# FINAL ENVIRONMENTAL IMPACT STATEMENT/FISHERY MANAGEMENT PLAN

# FOR THE

# SQUID FISHERY OF THE NORTHWEST ATLANTIC OCEAN

## SUPPLEMENT NUMBER 1

November, 1978

Mid-Atlantic Fishery Management Council

in cooperation with

New England Fishery Management Council

South Atlantic Fishery Management Council

National Marine Fisheries Service

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

January 8, 1979

Dear Reviewer:

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

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

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Mid-Atlantic Fishery Management Council
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Telephone: 302/674-2331

Thank you for your cooperation in this matter.

Sincerely,

Sidney R. Galler
Deputy Assistant Secretary
for Environmental Affairs

Enclosure

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

# PROPOSED FISHERY MANAGEMENT ACTIONS

for the

Squid Fishery of the Northwest Atlantic

## Decision Rationale

The proposed actions to implement recommendations resulting from the Fishery Management Plan for the Squid Fishery of the Northwest Atlantic Ocean are as follows:

1. Restrict the harvest of squid in the Atlantic within U.S. jurisdiction to a total of 74,000 mt. The total harvest level is to be further allocated as follows:

| Species | Domestic | Foreign | Total |
|---|---|---|---|
| Illex | 10,000 | 20,000 | 30,000 |
| Loligo | 14,000 | 30,000 | 44,000 |
| Total | 24,000 | 50,000 | 74,000 |

2. Require licensing of all commercial fishing vessels, including head and charter boats, that fish for or are expected to have incidental catches of squid in the Fishery Conservation Zone (FCZ).

3. Require licensed vessels to file squid catch reports weekly.

4. Require processors to file squid transaction reports weekly.

The proposed harvest level is an environmentally acceptable action, as it is at or below the maximum sustainable yield from the squid fisheries.

The allocation between domestic and foreign fisheries is intended to promote the growth of the U.S. squid fishery while allowing the surplus to be harvested by foreign fishing interests. Licensing of vessels, and the filing of squid catch reports by licensed vessels and processors would strengthen the National Marine Fisheries Service's ability to collect much needed data on the state of the fishery.

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## ABBREVIATIONS USED IN THIS DOCUMENT

CFR - Code of Federal Regulations
cm - centimeter
EIS - Environmental Impact Statement
fathom - 6 feet
FCMA - Fishery Conservation and Management Act
FCZ - Fishery Conservation Zone
fishing year - the 12 month period beginning April 1
FMP - Fishery Management Plan
FRG - Federal Republic of Germany
GDR - German Democratic Republic
GIFA - Governing International Fishery Agreement
ICNAF - International Commission for the Northwest Atlantic Fisheries
km - kilometer
knot - a unit of speed equal to one nautical mile (1.15 miles) per hour
mt - metric ton = 2204.5 pounds
MSY - maximum sustainable yield
NMFS - National Marine Fisheries Service
NOAA - National Oceanic and Atmospheric Administration
OY - optimum yield
PMP - Preliminary Fishery Management Plan
SA - Subarea or Statistical Area
Secretary - Secretary of Commerce
TAC - Total Allowable Catch
TALFF - total allowable level of foreign fishing

## II. SUMMARY

( ) Draft (X) Final Supplemental Environmental Impact Statement/Fishery Management Plan for the Squid 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 (18 USC 1801 et seq.), enacted and signed into law on April 13, 1976, established a fishery conservation zone and provided for exclusive US regulation over all fishery resources except highly migratory species (i. e., tuna) within the Zone. This management plan for the squid 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 PMP currently in effect for Northwest Atlantic Squid. The objectives of the plan are to:

1. Achieve and maintain optimal stocks for future recruitment.
2. Prevent destructive exploitation of squid species.
3. Minimize capture of nontarget species.
4. Achieve efficiency in harvesting and use.
5. Maintain adequate food supplies for predator species, recognizing that squid are also predators.
6. Minimize user conflicts.
7. Improve understanding of the condition of the stocks.
8. Encourage increased American participation in the squid fishery.

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

1. Define the management unit for this FMP as all *Loligo pealei* and *Illex illecebrosus* under US jurisdiction in the Atlantic.
2. The 1979 - 1980 fishing year Optimum Yield for *Illex* be set at 30,000 metric tons and the 1979 - 1980 fishing year Optimum Yield of *Loligo* be set at 44,000 metric tons. The US capacity is 10,000 mt of *Illex* and 14,000 mt of *Loligo*. The foreign surplus (TALFF) is 20,000 mt of *Illex* and 30,000 mt of *Loligo*.
3. Any vessel owner or operator (foreign or domestic) desiring to catch squid or transport or deliver for sale, any squid must possess the appropriate valid registration or permit from the NMFS. This does not apply to individual US fishermen catching squid for their personal use.
4. Foreign fishing for squid be restricted to five designated areas.
5. Appropriate gear restrictions be imposed on foreign vessels fishing for squid.
6. Periodic reports on squid catches must be filed by foreign and domestic fishermen. Domestic dealers and processors must submit weekly

reports on any transactions involving squid.

7. Incentives be provided, as discussed in Section XIII-8, to encourage development of the domestic squid industry.

8. A reassessment of the estimated US harvesting capacity for squid will be conducted annually. Based on this analysis allocation of additional amounts of squid available for foreign harvest will be considered as discussed in 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 squid stocks while permitting and encouraging the domestic squid industry to develop fully. This plan allows for the continuation of the foreign squid fishery.

## II-5. Alternatives

Alternative conservation and management measures for which comments are desired are:

1. Increased Optimum Yields (OYs) - This may result in a reduction in future productivity of the stocks for a moderate stock-recruitment relationship.* If recruitment is independent of spawning stock, increases in OYs could occur without risk to future productivity. Sufficient information is not now available with which to estimate the impact of increased OYs for Loligo or Illex until responses of the squid populations, particularly Illex, to present OY levels are observed.

2. Reduced OYs - This would decrease the chances of a reduction in future productivity of these stocks, but unless there is a strong stock recruitment relationship, the most likely result is that a resource available for harvest would be underutilized. This is in part predicated on the fact that the OYs selected for both Loligo and Illex take into consideration the short life spans of the species. Based on past catch estimates and trends in abundance, there is little justification for reducing the OYs for Loligo or Illex below these levels. However, the Squid/Butterfish Advisory Subpanel has recommended reducing the OY for Loligo to 10% less than the MSY level in order to enhance prey abundance for predator spcies of significant recreational or commercial importance.

3. Changes in fishing seasons and areas - These seasonal and area limitations on fishing were established to reduce gear conflicts between the offshore lobster pot fishery and the squid fishery. Based on available data, less severe restrictions are likely to result in increased gear conflicts. Alternatively, more severe restrictions are not likely to reduce gear conflicts substantially, and may make it impossible for foreign nationals to catch their proposed allocations.

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

*The relationship, however, between stock size and recruitment for either species is unknown.

effectively, and assessments of the scope and development of the domestic fishery would not be as accurate as they would be with the plan.

5. Changes in gear - Various alternative methods of catching squid to reduce or eliminate bycatch have been considered. These include jigging and use of lights as well as mid-water trawling. The Council believes that the continuation of the gear regulations set forth in 50 CFR 611.13(c) for foreign fishermen should reduce bycatch. Consideration may be given in future amendments to the plan for imposing gear restrictions on domestic fishermen to improve selectivity.

6. Changes in the Management Unit - Alternative management units include (a) only the FCZ, and (b) US territory, that is, the FCZ and the territorial sea combined. Using (a) only would, if nothing else, severly hamper the collection of data on the US fishery. Limiting the management unit to squid in US territory would be adequate only if a bilateral agreement with Canada were resolved, or if Illex were not a transboundary stock.

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

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

II-7. Dates

Hearings:

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

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

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

## III. TABLE OF CONTENTS

# IV. INTRODUCTION

## IV-1. Development of the Plan

This management plan for squid 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 two species of squid (Loligo pealei and Illex illecebrosus) 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 designee of the management measures contained in this plan will constitute such a major Federal action.

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

## IV-2. Overall Management Objectives

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

1. Achieve and maintain optimum stocks for future recruitment.
2. Prevent destructive exploitation of squid species.
3. Minimize capture of non-target species.
4. Achieve efficiency in harvesting and use.
5. Maintain adequate food supply for predator species, recognizing that squid are also predators.
6. Minimize user conflicts.
7. Improve understanding of the condition of the stocks.
8. Encourage increased American participation in the squid fishery.

# V. DESCRIPTION OF THE STOCKS

## V-1. Species and Their Distribution

### Loligo pealei

Known by the common names of long-finned squid, winter squid, common squid, and bone squid, Loligo pealei (Lesueur) is one of five Atlantic species of the genus Loligo of the squid family Loliginidae. L. pealei ranges over the continental shelf from Nova Scotia to the Gulf of Mexico. However, primary commercial concentrations occur from Corsair Canyon on Georges Bank to Cape Hatteras (Serchuck and Rathjen, 1974; Tibbetts, 1975; Hotta, 1976).

Seasonal differences in geographic and bathymetric distribution of long-finned squid are evident and appear to be related to bottom water temperatures. Concentrations are usually found in areas where these temperatures are above 8°C (46° F). For example, the greatest squid catches made by the NMFS 1967-1971 spring and autumn bottom trawl surveys were in 10-12°C and 10-14°C

waters, respectively. During winter, when water temperature is coldest inshore, long-finned squid concentrate along the outer edge of the continental shelf in 8-12°C waters (Summers, 1967; Vovk, 1969). From late spring to early autumn the species disperses from the shelf edge into shallow coastal waters with heaviest concentrations usually occurring in the Cape Hatteras, New York Bight, and Nantucket Shoals areas. During summer, however, concentrations of Loligo may possibly occur anywhere on the continental shelf. This dispersion is part of a spring inshore spawning migration which begins in the southern areas and as water temperatures rise, proceeds northward along the coast. By April or May, mature squid arrive in Massachusetts waters with smaller immature individuals arriving in May and June. During late spring and summer, long-finned squid may be found in harbors and estuaries, particularly in southern New England. In the fall, concentrations appear in the southern New England and Hudson Canyon area (ICNAF 5Zw and 6A) in water less than 110m (9361 ft.) deep (Rathjen, 1973; Serchuck and Rathjen, 1974; Tibbetts, 1975). Vovk (1969) also found large fall concentrations of long-finned squid in the area between Block Island and southern Georges Bank.

NMFS spring bottom trawl surveys show primary concentrations of Loligo in depths of 111-183m (364-600 ft.) and lesser concentrations in other depths surveyed (27-110m and 184-366m). Size distribution correlates with depth in both spring and fall survey data, with the largest individuals usually taken at the greatest depths (Serchuck and Rathjen, 1974). Other investigators (Summers, 1967; Mercer, 1969) have found similar correlations.

Loligo pealei usually spawn in shallow waters between Delaware and eastern Cape Cod. A six-month spawning season which extends through the warmer half of the year is indicated by the annual cycle of sexual maturation of Loligo. Recently, however, Mesnil (1976) proposed to ICNAF the concept of two crossed life cycles for Loligo pealei based on various size groups found during research surveys and inferences to similar life cycles for Loligo vulgaris and the cuttlefish Sepia officinalis in the northeast Atlantic. Briefly, this theory is as follows: squid hatching in early summer spawn approximately 14 months later the following fall. These eggs hatch in late fall and mature about 20 months later in late spring - early summer. This cycle would then be repeated. However, much more study is necessary before this theory can be firmly established.

During spawning, male squid deposit sperm cells in the mantle cavity of the female with a modified arm. The female then extrudes eggs into its mantle cavity which upon contact with sperm cells become fertilized. Between 150 and 200 fertilized eggs are contained in each gelatinous capsule and these are passed through the siphon into the water (McMahon and Summers, 1971). The demersal capsules are attached to bottom debris or often to clusters of previously spawned egg capsules. Sexually mature females, depending on their size, produce between 3500 and 6000 eggs. It is believed that there is heavy mortality of both sexes after spawning; however, this has not been conclusively established. Eggs hatch in 11-27 days, releasing larvae about 3 mm (1/8 inch) in length. Little is known of these larval stages, as they are not often found in spawning areas and are assumed to be carried away by currents. Larvae are essentially similar to adults; development is gradual with the juveniles remaining in coastal waters until fall (Summers, 1971; Rathjen, 1973; Barnes, 1974).

Squid age determination through analysis of growth rings in beaks, statoliths and pens is not yet conclusive. Therefore, age and growth data is inferred

from sequential length frequency distribution analyses. Present data indicate that Loligo live for 14-24 months although some males may reach 36 months of age. Individuals grow an average of 1.0-1.5 cm per month, reaching a dorsal mantle length of 16 and 18 cm (6-1/4 and 7 inches) at one year, and 27 and 32 cm (10-1/2 and 12-1/2 inches) at two years for females and males, respectively. The observed sex ratio is approximately 1:1 (Summers, 1971; Mesnil, 1976).

## Illex illecebrosus

The summer or short-finned squid (Illex illecebrosus)(Lesueur) belongs to the ocean squid family Ommastrephidae, and is one of three species of Illex found in the northwest Atlantic. Its range extends from Greenland to Florida and it is relatively abundant between Nova Scotia and New Jersey. However, it is most abundant in summer in the Gulf of Maine and in the Newfoundland region (Mercer, 1965).

Details of the life history and biology of Illex are not well known. During the spring and summer, they migrate into coastal waters about 10-15 m (33-50 ft.) deep off Newfoundland and Nova Scotia and somewhat deeper in the New England area and may form large surface schools. This inshore movement may be in response to temperature and salinity preferences, and off Canada may be due to their pursuit of capelin (Mallotus villosus) which also move inshore at this time. In late fall (October-December) short-finned squid move offshore in ICNAF Subarea 5 and Statistical Area 6 and to the southeast and open ocean from Subareas 3 and 4 (see Figure 1).

Unlike Loligo, Illex is not restricted to water above 8°C (Mercer, 1973). The optimum temperature range of Illex is about 7-15°C (45-59°F), although they were taken by Canadian research surveys on the Grand Banks at depths of 55-365 m (180-1200 ft.) with bottom water temperatures of 0.5-8.0° C (Squires, 1957). However, large concentrations of short-finned squid are usually found along the edge of the continental shelf where temperatures are greater than 5°C (41°F)(Tibbetts, 1975).

Spawning is usually assumed to take place in the deep waters of the continental slope from December through June with most individuals dying after spawning. Actual spawning grounds have not been documented, however. In fact, some short-finned squid have been taken on Georges Bank during the assumed winter spawning season. Wigley (personal communication) encountered sexually mature Illex on Georges Bank during summer as did a joint US-Japanese survey in July, 1977, and recently USSR scientists confirmed this observation. Presence of larvae is of little help, since all members of the family Ommastrephidae have virtually identical planktonic stages. Eggs are believed to be spawned one by one in batches and fertilized in the water column. Yet no eggs identified as those of Illex have been reported to date (Nesis, 1968; Mesnil, 1976).

Short-finned squid are usually shorter-lived than long-finned squid, reaching ages of 12-16 months. Maximum mantle length is approximately 24-35 cm (9-1/2 - 13-3/4 inches). Females grow larger than males, although males are heavier than females for any given length. Growth is rapid with an approximate doubling in mantle length between May and October and a resultant six- to eight-fold weight increase (Squires, 1967; Rathjen, 1973; Tibbetts, 1975).

V-2. Abundance and Present Condition*

Squid are short-lived animals that fluctuate widely in abundance, and it is impossible to predict long-term relative abundance of these species. Assessment of relative abundance of Loligo can only reliably be made in the autumn immediately preceding the fall-winter fishery (i.e., using data from the annual NMFS autumn bottom trawl surveys). The same predictive limitations also apply to Illex , but for this species neither the annual spring nor the autumn NMFS trawl surveys has in the past been particularly useful for management purposes. The autumn survey indicates abundance of Illex at the end of the summer fishing season, presumably just before Illex migrate offshore to spawn and die. The spring survey appears to be too early in the year (the water temperatures are still low) to give an accurate indication of the abundance of Illex during the following summer and autumn (NMFS, 1977).

Stock size estimates of Loligo and Illex populations in ICNAF SA 5 and 6 were reviewed by Sissenwine (1976). All of the estimates exhibit considerable variance. The most useful of these for Loligo are minimum biomass estimates based on NMFS autumn bottom trawl surveys. These biomass estimates are for the autumn when mean weight of individual Loligo is about 20 grams (0.7 ounces). The mean weight of these same Loligo taken by foreign fisheries during winter is about 60 grams (2 ounces) and when taken by US fishermen in late spring about 80-100 grams (2.8-3.5 ounces). Thus, the number of individuals rather than the weight in metric tons is the more important figure for estimating stock size.

Table 1 gives the results of NMFS autumn bottom trawl survey data for long-finned squid for 1968-1976. Data from 1976 indicate that Loligo remained at about the same relatively high level that occurred in the previous two years. The abundance of pre-recruit Loligo was observed in earlier years. Table 2 gives Loligo biomass estimates based on the above results. $B^1$ values (in metric tons and in millions of individuals) were derived by areal expansion of the survey data (i.e., area of tows vs. area of fishing grounds), and thus are probably conservative estimates. Loligo are more vulnerable to trawl capture during the day (Table 1). $B^2$ estimates in Table 2 were obtained by adjusting nighttime trawl catches of Loligo upward to account for this difference in efficiency. Thus, $B_2$ estimates of biomass are probably more realistic (yet still conservative) than those derived from the simpler areal expansion.

*From Sissenwine et al. (1977) and updated by Lange and Sissenwine (1977)

Table 1. Catches of Loligo pealei in NMFS Autumn Bottom Trawl Surveys for Southern New England-Middle Atlantic (SNE-MA), Georges Bank and the Gulf of Maine.
(mean weights in kg and numbers per tow by strata set)

| | TOTAL | | | DAY | | | NIGHT | | |
|---|---|---|---|---|---|---|---|---|---|
| | # tows | $\bar{wt}$ /tow | #/tow | # tows | $\bar{wt}$ /tow | #/tow | # tows | $\bar{wt}$ /tow | #/tow |
| 1968 SNE-MA | 124 | 10.86 | 267.57 | 40 | 16.23 | 362.60 | 43 | 2.51 | 30.58 |
| G. Bank | 69 | .40 | 10.73 | 22 | .77 | 17.13 | 25 | .02 | .12 |
| G. Maine | 50 | .01 | .09 | 18 | .01 | .10 | 15 | .00 | .11 |
| 1969 SNE-MA | 119 | 13.99 | 347.50 | 38 | 27.32 | 777.30 | 39 | 3.29 | 51.29 |
| G. Bank | 73 | 1.56 | 36.70 | 25 | 2.49 | 60.37 | 32 | .54 | 9.70 |
| G. Maine | 51 | .03 | .40 | 17 | .06 | .90 | 16 | .00 | .00 |
| 1970 SNE-MA | 122 | 4.13 | 105.40 | 38 | 5.55 | 168.10 | 40 | 2.98 | 63.70 |
| G. Bank | 70 | 1.12 | 49.40 | 23 | 2.99 | 133.73 | 24 | .22 | 6.40 |
| G. Maine | 53 | .05 | 1.46 | 18 | .06 | 1.55 | 16 | .00 | .00 |
| 1971 SNE-MA | 125 | 4.04 | 234.20 | 43 | 8.55 | 515.70 | 41 | .27 | 11.29 |
| G. Bank | 73 | 1.06 | 34.10 | 27 | 1.51 | 63.75 | 24 | .51 | 9.69 |
| G. Maine | 55 | .03 | .57 | 16 | .08 | 1.08 | 20 | .01 | .42 |
| 1972 SNE-MA | 114 | 9.41 | 398.90 | 31 | 13.14 | 524.90 | 40 | 1.24 | 31.25 |
| G. Bank | 73 | 1.13 | 39.30 | 29 | 1.70 | 68.71 | 21 | .28 | 5.08 |
| G. Maine | 55 | .00 | 0.20 | 18 | .00 | .00 | 18 | .00 | .02 |
| 1973 SNE-MA | 111 | 14.20 | 542.90 | 38 | 17.47 | 817.10 | 35 | 3.68 | 66.94 |
| G. Bank | 73 | 4.53 | 60.90 | 27 | 7.16 | 96.15 | 28 | 2.31 | 30.44 |
| G. Maine | 54 | .05 | .91 | 16 | .08 | 1.56 | 21 | .02 | .48 |
| 1974 SNE-MA | 108 | 11.41 | 355.90 | 33 | 16.33 | 886.10 | 38 | 5.38 | 130.00 |
| G. Bank | 74 | 2.21 | 62.07 | 20 | 2.67 | 96.20 | 26 | 2.93 | 22.10 |
| G. Maine | 57 | .03 | .78 | 19 | .03 | .63 | 21 | .03 | .23 |
| 1975 SNE-MA | 115 | 15.55 | 895.50 | 41 | 20.27 | 1548.40 | 36 | 6.11 | 115.20 |
| G. Bank | 73 | 1.80 | 102.56 | 23 | 1.64 | 142.70 | 25 | .47 | 1.82 |
| G. Maine | 57 | .81 | .81 | 19 | .03 | 1.56 | 23 | .02 | .40 |
| 1976 SNE-MA | 123 | 15.79 | 579.79 | 37 | 22.05 | 979.90 | 40 | 3.65 | 90.74 |
| G. Bank | 67 | 3.14 | 103.52 | 27 | 5.82 | 207.53 | 19 | 2.18 | 54.94 |
| G. Maine | 55 | .36 | 12.67 | 14 | .51 | 16.00 | 21 | 1.37 | 8.58 |
| *1977 SNE-MA | 131 | 11.89 | 685.77 | | | | | | |
| G. Bank | 92 | 0.87 | 39.38 | | | | | | |

From Sissenwine et al. (1977) and updated by Lange and Sissenwine (1977)
* estimates do not include the Gulf of Maine

Table 2. Loligo pealei Biomass Estimates ($B_1$ and $B_2$) Based On Data From NMFS Autumn Bottom Trawl Surveys, For Southern New England - Middle Atlantic, Georges Bank, And The Gulf of Maine

| | $B_1$ wt. (tons) | $B_1$ (no. x $10^6$) | $B_2$ wt. (tons) | $B_2$ (no. x $10^6$) |
|---|---|---|---|---|
| 1968 | 28,073 | 692.6 | 29,114 | 1211.9 |
| 1969 | 37,643 | 931.6 | 48,053 | 2393.1 |
| 1970 | 12,095 | 337.9 | 19,640 | 1946.2 |
| 1971 | 11,752 | 641.4 | 14,050 | 1106.1 |
| 1972 | 25,400 | 1065.1 | 21,039 | 1533.3 |
| 1973 | 42,338 | 1460.9 | 44,252 | 3092.0 |
| 1974 | 32,014 | 989.0 | 46,442 | 4757.0 |
| 1975 | 41,912 | 2412.0 | 48,636 | 4789.0 |
| 1976 | 44,935 | 1632.0 | 48,930 | 4372.0 |
| *1977 | 31,318 | 1791.3 | | |

From Sissenwine et al. (1977) and updated by Lange and Sissenwine (1977)
*does not include the Gulf of Maine

Preliminary analysis of the spring survey in 1977 indicates that Loligo was quite scarce. This may reflect cooler water temperatures which might have delayed the movement of Loligo inshore. Abundance of squid in the spring survey has been more variable than abundance in the autumn survey, thus the latter is usually used as an index of population size, especially for Loligo.

Preliminary analysis of data collected thus far from the Southern New England - Middle Atlantic and Georges Bank strata (Gulf of Maine data is not yet available) indicates that the number of Loligo in 1977 in the SNE-MA area was 18% greater than in 1976 but 23% less than in 1975. The average size of the individuals (mean weight), however, is much less in 1977 than in 1976, and consequently estimates of biomass are less (Table 2). This decrease in size, and, therefore, total weight, may be due to later spawning. Even the conservative estimate of stock size for 1977 indicated in Table 2 is adequate to support the Loligo optimum yield of 44,000 tons based on the analysis described by Sissenwine and Tibbetts (1977) and repeated in Preliminary Management Plans and this FMP. It is noteworthy that because of the annual small size of Loligo in the NMFS autumn bottom trawl survey catch, the biomass of fishable individuals available to the winter offshore fishery may be lower than in recent years, particularly if large mesh nets are used (Lange and Sissenwine, 1977).

The abundance of Illex increased sharply from 1974-1976. It appears that catches have been related to population abundance and there is no evidence that catches as high as 20,000 tons have had an impact on Illex production when the population is large. Illex was very abundant in the autumn 1976 bottom trawl survey (Table 3) but this indicated past abundance in 1976 more than abundance in 1977. Illex, like Loligo, was also scarce in spring survey catches; however, this may have been a result of unusually cold water temperatures delaying migration.

The USSR has estimated the minimum biomass of Illex on Georges Bank (by areal expansion) as 100,000, 58,000, 197,000, and 258,000 tons for the summers of 1971, 1972, 1975, and 1976, respectively. The high abundance in 1976 was

confirmed by USSR, Canadian, French, Polish, and US research vessels. In the past, separate catch quotas have been established for Illex in coastal waters of the US and Canada, although there is no evidence that Illex populations in these areas comprise separate stocks.

## Stock-Recruitment Relationships And Yield Per Recruit

The degree of dependence between spawning stock size and recruitment is unknown for Loligo and Illex. Simulation models developed by Sissenwine and Tibbetts (1977) considered three hypothetical relations in order to estimate maximum yield per recruit to the unexploited population for a range of stock-recruitment circumstances. The three relationships considered are shown in Figure 3.

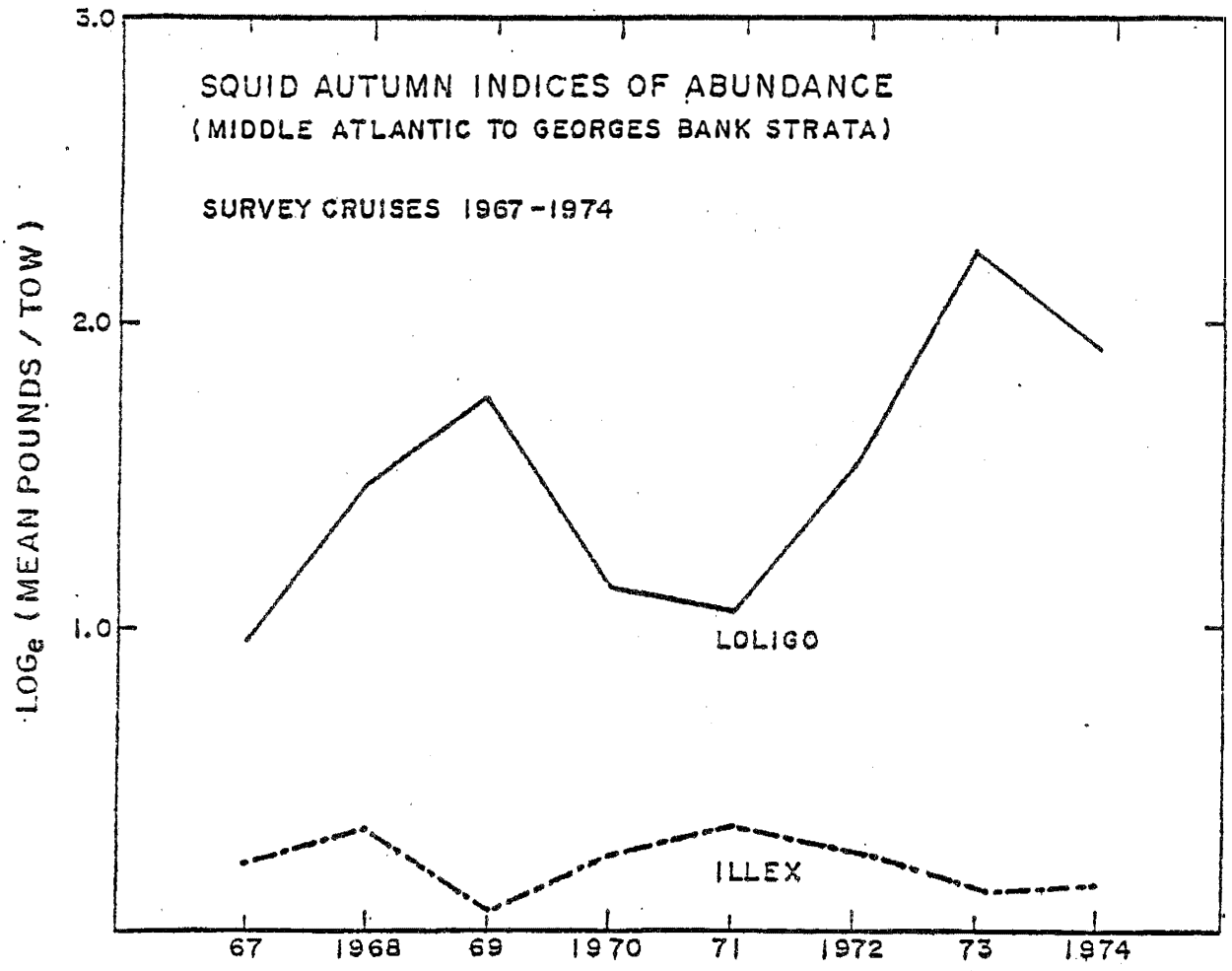



Figure 2

Autumn Survey Abundances ($Log_e$ Mean Pounds Per Tow) For Squid,

Loligo pealei And Illex illecebrosus, 1967 - 1974,

From The Middle Atlantic To Georges Bank (From Tibbetts, 1977)

Sissenwine and Tibbetts' (1977) models were designed to simulate the effect of fishing on squid (Loligo and Illex). Instantaneous growth, fishing and natural mortality rates vary on a monthly basis in a realistic manner with more fishing mortality occurring during winter and summer for Loligo and Illex, respectively. A two-year life-span was assumed for Loligo with spawning spread uniformly over May-September. For Illex, a one-year life-span with spawning spread uniformly over January-March was assumed. Recruitment was described by a single parameter stock recruitment function ($R = p'/[1 + A(p' - 1)]$ where R = size of recruiting cohorts as proportion (from 0-1.0) of recruiting cohorts to unexploited stock, $p'$ = weight of spawning stock as propostion (from 0-1.0) of weight of virgin spawning stock, and A = coefficient from 0-1.0 which has a specific value depending upon density dependence assumptions).

Table 3. Stratified Mean Catch per Tow in Pounds for Loligo and Illex, from US Survey Vessel Spring and Autumn 1967 - 1977. (Data for 1977 are preliminary and incomplete.)

| | | Spring | | Autumn | |
|---|---|---|---|---|---|
| | | Loligo | Illex | Loligo | Illex |
| Area | Year | wt/tow | wt/tow | wt/tow | wt/tow |
| Mid- | 1967 | | | 4.23 | 1.14 |
| Atlantic | 1968 | 5.49 | .09 | 26.85 | 1.62 |
| | 1969 | 3.82 | .02 | 39.76 | .28 |
| | 1970 | 2.75 | .02 | 7.97 | .55 |
| | 1971 | 6.22 | .57 | 11.76 | .72 |
| | 1972 | 6.69 | .00 | 14.79 | 1.27 |
| | 1973 | 6.23 | .02 | 36.88 | .20 |
| | 1974 | 6.09 | .26 | 25.25 | .47 |
| | 1975 | 10.71 | .03 | 28.59 | 3.53 |
| | 1976 | 15.89 | .07 | 18.74 | 21.96 |
| | 1977 | 2.15 | .04 | | |
| Southern | 1967 | | | 23.28 | .61 |
| New England | 1968 | 2.74 | .00 | 20.47 | .36 |
| | 1969 | 0.62 | .30 | 20.17 | .16 |
| | 1970 | 2.35 | .24 | 10.48 | .76 |
| | 1971 | 2.98 | .06 | 5.48 | .51 |
| | 1972 | 13.08 | .00 | 27.84 | .68 |
| | 1973 | 10.76 | .01 | 24.64 | .11 |
| | 1974 | 21.44 | .17 | 25.02 | .32 |
| | 1975 | 16.73 | .06 | 41.09 | .58 |
| | 1976 | 16.81 | .14 | 54.02 | 3.92 |
| | 1977 | 2.56 | .04 | | |
| Southern | 1967 | | | 2.13 | .43 |
| Georges | 1968 | 2.45 | .00 | 1.54 | .96 |
| Bank | 1969 | 11.60 | .00 | 6.72 | .18 |
| | 1970 | 1.61 | .00 | 1.97 | .90 |
| | 1971 | 3.94 | .02 | 4.15 | 2.61 |
| | 1972 | 6.11 | .02 | 2.50 | .62 |
| | 1973 | 7.42 | .17 | 11.42 | 2.21 |
| | 1974 | 0.29 | .13 | 5.06 | .59 |
| | 1975 | 4.49 | .12 | .64 | 2.77 |
| | 1976 | 1.90 | .05 | 11.38 | 20.90 |
| | 1977 | 1.36 | .11 | | |

Table 3. (continued)

| | | | | | |
|---|---|---|---|---|---|
| East | 1967 | | | 1.02 | .07 |
| Georges | 1968 | .00 | .02 | 1.51 | 1.03 |
| Bank | 1969 | 1.15 | .00 | 6.29 | .14 |
| | 1970 | 1.29 | .03 | 5.62 | .33 |
| | 1971 | .13 | .00 | .69 | .33 |
| | 1972 | .21 | .00 | .49 | .22 |
| | 1973 | .00 | .00 | 12.19 | .50 |
| | 1974 | .00 | .00 | .92 | .48 |
| | 1975 | .61 | .00 | .00 | .53 |
| | 1976 | .03 | .00 | 9.03 | 48.07 |
| | 1977 | .04 | .09 | | |
| North | 1967 | | | .03 | .08 |
| Georges | 1968 | .00 | .00 | .38 | .54 |
| Bank | 1969 | .00 | .00 | 1.01 | .02 |
| | 1970 | .00 | .00 | 1.36 | .48 |
| | 1971 | .00 | .00 | 2.32 | .67 |
| | 1972 | .00 | .00 | 3.33 | .45 |
| | 1973 | .00 | .00 | 8.59 | .94 |
| | 1974 | .00 | .00 | 6.41 | .19 |
| | 1975 | .00 | .00 | 6.89 | 3.13 |
| | 1976 | .03 | .02 | 4.36 | 30.66 |
| | 1977 | .03 | .00 | | |

From Sissenwine et al. (1977).

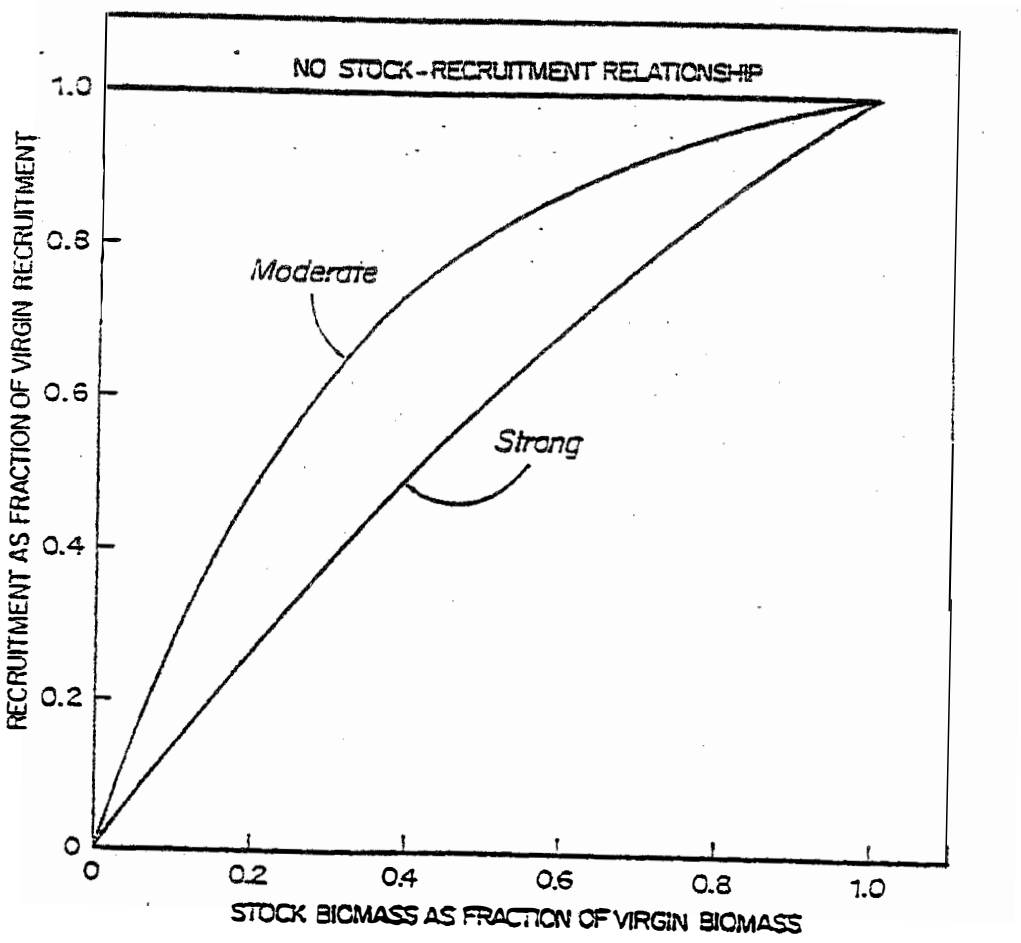



Figure 3. Squid Stock-Recruitment Relationships

Table 4. Squid Stock-Recruitment Characteristics

| Species | Stock-Recruitment | $Y_{msy}$ (grams) | $E_{msy}$ (%) | $W_{msy}$ (grams) |
|---|---|---|---|---|
| Loligo | None | 38 | 75 | 52 |
| Loligo | Moderate | 21 | 40 | 72 |
| Loligo | Strong | 8 | 15 | 85 |
| Illex | None | 45 | 63 | 72 |
| Illex | Moderate | 25 | 37 | 90 |
| Illex | Strong | 9 | 15 | 100 |

$Y_{msy}$ = Expected maximum yield per individual to the virgin fishery.

$E_{msy}$ = Exploitation rate over lifespan of organism that will produce MSY. Percent of recruits that should be caught in order to produce MSY.

$W_{msy}$ = Average weight of individual in catch if fishery exploited at MSY level.

Based on these models, maximum yield per recruit ($Y_{MSY}$) of Loligo and Illex is about 38 grams at an exploitation rate (over the lifespan of the species)($E_{MSY}$) of 75% and 63%, respectively. If recruitment is moderately dependent upon spawning stock size then the maximum yield per recruit to the unexploited fishery is 21 grams for Loligo and 25 grams for Illex, with $E_{MSY}$ equal to 40% and 37% respectively. For a strong relationship between stock and recruitment, the corresponding values are 8 grams and 15% for Loligo and 9 grams and 15% for Illex. These results along with the average weight of individuals of the catch according to the simulations are summarized in Table 4. Both species of squid are cannibalistic and cannibalism is a mechanism that could potentially result in a density dependent relationship between spawning stock size and recruitment.

Population size estimates for Loligo range from about 1.0 to 4.8 billion individuals between 1968-1976. These are probably underestimates since they are based on areal expansion of bottom trawl survey data (see Sissenwine, 1976). Most of the squid taken in autumn bottom trawl surveys were small, recruiting squid. Therefore, an annual recruitment of greater than 1.5 billion Loligo seems likely. If a moderately strong stock recruitment relationship is assumed, then a catch of 44,000 metric tons is indicated by the model (based on a maximum long-term average yield). This was the basis for optimum yield in 1977 for Loligo. The model was not used to determine optimum yield for Illex in 1977 because of uncertainty in model parameters and inadequate estimates of annual recruitment.

Using the USSR estimates of standing stock size of Illex on Georges Bank (100,000, 58,000, 197,000, and 257,000 metric tons in summers of 1971, 1972, 1975, and 1976, respectively), and assuming a moderate stock-recruitment relationship and most exploitation during the summer, these estimates indicate that a catch of at least 37,000, 21,000, 73,000, and 95,000 tons could have been supported by the population, according to the model (applying a 37% exploitation rate).

It should be noted that the models described above are based on the life cycles for Loligo and Illex of 24 and 12 months as described by Summers (1971)

and Squires (1967). Recently, Mesnil (1976) suggested more complicated cross-over life cycles for both species of squid. If further investigation supports these proposed life cycles, it will be necessary to modify the models. In addition, the models are based on seasonal patterns of fishing that occurred prior to establishment of foreign fishing "windows" (primarily winter fishing for Loligo and summer fishing for Illex) and a sharp departure from this seasonal fishing pattern will also require modification of the model.

## Cohort Analysis

Without a reliable method to determine the age of squid landed and age composition of the catch, only a crude approach to cohort analysis is possible. Ikeda and Sato (1976) approximated age composition of the Japanese Loligo catch for the 1972-1973 and 1973-1974 fishing seasons based on length composition and the hypothetical growth function:

$$L = 38.3 \times (1 - e^{0.59t})$$

where:
L = mantle length in cm
t = age in years

Cohorts were defined as monthly brood groups, and the estimated brood composition of the catch was used to calculate the number and exploitation rate of Loligo in the April, May, and June broods at the beginning of the fishing season. Sissenwine (1976) noted problems with the results because of possible errors in assignment of individuals to broods, inadequate data on natural mortality, and the small portion of the total catch resulting from the broods that was considered in the analysis.

## Loligo pealei Stock Status: November, 1977*

The pre-recruit index (the stratified mean number per tow of individuals $\leq 8$ cm mantle length; Table 5) from the autumn 1976 US bottom trawl survey was higher than the previous 9 year (1967 - 1975) average, although it was 49% lower than that in 1975. The catch/tow of Loligo of all sizes was also above the 9 year average for 1976, but lower than 1975.

Early 1977 commercial catches of Loligo were, however, less than in previous recent years. Preliminary reports of foreign catches in the first three months were 25% less than in 1976, even though total allowable catches had not been reached. Inshore catches by US fishermen during the first six months of 1977 dropped 71% from 1976 catches, and 16% from the previous seven year (1970 - 1976) average. Even though the US directed fishery in May and June realized approximately the same landings as in May and June of 1976, the amount of effort applied to obtain this catch may have been greater (personal communication, Pat Gerrier, NMFS). Incidental catches in earlier months and since June have been substantially lower than previously.

NMFS spring bottom trawl survey results in 1977 indicate a decrease in Loligo abundance in the Southern New England, Middle Atlantic, and Southern Georges Bank areas from 1976 to 1977 of 85%, 86%, and 28% respectively. The decreases from the 1968 to 1976 mean catch were 70%, 74%, and 69% respectively (Table 3). In August, 1977, the NMFS research vessels Albatross IV and Delaware II

*This section was taken from Lange and Sissenwine (1977).

participated in an inshore ($\leq$ 60 fathoms) summer bottom trawl survey from Cape HAtteras to Nova Scotia. Loligo is usually abundant in these shallow waters during the summer. Stratified mean numbers per tow for this survey, in the standard survey strata, (15 - 60 fathoms) were calculated and compared with a similar survey conducted in 1969. It should be noted that the 1969 autumn bottom trawl survey indicated that the abundance of Loligo in that year was typical of other years during which surveys were conducted.

In 1977, the stratified mean number of Loligo per tow was 54.087 [with $P(78.36 \leq y_{st} \leq 29.81) = .95$] in the Southern New England - Mid-Atlantic area; 2.194 [$P(0.0 \leq y_{st} \leq 4.903) = .95$] on Georges Bank, with none in the Gulf of Maine area. These values were about half those of 1969 (104.86, 4.36, and 0.0, respectively). Strata by strata comparison of Loligo catches in these two years shows a significant (at the 0.05 level) decrease in mean catches per tow for those strata sampled during both cruises (Table 6). There was also a substantial change in the percent composition of squid (Loligo vs. Illex) in the catches. In 1969 Illex made up 49% and 53% of the total squid catch (in numbers) in the Southern New England and Mid-Atlantic, respectively, while the corresponding percentages were 76% and 95.5%, indicating an increase in importance of Illex in the squid biomass of these areas. In both years, Illex made up 100% of the squid caught in the Gulf of Maine.

Information from vessels which collect Loligo for biological samples for the Marine Biological Laboratory in Woods Hole indicate the possibility of late arrivals to the inshore area. Few large individuals were taken in the late spring - early summer when they are usually quite abundant, but as the summer progressed these large Loligo began to appear in great quantities, possibly indicating a delay in the peak spawning period from May to late July.

The NMFS autumn bottom trawl survey provides the most reliable indices of abundance for Loligo, and preliminary analysis of data collected thus far, from Southern New England - Middle Atlantic and Georges Bank strata (the Gulf of Maine has not been sampled yet), indicate that the number of Loligo in 1977 in the Southern New England- Middle Atlantic area is 18% greater than in 1976, but 23% less than in 1975. However, the average size of the individuals (mean weight) was much less in 1977 than in 1976, and, consequently, estimates of biomass are less (Table 1). This decrease in size and, therefore, total weight, may be due to later spawning. Estimates of stock size in numbers and weight were calculated by areal expansion of catch/tow data (Tibbetts, 1977). These estimates are very conservative since they assume that the gear efficiency is 100%. Since Loligo migrate vertically at night and thus are less vulnerable to bottom trawl gear, a more realistic estimate of stock size can be obtained by adjusting all night tows by a factor corresponding to the fishing power of the bottom trawl gear during day relative to night.

Even the conservative estimate of stock size for 1977 indicated in Table 1 is adequate to support a total catch of 44,000 tons, based on the analysis described in Sissenwine and Tibbetts (1977) and repeated in PMPs. Because of the annual small size of Loligo in the NMFS autum bottom trawl survey catch, the biomass of fishable individuals available to the winter offshore fishery may be lower than in recent years, particularly if large mesh nets are used.

Table 5. Pre-Recruit Indices of *Loligo* - Stratified Mean Number Per Tow of *Loligo* of All Sizes and of These ≤ 8 cm in Mantle Length in Autumn Bottom Trawl Surveys - Middle Atlantic to Georges Bank

| | Mean number per tow of Loligo | |
|---|---|---|
| Year | All sizes | < 8 cm |
| 1967 | 134.5 | 126.9 |
| 1968 | 176.5 | 159.9 |
| 1969 | 237.3 | 217.4 |
| 1970 | 85.6 | 79.3 |
| 1971 | 163.3 | 161.5 |
| 1972 | 271.4 | 258.5 |
| 1973 | 372.0 | 353.9 |
| 1974 | 251.7 | 233.3 |
| 1975 | 614.4 | 593.3 |
| 1976 | 410.9 | 302.5 |

Table 6. Strata Mean Number Per Tow *Loligo* from NMFS Summer Bottom Trawl Surveys, 1969 and 1977, Including Number of Tows Per Strata

| Strata | Number of Tows | Mean Number per Tow, 1969 | Number of Tows | Mean Number per Tow, 1977 |
|---|---|---|---|---|
| 1 | 7 | 134.3 | 7 | 0.6 |
| 2 | 7 | 7.6 | 0 | - |
| 3 | 3 | 0 | 0 | - |
| 4 | 3 | 0 | 0 | - |
| 5 | 5 | 47.2 | 5 | 0 |
| 6 | 8 | 0 | 0 | - |
| 7 | 3 | 0 | 0 | - |
| 8 | 3 | 0 | 0 | - |
| 9 | 5 | 1.2 | 5 | 0 |
| 10 | 8 | 0 | 6 | 0 |
| 11 | 3 | 0 | 0 | - |
| 12 | 3 | 0 | 0 | - |
| 61 | 4 | 88.8 | 5 | 173.6 |
| 62 | 2 | 120.0 | 2 | 34.5 |
| 63 | 2 | 34.0 | | 3308.0 |
| 64 | 2 | 2.0 | 0 | - |
| 65 | 7 | 417.7 | 10 | 121.3 |
| 66 | 4 | 112.5 | 2 | 144.5 |
| 67 | 1 | 12.0 | 0 | - |
| 68 | 2 | 2.5 | 0 | - |
| 69 | 6 | 255.3 | 4 | 30.5 |
| 70 | 4 | 502.3 | 1 | 46.0 |
| 71 | 2 | 616.5 | 0 | - |
| 72 | 2 | 80.5 | 0 | - |
| 73 | 5 | 172.6 | 3 | 108.3 |
| 74 | 4 | 16.2 | 0 | - |
| 75 | 2 | 17.0 | 0 | - |
| 76 | 2 | 1.0 | 0 | - |
| 13 | 9 | 0 | 10 | 0 |
| 14 | 4 | 0 | 0 | - |
| 15 | 3 | 0 | 0 | - |

Table 6 (continued)

| | | | | |
|---|---|---|---|---|
| 16 | 10 | 0 | 11 | 0 |
| 17 | 4 | 0 | 0 | - |
| 18 | 3 | 0 | 0 | - |
| 19 | 9 | 14.2 | 9 | 11.7 |
| 20 | 6 | 20.7 | 6 | 1.5 |
| 21 | 4 | 0 | 4 | 0 |
| 22 | 0 | - | 4 | 0 |
| 23 | 5 | 0.4 | 5 | 0 |
| 24 | 6 | 0 | 7 | 0 |
| 25 | 0 | - | 4 | 0 |

## V-3. Ecological Relationships

Squid play key roles as predators and prey in the flow of energy in the coastal northwest Atlantic ecosystem. They are rapid growing (high production to biomass ratio), abundant and widely distributed during the warm months when the ecosystem is most productive. Overexploitation of squid might result in the decrease of other marine species which compete with fisheries for squid, and substantial increases in squid abundance might threaten fish species that are preyed upon, during the early life stages, by squid (Sissenwine *et al.*, 1977).

Both *Loligo* and *Illex* are active, voracious predators. Young of both species feed heavily on euphausiid shrimp and other small crustaceans. As the individuals grow, the diet gradually changes to young fish. For example, Squires (1957) reported that as the mantle length of *Illex* increased from 10 to 30 cm (4 to 11-3/4 inches), the percentage of individuals with fish in their stomachs increased from 11.8% to 62.5%, respectively. Major prey species for short-finned squid include cod (*Gadus morhua*), haddock (*Melanogrammus aeglefinus*), redfish (*Sebastes marinus*), capelin (*Mallotus villosus*), and mailed sculpin (*Triglops nybelini*) (Squires, 1957). Atlantic mackerel (*Scomber scombrus*), Atlantic herring (*Clupea harengus*), sand lance (*Ammodytes americanus*), and flounders are also eaten by *Illex* (Bigelow and Schroeder, 1953; Rathjen, 1973; Lux, Uzmann, and Lind, 1977).

*Loligo* actively feed on pelagic shrimp, schools of young Atlantic mackerel, silver hake (*Merluccius bilinearis*), and butterfish (*Peprilus triacanthus*) (Barnes, 1974). In addition, squid are cannabilistic as adults and often prey on the young. Vovk (1969) reported squid, euphausiids, fish, shrimp, copepods, crabs, and polychaetes in more than 2% of the stomachs of *Loligo* examined. The first four items were found in greater than 25% of the stomachs. Vovk found a higher occurrence of fish in the stomachs of *Loligo* as the squid increased in size. Various fish groups were found, such as *Diaphus* (Myctophidae), *Anchoa* (Engraudidae), *Stenotomus* (Sparidae), *Clupea* (herring), and *Alosa* (Clupeidae), with most individual fish between 5 and 19 cm in length (Sissenwine *et al.*, 1977).

Fifty-four fish species have been identified as predators of adult squid (*Illex* and *Loligo*) in the Fishery Conservation Zones of the United States and Canada (see Table 7). The largest predator reported specifically from the northwest Atlantic is the northern pilot whale (*Globicephala melaena*)(Squires, 1967; Mercer, 1974). Squires (1967) reported that pilot whales feed almost exclusively on squid and mainly on *Illex*, since the abundance of Artic squid (*Gonatus fabricii*) is not sufficient to provide a long-term food source for

large herds of pilot whales. For approximately six months out of every year, these whales off Newfoundland subsist on Illex. Years of scarcity of Illex, therefore, could significantly impact on pilot whale populations of the Newfoundland area.

Table 7. Squid Predators and References

| | |
|---|---|
| Alewife* | Arvidson, manuscript report |
| American john dory | Bigelow and Schroeder, 1953 |
| Atlantic angel shark | Maurer and Bowman, 1975 |
| Atlantic bonito* | Bigelow and Schroeder, 1953 |
| Atlantic croaker* | Maurer and Bowman, 1975 |
| Atlantic silverside | Bigelow and Schroeder, 1953; Mulkana, 1966 |
| Atlantic tomcod | Bigelow and Schroeder, 1953 |
| Barndoor skate | Bigelow and Schroeder, 1953; Arvidson, manuscript report |
| Barrelfish | Bigelow and Schroeder, 1953 |
| Bigeye thresher shark | Stillwell and Casey, 1976 |
| Black sea bass* | Bigelow and Schreoder, 1953 |
| Bluefin tuna* | Crane, 1936; Bigelow and Schroeder, 1953; Dragovich, 1969; 1970 |
| Bluefish* | Bigelow and Schroeder, 1953; Grant, 1962; Lux and Mahoney, 1972; Maurer and Bowman, 1975 |
| Butterfish* | Bigelow and Schroeder, 1953 |
| Fourspot flounder | Bigelow and Schroeder, 1953; Maurer and Bowman, 1975; Arvidson, manuscript report |
| Goosefish* | Schroeder, 1895; Field, 1907; Bigelow and Schroeder, 1953; Maurer and Bowman, 1975; Arvidson, manuscript report |
| Haddock* | Homans and Needler, 1944; Wigley, 1956; Wigley and Theroux, 1965; Bowman, 1975; Arvidson, manuscript report |
| Hickory shad* | Bigelow and Schroeder, 1953; Arvidson manuscript report |
| Lancetfish | Mathews et. al., 1977 |
| Little skate | Field, 1907; Bigelow and Schroeder, 1953; Richards et. al., 1963 |
| Mackerel* | Maurer, 1975 |
| Night shark | Maurer and Bowman, 1975 |
| Northern pilot whale | Squires, 1967; Mercer, 1974 |
| Northern searobin | Bigelow and Schroeder, 1953 |
| Offshore hake | Maurer and Bowman, 1975 |
| Opah | Bigelow and Schroeder, 1953 |

Table 7. (continued)

| | |
|---|---|
| Oyster toadfish | Field, 1907; Gudger, 1910; Bigelow and Schroeder, 1953; Schwartz and Durcher, 1963 |
| Rainbow smelt* | Kendall, 1927; Bigelow and Schroeder, 1953 |
| Redfish* | Bigelow and Schroeder, 1953; Kelly and Barker, 1961; Dexter, 1969; Konchina, 1970 |
| Red hake* | Bigelow and Schroeder, 1953; Vinogradov, 1972; Arvidson, manuscript report |
| Roughtail stingray | Maurer and Bowman, 1975 |
| Roundnosed grenadier | Podrazhanskaya, 1971 |
| Sand tiger | Bigelow and Schroeder, 1953 |
| Scup* | Bigelow and Schroeder, 1953; Arvidson, manuscript report |
| Sea raven | Maurer and Bowman, 1975 |
| Silver hake* | Dexter, 1969; Vinogradov, 1972; Bowman, 1975 |
| Skipjack tuna* | Bigelow and Schroeder, 1953; Dragovich, 1969 |
| Smooth dogfish | Breder, 1921; Bigelow and Schroeder, 1953; Maurer and Bowman, 1975; Arvidson, manuscript report |
| Spiny dogfish* | Bowers, 1906; Field, 1907; Bigelow and Schroeder, 1953; Jensen, 1966; Maurer and Bowman, 1975; Arvidson, manuscript report |
| Striped bass* | Bigelow and Schroeder, 1953; Merriman, 1941; Nicholson and Lewis, 1973 |
| Swordfish* | Bigelow and Schroeder, 1953; McKenzie, 1959; Tibbo et al., 1961; Scott and Tibbo, 1968; Saila and Pratt, 1973 |
| Thorny skate | Maurer and Bowman, 1975 |
| Threespine stickleback | Bigelow and Schroeder, 1953 |
| Thresher shark | Bigelow and Schroeder, 1953 |
| Tilefish* | Bigelow and Schreoder, 1953; Arvidson, manuscript report |
| Weakfish* | Bigelow and Schroeder, 1953; Maurer and Bowman, 1975 |
| White hake* | Maurer and Bowman, 1975 |
| White marlin* | Ovchinnikov, 1970 |
| White perch* | Bigelow and Schroeder, 1953 |
| White shark | Bigelow and Schroeder, 1953 |
| Winter skate | Bigelow and Schroeder, 1953; Arvidson, manuscript report |
| Witch flounder* | Sumner et al., 1913; Linton, 1921; Smith, 1950; Nichols and Breder, 1927; Maurer and Bowman, 1975 |
| Yellowfin tuna* | Dragovich, 1969 |

* = species have commercial or recreational importance
Modified from Maurer, 1975.

In the eastern Pacific Ocean, the squid family Ommastrephidae is an important food source for several species of porpoise (Perrin et al, 1973). While no actual data are available from the northwest Atlantic, it can probably be inferred from the Pacific data that squid are a significant part of the diet for porpoise species of the northwest Atlantic.

The billfishes, an important and valuable group of recreational and commercial species, utilize squid heavily for food. Saila and Pratt (1973) reported that squid comprise approximately 20% by volume of food items in stomachs of swordfish (Xiphias gladius) from the western north Atlantic. The white marlin (Tetrapturus albidus) is reported to consume Loligo pealei more than any other fish or invertebrate as a food item (Ovchinnikov, 1970).

Maurer (1975) looked at food habits of eleven fish species classified as squid predators. Of these eleven species, nine are demersal and two are pelagic. Specimens were selected at random from catches made during nine standard NMFS bottom trawl surveys (1969-1972) from Cape Hatteras to the Nova Scotian shelf. Relative importance of squid (Loligo and Illex) in their diets is shown in Table 8. Squid constituted 30.5% of the diet weight of bluefish, thus making squid probably the most important prey for this species. Bluefish are known for voracious feeding habits and have been observed "tearing" through large schools of squid (Bigelow and Schroeder, 1953). Although Atlantic mackerel seem to possess the speed and size necessary to be a successful squid predator, squid represented only 0.1% of the diet by weight. Squid represented a significant percentage of the diet of four demersal species: sea raven (19.9%), fourspot flounder (17.7%), spiny dogfish (12.6%), and goosefish (12.2%), but was less important in the diets of other demersal fish such as silver hake (2.1%) and white hake (1.8%).

Table 8. The Relative Quantitative Importance of Squid in the Generalized Diets of Some North Atlantic Fish.

| Predators | Precent Diet Weight |
|---|---|
| Bluefish | 30.5 |
| Sea raven | 19.9 |
| Fourspot flounder | 17.7 |
| Spiny dogfish | 12.6 |
| Goosefish | 12.2 |
| Witch flounder | 2.8 |
| Silver hake | 2.1 |
| White hake | 1.8 |
| Red hake | 1.2 |
| Offshore hake | 0.9 |
| Atlantic mackerel | 0.1 |

From Maurer, 1975.

Interaction with the demersal community may be associated with observed squid behavior. Observers aboard research submersibles have reported that squid frequently lie in a "resting position" on the bottom. During this period individuals appear to be quite lethargic and therefore subject to substantial predation by demersal species (Maurer, 1975).

Streaker (greater) shearwaters (Puffinus gravis) off Newfoundland utilize Illex as an important food item in their diets (Zuev and Nesis, 1971). While there is no other known documentation of seabirds feeding on squid of the northwestern Atlantic, Zuev and Nesis (1971) reported that Loligo reynaudi is a prey species for cape jackass penguins off of South Africa, and therefore it is probable that many north Atlantic seabirds utilize squid as a food. However, the relative importance of squid in avian diets is not known.

The role of squid (Loligo and Illex) in the continental shelf ecosystem of the northwest Atlantic has not been quantified. However, the large number of species involved in a predator-prey relationship with Loligo and Illex suggests great importance of squid in the food web of the area (Tibbetts, 1975). Recent data (Clark and Brown, 1977) show pronounced increases in relative abundance of mackerel, squid, and white hake in recent years coincident with declines of other species "occupying similar ecological niches". They postulate that the "apparent increase in squid abundance may

have occurred in response to declining abundance of finfish species". Actual relationships, however, remain unclear.

V-4. Estimates of MSY

Recent minimum stock size estimates indicate from about 1.0 billion to 4.6 billion Loligo in Subarea 5 and Statistical Area 6 during the fall of each year, most of which are new recruits. Therefore, recruitment of at least 1.5 billion individuals seems likely for 1979 based on past observations. The results of the autumn 1977 NMFS survey support this conclusion (Lange and Sissenwine, 1977). One very preliminary estimate of MSY for Loligo is 50,000 metric tons (Anderson, 1976). MSY estimates based on the model discussed above (Sissenwine and Tibbetts, 1977; Sissenwine, 1976), a moderate stock recruitment relationship, and recruitment of 1.5 billion individuals to the virgin fishery, is about 31,000 metric tons. If recruitment is 1.5 billion individuals to the fishery at equilibrium under exploitation at MSY level, then MSY would be about 44,000 tons. Both these estimates tend to overestimate MSY because they are based on a deterministic model while recruitment is in fact variable, but on the other hand recruitment estimates may in fact be too low. Therefore, these errors may cancel.

There are no reliable estimates of stock size nor certainty as to catches of Illex in recent years. There is no basis at present for predicting the abundance of Illex for 1979. The high abundance of Illex in 1976 was confirmed by USSR, Canadian, French, Polish, and US research vessels. Maximum sustainable yield of Illex has been estimated by Anderson (1976) as 40,000 tons, but this is a very preliminary estimate. The Council, after considering this analysis, has chosen this most conservative value for MSY.

V-5. Probable Future Condition

As noted in Section V-2, it is impossible to predict long-term relative abundances of either squid species. However, the MSYs and OYs proposed in this plan are conservative biologically and are based on minimum estimates of biomass sizes. The OY for Illex, in particular, is designed to prevent overfishing of the stock in the absence of more reliable scientific information. In addition, depending on the results of data analyses of summer and autumn NMFS survey data, the OY for each species may be adjusted by the Council prior to the fishing season to prevent over-reduction of spawning stock sizes.

# 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 Middle 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 relatively 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 estuary, Delaware Bay, and the nearly continuous band of estuaries behind the barrier beaches along southern Long Island, New Jersey, Delaware, Maryland, and Virginia. The southern edge of the region includes the significant estuarine complex of Currituck, Albermarle, and Pamlico Sounds behind the outer banks of Cape Hatteras.

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

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

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

The salinity cycle results from stream flow and intrusion of slope water from offshore. The winter salinity maximum is reduced to a minimum in early summer by large volumes of spring river runoff. Inward drifts of offshore saline water in autumn eventually counterbalance fresh water outflow and return the region's salinity distribution to the winter maximum. Water salinities near shore average 32°/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 southwestly during all seasons, although this may be interrupted by coastal indrafting and some reversal of flow at the northern and southern extremities of the area. Speeds of the drift are on the order of five nautical miles per day. There may be a shoreward component to this drift during the warm half of the year and an offshore component during the cold half. This drift, fundamentally the result of temperature-salinity distribution, may be made final by the wind. A persistent bottom drift at speeds of tenths of nautical miles per day extends from beyond mid-shelf toward the coast and eventually into the estuaries. Offshore, the Gulf Stream flows northeasterly.

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

Water temperatures range from 2°C to 17°C at the surface and over the banks, and 4°C to 9°C at 200 meters in the inner Gulf of Maine. Mean salinity values range 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 Nantuckett 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 resources 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. Mortalty of Georges Bank fish larvae is known to occur, presumably because of temperature elevation when shelf water in which they occur is carried into the slope water. (Colton, 1959). The most profound effects of the entrainment on the fishing grounds may be changes in circulation and in water mass properties resulting from the replacement of the waters lost from the shelf.

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

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

The annual cycle of the plankton community (drifting organisms) of the region is typical of the temperate zone. During the winter, phytoplankton (plant plankton) and zooplankton (animal plankton) populations are low. Nutrients are available, but production is 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 autumn, as water temperatures decrease, the water column becomes unstable due to mixing and nutrients are recycled to the euphotic zone. This stimulates another phytoplankton bloom which is limited by decreasing levels of solar radiation. Phytoplankton and zooplankton levels then decline to their winter minimum while nutrient levels increase to their winter maximum.

Anomalous conditions within the generalized annual cycles are probably common. The stability of the water column which affects nutrient availability may be disrupted by severe storms. Anomalies in temperature may disturb the timing between the annual cycles of interacting species.

Zooplankton feed predominantly but not exclusively on phytoplankton and thus form an intermediate link between phytoplankton, the primary producers of the sea, and the larger animals of the nekton and benthos. The exact relationships within the food webs are poorly understood, but it is certain that the zooplankton play an important role in the conversion of plant to animal tissue (Saila, 1973).

## VI-2. Habitat Areas Of Particular Concern

During the summer and early autumn of 1976, oxygen concentrations at bottom were severely depleted and widespread mortalities of benthic organisms

occurred in the section of the New York Bight shown in Figure 5. 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).

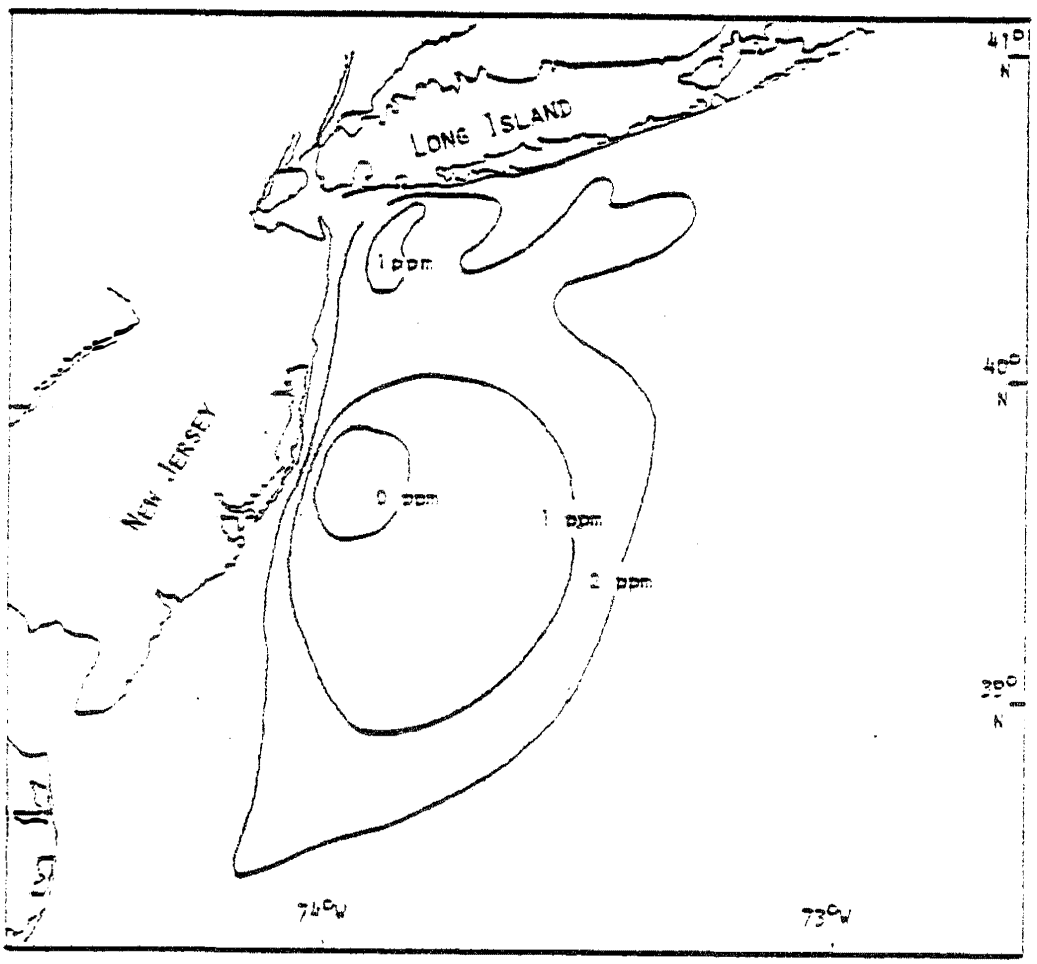
The species affected by the anoxia of most commercial importance were surf clam, red hake, lobster, and crabs. Finfish were observed to be driven to inshore areas to escape the anoxia, or were trapped in water with concomitant high levels of hydrogen sulfide (Steimle, 1976).

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 to 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 squid species that are the subjects of this plan. Sampling for pollution is carried out by both the NMFS and the Environmental Protection Agency. Habitat protection programs are administered by a variety of Federal agencies including the Bureau of Land Management of the Interior Department, the Coast Guard, and the Environmental Protection Agency. The only States in the region with approved Coastal Zone Management Programs are Massachusetts and Rhode Island.




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

Figure 4

## 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 stocks.

### VII-2. Treaties And International Agreements

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

### VII-3. Federal Laws, Regulations, And Policies

The only known Federal law that directly regulates the management of the squid 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 FMP following its approval by the Secretary of Commerce. No Indian treaty rights are known to exist relative to the species that are the subjects of this FMP.

### VII-4. State Laws, Regulations, And Policies

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

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

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

## VIII. DESCRIPTION OF FISHING ACTIVITIES

### VIII-1. History Of Exploitation

The squid fishery of the northwest Atlantic off the United States was, until the mid-1960s, a small, relatively insignificant fishery pursued only by domestic fishermen, and landings never totaled more than several thousand metric tons. In contrast, the California squid fishery for Loligo opalescens since its inception during World War I has been significantly larger, dominating the total amount of squid harvested by the United States. While a market for US caught squid has traditionally existed, it has been supplied principally by west coast operations. California landings have been greater than 10,000 metric tons only once (1946).

Exploitation of the squid resource in ICNAF SA 5 and SA 6 increased when foreign fishing began in 1964 when USSR trawlers reported small incidental catches (Table 9). When Japan and Spain entered the fishery in 1967 and 1970, respectively, catches increased more rapidly with a reported 1971 total catch of 22,210 tons, ten times that caught by the US alone in 1963 (the last year of sole domestic harvest). During 1972, trawlers from eleven countries operating in the fishery harvested 48,707 tons, a 119% increase over 1971. The US was ranked sixth that year among the eleven nations harvesting squid.

Total catch for both Loligo and Illex combined peaked in 1973 at 56,768 tons and then gradually declined during the next three years to 47,024 tons harvested in 1976.

In 1974 ICNAF began to set Total Allowable Catch (TAC) quotas for squid. Table 10 lists the quotas, each country's allocation for 1974-1976, and their reported squid catches for the same period. The 1974, 1975, and 1976 catches were only 78%, 73%, and 64% of the TACs, with the US and Japan never harvesting their entire assigned allocations. Overall, the amounts of squid harvested from SA 5 have been greater than those from SA 6 with the most significant difference occurring in 1973 (SA 5 = 36,161 tons, SA 6 = 20,492 tons). Japanese and Italian catches have been greater in SA 6 while Bulgarian, East German, Polish, USSR, and US catches have been greater in SA 5. Spanish catches have been relatively evenly divided between the two areas. In 1972-1976, a reported annual average catch of 52,000 tons of squid from Cape Hatteras to the Gulf of Maine (ICNAF SA 5 and SA 6) was recorded for all countries combined. This represented only 7% of the mean world squid catch (1970-1974) of 747,080 tons as compiled by the Food and Agricultural Organization of the United Nations (FAO) (Hotta, 1976). Most of the world catch is taken in the eastern Pacific Ocean and consists of genera other than Loligo or Illex. Thus, while the squid fishery of the northwestern Atlantic is very significant for certain foreign markets, its overall importance in providing the world population with much needed protein is quite small.

## VIII-2. Domestic Commercial And Recreational Fishing Activities

United States fishermen have landed squid at least since the late 1800s. Accounts by Lyles (1968) of this early fishing indicate that most squid were taken by otter trawls incidental to fishing for other species. Traps were employed to take squid also. Through the years this situation appears to have remained unchanged, since NMFS statistical data and Fishery Reporting Specialists' port surveys indicate that on the Atlantic coast otter trawls and traps are still the major harvesting gear for squid, the former being the most productive while taking squid incidentally. The fishery is seasonal, with domestic catches of Loligo and Illex taking place predominantly in summer (May-August) and fall (July-November), respectively. Accurate relative proportions of each species in the total landings, however, are unknown since until recently no distinction was made between the two. However, recent data (Table 10) and species distributions indicate that Loligo has traditionally accounted for the major portions of east coast US landings, especially from fishing grounds south of Cape Cod. US counties where squid are landed are shown in Table 31.

Squid Catches By Foreign And US Vessels In ICNAF Subdivisions 5Ze & 5Zw And Subarea 6, By Month, January 1974-December 1976

(Note scale changes for US catches)

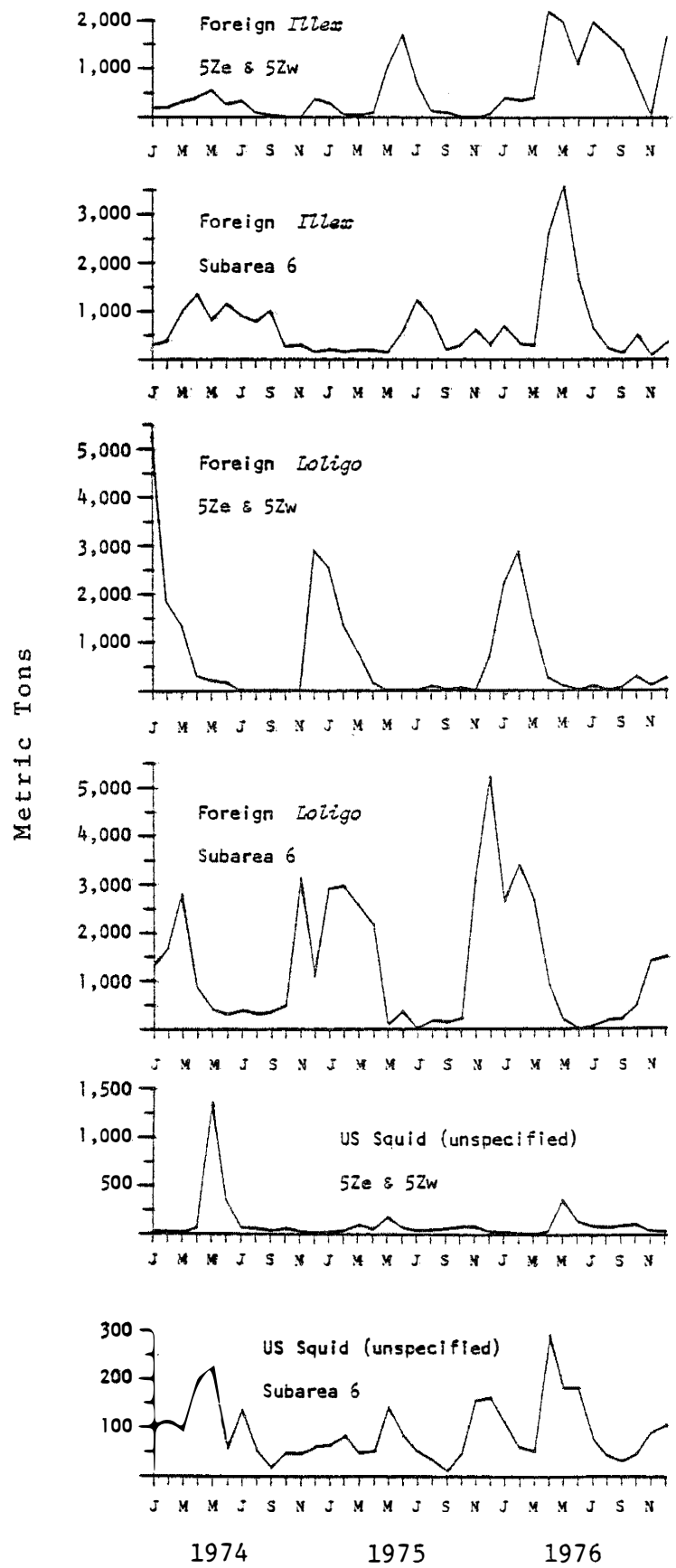



Figure 5

Table 9. Annual squid landings in metric tons, by country for SA 5 and 6, 1963-1974

| Areas | Year | Canada | Bulgaria | France | Federal Republic of Germany | Japan | Italy | Spain | Poland | Romania | USSR | USA | German Democratic Republic | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 5 and 6 | 1963 | | | | | | | | | | | 2,105 | | 2,105 |
| | 1964 | | | | | | | | | | 4 | 929 | | 933 |
| | 1965 | | | | | | | | | | 176 | 1,154 | | 1,330 |
| | 1966 | | | | | | | | | | 389 | 1,173 | | 1,562 |
| | 1967 | | | | | 6 | | | | | 833 | 1,829 | | 2,662 |
| | 1968 | | | | | 1,731 | | | | | 3,176 | 1,762 | 10 | 6,679 |
| | 1969 | | | | | 7,122 | | | | | 1,340 | 1,461 | 1 | 9,924 |
| | 1970 | | | | | 13,639 | | 4,510 | | | 655 | 1,061 | 20 | 19,885 |
| | 1971 | 1 | 90 | | | 10,602 | | 4,187 | | | 6,130 | 1,182 | | 22,210 |
| | 1972 | | 499 | 296 | 463 | 18,691 | 3,200 | 11,859 | 5,428 | 67 | 6,976 | 1,214 | 14 | 48,707 |
| | 1973 | | 410 | 820 | 1,641 | 15,526 | 3,165 | 14,932 | 9,199 | 150 | 8,977 | 1,635 | 313 | 56,768 |
| | 1974 | 27 | 592 | | | 16,820 | 4,260 | 16,144 | 6,709 | 9 | 8,496 | 2,422 | | 55,528 |
| 5 | 1963 | | | | | | | | | | | 1,210 | | 1,210 |
| | 1964 | | | | | | | | | | 4 | 189 | | 193 |
| | 1965 | | | | | | | | | | 176 | 387 | | 563 |
| | 1966 | | | | | | | | | | 341 | 193 | | 534 |
| | 1967 | | | | | | | | | | 330 | 913 | | 1,243 |
| | 1968 | | | | | 112 | | | | | 2,415 | 903 | 10 | 3,440 |
| | 1969 | | | | | 3,724 | | | | | 1,102 | 739 | 1 | 5,646 |
| | 1970 | | | | | 5,363 | | | | | 655 | 483 | 20 | 6,501 |
| | 1971 | 1 | 80 | | | 4,661 | | 266 | | | 5,659 | 711 | | 11,368 |
| | 1972 | | 480 | 6 | 63 | 7,862 | | 5,797 | 5,042 | 28 | 6,301 | 459 | 14 | 26,138 |
| | 1973 | | 396 | 403 | 136 | 5,811 | | 10,147 | 9,157 | 18 | 8,631 | 873 | 313 | 36,161 |
| | 1974 | 3 | 196 | | | 7,267 | 1,010 | 7,440 | 6,229 | 2 | 5,612 | 1,117 | | 28,894 |
| 6 | 1963 | | | | | | | | | | | 895 | | 895 |
| | 1964 | | | | | | | | | | | 740 | | 740 |
| | 1965 | | | | | | | | | | | 767 | | 767 |
| | 1966 | | | | | | | | | | 48 | 980 | | 1,028 |
| | 1967 | | | | | 6 | | | | | 503 | 916 | | 1,425 |
| | 1968 | | | | | 1,619 | | | | | 761 | 859 | | 3,239 |
| | 1969 | | | | | 3,398 | | | | | 158 | 722 | | 4,278 |
| | 1970 | | | | | 8,276 | | | | | - | 578 | | 8,854 |
| | 1971 | | 10 | | | 5,941 | | 3,941 | | | 479 | 471 | | 10,842 |
| | 1972 | | 19 | 290 | 400 | 10,829 | 3,200 | 6,063 | 836 | 39 | 595 | 748 | | 22,569 |
| | 1973 | | 14 | 417 | 1,505 | 9,715 | 3,165 | 4,785 | 42 | 132 | 346 | 762 | | 20,492 |
| | 1974 | | 24 | 396 | | 9,553 | 3,250 | 8,696 | 480 | 7 | 2,883 | 1,305 | | 26,594 |

Data from ICNAF

# Table 10

Squid Quotas and Catch Under ICNAF 1974-1976 for SA 5 and 6

| Year | Rec Tac | Agreed Tac | Bul | Can | Cuba | Den | Fra | Frg | Ice | Ita | Jap | Nor | Pol | Por | Rom | Spa | USSR | Uk | USA | Gdr | Others | Total | % Harvested 1/ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1974 | 50000-80000 | 71000 | 0 | 0 | 0 | 0 | 0 | 1000 | 0 | 4760 | 24300 | 0 | 6800 | 0 | 0 | 13000 | 8500 | 0 | 5600 | 0 | 7100 | 71000 | |
| | | | *592 2/* | *27* | *0* | *0* | *0* | *0* | *0* | *1260* | *18820* | *0* | *6709* | *0* | *9* | *16144* | *8495* | *0* | *2422* | *0* | *50* | *55528* | 78% |
| 1975 | 71000 3/ | 71000 | 0 | 0 | 0 | 0 | 0 | 1000 | 0 | 4700 | 24300 | 0 | 6800 | 0 | 0 | 13000 | 8500 | 0 | 5600 | 0 | 7100 | 71000 | |
| | | | *205* | *0* | *151* | *0* | *0* | *27* | *0* | *4234* | *13985* | *0* | *6838* | *0* | *48* | *9902* | *8928* | *0* | *1728* | *898* | *4745* | *51687* | 73% |
| 1976 | | | | | | | | | | | | | | | | | | | | | | | |
| Illex | 30000 | 30000 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1000 | 0 | 0 | 5000 | 0 | 0 | 5000 | 7500 | 0 | 7500 | 0 | 4000 | 30000 | |
| | | | *0* | *0* | *0* | *0* | *0* | *240* | *0* | *1117* | *3349* | *0* | *5050* | *0* | *9* | *4058* | *8812* | *0* | *229* | *998* | *4/* | *21886* | |
| Loligo | 44000 | 44000 | 0 | 0 | 1000 | 0 | 0 | 1000 | 0 | 3300 | 15700 | 0 | 1700 | 0 | 0 | 8800 | 2000 | 0 | 8500 | 0 | 2000 | 44000 | |
| | | | *13* | *0* | *259* | *0* | *0* | *883* | *0* | *3304* | *5004* | *0* | *1708* | *0* | *13* | *9137* | *832* | *0* | *1230* | *317* | *4/* | *22708* | |
| TOTAL | 74000 | 74000 | 0 | 0 | 1000 | 0 | 0 | 1000 | 0 | 4300 | 15700 | 0 | 6700 | 0 | 0 | 13800 | 9500 | 0 | 16000 | 0 | 6000 | 74000 | |
| | | | *23* | *78* | *267* | *0* | *1* | *1183* | *0* | *4421* | *8353* | *0* | *6756* | *0* | *22* | *13193* | *7644* | *0* | *3830* | *1313* | *4/* | *47024* | 64% |

Key: Number in block print are TAC allocations. Numbers in script are actual reported squid catches.

1/ The total amount harvested as a percentage of the TAC
2/ Catches of squid as reported to ICNAF
3/ Was intended by STACRES to pertain only to Loligo
4/ Catches for non-ICNAF member nations during 1976 are not available at this time

Data from ICNAF. 1976 information is preliminary and subject to final revision.

Gloucester and Point Judith have been the most productive ports making Massachusetts and Rhode Island the first and second ranking States, respectively, for squid landings on the Atlantic Coast. New York ranks a significant third. Historical landing data for the domestic fishery appear in Tables 11 and 12. Documented landings for the early fishery through 1927 are scarce. However, landings as high as 2,500 and 2,900 metric tons in 1902 and 1919, respectively, were reported for New England. Prices for squid during this period ranged from one-half to two cents per pound. In the decade that followed (1928-1938), reporting of annual landings on a regular basis for the New England, Mid-Atlantic, and Chesapeake areas was begun (Table 11). Total annual landings during 1928-1938 averaged greater than 2,100 metric tons (4.62 million pounds) with an average ex-vessel price of 2.2 cents per pound. Landings in the New England area were relatively high in 1928 at 3,317 metric tons but then tapered off to approximately 1,200 metric tons per year. Mid-Atlantic landings in contrast, were 410 metric tons in 1928, increased to 1,000 metric tons by 1931, and then more or less stabilized at that level through 1938. Throughout this decade Chesapeake landings averaged 100 metric tons annually. Ex-vessel squid prices in the 1930s averaged 2.5 cents per pound in the Mid-Atlantic - Chesapeake area and 1.7 cents per pound in New England. These prices are on par with the 1939 Massachusetts ex-vessel prices for haddock, cod and flounder. However, it must be realized that squid landings were insignificant compared to groundfish landings, and had squid landings increased to any extent, the ex-vessel price per pound would have been much lower.

In the 1940s there was an evident drop in landings in all three areas (Table 12). Tables 13 and 14 show that this drop is also evident within individual states, especially New York, New Jersey, and Maryland and to a lesser extent in Massachusetts and Rhode Island. With the drop in landings, average price of squid in New England increased from 1.3 to 5.5 cents per pound, and in the combined Mid-Atlantic Chesapeake area from 2.4 to 10 cents per pound. The reason for this occurrence is not documented, but may have resulted from home-life and economic conditions indicative of World War II.

During the post-wars years, New England landings increased to annual levels as high as 4.6 million pounds (2,087 metric tons) in 1949. Overall however, landings from the late 1940s through the mid-1970s fluctuated around a mean of 1,000 metric tons annually indicating stable yet limited market conditions. The Mid-Atlantic and Chesapeake area (Table 14) shows a similar trend with 1,040 metric tons of squid landed in 1949, but from the late 1940s to the mid-1970s fluctuated around a mean of 1,000 metric tons annually indicating stable yet limited market conditions.

Again, as in the 1940s, there occurred a general decrease in landings during 1964 through 1972 in the New England area (Tables 12 and 13) which was paralleled by up to a 2.6 fold increase in price per pound. During this period, as in the 1940s, the elevations in price per pound that occurred lasted even after landings again increased.

Table 11. US Historical Landings for the New England, Mid-Atlantic, and Chesapeake Areas, 1928-1938
(in metric tons and thousands of dollars)

| | New England | | Mid-Atlantic | | Chesapeake | | Total | |
|---|---|---|---|---|---|---|---|---|
| Year | MT | $ | MT | $ | MT | $ | MT | $ |
| 1928 | 3317 | 157 | b | b | b | b | 3317 | 157* |
| 1929 | 2566 | 128 | 410 | 36 | 83 | 6 | 3059 | 170 |
| 1930 | 2503 | 112 | 806 | 55 | 102 | 8 | 3411 | 175 |
| 1931 | 1278 | 55 | 998 | 49 | 187 | 12 | 2463 | 116 |
| 1932 | 1414 | 42 | 1000 | 35 | 147 | 6 | 2561 | 83 |
| 1933 | 489 | 19 | 390 | 16 | 66 | 3 | 945 | 38 |
| 1934 | b | b | b | b | 52 | 4 | 52 | 4* |
| 1935 | 1611 | 57 | 1101 | 67 | 132 | 5 | 2844 | 129 |
| 1936 | b | b | b | b | 55 | 4 | 55 | 4* |
| 1937 | 1498 | 42 | 1070 | 66 | 84 | 3 | 2652 | 111 |
| 1938 | 979 | 29 | 930 | 33 | 165 | 4 | 2074 | 66 |

b = data not available.
* = partial totals
Modified from Lyles (1968)

Table 12. Contribution Of Squid Landings To Selected New England Port Landings (By Weight)
(thousands of pounds)

| Port And State | Squid | Total Finfish And Squid | Squid % Of Total Finfish Squid | Total All Species | Squid % Of All Species |
|---|---|---|---|---|---|
| Portland, ME | 13.7 | 31,950.0 | <0.1 | 32,124.0 | <0.1 |
| Gloucester, MA | 1,917.7 | 148,722.2 | 1.3 | 149,710.5 | 1.3 |
| Chatham, MA | 9.0 | 3,292.0 | 0.3 | 8,299.7 | 0.1 |
| New Bedford, MA | 169.5 | 62,746.0 | 0.3 | 167,030.6 | 0.1 |
| Plymouth, MA | 87.3 | 2,516.9 | 3.5 | 3,246.1 | 2.7 |
| Provincetown, MA | 332.4 | 18,107.8 | 1.8 | 28,493.6 | 1.2 |
| Sandwich, MA | 77.2 | 15,228.5 | 0.5 | 20,983.3 | 0.4 |
| Newport, RI | 181.7 | 16,358.5 | 1.1 | 19,146.1 | 0.9 |
| Pt. Judith, RI | 569.2 | 42,476.5 | 1.3 | 43,467.4 | 1.3 |

< = less than

Table 13. US Squid Fishery: Catch and Value by Sections
(in metric tons and thousands of dollars)

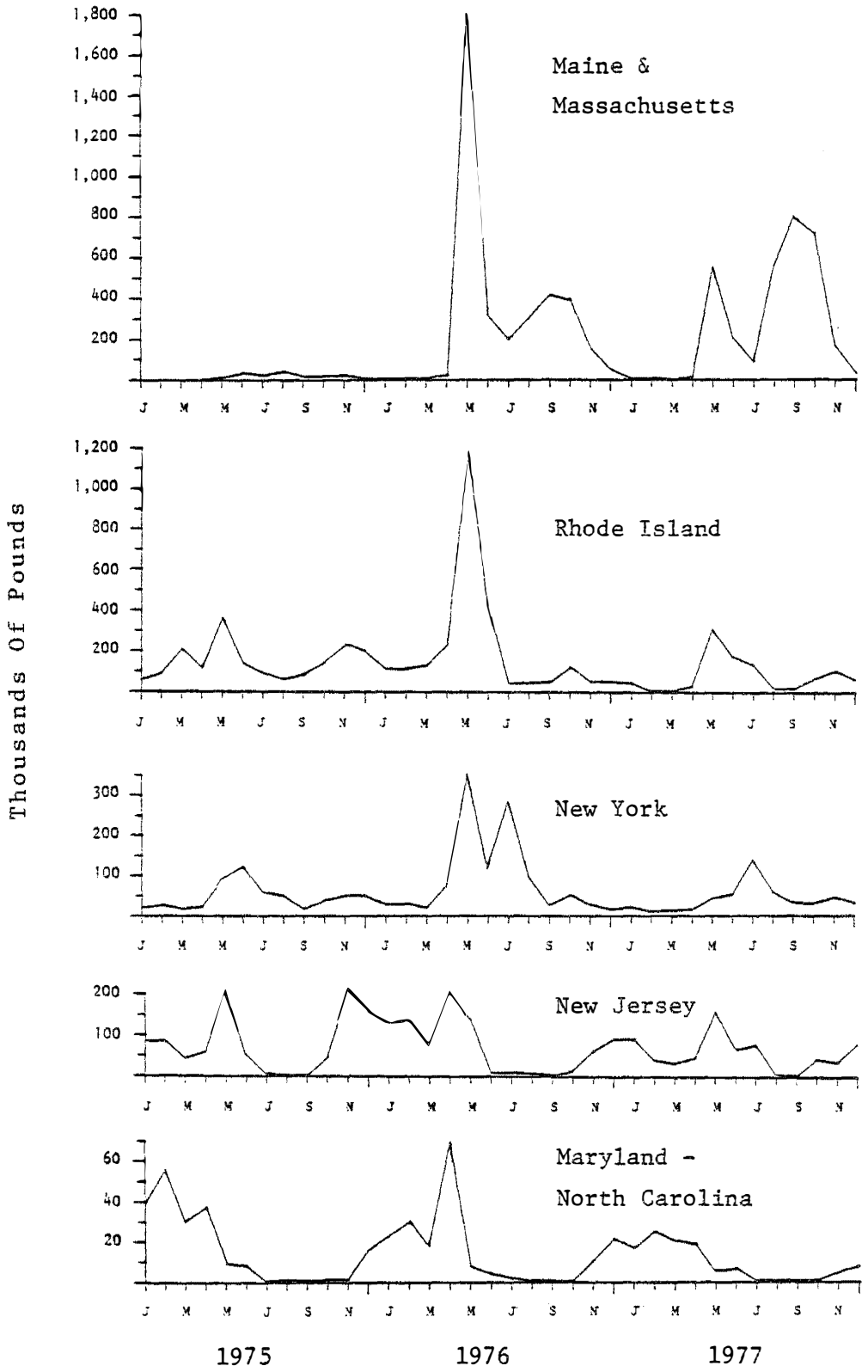
| | New England | | Mid-Atlantic | | Chesapeake | | Total | |
|---|---|---|---|---|---|---|---|---|
| | MT | $ | MT | $ | MT | $ | MT | $ |
| 1939 | 1091 | 33 | 1500 | 86 | 201 | 5 | 2792 | 124 |
| 1940 | 796 | 22 | 1191 | 51 | 137 | 3 | 2124 | 75 |
| 1941 | | | | | 129 | 4 | 129 | 4* |
| 1942 | 495 | 35 | 329 | 63 | 87 | 4 | 911 | 102 |
| 1943 | 474 | 58 | 495 | 110 | | | 969 | 168* |
| 1944 | 435 | 52 | 408 | 94 | 76 | 13 | 919 | 159 |
| 1945 | 751 | 91 | 564 | 105 | 68 | 12 | 1383 | 208 |
| 1946 | 477 | 49 | 204 | 47* | 62 | 18 | 743 | 144* |
| 1947 | 750 | 90 | 334 | 64 | 44 | 9 | 1128 | 163 |
| 1948 | 1171 | 167 | 834 | 172 | 65 | 10 | 2070 | 349 |
| 1949 | 2107 | 125 | 952 | 92 | 88 | 10 | 3147 | 227 |
| 1950 | 638 | 57 | 422 | 57 | 47 | 8 | 1107 | 122 |
| 1951 | 1827 | 147 | 678 | 123 | 38 | 7 | 2543 | 277 |
| 1952 | 370 | 73 | 528 | 94 | 41 | 6 | 939 | 172 |
| 1953 | 2045 | 211 | 439 | 62 | 70 | 8 | 2554 | 281 |
| 1954 | 1197 | 82 | 405 | 65 | 43 | 5 | 1645 | 152 |
| 1955 | 1184 | 101 | 630 | 69 | 65 | 8 | 1879 | 178 |
| 1956 | 867 | 81 | 465 | 81 | 54 | 7 | 1386 | 169 |
| 1957 | 2021 | 138 | 642 | 93 | 70 | 9 | 2733 | 240 |
| 1958 | 1168 | 108 | 737 | 91 | 65 | 5 | 1970 | 204 |
| 1959 | 1152 | 137 | 496 | 80 | 89 | 9 | 1737 | 226 |
| 1960 | 950 | 160 | 550 | 80 | 137 | 23 | 1637 | 263 |
| 1961 | 555 | 105 | 803 | 127 | 159 | 18 | 1517 | 250 |
| 1962 | 1127 | 160 | 909 | 116 | 116 | 19 | 2152 | 295 |
| 1963 | 1219 | 154 | 758 | 110 | 133 | 16 | 2110 | 280 |
| 1964 | 253 | 58 | 629 | 96 | 107 | 13 | 989 | 167 |
| 1965 | 382 | 81 | 649 | 99 | 116 | 13 | 1147 | 193 |
| 1966 | 238 | 54 | 753 | 141 | 194 | 22 | 1185 | 217 |
| 1967 | 827 | 101 | 633 | 91 | 265 | 24 | 1725 | 216 |
| 1968 | 837 | 120 | 627 | 96 | 202 | 20 | 1666 | 236 |
| 1969 | 877 | 202 | 412 | 91 | 177 | 20 | 1466 | 313 |
| 1970 | 498 | 159 | 344 | 94 | 196 | 27 | 1038 | 280 |
| 1971 | 804 | 220 | 234 | 94 | 191 | 40 | 1229 | 354 |
| 1972 | 657 | 220 | 534 | 177 | 121 | 30 | 1312 | 427 |
| 1973 | 1167 | 508 | 510 | 232 | 79 | 24 | 1756 | 764 |
| 1974 | 1291 | 532 | 1023 | 415 | 106 | 40 | 2420 | 987 |
| 1975 | 1199 | 461 | 687 | 308 | 64 | 24 | 1950 | 793 |
| 1976 | 2738 | 1116* | 901 | 422 | 69 | 24 | 3708 | 1562* |

* partial totals
Sources: NOAA-NMFS Fishery Statistics of the United States 1939-1973.
NMFS Current Fishery Statistics 1974-1976.

Table 14. Squid Landings by State - New England Region
(in thousands of pounds and thousands of dollars)

| | ME | | NH | | MA | | RI | | CT | | TOTAL | | AVERAGE PRICE/LB. FOR REGION |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | lbs | $ | lbs | $ | lbs | $ | lbs | $ | lbs | $ | lbs | $ | $ |
| 1939 | 1 | a* | - | - | 1724 | 24 | 663 | 7 | 12 | 1 | 2400 | 33 | .013 |
| 1940 | - | - | - | - | 1367 | 15 | 381 | 6 | 4 | a | 1752 | 22 | .012 |
| 1941 | b* | b | b | b | b | b | b | b | b | b | b | b | b |
| 1942 | - | - | - | - | 990 | 26 | 96 | 9 | 2 | a | 1088 | 35 | .032 |
| 1943 | - | - | - | - | 802 | 38 | 193 | 15 | 47 | 5 | 1042 | 58 | .056 |
| 1944 | - | - | - | - | 586 | 35 | 309 | 10 | 62 | 7 | 957 | 52 | .054 |
| 1945 | - | - | - | - | 1217 | 60 | 273 | 14 | 162 | 17 | 1652 | 91 | .055 |
| 1946 | 1 | a | - | - | 319 | 11 | 509 | 18 | 220 | 20 | 1049 | 49 | .047 |
| 1947 | 1 | a | - | - | 666 | 32 | 774 | 46 | 208 | 13 | 1649 | 90 | .054 |
| 1948 | - | - | - | - | 1396 | 83 | 558 | 36 | 622 | 48 | 2576 | 167 | .065 |
| 1949 | 20 | a | - | - | 2438 | 53 | 1870 | 47 | 307 | 24 | 4635 | 125 | .027 |
| 1950 | 21 | a | - | - | 835 | 34 | 483 | 18 | 64 | 5 | 1403 | 57 | .041 |
| 1951 | 5 | a | - | - | 2196 | 76 | 1735 | 64 | 84 | 7 | 4121 | 147 | .036 |
| 1952 | 1 | a | - | - | 383 | 35 | 416 | 37 | 14 | 1 | 814 | 73 | .090 |
| 1953 | 3 | a | - | - | 3243 | 134 | 1208 | 74 | 45 | 3 | 4499 | 211 | .047 |
| 1954 | 2 | a | - | - | 1989 | 55 | 626 | 26 | 16 | 1 | 2633 | 82 | .031 |
| 1955 | 6 | a | - | - | 1939 | 60 | 605 | 37 | 55 | 4 | 2605 | 101 | .039 |
| 1956 | 1 | a | - | - | 1085 | 20 | 722 | 52 | 99 | 9 | 1907 | 81 | .042 |
| 1957 | 3 | a | - | - | 2826 | 55 | 1467 | 72 | 150 | 11 | 4446 | 138 | .031 |
| 1958 | 6 | a | - | - | 1228 | 28 | 1289 | 76 | 46 | 4 | 2569 | 108 | .042 |
| 1959 | - | - | - | - | 1686 | 71 | 728 | 59 | 122 | 7 | 2536 | 137 | .054 |
| 1960 | - | - | - | - | 1248 | 73 | 803 | 84 | 38 | 3 | 2089 | 160 | .076 |
| 1961 | - | - | - | - | 868 | 65 | 301 | 35 | 52 | 5 | 1221 | 105 | .086 |
| 1962 | 1 | a | - | - | 1387 | 75 | 943 | 75 | 148 | 10 | 2479 | 160 | .064 |
| 1963 | 7 | a | - | - | 1971 | 107 | 666 | 44 | 38 | 3 | 2682 | 154 | .057 |
| 1964 | - | - | - | - | 238 | 12 | 287 | 43 | 31 | 3 | 556 | 58 | .104 |
| 1965 | - | - | - | - | 436 | 31 | 357 | 45 | 47 | 5 | 840 | 81 | .096 |
| 1966 | - | - | - | - | 35 | 2 | 386 | 44 | 102 | 8 | 523 | 54 | .103 |
| 1967 | - | - | - | - | 885 | 46 | 910 | 53 | 24 | 2 | 1819 | 101 | .055 |
| 1968 | 4 | a | - | - | 710 | 45 | 996 | 67 | 132 | 8 | 1842 | 120 | .065 |
| 1969 | - | - | - | - | 537 | 59 | 1123 | 116 | 269 | 27 | 1929 | 202 | .105 |
| 1970 | a | a | - | - | 505 | 49 | 559 | 104 | 31 | 6 | 1095 | 159 | .145 |
| 1971 | a | a | - | - | 979 | 76 | 703 | 128 | 86 | 16 | 1768 | 220 | .124 |
| 1972 | 2 | a | - | - | 688 | 85 | 750 | 134 | 6 | 1 | 1446 | 220 | .152 |
| 1973 | 3 | a | - | - | 924 | 143 | 1621 | 361 | 19 | 4 | 2567 | 508 | .198 |
| 1974 | 21 | 3 | - | - | 1431 | 241 | 1376 | 286 | 13 | 2 | 2841 | 532 | .187 |
| 1975 | 12 | 2 | - | - | 832 | 122 | 1776 | 334 | 17 | 3 | 2637 | 461 | .175 |
| 1976 | 36 | 2 | - | - | 3597 | 502 | 2571 | 612 | b | b | 6204 | 1116* | .180 |

a = amounts less than 500 lbs or 500 dollars
b = data not available
* = partial totals
Sources: NOAA-NMFS Fishery Statistics of the United States 1939-1973.
NMFS Current Fishery Statistics 1974-1976.




Reported Commercial Landings Of Squid By State
January, 1975 - December, 1977

(Note changes of scale. Almost all of the "Maine & Massachusetts" landings are landed in Massachusetts.)

Figure 6

## Table 15.

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 |
| Squid | 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 | Squid | 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 |
| 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 | Squid | 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, indus. | 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

Since the 1960s, North Carolina has landed small quantities of squid. During 1969-1976, approximately 15 metric tons were landed annually, with the fishery peaking in 1974 at 34 metric tons and then declining to only 16 metric tons in 1976 (Table 17). Landings in southern states (South Carolina, Georgia and Florida) are even less. Fishermen interviews indicate that these figures may be low by as much as 50% due to unreported charter boat squid catches that are immediately employed as bait. However, doubling these landing figures still results in a relatively insignificant fishery in terms of the total squid fishery of the northwest Atlantic.

Since 1970, total east coast squid landings and ex-vessel prices have increased. Total landings in New England of 2,738 metric tons and in the Mid-Atlantic - Chesapeake area of 970 metric tons in 1976 reflect Massachusetts', Rhode Island's and New York's dominance as squid producing states.

The majority of US vessels catch squid incidentally to finfish operations directed primarily at groundfish and butterfish. As the marketability of squid has increased in recent years, the number of vessels landing squid has also increased substantially. For example, between 1965 and 1975, the number of vessels which landed squid in New England ports increased by 60% to 205 (Table 18). In 1975, mean length of these vessels was 58 feet and engines averaged 242 horsepower. Gross tonnage ranged from 7 to 191 tons with a mean of 54 tons (Table 19). The wide range of such characteristics indicates the diversity of the fleet. Frequency distributions for the characteristics of length, gross tonnage, horsepower and age of vessels are shown in Figures 8 through 11, respectively. Of these vessels, 89% have wooden hulls and 11% have steel hulls, with a single ferro-cement hulled vessel in the 16 to 22 gross tonnage class. Mean age of New England vessels landing squid is 25 years, with the mean age of the steel and wood hulled vessels differing significantly - 8 to 28 years old, respectively. In addition, 86% of the steel vessels are 10 years old or less as opposed to only 5% of the wooden vessels being in that age category. The number of operating units (vessels or traps) conducting a directed fishery for squid in 1974-1976 as compiled by the Statistics Branch, Northeast Region, NMFS, is shown in Table 20. All of the vessels pursuing a directed squid fishery were otter trawlers, and the percentage of such vessels from New England increased from 73% in 1974 to 93% in 1976. This increase possibly resulted from fishermen desiring to catch squid because of easier marketing in New England and decreased availability of traditional groundfish species. All 11 trap operations directed at squid were located in New England. Concentration of the directed squid fishery in New England is to be expected based upon the total landings of squid presented in Table 12. New England landings in recent years have comprised a majority of total east coast squid landings.

Employment In The Domestic Harvesting Sector

In 1975, 205 vessels landed squid in New England ports as reported by the Statistics Branch, Northeast Region, NMFS. NMFS Statistical Port Agents estimate that in the states of New York through Virginia approximately 300 vessels harvest some squid. This figure does not necessarily indicate vessels in addition to those counted in New England. However, the extent of possible overlap cannot be determined at this time.

Table 16. Squid Landings by State
Mid-Atlantic and Chesapeake Regions
(in thousands of pounds and thousands of dollars)

| YR | NY | | NJ | | DE | | MD | | VA | | TOTAL | | AVERAGE PRICE/LB. FOR REGION |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | lbs | $ | lbs | $ | lbs | $ | lbs | $ | lbs | $ | lbs | $ | $ |
| 1939 | 1643 | 67 | 1657 | 19 | — | — | 105 | 1 | 337 | 4 | 3742 | 91 | .024 |
| 1940 | 1471 | 31 | 1149 | 20 | — | — | 86 | 1 | 215 | 2 | 2921 | 54 | .018 |
| 1941 | b | b | b | b | b | b | 71 | 1 | 212 | 3 | 283* | 4* | .014 |
| 1942 | 355 | 35 | 368 | 28 | — | — | 31 | 2 | 161 | 2 | 915 | 67 | .073 |
| 1943 | 510 | 52 | 580 | 58 | — | — | b | b | b | b | 1090* | 110* | .101 |
| 1944 | 455 | 51 | 442 | 43 | — | — | 28 | 3 | 139 | 10 | 1064 | 107 | .100 |
| 1945 | 640 | 63 | 600 | 42 | 1 | a | 47 | 6 | 102 | 5 | 1390 | 117 | .084 |
| 1946 | 449 | 47 | b | b | b | b | 73 | 11 | 64 | 7 | 586* | 65* | .111 |
| 1947 | 339 | 38 | 391 | 25 | 6 | 1 | 41 | 4 | 56 | 5 | 833 | 73 | .088 |
| 1948 | 1055 | 106 | 766 | 65 | 14 | 1 | 76 | 6 | 68 | 4 | 1979 | 182 | .092 |
| 1949 | 1144 | 64 | 940 | 28 | 11 | a | 48 | 3 | 146 | 6 | 2289 | 102 | .044 |
| 1950 | 636 | 44 | 278 | 12 | 14 | 1 | 40 | 4 | 64 | 4 | 1032 | 65 | .063 |
| 1951 | 1053 | 100 | 428 | 22 | 10 | 1 | 24 | 2 | 60 | 5 | 1575 | 130 | .082 |
| 1952 | 816 | 63 | 325 | 29 | 21 | 2 | 6 | 1 | 83 | 5 | 1251 | 100 | .080 |
| 1953 | 362 | 27 | 589 | 33 | 15 | 2 | 5 | a | 149 | 8 | 1120 | 70 | .062 |
| 1954 | 554 | 39 | 335 | 26 | 2 | a | 6 | a | 90 | 5 | 987 | 70 | .071 |
| 1955 | 682 | 38 | 695 | 30 | 10 | 1 | 16 | 1 | 127 | 7 | 1530 | 77 | .050 |
| 1956 | 704 | 56 | 299 | 23 | 19 | 2 | 13 | 1 | 105 | 6 | 1140 | 88 | .077 |
| 1957 | 996 | 73 | 413 | 20 | 4 | a | 25 | 1 | 128 | 8 | 1566 | 102 | .065 |
| 1958 | 1232 | 69 | 374 | 21 | 15 | 1 | 16 | 1 | 127 | 4 | 1764 | 96 | .054 |
| 1959 | 740 | 56 | 352 | 24 | — | — | 14 | 1 | 182 | 8 | 1288 | 89 | .069 |
| 1960 | 1035 | 68 | 176 | 12 | — | — | 18 | 1 | 284 | 22 | 1513 | 103 | .068 |
| 1961 | 1186 | 89 | 580 | 38 | — | — | 35 | 2 | 314 | 16 | 2115 | 145 | .068 |
| 1962 | 1456 | 84 | 544 | 32 | — | — | 31 | 2 | 224 | 17 | 2255 | 135 | .060 |
| 1963 | 872 | 68 | 796 | 42 | — | — | 39 | 3 | 253 | 13 | 1960 | 126 | .064 |
| 1964 | 1007 | 74 | 377 | 22 | — | — | 29 | 2 | 206 | 11 | 1619 | 109 | .067 |
| 1965 | 974 | 66 | 453 | 33 | — | — | 32 | 3 | 223 | 10 | 1682 | 112 | .066 |
| 1966 | 1238 | 110 | 419 | 31 | — | — | 62 | 6 | 364 | 16 | 2083 | 163 | .078 |
| 1967 | 772 | 58 | 621 | 33 | — | — | 42 | 4 | 542 | 20 | 1977 | 115 | .058 |
| 1968 | 973 | 69 | 406 | 27 | — | — | 15 | 1 | 430 | 19 | 1399 | 116 | .083 |
| 1969 | 532 | 55 | 374 | 36 | — | — | 14 | 1 | 375 | 19 | 1295 | 111 | .086 |
| 1970 | 404 | 51 | 352 | 43 | — | — | 10 | 2 | 422 | 25 | 1188 | 121 | .102 |
| 1971 | 311 | 56 | 205 | 38 | — | — | 11 | 2 | 410 | 38 | 937 | 134 | .143 |
| 1972 | 764 | 100 | 412 | 77 | — | — | 4 | 1 | 262 | 29 | 1442 | 207 | .144 |
| 1973 | 537 | 97 | 585 | 135 | — | — | 13 | 4 | 160 | 20 | 1295 | 256 | .198 |
| 1974 | 964 | 178 | 1287 | 237 | — | — | 64 | 15 | 169 | 25 | 2484 | 455 | .183 |
| 1975 | 569 | 134 | 942 | 174 | — | — | 41 | 13 | 101 | 11 | 1653 | 332 | .200 |
| 1976 | 1108 | 225 | 875 | 197 | — | — | 39 | 11 | 113 | 13 | 2135 | 446 | .209 |

a = amounts less than 500 pounds or 500 dollars
b = data not available
* = partial totals
Source: NOAA-NMFS Fishery Statistics of the United States 1939-1973.
Current Fishery Statistics 1974-1976.

Table 17. North Caroline Squid Fishery - Catch and Value

| | lbs. | MT | $ | Average Price/lb. |
|---|---|---|---|---|
| 1969 | 24491 | (11) | 1244 | .051 |
| 1970 | 21252 | (10) | 1197 | .056 |
| 1971 | 10437 | ( 5) | 877 | .084 |
| 1972 | 14995 | ( 7) | 1085 | .072 |
| 1973 | 28161 | (13) | 3184 | .113 |
| 1974 | 75087 | (34) | 11935 | .159 |
| 1975 | 59903 | (27) | 6753 | .113 |
| 1976* | 35664 | (16) | 4822 | .135 |

* 1976 data is preliminary
Source: NMFS Current Fishery Statistics, 1969-1976

Table 18. Number of Vessels Landing Squid in New England

| Year | Number of Vessels |
|---|---|
| 1965 | 122 |
| 1970 | 152 |
| 1975 | 205 |

Table 19. Characteristics of Domestic Vessels That Landed Squid in New England during 1975

| | Range | Mean | Standard Deviation |
|---|---|---|---|
| Length (feet) | 32-104 | 58 | ±13 |
| Length (meters) | 10-32 | 18 | ±4 |
| Gross tonage | 7-191 | 54 | ±33.5 |
| Horsepower | 24-765 | 242 | ±128 |
| Crew size | 2-8 | 3.4 | ±1.8 |
| Age of vessel (years) | 2-74 | 25 | ±13 |

Data from Statistics Branch, Northeast Region - NMFS

Vessels landing squid in New England employed 695 fishermen. By assuming the same mean crew size of 3.4 from the New England data (Table 19) for vessels fishing from New York through Virginia, an additional 972 fishermen were employed. Also, two independent approaches based on 1973 data for otter trawlers and otter trawl fishermen were used. Application of these data to reported numbers of vessels landing squid in 1975 in New York through Virginia yielded estimates of 805 and 958 fishermen employed on these vessels. Thus, from Maine to Virginia approximately 1,650 persons are employed on fishing vessels landing some squid.

However, since squid landings are incidental to catches of other species by the otter trawl fleet, probably none of the individuals is employed solely due to the squid fishery. Even for the slightly less than 100 fishermen employed by the approximately 30 boats conducting a directed squid fishery, squid most likely accounts for only a relatively small percentage of the crew's total earnings. This is due to the fact that their directed fishing effort for

squid may last for only short periods of time. In the Mid-Atlantic, when squid is not the directed fishery, many boats "shack" the squid. Due to this different settlement system the squid accounts for a more significant percentage of earnings than would seem the case. For example, on a recent "poor" trip squid accounted for less than half the total gross but accounted for about 83% of the crew's paycheck. This system is not used when squid is the directed fishery. The major significance of squid to the harvesting sector at the present time is that it offers a supplemental income to fishermen. During part of May and June squid landings may be the deciding factor as to whether fluke fishing is profitable. In certain localities, such as North Carolina, squid may also provide fishing opportunities and income between seasons for other more profitable species.

Table 20. Number of Domestic Operating Units Engaged in a Directed Fishery for Squid

| YEAR | OTTER TRAWLERS | TRAPS |
|---|---|---|
| 1974 | 41 | 10 |
| 1975 | 30 | 9 |
| 1976 | 41 | 8 |

Data from Statistics Branch, Northeast Region, NMFS

## Gear Employed in the Fishery

The early domestic fishery for squid was essentially for Loligo, which during the summer can often be found close to shore near docks in southern New England during the evening. Rathjen (1973) stated that during the late 19th and early 20th centuries pound nets all along the coast, but especially in New England, yielded catches of squid.

In the 1930s and 1940s pound nets, otter trawls, and floating traps were the principal types of gear used by east coast domestic fishermen to catch squid. Insignificant amounts of squid were also taken by purse and haul seines, anchor gill nets, and hand lines. By 1973 otter trawls were the major gear employed, with over 85% of the total amount of squid landed by this method, mainly as an incidental catch to groundfish operations. Rhode Island, Massachusetts, and New Jersey were the three principal states using this gear. Pound nets and floating traps were also significant in the New England area. Minimal quantitities of squid were taken by several additional methods (Table 21).

A comparison of gear used in 1939 and 1973 (Table 21) shows the use of pound nets has decreased significantly in every state during this 44 year period. Conversely, otter trawl squid catches have increased dramatically in every state except New York where reported otter trawl squid catches decreased by almost 50%. However, otter trawls accounted for 83% of the State's squid landings in 1973 as opposed to only 58% in 1939. Squid taken by haul seines have been reported only from New York where they comprise less than 1% of the total squid landings.

Table 21. Comparison of Squid Catch By Gear For 1939 And 1973 By State (in thousands of pounds)

| | Pound Nets | | Otter Trawls | | Floating Traps | | Haul Seines | | Other* | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1939 | 1973 | 1939 | 1973 | 1939 | 1973 | 1939 | 1973 | 1939 | 1973 |
| ME | --- | --- | --- | 2.6 | 1.3 | --- | --- | --- | --- | --- |
| MA | 1,448.4 | 143.6 | 248.2 | 771.5 | 27.7 | 1.1 | --- | --- | --- | 7.6 |
| RI | 50.6 | --- | 10.8 | 1,294.0 | 601.2 | 326.6 | --- | --- | --- | .1 |
| CT | 7.7 | --- | 3.9 | 18.5 | --- | --- | --- | --- | --- | --- |
| NY | 697.5 | 44.4 | 945.5 | 447.2 | --- | --- | .2 | 45.8 | --- | --- |
| NJ | 1,583.0 | --- | 73.1 | 584.1 | --- | --- | --- | --- | .1 | .4 |
| MD | 105.0 | 13.4 | .3 | --- | --- | --- | --- | --- | --- | --- |
| VA | 275.2 | --- | 62.0 | 187.1 | --- | --- | --- | --- | --- | .9 |

* Includes: purse seines, drift gill nets, hand lines, offshore lobster pots and scallop dredges.

Source: NOAA-NMFS Fishery Statistics of the United States 1939 & 1973.

## VIII-3. Foreign Fishing Activities

Regulation of foreign fisheries along the United States coast of the northwest Atlantic Ocean began in 1949 when the US convened a conference of 11 countries in Washington, D.C. This conference resulted in the formation of the International Commission for the Northwest Atlantic Fisheries (ICNAF). The Northwest Atlantic Fisheries Act of 1950 authorized US participation in the activities of the convention. The designated areas were the waters north of 39°00′ north latitude and east of 71°40′ west longitude. ICNAF regulations in the early 1950s resulted in the establishment of mesh size regulations for certain directed groundfish fisheries and groundfish bycatch provisions for other small mesh directed fisheries.

Management of squid in ICNAF SA 5 and SA 6 began in 1974 when the ICNAF Standing Committee on Research and Statistics (STACRES) recommended a pre-emptive Total Allowable Catch (TAC) of between 50,000 and 80,000 metric tons based primarily on a 1973 assessment of the Loligo stock by Japanese scientists. The TAC set for both species (Loligo and Illex) was 71,000 tons annually for 1974 and 1975 (Table 10). Based on updated assessments for Loligo by the United States and estimates of stock biomass by Japanese scientists, separate TACs were set for each genus (30,000 tons for Illex and 44,000 tons for Loligo) for 1976.

Foreign fishing for squid began in 1964 when the USSR reported taking 4 tons incidentally in ICNAF SA 5 (Tables 9 and 10). Through 1966, the Soviets were the only foreign nationals off our coast pursuing any type of squid fishery and their catches totaled 389 tons. Japan, fishing in ICNAF SA 6, entered the fishery in 1967 and by 1969 had become the dominant squid harvester with 7,122 tons landed. Japan retained this dominance through 1975. In 1976 Spain became the leading harvester with a catch of 13,193 tons, a 33% increase over 1976 while Japanese catches decreased 40% to 8,353 tons (Table 22)

The mean squid catch for 1972-1976 for all countries except the US was just under 50,000 tons, the fishery peaking in 1973 at 56,768 metric tons.

"Days fished" data reported to ICNAF for 1974 and 1975 (Tables 23 and 24)

indicate the relative amount of fishing pressure exerted by foreign nationals of particular fisheries. Overall, total fishing days for squid, as reported to ICNAF, decreased 25% from 1974 to 1975 but total squid catch in 1975 was down only 7% from the 1974 level.

The characteristics of Italian, Japanese, and Spanish vessels that fished in ICNAF SA 5 and SA 6 during 1974 are given in Table 25. These nations were chosen since their effort was directed primarily at squid. Of these, Japan had the largest vessels in terms of mean gross tonnage, length, and horsepower. Compared to the United States fleet harvesting squid, the vessels of these three countries are much larger, more powerful, and newer.

Foreign nations have traditionally pursued their directed Loligo fishery with bottom trawling gear. The Japanese have experimented using jigs to harvest Illex but this technique is mainly employed in the Pacific squid fishery. However, jigging is the basic approach to harvesting Illex by Canadians off Newfoundland. The predominant bycatch of the Loligo fishery off the Mid-Atlantic states is butterfish, and this bycatch may possibly be increased by use of pelagic gear.

In 1977 the Canadian allocation in US waters of Loligo was 2,000 mt of which 15 mt were caught and 1,000 mt of Illex of which none were caught. The Canadian caught no Loligo in Canadian waters and caught 29,759 mt of Illex in Subarea 3 and 9,280 mt in Subarea 4. The total catch in Canadian waters (by Canadians and foreigners) in 1977 was 32,692 mt of Illex in Subarea 3 and 55,218 mt in Subarea 4. No Loligo were caught.

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

US and foreign landings data for squid in SA 5 and SA 6 are given in Tables 26 and 27, respectively. Total US landings have remained relatively constant and show no trends. However, in terms of percentage of the total catch, US landings have declined from 100% of both species in 1963 to 5% for Loligo and 1% for Illex in 1975. Bycatch of other species of interest to US fishermen (e.g., butterfish) in the foreign directed fishery for squid presents another level of competition for limited available resources.

Fisheries (main species sought category) in which squid were caught in the northwest Atlantic are presented in Table 28 by country. A total squid catch of 55,528 metric tons was taken in 1974, of which 12,853 tons was bycatch. The squid fishery was difficult to identify as directed or incidental under the ICNAF catch reporting scheme since it occurred in a mixed fishery situation. A procedure was adopted of assigning a catch record to the squid fishery if the largest catch was of squid.

It is not known to what extent foreign fishing activities have affected the domestic squid fishery. Since the US squid market is quite small and the development of export markets for squid represents a distinct opportunity for expanding the US squid industry, large foreign squid catches may have hindered development of this export trade and the domestic squid industry. Fishermen have indicated that activity of large foreign trawlers in areas of squid concentration may adversely influence the development of a directed squid fishery by smaller US vessels because of perceived foreign dominance of the limited space because of size and number of vessels. However, the area concept governing foreign fishing within the FCZ should minimize this potential obstacle.

Table 22. Estimated[a] species breakdown of squid landings in ICNAF SA 5 and 6, 1963-1975.

| Year | Canada | Bulgaria | France | FRG | Japan | Italy | Spain | Poland | Romania | USSR | USA | GDR | Cuba | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Loligo | | | | | | | | |
| 1963 | | | | | | | | | | | 1,294 | | | 1,294 |
| 1964 | | | | | | | | | | | 572 | | | 576 |
| 1965 | | | | | | | | | | 99 | 709 | | | 808 |
| 1966 | | | | | | | | | | 226 | 722 | | | 948 |
| 1967 | | | | | 5[b] | | | | | 548 | 1,125 | | | 1,678 |
| 1968 | | | | | 177[b] | | | | | 2,184 | 1,083 | 5 | | 3,449 |
| 1969 | | | | | 7,125[b] | | | | | 1,080 | 898 | | | 9,103 |
| 1970 | | | | | 13,557 | | 4,483 | | | 482 | 652 | 10 | | 36,184 |
| 1971 | | 50 | | | 10,528 | | 1,881 | | | 3,561 | 727 | | | 16,747 |
| 1972 | | 254[b] | 296 | 463 | 17,102 | 2,928 | 8,165 | 2,754 | 33 | 4,045 | 742 | | 7 | 36,789 |
| 1973 | | 410[b] | 820 | 1,639 | 14,396[b] | 2,994 | 11,145[b] | 5,134 | 139[b] | 5,000 | 1,100 | 163 | | 42,940 |
| 1974 | | 300 | 27 | | 13,493[b] | 3,280[b] | 9,375[b] | 1,653 | - | 4,485 | 2,141 | - | | 34,754 |
| 1975 | - | 74 | | | 10,746 | 3,390 | 8,090 | 3,785[b] | - | 4,295 | 1,593[b] | 620[b] | | 32,593 |
| | | | | | | Illex | | | | | | | | |
| 1963 | | | | | | | | | | | 810 | | | 810 |
| 1964 | | | | | | | | | | | 358 | | | 358 |
| 1965 | | | | | | | | | | 78 | 444 | | | 522 |
| 1966 | | | | | | | | | | 118 | 452 | | | 570 |
| 1967 | | | | | 2[b] | | | | | 286 | 704 | | | 992 |
| 1968 | | | | | 1,655[b] | | | | | 1,052 | 678 | 5 | | 3,390 |
| 1969 | | | | | 586[b] | | | | | 260 | 562 | 1 | | 1,409 |
| 1970 | | | | | 82 | | 27 | | | 174 | 408 | 10 | | 701 |
| 1971 | 1 | 40 | | | 48 | | 2,317 | | | 2,578 | 455 | | | 5,439 |
| 1972 | | 245 | | | 1,589 | 272 | 3,694 | 2,674 | 33 | 2,927 | 472 | | 7 | 11,913 |
| 1973 | | - | | | 1,009[b] | 171 | 3,784[b] | 4,070 | - | 3,976 | 530 | 156 | | 13,696 |
| 1974 | | 293 | | | 3,327[b] | 980[b] | 6,769[b] | 5,052 | 9 | 3,945 | 148 | | | 20,523 |
| 1975 | | 120 | 66 | | 3,237[b] | 844[b] | 1,998 | 3,051[b] | 48 | 3,706 | 107[b] | 278[b] | | 13,255 |

Source:

a - Tibbetts 1976. If not reported by species; the estimate is 60% of the April through September catches of *Illex* in the offshore fishery of Japan, Spain, Italy, and 50% of the April through September catches of *Illex* in the shelf fishery of the remaining countries.

b - As reported to ICNAF

Table 23. 1974 days fished as reported to ICNAF

| Country | Cod | Haddock | Redfish | Silver hake | Red hake | Pollock | Flounder | Ground-fish | Herring | Mackerel | Pelagic | Other fish | Squid | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bulgaria | | | | 55 | | | | | | 712 | | | | 767 |
| Canada | 310 | 91 | 13 | | | 553 | | 148 | 0 | | | | 9 | 1,124 |
| Denmark | | | | | | | | | | | | | | |
| France | 3 | | | | | | | | 65 | | | | | 68 |
| FRG | | | | | | | | | 616 | | | | | 616 |
| Iceland | | | | | | | | | | | | | | |
| Italy[a] | | | | | | | | | | | | | 0 | |
| Japan | | | | | | | | 3 | 147 | | 362 | | 1,092 | 2,649 |
| Norway | | | | | | | | | | | | | | |
| Poland | 6 | | | | | | | | 1,241 | 3,500 | | 5 | 423 | 5,175 |
| Portugal | | | | | | | | | | | | | | |
| Romania | | | | | | | | | 170 | 345 | | | | 523 |
| Spain | 419 | | | | | | | | | | | | 2,378 | 2,797 |
| USSR | | | | 6,004 | 2,412 | | 18 | 304 | 3,012 | 4,045 | | 1,317 | 435 | 18,347 |
| UK | | 11 | | | | | | | | | | | | 11 |
| USA | 5,890 | 77 | 770 | 924 | 106 | 1,145 | 13,365 | 7,051 | 222 | 541 | 574 | 1,276 | 1,805 | 33,754 |
| GOR | 2 | | | | | | | | 936 | 1,392 | 8 | 458 | | 2,797 |
| Other | | | | | | | | | | | | | | |

[a]No reporting of effort units.

Table 24. 1975 days fished as reported to ICNAF

| Country | Cod | Haddock | Redfish | Silver hake | Red hake | Pollock | Flounder | Ground-fish | Herring | Mackerel | Pelagic | Other fish | Squid | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bulgaria | | | | 63 | | | | | | 715 | | | | 778 |
| Canada | 386 | 153 | 1 | | | 450 | | 141 | | | | | | 1,131 |
| Cuba | | | | 135 | | | | | 67 | 15 | | | | 217 |
| France | | | | | | | | | 64 | | | | | 64 |
| FRG | | | | | | 5 | | | 598 | 4 | | | | 607 |
| Italy[a] | | | | | | | | | | | | | | |
| Japan | | | | | | | | 65 | 188 | 26 | 259 | | 1,663 | 2,201 |
| Norway | 1 | | | | | | | | | | | | | 1 |
| Poland | | | | 9 | | | | | 1,589 | 3,539 | 9 | | 252 | 5,398 |
| Romania | | | | | | | | | 109 | | | | | 109 |
| Spain | 1,510 | | | | | | | | | | | | 2,634 | 4,144 |
| USSR | | | | 7,615 | 775 | | | | 3,106 | 3,598 | | 384 | 572 | 16,050 |
| UK | | | | | | | | | | | | | | |
| USA | 6,695 | 297 | 875 | 1,932 | 24 | 1,678 | 15,174 | 6,347 | 241 | 141 | 693 | 695 | 69 | 34,861 |
| GDR | | | | | | 1 | | | 1,039 | 1,302 | | 51 | 23 | 2,416 |
| IRE[a] | | | | | | | | | | | | | 0 | |
| Total | 8,592 | 450 | 876 | 9,754 | 799 | 2,134 | 15,174 | 6,553 | 7,001 | 9,340 | 961 | 1,130 | 5,213 | 67,977 |

[a] No reporting of effort units

Table 25. Characteristics of Foreign Vessels Fishing in SA 5 & 6 During 1974 for Those Countries Fishing Primarily for Squid

| | Italy | | Japan | | Spain[1] | |
|---|---|---|---|---|---|---|
| | Mean | Range | Mean | Range | Mean | Range |
| Gross Tonnage | 1220 | 632-1584 | 2202 | 999-2880 | 667 | 284-1646 |
| Length (meters) | 70 | 59-75 | 76 | 62-79 | 50 | 36-74 |
| (feet) | 230 | 194-246 | 250 | 203-259 | 165 | 118-243 |
| Horsepower | 2374 | 1285-2900 | 2818 | 2200-3500 | 1418 | 800-2670 |
| Crew Size | 28 | 16-32 | 53 | 43-60 | 28 | 19-46 |
| Age at 1974 | 4 yrs. | 1-7 | 9 yrs. | 7-14 | 5 yrs. | 0-12[2] |

[1] = Charactistics are for Spanish vessels which fished exclusively in SA6, primarily for squid.
[2] = Age 0 means the vessel was built in 1974.
Number of vessels: Italy - 10; Japan - 16; Spain - 35.
Data compiled from "ICNAF. (1976). List of Fishing Vessels for 1974."

Table 26. USA and Foreign Landings of Loligo for SA 5 and 6, Expressed as Relative Percentages of the Total Quantity Landed, 1963-1975.

| Year | USA landings (MT) | Percent of total USA landings | Foreign landings (MT) | Percent of total foreign landings | Total landings (MT) |
|---|---|---|---|---|---|
| 1963 | 1,249 | 100 | 0 | 0 | 1,249 |
| 1964 | 572 | 100 | 4 | 0 | 576 |
| 1965 | 709 | 88 | 99 | 12 | 808 |
| 1966 | 722 | 76 | 226 | 24 | 948 |
| 1967 | 1,125 | 67 | 553 | 33 | 1,678 |
| 1968 | 1,083 | 31 | 2,366 | 69 | 3,449 |
| 1969 | 898 | 10 | 8,205 | 90 | 9,103 |
| 1970 | 652 | 2 | 35,532 | 98 | 36,184 |
| 1971 | 727 | 4 | 16,020 | 96 | 16,747 |
| 1972 | 742 | 2 | 36,047 | 98 | 36,789 |
| 1973 | 1,100 | 3 | 41,840 | 97 | 42,940 |
| 1974 | 2,141 | 6 | 32,613 | 94 | 34,754 |
| 1975* | 1,593 | 5 | 31,001 | 95 | 32,594 |
| 1976* | 1,230 | 5 | 21,478 | 95 | 22,708 |

* = Preliminary data.

Table 27. USA and Foreign Landings of Illex Squid for SA 5 and 6 Expressed as Relative Percentages of the Total Quantity Landed, 1963-1975

| Year | USA landings (MT) | Percent of total USA landings | Foreign landings (MT) | Percent of total foreign landings | Total landings (MT) |
|---|---|---|---|---|---|
| 1963 | 810 | 100 | 0 | 0 | 810 |
| 1964 | 358 | 100 | 0 | 0 | 358 |
| 1965 | 444 | 85 | 78 | 15 | 522 |
| 1966 | 452 | 79 | 118 | 21 | 570 |
| 1967 | 704 | 71 | 288 | 29 | 992 |
| 1968 | 678 | 20 | 2,712 | 80 | 3,390 |
| 1969 | 562 | 40 | 847 | 60 | 1,409 |
| 1970 | 408 | 58 | 293 | 42 | 701 |
| 1971 | 455 | 8 | 4,984 | 92 | 5,439 |
| 1972 | 472 | 4 | 11,441 | 96 | 11,913 |
| 1973 | 530 | 4 | 13,166 | 96 | 13,696 |
| 1974 | 148 | 1 | 20,375 | 99 | 20,523 |
| 1975* | 107 | 1 | 13,148 | 99 | 13,255 |
| 1976* | 229 | 1 | 21,637 | 99 | 21,866 |

* = Preliminary data.

Table 28. By-catches (metric tons) and By-catch Ratios of Squid Taken in 1974 in SA 5 and 6 in Designated Fisheries (Main Species Sought Category) by Country*

| | Main Species Sought | | | | | | |
|---|---|---|---|---|---|---|---|
| Country | Silver Hake | Red Hake | Other ground-fish | Herring | Mackerel | Other pelagic fish | Other finfish |
| Bulgaria | 56 (.034) | | | | 536 (.026) | | |
| Canada | | | 0 (.00) | 0 (.00) | | | |
| France | | | | 0 (.00) | | | |
| FRG | | | | 0 (.00) | | | |
| GDR | | | | 0 (.00) | 0 (.00) | 0 (.00) | 0 (.00) |
| Japan | | | 1 (.091) | 11 (.005) | | 623 (.188) | |
| Poland | | | | 664 (.020) | 3,904 (.004) | | 0 (.00) |
| Romania | | | | 2 (.002) | 7 (.001) | | |
| USSR | 3,162 (.032) | 1,349 (.090) | 22 (.040) | 896 (.025) | 824 (.010) | 0 (.00) | 796 (.039) |
| Total | 3,218 | 1,349 | 23 | 1,573 | 5,271 | 623 | 796 |

* = USA figures are not available as squid catches are combined with other invertebrates in distribution of catch by gear tables.

Table 29. By-catch ratios and catches (metric tons) in squid fishery for 1974 by countries.

| Country | Species Caught: Cod | Haddock | Red-fish | Silver hake | Red hake | Pol-lock | Am. plaice | Witch Flounder | Y.T. Flounder | Other Flounder | Herring | Mackerel | Squid | Other fish | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total | | | | | | | | | | | | | | | |
| Ratio | 0 | 0 | 0 | 0.011 | 0.007 | 0 | 0 | 0 | 0 | 0.004 | 0.009 | 0.057 | 1.000 | 0.084 | 1.172 |
| Catch | 15 | 5 | 0 | 436 | 296 | 0 | 0 | 0 | 4 | 151 | 351 | 2,345 | 40,842 | 3,421 | 47,861 |
| Canada | | | | | | | | | | | | | | | |
| Ratio | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.000 | 0 | 1.000 |
| Catch | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 27 | 0 | 27 |
| Italy | | | | | | | | | | | | | | | |
| Ratio | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.099 | 1.000 | 0 | 4,680 |
| Catch | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 420 | 4,260 | 0 | 1,099 |
| Japan | | | | | | | | | | | | | | | |
| Ratio | 0 | 0 | 0 | 0.006 | 0 | 0 | 0 | 0 | 0 | 0.004 | 0 | 0.004 | 1.000 | 0.179 | 1,193 |
| Catch | 0 | 0 | 0 | 104 | 0 | 0 | 0 | 0 | 0 | 72 | 0 | 62 | 16,185 | 2,836 | 19,309 |
| Spain | | | | | | | | | | | | | | | |
| Ratio | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.002 | 0 | 0 | 1.000 | 0.008 | 1,010 |
| Catch | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 37 | 0 | 0 | 16,144 | 127 | 16,308 |
| USA | | | | | | | | | | | | | | | |
| Ratio | 0.003 | | 0 | 0.009 | 0 | 0 | 0 | 0 | 0.002 | 0.063 | 0 | 0.160 | 1.000 | 0.269 | 1,505 |
| Catch | 2 | | 0 | 6 | 0 | 0 | 0 | 0 | 1 | 40 | 0 | 102 | 639 | 172 | 952 |
| USSR | | | | | | | | | | | | | | | |
| Ratio | 0.009 | 0.003 | 0 | 0.225 | 0.205 | 0 | 0 | 0 | 0.002 | 0.001 | 0.066 | 0.010 | 1.000 | 0.161 | 1,632 |
| Catch | 13 | 5 | 0 | 326 | 296 | 0 | 0 | 0 | 3 | 2 | 95 | 15 | 1,446 | 233 | 2,434 |
| Poland | | | | | | | | | | | | | | | |
| Ratio | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.120 | 0.816 | 1.000 | 0.001 | 1,937 |
| Catch | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 256 | 1,746 | 2,141 | 3 | 4,146 |

## IX. DESCRIPTION OF ECONOMIC CHARACTERISTICS OF THE FISHERY

### IX-1. Domestic Harvesting Sector

The US squid fishery has traditionally been incidental in nature, although a directed fishery with floating traps has been conducted for some time in Maine and southern New England. However, with the significant declines in abundance of traditional finfish species in recent years, more interest in a directed squid fishery has developed. In 1974 and 1975, approximately 35-40 small and medium otter trawlers from Massachusetts ports conducted a short-term directed fishery for Loligo on spring spawning concentrations near Nantucket with catches processed for export. Most recently, there has been some interest in pair trawling for squid.

The main reason for little domestic interest in squid harvesting has been lack of a substantial domestic market; thus, prices remained low until recent years. The average ex-vessel price remained below ten cents per pound until 1964 and 1970 for the New England and Mid-Atlantic - Chesapeake areas, respectively. For the ten-year period 1967-1976, average ex-vessel price for squid increased 360% in the Mid-Atlantic - Chesapeake area (from 5.8 to 20.9 cents per pound) and slightly greater than 325% in New England (from 5.5 to 18.0 cents per pound).This price increase was coupled with a 300% increase in squid landings in New England, yet in other areas landings remained relatively constant. This large increase in New England landings may have been because squid prices compared somewhat favorably with groundfish prices during certain seasons of 1971-1974. However, because of market conditions, historic prices for squid have been substantially less than for finfish. The price of squid is extremely inelastic and thus high squid prices are maintained only during periods of low landings. Once landings increase to high levels, the market becomes saturated and the price decreases dramatically.

Massachusetts and Rhode Island landings comprise about 95% of the total squid landed in New England. Table 30 presents recent data on the value of this catch in these two States as a percentage of the value of the total States' fish and shellfish catches. The data show that the squid catch in Massachusetts constitutes less than 1% of the total value of the State catch, while in Rhode Island it has constituted from 1 to 2% of the total.

The squid fishery of the Mid-Atlantic and Chesapeake areas has been much smaller than that of New England since 1969 except for 1974 (Table 13). For this area, squid landings have represented less than 1% of the total finfish and shellfish landings except for the years 1967-1970 when they averaged between 1 and 2%.

Landings by gear by county for Mid-Atlantic States with squid landings are shown in Table 32. Squid accounted for less than 10% of finfish and squid landings in all counties except Atlantic, New Jersey and for fish pound nets in Suffolk, New York.

Table 30. Values of Squid Catches in Comparison to Total Landed Values in Massachusetts and Rhode Island, 1971-1975.

| | Massachusetts | | | Rhode Island | | |
|---|---|---|---|---|---|---|
| Year | Total fish and shellfish ($1000) | Squid | % | Total fish and shellfish ($1000) | Squid | % |
| 1971 | 48,348 | 76 | (1) | 12,552 | 128 | 1 |
| 1972 | 56,757 | 85 | (1) | 12,592 | 134 | 1 |
| 1973 | 56,226 | 143 | (1) | 14,953 | 361 | 2 |
| 1974 | 50,712 | 241 | (1) | 15,866 | 285 | 2 |
| 1975 | 65,738 | 19 | (1) | 18,796 | 333 | 2 |

(1) = less than one percent

Table 31. Species Rank by Volume of the Catch - 1964-1968
Rhode Island, Conn., New York, New Jersey, Delaware, Maryland, Virginia
Ranking of Top 15 Species is for 1964-8,
with Complete Ranking Figures for 1968.

| RANK | | | | | SPECIES | 1968 QUANTITY (Thousands of Pounds) |
|---|---|---|---|---|---|---|
| 1968 | '67 | '66 | '65 | '64 | | |
| 1 | 1 | 1 | 1 | 1 | Menhaden | 360,354 |
| 2 | 2 | 2 | 2 | 2 | Crabs, Blue | 56,353 |
| 3 | 3 | 3 | 3 | 3 | Clams, Surf | 40,534 |
| 4 | 4 | 4 | 4 | 5 | Alewives | 36,533 |
| 5 | 5 | 6 | 6 | 6 | Oysters | 24,340 |
| 6 | 6 | 5 | 5 | 4 | Scup or Porgy | 13,931 |
| 7 | 7 | 7 | 7 | 8 | Clams, Hard | 13,702 |
| 8 | 8 | 9 | 10 | 9 | Flounder, Yellowtail | 12,226 |
| 9 | 9 | 10 | 8 | 7 | Whiting | 9,722 |
| 10 | 12 | 13 | 14 | 12 | Striped Bass | 8,303 |
| 11 | 10 | 11 | 13 | 13 | Flounder, Blackback | 7,552 |
| 12 | 14 | 15 | 15 | 14 | Lobsters, Northern | 6,454 |
| 13 | 11 | 8 | 9 | 11 | Flounder, Fluke | 6,288 |
| 14 | 13 | 12 | 11 | 10 | Clams, Soft | 5,906 |
| 15 | 15 | 14 | 12 | 15 | Scallops, Sea | 4,103 |
| 16 | | | | | Shad | 4,101 |
| 17 | | | | | Swellfish | 3,996 |
| 18 | | | | | Butterfish | 3,449 |
| 19 | | | | | Squid | 2,952 |
| 20 | | | | | Cod | 2,914 |

From: Saila and Pratt (1973) page 6-7

Table 32. Contribution Of 1976 Squid Landings To New York, New Jersey, Maryland, and Virginia Counties And Fishing Gears

| | Thousands of Pounds Quantity | Thousands of Dollars Value | Average $/Pound | Squid Contribution % Pounds | $ |
|---|---|---|---|---|---|
| | | New York | | | |
| Kings County | | | | | |
| Squid Landings | | | | | |
| Fish Otter Trawls | 99.3 | 19.6 | 0.20 | | |
| County Landings | | | | | |
| All Species | 2,449.1 | 532.1 | | 4.1 | 3.7 |
| Finfish & Squid | 2,293.4 | 464.6 | | 4.3 | 4.2 |
| Fish Otter Trawls | 2,027.1 | 332.3 | | 4.9 | 5.9 |
| Nassau County | | | | | |
| Squid Landings | | | | | |
| Fish Otter Trawls | 35.9 | 7.7 | 0.21 | | |
| County Landings | | | | | |
| All Species | 4,871.1 | 2,539.9 | | 0.7 | 0.3 |
| Finfish & Squid | 1,029.7 | 265.7 | | 3.5 | 2.9 |
| Fish Otter Trawls | 947.3 | 238.4 | | 3.8 | 3.2 |
| New York County | | | | | |
| Squid Landings | | | | | |
| Sea Scallop Dredges | 0.5 | 0.1 | 0.23 | | |
| County Landings | | | | | |
| All Species | 534.1 | 828.6 | | <0.1 | <0.1 |
| Finfish & Squid | 24.8 | 8.8 | | 2.0 | 1.3 |
| Sea Scallop Dredges | 534.1 | 828.6 | | <0.1 | <0.1 |
| Suffolk County | | | | | |
| Squid Landings | | | | | |
| Haul Seines | 0.7 | 0.1 | 0.21 | | |
| Fish Otter Trawls | 688.5 | 139.8 | 0.20 | | |
| Fish Pound Nets | 282.7 | 57.4 | 0.20 | | |
| Total | | 197.4 | 0.20 | | |
| County Landings | | | | | |
| All Species | 26,310.1 | 28,239.3 | | 3.7 | 0.7 |
| Finfish & Squid | 14,311.2 | 3,875.5 | | 6.8 | 5.1 |
| Haul Seines | 760.6 | 208.4 | | 0.1 | <0.1 |
| Fish Otter Trawls | 9,176.4 | 2,776.0 | | 7.5 | 5.0 |
| Fish Pound Nets | 2,418.7 | 469.0 | | 11.7 | 12.2 |

Table 32. (Continued)

| | Thousands of Pounds Quantity | Thousands of Dollars Value | Average $/Pound | Squid Contribution % Pounds | Squid Contribution % $ |
|---|---|---|---|---|---|
| | | New Jersey | | | |
| Atlantic County | | | | | |
| Squid Landings | | | | | |
| Fish Otter Trawls | 122.9 | 26.8 | 0.22 | | |
| County Landings | | | | | |
| All Species | 13,048.2 | 5,670.3 | | 0.9 | 0.5 |
| Finfish & Squid | 1,147.9 | 511.2 | | 10.7 | 5.2 |
| Fish Otter Trawl | 734.0 | 234.8 | | 16.7 | 11.4 |
| Cape May County | | | | | |
| Squid Landings | | | | | |
| Fish Otter Trawls | 523.5 | 112.3 | 0.21 | | |
| Scallop Otter Trawls | 1.1 | 0.2 | 0.20 | | |
| Shrimp Otter Trawls | 0.1 | <0.1 | 0.13 | | |
| Mid-Water Trawls | 1.6 | .4 | 0.22 | | |
| Total | 526.3 | 112.9 | 0.21 | | |
| County Landings | | | | | |
| All Species | 39,896.7 | 14,961.9 | | 1.3 | 0.8 |
| Finfish & Squid | 22,508.3 | 4,373.2 | | 2.3 | 2.6 |
| Fish Otter Trawls | 15,150.1 | 3,234.8 | | 3.5 | 3.5 |
| Scallop Otter Trawls | 821.3 | 1,192.5 | | 0.1 | <0.1 |
| Shrimp Otter Trawls | 131.1 | 161.3 | | <0.1 | <0.1 |
| Mid-Water Trawls | 4,525.3 | 331.5 | | <0.1 | 0.1 |
| Monmouth County | | | | | |
| Squid Landings | | | | | |
| Fish Otter Trawls | 10.9 | 2.8 | 0.26 | | |
| County Landings | | | | | |
| All Species | 154,644.9 | 5,411.1 | | <0.1 | <0.1 |
| Finfish & Squid | 153,917.7 | 4,840.9 | | <0.1 | <0.1 |
| *Food Finfish & Squid | 3,834.1 | 553.6 | | 0.3 | 0.5 |
| Fish Otter Trawls | 3,000.8 | 350.4 | | 0.4 | 0.8 |

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

< = less than

Table 32. (Continued)

| | Thousands of Pounds Quantity | Thousands of Dollars Value | Average $/Pound | Squid Contribution % Pounds | Squid Contribution % $ |
|---|---|---|---|---|---|
| | | New Jersey (Continued) | | | |
| Ocean County | | | | | |
| Squid Landings | | | | | |
| Fish Otter Trawls | 211.0 | 53.0 | 0.25 | | |
| Lobster Otter Trawls | 2.9 | 1.1 | 0.39 | | |
| Scallop Otter Trawls | 1.0 | 0.4 | 0.41 | | |
| Total | 214.9 | 54.5 | 0.25 | | |
| County Landings | | | | | |
| All Species | 15,459.5 | 6,479.2 | | 1.4 | 0.8 |
| Finfish & Squid | 10,897.4 | 2,577.7 | | 2.0 | 2.1 |
| Fish Otter Trawls | 8,510.8 | 1,703.7 | | 2.5 | 3.1 |
| Lobster Otter Trawls | 191.6 | 276.8 | | 1.5 | 0.4 |
| Scallop Otter Trawls | 445.4 | 698.2 | | 0.2 | <0.1 |
| | | Maryland | | | |
| Worcester County | | | | | |
| Squid Landings | | | | | |
| Fish Otter Trawls | 39.3 | 11.4 | 0.29 | | |
| County Landings | | | | | |
| All Species | 11,378.5 | 5,447.0 | | 0.3 | 0.2 |
| Finfish & Squid | 2,998.3 | 576.5 | | 1.3 | 2.0 |
| Fish Otter Trawls | 2,706.5 | 495.2 | | 1.5 | 2.3 |

Table 32. (Continued)

| | Thousands of Pounds Quantity | Thousands of Dollars Value | Average $/Pound | Squid Contribution % Pounds | Squid Contribution % $ |
|---|---|---|---|---|---|
| | | Virginia | | | |
| Accomack County | | | | | |
| Squid Landings | | | | | |
| Fish Otter Trawls | 2.6 | 0.6 | 0.23 | | |
| Scallop Otter Trawls | 0.3 | 0.1 | 0.43 | | |
| Total | 2.9 | 0.7 | 0.25 | | |
| County Landings | | | | | |
| All Species | 9,437.0 | 3,574.9 | | <0.1 | <0.1 |
| Finfish & Squid | 2,893.7 | 645.9 | | 0.1 | 0.1 |
| Fish Otter Trawls | 796.8 | 281.4 | | 0.3 | 0.2 |
| Scallop Otter Trawls | 191.2 | 245.5 | | 0.2 | <0.1 |
| City of Norfolk | | | | | |
| Squid Landings | | | | | |
| Fish Otter Trawls | 60.7 | 6.8 | 0.11 | | |
| Scallop Otter Trawls | 0.5 | <0.1 | 0.10 | | |
| Total | 61.2 | 6.9 | 0.11 | | |
| County Landings | | | | | |
| All Species | 3,337.3 | 1,171.4 | | 1.8 | 0.6 |
| Finfish & Squid | 2,703.5 | 261.8 | | 2.3 | 2.6 |
| Fish Otter Trawls | 1,303.3 | 310.5 | | 4.7 | 2.2 |
| Scallop Otter Trawls | 401.0 | 556.5 | | 0.1 | <0.1 |
| City of Hampton | | | | | |
| Squid Landings | | | | | |
| Fish Otter Trawls | 45.9 | 4.8 | 0.10 | | |
| Scallop Otter Trawls | 1.9 | 0.2 | 0.12 | | |
| Total | 47.8 | 5.0 | 0.11 | | |
| County Landings | | | | | |
| All Species | 9,382.8 | 5,618.5 | | 0.5 | <0.1 |
| Finfish & Squid | 4,343.3 | 1,025.6 | | 1.1 | 0.5 |
| Fish Otter Trawls | 3,471.9 | 926.5 | | 1.3 | 0.5 |
| Scallop Otter Trawls | 840.9 | 1,260.2 | | 0.2 | <0.1 |
| Northampton County | | | | | |
| Squid Landings | | | | | |
| Fish Otter Trawls | 0.1 | <0.1 | 0.18 | | |
| County Landings | | | | | |
| All Species | 20,339.7 | 8,513.6 | | <0.1 | <0.1 |
| Finfish & Squid | 2,951.0 | 265.6 | | <0.1 | <0.1 |
| Fish Otter Trawls | 41.5 | 10.9 | | 0.2 | 0.2 |

< = less than

Total domestic catch for this region in 1968 was 701 million pounds (318,000 tons), 545 million of which were finfish and 156 million shellfish and related organisms. A ranking of species by quantity landed in the Mid-Atlantic Bight shows that for 1968, squid ranked 19 out of 84 with 1,342 tons (2.9 million pounds). Of the top twenty species ranked by quantity (Table 31), only cod, squid, and swellfish (Sphoeroides maculatus) did not also rank in the top twenty species by value. Squid ranked 25 out of 76 with an ex-vessel value of $4,191,000.

Squid caught for use as bait did not show up in reported landings until 1972. In that year a total of 100 pounds was reported, all landed in Rhode Island. In 1973, the reported Rhode Island catch increased to 1,000 pounds. In addition, 7,400 pounds of recreationally caught squid was landed in Massachusetts that same year. Beyond 1974, published data on recreational squid landings are not currently available. However, squid questionnaire returns completed by NMFS Statistical Reporting Specialists indicate that for the years 1974-1976 no overall coast wide recreational squid fishing effort occurred. In local areas, though, periodic angling for squid is known to occur. For example, during summers when squid are abundant in the Cape Cod Canal, anglers will jig for them (Thomas Morrissey, 1977, personal communication). This is where the 1973 Massachusetts recreational landings may have occurred. Also, an undetermined amount of squid is taken by charter boat anglers for bait throughout the region (Bruce Freeman, 1977, personal communication).

The squid's great significance as a prey for many game fish makes it more important as a bait species than as a target species for the recreational angler. At recent meetings, North Carolina fishermen stated that large amounts of squid are caught and utilized as bait on charter boats and much of this goes unrecorded. For this reason, the fishermen believe that reported North Carolina landings are less than amounts actually caught. It is possible that this situation exists for the Atlantic coast in general. It is, therefore, necessary to consider catches from this component of the fishery in future management efforts.

## IX-2. Domestic Processing Sector

Analysis of the processing and marketing aspects of the domestic squid industry is currently being carried out through a processor questionnaire and on-site processor interviews. However, squid processing sector information of a general nature has been obtained through questionnaires completed by NMFS Statistics Branch Fishery Reporting Specialists. This information is presented below.

A total of 29 processing firms reportedly participate in the squid fishery. Of the total, eleven are located in Massachusetts, eight in Rhode Island, seven in Virginia, and one each in Maine, New York, and New Jersey. All of these firms handle other fish products in additional to their seasonal squid supply. The market forms of squid were identified as "fresh, fresh frozen, frozen bait, and other". The precentage breakdown for these forms by State was:

MARKET FORMS OF SQUID EXPRESSED AS A PERCENT OF TOTAL SQUID LANDINGS

| | ME | NH | MA | RI | NY | NJ | MD | VA |
|---|---|---|---|---|---|---|---|---|
| Fresh | 100% | 100% | 16% | 100% | 50% | 75% | 10% | 75% |
| Fresh frozen | 0 | 0 | 68 | 0 | 25 | 5 | 13 | 1 |
| Frozen bait | 0 | 0 | 16 | 0 | 25 | 15 | 77 | 24 |
| Other | 0 | 0 | 0 | 0 | 0 | 5 | 0 | 0 |

Notice that Maine, New Hampshire, and Rhode Island are solely "fresh"squid marketers, followed by New Jersey and Virginia at 75% fresh. Massachusetts converts 68% of its landings to the fresh frozen product; New York 25%.

Table 33 shows the historical production for frozen squid by geographical section. Inspection of the figures shows the New England, Mid-Atlantic, and Pacific sections to be the dominant producers for frozen squid. New England's dominance through the mid-1950s has been replaced by the Pacific sections, suggesting limited market opportunities.

Canned squid has reportedly been produced by New York and New Jersey firms. Table 34 shows the east coast production of canned squid relative to total US canned squid production. While east coast production has increased in recent years, it is still a minor comodity when compared to Pacific coast production. At the present time canned squid is the only US commercially prepared squid product. The canning is done in oil, in tomato sauce, and in brine with or without the ink sac (Ampola, 1974).

Miller, Kolhonen, and Hall (1973) reported that "technology used in other food processing operations is probably adaptable to processing most types of squid." However, they did not elaborate and it is not known what types of automated machinery (if any) are used to process squid.

The potential for other squid products exists if markets could be developed and cultivated. For example, cephalopod ink has been used as an artists' colorant for many years. Research is ongoing to extract a viscous glue from squid skin and a high grade nitrogenous fertilizer from the pen and viscera (Ampola, 1974). Data are not available to estimate US processor capacity. The reporting requirements proposed in this FMP should result in the necessary data being available for use in updating this FMP.

## IX-3. International Trade

Exports of domestic canned squid are presented in Table 35. The volume of exports varied during the 1963-1976 period, reaching a high of 12,787,000 pounds in 1967. While the volume of exports has decreased since 1967, the value has increased to a 1976 high of $2,095,000. In 1977 most canned squid was exported to Greece (2,154,000 pounds) and the Philipines (2,528,000 pounds).

Data on imports of squid are not available.

Table 33. Production of Frozen Squid by Section[1/ 2/]
(in thousands of pounds)

| | NE | MID-A | SA | NC | SC | PAC | TOTAL[3/] |
|---|---|---|---|---|---|---|---|
| 1939 | 2066 | 1321 | --- | 60 | 7 | 79 | 3533 |
| 1940 | 1005 | 910 | 6 | 42 | --- | 74 | 2037 |
| 1941 | 1217 | 868 | 12 | 1 | 16 | 291 | 2405 |
| 1942 | 85 | 234 | 4 | 9 | --- | 309 | 641 |
| 1943 | 978 | 665 | --- | 198 | --- | 273 | 2114 |
| 1944 | 1057 | 363 | 1 | 1 | --- | 65 | 1487 |
| 1945 | 967 | 482 | 1 | --- | --- | 283 | 1733 |
| 1946 | 1118 | 659 | 8 | --- | 1 | 341 | 2127 |
| 1947 | 1411 | 274 | 9 | --- | 14 | 538 | 2246 |
| 1948 | 939 | 447 | 97 | --- | --- | 281 | 1764 |
| 1949 | 2263 | 1251 | 64 | --- | 3 | 547 | 4128 |
| 1950 | 694 | 286 | 46 | --- | 1 | 381 | 1408 |
| 1951 | 2169 | 1005 | 38 | --- | 2 | 377 | 3591 |
| 1952 | 1054 | 250 | 13 | --- | 2 | 163 | 1482 |
| 1953 | 1437 | 1495 | 108 | --- | 13 | 331 | 3384 |
| 1954 | 864 | 759 | 18 | --- | 7 | 287 | 1935 |
| 1955 | 905 | 936 | 67 | --- | 4 | 291 | 2203 |
| 1956 | 668 | 725 | 1 | --- | 8 | 104 | 1506 |
| 1957 | 1333 | 1394 | 115 | --- | 4 | 46 | 2892 |
| 1958 | 1018 | 1250 | 26 | --- | 2 | 305 | 2601 |
| 1959 | 644 | 1123 | 2 | --- | 3 | 554 | 2326 |
| 1960 | 558 | 648 | 13 | --- | 3 | 7 | 1229 |
| 1961 | 160 | 465 | 28 | --- | 24 | 105 | 782 |
| 1962 | 461 | 823 | 9 | --- | 52 | 53 | 1398 |
| 1963 | 586 | 963 | 2 | --- | 118 | 288 | 1957 |
| 1964 | 8 | 400 | 11 | --- | 81 | 1001 | 1501 |
| 1965 | 18 | 238 | 9 | --- | 9 | 3998 | 4272 |
| 1966 | 30 | 963 | 5 | --- | 101 | 3494 | 4593 |
| 1967 | 372 | 384 | 111 | --- | 105 | 625 | 1597 |
| 1968 | 527 | 164 | 29 | --- | 118 | 1806 | 2644 |
| 1969 | 268 | 471 | 53 | --- | 175 | 3225 | 4192 |
| 1970 | 51 | 55 | 20 | --- | 69 | 2984 | 3179 |
| 1971 | 58 | 369 | 70 | --- | --- | 2215 | 2712 |
| 1972 | 275 | 182 | 40 | --- | --- | 1458 | 1955 |
| 1973 | 470 | 94 | 5 | --- | --- | 2371 | 2993[4/] |
| 1974 | 858 | 118 | 144 | --- | --- | 5602 | 6722 |
| 1975 | 432 | 149 | 91 | --- | --- | 3190 | 3862 |

1976 data not yet available.

[1/] Table gives production of frozen squid by firms voluntarily reporting to NMFS. Excluded were freezings by firms not reporting to NMFS on a monthly basis and by firms operating plate freezers at the end of fillet production lines. Production of fishery products frozen on US fishing or transporting craft is not included in this table.

Table 33. (continued)

2/The section designations used include the following states:
NEW ENGLAND--MAINE, MASSACHUSETTS, RHODE ISLAND, CONNECTICUT, AND NEW HAMPSHIRE.
MIDDLE ATLANTIC--NEW YORK, NEW JERSEY, DELAWARE, AND PENNSYLVANIA.
SOUTH ATLANTIC--MARYLAND, DISTRICT OF COLUMBIA, VIRGINIA, NORTH CAROLINA, SOUTH CAROLINA, GEORGIA, AND FLORIDA.
NORTH CENTRAL--OHIO, INDIANA, ILLINOIS, MICHIGAN, WISCONSIN, MINNESOTA, IOWA, MISSOURI, NEBRASKA, KANSAS, NORTH DAKOTA, AND SOUTH DAKOTA.
SOUTH CENTRAL--ARKANSAS, OKLAHOMA, TENNESSEE, ALABAMA, MISSISSIPPI, LOUISIANA, AND TEXAS.
PACIFIC--WASHINGTON, OREGON, CALIFORNIA, ARIZONA, UTAH, COLORADO, NEVADA, AND IDAHO.

3/There is no way of telling what percentage of total freezings went for human consuption, were used as bait, and for other purposes.

4/Includes 53 x $10^3$ lbs. from the State of Alaska.

Source: NOAA-NMFS Fishery Statistics of the United States 1939-1973
NMFS Current Fishery Statistics 1974-1975

Table 34. US Production of Canned Squid
(in metric tons, thousands of pounds and thousands of dollars)

| | Atlantic Coast[1] | | | Pacific Coast[2] | | |
|---|---|---|---|---|---|---|
| | MT | lbs | $ | MT | lbs | $ |
| 1962 | 24 | 52 | 25 | 3201 | 7042 | 607 |
| 1963 | 30 | 65 | 30 | 3228 | 7102 | 591 |
| 1964 | 30 | 65 | 32 | 4654 | 10238 | 855 |
| 1965 | 28 | 62 | 28 | 5617 | 12358 | 1088 |
| 1966 | 11 | 24 | 18 | 5154 | 11339 | 1130 |
| 1967-1971[3] | --- | --- | --- | --- | --- | --- |
| 1972 | 31 | 69 | 65 | 4976 | 10946 | 1227 |
| 1973-1975[3] | --- | --- | --- | --- | --- | --- |

1/Represents the output of canning firms in New York and New Jersey. These firms are the only ones reportedly canning east coast squid.
2/All canning is done in California. The number of canning firms has fluctuated during the period 1962-1975 from a high of 10 in 1962 to a low of 3 in 1973.
3/Statistics on squid canned for these years is not available by coast.

Source: NOAA-NMFS Fishery Statistics of the United States
NMFS Current Fishery Statistics

Table 35. US Exports of Domestic Canned Squid

| Year | Quality (thousands of pounds) | Value (thousands of dollars) |
|---|---|---|
| 1963 | 8,048 | 742 |
| 1964 | 7,005 | 622 |
| 1965 | 11,911 | 1,160 |
| 1966 | 10,159 | 1,067 |
| 1967 | 12,787 | 1,562 |
| 1968 | 11,955 | 1,418 |
| 1969 | 12,216 | 1,500 |
| 1970 | 8,825 | 1,075 |
| 1971 | 10,096 | 1,339 |
| 1972 | 10,051 | 1,411 |
| 1973 | 8,166 | 1,341 |
| 1974 | 8,221 | 1,712 |
| 1975 | 6,759 | 1,866 |
| 1976 | 7,914 | 2,095 |
| 1977 | 5,045 | 1,411 |

Source: US Department of Commerce, Bureau of the Census, as reported in Fisheries of the United States, 1966 through 1976 editions, NMFS, NOAA, DOC.

## X. DESCRIPTIONS OF THE BUSINESSES, MARKETS, AND ORGANIZATIONS ASSOCIATED WITH THE SQUID 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 36.

### X-3. Labor Organizations Concerned With Squid

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 36.

### X-4. Foreign Investment In The Domestic Squid Fishery

The information for this analysis is not available.

Table 36. 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).

## XI. DESCRIPTION OF SOCIAL AND CULTURAL FRAMEWORK OF DOMESTIC SQUID 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, squid landings were tabulated by county and analyzed to identify those counties with a significant involvement in this fishery (Table 37). Barnstable, Massachusetts, Newport and Washington, Rhode Island, Suffolk, New York, and Atlantic, New Jersey were selected as being relatively important in this fishery.

Table 37. Squid and Total Finfish and Squid Landings, 1976
(landings in thousands of pounds)

| State | County | Squid | Total Finfish & Squid | Squid Share of County Total | Dist. of Squid |
|---|---|---|---|---|---|
| ME | Cumberland | 0.5 | 32,442.4 | <0.1% | 0.2% |
| | Sagadahoc | 18.0 | 7,316.1 | 0.2 | 0.2 |
| | York | 3.9 | 6,376.4 | <0.1 | <0.1 |
| MA | Barnstable | 1,703.3 | 32,402.2 | 5.3 | 20.3 |
| | Bristol | 797.0 | 55,888.2 | 1.4 | 9.5 |
| | Dukes | 3.4 | 2,717.6 | 0.1 | <0.1 |
| | Essex | 1,020.0 | 143,909.1 | 0.7 | 12.2 |
| | Plymouth | 73.3 | 2,503.2 | 2.9 | 0.9 |
| RI | Newport | 874.0 | 23,021.8 | 3.8 | 10.4 |
| | Washington | 1,696.5 | 41,731.7 | 4.1 | 20.2 |
| CO | New London | 34.9 | 2,931.3 | 1.2 | 0.4 |
| NY | Kings | 99.3 | 2,293.4 | 4.3 | 1.2 |
| | Nassau | 35.9 | 1,029.7 | 3.5 | 0.4 |
| | New York | 0.5 | 24.8 | 2.0 | <0.1 |
| | Suffolk | 971.9 | 14,311.2 | 6.8 | 11.6 |
| NJ | Atlantic | 122.9 | 1,147.7 | 10.7 | 1.5 |
| | Cape May | 526.3 | 22,508.3 | 2.3 | 6.3 |
| | Monmouth | 10.9 | 153,916.8 | <0.1 | 0.1 |
| | Ocean | 214.9 | 10,897.7 | 2.0 | 2.6 |
| MD | Worcester | 39.4 | 2,998.3 | 1.3 | 0.5 |
| VA | Accomack | 2.9 | 2,893.7 | 0.2 | <0.1 |
| | Norfolk | 61.2 | 2,703.5 | 2.3 | 0.7 |
| | Hampton (city) | 47.8 | 4,343.3 | 1.1 | 0.6 |
| | Northampton | 0.1 | 2,951.0 | <0.1 | <0.1 |
| Total | | 8,375.8 | | | 100.0% |

< = less than

Data from the census are presented in Table 38. The resort nature of the economies of Barnstable and Atlantic Counties is obvious from the data (note retail sales and hotel receipts). 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.

Data on fisheries employment are not available on the county level.

Table 38. Selected 1970 Population and Economic Characteristics for Counties with Significant Squid Landings

| | US | Barnstable | Newport | Washington | Suffolk | Atlantic |
|---|---|---|---|---|---|---|
| **Population** | | | | | | |
| Total (000) | 203,212 | 97 | 95 | 86 | 1,295 | 175 |
| US rank | | 364 | 373 | 403 | 19 | 210 |
| Per sq. mi. | 57 | 246 | 819 | 267 | 1,213 | 308 |
| % Change,60-70 | 13.3 | 37.5 | 15.1 | 45.1 | 69.0 | 8.8 |
| % Net mig.60-70 | 1.7 | 32.4 | .4 | 24.6 | 49.3 | 4.8 |
| % Female | 51.3 | 52.1 | 44.0 | 47.5 | 50.3 | 53.4 |
| % Urban | 73.5 | 41.3 | 68.0 | 59.1 | 89.8 | 81.1 |
| % Under 5 yrs. | 8.4 | 7.4 | 8.3 | 8.9 | 10.0 | 7.5 |
| % 18 yrs. & over | 65.6 | 68.5 | 69.6 | 68.0 | 60.3 | 68.6 |
| % 65 yrs. & over | 9.9 | 16.9 | 7.2 | 7.8 | 7.6 | 16.3 |
| Median age | 28.3 | 34.4 | 23.9 | 23.7 | 26.4 | 35.5 |
| Over 25, median school yrs. completed | 12.1 | 12.6 | 12.2 | 12.2 | 12.2 | 11.2 |
| **Labor force** | | | | | | |
| Total (000) | 82,049 | 37 | 47 | 37 | 404 | 70 |
| Civilian (000) | 80,051 | 34 | 27 | 28 | 403 | 69 |
| % Fem./w husb. | 57.0 | 58.5 | 56.9 | 58.3 | 61.3 | 51.6 |
| % Unemployed | 4.4 | 3.9 | 4.6 | 4.3 | 3.5 | 5.7 |
| % Emp. in mfg. | 25.9 | 7.6 | 17.0 | 27.9 | 21.8 | 16.5 |
| % Emp. outside county | 17.8 | 6.1 | 13.2 | 22.1 | 34.4 | 14.6 |
| % Families with female head | 10.8 | 10.5 | 14.1 | 10.4 | 7.2 | 14.7 |
| Median family Income ($) | 9,586 | 9,242 | 9,162 | 9,603 | 12,081 | 8,757 |
| % Families low income | 10.7 | 8.3 | 11.7 | 9.0 | 4.8 | 9.9 |
| **Mfg.estab.** | | | | | | |
| Total | 311,140 | 96 | 53 | 74 | 1,475 | 248 |
| % 20-99 emp. | 24.3 | 10.4 | 13.2 | 31.1 | 26.5 | 27.4 |
| % 100 or more emp. | 11.2 | 2.1 | 5.7 | 12.2 | 5.8 | 10.1 |
| % Change, value added, 63-67 | 36.4 | 12.5 | 189.0 | 160.0 | 37.3 | 53.8 |
| **Retail sales** | | | | | | |
| % of total in eating & drinking places | 7.7 | 12.4 | 10.2 | 7.6 | 7.1 | 16.4 |
| **Selected services** | | | | | | |
| % Receipts, hotels, etc. | 11.6 | 55.7 | 27.8 | 25.7 | 7.4 | 53.8 |
| % Receipts, amusements | 13.7 | 8.8 | 22.5 | D | 15.8 | 20.9 |

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 has adopted eight objectives to guide management and development of the squid fishery in the northwestern Atlantic. They are:

1. Achieve and maintain optimum stocks for future recruitment.
2. Prevent destructive exploitation of squid species.
3. Minimize capture of nontarget species.
4. Achieve efficiency in harvesting and use.
5. Maintain adequate food supply for predator species, recognizing that squid are also predators.
6. Minimize user conflicts.
7. Improve understanding of the condition of the stocks.
8. Encourage increased American participation in the squid fishery.

### 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, a level of foreign fishing based on the surplus after the US catches its estimated capacity, and area and seasonal limits on foreign fishing. 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 Optimum Yield (OY) for *Loligo* and *Illex*: This may result in a reduction in future productivity of the stocks for a moderate stock-recruitment relationship. If recruitment were independent of spawning stock, some incease in OY could occur without reducing future productivity. Sufficient information is not available by which to estimate the impact of an increased OY for *Illex* or *Loligo* until response of the squid populations to present OY levels is observed.

2. Reduced OY for *Loligo* and *Illex*: This would decrease the chances of a reduction in long-term future productivity of these stocks, but unless there is a strong stock recruitment relationship, the most likely result is that a resource available for harvest would go underutilized. The Council has rejected this alternative and has adopted instead biologically conservative estimates of OY. This is in part predicated on the fact that the OYs selected for both *Loligo* and *Illex* take into consideration the short life span of the species. Based on past catch estimates and trends in abundance, there is little justification for reducing the OYs for *Loligo* and *Illex* below the MSY levels.

3. Changes in Seasons and Areas for Fishing: These seasonal and area limitations on fishing were established to reduce gear conflicts between the offshore lobster pot fishery and the squid fishery. Based on available data, less severe restictions are likely to result in increased gear conflicts. Alternatively, the Council has determined that more severe restrictions are not likely to reduce gear conflicts substantially and may make it impossible for foreign nationals to catch their proposed allocation.

4. 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, but

not domestic, fishermen. 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 FMP could not be collected as effectively and assessments of the scope and development of the domestic fishery would not be as accurate as they would be with the plan.

5. Changes in Gear: Various alternative methods of catching squid to reduce or eliminate bycatch have been considered. These include jigging and the use of lights as well as mid-water trawling. The Council believes that the continuation of the gear regulations set forth in Part 611.13(c) of 50 CFR for foreign fishermen should reduce bycatch. Consideration may be given in future amendments to the plan for imposing gear restrictions on domestic fishermen to improve selectivity.

6. Selection of Various Management Units for Regulation and Optimum Yield: The three possible options for the management unit (i.e., the fishery) to be addressed by this FMP and for the specification of an optimum yield are:

(a) Squid (Loligo pealei and Illex illecebrosus) Within the Fishery Conservation Zone: Selection of this option would limit the jurisdiction of this FMP to the fishery for squid within the FCZ only. Application of an optimum yield to only this component might render attainment of the objectives of the FMP impossible and might result in the abrupt closure of the US fishery in the FCZ because (1) squid catches in the territorial sea would not be controllable and might grow to a level which would undermine the Council's objectives for this FMP and (2) the provisions of a bilateral agreement could possibly render the FMP void.

(b) Squid (Loligo pealei and Illex illecebrosus) Within All US Waters: Selection of this option would result in an OY for squid in the territorial sea and the FCZ combined. This approach would remedy the problems of uncontrollable growth of the territorial sea fishery because of the Secretary's ability to limit squid catches in the FCZ so that the total squid catch in all US waters would not exceed an OY, and if necessary to limit the catch in the territorial sea, if preemption becomes necessary. This option, however, does not address the potential problems of a US/Canadian bilateral agreement.

(c) All Squid (Loligo pealei and Illex illecebrosus) Under US Jurisdiction in the Atlantic: If the US and Canada successfully reach a bilateral agreement, then the management unit as defined by this option would be the US share of the negotiated TAC. This might conceivably include a US squid fishery in Canadian waters if, as part of a bilateral agreement, the US received fishing privileges in Canadian waters. Under these circumstances, the management unit (and, therefore, the OYs selected for it) would be theoretically free of area restrictions, i. e., the OYs selected would pertain to that fraction of the negotiated TAC which would be assigned to the US. The Canadian share of the TAC would not have to be considered in (i. e., subtracted from) the US optimum yields. If the US and Canada fail do reach a bilateral agreement, the management unit as defined by this option would revert to be squid within all US territory ("US jurisdiction" defined here in the broad sense to include all waters under Federal and State jurisdiction). In other words, the management unit would be the same as the management unit described in (b).

For the above reasons, the Mid-Atlantic Council has determined that the management unit of this FMP is all Loligo and Illex under US jurisdiction.

7. Preemption of the States' Jurisdiction in the Territorial Sea and/or Regulation of the Squid Fishery in the FCZ: Unless preempted by the Secretary of Commerce, management of fisheries within the territorial sea is within the jurisdiction of the individual coastal States. Management of fisheries in the FCZ is the responsibility of the Federal government in conjunction with the Regional Fishery Management Councils. It is the feeling of the Mid-Atlantic Council that preemption of State jurisdiction over fishery management is a drastic and cumbersome measure that should be avoided if possible and practicable. The Council has determined that the achievement of the objectives and optimum yield can best, most efficiently, and most equitably be accomplished through monitoring the entire US fishery, both in the territorial sea and the FCZ, and by regulation of the fishery primarily in the FCZ, unless the growth of the domestic commercial fishery in the territorial sea is so great as to jeopardize attainment of the objectives of this plan. Only under such circumstances, therefore, would preemption be warranted. The individual States and the Atlantic States Marine Fisheries Commission, however, are urged to adopt this FMP, so that management of this resource may be as uniform and comprehensive as possible.

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

### Optimum Yield and TALFF

The combined optimum yields specified by the proposed action is less than the total annual harvest of squids by nations which have fished in the region in recent years. The 1979 - 1980 fishing year TALFF in this FMP for Loligo is less than the average annual foreign catch of Loligo in SA5 and SA6 since 1972. The FMP TALFF for Illex, however, is greater than the average annual foreign catch of Illex from the same areas over the same period. Therefore, the combined OYs represent at adverse action with respect to foreign fishing.

Increased US landings of squid 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. Increased US landings of squids could also result in a significant reduction in the price of both Atlantic and Pacific squid. An unpublished NMFS study has estimated that squid prices are inelastic and that there is a statistically significant relationship between Atlantic and Pacific squid prices. While this could have an adverse impact on fishermen's earnings, it would possibly benefit consumers. Development of the established European markets by US interests is of obvious importance.

There should be no adverse impact on the recreational fishing industry, which utilizes squid heavily as a bait source, since a reduction in US squid catches will not result from the allocations contained herein. No severe reduction in the availability of squid as a prey organism is expected.

### Management Unit Selection

The advantages of the selection of the management unit to be all squid under US jurisdiction in the Atlantic are discussed in Sections XII-2/XII-3. Selection of this management unit provides the greatest possible flexibility for implementation of this FMP. Without such inherent flexibility, it is

possible that an FMP for these species could not be instituted until a bilateral agreement with Canada is reached - which may never occur.

### Management of the Fishery Via Regulation in the FCZ

Primary management of the fishery through regulation of its FCZ component is the most efficient and equitable means of achieving the objectives of this Plan. 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 involked for this FMP only if absolutely necessary, for the reasons and under the conditions specified in Sections XX-2/XII-3.

### Environmental Considerations

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

## XII-5. Specification of Optimum Yield

The Mid-Atlantic Fishery Management Council, in conjunction with the New England and South Atlantic Fishery Management Councils, has determined in the 1979 - 1980 fishing year the optimum yield of *Loligo* should be set at 44,000 metric tons. This is equal to the best conservative estimate of MSY for this species. The Mid-Atlantic Council has determined that OY should be equivalent to MSY for this species in 1979 - 1980 for the following reasons: (1) the best and most recent scientific evidence (from the autumn, 1977, NMFS trawl survey) indicates that this species is neither overfished nor depleted in abundance, (2) the short life-span of this species suggests that the portion of the MSY not taken through fishing would be lost (with no resultant benefit to future recruitment) through natural mortality, and (3) overall demand for squid is great and probably surpasses the combined OYs described in this FMP. Thus, harvesting at the MSY level should allow for the greatest benefit to the nation while guarding against overfishing.

Scientific information for *Illex* is much less complete than that for *Loligo*. Information available to date suggests that the MSY for *Illex* in ICNAF SA 5 and 6 (equivalent for all practical purposes to the management unit specified for this FMP) may be approximately 40,000 mt for a moderate to strong stock-recruitment relationship.*

The Council has determined that an *Illex* harvest of 30,000 mt will be the optimum yield from the management unit in fishing year 1979 - 1980. The Council has determined that this is the greatest harvest consistent with sound conservation and management principles. The following factors were taken into consideration in the establishment of this OY: (1) uncertainties as to *Illex* population structure in the northwest Atlantic and stock-recruitment

*Based on the average of the estimated standing stock sizes for Georges Bank in 1971, 1972, 1975, and 1976, the estimates of the allowable catch based on the model (see Section V-2) range from about 57,000 to 23,000 mt, for moderate and strong stock-recruitment relationships, respectively. The mean of these values is about 40,000 mt.

relationships; (2) environmental considerations stemming from the uncertainties of (1) and recognition of the important role Illex plays as prey in the ecosystem; (3) recognition of the fact that current NMFS autumn and spring surveys are suboptimal for this species and produce untimely biological data for Illex; (4) recognition of the developing nature of this fishery; (5) the intent to accomodate to a limited degree the foreign squid fishery which will experience declines in its Loligo catches over historic levels. This OY for Illex is greater than the peak total catch of this species in ICNAF SA 5 and 6, while simultaneously it is conservative biologically.

It is the Council's intention to provide for a cautious development of this fishery, at least until such time as biological and environmental information about this species is more fully developed.

The Council made these determinations of optimum yield in light of the biological and socio-economic data and analyses presented earlier in this plan. In estimating US capacity the Council has considered not only the historical domestic harvesting analysis in VIII but also the program for the development of the fishery in XIII-8, including the possibility of joint ventures that would make use of domestic harvesting capacity. The Council has been advised that a number of US vessels will be added to this fishery in the near future.

Table 39. MSY, OY, US Capacity, and Total Allowable Level of Foreign Fishing (in metric tons)

| Species | Maximum Sustainable Yield | Optimum Yield | US Capacity | Total Allowable Level of Foreign Fishing |
|---|---|---|---|---|
| Illex | 40,000 | 30,000 | 10,000 | 20,000 |
| Loligo | 44,000 | 44,000 | 14,000 | 30,000 |

Relationships Between This FMP and the 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 both species of squid are neither currently overfished nor at reduced levels of abundance. Harvests of both species at the optimum yield levels 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 simultaneously managing Loligo and Illex in a

complementary manner.

"(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 OYs and US capacity estimates described in this FMP will accomodate all US demand for squid in the commercial and recreational fisheries without prejudice to residents of any State. The seasonal movements of these species make it extremely unlikely that fishermen of any State or region could harvest the US capacity before the species become available to other domestic fishermen. Moreover, this FMP contains provisions for adjustment and reallocation of the OYs prior to the start of each fishing season if any of the relevant parameters upon which these figures are based change significantly.

"(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 both squid species significantly beneath the respective OY levels, no economic inefficiencies due to surplus investment or fishing effort, or similar considerations, should result from the provisions of this FMP. As US capacity estimates for squid anticipate some redirection to these species of domestic commercial fishing effort from traditional and currently depleted resources, such as groundfish, this FMP will promote greater overall economic efficiency in domestic commercial fisheries. The combined OYs do not differ from historic patterns to such an extent so as to create significant inefficiencies for foreign fishermen.

"(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 OYs and allocations described herein take into account possible fluctuations in species abundance (see Section V-2) and expected trends in US demand for squid (see Section VIII). The management unit takes into account the US/Canadian negotiations for a bilateral fishery agreement.

"(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 other NMFS and Coast Guard 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 the foreign effort this plan adopts by reference the foreign fishing regulations presently in effect, and as they may be amended, 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 intened 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 squid within the FCZ, or transport or deliver for sale, any squid 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 Section 204 of P.L. 94-295.

(3) This section does not apply to recreational fishermen taking squid 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 squid, gross tonnage of vessel, crew size including captain, fish hold capacity (to the nearest 100 pounds), and the home port of the vessel. The registration form shall be submitted , in duplicate, to the Regional Director, NMFS, Gloucester, Massachusetts, 01930, who shall issue the required registration, for an indefinite term; such term to include the calendar year in which the registration is issued. New registrations will be issued to replace lost or mutilated registrations A registration shall expire whenever vessel ownership changes, or when the master of the vessel changes in the directed fishery or fisheries of such vessel. Application for a new registration, because of a change in vessel ownership shall include the names and addresses of both the purchaser and the seller and be submitted by the purchaser.

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

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

Vessel Identification

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

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

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

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

Sanctions

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

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

XIII-2. Time and Area Restrictions

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

$38^{o}20'00"N - 38^{o}25'00"N$ and $74^{o}10'00"W - 74^{o}20'00"W$
$38^{o}40'00"N - 39^{o}00'00"N$ and $72^{o}00'00"W - 72^{o}30'00"W$

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

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

XIII-3. Catch Limitations

The total allowable level of foreign fishing for Illex in the 1979 - 1980 fishing year is 20,000 metric tons. The total allowable level of foreign fishing for Loligo in the 1979 - 1980 fishing year is 30,000 metric tons.

The catch limits for domestic fishermen are 10,000 metric tons of Illex and 14,000 metric tons of Loligo.

The Mid-Atlantic Council and the NMFS will review the US squid capacity in October of each year. Squid catches by the domestic fleet from April through September of that year, as well as catches in prior years, projected landings for the remainder of the year based on harvestor and processor information,

and other relevant information will be examined during this review process. Results of this reassessment will be published in the Federal Register by November 15 of each year. If adjustments in US capacity estimates result in a change in the TALFFs, a proposed rulemaking to accomplish this reallocation will be published in the Federal Register as near to November 15 as possible. Final notice to foreign governments of any additional amounts of squid available for harvest will be given no later than December 31.

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 diminution in allowable catch become necessary.

XIII-4. Types of Gear

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

XIII-6. Restrictions

No operator of any foreign fishing vessel, including those catching squid for use as bait in other directed fisheries, shall conduct a fishery for squid 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 Fishery Conservation and Management Act to take into account the impact of pollution on fish. The extremely substantial quantity of pollutants which are being introduced into the Atlantic Ocean poses a threat to the continued 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 Fishery Conservation and Management Act 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

Overall development of the squid fishery will be assisted by the pertinent objectives of this plan as recommended by the Mid-Atlantic Fishery Management Council. However, within these objectives, the extent to which the squid fishery develops depends upon which of several developmental paths the fishery follows. These paths are by and large dictated by the market potential for squid. This marketabiliy (e.g., the extent and location of markets) will ultimately be determined by consumer acceptance of squid. Therefore, it is necessary to assess squid's potential in meeting the consumer's preferences for fishery products. This evaluation identifies squid's position as a preferred species in the total array of harvestable species and finally gives an indication of the rate, extent, and nature at which the fishery can potentially develop.

The Mid-Atlantic Council or the Secretary's designee, acting on behalf of the Secretary, will:

(1)Continually work with the squid industry to identify industry's perceptions of the squid fishery for development considerations in the years ahead. These perceptions will be evaluated as to their probable impact on the resource, demands of all industry sectors, demands on the consumer, etc.

(2)Implement a campaign of consumer market surveys utilizing available expertise from NMFS, State and private sources to determine consumer preferences for seafood products.

(3)Evaluate the probable long-term impacts on the industry and potential return involved from production of acceptable squid products.

(4)Reexamine and reevaluate industry's perceptions of squid development in view of the consumer preferred seafood products.

(5)Determine an agreed procedural pathway to squid fishery development and the criteria by which to meet this development within the objectives of this plan. These might include technology transfer programs, extension programs, and marketing programs.

(6)Implement controls as needed to maintain the integrity of this development for sustained long-term resource use.

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 undetermined 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 squid PMP. It is not possible to specify these costs because of the multi-mission responsibilities of the Coast Guard.

## XIV. SPECIFICATIONS AND SOURCES OF PERTINENT FISHERY DATA

### XIV-1. General

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 Secreatry of Commerce and as they may be amended from time to time following FMP adoption.

The following requirements are recommended in order for the Fishery Management Councils and the NMFS to acquire accurate data on the squid catch, by-catch, discards, disposition of such catch, effort in the fishery, and importance of squid to fishermen relative to all other species caught. These data reporting requirements are necessary to manage the fishery for the maximum benefit of the United States. It is necessary that reporting be as comprehensive as possible and should include the territoral 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 from the territoral 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 licensed in the squid fishery, the owner or master of such vessel must maintain an accurate daily 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 the Secretary of Transportation to enforce the Act, or (4) any Coast Guard personnel accompanying and acting under the direction of any person described in category (1), and shall be presented for examination and subsequent return to the owner or master of the vessel upon proper demand by such authorized official at any time during or at the completion of a fishing trip. Such required documentation will be maintained by the owner or master of the vessel at least one year subsequent to the date of the last entry in the log book. Copies of 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 may be required for enforcement of this FMP.

XIV-2(b). Foreign Fishermen

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

XIV-3. Processors

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

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

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

XV-1. Fishery Management Plans

Preliminary Fishery Management Plans (PMPs) for five fisheries of the northwest Atlantic were implemented on March 1, 1977, by the US Department of Commerce. These PMPs presently regulate foreign fishing within the FCZ for Atlantic herring, Atlantic mackerel, silver and red hake, squid (Loligo and Illex) and finfish caught incidentally to trawling. The New England Fishery Management Council has prepared a Fishery Management Plan (FMP) for the Atlantic Groundfish fishery. Regulations promulgated by the Secretary of Commerce imposing quotas, minimum size limits, mesh restrictions, etc., went into effect on June 13, 1977, and have been subsequently amended to apply to the fisheries during 1978. Plans for several other species are also in various stages of preparation by the New England and Mid-Atlantic Fishery Management Councils.

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

1. This Squid FMP will replace the PMP regulating foreign fishing for squid 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 of 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. Squid are a food item for many commercially and recreationally important fish species. Also, squid utilize young hake, mackerel, and herring, and possibly many other finfish species, as food items.

5. Present ongoing research programs often provide data on stock size, levels of recruitment, distribution, age, and growth for many species regulated by the PMPs, FMPs, and proposed FMPs.

XV-2. Treaties or International Agreements

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

XV-3. Federal Laws and Policies

The only Federal law that controls the fisheries 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 squid fishing operations under this plan if implemented by the Secretary of Commerce. Also, the Monitor Marine Sanctuary is clearly designated on all National Ocean Survey (NOS) charts by the caption "protected area". This minimizes the potential for damage to the Sanctuary by domestic fishing operations.

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

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

of deep water port facilities.

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

No State or local laws control the fisheries that are the subject of this management plan.

State Coastal Zone Management (CZM) Programs

The proposed action entails management of squid 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 probabily assimilate the ecological principles upon which this particular fishery management plan is based. It is recognized that responsible long-range management of both coastal zones and fish stocks must involve mutually supportive goals. The Massachusetts and Rhode Island CZM programs have been reviewed relative to this FMP and no conflicts have been identified. Future CZM Programs will be reviewed for consistency with this FMP.

## XVI. COUNCIL REVIEW AND MONITORING OF THE PLAN

The Council will review the plan each year. 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 any 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 fishery evolves.

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# XVIII. APPENDIX

## XVIII-1. Sources of Data and Methodology

Data in the plan were supplied by the NMFS. Biological and economic methodologies were developed by the NMFS.

## XVIII-2. Environmental Impact Statement

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

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

### Regional Council Fishery Management Plans and Other Preliminary Plans

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

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

1. This Squid FMP will replace the PMP currently regulating foreign fishing for squid within the FCZ as prescribed by Section 201(g) of 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. Squid are a food item for many commercially and recreationally important fish species. Also, squid utilize young hake, mackerel, and herring and possibly many other finfish species as food items.
5. Present ongoing research programs often provide data on stock size, levels of recruitment, distribution, age, and growth for many 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 squid 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 squid stocks in an attempt to ensure sustained productivity at some optimum level. In order to achieve this goal, all management plans must incorporate means to achieve integrity of fish stocks, related food chains, and habitat necessary for this integrated biological system to function effectively. Since CZM plans are presently in the developmental stages, we are not aware of specific measures on the part of individual states which would ultimately impact this fishery management plan. However, the CZM Act of 1972, as amended (P.L. 92-583), is primarily protective in nature and provides measures for ensuring stability of productive fishery habitat within the coastal zone. Therefore, each state's CZM plan will probably include the ecological principles upon which this particular fishery management plan is based. It is recognized that responsible long-range management of both coastal zones and fish stocks must involve mutually supportive goals. The Massachusetts and Rhode Island CZM programs have been reviewed relative to this FMP and no conflicts have been identified. Future CZM Programs will be evaluated 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 Loligo that will be established by this action is based on recent estimates of stock size and estimates of the level of fishing mortality that will result in the maximum sustainable yield assuming a moderately strong stock-recruitment relationship. Therefore, no significant adverse long-term effect on the stock of Loligo 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. Based on available information, the proposed action is unlikely to lower the productivity of Illex. However, 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 great importance of squid as a forage species and thereby contributing to the overall productivity of the ecosystem.

The proposed action would permit a catch of Loligo and Illex by United States fishermen equal to their estimated capacity for 1977 and exceeding those allowed under ICNAF 1976 TACs. 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. An unpublished NMFS study has indicated some potential negative price impacts for both Atlantic and Pacific squid if landings increase. However, this analysis did not (and could not) take into consideration the potential development of an European squid market.

## 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 OY for Loligo and Illex: This may result in a reduction in future productivity of the stocks for a moderate stock-recruitment relationship. If recruitment were independent of spawning stock, some increase in OY could occur without reducing future productivity. Sufficient information is not available by which to estimate the environmental impact of an increased OY for Loligo or Illex, but an increase would not be prudent until response of the squid populations to the present OYs are observed.
2. Reduced OY for Loligo and Illex: This would decrease the chances of a reduction in long-term future productivity of these stocks, but unless there is a strong stock-recruiment relationship, the most likely result is that a resource available for harvest would go underutilized. Based on past catch estimates and trends in abundance, there is little justification for reducing the OYs for Loligo or Illex below MSY levels.

3. Changes in seasons and areas for fishing: These limitations on fishing were established to reduce gear conflicts between the offshore lobster pot fishery and the squid fishery. Based on available data, less severe restrictions are likely to result in increased gear conflicts. More severe restrictions will not reduce gear conflicts substantially and may make it impossible for foreign nationals to catch their proposed allocation.

4. 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, but not domestic, fishermen. 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 would be with the plan.

5. Changes in gear: Various alternative methods of catching squid to reduce or eliminate bycatch have been considered. These include jigging and use of lights as well as mid-water trawling. The Council believes that the continuation of the gear regulations set forth in 50 CFR 611.13(c) for foreign fishermen should reduce bycatch. Consideration may be given in future amendments to the plan to imposing gear restrictions on domestic fishermen to improve selectivity.

6. Selection of Various Management Units for Regulation and Optimum Yield: There are three possible options for the management unit (i. e., the fishery) to be addressed by this FMP and for the specification of optimum yield. They are:

(a) Squid (Loligo pealei and Illex illecebrosus) within the FCZ: Selection of this option would limit the jurisdiction of this FMP to the fishery for squid within the FCZ only. Application of an optimum yield to only this component might render the attainment of the objectives of the FMP impossible and might result in an abrupt and total closure of the US fishery in the FCZ because squid catches in the territorial sea would not be controllable and might grow to a level which would undermine the Council's objectives for this FMP.

(b) Squid (Loligo pealei and Illex illecebrosus) within All US Waters: Selection of this option would result in an OY for squid in the territorial sea and the FCZ combined. The approach would remedy the problems of uncontolled growth of the territorial sea fishery because of the Secretary's ability to limit squid catches in teh FCZ so that the total squid catch in all US waters would not exceed OY and, if necessary to limit the catch in the terrritorial sea, if preemption becomes necessary. This approach, however, does not adequately address the consequences of a bilateral agreement.

(c) All Squid (Loligo pealei and Illex illecebrosus) Under US Jurisdiction: If the US and Canada successfully reach a bilateral agreement, the management unit as defined by this option would be the US share of the negotiated TAC. Under these circumstances, the management unit (and, therefore, the OY selected for it) would be theoretically free of area restrictions, i. e., the OY selected would pertain to that fraction of the negotiated TAC which would be assigned to the US. The Canadian share of the TAC would not have to be considered in (i. e., subtacted from) the US optimum yield.

The Mid-Atlantic Council has determined that the management unit of this FMP is all Loligo pealei and Illex illecebrosus under US jurisdiction.

## 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 squid 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 squid 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. They also could result in a significant reduction in the price of both Atlantic and Pacific squid. An unpublished NMFS study has estimated that squid prices are inelastic and that there is a statistically significant relationship between Atlantic and Pacific squid prices. While this could adversly impact on fishermen's earnings, it would possibly benefit consumers. Development of the established European markets by US interests is of obvious importance.

There should be no adverse impact on the recreational fishing industry which utilizes squid heavily as a bait source as a result of the harvesting restrictions proposed in this plan, since a reduction in US catches will not result from the quotas contained herein. Because of this fact, the supply of bait squid for recreational finfishing should not be diminished. Also, no severe reduction in the availability of squid 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 contained in this plan are designed to accomplish two goals: (1) provide for a sustained optimum yield of biomass based on stable stock levels (recognizing, of course, that natural fluctuations in stock production and abundance), and (2) provide the United States with an allocation that will encourage efforts to develop the domestic squid fishery. The proposed action could, over the long run, lead to increased profit from the squid fishery for the US fishing industry.

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 the trophic interactions among squid and other species beyond our present understanding living marine resources. 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 squid 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 could be modified or amended if adverse impacts appeared.

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

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

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

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

The squid resources of the northwest Atlantic are, in fact, public resources and, therefore, belong 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 to all Americans. The species considered herein are treated much like any other natural resources 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 squid by foreign nations below their harvesting capacity and demand for fish products, thus having adverse economic impact on them. This is based on the fact that in 1972-1976, the squid catch in SA 5 and 6 by countries other than the United States averaged just under 50,000 MT annually with virtually all harvested in a directed fishery. For 1977, the total allowable level of foreign fishing (TALFF) for squid within the FCZ was 42,500 MT, a moderate reduction. This fishery management plan proposes for 1979 a TALFF of 50,000 tons. Quantification of the impact of foreign nations is not possible, since there is no way of knowing the opportunities for deployment of foreign vessels into fisheries in other parts of the world or the costs of such redeployment. 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. Yet some risk is necessary in order to make sure of a badly needed source of protein. Therefore, squid OYs have been set at levels that take both these views into consideration, while fulfilling the requirement in the FCMA of making a fishery surplus available to foreign nationals for harvest.

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

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

Introduction to Comments on Hearings for the Original FMP

Numerous comments were received on the draft EIS/FMP. All letters received are on file at the office of the Mid-Atlantic Fishery Management Council and are reproduced following this narrative. The hearings were tape recorded and the tapes are on file at the office of the Mid-Atlantic Fishery Management Council. Issues raised at the hearings included the amount of recordkeeping required by the various fishery management plans, the southern squid fishing areas, gear conflicts, reduction in the proposed foreign allocation of Loligo and the need for actions to develop the US squid fishery. The primary issues raised are discussed below.

Loligo Quota

Several persons indicated that the total allowable level of foreign fishing for Loligo should be reduced because they believe that Loligo landings by US fishermen have been reduced by foreign fishing and because the TALFF will result in an excessive foreign catch of butterfish.

The maximum sustainable yield in the DEIS/FMP was based on the best available scientific information. Reduction of the OY below the MSY level would decrease the chances of a reduction in long-term future productivity of this stock, but unless there is a strong stock recruitment relationship, the most likely result is that squid available for harvest would by underutilized. The estimate of US capacity was based on historic data adjusted to allow for an increase in the domestic fishery. Since the TALFF is the difference between optimum yield and the US capacity, there is no way to change the TALFF without first changing OY and/or US capacity. Since the Council has seen no justification for changing OY and/or US capacity at this time, the TALFF cannot be changed.

Illex Quota

Several letters (12/22/77 from the Japanese Embassy and 12/22/77 from the Department of State) recommended an increase in the Illex TALFF. The Council believes that the MSY was based on the best scientific information available. An increase in the OY may result in a reduction in future productivity of the

stock for a moderate stock-recruitment relationship. If recruitment were independent of spawning stock size, some increase in OY could occur without reducing future productivity. Sufficient information is not available with which to estimate the environmental impact of an increased OY. The Council, therefore, sees no justification for changing the MSY, OY, US capacity, and/or TALFF for Illex at this time.

## Recordkeeping and Licenses

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

## Foreign Fishing Regulations

Several reviewers (note especially pp. 3 and 4 of the State Department letter and items 6, 9, 10, and 11 of the Coast Guard letter) suggested that the foreign fishing regulations in effect for 1978 be adopted in lieu of those proposed in the draft EIS/FMP. The Council agrees with this suggestion. Adoption of the 1978 foreign fishing regulations resolves the question of gear conflicts identified in the DEIS/FMP since appropriate provisions are included in the 1978 foreign fishing regulations.

## Additional Foreign Fishing Areas

The South Atlantic Fishery Management Council has requested that two additional foreign fishing areas be identified. The Coast Guard (item 8 of their letter) also commented on this issue. The proposed coordinates, seasons, and regulations for these areas are set forth in the letter from the South Atlantic Council. The Mid-Atlantic Fishery Management Council has no objection to creating these areas as requested. However, the South Atlantic Council has requested that action be postponed until that Council has had the opportunity to hold additional hearings on the proposal. The Mid-Atlantic Council, therefore, deleted these two areas from the plan pending further input from the South Atlantic Council. If, after further consideration and additional hearings, the South Atlantic Council still desires to add these areas, the Mid-Atlantic Council will work to amend the plan so the areas would be available for use.

## Foreign Allocations

The State Department has commented that the OY for Illex is inconsistent with applicable law because it is less than the OY set in the present PMP. The Mid-Atlantic Fishery Management Council is of the opinion that: (1) the FCMA specifically provides that FMPs shall supercede PMPs, (2) it is the responsibility of the Council to determine the OY for each FMP, and (3) GIFAs subject foreign fishermen to existing regulations which are subject to change. The Council believes that its determination of OY cannot be superceded by

existing PMPs. Therefore, this plan, with an OY for Illex at the 20,000 metric ton level, is consistent with the FCMA and applicable law. The Secretary of Commerce may wish to take the State Department's comments into consideration in implementing this plan.

The Northeast Region of NMFS also recommended that the catch year for Illex be changed to begin in September in order to allow for an orderly implementation of the FMP. No seasonal change has been made nor has the OY been increased to 23,500 metric tons as the orderly implementation of the FMP is a consideration that the Secretary may make after adopting the plan.

Evaluation of Quotas

The Coast Guard (see items 2 and 5 of their letter) commented on the possible waste that could occur if the US did not catch its quota. The plan provides for a formal evaluation twice each year (see Section XVI). Nothing in the plan precludes more frequent review and amendment if US landings are not in accord with the plan.

Summary of Hearings on Supplement #1

September 20, 1978, Norfolk, Virginia

The hearing began at 7:15 p.m. Mr. Harry Keene was the moderator. Dr. Steven Murawski represented the Northeast Fisheries Center. Mr. Peter Colosi represented the Northeast Regional Office of the 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.

BUTTERFISH PLAN

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

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

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

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

September 28, 1978, Centerreach, New York

The hearing was convened at 7:30 p.m. Ms. Nancy Goell was the moderator. Other Councilmembers present were: Dr. John L. McHugh, Mr. Allan Ristori, and Mr. Anthony Taormina. Messrs. William Overholtz and Stuart Wilk represented the Northeast Fisheries Center. Mr. Bruce Nicholls represented the Northeast Regional Office of the 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
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Peabody, Massachusetts 01960

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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

SOUTH ATLANTIC FISHERY MANAGEMENT COUNCIL
Southpark Building, Suite 306
1 Southpark Circle
Charleston, South Carolina 29407
(803) 571-4366

December 8, 1977



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

Dear John:

At the November meeting of the South Atlantic Council, a motion was passed recommending squid fishing in certain areas and with selective gear in designated sectors off the coasts of North and South Carolina and Georgia. For your information and consideration the motion is as follows: (1)

"Squid fishing will be permitted in the following areas only during the months of November, December, January, and February.

| Area #1 | | Area #2 | |
|---|---|---|---|
| Trawling Area | | Selective Gear Area | |
| 32.40N | 77.51W | 32.55N | 78.15W |
| 32.25N | 77.30W | 32.40N | 77.51W |
| 31.08N | 79.45W | 32.24N | 78.42W |
| 31.55N | 79.05W | 31.08N | 79.45W |
| | | 31.08N | 80.17W |
| | | 32.55N | 78.15W |

Trawling will be permitted only in Area #1. In area #2 only highly selective squid fishing gear will be permitted, such as jigging or pump and light attraction gear. Fishing in these additional areas will be undertaken on an exploratory/research basis within the quota prescribed in the FMP currently under development by the Mid-Atlantic Council."

Sincerely,

Ernest D. Premetz
Executive Director



SOUTH ATLANTIC FISHERY MANAGEMENT COUNCIL
Southpark Building, Suite 306
1 Southpark Circle
Charleston, South Carolina 29407
(803) 571-4366



October 14, 1977

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

Dear John:

The following comments are offered on behalf of the South Atlantic Fishery Management Council relative to the squid FMP which is currently under review. (2)

In full session on September 21 the Council approved a motion whereby it was recommended that the southern boundary of squid window No. 1 be moved northward to 36° 15' north and that the western and northwestern boundaries of Areas 2, 3, and 4 be moved eastward to or beyond the 100 fathom line. In addition, the South Atlantic Council recommended that consideration be given to allowing the capture of squid by foreigners on the Continental Shelf (landward of the 100 fathom contour) in appropriate seasons and places if the foreigners used only highly selective gear such as jigs or lights and pumps rather than using unselective gear such as bottom-tending trawls.

Sincerely,

Ernest D. Premetz
Executive Director

cc: Regional Director, Northeast, NMFS
Council Members, South Atlantic Fishery Management Council

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

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

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

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

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



DEPARTMENT OF STATE

Washington, D.C. 20520

BUREAU OF OCEANS AND INTERNATIONAL
ENVIRONMENTAL AND SCIENTIFIC AFFAIRS

December 22, 1977

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



Dear Mr. Bryson:

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

For the reasons set forth below, the Department of State considers that the determination of a foreign allowable catch of only 20,000 metric tons (mt) contained in the FMP for Illex is inconsistent with applicable law. (3)

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

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

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

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

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

(2) The requirement that an English speaking individual be present on each vessel is not required in the 1978 FFR, and would impose an unreasonable burden on operators of foreign fishing vessels. (5)

(3) Data reporting: For baseline data, the methods should follow Section 611.9 of the FFR. We have no objection if the Council wishes to collect more detailed data. (6)

(4) The time and area restrictions outlined in Section XIII.2 should follow Section 611.50 of the FFR. (7)

(5) The 100-200 fathom restriction has been eliminated from the 1978 FFR. We believe that the prohibition of two nautical miles around marked fixed gear (Section 611.50 (e)) is more than sufficient to minimize gear conflicts. (8)

(6) In reference to Section XII.4 of the squid plan, the 1978 FFR describes two types of trawl gear for the Northwest Atlantic fishery--the pelagic trawl (45mm mesh size) and the bottom trawl (60mm mesh size). The regulations do not define, in terms of distance from the bottom, where in the water column a pelagic trawl must be used. The distance was not defined because it would be difficult to enforce. Moreover, there is no scientific justification that netting fish a certain distance above the bottom would prevent a bycatch. However, the language of paragraphs 611.12 and 611.13 in the 1978 (9)





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

(7) The 1978 FFR do not identify which species are bycatch of directed fisheries (Section XIII.5 of the squid plan). "Herring" should read "river herring." It should be clear that when the quota for one species of squid is caught by a country, all fishing in the Atlantic by that country stops. Therefore, under the FFR, there is no "subsequent incidental catch." (10)

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

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

We hope the Council will consider our recommendations favorably.

Sincerely,

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

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION I

J.F. KENNEDY FEDERAL BUILDING, BOSTON, MASSACHUSETTS 02203

December 28, 1977

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

Dear Mr. Bryson:

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

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

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

Sincerely,

Wallace E. Stickney, P.E.
Director, Environmental & Economic
Impact Office

Enclosure

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## EXPLANATION OF EPA RATING

### Environmental Impact of the Action

LO -- Lack of Objections

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

ER -- Environmental Reservations

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

EU -- Environmentally Unsatisfactory

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

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### Adequacy of the Impact Statement

Category 1 -- Adequate

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

Category 2 -- Insufficient Information

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

Category 3 -- Inadequate

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

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

DEPARTMENT OF TRANSPORTATION
UNITED STATES COAST GUARD

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

RECEIVED
JAN 11 1978
MID ATLANTIC COUNCIL

16200
JAN 9 1978

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

Dear Mr. Bryson:

The DEIS/FMP for the Squid Fishery of the Northwestern Atlantic has been reviewed by my staff. Coast Guard comments are contained in the enclosure (1) of this letter.

Sincerely,

C. F. JUECHTER
Captain, U. S. Coast Guard
Atlantic Area
Deputy Commander
By direction

Encl: (1) CG Comments on DEIS/FMP for Squid Fishery, NW Atlantic
(2) Draft Report of the New England & Mid-Atlantic Joint Fixed Gear Committee

Copy to:
COMDT (G-W) (G-OOO-4)
CCGDONE (dcs)
CCGDTHREE (dcs)
CCGDFIVE (dcs)
CCGDSEVEN (dcs)
CEQ (5)
OST/TES (5)
DOTSECREP 1, 2, 3, 4
MARFMC
SARFMC
NERFMC

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ENCL (1) USCG Comments on DEIS/FMP for Squid Fishery of the Northwest Atlantic

1. Page 5, II.5.3a - The prohibition of foreign fishery in the area between 100 and 200 fathoms is not included in the final foreign fishery regulations for 1978 (50 CFR 611). We concur in the revocation of such a regulation. (11)

2. Page 5, II-5-4 - In light of the statement made in subparagraph 2 of Section II-5 concerning unutilized protein and the social and moral implications of this potential waste, a review of catch statistics and potential surplus should be made during mid-year to reallocate any unused U.S. "allocation" to foreign nationals. (12)

3. Page 112, XIII.3.3 - In addition to conflicts with offshore lobster fishery, conflicts have occured and can be expected to continue to occur with fishermen involved in the offshore red crab fishery between Rhode Island and Virginia. (13)

4. Page 112, XII.3.3a - Same comment as No. 1. (14)

5. Page 112, XII.3.4 - Same comment as No. 2. (15)

6. Page 116, XIII.1 - Vessel Identification (a)-This conflicts with 50 CFR 611.5 which prescribes that foreign fishing vessels display their international radio call sign rather than their official number. 50 CFR 651,652 require U.S. vessels to display their official number. (16)

7. Page 117, XIII.2(2) - Same comment as No. 3. (17)

8. Page 118 - Proposed areas 6 and 7 should be specified. (18)

9. Page 120, XIII.6.(3) - This section implies that fishing outside an authorized window is permitted. (19)

10. Page 129, Para. b - No mention is made of reporting requirements to the USCG. (20)

11. General - Fixed Gear. Enclosure (2) to the basic letter is a copy of the Draft Report of the New England and Mid-Atlantic Joint Fixed Gear Committee for consideration for adoption into this plan as a means of ameliorating the gear conflict problems existing with respect to this fishery. (21)

"ENCLOSURE (1)"

MID-ATLANTIC/NEW ENGLAND REGIONAL FISHERY MANAGEMENT COUNCILS

Report of the

JOINT COMMITTEE ON GEAR CONFLICTS

Background:

The New England and Mid-Atlantic Regional Fisheries Management Councils recognize the growing concern of the fishing industry and the public at large concerning the conflict and/or potential conflicts among the various users of the maritime environment. Gear conflicts normally occur between domestic fixed gear fishermen and foreign or domestic mobile gear fishermen. Other conflicts have occured between fixed gear fishermen and geophysical research vessels, tugs and barges, naval vessels, and merchant vessels. The term fixed gear includes pot fishing, trap fishing, gill net fishing, long line fishing, and drift net fishing.

Each of the Councils surveyed fishermen concerning the scope of the problem and recommended solutions. The Mid-Atlantic Council conducted three public meetings during November in Ocean City, MD; Asbury Park, NJ and Southhampton, LI, NY. The New England Council asked the State Fishery Directors to solicit industry opinions.

The meetings reflect that gear conflict problems continue and that a need exists to attempt to ameliorate the problem. Fishermen, employing both fixed gear and mobile gear, generally feel that standard markings should be used for fixed gear, that gear be identified by the vessel setting gear and that it should be mandatory that offshore fixed gear be reported to the Coast Guard. In the Gulf of Maine, it is generally held that standard "high seas" markings, identification and reporting be only required beyond 12 nautical miles of the coast. In the Southern New England to Hudsons Canyon area it is generally felt that mandatory systems should only be established beyond the 25 fathom depths. South of Hudsons Canyon, the 12 mile rule is believed to be practical.

Fishermen also feel that fixed gear, particularly pots and gill nets should be set in a particular pattern in particular areas. For example, in the area east of Oceanographer Canyon, it is felt that gear should be set in a north to south pattern except in the canyons and in depths greater than 100 fathoms where fixed gear fishermen prefer to set along depth contours. From Oceanographer to Hudson Canyon, the preferred method is to set gear East to West and along contours in Canyons and in depths greater than 100 fathoms.

A marking system has been proposed by fishermen as follows. One end of the trawl should be marked with a radar reflector placed a minimum of six feet above the water. The other end should be marked with one radar reflector and a flag of a minimum of 150 square inches maintained in good condition or with two radar reflectors; radar reflectors and flags to be a minimum of six feet above the water. Buoys having a minimum diameter of 30 inches shall be used for all such markings with flags/reflectors displayed from "high flyers".



Fishermen also propose that all gear (pots, nets, buoys, flags, etc.) be marked with the name of the vessel setting the gear. The Coast Guard is concerned that several vessels have the same name. Fishermen have indicated that if names alone do not work they will accept addition of vessel document numbers or radio call signs to identify gear.

Fishermen also have suggested that drift nets and other gear be lighted. Also proposed is that one end of trawls be marked with a flourescent orange/red buoy and the other end with a flourescent green marker, each with a minimum flag size of 256 square inches placed a minimum of 12 feet above the water. A buoy was recommended to be placed at the center of each trawl of length greater than one nautical mile. It was also urged that lost gear be reported to the Coast Guard and that degradable traps be used to prevent ghost traps from continuing to fish.

The prohibitions against foreign fishing vessels fishing in areas of reported fixed gear should be continued, in the opinion of fishermen. Fishermen, realizing the problems associated with broadcasts of gear locations have proposed that a grid system be developed by which fishermen would be able to inquire on the volume of fixed gear set in various grids so as to enable them to plan their fishing operations. Fixed gear fishermen would continue to report their trawls by Loran A or C rates of Latitude/Longitude.

Committee Deliberations:

The Committee appreciates the thoughtful contributions made by fishermen, state and federal officials and by Committee members in obtaining insight into the fixed gear problem. The Committee recognizes that any regulatory regime that might be imposed will at best be a compromise among the various recommendations made by interested parties. The Committee also appreciates the impact that any regulatory measure may have upon governmental agencies, particularly upon the Coast Guard, in implementing fixed gear measures.

Based on the suggestions of fishermen, the Committee feels that while standardization of procedures is the ideal situation, that any regulatory regime must take into account the peculiarities of respective fishing areas and methods.

The Committee also appreciates that in the fishing area between the limit of the territorial sea and the 12 mile or 25 fathom limits proposed by fishermen for regulation that a "no man's land" might be created with no standard marking system. It is realized that the reason for not bringing a "high seas" marking system to the limits of the territorial sea would affect and surround those inshore fishermen using "inshore techniques". However, it is also realized that the various states differ in their regulations with respect to fixed gear markings and identification. The Committee feels that the several New England and Mid-Atlantic States should, through the NMFS State-Federal Program, establish uniform standards for fixed gear marking. Upon the establishment of such standards, the Committee recommends that these standards apply in the FCZ from the limits of the territorial sea to the shoreward boundary of the "high seas fixed gear marking system".

The Committee also recognizes the desire of some fishermen for the establishment of mandatory separation of fixed and mobile fishing. At present, the Committee does not feel that the establishment of such a scheme is prudent considering the dearth of scientific, economic, and social data associated with fisheries employing fixed and mobile gear. The Committee also feels that a developmental approach may well provide a satisfactory amelioration of problems.

The Committee also recognizes the conflicts that occur between fixed gear operators and other users of the ocean such as vessels engaged in geophysical research, tugs, naval and merchant vessels. Particular note is made of the efforts of the Association of Geophysical Contractors, Mobil Oil Corporation, Shell Oil Corporation, and the New England Fisheries Steering Committee to ameliorate conflicts involving geophysical research vessels. Note is also made of work being done by the Bureau of Land Management, the Corps of Engineers, and the Coast Guard with respect to conflicts.

Committee Recommendations:

The Joint Committee on Gear Conflicts of the New England and Mid-Atlantic Fishery Management Councils recommends to both Councils that the enclosed letter (enclosure 1) be addressed to each State Fisheries Director and the Executive Director of the Atlantic States Marine Fisheries Commission with respect to the alignment of the gear marking regulations of the several States and the proposed adoption of such standards by the national government in waters beyond State jurisdiction to a line seaward of which a system of "high seas" marking would be established.

The Committee also recommends that the enclosed proposed regulations (enclosure 2) be referred to the Secretary of Commerce for promulgation in the Squid Fishery Management Plan and such other management plans as may be appropriate.

Enclosures: (1) Draft Council ltr to State Fisheries Directors and the Executive Director of the Atlantic States Marine Fisheries Commission.
(2) Draft proposed regulations concerning Gear Conflicts.



Proposed letter to be addressed to State Fishery Directors and ASMFC concerning Gear marking Standards.

Dear _____;

The New England and Mid-Atlantic Regional Fishery Management Councils through their joint gear conflict committee have recommended and the Councils have approved a set of recommendations to be forwarded to the Secretary of Commerce concerning measures to help ameliorate gear conflicts in the northwest Atlantic Ocean.

The Committee solicited the views of fishermen throughout the northeastern states. It became apparent that a shoreward boundary should be established for a "high seas" marking and reporting system. The shoreward boundaries recommended by the fishermen are as follows: Gulf of Maine - 12 miles; Southern New England to Hudson Canyon - 25 fathoms; South of Hudson Canyon - 12 miles. The draft regulations submitted by the Committee have faired in boundary lines.

These shoreward boundaries were considered necessary due to the great number of inshore fixed gear fishermen working gear to their limits. The Committee also noted that the several states vary with respect to fixed gear marking requirements. The Council requests your support through the NMFS State-Federal program in establishing a uniform marking system for fixed gear within state waters.

Both the New England and Mid-Atlantic Councils intend that upon the establishment of such a uniform state system to recommend adoption of that system to waters between the territorial sea and the line denoting the start of the "high seas" system.

Thank you for your cooperation.

/s/

ENCLOSURE 1

## GEAR CONFLICTS
## DRAFT REGULATIONS

(a) Each fishing vessel shall conduct its operations with due regard for the activities of other vessels. Fishing vessels employing mobile gear shall take special care to minimize the possibility of conflict with, and damage to, fixed fishing gear. Fishing vessels employing fixed gear shall take special care to minimize potential conflict and/or damage with mobile gear fishermen.

(b) The term "fixed fishing gear" includes all methods of fishing other than fishing by otter trawl, seining, clam or scallop dredging, trolling, handlining, and rod and reel fishing. The most common methods of fixed gear fishing are pot fishing, trap fishing, longlining, and gillnetting.

(c) Reporting of Conflicts-

1. Each vessel involved in a gear conflict, or which retrieves the gear of another in its gear by accident, shall immediately notify Commander, U. S. Coast Guard Atlantic Area via radio by calling:

a. "Any Coast Guard Unit" (Voice on 2182KHZ or Channel 16 VHF-FM).

b. "NCG" (radio telegraphy) on 500 KHZ.

c. Commander, Atlantic Area Operations Center via Marine Operator (212-264-4800).

2. Reports required by (c)1 above shall contain the following minimum information:

a. Reporting Vessel International Radio Call Sign (IRCS), Hull Identifier, Master's name, address, telephone.

b. Other vessel(s) involved, IRCS(s), Hull Identifier(s), description of vessel(s) and involvement in incident.

c. Nature of incident, time of incident (GMT).

d. Type damage, estimate of dollar value of damage.

e. Position (latitude and longitude, Loran C rates, or Loran A rates) of incident.

f. Heading and speed of offending vessel.

(d) It shall be unlawful for a fishing vessel involved in a gear conflict to depart the scene of the conflict without authorization of an authorized enforcement officer. Approval for departure will be passed via radio or in person.

(e). It shall be unlawful for a person, or vessel to remove fixed gear from the water when such fixed gear is not the property of the removing person or of a common owner without the consent of the owner.

(f) It shall be unlawful for any fishing vessel to dispose of or return to the sea any gear of another vessel retrieved accidently during fishing operations without the approval of an authorized enforcement officer or the owner/operator of such gear.

(g). Marking of Gear - United States fishermen shall mark or identify their fixed gear in accordance with this section when placing gear in the areas of the FCZ as described in section (i) below.

1. All fixed gear apparatus; including but not limited to buoys, traps, pots, wash buoys, nets, lines, and flags; shall have the name of the vessel attending the gear permanently affixed. Such name shall be in letters and/or numerals which are clearly readible and maintained in good condition by the owner of the equipment.

2. Each end of a fixed gear trawl or set shall be marked with a buoy having a minimum outside diameter of thirty inches (75 cm.). A radar reflector shall be placed a minimum of six feet above the buoy attached to a staff rising from the buoy. See Appendix I.

3. One end of each trawl shall be called the "long end" and the other the "short end". A flag having a minimum area of 150 square inches (96.78) square centimeters) shall be displayed on the short end. Two flags, each having a minimum area of 150 square inches (96.78 square centimeters) shall be displayed on the long end of each trawl. Such flags shall be dark in color and shall be displayed a minimum of five feet above the water. See Appendix I.

4. Fixed Gear trawls longer than 1.5 nautical miles shall have a buoy affixed to the midpoint. Such buoy shall be as described in paragraph 2 above. See Appendix I.

(h) Foreign Vessel Gear Marking - foreign fishing vessels utilizing gear not attached to the vessel shall permanently mark such gear with the required identification marking of the vessel to which such gear belongs.

(i) Fixed Gear Reporting and Avoidance

1. United States fishermen shall report the locations of their fixed fishing gear within the geographical areas described below.

a. Gulf of Maine - all waters of the Fishery Conservation Zone of the United States (FCZ) north of 42-00N and seaward of a boundary (coordinates of a proposed straight line boundary approximately 12 miles off the coastal baseline is contained in Exhibit A - rhumb lines).

b. Georges Bank - all waters of the FCZ south of 42-00N and east of 68-30W, seaward of a boundary (coordinates of a proposed straight line boundary approximately along 25 fathom curve is contained in Exhibit A - rhumb lines).

c. Southern New England - all waters of the FCZ west of 68-30W longitude and north of 39-20N latitude and seaward of a boundary (coordinates of a proposed straight line boundary approximately along 25 fathom curve is contained in Exhibit A - rhumb lines).

d. Mid-Atlantic - all waters of the FCZ south of 39-20N, north of 35-00N and seaward of a boundary (coordinates of a proposed straight line boundary approximately along 12 miles off the coastal baseline is contained in Exhibit A - rhumb lines).

2. Mandatory Fixed Gear Setting Patterns

a. The recommended pattern for setting fixed gear trawls or sets in the Gulf of Maine, defined in para (i) 1 a., is to be generally along the charged depth contours where possible.

b. The mandatory pattern for setting fixed gear trawls or sets in the Georges Bank and Mid-Atlantic areas, defined in paragraph (i) 1 b.

and d., shall be along charted depth contours in a general north-south orientation.

c. The mandatory pattern for setting fixed gear trawls or sets in the Southern New England area, defined in paragraph (i) 1 c., shall be along charted depth contours in a general east-west orientation.

d. The "long end" of each trawl (defined in paragraph (g) 3.) shall be placed as the northern buoy in the Gulf of Maine, Georges Bank, and Mid-Atlantic Areas. It shall be placed as the western buoy in the Southern New England Area. See Appendix 1.

3. Fixed gear locations shall be reported as follows:

a. The end points of each fixed gear trawl or set shall be reported to Commander (Aol), USCG Atlantic Area, Governors Island, NY 10004 by radio via any Coast Guard unit or station, as described in Section (c) above or direct to telephone no. _____ as soon as possible after gear has been set. The coordinates of positions shall be reported in latitude/longitude, Loran C rates, or Loran A rates. Trawls or sets one nautical mile or less in length may be reported with coordinates (in any of the above navigational systems) for only one end of each trawl by including the direction the trawl or trawls have been set and defining which end is being reported (East or West; North or South).

b. Only unattended gear set for a period of greater than 48 hours shall be reported.

c. Fixed gear positions shall be maintained by the Coast Guard for a period of 20 days. Unless updated information is received within 20 days, the previously reported gear shall be removed from the active gear location records of the Coast Guard on the 21st day following the last report.

4. No foreign fishing vessel may fish in any fixed gear area (as determined by the Coast Guard; see below). Operation in areas of fixed gear locations shall be at the risk of the owner or operator for liability purposes resulting from damage to fixed gear.

5. The locations of fixed gear in the Grid System as defined in paragraph (j) below, are broadcast at 1350 GMT daily by Coast Guard Communications Station Boston (NMF) on the following frequencies in radio telegraphy: _____ _____ _____.

6. Domestic fishermen may receive reports of current fixed gear locations by calling _____.

7. A printed summary of fixed gear information is available from Commander (Aol), U. S. Coast Guard, Atlantic Area, Governors Island, NY 10004 (telephone: 212-264-0645, TELEX: 126831).

(j) Grid System Employed in the Communication of Fixed Gear Information.

1. The grid to be employed is based on the International Geographic Reference System found on any navigational chart (Mercator Projection). The basic division of the grid will be 12 minute latitude by 12 minute longitude rectangles (1 minute of latitude = 1 nautical mile) with divisions down to 2 minutes latitude by 2 minutes longitude. (It is anticipated that either a grid chart will be prepared or overlays for appropriate charts would be made available to all who desire or are required to plot fixed gear areas .)





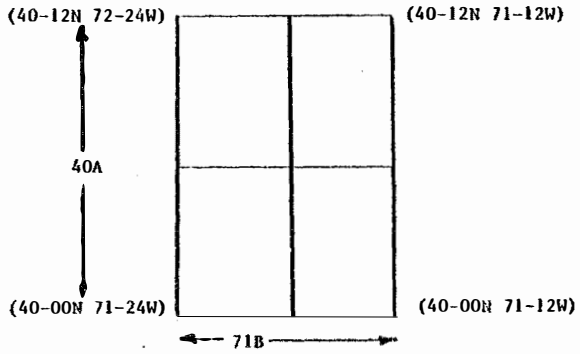
2. The individual grids or rectangles will be identified and broadcasted or communicated as follows:

a. Each degree (1 degree = 60 minutes) of latitude and longitude is subdivided into units of 12 minutes with alphabetical names (A through E). For example, 40°-00'N to 41°-00'N latitude and 70°-00'W to 71°-00'W longitude are subdivided as follows:

| 40°-00'N to 41°-00'N latitude | 70°-00W to 71°-00W longitude |
|---|---|
| 40A = 40°-00'N to 40°-12'N | 70A = 70°-00'W to 70°-12'W |
| 40B = 40°-12'N to 40°-24'N | 70B = 70°-12'W to 70°-24'W |
| 40C = 40°-24'N to 40°-36'N | 70C = 70°-24'W to 70°-36'W |
| 40D = 40°-36'N to 40°-48'N | 70D = 70°-36'W to 70°-48'W |
| 40E = 40°-48'N to 41° 00'N | 70E = 70°-48'W to 71°-00'W |

b. To identify a single 12 minute latitude by 12 minute longitude rectangle anywhere on the earth's surface all that is needed is the 12 minute latitude designator and the 12 minute longitude designator:

For example: 40A-71B would identify the area below.



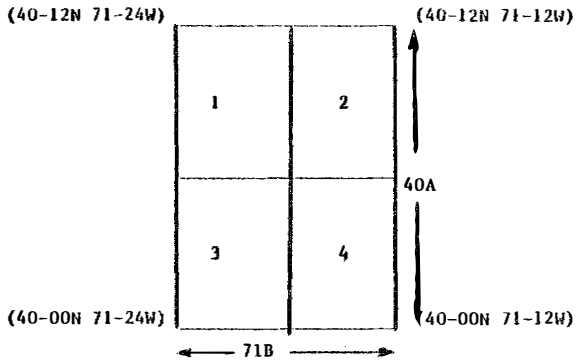

(Approximate size on NOAA chart 12300 Approaches to NY, mercator projection Scale: 1:400,000)

Also a significant reduction in the number of characters to be communicated is realized.

For example: 40A-71B = From 40-12N 71-24W to 40-12N 71-12W to 40-00N 71-12W to 40-00N 71-24W then return to origin.

Or in LORAN A: 40A-71B = From 3H4-5397 3H5-1983 to 3H4-5465 3H5-1891 to 3H4-5348 3H5-1934 to 3H4-5280 3H5-2024 then return to origin.

c. This basic area may be further divided into quadrants and labeled 1, 2, 3 and 4.



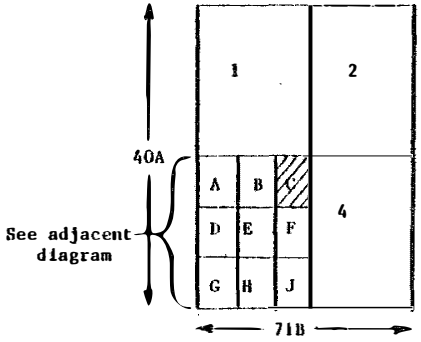

To designate the lower left hand quadrant the name or identifier is:

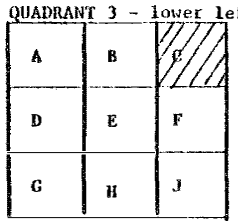
"40A-71B-3" = A six minutes latitude by six minutes longitude rectangle (6 by 4.6 nautical miles.

d. The above quadrant may then be further subdivided into nine subquadrangles and labelled A, B, C, D, E, F, G, H, and J*.
*NOTE: Letter "I" omitted to avoid confusion with the numeral one (1).

To designate the upper right hand subquadrangle the name or identifier would be :

"40A-71B-3C" = A two minute latitude by two minute longitude rectangle. This would be the smallest area designated as a fixed gear area - essentially a 2 by 1.6 nautical mile rectangle.

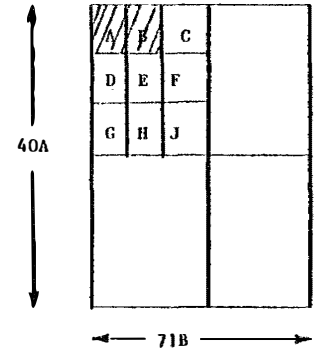




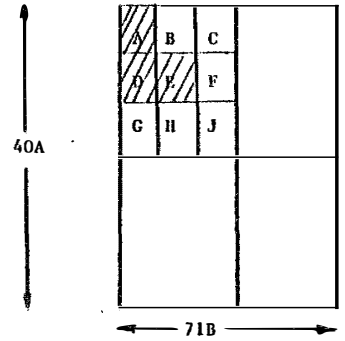

e. Other options could be utilized in obtaining combinations of these three basic sizes.
For example to name:

(1) two consecutive 2 by 2 minute areas




"40A-71B-1AB"

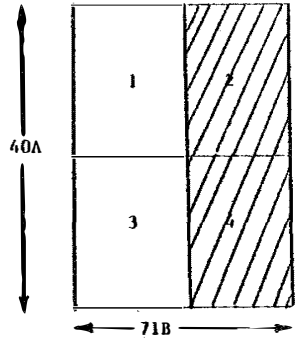
(2) three consecutive 2 by 2 minute areas:




"40A-71-b-1ADE"

* May list up to eight consecutive subquadrangles. The longest name/identifier example would be 40A-71B-1ABCDEFGH".

(3) two consecutive 6 minute by 6 minute quadrants




"40A-71B-24"

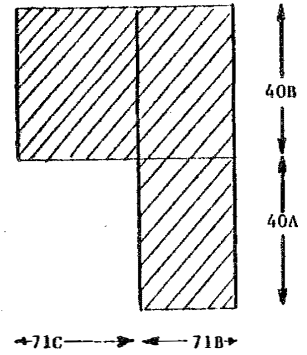
(4) two consecutive 12 minute by 12 minute

"40A-71BC" or "40AB-71B"

(5) 24 minute by 24 minute rectangle

"40AB-71BC"

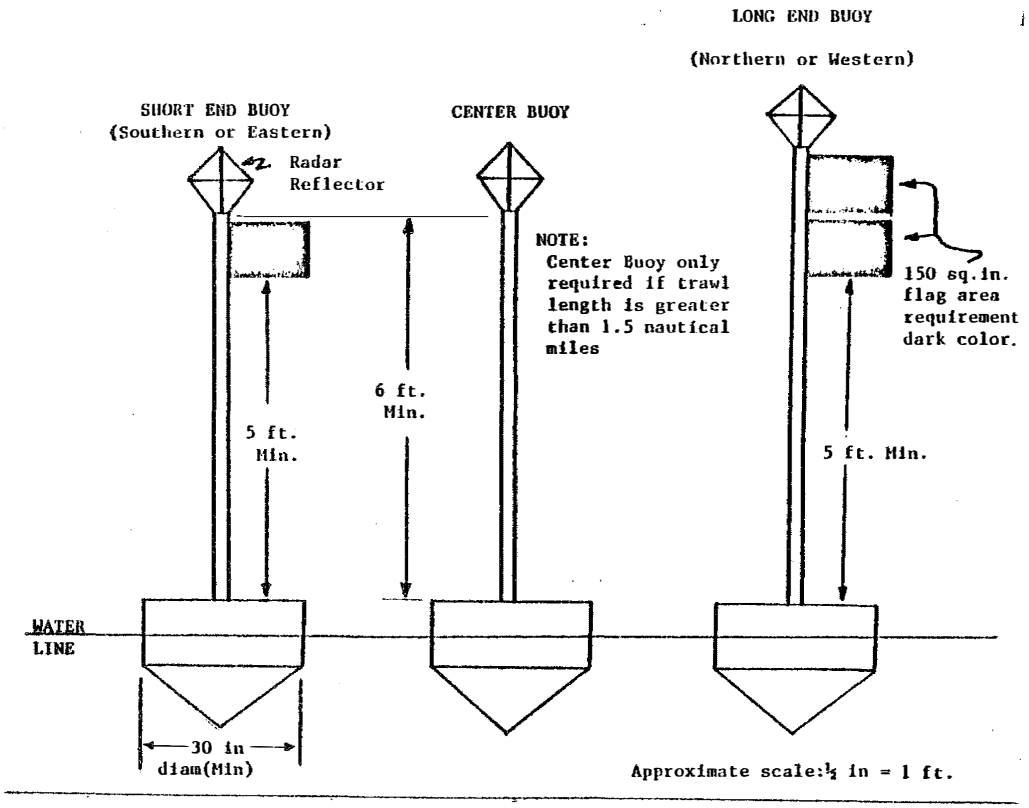
(6) This shape would be described in two separate areas"




"40AB-71B" and "40B-71C"







## EXHIBIT A

**Proposed Inshore Boundary of FCZ Offshore Fixed Gear Area**

| | | |
|---|---|---|
| | Bay of Fundy to Cape Cod NOAA Chart No. 13260 | |
| 12 miles | 43-37.5N | 69-30W |
| | 43-30N | 69-49W |
| | 43-27N | 70-00W |
| | 42-52.5N | 70-32W |
| | 42-49N | 70-24W |
| | 42-40N | 70-20W |
| | 42-30N | 70-24.5W |
| | 42-22N | 70-36W |
| | 42-18.5N | 70-28.5W |
| | 42.15.5N | 70-00W |
| | 42-10N | 69-51W |
| | Georges Bank and Nantucket Shoals NOAA Chart No. 13200 | |
| | 42-00N | 69-45W |
| | 41-48.5N | 69-40W |
| 12 Miles | 41-21N | 69-22.5W |
| 25 Fathom | 41-04.5N | 69-20.5W |
| | 40-44.5N | 60-30W |
| | 40-43.5N | 69-52W |
| | 40-40N | 70-07W |
| | 41-03N | 70-33W |
| | Approaches to New York NOAA Chart No. 12300 | |
| | 41-02.5N | 71-15.5W |
| | 40-59N | 71-44W |
| | 40-47N | 71-50W |
| | 40-42.5N | 72-16.5W |
| | 40-34.5N | 72-21W |
| 25 Fathoms | 40-20N | 72-54.5W |
| 12 Miles | 40-07N | 73-46.5W |
| | 39-40.5N | 73-51W |
| | 39-21N | 74-06W |
| | 39-11.5N | 74-17.5W |
| | 39-07.5N | 74-25W |
| | Cape May to Cape Hatteras NOAA Chart No. 12200 | |
| | 38-35.5N | 74-48.5W |
| | 38-16.5N | 74-50W |
| | 38-02N | 74-57W |
| | 37-42.5N | 75-12W |
| | 37-36.5N | 75-19W |
| | 37-06N | 75-35.5W |
| | 36-56.6N | 75-45W |
| | 36-37.5N | 75-38W |
| | 36-19N | 75-33.5W |
| | 35-42.5N | 75-14W |
| | 35-38N | 75-13W |
| 12 Miles | 35-13.5N | 75-17W |

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


December 22, 1977



Mr. John Bryson
Executive Secretary
Mid-Atlantic Fisheries
Management Council
Federal Building
Room 2115
Dover, Delaware 19901

Dear Mr. Bryson:

As per the request of the Japan Deep-Sea Trawlers Association, I herewith convey its comments on the Draft FMP for the Atlantic Squid Fishery.

I hope that your Council will give full consideration to the said comments.

Sincerely yours,

Kazuo Nonaka

Kazuo Nonaka
First Secretary

KN:ss

Enclosure

COMMENTS ON THE DRAFT FMP FOR THE ATLANTIC SQUID FISHERY
( As prepared by the Mid-Atlantic Fisheries Management Council )
( December 19, 1977 )

SUBMITTED BY: Japan Deep-Sea Trawlers Association
3-6 Ogawa-cho, Kanda, Chiyoda-ku
Tokyo, Japan
Tel. (03) 291-8508

INTRODUCTION:

The Japan Deep-Sea Trawlers Association submits herewith its comments on the draft FMP for the Atlantic Squid Fishery, as prepared by the Mid-Atlantic Fisheries Management Council. Several of the regulations set forth in the draft would, in our opinion, create serious operating problems for our squid-directed fishery. Yet these are, we feel, unjustified from the standpoint of domestic catch capability, protecting the squid resource, controls on incidental catches, the realities of the squid fishery, or avoiding conflict with domestic fisheries directed at continental shelf resources.

We ask your consideration of the comments and suggestions made herein in the interest of developing a final FMP that would be fair and equitable to both the domestic and foreign fisheries within the parameters of optimum resource utilization.

(1) We ask that the OY for Illex be set at the MSY level, as in the case of Loligo. (CF. P. 113, section XII .5, "Specification of Optimum Yield") (22)

JUSTIFICATION:

The 1977 report of the ICNAF assessment sub-committee demonstrates that the OY level for Illex of some 100,000 tons may be set without giving any adverse effect on the resource. However, as a result of a preliminary analysis, the MSY for Illex has been estimated at some 40,000 tons, while the OY has been set at only 30,000 tons -- well below the MSY level. This we can not accept. We see no ground for reducing the OY below the 35,000 tons of 1977.

Illex, like Loligo, has a one-year life cycle, so catch has little influence on the state of the resource. Moreover, during the Illex catch season, there is very little incidental catch of other species. Accordingly, to set the OY below the MSY level is tantamount to a waste of this resource and therefore more illogical from the standpoint of efficient resource utilization. We feel that, when the final estimate of MSY is prepared, the OY should be set at the MSY level.

(2) We ask that the determination of U.S. fishing capabilities for Illex and Loligo be made at the beginning of the fishing season and that the assessment be a reasonable one. (P. 119, section XIII. 3, " Catch Limitations") (23)

The draft FMP estimates the U.S. harvesting capacity for Loligo and Illex to be 14,000 tons and 10,000 tons, respectively, a drastic increase over the previous year's catch. We are sceptical about the validity of this estimate.

As a matter of fact, U.S. fishermen gave this July and August portion of their allocations to foreign countries in recognition of their incapability of achieving their target. In view of the above and of the fact that squid fishery requires consideratle practical experience, there seems to be little likelihood that the U.S. capability for 1978 will improve to the contemplated level.

An argument may be made that reallocation of the quota should always be possible during the course of the year. However, since fishing needs careful planning in advance, no one would disagree that such an argument does not alleviate the responsibility on the part of U.S. fishermen to make more reasonable estimate of their capability.

With a view to permitting the foreign countries concerned to develop sound operating plans from the standpoint of both catch volume and management control, we earnestly hope that the determination of U.S. fishing capabilities in these species for 1978 can be made at the beginning of the fishing season and that the assessment will be a reasonable one, based on actual results achieved during 1977.

(3) With respect to the incidental catch regulations, we request that reasonable regulatory measures be adopted which take fully in to account the realities of the squid fishery. We propose also that joint research be undertaken on current conditions within the fishing area. (CF. P. 119, section XII. 5, "Incidental Catch") (24)

JUSTIFICATION:

Various species, including Butterfish, Mackerel, Red Hake and Silver Hake occur as incidental catch in the squid fishery.

Generally speaking, in the case of summer Illex, the incidental catch is very limited. It has been our experience that the amount of such incidental catch is larger for winter Loligo than for Illex. Also, as the draft FMP itself acknowledges ( on P. 78, Section VIII. 4, "Interaction between domestic and foreign participants in the fishery"), historical data on incidental catches by the squid fishery are inadequate.

Accordingly, in order to justify a regulation that sets the end of the squid-

directed fishing season at such time as the incidental catch quotas have been filled, it is, in our view, necessary first that the realities of the incidental catch situation be fully appreciated. In an effort to give the U.S. a better understanding of conditions within the squid fishery, Japan conducted joint research with the U.S. during July 1977 aboard the Suzuka-Maru and later actively welcomed U.S. Observers on board the Japanese vessels.

We propose another joint research effort, under appropriate conditions, during the winter Loligo fishery.

(4) With regard to time and area restrictions on foreign vessels, we ask the opening of Area 3 between June 15 and September 15 and of Areas 4 and 5 during November and December (CF. P. 117, section XIII. 2, "Time and Area restrictions") (25)

JUSTIFICATION:

a) In past years, Areas 2 and 3 have accounted for the bulk of the squid catch. However, Area 2 has actually very few areas capable of being trawled and so is severely limited as a fishing ground.

While it is true that in 1977 we were fortunately just about able to attain the quota due to a good run of fish in Area 2, areas of good runs differ from year to year. The drawing of a counter line that divides what should be considered a homogeneous fishing area into Areas 2 and 3 clearly ignores the realities of fishing activity.

Furthermore, there are relatively few Lobster pots in Area 3. Also, under the regulations contained in the subject draft adopting the off-bottom gear, the incidental catch of continental shelf resources, such as Lobster and Crab, would be held to a minimum.

We ask, therefore, that Area 3 be opened during the summer Illex fishing season.

b) As a result of the closure of Areas 4 and 5 during November and December, despite the importance of these areas as fishing grounds for winter Loligo, not only is Japan unlikely to attain its 1977 Loligo catch quotas but its fleet operations have also been subjected to extreme economic hardship due to the resultant decline in fishing efficiency.

We earnestly hope that you will see fit to open these areas.

(5) We are most appreciative of the adoption of off-bottom gear (off-bottom trawl nets) in the squid fishery as being the most effective means of avoiding incidental catch of such continental shelf resources as Lobster and Crab. (CF. P. 117, section XIII. 2, "Time and Area restrictions and P. 119, section XIII. 4, "Type of vessels, gear and enforcement devices")





JUSTIFICATION:

The off-bottom trawl is the only way in which squid can be caught by the squid-directed trawl fishery without incurring the risk of incidental catch of Lobster, Crab or similar species.

Three kinds of gear are used in the trawl fishery:

Bottom trawl nets
Off-bottom trawl nets
Mid-water trawl nets

However, at the present time, it is difficult to catch squid efficiently with mid-water trawl nets. Thus, the off-bottom trawl net is the only gear that will satisfy both the squid and lobster fisheries.

(6) Fixed Gear Avoidance
(CF. P. 118, section on "Fixed Gear Avoidance")
The draft expressly prohibits fishing activities within two miles of any fixed gear point, and we can fully accept the correctness of this position.

However, if the intention of this passage is to further prohibit fishing within two miles of any "Fixed Gear area", as broadcast by the National Marine Fisheries Service, this would amount to an unnecessary restriction on foreign vessel operations.

If the intention is simply to avoid conflict with Lobster pots, it would appear more than adequate to simply stipulate that (1) fishing is prohibited within fixed gear areas: and (2) all possible care is to be taken when operating within two miles of such areas.

(7) We ask removal of the depth restriction between 100 and 200 fathoms.
(CF. P. 112, Section 3A) (26)

JUSTIFICATION:

The primary runs of summer Illex occur in waters between 100 and 200 fathoms. It is therefore most unreasonable that these depths should be closed.

We feel we are perfectly capable of avoiding conflict with Lobster areas through broadcast advice and the use of radar reflectors.

Moreover, there is no concentration of Lobster pots between 100 and 200 fathoms. To the contrary, depending on the particular grounds and period, few pots are actually seen in this depth banned.

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. 27

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 existence your starting to put U.S. fishermen out of business, starting with the New England fishermen. 28

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

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

The remainder of U.S. fishermen that are not affected by the cod, yellowtail, and haddock fisheries are waiting to be told in the 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 managment 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. 29

Yours truly,

Richard Stern
Boat "DONNA LEE"

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

30

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.

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. MAINTENANCE OF THE FLEET! SHIPYARDS OR THE LACK OF THEM. HELP THE YARD OWNERS WHO CATER TO THE COMMERCIAL FISHERMEN.

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

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

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October 5, 1978

John Bryson
Mid-Atlantic Fishery Management Council
room 2115
Federal Building
North and New Streets
Dover, Delaware

Dear Mr Bryson

I was unable to attend last nights meeting on the squid fisheries held in Gloucester

I would like to offer some comments

The quotas for the Illex and Loligo are necessary. But the distribution of the quotas is another matter.

The United States fishermen do not land enough squid to justify a higher quota. The obvious reason they do not land more (when they can catch more) is that there is not enough of a demand. Herein lies the problem.

Domestic consumption of squid is not enough to create a large market. There is an export market, but that can not be developed as long as foreign boats are allowed within the 200 mile limit. If the foreign boats were

32

stopped from fishing for squid within the 200 mile limit the possibility of a healthy export business in squid is almost assured.

The demand for squid in the foreign countries that are stopped from fishing would not lessen their sources of supply would have to change though. Domestic boats could land more squid to meet the demand. Domestic preparing of the squid for export is no problem.

Domestic boats catching more squid could help take the pressure off the endangered species cod, haddock and yellowtail flounder.

Exporting the squid would help local economies and in a small way our balance of payment problem.

It is certainly worth a try. If nothing positive comes of it, the foreign boats can be let back in.

If you can, I would be interested in any comments.

Sincerely
John D. MacEachern
J. D. M. Seafoods
PO Box 5
Gloucester, Mass 01930



OTONKA INC.
Rt 2 Box 91 A
Dagsboro, Delaware 19939
October 3, 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:

I was unable to attend the Squid public hearing in Ocean City, Maryland due to the sudden illness of one of our crew members. This letter is to comment on the proposed Squid plan.

I feel that the poor spawning season witnessed in this area and to the north has not been adequately taken into account in the 1979 quotas. Both the spring squid run and the amount of squid eggs caught in nets after the spawn were a fraction of that normally caught.

Squid is very important to most Mid-Atlantic trawl fishermen, especially crewmen, as it normally accounts for between 10 and 50% of their monthly income.

Even thought there is a large stock of squid and scientific evidence points to underutilization at this time, management of the stock is new. I feel that the management should be geared to the maximum catch over many years when world protein needs will be increasing. Allowing large catches in the next few years may adversely affect the total stock and catches in future years. 33

Perhaps when adverse circumstances are suspected, but not confirmed, a tenative quota could be set with provision for increasing it to the established OY if the stocks appear healthy in another period of their cycle. I realize this is more time consuming than the present plan, it is suggested because there seems to be a resistence to lowering foreign allocation without firm lower stock assesment figures.

I feel the Council's responsibility is first to the long term health of the squid stock then to the United States fishermen - both commercial and recreational-, and lastly to allow unutilized resources to be harvested by foreign fishermen.

Very truly yours,
William W. Stevenson Jr.
William W. Stevenson, Jr.

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.

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 .....





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. 34

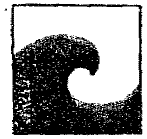
I feel there is much to be discussed and much to be considered when setting quotas. I am looking forward to hearing from you regarding this letter.

Very truly yours,

Louis Ventafredda

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
All Areas

| Vessel Class | 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



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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

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 COMMENTS ON DRAFT FISHERY MANAGEMENT PLAN ON ATLANTIC SQUID

October 23, 1978

Japan Fisheries Association

With respect to the draft fishery management plan, Japan Fisheries Association presents herewith the following comments.

## I. MSY AND OY

Request:

Illex : MSY for this species should be raised to 80,000 MT and OY should be set on the same level. 35

Loligo: MSY for this species of 44,000 MT is too low and should substantially be raised.

Reasons:

1) According to ICNAF area including U.S. FCZ is estimated to be no less than 450,000 MT and, at a maximum exploitation rate of 0.4, MSY is estimated to be no less than 180,000 MT. At the special meeting on squid held in Havana, Cuba, February this year, TAC in ICNAF subarea 3 and 4 which constitute the Canadian Zone was fixed at 100,000 MT. Since the remainder of the resources exists in U.S. waters, it is quite natural to set the MSY in U.S. waters at 80,000 MT by subtracting the said 100,000 MT from the total MSY in the ICNAF areas.

2) Both for Illex and Loligo, unusually dense schools of these species have been observed very frequently throughout the 1978 fishing season. This will be confirmed by the report of U.S. Observers on board Japanese trawlers. Above fact will well justify the substantial increase of OY for both species.

3) According to our knowledge and experience in both fishery and researches on squid, the limitation on catch does not necessarily result in the increase in the stock rise. This observation is justified by the well established biological findings that the abundance of such a short-lived species with high fecundity as squids are far more dependent on oceanographic conditions rather than the fishing mortality. In other words one can not expect any meaningful result in the rise of stocks by setting too small quota for these species.

## II. DAH AND TALFF

Request: DAH of both Loligo and Illex shall be set on the same level of 5,000 MT as this year's.
TALFF of both squids shall be increased accordingly. 36

Reasons: As shown in the following table, the largest annual catch total of Loligo and Illex in the past was 3,800 MT registered in 1976.

| Year | USA Landing Loligo | USA Landing Illex | Subtotal | Total in World | Ratio of USA Total |
|---|---|---|---|---|---|
| 1972 | A 742 MT | B 472 MT | C 1,214 MT | D 45,848MT | C/D 2.6 % |
| 1973 | 1,100 | 530 | 1,630 | 55,277 | 2.9 |
| 1974 | 2,141 | 148 | 2,289 | 56,636 | 4.0 |
| 1975 | 1,593 | 107 | 1,700 | 48,702 | 3.5 |
| 1976 | | | 3,800 | 74,000(A) | 5.1 |
| 1977 | | | 2,480 | 79,000(B) | 3.2 |

NOTE: (A) TAC for 1976 is adopted as total in world for the year (74,000 MT)

(B) OY for 1977 is adopted as total in world for the year (79,000 MT)

Source: FMP for the Squid of the Northwest Atlantic Ocean

Moreover, the total catch of both squids as of July this year stood at only 500 MT.

In the light of the said records DAH of Loligo (14,000 MT) and Illex (10,000 MT) in the draft FMP can not but be regarded as overestimation even if we take account possible expansion of U.S. fishing capabilities in recent years. We, therefore, consider it reasonable to set them at 5,000 MT each at most, the same as this year's, and TALFF should be increased accordingly.

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## III. REGULATIONS, ETC.

### (1) Fishing Areas and Fishing Periods

Requests: During June - September, which is the main fishing season for Illex, Fishing Area 3 should also be opened simultaneously with Area 2. 37

Reasons: During June - September, which is the main fishing season for Illex, only Area 2 is opened under 1978 Regulation and proposed 1979 Regulation as well. In addition an excessively large fixed gear area is established in the Area 2 so that the operation of foreign fishing vessels limited to extremely small areas -- that is, only about 5 miles in terms of net sweeping distance in many cases. As a result, it is impossible to conduct efficient operation pursuing the movement of squid runs.

In the case that Area 3 is opened simultaneously with Area 2, there will be no possibility of any other increase of gear conflict which is already minimal because of strict regulations, and moreover, no adverse effect upon the fish resources.

### (2) Avoidance of Fixed Gear

38

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.



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.

## IV. RELATIONSHIP WITH BUTTERFISH FMP

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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.

## V. PROPOSAL FOR JOINT SURVEY

The existing Regulations on Foreign Fishing contain unreasonable points in such respects as 40

(1) Control on the establishment of minimum area for foreign fishing by way of so-called window area,
(2) Limitation of the fishing period,
(3) Control on establishment of fixed gear area,
(4) 100 - 200 fathom depth control and
(5) Control through the establishment of very small quotas.

As a result, the operations of foreign fishing vessels are forced to extreme inefficiency.

Some of those unreasonable points, if not all, can be resolved by advancing researches through joint survey. Therefore, it is proposed that joint survey should be undertaken first on the selectivity of various mesh sizes with respect to Loligo.

October 27, 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:

On October 23, 1978, we submitted Japanese Comments on Draft Fishery Management Plan on Atlantic Squid and Butterfish.

However, there was an omission in MSY and OY of Atlantic Squid comment, which should be corrected as follows:

Reasons:

(1) According to ICNAF Doc. 78/II/11, the biomass of Illex of whole ICNAF area including U.S. FCZ is estimated to be no less than 450,000 MT and, at a maximum exploitation rate of 0.4, MSY is estimated to be no less than 180,000 MT.

Thank you very much for correcting this error.

Very truly yours,

Takeshi Nakamura

Takeshi Nakamura
Executive Director
Japan Fisheries Association
Washington Representative Office

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DEPARTMENT OF TRANSPORTATION
UNITED STATES COAST GUARD

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

16475
NOV 1978

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

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

Comments

1. Permits and Fees:

This section requires the owner or operator of a vessel desiring to take these species, or transport or deliver these species for sale to obtain a registration for that purpose. This same language is used throughout these documents. Is the term registration synonymous with license? If it is not what does a registration mean in terms of documents required to be permitted to fish. 41

2. Time and Area Restrictions:

These plans list two areas which are to be closed to fishing based on the request of the Environmental Protection Agency. There should be some statement in the plan which explains why the EPA has requested these areas to be closed; it is presumably because there are chemical dumpsites in these areas which have degraded the water quality. There should also be some discussion as to what enforcement actions will be necessary in these areas and how the fish product harvested from these areas may differ from that of other areas. 42

Specific Comments:

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

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.

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.

## XVIII-4. Responses To Written Comments

1. See "Additional Foreign Fishing Areas" section in XVIII-3.
2. Same as #1.
3. See "Foreign Allocations" section in XVIII-3.
4. See "Foreign Fishing Regulations" section in XVIII-3.
5. Same as #4.
6. Same as #4.
7. Same as #4.
8. Same as #4.
9. Same as #4.
10. Same as #4.
11. Same as #4.
12. See "Evaluation of Quotas" section in XVIII-3.
13. Same as #4.
14. Same as #4.
15. Same as #12.
16. Same as #4.
17. Same as #4.
18. Same as #1.
19. Same as #4.
20. Same as #4.
21. Same as #4.
22. Same as #3.
23. Same as #12.
24. Same as #4.
25. Same as #4.
26. Same as #4.

RESPONSES TO COMMENTS ON SUPPLEMENT #1

27. The FMP has been revised to put it on a fishing year basis.
28. This would require a change in the FCMA.
29. Same as #27.
30. Same as #27.
31. This issue is outside the scope of the FMP.
32. The Council is supportive of the development of US export fisheries. However, it feels that the OYs, US capacities, and TALFFs in the FMP are reasonable until more US fishermen indicate intent to fish for squid.
33. The Council believes the OYs are rasonable given available scientific information.
34. There were attempts made through press releases and other methods to notify as many people as possible about the FMP and hearings.
35. The Council considers the MSYs and OYs reasonable given available scientific information.
36. The Council considers the US capacities reasonable given available data.
37. This matter should be resolved through the comment process on the Foreign Fishing Regulations.
38. The Council is working with the Coast Guard, the NMFS, and the New England Council on these regulations.
39. The Council believes the butterfish TALFF is reasonable given the objectives of that FMP. The Council also believes that bycatch should be minimized in the interest of conservation.
40. This matter should be discussed with the NMFS since that agency has responsibility for surveys of the type proposed.
41. "Registration" and "permit" should be considered synonymous.
42. The Council was responsive to the EPA request relative to this matter.