FINAL ENVIRONMENTAL IMPACT STATEMENT/FISHERY MANAGEMENT PLAN

FOR THE

BUTTERFISH FISHERY OF THE NORTHWEST ATLANTIC OCEAN

November, 1978

Mid-Atlantic Fishery Management Council

in cooperation with

New England Fishery Management Council

South Atlantic Fishery Management Council

National Marine Fisheries Service

Revised May, 1979
Revised FMP Approved by Mid-Atlantic Council June 14, 1979

FINAL ENVIRONMENTAL IMPACT STATEMENT/FISHERY MANAGEMENT PLAN

FOR THE

BUTTERFISH FISHERY OF THE NORTHWEST ATLANTIC OCEAN

November, 1978

Mid-Atlantic Fishery Management Council

in cooperation with

New England Fishery Management Council

South Atlantic Fishery Management Council

National Marine Fisheries Service

Revised May, 1979
Revised FMP Approved by Mid-Atlantic Council June 14, 1979

ABBREVIATIONS AND DEFINITIONS USED IN THIS DOCUMENT

CFR - Code of Federal Regulations
cm - centimeter
EIS - Environmental Impact Statement
fathom - 6 feet
FRG - Federal Republic of Germany
FCMA - Fishery Conservation and Management Act
FCZ - Fishery Conservation Zone
FMP - Fishery Management Plan
fishing year - the 12 month period beginning April 1
Fork Length - length of a fish as measured from the most anterior point to the end of the median rays of the tail.
g - gram
GDR - German Democratic Republic
GIFA - Governing International Fishery Agreement
ICNAF - International Commission for the Northwest Atlantic Fisheries
km - kilometer
Knot - a unit of speed of one nautical mile (about 1.1 statute miles) per hour
mm - millimeter
mt - metric ton = 2204.5 pounds
NMFS - National Marine Fisheries Service
NOAA - National Oceanic and Atmospheric Administration
OY - Optimum Yield
PMP - Preliminary Fishery Management Plan
SA - Subarea or Statistical Area
Secretary - Secretary of Commerce
TAC - Total Allowable Catch
TALFF - Total Allowable Level of Foreign Fishing
$<$ - less than
$\leq$ - less than or equal to
$>$ - greater than
$\geq$ - greater than or equal to

II. SUMMARY

( ) Draft (X) Final Environmental Impact Statement/Fishery Management Plan for the Butterfish 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 exclusive US regulation over all fishery resources except highly migratory species (i. e., tuna) within the Zone. This management plan for the butterfish 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. The objectives of the plan are to:

1. Promote the growth of the US butterfish export industry;
2. Minimize cost of harvesting butterfish;
3. Increase employment opportunities for commercial fishermen;
4. Prevent exploitation of the resource beyond that level producing the maximum sustainable yield; and
5. Minimize costs of enforcement and management of the resource.

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

1. That the fishing year 1979-1980 optimum yield for butterfish be set at 11,000 metric tons. US capacity for butterfish for the 1979 - 1980 fishing year has been predicted to be 7,000 metric tons. Foreign fishermen, therefore, will be allocated an initial surplus of 4,000 metric tons of butterfish.
2. That any owner/operator of a vessel (foreign or domestic) desiring to catch butterfish within the FCZ (other than individual US fishermen for their own use), or transport or deliver for sale any butterfish caught within the FCZ, possess a valid registration issued by the NMFS.
3. That foreign fishing for butterfish be governed by the restrictions set forth in part 611 of Title 50, Code of Federal Regulations (the Foreign Fishing Regulations) in effect at the time of FMP implementation, and as they may be amended in the future.
4. That weekly catch reports of all species harvested be filed by domestic fishermen possessing a valid registration for the butterfish fishery (see Section XIV-2(a)), and that domestic dealers and processors submit weekly reports on transactions involving butterfish.
5. That any significant fraction of the US butterfish capacity not harvested by US fishermen be reallocated to foreign fishermen (see Section XIII-3).

Implementation of FMPs by the Secretary of Commerce has been defined as a major

Federal action significantly affecting the environment.

II-4. Summary of Impact

The measures recommended in the plan will provide for the long-term viability of the butterfish stock while permitting and encouraging the domestic butterfish industry to develop fully. The proposed action recommended herein should have no adverse impact on the environment.

II-5. Alternatives

Alternatives not included in the plan are:

1. Increased/Decreased Optimum Yield (OY) - The proposed optimum yield (OY) represents the best balance of possible catch levels consistent with the attainment of the objectives of this FMP (see Section XII). The probable biological consequences of an increased or decreased optimum yield are described in Sections V-2 and V-3. The "practical" maximum sustainable yield for butterfish, under present fishery conditions, is approximately 16,000 metric tons, and the stock currently appears able to sustain an annual harvest of that magnitude, barring any significant declines in future recruitment. An increased OY might also result in an increased TALFF for butterfish. The US fishery for butterfish for export is presently in its initial stages, but is growing rapidly. A large TALFF for butterfish might hinder the development of this export industry. Decreasing the OY beneath 11,000 metric tons would not be of significant biological advantage, but would result in the unwarranted restriction of either the US butterfish fishery, the foreign squid fishery, or both, and would not significantly further the growth of the US export fishery.

2. Increased/Decreased US Capacity - The US capacity estimate proposed in this FMP represents the best prediction of domestic harvest for this species during the proposed 1979-1980 fishing year, based upon information received to date by the Mid-Atlantic Fishery Management Council (see in Section VIII, "Rhode Island Commercial Fishery").

3. Take No Action At This Time - This alternative would mean that the Preliminary Fishery Management Plan prepared by the NMFS would continue in force. Since the PMP for 1979 proposes an OY and a US capacity significantly in excess of that proposed by this FMP, it is likely that continuation of the PMP would result in a large reallocation of butterfish to foreign fleets at the end of calendar year 1979. This would significantly undermine the stability and development of the US fishery, because foreign demand for US caught butterfish will be largely contingent upon an anticipated reallocation. Establishment of the OY proposed in this FMP, therefore, will protect US interests in this regard, by eliminating any possibility of a hugh reallocation to foreign fleets.

The PMP regulates foreign, but not domestic, fishermen. The effect of this alternative would be that data that would be collected on domestic fishing and processing efforts as a result of this plan could not be collected as effectively, and that assessments of the scope and development of the domestic fishery would not be as accurate as they would be with the FMP.

4. Selection of Management Unit - The FCMA dictates that each FMP identify a specific management unit for each subject species. It is desirable for management purposes that such management unit include as much of a stock and/or fishery as possible.

One factor which influences the selection of a management unit is political boundaries. States' jurisdictions within the territorial sea must be considered, as must the jurisdictions of other nations as they relate to US management of each resource. The US and Canada presently are engaged in negotiations to determine the demarcationof each nation's 200 mile fishing zone. One possible outcome of these negotiations may include American fisheries in Canadian waters (and/or vice versa). A ratified bilateral fisheries or boundary agreement will supercede the provisions of a FMP if conflicts exist. It is impossible to anticipate all possible outcomes of any agreement in a timely fashion, given the amount of time necessary to develop, implement and update US fishery management plans. It is therefore necessary, until such time as a permanent agreement is concluded, that a FMP for any species which is even marginally transboundary in its distribution, or which may be the explicit subject of a bilateral agreement, adopt a legally flexible management unit. This FMP is based on am management unit defined as all butterfish under US jurisdiction north of Cape Hatteras. Other alternative management units for this FMP are:

(a) Butterfish Within the FCZ North of Cape Hatteras - Selection of this option would limit the jurisdiction of this FMP to the fishery for butterfish within the FCZ only. (All management unit options for butterfish do not extend south of Cape Hatteras because the important fishery for this species does not extend south of that point and because the assessments upon which this FMP was based were performed for the area north of Cape Hatteras.) This management unit would ignore the significant fraction of the fishery and stock which occurs within the territorial sea. This option also does not anticipate management conflicts which might arise from the US/Canadian fishery negotiations.

(b) Butterfish Within All US Waters North of Cape Hatteras - This option includes virtually the entire butterfish stock and fishery, but does not have the inherent flexibility necessary to coordinate this FMP with a possible US/Canadian bilateral agreement. For example, this management unit could not include any possible US fishing effort for butterfish within Canadian waters, should such effort ever occur.

5. Other Management Measures - The Council has considered the use of other management measures and fishing regulations in order to determine if such are necessary or desirable to attain the management objectives, optimum yield, US capacity, or TALFF proposed by this FMP. This option includes such measures as gear, area, season, and other fishing regulations. It is the opinion of the Council that no management measures other than quota regulations and the Foreign Fishing Regulations are necessary at this time. Institution of other measures at this time would be of no management advantage for the domestic fishery and would lead to unwarranted increased costs of enforemment of this FMP.

Further discussion of these alternatives is presented in Section XII-2.

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

Agency	Comment Received
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	X
Bureau of Land Management	
US Dept. of Transportation, US Coast Guard	X
Environmental Protection Agency	
The States of Maine through North Carolina	
New England Fishery Management Council	
South Atlantic Fishery Management Council	

II-7. Dates

Hearings:

September 20, 1978	Norfolk, Virginia
September 21, 1978	Ocean City, Maryland
September 26, 1978	Cape May, New Jersey
September 27, 1978	Asbury Park, New Jersey
September 28, 1978	Centerreach, New York
October 3, 1978	Pt. Judith, Rhode Island
October 4, 1978	Gloucester, Massachusetts
October 5, 1978	Portland, Maine

Draft statement to Environmental Protection Agency:

Final statement to Environmental Protection Agency: Dec. 15, 1978

III. TABLE OF CONTENTS

IV. INTRODUCTION

IV-1. Development of the Plan

This management plan for butterfish 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 butterfish 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 butterfish 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 butterfish 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 butterfish fishery in the northwestern Atlantic. They are:

1. Promote the growth of the US butterfish export industry;
2. Minimize costs of harvesting butterfish;
3. Increase employment opportunities for commercial fishermen;
4. Prevent exploitation of the resource beyond that level producing the maximum sustainable yield; and
5. Minimize costs of enforcement and management of the resource.

V. DESCRIPTION OF THE STOCKS

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

Butterfish (Peprilus triacanthus) range from Nova Scotia to South Carolina (Bigelow and Schroeder, 1953). This species has also been observed in deeper offshore waters off Cape Hatteras and Florida, and infrequently as far north as Prince Edward Island (Nichols and Breder, 1927; Needler, 1938; Murawski et al., 1978).

The seasonal distribution of butterfish is similar to that of scup (Stenotomus chrysops), Atlantic mackerel (Scomber scombrus), weakfish (Cynoscion regalis), and long-finned squid (Loligo pealei). Butterfish north of Cape Hatteras display definite migratory patterns in response to water temperatures. Horn (1970), Waring (1975) and Fritz (1965) concluded on the basis of distribution of survey catches that summer movements of butterfish are both inshore and northward. Butterfish south of Cape Hatteras evidence no strong inshore-offshore migrations (Murawski et al., 1978).

Butterfish travel in small schools, usually near the surface when inshore during the warm months. Bigelow and Schroeder (1953) state that butterfish "seldom descend deeper than 15 to 30 fathoms during the summer," and the northern component of this stock spends winter and early spring offshore and near the bottom.

Water temperature is probably the most significant factor affecting butterfish distribution. In winter in the Mid-Atlantic area, butterfish appear in water 660 -

690 feet (200 - 210 m) deep, at the edge of the continental shelf (Horn, 1970; Bigelow and Schroeder, 1953). South of New York Bight, from New Jersey to the Chesapeake Bay, butterfish overwinter along the 100 fathom (600 feet) contour (Heald, 1968). Butterfish appear off Rhode Island by the end of April, at Cape Cod by May, and arrive in the Gulf of Maine usually by June.

Meristic and morphometric studies by Caldwell (1961) and Horn (1970) have concluded that depth isolated populations of butterfish exist in the Atlantic. Caldwell (1961) proposed one population south of Cape Hatteras to Florida, distributed to 22 meters, and another group in all waters north of Cape Hatteras and deeper than 22 meters to the south. Horn (1970) examined specimens from both localities and concluded the two groups were distinct. For the purposes of this fishery management plan, all reported distant water fleet (foreign) catches and US landings north of Cape Hatteras are considered to come from the northern stock.

V-2. Abundance and Present Condition*

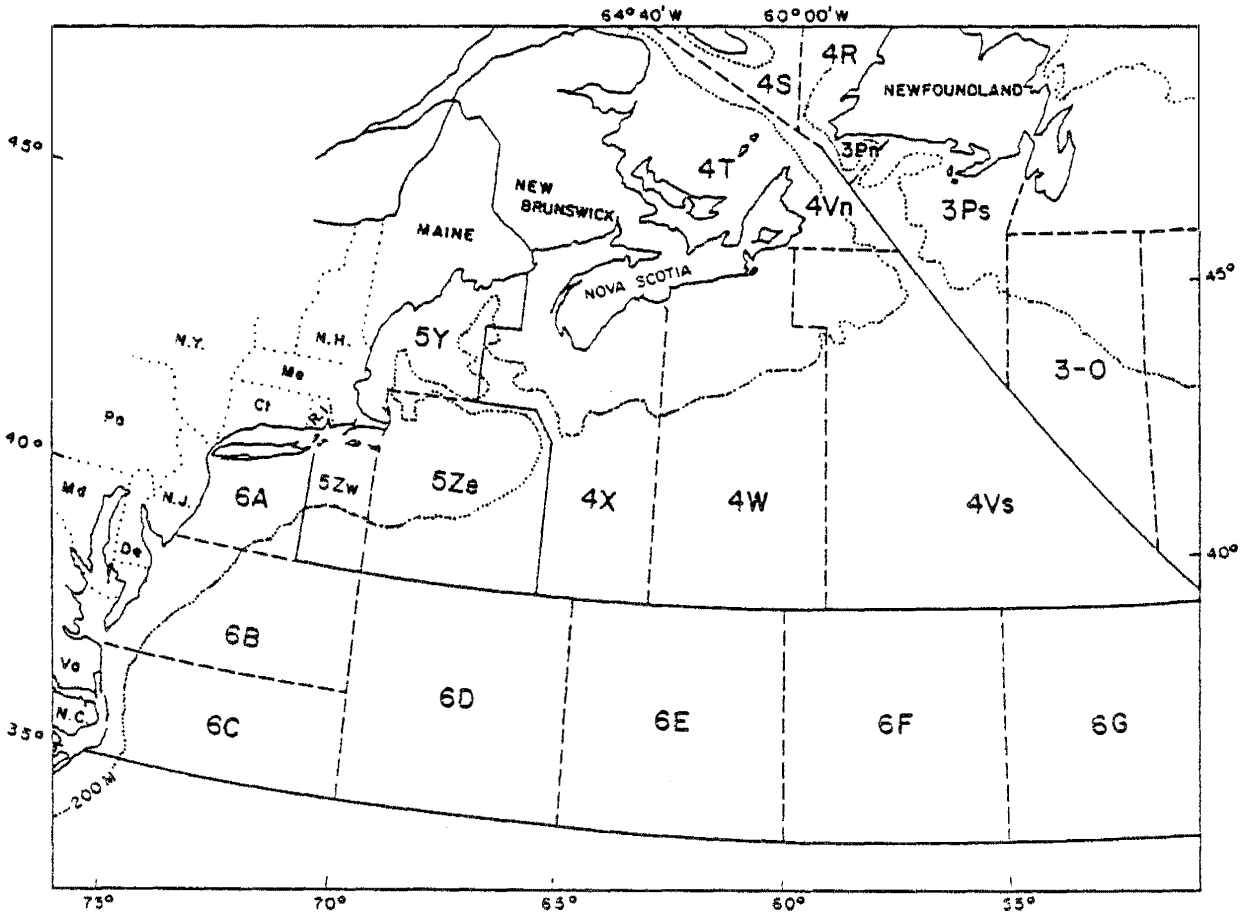
Catches of butterfish, Peprilus triacanthus, increased significantly off the northeastern US coast with the advent of distant water fleet fishing activity in 1963. Catches reported to ICNAF (Figure 1) increased from 3,209 metric tons in 1964 to 19,454 tons by 1973. Reported catches during this period were primarily by Japan, USSR, Poland, and the US. A considerable by-catch of butterfish was evident in squid fisheries pursued by several countries, with much of the catch discarded at sea (Lopez-Veiga and Labarta, 1975; Nagasaki, 1976; Waring, 1975). Concern for the status of butterfish in the ICNAF area was demonstrated by the recommendation of a total allowable catch (TAC) for 1977 of 18,000 tons (ICNAF, 1977; US Dept. of Commerce, 1976). This figure was judged to be precautionary in nature, since an adequate biological assessment was not available at the time.

The following discussion integrates available biological data with US research survey information and commercial catch statistics to determine the present status of the population, and harvests resulting from varying assumptions of population parameters, and size at selection by fishing gear.

Age And Growth DuPaul and McEachran (1973) reported that butterfish in the Chesapeake Bay are fully recruited to the spawning population at the end of their second year, as 37 of 56 age 1 fish examined were maturing, and all age 2 individuals were in spent or resting condition. Studies of age at maturity in other areas have not been conducted. Wilk et al. (1975) reported that from March to June immature or indeterminate specimens comprised 12.5-35.8% of samples in the New York Bight. It can therefore be inferred that all individuals are not necessarily mature at the end of their first year.

* The following sections were taken from Murawski and Waring (1978a), and updated by excerpts from Murawski and Waring (1978b) as noted.

Figure 1



Regulatory And Statistical Subareas And Divisions Established By The International Commission For The Northwest Atlantic Fisheries Off The United States Coast And Part Of Canada

Age and growth studies of butterfish have been conducted by Draganik and Zukowski (1966), DuPaul and McEachran (1973), Waring (1975), and Kawahara (1977). In the latter three studies the population was composed of four age groups (0+ - 3+), while Draganik and Zukowski reported the maximum age as six. Back-calculated lengths at age were significantly smaller within Chesapeake Bay (DuPaul and McEachran, 1973) than farther offshore (Kawahara, 1977). Predictive equations describing growth characteristics of the population, given by Kawahara (1977) are:

$$\ell_t = 210.2\ [1-\exp\ (-0.8618(t + 0.0699))]$$

and

$$w = 1.635 \times 10^{-6}\ L^{3.4920}$$

(fork length in mm, total weight in grams). According to the von Bertalanffy equation, growth is fastest during the first year and incremental increases in length are smaller as the fish age. The value of K is quite high, as is characteristic of fast-growing, short-lived fishes.

Development of the Fishery

Butterfish off the northeastern US coast were landed entirely by US fishermen during the period 1920-1962, with catches averaging 3,500 tons per annum (Waring, 1975). From 1963 to 1967 yearly production fluctuated around 5,000 tons. After 1967, reported catches increased dramatically, peaking in 1969 (17,506 tons) and again in 1973 (19,454 tons) (Figure 2; Table 1). Japan, USSR, Poland and the US accounted for most of the catches during recent years.

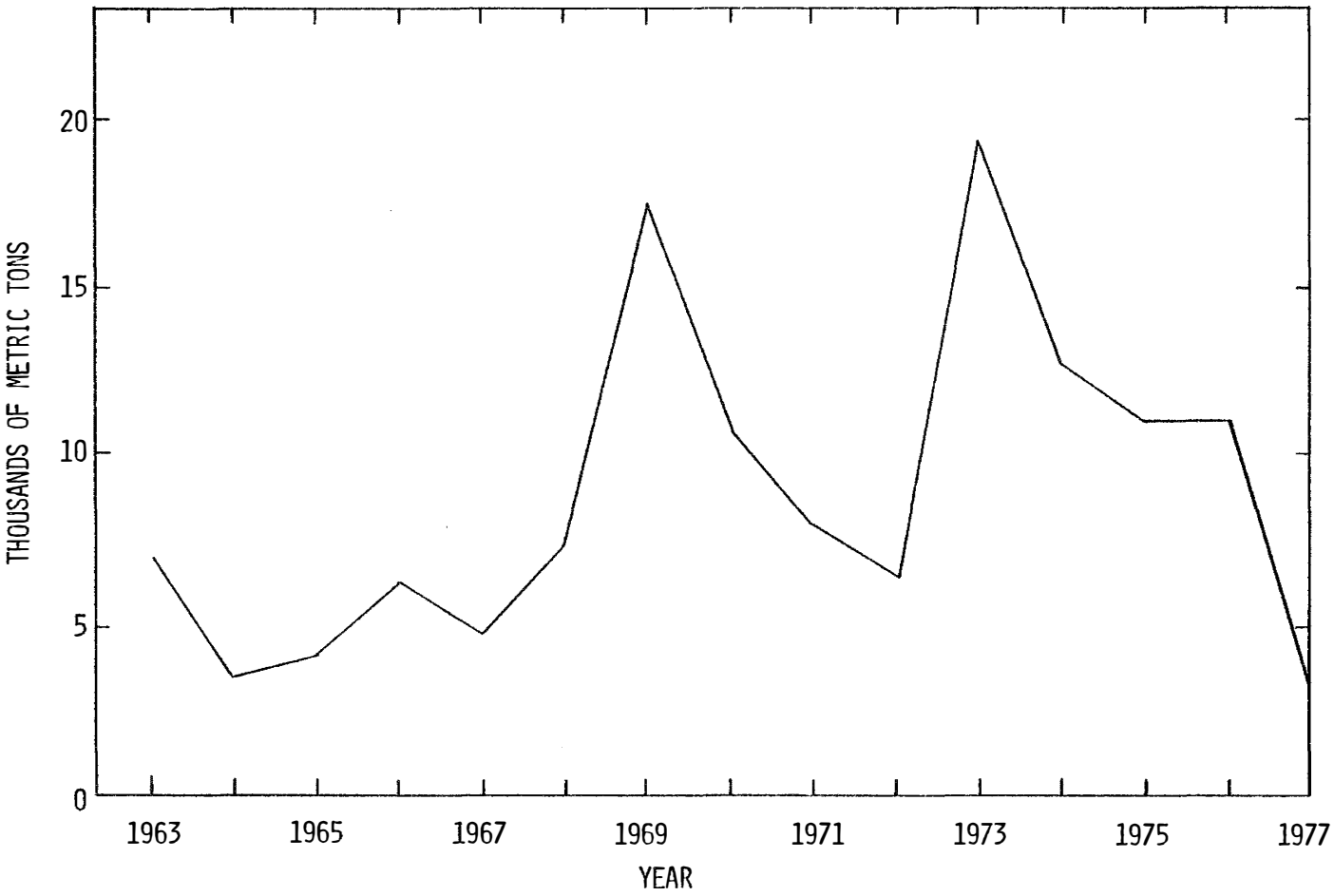
Catches by the US primarily were taken after the spawning season when butterfish are inshore. Seasonal domestic landings were greatest in early autumn (Waring, 1975). Japanese landings coincident with the offshore Loligo fishery, were taken from November to April with maximum production in November and January (Kawahara, 1977). Virtually no butterfish were landed by foreign fleets during summer when the resource is inshore and available to the domestic fishermen.

By-catch of butterfish during the Loligo fishery is considered to be significant. Lopez-Veiga and Labarta (1975) stated that butterfish is the main species in the by-catch of both the Spanish Loligo and Illex fisheries, although Spain has never reported any butterfish catches (Waring, 1975). Data presented by Lopez-Veiga and Labarta indicate that the monthly by-catch ranged from 3.15% (February) to 38.2% (September) of the entire catch in the directed squid fisheries during 1973 and early 1974. Italy has landed significant quantities of squid in the ICNAF area since 1972, however, their butterfish catches have also not been documented (Tibbetts, 1977; Waring, 1975).

Nagasaki (1976) reported the ability of Japanese fleets to direct effort at either Loligo or butterfish, when they inhabit the same grounds. However, the following evidence suggests that the ratio of Loligo to butterfish in Japanese catches was similar to the annual relative species abundance for the period of 1969-1975.

The average ratio (Kg/tow) of Loligo to butterfish was calculated for NMFS spring and autumn research vessel surveys from 1969-1975. Indices were developed for the combined Southern New England and Middle Atlantic strata (Tibbetts, 1977). Butterfish catches from the spring surveys (in weight) from 1973-1975 were divided by a factor of 1.35 to account for the larger survey net used, but Loligo catches

required no adjustment (Sissenwine and Bowman, 1977). Spring and autumn survey ratios were averaged to yield a value applicable to the entire year. The surveys bracket the Japanese fishing season, hence the index has a functional relationship to the commercial catches. The ratio of Loligo/butterfish landings reported by Japan was plotted vs. the survey ratio, resulting in a linear correlation (Figure 3). The 1972 point indicated a much higher ratio of Loligo to butterfish in the Japanese commercial catch than in the surveys, perhaps due to some discarding of butterfish in that year (when Japanese Loligo catches peaked). Commercial catch ratios for other countries landing both Loligo and butterfish in 1972 (e.g., US, Bulgaria, and the USSR) more closely approximated the survey data than the Japanese catches. Thus, the 1972 data were omitted from the regression analysis. The implications of the calculated relation are: (1) Japan probably discarded little of its catch of marketable butterfish during the period (excluding 1972), (2) Japanese fisheries are opportunistic, with landings reflecting availability, (3) if other countries reporting Loligo but not butterfish landings do not discard squid, then butterfish by-catch can be approximated from survey ratios. Accordingly, reported catches were adjusted upward using survey ratios to account for butterfish discards of those countries reporting only Loligo. The resulting total catches are listed in Table 1. The most significant change was in 1973, when the total catch increased 70.84% to 33,236 tons. The adjusted figures must also be regarded as underestimates of total catch, since there are no data on discards by those countries reporting butterfish landings.



TOTAL REPORTED BUTTERFISH CATCHES FROM ICNAF SUBAREAS 4 - 5 AND STATISTICAL AREA 6
1963 - 1977

FIGURE 2

Table 1. Nominal Landings, ICNAF SA 4-6, by Country, and Adjusted Total Catches[1], 1963-1977
(in metric tons)

Year	USA	Japan	USSR	Poland	Bulg.	GDR	Romania	Others	Nominal Total	Adj. Catch
1963	4513		2285						6798	7083
1964	2461		1011						3209	3209
1965	3340		749						4089	4089
1966	2615		3865						6480	6480
1967	2452	146	2170						4768	4768
1968	1804	3526	1911						7241	7241
1969	2433	3930	11107		36				17506	17816
1970	1869	8624	404						10897	14319
1971	1570	5771	486		26				7853	10483
1972	819	3675	1848		114	34			6490	13040
1973	1557	12172	2234	2804	239	196	152		19454	33236
1974	2528	5457	1372	3508					12865	17993
1975	2088	3624	798	3754	298	1		612	11166	14852
1976	1528	7884	420	1518	4	3	62		11419	15837
1977	1447	1750	419	280			16	381	4293	4293

[1]Adjusted to account for discards of countries not reporting butterfish catches from the Loligo fishery.
Source: Murawski and Waring (1978b)

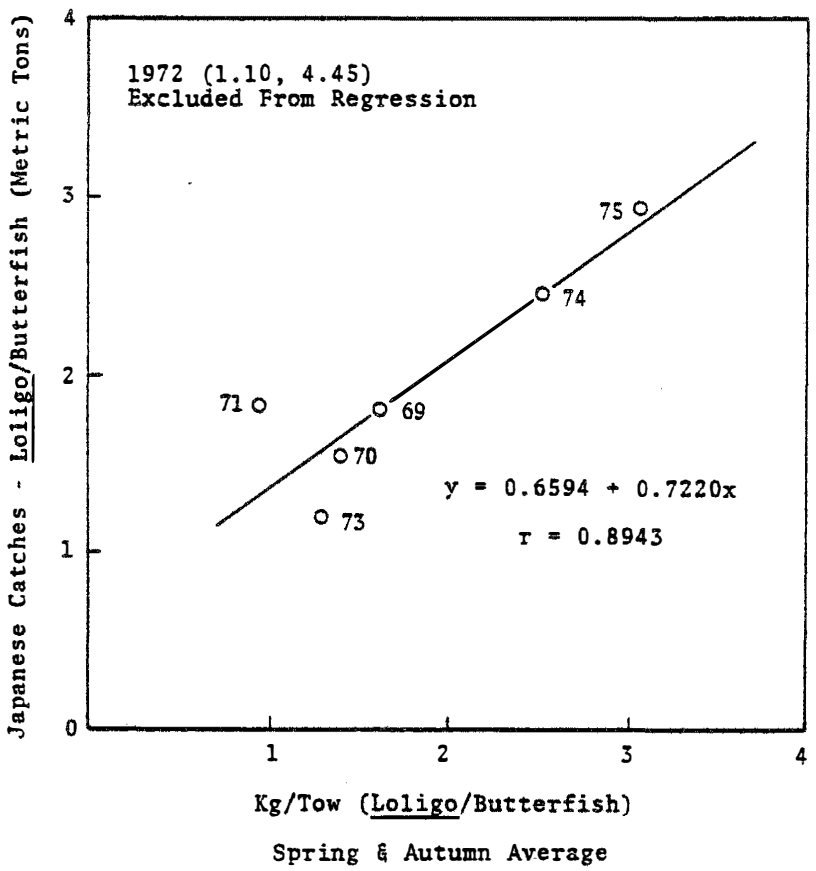


Figure 3

Ratio Of Loligo To Butterfish In US Research Vessel Surveys Vs. Japanese Catches

Age Composition of the Catch Length frequency sampling of butterfish catches by ICNAF member countries has been quite limited. Frequencies have been supplied by Japan, the USSR, and the US. Japan has provided first quarter frequencies since 1970; however, data reported for other quarters, and by the other countries has been intermittent. Since at least one length sample was reported for each quarter, beginning in 1970, all samples within a quarter were combined, weighting by individual sample size, to yield an overall quarterly frequency distribution. The length composition of the catches in 1968 and 1969 were derived from semi-annual NMFS research survey samples. Age frequencies were then calculated by applying the quarterly age/length keys of Kawahara (1977) to the length frequencies.

Japanese first quarter length and age frequencies from 1970-1976 are presented in Figure 4. The age distribution of the catch remained stable from 1970-1972, with 1+ individuals dominating the catch. A considerable proportion of the landings in 1973 were of those fish spawned the previous summer. From 1974-1976 age 0+ and 1+ fish were essentially co-dominant in the samples. Thus, a trend of decreasing age at recruitment is notable since 1970.

The annual catch in numbers at age was calculated in the following manner. The age composition in weight of each quarterly sample was derived by multiplying the percent age distribution in numbers by the mean weight at age (Table 2, determined by Kawahara, 1977), and dividing by the sum over all ages. The proportion at each age (in weight) was then multiplied by the commercial catch, yielding estimates of the total catch by age. Finally, the annual number caught in each age class was calculated by dividing the total catch at age by the average weight, and summing the quarterly estimates.

The calculated annual catches (numbers of fish) by year-class for the period 1968-1976 are presented in Table 3. Total catches were largest in 1973, followed by 1974, 1969, and 1976. The mean weight of fish landed was calculated by dividing the total catch by the number caught. Mean weights were greatest in 1970 and 1974, and smallest in value in 1968 and 1973.

1977 Survey Abundance Indices The relative abundance of butterfish was calculated from US research vessel surveys utilizing data for the Southern New England and Middle Atlantic strata (1-12, 61-76; Grosslein et al. 1973). Survey catches from Georges Bank were not included in the analysis since catches there were smaller and less consistent than those further to the south. The mean catch per tow in numbers and weight (linear, $\log_e$ N+1) was first calculated, then $\log_e$ values were re-transformed according to Bliss (1967). Estimates of the autumn abundance are given in Table 4 and Figure 5. Variations in numbers per tow parallel corresponding calculations in weight. Largest re-transformed catches (in weight) were in 1976, followed by 1973, and 1968, while butterfish catches were smallest in 1970, and 1972. Re-transformed numbers per tow peaked in 1976, 1973 and 1971, and were low in 1970 and 1972. Autumn survey indices generally correlate well with fluctuations in annual commercial catch (Table 1).

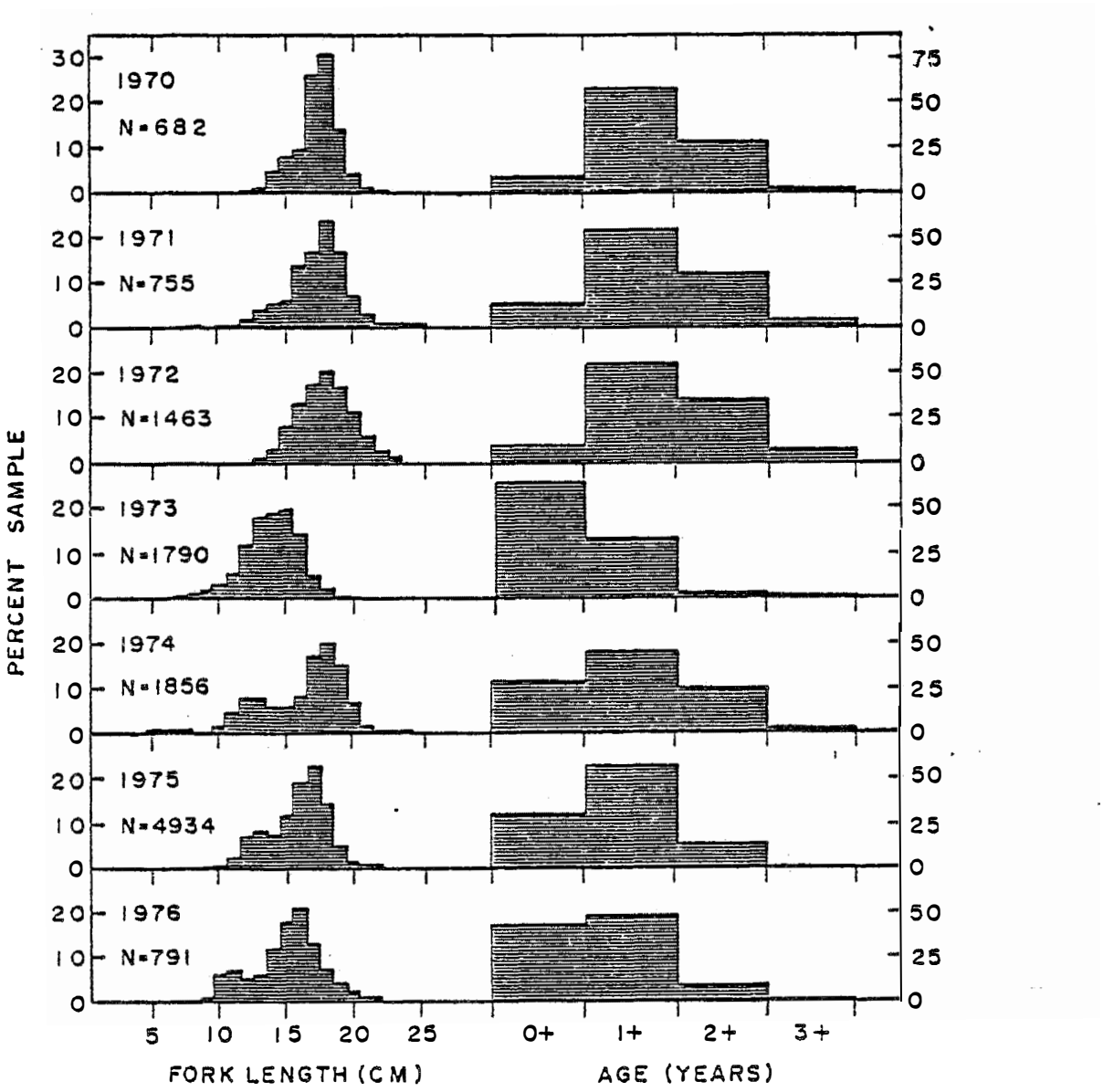


Figure 4

Length And Age Composition Of Japanese First-Quarter Butterfish Samples

1970 - 1976

Table 2. Mean Butterfish Weight (Kg) by Calendar Quarter

Age	July-Sept.	Oct.-Dec.	Jan.-Mar.	Apr.-June
0+	--	0.040	0.047	0.055
1+	0.056	0.101	0.104	0.104
2+	0.099	0.153	0.163	0.152
3+	0.150[1]	0.222	0.219	0.183

[1]Adjusted from 0.111 Kg

Table 3. Butterfish Catch ($x10^{-6}$ fish), ICNAF SA 4-6, 1968-1976

Year Class	Year 1968	1969	1970	1971	1972	1973	1974	1975	1976
1964	0.02								
1965	3.94	0.03							
1966	19.80	8.05	1.45						
1967	68.11	51.03	23.97	2.31					
1968	10.90	109.81	58.95	19.45	4.47				
1969		9.51	39.86	43.88	25.30	0.21			
1970			13.89	27.27	44.57	7.06	3.03		
1971				10.55	25.60	87.90	30.87	1.43	
1972					39.09	309.84	74.87	18.35	3.26
1973						55.04	65.76	67.67	17.49
1974							21.66	63.32	74.08
1975								5.30	75.09
1976									0.71
Σ[1]	102.77	178.44	138.12	103.46	139.02	460.05	196.19	156.06	170.62
$\bar{\omega}$ (g)	70.46	99.85	103.68	101.32	93.80	72.24	103.09	95.17	92.82

(1) Totals may not equal Σ due to rounding error

Table 4. Autumn US Survey Butterfish Catch per Tow, Strata 1-12, 61-76, 1968-1977

Year	Catch per Tow in Numbers: Linear	Log_e	Re-transformed	Catch per Tow in Weight (Kg): Linear	Log_e	Re-transformed
1968	121.09	1.99	47.28	10.44	0.66	2.91
1969	76.93	2.16	57.25	5.32	0.66	2.72
1970	48.29	1.13	10.74	3.07	0.34	1.06
1971	242.17	2.19	112.00	5.45	0.58	2.29
1972	86.67	1.36	20.11	3.21	0.36	1.16
1973	178.03	2.35	124.08	8.39	0.75	3.70
1974	116.32	1.95	77.52	5.12	0.66	2.66
1975	52.47	1.69	36.19	2.94	0.58	1.80
1976	160.31	2.32	156.60	6.71	0.86	4.15
1977	94.69	1.99	69.33	6.87	0.70	3.24

Source: Murawski and Waring (1978b)

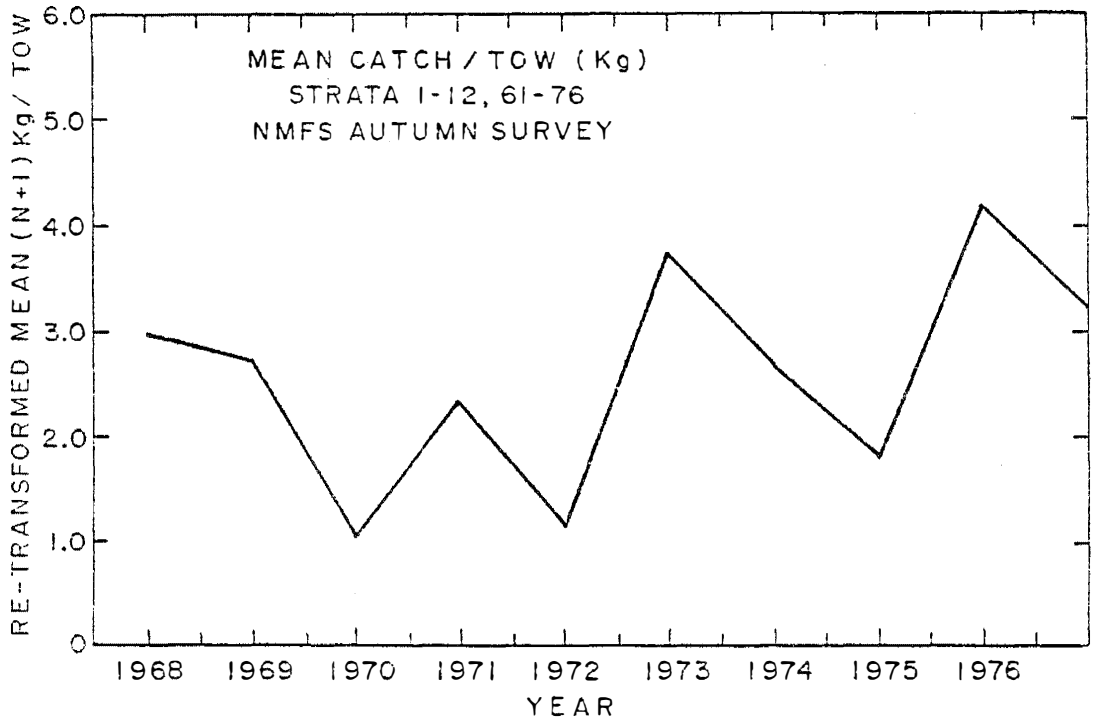


Figure 5

Retransformed Catch Per Tow (kg) From The Southern New England And Middle Atlantic Areas During Autumn US Research Vessel Surveys 1968 - 1977

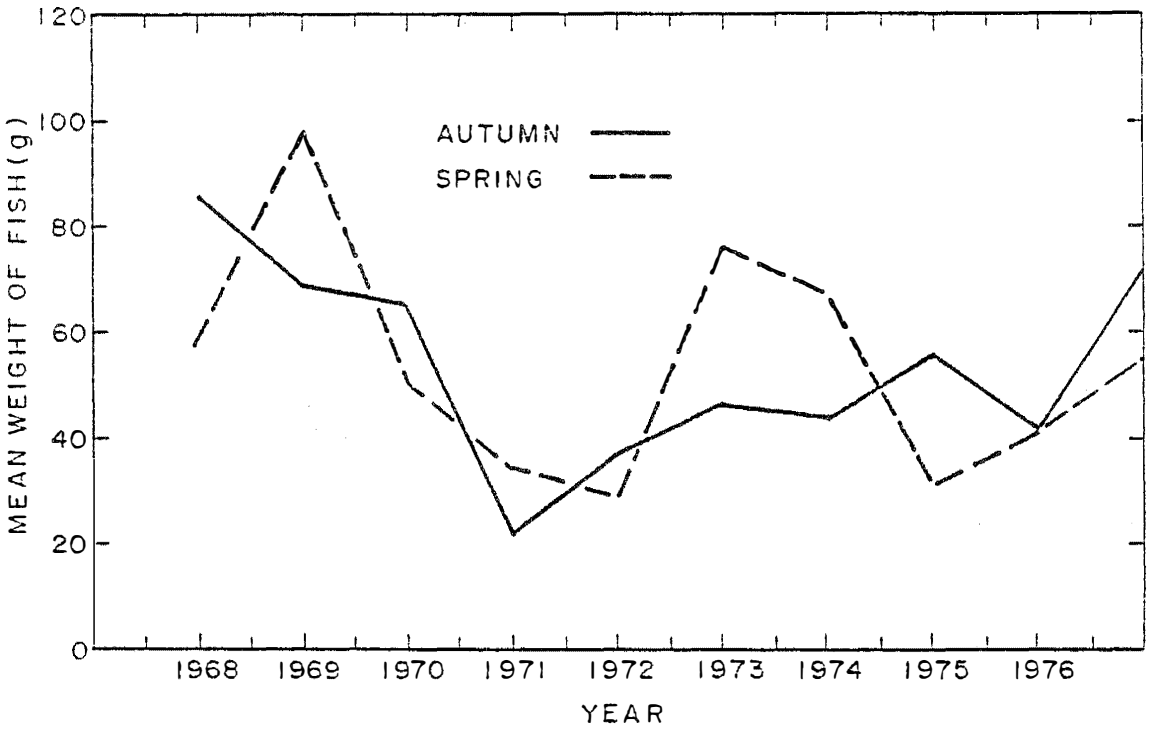


Figure 6

Mean Weight Of Butterfish (g) Taken From The Southern New England And Middle Atlantic Areas During US Research Vessel Surveys 1968 - 1977

The mean weight of individuals caught during the surveys is expressed in Figure 6. Both spring and autumn data show a trend of smaller average weights in recent years. This decrease may be attributable to two factors: (1) large year-classes dominating the survey catches as juveniles and (2) a decrease in mean weight as fishing becomes more intense. Although differential recruitment may play an important role in causing large fluctuations in mean weight, the long-term trend of smaller fish is probably due to increased fishing pressure. The autumn mean weight has averaged 41.43 g (about 1.5 ounces) since 1972, a figure quite close to the average weight of 0+ individuals in the fourth calendar quarter (Table 2). Estimates of average weight in the spring and autumn 1976 samples were nearly identical (41.82 and 41.86 g, respectively).

The total instantaneous mortality coefficient (Z) was estimated for each year-class from 1968-1975, utilizing spring survey mean catch per tow in numbers. Autumn data were not useful in this analysis since at this time juveniles are not fully recruited to the offshore areas. Spring frequency distributions of catch per tow were partitioned into age classes utilizing the age/length key of Kawahara (1977). Total mortality coefficients of each year-class were computed by regressing $\log_e$ number at age vs. coded age (Table 5). The increase in total mortality since 1968 has coincided with the tremendous rise in landings associated with the advent of distant water fleet activity.

Table 5. Calculation of Total Instantaneous Mortality (Z) Utilizing Number per Tow by Age for NMFS Spring Surveys, 1968-1978

Year Class	Stratified Number per Tow at Age				Regression Coefficients for $\log_e$ No./Tow vs. Coded Age#		
	0+	1+	2+	3+	r^2	a	b(= -Z)
1968	11.66	2.96	1.30	0.01*	0.980	3.462	-1.097
1969	10.04	2.36	1.24	0.31	0.981	3.322	-1.108
1970	26.36	4.22	8.00	0.33	0.768	4.546	-1.250
1971	313.31	40.17	3.78*	0.17*	1.000	7.801	-2.054
1972	44.09	9.05	1.89	0.18	0.989	5.745	-1.807
1973	22.12	6.88	1.82	0.18	0.972	4.918	-1.576
1974	162.24	5.12	1.04	0.03*	0.957	7.304	-2.524
1975	36.40	4.39	0.37	--	0.998	5.949	-2.294
1976	4.21	1.93	--	--	1.000	2.217	-0.780
1977	4.25	--	--	--	--	--	--

Coded Ages A_i = 1, 2, 3.....n for Ages 0+, 1+, 2+.....N+

*Not included in regression

Source: Murawski and Waring (1978b)

Virtual Population Analysis Stock size at the beginning of each year (1968-1976) was computed by virtual population analysis (Pope, 1972). Calculations of stock size for short-lived fishes utilizing this technique are particularly sensitive to values of the natural mortality coefficient (M) and starting fishing mortalities (F). Since no studies of the natural mortality rate of butterfish have been conducted, M was deduced from the age composition of survey catches prior to the heavy foreign fishing pressure. The surveys were initiated in 1963, the first year of foreign fishing for this species. The frequency distribution of autumn catches in the Southern New England area indicates larger individuals (to 30 cm, fork length) were in the population then than at present. Assuming Kawahara's (1977) age/length keys are applicable to the early data, the age composition of the 1963 catch was computed. Approximately 15.03% of the fully recruited fish were three years old, therefore:

$$Z = \frac{-\log_e 0.1503}{t - t_c} = \frac{1.8951}{3 - 1} = 0.95$$

If fishing mortality in 1963 was minimal ($\approx$ 0.2), then M approximates 0.8.

Virtual population analyses were conducted with an initial M value of 0.8, and starting Fs for each year-class scaled according to Z values from survey data (Table 5). Additional computations were run with M equalling 0.6, 1.0 and 1.2 to assess the sensitivity of stock size estimates to this parameter.

Fishing mortality rates derived from the VPA with M=0.8 are listed in Table 6. Mean mortality rates increased substantially from 1968 (.213) to 1974 (.872). Relatively large variations in Fs occur among fully recruited cohorts within years, perhaps due to the sensitivity of the analysis to starting Fs and/or a violation of the assumption of constant natural mortality for all ages.

Stock size estimates (numbers), by year-class, are presented in Table 7. Corresponding stock biomass was derived by multiplying numbers at age by the appropriate first quarter mean weight (Table 2), since the VPA estimates population size at the beginning of the year. Overall stock size varied from 31,896 (1976) to 70,631 tons (1973), averaging 53,571 tons. Biomass estimates from expanded catch per tow data averaged 61,360 tons from 1969-1973 (Waring, 1975). Mean stock sizes from the VPA corresponding to the period of areal expansion estimates (1968-1973) were 40,483 tons, 61,762 tons, 113,162 tons, and 190,571 tons for Ms of 0.6, 0.8, 1.0, and 1.2. Since areal expansion probably results in a minimum estimate, M is apparently at least 0.8. An M of 0.8 implies that the catch efficiency of survey gear (adjusted for daytime catches when butterfish concentrate close to the bottom) is nearly 100%.

The apparent discrepancy in the estimates of relative stock size in 1976 between the survey data and the VPA (Tables 4 and 7) is due to a large 1976 cohort that was not reflected in population size calculations at the beginning of the year. The larger year-classes indicated by the VPA were 1972, 1968, 1971, and 1973, while smaller cohorts were 1975, 1969, 1970, and 1974. These data are generally consistent with survey information. A large year-class may not be evident in the autumn survey of the year it was spawned since juvenile fish are concentrated inshore during the early autumn. Depending on the timing of the cruise relative to climatic changes, young fish may not be fully available to the offshore survey.

Annual landings during 1968-1976 averaged 31% of the initial yearly stock size (Table 7), with the proportion harvested (P) ranging from 18% (1968) to 50% (1976). Annual exploitation rates (E, calculated from mean Fs from the VPA and M=0.8) parallel calculations of the portion of initial biomass harvested, even though

computations of P and E are based on weights and numbers of fish respectively.

Table 6. Fishing Mortality Rates (F) for Butterfish, Calculated from Virtual Population Analysis (M = 0.8)

Year Class	Year 1968	1969	1970	1971	1972	1973	1974	1975
1966	.361	.494	.300					
1967	.191	.424	.776	.300				
1968	.009	.235	.376	.407	.300			
1969		.017	.171	.590	2.582	.300		
1970			.024	.112	.542	.298	.400	
1971				.013	.071	.773	1.920	1.000
1972					.029	.691	.762	.957
1973						.071	.214	.750
1974							.031	.227
1975								.021
$\bar{F}$*	.213	.279	.290	.504	.660	.690	.872	.788
Ages#	1-2	1-3	1-3	2-4	2-4	1-4	2-4	2-4

*Mean F for fully recruited ages, weighted by stock size in numbers (Table 7)
#Fully recruited ages

1978 Survey Abundance Indices[1]

The relative abundance of butterfish as been calculated on an annual basis as the catch in numbers and weight per tow from offshore (>27 m) bottom trawl surveys conducted by the NMFS. Catches from Mid-Atlantic and Southern New England strata during the autumn have been the largest and most consistent. Thus, the most relevant abundance indices are stratified random catches per tow for these cruises and strata (Table 4). The linear catch per tow index (in numbers) from the autumn 1977 survey (94.69) declined 40.9% from the previous year, and was 19.5% below the 10 year average of 117.70. However, linear weight per tow increased 2.4% to 6.87 kg/tow, implying that, although numbers per tow declined, their average weight increased. Autumn mean weights per fish were 72.6 g, highest since 1968, and a 73.3% increase over the autumn 1976 mean (41.86 g; Figure 6). The retransformed weight per tow index decreased 21.9% to 3.24 kg/tow in 1977 (Table 4; Figure 5).

The autumn linear catch per tow index in numbers was partitioned into age classes using the fourth quarter age/length key of Kawahara (1977). The autumn estimate of age 0+ relative abundance (Table 10) was 40.11 fish/tow, 68.5% below the 1976 estimate, and 53.2% below the 10 year average of 85.66. Thus, the 1977 year-class appears to be relatively weak when autumn abundance indices are compared with other year-classes. In contrast, the 1976 year-class was 48.8% greater than the 10 year average, and third highest in the time series.

Spring linear catch per tow estimates have been used to assess total mortality of various year classes by regressing $\log_e$ catch/tow on coded age (Murawski and Waring, 1978a). Table 5 incorporates data for the 1978 spring survey. The decline in the value of Z for the 1976 year-class may be attributed to the sharp decline in total catch following implementation of the FCMA in March, 1977, but should be interpreted with caution due to the limited amount of data. The spring catch per tow indices in numbers have, however, been relatively poor in 1976 and 1977 despite the presence of a relatively strong 1976 year-class in the autumn of that year. Interestingly, a

[1] Excerpted and adapted from Murawski and Waring (1978b).

similar phenomenon has occurred with abundance indices of long-finned squid (Loligo pealei) (NMFS, Resource Assessment Division, 1978), but the cause of such fluctuations is as yet not apparent.

Future Condition of the Resource

Recruitment of butterfish appears to vary independently of total stock size, therefore, $F_{0.1}$ was applied to average recruitment in order to estimate the maximum long term average yield (MAY) (16,000 mt) (see Section V-3) under the assumption that future recruitment will fluctuate within the range of values observed in recent years. A more refined management strategy will only be possible if recruitment can be monitored on a real-time basis, and used almost immediately in the formulation of regulations since a significant portion of the recruits enter the fishery in their first year of life (Murawski and Waring, 1978a).

The most recent survey data available (autumn 1977, spring 1978) indicate that butterfish abundance is still within the range of values used earlier to calculate MAY (see Section V-3) and the total mortality rate of the population has been drastically reduced. With the sharp decline in total catch in 1977 and 1978, a greater proportion of larger fish are available to spawn than would normally be the case with intensive fishing pressure. Even though an implicit stock-recruitment relation has not been demonstrated for this stock, the probability of a good 1978 year-class is no doubt enhanced. Early indication from the joint US-USSR juvenile hake survey, and observations aboard US commercial vessels from Rhode Island suggest that the 1978 year-class may be strong relative to other years. These observations combined with the low catch in 1978 lead to the conclusion that the present population status is good relative to past years.

V-3. Estimate of Maximum Sustainable Yield

Above average recruitment to the northwest Atlantic butterfish stock was deduced from NMFS research surveys in 1976. This information, coupled with the significant decrease in the total catch of this species since enactment of the FCMA (the total catch of butterfish in 1977 was 78% lower than the previous year), indicates that the current abundance of this stock is probably high relative to previous years. A preliminary estimate of maximum sustainable yield is 21,635 metric tons (given the several assumptions and specified conditions discussed below and in Section V-2.). This estimate of MSY, however, presupposes certain minimum mesh sizes to be used in the fishery and an average level of annual recruitment to the stock, and these conditions will not be completely met in 1979. Mesh sizes used by foreign and domestic vessels in 1979 frequently will vary from that which theoretically will produce this MSY. In addition, the best scientific evidence available indicates that annual recruitment to this fishery is not constant and that the substantial variations in yearly recruitment which have been observed in the past will probably continue in future years. If a significant shift in recruitment values occurs over a persistant time interval, then it will be necessary to adjust estimates of maximum sustainable yield accordingly.

Butterfish Stock Size (Millions Of Fish), Calculated From Virtual Population Analysis (M = 0.8)

Year Class	1968	1969	1970	1971	1972	1973	1974	1975	1976	
1964	1.9									
1965	5.6	0.2								
1966	92.7	29.0	8.0							
1967	562.1	208.7	61.4	12.7						
1968	1,684.2	750.3	266.6	82.2	24.6					
1969		823.3	363.7	137.7	34.3	1.2				
1970			847.5	371.8	149.4	39.0	13.0			
1971				1,215.3	539.4	225.7	46.8	3.1		
1972					1,976.8	862.5	194.1	40.7	7.0	
1973						1,168.8	489.4	177.6	37.7	
1974							1,024.0	446.1	159.7	
1975								368.1	161.9	
Stock size (S) (tons) at beginning of year	41,022	61,740	56,580	67,976	51,884	70,631	53,663	46,750	31,896	$\bar{S}$ 53,571
Total catch (C) (tons)	7,241	17,816	14,319	10,483	13,040	33,236	17,993	14,852	15,837	$\bar{C}$ 16,091
Portion of initial stock harvested (P)	0.18	0.29	0.25	0.22	0.25	0.47	0.34	0.32	0.50	$\bar{P}$ 0.31
Exploitation[2] Rate (E)	0.13	0.17	0.18	0.28	0.35	0.36	0.42	0.40	0.46[3]	$\bar{E}$ 0.31

(1) Calculated from $5.57 \times e^{-1.1}$ (2) $E = F(1-e^{-Z})/Z$ (3) Assumed

Table 7

Yield Analyses[1]

Yield Per Recruit Yield per recruit analyses were conducted for butterfish with the model of Paulik and Gales (1964), since an isometric length/weight relation could not be assumed. Fork lengths at 50% selection (ℓ_c) were calculated utilizing Meyer and Merriner's (1976) empirical selection factor of 1.8. Analyses were conducted for stretched mesh sizes of 30 mm (ℓ_c=54 mm), 60 mm (ℓ_c=108 mm), 80 mm (ℓ_c=144 mm) and 100 mm (ℓ_c=180 mm). Various values of M, ranging from 0.6 - 1.2 were also included. The following data were used as input parameters to the model:

L_∞ = 210.2 mm	β = 3.4920
W_∞ = 210.9 g	M = 0.6 - 1.2
K = 0.8618	F = 0.01 - 2.50
t_o = -0.0699 yrs	t_λ = 6.0 yrs
t_r = 0.25 yrs	t_c = 0.275, 0.767, 1.271, 2.182 yrs

Values of $F_{0.1}$ (Gulland and Boerema, 1973) were determined to be the point at which the marginal increase in yield per recruit was 10% of the yield at F = 0.01. Exploitation rates corresponding to F_{max} and $F_{0.1}$ were computed from:

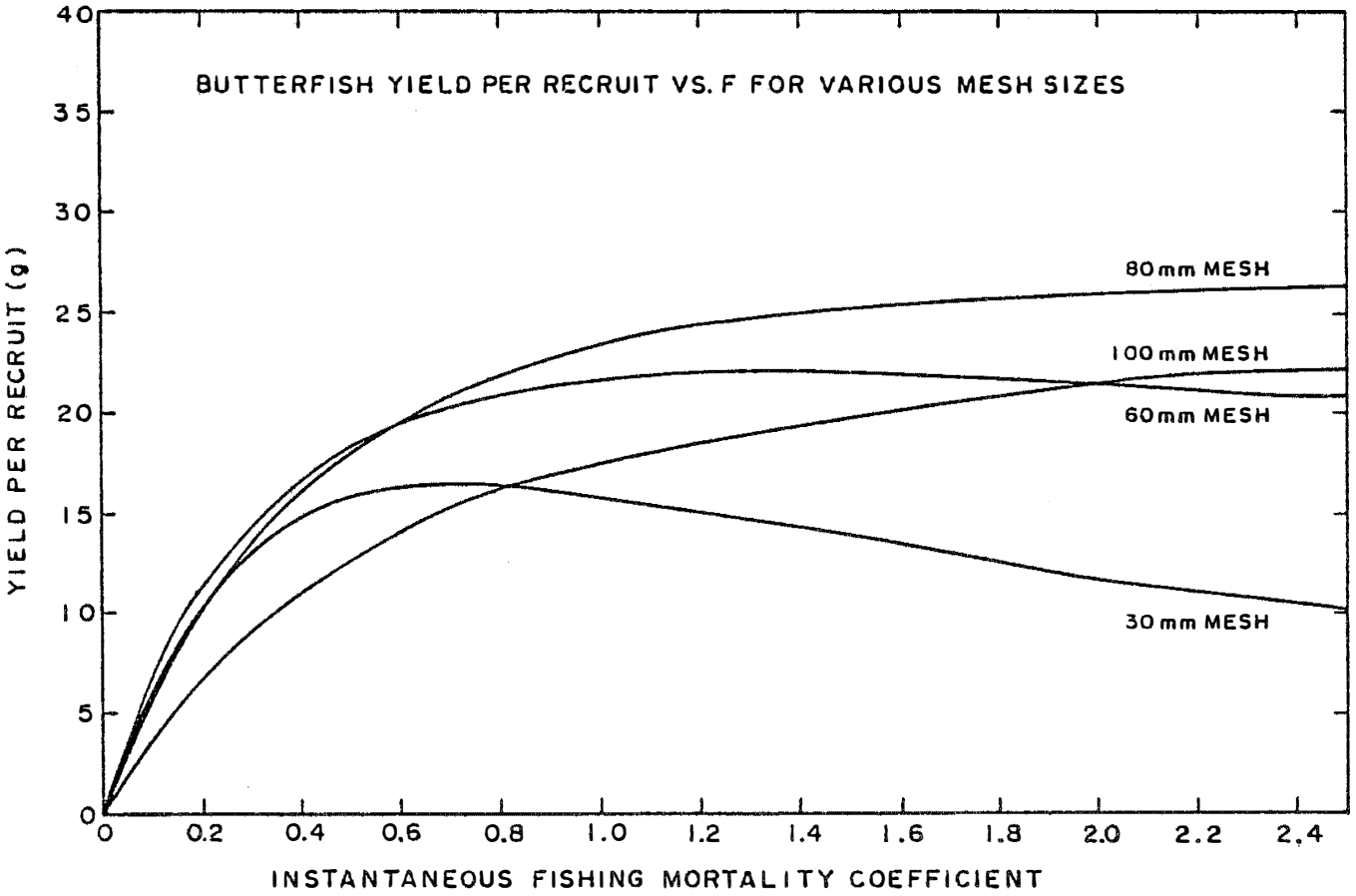
$$E = \frac{F(1 - e^{-Z})}{Z}$$

Calculations of yields, fishing mortalities, and exploitation rates for various combinations of mesh size and natural mortality rate are listed in Table 8. Transverse isopleth sections for M = 0.8 are presented in Figure 7. If M = 0.8, maximum yield per recruit (>26.48 g) occurs with the 80 mm mesh, at F >2.50. If a 60 mm mesh net was in use, a maximum yield of 22.07 g could be harvested with an F of 1.33. Utilizing $F_{0.1}$ computations, 23.04 g can be derived with F = 0.96 and a mesh of 80 mm, however, if a 60 mm mesh is used, 20.32 g can be taken with an F of only 0.69 (Figure 7, Table 8).

Exploitation rates (E_{max}, $E_{0.1}$) are only slightly different among M values within mesh size categories (Table 8). Thus, these calculations are not highly sensitive to the absolute value of the natural mortality coefficient. Figure 8 summarizes the relations between stretched mesh size (mm) and $E_{0.1}$. The calculated regression equations describe more than 99% of the variation about the lines for all M values, therefore, $E_{0.1}$ for a particular mesh size (assuming a selection factor of 1.8) can be accurately computed.

[1] The following discussion of Section V-3 was taken from Murawski (1978a).

Figure 7



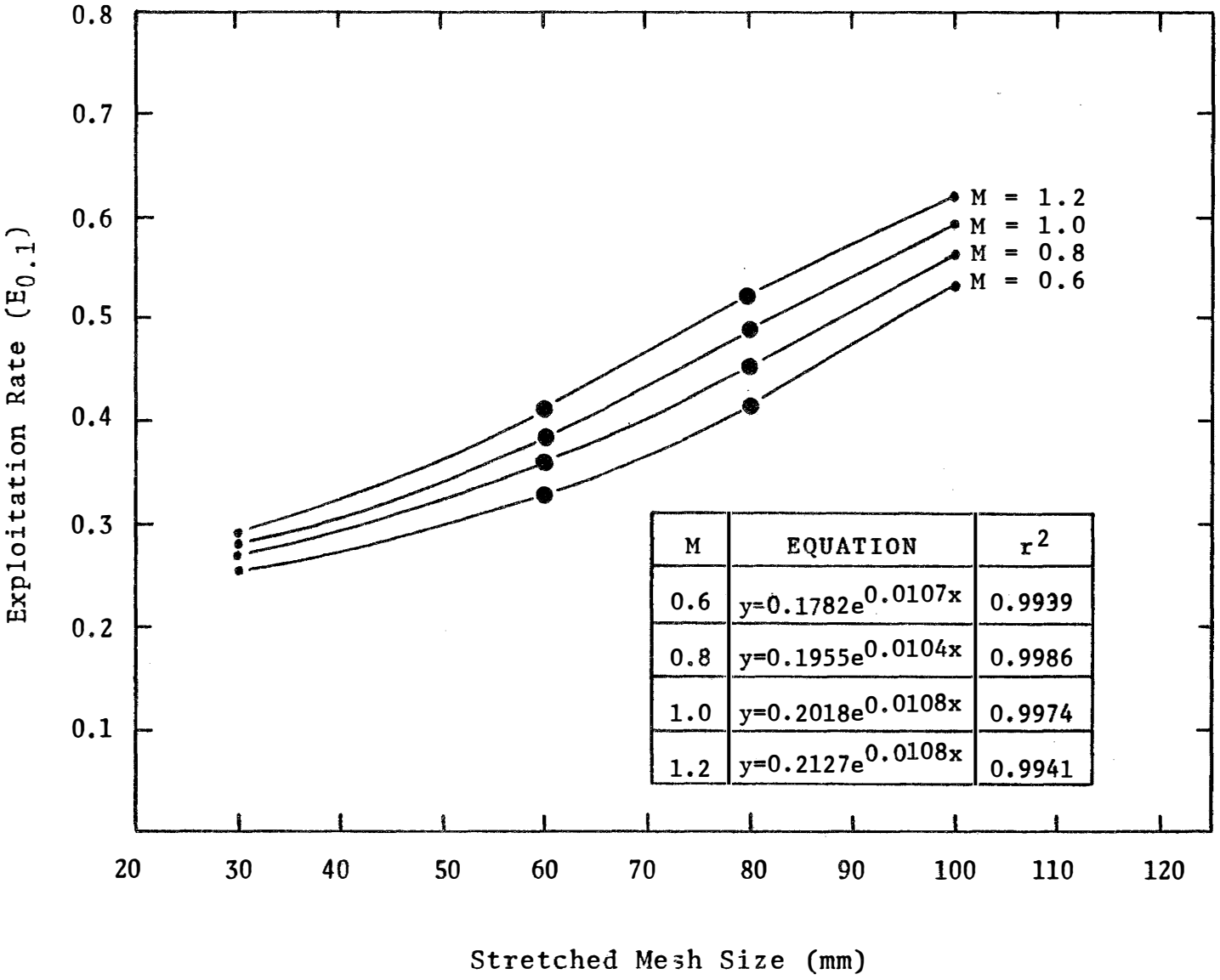
Yield Per Recruit Of Butterfish With Various Mesh Sizes (M = 0.8)

Table 8. Yield per Recruit Calculations for Butterfish

Size	M	(g)	F_{max}	(g)	$F_{0.1}$	E_{max}	$E_{0.1}$
30 mm	0.6	22.45	0.59	21.38	0.39	0.35	0.25
	0.8	16.44	0.71	15.60	0.47	0.37	0.27
	1.0	12.65	0.84	11.99	0.55	0.38	0.28
	1.2	10.11	0.98	9.55	0.63	0.40	0.29
60 mm	0.6	29.14	0.99	27.08	0.55	0.50	0.33
	0.8	22.07	1.33	20.32	0.69	0.55	0.36
	1.0	17.48	1.78	15.95	0.84	0.60	0.38
	1.2	14.29	2.35	12.92	1.03	0.64	0.41
80 mm	0.6	35.25	2.05	31.39	0.75	0.72	0.41
	0.8	>26.48	>2.50	23.04	0.96	>0.73	0.45
	1.0	>20.04	>2.50	17.56	1.22	>0.69	0.49
	1.2	>15.24	>2.50	13.62	1.49	>0.66	0.52
100 mm	0.6	>35.32	>2.50	30.23	1.09	>0.77	0.53
	0.8	>22.41	>2.50	19.57	1.38	>0.73	0.56
	1.0	>14.28	>2.50	13.01	1.74	>0.69	0.59
	1.2	> 9.13	>2.50	8.67	2.08	>0.66	0.61

The theoretical mean weight of individuals in the catch was estimated for several exploitation rates by dividing yield (in weight) per recruitment by the number of fish harvested from that cohort over its life span. Curves of mean weight vs. exploitation rate for the 30 mm and 60 mm mesh sizes are presented in Figure 9. Assuming the average exploitation rate from 1974-1976 was 0.43 (Table 7), then average weight in the catch should have equalled 40.73 g if a 30 mm mesh was used, and 87.99 g if the net was 60 mm. The Japanese have traditionally used a 30 mm mesh inside a 60 mm one in their squid-butterfish fisheries. However, trawls towed by US fishermen have averaged 66 mm in the industrial fishery and 114 mm for the food fishery (Waring, 1975). Mean weights of fish in the US survey catches in 1976 (spring and autumn average = 41.84 g) are quite close to those predicted with the 30 mm mesh. However, mean weights in the fishery (Table 3, 1976 average 92.82 g) more closely approximate those derived with the larger net. The apparent discrepancy may reflect culling of small butterfish (<15 cm, fork length) taken with the small mesh nets. The relative proximity of estimates from yield per recruit analyses to data from the fishery and surveys tends to validate the above assumptions of population parameters.

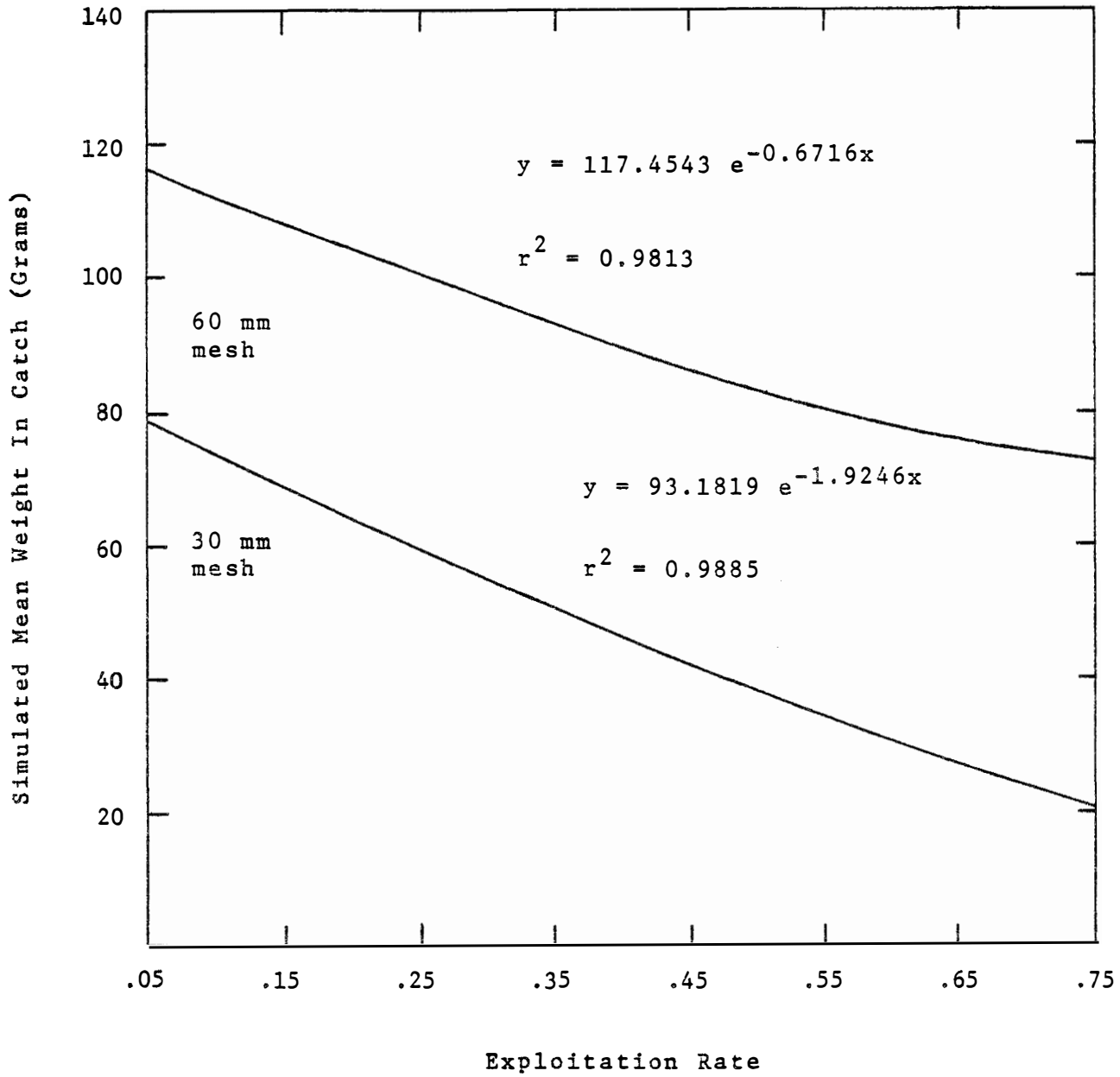
Figure 8



M	EQUATION	r^2
0.6	$y=0.1782e^{0.0107x}$	0.9939
0.8	$y=0.1955e^{0.0104x}$	0.9986
1.0	$y=0.2018e^{0.0108x}$	0.9974
1.2	$y=0.2127e^{0.0108x}$	0.9941

Relation Between Stretched Mesh Size (mm) And Exploitation Rate ($E_{0.1}$)
For Several Assumptions Of The Instantaneous Natural Mortality Rate (M)

Figure 9



Relations Between Exploitation Rate And Simulated Mean Weights Of Butterfish In The Catch With 30 mm And 60 mm Mesh Nets

Equilibrium Yield The total harvest of butterfish is a function of the number of recruits entering the population, fishing mortality, and the age at entry to the fishery. If the 30 mm mesh is used (ℓ_c = 54 mm, fork length) a considerable portion of the stock will be harvested prior to initial spawning since effort is concentrated in the late autumn and winter months, and butterfish are only partially recruited to the spawning population at age 1. However, if age at selection is delayed, harvest rates resulting in maximum yield increase to the point that very little of the adult stock survives the fishery, even though large increases in fishing rate result in only marginal gains in yield (Figure 7).

The total catch from a given number of recruits can be calculated utilizing the yield per recruit model. The mean number of fish entering the population from 1968-1975 was 1138.5 x 10^6 (Table 7). Assuming ages at selection for the 30 mm and 60 mm meshes are 0.275 and 0.767, then the average numbers of recruits alive at t_c are:

$$1138.5 \times 10^6 \quad e^{-(0.8)(0.275)} = 913.7 \times 10^6$$

and

$$1138.5 \times 10^6 \quad e^{-(0.8)(0.767)} = 616.4 \times 10^6$$

Yields associated with $E_{0.1}$ ($F_{0.1}$(30 mm) = 0.47; $F_{0.1}$ (60 mm) = 0.69) are then:

30 mm mesh (t_c = 0.275 yrs) = 14,540 tons

60 mm mesh (t_c = 0.767 yrs) = 18,945 tons

Thus, yield at $F_{0.1}$ from the average recruitment for 1968-1975 ranges from 14,540 tons to 18,945 tons, depending on mesh size used. Average reported landings during the period were 11,685 tons per year, with an adjusted mean catch of 16,123 tons. Since both mesh sizes were used at the time, the fact that the total adjusted catch was between the yield calculations indicates the population was utilized near $E_{0.1}$.

Derivation of Maximum Sustainable Yield[1]

Methods The total yield from the average juvenile production (1138.5 million fish) over its lifespan for combinations of F and t_c was calculated utilizing Paulik and Gales' (1964) yield per recruit methodology (Murawski and Waring (1978). The loci of yield values for various mesh sizes (and, thus, ages at entry based on the selection factor of 1.8) were determined at values of $F_{0.1}$ since transverse isopleth sections are generally flat in appearance, and result in very little marginal yield at large F values (near F_{max}). Although arbitrary, values of $F_{0.1}$ are preferable to those resulting in the maximum yield per recruit (F_{max}) when stock-recruitment relationships are considered. For many species, including butterfish, recruitment to the fishery occurs prior to first spawning. The reduction in fishing mortality rate from F_{max} to $F_{0.1}$ results in only minor decreases in yield per recruit, but preserves a larger portion of the spawning stock. A positive stock-recruitment relationship has not been conclusively demonstrated for butterfish, but it is clear that more progeny will be generated by fishing at $F_{0.1}$ than at F_{max}. Values of $F_{0.1}$ were calculated by determining the points at which marginal increases in yield per recruit (0.01 intervals of F) were 10% of the yield per recruit at F = 0.01. Other parameters used in the yield per recruit analysis are listed in Figure 10. Maximum yield at $F_{0.1}$ was thus derived by iterating with respect to mesh size (in 1 mm increments). Total production was calculated by multiplying the yield per recruit values by the number of fish alive at the age of recruitment (t_r = 0.25 years). The resultant yield calculations are presented in Table 9.

[1] Taken from Murawski (1978).

Results The maximum catch at $F_{0.1}$, given constant recruitment, was calculated to be 21,635 metric tons, at a mesh size of 82 mm and an $F_{0.1}$ = 1.01. Substantial decreases in total sustainable yield, however, should occur when mesh sizes smaller than 82 mm are used. Yield per recruit at $F_{0.1}$ is also reduced if the nets used are larger than 82 mm. Offshore bottom trawls at present must be at least 60 mm and pelagic trawls may be 45 mm for foreign vessels in the FCZ. Mesh sizes used by domestic vessels are generally significantly larger.

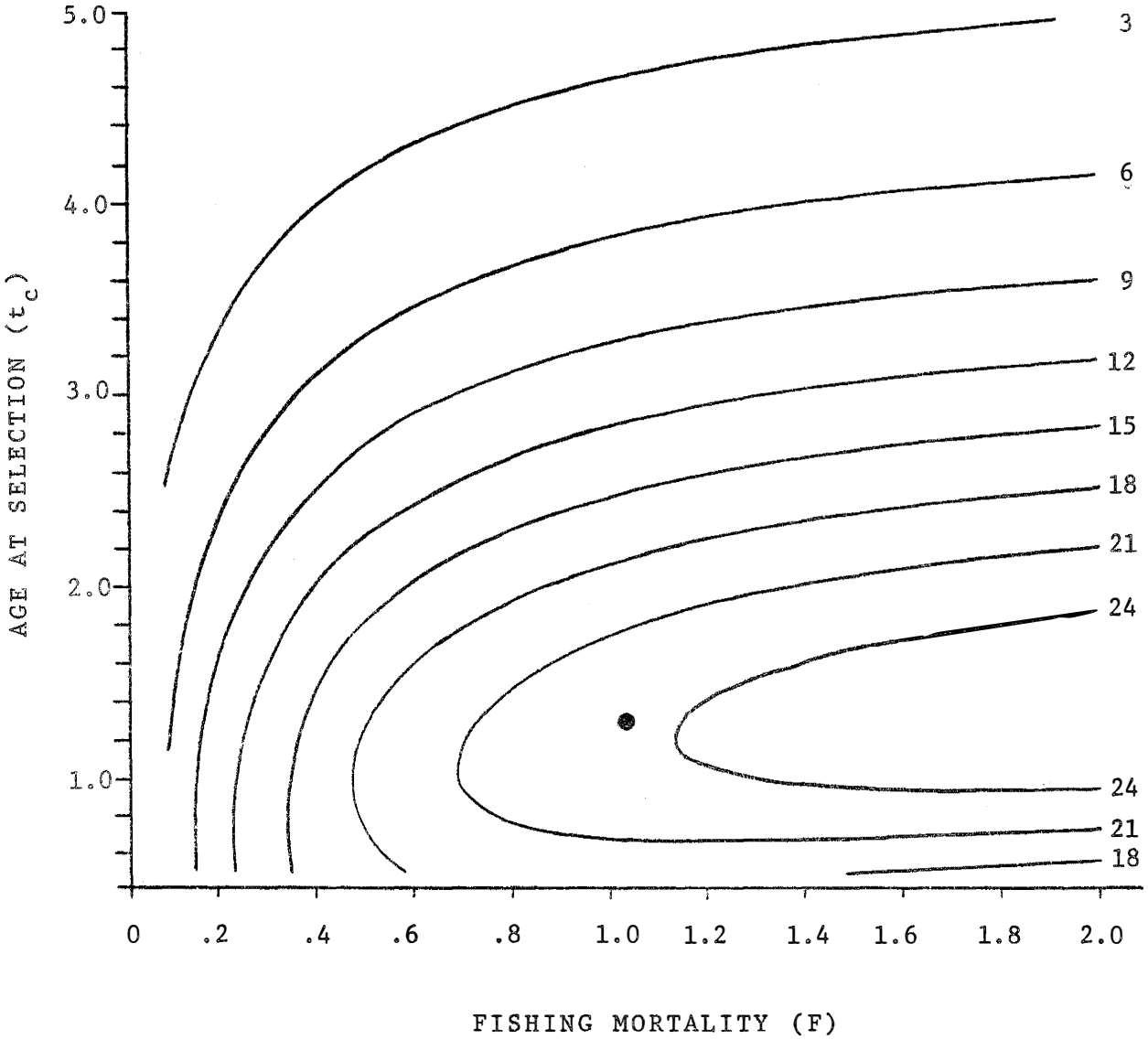
Estimates of relative juvenile abundance from autumn offshore bottom trawl surveys and total 0+ stock size estimates from virtual population analyses for 1968-1976 suggest substantial variations in annual recruitment (Table 10). The total estimated 0+ population size from the VPA ranged from 368.1 million to 1976.8 million fish (95% C.I. = 453.0 million). Autumn catch per tow indices (in numbers) varied from 29.95 to 231.58. The catch per tow index for the 1976 year-class was the third highest for the time series of data, and 48% greater than the 1968-1975 average. For planning purposes, the value of 21,635 tons (mesh = 82 mm, $F_{0.1}$ = 0.01) can be used as an estimate of MSY. It should be noted, however, that if smaller mesh nets are used in the butterfish fishery, total sustainable yields are less (Table 9). If average recruitment continues to fluctuate about the mean (1138.5 million fish), then the long-term MSY will remain at 21,635 tons. If a significant shift in recruitment values occurs over a persistent time span, however, MSY values should be adjusted accordingly.

Because butterfish are harvested with a wide range of mesh sizes (approximately 45 mm to 114 mm),a more 'practical' MSY, based on the present mix of gear in the fishery, may be between 15,000 and 19,000 mt. The best conservative estimate of MSY under current fishery conditions is approximately 16,000 metric tons.

Table 9. Butterfish Yield Per Recruit Data and Estimates Of Maximum Equilibrium Yield For Various Mesh Sizes (Selection Factor = 1.8, M = (Selection Factor = 1.8, M = 0.8)

Mesh Size (mm)	$Y/R_{0.1}$ (g)	$F_{0.1}$	Age At Selection t_c (year)	Yield For Average Recruitment At $F_{0.1}$ (tons)*
30	15.60	0.47	0.275	14.540
60	20.32	0.69	0.767	18,945
76	22.75	0.90	1.154	21,206
77	22.80	0.91	1.186	21,252
78	22.93	0.93	1.203	21,374
79	22.96	0.94	1.236	21,402
80	23.04	0.96	1.271	21,476
81	23.15	0.99	1.306	21,579
82	23.21	1.01	1.338	21,635
83	23.21	1.02	1.362	21,635
84	23.17	1.03	1.395	21,597
85	23.13	1.05	1.440	21,560
86	23.08	1.07	1.482	21,513
100	19.57	1.38	2.182	18,242

* Assuming that $F_{0.1}$ is the maximum F that will not adversely affect recruitment, then this is the maximum long-term average yield from the fishery, which is equivalent to the current interpretation of MSY.



Butterfish Yield Per Recruit Isopleth (Grams), Assuming:

$M = 0.8$, $W_\infty = 210.9$ g, $K = 0.8618$,

$t_o = -0.0699$ yr, $t_r = 0.25$ yr, $B = 3.4920$, And $t_\lambda = 6.0$ yr.

Dot indicates maximum yield at $F_{0.1}$ ($t_c = 1.338$ yr, $F_{0.1} = 1.01$).

Figure 10

Table 10. Estimates Of Relative Juvenile (Age 0+) Butterfish Abundance From NMFS Autumn Offshore Bottom Trawl Surveys, And Total 0+ Stock Size For Year-Classes 1968 - 1977

Year-Class	Autumn Catch Per Tow Index (x N/Tow Age 0+)	Estimate Of 0+ * Population Size From VPA ($x10^6$)
1968	46.19	1684.2
1969	44.61	823.3
1970	30.06	847.5
1971	231.58	1215.3
1972	79.59	1976.8
1973	135.02	1168.8
1974	92.02	1024.0
1975	29.95	368.1
1976	127.50	--
1977	40.11	--

* Source: Murawski and Waring (1978b).

V-4. Probable Future Condition

As discussed in Sections V-2 and V-3, it is impossible to predict long-term abundance of, or recruitment to, the butterfish stock. The optimum yield proposed in this plan, however, is conservative from a biological standpoint, and harvest at that level in 1979 should not by itself threaten future recruitment or abundance. Unless butterfish abundance is significantly affected by other factors, such as environmental fluctuations or other natural phenomena, the population should remain at a relatively high level in 1980.

V-5. Ecological Relationships

As is typical of a small, schooling, pelagic finfish, butterfish are subject to predation by a number of larger species, especially pelagic finfish. Table 11 lists several species which are known to consume butterfish specifically. The relative importance of butterfish, however, to the diet of any other species is unknown.

Table 11. Butterfish Predators

Common Name	Scientific Name	Reference
Haddock	*Melanogrammus aeglefinus*	Horn, 1970
Silver hake	*Merluccius bilinearis*	Horn, 1970
Swordfish	*Xiphias gladius*	Bigelow and Schroeder, 1953
Bluefish	*Pomatomus saltatrix*	Bigelow and Schroeder, 1953
Weakfish	*Cynoscion regalis*	Bigelow and Schroeder, 1953
Goosefish	*Lophius americanus*	Bigelow and Schroeder, 1953
Sand tiger	*Odontaspis taurus*	Bigelow and Schroeder, 1953
Porbeagle	*Lamna nasus*	Bigelow and Schroeder, 1953
Red hake	*Urophycis chuss*	Bigelow and Schroeder, 1953

(specifically cited by Horn (1970) and Bigelow and Schroeder (1953))

Young butterfish feed primarily on jellyfish (Horn, 1970), and ctenophores and salps (Haedrich, 1967). The diet of adult butterfish includes other small fish, squid, crustacea, polychaetes, tunicates and chaetnognaths (Bigelow and Schroeder, 1953; Leim and Scott, 1966; Nichols and Breder, 1927; Maurer and Bowman, 1975).

Table 12 lists the finfish species with which butterfish are most frequently captured by otter trawl surveys. Butterfish are known to prefer sandy sediments to rock and mud bottoms, which may partially explain the species composition of Table 12 (Bigelow and Schroeder, 1953).

Table 12. Ten Fish Species Most Regularly Collected With Butterfish In Groundfish Surveys Off the Northeast Coast of the United States Between The Gulf of Maine and Hudson Canyon

Species	Summer	Fall	Winter
Spiny dogfish	X	X	X
Little skate	X	X	
Haddock	X	X	
Silver hake	X	X	X
Squirrel hake	X	X	X
Alewife	X		
Yellowtail flounder	X	X	
Winter flounder		X	
Fourspot flounder		X	X
Longhorn sculpin		X	

(from Murawski et al., 1978, after Horn, 1970)

Butterfish also are commonly captured with squid by otter trawls, especially by foreign fisheries directed at squid.

Young butterfish are known to form associations with coelenterates (Murawski et al., 1978). Bigelow and Schroeder (1953) describe young butterfish as "often living in the shelter of the larger jellyfishes, as young haddock do," but state that this behavior is neither manifested by adult butterfish, nor necessary to the survival of the fry.

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 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.

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 the fresh water outflow and return the region's salinity distribution to the winter maximum. Water salinities near shore average 32°/oo, increase to 34-35°/oo along the shelf edge, and exceed 36.5°/oo along the main lines of the Gulf Stream.

On the continental shelf, surface circulation is generally southwesterly 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 knots 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°/oo 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 generally 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 the Great South Channel onto Nantucket Shoals. The anticyclonic eddy over Georges Bank that develops in the 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 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 supressed 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 (Cohn, 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 minima while nutrient levels increase to their winter maxima.

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

1976 Anoxia In The Middle Atlantic Bight

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 11. 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.

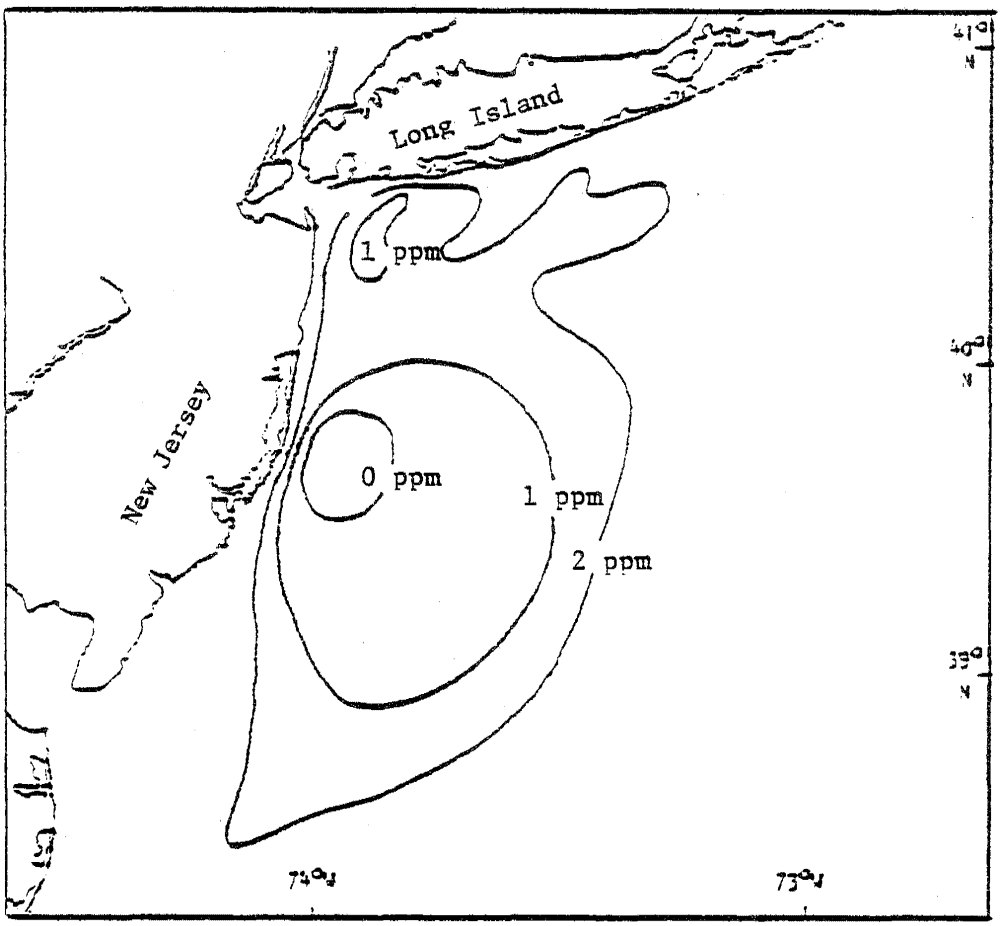
The Environmental Protection Agency has requested that no fishing be permitted between 38°20'00"N to 38°25'00"N and 74°10'00"W to 74°20'00"W because the area is a sewage disposal area and between 38°40'00"N to 39°00'00"N and 72°00'00"W and 72°30'00"W because it is a toxic industrial waste site (W. E.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

VI-3. Habitat Protection Programs

No special habitat protection programs exist in the habitat of the species that is the subject 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. States in the region with approved Coastal Zone Management Programs are Massachusetts and Rhode Island.

Figure 11

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



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 butterfish is regulated by the FCMA pursuant to which Governing International Fishery Agreements (GIFAs) 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 butterfish 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 butterfish under the PMP for 1978 and 1979 in metric tons were:

	1978		1979
	Allocation	Catch	Allocation*
Bulgaria	0	0	12
FRG	105	0	100
France	0	0	10
Italy	501	354	174
GDR	0	0	10
Japan	672	651	358
Mexico	1,263	93	128
Poland	67	0	37
Romania	150	56	10
Spain	1,053	156	606
USSR	100	14	497
Reserved	89		2,058
Total	4,000	1,324	4,000

* as of March, 1979

No Indian treaty rights are known to exist specific to this fishery.

VII-4. State Laws, Regulations, And Policies

No State laws, regulations, or policies specific to this fishery are known to exist.

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

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

VIII. DESCRIPTION OF FISHING ACTIVITIES

VIII-1. History Of Exploitation

Butterfish probably have contributed significantly to US commercial fisheries only since the early 20th century (McHugh, 1977). The commercial fishery for this species traditionally has been concentrated in the New York Bight - Southern New England area; in 1978, over 95% of the total reported US catch was landed in New Jersey, New York, and Rhode Island. Trends in US commercial butterfish landings in this region have tended to follow patterns of landings of food finfish by otter trawls, since most of the domestic butterfish catch is taken by this gear. Thus, commercial landings of this species from the New York Bight area peaked in the late 1930s - early 1940s, when landings of food finfish in this region were at their maximum during recent history. The average US reported catch of butterfish from 1964 - 1977 was 4.2 million pounds (1,914 metric tons)(Table 13). A significant but unknown amount is taken by industrial fisheries, especially in southern states (see Section VIII-2 and IX-1). About 60% on average of the yearly domestic catch has come from what is now the FCZ (Table 14). The development of the butterfish export industry in 1978 has resulted in a sharp increase in domestic landings, an increased importance of the fishery in Rhode Island, and a larger proportion of the domestic catch being taken in the FCZ (Tables 13 and 14). The development of the export fishery is discussed in Sections VIII-2 ("Rhode Island Commercial Fishery") and IX-3.

Foreign landings of butterfish were first reported in 1963, and the foreign fishery for this species, which is dominated by the Japanese, soon outgrew the US commercial fishery (Tables 1 and 16). Much of the Japanese catch of butterfish is taken in conjunction with the squid fishery (primarily for Loligo pealei, or long-finned squid). Precise data on the magnitude of the foreign catch are unavailable, since large quantities of butterfish frequently were caught but discarded by foreign vessels conducting directed fisheries for other species (see Section V-2). Most of the foreign butterfish catch has also come from the New York Bight - Southern New England area, although significant quantities have been taken on Georges Bank and in the southern reaches of the Middle Atlantic Bight. Assuming that most of the foreign butterfish catch is taken when these fleets conduct directed fisheries for squid, most of the foreign butterfish catch occurs in late fall and early winter in the Middle Atlantic Bight, when butterfish have returned to deep offshore waters at the edge of the continental shelf.

Although butterfish are known to bite on baited hooks, at present there is no recreational fishery for this species of reportable magnitude, and the impact of the sport catch on the stocks is probably negligible (see Section V-2).

Reported Commercial Landings Of Butterfish By State, 1964-1978

(Thousands Of Pounds And Thousands Of Dollars)

	ME	N H	MASS	R I	CONN	N Y	N J	DEL	MD	VA	N C	S C	TOTAL
1964	6	-	69	2671	123	1067	1187	4	33	1211	130	-	6501
	1	-	11	242	12	126	133	*	3	95	9	-	632
1965	1	-	220	1181	66	766	1181	7	164	2905	367	-	6858
	*	-	24	171	10	70	95	1	14	230	29	-	644
1966	-	-	42	1115	28	593	1475	4	131	2037	503	-	5928
	-	-	5	157	4	65	115	1	9	152	33	-	541
1967	-	-	23	1327	11	1120	1312	-	45	110	384	12	4344
	-	-	3	188	2	123	122	-	4	89	16	1	548
1968	1	-	44	958	74	974	727	-	18	698	107	-	3601
	*	-	5	146	11	150	86	-	2	70	8	-	478
1969	*	-	66	1141	68	763	1663	-	31	1112	130	-	4974
	*	-	10	191	11	110	166	-	3	85	8	-	584
1970	-	-	53	641	25	521	962	-	11	1603	133	-	3949
	-	-	10	152	6	142	120	-	1	202	11	-	644
1971	-	-	70	1098	11	353	1244	-	19	659	58	-	3512
	-	-	6	205	2	95	193	-	3	100	5	-	609
1972	1	1	120	267	3	411	492	-	5	252	88	-	1640
	*	*	23	84	1	139	93	-	1	56	7	-	404
1973	3	-	134	1304	8	668	1030	*	7	199	40	-	3393
	*	-	34	354	2	232	158	*	1	45	4	-	830
1974	-	-	163	1770	11	797	979	*	12	186	76	-	3994
	-	-	38	453	2	300	135	*	3	39	9	-	979
1975	-	-	21	1899	8	1239	856	*	22	143	127	-	4315
	-	-	5	507	2	327	157	*	5	30	10	-	1043
1976	9	-	289	1273	21	959	336	-	21	125	54	-	3087
	5	-	81	382	4	274	83	-	6	30	6	-	871
1977	1	-	56	1529	28	650	436	1	26	132	48	-	2907
	*	-	19	425	7	215	105	*	7	30	8	-	816
#1978	*	2	78	6297	48	926	482	-	22	118	111	-	8084
	*	1	21	2340	7	354	123	-	5	28	26	-	2905
Aver-age	1	*	97	1631	36	787	957	1	38	766	157	1	4472

* = less than 500 pounds or $500

= preliminary

- = zero

Table 13

Table 14. US Commercial Landings of Butterfish
by Distance Caught Offshore
(quantity in thousands of pounds, value in thousands of dollars)

	0 - 3 Miles				0 - 200 Miles			
Year	Quantity	Value	Average $/lb.	% of Total Weight	Quantity	Value	Average $/lb.	% of Total Weight
1974	1,871	488	0.26	47	2,124	491	0.23	53
1975	1,613	396	0.25	37	2,695	643	0.24	63
1976	1,544	425	0.28	50	1,530	442	0.29	50
1977	983	322	0.33	32	2,060	542	0.26	68
1978	801	256	0.32	10	7,280	2,650	0.36	90

VIII-2. Domestic Commercial And Recreational Fishing Activities

Following is a discussion of the domestic butterfish fishery in those states in which significant quantities of this species are landed. Detailed information on the contribution of butterfish by weight and value to US commercial fisheries is given by county and by fishing gear in Section IX-1.

There exists at present no sport fishery for butterfish of significant magnitude.

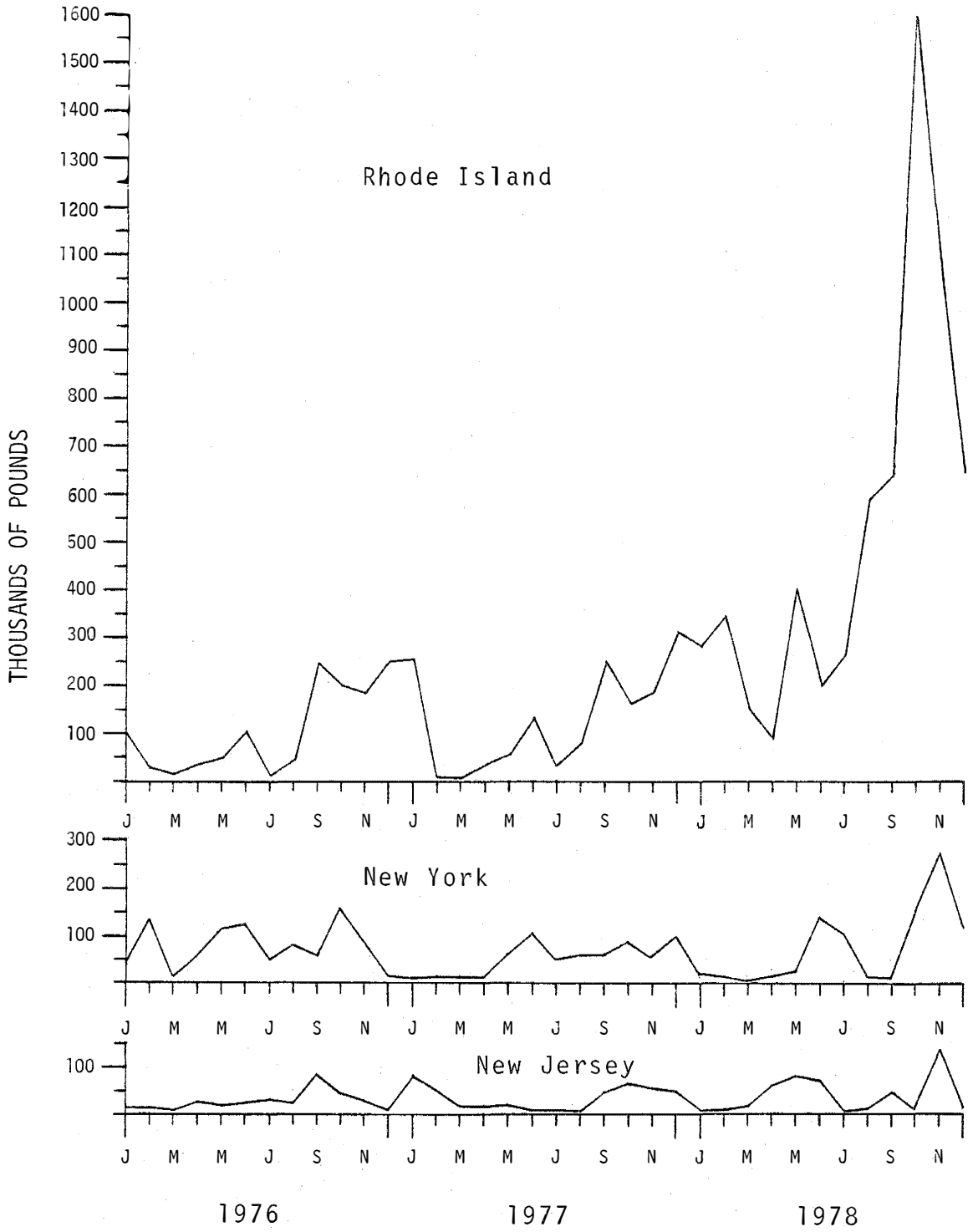
New York Commercial Fishery

From 1964 - 1978, New York commercial landings of butterfish averaged 787,000 pounds (357 metric tons). Peak landings of butterfish in New York occurred in 1939 (2,380 metric tons), the year that total State landings of food finfish and shellfish were greatest (Figure 13). The decline of butterfish landings since that date reflects the decline of the otter trawl fishery in New York. In 1978, butterfish was the ninth most important finfish, by weight landed, in New York, and the total ex-vessel value of that year's catch accounted for about four percent of the total landings and ex-vessel value of all food finfish and squid, but only about one percent of the total dockside value from all species in New York. In 1978, the New York butterfish catch represented approximately 11% and 12% of the total national catch of this species, in terms of pounds and ex-vessel value, respectively.

Almost all the butterfish landed in New York is sold for food, but some is used for bait. In 1977, pound nets accounted for approximately 23% of the total State catch, and otter trawls for the remainder. In recent years, 90% or more of the catch has been landed in Suffolk County. In 1977 in that county, butterfish contributed five percent of otter trawl landings and ex-vessel value, and six per cent and eight per cent of landings and revenues from pound nets, respectively.

Most butterfish landings in New York occur in late spring and early summer, although significant quantities are landed year-round. The pound net fishery takes its largest quantities during the warm months, when butterfish move inshore and north. A secondary peak in landings usually occurs in mid-autumn. This cycle is similar to, and may result from, the seasonal pattern of total finfish landings in this State. An increase in late fall - early winter landings of this species, while it would require increased effort by offshore trawlers, could significantly add to overall ex-vessel fishery income during these months, when New York fishery revenues are usually at a yearly minimum.

Figure 12



Reported Commercial Butterfish Landings In Rhode Island, New York, And New Jersey By Month, 1976-1978

The average ex-vessel price per pound in 1978 for butterfish in New York was about $0.38, but monthly average price varied from $0.25 per pound (in early summer) to $0.52 per pound (in autumn). These prices, however, reflect only the average paid for all butterfish. Pound net-caught butterfish frequently bring higher prices than those taken by trawls, as the fish are usually in better condition and reach the markets sooner after capture. For different sizes and qualities, also, butterfish prices may vary significantly. "Jumbo" butterfish, usually available only in the autumn, brought $1.20 per pound at Fulton Fish Market in November, 1978. These are the butterfish which are utilized by smokehouses in New York City and which are usually preferred by most wholesale buyers. During autumn, demand for these fish frequently exceeds supply. Small butterfish, however, often are almost valueless or are utilized mainly as bait.

New Jersey Commercial Fishery

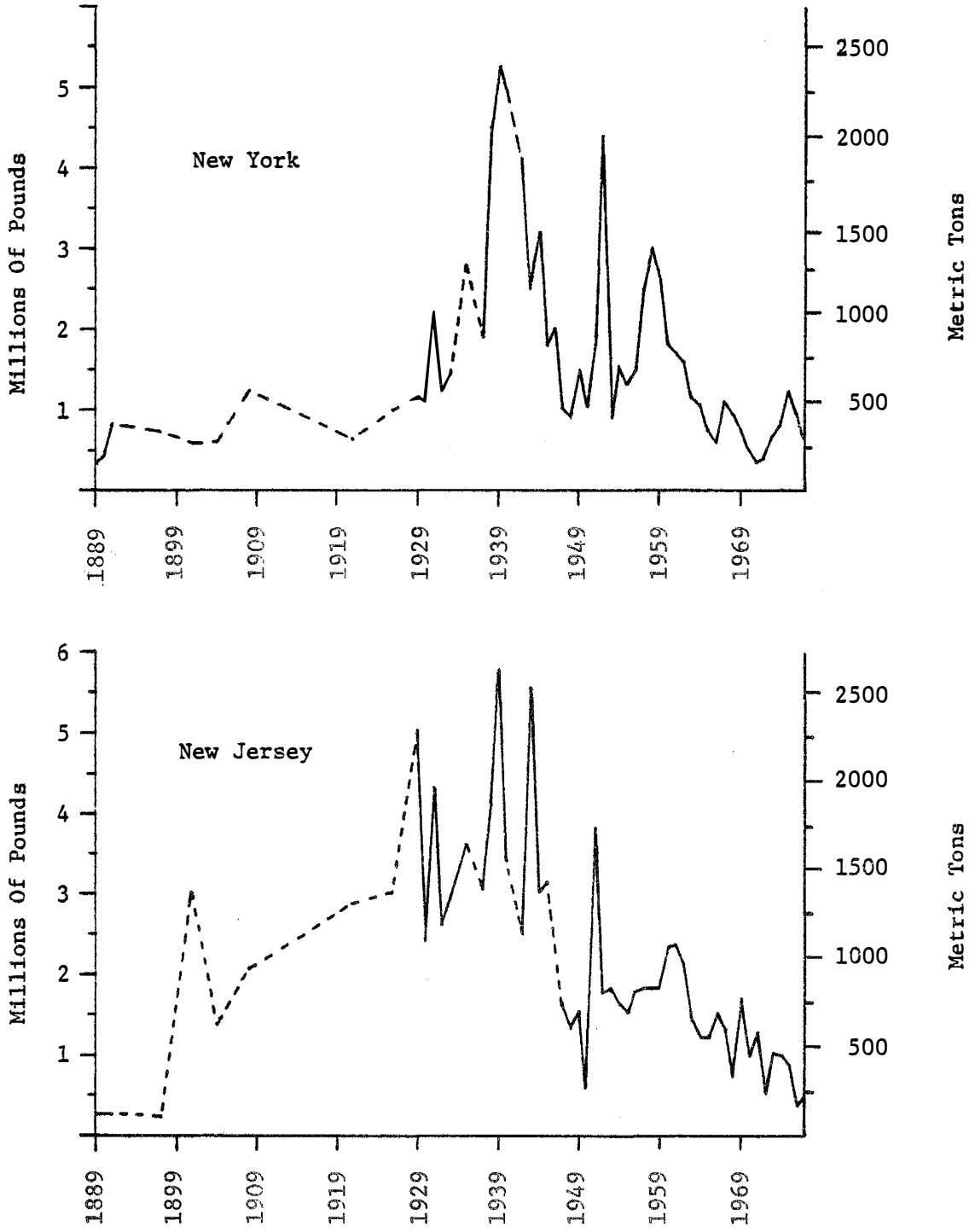
Commercial landings of butterfish in New Jersey in 1978 were 482,000 pounds, worth $123,000, accounting for six percent of total US commercial landings of this species, but representing about half of the average State catch of butterfish since 1964 (Table 13). The 1978 butterfish catch contributed approximately 0.6% of the weight and 0.3% of the ex-vessel value of total New Jersey food finfish and shellfish landings in that year.

Most of the State butterfish catch is landed in Cape May and Ocean Counties, where the 1978 butterfish catch accounted for about 1.3% and 1.2%, and 1.0% and 0.9% by weight and ex-vessel value of finfish and squid landings in those counties, respectively.

Over 90% of the 1977 New Jersey butterfish catch was trawl-caught; the remainder was taken mainly by pound nets. The average price for trawl-caught butterfish in 1977 in New Jersey was about $0.24 per pound, while the average price for those taken by pound nets and other gear was about $0.28 per pound. The reason for this discrepancy is probably the same as that discussed for the pound net industry in New York.

Butterfish accounted for less than two percent of total New Jersey food finfish and squid landings and ex-vessel value in 1978. The New Jersey food finfish fishery is supported mainly by flounders (especially summer flounder) which provided about 30% of the ex-vessel revenues of this fishery sector that year. It is probable that much of the New Jersey butterfish catch is taken as a by-catch to the flounder fishery, since landings of flounders and butterfish tend to peak in the same seasons. In general, the New Jersey food finfish fishery relies heavily on those species which are also subject to intense recreational fishing pressure, e.g., summer flounder, bluefish, weakfish, black sea bass, and scup. In 1978, the ex-vessel price per pound for butterfish did not rank it among the top ten species ordered by the same criterion. Thus, while butterfish may occasionally contribute significantly in some months to a few ports or to a specific fishing gear, the value of this species to New Jersey fishermen is almost entirely as added income from an incidental fishery.

Figure 13



Reported Commercial Landings Of Butterfish In New York And New Jersey

1889 - 1977

Rhode Island Commercial Fishery

More butterfish has been reported landed in Rhode Island than in any other State since 1973. Rhode Island landings averaged 30% of the reported national catch of this species from 1964 - 1977, and in 1977 provided about half of the US commercial catch (Table 13). This dominance was increased in 1978, when Rhode Island landings, in response to the development that year of foreign markets for this species, reached almost 6.3 million pounds (2,856 mt) and accounted for 78% of reported US butterfish landings. This 1978 catch was over five times greater than average State butterfish landings in the previous decade and represented the largest Rhode Island landings of this species on record (Figure 14).

The food finfish (including squid) fishery of Rhode Island traditionally has concentrated on a few species, mainly flounders (41% and 29% by weight of this category in 1977 and 1978, respectively) and other groundfish such as cod, haddock, and silver hake (24% and 26% in 1977 and 1978). Rhode Island butterfish landings from 1968 - 1977 averaged only 3% by weight of annual Stae food finfish landings, but in 1978 this contribution increased to 13%. In 1978, landings of large butterfish (the preferred size for the domestic and foreign markets) ranked fourth by weight and fourth by ex-vessel price per pound (after summer and yellowtail flounders and squid) among those species which contributed significantly (1% or greater by weight) to State landings of food finfish.

Most of the butterfish catch in Rhode Island is taken by otter trawls, the remainder by floating traps (about 10% in 1977). Three-quarters or more of the catch is taken in the FCZ, almost entirely by trawls. Almost all of the butterfish taken by floating traps is caught in Rhode Island Sound, within State waters. The increased trawling effort for butterfish in 1978 was expended almost completely within the FCZ.

Butterfish landings in Rhode Island are reported by various market sizes (see Table 24). Large butterfish and those taken by floating traps (which are usually reported as "unclassified") are the most highly valued on the market, the latter because the fish are usually in prime condition In 1977, the average prices per pound paid to fishermen for large, medium, small, and unclassified butterfish were $0.34, $0.19, $0.11, and $0.40, respectively. In 1978, despite the dramatic increase in landings, the average ex-vessel prices for these categories were $0.39, $0.21, $0.18, and $0.41, respectively (Table 24). The effect of the development of the export market is most obvious in landings of large butterfish, which not only accounted for almost all of the increase in overall landings, but also reflected a significant increase in ex-vessel price over 1977.

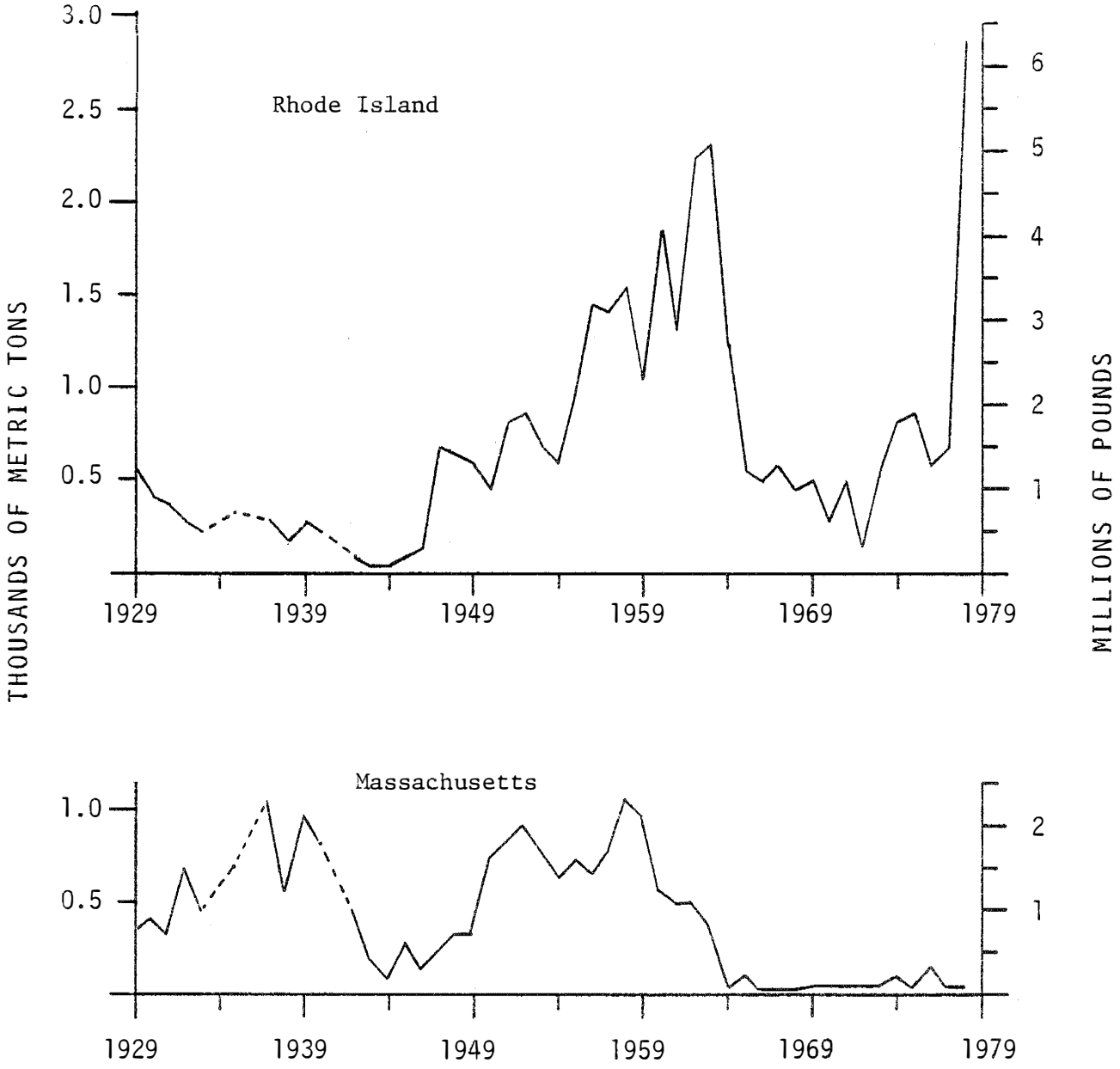
Rhode Island landings of large butterfish usually peak from early autumn through early winter (Figure 12). Butterfish catches by floating traps usually are greatest in early summer, coinciding with the months of greatest butterfish landings by pound nets in New York and New Jersey. Landings of food finfish in Rhode Island usually are at a maximum in late spring. The value of butterfish to the Rhode Island food finfish industry is, therefore, far greater seasonally than on a yearly basis. In 1977, butterfish accounted for about seven percent of ex-vessel revenue from food finfish for the last quarter of the year. From October - December, 1978, ex-vessel revenue from butterfish represented about 34% of total Sate ex-vessel revenues from food finfish (43% in October, 1978) (Figure 15).

At least 90% of the butterfish landed at Pt. Judith, the center of the Rhode Island butterfish industry, is being exported, mainly to Japan. Exported butterfish from this port resulted in approximately $2 million to these fishermen in 1978. Another result of the development of the export market in 1978 was that the wholesale price

of frozen butterfish exceeded that for fresh butterfish for the first time in history (Pt. Judith Fishermen's Cooperative, personal communication).

Based on the rapid development of this fishery in Rhode Island, total US landings of butterfish in 1978 exceeded 3,600 metric tons. If a similar rate of growth for this fishery is maintained, as is predicted by the industry, then total US landings of butterfish in 1979 should reach 7,000 metric tons. It is impossible at present to predict the level of butterfish exports in 1979 because (1) butterfish exports are not determined by contracts set many months in advance of actual production but are negotiated on a short-term (immediate shipment) basis, and (2) the height of the trawl fishery for butterfish occurs in the autumn. It is clear that the main determinant of how rapidly the Rhode Island butterfish fishery develops will be the strength of foreign markets. Butterfish and squid, the harvests of which can readily be coordinated, offer the best prospects for expansion and diversification of fishing effort in this State, in terms of ex-vessel price, processing technology, and abundance and availability (both on traditional fishing grounds and with conventional fishing gear). The species which at present support the Rhode Island commercial food finfish fishery (groundfish and flounders) are in many cases overfished, under quota management, and/or have a lower ex-vessel price.

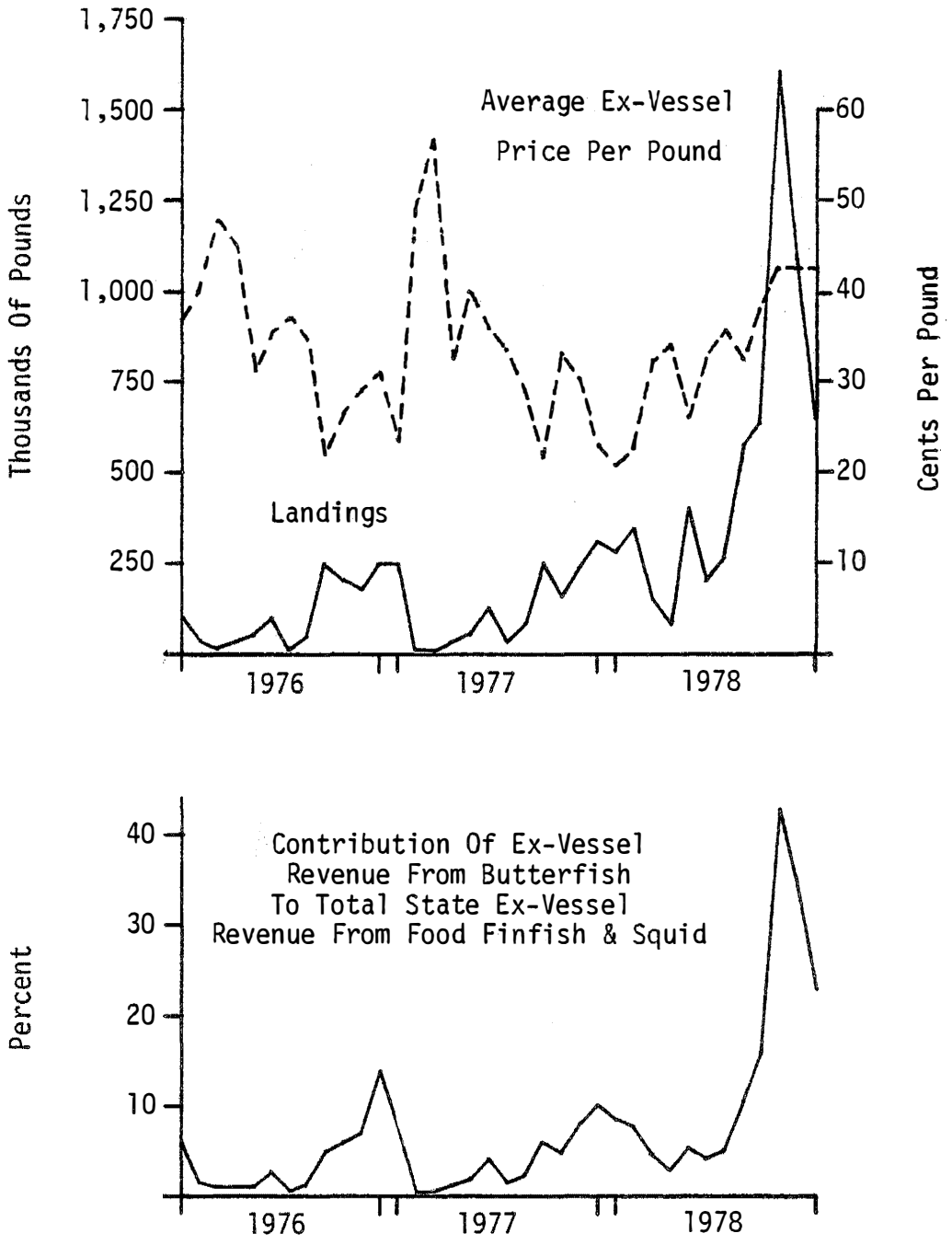
The development of this fishery in Rhode Island directly and indirectly benefits the fishery and related industries in other states. A significant fraction of the Rhode Island catch is processed and shipped to the overseas market through processors in other states. Export of most of the Rhode Island catch permits a stable market for butterfish in ports in other states which do not have the processing and handling facilities to enter the export market.



Reported Commercial Landings Of Butterfish
In Rhode Island And Massachusetts, 1929-1978

(Dashed Lines Indicate Missing Data Years)

Figure 14



Rhode Island Butterfish Fishery:

Average Ex-Vessel Price Per Pound (All Size Categories), Landings, And Percentage Of Total State Ex-Vessel Revenue From Food Finfish And Squid Attributable To Butterfish Landings, By Month, 1976 - 1978

Figure 15

Virginia Commercial Fishery

From 1964 - 1978, reported commercial landings of butterfish in Virginia averaged 766,000 pounds (347 metric tons), or about 17% of the total US reported butterfish catch on average during that period (Table 13). The 1978 reported Virginia catch, approximately 118,000 pounds, worth $28,000, represented about 1.5% and 1.0% of the national catch, by weight and ex-vessel value, respectively.

A significant fraction (in 1978, about 30%) of the State butterfish landings came from the Chesapeake Bay. In 1978, about 70% of the catch came from offshore ocean waters (i.e., the FCZ). Over half the butterfish reported landed in Virginia in 1977 was taken by pound nets. Otter trawls accounted for about one-third of the total catch, and gill nets for most of the remainder.

The average ex-vessel price per pound for butterfish varies relatively little by season or by method of capture in Virginia, in contrast to other states. The average ex-vessel price per pound for butterfish in 1978 in Virginia was about $0.24, ranking this species 8th among other food finfish species (with significant landings). Butterfish, however, are no longer an important component of the State's food finfish landings. In 1978, this species accounted for only 0.3% and 0.3% of the Virginia food finfish and squid catch, by weight and ex-vessel value, respectively. In no month of that year did butterfish account for more than approximately 2% of the State's ex-vessel revenues from this fishery sector. The contribution of this species to Virginia commercial fisheries by county and by fishing gear is given in Table 21.

Butterfish were historically an important component of the State's industrial ("scrap fish") fishery by pound nets. From the late 1930s through at least the late 1950s, large quantities of butterfish were taken by the pound net fishery for menhaden (McHugh, 1960; J. Zaborski, Virginia Sea Grant, personal communication). McHugh (1960) noted that butterfish "was the most important food fish in York River scrap in 1954, 1955, and 1958," and "almost two-thirds by number and one-half by weight of all butterfish caught in the York River fishery in 1958 were sold as scrap." It is estimated that during the 1930s, as much as 30% of the scrap fish catch by pound nets (other than menhaden) was composed of butterfish (J. Zaborski, personal communication).

Almost all butterfish sold as scrap in Virginia was recorded as "menhaden" during this period (W. Kelly, NMFS, personal communication). These fish were mainly young butterfish, unsuitable of marketing for human consumption because of their small size (McHugh, 1960). It is quite possible that the total weight of butterfish caught by this industrial fishery frequently was far greater than the reported (for human food) catch during this period. The total number of butterfish sold as scrap, however, probably always exceeded the numbers sold for human food. In recent years, the relatively high price of butterfish has resulted in almost complete culling of this species from scrap fish pound net catches. It is probably that the total weight of butterfish used industrially is significantly less than the reported State catch (J. Zaborski, personal communication). The industrial catch may still be a significant source of mortality, however, because it is composed of high numbers of juvenile and undersized fish.

North Carolina Commercial Fishery

Reported landings of butterfish (taken by the foodfish fishery) in North Carolina have only averaged 157,000 pounds per year from 1964 - 1978, or less than four percent of the national catch on average over the same period. North Carolina

reported yearly landings of butterfish have not attained that average level since 1967, and the 1978 State reported catch accounted for less than two percent of US commercial butterfish landings that year (Table 13).

Large but unreported quantities of butterfish, however, have been taken by North Carolina trash fish and shrimp fisheries during the same time. Fahy (1966) and Brown and McCoy (1969) estimated that the following amounts of butterfish were caught and landed by the largely inshore scrap fish fishery from 1964 to 1971 (Table 15). The average size of these by-catch butterfish indicates that these fish were almost entirely young-of-the-year. The shrimp fishery, which operates mainly in Pamlico sound, was estimated by Wolff (1972) to catch about 50 million pounds of finfish incidentally during 1969 - 1971 which was not landed but discarded at sea. Wolff (1972) estimated that during those years, 1.3% of this by-catch was butterfish, or about 650,000 pounds per year. It is reasonable to assume that most of this butterfish by-catch was returned to the sea dead. By-catch estimates from the shrimp fishery during previous or subsequent years are not available.

The scrap fishery of North Carolina has declined significantly in the 1970s, due mainly to a diversion of these vessels to other more lucrative fisheries and fishing areas. In addition, butterfish have largely disappeared from these inshore waters and catches in recent years. Wolff (personal communication) estimates that at present only negligible amounts of butterfish are taken in this fishery.

If the above incidental catches of butterfish in North Carolina are added to the State reported catches, the total US catch and the portion of the total catch taken in this State increase significantly (e.g., to 16% in 1964). Although it is probable that unreported butterfish catches in this State have declined drastically in recent years, a revival of the scrap fishery and/or changes in abundance or distribution of butterfish could result in a renewed and large-scale source of mortality to this species.

Table 15. North Carolina Reported and Unreported (Estimated) Catches of Butterfish, 1964 - 1971 (thousands of pounds)

Year	Reported Catch	Industrially Caught Butterfish	Butterfish By-catch from Shrimp Fishery
1964	130	1,086	unknown
1965	367	785	unknown
1966	503	528	unknown
1967	384	555	unknown
1968	107	466	unknown
1969	130	86	650
1970	133	121	650
1971	58	194	650

VIII-3. Foreign Fishing Activities

Foreign catches of butterfish were first reported in the ICNAF area (Figure 1) in 1963 by the Soviet Union, which was the only foreign nation to report landings of this species until 1967. These catches came mainly from Georges Bank and ICNAF Subarea 4, although some was taken in Statistical Area 6. Other nations did not begin reporting butterfish catches until 1967-1968, when Japan began taking butterfish, mainly from the Middle Atlantic Bight (Statistical Area 6). Catches by vessels from Bulgaria, the GDR, Poland, Romania, and Ireland were first reported in

1969, 1972, 1973, 1973, and 1975, respectively (Table 16). Although it was never officially reported, it is known that significant quantities of this species were also caught but discarded at sea by Spanish vessels. Reported and probable total foreign catches of butterfish in the ICNAF area are discussed in Section V-2 (see also Section VII-3 and Figure 16).

Most reported foreign catches of butterfish in what is now the FCZ have come from the Southern New England - Middle Atlantic Bight. In 1973, the year of peak foreign catches, approximately half the total foreign butterfish catch came from Subdivision 6A, which encompasses New York Bight. Compared to landings of other species, the foreign fishery for butterfish has been relatively small. Undoubtedly a large fraction of this catch has been taken incidentally to directed fisheries for other pelagic species, especially mackerel, herring, and squid. Since 1970, the largest harvester (including the US) of butterfish has been Japan. In 1973, the peak year of Japanese butterfish landings, this species accounted for 37% of Japan's catch of all species from what is now the FCZ. The contribution of butterfish to total landings by other major foreign fishing nations has been much smaller (about 2% for the USSR in 1969, the year of peak Soviet butterfish landings).

ICNAF Statistical Bulletins do not record foreign catches of butterfish by month by fishing area. Catches of Loligo pealei (long-finned squid), however, are available on that basis. Since the Japanese fishery for butterfish is conducted mostly in conjunction with its fishery for squid, it can be deduced from these records that most Japanese catches of butterfish occur from late autumn to late winter in the Middle Atlantic Bight, when butterfish are offshore and in deep water at the edge of the continental shelf. This is also usually the season of minimum domestic commercial landings of this species.

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

Until enactment of the FCMA, the foreign fishery for butterfish was largely confined to those cold weather months when US catches of this species traditionally were at a minimum, when butterfish are offshore in deep water and less accessible to US fishermen (Section VIII-3). Historically, there was a US fishery in this area also. Since 1977, foreign fishing for butterfish has been controlled by regulations pursuant to a Preliminary Management Plan and amendments thereto, prepared by the NMFS under the FCMA. These regulations should minimize of conflict between US and foreign competition for this species. Since much of the foreign butterfish catch has occurred as a by-catch from other fisheries, the reduction in foreign TALFFs for major pelagic species should also serve to control by-catch of this species.

Reported Catches Of Butterfish In ICNAF Subareas 4-5 And Statistical Area 6, 1963-1976

(Metric Tons)

Year	Country	Subarea 4	Division 5Y	Subdivision 5Ze #	Subdivision 5Zw #	Subarea 5NK*	Division 6A	Division 6B	Division 6C	Subarea 6NK*	Total
1976	USSR	73	-	154	106	-	20	67	-	-	420
	Bulgaria	-	-	4	-	-	-	-	-	-	4
	Japan	-	-	1,405	5,391	-	929	116	26	-	7,867
	Poland	-	-	664	392	-	140	322	-	-	1,518
	Romania	-	-	35	27	-	-	-	-	-	62
	Ireland	-	-	64	211	-	191	13	-	-	479
	USA	-	15	48	711	-	568	169	17	-	1,528
	GDR	-	-	3	-	-	-	-	-	-	3
1975	USSR	119	-	411	187	-	56	13	3	-	789
	Bulgaria	-	-	128	4	-	166	-	-	-	289
	GDR	-	-	1	-	-	-	-	-	-	1
	Japan	-	-	110	854	-	1,916	645	99	-	3,624
	Poland	-	-	871	809	-	1,136	889	49	-	3,754
	USA	-	2	8	869	-	850	339	20	-	2,088
	Ireland	-	-	13	174	-	230	192	3	-	612
1974	Japan	3	2	1,202	2,596	-	1,403	207	44	-	5,457
	Poland	-	47	1,365	88	-	1,061	947	-	-	3,508
	USSR	-	-	439	508	-	320	104	1	-	1,372
	USA	-	3	18	1,432	-	637	417	8	13	2,528
1973	Bulgaria	-	-	82	124	-	18	15	-	-	239
	GDR	-	-	-	190	-	-	6	-	-	196
	Japan	-	-	610	1,680	-	7,773	1,997	112	-	12,172
	Poland	-	81	2,354	155	-	214	-	-	-	2,804
	Romania	-	-	30	26	-	16	80	-	-	152
	USSR	-	-	500	852	-	929	47	6	-	2,334
	USA	-	1	5	508	-	171	-	-	872	1,557
1972	Japan	14	-	1,107	289	-	1,198	989	78	-	3,675
	Bulgaria	-	-	45	53	-	18	-	-	-	114
	USSR	-	83	158	214	-	1,160	246	7	-	1,848
	GDR	-	-	10	-	-	10	14	-	-	34
	USA	-	24	2	97	-	102	-	-	594	819
1971	Japan	3	-	550	423	-	1,215	3,075	505	-	5,771
	USSR	-	-	61	232	107	72	14	-	-	486
	Bulgaria	-	-	1	-	-	9	16	-	-	26
	USA	-	24	8	387	-	103	-	-	1,048	1,570
1970	Japan	-	-	846	877	-	2,142	3,680	1,076	-	8,621
	USSR	3	-	70	326	-	8	-	-	-	407
	USA	-	20	17	354	-	25	-	-	1,453	1,869
1969	USSR	15	-	702	8,777	-	183	749	681	-	11,107
	USA	-	33	74	637	-	60	-	-	1,634	2,433
	Bulgaria	-	-	-	36	-	-	-	-	-	36
	Japan	-	-	1,087	833	-	1,096	912	2	-	3,930
1968	USSR	-	-	648	948	-	-	-	-	315	1,911
	USA	-	37	27	611	-	10	-	-	1,119	1,804
	Japan	-	-	284	44	-	1,024	2,174	-	-	3,526
1967	USSR	-	-	1,406		-	-	-	-	764	2,170
	USA	-	44	751		-	-	-	-	1,657	2,452
	Japan	-	-	-	1	-	30	114	1	-	146
1966	USSR	-	-	3,865		-	-	-	-	-	3,865
	USA	-	52	553		-	-	-	-	2,615	3,220
1965	USSR	-	-	732		-	-	-	-	17	749
	USA	-	37	1,025		-	-	-	-	2,278	3,340
1964	USSR	263	-	169		-	-	-	-	316	748
	USA	-	27	946		-	-	-	-	1,588	2,561
1963	USSR	285	110	1,779		-	-	-	-	111	2,285
	USA	-	74	2,464		166	-	-	-	1,809	4,515

* "NK" = not known

\# Catches before 1968 were reported from "Division 5Z"

Table 16

The US butterfish market is limited, and the development of export markets, which began in 1978, represents a distinct opportunity for expanding the US butterfish industry. Large foreign catches of this species in the past may have hindered the development of such an export market. Fishermen have indicated that activity of large foreign trawlers in areas of butterfish concentration may adversely influence the development of an offshore butterfish fishery by smaller US vessels because of perceived foreign dominance of the limited space because of size and number of vessels.

IX. DESCRIPTION OF ECONOMIC CHARACTERISTICS OF THE FISHERY

IX-1. Domestic Harvesting Sector

Historical records of butterfish landings are available for the States of Maine through Virginia. These records indicate that butterfish has been an important component of the foodfish fisheries of this region since at least the 1930s. The ex-vessel values of this fishery in each of these States are given in Table 13 in Section VIII.

Those New England ports at which butterfish was recorded landed in 1977 are listed in Table 17. The most important New England port for butterfish traditionally has been Pt. Judith, Rhode Island. Total landings and ex-vessel value of butterfish at this port exceeded the combined similar total for all other New England ports in 1977. Although butterfish contributed less than one percent of total landings and ex-vessel revenue in other New England ports that year, this species accounted for just under three precent of total Pt. Judith food finfish and squid landings and revenues in 1977. Further information on the characteristics of this fishery in Rhode Island are given in Section VIII-2.

The total ex-vessel value of the New England (Maine - Connecticut) butterfish catch in 1977 (the latest year for which complete New England data are available) was $451,000, or about 0.2% of the total New England ex-vessel revenue from all species, and 0.5% of the ex-vessel revenue from food finfish and squid. The aggregate value of this butterfish catch, however, which includes the economic impact of this catch upon other fishery industries and related activities, probably was well in excess of one million dollars.

The Middle Atlantic (New York - Virginia) butterfish catch in 1977, 1.25 million pounds worth $357,000, accounted for about 1.5% of the regional ex-vessel revenue from food finfish and squid and 1.3% of the total landings of food finfish and squid by weight. In almost all counties in the Middle Atlantic states where butterfish are landed, the relative contribution of this species to the finfish and squid fisheries is greater in terms of ex-vessel value than it is in terms of weight landed.

Table 17. 1977 Contribution of butterfish Landings to Total New England Port Landings, by Weight (in metric tons)

Port and State	Butterfish	Total Finfish and Squid	Butterfish % of Total Finfish & Squid	Total All Species	Butterfish % of All Species
Portland, Maine	0.4	14,493.1	<0.1	14,572.0	<0.1
Gloucester, Mass.	0.1	67,463.0	<0.1	67,911.3	<0.1
Chatham, Mass.	10.7	1,493.3	0.7	3,764.9	0.3
New Bedford, Mass.	1.7	28,462.7	<0.1	75,768.0	<0.1
Plymouth, Mass.	0.5	1,141.7	<0.1	1,472.5	<0.1
Provincetown, Mass.	1.3	8,214.0	<0.1	12,925.2	<0.1
Sandwich, Mass.	1.2	6,907.9	<0.1	9,518.4	<0.1
Newport, R. I.	76.2	7,420.5	1.0	8,685.0	0.9
Pt. Judith, R. I.	549.6	19,268.1	2.9	19,717.6	2.8

Tables 18 - 21 show the contribution of butterfish to all counties in the Middle Atlantic states with recorded butterfish landings in 1976. These tables also show the value of the 1976 butterfish catch to each fishing gear industry within each county. Overall, butterfish provided approximately 3% and 4% of the ex-vessel revenues from otter trawls and pound nets, respectively, in these counties in 1976. In single counties to specific fishing gears, however, butterfish frequently was more valuable. For example, the 1976 butterfish catch provided almost 7% and 12% of the otter trawl and pound net income, respectively, in Suffolk County, New York (Table 18).

Table 18

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

Kings County

	Pounds	Dollars	Average $/Pound	Butterfish Contribution (%) Pounds	Butterfish Contribution (%) Dollars
Butterfish Landings:					
Fish Otter Trawls	82,800	24,365	0.29		
County Landings:					
All Species	2,449,100	532,114		3.4	4.6
Finfish & Squid	2,293,400	464,554		3.6	5.2
Fish Otter Trawls	2,027,100	332,283		4.1	7.3

Nassau County

	Pounds	Dollars	Average $/Pound	Butterfish Contribution (%) Pounds	Butterfish Contribution (%) Dollars
Butterfish Landings:					
Fish Otter Trawls	38,500	11,475	0.30		
County Landings:					
All Species	4,871,100	2,539,856		0.8	0.5
Finfish & Squid	1,029,700	265,686		3.7	4.3
Fish Otter Trawls	947,300	238,390		4.1	4.8

Suffolk County

	Pounds	Dollars	Average $/Pound	Butterfish Contribution (%) Pounds	Butterfish Contribution (%) Dollars
Butterfish Landings:					
Haul Seines	5,300	1,589	0.30		
Fish Otter Trawls	622,300	181,062	0.29		
Fish Pound Nets	207,200	54,572	0.26		
Anchor/Set/Stake Gill Nets	3,300	891	0.27		
Total	838,100	238,114	0.28		
County Landings:					
All Species	26,310,100	28,239,286		3.2	0.8
Finfish & Squid	14,311,200	3,875,452		5.9	6.1
Haul Seines	760,600	208,353		0.7	0.8
Fish Otter Trawls	9,176,400	2,776,050		6.8	6.5
Fish Pound Nets	2,418,700	469,048		8.6	11.6
Anchor/Set/Stake Gill Nets	803,800	97,932		0.4	0.9

Table 19

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

Atlantic County

	Pounds	Dollars	Average $/Pound
Butterfish Landings			
Fish Otter Trawls	7,500	2,436	0.32
Scallop Otter Trawls	100	23	0.23
Total	7,600	2,459	0.32

			Butterfish Contribution (%)	
			Pounds	Dollars
County Landings:				
All Species	13,048,200	5,670,261	<0.1	<0.1
Finfish & Squid	1,147,700	511,385	0.7	0.5
Fish Otter Trawls	734,000	234,772	1.0	1.0
Scallop Otter Trawls	21,000	29,286	0.5	<0.1

Cape May County

	Pounds	Dollars	Average $/Pound
Butterfish Landings:			
Fish Otter Trawls	186,900	41,603	0.22
Mid-Water Trawls	52,400	11,965	0.23
Runaround Gill Nets	100	13	0.13
Total	239,400	53,581	0.22

			Butterfish Contribution (%)	
			Pounds	Dollars
County Landings:				
All Species	39,896,700	14,961,938	0.6	0.4
Finfish & Squid	22,508,300	4,373,150	1.1	1.2
Fish Otter Trawls	15,150,100	3,234,789	1.2	1.3
Mid-Water Trawls	4,525,300	331,463	1.2	3.6
Runaround Gill Nets	51,100	6,687	0.2	0.2

Monmouth County

	Pounds	Dollars	Average $/Pound
Butterfish Landings:			
Fish Otter Trawls	3,900	1,395	0.36
Fish Pound Nets	45,800	12,195	0.27
Total	49,700	13,590	0.27

			Butterfish Contribution (%)	
			Pounds	Dollars
County Landings:				
All Species	154,644,700	5,411,170	<0.1	0.2
Finfish & Squid	153,916,789	4,840,930	<0.1	0.3
*Food Finfish & Squid	3,833,322	553,603	1.3	2.5
Fish Otter Trawls	3,000,800	350,394	0.1	0.4
Fish Pound Nets	3,007,900	242,994	1.5	5.0

Ocean County

	Pounds	Dollars	Average $/Pound
Butterfish Landings:			
Fish Otter Trawls	36,400	12,563	0.35
Lobster Otter Trawls	2,100	240	0.11
Runaround Gill Nets	100	41	0.41
Total	38,600	12,844	0.33

			Butterfish Contribution (%)	
			Pounds	Dollars
County Landings:				
All Species	15,459,500	6,479,155	0.2	0.2
Finfish & Squid	10,897,664	2,577,855	0.4	0.5
Fish Otter Trawls	8,510,800	1,703,668	0.4	0.7
Lobster Otter Trawls	191,600	276,847	1.1	<0.1
Runaround Gill Nets	497,200	81,738	<0.1	<0.1

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

< = less than

Contribution Of 1976 Butterfish Landings To Maryland Counties And Fishing Gears

Dorchester County

	Pounds	Dollars	Average $/Pound
Butterfish Landings:			
Anchor/Set/Stake Gill Nets	100	38	0.38

			Butterfish Contribution (%)	
			Pounds	Dollars
County Landings:				
All Species	12,158,300	5,195,529	<0.1	<0.1
Finfish & Squid	3,372,600	504,157	<0.1	<0.1
Anchor/Set/Stake Gill Nets	151,100	57,167	<0.1	<0.1

Kent County

	Pounds	Dollars	Average $/Pound
Butterfish Landings:			
Anchor/Set/Stake Gill Nets	100	44	0.44

			Butterfish Contribution (%)	
			Pounds	Dollars
County Landings:				
All Species	2,409,300	849,215	<0.1	<0.1
Finfish & Squid	1,095,900	365,154	<0.1	<0.1
Anchor/Set/Stake Gill Nets	674,300	278,568	<0.1	<0.1

Worcester County

	Pounds	Dollars	Average $/Pound
Butterfish Landings:			
Fish Otter Trawls	20,400	5,488	0.27
Anchor/Set/Stake Gill Nets	100	17	0.17
Total	20,500	5,505	0.27

			Butterfish Contribution (%)	
			Pounds	Dollars
County Landings:				
All Species	11,378,500	5,446,980	0.2	0.1
Finfish & Squid	2,998,300	576,537	0.7	1.0
Fish Otter Trawls	2,706,500	495,170	0.8	1.1
Anchor/Set/Stake Gill Nets	24,900	2,851	0.4	0.6

Table 20

Contribution Of 1976 Butterfish Landings To Virginia Counties And Fishing Gears

Accomack County

	Pounds	Dollars	Average $/Pound
Butterfish Landings:			
Fish Otter Trawls	2,100	595	0.28
Drift Gill Nets	3,800	1,031	0.27
Total	5,900	1,626	0.28

			Butterfish Contribution (%)	
			Pounds	Dollars
County Landings:				
All Species	9,437,000	3,574,945	<0.1	<0.1
Finfish & Squid	2,893,700	645,860	0.2	0.3
Fish Otter Trawls	796,800	281,391	0.3	0.2
Drift Gill Nets	1,723,800	265,139	0.2	0.4

City Of Norfolk

	Pounds	Dollars	Average $/Pound
Butterfish Landings:			
Fish Otter Trawls	2,900	726	0.25
Fish Pound Nets	31,700	7,216	0.23
Total	34,600	7,942	0.23

			Butterfish Contribution (%)	
			Pounds	Dollars
County Landings:				
All Species	3,337,300	1,171,362	1.0	0.7
Finfish & Squid	2,703,500	261,800	1.3	3.0
Fish Otter Trawls	1,303,300	310,489	0.2	0.2
Fish Pound Nets	1,346,700	107,980	2.4	2.3

City Of Hampton

	Pounds	Dollars	Average $/Pound
Butterfish Landings:			
Fish Otter Trawls	8,900	2,045	0.23
Fish Pound Nets	2,500	537	0.21
Anchor/Set/Stake Gill Nets	1,400	303	0.22
Hand Lines	100	21	0.21
Total	12,900	2,906	0.23

			Butterfish Contribution (%)	
			Pounds	Dollars
County Landings:				
All Species	9,382,800	5,618,549	0.1	<0.1
Finfish & Squid	4,343,300	1,025,604	0.3	0.3
Fish Otter Trawls	3,471,900	926,508	0.3	0.2
Fish Pound Nets	522,100	42,022	0.5	1.3
Anchor/Set/Stake Gill Nets	150,600	18,274	0.9	1.7
Hand Lines	27,200	3,914	0.4	0.5

Table 21

Contribution Of 1976 Butterfish Landings To Virginia Counties And Fishing Gears

(continued)

Northampton County

	Pounds	Dollars	Average $/Pound	Butterfish Contribution (%) Pounds	Butterfish Contribution (%) Dollars
Butterfish Landings:					
Fish Pound Nets	300	71	0.24		
County Landings:					
All Species	20,339,700	8,513,620		<0.1	<0.1
Finfish & Squid	2,951,000	265,633		<0.1	<0.1
Fish Pound Nets	2,326,200	226,847		<0.1	<0.1

City Of Virginia Beach

	Pounds	Dollars	Average $/Pound	Butterfish Contribution (%) Pounds	Butterfish Contribution (%) Dollars
Butterfish Landings:					
Haul Seines	1,600	409	0.26		
Fish Pound Nets	7,600	1,845	0.24		
Anchor/Set/Stake Gill Nets	300	67	0.22		
Drift Gill Nets	1,000	250	0.25		
Total	10,500	2,571	0.24		
County Landings:					
All Species	1,792,100	367,719		0.6	0.7
Finfish & Squid	1,374,300	198,299		0.8	1.3
Haul Seines	487,200	77,582		0.3	0.5
Fish Pound Nets	525,800	56,367		1.4	3.3
Anchor/Set/Stake Gill Nets	260,000	42,586		0.1	0.2
Drift Gill Nets	73,700	12,175		1.4	2.1

York County

	Pounds	Dollars	Average $/Pound	Butterfish Contribution (%) Pounds	Butterfish Contribution (%) Dollars
Butterfish Landings:					
Haul Seines	800	174	0.22		
Fish Pound Nets	6,100	1,353	0.22		
Anchor/Set/Stake Gill Nets	1,400	306	0.22		
Total	8,300	1,833	0.22		
County Landings:					
All Species	3,185,500	762,965		0.3	0.2
Finfish & Squid	1,540,200	176,718		0.5	1.0
Haul Seines	793,300	105,216		0.1	0.2
Fish Pound Nets	533,000	44,945		1.1	3.0
Anchor/Set/Stake Gill Nets	180,800	21,561		0.8	1.4

Table 21

(continued)

Contribution Of 1976 Butterfish Landings To Virginia Counties And Fishing Gears

(continued)

Gloucester County

	Pounds	Dollars	Average $/Pound
Butterfish Landings:			
Fish Pound Nets	22,600	6,709	0.30

			Butterfish Contribution (%)	
			Pounds	Dollars
County Landings:				
All Species	7,125,200	1,778,846	0.3	0.4
Finfish & Squid	2,864,800	323,386	0.8	2.1
Fish Pound Nets	2,529,900	249,716	0.9	2.7

Lancaster County

	Pounds	Dollars	Average $/Pound
Butterfish Landings:			
Fish Pound Nets	600	163	0.27

			Butterfish Contribution (%)	
			Pounds	Dollars
County Landings:				
All Species	17,431,300	1,927,491	<0.1	<0.1
Finfish & Squid	14,529,200	523,780	<0.1	<0.1
Fish Pound Nets	14,078,800	426,652	<0.1	<0.1

Mathews County

	Pounds	Dollars	Average $/Pound
Butterfish Landings:			
Fish Pound Nets	29,600	6,466	0.22

			Butterfish Contribution (%)	
			Pounds	Dollars
County Landings:				
All Species	9,786,500	1,151,262	0.3	0.6
Finfish & Squid	6,640,400	449,082	0.4	1.4
Fish Pound Nets	6,582,700	431,519	0.4	1.5

Table 21

(continued)

Table 22 presents an analysis of major commercial fisheries in 1976 from Maine through Virginia in terms of total weights landed, total ex-vessel revenues, and ex-vessel prices per pound paid for each species, and the relative contribution of each species to total regional production. In 1976, butterfish ranked 35th by total poundage landed, 33rd by total ex-vessel revenue, and 26th by average ex-vessel price per pound paid to fishermen. If only food finfish and squid are considered in these rankings, butterfish ranked 26th, 22nd, and 15th, respectively. The relative positions of butterfish in these rankings indicate that the fishery for butterfish would be quite likely to expand significantly under conditions of a generally expanding commercial fishing industry in this region. This is especially probable since the fisheries for at least four of the food finfish species which precede butterfish by total weight landed and ex-vessel value - cod, haddock, yellowtail flounder, and Atlantic herring - are now or will be in the near future under regulation by Fishery Management Plans which will strictly limit expansion of the groundfish and herring fisheries for at least several years.

Table 23 shows the average national ex-vessel price per pound paid for butterfish since 1964 in actual dollars and in dollars adjusted for inflation. Table 24 shows these same prices for the Rhode Island butterfish fishery over the same period. Rhode Island is one of the largest butterfish producing States and is also one of the few States whose butterfish catch is reported by market categories. As Table 24 indicates, demand for butterfish depends greatly on size and quantity available. The price spreads between these size categories of butterfish in Rhode Island in 1977, for example, were greater than price differences for various market grades of almost all other food finfish (including groundfish). Such price differences in the butterfish market have also been observed in other States in which significant quantities of this species are landed. This is due to the fact that only the largest (or top quality) butterfish are in significant demand for human consumption domestically. Undoubtedly a large fraction of the catch of undersized butterfish is frequently used for industrial or bait purposes, especially when the supply of large fish is abundant.

1976 US Commercial Landings* Of Selected Species In The New England And Middle Atlantic States (Maine - Virginia)

Species	Thousands Of Pounds	% Of Total	Species	(Ex-Vessel) Thousands Of Dollars	% Of Total	Species	Average (Ex-Vessel) Price/lb.
Atlantic menhaden	656,380	46.7	American lobster	54,678	17.0	Bloodworms	$2.36
Atlantic herring	110,517	7.9	Sea scallop	33,135	10.3	Bay scallop	2.10
Atlantic cod	56,019	4.0	American oyster	28,490	8.9	Sea scallop	1.79
Blue crab	53,861	3.8	Hard clam	24,660	7.7	Hard clam	1.76
Surf clam	49,138	3.5	Surf clam	23,357	7.3	American lobster	1.65
Silver hake	47,660	3.4	Atlantic menhaden	18,487	5.8	Swordfish	1.36
Yellowtail flounder	37,940	2.7	Yellowtail flounder	15,553	4.8	Soft clam	1.18
American lobster	33,113	2.4	Atlantic cod	14,626	4.6	American oyster	1.16
Redfish	32,133	2.3	Blue crab	13,335	4.2	Northern puffer	0.68
American oyster	24,666	1.8	Soft clam	12,317	3.8	Striped bass	0.58
Summer flounder	23,635	1.7	Summer flounder	10,650	3.3	Witch	0.49
Unclassified, industrial	22,472	1.6	Haddock	5,563	1.7	Surf clam	0.48
Pollock	22,117	1.6	Winter flounder	5,444	1.7	Summer flounder	0.45
Sea scallop	18,479	1.3	Swordfish	4,905	1.5	Haddock	0.44
Scup	15,959	1.1	Redfish	4,394	1.4	Yellowtail flounder	0.41
Winter flounder	15,631	1.1	Atlantic herring	4,360	1.4	Bluefin tuna	0.41
Hard clam	14,009	1.0	Silver hake	3,979	1.2	Tilefish	0.40
Haddock	12,789	0.9	Scup	3,301	1.0	American eel	0.38
Weakfish	12,059	0.9	Pollock	2,934	0.9	Winter flounder	0.35
Soft clam	10,449	0.7	Bay scallop	2,790	0.9	American shad	0.34
White hake	9,046	0.6	American plaice	2,365	0.7	Shrimps	0.34
Squids	8,379	0.6	Striped bass	2,298	0.7	Black sea bass	0.33
Alewives	7,838	0.6	Witch	2,057	0.6	Mussels	0.31
American plaice	7,822	0.6	Weakfish	1,670	0.5	American plaice	0.30
Atlantic croaker	7,673	0.5	Bluefin tuna	1,650	0.5	Ocean quahog	0.29
Bluefish	6,905	0.5	Ocean quahog	1,617	0.5	Butterfish	0.29
Ocean quahog	5,600	0.4	Squids	1,577	0.5	Jonah crab	0.28
Atlantic mackerel	4,975	0.4	Bloodworms	1,256	0.4	Red crab	0.28
Red hake	4,975	0.4	White hake	1,185	0.4	Unclassified, Food	0.28
Witch	4,157	0.3	Black sea bass	1,143	0.4	White perch	0.27

Table 22

Table 22

(continued)

1976 US Commercial Landings* Of Selected Species In The New England And Middle Atlantic States (Maine - Virginia)

Species	Thousands Of Pounds	% Of Total	Species	(Ex-Vessel) Thousands Of Dollars	% Of Total	Species	Average (Ex-Vessel) Price/lb.
Bluefin tuna	4,021	0.3	Atlantic croaker	967	0.3	Atlantic cod	$0.26
Striped bass	3,987	0.3	Tilefish	887	0.3	Blue crab	0.25
Swordfish	3,595	0.3	Butterfish	865	0.3	Yellow perch	0.22
Black sea bass	3,431	0.2	Shrimps	764	0.2	Scup	0.21
Butterfish	3,033	0.2	Unclassified, Food	761	0.2	Catfish/Bullheads	0.19
Unclassified, Food	2,734	0.2	Bluefish	625	0.2	Squids	0.19
Shrimps	2,254	0.2	Atlantic mackerel	614	0.2	Spot	0.19
Tilefish	2,225	0.2	American shad	526	0.2	Weakfish	0.14
Mussels	1,695	0.1	American eel	518	0.2	Redfish	0.14
American shad	1,557	0.1	Mussels	517	0.2	White hake	0.13
Catfish/Bullheads	1,462	0.1	Unclassified, Industrial	431	0.1	Pollock	0.13
Red crab	1,428	0.1	Red hake	416	0.1	Atlantic croaker	0.13
Rock crab	1,413	0.1	Red crab	404	0.1	Atlantic mackerel	0.12
American eel	1,373	0.1	Catfish/Bullheads	285	<0.1	Sharks	0.10
Bay scallop	1,328	0.1	Alewives	279	<0.1	Tautog	0.09
Spot	1,221	0.1	Spot	229	<0.1	Red crab	0.09
Dogfish	1,212	0.1	White perch	223	<0.1	Bluefish	0.09
White perch	837	0.1	Rock crab	129	<0.1	Red hake	0.08
Bloodworms	532	<0.1	Jonah crab	81	<0.1	Silver hake	0.08
Jonah crab	284	<0.1	Dogfish	65	<0.1	Dogfish	0.05
Tautog	254	<0.1	Tautog	23	<0.1	Alewives	0.04
Sharks	121	<0.1	Sharks	12	<0.1	Atlantic herring	0.04
Yellow perch	24	<0.1	Northern puffer	6	<0.1	Atlantic menhaden	0.03
Northern puffer	9	<0.1	Yellow perch	5	<0.1	Unclassified, Industrial	0.02
Total	1,376,428	98	Total	312,408	97		
Grand total, all species	1,405,792		Grand total, all species	320,732			

* Landings are shown in round (live) weight except for shell mollusks. Clams, mussels and oyster are reported in weight of total meats; scallops are reported in weight of edible meats.

< = less than

National Average Ex-Vessel Price Of Butterfish

(Dollars Per Pound)

Year	Unadjusted	Adjusted*
1964	$0.10	$0.12
1965	0.09	0.11
1966	0.09	0.09
1967	0.13	0.10
1968	0.13	0.12
1969	0.12	0.09
1970	0.16	0.11
1971	0.17	0.09
1972	0.25	0.13
1973	0.24	0.11
1974	0.25	0.11
1975	0.24	0.11
1976	0.28	not available
1977	0.28	not available
1978	0.36	not available

*1967 Standard Dollars. Index from US Bureau of Labor Statistics, Wholesale Prices And Price Indexes. Index used is for "Fresh Packaged Fish And Other Seafood".

Table 23

Ex-Vessel Price Of Butterfish In Rhode Island

(Dollars Per Pound)

	Large[1] Butterfish		Medium[2] Butterfish		Small[3] Butterfish		Unclassified[4] Butterfish	
Year	Unadj.	Adj.[5]	Unadj.	Adj.[5]	Unadj.	Adj.[5]	Unadj.	Adj.[5]
1964	-	-	-	-	-	-	$0.09	$0.11
1965	-	-	-	-	-	-	0.14	0.16
1966	-	-	-	-	-	-	0.14	0.14
1967	-	-	-	-	-	-	0.14	0.14
1968	-	-	-	-	-	-	0.15	0.13
1969	-	-	-	-	-	-	0.17	0.13
1970	-	-	-	-	-	-	0.24	0.17
1971	-	-	-	-	-	-	0.19	0.12
1972	$0.38	$0.20	$0.15	$0.08	-	-	0.28	0.15
1973	0.28	0.13	0.23	0.10	$0.16	$0.07	0.34	0.15
1974	0.25	0.11	0.19	0.09	0.12	0.05	0.45	0.21
1975	0.29	0.13	0.22	0.10	0.15	0.06	0.34	0.15
1976	0.34	na	0.23	na	0.15	na	0.29	na
1977	0.34	na	0.19	na	0.11	na	0.40	na
1978	0.39	na	0.21	na	0.18	na	0.41	na

(1) Large = 300-350 per 100 lbs. (2) Medium = 400-450 per 100 lbs. (3) Small = more than 450 per 100 lbs. (4) Rhode Island butterfish landings prior to 1972 were not reported by size category. After that year, this category contains mainly fish caught by floating traps. (5) 1967 Standard Dollars.

Table 24

IX-2. Domestic Processing Sector

Most butterfish reported landed is sold fresh or frozen for human consumption. Demand in the US for butterfish as food is concentrated mainly on the largest and best quality fish (specification of market sizes is given in Table 24).

A small but growing fraction of the catches of the largest butterfish is smoked and sold in specialty markets. This processing is carried out almost exclusively in New York City, and most of these fish come from Suffolk County, New York, landings in the autumn, when large butterfish are most available in this area (see Section VIII-2, "New York Commercial Fishery").

Table 25. US Production of Smoked Butterfish

Year	Pounds	Wholesale Value
1974	22,000	$ 38,000
1975	28,000	55,000
1976	43,000	101,000

About 20% on average of the annual reported butterfish catch was used industrially from 1965 - 1974 (the latest year for which data are available). Most of this fraction of the catch is used for bait (Tables 26 and 27). Large quantities of butterfish have been periodically taken by industrial (scrap fish) fisheries which do not report landings by species. The composition of such "trash" fish landings may fluctuate markedly from year to year. See Section VIII-2, "North Carolina Commercial Fishery").

Data to develop estimates of US processor capacity are not available at this time. The reporting requirements proposed in this FMP should result in the necessary data being available for use in updating this FMP.

Table 26. Reported* Butterfish Landings Used For Industrial Products, By Region (thousands of pounds)

Year	New England	Middle Atlantic	South Atlantic	Total	% Of Total Butterfish Landings
1965	214	639	521	1,374	20
1966	401	445	397	1,243	21
1967	488	253	407	1,148	22
1968	416	352	262	1,030	29
1969	-	222	99	321	7
1970	247	278	139	664	17
1971	536	241	146	923	22
1972	-	167	600	767	47
1973	-	583	590	1,173	35
1974	-	781	-	781	20
1975	-	916	-	916	21

New England = Maine through Connecticut
Middle Atlantic = New York through Virginia
South Atlantic = North Carolina through east coast Florida

1978, and (b) the possibility that foreign nations may have purposely minimized their catches of butterfish to the greatest extent practicable in order to prevent closure of their squid fisheries, which at present are of far greater importance to foreign fishing nations, and in which butterfish is an unavoidable by-catch.

The 1979 TALFF for butterfish (4,000 mt in the 1979 PMP and in this FMP), which is the same as the 1978 TALFF, makes it extremely probable that foreign demand for US-caught butterfish will exceed the 1978 level. Japan, traditionally the largest harvester of butterfish (Table 16), was allocated only 672 mt of butterfish in 1978 and only 358 mt in 1979 (as of May, 1979), which is less than 13% of its average annual catch of butterfish from the Atlantic Ocean in the years prior to enactment of the FCMA. It is likely that, as foreign butterfish allocations in the FCZ are being limited, these countries will seek to maintain their butterfish supplies through imports from the US.

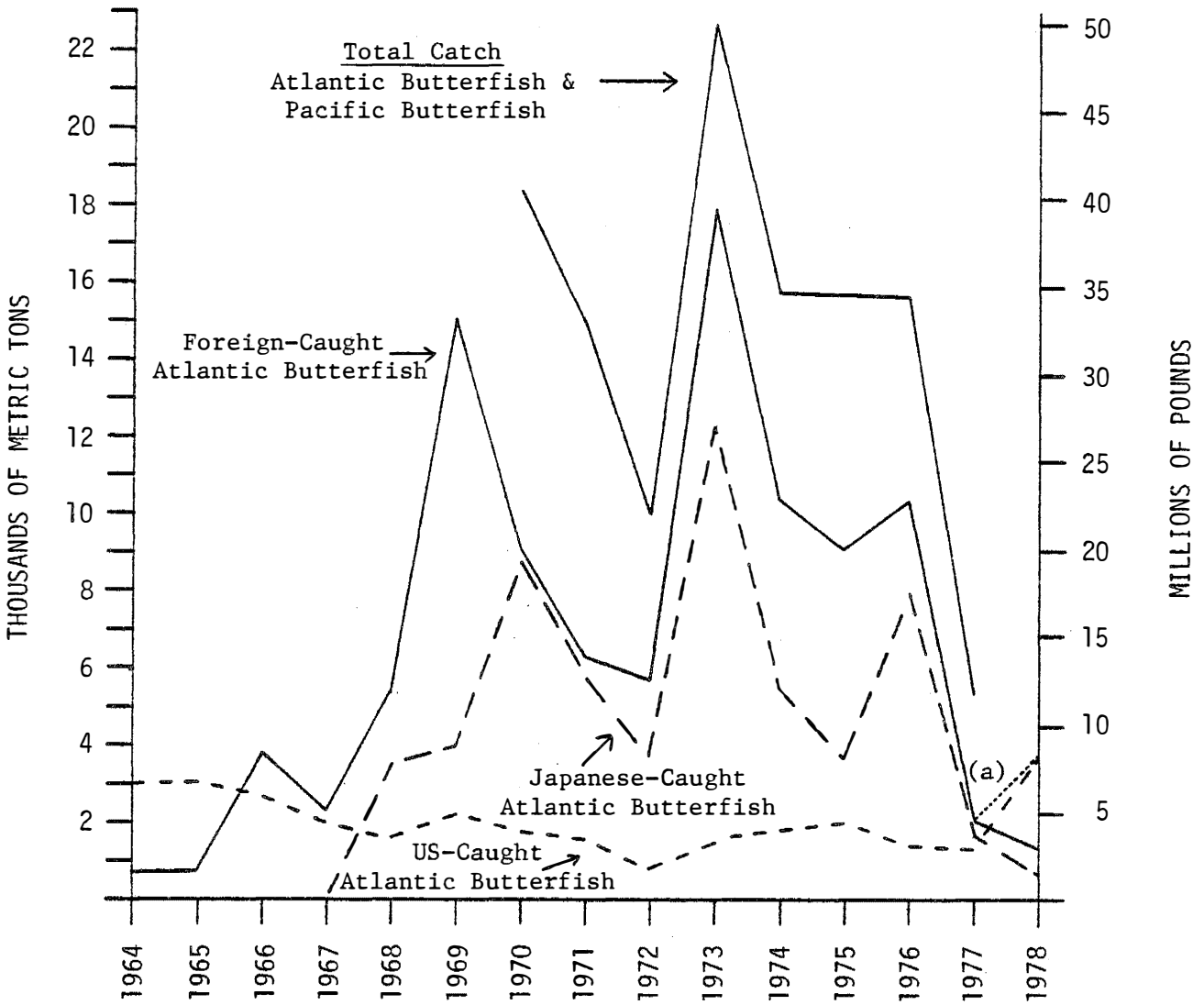


Figure 16

Total Catch By All Nations Of Atlantic Butterfish And Pacific Butterfish (1970-1977), Total Catch Of Atlantic Butterfish By Foreign (Non-US) Nations (1964-1978), Total Catch Of Atlantic Butterfish By Japan (1967-1978), And US Landings Of Atlantic Butterfish (1964-1978). Dashed Line (a) Represents Sum Of Foreign-Caught Atlantic Butterfish And Atlantic Butterfish Exported By US Processors In 1978. Exports Of US-Caught Butterfish Prior To 1978, If Any, Were Negligible.

Table 27. Use of Reported* Butterfish Landings For Industrial Products, By Commodity (thousands of pounds)

Year	Animal Food (Fresh/Frozen)	Bait (Fresh/Frozen)	Canned Animal Food	For Reduction
1965	491	104	12	767
1966	416	114	-	713
1967	117	187	122	722
1968	239	158	-	633
1969	156	96	-	69
1970	-	312	3	349
1971	8	281	-	634
1972	2	338	-	427
1973	-	791	-	381
1974	-	781	-	-
1975	-	916	-	-

* Large quantities of butterfish have been periodically taken by industrial fisheries which do not report landings by species. The composition of such trash fish landings may fluctuate markedly from year to year. See Section VIII-2, "North Carolina Commercial Fishery" and "Virginia Commercial Fishery").

IX-3. International Trade

Prior to 1978, US butterfish exports, if any, were negligible. A US butterfish fishery for export was begun in 1978, based almost entirely on Rhode Island landings. Approximately 2,400 metric tons of whole frozen butterfish were exported in 1978, mainly to Japan (Pt. Judith Fishermen's Cooperative, personal communication) (see Section VIII-2). The ex-vessel value of this exported butterfish was approximately $2 million. Detailed information on the processed value of these exports are unavailable, although it is estimated that US processors grossed between $3 and $4 million from these sales.

It is impossible to predict the magnitude of butterfish exports in 1979. At present, foreign demand is greatest for large and roe-free butterfish, which are most available to domestic fishermen during autumn and early winter. Accurate estimates of 1979 exports will not be available until the height of the fall fishing season (October - November).

As Figure 16 illustrates, the world supply of butterfish (butterfish and Pacific butterfish, Pampus echinogaster) is heavily dependent upon the Atlantic species (74% by weight of total landings of both species from 1970 - 1977). From 1970 - 1976, the last year of unrestricted (except by area) foreign fishing for butterfish in the Atlantic Ocean, foreign butterfish catches from what is now the FCZ accounted for about 60% on average of the total harvest of both species (Pacific butterfish are not found within the US FCZ). In 1977, due mainly to enactment of the FCMA, the total foreign catch of Atlantic butterfish fell to 2,077 tons, resulting in a total (all nations) catch of Atlantic and Pacific butterfish that year of about 5,400 metric tons, about one-third of the previous year's catch. The total foreign catch of both species, which averaged over 14,000 mt from 1970 - 1976, dropped to about 4,000 mt in 1977. The total catch of both species in 1978 is unknown. The failure of foreign nations to harvest the entire butterfish TALFF in 1978 in the Atlantic FCZ (Section VII-3) reflects not a lack of demand for butterfish, but probably a combination of other factors including (a) the failure of some nations with butterfish allocations to fish for any species whatsoever in the Atlantic FCZ in

X. DESCRIPTIONS OF THE BUSINESSES, MARKETS, AND ORGANIZATIONS ASSOCIATED WITH THE BUTTERFISH 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 28.

Table 28. 1976 Labor Force Characteristics For Offshore Fishermen In New England Ports

Ports	Number of Full-Time Fishermen	Unions & Cooperatives	Approximate Average Age	Major Ethnic Groups
MA				
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
RI				
Newport	80	Union & Nonunion	45	Yank./Port./ Ital.
Pt. Judith	120	Cooperative	40	Yank./Norw.
ME				
Portland	150	None	40	Yankee
Rockland	80	None	40	Yankee
CT				
Stonington	45	None	50	Yankee
NH				
Rye	20	None	40	Yankee

Source: Smith and Peterson (1977).

X-3. Labor Organizations Concerned With Butterfish

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 28.

X-4. Foreign Investment In The Domestic Butterfish Fishery

The information for this analysis is not available.

XI. DESCRIPTION OF SOCIAL AND CULTURAL FRAMEWORK OF DOMESTIC BUTTERFISH 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, butterfish landings were tabulated by county and analyzed to identify those counties

with a significant involvement in this fishery (Tables 17-21). Barnstable, Massachusetts, Newport and Washington, Rhode Island, Suffolk, New York, and Cape May, New Jersey were selected as being relatively important in this fishery.

Table 29. Butterfish and Total Finfish and Squid Landings, 1976
(landings in thousands of pounds)

State	County	Butterfish	Total Finfish & Squid	Butterfish Share of County Total	Dist. of Butterfish
ME	Cumberland	0.5	32,442.4	<0.1%	<0.1%
	York	8.6	6,376.4	0.1	0.3
MA	Barnstable	250.7	32,402.2	7.7	8.3
	Bristol	16.6	55,888.2	<0.1	0.6
	Dukes	8.7	2,717.6	3.2	0.3
	Essex	11.6	143,909.1	<0.1	0.4
	Plymouth	2.0	2,503.2	<0.1	0.1
RI	Newport	301.6	23,021.8	1.3	10.0
	Washington	971.8	41,731.7	2.3	32.2
CO	Fairfield	0.1	263.2	<0.1	<0.1
	New Haven	0.3	78.3	3.8	<0.1
NY	Kings	82.8	2,293.4	3.6	2.8
	Nassau	38.5	1,029.7	3.7	1.3
	Suffolk	838.1	14,311.2	5.9	27.8
NJ	Atlantic	7.6	1,147.7	0.7	0.2
	Cape May	239.4	22,508.3	1.1	8.0
	Monmouth	49.7	153,916.8	<0.1	1.6
	Ocean	38.6	10,897.7	0.4	1.3
MD	Dorchester	0.1	3,372.6	<0.1	<0.1
	Kent	0.1	1,095.9	<0.1	<0.1
	Worcester	20.5	2,998.3	0.7	0.7
VA	Accomack	5.9	2,893.7	0.2	0.2
	Norfolk	34.6	2,703.5	1.3	1.2
	Hampton (city)	12.9	4,343.3	0.3	0.4
	Northampton	0.3	2,951.0	<0.1	<0.1
	Virginia Beach	10.5	1,374.3	0.8	0.4
	York	8.3	1,540.2	0.5	0.3
	Gloucester	22.6	2,864.8	0.8	0.8
	Lancaster	0.6	14,529.2	<0.1	<0.1
	Mathews	29.6	6,640.4	0.4	1.0
Total		3,013.2			100.0%

Data from the census are presented in Table 30. The resort nature of the economies of Barnstable and Cape May Counties is obvious from the data (low percentage of residents employed in manufacturing and relatively older population). The heavy involvement of the military in the Newport economy, and to a significant but lesser extent in the Washington County economy, is also apparent. Suffolk County was highly urban and and was the place of residence of many persons who worked outside the county (34.4%), probably in New York City.

The only one of the five counties that may have been in some economic difficulity 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.

Table 30. Selected 1970 Population and Economic Characteristics for Counties with Significant Butterfish Landings

	US	Barnstable	Newport	Washington	Suffolk	Cape May
Population						
Total (000)	203,212	97	95	86	1,295	60
US rank		364	373	403	19	567
Per sq. mi.	57	246	819	267	1,213	223
% Change,60-70	13.3	37.5	15.1	45.1	69.0	22.7
% Net mig.60-70	1.7	32.4	.4	24.6	49.3	21.9
% Female	51.3	52.1	44.0	47.5	50.3	51.3
% Urban	73.5	41.3	68.0	59.1	89.8	61.8
% Under 5 yrs.	8.4	7.4	8.3	8.9	10.0	6.6
% 18 yrs. & over	65.6	68.5	69.6	68.0	60.3	71.7
% 65 yrs. & over	9.9	16.9	7.2	7.8	7.6	20.0
Median age	28.3	34.4	23.9	23.7	26.4	38.9
Over 25, median school yrs. completed	12.1	12.6	12.2	12.2	12.2	11.3
Labor force						
Total (000)	82,049	37	47	37	404	21
Civilian (000)	80,051	34	27	28	403	20
% Fem./w husb.	57.0	58.5	56.9	58.3	61.3	54.8
% Unemployed	4.4	3.9	4.6	4.3	3.5	6.5
% Emp. in mfg.	25.9	7.6	17.0	27.9	21.8	11.4
% Emp. outside county	17.8	6.1	13.2	22.1	34.4	15.8
% Families with female head	10.8	10.5	14.1	10.4	7.2	10.1
Median family Income ($)	9,586	9,242	9,162	9,603	12,081	8,295
% Families low income	10.7	8.3	11.7	9.0	4.8	8.9
Mfg.estab.						
Total	311,140	96	53	74	1,475	52
% 20-99 emp.	24.3	10.4	13.2	31.1	26.5	26.9
% 100 or more emp.	11.2	2.1	5.7	12.2	5.8	5.8
% Change, value added, 63-67	36.4	12.5	189.0	160.0	37.3	16.8
Retail sales						
% of total in eating & drinking places	7.7	12.4	10.2	7.6	7.1	19.6
Selected services						
% Receipts, hotels, etc.	11.6	55.7	27.8	25.7	7.4	58.3
% Receipts, amusements	13.7	8.8	22.5	D	15.8	18.1

D = Data not reported
Source: County and City Data Book, 1972.

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 butterfish fishery in the northwestern Atlantic. They are:

1. Promote the growth of the US butterfish export industry;
2. Minimize cost of harvesting butterfish;
3. Increase employment opportunities for commercial fishermen;
4. Prevent exploitation of the resource beyond that level producing the maximum sustainable yield; and
5. Minimize costs of enforcement and management of the resource.

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

This plan proposes a level of optimum yield and restrictions on the level of foreign fishing based on the surplus after the US catches its estimated capacity. Changes in any of these proposals are possible alternative actions. The probable impact of each group of alternatives relative to the proposed action is discussed below.

1. Increased/Decreased Optimum Yield (OY) For Butterfish: The proposed optimum yield represents the best balance of possible catch levels consistent with the attainment of the objectives of this FMP. The probable biological consequences of an increased or decreased optimum yield are described in Sections V-2 and V-3. The "practical" maximum sustainable yield for butterfish, under present fishery conditions, is approximately 16,000 metric tons, and the stock currently appears able to sustain an annual harvest of that magnitude, barring any significant declines in future recruitment. An increased OY might also result in an increased TALFF for butterfish. The US fishery for butterfish for export is presently in its initial stages, but is growing rapidly. A large TALFF for butterfish might hinder the development of this export industry. Decreasing the OY beneath 11,000 metric tons would not be of significant biological advantage, but would result in the unwarranted restriction of either the US butterfish fishery, the foreign squid fishery, or both, and would not significantly further the growth of the US export fishery.

2. Increased/Decreased US Capacity For Butterfish: The US capacity estimate proposed in this FMP represents the best prediction of domestic harvest for this species during the proposed 1979-1980 fishing year, based upon information received to date by the Mid-Atlantic Fishery Management Council (see Section VIII-2, "Rhode Island Commercial Fishery").

3. Take No Action At This Time: This alternative would mean that the Preliminary Fishery Management Plan prepared by the NMFS would continue in force. Since the PMP for 1979 proposes an OY and a US capacity significantly in excess of that proposed by this FMP, it is likely that continuation of the PMP would result in a large reallocation of butterfish to foreign fleets at the end of calendar year 1979. This would significantly undermine the stability and development of the US fishery, because foreign demand for US-caught butterfish will be largely contingent upon an anticipated reallocation. Establishment of the OY proposed in this FMP, therefore, will protect US interests in this regard, by eliminating any possibility of a huge reallocation to foreign fleets.

The PMP regulates foreign, but not domestic, fishermen. The effect of this alternative would be that data that would be collected on domestic fishing and processing efforts as a result of this plan could not be collected as effectively,

and that assessments of the scope and development of the domestic fishery would not be as accurate as they would be with the FMP.

4. Selection of Management Unit: The FCMA dictates that each FMP identify a specific management unit for each subject species. It is desirable for management purposes that such management unit include as much of a stock and/or fishery as possible.

One factor which influences the selection of a management unit is political boundaries. States' jurisdictions within the territorial sea must be considered, as must the jurisdictions of other nations as they relate to US management of each resource. The US and Canada presently are engaged in negotiations to determine the demarcation of each nation's 200 mile fishing zone. One possible outcome of these negotiations may include American fisheries in Canadian waters (and/or vice versa). A ratified bilateral fisheries or boundary agreement will supercede the provisions of a FMP if conflicts exist. It is impossible to anticipate all possible outcomes of any agreement in a timely fashion, given the amount of time necessary to develop, implement and update US fishery management plans. It is therefore necessary, until such time as a permanent agreement is concluded, that a FMP for any species which is even marginally transboundary in its distribution, or which may be the explicit subject of a bilateral agreement, adopt a legally flexible management unit. The alternative management units for this FMP are:

(a) Butterfish Within the FCZ North of Cape Hatteras: Selection of this option would limit the jurisdiction of this FMP to the fishery for butterfish within the FCZ only. (All management unit options for butterfish do not extend south of Cape Hatteras because the important fishery for this species does not extend south of that point and because the assessments upon which this FMP was based were performed for the area north of Cape Hatteras.) This management unit would ignore the significant fraction of the fishery and stock which occurs within the territorial sea. This option also does not anticipate management conflicts which might arise from the US/Canadian fishery negotiations.

(b) Butterfish Within All US Waters North of Cape Hatteras: This option includes virtually the entire butterfish stock and fishery, but does not have the inherent flexibility necessary to coordinate this FMP with a possible US/Canadian bilateral agreement. For example, this management unit could not include any possible US fishing effort for butterfish within Canadian waters, should such effort ever occur.

(c) All Butterfish Under US Jurisdiction North of Cape Hatteras: This management unit precisely defines the management authority of this FMP under any possible outcome of a bilateral agreement, while simultaneously it encompasses as large a fraction of the butterfish stock and fishery as possible. (US jurisdiction is defined here in the broad sense to include both state and federal jurisdictions.) Should the US and Canada fail to achieve an agreement during the life of this plan, this management unit would be identical with (b), above. This management unit includes virtually the entire butterfish stock and fishery. The proposed OY has been designed for the entire stock and the US capacity estimate includes any US catches which might (albeit improbably) occur in Canadian waters. Relatively insignificant quantities of butterfish are occasionally taken in what are now Canadian waters. It is extremely improbable that such catches by any other country could ever grow to a level which, when added to the proposed OY, would result in overfishing. It is necessary to note, however, that a small fraction of the stock may not be addressed by this FMP.

5. Other Management Measures: The Council has considered the use of other management measures and fishing regulations in order to determine if such are necessary or desirable to attain the management objectives, optimum yield, US capacity, or TALFF proposed by this FMP. This option includes such measures as gear, area, season, and other fishing regulations. It is the opinion of the Council that no management measures other than quota and reporting regulations and the Foreign Fishing Regulations are necessary at this time. Institution of other measures at this time would be of no management advantage for the domestic fishery and would lead to unwarranted increased costs of enforcemment of this FMP. It must be noted that the Council is working to develop a series of regulations to establish rules of conduct for fixed and mobile gear fishermen to minimize conflicts. When these have been developed they may be considered as amendments to this and other FMPs.

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

The optimum yield specified by the proposed action is below the harvesting capacity and demand for butterfish by foreign nations which have fished in the region in recent years. Thus, the OY represents an adverse action with respect to foreign fishing.

Increased US landings of butterfish on the Atlantic coast could require more labor input but because of substantial unemployment no increase in the cost of labor is expected. Also, no severe reduction in the availability of butterfish as a prey organism for commercially and recreationally important species is expected.

The advantages of the selection of the management unit to be all butterfish under US jurisdiction north of Cape Hatteras 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 a FMP for this species could not be instituted until a bilateral agreement with Canada is reached.

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.

Since the provisions of this FMP should not result in a decline in future abundance of butterfish due to fishing, the optimum yield, management unit, and all other provisions of this FMP should not have an adverse impact on the environment.

XII-5. Specification Of Optimum Yield

A prime objective of the Mid-Atlantic Council is to foster the development of the US fishery for butterfish for export. It is the aim of this Council that this be accomplished subject to the constraints imposed by other plan objectives.

Since enactment of the FCMA, the annual foreign harvest of this species in the northwest Atlantic has decreased significantly (see Sections VIII-2 and IX-3). This has resulted in the increased export of US-caught butterfish to foreign countries. There can be no doubt that the level of such foreign demand is dependent upon (a) the level of the butterfish TALFF, and, equally importantly, (b) foreign nations' anticipation of any annual reallocation of a portion of the US capacity initially

set (see Sections VIII-2 and IX-3).

The PMP for 1979 for Other Finfish set a butterfish OY of 16,000 metric tons and initial US capacity and TALFF levels of 12,000 metric tons and 4,000 metric tons, respectively. Based on the information received to date and export estimates, we expect that 7,000 mt may be an adequate US Capacity for butterfish for fishing year 1979-1980 (the 12 month period beginning 1 April, 1979).

The 1978 US harvest of butterfish increased significantly from the 1977 level, from 1,319 mt to 3,667 mt. Reported foreign landings decreased from 2,077 mt in 1977 to 1,324 mt on 1978. The final 1977 TALFF was 5,500 mt and the 1978 TALFF was 4,000 mt. There was no reallocation to increase the TALFF in 1978.

The 1978 US landings were the highest for any year in the period 1964-1978 and exceeded the average for that period of 2,028 mt by 1,638 mt.

Export data on butterfish are not available. To determine the extent to which the increased US butterfish landings entered the export market, the Council contacted processors throughout the Mid-Atlantic and New England areas. The processors reported that exports were negligible during 1977 but were significant during 1978. Estimates of exports in 1978 by US processors were approximately 2,400 mt, according to the survey of processors. While these data are incomplete, it is obvious that during 1978, the ex-vessel price of butterfish was adequate to cause fishermen to harvest the species while the price was reasonable enough to develop an export trade. All processors contacted reported plans to enter the export trade during 1979. The processors surveyed are located throughout the Mid-Atlantic and New England. They believe that they have the ability to meet the quality requirements of foreign buyers. They have established contacts with foreign buyers. The aggregate of their estimates of exports for 1979 substantiate the estimate of USCAP and US processing capacity in the FMP.

It also seems reasonable to conclude that a significant, if moderate, export trade for butterfish could be developed, if historical landings reported by foreign nations can be used as an indication of demand. Reported foreign landings of Atlantic butterfish averaged 6,682 mt for the period 1964-1978 with a peak of 17,897 mt in 1969. Since no economic data on exports are available, it is not possible to estimate how much of the demand that was met by direct foreign harvests could be met by the export of US harvested fish. However, it seems reasonable to conclude, particularly in light of the preliminary development that actually took place during 1978, that an export market for butterfish can be realized.

In the past two years foreign nations have harvested only a small portion of their TALFF for butterfish (2,077 mt vs. 5,500 mt in 1977 and 1,324 mt vs. 4,000 mt in 1978). However, it must be remembered that each foreign nation receives an allocation of each species. When a nation harvests its allocation of any one species, it is required to cease fishing operations in the Atlantic FCZ. It might also be possible that to some extent the relatively low harvest of butterfish by foreign nations during 1977 and 1978 was because of the effect on fishing operations of the foreign fishing areas (windows) and related restrictions.

In any event, the limited available data seem to indicate that there is a very real possibility for the expansion of the US butterfish fishery for export. Given the biological condition of the stock along with landings in the recent past, an optimum yield of 11,000 mt seems reasonable for the fishing year beginning April 1, 1979. Total landings of Atlantic butterfish in the years immediately prior to the enactment of the FCMA were 12,149 mt in 1974, 11,026 mt in 1975, and 11,753 mt in 1976. The relatively low levels in 1977 (3,396 mt) and 1978 (4,988 mt) could have reflected the effects of the foreign fishing regulations coupled with the developing

US fishery for export.

Another positive result of the developing export fishery is that ex-vessel prices remained high throughout the year (in fact, reports indicate prices significantly higher than the annual average near the end of the season), even though significantly increased quantities of butterfish were landed. Traditionally, ex-vessel prices decreased during the season as landings increased.

The FCMA defines optimum yield as "the amount of fish (A) which will provide the greatest overall benefit to the nation, with particular reference to food production and recreational opportunities; and (B) which is prescribed as such on the basis of the maximum sustainable yield from such fishery, as modified by any relevant economic, social or ecological factor" (emphasis added). If OY were set equal to the "practical" MSY (16,000 mt), an increased harvest of 5,000 mt in addition to that provided by the 11,000 mt OY would be permitted. The entire increase would be allocated to TALFF given the USCAP of 7,000 mt. The current poundage fee for butterfish is 3.5% of $626 per metric ton. For the 5,000 mt, this would yield $109,550.00 in revenues to the US. However, it would certainly eliminate the US export trade and would result in the US harvest being reduced to the levels experienced prior to 1978. US landings in 1977, the most recent year prior to the development of the export trade were 2,907,000 pounds (1,319 mt) with an ex-vessel value of $816,000 (Table 13). 1978 US landings were 8,084,000 pounds with an ex-vessel value of $2,905,000. If the export trade develops as proposed in the FMP and the USCAP is realized, at the 1978 ex-vessel value of $0.36 per pound, the result would be $5,555,340. It may, therefore, be concluded that, while the specification of OY at 16,000 mt would likely increase government revenues by $109,550, it would significantly decrease potential income to fishermen. It must be noted that this analysis does not include the additional benefits of the 11,000 mt OY to the processing sector because limited data make such an analysis impossible. However, the benefits to the processing sector of the 11,000 mt OY would serve to increase the difference between the approximately $4.5 million and the approximately $0.1 million.

In addition, the reduction of fishing mortality resulting from an OY of 11,000 mt (as opposed to 16,000 mt) increases the probability of increased mean weight of butterfish in the catch. Large butterfish are preferred by domestic and foreign markets and have a significantly greater ex-vessel value than small butterfish. This may have significant economic implications for the domestic industry. However, other factors, especially mesh sizes used in the fishery, also will effect the mean weight of butterfish in the catch (Figure 9).

The recent amendments to the FCMA require that US processor capacity be considered as well as US harvesting capacity. Data are not available to determine historical processing capacity for butterfish. Processing butterfish generally involves only packing and freezing. Therefore, this plan is based on the estimate that processor capacity at this time is at least 7,000 mt, that is, equal to US harvesting capacity. It is necessary that reporting systems be developed to gather the necessary data so that there will be a data base for the development of processor estimates in the future.

Another factor that must be considered in determining the optimum yield is that the foreign fisheries for Loligo and butterfish are inextricably related. Butterfish is an unavoidable by-catch in this squid fishery. Prior to enactment of the FCMA, the ratio of reported butterfish to Loligo catches by foreign fleets was relatively high, usually greater than 20%. Much of this butterfish, however, was not taken purely incidentally, but was directly pursued, in order to increase the overall efficiency of the foreign Loligo/butterfish fishery. Since implementation of the FCMA, it has been demonstrated that foreign fleets do not require this ratio of

butterfish to Loligo quotas in order to take their Loligo allocations. In 1978, the foreign butterfish catch was approximately 14% of the Loligo catch, and there is good reason to believe this by-catch can be further reduced without significantly disrupting the foreign squid fishery.

It is the intent of the Council that the butterfish TALFF should be set at the minimum required to allow foreign nationals to harvest their expected squid allocations. The Loligo TALFF proposed by the 1979 FMP for Squid is 30,000 metric tons. It is the opinion of the Council that a butterfish TALFF of 4,000 metric tons is sufficient to allow foreign nations to completely harvest the Loligo TALFF, yet will not be of a magnitude that will drastically hinder the development of the US butterfish export industry.

It is clear, for the factors stated above, that it is necessary to modify MSY to determine OY in order to achieve the objectives of this FMP, particularly the development of an export industry. The stability and development of the US butterfish exporting industry necessitates setting a TALFF consistent with FMP objectives and elimination of uncertainties on the part of US and foreign fishermen as to the ultimate butterfish TALFF in fishing year 1979-1980.

The Mid-Atlantic Fishery Management Council, therefore, has determined that the optimum yield for butterfish in fishing year 1979-1980 for the specified management unit is 11,000 metric tons.

Table 31. Butterfish MSY, OY, US Capacity, and Total Allowable Level of Foreign Fishing
(metric tons)

'Theoretical' MSY	21,635
'Practical' MSY*	16,000
Optimum Yield	11,000
US Capacity	7,000
TALFF	4,000

* Given the mesh sizes currently in use in the fishery.

Attainment of Plan Objectives

(1) Promote The Growth Of The US Butterfish Export Industry - This objective will be met by the reduction of the foreign butterfish harvest in the FCZ to the proposed TALFF level. The validity of this assumption has already been demonstrated by the development of this domestic fishery since enactment of the FCMA and the concomitant reduction in foreign catches in the FCZ.

(2) Minimize Cost Of Harvesting Butterfish - This plan does not propose any regulation of the domestic fishery which would significantly result in increased harvesting costs. In addition, foreign fishing for butterfish and Loligo is subject to the Foreign Fishing Regulations which are designed in part so that foreign effort for these species will not adversely affect butterfish availability to domestic fishermen. Basing the FMP on a fishing year beginning April 1 will serve to enhance the efficiency of the foreign fishery since the major foreign fishery is carried out during the fall and winter. With a calendar year FMP, the foreign fishery would be split between two FMPs and could also present problems with reallocations. With an April 1 fishing year, foreign nations will know their entire allocation for a year before they begin fishing and will receive any reallocation while they are in the process of harvesting their base allocation.

(3) Increase Employment Opportunities For Commercial Fishermen - The OY, US

capacity, and TALFF proposed in this FMP will promote the rapid growth of the US butterfish export industry. This will increase employment opportunities in the fishing, processing, and related sectors. The growth of this industry may also provide replacement or supplemental employment for fishermen who are currently underemployed in other fisheries, especially for groundfish.

(4) Prevent Exploitation Of The Resource Beyond That Level Producing The Maximum Sustainable Yield - The optimum yield proposed by this plan is less than the best available estimate of the maximum sustainable yield under current fishing conditions. There is no evidence that this stock cannot sustain the proposed OY on a continuing basis or that this level of harvest will endanger future recruitment or abundance.

(5) Minimize Costs Of Enforcement And Management Of The Resource - Costs of managing this resource and enforcement will be mainly limited, for the domestic fishery, to costs incurred in the collection of data mandated by this plan. No gear, seasonal, area or other restictions have been proposed by this plan for the domestic fishery. The costs of enforcing the provisions of this plan relative to the foreign fishery should be similar to those currently incurred in enforcing the PMP.

Relationship to National Standards

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 best scientific evidence available indicates that butterfish is neither currently overfished nor at a reduced level of abundance. Harvests at the optimum yield level described in this FMP should not endanger future harvests at comparable levels.

"(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-2.

"(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 meets the requirements of this standard by managing this species throughout the area of US jurisdiction north of Cape Hatteras. The range of the species is somewhat greater than that, extending into Canadian waters. However, historical landings of this species in Canadian waters have been at such a small level that the management unit of this FMP effectively amounts to management of the species throughout its range. The fishery for this species effectively stops at Cape Hatteras, so managing the species north of that point does not violate this standard.

The foreign fisheries for Loligo and butterfish are closely coordinated. Butterfish is an almost unavoidable bycatch of Loligo at present because of the intermixing of the species and fishing gear and methods now in use. The FMP for Squid proposes a Loligo OY of 30,000 metric tons. The butterfish OY proposed in this FMP is adequate to allow foreign nations to completely harvest the initial squid TALFF plus any reasonable squid allocations. In addition, the schedules for Council review of US capacity and notification of any reallocations of these species are identical in the Squid and Butterfish FMPs. This will provide for coordinated management of the

foreign fisheries for butterfish and Loligo.

"(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." The OY and US capacity estimates described in this FMP will accomodate all US demand for butterfish without prejudice to residents of any State. The distribution of this species makes it extremely unlikely that fishermen of any State or region could harvest the US capacity before the species becomes available to other domestic fishermen.

"(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 butterfish beneath the OY level, no economic inefficiencies due to surplus investment or fishing effort or other factors, should result from the provisions of this FMP. As US capacity estimates anticipate an increase in commercial fishing for butterfish, 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) and expected trends in US demand for butterfish (see Section VIII).

Butterfish recruitment historically has varied by about $\pm$ 45% (one standard deviation) from the mean. The proposed OY is significantly beneath the maximum sustainable yield and, thus, the harvest should provide an adequate safeguard to stock abundance should future recruitment decrease signifiacntly compared to levels observed in recent years. In addition, the management unit takes into account US/Canadian negotiations relative to a bilateral treaty on fisheries.

"(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 and related enforcement costs. 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 butterfish within the FCZ, or transport or deliver for sale, any butterfish 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 butterfish 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 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 utilized to take butterfish, 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. Foreign fishing vessels shall display their International Radio Call Signs (IRCS) 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 butterfish for any use.

Sanctions

Vessels conducting fishing operations pursuant to this FMP are subject to the 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 polution problems are corrected and the areas are safe for fishing.

In addition, foreign nations fishing for butterfish 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 butterfish shall be subject to the fixed gear avoidance regulations set forth in part 611.50(e) of 50 CFR.

XIII-3. Catch Limitations

The fishing year for butterfish shall be the twelve (12) month period beginning April 1.

The total allowable level of foreign fishing for butterfish in fishing year 1979 - 1980 is 4,000 metric tons.

The US capacity (quota) for butterfish is 7,000 metric tons.

It is the policy of the Mid-Atlantic Fishery Management Council that the Assistnat Administrator for Fisheries, NOAA, be allowed to make an in-season adjustment to the estimated domestic annual harvest (DAH) and Total Allowable Level of Foreign Fishing (TALFF) for butterfish based on the criteria specified by the Council as set forth below. The Council further establishes that any reallocation made by the Assistant Administrator in consultation with the Council must be consistent with the objectives of this management plan for the butterfish fishery. An adjustment is a

temporary in-season reduction of USCAP and annual domestic quota and an equivalent temporary in-season increase of TALFF. At the end of the fishing year (March 31), USCAP, annual domestic quota, and TALFF shall revert to the amounts specified by the Mid-Atlantic Fishery Management Council in Section XII-5 of this FMP.

The Council's criteria to guide the Assistant Administrator in the reallocation process are as follows:

> The National Marine Fisheries Service (NMFS) shall review reported domestic harvest (including off-loadings at sea) for butterfish for the first seven months of the fishing year (April 1 to October 31). Domestic harvest shall be determined based upon vessel and processor reports required by Section XIV of this FMP and additional statistical port sampling data collected by NMFS.
>
> If reported domestic harvest is equal to or greater than forty percent (40%) of the annual domestic quota, no reallocation of butterfish shall be made. However, if reported harvest for this period is less than forty percent (40%) of the annual domestic quota, the Assistant Administrator shall consider reallocating a portion of USCAP to TALFF. No reallocation shall be greater than one-half the difference between reported domestic harvest for the first seven months of the fishing year and the annual domestic quota. Any reallocation of USCAP to TALFF for butterfish shall be effective on January 1. Prior to making a reallocation the Assistant Administrator shall take into account: (1) the intent and capacity of the domestic industry to harvest butterfish during the latter portion of the fishing year for both domestic use and export; (2) the status of the butterfish population; and (3) the current harvest of butterfish by foreign nationals.

The Assistant Administrator shall accomplish any reallocation of butterfish through the regulatory process. The notice of proposed relemaking shall reflect the above-mentioned criteria, and be published in the Federal Register. The public shall be given a 15-day comment period from the date of publication. During this time the Assistant Administrator or his designee shall consult with the appropriate committee of the Council to ensure that the proposed reallocation is consistent with the objectives contained in the FMP. The Assistant Administrator shall publish final regulations in the Federal Register to accomplish any reallocation. The Council believes these final regulations should be published in the Federal Register approximately 15 days prior to the effective date, to allow for proper notice. When the final regulations are published in the Federal Register, all comments and relevant information received including catch statistics shall be summarized.

The Council has determined that it is inappropriate to provide for reallocation of the entire difference between reported domestic catch andf the annual domestic quota for butterfish for the following reasons:

> (1) The traditional pattern of US harvesting of butterfish throughout the latter part of the fishing year, including the last month of the fishing year.
>
> (2) The unknown amount of incidental catch of butterfish which may be unreported.
>
> (3) The possiblity of unforeseen entry into the butterfish fishery by domestic fishermen late in the season.
>
> (4) The development of the butterfish export market.

The Council anticipates that the Secretary, after consultation with the Council, will implement the intent of the FMP to restrict US harvest by imposing such

measures including, but not limited to, trip limitations, quarterly or half yearly quotas, and closed areas, as she deems appropriate in the final regulations. Such measures should ensure the achievement of OY in a manner that does not result in a sudden dislocation of those involved in the fishery. The Council intends that these measures will enable fishermen to redirect their effort in a timely manner should a closure of the fishery or a substantial dimimution in allowable catch become necessary.

XIII-4. Types of Gear

Foreign nations fishing for butterfish 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 butterfish 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 foreign fishing vessel operator, including those catching butterfish for use as bait in other directed fisheries, shall conduct a fishery for butterfish 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 quantities of pollutants which are being introduced into the Atlantic Ocean pose a threat to the continued existance 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 acheivement 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

The domestic fishery for butterfish and the butterfish export industry are developing and this development is expected to continue without direct governmental assistance at this time.

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 will be limited to costs of processing and manipulating the data from vessel logbooks and processor records, as outlined in the plan and other enforcement costs.

The Coast Guard will incur enforcement costs that should be similar to those incurred enforcing the PMP that regulates the butterfish fishery. 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 butterfish catch, by-catch, discards, catch disposition, fishing effort, and importance of butterfish to fishermen relative to all other species caught. These data 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 the FCZ. The following suggestions are designed to meet this need. If it is determined that the Secretary does not have the authority to mandate reporting of catches in the territorial sea, alternative methods of securing the data must be developed. It is understood that the NMFS is preparing model reporting requirements. The Mid-Atlantic Council will review these model requirements when they have been published to determine whether they meet the needs identified in this section. If such a determination is made by the Council, notice of the action will be published in the Federal Register and the model regulations will be considered as replacing the proposals that follow.

XIV-2. Domestic and Foreign Fishermen

XIV-2(a). Domestic Fishermen

(1) For a vessel registered in the butterfish fishery, the owner or master of such vessel must maintain 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. 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 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 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 as necessary for purposes of enforcement of this FMP.

XIV-2(b). Foreign Fishermen

Foreign fishermen will be subject to the reporting and recordkeeping requirements set forth in part 611.9 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 butterfish from US flag vessels shall keep accurate records of all transactions involving butterfish on forms supplied by the Regional Director, NMFS. These records will be submitted weekly to the Regional Director, NMFS. Records willshow at least the name of vessel or common carrier butterfish was received from, date of transaction, amount of butterfish received, price paid, capacity to process butterfish, and the amount of that capacity actually used.

(2) The possession by any person, firm, or corporation of butterfish which such person, firm, or corporation knows, or should have known, to have been taken from the FCZ 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 butterfish in any manner whatsoever other than temporarily preserving butterfish in its fresh state for immediate use, shall keep accurate records of all transactions involving butterfish. Such records will show at least the name of the entity from whom the butterfish was received, date of transaction, amount of butterfish received (by size if presorted), price paid, capacity to process butterfish, 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 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 Regional Fishery Management Councils.

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

1. This Butterfish FMP will replace the PMP regulating foreign fishing for butterfish within the FCZ as prescribed under 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 of a group of related species may impact upon other fisheries by causing

transfers of fishing effort. 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.

3. Butterfish are a food item for many commercially and recreationally important fish species. Also, butterfish utilize many finfish and invertebrate species as food items.

4. Present 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 butterfish 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.

Potential Impact on Marine Mammals and Endangered Species

Numerous species of marine mammals occur in the Northwest Atlantic Ocean, yet definitive species composition is unknown. Indications are that the most numerous species in the area are the common (saddleback) dolphin (Delphinus delphis), harbor porpoise (Phocoena phocoena), and harbor seal (Phoca vitulina). Data on population abundance for various species, however, is sketchy at best, and for some species is non-existent. In addition, feeding behavior and preference for certain prey species are not well understood. These facts in combination make it extremely difficult to assess, even qualitatively, the potential impact of the Butterfish management program on marine mammal populations.

The proposed harvest level for the 1979-1980 fishing year of 11,000 mt is not expected to cause any declines in abundance of this species. Therefore, no change in the availability of these species to those toothed cetaceans and pinnipeds that utilize butterfish as a food item is expected to occur.

Whenever fishing gear and marine mammals occur in the same area, there always exists a potential for an incidental kill of marine mammals. Except in unique situations (e.g., tuna-porpoise in the central Pacific), the incidental kill as a result of commercial fishing activities usually has an insignificant impact upon the stability of marine mammal populations. This is because the number of animals killed is relatively small compared to total population size.

Outside of certain marine mammals, the only threatened/endangered species occurring in the Northwest Atlantic are the shortnose sturgeon (Acipenset brevirostrum) and several species of sea turtles. Because data on occurences of shortnose sturgeon are vital to understanding its current status, the Council urges fishermen to report any incidental catch of this species to the Shortnose Sturgeon Recovery Project of the NMFS.

Available data appear to indicate that several species of sea turtles are regularly found in New England waters. These turtles are the Kemp's ridley (Lepidochelys kempi), leatherback (Dermochelys coriacea), loggerhear (Caretta caretta), and green (Chelonia mydas). In addition, hawksbill turtles (Eretmochelys imbricata) occasionally stray into the area. The Kemp's ridley sea turtle, while probably the most endangered reptile on earth (total population estimated at several thousand animals), is also the most frequently observed sea turtle in New England waters, especially Cape Cod Bay. Strandings of Kemp's ridley, with many individuals dying as a result, are not infrequent in the Bay and have been known to occur for some time. One hypothesis is that individuals remain in the Bay until late autumn, and with the decrease in water temperature as winter approaches, these animals become subject to hypothermia and subsequently die.

In late autumn 1978 seven Kemp's ridley turtles were found on the beaches along Cape Cod Bay. While several of these individuals were reportedly cut and bleeding when first observed, recent examination of the preserved specimens did not reveal any major physical damage to the individuals. It is possible that these animals were injured by fishing activity either through entanglement in the trawl nets or by contact with the vessel's propellor. However, there is no solid evidence to indicate that fishing operations were responsible for the kills. Based on inquiries to fishermen conducted by NMFS and Massachusetts Division of Marine Fisheries personnel, the general conclusion can be drawn that regular and numerous killings of Kemp's ridley turtles in Cape Cod Bay do not occur as a result of normal commercial fishing operations. Efforts are underway to provide much needed monitoring of turtles and to better inform fishermen and the public about the necessity of protecting these animals, consistent with the position of not interfering, to the extent possible, with legitimate fishing activities.

In conclusion, the Council does not believe that implementation of the Butterfish FMP will have any adverse impact upon populations of marine mammals and endangered species. As additional understanding of the status and dynamics of marine mammal and sea turtle populations becomes available, the Council will integrate this information into their examination of potential impacts upon the environment as a result of FMPs.

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 fishery that are the subject of this management plan.

State Coastal Zone Management (CZM) Programs

The proposed action entails management of butterfish 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 Coastal Zone Management 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. The review will include the most recent cruise survey data and data on the US harvesting and processing industries. This will permit a review of MSY, OY, US capacity, and TALFF and the development of and required modifications to the FMP. These reviews will be carried out so that any amendments to the FMP can be reviewed by the Council and the public and be implemented by the Secretary of Commerce by April 1 of each year. This schedule may be modified in the future as the domestic fishery evolves.

XVII. REFERENCES

All requests for information upon which this FMP has been based should be directed to the offices of the Mid-Atlantic Fishery Management Council.

Atkinson, L. P. 1976. Chemical oceanography. In: Sharp, J. H. (ed.), 1976. Report on a Workshop held in Washington, D.C., 15-16 October, 1976. NSF Contract No. OCE 7700465. Univ. of Delaware: 81-84.

Beverton, R. J. H., and S. J. Holt. 1957. On the dynamics of exploited fish populations. Fish. Invest., London (2) 19: 533 p.

Bigelow, H. B., and W. C. Schroeder. 1953. Fishes of the Gulf of Maine. US Fish. Wildl. Serv., Fish. Bull. 53(74): 577 p.

Bliss, C. I. 1967. Statistics in Biology. Vol. I. Statistical Methods For Research In the Natural Sciences. McGraw-Hill, New York: 588 p.

Brown, J., and E. McCoy. 1969. A review of the North Carolina scrap fishery. N.C. Dept. of Conserv. and Development, Div. Comm. Sports Fish. : 12 p.

Caldwell, D. K. 1961. Populations of the butterfish, Poronotus triacanthus (Peck), with systematic comments. Bull. South. Calif. Acad. Sci., 60(1): 19-31.

Chamberlin, J. L. 1977. Monitoring effects of Gulf Stream meanders and warm core eddies on the continental shelf and slope. ICNAF Sel. Pap. 2: 145-153.

Cohen, E. G. 1975. An overview of the plankton community of the Gulf of Maine. ICNAF Res. Doc. 75/106.

Draganik, B., and Cz. Zukowski. 1966. The rate of growth of butterfish (Poronotus triacanthus (Peck)) and ocean pout (Macrozoarces americanus (Schneider)) from the region of Georges Bank. ICNAF Res. Doc. 66-42: 3 p.

DuPaul, W. C., and J. D. McEachran. 1973. Age and growth of the butterfish, Peprilus triacanthus, in the lower York River. Ches. Sci. (14(3)): 205-207.

Fahy, W. E. 1966. Species composition of the North Carolina industrial fish fishery. Commercial Fisheries Review 28(7): 8 p.

Fritz, R. L. 1965. Autumn distribution of groundfish species in the Gulf of Maine and adjacent waters, 1955-1961. Am. Geol. Soc., Ser. Atlas Mar. Environ., Folio 10: 48 p.

Fahy, W. E. 1966. Species composition of the North Carolina industrial fish fishery. Commercial Fisheries Review 28 (7); 8 p.

Grosslein, M. D., E. G. Heyerdahl, and H. Stearn, Jr. 1973. Status of the international fisheries off the Middle Atlantic coast. NMFS, Northeast Fish. Center, Woods Hole Lab. Ref. 73-4: 123 p.

Gulland, J. A., and L. K. Boerema. 1973. Scientific advice on catch levels. NMFS, Fish. Bull. 71(2): 325-335.

Gusey, W. F. 1976. The fish and wildlife resources of the Middle Atlantic Bight. Shell Oil Company, Houston: 582 p.

Haedrich, R. L. 1967. The stromateoid fishes: systematics and a classification. Bull. Mus. Comp. Zool. 135(2): 31-139.

Heald, E. J. 1968. Atlas of the principal fishery resources on the continental shelf from New York to Florida. Inst. Mar. Sci., Univ. Miami: 235 p.

Horn, M. H. 1970. Systematics and biology of the stromateoid fishes of the genus Peprilus. Bull. Mus. Comp. Zool. 140(5): 165-261.

International Commission for the Northwest Atlantic Fisheries. 1977. Proceedings of the Ninth Special Meeting, December, 1976, 27th Annual Meeting, June, 1977: 172 p.

Kawahara, S. 1977. Age and growth of butterfish, Poronotus triacanthus (Peck) in ICNAF Subarea 5 and Statistical Area 6. ICNAF Res. Doc. 77/VI/27: 13 p.

Leim, A. H., and W. B. Scott. 1966. Fishes of the Atlantic coast of Canada. Bull. Fish. Res. Bd. Canada 155: 485 p.

Lopez-Veiga, E. C., and E. Labarta. 1975. Some observations on the Spanish squid

(Illex and Loligo) fishery in Subarea 5 and Statistical Area 6 of ICNAF. ICNAF Working Paper No. 3: 16 p.

Maurer, R. O.,Jr., and R. E. Bowman. 1975. Food habits of marine fishes of the northwest Atlantic - data report. NMFS, NEFC, Woods Hole Lab. Ref. 75-3: 90 p.

McHugh, J. L. 1977. Fisheries and fishery resources of New York Bight. NOAA Tech. Rept., NMFS Circ. 401: 50 p.

McHugh, J. L. 1960. The pound-net fishery in Virginia. Part 2. Species composition of landings reported as menhaden. US Dept. Int., Comm. Fish. Rev. 22(2): 16 p.

Meyer, H. L., and J. V. Merriner. 1976. Retention and escapement characteristics of pound nets as a function of pound-head mesh size. Trans. Amer. Fish. Soc. 105(3): 370-379.

Murawski, S. A. 1978. Consideration of the maximum sustainable yield from the northwestern Atlantic butterfish stock. NMFS, Woods Hole Lab. Ref. 78-30: 8 p.

Murawski, S. A., D. G. Frank, and S. Chang. 1978. Biological and fisheries data on butterfish, Peprilus triacanthus (Peck). NMFS, NEFC, Sandy Hook Lab., Tech. Ser. Rept. No. 6: 39 p.

Murawski, S. A., and G. T. Waring. 1978. An assessment of the butterfish, Peprilus triacanthus (Peck), off the northwestern Atlantic coast. NMFS, Woods Hole Lab. Ref. 77-29: 33 p.

Nagasaki, F. 1976. By-catch in Japanese squid-butterfish fisheries of Subarea 5 and Statistical Area 6. ICNAF Working Paper No. 76/XII/158: 7 p.

Nichols, J. T., and C. M. Breder. 1927. The marine fishes of New York and southern New England. N.Y. Zoll. Soc. Zoologica 9(1): 192 p.

Paulik, G. J., and L. E. Gales. 1964. Allometric growth and the Beverton-Holt yield equation. Trans. Amer. Fish. Soc. 93(4): 369-381.

Pope, J. G. 1972. An investigation of the accuracy of virtual population analysis using cohort analysis. ICNAF Res. Bull. 9: 65-74.

Saila, S. B. 1973. Introduction. In: Coastal and offshore environmental inventory - Cape Hatteras to Nantucket Shoals. University of Rhode Island Mar. Pub. Ser. 2.

Sharp, J. H. (ed.) 1976. Anoxia on the middle Atlantic shelf during the summer of 1976. Report on a workshop held in Washington, D. C., 15-16 October, 1976. NSF Contract No. OCE 7700465. Univ. Delaware: 81-84.

Sissenwine, M. P., and E. W. Bowman. 1977. Fishing power of two bottom trawls towed by research vessels off the northeast coast of the USA during day and night. ICES Gear and Behavior Comm. C. M. 1977/B:30: 12 p.

Smith, L. J., and S. B. Peterson. 1977. The New England fishing industry: a basis for management. Woods Hole Oceanographic Institution, Technical Report WHOI-77-57: 130 p.

Steimle, F. 1976. A summary of the fish fill-anoxia phenomenon off New Jersey and its impact on resource species. In: Sharp, J. H. (ed.), Anoxia on the middle Atlantic shelf during the summer of 1976. Report of a workshop held in Washington, D. C., 15-16 October, 1976. NSF Contract No. OCE 7700465. Univ. Delaware: 5-11.

Theilacker, G., and R. Lasker. 1974. Laboratory studies of predation by euphausiid shrimps on fish larvae. In: Blaxter, J. H. S. (ed.), The Early Life History of Fish. Springer-Verlag, New York: 765 p.

Tibbetts, A. M. 1977. Squid fisheries (Loligo pealei and Illex illecebrosus) off the northeastern coast of the United States of America, 1963-1974. ICNAF Selected Pap. No. 2: 85-109.

US Department of Commerce. 1976. Draft EIS/PMP for Other Finfish. US Department of Commerce, NOAA, NMFS: 85 p.

US Department of Commerce, Census Bureau. City County Data Book.

Waring, G. 1975. A preliminary analysis of the status of butterfish in ICNAF Subarea 5 and Statistical Area 6. ICNAF Res. Doc. 75/74: 32 p.

Wilk, S. J., W. W. Morse, D. E. Ralph, E. J. Steady. 1975. Life history aspects of New York Bight finfishes. Unpub. Rept., NMFS, Sandy Hook Laboratory: 265 p.

Wolff, M. 1972. A study of North Carolina scrap fishery. N.C. Dept. of Natural and Economic Resources, Div. Comm. Sports Fish., Spec. Sci. Rept. No. 20: 29 p.

XVIII. APPENDIX

XVIII-1. Sources of Data and Methodology

Data in the plan were supplied by the NMFS and the individual states. 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, squids 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. These have been updated and amended for 1978. Plans for several other species are also in various stages of preparation by the New England and Mid-Atlantic Fishery Management Councils.

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

1. This Butterfish FMP will replace the PMP currently regulating foreign fishing for butterfish 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. Butterfish are a food item for many commercially and recreationally important fish species. Also, butterfish utilize many species of finfish and squid as food items.
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. Therefore, there is no threat to the Sanctuary by allowing foreign fishing for butterfish 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 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 butterfish 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 Coastal Zone Management 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 proposed optimum yield of butterfish that will be established by this action has been considered in light of recent estimates of stock size and various estimates of the levels of fishing mortality. No significant adverse long-term effect on the stock of butterfish is expected as a result of this action, but it must be noted that sufficient data are not available to support a high degree of confidence in this statement. Thus, continuing monitoring and assessment for this stock is critical so that better assessments can be made. New information may be required and modifications of the management plan may be necessary. The data are tenuous and modifications of the estimated yields in response to fluctuations in stock size can

be expected.

This plan should induce no significant adverse impact on the environment. It is designed to optimize long-term yield recognizing the importance of butterfish as a forage species and thereby contributing to the overall productivity of the ecosystem.

The proposed action would permit a catch of butterfish by US fishermen in excess of their estimated catch for 1978. Therefore, this action will help offset the economic impact of expected lower catches of other species. This may lead to the development of an export industry. No increases in labor costs are likely to result from the larger catches because of substantial unemployment in the affected ports.

Alternatives To The Proposed Plan

This plan proposes a level of optimum yield, plus restrictions on the level of foreign fishing based on the surplus after the US catches its estimated capacity, and area and seasonal limits on fishing by foreign nations. Changes in any of these proposals are possible alternative actions. The probable impact of each group of alternatives relative to the proposed action is discussed below:

1. Increased/Decreased Optimum Yield - The proposed optimum yield (OY) represents the best possible balance of possible catch levels consistent with the attainment of the objectives of this FMP (see Section XII). The probable biological consequences of an increased or decreased optimum yield are described in Section V-2.
2. Increased/Decreased US Capacity - The US capacity estimate proposed in this Plan represents the best prediction of domestic harvest for this species in 1979 - 1980, based upon information received to date by the Mid-Atlantic Fishery Management Council.
3. Take No Action At This Time - This alternative would mean that the PMP, prepared by the NMFS, would continue in force. The PMP regulates foreign fishermen only. The effect of this alternative would be that the data that will be collected on domestic fishing and processing efforts as a result of this plan could not be collected as effectively, and assessments of the scope and development of the domestic fishery would not be as accurate as they will be with the plan.
4. Changes In The Management Unit - Alternative management units include (a) only the FCZ and (b) US territory, in both cases north of Cape Hatteras. Using butterfish in the FCZ only would not maintain the flexibility of the FMP relative to US/Canadian fishery negotiations and would limit the collection of data on all US fishing efforts for butterfish. This would be a significant problem in a developing fishery. Limiting the management unit to butterfish in US territory would be adequate if the question of a bilateral agreement with Canada were resolved.

Probable Adverse Effects Of The Action Which Cannot Be Avoided

The optimum yield specified by the proposed actions is below the harvesting capacity and demand for butterfish of nations which have fished in the region in recent years. Thus the OY represents an adverse action with respect to foreign fishing.

Increased US landings of butterfish on the Atlantic coast could require more labor input for processing, but because of substantial unemployment, no increase in the cost of labor is expected.

There should be no adverse impact on the recreational fishing industry which does not utilize butterfish heavily. No severe reduction in the availability of

butterfish as a prey organism for commercially and recreationally important species is expected.

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

The proposed management measures are designed to accomplish two goals: (1) provide for a sustainable optimum yield based on stable stock levels (recognizing, of course, natural fluctuations in stock abundance), and (2) provide the United States an allocation that will encourage efforts to develop the domestic butterfish fishery. The proposed action could, over the long run, lead to increased US profit from the butterfish fishery.

Sufficient data are not available to predict effects of the proposed action on total productivity of the region. To do so would require knowledge of trophic interactions among butterfish and other species beyond our present understanding. Therefore, the proposed action is designed to result in continued yields on at least the present level based on the best scientific evidence available. Even so, it is impossible to completely forecast the long-term effects of the proposed action.

The relationship between the short-term use of the environment and the promise of long-term viability of the stocks is a strong and necessary bond. Prudent and responsible use of the resource base requires no less.

Irreversible And Irretrievable Commitments of Resources

No irreversible commitments of resources will result from the implementation of this butterfish management plan which has been set in motion by the passage of the FCMA. 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 can 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.

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

The butterfish 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 the fisheries so as to maximize the 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 forseeable future.

The proposed action will result in catches of butterfish by foreign nations below their harvesting capacity and demand for butterfish, and thus will have an adverse economic impact on them. From 1963-1976, the butterfish catch in SA 5 and 6 by

countries other than the United States averaged just under 9,900 metric tons annually. For 1978, the total allowable level of foreign fishing (TALFF) for butterfish within the FCZ was 4,000 mt, a drastic reduction. This fishery management plan proposes for 1979 a TALFF of 4,000 tons. Quantification of the impact on foreign nations is not possible, since the opportunities for deployment of foreign vessels into fisheries in other parts of the world or the costs of such redeployment are unknown. However, a reduction in catches by other countries is considered necessary to help assist the development of the US industry while at the same time avoiding the risk of reducing future productivity of the stocks. Therefore, the butterfish OY has been set at a level that take both these views into consideration, while fulfilling the requirement in the FCMA of making a fishery surplus available to foreign nationals.

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

Location	Date	Number of Public Attending
Norfolk, VA	9/20/78	7
Ocean City, MD	9/21/78	11
Cape May, NJ	9/26/78	3
Asbury PArk, NJ	9/27/78	18
Centerreach, NY	9/28/78	8
Pt. Judith, RI	10/3/78	34
Gloucester, MA	10/4/78	16
Portland, ME	10/5/78	8

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 National Marine Fisheries Service. 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 National Marine Fisheries Service. 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 National Marine Fisheries Service, 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 National Marine Fisheries Service. 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.

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 National Marine Fisheries Service. 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

Peabody Office Building
One Newbury Street
Peabody, Massachusetts 01960

617-535-5450 FTS 8-223-3822

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 distinquished 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.

pp

DEPARTMENT OF STATE

Washington, D.C. 20520

BUREAU OF OCEANS AND INTERNATIONAL
ENVIRONMENTAL AND SCIENTIFIC AFFAIRS

October 2, 1978

Mr. Roland F. Smith
Acting Director
Office of Conservation
and Management
NMFS, Page Bldg. 2
3300 Whitehaven Street N.W.
Washington, D. C. 20235

Dear Roland:

Thank you for giving us the opportunity to comment on the August draft Butterfish Fishery Management Plan/Environmental Impact Statement.

Our main concern is that, while the maximum sustainable yield (MSY) is 21,635mt, the optimum yield is only 10,000mt, with a foreign surplus of 4,000mt. We understand the mid-Atlantic Council's desire to foster growth of the U.S. butterfish fishery, but there is no evidence in the Plan of an economic analysis of the world market. It appears, on pages 52 and 70, that conjecture alone justifies the foreign surplus. We would appreciate a copy of any such study that has been made. 1

The National Marine Fisheries Service is aware of the contraints on foreign fishing caused by low bycatch levels. We believe that the practice of correlating the bycatch TALFF to the target species TALFF's might have merit, especially if the best observer program data are used. In 1978, an arbitrary TALFF of 4,000mt butterfish to 1900mt Loligo was established. Since it appears that the 1979 squid FMP will set a Loligo TALFF of 30,000mt, it may be necessary to raise the butterfish TALFF--without exceeding MSY--to a level that will not prohibit foreign nations from taking their quotas. 2

We also request, unless there are overriding conservation reasons, that the butterfish TALFF be raised automatically with any midseason increase in the Loligo TALFF. 3

Again, thank you for the opportunity to comment on this Plan.

Sincerely,

John D. Negroponte
Deputy Assistant Secretary
Office of Oceans and
Fisheries Affairs

DEPARTMENT OF TRANSPORTATION
UNITED STATES COAST GUARD

MAILING ADDRESS:
U.S. COAST GUARD (G-WEP-7/73)
WASHINGTON, D.C. 20590
PHONE: 202-426-3300

16476/7.b 486

Mr. Roland F. Smith
Acting Director, Office of
Resource Conservation and Management
National Marine Fisheries Service
Washington, D.C. 20235

Dear Mr. Smith:

The concerned operating administrations and staff of the U.S. Coast Guard have reviewed the draft Environmental Impact Statement (EIS) and Fishery Management Plan (FMP) for the Butterfish Fishery Northwestern Atlantic Ocean. We offer the following comments on these documents:

a. p. 75, Paragraph XIII - 1(b). We recommend the National Marine Fisheries Service (NMFS) and the U. S. Coast Guard (USCG) jointly develop a license form containing information relating to those elements mentioned in this section. The phrase "..., or when the master of the vessel changes in the directed fishery or fisheries of such vessel," is unclear and should be clarified. Prior to this phrase there is no reference to directed or incidental fisheries. Expiring a permit for a change of directed fishery is questionable since butterfish are likely to be taken incidentally to a newly claimed directed fishery and the requirement for a butterfish permit remains. 4

b. p. 75-76 Vessel Identification. Since a marking system for foreign fishing vessels has already been established, paragraph (a) should reflect 50 CFR 611.5 (vessel and gear identification). We recommend the Council with NMFS and the USCG, develop domestic vessel identification standards which are consistent with existing requirements of the federal and state marking regulations. 5

c. p. 76, Sanctions. This section should make it clear that all sanctions referred to in Sections 308, 309, and 310 of the Fishery Conservation and Management Act apply equally with those of Section 204(b)(12) to violations by U. S. nationals and vessels. 6

d. p. 76, Time and Area Restrictions. It is unclear whether the Council intends to prohibit all fishing within the coordinates listed. Are recreational, domestic and foreign fishing to be prohibited? Also, it is unclear whether the Council proposes to close all fishing within an approximately 190 square mile area of the Northwestern Atlantic Ocean (39°49'00"N - 39°00'00"N, 72°05'00"W - 72°30'00"W) designated in 50 CFR 611.30. If so, area 4 should be amended to reflect this closure. 7

e. p. 76, Fixed Gear Avoidance. The problem relating to mobile gear conflicting with fixed gear is equally applicable to domestic vessels as well as foreign vessels. There is a need to develop a separate set of regulations regarding the handling of gear conflicts in which domestic vessels are the principals involved. The Secretary of Commerce has the authority, under the Act, to promulgate such regulations (Coast Guard may otherwise consider promulgation of gear conflict regulations under the authority of the Outer Continental Shelf Lands Act). 8

f. p. 78, Paragraph XIV-2(a)(1). A standard log format for recording fishing effort and catch should be developed, incorporated into the FMP, and explicitly outlined in the regulations. A standardized log with simple and complete instructions will facilitate data compilations by vessel personnel, and data location and interpretation by boarding personnel. 9

The opportunity to review the Environmental Impact Statement and Fishery Management Plan is greatly appreciated.

Sincerely,

[signature]

By direction
Chief, Environmental Impact Branch
Marine Environment and Systems

United States Department of the Interior

OFFICE OF THE SECRETARY
Northeast Region
15 State Street
Boston, Massachusetts 02109

ER78/865

October 20, 1978

RECEIVED
OCT 23 1978
MID ATLANTIC COUNCIL

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

Dear Mr. Bryson:

This is in response to Mr. Sidney R. Galler's request for the Department of the Interior's comments on the draft environmental statement for the proposed fishery management plan for Butterfish Fishery, Northwest Atlantic Ocean.

We believe the document adequately treats its subject matter and we therefore have no further comment.

Sincerely yours,

William Patterson

William Patterson
Regional Environmental Officer

104

RECEIVED
OCT 13 1978
MID ATLANTIC COUNCIL

Oct 8, 1978

Dear Mr. Bryson,

As the lesser of two evils, I will agree with the amendment to establish a fishing year instead of a calender year for squid, mackeral and butterfish. It could be disasterous if reallocation of unused domestic quotas are established in May. 10

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 managment development plan because ever since your council has been in existance your starting to put U.S. fisherman out of business, starting with the New England fisherman. 11

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. fisherman that are not affected by the cod, yellowtail, and haddock fisheries are waiting to be told in the near 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 your council 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 SCIABARRA, 31 Ross Lane, Mt. SINAI, N.Y. 11766

So. DeWitt Place
P. O. Box 307
Montauk, N. Y. 11954
October 10, 1973

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. 12

Yours truly,

Richard Stern

Richard Stern
Boat "DONNA LEE"

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

DEAR SIR:

IT'S BEEN BROUGHT TO OUR ATTENTION THAT IN YOUR MANAGEMENT PLANS FOR SQUID, MACKERAL & BUTTERFISH THAT WE OUR ON A CALENDER 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. 13

RIGHT NOW ON LONG ISLAND 15-20 NEW BOAT WILL BE ARRIVING IN THE NEXT 6 MO. QUOTA'S ARE BEING REDUCED & FEDERAL AID FOR NEW CONSTRUCTION INCREASED. HOW DO YOU PAY A FEDERAL GUARANTEE LOAN OFF WHILE FISHING UNDER FEDERALLY REDUCED QUOTA'S (COMM. DEPT.)

(2)

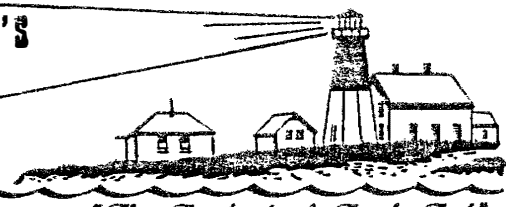
CAPTAIN JOHN, INC.
FLEMING STREET
EAST HAMPTON, N. Y. 11937

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 AFFECTS TO EVERYTHING ALONG THE WAY. WITH NEW BOATS, THE OLD BOATS OUR STILL IN THE FLEET. MORE DEMAND FOR DOCKING!, HELP TO TOWNS & COUNTIES WITH THIS PROBLEM. MORE PACKING & ICE & FUELING PROBLEM. UPDATE THE OLD PACKING HOUSES & ENCOURAGE NEW FACILITIES. MAINTINANCE OF THE FLEET! SHIPYARDS OR THE LACK OF THEM. HELP THE YARD OWNERS WHO CATER TO THE COMMERIAL FISHERMEN. 14

SORRY FOR GETTING OFF THE SUBJECT! QUOTA'S FOR SQUID, MACKEREL, + BUTTERFISH.

YOURS TRULY,
CAPTAIN ROBERT ERIC SPANG
F/V CAPTAIN JOHN

POINT JUDITH FISHERMEN'S
Cooperative Ass'n., Inc.



POINT JUDITH, R. I. · TELEPHONE 783-3368 *"The Freshest of Fresh Fish"*

August 24, 1978

RECEIVED
AUG 29 1978
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 Sir:

At the request of Jacob J.Dykstra I am submitting the pounds of butterfish packed out at our Co-operative for the years 1976, 1977 and for the year 1978 (up to August 21st.)

	Butterfish Landings
1976 (12 months)	931,251 lbs.
1977 (12 months)	1,094,236 lbs.
1978 to Aug. 21, 1978	1,592,954 lbs.

It should be noted that our butterfish landings are heaviest during the months of September through December and the pounds packed out during this period for 1976 and 1977 were 707,291 pounds and 688,692 pounds respectively. It can reasonably be concluded that the landings for 1978 will be over two and one-half million pounds.

The main reasons for the increased landings are: 1. Availability; 2. markets opened up with Japanese; 3. sustained high ex-vessel price regardless of increased landings. If the foreign nationals are given a quota on butterfish, we believe the three favorable conditions listed above will be adversely effected. In fact, this year was the first time that processed butterfish (frozen) afforded the fishing vessels a better ex-vessel price than the fresh market.

Very truly yours,

Pt. Judith Fishermen's
Co-operative Ass'n., Inc.

Leonard J. Stasiukiewicz
General Manager

LJS/e

107

15

RECEIVED
OCT 18 1978
MID ATLANTIC COUNCIL

October 16, 1978

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.

16

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 specics 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 .....

Mr. John Bryson
Mid-Atlantic Fishery Council

10/16/78

All these quotas being set are inflationary in a supply and demand market. Most fisherman hear about quotas, but know nothing until that are imposed on them. Glouster 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. 17

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.

EXTENDED FISHERIES JURISDICTION

UPDATE 28 September 1978

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

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.

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 6½ 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 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

Vessel Class	Gulf of Maine Trip Limit	Overrun
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

Vessel Class	Georges Bank and South Trip Limit	Overrun
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

Vessel Class	All Areas Trip Limit	Overrun
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

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.

For information write or call:

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

COOPERATIVE EXTENSION
U.S. Department of Agriculture
Roberts Hall, Cornell University
Ithaca, New York 14850

Official Business
Penalty For Private Use, $300

POSTAGE AND FEES PAID
U.S. DEPARTMENT OF
AGRICULTURE
AG2 101

111

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 Haby

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 Human Ecology, and New York State Veterinary College at Cornell University, Cooperative Extension Associations, County Governing Bodies, and United States Department of Agriculture, cooperating.

RECEIVED
OCT 24 1978
MID ATLANTIC COUNCIL

October 23, 1978

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:

In accordance with notices of Federal Register in September 1 and September 28 issues, I herewith submit Japanese Comments on Draft Fishery Management Plan on Atlantic Squid, as requested by Fisheries Agency of the Japanese Government, and comment on Butterfish.

Very truly yours,

Takeshi Nakamura

Takeshi Nakamura
Executive Director
Japan Fisheries Association
Washington Representative Office

Encl:
as stated

JAPANESE COMMENT ON DRAFT FISHERY MANAGEMENT PLAN

FOR

BUTTERFISH

Japan Fisheries Association

October 23, 1978

In putting forward our comment regarding the FMP of Butterfish we would like to stress the fact that it is Japanese fishermen who have developed the winter butterfish fishery off the Atlantic coast of U.S. in combination with our fishery for Loligo, both of which had been left untouched by U.S. fishermen. We wish that our historical fishery should be given due conside ration in formulating the management plan for butterfish. Striking feature of the present draft FMP is the fact that while admitting the better resource condition than that of last year OY is set at about 50 percent of that of last year. We can not but feel that this runs counter to the spirit of optimum utilization of resources and, if not, that the concept of optimum utilization has been distorted to mean undue restriction on foreign fishermen.

I. INCREASE OF OY AND TALFF

Request: OY should be set on the same level as MSY. If not, OY should be set at no less than 18,000 MT, the OY for 1978 at least, TALFF should be increased accordingly. 18

Reasons: In this FMP, it is admitted that the condition of the butterfish stock in 1978 is good relative to previous year, and that, if the average recruitment continues to fluctuate about the mean, then the long-term MSY will remain at 21,635 MT. We, therefore, consider that setting OY on the same level as MSY will cause no adverse effect to the resources.

Only one reason, we can find in this FMP, for setting OY on such a low level is the apprehension that the increase in TALFF according to the increase of OY may bring some adverse effect on U.S. interest in the butterfish fishery and export.

We can not but saying that setting such a low OY for such a reason runs entirely counter with the spirit of FCMA which provides the objective of the optimum utilization of the fishery resources.

We, therefore, strongly request that OY should be set on the same level as MSY and in no case should it be lower than 18,000 MT which was the OY of 1978, since, as is clearly stated in the draft FMP, the resource is definitely getting better than the previous year.

It goes without saying that TALFF should be increased accordingly.

We appreciate the reduction of DAH from 14,000 MT of 1978 to 6,000 MT in the present draft FMP in the light of recent trend of butterfish catch by U.S. fishermen. We would like to request further, however, the DAH should be reviewed periodically, so that any possible excess reserve to U.S. capacity be reallocated to foreign fishery as early as possible

II. AVOIDANCE OF FIXED GEAR

Request: Early implementation of the Gear Conflict Regulations shall be encouraged. And on the basis of the said regulation the present 100 - 200 fathom depth restriction shall be reconsidered to reduce the prohibited area for foreign fishing to the minimum necessary for avoidance of actual gear conflict. 19

Reasons: As already acknowledged by the U.S. Coast Guard and the U.S. Observers, Japanese fishing vessels are operating with the greatest circumspection to avoid gear conflicts. In fact, there have been no such conflicts attributable to Japanese vessels. However, in order to further avoid any accidental conflicts, it is considered very effective to enhance on your part the accuracy of the information on the position of the fixed gear.

III. RELATIONSHIP WITH ATLANTIC SQUID FMP

Request: School of Loligo and that of Butterfish are usually mixed with each other. As may be well known, Japan is the only nation that has initiated utilization of this mixed offshore group of the two species. To continue this fishery we request that the present too restrictive quota for butterfish shall be reconsidered. 20

DEPARTMENT OF TRANSPORTATION
UNITED STATES COAST GUARD

MAILING ADDRESS:
COMMANDER (AO1)
ATLANTIC AREA, U.S. COAST GUARD
Ggovernors ISLAND
NEW YORK, N.Y. 10004

16475
APR 1978

NOV

MID-ATLANTIC COUNCIL

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

Subj: Environmental Impact Statement/Fishery Management Plans; 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).

D. L. 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)
CCGDONE (o,mep)
CCGDTHREE (o,mep)
CCGDFIVE (o,mep)
NERFMC
MARFMC
SARFMC
NMFS NE REGION

113

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: 21

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: 22

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:

1. Figure 8 has been mistakenly omitted from the draft EIS/FMP for Butterfish on page 25. 23

2. 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. 24

3. 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"N vice 38°-20'00"N - 39°-25'00"N. 25

Enclosure (1)

XVIII-4. Responses to Written Comments

1. The OY has been increased to 11,000 mt. Given the assessment and the objective of promoting the growth of the US butterfish export industry, that OY seems reasonable at this time.
2. The Council has reviewed foreign catch statistics for butterfish and Loligo and feels that the 4,000 mt TALFF does not present an unreasonable hardship for foreign nations.
3. The Council does not believe there should be an automatic adjustment for the butterfish TALFF to reflect possible adjustments to the Loligo TALFF at this time, given the FMP's first objective.
4. The Council believes that this matter should be resolved between the NMFS and the Coast Guard prior to any changes being made to the FMP.
5. See response #4.
6. The FMP has been revised to clarify this matter.
7. The Council was responsive to the EPA request relative to this matter.
8. The Council is working with the Coast Guard, the NMFS, and the New England Council to prepare regulations of this type.
9. The NMFS is working on this problem. The Council supports these efforts.
10. The FMP has been revised to put it on a fishing year basis.
11. This would require a change in the FCMA.
12. See response #10.
13. See response #10.
14. This issue is outside the scope of the FMP.
15. The US capacity has been increased from 6,000 mt to 7,000 mt.
16. See response #1.
17. There was an attempt made through press releases and other methods to notify as many people as possible about the FMP and hearings.
18. See response #1.
19. See response #8.
20. See response #3.
21. "Registration" and "permit" should be considered synonymous.
22. See response #7.
23. This problem has been resolved.
24. See response #23.
25. See reponse #23.

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