1978. The high

1973 value was also excluded because it resulted from a large catch of age 1 fish from a below-average year-class which occurred as a consequence of intensive fishing effort being exerted on younger age-groups to maintain previous high levels of catch at a time when older age-groups had experienced a sharp decrease in abundance. For age 2, an average of the 1968 - 1977 values (except 1974 - 1975) was used for 1978 (39%). The values in 1974 - 1975 were excluded because they were unusually higher than most others and did not appear to be representative of the expected situation for 1978. They resulted from (1) large catches being taken from good-strong year-classes, and (2) from apparent direction of fishing effort onto that age-group from older age-groups to maintain high levels of catch.

Table 13. Percentage Of Fishing Mortality (F) At Ages 1 And 2 Compared To Mean F At Age 3 And Older (Partial Recruitment)

<u>Year</u>	<u>Age 1</u>	<u>Age 2</u>
1962	78.9	15.8
1963	9.5	23.8
1964	112.8	82.1
1965	46.2	32.7
1966	46.7	70.0
1967	0.9	40.5
1968	17.4	25.2
1969	2.1	44.4
1970	41.6	16.2
1971	20.9	64.6
1972	4.7	28.8
1973	37.3	67.6
1974	11.3	89.9
1975	38.0	85.0
1976	2.4	44.3
1977	1.5	17.2

Table 14. Summary of Parameters Used In The Mackerel Assessment

Fishing mortality in 1977 (4+)		0.39
Recruitment at age 1:	1974 year-class	2,360.0 x 10 ⁶
	1975 year-class	810.0 x 10 ⁶
	1976 year-class	415.0 x 10 ⁶
	1977 year-class	415.0 x 10 ⁶
Partial recruitment in 1978 (%):	Age 1	9
	Age 2	39
	Age 3+	100
1978 Projection: Spawning Stock (10 ³ tons)		402.5

Assessment Results*

Calculated fishing mortalities and stock sizes by age for 1962 - 1977 are listed in Tables 10 and 8. The assessment parameters used are summarized in Table 14. Fishing mortality for ages 3 and older increased throughout the period from 0.038 in 1962 to 0.745 in 1976 before decreasing in 1977 to an estimated 0.39. Total stock biomass (age 1 and older) increased from about 600,000 tons in 1962 - 1966 to a peak of 2.4 million tons in 1969 and then declined steadily to an estimated 524,000 tons at the beginning of 1977. Spawning stock biomass (50% of age 2 and 100% of age 3 and older) increased from around 500,000 tons during 1962 - 1967 to 1.8 million tons in 1970 - 1972 and then decreased to 435,000 tons in 1977. Under the assumption that 92,000 tons will be caught in 1977, the spawning stock will be further reduced to 402,500 tons in 1978. Table 15 lists the projected catch in 1978 and the spawning stock in 1979 at levels of fishing mortality from 0.0 to 0.7. If no fishing were allowed in 1978, the spawning stock would be increased about 6% to 428,000 tons in 1979. A catch of 23,500 tons in 1978 ($F = 0.07$) would maintain the 1979 spawning stock at the 1978 level. Fishing at $F_{0.1} = 0.35$ would produce a catch of about 104,000 tons, but would reduce the spawning stock by 21% in 1979.

If the entire assessment was done assuming a total catch of 110,000 tons in 1977 (TAC of 105,000 plus 5,000 tons for US recreational catch) instead of 92,000 tons, the catch projections for 1978 would differ very little. The fishing mortality estimate for 1977 would be 0.435 instead of 0.39 and projected spawning stock size in 1978 would be about 390,000 tons, instead of 402,500 tons. A catch of about 25,000 tons in 1978, instead of 23,500 tons, would maintain the 1979 spawning stock at the 1978 level.

Figure 2 shows the historical relationship between spawning stock and recruitment. The spawning biomass present in 1962 - 1967 of about 500,000 tons produced year-classes ranging from the poorest (1962 - 1963) to the strongest (1967). The largest spawning stocks present during the late 1960s - early 1970s produced both above- and below-average year-classes. It is evident that spawning stock size exerts little influence on the size of a year-class unless perhaps the spawning stock is reduced to extremely low levels. Lett and Kohler (1976) found this to be evident in simulations of Gulf of St. Lawrence herring. Environmental factors are obviously the major controlling forces, but the present state of knowledge concerning the influence of these factors is inadequate for assessment use. Consequently, it is virtually impossible to define an optimum or minimum spawning stock size at or above which level adequate recruitment can be predicted or below which level poor recruitment is likely. However, since spawning stock size has continued to steady decline and recent year-classes (1975 - 1976) appear to be as poor as any observed previously, there is obvious cause for concern if the spawning stock is allowed to decrease below the projected 1978 level.

* This section has been updated by the following discussion, "Condition of the Stock in 1979 and 1980."

Table 15. Projected Mackerel Catch in SA 3-6 in 1978 with Fishing Mortality Ranging from 0.0 to 0.7, and the Resulting Spawning Stock in 1979 and the Percentage Change from 1978.

Mortality (F)	Mortality (F)	1978 (10 ³ tons)	Spawning Stock in 1979 (10 ³ tons)	% Change in Spawning Stock from 1978 (by weight)
0.00	0.30	0.0	428.0	+6.3
0.05	0.35	16.9	409.6	+1.8
0.07	0.37	23.5	402.5	0.0
0.10	0.40	33.0	392.6	-2.5
0.15	0.45	48.5	376.3	-6.5
0.20	0.50	63.2	360.8	-10.4
0.25	0.55	77.3	346.0	-14.0
0.30	0.60	90.8	331.9	-17.5
0.35	0.65	103.7	318.5	-20.9
0.40	0.70	116.0	305.6	-24.1
0.45	0.75	127.8	293.4	-27.1
0.50	0.80	139.0	281.7	-30.0
0.55	0.85	149.8	270.6	-32.8
0.60	0.90	160.1	260.0	-35.4
0.65	0.95	170.0	249.8	-37.9
0.70	1.00	179.5	240.1	-40.3

Condition of the Stock in 1979 and 1980*

Information from the 1978 NMFS spring trawl survey was added to the data used in the above assessment. The following discussion incorporates the results of this research that are presently available. The 1978 survey data have confirmed the results and conclusions of the above assessment discussion, although minor revisions in some parameters have occurred due to better information regarding the 1978 mackerel catch and other factors.

Abundance indices

The stratified mean mackerel catch per tow in numbers increased from a low in 1977 of 0.946 (Table 6) to 2.614 in 1978. The mean catch per tow in weight (kg) index also increased from 0.199 in 1977 (Table 5) to 0.447 in 1978. These increases are probably due to a change in availability and not to an increase in stock size. Before 1978 a major foreign fishery in ICNAF Statistical Area 6 (now part of the FCZ) concentrated on this species during each winter. However, 1978 was the first year since 1962 that a large foreign fishery was not exploiting mackerel and, thus, the fish were more available at the time of the NMFS spring bottom trawl survey.

These survey results suggest that the 1976 and 1977 year-classes are poor, as previously assumed. Mackerel catches by the Soviet research vessel Argus in 1978 also showed a low abundance of age 1 (1977 year-class) and age 2 (1976 year-class) fish in 1978. The 1974 and 1973 year-classes appear to be

*This discussion was taken from Overholtz and Anderson (1978).

predominant in the stock at the present time.

Recruitment Estimates

Estimates of the 1974-1977 year-classes at age 1, and the 1974-1976 year-classes at age 2, were obtained using the procedure outlined by Anderson (1977). These results suggest that the estimates for the 1974 and 1975 year-classes at age 1 were approximately correct. The 1976 and 1977 year-classes were both assumed to be 700 million fish. Partial recruitment to the fishery was assumed to be the same as that used in the 1978 assessment: 9% at age 1, 3 % at age 2, and 100% at age 3 and older.

Assessment Results

The mackerel stock size (age 1 and older) continued to decline to a low of 517,000 metric tons at the beginning of 1978. The spawning stock biomass (50% of age 2 fish and 100% of age 3 and older fish) also declined to a low of 405,000 metric tons.

In order to estimate the mackerel stock size in 1979, six catch options for 1978 were considered because of uncertainties as to the 1978 mackerel catch in Canadian waters and US waters.

The first option assumes that US fishermen will catch their predicted capacity of 14,000 tons (commercial and recreational), that the foreign catch in US waters will be 1,200 tons (as allocated by the 1978 PMP for this species), and that the catch in Canadian waters will be 25,000 tons. Options 2 and 3 assume the same US and foreign catch as in Option 1, but assume Canadian catches of 50,000 and 100,000 tons, respectively.

Option 4 assumes a US catch (commercial and recreational) of 4,000 tons, a foreign catch in US waters of 1,200 tons, and a catch in Canadian waters of 25,000 tons. Options 5 and 6 assume the same US and foreign catch as in Option 4 but assume Canadian catches of 50,000 and 100,000 tons, respectively (Table 16).

If a desired objective for this resource is to maintain the spawning stock biomass in 1980 at the 1978 level, then under Option 5 a total catch of about 55,000 tons (US and Canadian waters) could be removed in 1978 and a total catch of about 64,000 tons could be taken in 1979. A lower total catch in 1978 (Options 1 or 4) would result in some stock rebuilding. For example, if 40,000 tons are taken in 1978 (Option 1), a similar amount could be removed in 1979 and some stock rebuilding should occur. If the total mackerel catch in 1978 exceeds 105,000 tons (Option 6), then the spawning stock biomass in 1980 will be beneath that of 1978, even at a low level (i.e., a very small total catch) of fishing mortality (F) in 1979.

V-3. Ecological Relationships

Although some research has been directed at the ecological relationships of Atlantic mackerel, no conclusive evidence on this subject of relevance to the formulation of a FMP is presently available. Future updates of this FMP will incorporate such information as it becomes available. The following section presents much of what is known on this subject, and is excerpted from Maurer (1976).

The Atlantic sea herring (Clupea harengus) and Atlantic mackerel share many common characteristics, i.e., distribution, abundance and size. Ecologically, they can be described as pelagic, schooling and fast swimming zooplankton feeders associated with similar water masses along the continental shelf of the northeast coast of the United States from Cape Hatteras, ranging in winter to boreal waters. Morphologically, both species are laterally compressed and possess pronounced visual acuity. Their general feeding strategies are also alike as either can select prey items or "filter feed". With so many similar niche parameters a measurable degree of overlap between food resources might be expected. Over the area of investigation, herring have been reported as feeding on small copepods (Saunders, 1952), large copepods (Pavshtics, 1965), copepods, euphausiid shrimp and amphipods (Paulmier and DeCamps, 1973) and chaetognaths, copepods and euphausiid shrimp (Maurer and Bowman, 1975). Sette (1943) first linked mackerel to Calanus rich waters, while others have reported the dominance of chaetognaths, small copepods and pteropods (Maurer and Bowman, 1975).

In the spring of 1974 the Northeast Fisheries Center initiated a special preliminary study designed to investigate the similarities and measure the overlap of the food habits of herring and mackerel.

Results

General characteristics of herring diet A complete list of food items eaten by herring is presented in Table 17. A total of 32 different prey items was identified. Examining the general quantitative composition by weight and number, clearly, chaetognaths dominated the diet by weight (43%) and number (68%). All chaetognaths were identified as Sagitta elegans, a common carnivorous zooplankton averaging 20 mm in length, especially abundant in the area of Georges Bank where densities of 5,840 per 100 cubic meters have been reported (Clarke et al., 1943). Euphausiids as a group accounted for 34% of the stomach content weight, however, only 0.6% of the numbers. Euphausiids were one of the largest prey items ingested by herring, approximately 40 mm in length, and constitute an extremely important prey resource in the outer shelf and slope waters. These shrimp-like crustaceans are known to perform diel vertical migrations, a behavior which may account for their importance in food chains of many demersal as well as pelagic predators. Of the two species identified, Meganycitiphanes norvegica was the dominant form in terms of diet weight, 23.5%, while Thysanoessa inermis represented 6.5% of the diet weight. The shelled pteropod, Limacina retroversa, ranks third in importance as regards diet weight (6.2%) and numbers (10.6%). As an aggregate, copepods represented only 3% of the diet weight and 8% of the diet numbers. Twelve genera were identified, ten calanoid, one cyclopid (Oithona) and one harpacticoid (Macrosetella). The four dominant copepod genera are all common coastal shelf-water species ranging in size (length) from 0.5 mm to 1.2 mm. Barnacle cypris (larval stages) made up 12.2% of diet numbers while

contributing only 0.6% to diet weight. This meroplankton component is a seasonal (spring-summer) member of the plankton and is known to occur in local patches resulting from simultaneous release of nauplii by adults. The mean size of these larvae was 0.5 mm. Larval and juvenile fish comprised only 0.4% of the diet weight. The most frequently occurring were sand lance, Ammodytes americanus, and a singular occurrence of cannibalism, one herring larvae.

The remainder of the food groups reported contribute a rather insignificant amount to diet weight or numbers. These include larvaceans, pandalid shrimp, gammarid and hyperiid amphipods. The presence of demersal crustaceans, five pandalids, fifteen gammarid amphipods and a few sand grains indicate occasional departures from the pelagic feeding habit.

General characteristics of mackerel diet A total of 38 different food items was identified (Table 17). Copepods (32.7%) and pteropods (33.5%) contributed almost equally to the diet weight. However, their numbers were quite disproportionate, the smaller copepods constituting 81.5% of the diet numbers. All pteropods were L. retroversa except thirteen gymnosomate forms of the genus Clione. Nine copepod genera were identified, although only four genera dominated weight and numbers; their numbers ranging from 2-3 orders of magnitude above the other copepod genera. Other calanoid genera, cyclopoid and harpacticoid copepods occurred in relatively small numbers and as a group made up only about 1% of the diet weight. Larvaceans comprised 5.1% of diet weight and 2% of diet numbers; clearly dominated by the small coastal form Oikopleura dioica, size range 1 - 1.5 mm. Some 18 larval and post-larval fish represented 4.5% of the diet weight. Although fish eggs did not contribute much to diet weight (0.4%), a total of 68 were enumerated. Euphausiids M. norvegica (4.1%) and T. inermis (0.1%) occurred in the same relative proportion as in the herring diet. Decapods were of little importance, 3.4% of the diet weight. Larger adult forms were ingested in small numbers; Crangon (20), Pandalus (3), Sergestid shrimp (1), while small pelagic larvae were taken in substantially greater numbers; decapod larvae (749) and Pagurus zoea (6). Other minor foods include Neomysis (0.5% diet weight), Ophiura (0.2%), hyperiid amphipods (0.2%), gastropod veliger, pelecypod veliger, cumaceans, gammarid amphipods, polychaete larvae, and siphonophores.

Table 17. A List of Food Items Resulting from the Quantitative Analysis of Stomach Contents of All Mackerel and Herring Samples. Weight (Wet) Expressed in Grams.

Prey items	Atlantic Mackerel				Sea Herring			
	Weight		Number		Weight		Number	
	g	% of Total	No.	% of Total	g	% of Total	No.	% of Total
FORAMINIFERA	Tr	<0.1	2	<0.1				
DIATOMS					.034	<0.1	7	<0.1
SIPHONOPHORE	.011	0.1	2	<0.1				
HYDROZOA	Tr				.053	<0.1	4	<0.1
POLYCHAETE LARVAE	.002	<0.1	11	<0.1	.001	<0.1	4	<0.1
AMPHIPODA								
<u>Gammaridea</u>	.015	<0.1	5	<0.1	.081	0.1	13	<0.1
<u>Gammarus</u>	.062	<0.1	6	<0.1	.010	<0.1	2	<0.1
<u>Hyperidea</u>	.002	<0.1	1	<0.1	.022	<0.1	3	<0.1
<u>Hyparia</u>	.357	0.2	97	<0.1	.029	<0.1	9	<0.1
<u>Lyperiid</u>	.028	<0.1	7	<0.1				
DECAPODA								
<u>Crangon</u>	2.656	1.8	20	<0.1				
<u>Pagurus zoea</u>	.056	<0.1	6	<0.1	.023	<0.1	9	<0.1
<u>Pandalidae</u>					.020	<0.1	5	<0.1
<u>Pandalus</u>	1.334	0.9	3	<0.1				
<u>Sargestidae</u>	.099	<0.1	1	<0.1				
Decapod larvae	.814	0.5	749	0.3	.131	<0.1	85	0.2
ISOPODA					.010	<0.1	12	<0.1
CUMACEA								
<u>Diastylus</u>	.014	<0.1	10	<0.1	.003	<0.1	1	<0.1
EUPHAUSIACEA								
<u>M. norvegica</u>	6.128	4.1	51	<0.1	18.627	23.1	133	0.3
<u>T. inermis</u>	.419	0.1	28	<0.1	4.886	6.1	103	0.2
Other euphausiids					3.057	3.8	32	<0.1
MYSIDACEA								
<u>Neomysis</u>	.738	0.5	134	<0.1	.007	<0.1	3	<0.1
Other mysids					.003	<0.1	4	<0.1
CIRRIPEDEA (Cypris)	Tr	<0.1	5	<0.1	.501	0.6	5,131	12.2
COPEPODA								
<u>C. finmarchicus</u>	3.828	2.6	3,399	1.2	1.568	1.9	1,459	3.5
<u>Calanus</u>					.003	<0.1	36	0.1
Calanidae					Tr	<0.1	2	<0.1
<u>R. nasutus</u>	.015	<0.1	15	<0.1	.012	<0.1	14	<0.1
<u>C. typicus</u>	12.969	8.8	58,491	21.0	.195	0.2	824	1.9
<u>T. longicornis</u>	9.135	6.2	40,144	14.4	.005	<0.1	50	0.1
<u>P. minutus</u>	10.206	6.9	51,222	18.4	.050	<0.1	277	0.5
<u>E. rostrata</u>					Tr	<0.1	1	<0.1
<u>Metridia lucens</u>	.012	<0.1	17	<0.1	.013	<0.1	41	0.1
<u>Pleuromamma</u>	.015	<0.1	18	<0.1	.004	<0.1	3	<0.1
<u>Candacia arrata</u>	.017	<0.1	22	<0.1	.080	0.1	134	0.3
<u>Tortanus</u>					.001	<0.1	5	<0.1
<u>Calanoid nauolii</u>	Tr	<0.1	1	<0.1				
Other calanoids	12.202	8.2	73,993	26.5	.128	0.2	479	1.1
<u>Oithona</u>	Tr	<0.1	32	<0.1	Tr	<0.1	7	<0.1
Other cyclopoids					Tr	<0.1	1	<0.1

Table 17 (Continued)

<u>Macrosetella</u>					.001	<0.1	4	<0.1
Other harpacticoids	.006	<0.1	49	<0.1	Tr	<0.1	1	<0.1
CRUSTACEAN EGGS	Tr	<0.1	30	<0.1				
CRUSTACEAN LARVAE					.004	<0.1	10	<0.1
PELECYPOD VELIGER	.004	<0.1	3	<0.1				
PTEROPODA								
<u>Clione</u>	.059	<0.1	13	<0.1				
<u>L. retroversa</u>	49.507	33.5	43,348	15.6	5.020	6.2	4,478	10.6
GASTROPODA (Veliger)	.035	<0.1	1	<0.1				
CEPHALOPODA	.209	0.1	1	<0.1				
ECHINODERMATA								
<u>Ophiura</u> (larvae)	.299	0.2	125	<0.1				
CHAETOGNATHA								
<u>Sagitta elagans</u>	.704	0.5	647	0.2	34.743	43.1	28,622	67.9
PENDICULARIA								
<u>Oikopleura</u>	6.783	4.6	5,606	2.0	.095	0.1	82	0.2
<u>Fritillaria</u>	.758	0.5	244	<0.1				
TUNICATA					Tr	<0.1	1	<0.1
PISCES								
<u>Leptocephalus</u>	.058	<0.1	1	<0.1				
<u>Urophycis</u>	2.747	1.8	1	<0.1				
<u>A. americanus</u>	2.283	1.5	16	<0.1	.351	0.4	4	<0.1
<u>Clupea harengus</u>					.015	<0.1	1	<0.1
Unidentified fish	1.763	1.2	1	<0.1	.032	<0.1	14	<0.1
Scales	.004	<0.1	95	<0.1	Tr	<0.1	13	<0.1
Eggs	.625	0.4	68	<0.1	Tr	<0.1	13	<0.1
ANIMAL REMAINS	18.511	12.5			10.324	12.8		
SAND	.002	<0.1			.006	<0.1		
Total Weight & No.	145.491 g		278,741		80.148 g		42,140	
No. of Stomachs w/food	196				174			
Mean Weight and No.	.742 g		1.422		.461 g		242	

An Ecological Classification Of Food Types

The foods listed in Table 17 cover a broad phylogenetic spectra from unicellular forms (diatoms and foraminifera) to fish. However, if the different foods are classified on an ecological basis according to life form (Odum, 1971), they can be grouped as one of three ecological types; holoplanktonic, meroplanktonic, or epibenthic (Table 18).

Table 18. A Classification Of Food Groups Showing The Relative Importance Of Each Component In The Diet Of Herring And Mackerel

ECOLOGICAL TYPES

	<u>Holoplankton</u>	<u>Meroplankton</u>	<u>Epibenthos</u>
	Foraminifera	Decapod larvae	Gammarid amphipods
	Diatoms	Barnacle cypris	<u>Crangon</u>
	Siphonophores	Pelecypod veliger	Pandalid shrimp
	Hyperiid amphipods	Ophiuroid larvae	Isopods
	Sergestid shrimp		Cumaceans
	Euphausiid shrimp		Mysid shrimp
	Copepods		
	Pteropods		
	Cephalopods		
	Chaetognaths		
	Larvaceans		
	Tunicates		
	Fish		
<u>Herring</u>			
% diet weight	98.9	0.9	0.2
Number of food types	30	5	3
<u>Mackerel</u>			
% diet weight	95.2	1.0	3.8
Number of food types	33	6	5

Both herring and mackerel depend almost entirely on the holoplanktonic component for their food supply. True planktonic forms constituted 98.9% of the weight of food organisms consumed by herring and 95.2% of those consumed by mackerel. Although the planktonic larval stages of certain benthic invertebrates (barnacle cypris and decapod larvae) were consumed by both species in substantial numbers, these items contributed only about 1% to the total stomach weight. Therefore, the meroplankton component did not constitute a significant source of energy for these pelagic feeders during this survey. The epibenthic component can be considered as a third potential food source. Epibenthic crustaceans contributed 3.8% to the mackerel stomach content weight and only 0.2% of the herring stomach content weight. If we were to consider the epibenthos as a serious alternative resource for either species, mackerel would seem to be slightly more successful in foraging for epibenthic forms than herring, thus able to supplement its diet when suitable plankton is scarce.

Prey Size And Biomass

The relative trophic requirements, as regards prey size and biomass, can be determined by comparing the mean weight and mean number ratio of prey per stomach for each species.

$$\text{Biomass ratio} = \frac{\text{x weight mackerel stomach contents}}{\text{x weight herring stomach contents}}$$

$$\text{Number ratio} = \frac{\text{x number mackerel food items}}{\text{x number herring food items}}$$

Considering only fish with stomachs containing food, the average prey biomass for mackerel was 0.742 grams and 0.461 grams for herring, which results in a biomass ratio of 1.61. The number ratio, 5.87, indicates that mackerel are ingesting 5.87 times as many prey items as herring. This ratio is the result of mackerel consuming large numbers of small calanoid copepods especially Pseudocalanus minutus, Centropages typicus, and Temora longicornis. A general conclusion would be that mackerel feed on a larger number of smaller prey items than does herring.

A Measure Of Competition Potential

A further analysis of the total diet examines the potential for competition. The generic items from Table 17 are arranged in Table 19 to show the prey genera which occurred in diets of both herring and mackerel. These can be considered as items over which competition may result. Sixteen of the 29 food organisms identified to the generic level were consumed by both species. These include two amphipods, ten copepod genera, Limacina, Sagitta, Oikopleura and Ammodytes. All of the items which contribute significantly to the stomach content weight co-occur.

Table 19. Co-Occurring Generic Food Items

<u>Genera</u>	<u>Herring</u>	<u>Mackerel</u>
Gammarus	+	+
Hyperia	+	+
Diastylus	+	-
Crangon	-	+
Pagurus	-	+
Pandalus	-	+
Meganyctiphanes	+	+
Thysanoessa	-	+
Neomysis	+	+
Calanus	+	+
Centropages	+	+
Temora	+	+
Rhincalanus	+	+
Pseudocalanus	+	+
Euchirella	+	-
Metridia	+	+
Pleuromamma	+	+
Candacia	+	+
Tortanus	+	-
Oithona	+	+
Macrosetella	+	-
Clione	-	+
Limacina	+	+
Sagitta	+	+
Ophiura	-	+
Oikopleura	+	+
Fritillaria	-	-
Merluccius	-	+
Ammodytes	+	+

16/29 co-occurring genera

Analysis Of Diet Similarity And Food Overlap

In general, both species often feed on the same types of prey, although the proportions of specific items frequently vary significantly between species. The degree of similarity or overlap depends not only upon which stomach analysis parameter is tested (see Bogorov, 1934; Yanulov, 1963; Vinogradov, 1972; Morisita, 1959, and Horn, 1966), percent occurrence or percent weight, but can be affected by the choice of index. A measure of similarity or overlap based on the frequency of occurrence of food items does not consider the relative proportions of food items in the diet. Investigations of possible competition should only be based on quantitative measures (percent weight or percent volume).

The degree of overlap appears to be influenced by relatively few species which occur in the diet. Consistently high diet overlap on Georges Bank can be explained by the fact that both species were feeding on the "krill shrimp" Meganyctiphanes norvegica. It has been established that zooplankton diversity is greatest in equatorial waters decreasing continually from south to north. Following that rationale, food similarity should increase, proceeding northward from the Mid-Atlantic to the Scotian Shelf, as the number of

V-4. Estimates of MSY

Anderson (1973) and Walter (1975) have estimated maximum sustainable yield from Schaefer models as 310,000 metric tons and 313,000 tons, respectively, for mackerel, corresponding to a stock biomass of 1,250,000 tons (Walter, 1975). These estimates were calculated using only commercial catch data. However, historical commercial catch data suggest wide fluctuations in biomass, and it is probable that the above MSY figures are overestimates because of the effect of one very strong year-class and several above-average year-classes on catch and effort data used in the estimation procedures. The most recent estimate of MSY, which includes recreational catches in the calculations (E. D. Anderson, personal communication) is 210,000-230,000 tons, which is based on the exploitation of an average year-class (1961-1973 year classes) at fishing mortality ranging from $F_{0.1}$ (0.35) to F_{max} (0.70) with average patterns of fishing and mortality at age. In view of the magnitude of past catches, the 210,000-230,000 ton level appears to be more realistic than the 310,000 ton level.

Yield per individual entering the fishery (yield per recruit) (Ricker, 1975) is maximized at instantaneous rates of fishing mortality (F) of 0.5, 1.0, and greater than 2.0 at a mean age of first capture of 1, 2, and 3 years, respectively. These F values are commonly referred to as F_{max} values. At a lower of F (i.e., $F_{0.1}$, where the instantaneous fishing mortality rate at which the additional yield per recruit gained from an additional mortality unit is 10% of the gain per unit of mortality in a lightly exploited stock), the corresponding values are 0.28, 0.35, and 0.43. These values are judged to be more appropriate from a management standpoint.

V-5. Probable Future Condition

The spawning stock size of mackerel was at a record or near-record low level in 1977, and is expected to remain so in 1978 and 1979, as discussed in Section V-2. In the absence of greatly improved recruitment, the spawning stock size probably would tend to remain at the same relatively low levels, and perhaps might even decrease further, even in the absence of foreign fishing for mackerel in the Fishery Conservation Zone.

It is commonly believed that mackerel has undergone extreme variations in abundance historically (Hoy and Clark, 1967). No documentation of such variations exists, however, except indirect evidence of widely fluctuating catches primarily during the 19th century when US demand was at its peak (Anderson, 1977). Various factors have been correlated with the supposed variations in abundance, including year-class strengths, temperature fluctuations, wind movements, and a fungal epizootic (Sette, 1943; Taylor *et al.*, 1957; Sindermann, 1958; MacKay, 1967). Lett *et al.* (1975) have shown, however, that mackerel abundance and recruitment are most variable when fishing mortality is low, e.g., prior to 1960 and the growth of the foreign fishery.

As noted in Section V-2, little information exists from which to predict stock-recruitment relationships for mackerel. Large spawning stocks have in the past produced both weak and strong year-classes. Thus, while it may be probable that wide fluctuations in abundance have occurred in the past, there is no evidence to indicate a cyclic or predictable pattern in year-class strengths or improved recruitment in the foreseeable future (Anderson, 1977).

VI. DESCRIPTION OF HABITAT

VI-1. Condition Of The Habitat

Climatic, physiographic, and hydrographic differences separate the ocean region from Cape Hatteras to the Gulf of Maine into two distinct areas: the Mid-Atlantic - Southern New England Region and the New England Region, with the natural division occurring at Nantucket Shoals.

The Middle Atlantic - Southern New England Region is fairly uniform physically and is influenced by many large coastal rivers and the Chesapeake Bay, the largest estuary in the United States. Additional significant estuarine influences are Narragansett Bay, Long Island Sound, the Hudson River, Delaware Bay, and the nearly continuous band of estuaries behind the barrier beaches along southern Long Island, New Jersey, Delaware, Maryland, and Virginia. The southern edge of the region includes the estuarine complex of Currituck, Albermarle, and Pamlico Sounds behind the outer banks of Cape Hatteras.

At Cape Hatteras, the continental shelf (characterized by waters less than 200 meters [656 feet] deep) extends seaward approximately 32 km (20 miles), widens gradually to 113 km (70 miles) off New Jersey and Rhode Island and then broadens to 193 km (120 miles) off Cape Cod forming Georges Bank. The substrate of the shelf in this region is predominantly sand interspersed with large pockets of sand-gravel and sand-shell. Beyond 200 m, the substrate becomes a mixture of silt, silt-sand, and clay. As the continental slope turns into the Abyssal Plain [at depths greater than 2,000 m (6,560 feet)], clay predominates over silt and becomes the major substrate.

Mineral resources of the area include large sand and gravel deposits, now being mined in some localities near shore. There are potentially recoverable offshore deposits of phosphate rock, placer deposits of titanium, monazite and zircon, and oil. Locally important concentrations of sulfur, salt, anhydrite, potash, and magnesium are known. It is also probable that manganese oxide nodules occur offshore. However, current technology is inadequate for economic recovery of most placer and hard rock deposits.

Water temperatures range from less than 3°C in the New York Bight in February to approximately 27°C off Cape Hatteras in August. The annual range of surface temperature at any location may be 15°C in slope waters to greater than 20°C near shore. During the coldest season the vertical thermal gradient is minimized. In late April - early May, a thermocline develops although storm surges over Nantucket Shoals retard thermocline development there. The thermocline persists through the summer. Surface waters begin to cool in early autumn, weakening the thermocline so that by mid-November surface to bottom water temperature is nearly homogeneous. Overturns occur in the spring and fall, resulting in recycling of nutrients.

The salinity cycle results from stream flow and the intrusion of slope water from offshore. The salinity maximum of winter is reduced to a minimum in early summer by large volumes of spring river runoff. Inward drifts of offshore saline water in autumn eventually counterbalance fresh water outflow and return the region's salinity distribution to the winter maximum. Water salinities near shore average 32‰, increase to 34-35‰ along the shelf edge, and exceed 36.5‰ along the main lines of the Gulf Stream.

On the continental shelf, surface circulation is generally southwestly during all seasons, although this may be interrupted by coastal indrafting and some reversal of flow at the northern and southern extremities of the area. Speeds of the drift are on the order of five knots per day. There may be a shoreward component to this drift during the warm half of the year and an offshore component during the cold half. This drift, fundamentally the result of temperature-salinity distribution, may be made final by the wind. A persistent bottom drift at speeds of tenths of nautical miles per day extends from beyond mid-shelf toward the coast and eventually into the estuaries. Offshore, the Gulf Stream flows northeasterly.

The New England region from Nantucket Shoals to the Gulf of Maine includes two of the worlds most productive fishing grounds: Georges Bank and Browns Bank. The Gulf of Maine, which is a deep cold water basin, is nearly sealed off from the open Atlantic by these two Banks. The outer edges of Georges and Browns Banks fall off sharply into the continental shelf. Other major features include Vineyard and Nantucket Sounds, Cape Cod Bay, and Cashes Ledge and Stellwagen Basin within the Gulf of Maine.

Water temperatures range from 2°C to 17°C at the surface and over the banks, and 4°C to 9°C at 200 meters in the inner Gulf of Maine. Mean salinity values vary from about 32 to 34‰ depending on depth and location. However, lower salinity values generally occur close to shore. In addition, both water temperatures and salinities within the Region, but especially along the southern boundary of Georges Bank and the deep basins of the inner Gulf of Maine, are influenced by intrusion of slope water.

Surface circulation within the Gulf of Maine is usually counterclockwise. Cold Nova Scotian waters enter through the Eastern Channel and move across Browns Bank while slope waters enter through the Northeast (Fundian) channel. Gulf of Maine waters spill out over Georges Bank and through Great South Channel onto Nantuckett Shoals. The anticyclonic eddy over Georges Bank that develops in spring breaks down into a westerly and southerly drift by autumn.

Gulf Stream meanders and warm core eddies, two oceanographic phenomena which normally remain in deep offshore water, can profoundly effect environmental conditions on the fishing grounds off the northeast United States when either one moves close along the continental slope. The warm core eddies seen off the New England coast mostly form in the slope water region southeast of Georges Bank by detaching from meanders of the Gulf Stream. Rotation is in a clockwise direction at speeds varying from 0.6 to 1.8 knots.

Environmental effects and their possible influence on fishery resources resulting from meanders and eddies have been identified by Chamberlin (1977) and are as follows:

1. Warming of the upper continental slope and outer shelf by direct contact of a meander or eddy. This may influence the timing of seasonal migrations of fish as well as the timing and location of spawning.
2. Injection of warm saline water into the colder less saline waters of the shelf by turbulent mixing at the inshore boundary of a meander or eddy. This may have influences on the fishery resource similar to that of direct warming, and also cause mortality of fish eggs and larvae on the shelf when the colder water in which they live is warmed beyond their tolerance by the mixing-in of warm slope water.

3. Entrainment of shelf water off the shelf, an effect frequently seen in satellite imagery. Mortality of Georges Bank fish larvae is known to occur, presumably because of temperature elevation when shelf water in which they occur is carried into the slope water. (Colton, 1959). The most profound effects of the entrainment on the fishing grounds may be changes in circulation and in water mass properties resulting from the replacement of the waters lost from the shelf.

4. Upwelling along the continental slope, which may result in nutrient enrichment near the surface and increased primary biological productivity.

The ecosystem can be divided into the following fundamental groups which are necessary for the system to continue indefinitely: abiotic (nonliving) substances; autotrophic organisms (primary producers) which are able to use abiotic material to store solar energy to create organic matter; and decomposers which break down organic matter, using its stored energy to create inorganic constituents. Most ecosystems also have consumers which convert organic material to another form, using some of the stored energy of the organic material for maintenance. The rate of transfer of material and energy between parts of the ecosystem is affected by the amount, type, or condition of abiotic and biotic material (factors) in the system.

The annual cycle of the plankton community (drifting organisms) of the region is typical of the temperate zone. During the winter, phytoplankton (plant plankton) and zooplankton (animal plankton) populations are low. Nutrients are available, but production is suppressed by low levels of solar radiation and low temperature. As spring approaches and the level of solar radiation increases, an enormous diatom bloom occurs. As the bloom progresses, concentrations of inorganic nutrients decrease.

As water temperatures increase during late spring and summer, phytoplankton and zooplankton become increasingly abundant because of the more rapid development of early life stages, the spawning of fish and benthos, and the abundant food supply.

During summer, zooplankton reaches maximum abundance while phytoplankton declines to a level near the winter minimum. Dinoflagellates and other forms apparently better suited than diatoms to warm, nutrient-poor waters become more abundant during summer. Bacteria in the sediment actively regenerate nutrients, but because of vertical temperature and salinity gradients, the water column is stable and nutrients are not returned to the euphotic zone (where solar radiation and nutrients are "fixed" into organic matter). On Georges Bank, nutrients regenerated by sedimentary bacteria are immediately available to phytoplankton because of mixing. Thus, diatoms dominate throughout the year on Georges Bank (Cohen, 1975).

During autumn, as water temperatures decrease, the water column becomes unstable due to mixing and nutrients are recycled to the euphotic zone. This stimulates another phytoplankton bloom which is limited by decreasing levels of solar radiation. Phytoplankton and zooplankton levels then decline to their winter minimum while nutrient levels increase to their winter maximum.

Anomalous conditions within the generalized annual cycles are probably common. The stability of the water column which affects nutrient availability may be

disrupted by severe storms. Anomalies in temperature may disturb the timing between the annual cycles of interacting species.

VI-2. Habitat Areas Of Particular Concern

During the summer and early autumn of 1976, oxygen concentrations at bottom were severely depleted and widespread mortalities of benthic organisms occurred in the section of the New York Bight shown in Figure 10. This near-anoxic (and in places anoxic) region of O_2 levels less than 2 parts per million (ppm) was located approximately 4 miles (6.5 km) off New Jersey and covered an area about 100 miles (160 km) long and 40 miles (64 km) wide during the most critical phases of the depletion (Sharp, 1976). Normal O_2 levels in this region are greater than 4 ppm.

Investigations to date indicate that this state was probably induced by a combination of meteorological and circulatory conditions in conjunction with a large-scale algal bloom (predominantly of Ceratium tripos). Lack of normal seasonal turbulence occasioned by relatively few storms (Hurricane Belle notwithstanding), unusual wind patterns, and above-average surface water temperatures probably all contributed to depletion of the oxygen content of waters beneath the permanent thermocline in this region (Sharp, 1976). It is not known to what degree the routine dumping of wastes (sewage sludge and dredge spoils) contributed to the depletion. However, it is reasonable to assume that any effect would have been detrimental (Atkinson, 1976).

The species affected by the anoxia of most commercial importance were surf clam, red hake, lobster, and crabs. Finfish were observed to be driven to inshore areas to escape the anoxia, or were trapped in water with concomitant high levels of hydrogen sulfide (Steimle, 1976). Freeman and Turner (1977) pointed out that "...it is difficult to measure with any precision the extent of damage to highly mobile organisms, especially the fishes. Sublethal effects can also occur. Among the observed effects of the anoxic water on fishes were behavioral changes involving vertical distribution and migratory routes which in turn may affect feeding and spawning habits."

Reduction in oxygen levels in New York Bight below normal levels has been observed several times in recent history (Atkinson, 1976) although not to levels as low as those observed in summer, 1976. The relative contribution of any of the above mentioned factors to the anoxia cannot yet and may never fully be assessed. However, it is important to note that each of these conditions, by itself, was not a unique, previously unobserved phenomenon. It is as yet too early to predict the long-term effects of the anoxic condition on any of the affected resources or their habitats.

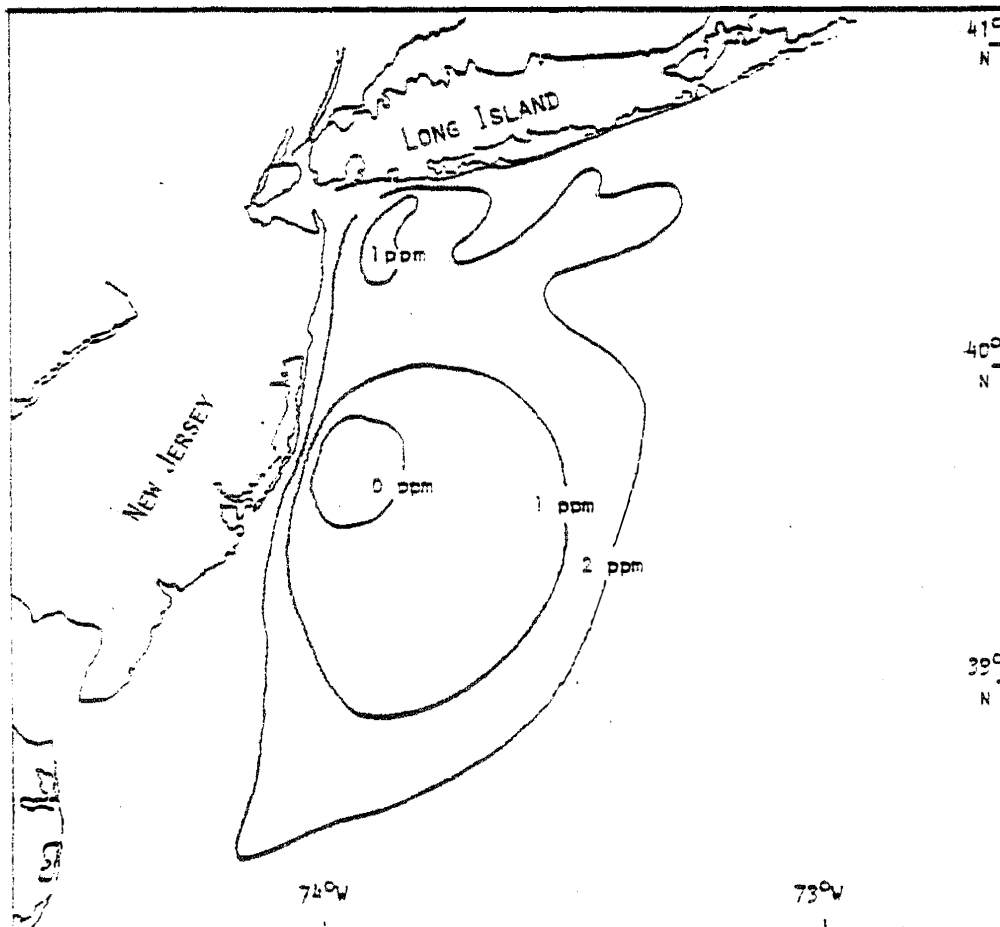
The Environmental Protection Agency has requested that no fishing be permitted between $38^{\circ}20'00''N$ to $38^{\circ}25'00''N$ and $74^{\circ}10'00''W$ to $74^{\circ}20'00''W$ because the area is a sewage disposal area, and between $38^{\circ}40'00''N$ to $39^{\circ}00'00''N$ and $72^{\circ}00'00''W$ to $72^{\circ}30'00''W$ because is a toxic industrial waste site (W. E. Stickney, personal communication).

VI-3. Habitat Protection Programs

No special habitat protection programs exist in the habitat of the mackerel species that are the subjects of this plan. Sampling for pollution is carried out by both the NMFS and the Environmental Protection Agency.

Habitat protection programs are administered by a variety of Federal agencies including the Bureau of Land Management of the Interior Department, the Coast Guard, and the Environmental Protection Agency.

The Massachusetts and Rhode Island Coastal Zone Management Programs have been reviewed relative to this FMP and no conflicts were identified.



Oxygen Concentrations (Parts Per Million) In "Fish Kill" Area Of The Middle Atlantic Bight, Summer, 1976 (From Sharp, 1976)

Figure 10

VII. FISHERY MANAGEMENT JURISDICTION, LAWS, AND POLICIES

VII-1. Management Institutions

The US Department of Commerce, acting through the Mid-Atlantic, New England, and South Atlantic Fishery Management Councils, pursuant to the FCMA, has authority to manage the stock throughout its range.

VII-2. Treaties And International Agreements

Foreign fishing for mackerel is regulated by the FCMA pursuant to which Governing International Fishery Agreements are negotiated with foreign nations for fishing within the FCZ.

VII-3. Federal Laws, Regulations, And Policies

The only known Federal law that regulates the management of the mackerel fishery is the FCMA. Currently the fishery is managed pursuant to a Preliminary Management Plan prepared by the Department of Commerce. That PMP will be replaced by this Fishery Management Plan following its approval by the Council and the Secretary of Commerce.

Foreign allocations of mackerel under the PMP for 1978 (as of April 28, 1978) in metric tons were:

Bulgaria	11
Cuba	70
Federal Republic of Germany	6
France	11
Italy	28
Japan	56
Mexico	105
Poland	38
Spain	125
USSR	672
Reserved	78
Total	<u>1,200</u>

No Indian treaty rights are known to exist relative to the species that is the subject of this FMP.

VII-4. State Laws, Regulations, And Policies

Several States have minimum size limits for the sale or possession of mackerel: Massachusetts, 6 inches (15 cm); Connecticut, 7 inches (18 cm); New York, 7 inches (18 cm); and New Jersey, 7 inches (18 cm). No other State laws, regulations, or policies are known to exist relative to this fishery.

VII-5. Local And Other Applicable Laws, Regulations And Policies

No local or other laws, regulations, or policies are known to exist relative to this fishery.

VIII. DESCRIPTION OF FISHING ACTIVITIES

VIII-1. History Of Exploitation

Atlantic mackerel have been harvested commercially off the US coast since the 17th century, although detailed catch statistics are not available for periods prior to 1804. In the early years (1804 - 1818), the fishery was restricted to coastal waters and US catches were low, averaging 3,100 metric tons annually (Table 20). From 1819 - 1885, American vessels ranged farther offshore to satisfy a large market for salted mackerel, and catches rose to an annual average of 41,700 tons during this period (Hoy and Clark, 1967).

Mackerel abundance has appeared to vary widely historically, although no documentation of such variations exist, except the indirect evidence of large fluctuations in catch in the 19th century. Landings ranged from 10,500 tons in 1840 to 81,300 tons in 1884, but dropped during 1886 - 1924 to an average of 9,300 tons annually. During the latter period, however, a shift from sail to motor power occurred and a market for fresh mackerel developed. As result, catches again rose substantially averaging 20,300 tons annually during 1930 - 1949, and reached a peak of 36,600 tons in 1944. In more recent years (1950 - 1964), the US commercial landings declined to an average of 1,500 tons, followed by a modest increase to 4,040 tons in 1969 and a subsequent decline to 1,061 tons in 1974. Total US commercial landings in 1976 were approximately 2,450 metric tons.

Canada has also fished extensively for mackerel over the years, although complete statistics are not available for years prior to 1876. Since that year, landings tended to parallel those of the US until the 1950s, with both sets of data showing a pronounced decline from the 1880s to the early 1920s and a subsequent increase. Average landings throughout the 1940s by the US exceeded those by Canada (24,200 tons for the US versus 14,900 tons for Canada), but in succeeding years Canadian landings have remained at roughly the same level while US landings have declined precipitously (Table 20).

Before 1962 only the US and Canada fished for mackerel in the northwest Atlantic. Poland entered this fishery in 1962 with a catch of 111 tons in ICNAF Subarea 5. Shortly thereafter, the USSR and other nations began fishing for mackerel, and total landings increased dramatically from about 1,136 tons in SA 5 and 6 in 1963 to an apparent all-time high of over 431,000 tons in 1972. From 1971 through 1976 (and the end of US participation in ICNAF), mackerel was the largest commercial fishery in ICNAF SAs 5 and 6. The total mackerel catch in the decade 1966 - 1975 accounted for 12% of the total commercial catch of all species (17,321,000 metric tons) over the same period, according to ICNAF statistics (Table 21).

From 1973 - 1976, the stock was under ICNAF quota management, and catches consequently decreased. The increase in total catch observed during 1962 - 1972 has been attributed to increases in stock size and to subsequent diversions of effort from declining herring stocks (Anderson, 1973). Intensive fisheries were initiated by the USSR in 1967, Poland in 1968, and by the GDR (German Democratic Republic) and Bulgaria in 1971. USSR, Polish and GDR vessels averaged 90% of the total catch from 1967 to 1975, and USSR landings exceeded those of any other country since 1965 with the exception of 1972.

A substantial US recreational fishery for mackerel exists from Maine to North Carolina. Angler surveys were conducted in 1960, 1965, 1970, 1974 and 1976, with estimated catches in those years of 5,000, 8,600, 32,100, 7,600 and 4,900 tons respectively (Clark, 1962; Deuel and Clark, 1968; Deuel, 1973; Deuel, personal communication; and Christensen et al., 1976) (Table 1).

VIII-2. Domestic Commercial And Recreational Fishing Activities

Types and Numbers of Vessels

Table 22 gives the number of domestic commercial vessels in 1965, 1970, and 1975 which landed some mackerel and the number whose catch for the year consisted of 50% or more mackerel (by weight). There was an increase in the number of vessels which landed some mackerel from 1965 to 1970, but this number declined from 1970 to 1975. The number of vessels whose total catch for the year was 50% or more of mackerel declined during the entire period.

Table 22. Number Of Vessels In The Commercial Mackerel Fishery
1965, 1970, and 1975

<u>Year</u>	<u>Vessels Landing Some Mackerel</u>	<u>Vessels Whose Total Catch Was 50% or More of Mackerel</u>
1965	80	9
1970	167	6
1975	104	3

Table 23 contains data on the number of trips (of all gears), days fished, and catch per day fished for those New England trips where 50% or more of the trip catch consisted of mackerel for the years 1965, 1970, and 1975. There was a general decrease in number of trips, days fished, and catch per day fished (except in 1970).

Table 23. Performance Data On Vessel Trips Whose
Commercial Landings Consisted Of 50% Or More Mackerel

<u>Year</u>	<u>Trips</u>	<u>Days Fished</u>	<u>Catch/Day Fished (1,000 lbs)</u>
1965	89	410.6	4.62
1970	78	303.8	10.77
1975	24	158.3	1.66

It is estimated that in 1975 there were approximately 15 fishermen employed on those vessels whose catch was characterized by 50% or more of mackerel. It should not be implied that these fishermen were solely supported by the value of the mackerel catch, for other species were landed in addition to mackerel during that period. Nor, conversely, the fishermen on board those vessels which landed mackerel, but which are not included in the directed mackerel vessel category, were supported somewhat by the value of the mackerel catch. There were no published financial studies for these vessels.

It is estimated that approximately ten plants process mackerel in the

northeast, although mackerel constitutes only a small percentage of the total volume processed. Similarly, a limited number of firms process mackerel in the Mid-Atlantic area. Processing for domestic consumption primarily involves filleting and canning. A substantial portion of the catch is also sold for bait. In 1963, 1965 and 1975, the value of processed mackerel from New England was \$5,000, \$21,000 and \$75,000, respectively.

Maine Commercial Landings

Figure 12 illustrates commercial landings of mackerel in Maine from 1880 - 1976. Peak landings of 31.7 million pounds (14,380 metric tons) were recorded in 1880, with a secondary peak of 7.7 million pounds (3,475 metric tons) in 1932 (0.7% of the total Maine commercial catch that year). The 1976 catch of 405,000 pounds (184 tons) had an approximate ex-vessel value of \$81,000 (or \$0.20/pound). The Maine commercial mackerel catch for the first nine months of 1977 was 288,000 pounds (131 tons), down 18% from the same period in 1976. The average price per pound for mackerel in September, 1977, was \$0.25. Both by weight and value, this species contributed less than 1% to 1976 total finfish landings in this state.

Most of the Maine catch is now taken by purse seines and floating traps. Weirs, gill nets, and otter trawls together have accounted for less than 30% of the catch on average in recent years. As Figure 11 illustrates, mackerel is landed in Maine primarily from late spring through fall, with peak landings in summer. This corresponds to the season when mackerel are most abundant offshore of this state. Approximately 80% of the 1976 Maine mackerel catch came from the territorial sea (within three miles of shore).

Massachusetts Commercial Landings

Commercial landings of Atlantic mackerel in Massachusetts from 1879 - 1976 are shown in Figure 13; seasonal distribution of the landings in 1975 - 1977 is shown in Figure 11. From 1967 - 1976, annual Massachusetts landings averaged 3.2 million pounds (1,470 metric tons), but yearly catches have been beneath that level since 1971. The 1976 catch of 1.5 million pounds (700 tons) brought \$190,000 at dockside; this represented 0.6% and 0.35% of total Massachusetts finfish landings by weight and value, respectively. The 1976 average ex-vessel price for mackerel in Massachusetts was about \$0.12 per pound (compared to \$0.09, \$0.21, and \$0.16 per pound in 1975, 1974 and 1973 respectively).

Most of the Massachusetts catch is landed between November and May. Little is received at Boston or New Bedford, and about 60% of the 1976 catch was landed at Gloucester, where the average price was \$0.09 per pound.

Most of the mackerel landed in Massachusetts is caught in the territorial sea; in 1976, about 70% of the catch was taken within three miles of shore. In 1974, pound nets accounted for about two-thirds of the catch, floating traps for about 18%, and otter trawls for about 3%.

Rhode Island Commercial Landings

Commercial landings of mackerel in Rhode Island averaged 600,000 pounds (270 metric tons) from 1967 - 1976. The 1976 landings of 410,000 pounds (186 tons) had an ex-vessel value of \$87,000 (or about \$0.21 per pound), and constituted about 0.6% by weight of total State landings that year (Figure 14).

Peak landings of mackerel in Rhode Island occurred in 1928 (2.7 million pounds), and annual landings have not surpassed one million pounds since 1949. Floating traps and otter trawls take the bulk of the catch, although purse seines occasionally take large amounts. Almost all of the catch is taken from November through May (Figure 11).

Over half of the annual mackerel catch comes from inshore waters. In 1976, approximately one-third of the total State catch came from what is now the Fishery Conservation Zone. Most of the State catch is landed in Point Judith.

New York Commercial Landings

Landings of Atlantic mackerel in New York have also varied more or less similarly to total domestic commercial landings. The 1976 State landings of 249,000 pounds (113 metric tons), worth about \$40,000 at the dock, represented only 1.5% by weight and about 1% by value of the 1976 total finfish landings in New York, and only 7% by weight of the peak 1947 New York mackerel catch (Figure 16).

The New York mackerel catch for the first nine months of 1977 was 544,213 pounds (247 tons); this figure, however, should reflect fairly accurately the total 1977 catch, since this species is landed in New York almost entirely in spring and early summer (Figure 11). Thus, the 1977 State mackerel catch will be the highest in a decade. The average ex-vessel price for this species was about \$0.16 per pound in 1976 and 1977.

Pound nets usually take the largest proportion of the catch (59% in 1974), and haul seines and otter trawls account for most of the remainder. The overall decline in New York mackerel landings since World War II may thus to some extent be a result of the decline of the New York pound net industry (McHugh, 1972).

Almost the entire mackerel catch is landed in Suffolk County. Since at least 1974, all mackerel has been caught in the territorial sea. In 1976, approximately 20% of the total state mackerel catch was taken from Long Island Sound.

New Jersey Commercial Landings

Landings of Atlantic mackerel in New Jersey have roughly paralleled those in New England. State mackerel landings in 1976, 1.852 million pounds (840 metric tons) (worth about \$151,000 ex-vessel), were the highest recorded in 25 years, but represented only about 10% of the peak 1949 catch (Figure 17). The 1977 mackerel catch, however, probably was not greater than 600,000 pounds (272 tons). The average yearly landings in the decade from 1967 - 1976 were just over one million pounds.

Finfish landings in New Jersey are dominated by the (industrial) menhaden fishery, which in 1976 accounted for 80% by weight of the total finfish catch. The low ex-vessel value of menhaden distorts the relative value of other species. Thus, of total New Jersey finfish landings (without menhaden) in 1976, mackerel accounted for about 5% by weight and 2% by value. The yearly average 1976 and 1977 ex-vessel price for this species was about \$0.08 per pound, which is also average for the fishery from 1967 - 1977 (unadjusted for inflation).

Almost all mackerel landed in New Jersey is taken in the spring (Figure 11), and most of the catch is received in Cape May County, which received about 12% of the total State finfish catch that year (almost all menhaden is landed in Monmouth County). Mackerel landings in Cape May constituted 8% by weight of total finfish in 1976. Even during peak mackerel-landing months in 1977 in this county, however, this species never accounted for more than 10% by weight or value of landings, since the Cape May finfish fishery is supported mainly by scup from autumn through spring.

Almost all mackerel landed in New Jersey is caught with otter trawls, and almost all is taken in what is now the Fishery Conservation Zone. In most recent years, most of the catch has been taken in waters between three and 12 miles from shore.

Maryland Commercial Landings

Commercial landings of finfish in Maryland are dominated by catches from the Chesapeake Bay and the Potomac River and their tributaries. In 1976, 29% by weight and 37% by value of the State's total finfish catch came from the Atlantic Ocean. The only Atlantic fishing port in Maryland is Ocean City, which is home to but a few otter trawlers.

No directed trawl fishery for mackerel exists in this State. Catches have been significant in recent years only since 1974 (Table 25). The 1977 landings were probably about 100,000 pounds (45 metric tons) (worth approximately \$20,000, or \$0.20 per pound). Mackerel is not an important component of the State's industrial fishery, which relies on menhaden taken from inland waters, although some of the catch is used for bait. Little consumer demand for mackerel exists locally, and much of the catch is shipped as foodfish to northern markets, usually New York (W. Brey, NMFS, personal communication).

Mackerel is landed in Maryland only during spring. Over half of the year's catch in 1975 and 1976 was landed in March. Since overall finfish catches from the ocean are greatest usually from early spring to early autumn, mackerel catches therefore reflect a seasonal increase in trawling coupled with increased availability due to inshore and northward migration.

In 1976, mackerel was the sixth most important finfish landed in Maryland, of those taken primarily from the ocean, in terms of weight and value, and landings accounted for almost 6% of the year's total ocean finfish production. Increased mackerel landings since 1975 have had a significant if only seasonal impact on the Maryland ocean finfish fishery. In 1976, for example, the March and April mackerel catches provided 56% and 36% by weight of total ocean finfish landings, respectively, and 27% and 15% of the overall value. Almost the entire 1977 catch was landed in April, and for that month, mackerel provided 48% and 38% of the weight and value, respectively, of the ocean

finfish landings. Since Ocean City landings are usually supported during spring months by summer flounder catches, a species which is heavily exploited throughout its range, the development of a mackerel fishery in Maryland could provide desirable diversification and financial stability for the Ocean City fishing community.

Virginia Commercial Landings

Virginia's 1976 commercial catch of mackerel, 277,000 pounds (126 metric tons, worth about \$40,000 ex-vessel) is approximately equal to the State's average landings of mackerel in the last decade, although annual catches during that period varied from 14,000 pounds to 645,000 pounds (6 to 293 tons). The average price per pound of mackerel in 1976 was \$0.14, the lowest price since 1973. The average price per pound (unadjusted for inflation) over the last 10 years was \$0.11 (Table 25).

Landings of mackerel in 1977 decreased drastically; the total catch was approximately 11,200 pounds (5 tons) which was worth \$2,600 (\$0.23 per pound). This decrease was probably due to lowered abundance.

Mackerel is caught with a variety of fishing gears in Virginia. Almost the entire catch is landed in late winter through early spring.

North Carolina Commercial Landings

Commercial landings of mackerel in North Carolina were insignificant until 1975, and no directed fishery for this species exists in this State. In 1975, and 1976, 105,000 pounds (47 metric tons) and 440,000 pounds (200 metric tons), respectively, were landed. The 1976 catch of mackerel was worth \$40,000 ex-vessel, or about \$0.09 per pound. Almost all of the 1976 catch was taken January - March; the 1977 catch for the same period was approximately 259,000 pounds (117 tons), worth about \$26,000 (\$0.10 per pound) (Table 25, Figure 11).

The increase in mackerel landings reflects increases in otter trawl caught species in this state; total finfish landings grew from 173 million pounds (79,000 tons) in 1974 to 215 million pounds (97,000 tons) in 1975 (or 52 million pounds to 61 million pounds, if the menhaden catch is subtracted from the total finfish catch). Almost all of the mackerel landed in North Carolina is shipped north to other states; little if any market exists for this species locally (K. Norris, NMFS, personal communication).

Recreational Fishery

Atlantic mackerel occur both offshore and inshore, and enter large estuaries, but most of the angling for them occurs along the ocean shore between the 13 and 60 meter contours. They are caught throughout the year, depending on the particular stretch of coast fished. Off Virginia, Maryland, and Delaware they are caught during late fall, winter and early spring; off New Jersey, New York and southern New England during summer and early fall. Mackerel are caught during daylight hours by jigging, chumming and trolling from boats, and by casting, jigging and live-lining from shore. The great majority of the angler catch consists of specimens weighing 0.24 - 0.70 kg (0.50 - 1.5 pounds) (25-40 cm fork length). The New York - Maine area accounted for about 95% of the catch in 1960 and 1965, 60% in 1970, and 30% in 1974. The New Jersey - North Carolina area accounted for an increasingly greater share of the catch in 1970

and 1974. In 1970, about 94% of the mackerel catch (by numbers) was from private, party, or charter boats.

In order to account for the recreational catches in the stock assessment (Section V-2), it was necessary to estimate the catches in the years with no surveys (Table 1). In the years of the surveys, the estimated sport catches were closely proportional to stock biomass estimates determined from commercial data. This relationship was assumed to apply in the years with no surveys. The recreational catch has been significantly higher than the US commercial catch in recent years.

The NMFS conducted a survey of sport fishing for mackerel from boats (private, party, and charter) in 1978. The estimated recreational mackerel catch that year by anglers on boats was approximately 6,200 metric tons. Assuming that this represents 94% of the total sport catch (as was estimated for 1970) the total US sport catch of Atlantic mackerel in 1978 was approximately 6,600 metric tons (D. Christensen, NMFS, personal communication, November, 1978).

Table 26. Species Ranking By Total Weight Of Catch Of Recreational Anglers Fishing Along The Northeastern United States Coast

	<u>1960</u>	<u>1965</u>	<u>1970</u>	<u>1974</u>
1	Striped bass	Bluefish	Bluefish	Bluefish
2	Bluefish	Striped bass	Striped bass	Striped bass
3	Atlantic cod	Atlantic cod	<u>Atlantic mackerel</u>	Summer flounder
4	Flounder*	Summer flounder	Winter flounder	Atlantic cod
5	Flounder*	Winter flounder	Atlantic cod	Weakfish
6	Sharks	Puffers	Puffers	Winter flounder
7	Pollock	<u>Atlantic mackerel</u>	Spot	<u>Atlantic mackerel</u>
8	Tautog	Perches	Summer flounder	Tautog
9	Scup	Scup	Tautog	Perches
10	Black sea bass	Tautog	Weakfish	Scup
11	Red drum	Black sea bass	Perches	Spot
12	<u>Atlantic mackerel</u>	Spot	Sea robins	Black sea bass

* Winter and summer flounders were combined as "flatfish" in the 1960 survey.

Table 27. Estimated Weights of Marine Anglers' Finfish Catches, 1970,
by Species and Region
(thousands of pounds)

<u>North Atlantic Region</u>		<u>Middle Atlantic Region</u>		<u>South Atlantic Region</u>	
Bluefish	50,161	Bluefish	49,720	King mackerel	34,942
Striped bass	45,844	Atlantic mackerel	29,250	Jacks	33,149
Atlantic mackerel	41,482	Striped bass	27,262	Dolphins	27,806
Atlantic cod	35,688	Spot	21,573	Grunts	25,962
Winter flounder	24,684	Puffer	16,568	Spotted seatrout	25,040
Tautog	15,629	Weakfish	14,039	Grouper	24,121
Summer flounder	11,611	Winter flounder	12,881	Scup	24,059
Puffer	7,899	Perches	12,592	Yellowtail snapper	20,163
Pollock	5,584	Summer flounder	7,742	Bluefish	19,271
Sharks	4,795	Sea robins	6,741	Snook	17,957
Tunas	3,711	Black sea bass	6,710	Catfish	16,570
Kingfish	3,457	Catfish	6,151	Spanish mackerel	14,623
American eel	3,166	American shad	4,231	Kingfish	14,533
Haddock	2,528	Wahoo	3,985	Red drum	13,358
Sea robins	2,343	Croaker	3,831	Billfishes	12,489
Scup	2,296	Yellow perch	2,581	Black sea bass	12,381
Cunner	1,914	Kingfish	2,402	Black drum	12,123
Weakfish	1,645	Scup	2,127	Spot	9,840
Silver hake	659	Tautog	1,619	Summer flounder	8,938
American shad	625	Black drum	1,454	Croaker	5,947
Black sea bass	615	Silver hake	1,436	Tunas	5,943
Dogfish	468	Sharks	1,276	Red snapper	5,682
Smelts	195	Spanish mackerel	946	Puffer	4,440
Skates/rays	185	Red hake	904	Barracuda	3,746
Perches	32	Tunas	886	Bonito	2,295
Miscellaneous	235	American eel	740	Ladyfish	1,910
		Billfishes	717	Wahoo	1,571
		Dolphins	419	Cobia	775
		Dogfish	404	Snappers	735
		Bonito	282	Sharks	669
		Atlantic cod	230	Skates/rays	470
		King mackerel	225	Mulletts	341
		Skates/rays	180	Perches	226
		Oyster toadfish	133	Dogfish	214
		Red drum	83	Striped bass	189
		Miscellaneous	3,947	Pompano	153
				American eel	122
				Atlantic spadefish	51
				Sand seatrout	23
				Sea robins	4
				Miscellaneous	1,082
Total	<u>267,451</u>		<u>246,267</u>		<u>403,913</u>

North Atlantic Region = Maine through New York

Middle Atlantic Region = New Jersey to Cape Hatteras, North Carolina

South Atlantic Region = Cape Hatteras to southern Florida, including the Florida Keys

VIII-3. Foreign Fishing Activities

Regulation of foreign fishing along the US coast of the northwest Atlantic Ocean began in 1949 when the US convened a conference of 11 countries at Washington, D.C. This conference resulted in the formation of the International Commission for the Northwest Atlantic Fisheries (ICNAF). The Northwest Atlantic Fisheries Act of 1950 authorized US involvement in the activities of the Commission. The designated area was the waters north of 39° 00' N latitude and east of 71° 40' W longitude. Commission regulations in the early 1950s evolved around the establishment of mesh regulations for certain directed groundfish fisheries (e.g., cod and haddock), with groundfish by-catch provisions for other small-mesh directed fisheries (e.g., silver hake and herring).

The arrival of the foreign distant water fleets off the US coast in the early 1960s stimulated a great deal of discussion about the possible extension of territorial waters. Failure to resolve this question through the International Law of the Sea Conferences led to the establishment in late 1966 of a contiguous fishing zone off the entire US coastline between three and 12 nautical miles. Only Canada was authorized to fish within this zone under a reciprocal fishing agreement with that country.

As the activity of the foreign distant water fleets increased, their operations began to expand to waters south of the Convention Area. Because of the overlap in fish stocks and the known migrations of commercially important species between the Convention Area and the waters to the south, ICNAF in 1966 adopted the responsibility for collecting statistics for the catches from non-convention waters as far south as Cape Hatteras. The area was designated Statistical Area 6. Management of the fisheries within these waters, however, had to be accomplished through a series of bilateral negotiations, beginning in 1968 with the USSR.

Prior to 1973 the Atlantic mackerel fishery in ICNAF Subareas 3 - 5 and Statistical Area 6 was not regulated. The first TAC (Total Allowable Catch) of 450,000 metric tons was set for 1973 in SAs 5 and 6 in an attempt to limit the rapidly developing distant-water fisheries until an adequate assessment could be completed.

The 1974, 1975 and 1976 TACs (304,000, 285,000 and 254,000 metric tons, respectively) in SAs 5 and 6 were established to stabilize fishing mortality at the 1973 level, which was near the point of F_{max} . F_{max} is defined as the (instantaneous) fishing mortality rate at which yield per individual entering the fishery (recruit) is maximized. The first TAC in SAs 3 and 4 was set (1974) only for ICNAF Divisions 4V, 4W, and 4X (55,000 tons) to permit a reasonable but limited expansion of that fishery. The 1975 TAC for SAs 3 and 4 (70,000 tons) was established to stabilize the fishery at the 1974 expected level of catch. The 1976 TAC was set at 56,000 tons.

Although some progress has been made in tracing migratory pathways, seasonal distributions of the northern and southern contingents are still uncertain. It is known, for example, that both contingents contribute to the winter fishery off New England, although their relative contributions have never been determined. Consequently, the ICNAF Assessments Subcommittee agreed in 1975 to assess all mackerel in SA 3-6 as a unit stock. The 1976 TAC of 310,000 tons for SA 3 - 6 was, therefore, apportioned on the basis of historical

catches to determine the SAs 5 and 6 and SAs 3 and 4 allocations.

Distant-water fleets conduct their mackerel fisheries primarily with pelagic midwater trawls, although bottom trawls are also used to some extent.

It is difficult to make an accurate evaluation as to the numbers and types of vessels involved in the mackerel fishery by nation. However, it is apparent that a substantial amount of effort was directed toward mackerel in recent years, primarily during the early months of the year off southern New England and the Mid-Atlantic states. Here large numbers (over 100) of factory stern trawlers (primarily USSR) fished for mackerel and other species during winter. The directed USSR fishery for mackerel ended in spring following the taking of most of the mackerel quota. This pattern of movement and activity was duplicated to some extent by the two other nations most heavily engaged in the mackerel fishery (Poland and the GDR), although in 1974 and 1975 these countries were unable to reach their quotas in spring and therefore fished for mackerel in the autumn.

VIII-4. Interaction Between Domestic And Foreign Participants In The Fishery

Fisheries off the northeast coast of the US have been studied and managed under the auspices of the International Commission for the Northwest Atlantic Fisheries (ICNAF), established in 1949. In 1976, ICNAF was composed of 18 member nations, including the US and Canada. The US withdrew from ICNAF as of January 1, 1977, in order to implement the Fishery Conservation and Management Act of 1976 (FCMA). For management under ICNAF, the northwest Atlantic was divided into 5 Subareas (SA) (the Convention Area). An additional Statistical Area (SA) 6 was established in 1966. These Areas were further divided into Divisions and Subdivisions (Figure 1). Fisheries for numerous species of the region were regulated through ICNAF by establishing Total Allowable Catches (TACs) and gear and area restrictions. Some species were also managed through bilateral agreements between the US and other nations.

Subarea 5 and Statistical Area 6 together include the region extending from Maine to Cape Hatteras, which is within the Fishery Conservation Zone established by the FCMA. Until implementation of the FCMA, the 12 mile limit was the western boundary of ICNAF SA 5 and 6. The western limit of ICNAF Subarea 5, bounded by the line $71^{\circ} 40'$ W longitude, runs south through Block Island to $39^{\circ} 00'$ N latitude, due east of Cape May, New Jersey. The southern boundary of the ICNAF Convention Area runs east to $42^{\circ} 00'$ W longitude. The eastern boundary is not shown in the figure because virtually all fishing in the region takes place over the continental shelf, bounded by the 200 meter isobath. Subdivision 5Ze corresponds roughly to Georges Bank, and 5Zw to Nantucket Shoals (Figure 1).

Almost all catches from SA 6 have come from Divisions 6A (New York Bight), 6B, and 6C. Foreign fleets first began fishing in these waters in the early 1960s. Statistical Area 6 was not subdivided until 1968, and submission by member nations of detailed catch reports by each Division was not consistent until recent years. Thus, the precise distribution of foreign fishing since its inception in the Middle Atlantic Bight is not completely known. It is probable that much of the foreign catch in Divisions 6A-6C has directly influenced abundance and availability of many migratory species to the north and south of the waters under the purview of the Mid-Atlantic Fishery Management Council.

Since the United States and Canada extended their jurisdictions to 200 miles in 1977, sovereignty over portions of Georges Bank is in dispute. The problem is further complicated by uncertainty as to fish stock relationships. Currently, two contingents in the Atlantic mackerel stock are recognized, both of which may migrate into and through the disputed area.

United States and foreign landings data for all Atlantic mackerel stocks are given in Table 28. The US percentage in terms of total catch has declined steadily since 1961 coincidentally with the introduction of the foreign fishing fleets. The US portion of the total landings since 1971 has been less than 10%. It has been noted in earlier sections that the major portion of the catch is taken by the USSR, Poland, the GDR, and Bulgaria. The reduction of stock size as a result of the foreign catch may have had an effect on the availability of mackerel to US fishermen, particularly to those in the sport fishery.

Table 28. US (Commercial and Recreational), Foreign, and Total Landings Expressed as Relative Percentages of the Total for the ICNAF Subareas 3 - 5 and Statistical Area 6 Mackerel Stock 1961 - 1976 (metric tons)

<u>Year</u>	<u>United States</u>	<u>Percent</u>	<u>Foreign Nations</u>	<u>Percent</u>	<u>Total</u>
1961	8,189	60	5,470	40	13,659
1962	9,636	58	6,976	42	16,612
1963	9,668	56	7,662	44	17,330
1964	10,130	49	10,587	51	20,717
1965	10,581	43	14,130	57	24,711
1966	12,896	40	19,528	60	32,424
1967	17,418	37	30,229	63	47,647
1968	33,059	30	76,882	70	109,941
1969	37,667	23	127,466	77	165,133
1970	36,127	14	226,559	86	262,686
1971	33,048	8	370,627	92	403,675
1972	23,888	6	407,718	94	431,606
1973	11,280	3	417,970	97	429,250
1974	8,682	3	338,538	97	347,220
1975	7,627	3	227,180	97	284,807
1976	7,397	3	232,550	97	239,947

Non-Target Species Mortalities

Fisheries (main species sought category) in which mackerel were caught in SAs 5 and 6 in 1974 are shown by country in Table 30. A total mackerel catch of 294,925 metric tons was harvested of which 36,554 tons (12%) occurred as by-catch in fisheries directed toward other species. In the absence of information to the contrary, it was assumed that if a given catch record consisted predominantly of a given species, then the fishery was directed toward that species. This procedure is necessary since much of the catch data reported to ICNAF are not submitted in terms of species sought. Ninety-five percent of the by-catch occurred in directed fisheries for three species

categories: silver hake (71%), herring (18%), and invertebrates (6%); and 94% was taken by two countries, the USSR (76%) and Poland (18%), with only minor quantities reported by other countries. Mackerel caught as by-catch accounted for approximately 12% of the total TAC allocation of 304,000 tons in SAs 5 and 6 for 1974.

The mackerel fishery was difficult to identify under the previous catch reporting scheme because it occurred in a mixed fishery situation. A procedure was adopted of assigning a catch record* to the mackerel fishery if the largest catch was of mackerel (Table 30). The international mackerel fishery thus defined had a by-catch of other species equal to 18% of its directed mackerel catch of 258,283 tons. The species constituting most of this by-catch were herring (28%), silver hake (23%), and other fish (35%). These by-catches accounted for 8% (10,828 tons) of the silver hake catch in 1974, 7% (13,287 tons) of the herring catch in 1974, and 12% (16,437 tons) of the other fish catch in 1974. Table 30 lists the 1974 by-catches and by-catch ratios in the mackerel fishery for all countries combined and for individual countries.

By-catch ratios should be regarded as very tentative, since statistics reported to ICNAF lump several directed fisheries together under a mixed fishery classification. This procedure gives higher ratios than actually occur, since some "directed" catch would be considered as by-catch when the target species was recorded as mixed. Analyses of US inspections under ICNAF indicate by-catch ratios in the recent directed mackerel fishery are usually below 3%.

Economic Interactions

A number of economic interactions are possible which could influence the US industry. Declines in stock abundance resulting from increased exploitation would result in declining catch per unit of effort, thus increasing commercial operational costs and adversely affecting profitability (a pronounced decline in catch per unit of effort has in fact occurred for the US since 1970). Decline in stock abundance could similarly produce a declining catch per unit of effort in the sport fishery and adversely affect profitability of party and charter boat operators due to a reduced demand for recreational fishing. Foreign imports could have an impact on ex-vessel prices, further affecting profitability.

*A catch record lists catches monthly by species for a gear-tonnage class category in an ICNAF Division.

By-Catch Ratios And Catches In The Mackerel Fishery For 1974 By Countries
(metric tons)

Country	Cod	Haddock	Redfish	Silver hake	Red hake	Pollock	American plaice	Witch flounder	Yellowtail flounder	Other flounder	Herring	Mackerel	Squid	Other fish	Total
All countries combined															
Ratio	0.001	0	0	0.042	0.005	0	0	0	0	0	0.051	1.000	0.020	0.063	1.182
Catch	286	0	0	10,028	1,310	0	3	51	14	10	13,207	258,283	5,280	16,437	305,805
Bulgaria															
Ratio	0	0	0	0.050	0.016	0	0	0	0	0	0.065	1.000	0.026	0.159	1.316
Catch	0	0	0	1,034	336	0	0	0	0	0	1,353	20,664	536	3,292	27,215
GDR															
Ratio	0	0	0	0.001	0	0	0	0	0	0	0.040	1.000	0	0.013	1.054
Catch	20	0	0	38	0	0	0	0	0	0	2,367	59,832	0	754	63,011
Poland															
Ratio	0.003	0	0	0.002	0	0	0	0	0	0	0.072	1.000	0.044	0.081	1.202
Catch	248	0	0	136	0	0	0	0	0	0	6,481	69,620	3,904	7,267	107,656
Romania															
Ratio	0	0	0	0.027	0.012	0	0	0	0	0	0.146	1.000	0.001	0.054	1.240
Catch	2	0	0	174	78	0	0	0	0	0	956	6,555	7	355	8,127
USSR															
Ratio	0	0	0	0.116	0.011	0	0	0.001	0	0	0.026	1.000	0.010	0.057	1.221
Catch	13	0	0	9,438	896	4	3	51	14	10	2,106	81,279	824	4,693	99,331
USA															
Ratio	0.009	0	0	0.024	0	0.012	0	00	0	0	0.072	1.000	0.051	0.228	1.396
Catch	3	0	0	0	0	4	0	00	0	0	24	333	17	76	465

Table 29

Table 30. By-Catches and By-Catch Ratios of Mackerel Taken in 1974 in ICNAF SA 5 and SA 6 in a Designated Fishery (Main Species Sought Category) by Country (metric tons)

Country	Main Species Sought							
	Silver hake	Red hake	Other ground-fish	Herring	Other pelagics	Other fish	Invertebrates	Miscellaneous
Bulgaria								
Catch	59							
Ratio	0.039							
FRG								
Catch				483				
Ratio				0.016				
GDR								
Catch				48		93		4
Ratio				0.400		0.051		0.500
Italy								
Catch							420	
Ratio							0.099	
Japan								
Catch			0		8		62	
Ratio			0.000		0.002		0.004	
Poland								
Catch				4,730		0	1,746	7
Ratio				0.145		0.000	0.816	0.072
Romania								
Catch				411				
Ratio				0.387				
USSR								
Catch	25,886	484	0	766	0	711	15	
Ratio	0.262	0.032	0.000	0.022	0.000	0.035	0.010	
USA								
Catch	85	1	282	1	113	18	102	19
Ratio	0.009	0.001	0.019	0.000	0.002	0.001	0.160	0.001
Total								
Catch	26,030	485	282	6,439	121	822	2,345	30

IX. DESCRIPTION OF ECONOMIC CHARACTERISTICS OF THE FISHERY

IX-1. Domestic Harvesting Sector

Historical records indicate that Atlantic mackerel has been an important source of revenue to New England and Mid-Atlantic fishermen since the early 19th century. Trends in the total dollar values (ex-vessel) reflect trends in landings; for Boston (the leading port) landings values averaged \$341,928 during 1893 - 1930, and ranged from a low of \$46,133 in 1895 to a high of \$973,105 in 1926. During the next two decades, Boston landings values steadily increased to an all time high of \$1,550,000 in 1945. This was followed by a precipitous decline to \$81,071 in 1949. Landings values have since declined to insignificant levels in Boston (1,100 pounds in 1976, worth \$257).

The total ex-vessel value of mackerel landed in all the New England States was \$2,302,596 in 1929, but since 1950 this figure has been less than \$1,000,000, and in 1976 the total reported figure was \$363,000 (Table 24). The total value in the Middle Atlantic region reached \$852,814 in 1947, declined to \$24,000 in 1959, and increased to \$151,000 in 1972. In 1976, the total reported figure was about \$190,000 (Table 24). The total dollar value of the US commercial mackerel catch was approximately \$655,000 in 1976. In the last decade, conditions for the fishery as a whole have been rather stable; price increases in the 1973 - 1975 period appear to have been offset by declining catches, and total catch values have, if anything, declined somewhat.

Tables 31 - 35 show landings by gear by county for the Mid-Atlantic States. Mackerel have been relatively unimportant except in several New Jersey and Maryland counties.

Table 36 contains data on the value of the mackerel catch as a percentage of the total regional fish catch for the 1966 - 1972 period. The value of the regional mackerel catch during the 1966 - 1972 period constituted, in general, less than one percent of the total regional fish catch. Clearly, the mackerel fishery has not been of great economic importance during this period.

IX-2. Domestic Processing Sector

The number of firms in the domestic processing sector is so small that the data are not published. Therefore, this analysis cannot be made. Estimates of processing capacity, as required by the amended FCMA, cannot be made because of the lack of relevant data. The proposed reporting requirements in this FMP should resolve this problem so that the analysis can be made in future updates of this FMP.

IX-3. International Trade

In 1973, 1,697,000 pounds of mackerel (pickled or salted) worth \$433,000 were imported into the US. During 1974, imports of this commodity totalled 1,046,000 pounds and \$289,000. In addition, in 1973, 5,000 pounds of smoked or kippered mackerel worth \$4,000 were imported. Imports of this item grew to 44,000 pounds and \$32,000 in 1974.

In 1973, 248,000 pounds of canned mackerel worth \$46,000 were exported from the US. Exports in 1974 were 353,000 pounds worth \$76,000.

Table 31

Contribution Of 1976 Mackerel Landings To New York Counties And Fishing Gears

<u>Kings County</u>				
	<u>Pounds</u>	<u>Dollars</u>	<u>Average \$/Pound</u>	
Mackerel Landings				
Fish Otter Trawls	9,300	1,783		0.19
Hand Lines	8,100	1,373		0.17
Total	17,400	3,156		0.18
			<u>Mackerel Contribution (%)</u>	
	<u>Pounds</u>	<u>Dollars</u>	<u>Pounds</u>	<u>Dollars</u>
County Landings				
All Species	2,449,100	532,114	0.7	0.6
Finfish & Squid	2,293,400	464,554	0.8	0.7
Fish Otter Trawls	2,027,100	332,283	0.5	0.5
Hand Lines	266,300	132,267	3.0	1.0
<u>Nassau County</u>				
	<u>Pounds</u>	<u>Dollars</u>	<u>Average \$/Pound</u>	
Mackerel Landings				
Fish Otter Trawls	2,500	475		0.19
Hand Lines	300	97		0.32
Total	2,800	572		0.20
			<u>Mackerel Contribution (%)</u>	
	<u>Pounds</u>	<u>Dollars</u>	<u>Pounds</u>	<u>Dollars</u>
County Landings				
All Species	4,871,100	2,539,856	<0.1	<0.1
Finfish & Squid	1,029,700	265,686	0.3	0.2
Fish Otter Trawls	947,300	238,390	0.3	0.2
Hand Lines	50,000	15,603	0.6	0.6
<u>Suffolk County</u>				
	<u>Pounds</u>	<u>Dollars</u>	<u>Average \$/Pound</u>	
Mackerel Landings				
Haul Seines	40,200	7,642		0.19
Fish Otter Trawls	29,400	4,204		0.14
Pound Nets	144,900	21,630		0.15
*A/S/S Gill Nets	3,300	765		0.23
Hand Lines	11,100	1,548		0.14
Total	228,900	35,789		0.16
			<u>Mackerel Contribution (%)</u>	
	<u>Pounds</u>	<u>Dollars</u>	<u>Pounds</u>	<u>Dollars</u>
County Landings				
All Species	26,310,100	28,239,286	0.9	0.1
Finfish & Squid	14,311,200	3,875,452	1.6	0.9
Haul Seines	760,600	208,353	5.3	3.7
Fish Otter Trawls	9,176,400	2,776,050	0.3	0.2
Pound Nets	2,418,700	469,048	6.0	4.6
*A/S/S/ Gill Nets	803,800	97,932	0.4	0.8
Hand Lines	830,900	271,216	1.3	0.6

< = less than

* Anchor, Set or Stake Gill Nets

Table 32

Contribution Of 1976 Mackerel Landings To New Jersey Counties And Fishing Gears

<u>Atlantic County</u>			
	<u>Pounds</u>	<u>Dollars</u>	<u>Average \$/Pound</u>
Mackerel Landings			
Fish Otter Trawls	26,000	3,941	0.15
Drift Gill Nets	200	22	0.11
Total	26,200	3,963	0.15
<u>Mackerel Contribution (%)</u>			
	<u>Pounds</u>	<u>Dollars</u>	<u>Pounds</u> <u>Dollars</u>
County Landings			
All Species	13,048,200	5,670,261	0.2 <0.1
Finfish & Squid	1,147,700	511,385	2.3 0.8
Fish Otter Trawls	734,000	234,772	3.5 1.7
Drift Gill Nets	14,400	4,038	1.4 0.5
<u>Cape May County</u>			
	<u>Pounds</u>	<u>Dollars</u>	<u>Average \$/Pound</u>
Mackerel Landings			
Fish Otter Trawls	417,700	32,929	0.08
Mid-Water Trawls	1,351,800	105,406	0.08
Drift Gill Nets	2,200	957	0.44
Hand Lines	400	32	0.08
Total	1,772,100	139,324	0.08
<u>Mackerel Contribution (%)</u>			
	<u>Pounds</u>	<u>Dollars</u>	<u>Pounds</u> <u>Dollars</u>
County Landings			
All Species	39,896,700	14,961,938	4.4 0.9
Finfish & Squid	22,508,300	4,373,150	7.8 3.2
Fish Otter Trawls	15,150,100	3,234,789	2.8 1.0
Mid-Water Trawls	4,525,300	331,463	29.9 31.8
Drift Gill Nets	15,800	2,974	13.9 32.2
Hand Lines	11,800	1,609	3.4 2.0
<u>Monmouth County</u>			
	<u>Pounds</u>	<u>Dollars</u>	<u>Average \$/Pound</u>
Mackerel Landings			
Fish Otter Trawls	200	20	0.10
Drift Gill Nets	2,400	268	0.11
Runaround Gill Nets	300	63	0.21
Total	2,900	351	0.12
<u>Mackerel Contribution (%)</u>			
	<u>Pounds</u>	<u>Dollars</u>	<u>Pounds</u> <u>Dollars</u>
County Landings			
All Species	154,644,900	5,411,065	<0.1 <0.1
Finfish & Squid	153,917,700	4,840,937	<0.1 <0.1
*Food Finfish & Squid	3,834,100	553,610	<0.1 <0.1
Fish Otter Trawls	3,000,800	350,394	<0.1 <0.1
Drift Gill Nets	2,400	268	100.0 100.0
Runaround Gill Nets	101,600	22,811	0.3 0.3
<u>Ocean County</u>			
	<u>Pounds</u>	<u>Dollars</u>	<u>Average \$/Pound</u>
Mackerel Landings			
Fish Otter Trawls	50,900	6,952	0.14
Drift Gill Nets	100	9	0.09
Total	51,000	6,961	0.14
<u>Mackerel Contribution (%)</u>			
	<u>Pounds</u>	<u>Dollars</u>	<u>Pounds</u> <u>Dollars</u>
County Landings			
All Species	15,459,500	6,479,155	0.3 0.1
Finfish & Squid	10,897,400	2,577,674	0.5 0.3
Fish Otter Trawls	8,510,800	1,703,668	0.6 0.4
Drift Gill Nets	34,500	10,068	0.3 <0.1

* Monmouth County is the center of the New Jersey menhaden industry.

< = less than

Table 33

Contribution Of 1976 Mackerel Landings To Maryland Counties And Fishing Gears

<u>Worcester County</u>				
	<u>Pounds</u>	<u>Dollars</u>	<u>Average \$/Pound</u>	
Mackerel Landings				
Fish Otter Trawls	223,600	20,741	0.09	
			<u>Mackerel Contribution (%)</u>	
	<u>Pounds</u>	<u>Dollars</u>	<u>Pounds</u>	<u>Dollars</u>
County Landings				
All Species	11,378,500	5,446,980	2.0	0.4
Finfish & Squid	2,998,300	576,537	7.5	3.6
Fish Otter Trawls	2,706,500	495,170	8.3	4.2

Table 34

Contribution Of 1976 Mackerel Landings To Delaware Counties And Fishing Gears

<u>Sussex County</u>				
	<u>Pounds</u>	<u>Dollars</u>	<u>Average \$/Pound</u>	
Mackerel Landings				
Drift Gill Nets	300	24	0.08	
			<u>Mackerel Contribution (%)</u>	
	<u>Pounds</u>	<u>Dollars</u>	<u>Pounds</u>	<u>Dollars</u>
County Landings				
All Species	1,727,600	483,244	<0.1	<0.1
Finfish & Squid	384,500	129,377	<0.1	<0.1
Drift Gill Nets	109,700	42,704	0.3	<0.1

< = less than

Table 35

Contribution Of 1976 Mackerel Landings To Virginia Counties And Fishing Gears

<u>Accomack County</u>				
	<u>Pounds</u>	<u>Dollars</u>	<u>Average \$/Pound</u>	
Mackerel Landings				
Fish Otter Trawls	127,900	17,114	0.13	
*A/S/S/ Gill Nets	25,000	3,759	0.15	
Drift Gill Nets	3,300	480	0.15	
Total	<u>156,200</u>	<u>21,353</u>	<u>0.14</u>	
	<u>Pounds</u>	<u>Dollars</u>	<u>Mackerel Contribution (%)</u>	
County Landings			<u>Pounds</u>	<u>Dollars</u>
All Species	9,437,000	3,574,945	1.7	0.6
Finfish & Squid	2,893,700	645,860	5.4	3.3
Fish Otter Trawls	796,800	281,391	16.1	6.1
*A/S/S Gill Nets	317,400	76,474	7.9	4.9
Drift Gill Nets	1,723,800	265,139	0.2	0.2
<u>City Of Hampton</u>				
	<u>Pounds</u>	<u>Dollars</u>	<u>Average \$/Pound</u>	
Mackerel Landings				
Fish Otter Trawls	60,200	8,791	0.15	
Hand Lines	300	65	0.22	
Total	<u>60,500</u>	<u>8,856</u>	<u>0.15</u>	
	<u>Pounds</u>	<u>Dollars</u>	<u>Mackerel Contribution (%)</u>	
County Landings			<u>Pounds</u>	<u>Dollars</u>
All Species	9,382,800	5,618,549	0.6	0.2
Finfish & Squid	4,343,300	1,025,604	1.4	0.9
Fish Otter Trawls	3,471,900	926,508	1.7	0.9
Hand Lines	27,200	3,914	1.1	1.7
<u>Northampton County</u>				
	<u>Pounds</u>	<u>Dollars</u>	<u>Average \$/Pound</u>	
Mackerel Landings				
Fish Otter Trawls	2,000	360	0.18	
	<u>Pounds</u>	<u>Dollars</u>	<u>Mackerel Contribution (%)</u>	
County Landings			<u>Pounds</u>	<u>Dollars</u>
All Species	20,339,700	8,513,620	<0.1	<0.1
Finfish & Squid	2,951,000	265,633	<0.1	0.1
Fish Otter Trawls	41,500	10,941	4.8	3.3
<u>City Of Virginia Beach</u>				
	<u>Pounds</u>	<u>Dollars</u>	<u>Average \$/Pound</u>	
Mackerel Landings				
*A/S/S Gill Nets	33,800	5,211	0.15	
Drift Gill Nets	24,000	4,320	0.18	
Total	<u>57,800</u>	<u>9,531</u>	<u>0.16</u>	
	<u>Pounds</u>	<u>Dollars</u>	<u>Mackerel Contribution (%)</u>	
County Landings			<u>Pounds</u>	<u>Dollars</u>
All Species	1,792,100	367,719	3.2	2.6
Finfish & Squid	1,374,300	198,299	4.2	4.8
*A/S/S Gill Nets	260,000	42,586	13.0	12.2
Drift Gill Nets	73,700	12,175	32.6	35.5

* Anchor, Set, or Stake Gill Nets

< = less than

X. DESCRIPTIONS OF THE BUSINESSES, MARKETS, AND ORGANIZATIONS
ASSOCIATED WITH THE MACKEREL FISHERY

X-1. Relationship Among Harvesting, and Processing Sectors

The information for this analysis is not available.

X-2. Fishery Cooperatives Or Associations

The information for this analysis is not available for ports in the Mid-Atlantic region. Data for selected ports in New England are presented in Table 39.

Table 39. 1976 Labor Force Characteristics For Offshore Fishermen
In New England Ports

<u>Ports</u>	<u>Number of Full-Time Fishermen</u>	<u>Unions & Cooperatives</u>	<u>Approximate Average Age</u>	<u>Major Ethnic Groups</u>
<u>MA</u>				
Boston	100	Union & Nonunion	55	Yankee, Port.
Chatham	60-80	Cooperative	45	Yankee
Gloucester	500	Union & Nonunion	45	Italian, Yankee
Menemsha	30	None	40	Yankee
New Bedford	400	Union	43	Yank./Norw./Can./Port.
Provincetown	150-200	Coop. & Nonunion	40	Yankee
<u>RI</u>				
Newport	80	Union & Nonunion	45	Yank./Port./Ital.
Pt. Judith	120	Cooperative	40	Yank./Norw.
<u>ME</u>				
Portland	150	None	40	Yankee
Rockland	80	None	40	Yankee
<u>CT</u>				
Stonington	45	None	50	Yankee
<u>NH</u>				
Rye	20	None	40	Yankee

Source: Smith and Peterson (1977).

X-3. Labor Organizations Concerned With Mackerel

The information for this analysis is not available for ports in the Mid-Atlantic region. Data for selected ports in New England are presented in Table 39.

X-4. Foreign Investment In The Domestic Mackerel Fishery

The information for this analysis is not available.

XI. DESCRIPTION OF SOCIAL AND CULTURAL FRAMEWORK OF
DOMESTIC MACKEREL FISHERMEN AND THEIR COMMUNITIES

Uniform socio-economic data on fishing communities are not available. Certain information is available from the federal censuses on a county basis. Therefore, mackerel landings were tabulated by county and analyzed to identify those counties with a significant involvement in this fishery (Table 40). Barnstable and Essex Massachusetts, Worcester, Maryland, and Cape May, New Jersey were selected as being relatively important in this fishery.

Table 40. Mackerel and Total Finfish and Squid Landings, 1976
(landings in thousands of pounds)

State	County	Mackerel	Total Finfish & Squid	Mackerel Share of County Total	Dist. of Mackerel
ME	Cumberland	138.6	32,442.4	0.4%	2.8%
	Lincoln	68.2	3,564.4	1.9	1.4
	Sagadahoc	1.5	7,316.1	<0.1	<0.1
	Washington	50.6	15,081.6	0.3	1.0
	York	125.5	6,376.4	2.0	2.5
NH	Rockingham	0.4	2,833.8	<0.1	<0.1
MA	Barnstable	612.2	32,402.2	1.9	12.3
	Bristol	0.1	55,888.2	<0.1	<0.1
	Dukes	3.5	2,717.6	0.1	0.1
	Essex	933.2	143,909.1	0.6	18.8
	Plymouth	0.6	2,503.2	<0.1	<0.1
RI	Suffolk	1.2	23,546.8	<0.1	<0.1
	Newport	265.0	23,021.8	1.2	5.3
	Washington	151.8	41,731.7	0.4	3.1
CO	Fairfield	9.1	263.2	<0.1	0.2
	Middlesex	0.5	470.1	0.1	<0.1
	New Haven	2.6	78.3	3.3	<0.1
	New London	1.2	2,931.3	<0.1	<0.1
NY	Kings	17.4	2,293.4	0.8	0.4
	Nassau	2.8	1,029.7	0.3	0.1
	Suffolk	228.9	14,311.2	1.6	4.6
NJ	Atlantic	23.2	1,147.7	2.3	0.5
	Cape May	1,772.1	22,508.3	7.8	35.7
	Monmouth	2.9	153,916.8	<0.1	0.1
	Ocean	51.0	10,897.7	0.5	1.0
DE	Sussex	0.3	384.5	<0.1	<0.1
MD	Worcester	223.6	2,998.3	7.8	4.5
VA	Accomack	156.2	2,893.7	5.4	3.1
	Hampton (city)	60.5	4,343.3	1.4	1.2
	Northampton	2.0	2,951.0	<0.1	<0.1
	Virginia Beach	57.8	1,374.3	4.2	1.2
Total		4,964.5			100.0%

Data from the census are presented in Table 41. The resort nature of the economies of Barnstable, Worcester and Cape May Counties is obvious from the data. The only one of the five counties that may have been in some economic

difficulty was Cape May, with many indicators significantly differing from the national averages. For example, median age was 38.9 relative to the US average of 28.3. Educational achievement of residents aged 25 years and more was 11.3 years from Cape May County and 12.1 for the US. Unemployment was 6.5% relative to 4.4% for the nation. Manufacturing industries were relatively small and were growing at only about half the national rate (change in value added between 1963 and 1967 was 16.8% for the County and 36.4% for the US). Data on fisheries employment are not available on the county level.

Recreational fishing for mackerel is economically very important. However, data are not available to quantify this on a community or county basis.

The 1974 NMFS Marine Recreational Anglers Survey identified approximately 10.9 million marine recreational anglers resident in the coastal states of Maine through Virginia plus Vermont, Pennsylvania, West Virginia, and the District of Columbia. Total expenditures were estimated to be \$378,115,000. Table 42 shows the estimated expenditures for residents of the Mid-Atlantic States.

Table 43 shows the number of finfish caught by marine anglers as reported in the 1965, 1970, and 1974 Salt-Water Angling Surveys (Deuel, personal communication). Atlantic mackerel ranked third (by total numbers caught) in 1965, first in 1970, and fifth in 1974. For the same areas and years, mackerel ranked seventh, third, and seventh, respectively, by total weight caught (Table 26.)

An Atlantic mackerel angler survey was conducted along the New Jersey coast between July 12, 1975 and September 19, 1976 (Christensen *et al.*, 1976). Based on previous research (Deuel, 1973), the survey covered only party and charter boats. An estimated 1,028 metric tons of mackerel were caught by anglers fishing from New Jersey based party and charter boats during the survey period.

Party and charter boats based in Delaware, Maryland, and Virginia total about one-fourth of similar New Jersey boats. If their performance during the survey period was similar to that of New Jersey boats, the Mid-Atlantic catch (not counting New York) would have been approximately 1,285 metric tons.

If the 1970 percentage of the mackerel catch by party and charter boats (62.8%) (Deuel, 1973) was valid during the survey period, the total catch for the Mid-Atlantic (without New York) was 2,046 tons, and the entire US recreational catch of this species was about 4,947 tons.

Table 41. Selected 1970 Population and Economic Characteristics for Counties with Significant mackerel Landings

	<u>US</u>	<u>Barnstable</u>	<u>Essex</u>	<u>Worcester</u>	<u>Cape May</u>
<u>Population</u>					
Total (000)	203,212	97	638	24	60
US rank		364	50	1,276	567
Per sq. mi.	57	246	1,291	51	223
% Change, 60-70	13.3	37.5	12.1	3.0	22.7
% Net mig. 60-70	1.7	32.4	4.4	-5.5	21.9
% Female	51.3	52.1	52.5	52.0	51.3
% Urban	73.5	41.3	89.5	14.6	61.8
% Under 5 yrs.	8.4	7.4	8.2	8.1	6.6
% 18 yrs. & over	65.6	68.5	66.4	65.2	71.7
% 65 yrs. & over	9.9	16.9	11.9	12.9	20.0
Median age	28.3	34.4	31.0	31.9	38.9
Over 25, median school yrs. completed	12.1	12.6	12.3	10.2	11.3
<u>Labor force</u>					
Total (000)	82,049	37	272	10	21
Civilian (000)	80,051	34	271	10	20
% Fem./w husb.	57.0	58.5	54.2	60.1	54.8
% Unemployed	4.4	3.9	3.9	3.2	6.5
% Emp. in mfg.	25.9	7.6	34.5	22.3	11.4
% Emp. outside county	17.8	6.1	20.9	18.1	15.8
% Families with female head	10.8	10.5	11.3	11.9	10.1
Median family income (\$)	9,586	9,242	10,935	7,386	8,295
% Families low income	10.7	8.3	5.9	17.3	8.9
<u>Mfg. estab.</u>					
Total	311,140	96	1,294	50	52
% 20-99 emp.	24.3	10.4	26.5	34.0	26.9
% 100 or more emp.	11.2	2.1	11.7	14.0	5.8
% Change, value added, 63-67	36.4	12.5	24.3	39.5	16.8
<u>Retail sales</u>					
% of total in eating & drinking places	7.7	12.4	9.1	12.2	19.6
<u>Selected services</u>					
% Receipts, hotels, etc.	11.6	55.7	11.3	51.2	58.3
% Receipts, amusements	13.7	8.8	13.1	27.3	18.1

D = Data not reported

Source: County and City Data Book, 1972.

Table 42. Marine Recreational Anglers' Estimated Expenditures by State of Residence, 1974 (thousands of dollars)

	<u>NY</u>	<u>NJ</u>	<u>PA</u>	<u>DEL</u>	<u>MD</u>	<u>VA</u>	<u>TOTAL</u>
Tackle	24,503	18,304	6,765	1,415	9,301	4,137	64,425
License Fees	1,915	1,159	1,017	96	874	356	5,417
Access Fees	1,871	2,174	388	35	1,124	254	5,846
Boat Launch	2,346	3,356	647	7	1,479	235	8,070
Charter Rentals	5,344	13,729	7,572	493	5,683	1,281	34,102
Boat Fuels	15,713	11,485	3,475	701	4,873	1,988	38,235
Boat	9,154	4,996	1,523	330	1,823	896	18,722
Food	12,608	13,187	5,273	1,766	6,500	2,639	41,973
Lodging	4,900	6,917	5,406	851	7,292	1,832	27,198
Travel	10,891	14,941	7,642	990	6,316	3,158	43,938
Other	1,966	8,774	103	5	1,778	604	13,230
Total	91,211	99,022	39,811	6,689	47,043	17,380	301,156

Source: NMFS, 1974 Marine Recreational Anglers Survey.

Table 43. Number of Finfish Caught by Marine Recreational Anglers, Maine Through Virginia, by Major Species, 1965, 1970, and 1974

<u>Species</u>	<u>Salt-Water Angling Surveys*</u>		<u>1974</u>
	<u>1965</u>	<u>1970</u>	<u>Regional Survey</u>
Bass, black sea	6,447	4,130	2,156
Bluefish	21,700	23,044	28,254
Cod, Atlantic	5,032	3,844	2,901
Croaker	5,080	4,617	2,736
Flounder, summer	23,635	12,680	15,876
Flounder, winter	15,902	29,077	16,823
Mackerel, Atlantic	22,745	52,014	9,963
Perches	16,801	15,014	10,845
Porgy	13,866	4,038	6,272
Puffer	38,221	32,952	1,507
Searobins	4,015	8,651	3,279
Spot	8,174	32,952	6,058
Striped bass	15,937	14,166	6,695
Tautog	3,955	4,617	3,342
Weakfish	1,799	10,142	5,977
All other species	60,627	27,577	16,832
Total	264,786	285,223	139,516

* The Salt-Water Angling Surveys included the northern part of North Carolina (to Cape Hatteras).

Source: NMFS 1974 Marine Recreational Anglers Survey (Deuel, personal communication).

XII. DETERMINATION OF OPTIMUM YIELD

XII-1. Specific Management Objectives

The Mid-Atlantic Council adopted the following objectives to guide management and development of the mackerel fishery in the northwestern Atlantic. They are:

1. Provide opportunity for increased domestic recreational and commercial catch;
2. Maximize the contribution of recreational fishing for Atlantic mackerel to the national economy;
3. Maintain the spawning stock size of Atlantic mackerel at or above its size in 1978;
4. Achieve efficient allocation of capital and labor in the mackerel fishery; and
5. Minimize costs to taxpayers of development, research, management, and enforcement in achieving these objectives.

XII-2. Description of Alternatives and XII-3. Analysis of Beneficial and Adverse Impacts Of Potential Management Options

(1) Take No Action At This Time - This would mean that the PMP prepared by the NMFS would remain in effect. The PMP regulates foreign but not domestic fishing. No action to limit the harvest of Atlantic mackerel would probably result in a rapid expansion of the commercial mackerel fishery for export, in response to the great foreign demand for this species. No action to control this growth might easily result in the reduction of the spawning stock size to a level beneath that estimated for 1978. Although stock-recruitment relationships for mackerel are not known, and it is clear that environmental factors are significant in controlling recruitment, it is very probable that at low levels of abundance (as at present) there exists a positive correlation between spawning stock size and recruitment (i.e., future abundance). The Mid-Atlantic Council has determined that the spawning stock size should not be reduced beneath the 1978 level if the economic future of this fishery is to be safeguarded and in order to provide for the attainment of the Council's management objectives. In addition, data on the US mackerel fishery that will be reported as a result of this FMP would not be available. Therefore, the "No Action" alternative is unacceptable at this time.

(2) Selection Of Various Management Units - There are three possible options for the management unit to be address by this FMP for regulation and for specification of an optimum yield. They are:

(a) Atlantic Mackerel Within The Fishery Conservation Zone - Selection of this option would limit the jurisdiction of this FMP to the fishery for mackerel within the FCZ only. Application of an optimum yield to only this component might render attainment of the objectives of the FMP impossible and might result in the abrupt and total closure of the US fishery in the FCZ, because (i) mackerel catches in the territorial sea would not be controllable, and might grow to a level which would undermine the Council's objective for maintenance of mackerel spawning stock size, and (ii) the provisions of a bilateral agreement could possibly render the FMP void.

(b) Atlantic Mackerel Within All US Waters - Selection of this option

would result in an OY for Atlantic mackerel in the territorial sea and the FCZ combined. This approach would remedy the problems of uncontrollable growth of the territorial sea fishery, because of the Secretary's ability to monitor the total US fishery (in the territorial sea and the FCZ) and limit mackerel catches in the FCZ so that the total mackerel catch in all US waters would not exceed the OY, and, if necessary, limit the catch in the territorial sea. This option, however, does not address the potential problems of a US/Canadian bilateral agreement.

(c) All Mackerel Under US Jurisdiction - If the US and Canada successfully reach a bilateral agreement, then the management unit as defined by this option would be the US share of the negotiated TAC. This might conceivably include a US mackerel fishery in Canadian waters, if, as part of a bilateral agreement, the US received fishing privileges in Canadian waters. Under these circumstances, the management unit (and, therefore, the OY selected for it) would be theoretically free of areas restrictions, i.e., the OY selected would pertain to the fraction of the negotiated TAC which would be assigned to the United States. The Canadian share of the TAC would not have to be considered in (i.e., subtracted from) the US optimum yield. If the US and Canada fail to reach a bilateral agreement, the management unit, as defined by this option, would revert to be mackerel within all US waters ("US jurisdiction" defined here in the broad sense to include all waters under Federal and state jurisdiction). In other words, the management unit would be the same as the management unit described in (b).

For the above reasons, the Mid-Atlantic Fishery Management Council has determined that the management unit addressed by this FMP, for which an OY has been selected, is all Atlantic mackerel under US jurisdiction.

(3) Preemption of the States' Jurisdiction in the Territorial Sea and/or Regulation of the Mackerel Fishery in the Fishery Conservation Zone - Unless preempted by the Secretary of Commerce, management of fisheries within the territorial sea is within the jurisdiction of the individual coastal States. Management of fisheries in the FCZ is the responsibility of the Federal government in conjunction with the Regional Fishery Management Councils.

Restriction of the mackerel fishery in either or both of these areas may be necessary if the US becomes bound to an extremely restrictive quota via a negotiated TAC with Canada for this species. This is unlikely, however, due to Canada's preference for a TAC in excess of that recommended by the US and this FMP.

It is the feeling of the Mid-Atlantic Council that preemption of state jurisdiction over fishery management is a drastic and cumbersome measure that should be avoided if possible and practicable. The Council has determined that the achievement of the objectives and the optimum yield can be best, most efficiently, and most equitably accomplished through monitoring the entire US fishery, both in the territorial sea and the FCZ, and by regulation of the fishery primarily in the FCZ, unless the growth of the domestic commercial or sport mackerel fishery in the territorial sea is so great as to jeopardize attainment of the objectives of this plan. Only under such circumstances, therefore, would preemption be warranted. The individual states and the Atlantic States Marine Fisheries Commission, however, are urged to adopt this FMP, so that management of this resource may be as uniform and comprehensive

as possible. Further discussion of territorial sea vs. FCZ fishery considerations is given in Section XII-5.

XII-4. Tradeoffs between The Beneficial And Adverse Impacts Of The Preferred Management Option

Optimum Yield And TALFF

The optimum yield and TALFF specified in Section XII-5 are greatly below the average annual foreign harvest of this species. Thus, the optimum yield and TALFF are adverse actions with respect to foreign fishing. The Mid-Atlantic Council has determined, however, that a great reduction in fishing mortality is necessary if mackerel stocks are to rebuild to a higher level of abundance. In the long-run, therefore, such rebuilding will be advantageous to all fisheries, foreign and domestic, commercial and recreational, for mackerel.

Management Unit Selection

The advantages of the selection of the management unit to be all Atlantic mackerel under US jurisdiction are discussed in Sections XII-2/XII-3. Selection of this management unit provides the greatest possible flexibility for implementation of this FMP. Without such inherent flexibility, it is possible that an FMP for this species could not be instituted until a bilateral agreement with Canada is reached - which may never occur.

Management Of The Fishery Via Regulation In The FCZ

Primary management of the fishery through regulation of its FCZ component is the most efficient and equitable means of achieving the objectives of this FMP. The Secretary of Commerce has authority, outside of this FMP, to preempt the states' jurisdiction in the event that the states' management (or lack thereof) in the territorial sea significantly undermines the attainment of the objectives of this FMP. The Mid-Atlantic Council believes this authority should be invoked for this FMP only if absolutely necessary, for the reasons and under the conditions specified in Sections XII-2/XII-3.

Environmental Considerations

Since the provisions of this FMP will decrease the probability of further declines in mackerel abundance, the optimum yield, management unit and all other stipulations of this FMP should not have an adverse impact on the environment.

XII-5. Specification of Optimum Yield

This Fishery Management Plan proposes an optimum yield based on: (1) the best scientific evidence currently available; (2) the probable impacts of any TAC and bilateral agreement reached with Canada for this species; (3) the probability of a total 1978 mackerel catch in excess of that determined by the US to be most desirable for this stock; (4) estimated economic and social impacts of various catch levels to the US fisheries and affected communities; (5) analysis of historical incidental catches of mackerel by foreign fisheries for other species; and (6) environmental considerations. These factors are analyzed below.

The maximum sustainable yield of mackerel has been estimated at 210,000 -

230,000 metric tons (Section V-4). Harvest at this level on an annual basis, however, presupposes annual levels of recruitment well in excess of those observed in the last few years. Although the relationship between mackerel spawning stock size and recruitment to the fishery is unknown (and may be affected by environmental fluctuations), it is probable that at low levels of abundance, as is currently the case, there is a positive correlation between spawning stock size and recruitment. Thus, analyses within this FMP include the assumption that the larger the spawning stock size (up to an as yet undermined level), the higher the probability of larger recruitment to the fishery; conversely, that poor recruitment is more likely to result from small spawning stocks than from very abundant ones. As the spawning stock size of Atlantic mackerel is currently as low as any previously estimated, it was the determination of the Mid-Atlantic Council that management of this fishery should be designed, at least in part, to prevent significant further reductions from fishing of the mackerel spawning stock size.

In order to make a meaningful prediction of the biological consequences of various optimum yield levels, it was necessary to make certain assumptions regarding the size of the 1978 mackerel catch in US and Canadian waters. They are:

1. The US will harvest its predicted capacity of 14,000 metric tons.
2. The foreign mackerel catch in US waters will be 1,200 metric tons (as allocated by the PMP currently in effect).
3. The catch of mackerel in Canadian waters (by Canadian and foreign vessels) will approximate 50,000 metric tons (Canada has announced its intention of allowing a harvest of between 30,000 and 50,000 metric tons in 1978. For planning purposes, it is advisable to adopt the upper limit of this estimate).

A major objective of the Mid-Atlantic Council for this fishery is to maintain the spawning stock size at or above its estimated 1978 level. Attainment of this objective is deemed a necessary condition for attainment (or partial attainment) of most of the other objectives.

Table 16 in Section V-2 illustrates possible combinations of total mackerel catches in 1978 and 1979 and their consequential effects upon mackerel spawning stock size in 1980. Possible total catches in 1978 from 30,200 to 115,200 tons, and possible total catches in 1979 from 14,600 to 151,900 tons have been considered. Table 16 suggests that if the total (US and Canadian) mackerel catch in 1978 is approximately 65,200 tons, then a total catch of between 48,300 and 63,000 tons could be taken in 1979, with the result that the spawning stock size in 1980 would approximate that of 1978. Lower total catches in both years, therefore, would result in some stock rebuilding. The most recent, and tentatively agreed upon, provision in the US/Canadian bilateral negotiations is that the US will receive 60% and Canada 40% of whatever TAC is agreed upon yearly for this species. If, for example, a TAC of 100,000 tons for 1978 is negotiated, the US would, under this provision, receive 60,000 tons as its quota. The provisions of the 1978 PMP for mackerel, however, should result in a total mackerel catch in all US waters of about 15,200 tons. Assuming that Canada harvested all of this (hypothetical) quota, the resultant 1978 total mackerel catch in all waters would thus be about 55,200 metric tons.

Table 44 lists possible TACs for 1979 and the resultant total 1979 catches under the assumptions of (1) a 60%/40% ratio of US/Canadian quotas, (2)

maintenance of US FMP provisions that would result in a catch in US waters of 15,200 tons in 1979, as is the case for 1978, (3) that the Canadian quota would be fully harvested in 1979.

Table 44. Possible TACs For 1979 And Their Resultant 1979 Catches, Under The Assumptions: (1) A 60%/40% Ratio Of US/Canadian Quotas; (2) The Continuation Of 1978 PMP Provisions That Would Result In A 1979 Catch In US Waters Of 15,200 Tons; (3) Full Harvest Of The Canadian Quota (In Thousands of Metric Tons, Where Appropriate)

<u>1979 TAC</u>	<u>1979 US Quota</u>	<u>1979 US Catch</u>	<u>1979 Canadian Quota</u>	<u>1979 Total Catch (All Waters)</u>	<u>Stock Size In 1980</u>	<u>% Change In Stock Size From 1978</u>
30	18	15.2	12	27.2	>429.2	+5.9% to +10.1%
40	24	15.2	16	31.2	>429.2	+5.9% to +10.1%
60	36	15.2	24	39.2	429.2 to 413.1	+1.9% to +5.9%
80	48	15.2	32	47.2	429.2 to 413.1	+1.9% to +5.9%
100	60	15.2	40	55.2	413.1 to 397.7	-1.9% to +1.9%
120	72	15.2	48	63.2	~397.7	~-1.9%
140	84	15.2	56	71.2	397.7 to 383.0	-1.9% to -5.5%
160	96	15.2	64	79.2	383.0 to 369.0	-5.5% to -9.0%
180	108	15.2	72	87.2	383.0 to 369.0	-5.5% to -9.0%
200	120	15.2	80	95.2	369.0 to 355.6	-9.0% to -12.3%

> = greater than
~ = about equal to

The predicted US harvesting capacity for mackerel in fishing year 1979 - 1980 is 14,000 metric tons (9,000 tons by sport fishermen and 5,000 tons by

commercial fishermen). This capacity is above that caught by these fisheries in recent years due to (1) a decline in abundance and availability of the species, (2) direction of the commercial fishing fleet to other resources.

The Council expects this growth in 1979 - 1980 due to (1) greater availability of the species due to the reduction of the directed foreign mackerel fishery in US waters, (2) a reduction in abundance of other species, including groundfish, which should act to transfer some commercial fishing effort to mackerel, and (3) the expected development of a US mackerel fishery for export.

The Council has determined that mackerel should be managed primarily as a recreational fishery, at least until such time as the stocks rebuild to more desirable levels of abundance. Recreational demand for mackerel is great, and the annual capacity (catch) would exceed 30,000 metric tons (estimated to be the 1970 US sport catch) if the species were more abundant and available to US anglers. The 1978 sport catch of mackerel has been estimated to be approximately 6,600 metric tons (Section VIII-2). The contribution of mackerel sport fishing, even at the currently reduced level, to the American economy is great. The Council has determined that it is in the best interests of the nation to allow for a US recreational catch of 9,000 tons in fishing year 1979 - 1980 (the best available estimate of the US sport catch for that fishing year). To restrict the sport catch to a lower level would be (1) inequitable, since the recreational catch in fishing year 1979 - 1980 will be greatly beneath historical demand; (2) extremely costly and inequitable to enforce, because of the large number of anglers throughout the US east coast and the large fraction of the sport catch that is taken in the territorial sea, and (3) an imposition of a severe economic and social hardship on the recreational fishing industry (especially party and charter boats) since mackerel fishing provides a significant fraction of this industry's total revenues.

The Council believes that the unrestricted US commercial catch (capacity) for mackerel in fishing year 1979 - 1980 would be about 5,000 metric tons, for reasons given previously. The US commercial mackerel fishery has traditionally been small relative to the sport catch. The Council has determined that some allowance for growth (i.e., to 5,000 tons) of the commercial mackerel fishery in fishing year 1979 - 1980 would be in the best interests of the nation, because of severe dislocations in other commercial fisheries, notably for groundfish. Moreover, reduction in the US commercial catch, even to a zero allocation, would result in near-negligible benefits to the mackerel spawning stock size, and would be exceptionally difficult and costly to enforce, since much of the catch is taken as by-catch, and much of the catch is taken in the territorial sea.

No estimate can be made at this time of US processor capacity because of the lack of relevant data. The reporting requirements proposed in this FMP should result in the necessary data being available for the updating of this FMP.

The Council recognizes that despite US objections, the catch of mackerel in Canadian waters in 1978 and 1979 may be so great by itself as to result in reduced spawning stock sizes in 1979 and 1980. Under these circumstances, and given the Council's objective regarding spawning stock size, it is not in the best interests of the nation to provide for a significant foreign fishery for mackerel in US waters in fishing year 1979 - 1980.

The Council also recognizes that, even if no directed foreign fishing for mackerel whatsoever were to be allowed in 1979 - 1980 (i.e., a TALFF of zero), some fishing mortality from foreign fleets would still occur, because foreign vessels frequently catch mackerel incidentally to other species for which they have been given allocations. This would mean that foreign fleets would continue to capture mackerel incidentally, but would not be allowed to retain such mackerel catches; no limit on these incidental catches, however, could be imposed or enforced. This would result in an uncontrollable foreign mortality to this species, thereby conflicting with the FMP's objective to rebuild mackerel stocks. If, however, the Council allows for some foreign catch in its determination of optimum yield, then this TALFF would be assigned to foreign nations as direct allocations. Under these circumstances, each nation would be required to retain all mackerel catches, but would also be required to cease all fishing operations (for all species) in the FCZ once its mackerel allocation (or any other species allocation) had been reached.

The Council has determined, therefore, that its management objectives can be best served by allowing for a foreign catch of mackerel just large enough so as to allow foreign fleets to harvest their allocations of other species without undue hardship. The best estimate of this amount, given the probable 1979 - 1980 TALFFs for other species, is 1,200 metric tons. By allowing for this level of foreign catch, the Council will be better able to control mackerel mortality from foreign fishing than by setting an OY which would result in a TALFF of zero.

Due to present reduced abundance of mackerel, environmental considerations dictate that all efforts be made to prevent further declines in spawning stock size.

SUMMARY

After analysis of the above considerations, the Mid-Atlantic Fishery Management Council has determined that the fishing year 1979 - 1980 optimum yield from the mackerel management unit should be 15,200 metric tons, for the following reasons:

- (1) This OY allows for the harvesting of the full 1979 - 1980 US capacity, thus promoting achievement of FMP objectives 1, 2, 4 and 5.
- (2) This OY promotes attainment of objective (3) (maintain spawning stock size at or above its 1978 size) by restricting the total catch of mackerel in all US waters to less than that amount which would result in a reduced spawning stock size.
- (3) This FMP (management unit and OY) recognizes the possibility of a negotiated bilateral agreement and is valid with or without such agreement.
- (4) This OY minimizes any negative economic and social impacts on the US commercial and recreational fishing industries.

In summary, this FMP is based on a management unit that is defined as all Atlantic mackerel under US jurisdiction. It has an OY specified at 15,200 metric tons. Given probable abundance, US capacity has been estimated at 14,000 metric tons. This is made up of an estimated 9,000 metric ton capacity for the recreational fishery and a 5,000 metric ton capacity for the commercial fishery. The recreational capacity is based on recent experience as reported through the mackerel angler survey coupled with an allowance for growth. The commercial capacity is based on recent experience plus an allowance for growth. This commercial growth takes into account the likely

entry into the mackerel fishery of fishermen who have traditionally fished for other species which are not currently readily available such as groundfish. Comments at the public hearings on this FMP indicate that this is a real possibility. This results in a TALFF of 1,200 metric tons. Since the OY and US capacity cover the management unit and the management unit includes as a minimum (on a geographic basis) the territorial sea and the FCZ, the Secretary must establish a program to monitor the total US catch of mackerel so that appropriate adjustments may be made in the FCZ catch of mackerel by the Secretary to insure that OY is not exceeded. It is recognized that the Secretary may preempt State jurisdiction but the Council discourages such action unless all other methods of keeping the catch level below the OY level fail.

Since a significant fraction of the US sport and commercial mackerel catch (approximately 50% and 30% respectively) comes from the territorial sea, it was estimated that US fishermen will catch 4,500 metric tons in the sport fishery and 3,500 metric tons in the commercial fishery in the FCZ. These values should be used as guidelines for monitoring the territorial sea vs. FCZ catch of mackerel, but should not be considered quotas. The allocation for the 14,000 metric ton US capacity is 5,000 mt for the commercial fishery and 9,000 mt to the recreational fishery, the recreational fishery being defined to include party and charter boats.

Table 45. MSY, OY, US Capacity, and Total Allowable Level of Foreign Fishing (in metric tons)

Maximum Sustainable Yield	210,000 - 230,000 ¹
Optimum Yield	15,200 ²
US Capacity	14,000 ²
US Commercial Capacity	5,000 ²
US Recreational Capacity	9,000 ²
Total Allowable Level of Foreign Fishing	1,200 ²

1 Throughout species range

2 For the management unit in fishing year 1979 - 1980

Section 301(a) of the Fishery Conservation and Management Act states that: "Any fishery management plan prepared, and any regulation promulgated to implement such plan ... shall be consistent with the following national standards for fishery conservation and management." The following is a discussion of the standards and how this FMP meets them:

"(1) Conservation and management measures shall prevent overfishing while achieving, on a continuous basis, the optimum yield from each fishery." The optimum yields specified in this FMP for the entire stock and for the FCZ are designed to prevent further reductions in mackerel spawning stock size. The provisions of this FMP for 1979 - 1980 constitute an initial step in a program to rebuild the stocks to higher levels of abundance.

"(2) Conservation and management measures shall be based upon the best scientific information available." This FMP is based on the best scientific evidence currently available, as outlined in Section V-4.

"(3) To the extent practicable, an individual stock of fish shall be managed as a unit throughout its range, and interrelated stocks of fish shall be

managed as a unit or in close coordination." This FMP has been designed in anticipation of, and to complement, a possible US/Canadian bilateral agreement for the species. US-Canadian negotiations on transboundary species have not yet been concluded; thus, the approach to this problem utilized in this FMP results in a management unit that is viable without regard for the outcome of these negotiations.

"(4) Conservation and management measures shall not discriminate between residents of different States. If it becomes necessary to allocate or assign fishing privileges among various United States fishermen, such allocation shall be (A) fair and equitable to all such fishermen; (B) reasonably calculated to promote conservation; and (C) carried out in such a manner that no particular individual, corporation, or other entity acquires an excessive share of such privileges." Estimates of US capacity for mackerel used in this plan include expected catches by all fishermen (sport and commercial) in all affected coastal States. Thus, although mackerel is a migratory species which each year becomes available first to fishermen in more southern States (Section V-1), no closure of this fishery to fishermen in northern Mid-Atlantic or New England States should result from the provisions of this plan. In addition, most of the expected increase in domestic commercial catches probably will occur in New England States, which renders remote the likelihood of closure of this fishery prior to arrival of this species in northern waters. Provisions for Council review of this plan (Section XVI) also allow for readjustment and reallocation of the domestic allocation depending upon catch rates during the year.

"(5) Conservation and management measures shall, where practicable, promote efficiency in the utilization of the fishery resources; except that no such measure shall have economic allocation as its sole purpose." Since domestic fisheries presently harvest mackerel beneath the OY level, no economic inefficiencies due to surplus investment or fishing effort, or similar considerations, should result from the provisions of this FMP. As US capacity estimates anticipate an increase in commercial fishing for mackerel, this FMP will not create economic inefficiency in domestic commercial fisheries.

"(6) Conservation and management measures shall take into account and allow for variations among, and contingencies in, fisheries, fishery resources, and catches." This FMP and the OY and allocations described herein take into account possible fluctuations in species abundance (see Section V-2), expected trends in US demand for mackerel (see Section VIII), and the possible effects of the 1978 and 1979 Canadian mackerel catches and US/Canadian bilateral negotiations as they relate to this species (Sections XII-2 through XII-5; Table 44).

"(7) Conservation and management measures shall, where practicable, minimize costs and avoid unnecessary duplication." The management measures outlined in this FMP are consistent with and complement, but do not unnecessarily duplicate, management measures contained in other FMPs or PMPs. Costs of domestic management will be limited to collection and processing of basic fishery data which is necessary for future revisions of this FMP. Thus, the costs which will be incurred as a result of the implementation of this FMP can be considered as the minimum that would be required for implementation of any fishery management plan. With respect to foreign effort, this plan adopts by reference the foreign fishing regulations presently in effect, thereby reducing the impact of implementation of the FMP on foreign fleets.

XIII. MEASURES, REQUIREMENTS, CONDITIONS, OR RESTRICTIONS
PROPOSED TO ATTAIN MANAGEMENT OBJECTIVES

Note: All references to the Foreign Fishing Regulations are intended to adopt by reference the Foreign Fishing Regulations as they may exist at the time of the adoption of this FMP by the Secretary of Commerce and as they may be amended from time to time following FMP adoption.

XIII-1. Permits and Fees

(a) Registration

(1) Any owner or operator of a vessel desiring to take any mackerel within the FCZ, or transport or deliver for sale, any mackerel taken within the FCZ must obtain a registration for that purpose.

(2) Each foreign vessel engaged in or wishing to engage in harvesting the available surplus must obtain a permit from the Secretary of Commerce as specified in the FCMA.

(3) This section does not apply to recreational fishermen taking mackerel for their personal use but it does apply to the owners of party and charter boats (vessels for hire).

(b) The owner or operator of a domestic vessel may obtain the appropriate registration by furnishing on the registration form provided by the NMFS information specifying the names and addresses of the vessel owner and master, the name of the vessel, official number, directed fishery or fisheries, gear type or types, gross tonnage of vessel, crew size including captain, fish hold capacity (to the nearest 100 pounds), and the home port of the vessel. The registration form shall be submitted, in duplicate, to the Regional Director, NMFS, Gloucester, Massachusetts, 01930, who shall issue the required registration, for an indefinite term; such term to include the calendar year in which the registration is issued. New registrations will be issued to replace lost or mutilated registrations. A registration shall expire whenever vessel ownership changes, or when the master of the vessel changes in the directed fishery or fisheries of such vessel. Application for a new registration, because of a change in vessel ownership shall include the names and addresses of both the purchaser and the seller and be submitted by the purchaser.

(c) The registration issued by the NMFS must be carried, at all times, on board the vessel for which it is issued, mounted clearly in the pilothouse of such vessel, and such registration, the vessel, its gear and equipment and catch shall be subject to inspection by an authorized official.

(d) Registrations issued under this part may be revoked by the Regional Director for violations of this part.

Vessel Identification

(a) Each domestic fishing vessel shall display its official number on the deckhouse or hull and on an appropriate weather deck.

(b) The identifying markings shall be affixed and shall be of the size and style established by the NMFS.

(c) Fishing vessel means any boat, ship, or other craft which is used for,

equipped to be used for, or of a type which is normally used for, fishing, except a scientific research vessel. For the purpose of this regulation, fishing vessel includes vessels carrying fishing parties on a per capita basis or by charter which catch mackerel for any use.

Sanctions

Vessels conducting fishing operations pursuant to this FMP are subject to all sanctions provided for in the FCMA.

If any foreign fishing vessel for which a permit has been issued fails to pay any civil or criminal monetary penalty imposed pursuant to the Act, the Secretary may: (a) revoke such permit, with or without prejudice to the right of the foreign nation involved to obtain a permit for such vessel in any subsequent year; (b) suspend such permit for the period of time deemed appropriate; or (c) impose additional conditions and restrictions on the approved application of the foreign nation involved and on any permit issued under such application, provided, however, that any permit which is suspended pursuant to this paragraph for nonpayment of a civil penalty shall be reinstated by the Secretary upon payment of such civil penalty together with interest thereon at the prevailing US rate.

XIII-2. Time and Area Restrictions

The following areas are closed to fishing based on the request of the Environmental Protection Agency (see Section VI-2):

38°20'00"N - 38°25'00"N and 74°10'00"W - 74°20'00"W
38°40'00"N - 39°00'00"N and 72°00'00"W - 72°30'00"W

The Secretary may open these areas when the EPA notifies her that the pollution problems are corrected and the area is safe for fishing.

Foreign nations fishing for mackerel shall be subject to the time and area restrictions set forth in part 611.50 of Title 50 Code of Federal Regulations (CFR).

Fixed Gear Avoidance

Foreign nations fishing for mackerel shall be subject to the fixed gear avoidance regulations set forth in part 611.50(e) of 50 CFR.

XIII-3. Catch Limitations

The total allowable level of foreign fishing for mackerel in fishing year 1979 - 1980 is 1,200 metric tons.

The catch limit for domestic fishermen in fishing year 1979 - 1980 is 14,000 metric tons of mackerel, allocating 9,000 metric tons to the sport fishery and 5,000 metric tons to the commercial fishery. The Council will reevaluate these allocations in October, 1979, or at the capture of 5,000 metric tons of mackerel in either the sport or commercial fishery, or when 70% of either allocation has been taken in the FCZ, whichever comes first. The Regional Director, with the concurrence of the Council, may then redistribute these allocations between the US sport and commercial fisheries for the balance of the fishing year.

The Council anticipates that the Secretary, after consultation with the Council, will implement the intent of this FMP to restrict US harvest by imposing such measures including, but not necessarily limited to, trip limitations, quarterly or half year quotas, and closed areas, as she deems appropriate in the final regulations. Such measures should insure the achievement of OY in a manner that does not result in a sudden dislocation of those involved in the fishery.

XIII-4. Types of Gear

Foreign nations fishing for mackerel shall be subject to the gear restrictions set forth in part 611.50(c) of 50 CFR.

XIII-5. Incidental Catch

Foreign nations fishing for mackerel shall be subject to the incidental catch regulations set forth in parts 611.13, 611.14, and 611.50 of 50 CFR.

XIII-6. Restrictions

No operator of any foreign fishing vessel, including those catching mackerel for use as bait in other directed fisheries, shall conduct a fishery for mackerel outside the areas designated for such fishing operations in this FMP.

XIII-7. Habitat Preservation, Protection and Restoration

The Council is deeply concerned about the effects of marine pollution on fishery resources in the Mid-Atlantic Region. It is mindful of its responsibility under the FCMA to take into account the impact of pollution on fish. The extremely substantial quantity of pollutants which are being introduced into the Atlantic Ocean poses a threat to the continued existence of a viable fishery. In the opinion of the Council, elimination of this threat at the earliest possible time is determined to be necessary and appropriate for the conservation and management of the fishery, and for the achievement of the other objectives of the FCMA as well. The Council, therefore, urges and directs the Secretary to forthwith proceed to take all necessary measures, including but not limited to, the obtaining of judicial decrees in appropriate courts, to abate, without delay, marine pollution emanating from the following sources: (1) the ocean dumping of raw sewage sludge, dredge spoils, and chemical wastes; (2) the discharge of raw sewage into the Hudson River, the New York Harbor, and other areas of the Mid-Atlantic Region; (3) the discharge of primary treated sewage from ocean outfall lines; (4) overflows from combined sanitary and storm sewer systems; and (5) discharges of harmful wastes of any kind, industrial or domestic, into the Hudson River or surrounding marine and estuarine waters.

XIII-8. Development of Fishery Resources

Development of the domestic harvesting sector is encouraged. It is felt that such development can occur, not only through development of domestic markets for mackerel, but also through joint ventures that would employ domestic harvesting resources, at least until such time as the domestic market for mackerel more nearly matches the capacity of the harvesting sector.

XIII-9. Management Costs and Revenues

It is expected that the initial increased governmental costs of implementing the management measures described in this plan will be limited to those costs incurred in issuing the required permits. Of this, an as yet undermined amount may be recovered by the Secretary of Commerce, who is authorized to recover costs of licensing and regulation.

On-going and permanent (for the life of the plan) additional expenses to the NMFS will be limited to costs of processing and manipulating the data from vessel logbooks and processor records, as outlined in the plan, and enforcement costs.

The Coast Guard will incur enforcement costs that should be similar to those incurred enforcing the mackerel PMP. It is not possible to specify these costs because of the multi-mission responsibilities of the Coast Guard.

XIV. SPECIFICATIONS AND SOURCES OF PERTINENT FISHERY DATA

Note: All references to the Foreign Fishing Regulations are intended to adopt by reference the Foreign Fishing Regulations as they may exist at the time of the adoption of this FMP by the Secretary of Commerce and as they may be amended from time to time following FMP adoption.

XIV-1. General

The following requirements are recommended in order for the Fishery Management Councils and the NMFS to acquire accurate data on the overall catch, mackerel catch, disposition of such catch, and effort in the fishery. These data reporting requirements are necessary to manage the fishery for the maximum benefit of the United States. It is necessary that reporting be as comprehensive as possible and should include the territorial sea and FCZ. The following suggestions are designed to meet this need. It is understood that the NMFS is developing model reporting requirements. To the extent that they are consistent with the following proposals and are approved by the Mid-Atlantic Council, they may replace the following proposals without an amendment to this FMP. If it is determined that the Secretary does not have the authority to mandate reporting of catches from the territorial sea, alternative methods of securing the data must be developed. In addition, methods must be developed and implemented by the Secretary on a continuing basis to obtain data on the catches of marine anglers who, based on the recommendations below, are not required to maintain logs.

XIV-2. Domestic and Foreign Fishermen

XIV-2(a). Domestic Fishermen

(1) For a registered vessel taking mackerel either directly or incidentally, the owner or master of such vessel must maintain on a daily basis an accurate log of fishing operations showing at least date, type and size of gear used, locality fished, duration of fishing time, length of tow (where appropriate), time of gear set, and the estimated weight in pounds of each species taken for those tows in which mackerel were taken. Such logbooks shall be available for inspection by any authorized official, including (1) any commissioned, warrant or petty officer of the Coast Guard, (2) any certified enforcement or special agent of the NMFS, (3) any officer designated by the head of any Federal or

State agency which has entered into an agreement with the Secretary of Commerce or the Secretary of Transportation to enforce the Act, or (4) any Coast Guard personnel accompanying and acting under the direction of any person described in category (1), and shall be presented for examination and subsequent return to the owner or master of the vessel upon proper demand by such authorized official at any time during or at the completion of a fishing trip. Such required documentation will be maintained by the owner or master of the vessel at least one year subsequent to the date of the last entry in the log book. Copies of all logbook forms will be submitted weekly to an authorized official or designated agent of the NMFS.

(2) All data received under this section shall be kept strictly confidential and shall be released in aggregate statistical form only without individual identification as to its source except to the extent that the use of logbook information is required to enforce this FMP.

XIV-2(b). Foreign Fishermen

Foreign fishermen will be subject to the reporting and recordkeeping requirements set forth in part 611.50(d) of 50 CFR.

XIV-3. Processors

(1) All persons, individuals, firms, corporations, or business associations, at any port or place in the United States, that buy and/or receive mackerel from US flag vessels shall keep accurate records of all transactions involving mackerel on forms supplied by the Regional Director, NMFS. These records will be submitted weekly to the Regional Director, NMFS. Records will show at least the name of vessel or common carrier mackerel was received from, date of transaction, amount of mackerel received, price paid, capacity to process mackerel, and the amount of that capacity actually used.

(2) The possession by any person, firm, or corporation of mackerel taken from the FCZ which such person, firm, or corporation knows, or should have known, to have been taken by a vessel of the United States without a valid registration is prohibited. In addition, all persons, individuals, firms, corporations, or business associations which process mackerel in any manner whatsoever other than temporarily preserving mackerel in its fresh state for immediate use, shall keep accurate records of all transactions involving mackerel. Such records will show at least the name of the entity from whom the mackerel was received, date of transaction, amount of mackerel received, price paid, capacity to process mackerel, and amount of that capacity actually used.

XV. RELATIONSHIP OF THE RECOMMENDED MEASURES TO EXISTING APPLICABLE LAWS AND POLICIES

XV-1. Fishery Management Plans

Preliminary Fishery Management Plans (PMPs) for five fisheries of the northwest Atlantic were implemented on March 1, 1977, by the US Department of Commerce. These PMPs presently regulate foreign fishing within the FCZ for Atlantic herring, Atlantic mackerel, silver and red hake, butterfish and finfish caught incidentally to trawling. The New England Fishery Management Council has prepared a Fishery Management Plan (FMP) for the Atlantic Groundfish fishery. Regulations promulgated by the Secretary of Commerce

imposing quotas, minimum size limits, mesh restrictions, etc., went into effect on June 13, 1977, and have been subsequently amended to apply to the fisheries during 1978. Plans for several other species are also in various stages of preparation by the New England and Mid-Atlantic Fishery Management Councils.

This Mackerel Fishery Management Plan prepared by the Mid-Atlantic Fishery Management Council is related to these other plans as follows:

1. This Mackerel FMP will replace the PMP regulating foreign fishing for mackerel within the FCZ as prescribed by the FCMA.
2. All fisheries of the northwest Atlantic are part of the same general geophysical, biological, social, and economic setting. Domestic and foreign fishing fleets, fishermen, and gear often are active in more than a single fishery. Thus, regulations implemented to govern harvesting of one species or a group of related species may impact upon other fisheries by causing transfers of fishing effort.
3. Many fisheries of the northwest Atlantic result in significant non-target species fishing mortality. Therefore, each management plan must consider the impact of non-target species fishing mortality on other stocks and as a result of other fisheries.
4. Mackerel are a food item for many commercially and recreationally important fish species. Also, mackerel utilize many finfish species as food items.
5. Present ongoing research programs often provide data on stock size, levels of recruitment, distribution, age, and growth for many species regulated by the PMPs, FMPs, and proposed FMPs.

XV-2. Treaties or International Agreements

No treaties or international agreements, other than GIFAs entered into pursuant to the FCMA, relate to this fishery.

XV-3. Federal Laws and Policies

The only Federal law that controls the fishery covered by this management plan is the FCMA.

Marine Sanctuary and Other Special Management Systems

The USS Monitor Marine Sanctuary was officially established on January 30, 1975, under the Marine Protection, Research, and Sanctuaries Act of 1972. Rules and regulations have been issued for the Sanctuary (15 CFR Part 924). They prohibit deploying any equipment in the Sanctuary, fishing activities which involve "anchoring in any manner, stopping, remaining, or drifting without power at any time" (924.3(a)), and "trawling" (924.3(h)). Although the Sanctuary's position off the coast of North Carolina at 35°00'23" N latitude - 75°24'32" W longitude is located in the plan's designated management area, it does not occur within, or in the vicinity of, any foreign fishing area. Therefore, there is no threat to the Sanctuary by allowing foreign mackerel fishing operations under this plan if implemented by the Secretary of Commerce. Also, the Monitor Marine Sanctuary is clearly designated on all National Ocean Survey (NOS) charts by the caption "protected area". This minimizes the potential for damage to the Sanctuary by domestic fishing operations.

Current and/or Proposed Oil, Gas, Mineral, and Deep Water Port Development

While Outer Continental Shelf (OCS) development plans may involve areas overlapping those contemplated for offshore fishery management, we are unable to specify the relationship of both programs without site specific development information. Certainly, the potential for conflict exists if communication between interests is not maintained or appreciation of each other's efforts is lacking. Potential conflicts include, from a fishery management position: (1) exclusion areas, (2) adverse impacts to sensitive, biologically important areas, (3) oil contamination, (4) substrate hazards to conventional fishing gear, and (5) competition for crews and harbor space. We are not aware of pending deep water port plans which would directly impact offshore fishery management goals in the areas under consideration, nor are we aware of potential effects of offshore fishery management plans upon future development of deep water port facilities.

XV-4. State, Local, and Other Applicable Laws and Policies

No State or local laws control the fisheries that are the subject of this management plan other than those listed in Section VII-4.

State Coastal Zone Management (CZM) Programs

The proposed action entails management of mackerel stocks in an effort to ensure sustained productivity at some optimum level. In order to achieve this goal, all management plans must incorporate means to achieve integrity of fish stocks, related food chains, and habitat necessary for this integrated biological system to function effectively. Inasmuch as CZM plans are presently in the developmental stages, we are not aware of specific measures on the part of the individual states which would ultimately impact this fishery plan. However, the CZM Act of 1972, as amended, is primarily protective in nature, and provides measures for ensuring stability of productive fishery habitat within the coastal zone. Therefore, each State's CZM plan will probably assimilate the ecological principles upon which this particular fishery management plan is based. It is recognized that responsible long-range management of both coastal zones and fish stocks must involve mutually supportive goals. The Massachusetts and Rhode Island CZM Programs have been reviewed relative to this FMP and no conflicts have been identified. Future CZM Programs will be reviewed for consistency with this FMP.

XVI. COUNCIL REVIEW AND MONITORING OF THE PLAN

The Council will review the plan each year following the close of the mackerel fishery and the publication of the results of the spring NMFS survey cruise. This schedule will permit a review of MSY, OY, US Capacity, and TALFF prior to the development of foreign fishing allocations. This schedule may be modified in the future as the domestic fishery evolves. An additional factor in this evaluation will be the findings of the NMFS angler survey.

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XVIII. APPENDIX

XVIII-1. Sources of Data and Methodology

Data and biological and economic methodologies were developed by the NMFS.

XVIII-2. Environmental Impact Statement

The summary of the proposed action is presented at the beginning of this document.

Relationship Of The Proposed Action To OCS, Marine, And Coastal Zone Use Plans, Policies, And Controls For The Area

Regional Council Fishery Management Plans and Other Preliminary Plans

Preliminary Fishery Management Plans (PMPs) for five fisheries of the northwest Atlantic were implemented on March 1, 1977 by the US Department of Commerce. These were amended to extend them into 1978 during the fall of 1977. These PMPs presently regulate foreign fishing within the FCZ for Atlantic herring, Atlantic mackerel, silver and red hake, squid (Loligo and Illex) and finfish caught incidentally to trawling. The New England Fishery Management Council has prepared a Fishery Management Plan (FMP) for the Atlantic groundfish fishery (haddock, cod, and yellowtail flounder) which regulates the domestic fisheries only, since there are no surpluses of these three species available to foreign nations. Regulations promulgated by the Secretary of Commerce imposing quotas, minimum size limits, mesh restrictions, etc., went into effect on June 13, 1977. Plans for several other species are also in various stages of preparation by the New England and Mid-Atlantic Fishery Management Council.

This Atlantic Mackerel FMP prepared by the Mid-Atlantic Fishery Management Council is related to these other plans as follows:

1. This Atlantic Mackerel FMP will replace the PMP currently regulating foreign fishing for Atlantic mackerel within the FCZ as prescribed by the FCMA.
2. All fisheries of the northwest Atlantic are part of the same general geophysical, biological, social, and economic setting.
3. Domestic and foreign fishing fleets, fishermen, and gear often are active in more than a single fishery. Thus, regulations implemented to govern harvesting of one species or a group of related species may impact upon other fisheries by causing transfers of fishing effort.
4. Many fisheries of the northwest Atlantic result in significant non-target species fishing mortality. Therefore, each management plan must consider the impact of non-target species fishing mortality on other stocks and as a result of other fisheries.
5. Present ongoing research programs often provide data on stock size, levels of recruitment, distribution, age, and growth for many of the species regulated by the PMPs, FMPs, and proposed FMPs.

Marine Sanctuary and Other Special Management Systems

The USS Monitor Marine Sanctuary was officially established on January 30, 1975 under the Marine Protection, Research, and Sanctuaries Act of 1972 (P.L.

92-532). Rules and regulations have been issued for the Sanctuary (15 CFR Part 924). They prohibit deploying any equipment on the Sanctuary, fishing activities which involve "anchoring in any manner, stopping, remaining, or drifting without power at any time" (924.3(a)), and "trawling" (924.3(h)). Although the Sanctuary's position off the coast of North Carolina at 35°00'23" N latitude - 75°24'32" W longitude is located in the plan's designated management area, it does not occur within, or in the vicinity of, any foreign fishing area. Also, the Monitor Marine Sanctuary is clearly designated on all National Ocean Survey (NOS) charts accompanied by the caption "Protected area". This minimizes the potential for damage to the Sanctuary by domestic fishing operations.

State Coastal Zone Management Programs

The proposed action entails management of Atlantic mackerel stocks in an attempt to ensure sustained productivity at some optimum level. In order to achieve this goal, all management plans must incorporate means to achieve integrity of fish stocks, related food chains, and habitat necessary for this integrated biological system to function effectively. Since CZM plans are presently in the developmental stages, we are not aware of specific measures on the part of individual states which would ultimately impact this fishery management plan. However, the CZM Act of 1972, as amended (P.L. 92-583), is primarily protective in nature and provides measures for ensuring stability of productive fishery habitat within the coastal zone. Therefore, each state's CZM plan will probably include the ecological principles upon which this particular fishery management plan is based. It is recognized that responsible long-range management of both coastal zones and fish stocks must involve mutually supportive goals. The Massachusetts and Rhode Island CZM Programs have been reviewed relative to this FMP and no conflicts have been identified. Future CZM Programs will be reviewed for consistency with this FMP.

Current and/or Proposed Oil, Gas, Mineral, and Deep Water Port Developments

While Outer Continental Shelf (OCS) development plans may involve areas overlapping those contemplated for offshore fishery management, we are unable to specify the relationship of both programs without site-specific development information. Certainly, the potential for conflict exists if communication between interests is not maintained or appreciation of each other's efforts is lacking. Potential conflicts include, from a fishery management position: (1) exclusion areas, (2) adverse impacts to sensitive, biologically important areas, (3) oil contamination, (4) substrate hazards to conventional fishing gear, and (5) competition for crews and harbor space. We are not aware of pending deep water port plans which would directly impact offshore fishery management goals in the areas under consideration, nor are we aware of potential effect of offshore fishery management plans upon future development of deep water port facilities.

Probable Impact Of The Proposed Action On The Environment

The basic purpose of the FMP is to manage the Atlantic mackerel fishery off the east coast of the US for optimum yield, and to conserve and protect these fishery resources for future generations.

The recommended catch level of Atlantic mackerel represents the first step in

a process to gradually rebuild the stocks so as to insure that future catch levels can increase.

Alternatives To The Proposed Plan

Alternatives available include: (1) no action, (2) changes in allowable catch levels.

No Action - No action to limit the catches of Atlantic mackerel could result in an acceleration in the rate of decline of the stocks. The potential destruction of this resource base would obviously seriously affect the long-range viability of this fishery, both commercial and recreational, domestic and foreign.

Changes in Allowable Harvest Levels - The management plan proposes catch levels based upon many factors, among which are: (1) the best scientific evidence currently available, (2) estimated economic impact on the US fishing industry, (3) analysis of historical incidental catches of Atlantic mackerel by foreign fisheries for other species; (4) uncertainties as to future bilateral agreements with Canada concerning joint management for this transboundary stock; and (5) uncertainties as to the magnitude of the Canadian mackerel catch in 1978 and 1979. Stock rebuilding would be accelerated by closing the fishery or significantly reducing the catch in the US Conservation Zone. However, the size of the anticipated commercial and recreational catch relative to the cost of enforcement of closure makes this alternative unacceptable at this time. However, if the stocks do not rebuild as anticipated with curtailment of only the foreign fishery, further domestic controls will be necessary.

Probable Adverse Effects Of The Action Which Cannot Be Avoided

There will be an economic impact on the foreign fishing industry because of the reduced level of the Atlantic mackerel catch. However, this impact will be less in the long-run because of the anticipated rebuilding of the stocks. In other words, the negative economic impact of no plan would be much greater over time than the negative economic impact of the plan.

Relationship Between Local Short-Term Use Of Man's Environment And The Maintenance And Enhancement Of Long-Term Productivity

The measures proposed herein are designed to accomplish two goals relative to long-term productivity: (1) provide for a sustained optimum yield of biomass based on increased stock levels, and (2) provide long-term economic growth in the fishing community harvesting Atlantic mackerel. If successful, this strategy, on a long-term basis, should permit viable domestic commercial and recreational Atlantic mackerel fisheries while also providing a surplus for the foreign fishery for Atlantic mackerel.

Irreversible And Irretrievable Commitments of Resources

No irreversible commitments of resources will result from the implementation of this Atlantic mackerel management plan which has been set in motion by the passage of the Fishery Conservation and Management Act of 1976. Implicit in the implementation of the management plan is the periodic monitoring of the catch to provide data for management decisions.

Biological Resources - No loss of aquatic flora or fauna populations has been identified. Periodic monitoring of the catch is required and the management plan is flexible and could be modified or amended if adverse impacts appeared.

Land Resources - No irreversible or irretrievable commitments of land resources have been identified in the proposed management plan.

Water and air Resources - No irreversible or irretrievable commitments of water or air have been identified.

However, short-term irretrievable commitments of public funds can be identified. Irretrievable commitments can be generally defined as the use or consumption of resources that are neither renewable nor recoverable for subsequent use.

Irreversible damage to the commercial fishery is, indeed, possible if harvest levels are not controlled. The history of the haddock population is a recent, yet classic, example of a fish stock on the verge of economic extinction. The conservation measures presently proposed would prevent the irreversible and irretrievable commitment of the valuable national fishery resources addressed by this document.

Other Interests Or Considerations Of Federal Policy Offsetting Adverse Environmental Impacts Of The Proposed Action

The Atlantic mackerel resource of the northwest Atlantic is, in fact, a public resource and, therefore, belongs to no one particular interest group. The concept envisioned by Congress as stated in the FCMA is to conserve and manage fisheries so as to maximize benefits derived from these resources for all Americans. The species considered herein is treated much like any other natural resource of the public domain. Given these circumstances, the conservation measures proposed are examples of direct and responsible actions to ensure long-term resource availability at adequate levels for the foreseeable future.

XVIII-3. List of Public Meetings and Summary of Proceedings

<u>Location</u>	<u>Dates</u>	<u>Number of Public Attending</u>
Pt. Judith, RI	12/1/77, 10/3/78	31, 34
Portland, ME	12/2/77, 10/5/78	13, 8
Hyannis, MA	12/5/77	9
Gloucester, MA	12/6/77, 10/4/78	1, 16
Manteo, NC	12/6/77	23
Norfolk, VA	12/7/77, 9/20/78	5, 7
Ocean City, MD	12/8/77, 9/21/78	10, 11
Cape May, NJ	12/9/77, 9/26/78	5, 3
Riverhead, NY	12/12/77	2
Red Bank, NJ	12/14/77	52
Asbury Park, NJ	9/27/78	18
Centerreach, NY	9/28/78	8

Introduction to Comments on Hearings for the Original FMP

Numerous comments were received on the draft EIS/FMP. All letters received are on file at the office of the Mid-Atlantic Fishery Management Council and are

reproduced following this narrative. The hearings were tape recorded and the tapes are on file at the office of the Mid-Atlantic Fishery Management Council. The primary issues raised are discussed below.

Atlantic Mackerel Quota

Several persons and organizations commented that the proposed quotas for US sport and commercial fishermen, 7,000 metric tons each, unduly favored commercial interests, since this amount is far greater than the annual commercial harvest in recent years, but was less than one-fourth of the estimated sport catch in 1970.

After reviewing these comments, the Mid-Atlantic Council has changed its quota proposals to the following: 9,000 metric tons for recreational fishermen, and 5,000 metric tons for commercial fishermen. The proposed division of these quotas between the Fishery Conservation Zone and the territorial sea remains the same, i.e., 50% of the sport quota and 70% of the commercial quota to be reserved for the FCZ. This results in a new optimum yield in the FCZ of 9,200 metric tons, from the formerly proposed 9,700 metric tons, but should not change the overall harvest from all US waters from 15,200 tons.

The new proposed quotas will allow commercial fishermen to approximately double their 1976 total harvest, but will allow sport fishermen to significantly increase their 1978 catch beyond the 5,000 metric tons predicted by the NMFS. Although sport effort for this species is not expected to rise dramatically, some increase is likely, and thus a total allotment of 9,000 metric tons should fully meet this recreational demand. The Council feels that some expansion in the commercial fishery must be accommodated because of dislocations and restrictions in other fisheries, especially for groundfish.

Stipulations for reevaluation and possible reallocation of these amounts at specified points during the fishing season remain as previously proposed.

Recordkeeping and Licenses

There were numerous comments concerning the apparent burden on fishermen and processors relative to obtaining licenses, keeping logs, and filing reports for each fishery. The Mid-Atlantic Council shares this concern and is working with the New England and South Atlantic Fishery Management Councils and with the NMFS to develop uniform licensing and reporting requirements. However, it is beyond the scope of any one species oriented fishery management plan to solve this problem. Once a general solution to these problems is developed, the Mid-Atlantic Council will work to amend the plans for which it is responsible to bring them in line with the uniform procedures.

Several persons commented that private fishing boats and fishermen should also be licensed, as well as charter and party boats, since the former are responsible for a significant fraction of the sport catch of this species. Again, the Mid-Atlantic Council recognizes this to be an important broad-based question, outside the scope of a single FMP. This issue shall be addressed as the Councils develop uniform licensing, reporting, and recordkeeping systems for the FCZ.

10 Inch Minimum Size Limit

Several persons suggested that the proposal that commercial fishermen be

prohibited from capturing mackerel less than 10 inches in length in the FCZ should be withdrawn because: (1) the commercial harvest in the FCZ contributed only a relatively small proportion to the total US catch of this species, and thus the regulation would be ineffective; (2) the regulation would be unenforcable, especially since a large part of the commercial mackerel catch in the FCZ is taken incidentally to other species; (3) the regulation would be unfair since it would place an inequitable hardship on only one component of the mackerel fishery.

Taking these comments into consideration, the Mid-Atlantic Council has decided to withdraw the minimum size limit proposal, and shall reconsider it at a later date for possible future inclusion in a mackerel FMP.

Summaries of Hearings on Supplement #1

September 20, 1978, Norfolk, Virginia

The hearing began at 7:15 p.m. Mr. Harry Keene was the moderator. Dr. Steven Murawski represented the Northeast Fisheries Center. Mr. Peter Colosi represented the Northeast Regional Office of the NMFS. Mr. David R. Keifer represented the Council staff. Ms. Carol McDaniel served as recording secretary. Seven members of the public were present.

Mr. Keene reviewed the procedural rules for the hearing and the three plans.

The lack of availability of Atlantic mackerel and butterfish offshore Virginia in light of availability elsewhere was questioned. The response was that environmental and other factors were probably the cause, not depressed stock.

The relatively high price of bait squid was discussed in light of the plan's indication of adequate abundance. Given the relatively low ex-vessel prices of squid, after discussion there was agreement that the high prices were probably not due to a lack of squid, but to the distribution sector.

Several persons supported the reporting requirements but wanted details on the registration and reporting system for charter and party boats. They were assured that every effort would be made to simplify the process, but that daily logs, submitted monthly, would be required.

The hearing was closed at 9:00 p.m.

September 21, 1978, Ocean City, Maryland

The hearing began at 7:15 p.m. Ms. Barbara Porter was the moderator. Mr. Robert Rublemann of the Mid-Atlantic Council was also present. Dr. Steven Murawski represented the Northeast Fisheries Center. Mr. Peter Colosi represented the Northeast Regional Office of the NMFS. Mr. David R. Keifer represented the Council staff. Ms. Carol McDaniel served as recording secretary. Eleven members of the public were present.

Ms. Porter reviewed the procedural rules for the hearing and the three plans.

The relatively high price of bait squid was discussed in light of the plan's indication of adequate abundance. Given the relatively low ex-vessel prices of squid, after discussion there was agreement that the high prices were probably not due to a lack of squid, but to the distribution sector.

Several persons supported the reporting requirements but wanted details on the registration and reporting system for charter and party boats. They were assured that every effort would be made to simplify the process, but that daily logs, submitted monthly, would be required.

The hearing was closed at 8:00 p.m.

September 26, 1978, Cape May, New Jersey

The hearing was held at the Golden Eagle, Cape May, New Jersey, and convened at 7:30 p.m. Captain David H. Hart, Council Chairman, was moderator. Ms. Anne Lange represented the Northeast Fisheries Center, Mr. Stuart Wilk represented NMFS, Mr. Paul Hamer represented the New Jersey Division of Fish, Game, and Shellfisheries, and Mr. Joel MacDonald represented NOAA General Counsel's Office. Mr. John C. Bryson represented the Council staff and Ms. Nancy Weis served as recording secretary. Three members of the public were present.

Captain Hart reviewed the three plans.

Mr. Goldmark stated that squid were not abundant the last two years and in light of this questioned the foreign allocation in the plan. Mr. Bryson replied the US allocation in the plan surpassed the amount of squid taken in the past by US fishermen. Squid are not a depressed stock but have remained offshore due to temperature variations.

Mr. Goldmark asked if the quota on mackerel would be adjusted if commercial interest increased. Mr. Bryson replied yes and reported the foreign level had been cut in order to rebuild the stock.

Mr. Goldmark inquired about fluke. Mr. Bryson stated a plan was being developed by the State/Federal Program and would be reviewed by the Council and then taken to public hearings.

Mr. Bryson commented efforts were being made to develop a market for squid.

Captain Hart commented attempts had been made to notify the public of these meetings to generate input and felt perhaps low attendance was due to their pleasure with the plans.

The meeting was adjourned at 7:45 p.m.

September 27, 1978, Asbury Park, New Jersey

The hearing was held at the Asbury Park Pavilion, Asbury Park, New Jersey and was convened at 7:40 p.m. by Councilman William Feinberg who served as moderator. Councilmember Allan Ristori was also present. Ms. Anne Lange represented the Northeast Fisheries Center, Mr. Joel MacDonald represented NOAA General Counsel and Mr. Stuart Wilk represented NMFS. Mr. John Bryson represented the Council staff and Nancy Weis served as recording secretary. Eighteen members of the public were present.

Mr. Bryson reviewed the three plans.

SQUID PLAN

Mr. Flimlin asked if US capacity would be adjusted if the quota was not taken.

Mr. Bryson replied that if US fishermen did not take the quota it may be reallocated to the foreigners in mid-year. However, there are some boats who are gearing up to catch squid for export.

MACKEREL PLAN

Mr. Bramhall asked why passenger carrying vessels needed a license in light of the fact the subpanel suggested this be dropped from the plan. Mr. Bryson replied the Council felt this was necessary to have accurate catch data. Mr. Bramhall felt a voluntary program would provide accurate data; a license will decrease the cooperation of the fishermen.

Mr. Rodia felt licensing will not provide accurate catch data from the fishermen if it is mandatory. There are better ways to obtain data. Mr. Bryson replied this matter will be taken under consideration by the Council. Mr. Rodia felt more accurate figures would be obtained if it was on a voluntary basis.

One person suggested the voluntary reporting be tried before licensing is put into affect.

Mr. Ristori commented fishermen in New England have benefited from reporting systems. An attempt is being made to standardize logbooks for all species.

Mr. Wilk stated the survey on mackerel in the plan was within, plus or minus, 10% accurate. Mr. Bramhall asked why the survey could not be continued instead of issuing licenses. Mr. Ristori replied the cost was a major factor in doing constant surveys. Mr. Bryson stated information from logbooks provided more current data than surveys which resulted in more accurate plans.

Mr. Rodia asked why catch reporting had to be so accurate when the number of mackerel was not accurate. He further inquired how long it would be before recreational boats would be required to be licensed. Mr. Bryson replied NMFS could not handle the information from recreational logbooks and this measure had been considered by the Council. Mr. Bryson stated that the Council has no intention of putting a saltwater fishing license in the plans. Mr. Bramhall suggested this be stated in the plans.

Mr. Feinberg stated the Council was not a bureaucracy but represented the interests of the fishermen in their area.

Mr. Nash asked what would be the procedure if all logbooks were not returned. Mr. Bryson replied in the Surf Clam Fishery it has been suggested that enforcement measures be taken and the subpanel has suggested that a reminder of the penalties for not returning logbooks be sent to members of the fishery.

Mr. Halgren commented in California the voluntary system does not produce data from all fishermen but the figures that are reported are more accurate.

BUTTERFISH PLAN

Mr. Flimlin asked how a foreign surplus could be set until the US capacity was determined and if US fishermen had an increased fishing power would the US allocation be increased. Mr. Bryson replied US capacity was set above figures from past years. The US allocation would be raised accordingly if the fishing power increased.

One person asked if predator/prey factors were considered in setting the allocations. Mr. Bryson stated this was taken into consideration, however, the figures are not as accurate as desired. Ms. Lange commented work in this area was being expedited.

Mr. Feinberg stated the government encouraged US fishermen to enter into foreign export markets.

The meeting was adjourned at 9:00 p.m.

September 28, 1978, Centerreach, New York

The hearing was convened at 7:30 p.m. Ms. Nancy Goell was the moderator. Other Councilmembers present were: Dr. John L. McHugh, Mr. Allan Ristori, and Mr. Anthony Taormina. Messrs. William Overholtz and Stuart Wilk represented the Northeast Fisheries Center. Mr. Bruce Nicholls represented the Northeast Regional Office of the NMFS. Ms. Anne Williams represented the Council staff. There were eight members of the public present.

Ms. Goell reviewed the three plans.

Mr. Miller proposed that the Squid FMP be changed from a calendar year to a fishing year in order to facilitate the timing of reallocation.

Mr. Miller questioned the objective in the Mackerel FMP of promoting efficiency in the fishery because it could be interpreted as the basis for limiting entry.

Mr. Miller suggested that the Butterfish FMP be changed to a fishing year to facilitate the timing of reallocation. He also questioned the objective of minimizing costs to consumers since it could possibly be used to justify price controls or manipulation of the fishery.

The hearing was closed at 8:30 p.m.

New England Fishery Management Council

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One Newbury Street
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OCT 12 1978
MID ATLANTIC COUNCIL

SUMMARY OF BUTTERFISH, MACKEREL, SQUID PUBLIC HEARINGS

Point Judith, Rhode Island - October 3, 1978

- There was opinion that private boat owners should report mackerel catches for recreational purposes, since those landings may be substantial.
- It was stated that the butterfish and squid plans should provide for a mid-season re-allocation of quotas between domestic and foreign fisheries; such that domestic quotas may be increased and foreign quotas decreased if the domestic landings are ahead of expectations.
- There was opinion that if foreign fishing takes its quota early in the year, it will be impossible to re-allocate between foreign and domestic quotas and to increase the U.S. capacity or quota.
- There was considerable support for readjusting the seasons or fishing year by foreign nations for squid to permit U.S. fishermen first access to Loligo squid. It is believed that early offshore heavy foreign fishing for Loligo reduces the probability of substantial numbers of Loligo moving into fishing areas accessible to U.S. vessels. May 1 was suggested as the beginning of foreign fishing for Loligo.
- 100% observer coverage on foreign squid vessels was recommended to minimize the by-catch, particularly of butterfish, in that fishery.
- There was opinion that the by-catch of butterfish and mackerel is high in the present foreign fishing for Loligo, particularly the Japanese fishery.
- The foreign Loligo seasons and windows should be set to minimize by-catches of butterfish.
- Foreign fishing gear for squid should be regulated to minimize the butterfish by-catch.
- A one-year moratorium on foreign squid fishing was suggested to increase availability to domestic fishermen and to provide opportunity for restoration of previously-important trap fishery.
- High butterfish landings in southern New England in 1978 may push total U.S. landings over the proposed 6,000 MT quota.

- In view of strong market demand for processed butterfish, 6,000 MT may not be a non-restrictive quota for U.S. fishermen.
- There is opinion that increased surveillance by the Coast Guard is needed on Japanese vessels believed to be engaged in a strong directed fishery for butterfish, especially for night-time fishing.
- Because the quality of butterfish in the cold months produces the highest market value, the plan should consider the impact on values to U.S. fishermen of foreign quotas/windows in the cold months and high U.S. landings in the warmer months.
- It was recommended that:
 - 1) The foreign allocation of butterfish in 1979 be reduced to 2,700 MT, in order to provide a larger U.S. quota and therefore a higher incentive to U.S. fishermen, and
 - 2) the plan should make no provision for a mid-year reallocation of butterfish quotas to foreign nations.
- It was recommended that the butterfish objective of "minimizing costs to consumers" be eliminated. Fishermen are not in the business of minimizing costs to consumers.
- There was opinion that the butterfish objectives are too narrow in that they do not address the strong potential for export. The objectives should specifically address developing the export potential and the problem of balance of payments.
- It was recommended that the butterfish plan omit a reserve of 400 MT to be held for possible reallocation.
- It was noted that as groundfish quotas become more restrictive, there will be greater effort directed to species such as butterfish and squid.

Gloucester, Massachusetts - October 4, 1978

- There is concern that high volumes of recreational mackerel catches in the spring are sold in the New York market and are driving commercial trap fishermen in New England out of the mackerel business. There was testimony that recreational soles have depressed the commercial market prices from 40¢ to 10-15¢. A 9,000 MT quota to recreational fishermen will hurt the trap fishermen.
- There was a question on the meaning of mackerel objective #4; i.e. what is meant by efficient allocation of capital and labor? (Is this intended as a basis of limited effort?)

- What are the specific incentives in squid objective #7?
- There was opinion that the mackerel quota provided very little incentive to build U.S. processing plants for mackerel. The proposed 5,000 MT mackerel quota is not enough to operate one mackerel processing plant. 10,000 MT would be needed to encourage investment in one plant which is being planned now. On the other hand, present processing capacity for mackerel could not handle 5,000 MT.

Portland, Maine - October 4, 1978

- There was a question how the mid-year re-allocation of squid or butterfish will be made: on the basis of landings, or on the basis of a resource assessment?
- It was reported that large mackerel are abundant offshore in the Gulf of Maine. The rationale for a mackerel quota was asked for. It was reported that large amounts of mackerel have gone for swordfish bait, unreported.
- There was question on the accuracy of mackerel assessments, and the sampling technique by NEFC for such a highly-mobile, pelagic species.
- The uncertainty of a relationship between stock size and spawning success in mackerel was pointed out.
- It was urged that inshore and offshore butterfish fishing be distinguished and separated, because of different catching patterns.
- It was suggested that the mackerel and squid fishing years begin on May 1 --when the fish become accessible to U.S. fishermen.
- It was urged that all fishing years be set on the basis of appropriate biological characteristics, e.g., inshore migration, cessation of growth, spawning habits, etc.
- A mackerel processor asked if 5,000 MT, commercial, were taken, how long a delay would occur before the U.S. commercial/recreational quotas could be adjusted. The processor could not afford a long delay for re-allocations in mid-season.
- It was noted that, with new interest in mackerel processing, purse seiners could take 5,000 MT easily.
- It was noted that a mackerel, purse seine fishery would take pressure off groundfish, and is the only alternative for seiners with very limited herring quotas. The lower mackerel market in recent years resulted from other, more profitable markets. The mackerel landings will increase as a result of restrictive quotas in other fisheries.
- It was urged that prey species be protected as food for more valuable predator speices.



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION I

J.F. KENNEDY FEDERAL BUILDING, BOSTON, MASSACHUSETTS 02107

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JAN 8 1976

December 28, 1977

Mr. John C. Bryson
Executive Director
Mid Atlantic Fishery Management Council
Room 2115, Federal Building
North & New Streets
Dover, Delaware 19901

MID ATLANTIC COUNCIL

Dear Mr. Bryson:

We have completed our review of the Draft Environmental Impact Statement/
Fishery Management Plan for the Atlantic Mackerel Fishery.

From the standpoint of EPA's areas of jurisdiction and expertise, we believe that the project will not cause serious adverse impacts to the physical environment. The Draft EIS appears to provide an adequate discussion of the project's potential impacts. In accordance with our national rating system, we have rated this EIS 10-1 (see enclosed explanation).

Thank you for the opportunity to review the Draft EIS. We will look forward to receiving a copy of the Final EIS when it becomes available.
Sincerely,

William C. Steinhilber

Wallace E. St. John, P.E.
Director, Environmental & Economic
Impact Office

Enclosure

EXPLANATION OF EPA RATING

Environmental Impact of the Action

L0 -- Lack of Objections

EPA has no objections to the proposed action as described in the draft environmental impact statement; or suggests only minor changes in the proposed action.

ER -- Environmental Reservations

EPA has reservations concerning the environmental effects of certain aspects of the proposed action. EPA believes that further study of suggested alternatives or modifications is required and has asked the originating federal agency to reassess these aspects.

EU -- Environmentally Unsatisfactory

EPA believes that the proposed action is unsatisfactory because of its potentially harmful effect on the environment. Furthermore, the Agency believes that the potential safeguards which might be utilized may not adequately protect the environment from hazards arising from this action. The Agency recommends that alternatives to the action be analyzed further (including the possibility of no action at all).

Adequacy of the Impact Statement

Category 1 -- Adequate

The draft environmental impact statement sets forth the environmental impact of the proposed project or action as well as alternatives reasonably available to the project or action.

Category 2 -- Insufficient Information

EPA believes that the draft environmental impact statement does not contain sufficient information to assess fully the environmental impact of the proposed project or action. However, from the information submitted, the Agency is able to make a preliminary determination of the impact on the environment. EPA has requested that the originator provide the information that was not included in the draft environmental impact statement.

Category 3 -- Inadequate

EPA believes that the draft environmental impact statement does not adequately assess the environmental impact of the proposed project or action, or that the statement inadequately analyzes reasonably available alternatives. The Agency has requested more information and analysis concerning the potential environmental hazards and has asked that substantial revision be made to the impact statement.

If a draft environmental impact statement is assigned a Category 3, no rating will be made of the project or action; since a basis does not generally exist on which to make such a determination.



DEPARTMENT OF STATE

WASHINGTON, D.C. 20520

BUREAU OF OCEANS AND INTERNATIONAL ENVIRONMENTAL AND SCIENTIFIC AFFAIRS

December 22, 1977

RECEIVED

DEC 27 1977

MID ATLANTIC COUNCIL

Mr. John C. Bryson
Executive Director
Mid-Atlantic Regional Fishery
Management Council
2115 Federal Building
North and New Streets
Dover, Delaware 19901

Dear Mr. Bryson:

The following are the Department of State's comments on the draft EIS/FMPs for the squid and mackerel fisheries of the Northwest Atlantic Ocean. These FMPs, if approved and implemented by the Secretary of Commerce, will replace the Preliminary Management Plans for the squid and mackerel fisheries presently in effect under Section 210(g) of the Fishery Conservation and Management Act of 1976 (FCMA).

For the reasons set forth below, the Department of State considers that the determination of a foreign allowable catch of only 20,000 metric tons (mt) contained in the FMP for Illex is inconsistent with applicable law.

The governing international fishery agreements (GIFAs) in force between the United States and those countries which received allocations were completed in accordance with authority vested in the Executive Branch by the FCMA, the GIFAs are "other applicable law" as defined in the FCMA. These GIFAs operate as the supreme law of the land.

Each governing international fishery agreement in force between the United States and countries wishing to fish within the U.S. fishery conservation zone contains the provisions that "(t)he government of the United States shall determine each year, subject to such adjustments as may be necessitated by unforeseen circumstances affecting the stocks ... C. the portion of the total allowable catch for a specific fishery, that, on an annual basis, will not be harvested

by United States fishing vessels; and d. the allocation of such portion that can be made available to qualifying fishing vessels of ... (the foreign country)" (emphasis added). Each governing international fishery agreement further contains the provision that "(t)he Government of the United States shall notify the Government of ... (the foreign country) ... of the determinations provided for by this Article on a timely basis."

Timely notification is clearly notification sufficient in advance of the year for which annual allocations are made to permit planning for the pursuance of those fisheries. Approval and implementation of the Illex FMP would reduce the allocations already made, not for "unforeseen circumstances affecting the stocks," but merely for the circumstance that the assessment of surplus available for foreign fishing made by the Regional Council happens to be lower than that already made by the Secretary of Commerce.

The Department of State does not find it appropriate, or necessary, to address the question of the validity of the assessment of the amounts available for foreign fishing contained in the FMP in any detail greater than is necessary to determine that it is based on factors other than "unforeseen circumstances affecting the stocks." Changes in allocations would be inconsistent with those provisions of the GIFAs which provide that annual allocations, once made, shall be subject to adjustment only when necessitated by unforeseen circumstances.

Therefore, since the announced allocations were made on the basis of 23,500 mt as the total allowable level of foreign fishing permitted for Illex, a number determined by the Secretary of Commerce and published in the Federal Register on November 28, 1977, the Department of State requests that the total allowable level of foreign fishing in the Illex FMP be raised to 23,500 mt.

While we recognize that FMPs may amend the 1978 foreign fishing regulations, we urge that the Council modify the squid and mackerel fishing regulations in order to ensure uniformity with the 1978 Foreign Fishing Regulations (FFR). Standardization of such regulations

as vessel number size and time and area closures will minimize confusion among foreigners and provide for greater ease of enforcement.

Specifically, we would like the Council to consider the following:

(1) Vessel identification should be the same as in Section 611.5, FFR. Recognizing that the 1/2-meter height requirement for vessels less than 20 meters long may be impractical for some smaller vessels, a 1/4 or 1/3 meter size may be useful. This additional size requirement would augment present regulations and would provide for uniformity in vessel identification.

(2) The requirement that an English speaking individual be present on each vessel is not required in the 1978 FFR, and would impose an unreasonable burden on operators of foreign fishing vessels.

(3) Data reporting: For baseline data, the methods should follow Section 611.9 of the FFR. We have no objection if the Council wishes to collect more detailed data.

(4) The time and area restrictions outlined in Section XIII.2 should follow Section 611.50 of the FFR.

(5) The 100-200 fathom restriction has been eliminated from the 1978 FFR. We believe that the prohibition of two nautical miles around marked fixed gear (Section 611.50 (e)) is more than sufficient to minimize gear conflicts.

(6) In reference to Section XII.4 of the squid plan, the 1978 FFR describes two types of trawl gear for the Northwest Atlantic fishery--the pelagic trawl (45mm mesh size) and the bottom trawl (60mm mesh size). The regulations do not define, in terms of distance from the bottom, where in the water column a pelagic trawl must be used. The distance was not defined because it would be difficult to enforce. Moreover, there is no scientific justification that netting fish a certain distance above the bottom would prevent a bycatch. However, the language of paragraphs 611.12 and 611.13 in the 1978

FFR serves to accomplish the intent of a physical restriction. It also shifts the burden of proof from the enforcement agent to the individual fishing the vessel. Therefore, the two meter restriction appears to be superfluous.

(7) The 1978 FFR do not identify which species are bycatch of directed fisheries (Section XIII.5 of the squid plan). "Herring" should read "river herring." It should be clear that when the quota for one species of squid is caught by a country, all fishing in the Atlantic by that country stops. Therefore, under the FFR, there is no "subsequent incidental catch."

We suggest that Part 2 conform to the FFR Section 611.50(b)(3)(ii); i.e., delete bluefish, striped bass, scup, sea bass, croaker, spot, and American shad. Otherwise, we may come across the situation of a foreign vessel retaining the above species when fishing for squid, but not when fishing for hake.

(8) We feel that undersized mackerel should count against the quotas in order to make fishermen more selective in their fishing effort.

We hope the Council will consider our recommendations favorably.

Sincerely,

19/ John D. Negroponte

John D. Negroponte
Deputy Assistant Secretary
for Oceans and Fisheries Affairs



United States Department of the Interior

OFFICE OF THE SECRETARY
WASHINGTON, D.C. 20240

NOV 23 RECEIVED

In Reply Refer To:
ER-77/1060

NOV 28 1977

MID ATLANTIC COUNCIL

Mr. John C. Bryson
Executive Director
Mid-Atlantic Fishery Management Council
Room 2115, Federal Building
North and New Streets
Dover, Delaware 19901

Dear Mr. Bryson:

This is in regard to your transmittal of November 11, 1977, requesting the Department of the Interior's review and comments on the draft environmental statement concerning the proposed fishery management plan for the Atlantic Mackerel Fishery.

This is to inform you that the Department will have comments but will be unable to reply within the allotted time as we have just received your submittal of duplicate copies to satisfy our intradepartmental distribution needs. Please consider this letter as a request for an extension of time in which to comment on the statement.

Our comments should be available about the first part of January 1978.

Sincerely yours,

Bruce Blanchard, Director
Environmental Project Review



National Coalition for Marine Conservation, Incorporated

CHRISTOPHER M. WELD, SECRETARY
18th FLOOR
100 FEDERAL STREET
BOSTON, MASSACHUSETTS 02110
817-338-2808

December 6, 1977

Mr. John C. Bryson, Executive Director
Mid-Atlantic Fishery Management Council
Federal Building, Room 2115
North and New Streets
Dover, Delaware 19901

Re: Draft Environmental Statement/Fishery Management Plan for the Atlantic Mackerel Fishery

Dear Sir:

Thank you for sending me a copy of the Draft Environmental Impact Statement/Fishery Management Plan for the Atlantic Mackerel Fishery (the "PMP"), which I have read with interest. I would like to make the following comments on behalf of the Coalition:

1. The form and readability of the Plan is a great improvement over the various versions of the Environmental Impact Statement/Preliminary Management Plan for the Atlantic Mackerel Fishery of the Northwestern Atlantic (the "PMP") issued by the National Marine Fisheries Service ("NMFS").
2. The Coalition questions the wisdom of allowing an increased commercial catch of Atlantic mackerel in view of diminished stock abundance and the doubtful accuracy of stock assessments. For whatever reasons, U.S. scientists in 1977 first recommended a zero TAC and later changed it to 55,000 MT. Uncertainties concerning 1976 fishing mortalities were resolved in favor of a higher TAC by 100% or more. Moreover, data concerning the recreational catch was, and still is, sketchy at best. All abundance indices appear to indicate a continuing downward trend. I call your attention to page 3 of the September, 1977 Supplement to the PHP, where it is stated, "U.S.A. research vessel bottom trawl survey catch-per-tow index decreased 37% from 1976 to 1977. Both spring and autumn

indices have demonstrated a continuous biomass decline since 1968-69." At page 10 of the Enclosure to the Supplement a further caveat is sounded to wit: "... since spawning stock size has continued in a steady decline and recent year-classes (1975-76) appear to be as poor as any observed previously, there is obvious cause for concern if the spawning stock is allowed to decrease below the projected 1978 level."

3. To maintain the commercial catch at or near recent levels would not work an economic hardship upon commercial fishermen who presently participate in the fishery. Since 1971 the U.S. commercial catch has been under 3,000 MT and the 10 year average from 1966-1975 was 2,687 MT. According to the PMP, the number of domestic commercial fishing boats whose total was 508 or more mackerel declined steadily from 9 in 1965 to 6 in 1970 to 3 in 1975, and the value of the 1975 catch was under \$200,000. The Coalition suggests that the economic interest of those fishermen who have a claim by right of previous dependency on the resources could be adequately protected by limiting the commercial catch to 4,500 MT and limiting entry in 1978 to those vessels whose catch has been 50% or more mackerel in any one of the last 5 years.

4. There is cause for concern that fishing fleets in the Northeast are expanding too quickly in relation to the pace at which stock abundance of key species can be expected to recover, and that the situation is being exacerbated by the failure of BMS to effectively enforce existing management plans. The November, 1977 Supplement to the PMP justifies the 7,000 MT quota granted to commercial fishermen on the grounds that "in view of recent management efforts which have resulted in reduction in U.S. quotas, and anticipated implementation of fishery management plans which will reduce U.S. landings in 1978, it is expected that a portion of the displaced capacity will be utilized in a directed mackerel fishery during 1978." In other words, in terms of the present status of key commercial resources, such as cod, yellowtail flounder and haddock, there presently exists a greater catch capacity than the stocks can support. New vessels are joining the fleets every month. It is doubtful that present economic needs of the fleet can be satisfied without jeopardizing the future of the industry; therefore, it is unlikely that stocks can be restored without some degree of economic dislocation.

5. The TAC set by the PMP is based on the assumption that no fishing would result in only a 6% increase in spawning stock size, an increment too small to justify curtailing the commercial and recreational catch. This assumption is based on "the best scientific evidence available" which, if it can be judged by the history of the fishery, is none too good. Given the uncertainties and the variables, it is questionable whether this decision is consistent with Section 301(a)(6) of the Fishery Conservation and Management Act of 1976 ("FCMA").

6. The management objective "to maintain spawning stock size above the point where optimum sustained yield of the fishery is assured" is illusory and deceptive. The PMP states at p. 74 "lett et al (1975a) derived a stock recruitment relationship for mackerel in SA3-6 which suggests a strong density dependence between spawning stock biomass and egg production which was modulated by environmental effects as measured by temperature. The relationship between egg production and larval abundance was shown to be strongly density-dependent through competition for food and predation. These relationships demonstrated that maximum recruitment is produced by a spawning stock biomass of 650,000 MT with symmetrically declining recruitment from smaller and larger biomasses." (emphasis added) According to the PMP, the present estimated spawning stock biomass is 435,000 tons, down 33% from the hypothesized optimum level. The 1975 and 1976 year classes are poor, and the 1977 year class is still an unknown. According to the October, 1977 Supplement to the PMP, "it is virtually impossible to define an optimum or minimum spawning stock size at or above which level adequate recruitment can predict or below which level poor recruitment is likely." (emphasis added)

In other words, it is not entirely clear that present catch levels (whether or not characterized as "optimal") can be sustained, and in this situation the use of the term "optimum sustainable yield" -- which is undefined and therefore highly misleading -- appears to be deliberately deceptive.

7. Objectives 1 and 2 are misleading and deceptive. The Plan does not "provide the opportunity for increased recreational catch," as stated in objective number 1. In terms of historical catch records, 7,000 MT represents a substantial decrease for recreational fishing. During the last 10 years, for which NMFS is able to provide "catch records" (1967-1976), the average annual recreational mackerel catch was 18,960 MT. Moreover, to the extent that the Plan does not provide for stock restoration, it promises the recreational angler nothing but continued problems with respect to both abundance and availability of mackerel. For the same reasons, it is erroneous to suggest that the plan will "maximize the contribution of recreational fishing for Atlantic mackerel to the national economy."

8. We are flummoxed by the apparent non sequitur which appears on page 109 as follows: "Since mackerel should be managed primarily as a recreational fishery, the Council has determined that the most equitable division of the total U.S. allocation of 145,000 metric tons is 7,000 metric tons each to the commercial and recreational fisheries." If neither faction catches its total quota, of course, the question of equitability is moot. However, to characterize an even split as "equitable" or to decree that equal allocations is managing mackerel "primarily as a recreational

Mr. John C. Bryson
December 6, 1977
Page Four

fishery" flies in the face of the record. In the last 10 years the recreational catch has been 6 times the size of the commercial catch. The PMP states, "Mackerel is an important species for recreational fishermen. By weight, mackerel ranked 12th in 1960 for all species caught by recreational anglers. Mackerel ranked 7th in 1965, 3rd in 1970 and 7th in 1974. The mackerel fishery is a significant part of the total recreational fisheries in the northeast." Furthermore, the PMP states (p. 37), "For 1975, the number of anglers catching mackerel is estimated to be over 700,000" It should not have to be pointed out that if the average annual expenditure per angler was only \$5.00, the value of the recreational would be in the order of \$3.5 million before taking multiplier effects into account. By contrast, in 1975 the commercial fishery involved only 3 boats and the landed value of the catch was \$200,000. In short, the rationale for allocating 7,000 MT to recreational fishermen and 7,000 MT to commercial fishermen is obscure.

9. The FMP appears to reflect an unwillingness on the part of the Council to consider the longer term. For example, the FMP makes little or no reference to ecological considerations taken into account in determining optimum yield. Yet it is generally conceded that Section 301(a)(1) requires that the Council consider all relevant economic, social or ecological factors. Mackerel are an important prey species, and the abundance of mackerel bears upon the abundance, or at least the availability and migratory patterns, of numerous predator species of importance to recreational and commercial fishermen alike. Accordingly, a primary objective of the FMP should be the restoration of the stocks to levels that yielded the catches that prevailed from 1968-1972. At this level of abundance, there would be enough fish to maximize the contribution of recreational fishing for Atlantic mackerel to the national economy and to develop an American fishery for export.

Moreover, the Council should demonstrate greater concern for the need to restore the overall biomass of the northeast Atlantic. An important step in this direction is to restrain the growth of the American fishing fleets to a pace that will provide an opportunity for the efficient operators to prosper while preventing the substitution of domestic overfishing for foreign overfishing.

10. On the basis of the foregoing, the Coalition proposes a TAC of 11,500 MT composed of a strictly enforced incidental catch quota of 1,200 MT for foreign fishing, 4,500 MT for commercial fishermen and 5,800 MT for recreational fishermen.

Furthermore, we recommend that the Councils demand that MAFS provide them with recreational data adequate to the needs of managing the fishery. We also strongly urge the Council to insist

Mr. John C. Bryson
December 6, 1977
Page Five

that fishery regulations promulgated pursuant to the Plan be strictly, courteously and promptly enforced.

Sincerely yours,

Christopher M. Weld

CMM:cjb

Written Comments From:
Inter State Party Boat Owners & Operators Association
40 English Street
Salem, Massachusetts 01970

Our organization, which represents over 150 party and charter boat operators, wishes to pass on to you our analysis of your DEIS/FMP of November, 1977 for the Atlantic Mackerel Fishery.

The inconsistencies which we have observed are doubtless due to the problems which all Management Councils are facing with so great an array of complex and seemingly irreconcilable tasks before them -- especially in this start-up phase.

No one, certainly, can dispute the Objectives of the FMP, page 3, yet, the specific measures detailed in the FMP are, in our interpretation, in direct contradiction to the desired, ultimate results of the Objectives.

The Mackerel FMP, as proposed, could have serious repercussions on the Party Boat Industry and, more specifically, a possibly disastrous economic effect on a substantial segment of our own membership.

Our comments are focused on five basic issues:

I. The Proportions of the Quota

The historical ratios between recreational and commercial catches (page 60) reveal an average recreational catch from 1967 to 1976 of 18,960 MT compared with the commercial 2,734 MT for the same period or a ratio of 6.9 to 1.0. The proposed ratio including both T.Z. and F.C.Z., of 1.0 to 1.0 is a statistical denial of the importance of the recreational mackerel catch in relation to the commercial requirements and therefore also represents a semantic denial of the avowed purpose of the FMP. "This plan favors recreational interests" as well. Considering only the F.C.Z., the ratio further declines into 0.7 to 1.0 and this represents the true division of the two quotas.

II. The Justification for Quotas Allocated

We are curious about the reasons for a proposed 7,000 MT allocation for commercial harvesting when the 1967/76 average is 2,734 MT, the 1977 estimated tonnage is not in excess of 1,700 MT and 1978 is set at 3,000 MT. We have two major suppositions:

A. An increase in domestic demand through established retail or other outlets. This is not a general or apparent trend and there would seem no justification for an additional 4,000 or so MT in this direction. Furthermore, the trebling of the supply to this very minor market (\$650,000 estimated in 1976) would presumably have a destructive effect on current ex-vessel prices, if not the retail prices.

B. The satisfaction, minuscule to say the least, of the vast foreign demand for mackerel. Page 60, informs us that "Other Countries" harvested an astounding yearly average of 236,768 MT from 1967 to '76 and that the "Other Countries" will be permitted only 1,200 MT in 1978. We consequently assume that the difference between historical and 1978 commercial catches will go to the export market.

Were this quantity one of truly significant proportions and one representing truly significant quantities of protein to starving peoples, one might pause a bit. To the skeptical eye, however, it seems that this may be a measure designed to pointlessly placate Eastern European countries at the expense of the recreational angler and the multi-million industry which supports him.

III. The Seasonal and Geographical Factors

As you know, the Atlantic Mackerel is not caught in most of 5-Y until about 2 months, sometimes longer, after it is caught in 6A and 6B.

With a single proposed quota of 3,500 MT for recreational fishing to encompass the entire Atlantic Seaboard, and two contingents of mackerel, we fear that those to the south of 5-Y will leave few quota fish for our Association Members when their heavy season begins in mid to late June.

Council review of allocations as described in the FMP strongly suggest a race, particularly considering reduced stocks, as to who is going to catch the most the first; Mid-Atlantic recreational vs commercial; New England recreational vs commercial; Mid-Atlantic recreational vs New England recreational vs commercial; Mid-Atlantic which will likely arouse antagonisms on all sides -- and furthermore make for uncertain forward planning as well.

We believe that considerations should be given to dividing quotas into geographical areas according to contingent. Commercial mackerel fishing (Page 62) has been traditionally dominated by New England (76% from 1966 to 1972), which indicates a New England market over a Mid-Atlantic although the proportions have been trending in contrary direction. In recreational fishing, Deuel's 1970 salt water angling survey assigns 58.6% of the Atlantic mackerel catch to the North Atlantic Region (Haine through New York) and 41.4% to the Mid-Atlantic Region.

IV. The Importance of Mackerel as a Recreational Catch

A. 1. As a quantitative resource - mackerel has always been a highly important species by weight, ranking 7th in 1965, 3rd in 1970 and 7th again in 1974. But, of greater

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MID ATLANTIC COUNCIL

importance, particularly to the party boat, is the number of fish caught or to be caught and here the Atlantic mackerel ranked 3rd in 1965, 1st in 1970 and 5th in 1974. While the commercial fisherman naturally considers the weight of his catch as paramount, the head boat operator knows that the greater the number of fish available, the happier will be his customers. Therefore, the species that provides more catchable fish per ton is, all other things being relatively equal, the most significant source of income to him through the satisfaction of his customers.

2. As a qualitative resource - In addition to the value of the fish caught, there is a strong public interest in catching mackerel for two basic reasons:

- a. It provides a "family outing" where all ages can enjoy fishing. This is particularly true for youngsters as it is easy and fun to catch. "Take a kid fishing" is a well known motto in recreational fishing since a boy learning to fish early on tends to continue through life and, as in hunting as well, teaches his own children, and so forth, thus penetrating the interest.
- b. The mackerel is: pleasing to eat as the Europeans know; 'tho not a tarpon, it is still fun to catch; easy to catch; abundant in easily accessible areas during certain times of the year.

B. The reduction in allowable catch of such a valuable fish creates a hardship on the less affluent angler who patronizes the party boat:

- 1. It can reduce the amount of low cost, high quality protein which he takes home to feed his family.
- 2. It can diminish the sense of pleasure, or release, which he seeks in addition to the lowering of his food costs.

V. The Economic Impact of Reduced Quotas

A. Simplified Data on the New England Party/Charter Boat Industry

1. Investment Values - Estimated Replacement Costs	
a. Head Boats - est. 140 @ \$150,000	\$ 21,000,000
Probably low)	
Charter Boats - est. 325 @ \$100,000	32,500,000
Totals	\$ 53,500,000

- b. Bait and Tackle Shops - Book Value Estimated 122 @ \$50,000 \$ 6,100,000
- c. Motels/Hotels - Estimated 62 @ 60 rooms @ \$16,000 per room. \$ 59,520,000
Note: Included here are closely situated (most in walking distance) to docks. It is understood that these motels/hotels are not 100% occupied by anglers, however, many will put up at more remote locations.

- d. Restaurants - Anglers predominantly 150 @ \$80,000 \$ 12,000,000
- e. Marinas investment values not yet adequately determined. \$131,120,000

f. Real Estate There is obviously no replacement cost for real estate; it's value evidently varies widely according to location, dimensions, profit-making installations and ability of management.

2. Concise Economic Impacts of N.E. Marine Recreational Fishing (estimated for 1975)

- a. Sales - Tackle, boats, etc., marinas, fuel, food, lodging, travel, bait, party/head boats, insurance, other. \$196,288,000
- b. Value Added \$ 73,579,000
- c. Wages and Salaries \$ 36,011,000
- d. Employment - Person Years - 5,340 \$305,878,000

Note: Source of data in 2. above - "Economic Activity Associated with Marine Recreational Fishing," for NMFS, June 1977.

Note: There are a reported 700,000 mackerel anglers of which 50% are attributable to New England. Should these 350,000 fishermen spend only \$6 on party boat fees alone, the loss in fees would be \$2,100,000 and the aggregate approximately \$23,100,000.

3. Data submitted in 1. above is based on "best available information" to this organization and is supplemented here by the calculation of wage and salary input received from a cross section of individual employers. No add-on or multiplier values have been included.

Estimated Wages and Salaries - adjusted for seasonal factors.

a. Party Boats - average 30 weeks <u>full</u> operation	\$ 3,150,000
Charter Boats - average 25 weeks <u>full</u> operation	<u>3,656,250</u>
b. Bait and Tackle Shops - 30 weeks <u>full</u> operation	\$ 6,806,250
	1,921,500
c. Restaurants - 40 weeks <u>full</u> operation	13,500,000
d. Hotels/Hotels - 40 weeks <u>full</u> operation	3,348,000
	<u>\$25,575,750</u>

B. A substantial segment of our membership devotes 2 1/2 months from mid-June through Labor Day to Atlantic Mackerel. While we have not yet analyzed this segment for its investment values and various sales revenues, we assume that vessel fares for this period would be \$539,000. Should these expenditures be in proportion to all other related expenses, the aggregate economic impact, or loss, during this 2 1/2 months period would be an estimated \$5,940,000.

Obviously, these vessels cannot be tied up at their docks for this length of time. If they do not fish for Mackerel, they will fish for other species. The only others they can go for to satisfy customers, and because of their availability, are cod and haddock.

In summary, the Interstate Party Boat Owners believe that the DEIS/FRP does not, in fact, favor recreational fishing but to the contrary for reasons given in this letter.

1. We recommend stating the quotas in terms of FCZ catches only as the Councils have no jurisdiction over territorial waters. We do agree, however, that catches in both zones must be considered for maintenance and improvement of stocks.

2. We recommend that the quotas be recast as follows:

	<u>Recreational</u>	<u>Commercial</u>
Primary, or FCZ, Quota	5,000 MT	3,000 MT
Secondary, or Territorial, Quota	5,000 MT	1,000 MT
	10,000 MT	4,000 MT

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3. We recommend that quotas be revised to separate the Northern and Southern contingents to eliminate the time factor described in Section III above.

4. We recommend elimination of the Review of Quota based on tonnages caught and/or review in July, 1978.

We would be most appreciative of your response to this letter as we believe that we have fairly presented our position.

In hopes that we can work cooperatively in these difficult times, I am,

Sincerely yours,

Richard G. McNeill
Richard G. McNeill
Executive Secretary

/ds

cc: New England Regional Fishery Management Council
National Marine Fisheries Service, Gloucester, Massachusetts

UNIVERSITY OF DELAWARE

LEWES, DELAWARE

1995B

COLLEGE OF MARINE STUDIES
LEWES COMPLEX
PHONE: 302-845-4250

January 3, 1977

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Mr. John C. Bryson
Executive Director
Mid Atlantic Fishery Management Council
Room 2115, Federal Building
North & New Streets
Dover, DE 19901

JAN 4 1977

MID ATLANTIC COUNCIL

Dear Mr. Bryson:

To the best of my ability, I have reviewed the PMP's for Squid, Billfishes and Sharks and can make no comments concerning such plans.

I have also reviewed the Mackerel plan and would like to make the following comments:

1. On page 104 - Table 42 - There is a listing of estimated expenditures by states but it appears as though the States have been left out.
2. On page 109, the statement is made: "Since Mackerel should be managed primarily as a recreational fishery, etc." I can agree that this is a good thing, but again, it appears as though we are not giving any consideration to the species itself, but only to the hunters (fishermen). I quote Bigelow and Schroeder - "Few Mackerel spawn during their second year (10 to 13 inches) and 4/5 of the males and 2/3 of the females spawn during the third year" (14 inches).

I believe some consideration must be given to a minimum size regulation for recreational fisheries and if the same needs to be done for commercial fisheries, then the mesh size of nets should be regulated.

It appears that there has been deep, good thought given to these PMP's by the Councils but it appears as though the stock of fishes is considered as a whole, and reproduction is forgotten. I fail to see how we can sustain or improve any fishery, without giving thought to the biology of that species, including their reproductive cycle.

Thank you for an opportunity to comment on your plans.

Mr. John C. Bryson
Page 2
January 3, 1978

If there is any way I can be of assistance to you or the Council, please do not hesitate to call on me.

Very truly yours,



Howard H. Seymour
Marine Advisory Agent

HHS/df

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OCT 13 1973

AND ATLANTIC COUNCIL

Oct 8, 1973

Dear Mr. Bryson,

As the lesser of two evils, I will agree with the amendment to establish a fishing year instead of a calendar year for squid, mackerel and butterfish. It could be disastrous if reallocation of unusual domestic quotas are established in May.

I would like to see an amendment submitted wherein foreign fishing fleets never enter U.S. waters for any reason at anytime. If you want to talk about amendments and conservation to american fishermen, of which I am a third generation fisherman, stop foreign fishing fleets from fishing U.S. waters. Take politics out of the fisheries management development plan because ever since your council has been in existence your starting to put U.S. fishermen out of business, starting with the New England fisherman.

Slowly but surely your council will work your way to every species in the American fisheries. I am enclosing 2 articles out of many from the "National Fisherman Newspaper".

If the U.S. fisherman are to be quoted on any species of fish the foreigners shouldn't be able to harvest any of these fisheries. EVER!

The remainder of U.S. fishermen that are not affected by the cod, yellowtail, and haddock fisheries are waiting to be told in the future that for the fish they fish for now, that are being given away to the foreign fishing fleet, that in a matter of a few years your council will tell U.S. fishermen that their to be quoted on these species of fish that you are now giving away to the foreign fishing fleet.

Therefore, I want to make an amendment in the management plans wherein no foreigners at any time for any reason ever fish in U.S. waters. It only leads to the demise of the American fishing fleet! Sincerely, JOE SCIBARCA, 31 Ross Lane, Mt. Sinai, N.Y. 11766

So. DeWitt Place
P. O. Box 307
Montauk, N. Y. 11954
October 10, 1972

Mr. John Bryson, Executive Director
Mid-Atlantic Fishery Management Council
Federal Building, Room 2115
North and New Streets
Dover, Delaware 19901

Dear Sir:

I am in favor of an amendment that is being considered which would establish a fishing year instead of the calendar year currently used.

Yours truly,

Richard Stern
Richard Stern
Boat "DOMA LEE"

17

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OCT 10 1972
CAPTAIN JOHN, INC.
FLEMING STREET
EAST HAMPTON, N. Y. 11937
FISHING COUNCIL

DEAR SIR:

IT'S BEEN BROUGHT TO OUR ATTENTION THAT IN YOUR MANAGEMENT PLANS FOR SQUID, MACKEREL & BUTTERFLISH THAT WE OUR ON A CALENDAR YEAR. THIS IS VERY UNSATISFACTORY IN OUR OPINION. OUR FISHING EFFORTS FOR THESE SPECIES DOESN'T SEEM TO INTENSIFY UNTIL AFTER MAY. IF WE DON'T CHANGE THIS INEQUITY TO A FISHING YEAR INSTEAD OF CALENDAR YEAR THIS WILL LEAVE EAST COAST FISHERMEN ON THE SHORT END OF THE STICK, AGAIN.

RIGHT NOW ON LONG ISLAND IS-20 NEW BOAT WILL BE ARRIVING IN THE NEXT 6 MO. QUOTA'S ARE BEING REDUCED & FEDERAL AID FOR NEW CONSTRUCTION INCREASED. HOW DO YOU PLAN A FEDERAL GUARANTEE LOAN OFF WHILE FISHING UNDER FEDERAL QUOTA'S REDUCED QUOTA'S (COMM. DEPT.)

124

18

CAPTAIN JOHN, INC.
FLEMING STREET
EAST HAMPTON, N. Y. 11937

IT'S ALRIGHT TO GUARANTEE BOAT LOANS,
BUT YOU NEED A PLACE TO DOCK & UNPACK
THESE NEW BOATS. YOU CAN NOT INCREASE
OR DECREASE ONE END OF THE SPECTRUM
WITH OUT CONSIDERING THE EFFECTS TO
ENVIRONMENT ALONG THE WAY. WITH NEW
BOATS, THE OLD BOATS ARE STILL IN THE
FLEET. MORE DEMAND FOR DOCKING, HELP
TO TOWN & COUNTRIES WITH THIS PROBLEM.
MORE PARKING & ICE & FUELING PROBLEM.
UPDATE THE OLD PARKING HOUSES & ENSURE
NEW FACILITIES. MAINTENANCE OF THE FLEET!
SHIPYARDS OR THE LACK OF THEM. HELP
THE YARD OWNERS WHO CATER TO THE
COMMERCIAL FISHERMEN.

SORRY FOR GETTING OFF THE
SUBJECT! QUOTA'S FOR SANDMACKEREL,
& BUTTERFISH.
YOURS TRULY,
CAPTAIN ROBERT ERIC SPONG
FIN CAPTAIN JOHN

RECEIVED

OCT 18 1978

MID ATLANTIC COUNCIL

Mr. John Bryson
Executive Director
Mid-Atlantic Fishery Management Council
Federal Building
North and New Streets
Dover, Delaware 19901

Dear Mr. Bryson:

This letter is being sent as a matter of record and is in reference to the up-coming Fishery Management Plans.

In reference to your management plans for squid, I give praise to the councils knowledgeability. However, you do not state specific weight quotas. You claim that these quotas will be in favor of the U.S. Fisherman, but you do not state what the details are on the attached update. I feel this quota, along with the other quotas you are going to impose, will make the American Fisherman the endangered species.

The mackerel and butterfish quotas are much too low. For example, last year Japan among other countries, placed orders for so many metric tons of butterfish and mackerel at a set price. Your quotas are in no way near that. The fish stocks are way over what we consider good, especially butterfish to the eastern this very instance (for example). Your quotas on mackerel I also find well under reason to what I have seen, caught and the vast schools I run through. For example, last winter we could not even consider fishing for mackerel, as in previous years. We did our best to catch other species of fish which were worth something to us.

There are indeed a number of other specific items I would like to discuss, but I lack the detailed information from you. I am also trying to gather statistics confirming what I stated above. The basic knowledge I contain can only be learned by being a fisherman and one who covers a good part of the east coast. My experience includes ten years of fishing (not including childhood) and I hope thirty more years, at least.

There are many fisherman that have the attitude, "if you want to control us, you should pay us" (in reference to the farmers subsidy). I do not agree with them. My job is to catch fish.

continued

2



Mr. John Bryson
Mid-Atlantic Fishery Council

10/16/78

EXTENDED FISHERIES JURISDICTION

UPDATE 28 September 1978

Prepared by Michael Haby
New York Sea Grant Extension Program
(Tel: 516 246-7777)

-2-

All these quotas being set are inflationary in a supply and demand market. Most fishermen hear about quotas, but know nothing until that are imposed on them. Gloucester is now petitioning the government because the quotas on yellowtail and codfish are unfair.

I was lucky to obtain this information on your quota plans. The majority of the fisherman are not aware of what is now happening. I feel more fisherman should be contacted to view their thoughts. I am willing to get involved with your organization, not to sound like a job application, because I am willing to work for what I believe in.

I feel there is much to be discussed and much to be considered when setting quotas. I am looking forward to hearing from you regarding this letter.

Very truly yours,

Louis Ventafredda
93 Rockville Avenue
Staten Island, N.Y. 10314
(212) 761-7298

Att.

Contains information on: Draft Fishery Management Plans (FMPs), Current Regulations, and Amendments to the Fishermen's Protective Act.

UPCOMING FISHERY MANAGEMENT PLANS

The management plans for squid, mackerel, and butterfish have been prepared for public comment. These plans can be affected by public input, provided that the comments made are constructive and workable. A summary of each plan and any proposed amendment appears below. The amendment will be included in the plan only if the public (the fishermen) see it as being a good option. Your written comments should be submitted by 16 October. Send your comments to:

Mr. John Bryson
Executive Director
Mid-Atlantic Fishery Management Council
Room 2115
Federal Building
North and New Streets
Dover, Delaware 19901

Management Plan for Squid: Allows a much larger allotment for U.S. fishermen than they have historically landed. Generally, if this allotment (or a significant portion of it) isn't landed by May, reallocation of the difference may occur. The inshore U.S. squid fishery is at its height from May to August. This timing of reallocation could preclude domestic fishermen from having the option of harvesting squid when it becomes available closer to shore.

An amendment to the squid plan has been suggested which would allow the characteristics of the squid, and the timing of fishing effort to determine the year instead of the calendar, and allow for reallocation after the domestic harvesting "peak" has occurred thus giving U.S. fishermen the most benefit from the resource.

and West of 69°. This trip limit is in force for both areas, which means that a total of 5,000 pounds may be landed per week (or trip) regardless of whether the fish came from one, or both areas. No overruns are allowed under these new regulations. Also, the no discard rule of 23 July is still in effect which requires that all fish be landed regardless of size.

Cod

<u>Vessel Class</u>	<u>Gulf of Maine Trip Limit</u>	<u>Overrun</u>
0-60 GRT	2,500 pounds	1,500 pounds
61-125 GRT	5,000 pounds	1,500 pounds
Over 125 GRT	7,000 pounds	1,500 pounds
Fixed Gear	5,000 pounds	0

Georges Bank
and South

<u>Vessel Class</u>	<u>Trip Limit</u>	<u>Overrun</u>
0-60 GRT	4,900 pounds	3,500 pounds
61-125 GRT	9,800 pounds	3,500 pounds
Over 125 GRT	14,000 pounds	3,500 pounds
Fixed Gear	13,000 pounds	0

Haddock
All Areas

<u>Vessel Class</u>	<u>Trip Limit</u>	<u>Overrun</u>
0-60 GRT	3,500 pounds	2,500 pounds
61-125 GRT	7,000 pounds	2,500 pounds
Over 125 GRT	10,000 pounds	2,500 pounds
Fixed Gear	8,000 pounds	0

NEW AMENDMENT TO THE FISHERMEN'S PROTECTIVE ACT

A new amendment has been established which provides compensation for damaged vessels and gear. This amendment, which will take effect 1 January 1979, is a "no fault" program, however

Management Plan for Mackerel: Allocates 9,000 metric tons to domestic recreational fishermen, 5,000 metric tons to domestic commercial fishermen, and 1,200 metric tons to foreign nations. This allocation to foreign governments incorporates the idea of by-catch (or incidental catch) into foreign allocations. Actually, it is a control mechanism to regulate foreign catches in other fisheries besides mackerel. When foreign fleets have landed 1,200 metric tons of mackerel, they must stop fishing for their primary species, even if the quota hasn't been reached for this "primary" or target species.

Management Plan for Butterfish: Allocates 6,000 metric tons to domestic fishermen and 4,000 metric tons to foreign fishermen. The reallocation of the unused domestic quota would also occur in mid-year under the present plan. U.S. effort intensifies from May to November on butterfish. A reallocation at mid-year might leave the domestic fisherman with no butterfish quota at the time when he historically fishes for it.

Again, an amendment has been suggested which would have the fishing year determine when reallocation to foreign governments should occur instead of the calendar year.

CURRENT REGULATIONS

Surf Clam Beds Closed: A section of the clam beds off New Jersey have been closed to surf clamming because the majority of landed clams have been smaller than 4½". About 35 square miles have been closed. This area is located between 3 and 6¼ miles offshore from Atlantic City between Great Egg Harbor Inlet and Absecon Inlet. The coordinates of the closed area are as follows:

- 74° 30.0'W 39°15.5'N
- 74° 20.7'W 39°21.2'N
- 74° 17.1'W 39°21.2'N
- 74° 26.5'W 39°15.5'N

New Groundfish Regulations: A recent set of regulations will have a significant impact upon operators. All vessel classes are affected by these rules which establish new trip limits and are allowable overruns.

Yellowtail Flounder

Effective 1 October the clock has been started over. Basically this means that new, larger trip limits have been established, and that October is now the first month of the year.

For all vessel classes a limit of 5,000 pounds per week or trip, whichever is longer, has been established for areas East

For information write or call:

You must submit evidence of how the damage occurred. Under the amended Fishermen's Protective Act any damage may be compensated, regardless of the value. Vessels are eligible only if damaged by a foreign vessel. Gear is eligible regardless of whether the damage was by domestic, foreign, or an Act of God.

For further information on this program contact the Northeast Fisheries Center in Gloucester, Massachusetts at (617) 281-3600 or the New York Sea Grant Office at (516) 246-7777.

CORRECTION

In the August Update the telephone number for reporting fixed gear locations to the Coast Guard was temporary and has since been changed. To report your fixed gear call collect (212) 668-7877.

New York

New York Sea Grant Extension Program
Marine Sciences Research Center
South Campus, Building H
SUNY Stony Brook
Stony Brook, New York 11794
Telephone: (516) 246-7777

Maryland

Marine Advisory Program
Cooperative Extension Service
University of Maryland
Symons Hall
College Park, Maryland 20742
Telephone: (301) 454-3623

New Jersey

Sea Grant Marine Advisory Service
Center for Coastal & Environmental Studies
Rutgers University - Busch Campus
New Brunswick, New Jersey 08903
Telephone: (201) 932-3140

Delaware

Sea Grant College Program
College of Marine Studies
Robinson Hall
University of Delaware
Newark, Delaware 19711
Telephone: (302) 738-2842

Virginia

Marine Advisory Services
Virginia Institute of Marine Science
Gloucester Point, Virginia 23062
Telephone: (804) 642-2111

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EMBASSY OF JAPAN

2520 MASSACHUSETTS AVENUE, N.W.
WASHINGTON, D.C. 20008
(202) 234-2266

October 2, 1978

Mr. Terry L. Leitzel
Assistant Administrator for Fisheries
NOAA
Department of Commerce
Page 2 Bldg., Room 400
3300 Whitehaven Street, N.W.
Washington, D.C.

Dear Mr. Leitzel:

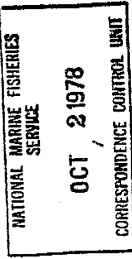
Under the instruction of my Government, I herewith submit its Comments of the Government of Japan on "Draft Atlantic Mackerel Plan" as published in the Federal Register of September 1, 1978.

I hope that you will give full consideration to the said Comments.

Sincerely yours,

Kunichi Ueno for
Hiromu Fukada
Minister

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Enclosure

COOPERATIVE EXTENSION NEW YORK STATE

Cornell University • State University of New York • U.S. Department of Agriculture
Sea Grant Advisory Service
Tel: (516) 246-7777

SUNY
Stony Brook, New York 11794

The enclosed material is provided by the New York Sea Grant Extension Program for your information and use.

Michael A. Bay
Michael Bay
John Scotti
John Scotti
Regional Extension Specialist
Sea Grant

**Cooperative Extension in New York State
Provides Equal Program and Employment Opportunities**

New York State College of Agriculture and Life Sciences, New York State College of Marine, Estuarine, and Near Shore Veterinary College at Cornell University, Cooperative Extension Associations, County Government Boards, and United States Department of Agriculture. Cooperating

Comment of the Government of Japan on "Draft Atlantic Mackerel Plan" as Published in the Federal Register of September 1, 1978

The Government of Japan herewith presents its comments with regard to "Draft Atlantic Mackerel Plan" as published in the Federal Register of September 1, 1978.

In this Draft, 1,200 MT of Atlantic mackerel is allocated for 1979 as a TALFF, which is caught incidentally and which is the same as for this year.

The Government of Japan can not help pointing out that this figure is too small even if this allocation is for by-catch only.

We strongly request that TALFF of mackerel as by-catch allocation be increased in order to enable harvesting of the allocation of other species.

(REASONS)

1. We consider that an increase of TALFF and OY does not have any adverse effect on the stock condition.
2. Atlantic mackerel has been caught incidentally in the directed fishery for Loligo, illex and butter fish by Japanese

fishing vessels in the FCZ off the Atlantic Coast of U.S. The by-catch of mackerel by Japan in the past 5 years are as follows;

1973	464 MT	1976	44 MT
1974	70 MT	1977	82 MT
1975	204 MT		

These figures, which have largely fluctuated from one year to another, indicate that it is very difficult to keep actual catch of mackerel within minimal by-catch allocation. As described in XII-5 of the Draft, each nation would be required to cease all fishing operation (for all species) in the FCZ, once its mackerel allocation (or any other species allocation) had been reached.

The minimal quantity of by-catch allocation, therefore, prevents fishing vessels from normal fishing operation of target species.



DEPARTMENT OF TRANSPORTATION
UNITED STATES COAST GUARD

MAILING ADDRESS (301)
COMMANDER
ATLANTIC AREA, U.S. COAST GUARD
GOVERNORS ISLAND
NEW YORK, N.Y. 10004

16475
NOV 1 1978

From: Commander, U. S. Coast Guard Atlantic Area
To: Commandant (G-WEP-7)

Subj: Environmental Impact Statement/Fishery Management Plans, Atlantic Council
review of

- Ref: (a) COMDTNOTE 16475 of 13 Apr 1978
 (b) Draft EIS/FMP for the Butterfish Fishery of the Northwest Atlantic Ocean of August 1978
 (c) Draft Final EIS/FMP for the Atlantic Mackerel Fishery of the Northwest Atlantic Ocean, Supplement Number 1 of August 1978
 (d) Draft Final EIS/FMP for the Squid Fishery of the Northwest Atlantic Ocean, Supplement Number 1 of August 1978

1. In accordance with reference (a), the comments in enclosure (1) are forwarded for inclusion in Coast Guard comments to the Mid-Atlantic Fishery Management Council and the National Marine Fisheries Service concerning reference (b), (c), and (d).

[Signature]
D. I. MUIR
Deputy

Encl: (1) CG LANTAREA Comments on the EIS's/FMP's for the Butterfish, Mackerel, and Squid fisheries of the Northwest Atlantic Ocean

- Copy to:
 COMDT (G-000-4)
 CGGDONE (o,mep)
 CGGDTHREE (o,mep)
 CGGDFOIVE (o,mep)
 NERFMC
 MARFMC
 SARFMC
 NMFS NE REGION

Commander, Atlantic Area
U. S. Coast Guard
Comments on Draft EIS/FMP for the Butterfish Fishery, the Draft Final EIS/FMP for the Atlantic Mackerel Fishery Supplement Number 1; and the Draft Final EIS/FMP for Squid Fishery Supplement Number 1

Comments

1. Permits and Fees:

This section requires the owner or operator of a vessel desiring to take these species, or transport or deliver these species for sale to obtain a registration for that purpose. This same language is used throughout these documents. Is the term registration synonymous with license? If it is not what does a registration mean in terms of documents required to be permitted to fish.

2. Time and Area Restrictions:

These plans list two areas which are to be closed to fishing based on the request of the Environmental Protection Agency. There should be some statement in the plan which explains why the EPA has requested these areas to be closed; it is presumably because there are chemical dumpsites in these areas which have degraded the water quality. There should also be some discussion as to what enforcement actions will be necessary in these areas and how the fish product harvested from these areas may differ from that of other areas.

Specific Comments:

- Figure 8 has been mistakenly omitted from the draft EIS/FMP for Butterfish on page 25.
- In Table 14 on page 41 of the Butterfish Plan the second column is titled 0-200 miles whereas the previous draft listed the title as 3-200 miles. Both versions contain the same data so it appears the correct title should be 3-200 miles.
- The coordinates of first area closed to fishing on page 76 of the Butterfish Plan are incorrect, they should read 38°-20'00"N - 38°-25'00"W vice 38°-20'00"N - 39°-25'00"N.

Enclosure (1)

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24

New England Fishery Management Council

Peabody Office Building
One Newbury Street
Peabody, Massachusetts 01960

617-535-5450

FTS 8-223-3822

November 9, 1978

Mr. John C. Bryson, Executive Director
Mid-Atlantic Fishery Management Council
Federal Building, Room 2115
300 South New Street
Dover, Delaware 19901

Dear John:

In reply to your letter of November 3, Dick Seamans' report of this Council's vote on the squid and mackerel plans is correct. My letter of October 25 on this issue was not correct on the mackerel issue, because of my error, but a phone call to your office the next day, October 26, set the record straight. The Council in fact did vote 8 yes, 5 no, 3 abstentions, to support the mackerel plan.

It took no action on the butterfish MP because the Council was informed during its meeting that your Council had decided to make modifications to the butterfish plan. I very much regret this Council was misinformed on that issue.

I am forwarding comments from this Council on the mackerel plan, for the consideration of the Mid-Atlantic Council. These comments in essence reflect the comments made at the New England public hearings on these plans. I sent you earlier a summary of those hearings.

The comments are as follows:

- 25 - recreational and private boat owners should have to keep records of their mackerel catches. This will do a great deal in helping verify what their actual catches are.
- 26 - If a market can be developed for mackerel at a price level that the fishermen will fish for, 5000 MT will not go very far in supporting a processing plant. Price and market will be the deciding factor.
- 27 - At least one company will make a big effort to fish mackerel to hopefully help replace our herring steak market which will be reduced because of the very restrictive herring quotas.
- 28 - If 15,000 MT of mackerel is the TAC for both New England and Mid-Atlantic it should be divided equally to allow the New England commercial and recreational fisherman an equal opportunity at the mackerel TAC as the Mid-Atlantic

Mr. John C. Bryson
November 9, 1978
Page 2

fisherman. If the Mid-Atlantic Council wants to take it upon themselves to give the recreational fisherman the larger percentage of their share of the TAC, that is their decision.

29 - It should be left up to the New England Council to allocate its part of the TAC as we feel is to the best interest of our fishing industry.

30 - It will be very difficult to give the recreational fisherman even half of New England's share of the TAC. Their catch data is not accurate enough to be used to possibly hinder the commercial fisherman who may need this fishing to replace the lack of quotas in other fisheries.

31 - "There is question on the accuracy of mackerel assessments, and the sampling technique by NEFC for such a highly-mobile, pelagic species." This uncertainty may underestimate the size of the resource and, therefore, result in unnecessarily low TACs.

32 - The uncertainty of a valid relation between stock size and spawning success in mackerel makes it difficult to use stock size as an indicator of future recruitment, or to justify a large standing stock size as a basis for higher

33 - It is urged that all fishing years including mackerel, be set on the basis of appropriate biological characteristics, e.g., inshore migration, cessation of growth, spawning habits, etc.

Sincerely yours,



Spencer Apollonio
Executive Director

SA:JR

XVIII-4. Responses to Written Comments

1. This provision has been changed. See Section XIII-1, "Vessel Identification", paragraph (b).
2. This provision has been addressed by adoption of the 1978 Foreign Fishing Regulations (Part 611.50 of 50 CFR).
3. This provision has been addressed by adoption of the 1978 Foreign Fishing Regulations (Part 611.50(d) of 50 CFR). See Section XIV-2(b).
4. See response 2.
5. See response 2.
6. Removal of the provision for a 10 inch minimum size limit addresses this comment. All mackerel captured will be counted against allocations.
7. Allocations of mackerel between domestic commercial and recreational fishermen have been changed. See "Atlantic Mackerel Quota", Section XVIII-3.
8. See response 7.
9. See response 7.
10. This potential problem has been considered in this plan. See Section XII-5, "Relationship Between This FMP And The National Standards," paragraph (4).
11. See response 7.
12. The domestic allocations in this plan have been changed. See response 7.
13. See response 10.
14. The proposal for a 10 inch minimum size limit has been eliminated in this plan. See Section XVIII-3, "10" Minimum Size Limit".

RESPONSES TO WRITTEN COMMENTS ON SUPPLEMENT NO. 1

15. The FMP has been revised to put it on a fishing year basis.
16. This would require a change in the FCMA.
17. See response 15.
18. See response 15.
19. This issue is outside the scope of the FMP.
20. The Council believes the OY is reasonable in light of available scientific data and the objectives of the FMP.
21. There was an attempt made through press releases and other methods to notify as many people as possible about the FMP and hearings.
22. The Council believes the OY is reasonable given the objectives of the FMP.
23. "Registration" and "permit" should be considered synonymous.
24. The Council was responsive to the EPA request relative to this matter.
25. The Council considered this possibility but ruled it out at this time because the NMFS advised the Council that the volume of work could not be handled.
26. See response 20.
27. See response 20.
28. The FMP is intended to manage mackerel throughout its range as a unit in compliance with the FCMA.
29. The allocations are considered reasonable in light of the condition of the stock and historical landing data.
30. See response 29.
31. See response 20.
32. See response 20.
33. See response 15.

REGULATORY ANALYSIS - ATLANTIC MACKEREL FMP

I. Introduction

In compliance with Executive Order 12044 and Department of Commerce Administrative Order 218-7, a draft Regulatory Analysis (RA) has been prepared for the Fishery Management Plan (FMP) for the Atlantic Mackerel Fishery of the Northwest Atlantic Ocean. In this RA, prepared by the Mid-Atlantic Fishery Management Council, attention is given to the impacts of new regulations and incremental effects of revised regulations from the previous Preliminary Fishery Management Plan (PMP).

II. Identification Of Problems Addressed By The FMP

The mackerel resource is harvested by four groups of fishermen: (1) domestic recreational, (2) domestic commercial, (3) Canadian commercial, and (4) other foreign country commercial. The Canadian fishery is distinguished from the foreign fishery because it has operated, and will continue to operate, under international agreement rather than under the Fishery Conservation and Management Act (FCMA).

Historically, mackerel have shown considerable and largely unexplained fluctuations in abundance (Figure 1). Spawning stock size has little influence on the size of a year-class unless the spawning stock is reduced to extremely low levels. The domestic commercial catch has fluctuated widely over the past 150 years, with the range in the past 10 years around 2,000 to 4,000 mt for the United States and 10,000 to 22,000 mt for Canada (Figure 2). The foreign commercial fishery developed rapidly in the 1960's. The total harvest exceeded 200,000 mt annually for the seven years from 1970 to 1976, reaching a peak of 432,000 mt in 1972. The stock was unable to support this high level of landings. It is estimated that foreign nations took 97 percent of the catch during the years 1973 to 1976. Foreign catches in US waters have been restricted sharply since 1977 when the FCMA came into effect and a PMP was prepared for the Atlantic mackerel fishery.

Major management problems specific to this fishery include (a) a drastic decline in abundance of mackerel which began in the early 1970s; (b) the transboundary (US and Canadian waters) range of this species and the fisheries for it, and uncertainties as to future bilateral arrangements for management of this resource; (c) the significant inshore distribution (seasonally) of mackerel and the fisheries for it in US waters; (d) large recreational landings, which have been poorly documented and a significant component of which consists of sport catches inside the territorial sea (some by anglers from shore).

At present, the mackerel fishery is being managed by regulations implemented through the PMP. Under a PMP, however, regulations may be implemented solely for foreign fishing in US waters. By instituting a FMP for this species, the Council can more effectively assure that Optimum Yield (OY) will not be exceeded. Under a PMP, the expected domestic catch is first estimated and then deducted from the OY to generate the Total Level of Foreign Fishing (TALFF).

However, PMPs do not, by law, have the authority to restrict US catches to the levels specified in the PMP. Thus, although the TALFFs are enforced, because of the inability to assure that the expected domestic catches are not exceeded, a PMP could be less effective than an FMP in assuring that an OY is not exceeded. Thus, this process of instituting an FMP for Mackerel should, in the long-run, assist in providing a stable and comprehensive management regime for this fishery in US waters which will be conducive to (a) restoration and maintenance of a higher level of mackerel abundance; (b) development of the US fishery; and (c) bilateral management with the Canadian government.

Several of the issues addressed by the FMP have economic implications, which relate mainly to the effects of various catch allocations on domestic commercial, recreational, and foreign fishermen. These issues include: determination of the optimum yield; estimation of US commercial and recreational harvesting capacities; and the need to prevent further depletion of the mackerel stock and take measures to rebuild it to exploitable levels.

III. Specific Objectives Of The FMP

The Council has specified five objectives to guide management and development of the Atlantic mackerel fishery.

- (1) Provide opportunity for increased domestic recreational and commercial catch;
- (2) Maximize the contribution of recreational fishing for Atlantic mackerel to the national economy;
- (3) Maintain the spawning stock size of Atlantic mackerel at or above its size in 1978;
- (4) Achieve efficient allocation of capital and labor in the mackerel fishery; and
- (5) Minimize costs to taxpayers of development, research, management, and enforcement in achieving these objectives.

IV. How The FMP Is Expected To Achieve The Stated Objectives

A. Proposed Management Measures

The Council has proposed the following management measures to achieve the objectives set in the FMP:

- (1) Restrict US Atlantic mackerel catches in the FCZ so that the total domestic catch from the territorial sea and the FCZ does not exceed 14,000 metric tons for the 1979-1980 fishing year (1 April, 1979 - 31 March, 1980), allocating 9,000 metric tons to the sport fishery and 5,000 metric tons to the domestic commercial fishery. The Council shall reevaluate the distribution of the domestic allocation between US sport and commercial fisheries during the fishing year according to a timetable specified in Section II-3 of the FMP. If a redistribution of these allocations is judged appropriate, the Regional Director of NMFS,

with the concurrence of the Council, may then adjust these allocations for the balance of the fishing year.

- (2) Restrict accumulative foreign Atlantic mackerel harvest to 1,200 metric tons for the 1979-1980 fishing year. This amount is intended to provide only for incidental foreign catches of mackerel.
- (3) Require registration of all vessels fishing commercially for Atlantic mackerel, either in a directed fishery or as a by-catch in other fisheries. This provision shall also apply to all vessels for hire to fish recreationally directly or indirectly for mackerel.
- (4) Require filing of weekly reports on mackerel catches by foreign and domestic fishermen, and require domestic dealers and processors to submit weekly reports on any transactions involving mackerel. Individual recreational anglers would not be required to file reports, only commercial fishermen and operators of recreational vessels for hire (party and charter boats).
- (5) Continue the time, area, and gear regulations for foreign fishing published in Part 611.50(b) and (c) of 50 CFR. These gear regulations are expected to reduce by-catch.

B. Rationale for Proposed Management Measures

(1) Determination of Fishery Management Unit

The management unit of this FMP is all Atlantic mackerel under US jurisdiction. This unit was so defined because of uncertainty concerning the possibility of a US/Canadian bilateral fishing agreement and the need to develop an FMP that would be valid and flexible with or without such an agreement. The primary uncertainty relative to the bilateral was the possible impact of any allocation to Canada under the agreement. If the management unit were defined geographically, for example, all Atlantic mackerel in the FCZ and Territorial Sea, any Canadian allocation would require an adjustment to US Capacity, or TALFF, or both. By defining the management unit as mackerel under US jurisdiction, only those mackerel allocated to the US under the bilateral would be included in the management unit. Table 44 in the FMP presents a series of possible US allocations pursuant to an agreement relative to the OY specified in the FMP to demonstrate the validity of the OY given a wide range of possible outcomes if an agreement is implemented during the fishing year. A discussion of possible alternative management units is set forth in Section XII-2 of the FMP. Section XII-2 also addresses the importance of the Atlantic States Marine Fisheries Commission and the States adopting measures compatible with the FMP.

(2) Determination of Maximum Sustainable Yield, Optimum Yield, US Capacity, and TALFF

Management measures 1 and 2 are aimed at FMP Objectives 1, 2, and 3. The domestic allocations specified should not restrict the domestic recreational mackerel fishery in 1979, according to recent surveys and

the best scientific information currently available. The US commercial allocation will allow a significant increase in commercial mackerel landings over levels in recent years (and will probably not be restrictive either).

The Council specified the maximum sustainable yield (MSY) as 210,000 to 230,000 mt. This estimate includes both recreational and commercial catches from the entire stock (US and Canadian waters) and reflects the magnitude of past catches. The estimate adopted by the Council was prepared by scientists of the Northeast Fisheries Center as a modification of earlier estimates based on historical commercial catch data.

In specifying OY, the Council departed from the MSY estimate in order to satisfy its objective of maintaining the spawning stock size at or above its 1978 level. The Council reasoned that a 1979 catch of 48,000 to 63,000 mt would result in a stable spawning stock in 1980, thus meeting the objective of maintaining the size of the spawning stock. The Council assumed that the approximate midpoint of this interval, namely, 55,200 mt would be an appropriate overall target catch. Based on this total catch and previous Canadian catches (and the assumption that the Canadians would concur with this OY estimate), the Council expected that the total Canadian removals would be approximately 40,000 mt, and that an appropriate US allocation would be approximately 15,200 mt.

The Council specified that the expected harvest during the 1979-80 fishing year by domestic fishermen in US waters as 14,000 mt. This amount was derived as follows:

Recreational - 9,000 mt. The magnitude of the recreational fishery is determined by the abundance and availability of mackerel and the effort expended. It was estimated that the fishery caught about 32,000 mt in 1970, a year of abundance, but only 6,600 mt in 1978, a year of relative scarcity. Mackerel will probably continue to be at a relatively low level of abundance (although greater than during 1978) during the 1979-80 fishing year. With the growing demand for recreational fishing in the US in general, and the Mid-Atlantic area in particular, the Council felt that a 9,000 mt catch would be a reasonable estimate of the expected US recreational harvests ("recreational capacity") from the state territorial waters and the Fisheries Conservation Zone.

Commercial - 5,000 mt. The 5,000 mt allocation is higher than catches in recent years due to a decline in abundance of mackerel and the shift of commercial effort to other fisheries. The Council expects growth in the domestic commercial fishery because of: (1) greater availability due to elimination of the directed foreign fishery (other than Canadian); (2) shift of commercial effort from other species, including groundfish; and (3) expected development of the export market for US caught mackerel.

In regards to item number one, as the general availability to US fishermen continues to increase, it would be expected that the catch per unit of effort would increase and that the cost per pound landed should decrease (shift of supply curve to the right). Thus, even with no new

effort transfers and demand held constant, greater equilibrium output would be expected. However, because of expected effort transfers due to various regulatory restrictions on other species, i.e., groundfish, and because it appears that the foreign demand for US mackerel is increasing, it is expected that US commercial output could expand considerably over harvest of recent years. While it is impossible at this time to quantify the dimensions of such expansion, the Council felt that 5,000 mt represented an upper bound to expected commercial production and thus should be specified as the US commercial "capacity."

TALFF - 1,200 mt The residual remaining from the OY after the expected US and Canadian harvests are deducted is 1,200 mt. This amount will probably be taken incidentally by the foreign fleets in the directed hake and squid fisheries. Although the TALFF is small, the Council felt that if mackerel were designated a prohibited species and immediately discarded at sea, as required by such designation, no limit on mackerel catches could be enforced. This was viewed as conflicting with the Council's objective to maintain the spawning stock.

These numbers on MSY, etc., are summarized below:

	<u>Metric Tons</u>
1. MSY	210,000 to 230,000
2. Acceptable 1979-80 catch in US & Canadian waters	55,200
3. Less expected Canadian catch	40,000
4. US OY	15,200
5. US expected recreational output (recreational capacity)	9,000
6. US expected commercial output (commercial capacity)	5,000
7. TALFF	1,200

(3) Data Collection

Management measures 3 and 4 will provide essential information on the US sport and commercial mackerel fisheries which are necessary for equitable and improved management of the resource in the future. Data from the recreational industry will supplement information derived from the periodic national anglers surveys. Data thus received from domestic and foreign fishermen will aid in achievement of FMP Objective 5, while imposing the minimum data collection/management costs feasible under any FMP. For example, it should take a fisherman no more than five minutes per fishing day to fill out a logbook.

While no management measures specifically address the achievement of Objective 4, none of the measures proposed would impede its achievement.

V. Methodology

The procedure for describing regulatory impacts was to analyze the management measures proposed by the Council in an attempt to determine whether there would be any incremental changes in prices, supplies, employment, distribution of income or productivity relative to the prevailing conditions under the PMP. The analysis was limited by data availability and the incremental changes in these variables could not be estimated. The following discussion describes the predicted economic impacts of the management measures on each fishery sector and on the appropriate government agencies.

VI. Economic Impacts of the FMP on Fishery and Government Sectors

A. Domestic Commercial Industry

The US commercial mackerel fishery is small relative to the US sport, Canadian, and foreign (prior to 1978) fisheries, and a significant fraction of the reported catch is used for industrial purposes (Figure 2 and Tables 1 and 2). Undoubtedly, a large fraction of commercial mackerel landings is taken as a by-catch in fisheries for other species which currently have a higher ex-vessel value. The commercial allocation specified (5,000 metric tons) by the FMP is significantly larger than the average annual US commercial mackerel harvest in recent years (the 1977 catch was approximately 1,400 tons). It is stated in the Mackerel FMP (page 80) that the "No Action" alternative might result in a rapid expansion of the commercial sector, with associated detrimental impacts on the resources. However, based on recent commercial catches, it seems that the catches in the 1979-1980 fishing year would not exceed the 5,000 ton commercial allocations whether there is a plan or not and, as stated previously, thus represents an upperbound on expected output. Thus, the allocation specified by the FMP should have not adverse impact on supply or price of this species to US consumers.

One of the benefits of implementing this plan, therefore, must be viewed not so much as the prevention of excess harvests in the short run, but rather the establishment of a system for generating information about the resource and the industry that will assist in the commercial and recreational development of this fishery in the long run. The management measures specified in the FMP should impose only the minimal costs on the processors which they incur through the recordkeeping provisions of the FMP.

B. Recreational Fishery

The recreational fishery has two components: (1) charter and party boats (recreational industry); and (2) individuals fishing in bays, sounds, or the ocean from piers or docks or from private boats. Only charter and party boats fishing in the FCZ are required to have permits and submit catch and effort data.

The Council determined that the mackerel fishery should be managed primarily as a recreational fishery, at least until the stock rebuilds. The Council intends to "Maximize the contribution of recreational fishing for Atlantic

mackerel to the national economy" by allocating 9,000 mt (59 percent) of the 15,200 mt OY to the recreational fishery.

From the 1970 saltwater angling survey, the charter and party boat catch represented 62.8 percent of the total recreational catch for the territorial sea and the FCZ. If this proportion is still valid, some 3,348 mt (37.2 percent) of the 9,000 mt recreational quota would be taken by individual anglers. At the present low level of the mackerel resource, the fishing by individual anglers does not pose a threat to the OY even if the level of catches by such anglers exceeds the amount estimated by the Council.

The 1970 national anglers survey also indicated that Atlantic mackerel accounted for about 18% by number and 14% by weight of all fish caught by sportfishermen from Maine through Virginia (which encompasses almost the entire range of mackerel in US waters) that year. Anglers surveys in 1960, 1965, 1970, 1974, and 1978 and resource assessment work on mackerel performed by the NMFS confirm that, over a short period of years, the sport mackerel catch is roughly proportional to resource abundance and availability. Thus, barring any dramatic increase in either the number of salt-water sportfishermen seeking mackerel or recreational fishing effort in the immediate future, the recreational allocation specified by the FMP should allow for an unrestricted (in the territorial sea and FCZ) sport fishery for mackerel in 1979. Thus, no additional management costs are anticipated for quota enforcement for this fishery sector.

C. Commercial - Recreational Reallocations

The Council provided a procedure that would allow a reallocation of mackerel from the domestic commercial fishery to the recreational fishery, or from the recreational fishery to the domestic commercial, as an in-season adjustment following an evaluation of the performance of both fisheries. There is no provision for an additional allocation to the foreign fisheries. The reallocation procedure requires a Council reevaluation of the performance of the domestic fisheries: (1) in October (i.e., one half of the fishing year); or (2) at the harvest of 5,000 mt in either the sport or commercial fishery; or (3) when 70 percent of either quota is taken in the FCZ, whichever comes first. Following the Council's reevaluation when any of the three criteria are met, surplus mackerel may be redistributed for the balance of the fishing year. The timely acquisition of catch data by the National Marine Fisheries Service is necessary to carry out the reallocation procedure in the FMP. However, State cooperation is needed to limit total catches by recreational and domestic fishermen to the quotas identified by the Council so as to prevent OY from being exceeded.

D. State-Federal Enforcement Strategies

Since a significant fraction of the US sport and commercial mackerel catches comes from the territorial sea (about 50% and 30%, respectively, in recent years), it was estimated that US fishermen will catch 4,500 metric tons in the sport fishery and 3,500 tons in the commercial fishery in the FCZ. These values should be used as guidelines for monitoring the territorial sea vs. FCZ catch of mackerel, but should not be considered quotas. Primary management of the fishery through regulation of its FCZ component is the most efficient and equitable means of achieving the objectives of this FMP.

The Council indicated that, to ensure that OY is not exceeded, "the Secretary must establish a program to monitor the total US catch of mackerel so that appropriate adjustments may be made in the FCZ catch of mackerel." The Council recognized that the Secretary may preempt State jurisdiction in the territorial sea but discouraged such action unless "all other methods" fail. The FMP places on the Secretary the major responsibility of obtaining States' voluntary action to carry out the FMP and, if necessary, preempting recalcitrant States.

Because the proposed conservation and management measures are limited to annual quotas, the minimum State cooperation needed would be a willingness of 11 coastal States from Maine to North Carolina to promulgate regulations authorizing a prohibition on mackerel fishing on their citizens in the territorial sea and internal waters to prevent OY from being exceeded. If appropriate regulations were not in place and enforced, the catches of commercial vessels and party/charter vessels in the FCZ could be reported as taken in the territorial sea to circumvent a Federal closure in the FCZ. Additional State actions might be necessary in the future if further restrictions (e.g., trip limits) are needed.

Securing the cooperation of the States is a vital part of fully implementing the FMP. There are various persuasive tactics that could be used with the States separately (e.g., letters to Governors). The Secretary could enter into a formal cooperative management regime with the States in which the Council's FMP could be supplemented by separate State plans or by a jointly developed multi-State plan monitored and managed by a mutually acceptable group, such as the Atlantic States Marine Fisheries Commission. The precedent for such a joint State effort is management of the Gulf of Maine shrimp fishery established under the NMFS State-Federal Fisheries Management Program. However, enforcement by each State would be necessary and the Secretary must be ready to persuade or preempt any recalcitrant State.

E. Foreign Fisheries

Foreign fishing nations have experienced a drastic decline in mackerel catches since 1976. This is in part due to a decline in species abundance and International Commission for the Northwest Atlantic Fisheries (ICNAF) regulation, but mainly due to enactment of the FCMA and restrictions on foreign fishing effort through the Atlantic Mackerel PMP, which has been in effect since 1977. It must be noted that ICNAF regulations have been replaced by regulations issued pursuant to the FCMA. Since the TALFF specified by this FMP is identical to that set by the current PMP, no additional costs or losses should be incurred by foreign nations as a result of the implementation of this FMP. If foreign nations harvest their allocation for 1979 of 1,200 metric tons, the US government will collect \$16,170 in fees.

F. Regulatory, Research, and Management Agencies

Costs incurred by the agencies responsible for enforcement of the FMP and the promulgated regulations (the Coast Guard and NMFS) are anticipated to be the least possible for implementation of any FMP, and should be limited to data collection and processing expenses. Since this FMP does not provide for stringent quota management and no fishing gear restrictions are proposed for the fishery, at-sea enforcement costs should be negligible. Data received

through the recordkeeping provisions of the FMP should enhance monitoring, research, and management responsibilities of the Council and NMFS, and should facilitate the FMP amendment process significantly.

The FMP for Atlantic mackerel contains further discussions of management alternatives and the tradeoffs (pps. 80-82).