

AMENDMENT #6 TO THE
FISHERY MANAGEMENT PLAN FOR THE
ATLANTIC SURF CLAM AND OCEAN QUAHOG FISHERIES

January 1985

Mid-Atlantic Fishery Management Council

in cooperation with the

National Marine Fisheries Service

and the

New England Fishery Management Council

Draft adopted by MAFMC: 17 January 1985
Final adopted by MAFMC: 7 March 1985
Revised adopted by MAFMC: 22 January 1986

II. SUMMARY

This Amendment to the Fishery Management Plan for the Atlantic Surf Clam and Ocean Quahog Fisheries (FMP), prepared by the Mid-Atlantic Fishery Management Council (Council), is intended to: (1) divide the New England Area into the Nantucket Shoals and Georges Bank Areas, (2) revise the Optimum Yield (OY) and management regime for the Nantucket Shoals Area, (3) establish an OY and management regime for the Georges Bank Area, and (4) revise the effort limitation provisions regulating the Mid-Atlantic Area surf clam fishery. The management unit is all surf clams (Spisula solidissima) and all ocean quahogs (Arctica islandica) in the Atlantic fishery conservation zone (FCZ). The objectives of the FMP are:

1. Rebuild the surf clam populations to allow eventual harvest approaching the 50 million pound level, which is the estimate of maximum sustainable yield over the range of the resource, based on the average yearly catch from 1960 to 1976.
2. Minimize economic dislocation to the extent possible consistent with objective 1 and encourage efficiency in the fishery.
3. Prevent the harvest of ocean quahogs from exceeding maximum sustainable yield and direct the fishery toward achieving Optimum Yield.
4. Provide the greatest degrees of freedom and flexibility to all harvesters of these resources consistent with the attainment of the other objectives of this Plan.
5. Optimize yield per recruit.
6. Increase understanding of the conditions of the stocks and fishery.

The FMP currently contains two management areas for surf clams: the Mid-Atlantic Area and the New England Area. The dividing line between the Mid-Atlantic and New England Areas is the line that begins at 41°18'16.249" north latitude and 71°54'28.477" west longitude and proceeds S 37°22'32.75" E to the point of intersection with the outward boundary of the FCZ. The Amendment defines the Nantucket Shoals Area as that portion of the New England Area west of 69° and the Georges Bank Area as that portion of the New England Area east of 69°.

The New England Area was originally delineated to gather information on the surf clam resource in the absence of comprehensive research data gathered by the Northeast Fisheries Center (NEFC). It was decided that the delineation of an area with no limitation on entry and with a quota and management measures separate from those operating in the Mid-Atlantic Area would encourage fishing in the New England Area and that such fishing would supply information on the extent of the surf clam resource in the New England Area. A fishery was initiated and NEFC prepared a stock assessment (Murawski and Serchuk, 1983a) concentrating on the western portion of the area (Nantucket Shoals). This assessment resulted in the specification of OY in the Nantucket Shoals Area as 25,000 - 200,000 bushels (bu), an increase over the 25,000 -100,000 bu specified for the New England Area. The annual quota is set following the procedures established in the FMP (MAFMC, 1981).

Management of the Nantucket Shoals Area is based on dividing the annual quota into quarterly quotas as follows: 20% for January through March, 30% for April through June, 30% for July through September, and 20% October through December. If the actual catch of surf clams in any quarterly period falls more than 5,000 bushels short of the specified quarterly quota, the Regional Director will add the amount of the shortfall to the succeeding quarterly quota. If the actual catch of surf clams exceeds the quarterly quota, the Regional Director will subtract the amount of the excess from the succeeding quarterly quota. The Regional Director shall publish a notice in the Federal Register whenever any quarterly quota for surf clams is adjusted as described above. The shortfall or excess will carry over from the last quarter of one year to the first quarter of the next year except that no more than 10% of the annual quota may be carried over to the next year. No catch restrictions shall be applied to the fishery until 50% of the quarterly quota has been landed. The Regional Director will monitor landings from the Nantucket Shoals Area and will determine either when the 50% point has been reached or when that point will likely be reached. The

Regional Director will thereupon consult with the Councils in the selection of trip limits to control catch adequately to keep the fishery open for the balance of the quarter. Trip limits will be established by vessel class as follows: for Class 1 vessels, trip limits may not be less than 224 bu/trip; for Class 2 vessels, trip limits may not be less than 416 bu/trip for Class 2, and for Class 3 vessels, trip limits may not be less than 768 bu/trip. Trip limits must maintain a fixed ratio of 1.0: 1.8: 3.4 for Class 1, 2, and 3, respectively. In the event that trip limits are not sufficient to keep landings to within the quota levels, the Regional Director may close the fishery until the beginning of the next quota period. Once initial trip limits have been established in consultation with the Councils, the Regional Director will notify the Councils in advance of any proposed action to further specify trip limits or close the fishery. The Regional Director will consider any comments received by the Councils or the public before implementing any adjustments in the Nantucket Shoals management program.

During 1984 vessels began a surf clam fishery on Georges Bank. This led to research using NMFS and commercial vessels that resulted in a stock assessment (Murawski and Serchuk, 1984b) for Georges Bank which suggested a maximum annual catch of 300,000 bu. The surf clam fishing grounds on Georges Bank are a substantial distance from shore. If the New England Area OY were increased to reflect the Georges Bank assessment, it is probable that all of the increased catch would come from Nantucket Shoals, leading to over fishing in that Area. Hence, it is necessary to partition the New England Area.

The OY for the Georges Bank Area is 25,000 to 300,000 bu. The annual quota is set following the procedures established in the FMP and is divided into quarterly quotas, with the first and fourth quarters (January-March and October-December) each allocated 10% of the annual quota and the second and third quarters (April-June and July-September) each allocated 40% of the annual quota. If the actual catch of surf clams in any quarterly period falls more than 5,000 bushels short of the specified quarterly quota, the Regional Director will add the amount of the shortfall to the succeeding quarterly quota. If the actual catch of surf clams exceeds the quarterly quota, the Regional Director will subtract the amount of the excess from the succeeding quarterly quota. The Regional Director shall publish a notice in the Federal Register whenever any quarterly quota for surf clams is adjusted as described above. The shortfall or excess will carry over from the last quarter of one year to the first quarter of the next year except that no more than 10% of the annual quota may be carried over to the next year.

Management of the Mid-Atlantic Area is based on the current FMP, except that the effort limitations are modified by this Amendment to add the provision that vessels may land surf clams only one time during an authorized fishing period.

The surf clam minimum size limit applies in all three Areas.

The permit eligibility requirements for the New England Area continue unchanged for both the Nantucket Shoals and Georges Bank Areas; specifically, vessels with permits issued pursuant to the moratorium on entry of vessels into the surf clam fishery and vessels with permits to fish only in the New England Area may both fish in both the Nantucket Shoals and Georges Bank Areas. However, it is the Council's intent that vessels with permits to fish only in the New England Area accrue no rights to participate in any future vessel allocation system that may be developed to replace or supplement the moratorium on entry of vessels into the surf clam fishery as a consequence of such vessels fishing in the New England Area.

Vessel owners or operators must notify NMFS in advance if they intend to fish for surf clams in a Notification Zone. For vessels authorized to fish in both the Mid-Atlantic and New England Areas (i.e., with permits issued pursuant to the moratorium) with home ports in the Mid-Atlantic Area, the Nantucket Shoals or Georges Bank Areas are Notification Zones. For vessels authorized to fish in both the Mid-Atlantic and New England Areas (i.e., with permits issued pursuant to the moratorium) with home ports in the New England Area, the Mid-Atlantic or Georges Bank Areas are Notification Zones. For vessels authorized to fish only in the New England Area, the Georges Bank Area is a Notification Zone. Home port is that specified on the vessel's permit application. Vessels may not fish in more than one Area on any day. If an operator intends to change the vessel's Area of fishing, NMFS must be notified in advance.

III. TABLE OF CONTENTS

I. TITLE PAGE	1
II. SUMMARY	3
III. TABLE OF CONTENTS	5
IV. INTRODUCTION.....	6
V. DESCRIPTION OF STOCK	11
VI. DESCRIPTION OF HABITAT	15
VII. FISHERY MANAGEMENT JURISDICTION, LAWS, AND POLICIES	15
VIII. DESCRIPTION OF FISHING ACTIVITIES	15
IX. DESCRIPTION OF ECONOMIC CHARACTERISTICS OF THE FISHERY	21
X. DESCRIPTION OF BUSINESSES, MARKETS, AND ORGANIZATIONS ASSOCIATED WITH THE FISHERY	25
XI. DESCRIPTION OF SOCIAL AND CULTURAL FRAMEWORK OF DOMESTIC FISHERMEN AND THEIR COMMUNITIES	25
XII. DETERMINATION OF OPTIMUM YIELD	26
XIII. MEASURES, REQUIREMENTS, CONDITIONS OR RESTRICTIONS SPECIFIED TO ATTAIN MANAGEMENT OBJECTIVES	36
XIV. SPECIFICATION AND SOURCE OF PERTINENT FISHERY DATA	41
XV. RELATIONSHIP OF THE PLAN TO EXISTING APPLICABLE LAWS AND POLICIES	41
XVI. COUNCIL REVIEW AND MONITORING OF THE PLAN.....	43
XVII. REFERENCES	43
XVIII. TABLES AND FIGURES.....	45

APPENDICES

I. ALTERNATIVES TO THE AMENDMENT	App I 1
II. ENVIRONMENTAL ASSESSMENT (yellow paper)	EA 1
III. SUMMARY OF PUBLIC HEARINGS (white paper)	App III 1
IV. REGULATORY IMPACT REVIEW (green paper)	RIR 1
V. PROPOSED REGULATIONS (blue paper)	PR 1
VI. ABBREVIATIONS AND DEFINITIONS OF TERMS (white paper).....	App VI 1

IV. INTRODUCTION

IV.A. DEVELOPMENT OF THE FMP

The original FMP was approved in November 1977 for the period through September 1979. Amendment #1 extended it through 31 December 1979. Amendment #2 extended it through the end of 1981. Amendment #3, approved 13 November 1981, extended the FMP indefinitely.

Amendment #4 was initiated in response to a closure of the New England Area to surf clam fishing during the second half of 1983. On 21 July 1983 the New England Council sent a letter to Secretary of Commerce Malcolm Baldrige requesting Secretarial action to reopen the New England Area surf clam fishery. The Mid-Atlantic Council passed a motion in August 1983 recommending that the Secretary not accept the proposal of the New England Council. After receiving a letter from Secretary Baldrige on 6 September 1983 denying implementation of emergency action to reopen the surf clam fishery in the New England Area, work was begun to investigate methods for avoiding an extended closure in 1984. In November 1983 the Mid-Atlantic Council passed a motion authorizing work with the New England Council "... to accomplish a management system for the New England Area involving trip limits, quarterly quotas, or similar strategies to insure fishing throughout the year ...". A proposed Amendment #4 was drafted by the New England Council staff in cooperation with NMFS staff and hearings were held on 21 and 22 March 1984 (see Appendix III for summaries). At a joint meeting of the New England and Mid-Atlantic Councils in May 1984 representatives of the surf clam industry from both New England and the Mid-Atlantic presented revisions to the proposed regime. The Mid-Atlantic Council passed a motion to "adopt Amendment #4 to the Surf Clam and Ocean Quahog FMP as amended to provide that any unharvested portion of a bimonthly allocation be added to the immediately following bimonthly allocation rather than being prorated over all remaining bimonthly periods and that trip and weekly limits be by vessel classes based on relative fishing power using the following ratios: Class 1 = 1.0, Class 2 = 1.8, and Class 3 = 3.4, and that NMFS use a rulemaking procedure to implement the Amendment on an emergency basis." The New England Council voted at the same meeting to adopt the Amendment.

The provisions of Amendment #4 were implemented on an emergency basis for 180 days beginning 1 July 1984, during which time the Amendment was finalized by the New England Council and submitted for Secretarial approval. However, it was determined that the document was not structurally complete for review.

Amendment #5, approved 28 February 1985, revised the surf clam minimum size limit provisions, extended the size limit throughout the entire fishery, and instituted a requirement that cages be tagged.

This Amendment (#6) was begun in October 1984 following an exploratory fishery conducted on Georges Bank as a result of emergency regulations published 2 August 1984 (49 FR 30946-30948), primarily to address problems associated with the development of a surf clam fishery on Georges Bank (Section IV.B.2). At its October 1984 meeting the Council voted to divide the New England Area into the Nantucket Shoals and Georges Bank Areas, the dividing line being 69 degrees longitude. At the same meeting the Council voted to approve revising Amendment #4 so its provisions applied to that portion of the New England Area west of 69 degrees longitude.

In response to the Council's recommendation that Amendment #4 be revised to apply only to that portion of the New England Area west of 69 degrees, the New England Council held a hearing on 11 December 1984 (Appendix III).

At its December 1984 meeting the Council adopted the provisions of Amendment #6. The Amendment was adopted by the Council for hearings in January 1985, with hearings held 18 and 19 February 1985 (Appendix III). The Council adopted Amendment #6 for Secretarial approval at its March 1985 meeting. At that time Amendment #4 had still not been found structurally complete. Given the relationship between the provisions of Amendments #4 and #6, the decision was made to abandon Amendment #4 and combine the provisions of Amendment #4 with Amendment #6 in this document. The combination of Amendments #4 and #6 did not change any substantive provisions of either Amendment.

In order to facilitate documentation, the rejected alternatives for both Amendments are presented separately in Appendix I and the public hearing summaries are presented separately in Appendix III.

The Council was notified via a letter of 25 July 1985 that NMFS had partially approved Amendment #6. The letter from Acting Regional Director Richard H. Schaefer to Council Chairman Robert L. Martin stated in part:

"The measures in Amendment 6 that I disapproved are the Nantucket Shoals Area bimonthly quota guidelines and effort control measures, the one landing per day restriction applying to the Mid-Atlantic Area, the provision prohibiting the Regional Director from subdividing allowable fishing hours when the hours are set at 12 or less, and the portion of the notification provision prohibiting vessels that have fished in a notification zone from returning to fish in the same notification zone within that calendar month. The disapproval of the bimonthly guidelines for Nantucket Shoals removed the basis for adjusting the quotas between bimonthly periods when harvest either exceeds or falls short of quota. Therefore, this provision, while not specifically disapproved, can not be implemented on Nantucket Shoals at this time."

This revised version of Amendment #6 replaces the bimonthly quotas with quarterly quotas and eliminates the weekly landing limits for the Nantucket Shoals Area. It clarifies the quota adjustment provisions for the Nantucket Shoals and Georges Bank Areas. Finally, it presents additional justification for the one landing per trip provision. The other disapproved provisions (prohibition on subdividing allowed fishing times under certain conditions and portions of the notification system) have been deleted from the Amendment.

IV.B. PROBLEMS ADDRESSED BY THIS AMENDMENT

IV.B.1. New England Area Management System

Amendment #3 to the FMP allowed for an annual surf clam quota of 25,000 to 100,000 bu in the New England Area. Amendment #3 also provided that when 50% of the New England quota had been caught, the Regional Director, on review of available information and public comment, must determine whether the total catch of surf clams during the remainder of the year will exceed the annual quota. If the Regional Director determines that the quota probably will be exceeded, the Secretary of Commerce may reduce the number of days per week, or establish authorized periods, during which fishing for surf clams is permitted, or he may take no action until the quota is achieved.

In 1983, the New England quota for surf clams was 100,000 bu. By 1 April 1983 50% of the quota was harvested; and the Regional Director reduced fishing time to 12 hours per week. According to logbook records and reports from NMFS statistical port samplers, the harvest of surf clams from the New England Area reached 114,000 bu on 1 June 1983. The Regional Director determined that the 100,000 bu quota for the New England Area for the year 1983 had been exceeded; and the fishery was closed on 1 July 1983 for the remainder of the year.

Four New England surf clam processors (Soffran Brothers of Ipswich, MA; Blount Seafood Corporation of Warren, RI; Galilean Seafoods of Pt. Judith, RI; and Harbourside Shellfish of Exeter, RI) are dependent to some degree on surf clams from the New England Area. In addition, a few vessels may be dependent on being able to fish year round for surf clams in the New England Area. Only two vessels permitted to fish only in the New England Area filed logbooks in either 1983 or 1984. It is important to note that for vessels rigged for hydraulic dredging, few alternative fisheries are available without major renovations to the vessel and gear.

IV.B.2. Georges Bank Area

The FMP currently contains two management areas for surf clams: the Mid-Atlantic Area and the New England Area. The dividing line between the Mid-Atlantic and New England Areas is the line that begins at 41°18'16.249" north latitude and 71°54'28.477" west longitude and proceeds S 37°22'32.75" E to the point of intersection with the outward boundary of the FCZ.

The New England Area was originally delineated to gather information on the surf clam resource in

the absence of comprehensive research data gathered by the NEFC. It was decided that the delineation of an area with no limitation on entry and with a quota and management measures separate from those operating in the Mid-Atlantic Area would encourage fishing in the New England Area and that such fishing would supply information on the extent of the surf clam resource in the New England Area. A fishery was conducted and the NEFC also prepared a stock assessment (Murawski and Serchuk, 1983a) in the western portion of the area (Nantucket Shoals). This resulted in proposed Amendment #4 to revise the management system in the New England Area and revise the OY from 25,000 - 100,000 bu to 25,000 - 200,000 bu.

During 1984 vessels began a surf clam fishery on Georges Bank. This led to research using NMFS and commercial vessels that resulted in a stock assessment for Georges Bank which suggested a maximum annual catch of 300,000 bu (Murawski and Serchuk, 1984b). If the New England Area OY were increased to allow for the Georges Bank assessment, it is probable that all of the increased catch would come from the Nantucket Shoals, leading to over fishing in that area, because the Georges Bank beds are substantially farther from shore than are the Nantucket Shoals beds. Most likely significant fishing would not occur on the Georges Bank beds until the catch per unit of effort (CPUE) on the Nantucket Shoals beds fell to such a point that the additional steaming time to the Georges Bank beds was feasible. Hence, it is necessary to divide partition the New England Area.

It is also necessary to determine the strategy that will be used to manage the Georges Bank resource. Should the Georges Bank resource be managed either on an equivalent basis with management of the Mid-Atlantic and Nantucket Shoals resources or should it be managed in a way to complement the other areas? The regimes in the Mid-Atlantic Area and in the New England Area (for the Nantucket Shoals fishery) were designed to facilitate established fisheries in those Areas. While fishing has occurred on Georges Bank in 1984, five months of fishing in one year cannot have developed a group of vessels dependent on the area for income on a year round basis. While two New England based vessels fished on the Georges Bank beds in 1984, the effort was largely that of the fifteen Mid-Atlantic based vessels seeking an alternative to the severe effort limitations and closures of the Mid-Atlantic Area. If the Georges Bank beds are to be managed to support a separate fishery a level of management with associated costs will be required. If Georges Bank is to supplement fishing in the Mid-Atlantic and on Nantucket Shoals, another level of management and costs will be required.

IV.B.3. Mid-Atlantic Area Effort Limitations

Management of the Mid-Atlantic Area is based on the current FMP except that the effort limitations are modified by this Amendment to allow no more than one trip per day. Effort limitations in the Mid-Atlantic Area are currently in terms of the number of hours a vessel may fish during a specified time period and in practice have been specified as a certain number of hours each week (although the FMP allows hours per month and hours per quarter). Catch rates during 1984 led to closures in June, July, and September and a reduction from twelve hours per week to six hours every other week effective 18 November. In spite of this the fishery also closed during the last week of December. Certain vessels that fish beds close to shore (generally off New Jersey) have reportedly been making more than one trip during a twelve hour day, which is considered a significant factor contributing to the reduction to six hours every other week. Multiple landings on one day complicate enforcement and may result in a more rapid harvest rate, leading to decreased allowed fishing time or closures, thereby negatively impacting vessels that do not operate out of ports close enough to the beds to enable them to make more than one trip per day as well as the vessels that can make multiple landings. This problem was also identified by the United Shellfishermen's Association through comments made at the hearings on Amendment #5 and by the National Fisheries Institute at the September 1984 meeting of the Council.

IV.C. MANAGEMENT OBJECTIVES

The objectives of the FMP are:

1. Rebuild the surf clam populations to allow eventual harvest approaching the 50 million pound level, which is the estimate of maximum sustainable yield over the range of the resource, based on the average yearly catch from 1960 to 1976.

2. Minimize economic dislocation to the extent possible consistent with objective 1 and encourage efficiency in the fishery.
3. Prevent the harvest of ocean quahogs from exceeding maximum sustainable yield and direct the fishery toward achieving Optimum Yield.
4. Provide the greatest degrees of freedom and flexibility to all harvesters of these resources consistent with the attainment of the other objectives of this Plan.
5. Optimize yield per recruit.
6. Increase understanding of the conditions of the stocks and fishery.

IV.D. MANAGEMENT MEASURES CURRENTLY IN EFFECT

IV.D.1. Permits

A vessel owner or operator must obtain a permit in order to conduct a directed fishery for surf clams or ocean quahogs within the FCZ or land or transfer to another vessel any surf clams or ocean quahogs, or part thereof, caught within the FCZ. Vessels taking surf clams or ocean quahogs for personal use are exempt from this requirement.

A vessel is eligible for a permit to harvest surf clams in both the New England and Mid-Atlantic Areas if it meets any of the following criteria:

1. The vessel had landed surf clams in the course of conducting a directed fishery for surf clams between 18 November 1976 and 17 November 1977; or
2. The vessel was under construction for, or was being rerigged for, use in the directed fishery for surf clams on 17 November 1977. For the purpose of this paragraph, "under construction" means that the keel had been laid; "being rerigged" means physical alteration of the vessel or its gear had begun to transform the vessel into one capable of fishing commercially for surf clams; or
3. The vessel is replacing a vessel of substantially similar harvesting capacity which involuntarily left the surf clam fishery during the moratorium, and both the entering and replaced vessels are owned by the same person.

Any US vessel is eligible for a permit allowing it to harvest surf clams in the New England Area only or for a permit allowing it to harvest ocean quahogs only.

IV.D.2. Recordkeeping and reporting requirements

Any person who buys surf clams and ocean quahogs from a fishing vessel subject to the regulations must submit weekly and annual reports to NMFS. The owner or operator of any vessel conducting any fishing operations subject to the regulations must maintain, on board the vessel, a daily fishing log for each fishing trip and submit weekly and annual reports to NMFS.

IV.D.3. Catch quotas

The annual surf clam quota in the Mid-Atlantic Area is between 1.8 and 2.9 million bu. This quota is divided into equal quarterly quotas, the quarters being January-March, April-June, July-September, and October-December. Each fishing quarter begins on the first Sunday of the new calendar quarter. If the actual catch of surf clams in any one quarter falls more than 5,000 bu short of the specified quarterly quota, NMFS adds the amount of the shortfall to the succeeding quarterly quotas. If the actual catch of surf clams in any quarter exceeds the specified quarterly quota, NMFS subtracts the amount of the excess from the succeeding quarterly quotas.

The annual surf clam quota in the New England Area is between 25,000 and 100,000 bu.

The annual ocean quahog quota is between 4,000,000 and 6,000,000 bu. If necessary, NMFS may establish quarterly quotas for ocean quahogs, which will be based on historical fishing patterns. In the event that NMFS establishes quarterly quotas for ocean quahogs, if the actual catch of ocean quahogs falls more than 5,000 bu short of the specified quarterly quota, the amount of the shortfall is added to the succeeding quarterly quotas. If the actual catch of ocean quahogs in any quarter exceeds the specified quarterly quota, the amount of the excess is subtracted from the succeeding quarterly quotas.

IV.D.4. Effort restrictions

Surf clams - Mid-Atlantic Area. Fishing for surf clams may be authorized only during the period beginning 0001 hours Sunday and ending 1800 hours Thursday. The NMFS notifies each owner or operator of a fishing vessel engaged in the surf clam fishery in the Mid-Atlantic Area concerning the allowable combinations of fishing periods for varying levels of allowable fishing time. All fishing periods end at a uniform time specified by the Regional Director. The vessel owner or operator must send NMFS written notice of the owner or operator's selection of allowable surf clam fishing periods for that vessel. All selections must be provided to NMFS no less than 15 days prior to the intended effective date. The NMFS sends a letter of authorization to each owner or operator stating the periods during which the vessel is authorized to fish for surf clams. The letter of authorization must be kept aboard the vessel at all times. Fishing may be conducted only during the times and under those conditions authorized by NMFS in the letter of authorization. Fishing for any part of an authorized period is counted as one day of fishing. The NMFS may revise allowable fishing times (hours per week, hours per month, or hours per quarter) to allow fishing for surf clams to be conducted throughout the entire year with the minimum number of changes to fishing times.

During November, December, January, February, March, and April, fishermen may claim a make-up period if, in the opinion of the vessel operator, weather or sea conditions would prevent effective fishing or endanger the vessel or crew during the authorized fishing period. The make-up period equals in length the scheduled authorized fishing period and begins 24 hours after the scheduled beginning of the authorized period, except that if the make-up period could not then be completed before the end of the fishing week on Thursday at 1800 hours, then the make-up period begins on the following Sunday.

Surf clams - New England Area. Fishing for surf clams is allowed seven days per week. When 50% of the quota for surf clams for the New England Area has been caught, NMFS determines whether the total catch of surf clams during the remainder of the year will exceed the annual quota. If NMFS determines that the quota probably will be exceeded, NMFS may reduce the number of days per week, or establish authorized periods, during which fishing for surf clams is permitted.

Ocean Quahogs. Fishing for ocean quahogs is allowed seven days per week. When 50% of the quota for ocean quahogs for any time period has been caught, NMFS determines whether the total catch of ocean quahogs during the applicable time period will exceed the quota for that time period. If NMFS determines that the quota will be exceeded, NMFS may reduce the number of days during which fishing for ocean quahogs is allowed.

IV.D.5. Closed areas

Certain areas are closed to all surf clam and ocean quahog fishing because of adverse environmental conditions. These areas will remain closed until NOAA determines that the adverse environmental conditions have been corrected. If additional areas, due to the presence or introduction of hazardous materials or pollutants, are identified as being contaminated, they may be closed by notice published by NOAA after a public hearing is held to discuss and assess the effects of such a closure.

Areas may be closed to surf clam and ocean quahog fishing if it is determined that the area contains surf clams of which 60% or more are smaller than 4.5" in size and not more than 15% are larger than 5.5" in size. Such areas or parts of areas may be reopened if the average length of the dominant (in terms of weight) size class in the area to be reopened is 5.5" or more or the yield or rate of growth of the dominant size class in the area to be reopened would be significantly

enhanced through selective, controlled or limited harvest of surf clams in the area. The harvest of surf clams from reopened areas is controlled separate from the management of the general fishery until the catch per unit of effort in the reopened area is comparable to the average catch per unit of effort in the general fishery, at which time the reopened area becomes part of the general fishery.

IV.D.6. Size restriction

There is a surf clam minimum size limit. After consultation with the Council and opportunity for public comment, the Regional Director shall adjust, by increments no less than 0.25", the surf clam minimum size limit to a value less than 5.5" as necessary, so that discards on average do not exceed 30% of the trip catch. In no event shall the size limit be less than 4.75". When data indicate the clams have grown sufficiently, the limit would be increased, ultimately reaching the 5.5" limit. There is a tolerance of 240 undersized clams per cage but no more than 50 clams per cage under 4.75". If any cage is in violation of the size limit, the entire load is in violation. In adjusting the size limit the Regional Director shall consider current stock assessments, catch reports, and other relevant information concerning the size distribution of the surf clam resource. No person shall harvest or possess surf clams smaller than the minimum size limit.

All surf clam cages must be tagged before leaving the vessel and tags may not be removed until cages are emptied at the processing plant. All surf clams landed on an authorized FCZ fishing day are assumed to have been caught in the FCZ and are subject to the Federal size limit.

V. DESCRIPTION OF THE STOCKS

V.A. SURF CLAM DISTRIBUTION AND ABUNDANCE

Surf clams, Spisula solidissima, are distributed in western Atlantic waters from the southern Gulf of St. Lawrence to Cape Hatteras. Commercial concentrations are found primarily off New Jersey and the Delmarva Peninsula, although some fishable quantities exist in the Nantucket Shoals and Georges Bank areas. In the Mid-Atlantic region, surf clams are found from the beach zone to a depth of about 200'; beyond 130', however, abundance is low (USDC, 1984c).

The modern fishery for surf clams has been primarily prosecuted in the Middle Atlantic region and more recently off Southern New England, although the fishery had its beginnings on Cape Cod during the last century (Serchuk et al. 1979, Murawski and Serchuk 1981, 1983a, 1984a). Recent renewed interest in New England surf clam resources has been generated due to the restrictive management regime employed in the Middle Atlantic to rebuild the stocks. During 1983 over 100,000 bu of surf clams were landed from Nantucket Shoals, off the Southern New England coast. Additional exploratory fishing by the fleet during spring 1984 revealed a dense concentration of clams in the Cultivator Shoals area on the western side of Georges Bank. Although the presence of surf clams on Georges Bank has been documented in the past (Merrill and Ropes 1969), only recently have quantitative sampling efforts been conducted to assess resident stocks of surf clam and ocean quahog, Arctica islandica, in the area (Murawski and Serchuk 1983a).

Total surf clam landings have continued to increase from a 1979 low of 35 million lbs of shucked meats to 56 million lbs in 1983 (Table 1). Total 1983 landings rose 12% over the 1982 level and 60% since 1979 (Table 1). Landings from the FCZ increased 21% between 1979 and 1980 and 6% between 1980 and 1981, remained constant between 1981 and 1982, and increased 22% between 1982 and 1983, for a 55% increase over the last five years (Table 2). The proportion of total landings taken from the FCZ during 1983 was 80%, which is not significantly different from the 13 year (1971-1983) average of 81%.

Total landings of surf clams from the Georges Bank area fishery were about 400 thousand bu or 6.8 million lbs of meat from May to November 1984 (Murawski and Serchuk 1984b). This entire area is in the FCZ.

Research vessel surveys of the mid-Atlantic surf clam resource have been conducted since 1965. Commercial-type hydraulic clam dredges, modified to retain pre-recruit sizes, have been used as survey gear. Indices of abundance (number of clams per tow) are adjusted to reflect differences in

the dimensions of gear and operational procedures employed. Survey strata traditionally have been grouped into four sets corresponding to the geographical boundaries of the principal Mid-Atlantic FCZ surf clam fishery areas (Northern New Jersey, Southern New Jersey, Delmarva, and Southern Virginia - North Carolina; Figure 1). Limited research surveys of the surf clam resource in New England waters have also been conducted since the late 1960s (Murawski and Serchuk 1983a).

Dredging surveys performed by the Northeast Fisheries Center (NEFC) in New England waters during 1980-1983 were localized in the southern half of Georges Bank to evaluate ocean quahog abundance. Low-level sampling in the central and northern portions of Georges Bank confirmed the distribution of surf clams in these regions, although the survey data were not sufficient to perform a reliable stock assessment of the surf clam resource. The rapid development of the Georges Bank surf clam fishery during 1984 necessitated a direct research program to provide adequate information about the extent of the stocks to facilitate rational management of the fishery. During most of 1984, the Georges Bank surf clam fishery was conducted under authority of a research exemption which allowed the fishery to proceed without quota, effort, or clam size regulation but which required that participants collect biological data and conduct exploratory fishing (Murawski and Serchuk 1984b).

A research vessel survey of the Georges Bank area was conducted during 25 July - 1 August 1984 using standard clam surveying procedures (Murawski and Serchuk 1981, 1983b). A stratified random survey was initially designed for the Georges Bank area, with the number of stations allocated to individual survey strata (Figure 1) based on stratum area and on the expected spatial distribution of clams within each strata. Data from the exploratory fishery conducted prior to the survey were to be used in assigning the number of random stations to every survey stratum. However, due to the few numbers of 10' squares (Figure 2) actually explored by the fleet prior to the survey, previous survey and fishery logbook data had to be used to augment the limited exploratory fishing data to derive sampling intensities for the various survey strata. The Georges Bank surf clam resource proved particularly difficult to survey using standard procedures developed for the Middle Atlantic region. Shallow areas of the Bank (180 feet) are extremely irregular in bottom topography, and the diversity of substrate types is much greater than in the southern region (Figures 3 and 4). Much of the survey gear was damaged when attempting to maintain the random station scheme because of the ubiquitous distribution of rocks, cobbles, pebbles, boulders. Observations by NMFS personnel aboard commercial vessels and written comments in logbooks indicated that exploratory fishing operations also resulted in extensive gear loss in many of these areas. Accordingly, survey procedures were modified during the cruise to allow continuation of sampling without jeopardizing the dredge and major components of the survey gear. Time of tow was reduced from the standard five minutes to one-minute duration. Additionally, before the dredge was set at a particular location, an echo-sounding trace of the bottom was taken to assess the "hardness" of the substrate. Where bottom type was judged to be rocks, etc., the station location was abandoned and the vicinity searched for "towable" bottom.

Average catch per tow values varied considerably among survey strata (Table 3). Stratum 67 (the Cultivator Shoals region) exhibited the highest catch rate, and contained the largest clams of the strata sampled. Moderate densities of clams were apparent in Strata 65 and 72. Average catch rate (Table 4) for all research vessel survey data combined (1980-1984) were not substantially different from the 1984 data taken separately (Table 3).

A distribution plot (Figure 5) of all research vessel survey data indicates the high density area on Cultivator Shoals as well as intermittent large clam catches to the northeast. Another concentration of clams is indicated just east of Cultivator Shoals. These data are consistent with results of exploratory fishing operations conducted by commercial vessels (Figure 2). Although some surf clams are apparently distributed over a wide area on the Bank (Figure 5), fishable concentrations appear to be mostly confined to the northern portion of the Bank. The recently determined US-Canada boundary in the Georges Bank region is plotted along with the distribution of survey catches from the area. Although relatively little sampling was accomplished on the Canadian side, it is likely that little surf clam resource exists there due to the deeper water depths (generally greater than 180 feet) and coarse bottom topography (Figures 3 and 4).

V.B. GEORGES BANK AREA SURF CLAM RESOURCE

Size frequency distributions of clams sampled by the observers at sea and from landings exhibit a pronounced mode at 5.9-6.3 inches shell length (150-159 mm) in both data sets although the observer data showed smaller clams in the population (Table 5, Figure 6). Average shell sizes in both sets of samples were nearly equal. Average size clams caught in the research vessel survey was considerably smaller than in either interview or observer samples. This difference is partly reflective of the fact that commercial vessels concentrated on large clams on Cultivator Shoals, and the use of smaller dredge openings in the research vessel gear to retain pre-recruit sized clams. Ageing analyses performed on three commercial samples of Cultivator Shoals clams revealed that most individuals were nine years old (1975 year class). Mean shell length at age for this cohort (154 mm for age nine during July 1984) was nearly equal to that expected in Middle Atlantic populations (Murawski and Serchuk 1981; Table 6).

A total of 610 clams obtained from the research vessel survey of Georges Bank during 1984 were utilized in age/growth studies. Age analyses revealed 20 different age classes on the Bank, with the majority of clams in the 4 to 5 and 8 to 9-year old groups. Growth rates for shallow areas (less than about 180 feet) were similar to long-term growth rates exhibited by Middle Atlantic surf clam populations. Several areas along the northern portion of the Bank (mean depth 180 feet) exhibited distinctly slower growth rates than shallower areas. However, these areas exhibiting slower growth did not represent a large proportion of total clam biomass on the Bank. The length frequency and size at age of clams in the Mid-Atlantic Area were discussed in Amendment #5 (MAFMC, 1984).

V.C. NANTUCKET SHOALS AREA SURF CLAM RESOURCE

Between the late 1960s and 1983, NMFS performed 219 sample tows in the New England Area for surf clams (Murawski and Serchuk, 1983a). This area had been sampled less frequently in the past than the Mid-Atlantic because of rugged bottom topography, sporadic distribution of beds, and lack of commercial fishing interest. The surf clam resource according to these 219 sample tows was located in the Southern New England area at the periphery of Nantucket Shoals (Figure 7), which is also an area difficult to survey and fish. In general, surf clams in Southern New England waters were confined to depths less than 180' (55 meters). Few surf clams were found to occur in FCZ waters off Rhode Island and west of Martha's Vineyard, Massachusetts, as these areas were generally too deep. Clam densities were greatest in waters 30-90' deep. They were less dense in 90-180' depths surveyed on Nantucket Shoals.

Nantucket Shoals Area surf clams are large in comparison to the Mid-Atlantic catch, with an average size of about 6.5" and ranging from 5.75" to 7.5". This population is dominated by clams 7-10 years old with relatively poor recruitment during the last 5-6 years. Nantucket Shoals clams appear slightly faster growing than their Mid-Atlantic counterparts, and have meat yields which are slightly greater for similar sized clams (Murawski and Serchuk, 1983a).

A relative abundance index for surf clams in the Southern New England (Nantucket Shoals) region was computed from survey catch data and compared with other clam assessment areas in the Mid-Atlantic Bight. The Southern New England region accounts for approximately 23% of the area surveyed for clams. An estimated 5% of the total surf clam numbers and 10% of the total clam resource in weight occurred in the Southern New England region. A portion of the Southern New England clam resource occurs in waters too shallow for normal survey operations (less than 30'). To account for the non-surveyed portion of the resource, clam densities of adjacent areas were extrapolated for the non-surveyed area. However, when the non-surveyed portion was included, the proportion of total resource weight occurring in Southern New England increased only slightly (from 10 to 12.7%).

An assessment of potential yields from the Southern New England surf clam resource was not performed as a part of the stock assessment (Murawski and Serchuk, 1983a). However, an estimate of the total annual harvest from the Southern New England resource can be derived from resource survey data, assuming that management strategies in the two regions (Southern New England and Mid-Atlantic) are similar. The management strategy in the Mid-Atlantic is to spread the harvest of the standing stock of clams over an extended period so that each clam has a higher likelihood of numerous spawnings which increases the probability of successful year class recruitment and so

that quotas are reasonably consistent over time rather than fluctuating widely as year classes recruit and are fished out. If a similar harvest strategy were adopted for the Nantucket Shoals Area, then the annual quota should reflect the fact that about 10% of the total FCZ resource in weight (only 5% in numbers) occurs there. The OY in the Mid-Atlantic Area is 1.8 to 2.9 million bu, and a similar harvest strategy would allow 176,000 - 294,000 bu to be taken from the Nantucket Shoals Area.

The standard conversion for meat weight to bu is 17 lbs/bu for the Mid-Atlantic region. However, as reported in the assessment document, Southern New England surf clams yield substantially more meat than do similar sized clams in the Mid-Atlantic region (9 to 38% more, depending on clam size). Thus, assuming a greater meat weight/bu conversion for the Southern New England resource yields an annual landings figure of about 200,000 bu, if management strategies (harvest to biomass ratio) are equivalent in the two areas.

V.D. ESTIMATE OF SURF CLAM MAXIMUM SUSTAINABLE YIELD AND BIOMASS

The estimate of maximum sustainable yield (MSY) in the original FMP was 2.9 million bu (approximately 50 million lbs of shucked meats) over the range of the resource, which was based upon commercial landings from 1960-1976.

Although tremendous variability and uncertainty exists concerning the absolute size of the pre-recruit and recruited resources off New Jersey, Delmarva and Southern Virginia - North Carolina, it is probable that the strong 1976 and 1977 year classes can be shepherded through wise management to support the fishery for at least the next 10 years. This 10 year time frame has been selected to provide stability to the fishery rather than allow catch levels to rise and fall significantly as clams are fished out over time or recruit to the fishery.

Extrapolating the mean catch per tow indices developed from the August 1984 NMFS research survey yields a very rough estimate of 1.1 billion lbs of meats as a crude standing stock (Table 7). With the current estimates of landings, discards, discard associated mortalities and natural mortalities this crude (large year to year variability) standing stock estimate should be sufficient to support the current fishery for 10 - 12 years. This estimate is equivalent to those presented in Murawski and Serchuk (1984c) where they state "adequate surf clam resource currently exists to support the fishery at or near current levels (40-50 million lbs of meats per year) until the mid 1990s". (This also includes discards.) Murawski and Serchuk (1984a) did not calculate a total Mid-Atlantic standing stock estimate but rather compared the average biomass index (Figure 8) from the late 1960s (during years which the landings produced the MSY estimate) to the early 1980s.

The Mid-Atlantic standing stock estimate of clams greater than 5.5" derived from the August 1984 survey is roughly 340 million lbs (Table 7). This estimate increased slightly from the 320 million lb estimate that was developed from the 1982 survey and the 338 million lb estimate that was developed from the 1983 survey. While over 50 million lbs of meats were landed in 1983 (Table 1) large numbers of individuals from the 1976 and 1977 cohorts were becoming available to the fishery (Figure 9) and thus this increase is logical.

Based upon Murawski and Serchuk (1983a), about five percent of the total surf clam resource in numbers and ten percent in weight is found in the Nantucket Shoals Area. These percentages correspond to a maximum harvest quota of about 200,000 bu (4 million lbs of meat) per year. Although part of the Nantucket Shoals Area resource is located in areas that cannot be surveyed, accounting for the potential resource in these areas did not appreciably increase the proportion of total stock weight located off the Nantucket Shoals Area.

Murawski and Serchuk (1984b) assessed potential harvest quotas for Georges Bank, assuming the same management strategy (i.e., exploitation ratio) as for Middle Atlantic and Southern New England surf clam resources. The Georges Bank resource is about 7-13% as large as the Mid-Atlantic surf clam population. If the ratio of clam landings to survey biomass index is similar in all three areas (and thus the exploitation rate is approximately equivalent), then the appropriate Georges Bank catch quota would be approximately 250-300 thousand bu (4.3-5.1 million lbs of meats) per year. This strategy should result in stable catch levels for several years as the exploitation rate would likely be relatively low.

It is recognized that the MSY estimate and FMP Objective 1, which is based in part on the MSY estimate, should be evaluated in light of the improved data relative to the Nantucket Shoals and Georges Bank resources. The Council is developing a major amendment to the FMP that will include a comprehensive evaluation of the entire FMP, including the objectives. The OY ranges provided for as a result of Amendment #6 are based on the best information available. The sum of the maximum limits of the OYs exceeds the current MSY estimate, but this in itself does not constitute overfishing since MSY is a long term average yield so a problem would occur only if quotas were set at the maximum OY level on a long term basis. Additionally, the NEFC is planning extensive analyzes for the 1985 stock assessment which are to include new analyses of yield per recruit and MSY (Murawski, pers. comm.).

V.E. SURF CLAM PROBABLE FUTURE CONDITION

Results of 1984 NMFS biological assessments indicate that surf clam biomass off both Northern New Jersey and Delmarva has been increasing due to strong 1976 and 1977 year-classes off Northern New Jersey and Delmarva, respectively. The 1976 year-class off Northern New Jersey began to reach commercial size (5.5") in 1981 while the 1977 year-class off Delmarva began to reach that size in 1983 (Figure 9).

The Nantucket Shoals Area and Georges Bank surf clam resources are well represented by a wide range of age groups in comparison to the Mid-Atlantic, which is dominated by strong year classes. The resources in these two New England areas are apparently only a small fraction of the size of the Middle Atlantic resource (Murawski and Serchuk 1984b). If the same management strategy is assumed for the Nantucket Shoals Area and Georges Bank that is used in the Mid-Atlantic, the strategy should result in stable catch levels for several years.

VI. DESCRIPTION OF HABITAT

There is no need to amend this section at this time.

VII. FISHERY MANAGEMENT JURISDICTION, LAWS, AND POLICIES

Current surf clam minimum size limits for States involved in the surf clam fishery are: Massachusetts - 5", Rhode Island - 5.5", New York - 4", New Jersey - none, Maryland - 5.5", and Virginia - 5.5".

VIII. DESCRIPTION OF FISHING ACTIVITIES

VIII.A. DOMESTIC FISHING ACTIVITY

VIII.A.1. Total Landings

In 1950, 8 million lbs of surf clam meats were landed, with New York and New Jersey ports accounting for 97% of the total (Table 1). The Maryland fishery developed in the early 1950s, but New Jersey dominated the fishery until the early 1970s. Significant Virginia landings first occurred in 1972 when that state accounted for 37% of the total 64 million lbs landed. Since that time, New Jersey, Maryland, and Virginia have been the major harvesting states, although the share of total landings for each state changed from year to year (Table 1). There have been landings in New England throughout the period since 1950, although landings have been small relative to the total fishery, in most years amounting to less than 0.5% of the total, with a peak of 7% in 1983 (Table 1).

The surf clam fleet typically concentrates its efforts in one area until the catch rates decline, and then moves to more productive grounds. Decreasing abundance of surf clams off New Jersey and discovery of large beds off Virginia resulted in a shift of effort to the latter area in the early 1970s. The introduction of mechanical shucking devices around 1970 greatly increased the capacity of processing plants. These devices, coupled with the expansion of the fishing grounds, are the major reasons for most of the industry's growth after 1970.

Surf clam landings peaked at approximately 96 million lbs in 1974, about 2.5 times the weight landed only a decade earlier (Table 1). After 1974, landings began to decline rapidly and, except

for 1977, declined continuously to a low of 35 million lbs in 1979. The FMP was implemented in November, 1977, and the slight increase (Table 1) in total surf clam landings that year, to about 52 million lbs, was due at least in part to greatly increased effort by the industry. There was a significant increase in the number of vessels which entered the fishery that year in anticipation of the stringent quota management and the vessel moratorium to be imposed by the FMP. Total landings increased 9% between 1979 and 1980, 21% between 1980 and 1981, 9% between 1981 and 1982, and 12% between 1982 and 1983, to a 1983 level of 56 million lbs, 60% more than 1979 (Table 1).

Surf clam landings by quarter (Figure 10) have shown a fairly steady increase since the low of the fourth quarter of 1979/first quarter of 1980. The first three quarters of 1984 yielded the three highest quarterly landings since 1975 when 87 million lbs of meats were landed (Table 1). The 10 year landings average of surf clams during the second quarter (823,462 bu) was the highest, while the fourth quarter averaged 686,783 bu from 1975-1983 and was the lowest quarterly average. Both the first and third quarters for the 10 year (1975-1984) period averaged slightly more than three quarters of a million bu. The large amount of variability which existed among years during the quarters prevented the detection of significant differences between quarterly averages.

Total surf clam and ocean quahog landings more than doubled between 1967 and 1974, from 45 to 97 million lbs of meats (Table 2), with ocean quahogs contributing about 1 million lbs to the 1974 total. Landings dropped rapidly to about 55 million lbs in 1976, with quahogs contributing almost 6 million lbs. Since then landings have generally increased, although there have been year-to-year fluctuations. Landings in 1983 were approximately 91 million lbs, a 7% increase from the 1982 level.

The ocean quahog fishery was traditionally a small industry operated out of Rhode Island ports, with annual landings through 1975 amounting to 200,000 bu or less. Total quahog landings increased from 600,000 bu in 1976 to 3.5 million bu in 1979, and remained at about that level through 1983 (Table 2). The development of the fishery is attributable to advances in ocean quahog processing technology, the relatively high value of surf clams, the strong demand for clam/quahog meats, the effects of surf clam quota management, and the excess harvesting capacity of the Mid-Atlantic surf clam fleet.

The ocean quahog share of the total clam meat supply has increased significantly, from less than 1% in 1967, 4% or less between 1968 and 1975, 11% in 1976, 26% in 1977, 37% in 1978, 50% in 1979, 47% in 1980, 44% in 1981, 41% in 1982, and 38% in 1983. The significant increases in the ocean quahog share of total landings in the late 1970s came during a period of decreased surf clam landings (Table 2). When surf clam landings began to recover in 1980, the ocean quahog share decreased, but the amount of meats remained stable.

VIII.A.2. FCZ Landings

FCZ surf clam landings in 1981 and 1982 were approximately 37 million lbs, half of the peak 1974 level and 93% of the 40 million lbs 1982 quota. FCZ landings for 1983 were 45 million lbs relative to a quota of 41.7 million lbs. Landings from the FCZ increased 21% between 1979 and 1980 and 6% between 1980 and 1981, remained constant between 1981 and 1982, and increased 22% between 1982 and 1983, for a 55% increase over the last five years (Table 2). The proportion of total landings taken from the FCZ during 1983 was 80%, which is not significantly different from the 13 year (1971-1983) average of 81%. Reported preliminary Mid-Atlantic FCZ landings for 1984 total about 2.55 million bu.

Annual New England surf clam landings were less than 500,000 lbs between 1950 and 1976 and 1 million lbs between 1977 and 1981 (Table 1). In 1982 landings increased to 3 million lbs, or 6% of total landings. In 1983, 2.5 million lbs were harvested from the FCZ during the first half of the year, which prompted a closure of the New England Area for the remainder of the year. New England reported FCZ landings for 1984 were 65,000 bu. excluding the 400,000 bu landed from Georges Bank. All of the clams landed from Georges Bank came from the FCZ.

From May to November 1984, about 6.8 million lbs of meats (400,000 bu) of surf clams were landed from the Cultivator Shoals area of Georges Bank (Murawski and Serchuk, 1984b). Most landings

were derived from one 10' square (Figure 2) on the western portion of the Bank. However, during late August-September an additional high density area was exploited by several vessels.

The FCZ ocean quahog fishery began in New Jersey in 1976 (400,000 bu) and grew rapidly until 1979 (3.2 million bu, Table 2). During the last five years landings have been quite stable, accounting for 97% of the total quahog catch in 1983. However, landings began increasing in 1984 with a preliminary estimate of slightly over 4 million bu landed.

VIII.A.3. Surf Clam Vessel Performance

Total reported (logbooks) Mid-Atlantic FCZ landings for 1983 were about 2.3 million bu (equal to the annual quota), with yearly estimates of 1.7, 1.9, 2.0, and 2.0 million bu in 1979, 1980, 1981, and 1982, respectively (Table 8). Average annual catch per vessel was about 10,000 bu in 1979, 15,000 bu in 1980, 16,000 bu in 1981, 18,000 bu in 1982, and 21,000 bu in 1983.

Average annual catch per vessel in the FCZ peaked in January 1984 for Class 1 (Figure 11) and Class 2 (Figure 12). The peak for Class 3 vessels occurred in August 1983 (Figure 13) with January 1984 being the second highest catch in bu/vessel. Class 1 are vessels less than 50 Gross Registered Tons (GRT), Class 2 50-100 GRT, and Class 3 greater than 100 GRT.

Average annual Mid-Atlantic surf clam vessel catch per unit of effort (CPUE) increased from 1979 through 1981, decreased in 1982, and increased in 1983 (Table 8). Average CPUE was 26 bu/hr in 1979, 32 bu/hr in 1980, 48 bu/hr in 1981, 36 bu/hr in 1982, and 48 bu/hr in 1983. The increase in 1981 was due to catches dominated by small clams from the relatively strong 1976 and 1977 year classes off New Jersey and Delmarva, respectively. These small clams were targeted because of their very high abundance; traditionally, however, the fishery targeted on clams at least as large as the current minimum size limit. In 1982, CPUE decreased after implementation of the 5.5" minimum surf clam size limit effective 26 July 1981. In 1983 it returned to the 1981 level because of increased availability of harvestable clams due to growth of the 1976 and 1977 dominant year classes even though many clams were sublegal (5.0-5.5") when harvested.

A total of at least 17 different vessels participated in the Georges Bank fishery through October 1984. Most of the vessels (82%) were Class 3, the remainder were Class 2. Fifteen of the 17 participating vessels listed Middle Atlantic locations as home port (Murawski and Serchuk, 1984b). The two New England vessels that filed logbooks for Georges Bank fishing had permits to fish only the New England Area.

Georges Bank average catch rate (bu per hour fished) declined sharply after June (Table 9) possibly indicating decreased clam abundance in the Cultivator Shoals area (where virtually all landings through mid-August were derived). However, these data should be interpreted cautiously since various vessels participated in the fishery at different times during the year. Several of the largest vessels that fished heavily during June and early July did not fish during the second half of July and early August. Thus, the data are likely confounded by vessel fishing power differences. Nevertheless, the apparent drop in CPUE is striking, particularly since most of the catch and effort was by Class 3 vessels.

Average CPUE for the Georges Bank fishery during 1984 was 121 bu per hour (Table 9). This rate is more than double the average CPUE value for the Class 3 fleet in the Middle Atlantic region during 1983 (56 bu/hour). However, the Middle Atlantic landings were subject to a minimum clam size for landings, which generally required extensive culling of the catch. The CPUE for Class 3 vessels in the Mid-Atlantic increased substantially during 1984 as increasing proportions of small clams were landed. Average CPUE for Class 3 vessels in the Mid-Atlantic region during the third quarter of 1984 was 91 bu/hour, only 25% less than the 1984 Georges Bank average (Murawski and Serchuk, 1984b).

According to logbook data, in 1983 twelve (11 Class 3) vessels landed nearly 88,000 bu (1.5 million lbs of meats) of surf clams from the Nantucket Shoals Area. Four reporting vessels listed New England ports as their homeport, two of which were permitted to fish only in the New England Area.

In 1984, ten vessels (7 Class 3) landed nearly 65,000 bu (1.1 million lbs) of surf clams from the Nantucket Shoals Area. Half of the vessels had New England homeports and, as in 1983, only two were permitted to fish only in the New England Area.

The CPUE of all 12 vessels in 1983 that fished the Nantucket Shoals Area was 91 bu/hr. The CPUE for the 10 vessels in 1984 fell to 38 bu/hr. Comparison of CPUE between equivalent vessel classes is prohibited due to the small sample sizes and data confidentiality.

The CPUE in the Mid-Atlantic area has changed differently for each of the three vessel classes (Table 8). For Class 1 vessels, CPUE was 17 bu/hr in 1979, 21 bu/hr in 1980, 22 bu/hr in 1981, 19 bu/hr in 1982, and 28 bu/hr in 1983. Class 2 CPUE was 19 bu/hr, 24 bu/hr, 38 bu/hr, 27 bu/hr, and 41 bu/hr in 1979-1983, respectively. Class 3 CPUE was 31 bu/hr, 38 bu/hr, 55 bu/hr, 43 bu/hr, and 56 bu/hr in 1979-1983, respectively.

The CPUE by all three classes of vessels has shown a steady increase in the past few years (Figures 14, 15, and 16). Both Class 1 and Class 3 vessels CPUE peaked in the last month (October 1984) for which data are available. Class 2 vessel CPUE peaked in August 1984, with the second highest CPUE in October 1984. These tremendous recent increases in CPUE are attributable to the increased percentages (Figure 9) of larger clams (growth), landings of sublegal clams, and the decrease in the legal minimum size (5.5" to 5.25"; 49 FR 40580).

Relative fishing power (catch per vessel by class divided by Class 1 catch per vessel) was 1.0, 1.7, and 3.9 for Classes 1, 2, and 3, respectively, in 1979, 1.0, 1.8, and 3.6 in 1980, 1.0, 2.5, and 5.2 in 1981, 1.0, 1.7, and 3.7 in 1982, and 1.0, 1.8, and 3.2 in 1983. Relative CPUE (CPUE by class divided by CPUE for Class 1) was 1.0, 1.1, and 1.3 for Classes 1, 2, and 3, respectively, in 1979, 1.0, 1.1, and 1.8 in 1980, 1.0, 1.7, and 2.5 in 1981, 1.0, 1.4, and 2.3 in 1982, and 1.0, 1.4, and 2.0 in 1983 (Table 8).

In summary, the shifts in CPUE in the Mid-Atlantic area and relative fishing power are most likely attributable to an increase in the surf clam resource, mostly made up of smaller clams, between 1979 and 1981, tempered with the imposition of the minimum size limit in mid-1981. Following implementation of the size limit, fishing practices changed because most of the clams in the largest year classes were sublegal, leading to culling or searching for beds of legal clams, all of which apparently reduced the effectiveness of the larger vessels relative to the smaller vessels. By 1983, the growth of the clams as well as reported landing of sublegal clams, pushed CPUE back to about the 1981 level with 1984 CPUE far outstripping any previous performances.

VIII.A.4. Ocean Quahog Vessel Performance

Ocean quahog vessels are divided into two classes for purposes of analysis: Class A (100 GRT or less) and Class B (larger than 100 GRT). This breakdown is necessary because there are so few Class 1 (0-50 GRT) ocean quahog vessels publishing the data using the surf clam classes would violate confidentiality rules.

Most of the ocean quahog vessels are Class B (39 of 58 in 1979, 36 of 53 in 1980, 39 of 48 in 1981, 34 of 44 in 1982, and 30 of 37 in 1983). These vessels account for the vast majority of the ocean quahog catch. The relative fishing power (bu/hr for Class B divided by bu/hr for Class A) was 3.3, 5.8, 3.9, 5.7, and 5.1 in 1979, 1980, 1981, 1982, and 1983, respectively (Table 10).

The number of active ocean quahog vessels declined from 58 in 1979 to 37 in 1983, while the catch was about 3 million bu annually throughout the period (Table 10). The hours that each vessel fished on average increased consistently from 437 in 1979 to 619 in 1983. Average CPUE was 119 bu/hr in 1979, 115 bu/hr in 1980, 122 bu/hr in 1981, 135 bu/hr in 1982, and 139 bu/hr in 1983.

On a quarterly basis, ocean quahog landings (Figure 17) have exhibited no consistent trend since 1979.

VIII.A.5. Vessel Data

There have been significant changes to the Mid-Atlantic surf clam fleet over time. In 1965 there

were 68 vessels; 33 Class 1, 33 Class 2, and 2 Class 3 (Table 11). Fleet size increased rapidly in the mid-1970s, to 122 vessels in 1976, 155 in 1977, 157 in 1978, and a peak of 165 in 1979. From that level, the number of vessels that landed surf clams (based on logbook reports) decreased by 22% to 128 vessels in 1980, by 5% to 122 vessels in 1981, by 7% to 114 vessels in 1982, and by 1% to 113 vessels in 1983 (13 Class 1, 43 Class 2, and 57 Class 3).

The composition of the Mid-Atlantic fleet has also changed. In 1965 48% of the vessels were Class 1, 48% Class 2, and 3% Class 3. In 1978 the distribution was 13% Class 1, 37% Class 2, and 50% Class 3. The 1983 distribution was 12% Class 1, 38% Class 2, and 50% Class 3 (Table 11).

The number of active surf clam vessels in the Mid-Atlantic area has been fairly steady during this decade (Figure 18). Generally between 75 and 90 vessels in any one month land surf clams. Over the last several years about 10 Class 1 vessels fished monthly (Figure 19), between 25 and 35 Class 2 vessels generally fished (Figure 20), and around 30 to 40 Class 3 vessels fished monthly (Figure 21). There appears to be a consistent downward trend from January through September 1984 among active Class 3 vessels. Although October (the last month for which data are available) may have discontinued this downward trend, there is no readily apparent explanation for it.

The physical characteristics of Mid-Atlantic surf clam vessels vary greatly (Table 12). In 1979 the tonnage per vessel ranged from 6 to 306 tons, with an average of 112 tons. Vessel length ranged from 28' to 146', with an average of 79'. The horsepower of the surf clam vessels ranged from 60 to 1,330 with an average of 389. Crew size ranged from 1 to 11 men, with an average of 4. Dredge size ranged from 16" to 240" with an average length of 90" (Table 12). The characteristics of the fleet did not change significantly during the period 1979-1983 except for dredge size, horsepower, and crew size (Table 12). Average dredge size increased from 90" to 108". Average horsepower increased from 389 to 560, although the maximum decreased to 1,000. Crew size changed from a range of 1-11, average 4, to a range of 2-6, average 5.

There are significant differences between the number of vessels that are permitted and the number of active vessels. As of 31 December 1983, 148 vessels had permits for surf clams and ocean quahogs for the Mid-Atlantic Area, 156 vessels had permits to fish for ocean quahogs only, and 362 vessels were permitted for the surf clam fishery in the New England Area (Table 13). The Mid-Atlantic Area surf clam and ocean quahog permits are accounted for primarily by vessels from New Jersey (44%), Maryland (27%), and Virginia (14%). The ocean quahog only permits are held primarily by vessels from Massachusetts (46%) and Maine (23%). The New England Area only surf clam permits have been issued primarily to vessels from Massachusetts (58%), Maine (15%), and Rhode Island (10%).

It is extremely difficult to describe the New England fleet since only 4 vessels in 1983 and 5 vessels in 1984 homeported in New England filed logbooks as having fished in the Nantucket Shoals Area. Two of those vessels in 1983 and 3 in 1984 had permits to fish in both the New England and Mid-Atlantic Areas (i.e., permits issued under the moratorium).

VIII.A.6. Fishing Trips

Another measure of fishing activity is the number of trips vessels make. As noted above, the number of vessels involved in the Mid-Atlantic Area surf clam fishery has been declining on an average annual basis (Table 11). However, if quarterly data are examined (Table 14), a more precise picture of the active fleet develops.

For example, during 1979, 112 vessels landed Mid-Atlantic Area surf clams at some time during the year. However, the number of vessels active during any quarter ranged from 82 to 97. For 1983, the annual count was 86, while the quarterly range was 71-82 (Table 14).

If vessels that land both Mid-Atlantic Area surf clams and ocean quahogs are added to the vessels landing only Mid-Atlantic Area surf clams, the 1979 fleet was 162 active vessels, with a quarterly range of 106-129 and the 1983 fleet was 113 with a quarterly range of 78-95 (Table 14).

Clearly, the number of active vessels changes on a monthly and quarterly basis, suggesting that at least some vessels fish only part of the year. In fact, many of the vessels fish only part of the year

(Table 15).

Logbook data for 1983 indicate that 38% of the Class 1, 22% of the Class 2, and 6% of the Class 3 vessels fishing for only Mid-Atlantic Area surf clams made between 1 and 10 trips (Table 15). All of the Class 1 vessels made 60 or fewer trips. The Class 2 vessels made 90 or fewer trips and the Class 3 vessels made 100 or fewer trips. The mean number of trips was 28 for Class 1, 39 for Class 2, and 54 of Class 3. The median number of trips (half the vessels made more and half less) was 28 for Class 1, 40 for Class 2, and 61 for Class 3, with the maximum number of trips for any vessel 52, 95, and 93 for Classes 1, 2, and 3, respectively. Remember that during 1983 the Mid-Atlantic Area surf clam fishery was restricted to 24 hours per week, which amounts to two 12 hour trips, or essentially a maximum of 104 allowable trips for the year.

For Class 3 vessels fishing only for ocean quahogs (there are not enough Class 1 and 2 vessels in the fishery to analyze), the average number of trips was 95, the peak was 131, and the median was 107 (Table 15).

Class 3 vessels fishing for both Mid-Atlantic Area surf clams and ocean quahogs on average made 96 trips, with a maximum of 160 and a median of 93 (12%) made 60 or fewer trips (Table 15).

Mid-Atlantic Area surf clam fishing is restricted to Sunday through Thursday. During 1984, Monday and Tuesday each accounted for 24% of the trips, with 21% on Wednesday, 19% on Sunday, and 12% on Thursday (Table 16).

While the above discussion presents only a summary of the data contained in the referenced tables, it is clear that only a portion of the permitted fleet is actually fishing and the vessels that are fishing are generally fishing only part time, both in terms of trips and hours.

VIII.A.7. Surf Clam Fishing Time

Surf clam fishing effort in the Mid-Atlantic Area is regulated by adjusting the number of hours per week that vessels are permitted to fish. Between 1 January 1978 and 31 December 1984, allowable times ranged from 0 (closure) to 96 hours per week (Table 17), but these extremes have been the exception. There have been only five closures, one for 3 weeks and one for 1 week in 1978 and two for two weeks and one for one week in 1984. The 96 hours per week period lasted for only 4 weeks (in 1978). Monthly analyses show the same pattern (Figure 22) with the rule averaging about 100 hours and the exceptions being the summer of 1980 and 1984.

During the period 1 January 1978 through 31 December 1984, of the total 364 weeks, 233 (64%) were at 24 hours per week, 57 (16%) were at 12 hours per week, 30 (8%) were at 36 hours per week, 26 (7%) were at 48 hours per week, 9 (2%) were accounted for by closures, 4 (1%) were at 96 hours per week, 4 (1%) were at 6 hours per two weeks, and 1 week was at 6 hours (Table 18).

There were 9,006 hours of fishing possible from 1 January 1978 through 31 December 1984, 62% of it in periods of 24 hours per week, 14% in periods of 48 hours per week, 12% in periods of 36 hours per week, 8% in periods of 12 hours per week, 4% in periods of 96 hours per week and the other two periods (6 hours per two weeks and 6 hours per week) accounted for less than 1% of the time (Table 19).

Allowable fishing hours have changed from 1,752 hours in 1978 to 1,440 hours in 1979 (-18%), to 1,728 hours in 1980 (+20%), to 972 hours in 1981 (-44%), to 1,248 hours (+28%) in 1982 and 1983 to 618 hours in 1984 (-50%). There has also been a decrease in the time periods (i.e., hours per week) during which fishing is allowed. In 1978, 40% of the hours were at 24 hours per week, 30% at 48 hours per week, 22% at 96 hours per week, and 8% at 36 hours per week. In 1979 allowable fishing hours were split between 24 hours per week (60%) and 36 hours per week (40%). In 1980, 42% of the time was at 48 hours per week, 38% at 24 hours per week, and 21% at 36 hours per week. During 1981 allowable hours decreased significantly to 72% at 24 hours per week and 28% at 12 hours per week. For 1982 there was an increase to 100% at 24 hours per week (Table 19). The rate continued at 24 hours per week through all of 1983, but was cut to 12 hours per week on 26 February 1984 and then decreased further several more times in 1984 (Table 17).

The reduction of allowed time to 12 hours per week on 26 February did not reduce catch rates enough to eliminate the need to close the fishery for two weeks beginning 24 June 1984. It is useful to examine catch relative to time to understand the situation in 1984. When the fishery was reduced to 12 hours per week, 17% of the year had elapsed with 26% of the surf clam quota taken (17% of the quahog quota taken). When 17% of 1983 had gone by, 12% of the surf clam and 9% of the quahog quotas had been caught. By the time 42% of 1984 had lapsed (1 June), 52% of the surf clam and 40% of the quahog quotas had been taken (at 50% of 1983, the catch was 40% and 37% of the surf clam and quahog quotas, respectively). Even with the severe effort restrictions imposed during 1984 the preliminary logbook reports show the quota exceeded for both surf clams and ocean quahogs.

Although there was a 50% decrease in the numbers of hours available for fishing between 1983 and 1984, there was no tremendous increase in the percent of the hours used. Class 1 vessels used slightly higher percentages (75-85%) during June, July and August 1984 than they had during the previous five years (Figure 23) but the other months of 1984 were quite comparable to the previous years. Overall, Class 2 vessels (Figure 24) appeared to have used a slightly higher percentage of time during 1984 than previously, but Class 3 vessels (the most numerous) continued a fairly variable monthly rate (Figure 25). Of course, the actual hours/vessel spent fishing for each class (Figures 26, 27 and 28) dropped appreciably during 1984.

Allowed fishing times must be considered in the context of permitted vessels relative to vessels that actually fished. In 1984 there were 145 vessels permitted for the surf clam fishery in the Mid-Atlantic Area and 618 hours allowed per vessel, for a potential total of 89,610 hours, of which only 27,394 hours (31% of the total) were used, based on logbook reports. In 1985 (through the first week of March), there were 54 hours allowed for each of the 145 permitted vessels, for a potential total of 7,830 hours, whereas 2,966 hours (38% of the total) were actually used. However, during the period covered in 1985, the vessels that actually fished in most weeks used more than 90% of their allowed hours.

Ever since the New England Area was created, the FMP has provided for a possible imposition of effort limitations in that Area. That provision was not used until 1 April 1983, when effort was reduced to 12 hours per week. The fishery was closed on 1 July 1983 because the catch reached 114,000 bu as of 1 June 1983 against a quota of 100,000 bu.

VIII.B. FOREIGN FISHING ACTIVITY

The surf clam and ocean quahog fisheries are domestic fisheries only.

VIII.C. INTERACTION BETWEEN DOMESTIC AND FOREIGN PARTICIPANTS IN THE FISHERY

There are no records of foreign (including Canadian) catches of either species in the northwest Atlantic.

IX. DESCRIPTION OF ECONOMIC CHARACTERISTICS OF THE FISHERY

IX.A. DOMESTIC HARVESTING SECTOR

IX.A.1. Surf Clam Ex-vessel Value and Price

Surf clam ex-vessel value for the period 1950-1983 (Table 20), moving in a pattern consistent with landings and available biomass, peaked at approximately \$27 million in 1977, declined consistently to a 1980 level of approximately \$19 million, and increased to approximately \$23 million in 1981, \$26 million in 1982, and \$25 million in 1983. On a state by state basis, value has moved in a pattern similar to landings, with total 1983 value shared primarily by New Jersey (40%), Maryland (12%), and Virginia (32%).

The ex-vessel value of the surf clam catch in current dollars, both total and in the FCZ, more than doubled between 1974 and 1977 and has since remained fairly stable (Table 21). The FCZ has consistently accounted for a greater share of the value than of landings: 83% of the value and 77% of landings in 1974; 81% of the value and 74% of landings in 1982, and 84% of the value and 80% of

the landings in 1983.

Surf clam ex-vessel value, when adjusted for inflation, was \$8 million in 1974. It peaked at \$14 million in 1977, then declined to a low of \$7 million in 1980. In 1981, 1982, and 1983 it was \$8 million. FCZ value was approximately \$6 million in 1974 and \$7 million in 1979-1983 (Table 21).

Surf clam price per pound (adjusted for inflation) remained fairly stable from 1950-1975, ranging between \$.07 and \$.14 (Table 22). In 1976 it increased to \$.26 and peaked in 1977 at \$.27, from which it has declined steadily to \$.15 in 1983 and \$.14 for the first quarter of 1984. FCZ deflated prices have moved in the same pattern as total prices, but have generally been slightly higher (\$.19/lb in 1980, 1981, and 1982 and \$.16 in 1983).

Quarterly analyses of surf clam price per bushel (Figure 29) shows a slight but somewhat steady decline from the peak during the second quarter of 1978 in terms of nominal dollars. Price in deflated dollars has been slightly decreasing since the third and fourth quarter peaks of 1977.

Average gross revenues (adjusted for inflation) show an upward trend during the last 5 years for the FCZ surf clam fleet (Table 23). For the total FCZ surf clam fleet, the average was \$43,000 in 1979, \$48,000 in 1980, \$52,000 in 1981, \$57,000 in 1982, and \$56,000 in 1983. The average for Class 1 vessels (under 50 Gross Registered Tons) increased 20% between 1979 and 1980, declined 22% between 1980 and 1981, increased 50% between 1981 and 1982, and increased 10% between 1982 and 1983. Class 2 vessels (50-100 GRT) changed +18%, +6%, +3%, and +17% for the same years. The changes for Class 3 vessels (greater than 100 GRT) were +6%, +9%, +10%, and -8%, respectively.

IX.A.2. Ocean Quahog Ex-vessel Value and Price

Ocean quahog ex-vessel value (Table 24), in current dollars, moving in a pattern consistent with landings, was less than \$500,000 for 1967 through 1975. It then increased to \$2 million in 1976, \$6 million in 1977, \$7 million in 1978, \$10 million in 1979 through 1981 and \$11 million in 1982 and 1983. The FCZ share increased from 77% when the fishery began in 1976 to 98% in 1981 and 1982, and 95% in 1983 (Table 24). There has been little change in deflated value since 1979.

Price per pound, adjusted for inflation, fell from a 1976 and 1977 high of \$.16 to \$.10 in 1981-1983 (Table 25). It remained at \$.10 for the first quarter of 1984. Ocean quahog price has been remarkably stable (nominal dollars) at about \$3.00 per bu since 1977 (Figure 30). Deflated price has been steadily decreasing slightly since 1977, however.

IX.A.3. Market Indicators

To analyze the supply and demand for surf clams and ocean quahogs, three sets of indicators were developed: those which are primarily supply related (Table 26), those which are primarily demand related (Table 27), and those reflective of the interactions of supply and demand (Table 28). A review of these indicators leads to the conclusion that demand is expanding relative to supply.

Basic supply or production indicators are: available biomass, availability of clams greater than 5.5", the number of vessels fishing, their combined effort, their CPUE, and the cost of fishing. All of these indicators except the cost of fishing have been previously discussed. There is no new major recruitment to the biomass at this time while the proportion of 5.5" clams, which dramatically decreased in the past (after 1974), is slowly showing some signs of increasing (Figure 8). Also discussed previously was the rise and subsequent decline in the number of vessels fishing for surf clams with the corresponding increase in the average size of the active vessel. These vessels are currently fishing less than 12 hours a week and do not fish all of their allowed fishing time.

The only supply indicator not previously discussed is unit vessel costs. Vessel costs over time are not available. However, one of the most significant components of vessel cost is fuel. Fuel costs range from 11-17% of a vessel's operating costs (MAFMC, 1981). Since catch rates have been increasing (Table 8), the average cost of harvesting a bu of surf clams must be declining. In 1979, the average Class 3 vessel fished 2.7 hours to catch 100 bu of clams. In 1983 it took the average

Class 3 vessel only 1.4 hours to catch 100 bu of clams. Fewer hours needed to fish imply lower fuel costs. Furthermore, over the past few years the deflated price of fuel has been decreasing after reaching a peak in 1981 (Figure 32). (For reference purposes, Figure 31 shows the trend in inflation. It takes approximately \$3 in 1983 to purchase what it took \$1 to purchase in 1965-1967.) Vessel operating costs should also be reduced as catch rates increase and regulated hours decrease for less maintenance will be required. Fewer hours fished imply fewer vessel breakdowns and less need for routine overhaul. Maintenance costs range from 33-50% of a vessel's operating costs (MAFMC, 1981).

In summation, not only are fuel costs and maintenance costs declining because there is less fishing time required to harvest a fixed amount of bushels, but additionally, fuel costs are declining because of a reduction in the price of fuel.

Two groups of demand indicators were developed. The first set of indicators primarily reflects the overall market for edible fish and shellfish. As the overall market increases, so should surf clam and ocean quahog demand. The second group of demand indicators reflects the prices of possible competing products for surf clams and ocean quahogs. Both groups of indicators imply a growing demand for surf clam and ocean quahog products.

The overall demand for edible fish and shellfish products has been increasing. Average per capita consumption of fish and shellfish has increased from 10.8 lbs in 1965 to 12.9 lbs in 1983 (Figure 33). The population has grown 21% since 1965 from 192 to 232 million in 1983 (Figure 34). Consumer after-tax disposable incomes have grown 47% since 1965 in 1972 dollars (29% in 1967 dollars, Figure 35) while their expenditures at retail eating and drinking establishments have increased 50% since 1965 (Figure 36). These expenditures seem to be rising as a percentage of disposable income.

These indicators show that the overall market for all fish and shellfish products is expanding. There are more potential consumers with increasing incomes that are spending more in retail eating and drinking establishments, major outlets for processed fish and shellfish (especially surf clams), while in general consuming more fish and shellfish in their diets.

The second set of demand indicators consists of the unit prices of potential competing products such as the retail price of canned and semi-prepared soups; the prices of canned shrimp and breaded shrimp; and the ex-vessel prices of sea scallops, shrimp, finfish, and hard clams. All of these products can be found with surf clam and ocean quahog products on many restaurant menus or along side surf clam and ocean quahog products on grocery market shelves. They are correspondingly substitutes for clam chowder and juices, breaded clam strips, and canned minced and whole clams. These products show, in current prices, rising trends from 1967 to 1981 (Figure 37). However, in 1982 and 1983, the prices of minced and canned clams declined sharply, probably due to the increased landing of surf clams in general, as well as the increase in small clam landings. Strip clam prices for 1983 are not available, but it is likely, with the decline in large clam availability in 1983, that it will have exceeded the 1983 minced and whole clam price.

The price of breaded shrimp has increased remarkably since the mid-1970s, increasing at a faster rate than the price of breaded clams (Figure 38). This is also true of the retail soup price index relative to the price of clam chowder and juices (Figure 39). While the price of canned shrimp has also increased remarkably, for the last three years canned and minced clam prices have declined. Again, this is primarily due to the recent increased landings of small clams. In all of these instances indications are that the prices of competing products are relatively higher than surf clam and ocean quahog product prices. Higher relative prices imply that consumers will more likely switch from the higher priced products to the lower priced products. Therefore, the demand for surf clam and ocean quahog products is increasing. A similar conclusion is reached if surf clam ex-vessel prices are compared to the ex-vessel prices of sea scallops, hard clams, gulf shrimp, summer flounder, and cod (Figure 40).

The final set of indicators are surf clam ex-vessel prices and revenues, ocean quahog prices and revenues, and total clam supply. These indicators are simultaneously reflective of supply and demand. Prices, and thus revenues, reflect situations where quantity demanded equals quantity supplied. The total clam supply shows not only the production levels of surf clams, but the availability of competing clam products as well. Surf clam and ocean quahog prices and revenues

have been previously discussed. In deflated terms, surf clam and ocean quahog prices show a decreasing trend since 1978 (Figures 29 and 30). Ocean quahog revenues have been fairly stable while surf clam revenues, after their decline from the peak in 1977, have been increasing slightly (Tables 23 and 24).

What has yet to be discussed is the total clam supply. This consists of not only surf clams and ocean quahogs but also hard clams, soft clams, inventories (frozen meats only), and imports (Figure 41). Inventory levels show a leveling off from 1978 to 1983 but a sharp decline beginning 1984, an early indication of the tremendous increase in landings in 1984. Imports of clam products have increased from 2 million lbs in 1975 to 11 million lbs in 1983. Landings of soft and hard clams have either remained level or exhibit a slow long term decline since 1965. Ocean quahogs have grown remarkably to 35 million lbs a year in 1979, and then leveled off (preliminary data indicate that in 1984 there were slightly over 40 million lbs landed). Surf clam landings have been increasing steadily since 1979. Total clam supply, while mirroring surf clam supply, is now at the peak 129 million lb level. However, in 1974 surf clams were 74% of the clam supply of 129 million lbs, while in 1983 they were only 43% of the 129 million lb supply.

If the indicators discussed above are compared across the years 1965, 1974, and 1983 (Tables 26, 27 and 28); years when, respectively, the fishery was small, at peak levels, and heavily regulated, the market picture is sharpened such that the conclusions and trends discussed above become distinct. The supply indicators show decreasing costs, the clams will be supplied at lower prices (unless closures cause a panic among buyers). The demand indicators show that competing products, in general, have rising prices in deflated terms and significant increases relative to surf clam and ocean quahog product prices. In 1974 the surf clam industry generated \$7.7 million for 96 million lbs of clams, but in 1983 total surf clam and ocean quahog revenues grew to almost \$12 million, even though only 56 million lbs of clams and 34 million lbs of quahogs were landed. It seems evident that the decline in abundance led to a shortfall in supply relative to demand and prices correspondingly increased. Currently increased abundance and the increased percentage of small clam landings are causing prices to fall. Current levels of per capita clam consumption are 9% less than in 1974, even though consumers have increased incomes, are spending a larger percentage of their income outside their homes for food and entertainment, and are consuming more fish and shellfish as part of their diet. Therefore, one would expect that the quantity of surf clam and ocean quahog products should expand as long as prices are stable or decline. The prevailing trend in CPUE indicates that prices will maintain their trends unless closures or the threat of closures causes panic among buyers who want to minimize the chance of having no clam meats to process.

IX.A.4. Surf Clam Quarterly Price Model

In order to be able to forecast effects of management measures on surf clam prices, an analysis was undertaken using NMFS quarterly surf clam and ocean quahog landing and price data. Prices were adjusted for inflation using the index for Producer Prices, All Commodities (Series 330; USDC, 1984d). Per capita disposable income (in 1972 dollars) was also used. To determine the best relationship a series of regression equations were prepared using prices in both nominal and deflated terms and using various combinations of surf clam landings, ocean quahog landings, ocean quahog prices, surf clam landings per capita, ocean quahog landings per capita, a series of dummy variables to adjust for possible quarterly variations, and a dummy variable to adjust for a combination of unusually high surf clam prices combined with relatively low landings during the third and fourth quarters of 1976 and the first and second quarters of 1977.

The best equation predicted surf clam prices in nominal terms, using surf clam landings (in bu), per capita disposable personal income, and the dummy variable to adjust for the last two quarters in 1976 and the first two quarters in 1977 (set equal to 1 for those quarters and 0 for all other quarters). The equations were also run with the data transformed into natural logarithms.

The variables are:

SCP = surf clam price (\$ per bu) in nominal terms.

SCL = surf clam landings in bu.

DPY = per capita disposable personal income in 1972 dollars.

D1 = 1 for 1976 quarters 3 and 4 and 1977 quarters 1 and 2; else 0.

The equation is:

$$SCP = -0.00000554 \times SCL + 0.00469 \times DPY + 3.52 \times D1 - 9.14$$

The R² is 0.85 and the Durbin-Watson is 1.87. The T statistics are 9.69 for SCL, 7.84 for DPY, and 7.31 for D1. The signs on the regression coefficients are correct, that is, the coefficient for SCL is negative (prices should rise as landings fall) and the coefficient for DPY is positive (prices should rise as incomes rise).

The quarters adjusted by the D1 variable reflect a response to two essentially concurrent phenomena. Through 1975 the fishery was dependent to a significant degree on surf clam beds off Virginia. Those beds were effectively depleted by 1976, resulting in a sharp drop in landings (Table 1 and Figure 10). The anoxia kill off New Jersey beginning in the third quarter of 1976 further reduced landings. Price began to gradually increase in the first quarter of 1976, reaching almost \$10/bu by the third quarter of that year (Figure 29). Price probably did not immediately rise with the drop in landings because of inventory left from the earlier periods. Prices were just as high at lower landing levels during later quarters. The problem with the quarters in question was apparently that processors responded to a severe drop in landings (from 5.6 million bu in 1974 to 2.9 million bu in 1976; obviously they did not know how bad it was really going to get in the future) by offering prices much higher than appropriate given the price and landing relationships for earlier and subsequent periods in the series. In other words, prices were bid up in what at the time seemed to be an immediate crisis and then settled down when it became clear that the crisis was a long term problem.

Note must be made of the difference between nominal and deflated prices. All of the significant statistical tests had lower statistical values when deflated prices were used. Surf clam prices have not kept pace with inflation (Figure 31). Fishermen's costs have likely not decreased, and have likely increased during the period. While CPUE data are not available prior to 1979 (Figures 14, 15, and 16), it is likely that CPUE declined beginning in 1976 and did not begin improving significantly until 1983. The apparent conclusion is that fishermen were willing to land surf clams at lower effective prices. Since cost data are unavailable, it cannot be determined whether this was a result of continued profitability, a lack of alternatives in spite of limited profits, or both.

The dummy variables to adjust for possible seasonal differences between quarters had T statistics that were not significant. An examination of landings by quarter (Figure 10) in fact shows no consistent seasonal pattern. The 10 year landing average of surf clams during the second quarter (823,462 bu) was the highest, while the fourth quarter averaged 686,783 bu from 1975-1983 and was the lowest quarterly average. Both the first and third quarters for the 10 year (1975-1984) period averaged slightly more than 750,000 bu. The large amount of variability which existed among years during the quarters prevented the detection of significant differences between quarterly averages.

IX.B. DOMESTIC PROCESSING SECTOR

There is no need to amend this section at this time.

IX.C. INTERNATIONAL TRADE

There is no need to amend this section at this time.

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

There is no need to amend this section at this time.

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

There is no need to amend this section at this time.

XII. DETERMINATION OF OPTIMUM YIELD

XII.A. DESCRIPTION OF THE AMENDMENT

As discussed previously (Section IV.A), this Amendment is a combination of the provisions of Amendment #4 as adopted following hearings and Amendment #6. This revised version incorporates changes made in response to NMFS disapproval of certain provisions of Amendment #6. This revised version of Amendment #6 replaces the bimonthly quotas with quarterly quotas and eliminates the weekly landing limits for the Nantucket Shoals Area. It clarifies the quota adjustment provisions for the Nantucket Shoals and Georges Bank Areas. Finally, it presents additional justification for the one landing per trip provision. The other disapproved provisions (prohibition on subdividing allowed fishing times under certain conditions and portions of the notification system) have been deleted from the Amendment (Section IV.A).

The New England Area is that portion of the Atlantic Ocean FCZ north of the line that begins at 41°18'249" north latitude and 71°54'28.477" west longitude and proceeds S 37°22'32.75" E to the point of intersection with the outward boundary of the FCZ. The Nantucket Shoals Area is that portion of the New England Area west of 69 degrees and the Georges Bank Area is that portion of the New England Area east of 69 degrees (Figure 42).

The OY for the Nantucket Shoals Area is 25,000 to 200,000 bu. The OY for the Georges Bank Area is 25,000 to 300,000 bu. The annual quotas are set following the procedures established in the FMP (Section XIII.B.2).

Management of the Nantucket Shoals Area is based on dividing the annual quota into quarterly quotas as follows: 20% for January through March, 30% for April through June, 30% for July through September, and 20% October through December. If the actual catch of surf clams in any quarterly period falls more than 5,000 bushels short of the specified quarterly quota, the Regional Director will add the amount of the shortfall to the succeeding quarterly quota. If the actual catch of surf clams exceeds the quarterly quota, the Regional Director will subtract the amount of the excess from the succeeding quarterly quota. The Regional Director shall publish a notice in the Federal Register whenever any quarterly quota for surf clams is adjusted as described above. The shortfall or excess will carry over from the last quarter of one year to the next year except that no more than 10% of the annual quota may be carried over to the next year. No catch restrictions shall be applied to the fishery until 50% of the quarterly quota has been landed. The Regional Director will monitor landings from the Nantucket Shoals Area and will determine either when the 50% point has been reached or when that point will likely be reached. The Regional Director will thereupon consult with the Councils in the selection of trip limits to control catch adequately to keep the fishery open for the balance of the quarter. Trip limits will be established by vessel class as follows: for Class 1 vessels, trip limits may not be less than 224 bu/trip; for Class 2 vessels, trip limits may not be less than 416 bu/trip for Class 2, and for Class 3 vessels, trip limits may not be less than 768 bu/trip. Trip limits must maintain a fixed ratio of 1.0: 1.8: 3.4 for Class 1, 2, and 3, respectively. In the event that trip limits are not sufficient to keep landings to within the quota levels, the Regional Director may close the fishery until the beginning of the next quota period. Once initial trip limits have been established in consultation with the Councils, the Regional Director will notify the Councils in advance of any proposed action to further specify trip limits or close the fishery. The Regional Director will consider any comments received by the Councils or the public before implementing any adjustments in the Nantucket Shoals management program.

The annual quota for the Georges Bank Area is divided into quarterly quotas, with the first and fourth quarters (January-March and October-December) each allocated 10% of the annual quota and the second and third quarters (April-June and July-September) each allocated 40% of the annual quota. If the actual catch of surf clams in any quarterly period falls more than 5,000 bushels short of the specified quarterly quota, the Regional Director will add the amount of the shortfall to the succeeding quarterly quota. If the actual catch of surf clams exceeds the quarterly quota, the Regional Director will subtract the amount of the excess from the succeeding quarterly quota. The Regional Director shall publish a notice in the Federal Register whenever any quarterly quota for surf clams is adjusted as described above. The shortfall or excess will carry over from the last quarter of one year to the first quarter of the next year except that no more than 10% of the annual quota may be carried over to the next year.

If the Regional Director determines (based on logbook reports, processor reports, vessel inspections, or other information) that the quota for surf clams in any Area for any time period or ocean quahogs for any time period will be exceeded, he must publish a notice in the Federal Register, stating the determination and, if necessary, stating a date and time for closure of the surf clam or ocean quahog fishery for the remainder of the time period. The Regional Director must send notice of the action to each surf clam or ocean quahog processor and to each permitted surf clam or ocean quahog vessel owner or operator.

Management of the Mid-Atlantic Area is based on the current FMP, except that the effort limitations are modified by this Amendment to add the provision that vessels may land surf clams only one time during an authorized fishing period.

The surf clam minimum size limit applies in all three Areas.

The permit eligibility requirements for the New England Area continue unchanged for both the Nantucket Shoals and Georges Bank Areas; specifically, both vessels with permits issued pursuant to the moratorium on entry of vessels into the surf clam fishery and vessels with permits to fish only in the New England Area may fish in both the Nantucket Shoals and Georges Bank Areas. However, it is the Council's intent that vessels with permits to fish only in the New England Area accrue no rights to participate in any future vessel allocation system that may be developed to replace or supplement the moratorium on entry of vessels into the surf clam fishery as a consequence of such vessels fishing in the New England Area.

Vessel owners or operators must notify NMFS in advance if they intend to fish for surf clams in a Notification Zone. For vessels authorized to fish in both the Mid-Atlantic and New England Areas (i.e., with permits issued pursuant to the moratorium) with home ports in the Mid-Atlantic Area, the Nantucket Shoals or Georges Bank Areas are Notification Zones. For vessels authorized to fish in both the Mid-Atlantic and New England Areas (i.e., with permits issued pursuant to the moratorium) with home ports in the New England Area, the Mid-Atlantic or Georges Bank Areas are Notification Zones. For vessels authorized to fish only in the New England Area the Georges Bank Area is a Notification Zone. Home port is that specified on the vessel's permit application form. Vessels may not fish in more than one Area on any day. If an operator intends to change the vessel's Area of fishing, NMFS must be notified in advance.

An example may clarify the notification requirement. Assume a vessel operator with a home port in the Mid-Atlantic Area decides to fish in the Georges Bank Area, after several trips to Georges Bank he decides to try the Nantucket Shoals Area, and after several trips there returns to fish in the Mid-Atlantic Area. He must notify NMFS in advance of his plan to go to Georges Bank, of his move to the Nantucket Shoals Area, and of his return to the Mid-Atlantic.

XII.B. IMPACTS OF THE AMENDMENT

XII.B.1. Dividing the Areas

Dividing the New England Area into the Nantucket Shoals and Georges Bank Areas would mean that fishing in the Nantucket Shoals Area could continue without any negative impacts from fishing in the Georges Bank Area, and vice versa. The management systems in the two Areas are different because of the different management objectives of the two Areas. The Nantucket Shoals Area is being managed to keep the fishery open for as much of the year as possible. The Georges Bank Area is managed to achieve a compromise between keeping the fishery open for as much of the year as possible, consistent with safety, while also providing an area where fishing may occur with minimal controls during periods when the Nantucket Shoals or Mid-Atlantic Areas may be either closed or operating under severe restrictions. The positive impact of the division is that the level of regulation imposed on the fishermen will be no greater than that considered necessary for each Area.

If the division were not implemented it can be assumed that the entire New England Area would be controlled either by the rules proposed for the Nantucket Shoals Area or the rules proposed for the Georges Bank Area; in which event the Georges Bank Area would be subjected to more regulation than is considered necessary or the Nantucket Shoals Area would be subjected to less. Both of

these situations have negative impacts. Application of the Nantucket Shoals Area rules throughout the entire New England Area would mean fishermen in the Georges Bank Area would be subject to different quarterly quotas and potentially to trip limits. Conversely, application of the proposed Georges Bank rules to the entire New England Area would mean the entire Area would be subject to different quarterly quotas and no limitations short of closure, potentially leading to outcomes not consistent with the objectives for the Area. Additionally, allowing the combined OYs to be harvested from either area could lead to excessive harvests from one of the areas; i.e., if the divided Areas were not specified but the OY increased as proposed, the annual quota could be as great as 500,000 bu, which could legally be taken from Nantucket Shoals (where the maximum catch should only be 200,000 bu) or from Georges Bank (where the maximum catch should be only 300,000 bu).

It is not possible to quantify the costs and benefits of dividing the Area. However, some qualitative observations may be made.

1. If the entire New England Area were operated under the Nantucket Shoals Area rules, the OY and quota range would be 50,000-500,000 bu. Since most of the harvest of the Nantucket Shoals resource occurred in 1983 and for the Georges Bank fishery in 1984, it is not possible to directly compare potential harvest patterns with historical performance. However, in 1984 the Georges Bank fishery alone took almost 90,000 bu per month for three months (Table 9), a harvest rate that would trigger trip limits even at the maximum quota level. Hence, it is not unreasonable to conclude that applying the Nantucket Shoals Area rules to the entire New England Area would very likely lead to an excessive level of regulation on the fishery in the Georges Bank Area, with resultant increased costs to industry and government to operate under and administer, respectively, the increased level of control.
2. If the entire New England Area were operated under the Georges Bank Area rules the OY range would again be 50,000-500,000 bu, with a quarterly quota distribution of 10%, 40%, 40%, and 10% of the annual quota. At the minimum quota level the quarterly quotas would be 5,000 bu, 20,000 bu, 20,000 bu, and 5,000 bu. At the current level the quarterly quotas would be 10,000 bu, 40,000 bu, 40,000 bu, and 10,000 bu. At the maximum rate the quarterly quotas would be 50,000 bu, 200,000 bu, 200,000 bu, and 50,000 bu. Given the problems in combining historical statistics for the Nantucket Shoals and Georges Bank Areas and recognizing that the Georges Bank fishery operated for only one complete quarter in 1984 (during which the catch was 266,538 bu; Table 9), closures might be expected if the July-September 1984 performance is repeated. While closures are contemplated for the Georges Bank Area, they should be seen as negative impacts vis-a-vis the Nantucket Shoals Area.
3. The price impacts of various quota levels with separate and joint Areas using the price equation discussed in Section IX and assuming a catch absent the Nantucket Shoals and Georges Bank Areas quotas equal to the average quarterly catch for the first three quarters of 1984 (1,061,000 bu), and a per capita disposable income equal to that of the third quarter of 1984 (\$4,961), suggest a price decrease and gross revenue increase for any catch over the base level (Table 30). If the minimum catch in the lowest quarter for the Georges Bank Area (2,500 bu) and no catch from the Nantucket Shoals Area is assumed, the price is predicted by the model to decrease by \$.01/bu and ex-vessel value to increase by about \$10,000 relative to those quantities in the absence of any catch from either Nantucket Shoals or Georges Bank. At the other extreme, if it is assumed that the New England Area is not divided and the proposed Georges Bank rules apply, at the maximum quarterly quota level (200,000 bu), the surf clam price would be \$7.14/bu and ex-vessel value would be \$9,004,990. That range of prices is not considered significant since actual quarterly prices have ranged from \$6.68 to \$8.84/bu during 1983 and 1984. Any price impact of the Georges Bank catch would decrease as the Mid-Atlantic Area quota and catch increase and as a greater portion of the Nantucket Shoals Area quota is landed. It must also be noted that the Georges Bank catch during the third quarter of 1984 was more than double the maximum quarterly quota and the third quarter price was \$8.46/bu.
4. Government costs would increase because of creating the two Areas as a result of the need to know where vessels were fishing. Knowledge of the Area in which fishing is occurring is necessary to assure the reliability of catch statistics so that appropriate measures could be

implemented as required to avoid overfishing.

XII.B.2. OY for the Nantucket Shoals Area

Quotas established for the New England Area in previous iterations of the FMP were based on limited survey information and a lack of significant fishing activity, which made it difficult to assess the potential commercial yield from the fishery.

During the last quarter of 1982 and the beginning of 1983 fishing activities increased substantially. Resource distribution and abundance was traced, survey data were collected and analysed, and a stock assessment was produced during the summer of 1983 (Murawski and Serchuk, 1983a). The survey, conducted in the Nantucket Shoals area, concluded that about 10% of the total surf clam resource biomass and 5% of the numbers was located in that Area. Applying the 10% figure to the biomass in the Mid-Atlantic, and basing a quota on the same assumptions used to fix the quota in the Mid-Atlantic, results in a conclusion that the upper bound of the OY range for the Nantucket Shoals Area may safely be established as 200,000 bu. The resource in the Nantucket Shoals Area is somewhat different from that in the Mid-Atlantic because the rough bottom topography, shallow depths, and strong currents complicate fishing activity. The current resource is generally older, slightly faster growing, and yields slightly more meat for similar sized clams than in the Mid-Atlantic. There has been essentially no recruitment during the last five to six years.

The effect of doubling the allowable quota should be significant to the few FCZ fishermen who are permitted to fish only in the New England Area, in that it will significantly increase possible fishing opportunities. The economic effect of the increased quota on the surf clam industry is likely to be far less significant. The maximum Nantucket Shoals Area annual quota (200,000 bu) is only 6.8% of the maximum Mid-Atlantic Area quota. If the Georges Bank maximum annual quota is added to the maximum Mid-Atlantic Area annual quota, then the maximum Nantucket Shoals Area annual quota is only 6.2% of the total.

XII.B.3. Nantucket Shoals Area Quarterly Quotas

Quotas are now used for the New England and Mid-Atlantic surf clam fisheries, and in other fisheries, to control total fishery removals. As an ultimate control of fishing mortality, they have value. Changes in resource abundance can be reflected if quotas are adjustable within ranges defined for the fisheries. Distribution of the quota over the fishing year can also serve the goal of avoiding lengthy closures and thus effectively addresses the potential closure problem of the New England fishery. Quotas are usually administered and enforced through some form of effort restriction, such as fishing time, trip limits, vessel allocations, or closure.

XII.B.4. Nantucket Shoals Area Control Measures

The Amendment replaces the control of fishing time with trip or weekly landing limits for the Nantucket Shoals Area. Control of fishing time is used in the Mid-Atlantic Area. Control of fishing time was not effective in 1983 as a means of slowing harvest to avoid lengthy closures in the New England Area because the FMP did not allow imposition of limits until half of the quota had been taken and, given the small maximum quota (100,000 bu), there was not enough quota left to allow reasonable fishing periods once the half way point had been reached. In 1983, fishing time was restricted on 1 April to 12 hours per week after over 64,000 bu (logbook data) of the 100,000 bu annual quota was taken. Despite this time reduction over 24,000 bu (logbook data) were taken during the next quarter, leading to a closure of the fishery effective 1 July and lasting for the next six months. The logbook data cited above do not sum to the 100,000 bu quota because of incomplete reporting; however, the actual catch was far in excess of 100,000 bu.'

Additional problems with fishing time include the difficulty of monitoring at sea activity for enforcement purposes.' Fishing time must be enforced by vessel inspection or overflight. With small amounts of available time, and with so much of the New England fishery occurring near State waters, detection and confirmation of violations is difficult. Weather conditions in New England are subject to rapid changes. Vessels fishing in the area work out of ports which require steaming times of as much as 12 hours each way to the grounds and back. Reduction of time to 12 hours increases the probability that fishermen will not be able to complete a trip because bad weather

intervenes. Operators who must steam 24 hours round trip for only 12 hours of fishing are understandably frustrated.

Landing limits can be enforced at the dock by inspection. Operators gain latitude in deciding when to fish, and how many trips to take. Trip limits also act as a direct translation between the quota, which is established in bushels, and a control mechanism, also stated in bushels. The indirect linkage between bushels and fishing time is avoided, increasing the possibility that management action may have its desired control effect.

The management strategy for the Nantucket Shoals Area is intended to increase the probability of spreading catch throughout the fishing year. The bimonthly quotas have been established, and will be reviewed by the Council annually to make clams available at times and places when the industry has indicated demand will be greatest.

The ratio between the trip limits, i.e., 1.0 for Class 1, 1.8 for Class 2, and 3.4 for Class 3 were the average relative fishing power for Mid-Atlantic Area surf clam vessels based on logbook data for 1982 and 1983. It was necessary to use Mid-Atlantic Area data because of the extremely limited amount of Nantucket Area logbook data.

Very limited logbook data also make it difficult to evaluate the minimum trip (not less than 224 bu/trip for Class 1, not less than 416 bu/trip for Class 2, and not less than 768 bu/trip for Class 3 vessels) landing limits. Analysis by class is not possible because of the limited data.

These minimums were established in recognition that closure of the fishery may be preferable to leaving the fishery technically open, but with harvest restrictions so stringent as to preclude an economically viable fishery. The proposed minimum values were proposed by industry representatives. Since cost data are not available, it is impossible to assess whether the proposed minimums would, in fact, assure profitable operations.

Trip limits, determined relative to vessel class, can be fixed at a level to spread catch out over time. Operators gain flexibility to take trips as weather permits, and to take as many trips as they can. The minimum trip limits by vessel class are established at levels where performance is profitable to ensure that operators do not suffer through periods of de facto closure, where the costs of operation cannot be defrayed by the expected returns. Like other alternatives, economic performance is limited by the total quota.

XII.B.5. Quarterly Quotas for the Georges Bank Area

The quarterly quotas are intended to distribute fishing in the Georges Bank Area through as much of the year as feasible in light of the steaming distance to the fishing grounds coupled with weather conditions. The concept of keeping the fishery operating throughout the year has been a key consideration in the FMP since its inception. This is considered a desirable goal in order to stabilize employment for fishermen and processing plant workers and to provide for an uninterrupted supply of product to processors in both New England and the Mid-Atlantic.

The quarterly quotas represent a compromise position between monthly quotas and only an annual quota. Monthly quotas would theoretically allow harvesting over a longer portion of the year, which might not be desirable in the Georges Bank Area because of weather conditions. With only an annual quota, stability in terms of landings from one period to the next would be reduced.

The allocation distribution (10% each for the first and fourth and 40% each for the second and third quarters) is designed to avoid fishing during months when weather conditions are likely to be adverse (thus make it more difficult to catch the last of the quota) while still distributing the catch throughout the year as much as possible. Using the limits of the OY range, the first and fourth quarter quotas would be 2,500-30,000 bu and the second and third quarter quotas would be 10,000-120,000 bu. A Class 3 vessel can carry 60-100 cages, or 1,920-3,200 bu. Based on available assessment information (Murawski and Serchuk, 1984b), the most likely quota for the Georges Bank Area is at the maximum end of the OY, i.e., 300,000 bu. At that quota, and assuming only Class 3 vessels fished and they had an average capacity of 80 cages (2,560 bu), during the first and fourth quarters they could make twelve trips and during the second and third quarters they could make 47

trips.

Unconstrained fishing on Georges Bank theoretically could have negative impacts on the surf clam market. Landings from the Georges Bank Area averaged about 20,000 bu/week while the fishery was operating at its peak during 1984 (July-September). During that period landings from the Mid-Atlantic FCZ Area were 518,000 bu (compared to a total during the period of 253,000 from Georges Bank) and the Mid-Atlantic Area was closed for three weeks. The average price was \$8.62/bu during the second quarter (when only 90,000 bu were landed from Georges Bank) and \$8.46/bu during the third quarter.

Using the price equation discussed in Section IX and assuming a catch absent the Georges Bank quota equal to the average quarterly catch for the first three quarters of 1984 (1,061,000 bu), a per capita disposable income equal to that of the third quarter of 1984 (\$4,961), and adding the maximum Georges Bank quarterly quota (120,000 bu), the equation predicts a price of \$7.58/bu and ex-vessel value of \$8,957,117. If the Georges Bank catch is excluded the predicted price is \$8.25/bu and ex-vessel value is \$8,753,250. At the smallest quarter at the lower end of the quota range with price would be \$8.24/bu with ex-vessel value equal to \$8,763,240 (Table 30). That range of prices is not considered significant since actual quarterly prices have ranged from \$6.68 to \$8.84/bu during 1983 and 1984. Any price impact of the Georges Bank catch would decrease as the Mid-Atlantic Area quota and catch increase and as a greater portion of the Nantucket Shoals Area quota is landed. It must also be noted that the Georges Bank catch during the third quarter of 1984 was more than double the maximum quarterly quota and the overall third quarter price was \$8.46/bu (Table 29).

XII.B.6. Notification Requirement

The FMP contains no declaration requirement. Emergency regulations implementing the provisions of Amendment #4 were put into effect on 1 July 1984 for a period of 180 days. The emergency regulations included a requirement that owners or operators of vessels intending to fish in the New England Area notify NMFS in writing of such intention before they intend to begin fishing (49 FR 27157). This Amendment would reinstitute that provision in a modified form consistent with the three defined Areas. The impact of the proposed declaration requirement is minimized relative to the impacts of the lapsed emergency provision by the exceptions based on permit type and home port. The exceptions are based on the assumption that most Mid-Atlantic based vessels will fish in the Mid-Atlantic Area most if not all of the time and that most of the New England based vessels will fish in the Nantucket Shoals Area most if not all of the time. Therefore, declarations must be made only for the exceptions to those situations.

While it is impossible to estimate the number of declarations that might be made, it is possible to outline some parameters of possible declarations. There are 148 vessels permitted pursuant to the moratorium and 362 vessels permitted to fish only in the New England Area (Table 13). In 1983, 113 vessels made at least one trip for surf clams in the Mid-Atlantic Area, 57 of them Class 3 and 43 Class 2 (Table 8). While data are not available on the number of New England only vessels that have actually fished, logbook data indicate that only twelve vessels in 1983 and ten vessels in 1984 fished in the Nantucket Shoals Area. During both years only two vessels that did not have permits to fish in the Mid-Atlantic Area filed logbooks (a requirement for fishing in the FCZ). Seventeen vessels, fifteen from the Mid-Atlantic, participated in the Georges Bank fishery during 1984 (with about 400,000 bu of landings). The pattern has been that the Mid-Atlantic vessels go to Nantucket Shoals or Georges Bank and fish for a time, then return to the Mid-Atlantic, but do not frequently shuttle back and forth. It is expected that this pattern will continue in the near future because of the distances involved and the location of processing plants. As long as the current time based regime continues in the Mid-Atlantic Area and assuming current stock conditions and demand, the Mid-Atlantic Area will be operating under severe effort limitations, which may provide an incentive for more Mid-Atlantic based vessels to fish in the Nantucket Shoals and Georges Bank Areas at least during some portion of the year. Therefore, the experience during the recent past could be considered the lower limit of possible declarations. Theoretically, the upper limit is the entire Mid-Atlantic fleet, but such an event is virtually impossible because: (1) it is unlikely that the Class 1 vessels could travel to and consistently fish in the Georges Bank Area, (2) the cost of travel between the Mid-Atlantic Area and the Nantucket Shoals and Georges Bank Areas, (3) the need to find and availability of dock space in New England, (4) and the cost of transporting the

clams from New England to Mid-Atlantic processing plants.

The number of closures in the Mid-Atlantic Area will be the most likely incentive for interest by Mid-Atlantic based vessels fishing in the Nantucket Shoals and Georges Bank Areas. Reduced allowed time in the Mid-Atlantic Area coupled with sustained demand will probably lead to more intensive use of vessels in the Mid-Atlantic Area during the times when fishing is allowed, with vessels making the trip to the Nantucket Shoals and Georges Bank Areas primarily to assure that the processors have a supply of clams if the Mid-Atlantic Area fishery is closed even with reduced allowed times.

The emergency regulations provided in part that all vessel owners or operators had to declare their intent to fish in the New England Area. Since New England based vessels generally do not file logbooks, there are no data on where the New England vessels fish. According to NMFS records only five vessels (all Mid-Atlantic based) filed letters of intent to fish in the New England Area as of 14 November 1984 (excluding letters of intent that were filed to fish under the special research program on Georges Bank) under the emergency regulations. However, it is understood that most New England based vessels fish in the Nantucket Shoals Area if they fish in the FCZ. Only six New England vessels have permits to fish in the Mid-Atlantic Area. Two New England vessels fished on Georges Bank during 1984. Therefore, it seems reasonable to conclude that the declaration requirement will have a positive impact on New England fishermen relative to the emergency regulations.

The Amendment's requirement that Mid-Atlantic based vessel operators declare their intent to fish in the Nantucket Shoals and Georges Bank Areas represents no change from the provisions of the emergency regulations that operators declare their intent to fish in the New England Area. However, this Amendment adds the requirement that they also declare when they return. The tradeoff associated with this Amendment is to keep management associated costs to the industry as low as possible to minimize disincentives to fishing in the Georges Bank Area while reducing the chances of the Georges Bank fishery impacting negatively on fishermen who cannot or do not participate in it.

It must be remembered that the entire management system requires accurate reporting of catch by Area. The system is designed to meet the needs of each of the Areas by changing restrictions to meet current conditions; e.g., varying allowed fishing times in the Mid-Atlantic, trip landing limits for Nantucket Shoals, and no limitations but closure for Georges Bank. Timely catch data assignable to each Area are critical to making this system work. The notification requirement is designed to facilitate enforcement and reporting by providing a mechanism for checking a vessel's logbook reports against information on where the vessel was supposed to be fishing and informing enforcement officers of which rules a vessel is fishing under on a given day. No negative impacts are anticipated from the notification requirements.

XII.B.7. Mid-Atlantic Area Landing Restriction

Effort limitations in the Mid-Atlantic Area are currently in terms of the number of hours a vessel may fish during a specified time period and in practice have been a certain number of hours each week (although the FMP allows hours per month and hours per quarter). Catch rates during 1984 led to closures in June, July, September, and December and a reduction from twelve hours per week to six hours every other week effective 18 November. Certain vessels that fish beds close to shore (generally off New Jersey) have reportedly been making more than one trip during a twelve hour day, which is considered a significant factor contributing to the reduction to six hours every other week. Multiple landings on one day complicate enforcement and may result in a more rapid harvest rate, leading to decreased allowed fishing time or closures, thereby negatively impacting vessels that do not operate out of ports close enough to the beds to enable them to make more than one trip per day as well as the vessels that can make multiple landings. This problem was also identified by the United Shellfishermen's Association through comments made at the hearings on Amendment #5 and by the National Fisheries Institute at the September 1984 meeting of the Council. Hence, this Amendment adds the provision that vessels may land surf clams only one time during an authorized time period. More than one landing per period tends to make enforcement more difficult because it encourages violations of the fishing hour limitations. The fishery has been operating at six or twelve hours of fishing per period (Table 17) and it is unlikely that this

situation will change in the foreseeable future. In order to increase harvests it is possible that fishermen will land more than one time during a period by beginning earlier than allowed and/or fishing later than allowed. Enforcing fishing time is extremely expensive since it requires at sea effort, but must be done rigorously to insure the integrity of the FMP. The possibility of legal multiple landings would increase the enforcement cost because of the greater probability of violations of the starting and ending times. Clams landed illegally have a negative impact throughout the fishery since they accelerate the rate at which the quota is harvested, leading to further reductions of allowed fishing time. Evidence of infringement on starting and stopping times was presented to the Regional Director in 1984 when dual landings were being made.

In addition, the limitation of one landing per fishing period should allow the Regional Director to establish longer fishing periods. This should not increase the rate at which the quota is harvested while providing the fishermen the time they need to be more selective in the beds they fish, thus tending to decrease the capture (landing or discard) of sublegal clams. This is true if it is assumed that vessels are currently landing their carrying capacity at allowed fishing times which have not exceeded six hours since November 1984. If the boats are being filled in six hours or less, then extending the allowed time to, for example, twelve hours, while allowing only one landing would double the time available to fish for the same quantity of clams, thereby providing the opportunity for fishermen to be more selective in their fishing areas, hence reducing discards and the landing of sublegal clams.

XII.B.8. Surf Clam Minimum Size Limit

There were two actions (Amendments #4 and #6) which had the effect of extending the surf clam minimum size limit throughout the entire management area. The surf clam minimum size limit was to be extended to the New England Area pursuant to Amendment #4 and was part of that Amendment when it was taken to public hearings and when it was finally adopted by both the Mid-Atlantic and New England Councils.

Amendment #5, and the regulations implementing it, included a mechanism for adjusting the surf clam minimum size limit and were written to apply to the entire management area, i.e., both the Mid-Atlantic and New England Areas.

The draft of Amendment #6 also stated that the size limit would be in effect in the New England Area as a result of Amendment #4 and contemplated that the limit would, therefore, apply to the Nantucket Shoals and Georges Bank Areas created in that Amendment within the New England Area. However, after the hearings on Amendment #6 it was determined appropriate to combine Amendments #4 and #6. It was also determined that the size limit would be a part of Amendment #6 as Amendments #4 and #6 were merged. Amendment #6 was adopted by the Mid-Atlantic Council on that basis on 7 March 1985.

According to vessel operators and to resource surveys conducted in the Nantucket Shoals and Georges Bank Areas, most of the surf clams which have been harvested and which are available for harvest are of sizes greater than 5.25". Very few surf clams smaller than 4.75" were captured, indicating that recruitment in the past 5 to 6 years has been relatively poor (Murawski and Serchuk, 1983a). Over an extended period of time, as exploitation rates increase and recruitment occurs, a greater proportion of the resource may be below the current minimum size. It is impossible to predict when this will occur. If recruitment does not occur, the resource will eventually be depleted. With the current size distribution of clams in the Areas, imposing the size limit in the Nantucket Shoals and Georges Bank Areas should have a negligible effect on landings in the present or immediate future. The measure will protect any small clams which might be produced, enhancing their yield and ensuring that they can spawn a number of times before they are harvested.

XII.B.9. Management Costs

The Amendment makes three changes to the FMP: it establishes a management regime for the Nantucket Shoals Area; it establishes a management regime for the Georges Bank Area; and it adds the trip restriction to the Mid-Atlantic Area surf clam fishery.

Management costs will increase as a function of administering the quarterly quota system with trip limits in the Nantucket Shoals Area relative to the effort limitations previously in effect. However, the quarterly quota system should achieve the objective of keeping the fishery open year round, whereas the annual quota and effort limitations did not.

Management costs will increase simply as a function of the need to manage the new Georges Bank fishery. The issue is whether the proposed regime results in the smallest possible cost increase given the objectives of the FMP and the benefits that accrue from the Georges Bank fishery. The incremental increase in government administrative costs relative to setting quotas and monitoring the fishery should be insignificant. The declaration system will add administrative costs, but they must be compared to the enforcement advantage that results from the system, since without the declaration system enforcement would be virtually impossible.

The trip limitation in the Mid-Atlantic Area surf clam fishery should not increase costs but rather increase enforcement effectiveness. The provision clearly adds another requirement, but the result is that all of the landing related regulations (especially the size limit) are easier to enforce.

XII.C. TRADEOFFS BETWEEN THE BENEFICIAL AND ADVERSE IMPACTS OF THE PROPOSED AMENDMENT

The benefits of the proposed Amendment are:

1. The maximum quantity of surf clams that may be landed is increased by 400,000 bu (100,000 bu as a result of the OY increase for the Nantucket Shoals Area and 300,000 bu as a result of the OY for the Georges Bank Area). Fishermen's revenues would increase by the value of that catch, which at the average 1984 price would be nearly \$3.3 million.
2. Dividing the New England Area into the Nantucket Shoals and Georges Bank Areas enables the surf clam fishery on Georges Bank to be carried out with fewer regulations than those that may be imposed on the Nantucket Shoals Area as a result of this Amendment.
3. The surf clam landing restriction in the Mid-Atlantic Area (one landing per authorized fishing period) should improve enforcement effectiveness.
4. The Amendment should not increase administrative costs because data collection and fishing permits all exist under the current FMP. However, enforcement of the quarterly landing limit in the Nantucket Shoals Area and the Georges Bank Area regime may increase costs that cannot be presently estimated.

The adverse impacts include:

1. The surf clam landing restriction in the Mid-Atlantic Area may result in negative impacts on those fishermen who have been landing more than one time during an authorized fishing period. No data are available to identify how many fishermen have been operating in this fashion. However, virtually the entire industry has requested this provision.

The Amendment Relative to the National Standards

Section 301(a) of the MFCMA states: "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 Plan meets them:

1. **Conservation and management measures shall prevent overfishing while achieving, on a continuous basis, the optimum yield from each fishery.**

The Amendment does not change the MSYs or quota setting process and, therefore, does not alter the FMP's consistency with this standard. The OYs are consistent with the latest available scientific information. The declaration system is intended to aid in preventing overfishing. The control measures are capable of preventing the quotas from being exceeded.

2. Conservation and management measures shall be based upon the best scientific information available.

This Amendment is based on the best and most recent scientific information available.

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.

The Amendment does not alter the FMP's consistency with this standard.

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 Amendment does not alter the FMP's consistency with this standard.

The management measures proposed by this amendment will apply equally to all fishermen. Although surf clams are managed differently in the Nantucket Shoals, Georges Bank, and Mid-Atlantic Areas because of the different character and demands of the respective resources for conservation, the measures do not discriminate between fishermen on the basis of State of origin.

Differential trip limits for three established vessel classes recognize the higher operating costs/investment and other needs of larger vessels. The vessel classes are derived from the FMP, and the trip limits are based on historical performance information. Using performance ratios to establish the trip limits is fair and equitable.

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.

The Amendment does not alter the FMP's consistency with this standard.

In the Nantucket Shoals Area, the shift from regulating fishing time to regulating landings will allow operators a better opportunity to plan their harvest strategies unhampered by the vagaries of weather and chance, and thus may reduce broken trips. A shift away from fishing time as a control measure may reduce the tendency in the fleet to increase harvesting capacity, which would be desirable since harvest is limited by the annual quota which can easily be taken with existing surf clam vessel capacity.

6. Conservation and management measures shall take into account and allow for variations among, and contingencies in, fisheries, fishery resources, and catches.

The Amendment does not alter the FMP's consistency with this standard.

7. Conservation and management measures shall, where practicable, minimize costs and avoid unnecessary duplication.

The Amendment does not alter the FMP's consistency with this standard.

XII.E. SPECIFICATION OF OPTIMUM YIELD

The annual surf clam OY for the Mid-Atlantic Area continues unchanged at 1.8 to 2.9 million bu (30 - 50 million lbs of meats). The OY for the Nantucket Shoals Area is 25,000 to 200,000 bu (425,000 - 3.4 million lbs of meats). The OY for the Georges Bank Area is 25,000 to 300,000 bu (425,000 - 5.1 million lbs of meats). A conversion of 17 pounds of meats per bushel for offshore surf clams has been used to convert from bushels to pounds. The annual ocean quahog OY for the entire area continues unchanged at between 4.0 and 6.0 million bu (40 - 60 million lbs of meats), with a conversion factor of 10 pounds of meats per bushel. The annual quotas are set following the

procedures in Section XIII.B.2, which are not changed by this Amendment.

The surf clam OY for the Mid-Atlantic Area has as its lower bound the quota level that has been in effect since the original Plan and is considered to be the lowest necessary quota in the absence of a major resource crisis. The upper bound is the maximum sustainable yield estimate. The upper bound of the surf clam OY range for the Nantucket Shoals Area is based on the NEFC stock assessment (Murawski and Serchuk, 1983a) and the lower bound is considered to be the lowest necessary quota in the absence of a major resource crisis. The limits of the surf clam OY for the Georges Bank Area were based on the same considerations as those of the Nantucket Shoals Area, specifically the NEFC stock assessment (Murawski and Serchuk, 1984b) for the upper limit and the lowest necessary quota in the absence of a major resource crisis for the lower limit. The ocean quahog OY range is based on available biological information (Murawski and Serchuk, 1983b).

As specified in the FMP, since US harvesting capacity, and the intent of US fishermen to use that capacity (Section IX) if permitted by the quotas, for both species exceeds the OYs, the Total Allowable Level of Foreign Fishing is 0. Since US processing capacity, and the intent of US processors to use that capacity if quotas permitted, is at least equal to the OYs and to US harvesting capacity, there is no provision for joint venture processing.

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

XIII.A. PERMITS AND FEES

There is no need to amend this section at this time.

XIII.B. CATCH LIMITATIONS

XIII.B.1. Foreign Fishing

Fishing for surf clams or ocean quahogs in the FCZ by any vessel other than a vessel of the US is prohibited.

XIII.B.2. Domestic Catch Quotas

XIII.B.2.a. Surf clams

The Optimum Yield, Domestic Annual Harvest, Domestic Annual Processing, and annual quota for surf clams equal between 1.8 and 2.9 million bu (approximately 30 - 50 million lbs) for the Mid-Atlantic Area, between 25,000 and 200,000 bu (approximately 425,000 - 3,400,000 lbs) for the Nantucket Shoals Area, and between 25,000 and 300,000 bu (approximately 425,000 - 5,100,000 lbs) for the Georges Bank Area.

In the Mid-Atlantic Area the annual quota is divided into equal quarterly quotas, the quarters being: 1 January - 31 March, 1 April - 30 June, 1 July - 30 September, and 1 October - 31 December. If the first day of a calendar quarter does not fall on Sunday, then the fishing quarter will begin on the first Sunday of the new calendar quarter.

In the Nantucket Shoals Area the annual quota is divided into quarterly quotas as follows: 20% for January through March, 30% for April through June, 30% for July through September, and 20% October through December.

In the Georges Bank Area the annual quota is divided into quarterly quotas, the quarters and share being: 1 January - 31 March, 10%; 1 April - 30 June, 40%; 1 July - 30 September, 40%; and 1 October - 31 December, 10%. If the first day of a calendar quarter does not fall on Sunday, then the fishing quarter will begin on the first Sunday of the new calendar quarter.

Prior to the beginning of each year, after consultation with the Council and opportunity for public comment, the Regional Director may adjust quotas and estimates of DAH and DAP within the ranges specified. In selecting the quota the Regional Director shall consider current stock

assessments, catch reports, and other relevant information concerning: exploitable and spawning biomass relative to the OY; fishing mortality rates relative to the OY; magnitude of incoming recruitment; projected effort and corresponding catches; and status of areas previously closed to surf clam fishing that are to be opened during the year and areas likely to be closed to fishing during the year. The quota shall be set at that amount which is most consistent with the objectives of this FMP. It is the Council's intent that this quota setting process will not involve the preparation of an FMP amendment and a Supplemental Environmental Impact Statement to establish the annual quota.

In the Mid-Atlantic Area, if the actual catch of surf clams in any one quarter falls more than 5,000 bu short of the specified quarterly quota, the Regional Director shall add the amount of the shortfall to the next succeeding quarterly quota. If the actual catch of surf clams in any quarter exceeds the specified quarterly quota, the Regional Director shall subtract the amount of the excess from the next succeeding quarterly quota. The Regional Director shall publish a notice in the Federal Register whenever the quarterly quota for surf clams is adjusted. It is understood that this process would also operate between years, that is, between the last quarter of one year and the first quarter of the next year.

In the Nantucket Shoals Area, if the actual catch of surf clams in any quarterly period falls more than 5,000 bushels short of the specified quarterly quota, the Regional Director will add the amount of the shortfall to the succeeding quarterly quota. If the actual catch of surf clams exceeds the quarterly quota, the Regional Director will subtract the amount of the excess from the succeeding quarterly quota. The Regional Director shall publish a notice in the Federal Register whenever any quarterly quota for surf clams is adjusted as described above. The shortfall or excess will carry over from the last quarter of one year to the first quarter of the next year except that no more than 10% of the annual quota may be carried over to the next year.

In the Georges Bank Area, if the actual catch of surf clams in any quarterly period falls more than 5,000 bushels short of the specified quarterly quota, the Regional Director will add the amount of the shortfall to the succeeding quarterly quota. If the actual catch of surf clams exceeds the quarterly quota, the Regional Director will subtract the amount of the excess from the succeeding quarterly quota. The Regional Director shall publish a notice in the Federal Register whenever any quarterly quota for surf clams is adjusted as described above. The shortfall or excess will carry over from the last quarter of one year to the first quarter of the next year except that no more than 10% of the annual quota may be carried over to the next year.

XIII.B.2.b. Ocean quahogs

There is no need to amend this section at this time.

XIII.B.2.c. Closure.

If the Regional Director determines (based on logbook reports, processor reports, vessel inspections, or other information) that the quota for surf clams in any Area for any time period or ocean quahogs for any time period will be exceeded, the Regional Director shall publish a notice in the Federal Register, stating the determination and, if necessary, stating a date and time for closure of the surf clam or ocean quahog fishery for the remainder of the time period. The Regional Director shall send notice of the action to each surf clam or ocean quahog processor and to each permitted surf clam or ocean quahog vessel owner or operator.

XIII.C. RESTRICTIONS

There is a surf clam minimum size limit. After consultation with the Council and opportunity for public comment, the Regional Director shall adjust, by increments no less than 0.25", the surf clam minimum size limit to a value less than 5.5" as necessary, so that discards on average do not exceed 30% of the trip catch. In no event shall the size limit be less than 4.75". When data indicate the clams have grown sufficiently, the limit would be increased, ultimately reaching the 5.5" limit. There is a tolerance of 240 undersized clams per cage but no more than 50 clams per cage under 4.75". If any cage is in violation of the size limit, the entire load is in violation. In adjusting the size limit the Regional Director shall consider current stock assessments, catch

reports, and other relevant information concerning the size distribution of the surf clam resource. No person shall harvest or possess surf clams smaller than the minimum size limit.

All surf clam cages shall be tagged before leaving the vessel and tags shall not be removed until cages are emptied at the processing plant. Information to be shown on the tags shall be determined by the Regional Director, in consultation with the Council, but will include at least the information needed to establish a chain of evidence adequate for enforcement of the surf clam minimum size limit from the vessel through the transportation system to the processor, inclusive. The Regional Director shall determine the minimum specifications of the tags, which as a minimum shall assure that markings are not erased prior to the cages being emptied at the processing plant.

All surf clams landed on an authorized FCZ fishing day are assumed to have been caught in the FCZ and are subject to the Federal size limit.

No person shall catch and retain on board any surf clams or ocean quahogs during closed seasons, in closed areas, or on days of the week during which fishing for these species is not permitted.

Possession of surf clams or ocean quahogs, by any person aboard any fishing vessel engaged in those fisheries, in closed areas or more than 12 hours after a closure announcement becomes effective shall be prima facie evidence that such clams or quahogs were taken in violation of the provisions of the Act and the regulations.

No person shall possess, have custody of or control of, ship, transport, offer for sale, deliver for sale, sell, purchase, import, export, or land, any surf clams, ocean quahogs, or part thereof, which was taken in violation of the Act or any regulations issued under the Act.

No person engaged in the surf clam or ocean quahog fisheries as an owner or operator, or as a dealer, processor or buyer shall unload or cause to be unloaded, or sell or buy, any surf clams or ocean quahogs whether on land or at sea, without preparing and submitting the documents required by the regulations.

No person shall refuse to permit an authorized officer to board a fishing vessel subject to such person's control for purposes of conducting any search, no matter where that vessel may be situated, in connection with the enforcement of the Act or any regulations issued under the Act; forcibly assault, resist, oppose, impede, intimidate or interfere with any authorized officer in the conduct of any search or inspection; resist a lawful arrest for any act prohibited by the regulations; or interfere with, delay, or prevent, by any means, the apprehension or arrest of another person knowing that such other person has committed any act prohibited by the regulations.

Vessel owners or operators must notify NMFS in advance if they intend to fish for surf clams in a Notification Zone. For vessels authorized to fish in both the Mid-Atlantic and New England Areas (i.e., with permits issued pursuant to the moratorium) with home ports in the Mid-Atlantic Area the Nantucket Shoals or Georges Bank Areas are Notification Zones. For vessels authorized to fish in both the Mid-Atlantic and New England Areas (i.e., with permits issued pursuant to the moratorium) with home ports in the New England Area the Mid-Atlantic or Georges Bank Areas are Notification Zones. For vessels authorized to fish only in the New England Area the Georges Bank Area is a Notification Zone. Home port is that specified on the vessel's permit application form. If an operator intends to change the vessel's Area of fishing, NMFS must be notified in advance.

Any person or vessel found to be in violation of these regulations, including the logbook and other reporting requirements, shall be subject to the civil and criminal penalty provisions and forfeiture provisions prescribed in the Act and pertinent regulations. It is recommended that the Secretary establish a specific list of penalties for specific civil violations of these regulations in order to expedite resolution of violations. It is recommended that the penalty for a first offense for any violation be a permit suspension for thirty days and that the penalty for a second offense be a permit suspension for ninety days. Subsequent offenses should carry penalties of a permit suspension combined with a fine. Appropriate fines should be specified for violations by processors.

XIII.D. EFFORT RESTRICTIONS

XIII.D.1. Surf Clams - Mid-Atlantic Area

Fishing for surf clams shall be permitted only during the period beginning 6:00 am Sunday and ending 6:00 pm Thursday and be conducted during this period only at the times and under the conditions authorized by the Regional Director. If fishing is permitted for periods of 18 hours, 36 hours, or other time periods that are evenly divisible by 18, the Regional Director may permit fishing beginning at 12:00 am Sunday if, in consultation with the Council, he determines that enforcement resources are adequate to monitor this expanded fishing period. This shall be accomplished by publishing a notice in the Federal Register.

Fishing time shall be regulated by the Regional Director to allow fishing for surf clams to be conducted throughout the entire quarter without exceeding the allocation for that quarter and at a rate that will minimize the number of changes to allowed fishing times during the quarter. It is anticipated that the general method of regulating fishing times, both in reopened areas and in the fishery outside of reopened areas, will be regulating the hours per week each vessel may fish. However, catch rates, particularly in reopened areas, may be such that regulating hours per week may result in time periods so short that they are uneconomic for the harvesters. If this were to occur, the Regional Director may regulate hours over a longer time period (i.e., hours per month or hours per quarter) so that each vessel could have a reasonable trip, even though the total hours of permitted fishing for the time period might be quite small. Vessels shall be required to stop fishing at uniform hours.

The Regional Director shall regulate fishing times for reopened areas to allow fishing for surf clams to be conducted in such areas throughout the entire time period established for each area without exceeding the estimated allowable catch for the area and at a rate that will minimize the number of changes to the allowed fishing times during the quarter. Reopened areas shall be managed with specific estimates of allowable harvest and effort restrictions until the catch per unit of effort in the reopened area equals the general catch per unit of effort in the overall fishery. The Regional Director may designate the maximum number of vessels that may fish in a reopened area at any one time and, if conflicts develop between that number and the fishing periods requested by fishermen, he may select the vessels that fish on particular days by use of a lottery.

If the Regional Director determines during the quarter that the quarterly allocation will be (will not be) exceeded, he may reduce (increase) the number of hours during which fishing for surf clams is permitted to avoid prolonged vessel tie-up times and fluctuations in the supply of surf clams which would result if the allocations were taken rapidly during the beginning of each quarter (facilitating the catch of the full quarterly allocation).

The Regional Director shall publish a notice in the Federal Register of any reduction or increase in days during which fishing for surf clams is permitted. The reduction or increase may take effect immediately upon publication in the Federal Register. The Regional Director shall also send notice of the change to each surf clam or ocean quahog processor in the fishery and to each surf clam or ocean quahog vessel owner or operator.

If NMFS continues the procedure of requiring surf clam fishermen to specify their fishing days, provision is made for an alternate fishing day in the event of unsafe weather conditions on the specified day. A fisherman may claim a weather day if the fisherman notifies the appropriate official designated by NMFS of his intent to claim a weather day within four hours of his official starting time for fishing and if he lands no clams on that day. This make-up day shall be the next fishing day and shall amount to the same number of hours as the fisherman normally has on a fishing day. A fisherman will not be permitted to claim an additional make-up day if weather conditions prohibited fishing on a make-up day. This make-up day provision shall be in effect only for the months of November, December, January, February, March, and April.

In addition to the effort restrictions in the current FMP presented above, surf clam vessels may land surf clams only one time during an authorized time period.

XIII.D.2. Surf Clams - Nantucket Shoals Area

In the Nantucket Shoals Area, no catch restrictions shall be applied to the fishery until 50% of the quarterly quota has been landed. The Regional Director will monitor landings from the Nantucket Shoals Area and will determine either when the 50% point has been reached or when that point will likely be reached. The Regional Director will thereupon consult with the Councils in the selection of trip limits to control catch adequately to keep the fishery open for the balance of the quarter. Trip limits will be established by vessel class as follows: for Class 1 vessels, trip limits may not be less than 224 bu/trip; for Class 2 vessels, trip limits may not be less than 416 bu/trip for Class 2, and for Class 3 vessels, trip limits may not be less than 768 bu/trip. Trip limits must maintain a fixed ratio of 1.0: 1.8: 3.4 for Class 1, 2, and 3, respectively. In the event that trip limits are not sufficient to keep landings to within the quota levels, the Regional Director may close the fishery until the beginning of the next quota period.

Once initial trip limits have been established in consultation with the Councils, the Regional Director will notify the Councils in advance of any proposed action to further specify trip limits or close the fishery. The Regional Director will consider any comments received by the Councils or the public before implementing any adjustments in the Nantucket Shoals management program.

XIII.D.3. Surf Clams - Georges Bank Area

There are no effort restrictions for fishing for surf clams in the Georges Bank Area.

XIII.D.4. Ocean Quahogs

There is no need to amend this section at this time.

XIII.E. Closed Areas

There is no need to amend this section at this time.

XIII.F. Vessel Identification

There is no need to amend this section at this time.

XIII.G. FACILITATION OF ENFORCEMENT

There is no need to amend this section at this time.

XIII.H. HABITAT PRESERVATION, PROTECTION, AND RESTORATION

There is no need to amend this section at this time.

XIII.I. DEVELOPMENT OF FISHERY RESOURCES

There is no need to amend this section at this time.

XIII.J. MANAGEMENT COSTS

Management costs may increase as a result of the work involved in administration of three rather than two Areas. The most significant effort will likely be the Area declaration system which has been reduced (from that specified in the emergency regulations that implemented the provisions of Amendment #4) by eliminating declarations for Mid-Atlantic vessels fishing in the Mid-Atlantic Area and New England vessels fishing in the Nantucket Shoals Area. The cost of the declaration system must be viewed in light of the enforcement costs that would be incurred in the absence of such a system in order to assure that vessels were complying with the appropriate Area regulations and reporting catch appropriately. These costs are discussed in Section XII.B.

XIV. SPECIFICATIONS AND SOURCES OF PERTINENT FISHERY DATA

There is no need to amend this section at this time.

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

XV.A. FISHERY MANAGEMENT PLANS

This FMP is related to other FMPs to the extent that all fisheries of the northwest Atlantic are part of the same general geophysical, biological, social, and economic setting. US fishermen 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 on other fisheries by causing transfers of effort.

Many fisheries of the northwest Atlantic result in significant non-target species fishing mortality. Therefore, each FMP must consider the impact of non-target species fishing mortality on other stocks and as a result of other fisheries. There is almost no bycatch of other species in either the surf clam or ocean quahog fisheries.

XV.B. TREATIES OR INTERNATIONAL AGREEMENTS

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

XV.C. FEDERAL LAWS AND POLICIES

The only Federal Law that controls the fishery covered by this FMP is the MFCMA.

Marine Sanctuary and Other Special Management Systems

The USS Monitor National Marine Sanctuary off North Carolina is in the area covered by the FMP. The Sanctuary was officially established on 30 January 1975 under the Marine Protection, Research, and Sanctuaries Act of 1972. Rules and regulations have been issued for the Sanctuary (15 CFR 924) that 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)). The Sanctuary is clearly designated on all National Ocean Survey charts by the caption "protected area", which minimizes the potential for damage to the Sanctuary by fishing operations. Details on sanctuary regulations may be obtained from the Director, Sanctuary Programs Office, Office of Coastal Zone Management, NOAA, 3300 Whitehaven Street NW, Washington, D.C. 20235.

Potential Impact on Marine Mammals and Endangered Species

Numerous species of marine mammals and sea turtles occur in the northwest Atlantic Ocean. The most recent comprehensive survey in this region was done in 1979 by the Cetacean and Turtle Assessment Program (CeTap), at the University of Rhode Island (University of Rhode Island, 1981), under contract to the Minerals Management Service (MMS), Department of the Interior. The following is a summary of some of the information gathered in that study, which covered the area from Cape Sable, Nova Scotia, to Cape Hatteras, North Carolina, from the coastline to 5 nautical miles seaward of the 1000 fathom isobath.

Twenty one cetaceans and the 4 turtle species were encountered in the 1979 survey (Table 31). Also presented in Table 31 are the study team's "estimated minimum population number" for the area, as calculated, and those species currently included under the Endangered Species Act. All information is preliminary.

The study team concluded that "both large and small cetaceans are widely distributed throughout the study area in all four seasons," and grouped the 13 most commonly seen species into three categories, based on geographical distribution. The first group contains only the harbor porpoise, which is distributed only over the shelf and throughout the Gulf of Maine, Cape Cod, and Georges

Bank, but probably not southwest of Nantucket." The second group contains the most frequently encountered baleen whales (fin, humpback, minke, and right whales) and the white-sided dolphin. These are found in the same areas as the harbor porpoise, and also occasionally over the shelf at least to Cape Hatteras or out to the shelf edge. The third group "shows a strong tendency for association with the shelf edge" and includes the grampus, striped, spotted, saddleback, and bottlenose dolphins, and the sperm and pilot whales.

Loggerhead turtles were found throughout the study area, but appear to migrate north to about Massachusetts in summer and south in winter. Leatherbacks appear to have a more northerly distribution. The study team hypothesized a "northward migration in the Gulf Stream with a southward return in continental shelf waters nearer to shore." Both species usually were found "over the shoreward half of the slope" and in depths less than 200 feet." No live green or Kemp's ridley turtles were found, and the latter's population has been estimated at only about 500 adults. The study area may be important for sea turtle feeding or migrations, but the nesting areas for these species generally are in the South Atlantic and Gulf of Mexico."

The only other endangered species occurring in the northwest Atlantic is the shortnose sturgeon (Acipenser brevirostrum).

The range of surf clams and ocean quahogs and the above marine mammals and endangered species overlap to a large degree, and there always exists some very limited potential for an incidental kill. Except in unique situations (e.g., tuna-porpoise in the central Pacific), such accidental catches should have a negligible impact on marine mammal/endangered species abundances, and the Council does not believe that implementation of this FMP will have any adverse impact upon these populations. As additional information on this subject becomes available, it will be integrated into future Amendments to this FMP. The regulation of commercial landings by this FMP should reduce the potential for the capture of endangered species.

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, no major conflicts have been identified to date. The Council, through involvement in the Intergovernmental Planning Program of the MMS monitors OCS activities and has opportunity to comment and to advise MMS of the Council's activities. 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: exclusion areas, adverse impacts to sensitive biologically important areas, oil contamination, substrate hazards to fishing gear, and competition for crews and harbor space. The Council is unaware of pending deep water port plans which would directly impact offshore fishery management goals in the areas under consideration, and is unaware of potential effects of offshore fishery management plans upon future development of deep water port facilities.

XV.D. STATE, LOCAL, AND OTHER APPLICABLE LAWS AND POLICIES

Coastal Zone Management (CZM) Programs

The CZM Act of 1972, as amended, provides measures for ensuring stability of productive fishery habitat while striving to balance development pressures with social, economic, cultural, and other impacts on the coastal zone. It is recognized that responsible management of both coastal zones and fish stocks must involve mutually supportive goals.

The Council must determine whether the Amendment will affect a State's coastal zone. If it will, the Amendment must be evaluated relative to the State's approved CZM program to determine whether it is consistent to the maximum extent practicable. The States have 45 days in which to agree or disagree with the Council's evaluation. If a State fails to respond within 45 days, the State's agreement may be presumed. If a State disagrees, the issue may be resolved through negotiation or, if that fails, by the Secretary.

The New England Council determined that draft Amendment #4 was consistent to the extent practicable with the approved CZM Programs in the relevant coastal States. This determination

was made in compliance with the provisions of the CZM Act. Concurrences with this determination are on file.

In order to comply with the CZM Act, Amendment #6 was reviewed relative to the approved CZM programs of Maine, New Hampshire, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania, Delaware, and Maryland. On 21 January 1985 letters were sent to all of the States listed above stating that the Council concluded that the Amendment is consistent to the maximum extent practicable with the State's CZM program as understood by the Council.

XVI. COUNCIL REVIEW AND MONITORING OF THE PLAN

There is no need to amend this section at this time.

XVII. REFERENCES

Merrill, A. S., and J. W. Ropes. 1969. The general distribution of the surf clam and ocean quahog. Proceedings of the National Shellfisheries Assn., 59:40-45.

Mid-Atlantic Fishery Management Council (MAFMC). 1977. Surf clam and ocean quahog fishery management plan. 42 FR 60438.

_____. 1979. Amendment #2 for the surf clam and ocean quahog fishery management plan. 44 FR 68872.

_____. 1980. Fisheries socio-economic inventory. Prepared by Marine Group, Development Sciences, Inc., in association with Robert J. Harmon and Associates, Inc.

_____. 1981. Amendment #3 to the fishery management plan for the surf clam and ocean quahog fisheries and supplemental environmental impact statement.

_____. 1984. Amendment #5 to the fishery management plan for the Atlantic surf clam and ocean quahog fisheries.

Murawski, S. A. and F. M. Serchuk. 1981. Assessment and current status of offshore surf clam, Spisula solidissima, populations off the middle Atlantic coast of the United States. NMFS, NEFC. Woods Hole Lab. Ref. Doc. No. 81-33.

_____. 1982. Assessment and current status of offshore surf clam, Spisula solidissima, populations off the middle Atlantic coast of the United States. NMFS, NEFC. Woods Hole Lab. Ref. Doc. No. 82-43.

_____. 1983a. An assessment of the surf clam resource in FCZ waters off southern New England - spring 1983. NMFS, NEFC. Woods Hole Lab. Ref. Doc. No. 83-20.

_____. 1983b. An assessment of the ocean quahog, Arctica islandica, resource and fishery in FCZ waters off northeastern USA - autumn 1983. NMFS, NEFC. Woods Hole Lab. Ref. Doc. No. 83-25.

_____. 1984a. Assessment update for Middle Atlantic offshore surf clam, Spisula solidissima, populations - winter 1983-1984. NMFS, NEFC. Woods Hole Lab. Ref. Doc. No. 84-07.

_____. 1984b. An assessment of the Georges Bank surf clam resource - summer 1984. NMFS, NEFC. Woods Hole Lab. Ref. Doc. No. 84-28.

_____. 1984c. Assessment update for Middle Atlantic offshore surf clam, Spisula solidissima, populations - autumn 1984. NMFS, NEFC. Woods Hole Lab. Ref. Doc.

No. 84-32.

Murawski, S. A. Personal communication. NMFS.

_____. 1984. Size distributions and discarding rates in the Atlantic surf clam fishery - August 1984. NMFS, NEFC. Woods Hole Lab. Ref. Doc. No. 84-25.

Serchuk, F. M. and S. A. Murawski. 1980. Assessment and status of offshore surf clam, Spisula solidissima, populations in offshore Middle Atlantic waters of the United States. NMFS, NEFC. Woods Hole Lab. Ref. Doc. No. 80-33.

Serchuk, F. M., S. A. Murawski, E. M. Henderson, and B. E. Brown. 1979. The population dynamics basis for management of offshore surf populations in the Middle Atlantic, p. 83-101. In Proceedings of northeast clam industries: management for the future. U Mass. MIT Sea Grant SP-112, 157 p.

University of Rhode Island. 1981. A characterization of marine mammals and turtles in the Mid-and North-Atlantic areas of the US outer continental shelf. Annual report for 1979. Prepared for US Dept. Interior. contract No. AA551.

US Dept. of Comm. (USDC). 1984a. Fisheries of the United States, 1983. NOAA, NMFS. Current Fishery Statistics No. 8320. (and earlier reports in this series).

_____. 1984b. Statistical Abstract of the United States. Bureau of Census.

_____. 1984c. Status of the fishery resources off the Northeastern United States for 1982. NOAA, NMFS. F/NEC-22.

_____. 1984d. Business Conditions Digest. Bureau of Census.

Wigley, R. L. 1961. Bottom sediments of Georges Bank. Journal of Sedimentary Petrology, 31(2):165-188.

Wigley, R. L., D. Maurer, and H. W. Jensen. 1976. Super gravels of eastern Georges Bank. Unpub. manuscript, NMFS, NEFC, Woods Hole, MA.

XVIII. TABLES AND FIGURES

Table 1. Surf Clam Landings and Distribution by State, 1950-1983
(millions of lbs of meat)

	New England		NY		NJ		DE		MD		VA		Total#		
	Land	%	Land	%	Land	%	Land	%	Land	%	Land	%	Land	%	Change
1950	*	1	3	42	4	55	-	-	*	2	-	-	8	100	
1951	*	*	4	34	6	53	-	-	2	13	-	-	12	100	50%
1952	*	*	4	33	7	59	-	-	1	9	-	-	13	100	8
1953	-	-	3	27	7	53	-	-	2	20	-	-	12	100	-8
1954	*	3	3	28	7	58	-	-	1	11	-	-	12	100	*
1955	*	*	2	17	8	69	-	-	2	14	-	-	12	100	*
1956	*	1	2	15	12	72	*	*	2	12	-	-	16	100	33
1957	*	*	2	9	15	85	*	1	1	5	-	-	18	100	13
1958	*	*	*	3	13	85	1	5	1	5	-	-	15	100	-17
1959	*	*	1	2	20	87	2	7	1	4	-	-	23	100	53
1960	*	*	1	3	23	94	*	2	*	2	-	-	25	100	9
1961	*	*	1	3	27	97	-	-	*	*	-	-	28	100	12
1962	*	*	1	3	30	97	*	*	*	*	-	-	31	100	11
1963	-	-	1	3	38	97	-	-	*	*	-	-	39	100	26
1964	*	*	1	3	37	97	-	-	*	*	-	-	38	100	-3
1965	*	-	2	3	42	96	-	-	*	1	-	-	44	100	16
1966	*	*	2	4	43	96	-	-	*	*	-	-	45	100	2
1967	*	*	2	5	42	92	-	-	1	3	-	-	45	100	*
1968	*	*	3	7	32	79	-	-	5	13	*	*	41	100	-9
1969	*	*	3	7	36	73	3	6	7	1	*	*	50	100	22
1970	*	*	4	6	40	59	9	13	14	20	1	1	67	100	34
1971	*	1	4	7	29	55	8	15	8	15	5	9	53	100	-21
1972	*	*	3	4	21	34	9	14	7	12	23	37	64	100	21
1973	*	*	3	4	22	26	7	8	7	9	43	53	82	100	28
1974	*	*	4	4	23	24	6	6	5	6	58	61	96	100	17
1975	*	*	5	5	36	41	2	3	5	6	39	45	87	100	-9
1976	*	*	3	7	24	50	-	-	7	15	14	29	49	100	-44
1977	1	2	3	7	23	45	-	-	8	16	16	31	52	100	6
1978	1	2	2	6	15	39	-	-	8	21	13	32	40	100	-23
1979	1	4	2	4	12	35	-	-	8	22	13	35	35	100	-13
1980	1	2	2	5	10	25	-	-	11	30	14	38	38	100	9
1981	1	1	2	5	20	44	-	-	12	25	11	24	46	100	21
1982	3	6	2	5	24	49	-	-	10	19	10	21	50	100	9
1983	4	7	2	4	24	43	-	-	7	13	18	32	56	100	12

% = % of total annual landings.

% Change = % change in total landings from previous year.

Includes any unallocated catch.

- = zero.

* = less than 500,000 lbs or .5%.

Rows may not add to Total because of rounding and unallocated catch.

Source: USDC, 1984a and unpub. prelim. NMFS data.

Table 2. FCZ and Total Surf Clam and Ocean Quahog Landings, 1967-1983
(millions of lbs of meat)

	Surf Clam					Ocean Quahog					Surf Clam + Ocean Quahog	
	FCZ		Total			FCZ		Total			Surf Clam + Ocean Quahog	
	% of Land	% Total	% Change	Land	Change	% of Land	% Total	% Change	Land	Change	Land	Change
1967	na	na	na	45		-	-		*	*	45	
1968	na	na	na	41	-9	-	-	-	*	*	41	-9
1969	na	na	na	50	22	-	-	-	1	*	50	22
1970	na	na	na	67	34	-	-	-	2	200	69	38
1971	50	95	na	53	-21	-	-	-	2	*	55	-20
1972	64	87	28	64	21	-	-	-	1	-50	65	18
1973	73	88	14	82	28	-	-	-	1	*	84	29
1974	74	77	1	96	17	-	-	-	1	*	97	15
1975	44	50	-41	87	-9	-	-	-	1	*	88	-9
1976	43	86	-2	49	-44	4	73	-	6	600	55	-38
1977	43	84	*	52	6	16	86	400	18	300	70	27
1978	31	79	-28	40	-23	20	88	25	23	28	63	-10
1979	29	82	-6	35	-13	32	91	60	35	52	70	11
1980	35	92	21	38	9	31	90	-3	34	-3	72	3
1981	37	80	6	46	21	35	98	13	36	6	82	14
1982	37	74	*	50	9	34	99	-3	35	-3	85	4
1983	45	80	22	56	12	34	97	*	35	*	91	7

- = zero. * = less than 500,000 lbs or .5%. na = data not available.
Source: USDC, 1984a and unpub. prelim. NMFS data.

Table 3. Stratified Mean Number of Surf Clams per Tow by Size Interval in Various Sampling Strata on Georges Bank during July-August 1984*

Size Interval (inches)	Stratum											
	54	61	65	67	68	69	70	71	72	73	74	
0.8 - 1.1	-	-	-	0.14	-	0.06	0.06	-	-	-	-	-
1.2 - 1.5	-	0.50	0.85	0.23	-	0.06	-	-	-	0.13	-	-
1.6 - 1.9	0.33	-	0.85	0.48	0.14	0.06	-	-	0.21	-	-	-
2.0 - 2.3	-	0.50	1.40	0.68	0.09	0.28	0.11	-	0.42	0.13	0.29	-
2.4 - 2.7	-	1.00	1.84	1.44	0.18	0.22	-	1.14	0.32	0.13	-	-
2.8 - 3.1	0.33	1.00	2.99	2.33	0.27	0.44	-	0.86	1.26	0.25	-	-
3.2 - 3.5	0.67	0.50	6.09	2.43	0.23	0.22	0.11	1.29	1.58	0.50	-	-
3.5 - 3.9	0.33	-	10.66	2.06	0.45	0.06	-	1.00	2.74	0.25	0.14	-
3.9 - 4.3	0.33	-	9.57	2.52	0.23	0.11	0.11	1.86	4.21	0.13	0.29	-
4.3 - 4.7	0.33	-	11.43	3.15	0.18	-	-	2.43	4.32	-	-	-
4.7 - 5.1	0.67	-	11.33	7.39	-	0.06	-	4.29	3.26	-	-	-
5.1 - 5.5	-	-	6.34	17.71	-	-	-	2.43	3.58	-	-	-
5.5 - 5.9	-	-	1.65	36.11	0.09	0.39	-	1.14	2.21	-	-	-
5.9 - 6.3	-	-	-	34.99	-	0.89	-	0.14	1.21	-	-	-
6.3 - 6.7	-	-	-	14.83	-	0.28	-	-	0.11	-	-	-
6.7 - 7.1	-	-	-	1.50	-	0.17	-	-	-	-	-	-
7.1 - 7.4	-	-	-	-	-	-	-	-	-	-	-	-
7.5 - 7.8	-	-	-	-	-	0.06	-	-	-	-	-	-
Total No. Per Tow	3.00	3.50	65.14	127.90	1.86	3.33	0.33	16.57	25.42	1.50	0.71	
No. of Tows	3	2	7	31	22	18	9	7	19	8	7	

* Survey included some 5-minute and some 1-minute tow durations.
Strata 57, 59, and 63 were sampled (1, 2, and 2 tows, respectively) but had no catch.
Source: Murawski and Serchuk, 1984b.

Table 4. Stratified Mean Number of Surf Clams per Tow* during NMFS Surveys of Georges Bank, 1980-1984

<u>Stratum</u>	<u>Mean Number Per Tow</u>	<u>Number of Tows</u>	<u>Proportion of Georges Bank Area**</u>
54	2.20	5	0.0302
55	0.50	2	0.0396
57	2.00	4	0.0200
59	0.25	12	0.0585
60	0.00	2	0.0881
61	0.57	14	0.0627
62	0.00	3	0.0763
63	0.50	8	0.0755
64	0.00	2	0.1075
65	56.00	12	0.0178
66	0.00	1	0.0289
67	121.48	33	0.0228
68	2.00	27	0.0403
69	2.55	33	0.1021
70	1.28	18	0.0566
71	14.63	8	0.0159
72	27.31	26	0.0548
73	1.35	17	0.0545
74	0.85	13	0.0471

*Survey tows during 1980-1983 were 5 minutes duration, tows during 1984 were 1 and 5 minutes duration.

**See Figure 1 for Stratum Areas.

Source: Murawski and Serchuk, 1984b.

Table 5. Size Distribution (% by number) of Georges Bank FCZ Surf Clam, Summer 1984

<u>Size Interval (")</u>	<u>Research Vessel Survey</u>	<u>Interview Samples</u>	<u>Observer Samples</u>
0.8 - 1.1	0.10	-	-
1.2 - 1.5	1.00	-	0.02
1.6 - 1.9	0.90	-	0.06
2.0 - 2.3	2.30	-	0.11
2.4 - 2.7	2.79	-	0.13
2.8 - 3.1	5.09	-	0.28
3.2 - 3.5	5.79	-	0.41
3.5 - 3.9	6.99	-	0.78
3.9 - 4.3	8.08	-	1.24
4.3 - 4.7	8.48	-	2.05
4.7 - 5.1	9.28	-	4.76
5.1 - 5.5	11.88	5.59	11.33
5.5 - 5.9	16.07	28.07	26.02
5.9 - 6.3	14.77	47.78	34.89
6.3 - 6.7	5.69	18.24	15.83
6.7 - 7.1	0.80	0.32	2.07
7.1 - 7.4	0.00	-	0.02
7.5 - 7.8	0.01	-	-
Mean Shell Length	4.80	6.02	5.83
Number of samples	138*	15	19**

* Stratified mean catch per tow (numbers) at length based on 138 survey stations sampled during July-August 1984.

** Number of trips sampled by NMFS observers; a total of 25,413 clams were measured.

Source: Murawski and Serchuk, 1984b.

Table 6. Calculated Mean Shell Lengths (in.) and Drained Meat Weights (lbs) at Age for Middle Atlantic FCZ Surf Clam Populations*

Age	New Jersey		Delmarva	
	Shell Length	Meat Weight	Shell Length	Meat Weight
1	1.6	0.01	1.6	0.01
2	2.8	0.04	2.9	0.03
3	3.7	0.08	3.8	0.08
4	4.4	0.13	4.5	0.12
5	4.9	0.18	5.0	0.16
6	5.3	0.23	5.4	0.20
7	5.6	0.27	5.7	0.24
8	5.8	0.30	5.9	0.26
9	6.0	0.32	6.1	0.28
10	6.1	0.35	6.2	0.29
11	6.2	0.36	6.3	0.31
12	6.3	0.37	6.4	0.32
13	6.4	0.39	6.4	0.32
14	6.4	0.39	6.5	0.33
15	6.5	0.40	6.5	0.33
16	6.5	0.40	6.5	0.33
17	6.5	0.41	6.5	0.34
18	6.5	0.41	6.5	0.34
19	6.5	0.41	6.5	0.34
20	6.5	0.41	6.5	0.34
21	6.5	0.42	6.5	0.34
22	6.6	0.42	6.6	0.34
23	6.6	0.42	6.6	0.34
24	6.6	0.42	6.6	0.34

* = Surf clams are spawned in late summer-autumn, so a 1 October birthdate is assumed.
Source: Murawski and Serchuk, 1981.

Table 7. Mid-Atlantic Surf Clam Population Estimates (weight) Based upon Areal Expansion of Survey Catch per Tow Data, 1984

Assessment Region	(1) Area of Region (sq n mi)	(2) Mean Catch/Tow (lbs)	Population estimate (millions of lbs)	% of Resource
ALL SURF CLAMS				
Northern New Jersey	3,440	12.1	389	35
Southern New Jersey	1,228	4.3	49	4
Delmarva	5,092	12.3	586	53
Southern Virginia-North Carolina	2,980	2.9	81	7
Total	12,740		1,105	100
SURF CLAMS GREATER THAN 5.5"				
Northern New Jersey	3,440	3.9	126	37
Southern New Jersey	1,228	4.1	47	14
Delmarva	5,092	2.9	138	40
Southern Virginia-North Carolina	2,980	1.1	30	9
Total	12,740		341	100

(1) and (2) Murawski and Serchuk, 1984c.

Table 8. Mid-Atlantic Surf Clam Vessel* Performance, 1979 - 1983

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	
Class	Vessels	Bu (000)	Hours at Sea (000)	Hours Fishing (000)	Bu/ Vessel (000)	Hrs. at Sea/ Vessel	Fishing Hrs./ Vessel	CPUE	Rel. Fishing Power	Rel. CPUE	
1979	1	26	100	9	6	4	336	214	17	1.0	1.0
	2	56	374	34	19	7	599	339	19	1.7	1.1
	3	71	1,177	64	38	15	808	479	31	3.9	1.8
	Total	161	1,650	106	62	10	659	386	26		
1980	1	14	80	6	4	6	403	259	21	1.0	1.0
	2	49	495	33	20	10	671	409	24	1.8	1.1
	3	65	1,346	58	35	21	896	532	38	3.6	1.8
	Total	128	1,921	97	58	15	756	455	32		
1981	1	15	65	5	3	4	312	194	22	1.0	1.0
	2	43	469	21	12	11	482	280	38	2.5	1.7
	3	64	1,437	52	26	22	827	403	55	5.2	2.5
	Total	122	1,971	77	41	16	631	334	48		
1982	1	14	93	7	5	7	522	339	19	1.0	1.0
	2	42	469	27	17	11	645	411	27	1.7	1.4
	3	58	1,441	62	33	25	1,064	576	43	3.7	2.3
	Total	114	2,003	96	55	18	843	486	36		
1983	1	13	112	6	4	9	482	306	28	1.0	1.0
	2	43	666	25	16	15	575	375	41	1.8	1.4
	3	57	1,546	52	28	27	913	482	56	3.2	2.0
	Total	113	2,324	83	48	21	734	421	48		

Column Notes:

- (1), (2), (3), and (4) from vessel logbook data.
- (5) = (2) divided by (1). Total rows = total for (2) divided by total for (1).
- (6) = (3) divided by (1). Total rows = total for (3) divided by total for (1).
- (7) = (4) divided by (1). Total rows = total for (4) divided by total for (1).
- (8) = (2) divided by (4). Total rows = total for (2) divided by total for (4).
- (9) = (5) for each Class divided by (5) for Class 1.
- (10) = (8) for each Class divided by (8) for Class 1.

Class 1 = less than 50 Gross Registered Tons (GRT); Class 2 = 51-100 GRT; Class 3 = greater than 100 GRT.

* = includes all vessels that landed surf clams; i.e., vessels that landed only surf clams and the clams landed by vessels that caught both surf clams and ocean quahogs.

Source: unpub. prelim. NMFS logbook data.

Table 9. Monthly Catch and Effort Summary for the Georges Bank Surf Clam Fishery, 1984.

Month	Total Catch (Bushels)	Total Hours Fished	Data for CPUE calculations*		CPUE Bushels/Hour
			Total Catch	Hours Fished	
May	22,929	77.0	22,929	77.0	298
June	56,718	238.0	54,909	238.0	231
July	89,420	683.0	83,177	683.0	122
August	89,344	886.5	74,178	886.5	84
September	87,774	701.5	76,768	701.5	109
October	5,737	44.0	5,737	44.0	130
TOTAL	351,922	2630.0	317,698	2630.0	121

*Data used when catch and hours fished were greater than 0 for individual trip records.

Source: Murawski and Serchuk, 1984b.

Table 10. Ocean Quahog Vessel Performance, 1979 - 1983

	Class	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
		Vessels	Bu (000)	Hours at Sea (000)	Hours Fishing (000)	Bu/ Vessel (000)	Hrs. at Sea/ Vessel	Fishing Hrs./ Vessel	CPUE	Rel. Fishing Power	Rel. CPUE
1979	A	19	342	8	3	18	396	168	107	1.0	1.0
	B	39	2,694	38	22	69	985	568	121	3.8	1.1
	Total	58	3,036	46	25	52	792	437	119		
1980	A	17	249	5	2	13	319	146	100	1.0	1.0
	B	36	2,702	42	23	75	1,159	638	117	5.8	1.2
	Total	53	2,952	47	25	56	889	480	115		
1981	A	9	161	4	2	18	438	208	86	1.0	1.0
	B	39	2,728	40	22	70	1,025	558	125	3.9	1.5
	Total	48	2,889	44	24	60	914	493	122		
1982	A	10	160	4	2	16	376	210	76	1.0	1.0
	B	34	3,082	41	22	91	1,195	642	141	5.7	1.9
	Total	44	3,242	44	24	74	1,009	543	135		
1983	A	7	140	3	2	20	454	252	79	1.0	1.0
	B	30	3,061	41	21	102	1,363	705	144	5.1	1.8
	Total	37	3,201	44	23	87	1,191	619	139		

* = Class A = 100 GRT or less; Class B = greater than 100 GRT.

(1), (2), (3), and (4) from vessel logbook data.

(5) = (2) divided by (1).

(6) = (3) divided by (1).

(7) = (4) divided by (1).

(8) = (2) divided by (4).

(9) = (5) for each Class B divided by (5) for Class A.

(10) = (8) for each Class B divided by (8) for Class A.

Source: unpub. prelim. NMFS logbook data.

Table 11. Mid-Atlantic Surf Clam Fishery, Vessel Distribution by Class, 1965-1983

	Class 1			Class 2			Class 3			Total	
	No.	% of Total	% Change	No.	% of Total	% Change	No.	% of Total	% Change	No.	% Change
1965	33	48		33	48		2	3		68	
1966	34	46	3	34	46	3	6	8	200	74	9
1967	40	44	18	40	44	18	11	12	83	91	23
1968	38	44	-5	42	49	5	6	7	-46	86	-6
1969	32	35	-16	56	61	33	4	4	-33	92	7
1970	33	32	3	59	57	5	12	12	200	104	13
1971	28	30	-15	46	50	-22	18	20	50	92	-12
1972	29	32	4	44	49	-4	17	19	-6	90	-2
1973	32	34	10	44	47	-	17	18	-	93	3
1974	35	36	9	46	47	5	17	17	-	98	5
1975	35	35	-	46	46	-	18	18	6	99	1
1976	33	27	-6	55	45	20	34	28	89	122	23
1977*	22	14	-33	56	36	2	77	50	126	155	27
1978**	21	13	-5	58	37	4	78	50	1	157	1
1979**	28	17	33	56	34	-3	81	49	4	165	5
1980**	14	11	-50	49	38	-13	65	51	-20	128	-22
1981**	15	12	7	43	35	-12	64	52	-1	122	-5
1982**	14	12	-7	42	37	-2	58	51	-9	114	-7
1983**	13	12	-7	43	38	2	57	50	-2	113	-1

* = licenses issued as of 31 Dec. 1977.

** = vessels active in the fleet as of 31 Dec., based on logbook reports.†

- = zero.

Rows may not add to Total because of rounding.

Source: unpub. prelim. NMFS logbook data.

Table 12. Physical Characteristics of Mid-Atlantic Surf Clam Vessels, 1979-1983

	Length (ft.)			Gross Tonnage			Dredge (in.)			Horsepower			Crew Size		
	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean
1979	28	146	79	6	306	112	16	240	90	60	1330	389	1	11	4
1980	43	146	81	24	306	117	16	240	107	60	1000	400	1	9	4
1981	43	146	81	24	306	117	16	240	107	60	1330	389	1	9	4
1982	45	146	82	24	306	115	36	240	105	90	1330	434	1	9	4
1983	54	146	82	34	306	115	60	240	108	225	1000	560	2	6	5

Note: 240" represents double 120" dredges; largest single dredge was 200".

Source: unpub. NMFS data.

Table 13. Surf Clam and Ocean Quahog Permits by State of Registry, 1983

	<u>Surf Clam/Ocean Quahog</u>		<u>Ocean Quahog</u>		<u>Surf Clam/New England</u>	
	<u>Number</u>	<u>%</u>	<u>Number</u>	<u>%</u>	<u>Number</u>	<u>%</u>
ME	-	-	36	23	55	15
NH	-	-	11	7	17	5
MA	2	1	72	46	210	58
RI	4	3	14	9	35	10
CT	-	-	1	1	3	1
NY	5	3	7	4	5	1
NJ	65	44	7	4	7	2
PA	9	6	-	-	-	-
DE	3	2	1	1	1	1
MD	40	27	-	-	19	5
VA	20	14	5	3	7	2
Other	-	-	2	1	3	1
Total	<u>148</u>	<u>100</u>	<u>156</u>	<u>100</u>	<u>362</u>	<u>100</u>

Source: unpub. prelim. NMFS data.

Table 14. Number of Vessels by Class that Made at Least One Trip for Mid-Atlantic Surf Clams, Ocean Quahogs, or both Mid-Atlantic Surf Clams and Ocean Quahogs by Year and Quarter, 1979-1983 and by Month, 1984

		Clam Only				Quahog Only				Clam & Quahog				Clam Only + Clam & Quahog				All			
		1	2	3	All	1	2	3	All	1	2	3	All	1	2	3	All	1	2	3	All
1979	1	19	33	41	93	-	3	11	14	-	2	17	19	19	35	58	112	19	38	69	126
	2	18	37	42	97	-	1	4	5	-	5	27	32	18	42	69	129	18	43	73	134
	3	13	35	36	84	1	2	11	14	-	9	16	25	13	44	52	109	14	46	63	123
	4	13	33	36	82	2	3	13	18	-	7	17	24	13	40	53	106	15	43	66	124
	Yr	25	43	44	112	2	1	5	8	1	14	35	50	26	57	79	162	28	58	84	170
1980	1	11	40	30	81	-	2	16	18	1	3	17	21	12	43	47	102	12	45	63	120
	2	11	33	28	72	-	2	15	17	-	6	14	20	11	39	42	92	11	41	57	107
	3	10	32	30	72	-	2	10	12	-	5	18	23	10	37	48	95	10	39	58	107
	4	6	30	34	70	-	2	11	13	3	6	13	24	9	36	47	94	9	38	58	107
	Yr	9	38	34	81	-	1	5	6	4	11	31	48	13	49	65	129	13	50	70	135
1981	1	8	32	34	74	-	1	11	12	-	3	19	22	8	35	53	96	8	36	64	108
	2	10	32	32	74	-	2	8	10	-	3	20	23	10	35	52	97	10	37	60	107
	3	11	29	34	74	-	2	11	13	1	4	18	23	12	33	52	97	12	35	63	110
	4	11	28	30	69	-	2	12	14	1	4	17	22	12	32	47	91	12	34	59	106
	Yr	14	36	29	79	-	1	4	5	1	7	35	43	15	43	64	122	15	44	68	127
1982	1	10	29	33	72	-	2	14	16	-	2	18	20	10	31	51	92	10	33	65	108
	2	12	30	36	78	-	1	12	13	-	5	13	18	12	35	49	96	12	36	61	109
	3	8	32	32	72	-	-	9	9	2	6	18	26	10	38	50	98	10	38	59	107
	4	11	31	38	80	-	-	13	13	-	4	10	14	11	35	48	94	11	35	61	107
	Yr	12	35	31	78	-	1	7	8	2	7	27	36	14	42	58	114	14	43	65	122
1983	1	10	28	36	74	-	-	17	17	-	5	9	14	10	33	45	88	10	33	62	105
	2	8	28	35	71	-	3	19	22	1	1	5	7	9	29	40	78	9	32	59	100
	3	9	35	35	79	-	1	13	14	1	3	10	14	10	38	45	93	10	39	58	107
	4	10	35	37	82	-	1	14	15	-	2	11	13	10	37	48	95	10	38	62	110
	Yr	12	37	37	86	-	-	10	10	1	6	20	27	13	43	57	113	13	43	67	123
1984	Jan	8	35	38	81	-	1	15	16	1	2	7	10	9	37	45	91	9	38	60	107
	Feb	9	35	32	76	-	3	17	20	-	-	7	7	9	35	39	83	9	38	56	103
	Mar	7	30	30	67	-	2	16	18	-	2	8	10	7	32	38	77	7	34	54	95
	Apr	6	30	26	62	-	1	13	14	1	5	12	18	7	35	38	80	7	36	51	94

Clam Only = vessels landing only Mid-Atlantic Area surf clams.

Quahog Only = vessels landing only ocean quahogs.

Clam & Quahog = vessels landing both Mid-Atlantic Area surf clams and ocean quahogs.

Source: unpub. prelim. NMFS logbook data.

**Table 15. Distribution of Trips of Vessels Catching
Mid-Atlantic Surf Clams Only, Ocean Quahogs Only, and Mid-Atlantic
Surf Clams and Ocean Quahogs, by Class, 1983**

Number of Trips	Surf Clam Only by Class								Quahog Only Class 3		Clam & Quahog Class 3	
	1		2		3		Total		%	Cum	%	Cum
	%	Cum	%	Cum	%	Cum	%	Cum	%	Cum	%	Cum
1-10	38%	38%	22%	22%	6%	6%	19%	19%	9%	9%	-%	-%
11-20	-	38	-	22	3	9	1	20	-	9	-	-
21-30	15	54	14	36	22	31	17	37	-	9	6	6
31-40	-	54	17	53	3	34	9	46	9	18	6	12
41-50	31	85	19	72	13	47	19	64	-	18	-	12
51-60	15	100	11	83	9	56	11	75	-	18	-	12
61-70	-	-	14	97	25	81	16	91	-	18	6	18
71-80	-	-	-	97	16	97	6	98	-	18	11	29
81-90	-	-	3	100	-	97	1	99	9	27	22	51
91-100	-	-	-	-	3	100	1	100	18	45	6	57
101+	-	-	-	-	-	-	-	-	55	100	44	100
Per vessel:												
Mean Trips		28		39		54		43		95		96
Peak Trips		52		95		93		95		131		160
Median Trips		28		40		61		47		107		93

Source: unpub. prelim. NMFS logbook data.

Table 16. Distribution of Mid-Atlantic Surf Clam Only Trips by Day, 1984

	<u>Share of Total Trips</u>
Sunday	19%
Monday	24
Tuesday	24
Wednesday	21
Thursday	12
Total (4,721 trips)	<u>100%</u>

Source: unpub. prelim. NMFS logbook data.

Table 17. Mid-Atlantic Allowable Surf Clam Fishing Time (hours/week)
17 November 1977 - 31 December 1984

Date	Hrs/wk	Number of Weeks	Number of Hours
11/17/77	48	6	288
1/1/78	96	4	384
1/30/78	48	6	288
3/10/78	Close	3	-
4/1/78	48	5	240
5/7/78	24	21	504
10/1/78	36	4	144
10/30/78	24	8	192
12/21/78	Close	1	-
1/1/79	24	9	216
2/27/79	36	5	180
4/1/79	24	27	648
10/15/79	36	11	396
1/1/80	24	9	216
2/18/80	36	6	216
3/31/80	24	3	72
4/20/80	36	4	144
5/18/80	48	6	288
6/29/80	24	1	24
7/7/80	48	9	432
9/28/80	24	14 (80), 29 (81)	336 (80), 696 (81)
7/21/81	12	23	276
1/4/82	24	52 (82), 52 (83), 8 (84)	1,248 (82), 1,248 (83), 192 (84)
2/26/84	12	17	204
6/24/84	Close	2	-
7/8/84	12	10	120
9/16/84	Close	2	-
9/30/84	12	7	84
11/18/84	6 every other	4	12
12/16/84	6	1	6
12/23/84	Close	1	-

Table 18. Mid-Atlantic Allowed Surf Clam Fishing Time by Weeks, 1978-1984

	Close	Hours/Week							Total
		6 every other	6	12	24	36	48	96	
1978	4	-	-	-	29	4	11	4	
1979	-	-	-	-	36	16	-	-	
1980	-	-	-	-	27	10	15	-	
1981	-	-	-	23	29	-	-	-	
1982	-	-	-	-	52	-	-	-	
1983	-	-	-	-	52	-	-	-	
1984	5	4	1	34	8	-	-	-	
Total	9	4	1	57	233	30	26	4	364
	2%	1%	*	16%	64%	8%	7%	1%	100%

* = less than 0.5%.

Table 19.1 Mid-Atlantic Allowed Surf Clam Fishing Time by Hours, 1978-1984

	Hours/Week							Total	Change
	6 every other	6	12	24	36	48	96		
1978	-	-	-	696	144	528	384	1,752	
	-	-	-	40%	8%	30%	22%	100%	
1979	-	-	-	864	576	-	-	1,440	-18%
	-	-	-	60%	40%	-	-	100%	
1980	-	-	-	648	360	720	-	1,728	20%
	-	-	-	38%	21%	42%	-	100%	
1981	-	-	276	696	-	-	-	972	-44
	-	-	28%	72%	-	-	-	100%	
1982	-	-	-	1,248	-	-	-	1,248	28
	-	-	-	100%	-	-	-	100%	
1983	-	-	-	1,248	-	-	-	1,248	-
	-	-	-	100%	-	-	-	100%	
1984	12	6	408	192	-	-	-	618	-50%
	2%	1%	66%	31%	-	-	-	100%	
Total	12	6	684	5,592	1,080	1,248	384	9,006	
	*	*	8%	62%	12%	14%	4%	100%	

* = less than 0.5%.

Table 20. Surf Clam Ex-Vessel Value (millions of \$) and Distribution (%) by State

	NE		NY		NJ		DE		MD		VA		Total#	
	Val	%	Val	%	Val	%	Val	%	Val	%	Val	%	Val	%
1950	*	1	*	43	*	54	-	-	*	1	-	-	1	100
1951	*	1	*	36	1	52	-	-	*	12	-	-	1	100
1952	*	*	*	31	1	57	-	-	*	12	-	-	1	100
1953	-	-	*	30	1	56	-	-	*	15	-	-	1	100
1954	*	2	*	29	1	58	-	-	*	12	-	-	1	100
1955	*	*	*	19	1	71	-	-	*	10	-	-	1	100
1956	*	2	*	17	1	72	*	-	*	10	-	-	2	100
1957	*	*	*	10	2	83	*	*	*	6	-	-	2	100
1958	*	-	*	4	1	84	*	6	*	6	-	-	2	100
1959	*	*	*	3	2	84	*	9	*	4	-	-	2	100
1960	*	-	*	5	2	90	*	3	*	2	-	-	2	100
1961	*	*	*	4	2	96	-	-	*	*	-	-	2	100
1962	*	*	*	4	2	95	*	1	*	*	-	-	2	100
1963	-	-	*	3	3	96	-	-	*	*	-	-	3	100
1964	*	*	*	4	3	96	-	-	*	*	-	-	3	100
1965	*	-	*	4	3	95	-	-	*	1	-	-	3	100
1966	*	*	*	4	4	96	-	-	*	*	-	-	4	100
1967	*	*	*	4	4	93	-	-	*	2	-	-	4	100
1968	*	*	*	7	3	80	-	-	1	13	*	*	4	100
1969	*	*	*	7	4	72	*	6	1	15	*	*	6	100
1970	*	1	*	6	5	61	1	12	1	19	*	1	8	100
1971	*	*	*	6	4	56	1	15	1	14	1	8	7	100
1972	*	1	*	4	3	35	1	14	1	15	3	32	8	100
1973	*	*	*	4	3	28	1	8	1	12	5	48	10	100
1974	*	*	1	6	3	24	1	6	1	8	7	56	12	100
1975	*	*	1	6	5	38	*	3	1	8	6	45	13	100
1976	*	*	1	5	11	46	-	-	4	16	8	32	23	100
1977	*	2	1	4	12	44	-	-	5	18	9	33	27	100
1978	*	1	1	4	8	36	-	-	5	24	7	35	21	100
1979	1	3	1	3	6	32	-	-	5	23	7	37	20	100
1980	*	2	1	4	5	25	-	-	6	30	8	39	19	100
1981	*	1	1	3	10	41	-	-	6	26	7	29	23	100
1982	2	7	1	3	12	45	-	-	5	21	6	24	26	100
1983	2	8	1	4	10	40	-	-	3	12	8	32	25	100

Includes any unallocated value. - = zero. * = less than \$500,000 or .5%.

Rows may not add to Total because of rounding.

Source: USDC, 1984a and unpub. prelim. NMFS data.

Table 21. FCZ and Total Surf Clam Ex-Vessel Value (millions of \$)

	FCZ					Total			
	Current \$		Deflated \$**		% of Total	Current \$		Deflated \$**	
	Value	Change	Value	Change		Value	Change	Value	Change
1974	10		6		83	12		8	
1975	7	-30%	4	-33%	54	13	8%	7	-13%
1976	21	300%	12	300%	91	23	77%	13	86%
1977	24	14%	12	*	89	27	17%	14	8%
1978	18	-25%	9	-25%	86	21	-22%	10	-29%
1979	17	-6%	7	-22%	85	20	-5%	8	-20%
1980	18	6%	7	*	95	19	-5%	7	-13%
1981	20	11%	7	*	87	23	21%	8	14%
1982	21	5%	7	*	81	26	13%	8	*
1983	21	*	7	*	84	25	19%	8	*

* = less than .5%. ** = Using Producer Prices, All Commodities, 1967 = 100.

Source: USDC, 1984a, 1984d, and unpub. prelim. NMFS data.

Table 22. Surf Clam Price Per Pound, 1950-1982

	Total		FCZ	
	Current	Deflated*	Current	Deflated*
1950	\$.10	\$.12	\$ -	\$ -
1951	.10	.11	-	-
1952	.11	.13	-	-
1953	.11	.13	-	-
1954	.12	.14	-	-
1955	.11	.13	-	-
1956	.11	.12	-	-
1957	.12	.13	-	-
1958	.11	.11	-	-
1959	.08	.09	-	-
1960	.07	.07	-	-
1961	.06	.07	-	-
1962	.07	.07	-	-
1963	.07	.07	-	-
1964	.07	.07	-	-
1965	.07	.08	-	-
1966	.09	.09	-	-
1967	.10	.10	-	-
1968	.10	.10	-	-
1969	.12	.11	-	-
1970	.11	.10	-	-
1971	.13	.11	-	-
1972	.12	.10	-	-
1973	.12	.09	-	-
1974	.13	.08	.13	.08
1975	.14	.08	.15	.09
1976	.47	.26	.50	.27
1977	.52	.27	.55	.28
1978	.53	.25	.58	.28
1979	.56	.24	.58	.25
1980	.51	.19	.52	.19
1981	.51	.17	.55	.19
1982	.52	.17	.57	.19
1983	.45	.15	.47	.16

- = zero. * = Using Producer Prices, All Commodities, 1967 = 100.

Source: USDC, 1984a, 1984d, and unpub. prelim. NMFS data.

Table 23. Mid-Atlantic FCZ Surf Clam Vessel Average Deflated Gross Revenue, 1979 - 1983 (bu in thousands)

	Class	Vessels (1)	Bu (2)	\$/lb (3)	\$/bu (4)	Ave. Gross Revenue (5)
1979	1	26	100	\$.25	\$ 4.25	\$ 16,000
	2	56	374	.25	4.25	28,000
	3	71	1,177	.25	4.25	70,000
	Total	161	1,650	.25	4.25	44,000
1980	1	14	80	.19	3.23	18,000
	2	49	495	.19	3.23	33,000
	3	65	1,346	.19	3.23	67,000
	Total	128	1,921	.19	3.23	48,000
1981	1	15	65	.19	3.23	14,000
	2	43	469	.19	3.23	35,000
	3	64	1,437	.19	3.23	73,000
	Total	122	1,971	.19	3.23	52,000
1982	1	14	93	.19	3.23	21,000
	2	42	469	.19	3.23	36,000
	3	58	1,441	.19	3.23	80,000
	Total	114	2,003	.19	3.23	57,000
1983	1	13	112	.16	2.72	23,000
	2	43	666	.16	2.72	42,000
	3	57	1,546	.16	2.72	74,000
	Total	113	2,324	.16	2.72	56,000

(1) and (2) from Table 8.

(3) = FCZ price per lb deflated for inflation from Table 22.

(4) = (3) × 17 lbs per bu.

(5) = (2) × (4) divided by (1).

Table 24. Ocean Quahog Ex-Vessel Value (millions of \$), by Water Area

	Territorial Sea					FCZ					Total			
	Current		Deflated		% of Total	Current		Deflated		% of Total	Current		Deflated	
	Value	Ch.	Value	Ch.		Value	Ch.	Value	Ch.		Value	Ch.	Value	Ch.
1967	*	*	*	*	100	-	-	-	-	-	*	*	*	*
1968	*	*	*	*	100	-	-	-	-	-	*	*	*	*
1969	*	*	*	*	100	-	-	-	-	-	*	*	*	*
1970	*	*	*	*	100	-	-	-	-	-	*	*	*	*
1971	*	*	*	*	100	-	-	-	-	-	*	*	*	*
1972	*	*	*	*	100	-	-	-	-	-	*	*	*	*
1973	*	*	*	*	100	-	-	-	-	-	*	*	*	*
1974	*	*	*	*	100	-	-	-	-	-	*	*	*	*
1975	*	*	*	*	100	-	-	-	-	-	*	*	*	*
1976	*	*	*	*	23	1	-	1	-	77	2	552	1	524
1977	1	88	*	*	13	5	500	3	300	83	6	300	3	300
1978	1	*	*	*	11	6	20	3	*	86	7	17	3	*
1979	1	*	*	*	9	9	50	4	33	90	10	43	4	33
1980	1	*	*	*	10	9	*	3	-25	90	10	*	4	*
1981	*	-83	*	*	2	10	11	3	*	98	10	*	3	-25
1982	*	*	*	*	2	10	*	4	33	98	11	10	4	33
1983	1	88	*	*	5	10	*	4	*	95	11	*	4	*

Ch. = % change from previous year. - = zero. * = less than \$500,000 or .5%.

Deflated using Producer Prices, All Commodities, 1967 = 100.

Source: USDC, 1984a, 1984d, and unpub. prelim. NMFS data.

Table 25. Ocean Quahog Average Price per Pound, by Water Area
(\$ per pound, Deflated: 1967 = 100)

	Territorial Sea		FCZ		Total	
	Current	Deflated	Current	Deflated	Current	Deflated
1967	\$.13	\$.13	\$ -	\$ -	\$.13	\$.13
1968	.13	.13	-	-	.13	.13
1969	.15	.15	-	-	.15	.15
1970	.17	.16	-	-	.17	.16
1971	.17	.15	-	-	.17	.15
1972	.17	.14	-	-	.17	.14
1973	.17	.13	-	-	.17	.13
1974	.17	.11	-	-	.17	.11
1975	.19	.11	-	-	.19	.11
1976	.25	.14	.30	.16	.29	.16
1977	.28	.15	.31	.16	.30	.16
1978	.29	.14	.29	.14	.29	.14
1979	.31	.13	.29	.12	.29	.13
1980	.31	.11	.30	.11	.30	.11
1981	.19	.06	.28	.10	.28	.10
1982	.38	.13	.31	.10	.31	.10
1983	.36	.12	.30	.10	.31	.10

- = zero.

Deflated using Producer Prices, All Commodities, 1967 = 100.

Source: USDC, 1984a, 1984d, and unpub. prelim. NMFS data.

Table 26. Supply Indicators

	1965	1974	1983
VESSELS			
Total Number	68	98	113
% Class 3	3	17	50
Effort	Full	Full	Part
Hours/week	96	96	24
WHOLESALE FUEL PRICE INDEX (deflated)	1.02	1.43	2.29
Fuel Price/Ex-Vessel Surf Clam Price	13.9	16.3	15.2

Table 27. Demand Indicators

	1965	1974	1983
CONSUMER			
Population (millions)	192	211	232
Per Capita Disposable Income (d\$)	2,625	3,195	3,375
Per Capita Eating & Drinking Establishment Sales (d\$)	115	134	173
% Eating & Drinking Estab. Sales/Disposable Income	4.5	4.2	5.1
Per Capita Consumption of Commercial Fish & Shellfish (lbs of edible meat)	10.8	12.1	12.9
Unemployment Rate (%)	4.5	5.6	9.6
Prime Interest Rate (%)	5.1	11.3	10.8
Consumer Price Index	.97	1.48	2.97
COMPETING PRODUCTS			
Index of Retail Soup Prices (deflated)	.61	.58	.48
Processed Clam Chowder & Juice (d\$/lb)	.20	.24	.20
Soup Price/Clam Chowder & Juice	3.1	2.4	2.4
Processed Canned Shrimp (d\$/lb)	1.39	1.28	2.00
Processed Canned Clams Whole & Minced (d\$/lb)	.81	.86	.62
Canned Shrimp Price/Canned Clam Price	1.72	1.49	3.23
Processed Breaded Shrimp (d\$/lb)	.83	1.05	1.24*
Processed Breaded Strips (d\$/lb)	N/A	.70	.70*
Breaded Shrimp Price/Breaded Strips Price	N/A	1.49	1.78*
Sea Scallops (d\$/lb)	.68	1.03	1.84
Sea Scallop Price/Surf Clam Ex-vessel Price	9.4	11.7	12.1
Gulf Shrimp (d\$/lb)	.37	.50	.71
Gulf Shrimp Price/Surf Clam Ex-vessel Price	5.1	5.7	4.7
Finfish Index	100#	230	465
Surf Clam Index	100#	137	445
Finfish Index/Surf Clam Index	1	1.7	1
Hard Clam Price (d\$/lb)	.69	.90	1.00
Hard Clam Price/Surf Clam Ex-vessel Price	9.6	10.2	6.6

d\$ = deflated \$ (1967 = 100). * = 1982 estimate. # = 1967.

Table 28. Supply and Demand Indicators

	1965	1974	1983
SURF CLAM EX-VESSEL PRICE (d\$/lb)	.08	.08	.15
TOTAL SURF CLAM REVENUE (d\$ in millions)	3.5	7.7	8.4
TOTAL OCEAN QUAHOG REVENUE (d\$ in millions)	N/A	N/A	3.5
TOTAL CLAM SUPPLY (lbs in millions)			
Beginning Frozen Inventories	N/A	2	5
Surf Clam Landings	38	96	56
Ocean Quahog Landings	-	1	35
Hard Clam Landings	15	15	14
Soft Clam Landings	11	10	8
Imports	2	5	11
Total	66	129	129
Lbs per capita	.34	.61	.56

d\$ = deflated \$ (1967 = 100).^c

Table 29. Surf Clam (SC) and Ocean Quahog (OQ) Landings (bu), Ex-vessel Value (\$ and deflated 1967 \$), Price (\$/bu and deflated 1967 \$/bu), and Per Capita Landings (bu), by Quarter, 1975-1984

	Surf Clams					Ocean Quahogs					Per Capita		
	Landing (bu)	Ex-vessel Value (\$)	Value (d\$)	Price (\$)	Price (d\$)	Landing (bu)	Ex-vessel Value (\$)	Value (d\$)	Price (\$)	Price (d\$)	SC (bu)	OQ (bu)	
1975	1	1318915	2944200	1719742	2.23	1.30	8623	27193	15883	3.15	1.83	0.00621	0.00004
	2	1379488	3409835	1971002	2.47	1.42	50243	123377	71316	2.45	1.41	0.00648	0.00023
	3	1158941	3039489	1720140	2.62	1.48	24866	47935	27127	1.92	1.08	0.00543	0.00011
	4	1253146	3140649	1758482	2.50	1.39	37224	72806	40764	1.95	1.09	0.00586	0.00017
1976	1	698838	3611582	2012023	5.16	2.87	38338	87670	48841	2.28	1.27	0.00326	0.00017
	2	657876	5236109	2875403	7.95	4.36	98418	243827	133897	2.47	1.35	0.00306	0.00045
	3	857472	8065083	4376062	9.40	5.10	164690	501395	272053	3.04	1.64	0.00399	0.00076
	4	672538	6400895	3441341	9.51	5.11	270239	799597	429890	2.95	1.58	0.00312	0.00125
1977	1	732498	7156566	3764632	9.77	5.13	500182	1529145	804389	3.05	1.60	0.00339	0.00231
	2	957006	9386735	4821127	9.80	5.03	588911	1742794	895117	2.95	1.51	0.00442	0.00272
	3	728803	5573071	2859451	7.64	3.91	379426	1108367	568684	2.92	1.49	0.00336	0.00175
	4	577730	4276589	2168655	7.40	3.75	361545	1070924	543064	2.96	1.50	0.00266	0.00166
1978	1	585685	4319906	2138567	7.37	3.64	557485	1660994	822274	2.97	1.47	0.00269	0.00256
	2	679213	6784146	3261608	9.98	4.79	546495	1617372	777582	2.95	1.41	0.00311	0.00250
	3	527674	5018035	2375963	9.50	4.49	509472	1490505	705731	2.92	1.38	0.00241	0.00233
	4	507109	4746789	2197587	9.36	4.33	740761	2103431	973810	2.83	1.31	0.00231	0.00338
1979	1	478194	4091444	1827353	8.55	3.81	743319	2132933	952627	2.86	1.27	0.00218	0.00338
	2	544266	5218961	2251493	9.58	4.13	947088	2762942	1191950	2.91	1.25	0.00247	0.00430
	3	578140	5691207	2380262	9.84	4.11	783078	2308989	965700	2.94	1.22	0.00262	0.00355
	4	444183	4175325	1687000	9.40	3.79	968008	2920317	1179926	3.01	1.21	0.00201	0.00438
1980	1	443807	3831350	1479285	8.63	3.33	896076	2712373	1047248	3.02	1.16	0.00196	0.00396
	2	597501	5282923	1999592	8.84	3.34	939394	2809615	1063442	2.99	1.13	0.00263	0.00414
	3	627535	5407775	1981595	8.61	3.15	779371	2343442	858718	3.00	1.09	0.00276	0.00342
	4	560365	4679965	1676205	8.35	2.99	754921	2266673	811845	3.00	1.07	0.00245	0.00331
1981	1	603004	5126101	1782371	8.50	2.95	859351	2619243	910724	3.04	1.05	0.00263	0.00376
	2	901869	7764420	2640061	8.60	2.92	765878	2325760	790805	3.03	1.03	0.00393	0.00334
	3	585546	5545793	1872945	9.47	3.19	692753	2114564	714138	3.05	1.03	0.00255	0.00301
	4	587733	4748411	1605277	8.07	2.72	636370	1929563	652320	3.03	1.02	0.00255	0.00276
1982	1	793147	6352264	2129488	8.00	2.68	968104	2901062	972531	2.99	1.00	0.00343	0.00419
	2	681143	6387117	2139021	9.37	3.13	851871	2605604	872606	3.05	1.02	0.00294	0.00368
	3	679213	6450495	2150165	9.49	3.16	815221	2507114	835704	3.07	1.02	0.00293	0.00351
	4	733829	6264360	2086033	8.53	2.84	902029	2771078	922769	3.07	1.02	0.00315	0.00388
1983	1	774313	6198580	2062755	8.00	2.66	907417	2778235	924537	3.06	1.01	0.00332	0.00389
	2	750103	5943156	1914059	7.92	2.55	944434	2892833	931669	3.06	0.98	0.00321	0.00404
	3	870553	6522383	2140591	7.49	2.45	863140	2627699	862388	3.04	0.99	0.00372	0.00368
	4	844417	5647395	1848574	6.68	2.18	878767	2684899	878854	3.05	0.99	0.00360	0.00374
1984	1	1154154	8532141	2762104	7.39	2.39	915363	2791195	903591	3.04	0.98	0.00491	0.00389
	2	1086157	9367135	3007105	8.62	2.76	1049102	3207657	1029745	3.05	0.97	0.00460	0.00445
	3	941684	7975860	2565410	8.46	2.72	836707	2553270	821251	3.05	0.98	0.00398	0.00354
	4	968894	8613403	2783905	8.88	2.87	1140859	3496870	1130210	3.06	0.98	0.00409	0.00481

Source: unpub. NMFS data.

Table 30. Quarterly Price and Ex-Vessel Value Impacts of Alternative Management Strategies Based on Quarterly Surf Clam Price Model*

Case	Quarterly Catch			Total	Price	Ex-Vessel Value
	Base	Nantucket Shoals	Georges Bank			
1	1,061,000	-	-	1,061,000	\$8.25	\$ 8,753,250
2	1,061,000	-	2,500	1,063,500	8.24	8,763,240
3	1,061,000	-	10,000	1,071,000	8.19	8,775,506
4	1,061,000	-	30,000	1,091,000	8.08	8,818,498
5	1,061,000	-	120,000	1,181,000	7.58	8,957,117
6	1,061,000	7,000	-	1,068,000	8.21	8,768,675
7	1,061,000	28,000	-	1,809,000	8.09	8,814,399
8	1,061,000	56,000	-	1,117,000	7.94	8,867,762
9	1,061,000	7,000	10,000	1,078,000	8.15	8,791,058
10	1,061,000	28,000	30,000	1,119,000	7.93	8,871,242
11	1,061,000	56,000	120,000	1,237,000	7.27	8,998,074
12	1,061,000		14,000	1,075,000	8.17	8,784,459
13	1,061,000		28,000	1,089,000	8.09	8,814,399
14	1,061,000		140,000	1,201,000	7.47	8,975,734
15	1,061,000		20,000	1,081,000	8.14	8,797,556
16	1,061,000		40,000	1,101,000	8.03	8,838,333
17	1,061,000		200,000	1,261,000	7.14	9,004,990

* The model is discussed in Section IX.A.4. The variables are:

SCP = surf clam price (\$ per bu) in nominal terms.

SCL = surf clam landings in bu.

DPY = per capita disposable personal income in 1972 dollars.

D1 = 1 for 1976 quarters 3 and 4 and 1977 quarters 1 and 2; else 0.

The equation is: $SCP = -0.00000554 \times SCL + 0.00469 \times DPY + 3.52 \times D1 - 9.14$

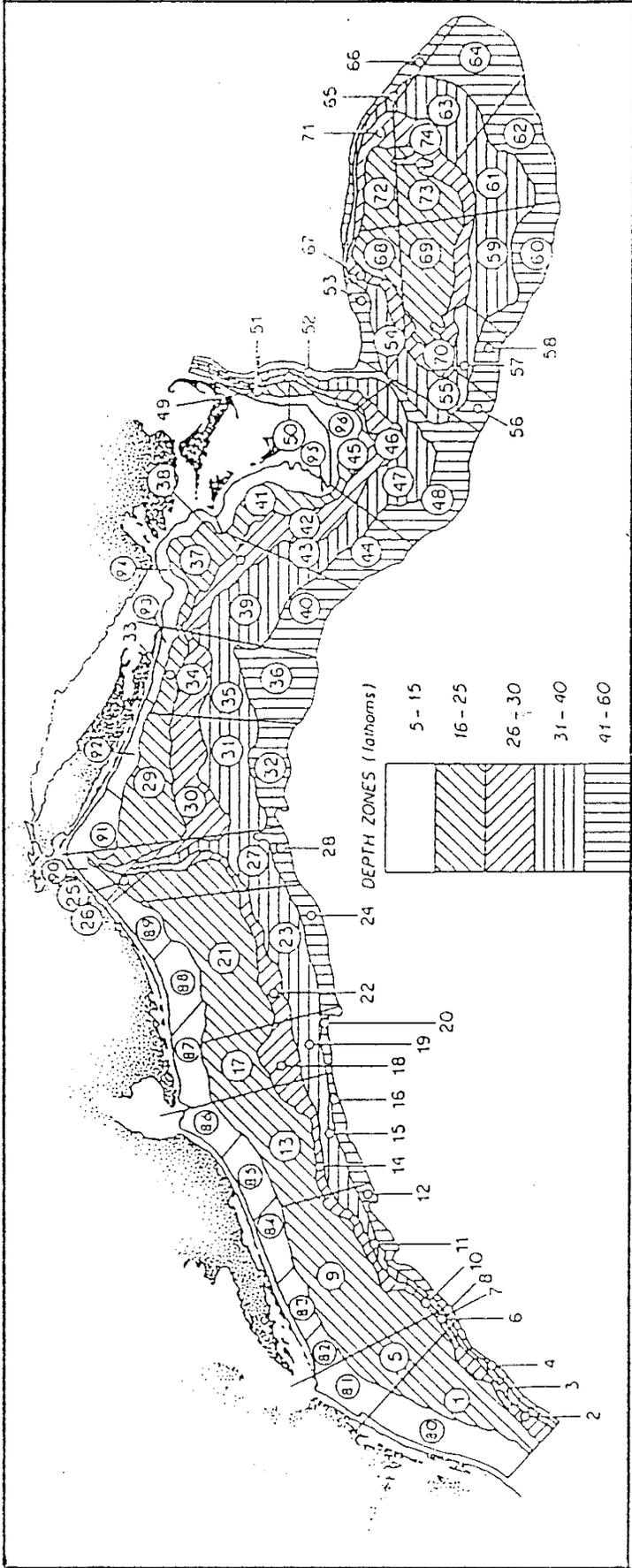
Cases: (for all cases DPY = \$4,961 = 3rd quarter 1984)

1. Base case. Base catch = mean quarterly catch, 1st 3 quarters of 1984.
2. Base catch + 10% quarterly quota at low end of Georges Bank OY.
3. Base catch + 40% quarterly quota at low end of Georges Bank OY.
4. Base catch + 10% quarterly quota at high end of Georges Bank OY.
5. Base catch + 40% quarterly quota at high end of Georges Bank OY.
6. Base catch + 28% bimonthly quota at low end of Nantucket Shoals OY.
7. Base catch + 28% bimonthly quota at current Nantucket Shoals quota (100,000 bu).
8. Base catch + 28% bimonthly quota at high end of Nantucket Shoals OY.
9. Base catch + 28% bimonthly quota at low end of Nantucket Shoals OY + 40% quarterly quota at low end of Georges Bank OY.
10. Base catch + 28% bimonthly quota at current Nantucket Shoals quota (100,000 bu) + 10% quarterly quota at high end of Georges Bank OY.
11. Base catch + 28% bimonthly quota at high end of Nantucket Shoals OY + 40% quarterly quota at high end of Georges Bank OY.
12. Base catch + 28% bimonthly quota at low end of OY (50,000 bu) if Nantucket Shoals and Georges Bank not divided and operate under Nantucket Shoals rules.
13. Base catch + 28% bimonthly quota at current quota (100,000 bu) if Nantucket Shoals and Georges Bank not divided and operate under Nantucket Shoals rules.
14. Base catch + 28% bimonthly quota at high end of OY (500,000 bu) if Nantucket Shoals and Georges Bank not divided and operate under Nantucket Shoals rules.
15. Base catch + 40% quarterly quota at low end of OY (50,000 bu) if Nantucket Shoals and Georges Bank not divided and operate under Georges Bank rules.
16. Base catch + 40% quarterly quota at current quota (100,000 bu) if Nantucket Shoals and Georges Bank not divided and operate under Georges Bank rules.
17. Base catch + 40% quarterly quota at high end of OY (500,000 bu) if Nantucket Shoals and Georges Bank not divided and operate under Georges Bank rules.

Table 31. Cetaceans and Turtles Found in Survey Area

<u>Scientific name</u>	<u>Common name</u>	<u>Est. Minimum Number in Study Area</u>	<u>Endan- gered</u>	<u>Threat- ened</u>
LARGE WHALES				
<u>Balaenoptera physalus</u>	fin whale	1,102	X	
<u>Megaptera novaeangliae</u>	humpback whale	684	X	
<u>Balaenoptera acutorostrata</u>	minke whale	162		
<u>Physeter catodon</u>	sperm whale	300	X	
<u>Eubalaena glacialis</u>	right whale	29	X	
<u>Balaenoptera borealis</u>	sei whale	109	X	
<u>Orcinus orca</u>	killer whale	unk		
SMALL WHALES				
<u>Tursiops truncatus</u>	bottlenose dolphin	6,254		
<u>Globicephala spp.</u>	pilot whales	11,448		
<u>Lagenorhynchus acutus</u>	Atl. white-sided dolphin	24,287		
<u>Phocoena phocoena</u>	harbor porpoise	2,946		
<u>Grampus griseus</u>	grampus (Risso's) dolphin	10,220		
<u>Delphinus delphis</u>	saddleback dolphin	17,606		
<u>Stenella spp.</u>	spotted dolphin	22,376		
<u>Stenella coeruleoalba</u>	striped dolphin	unk		
<u>Lagenorhynchus albirostris</u>	white-beaked dolphin	unk		
<u>Ziphius cavirostris</u>	Cuvier's beaked dolphin	unk		
<u>Stenella longirostris</u>	spinner dolphin	unk		
<u>Steno bredanensis</u>	rough-toothed dolphin	unk		
<u>Delphinapteras leucas</u>	beluga	unk		
<u>Mesoplodon spp.</u>	beaked whales	unk		
TURTLES				
<u>Caretta caretta</u>	loggerhead turtle	4,017		X
<u>Dermochelys coriacea</u>	leatherback turtle	636	X	
<u>Lepidochelys kempi</u>	Kemp's ridley turtle	unk	X	
<u>Chelonia mydas</u>	green turtle	unk		X

Source: University of Rhode Island, 1981.



Southern Va. - North Carolina		Delmarva		New Jersey		Long Island		Southern New England		Georges Bank	
Stratum	Miles	Stratum	Miles	Stratum	Miles	Stratum	Miles	Stratum	Miles	Stratum	Miles
1	1,163	9	2,171	17	749	29	1,096	37	672	53	266
2	175	10	152	18	249	30	669	38	280	54	278
3	126	11	229	19	274	31	932	39	967	55	364
4	117	12	204	20	120	32	627	40	573	56	209
5	453	13	1,127	21	1,650	33	363	41	602	57	184
6	62	14	219	22	312	34	203	42	343	58	300
7	46	15	394	23	714	35	601	43	432	59	538
8	74	16	211	24	476	36	694	44	383	60	810
80	767	82	180	25	648	91	340	45	392	61	576
81	360	83	241	26	188	92	191	46	416	62	701
		84	417	27	451	93	83	47	871	63	694
		85	382	28	149			48	1,109	64	988
		86	203	87	479			49	244	65	164
				88	578			50	150	66	266
				89	382			51	139	67	210
				90	182			52	307	68	370
								94	229	69	938
								95	446	70	520
								96	495	71	146
										72	504
										73	501
										74	433

Figure 1. Ocean quahog and surf clam survey strata off the northeast United States. Survey strata comprising each of six assessment areas are listed, along with the area (square nautical miles) of each.

Source: Murawski and Serchuk, 1984b

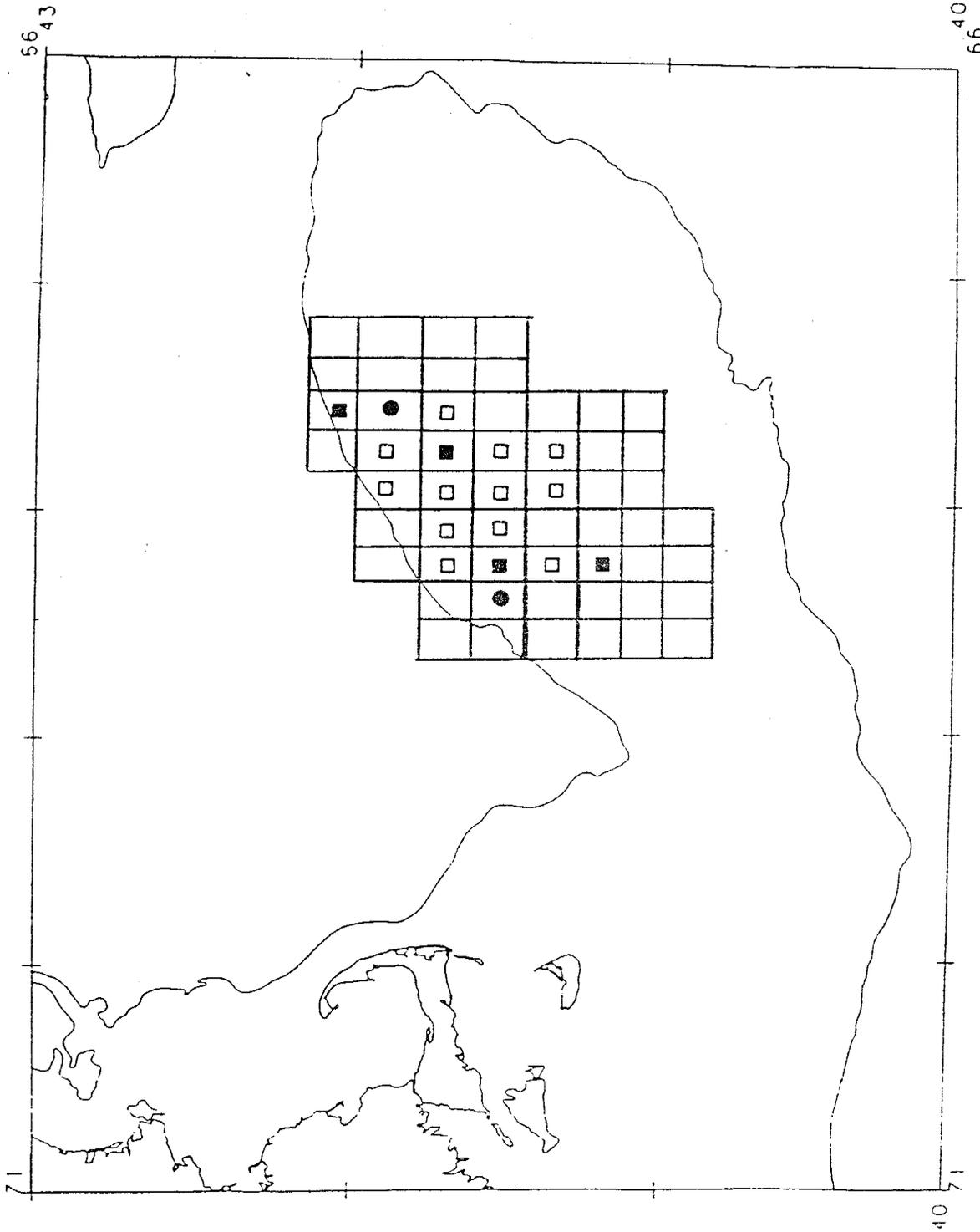


Figure 2. Ten minute longitude squares on Georges Bank where commercial vessels explored for surf clams, summer 1984. Open squares indicate little evidence of clam concentrations, closed squares indicate some fishable resource, closed circles indicate significant fishable concentrations of clams.
 Source: Murawski and Serchuk, 1984b

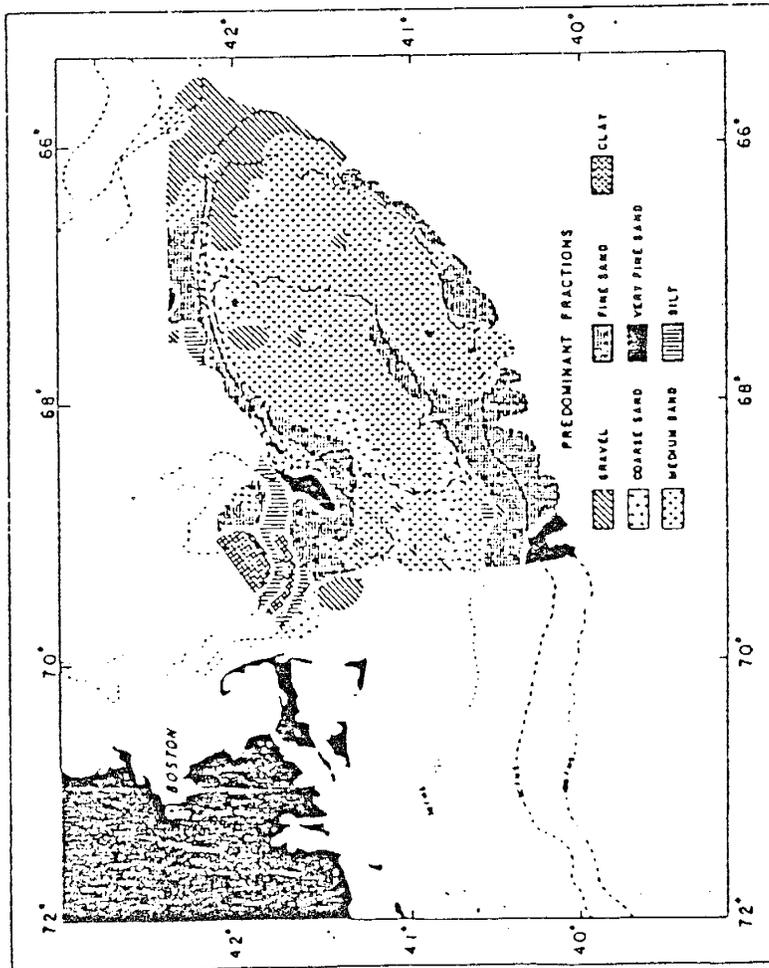


Figure 3. Geographic distributions of various sediment fractions (types) in the Georges Bank area. Figure is from Wigley (1961).

Source: Murawski and Serchuk, 1984b

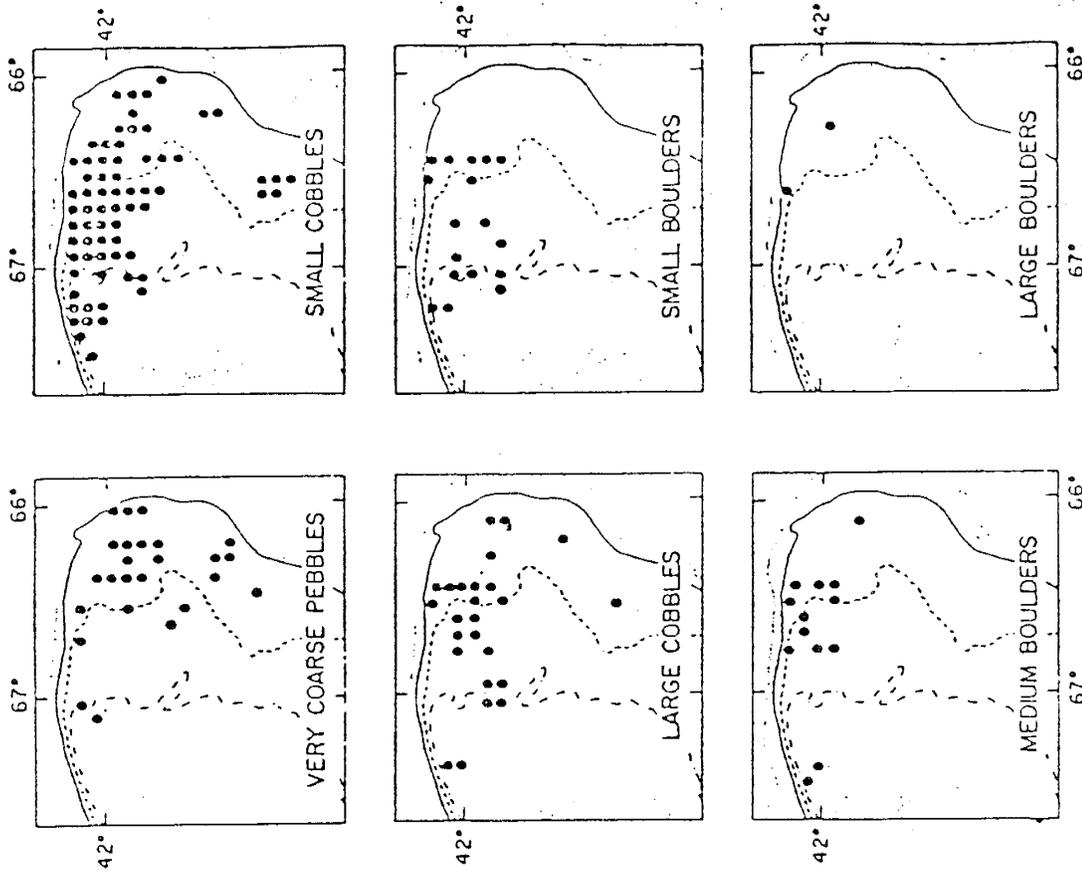
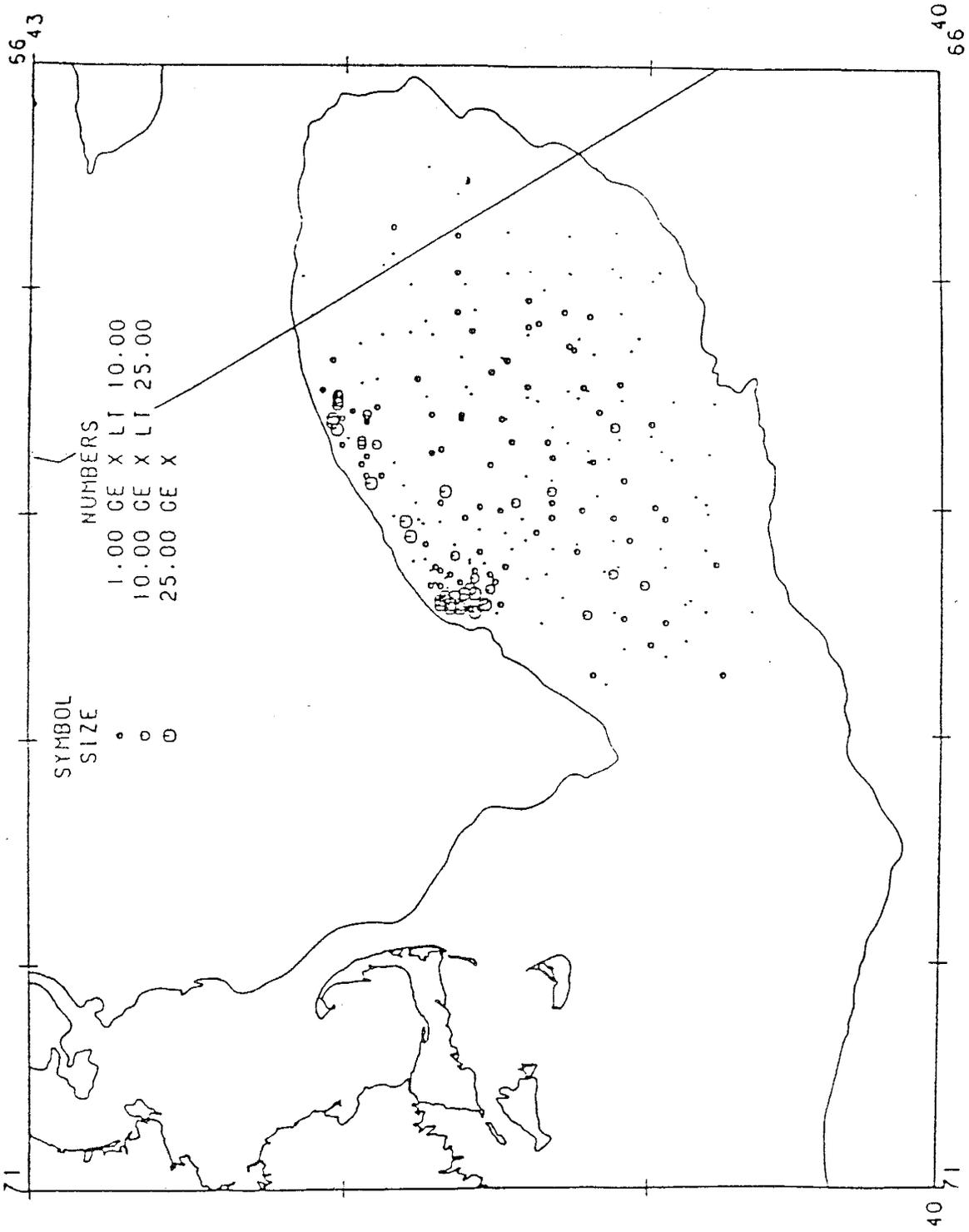


Figure 4. Geographic distribution of various classes of gravels on eastern Georges Bank. Figure is from Wigley et al. (1976).

Source: Murawski and Serchuk, 1984b



SURF CLAM DISTRIBUTION ON GEORGES BANK
 NMFS CLAM SURVEYS 1980-1984

Figure 5. Distribution of surf clam catches during NEFC clam surveys of Georges Bank, 1980-1984. Small closed dots indicate survey locations where no clams were caught. Open circles indicate survey catches in numbers of clams. Diagonal line indicates approximate U.S.-Canadian boundary in the Georges Bank region.

Source: Murawski and Serchuk, 1984b

GEORGES BANK SURF CLAM--1984

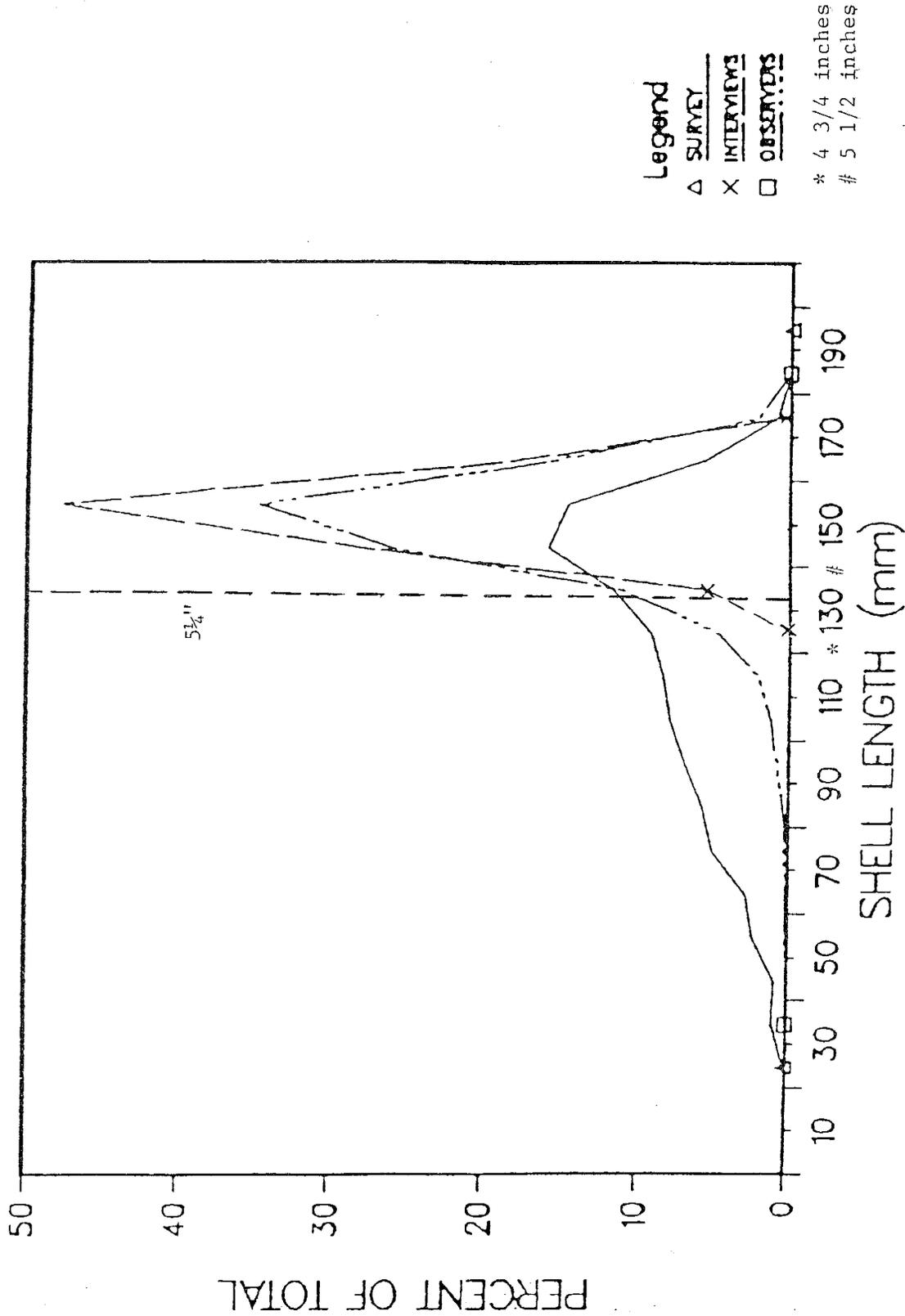


Figure 6. Size frequency distributions of surf clams on Georges Bank, 1984, as indicated from three different data sources. Solid line is the NEFC clam survey conducted during July-August 1984, dashed line represents data from port agent interview samples, dotted-dashed line is from NMFS observers aboard commercial vessels.

Source: Murawski and Serchuk, 1984b

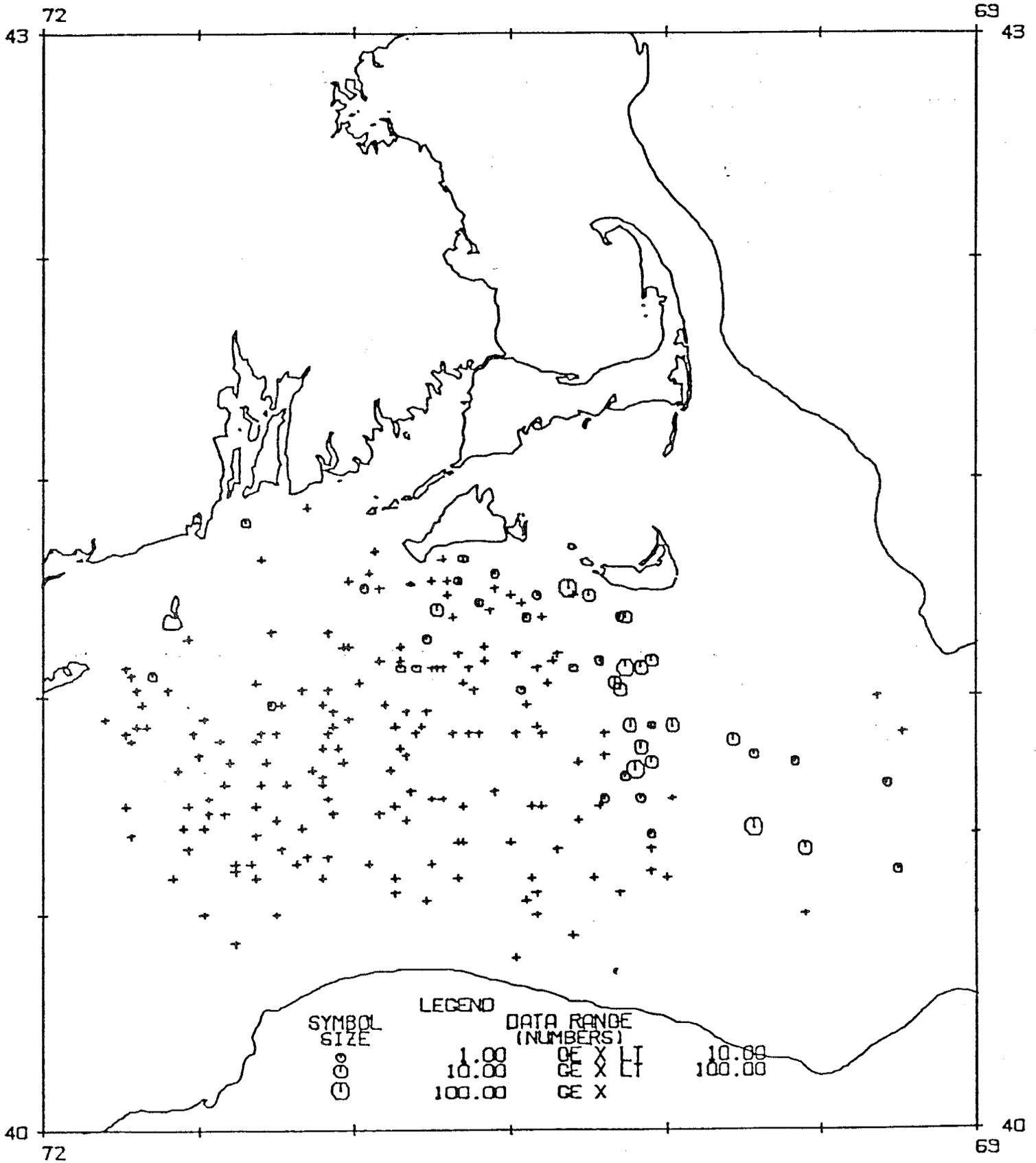


Figure 7. Distribution of surf clam catches during NEFC clam surveys of the Nantucket Area, mid-1970s through 1982. Source: Murawski and Serchuk, 1983a

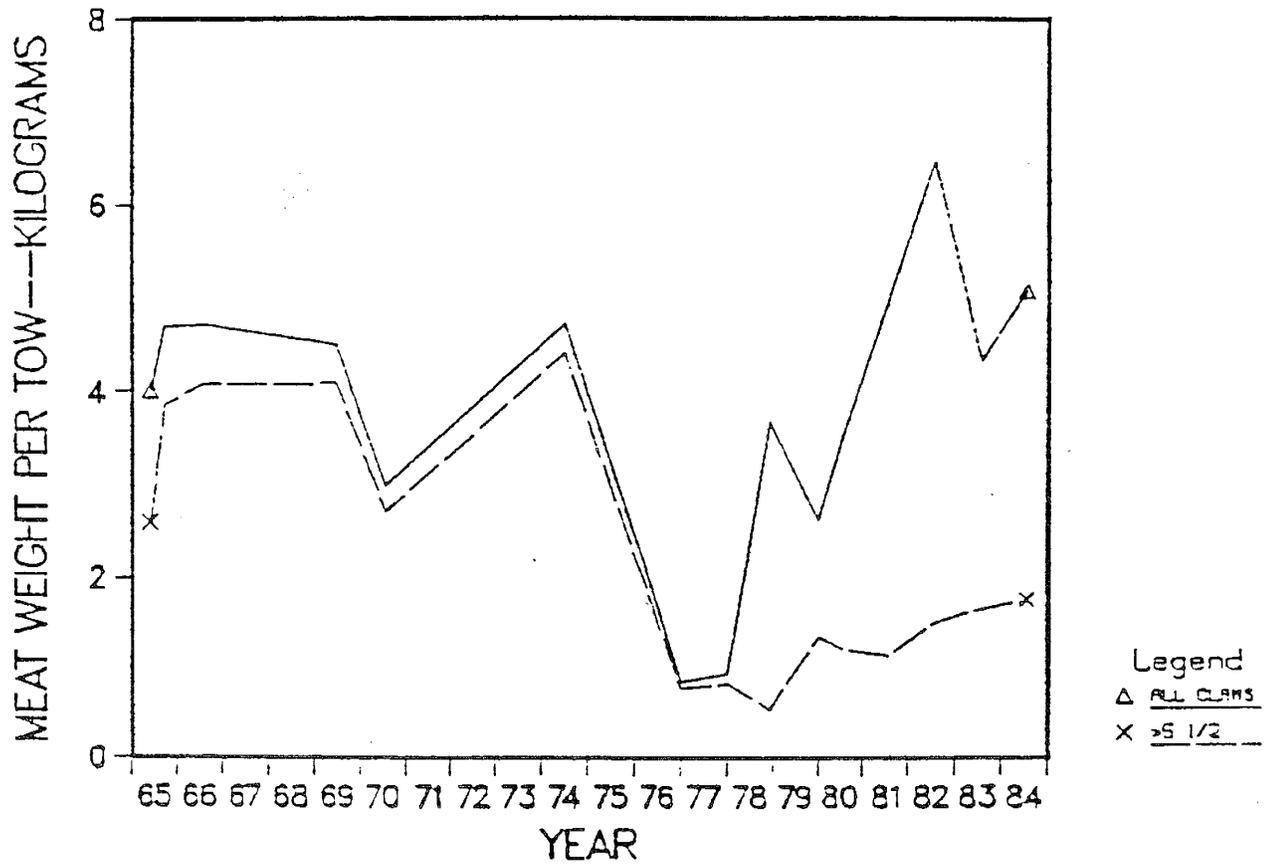


Figure 8. Mid-Atlantic Area Surf Clam Biomass
 (meat weight per tow in kg) 1965-1984.
 Source: Murawski, personal communication

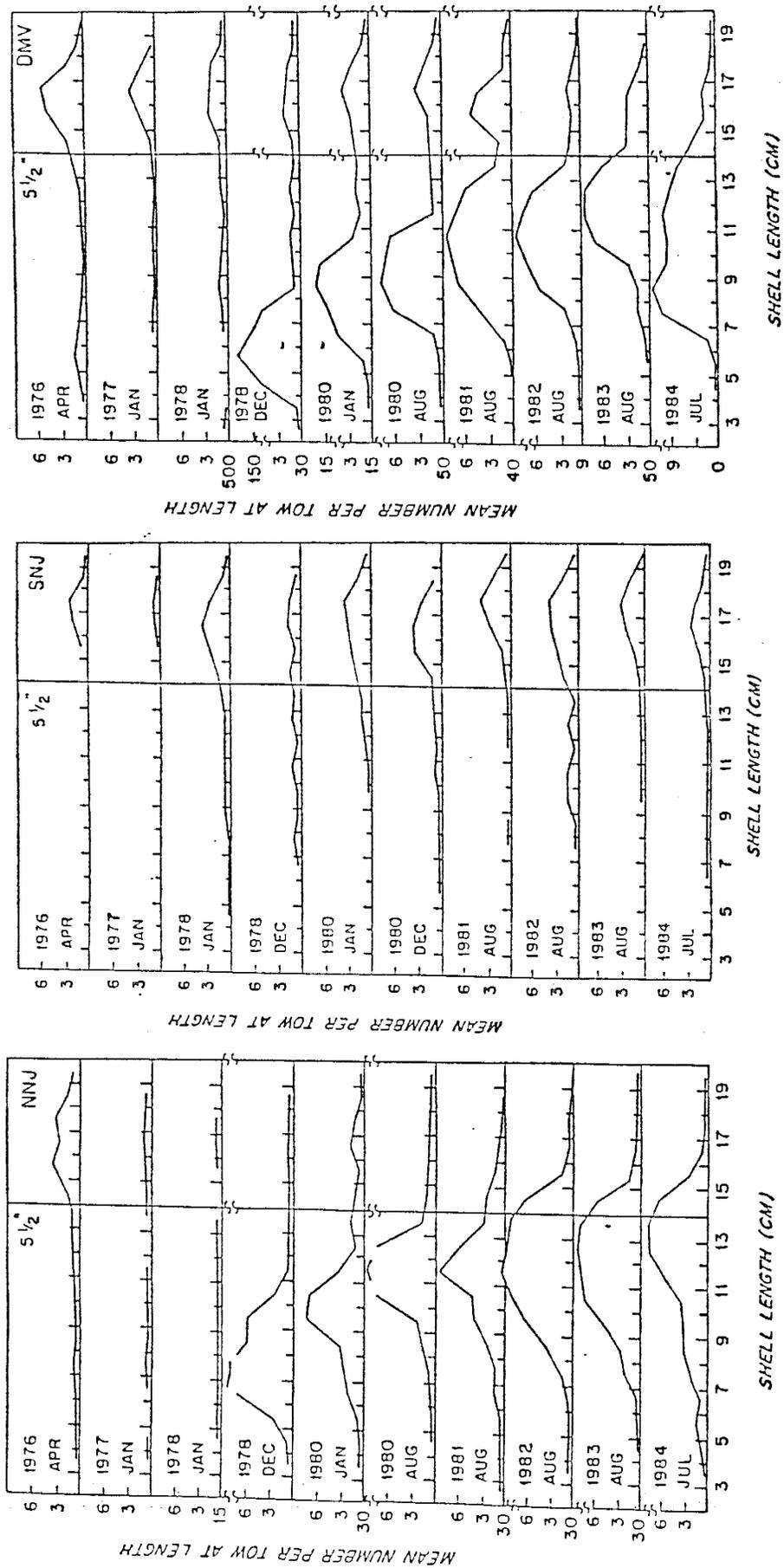
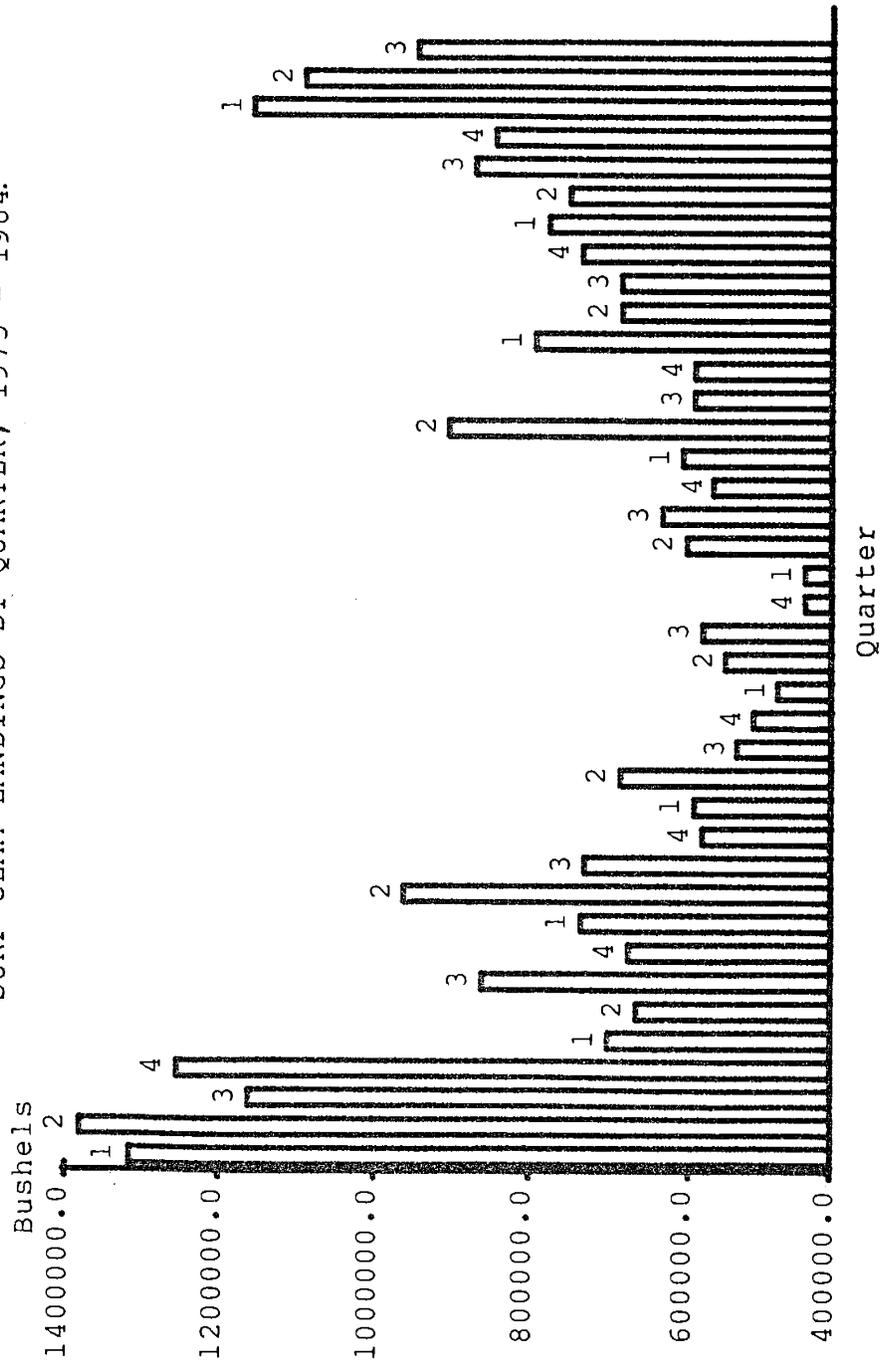


Figure 9. Stratified mean numbers of surf clams per standardized tow, at each 1 cm length group in NMFS shellfish surveys off Northern New Jersey, Southern New Jersey, and Delmarva, 1976 through 1984.

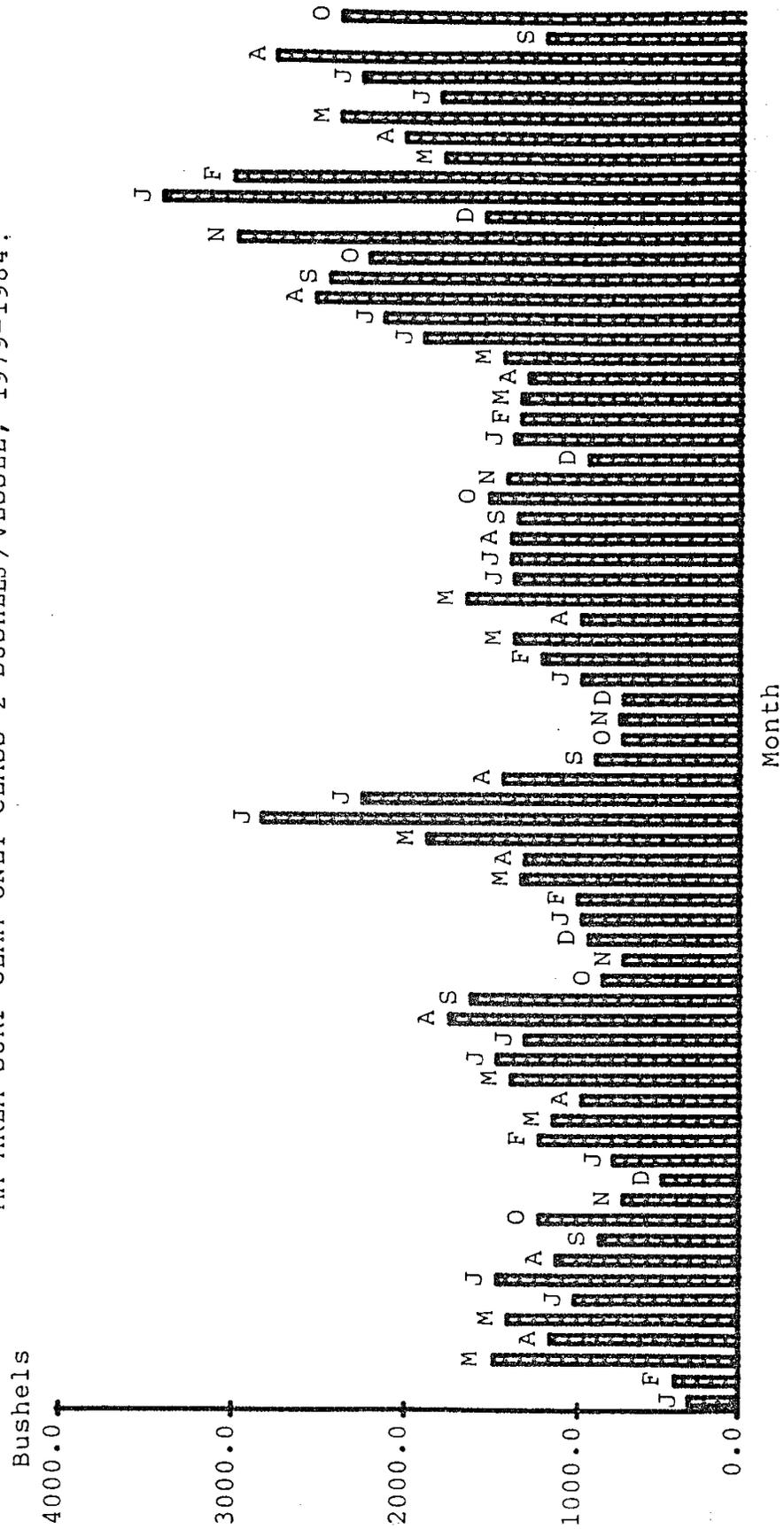
Source: Murawski and Serchuk, 1984c

Figure 10
 SURF CLAM LANDINGS BY QUARTER, 1975 - 1984.



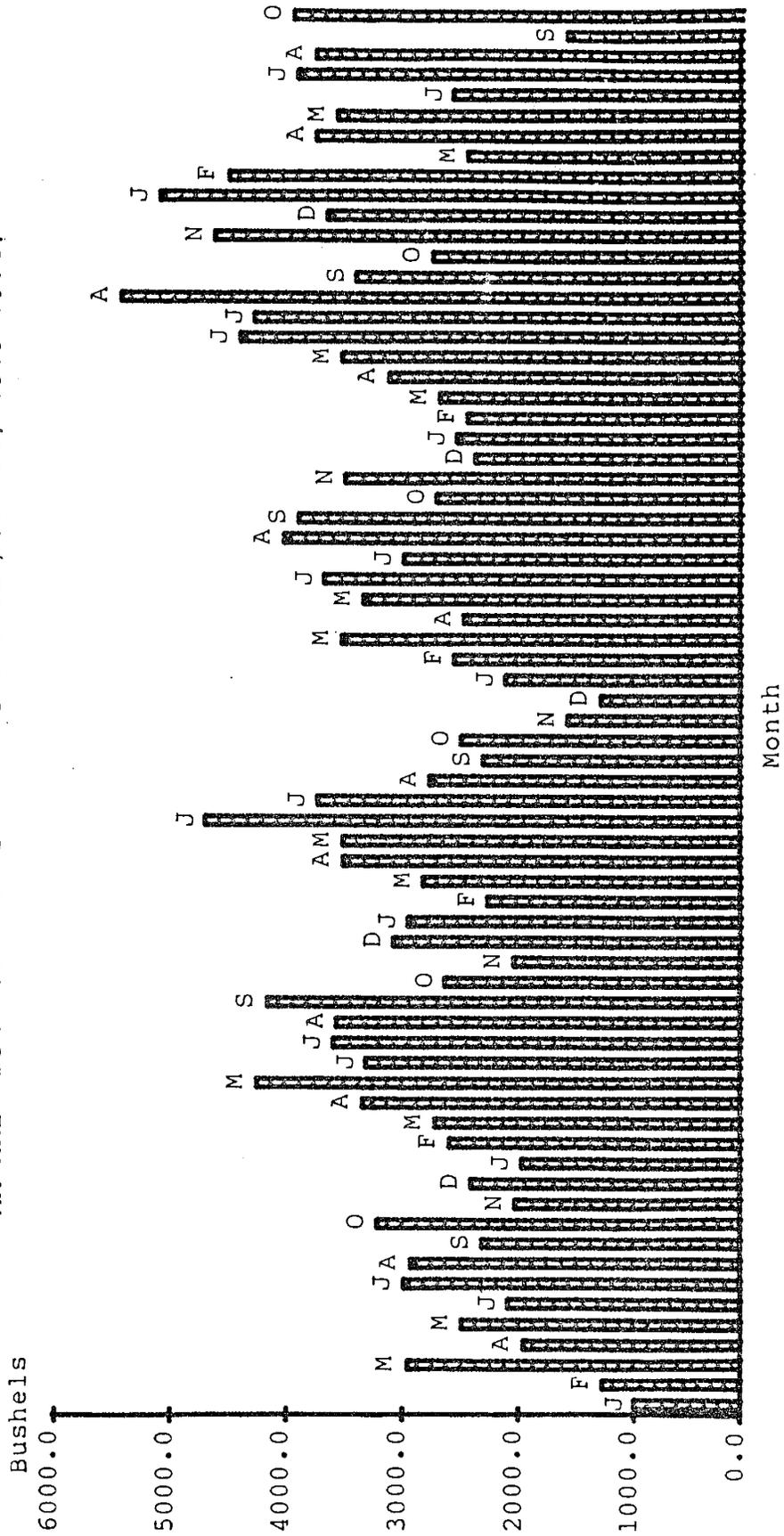
Source: unpub. prelim. NMFS data.

Figure 12
 MA AREA SURF CLAM ONLY CLASS 2 BUSHEL/VESEL, 1979-1984.



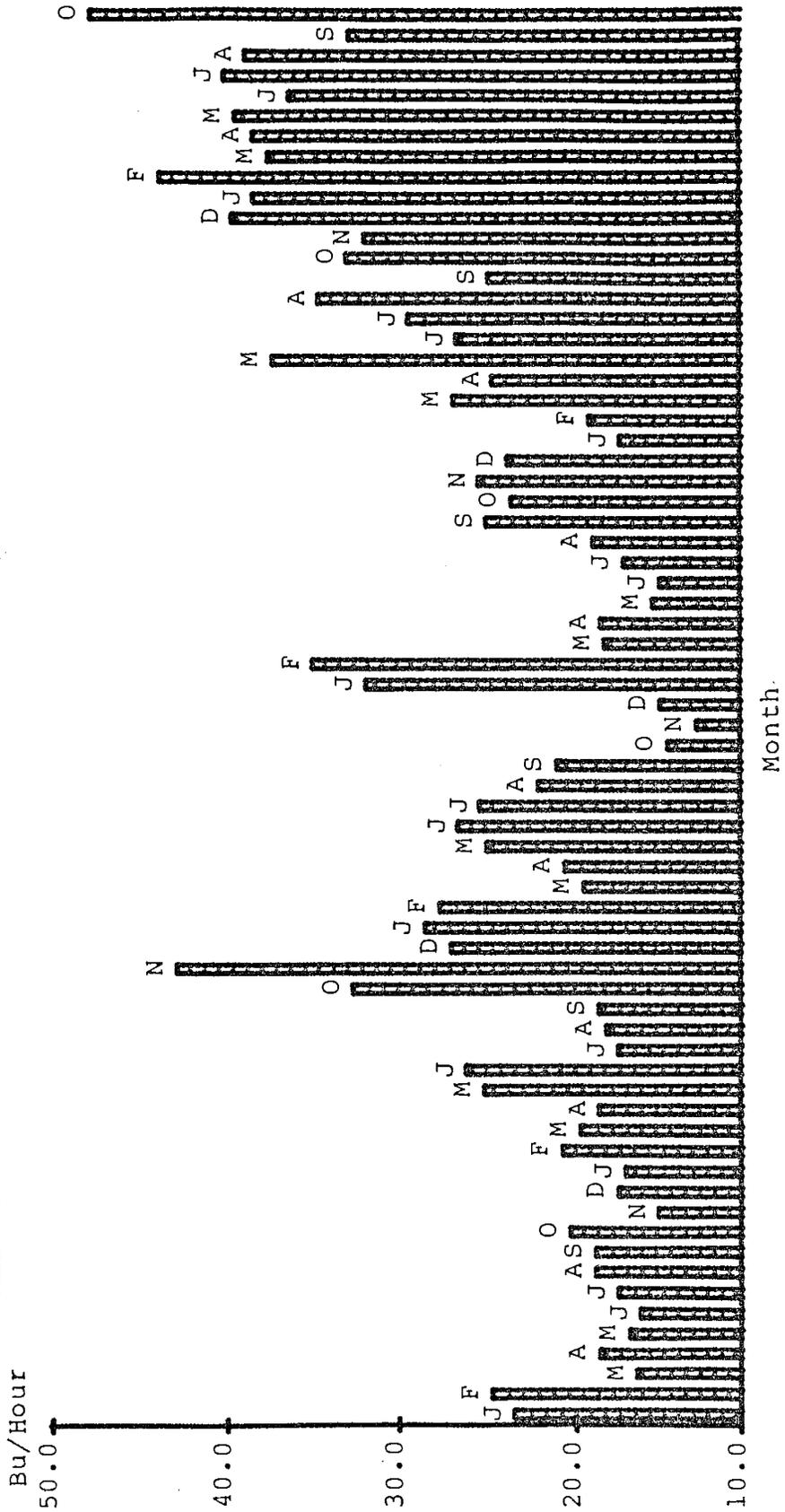
Source: unpub. prelim. NMFS logbook data.

Figure 13
 MA AREA SURF CLAM ONLY CLASS 3 BUSHEL/VESSEL, 1979-1984.



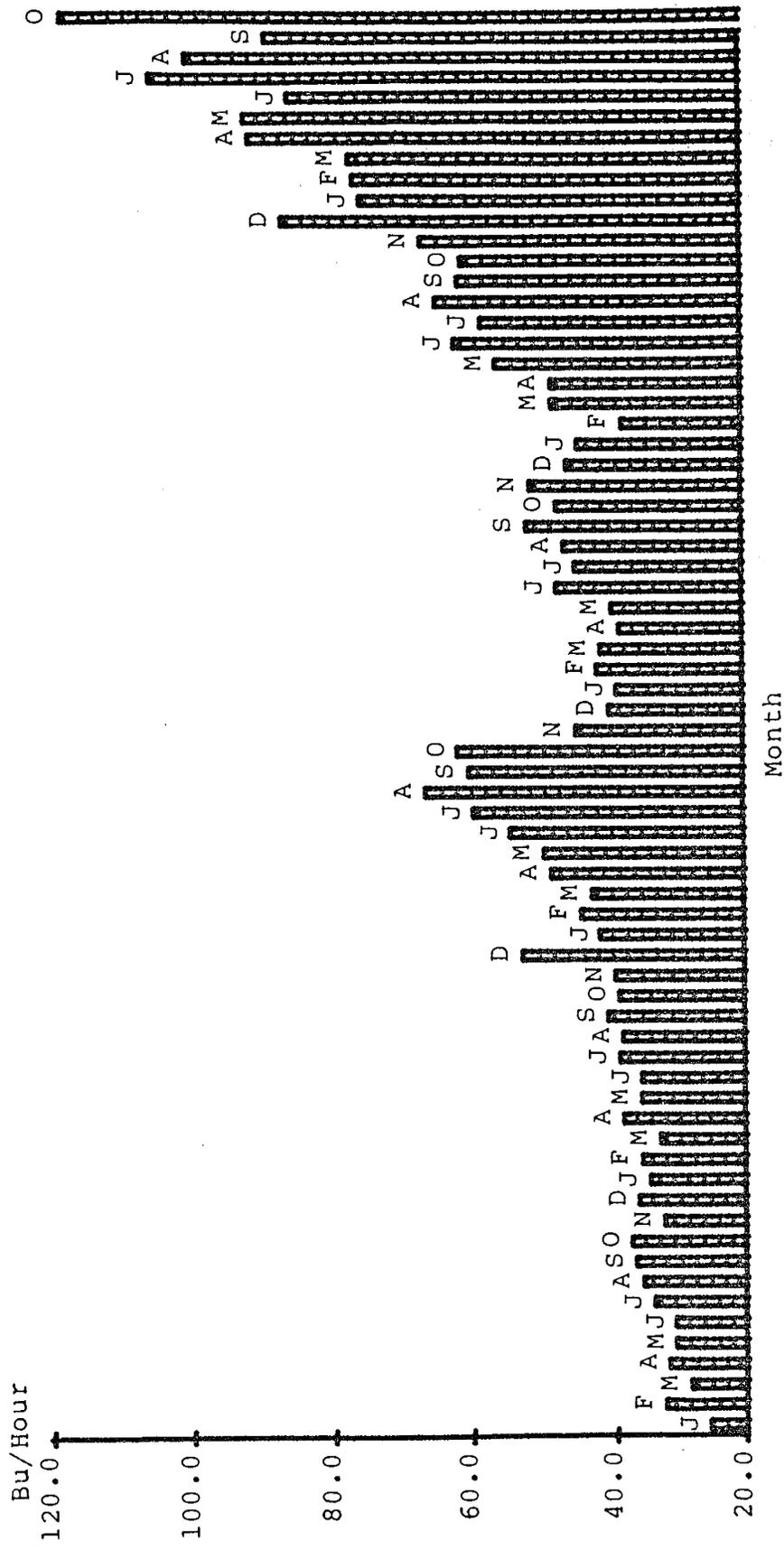
Source: unpub. prelim. NMFS logbook data.

Figure 14
 MID-ATLANTIC AREA SURF CLAM ONLY CLASS 1 VESSELS CPUE, 1979-1984



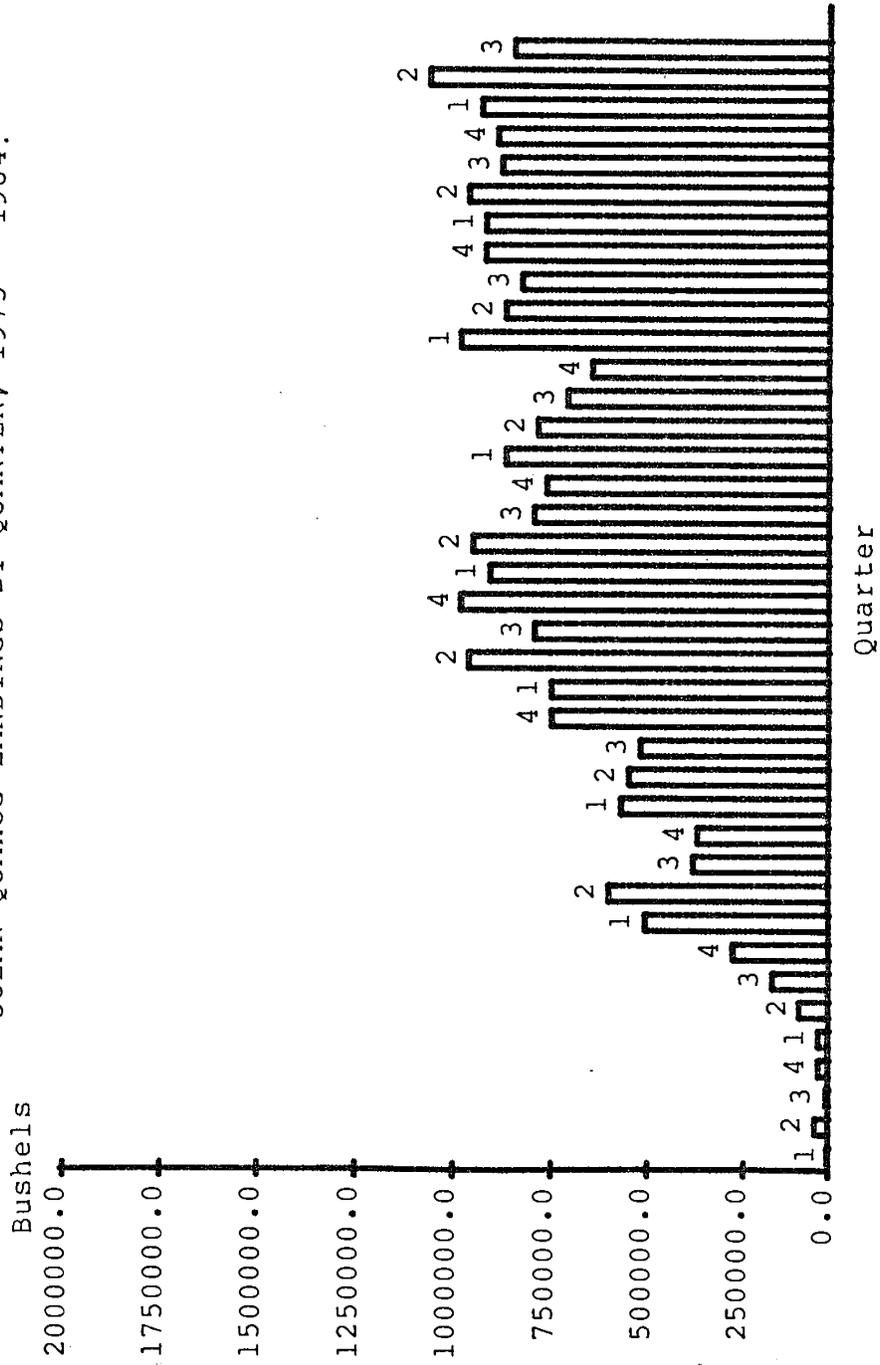
Source: unpub. prelim. NMFS logbook data.

Figure 16
MID-ATLANTIC AREA SURF CLAM ONLY CLASS 3 VESSELS CPUE, 1979-1984.



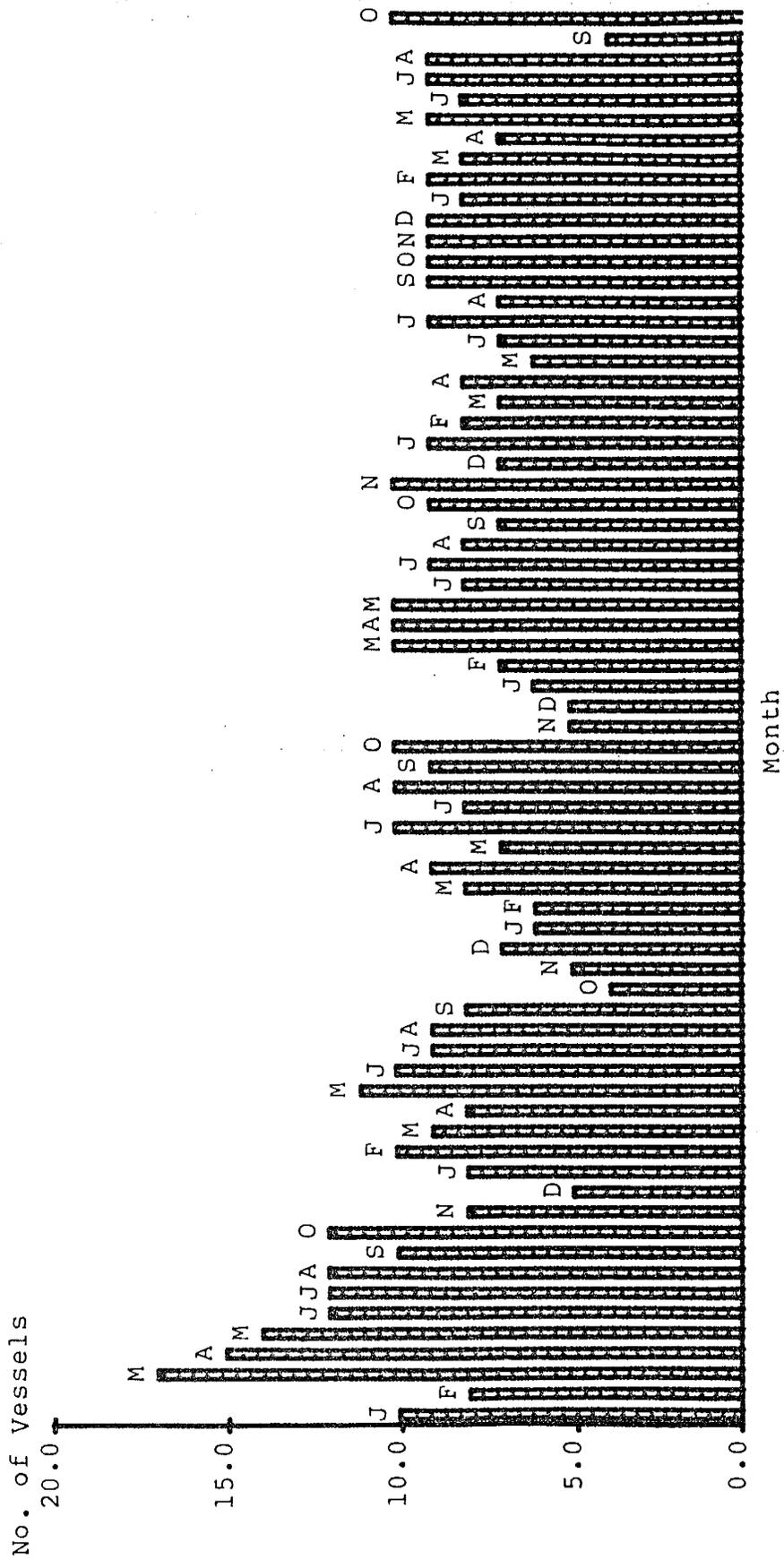
Source: unpub. prelim. NMFS logbook data.

Figure 17
 OCEAN QUAHOG LANDINGS BY QUARTER, 1975 - 1984.



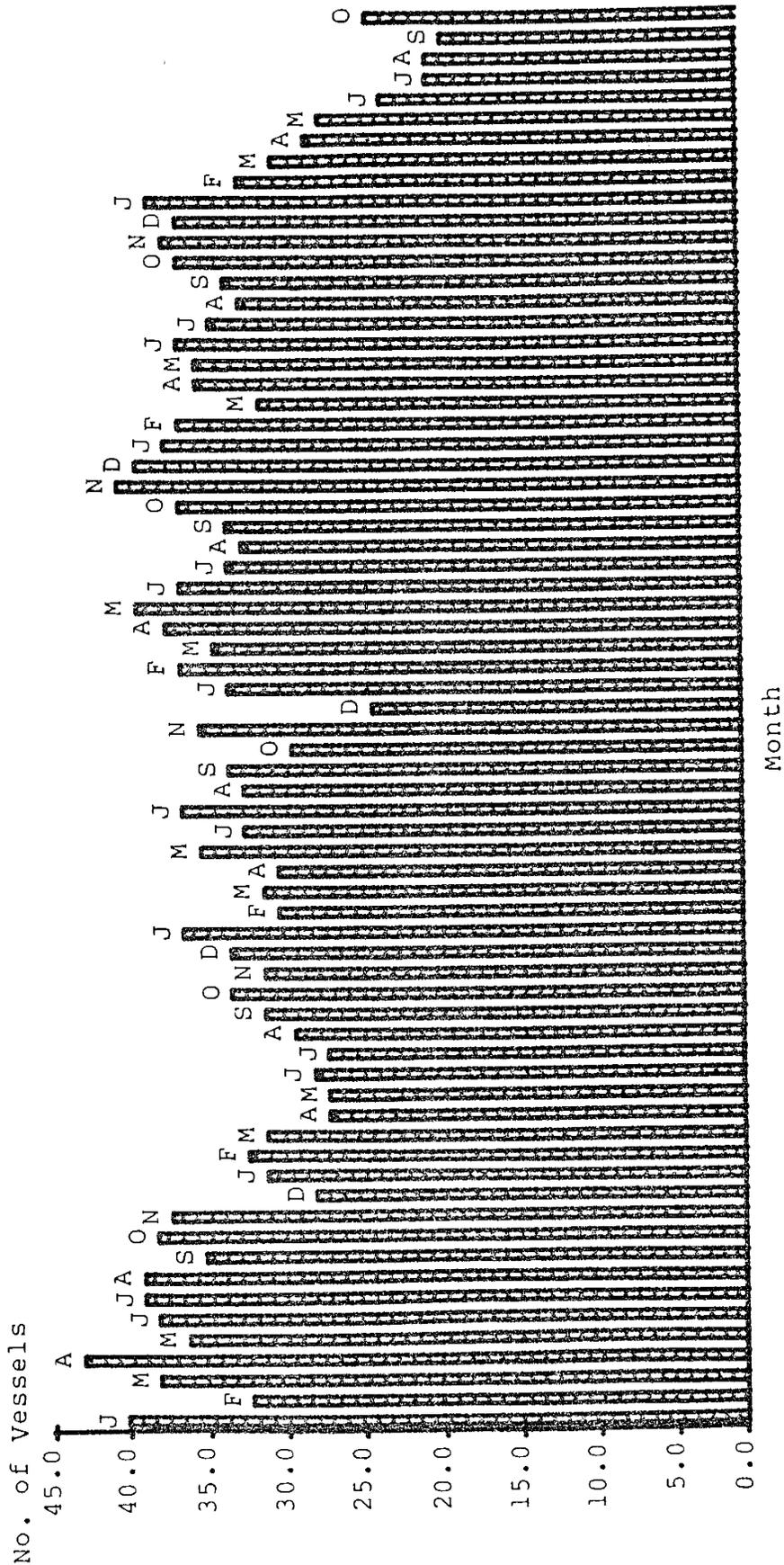
Source: unpub. prelim. NMFS data.

Figure 19
 MA AREA SURF CLAM ONLY ACTIVE CLASS 1 VESSELS, 1979-1984.



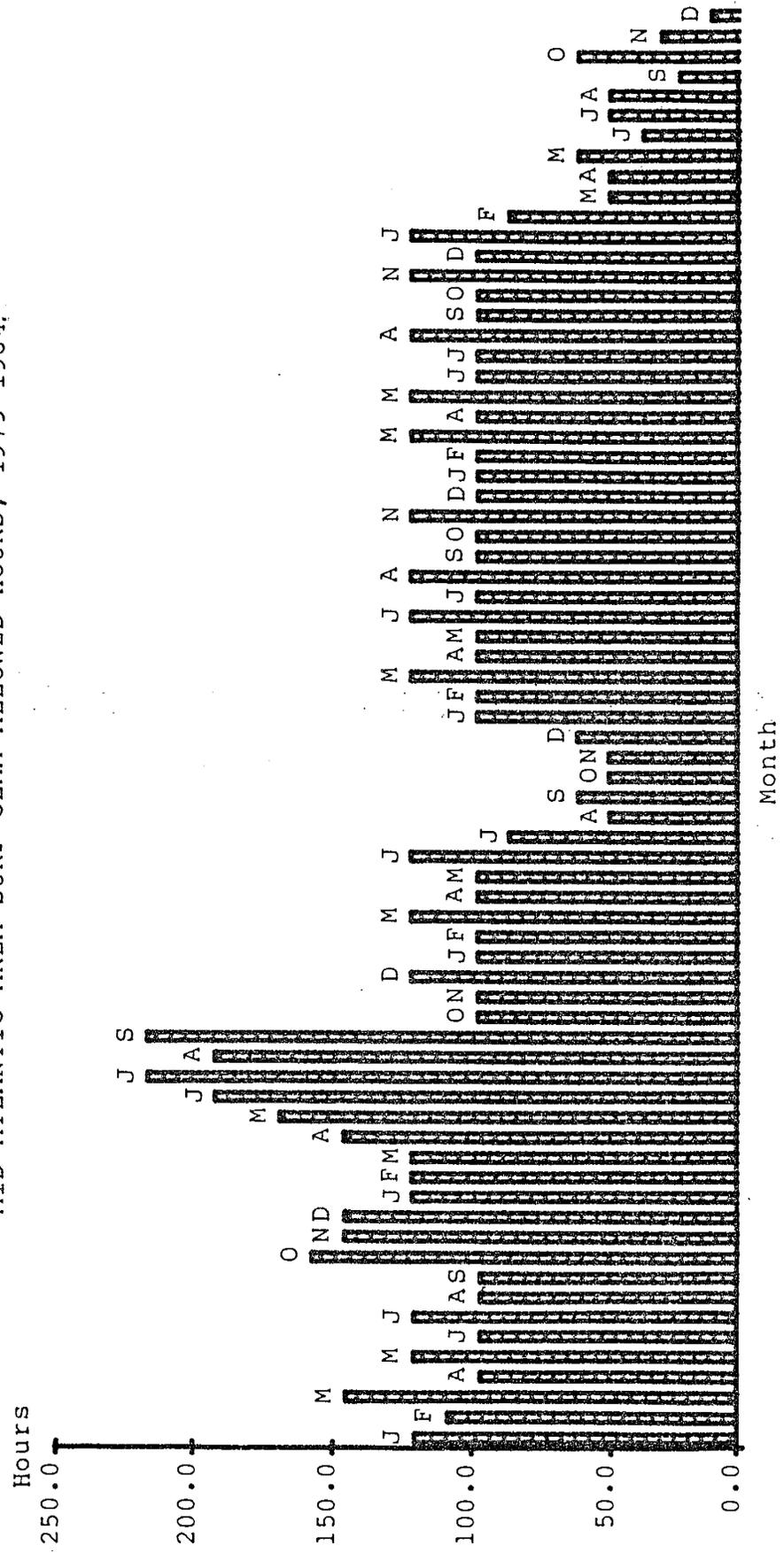
Source: unpub. prelim. NMFS logbook data.

Figure 21
 MA AREA SURF CLAM ONLY ACTIVE CLASS 3 VESSELS, 1979-1984.



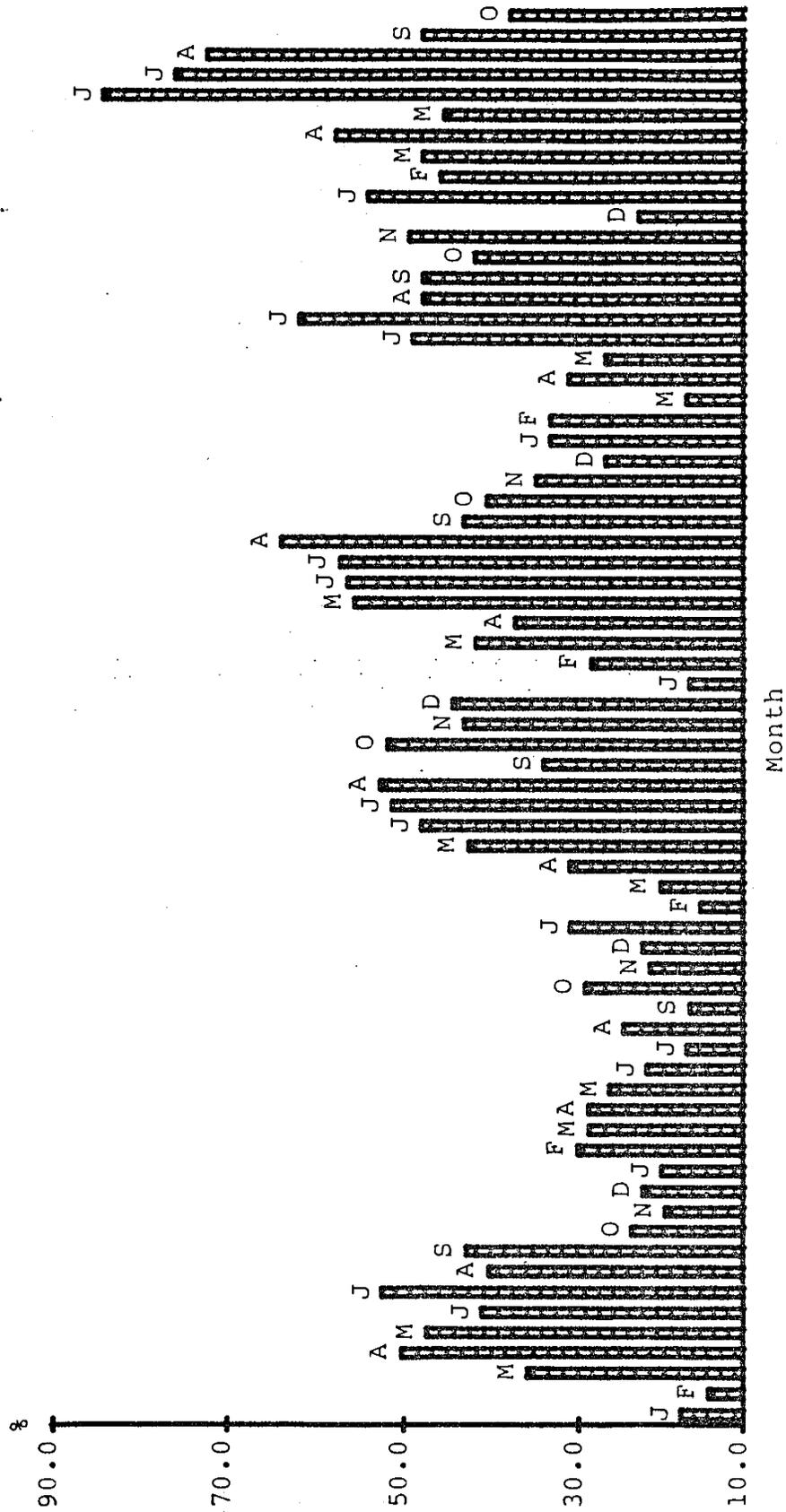
Source: unpub. prelim. NMFS logbook data.

Figure 22
 MID-ATLANTIC AREA SURF CLAM ALLOWED HOURS, 1979-1984.



Source: unpub. prelim. NMFS logbook data.

Figure 23
 MA AREA SURF CLAM ONLY CLASS 1 ALLOWED HOURS USED, 1979-1984.



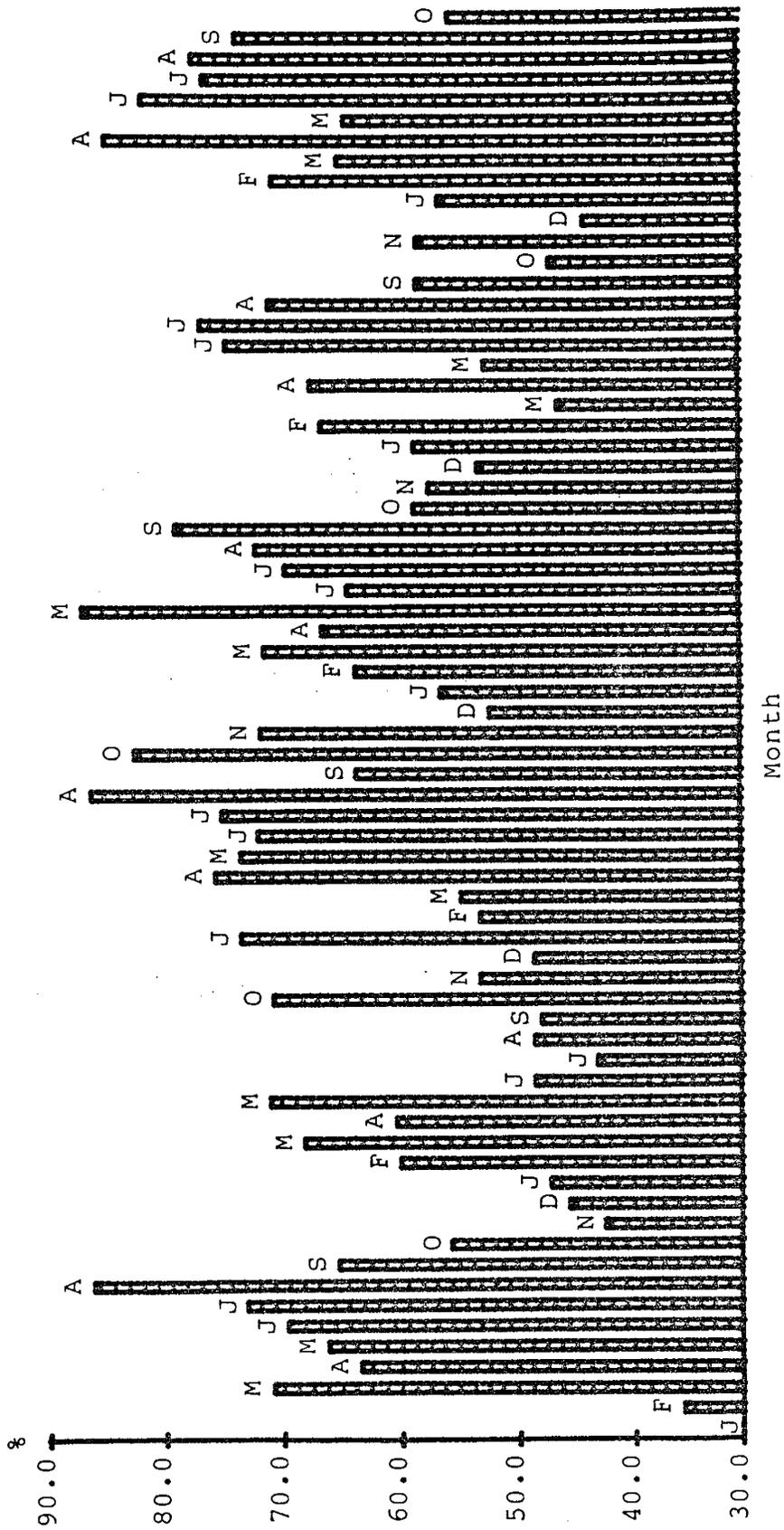
Source: unpub. prelim. NMFS logbook data.

Figure 24
 MA AREA SURF CLAM ONLY CLASS 2 ALLOWED HOURS USED, 1979-1984.



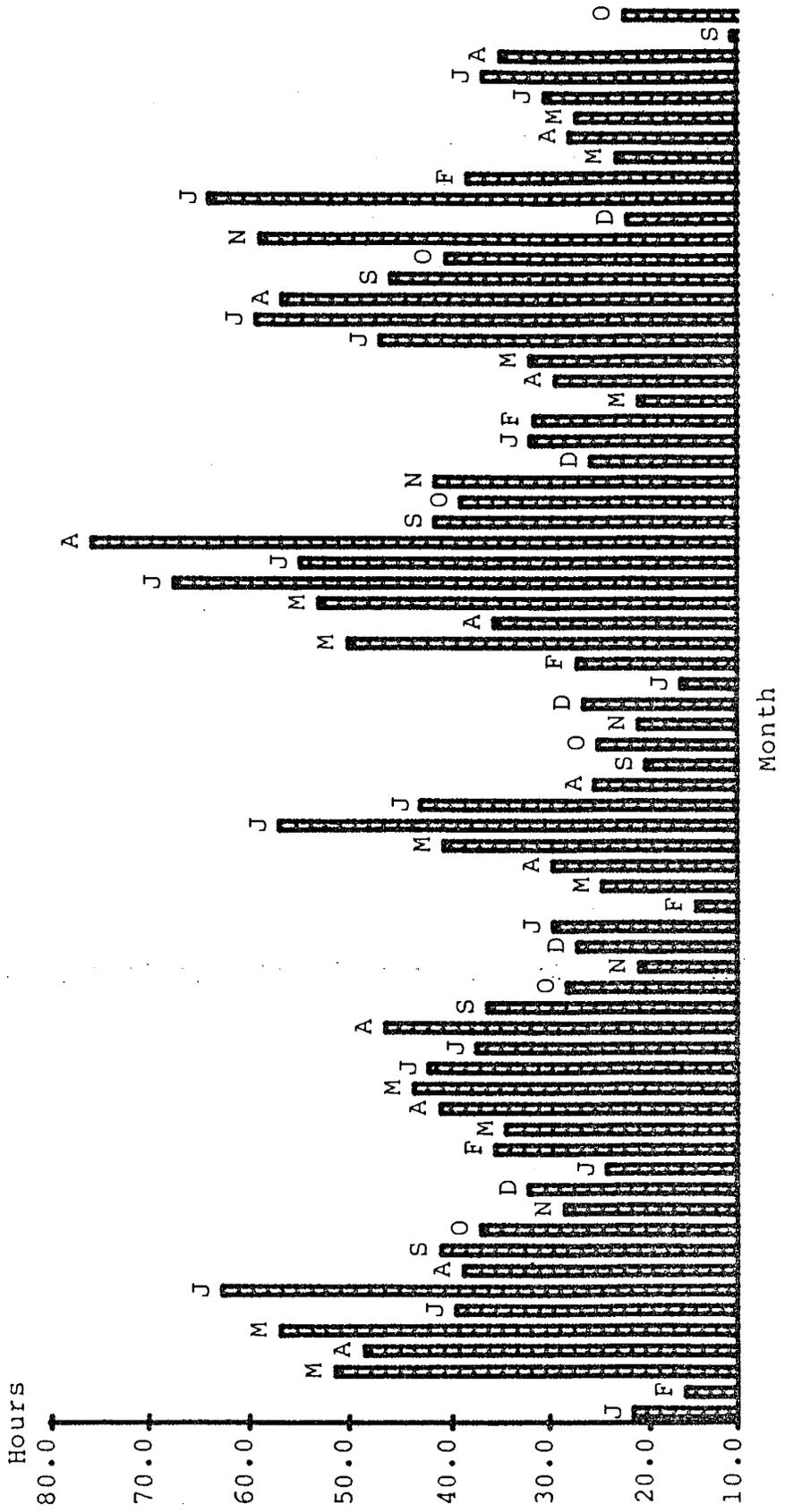
Source: unpub. prelim. NMFS logbook data.

Figure 25
 MA AREA SURF CLAM ONLY CLASS 3 ALLOWED HOURS USED, 1979-1984.



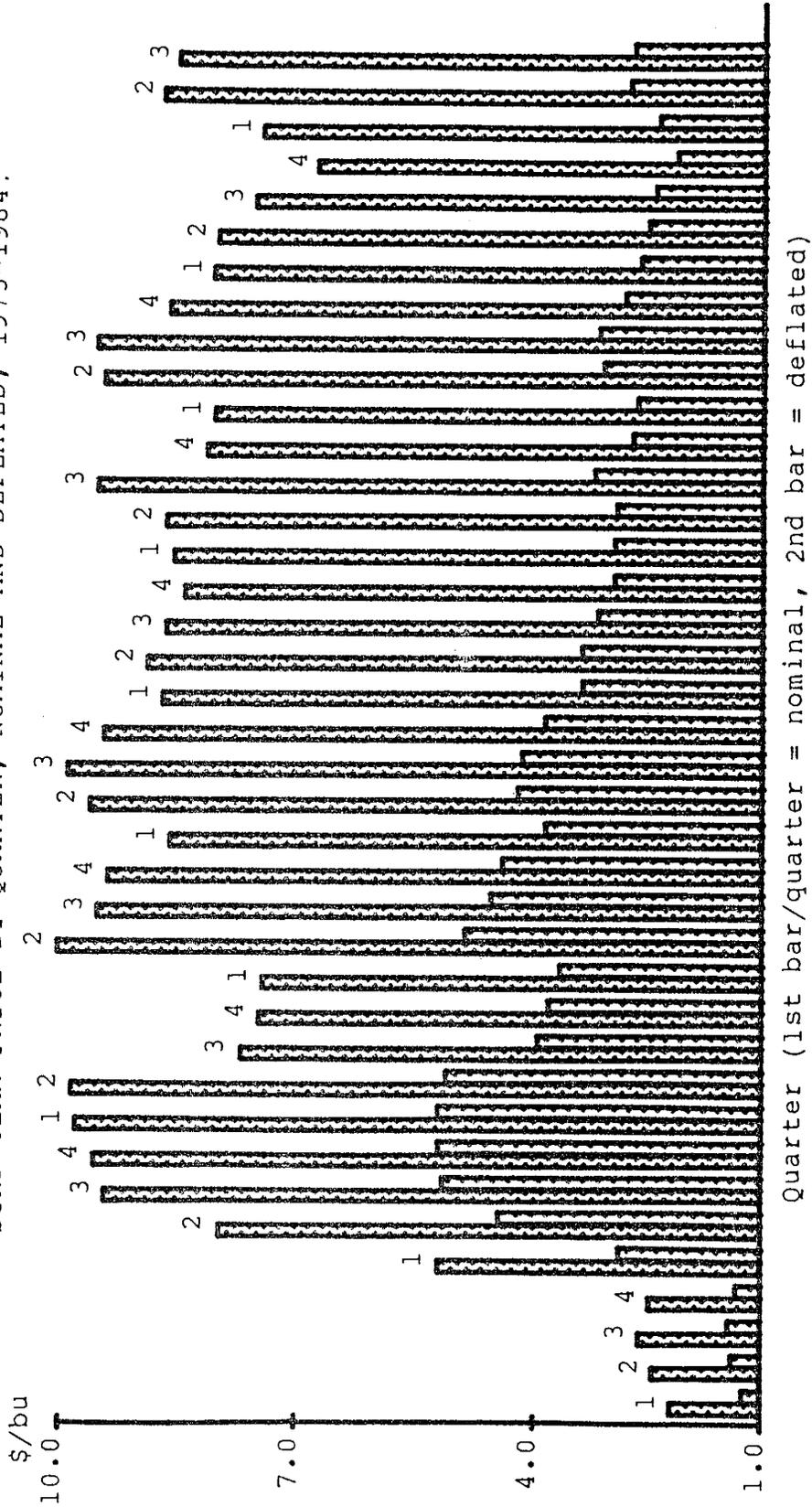
Source: unpub. prelim. NMFS logbook data.

Figure 26
 MA AREA SURF CLAM ONLY CLASS 1 FISHING HOURS/VESSEL, 1979-1984



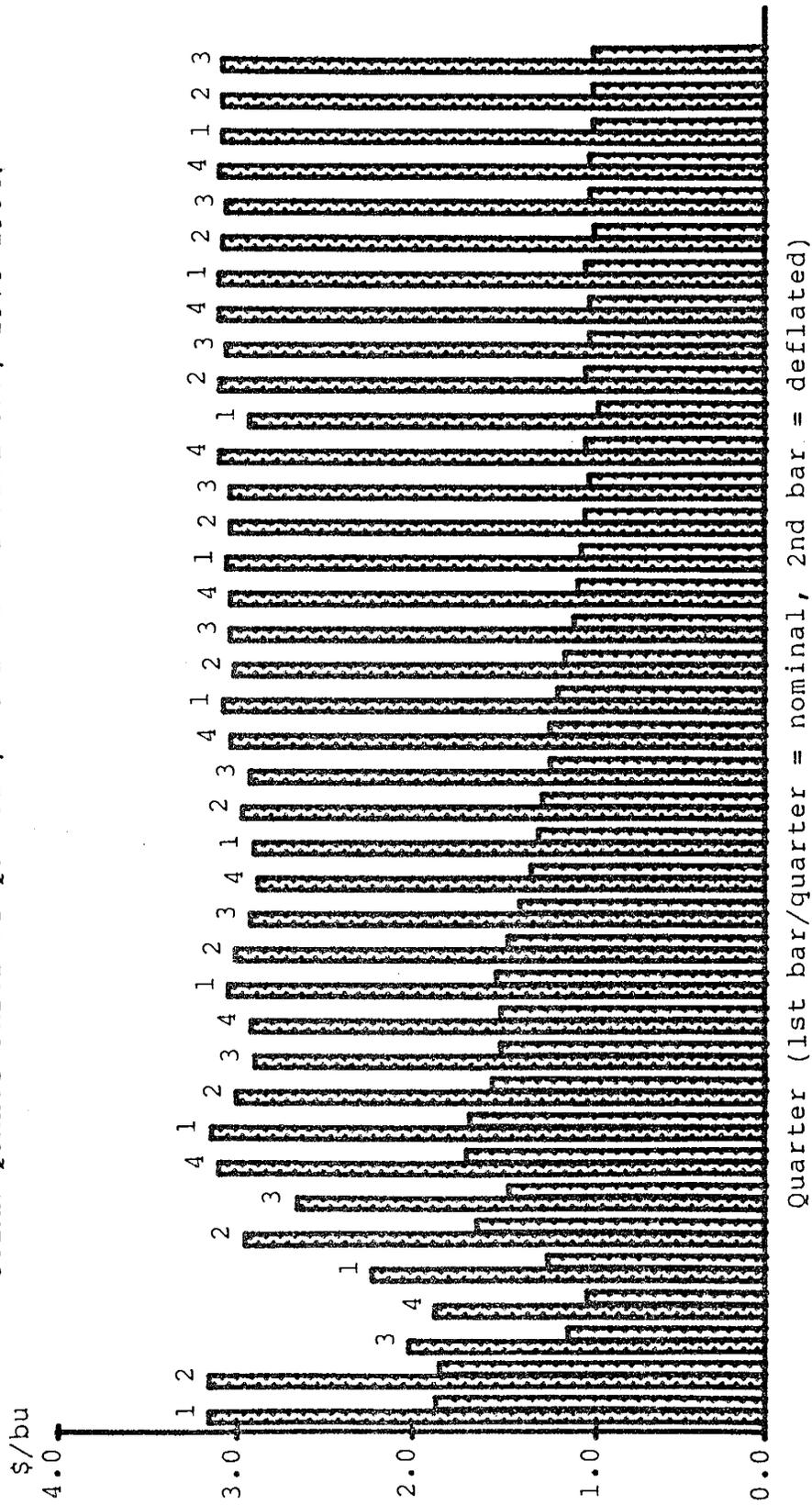
Source: unpub. prelim. NMFS logbook data.

Figure 29
 SURF CLAM PRICE BY QUARTER, NOMINAL AND DEFLATED, 1975-1984.



Source: unpub. prelim. NMFS data.

Figure 30
 OCEAN QUAHOG PRICE BY QUARTER, NOMINAL AND DEFLATED, 1975-1984.



Source: unpub. prelim. NMFS data.

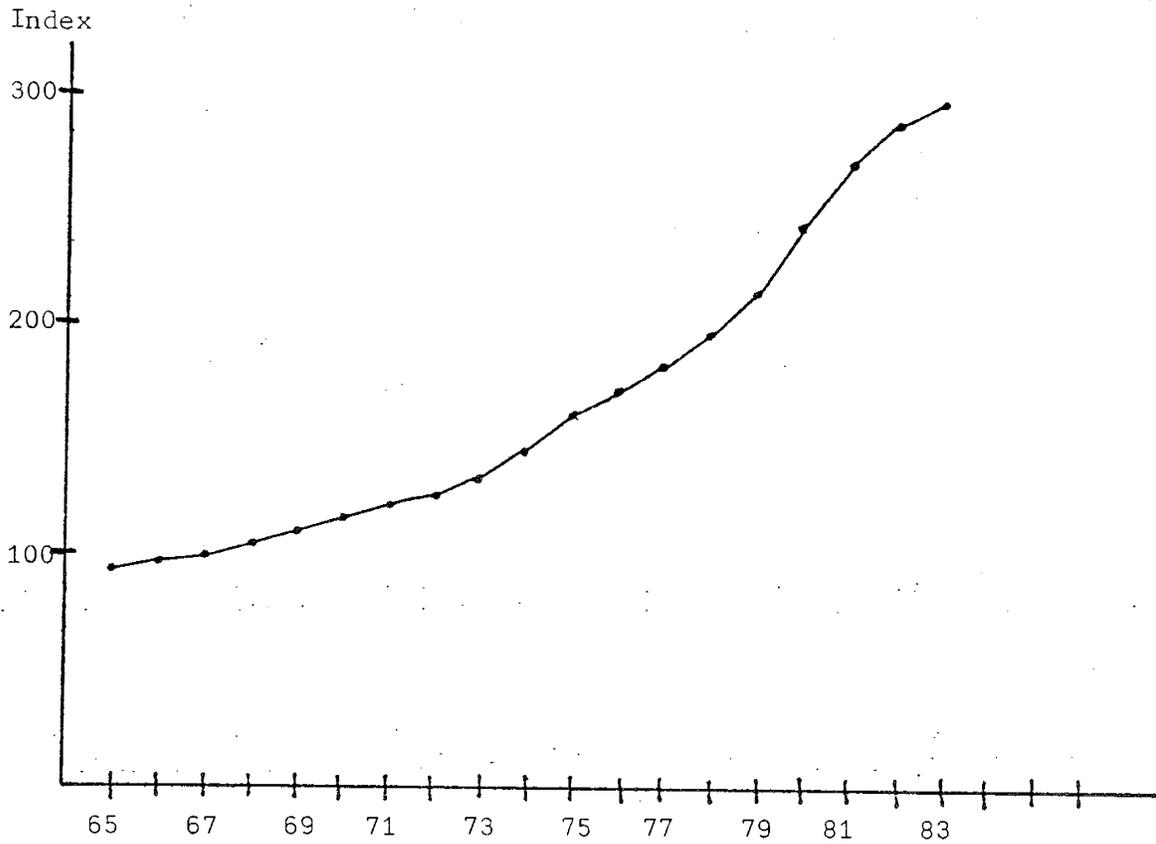


Figure 31 Consumer Price Index, 1965-83 (1967 = 100)
 Source: USDC, 1984d.

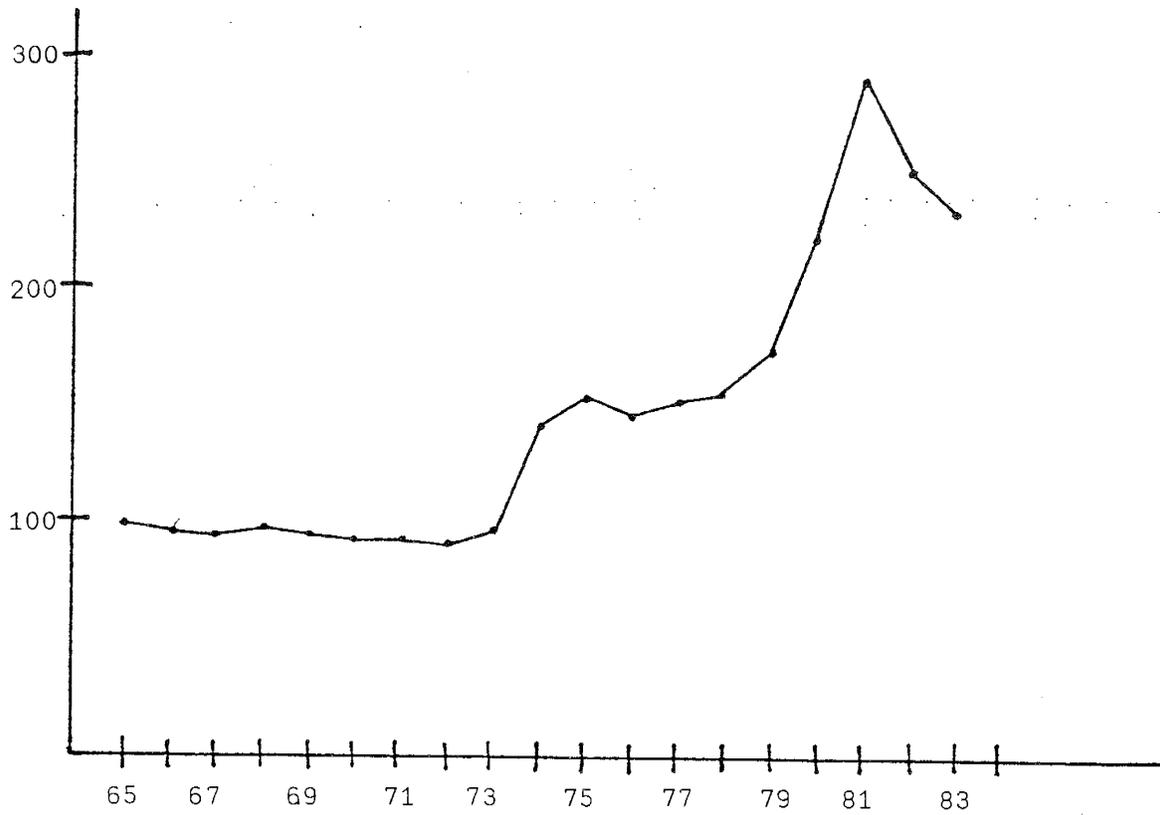


Figure 32. Wholesale Price Index Crude Oil, 1965-83
 (deflated by Consumer Price Index)
 Source: USDC, 1984d.

Figure 33

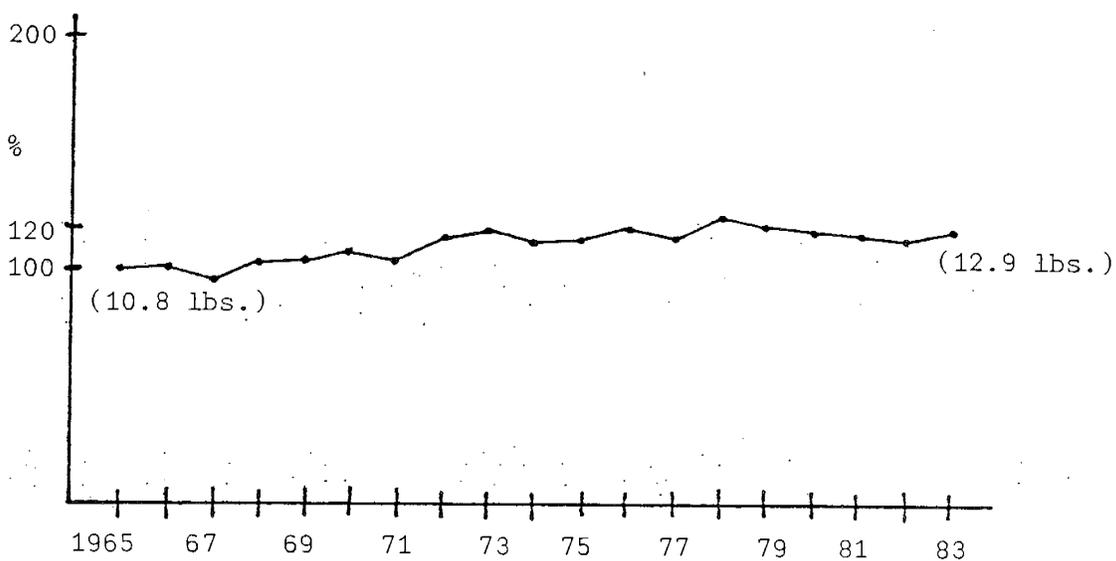


Figure 34

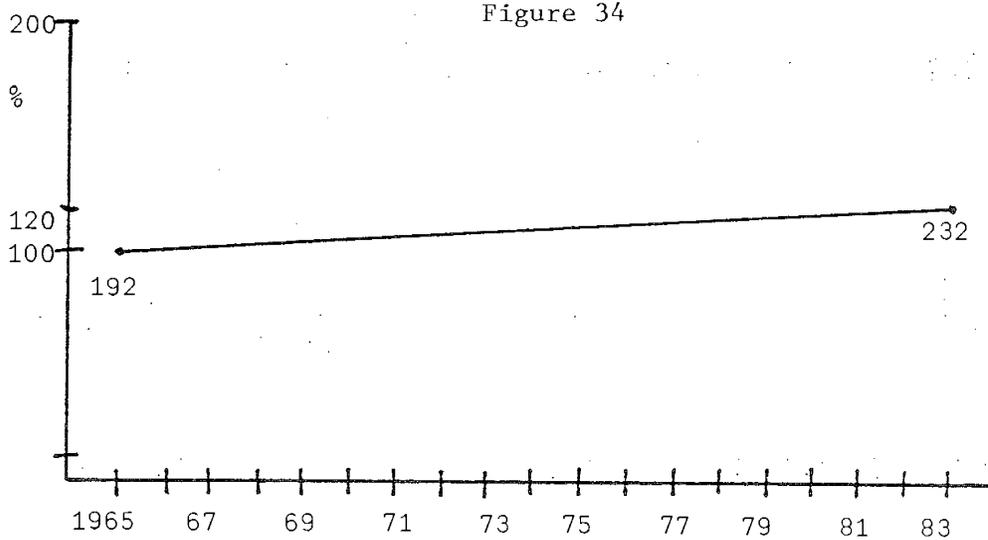


Figure 33. Per Capita Consumption of Commercial Fish and Shellfish, 1965-83 (Relative to 1965 per capita consumption, lbs/person) Source: USDC, 1984 d.

Figure 34. Civilian Resident Population, 1965-83 (Relative to 1965 Population, Millions) Source: USDC, 1984 d.

Figure 35

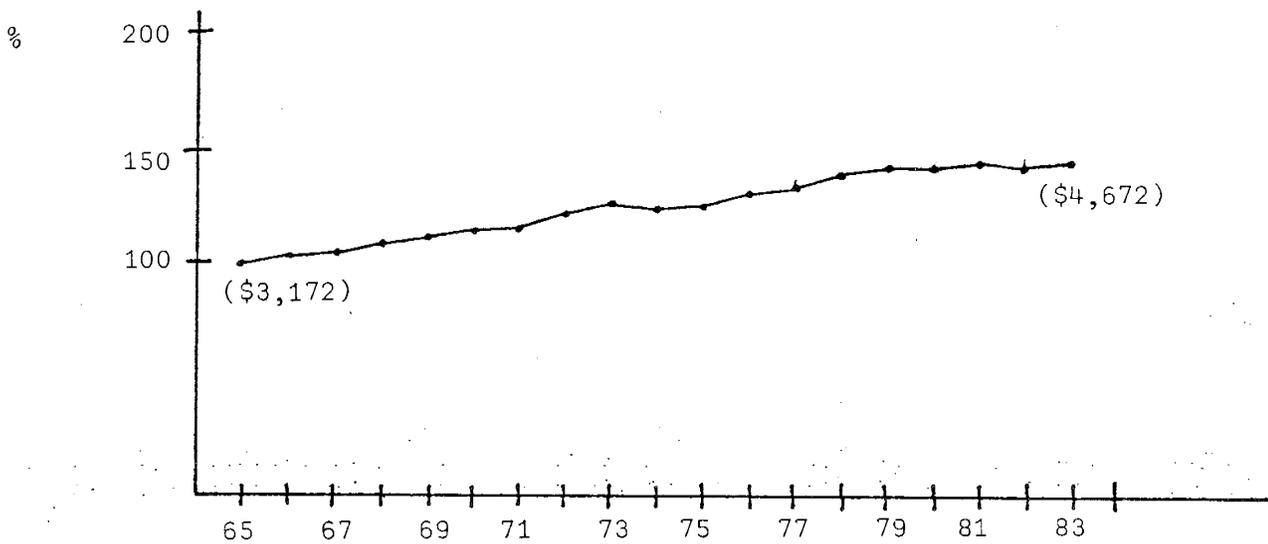


Figure 36

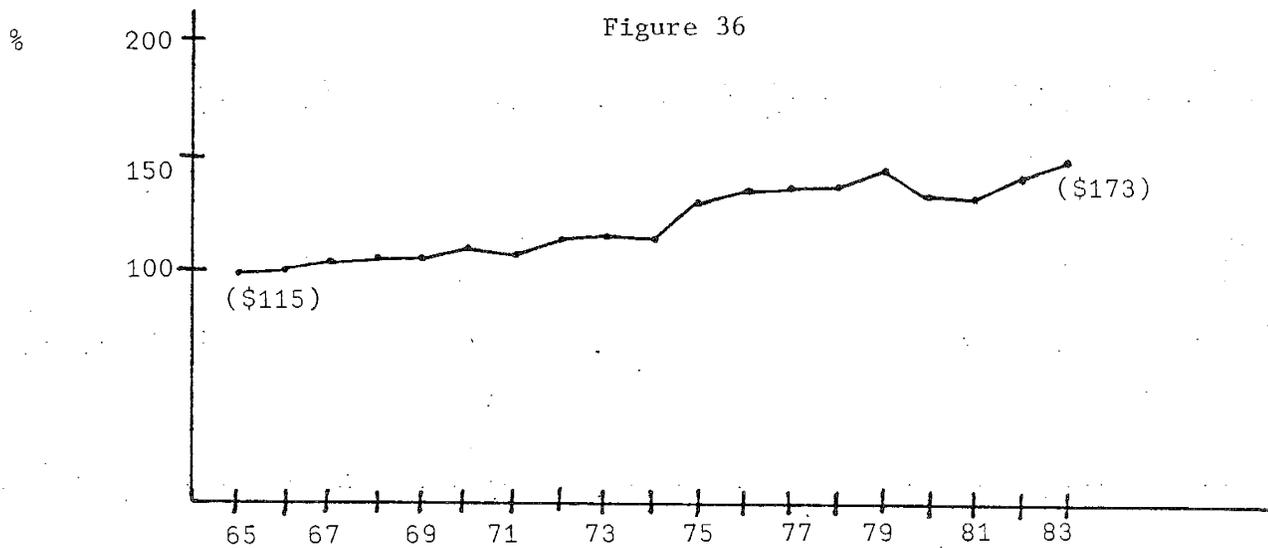


Figure 35. Per Capita Disposable Income, 1965-83 (Relative to 1965 Per Capita Disposable Income, 1972 Dollars) Source: USDC, 1984d.

Figure 36. Per Capita Expenditures at Retail Eating and Drinking Establishments, 1965-83. (Deflated by Consumer Price Index) Source: USDC, 1984d.

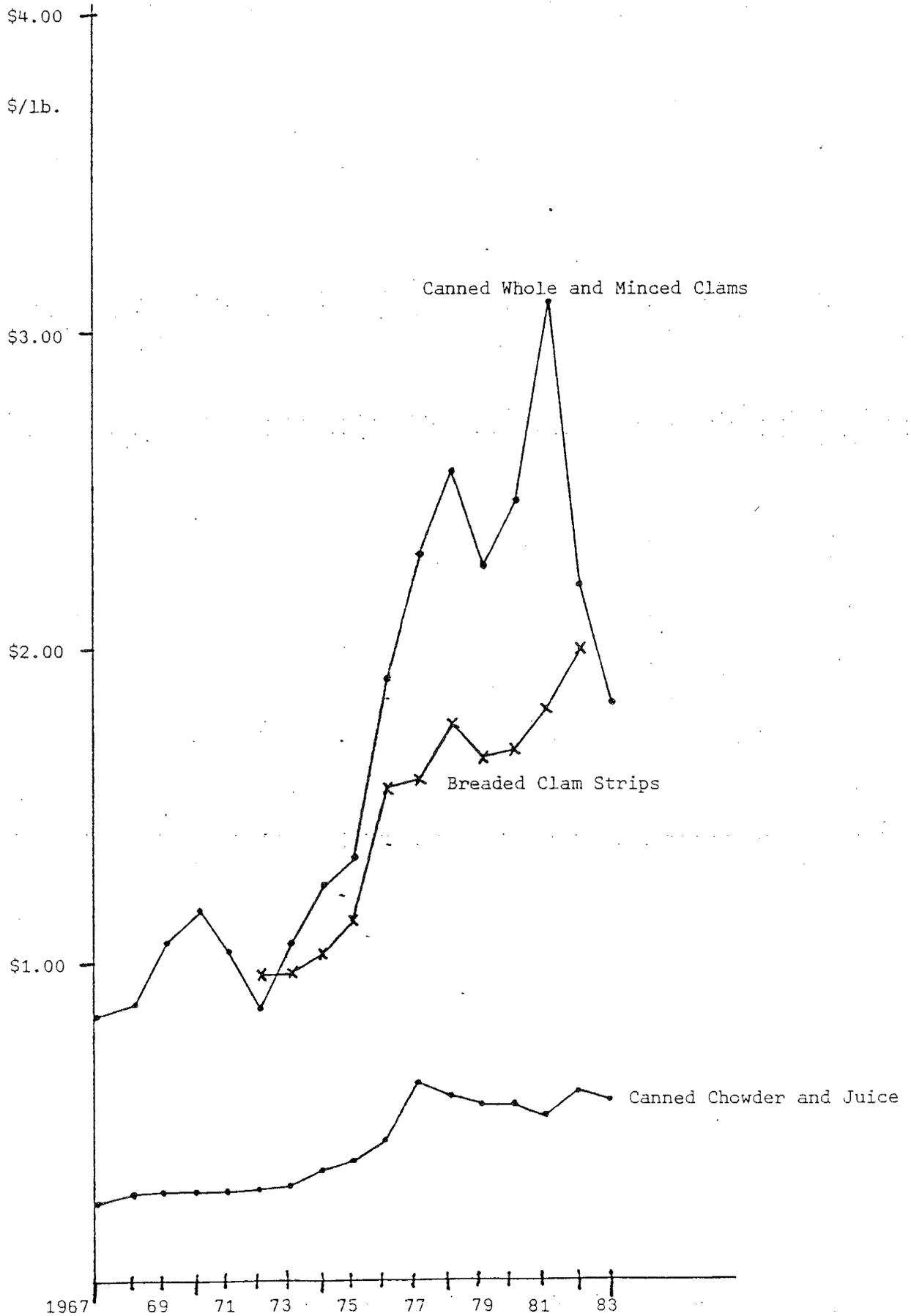


Figure 37. Processor Prices of Canned Chowder and Juice, Breaded Clam Strips, and Canned Whole and Minced Clams. Source: USDC, 1984 d.

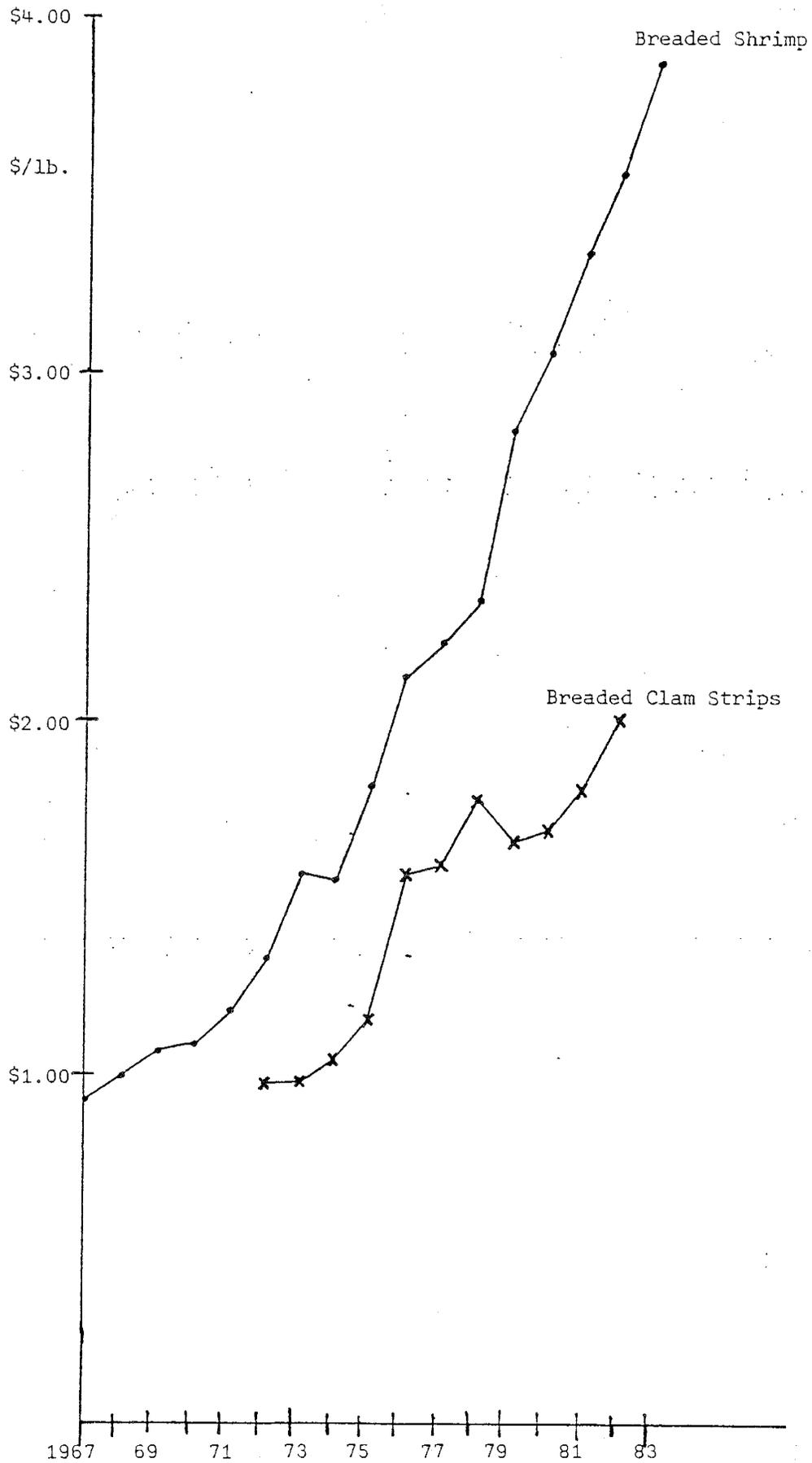


Figure 38. Processor Prices of Breaded Shrimp and Breaded Clam Strips 1967-83. Source: USDC, 1984 d.

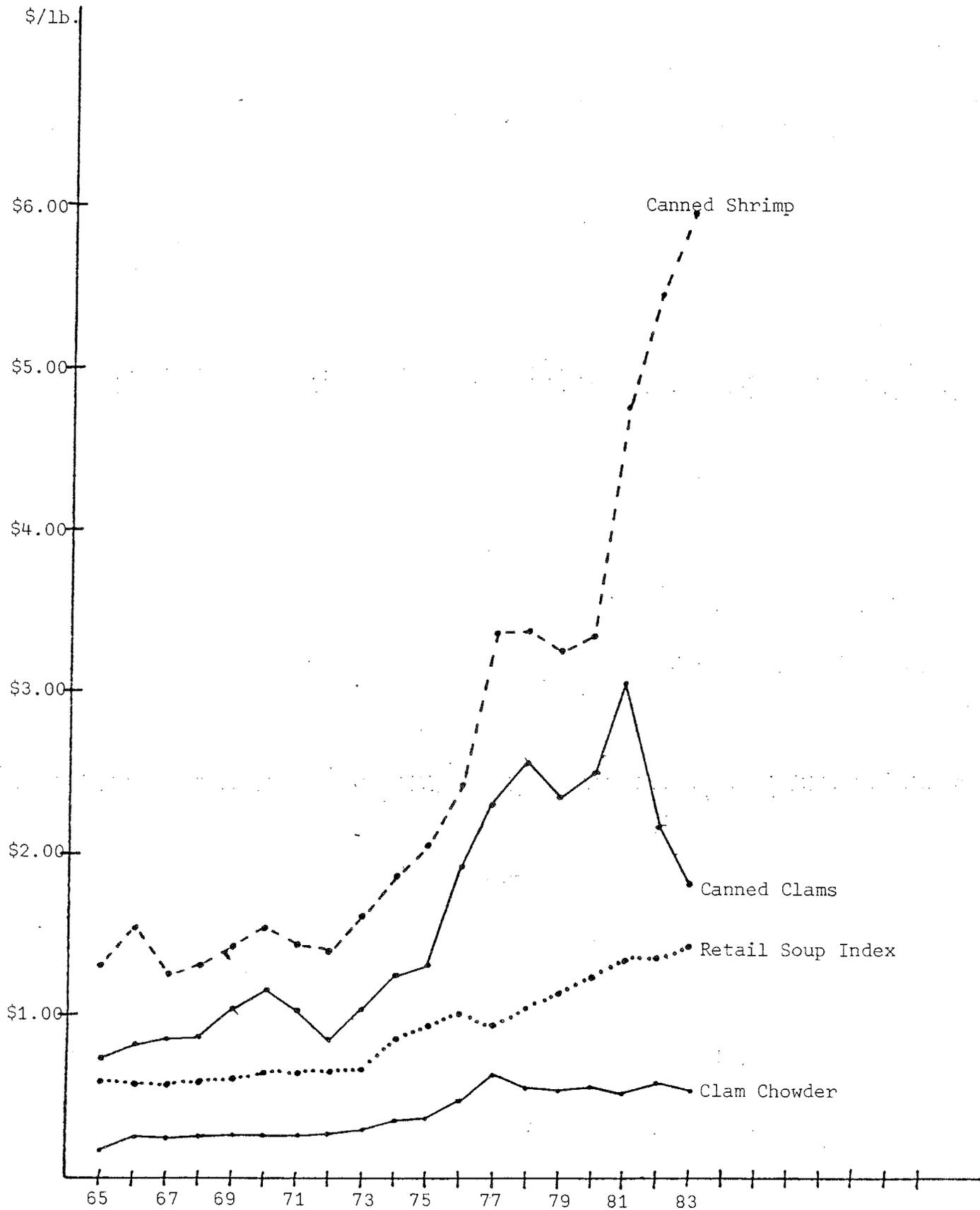


Figure 39. Current Prices of Canned Shrimp, Canned Whole and Minced Clams, Index of Canned and Semi-Prepared Soups, and Clam Chowder and Juice, 1965-83. Source: USDC, 1984d.

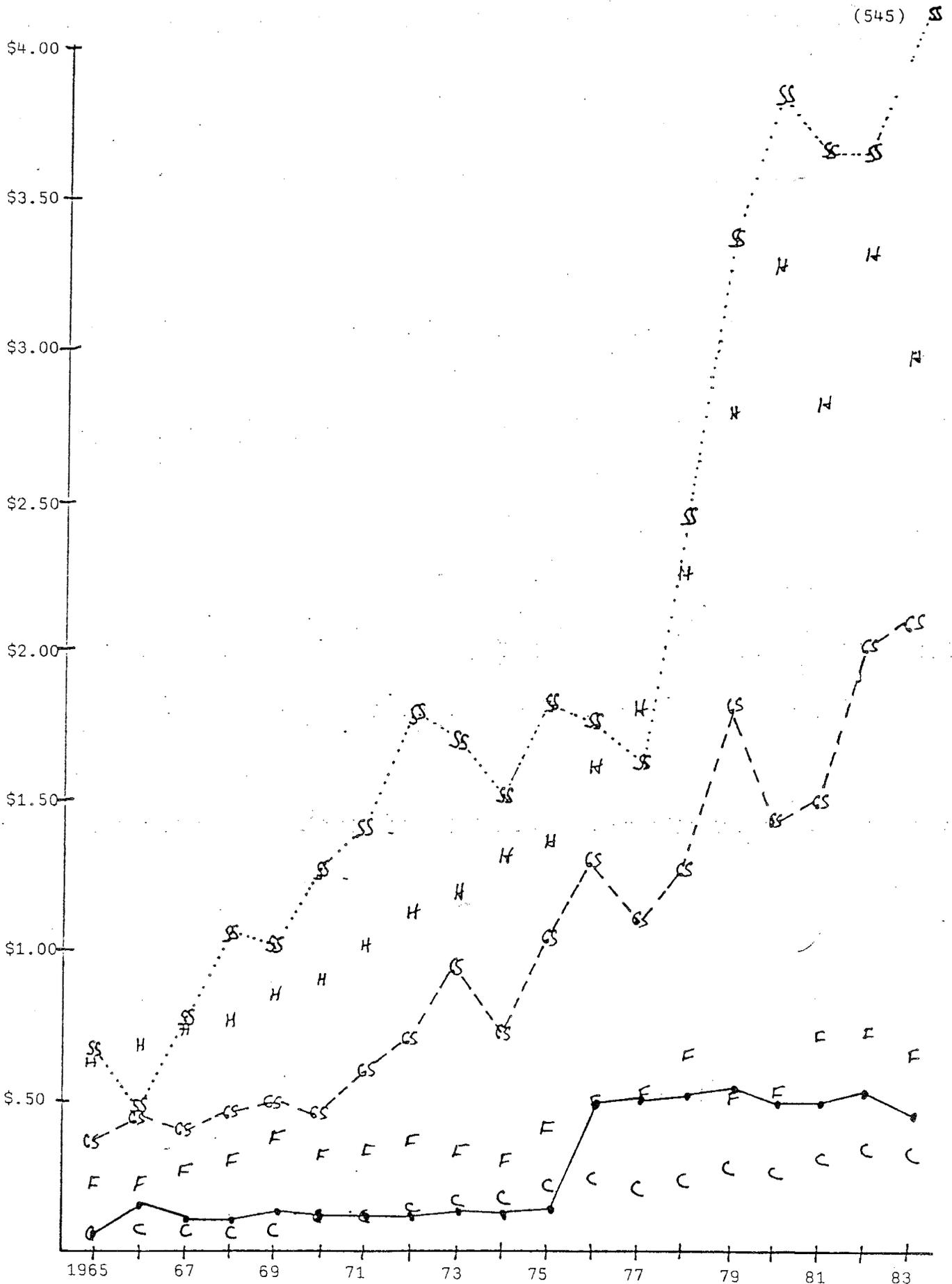


Figure 40. Ex-vessel prices of Sea Scallops (SS), Hard Clams (H), Gulf Shrimp (GS), Fluke (F), Cod (c), and Surf Clams (●—●—●) Source: USDC, 1984d.

Million lbs.

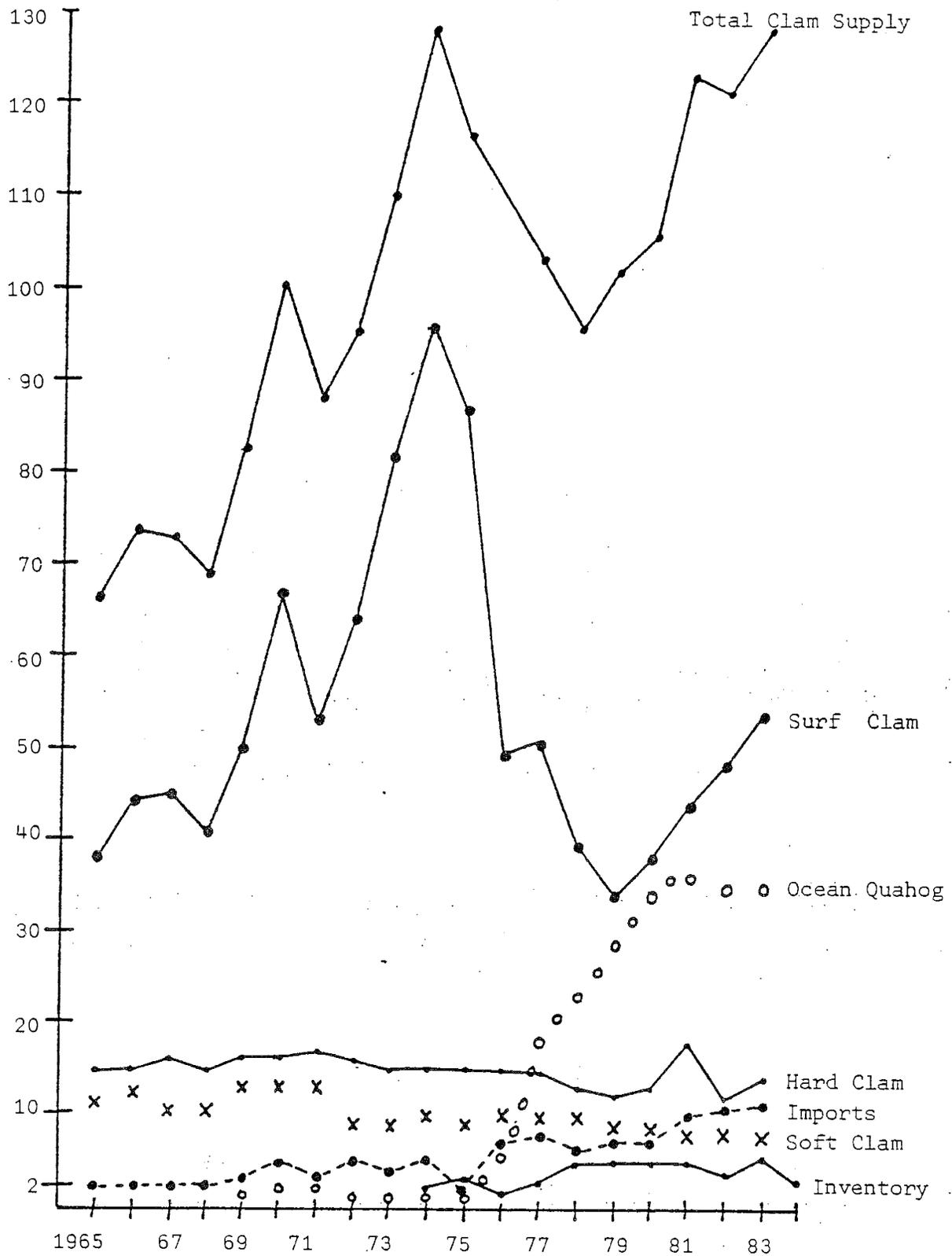


Figure 41. Total Clam Supply, 1965-83 Source: USDC, 1984 d.

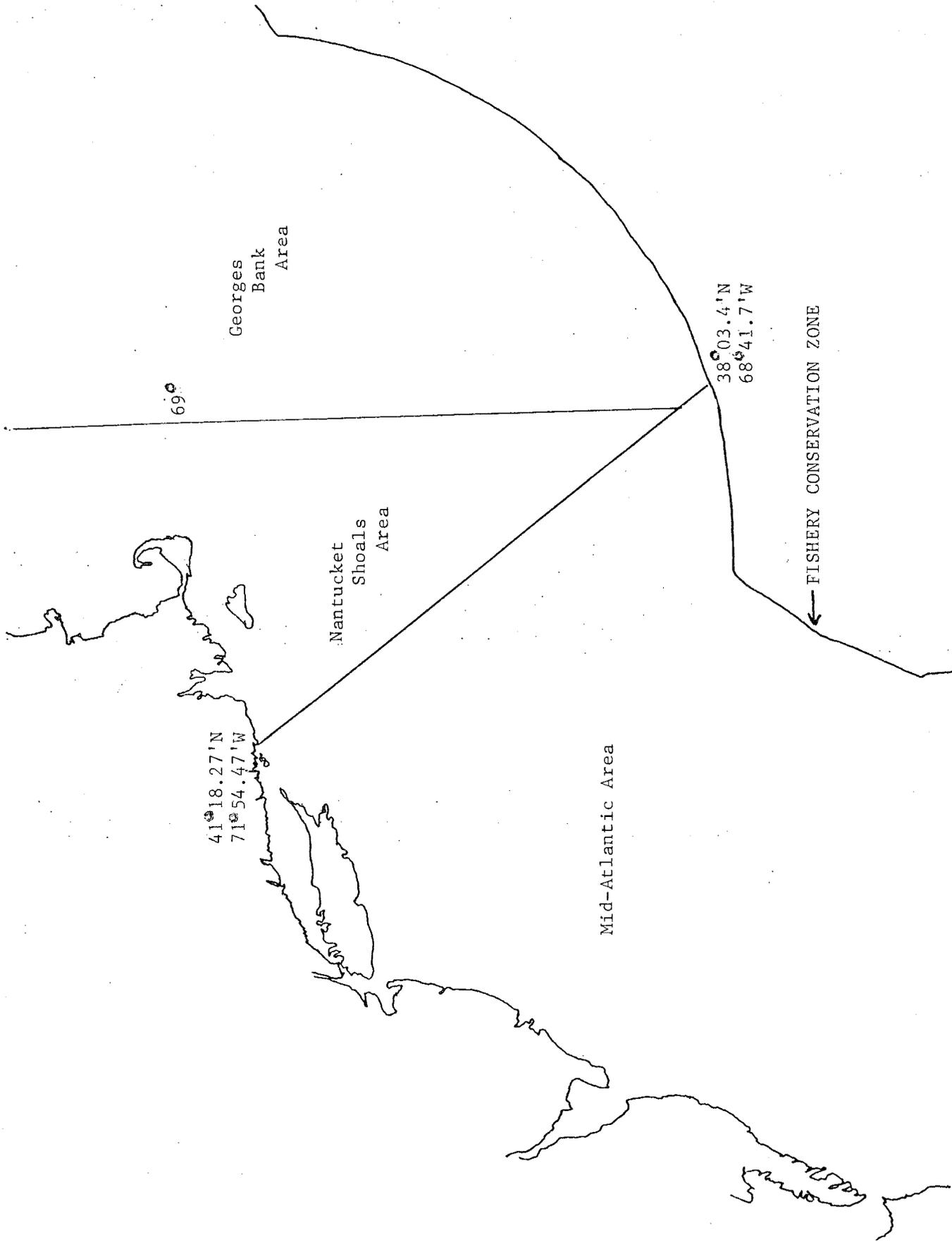


Figure 42. Delineation of Mid-Atlantic, Nantucket Shoals and Georges Bank Areas for Surf Clam Management.

APPENDIX I. ALTERNATIVES TO AMENDMENTS #4 AND #6

This appendix contains a description and evaluation of the alternatives, presented for public hearings, considered but not adopted for Amendments #4 and #6 to the Surf Clam and Ocean Quahog FMP.

AMENDMENT #4 ALTERNATIVES

1. TAKE NO ACTION AT THIS TIME

Description

No action would mean that the Nantucket Area maximum quota would be 100,000 bu.

Analysis of Beneficial and Adverse Impacts

As a consequence of the existing management structure in the New England Area and the current low exploitation rate, the objectives of the FMP are not being fully achieved in the New England Area. In particular, displaced fishing effort in 1983 into the New England Area from the Mid-Atlantic Area effectively preempted a year-round fishery by New England operators and resulted in economic dislocation, contrary to the intent of objective #2.

Finally, the low exploitation rate commensurate with a maximum 100,000 bu quota, coupled with the age composition of the stock decrease yield per recruit. In keeping with objective #5, recent analysis (Murawski and Serchuk, 1983a) of the the New England Area resource indicates that an exploitation rate consistent with a 100,000 to 237,000 bu maximum quota is appropriate. As a consequence of the foregoing, the intent of this amendment is to remedy those aspects of the management program which are inconsistent with the attainment of the FMP objectives in the New England Area. Therefore, the Council rejects the alternative of not taking action to amend the FMP in view of the management issues raised above.

2. QUOTA DISTRIBUTION

Description

Quotas are now used for the New England and Mid-Atlantic Areas, and for other fisheries, to control total fishery removals. As an ultimate control of fishing mortality, they have value. Changes in resource abundance can be reflected if, as is now the case, quotas are adjustable within ranges defined for the fisheries. Distribution of the quota over the fishing year can also serve the goal of avoiding lengthy closures and thus effectively addresses the potential closure problem of the New England Area. Quotas are usually administered and enforced through some form of effort restriction, such as fishing time, trip limits, vessel allocations, or closure.

Analysis of Beneficial and Adverse Impacts

This alternative management program provides, if correctly administered, sufficient control mechanisms to prevent the fishery from exceeding the annual quota.

The principal economic impact of the existing management program was felt severely in 1983 when the fishery was closed for six months. Extended closures such as the one which occurred in 1983 are clearly unacceptable to local operators and processors. Only operators who can move to other fisheries or other Areas can operate under such a regime. Surf clam vessels are not readily adaptable to other fisheries, and the limited entry program in the Mid-Atlantic allows only historical participants the opportunity to shift Areas.

Distributing the annual quota across quarters, two-month periods or monthly would reduce the length of the closures to some period of time within the desired distribution mode.

Managers are no happier imposing lengthy closures than fishermen are in the fishery being closed. Closures increase the risk of political intervention to reopen the fishery, thus voiding credibility

and conservation objectives. Closures also increase the probability that operators will violate the program to maintain some income flow, increasing the cost of enforcement. Although any of the identified selected modes of quota distributions will reduce the length of closures compared to 1983, distributing the quota alone could still result in numerous, relatively shorter closures which are costly to industry and to the government.

3. QUOTA DISTRIBUTION, AND TIME RESTRICTIONS

Description

Quotas are now used for the New England and Mid-Atlantic Areas, and for other fisheries, to control total fishery removals. As an ultimate control of fishing mortality, they have value. Changes in resource abundance can be reflected if, as is now the case, quotas are adjustable within ranges defined for the fisheries. Distribution of the quota over the fishing year can also serve the goal of avoiding lengthy closures and thus effectively addresses the potential closure problem of the New England Area. Quotas are usually administered and enforced through some form of effort restriction, such as fishing time, trip limits, vessel allocations, or closure.

Current regulations in the Mid-Atlantic fishery require restricting the number of allowable working hours per week so that quotas will not be exceeded. In the New England Area, fishing time restrictions under the original FMP have been optional for the Regional Director, although the fishery must close when the quota is caught. Under fishing time restrictions, differences among operators and vessel capabilities can lead to differences in total harvest, thus allowing for some incentives. However, restricting fishing time creates incentives to increase harvesting capacity to maximize potential revenues. Since fishing time provides an indirect linkage to total removals, control of the fishery within quotas is complicated. Enforcement of fishing time must be done by continual monitoring of at sea activity. This is costly and frequently frustrated. In the New England Area, where long steaming times and unpredictable weather are common, controlling fishing time leads, as it did in 1983, to an untenable operating climate. Another dimension which must be considered in the New England Area which makes fishing time restrictions particularly troublesome is that, unlike the Mid-Atlantic Area, the location and extent of surf clam populations are still not fully known and some fishermen find it necessary to spend considerable time searching.

Analysis of Beneficial and Adverse Impacts

This alternative management program provides, if correctly administered, sufficient control mechanisms to prevent the fishery from exceeding the annual quota.

The addition of fishing time effort restrictions to any selected quota distribution period would not necessarily decrease the number or length of necessary closures. There are practical limitations to the use of fishing time restrictions in the New England Area stemming from the need to allow for an economic trip for vessels, and this problem is made more difficult by the existence of vessels within the fishery with dramatically different performance capabilities. Experience from 1983 in the New England Area demonstrates that even a severe time restriction such as 12 hours per week is not effective in constraining the harvest given a relatively small annual quota and performance capabilities of some vessels.

The possibility of numerous closures results in the potential for continuing unnecessary high costs to government and industry. Further, a very high level of monitoring, data collection and projection analysis would be necessary to implement an equitable fishing time restriction program.

AMENDMENT #6 ALTERNATIVES

1. TAKE NO ACTION AT THIS TIME

Description

No action would mean that the FMP would make no provision for fishing for surf clams on the Georges Bank beds separate from the provisions in effect for the New England Area. The problem concerning multiple landings on one day in the Mid-Atlantic Area would continue.

Analysis of Beneficial and Adverse Impacts

Maintaining the status quo would mean that any fishing on Georges Bank would count against the New England Area quota. The New England Area OY and, consequently, quota were developed from data primarily from Nantucket Shoals. Hence, catches from Georges Bank, when added to catches from Nantucket Shoals, could reach levels that would trigger effort limitations on the entire area when such measures might not be justified based on catches from Nantucket Shoals alone. Such effort restrictions could be a disincentive to fishing on Georges Bank as a result of the cost of fishing operations on Georges Bank.

No action would also mean that the maximum allowable surf clam quota would be less than that which is biologically acceptable based on the best available scientific information. That is, the surf clams now known to exist on Georges Bank would not be accounted for in the New England Area quota. The effect would be that the maximum allowable catch would be between 25,000 and 300,000 bu (the Georges Bank Area OY) less than biologically allowable, which in turn would mean that potential income to fishermen would be reduced by the value of the Georges Bank OY. The Nantucket Area OY is 25,000-200,000 bu and the Mid-Atlantic Area OY is 1.8-2.9 million bu, so the total OY (including the Georges Bank Area) is 1.85-3.40 million bu, with the Georges Bank Area contributing 1.4%-8.8% of the total. At the 1984 average ex-vessel price of \$.49/lb (\$8.29/bu), the value of the Georges Bank OY would be \$208,000-\$2,499,000.

Not addressing the problem of multiple landings on a given day in the Mid-Atlantic Area would maintain one factor contributing to reduced fishing times and would also make enforcement more difficult.

2. DIVIDE THE NEW ENGLAND AREA INTO THE NANTUCKET AND GEORGES BANK AREAS WITHOUT MONTHLY OR QUARTERLY QUOTAS FOR THE GEORGES BANK AREA

Description

This alternative is the same as the proposed Amendment except that there would be no quarterly quotas for the Georges Bank Area; i.e., there would only be an annual quota.

Analysis of Beneficial and Adverse Impacts

The impacts of this alternative would be the same as those of the proposed Amendment (Section XII.B.) except for the difference between quarterly and only an annual quota for the Georges Bank Area.

Using the quarterly price model discussed in Section IX.A.4, with the assumptions set forth in Table 30, and assuming the entire Georges Bank quota could be taken in one quarter, the surf clam price would be \$8.11/bu at the low end of the OY (25,000 bu) with an ex-vessel value of \$8,808,166; \$7.70/bu at the current New England Area quota (100,000 bu) with an ex-vessel value of \$8,934,069, and \$6.59/bu at the high end of the OY (300,000 bu) with an ex-vessel value of \$8,965,111. That compares to the base case (no landings from the Nantucket Shoals or Georges Bank Areas) which produces a price of \$8.25/bu and an ex-vessel value of \$8,753,250 (Table 30).

It is not unreasonable to assume that the entire maximum annual Georges Bank quota could be taken in one quarter since the catch from that Area was 266,528 bu (Table 9) during the third quarter of 1984. Landings from the Georges Bank Area averaged about 20,000 bu/week while the fishery was operating at its peak during 1984 (July through September). During that period landings from the Mid-Atlantic FCZ Area were 518,000 bu (compared to a total during the period of 253,000 from Georges Bank) and the Mid-Atlantic Area was closed for three weeks.

Using proposed 1985 quotas as an example, the Georges Bank quota represents 9% of the combined Mid-Atlantic, Nantucket, and Georges Bank quotas (2,650,000, 200,000, and 300,000 bu, respectively). On an annual basis, it is unlikely that the Georges Bank quota would negatively impact prices in the other two Areas. However, preliminary 1984 data through October indicate that landings from the Mid-Atlantic Area averaged about 216,000 bu/month. If the entire 300,000 bu maximum Georges Bank quota were taken in one month (or even a substantial portion of 300,000

bu), it is possible that prices to the fishermen could be depressed throughout the entire fishery.

3. DIVIDE THE NEW ENGLAND AREA INTO THE NANTUCKET AND GEORGES BANK AREAS WITH MONTHLY QUOTAS FOR THE GEORGES BANK AREA

Description

This alternative is the same as Alternative 2, but no more than 100,000 bu could be harvested from the Georges Bank Area in any one month. The Regional Director would be required to close the surf clam fishery in the Georges Bank Area for the remainder of any month during which 100,000 bu was harvested and when the annual quota was harvested.

Analysis of Beneficial and Adverse Impacts

This alternative is intended to address possible impacts that unconstrained fishing on Georges Bank could have on the surf clam market. Landings from the Georges Bank Area averaged about 20,000 bu/week while the fishery was operating at its peak during 1984. During that period (June through September) landings from the Mid-Atlantic Area were 518,000 bu (compared to a total during the period of 253,000 from Georges Bank) and the Mid-Atlantic Area was closed for three weeks.

The tradeoff associated with this alternative is to keep management associated costs to the industry as low as possible to minimize disincentives to fishing in the Georges Bank Area while reducing the chances of the Georges Bank fishery impacting negatively on fishermen who cannot or do not participate in it.

This alternative is based on the concept that adding a maximum monthly catch limit to the regime is preferable to a situation that could possibly depress ex-vessel prices. The price impact would likely be temporary, with the degree and duration dependent on the extent to which the market was oversupplied relative to overall demand. However, it is unlikely that any ex-vessel price reduction generated by large short term catches would significantly change final produce prices.

It also assumes that the 100,000 bu/month maximum catch, when added to the potential maximum catch from the Nantucket Area, could supply processor demand during any period when the Mid-Atlantic Area might be closed. During the two week closure during September 1984 the Georges Bank catch was about 43,000 bu, when there were no limits except the research design on the Georges Bank fishery.

A statistically acceptable monthly surf clam price model has not been developed. However, if the quarterly model (Sections XII.A.4, XII.B., and above, and Table 30) is applied to this alternative along with the assumption that the maximum allowed catch (100,000 bu) is taken for three successive months (thus equalling 300,000 bu), the outcome is the same as for alternative 2.

ENVIRONMENTAL ASSESSMENT ON AMENDMENT #6 TO THE SURF CLAM AND OCEAN QUAHOG FISHERY MANAGEMENT PLAN (FMP)

I. INTRODUCTION

The original FMP was approved in November 1977 for the period through September 1979. Amendment #1 extended it through 31 December 1979. Amendment #2 extended it through the end of 1981. Amendment #3, approved 13 November 1981, extended the FMP indefinitely.

Amendment #4 was initiated in response to a closure of the New England Area to surf clam fishing during the second half of 1983. On 21 July 1983 the New England Council sent a letter to Secretary of Commerce Malcolm Baldrige requesting Secretarial action to reopen the New England Area surf clam fishery. The Mid-Atlantic Council passed a motion in August 1983 recommending that the Secretary not accept the proposal of the New England Council. After receiving a letter from Secretary Baldrige on 6 September 1983 denying implementation of emergency action to reopen the surf clam fishery in the New England Area, work was begun to investigate methods for avoiding an extended closure in 1984. In November 1983 the Mid-Atlantic Council passed a motion authorizing work with the New England Council "... to accomplish a management system for the New England Area involving trip limits, quarterly quotas, or similar strategies to insure fishing throughout the year ...". A proposed Amendment #4 was drafted by the New England Council staff in cooperation with NMFS staff and hearings were held on 21 and 22 March 1984 (see Appendix III for summaries). At a joint meeting of the New England and Mid-Atlantic Councils in May 1984 representatives of the surf clam industry from both New England and the Mid-Atlantic presented revisions to the proposed regime. The Mid-Atlantic Council passed a motion to "adopt Amendment #4 to the Surf Clam and Ocean Quahog FMP as amended to provide that any unharvested portion of a bimonthly allocation be added to the immediately following bimonthly allocation rather than being pro rated over all remaining bimonthly periods and that trip and weekly limits be by vessel classes based on relative fishing power using the following ratios: Class 1 = 1.0, Class 2 = 1.8, and Class 3 = 3.4, and that NMFS use a rulemaking procedure to implement the Amendment on an emergency basis." The New England Council voted at the same meeting to adopt the Amendment.

The provisions of Amendment #4 were implemented on an emergency basis for 180 days beginning 1 July 1984, during which time the Amendment was finalized by the New England Council and submitted for Secretarial approval. However, it was determined that the document was not structurally complete for review.

Amendment #5, approved 28 February 1985, revised the surf clam minimum size limit provisions, extended the size limit throughout the entire fishery, and instituted a requirement that cages be tagged.

This Amendment (#6) was begun in October 1985 following an exploratory fishery conducted on Georges Bank as a result of emergency regulations published 2 August 1984 (49 FR 30946-30948), primarily to address problems associated with the development of a surf clam fishery on Georges Bank (Section IV.B.2). At its October 1984 meeting the Council voted to divide the New England Area into the Nantucket Shoals and Georges Bank Areas, the dividing line being 69 degrees longitude. At the same meeting the Council voted to approve revising Amendment #4 so its provisions applied to that portion of the New England Area west of 69 degrees longitude.

In response to the Council's recommendation that Amendment #4 be revised to apply only to that portion of the New England Area west of 69 degrees, the New England Council held a hearing on 11 December 1984 (Appendix III).

At its December 1984 meeting the Council adopted the provisions of Amendment #6. The Amendment was adopted by the Council for hearings in January 1985, with hearings held 18 and 19 February 1985 (Appendix III). The Council adopted Amendment #6 for Secretarial approval at its March 1985 meeting. At that time Amendment #4 had still not been found structurally complete. Given the relationship between the provisions of Amendments #4 and #6, the decision was made to abandon Amendment #4 and combine the provisions of Amendment #4 with Amendment #6 in this document. The combination of Amendments #4 and #6 did not change any substantive provisions of either Amendment.

In order to facilitate documentation, the rejected alternatives for both Amendments are presented separately in Appendix I and the public hearing summaries are presented separately in Appendix III.

The Council was notified via a letter of 25 July 1985 that NMFS had partially approved Amendment #6. The letter from Acting Regional Director Richard H. Schaefer to Council Chairman Robert L. Martin stated in part:

"The measures in Amendment 6 that I disapproved are the Nantucket Shoals Area bimonthly quota guidelines and effort control measures, the one landing per day restriction applying to the Mid-Atlantic Area, the provision prohibiting the Regional Director from subdividing allowable fishing hours when the hours are set at 12 or less, and the portion of the notification provision prohibiting vessels that have fished in a notification zone from returning to fish in the same notification zone within that calendar month. The disapproval of the bimonthly guidelines for Nantucket Shoals removed the basis for adjusting the quotas between bimonthly periods when harvest either exceeds or falls short of quota. Therefore, this provision, while not specifically disapproved, can not be implemented on Nantucket Shoals at this time."

This revised version of Amendment #6 replaces the bimonthly quotas with quarterly quotas and eliminates the weekly landing limits for the Nantucket Shoals Area. It clarifies the quota adjustment provisions for the Nantucket Shoals and Georges Bank Areas. Finally, it presents additional justification for the one landing per trip provision. The other disapproved provisions (prohibition on subdividing allowed fishing times under certain conditions and portions of the notification system) have been deleted from the Amendment.

II. PURPOSE OF AND NEED FOR ACTION

This Amendment to the Fishery Management Plan for the Atlantic Surf Clam and Ocean Quahog Fisheries (FMP), prepared by the Mid-Atlantic Fishery Management Council (Council), is intended to: (1) divide the New England Area into the Nantucket Shoals and Georges Bank Areas, (2) revise the Optimum Yield (OY) and management regime for the Nantucket Shoals Area, (3) establish an OY and management regime for the Georges Bank Area, and (4) revise the effort limitation provisions regulating the Mid-Atlantic Area surf clam fishery. The management unit is all surf clams (Spisula solidissima) and all ocean quahogs (Arctica islandica) in the Atlantic fishery conservation zone (FCZ). The objectives of the FMP are:

1. Rebuild the surf clam populations to allow eventual harvest approaching the 50 million pound level, which is the estimate of maximum sustainable yield over the range of the resource, based on the average yearly catch from 1960 to 1976.
2. Minimize economic dislocation to the extent possible consistent with objective 1 and encourage efficiency in the fishery.
3. Prevent the harvest of ocean quahogs from exceeding maximum sustainable yield and direct the fishery toward achieving Optimum Yield.
4. Provide the greatest degrees of freedom and flexibility to all harvesters of these resources consistent with the attainment of the other objectives of this Plan.
5. Optimize yield per recruit.
6. Increase understanding of the conditions of the stocks and fishery.

The FMP currently contains two management areas for surf clams: the Mid-Atlantic Area and the New England Area. The dividing line between the Mid-Atlantic and New England Areas is the line that begins at 41°18'16.249" north latitude and 71°54'28.477" west longitude and proceeds S 37°22'32.75" E to the point of intersection with the outward boundary of the FCZ. The Amendment defines the Nantucket Shoals Area as that portion of the New England Area west of 69° and the Georges Bank Area as that portion of the New England Area east of 69°.

The New England Area was originally delineated to gather information on the surf clam resource in

the absence of comprehensive research data gathered by the Northeast Fisheries Center (NEFC). It was decided that the delineation of an area with no limitation on entry and with a quota and management measures separate from those operating in the Mid-Atlantic Area would encourage fishing in the New England Area and that such fishing would supply information on the extent of the surf clam resource in the New England Area. A fishery was initiated and NEFC prepared a stock assessment (Murawski and Serchuk, 1983a) concentrating on the western portion of the area (Nantucket Shoals). This assessment resulted in the specification of OY in the Nantucket Shoals Area as 25,000 - 200,000 bushels (bu), an increase over the 25,000 -100,000 bu specified for the New England Area. The annual quota is set following the procedures established in the FMP (MAFMC, 1981).

Management of the Nantucket Shoals Area is based on dividing the annual quota into quarterly quotas as follows: 20% for January through March, 30% for April through June, 30% for July through September, and 20% October through December. If the actual catch of surf clams in any quarterly period falls more than 5,000 bushels short of the specified quarterly quota, the Regional Director will add the amount of the shortfall to the succeeding quarterly quota. If the actual catch of surf clams exceeds the quarterly quota, the Regional Director will subtract the amount of the excess from the succeeding quarterly quota. The Regional Director shall publish a notice in the Federal Register whenever any quarterly quota for surf clams is adjusted as described above. The shortfall or excess will carry over from the last quarter of one year to the first quarter of the next year except that no more than 10% of the annual quota may be carried over to the next year. No catch restrictions shall be applied to the fishery until 50% of the quarterly quota has been landed. The Regional Director will monitor landings from the Nantucket Shoals Area and will determine either when the 50% point has been reached or when that point will likely be reached. The Regional Director will thereupon consult with the Councils in the selection of trip limits to control catch adequately to keep the fishery open for the balance of the quarter. Trip limits will be established by vessel class as follows: for Class 1 vessels, trip limits may not be less than 224 bu/trip; for Class 2 vessels, trip limits may not be less than 416 bu/trip for Class 2, and for Class 3 vessels, trip limits may not be less than 768 bu/trip. Trip limits must maintain a fixed ratio of 1.0: 1.8: 3.4 for Class 1, 2, and 3, respectively. In the event that trip limits are not sufficient to keep landings to within the quota levels, the Regional Director may close the fishery until the beginning of the next quota period. Once initial trip limits have been established in consultation with the Councils, the Regional Director will notify the Councils in advance of any proposed action to further specify trip limits or close the fishery. The Regional Director will consider any comments received by the Councils or the public before implementing any adjustments in the Nantucket Shoals management program.

During 1984 vessels began a surf clam fishery on Georges Bank. This led to research using NMFS and commercial vessels that resulted in a stock assessment (Murawski and Serchuk, 1984b) for Georges Bank which suggested a maximum annual catch of 300,000 bu. The surf clam fishing grounds on Georges Bank are a substantial distance from shore. If the New England Area OY were increased to reflect the Georges Bank assessment, it is probable that all of the increased catch would come from Nantucket Shoals, leading to over fishing in that Area. Hence, it is necessary to partition the New England Area.

The OY for the Georges Bank Area is 25,000 to 300,000 bu. The annual quota is set following the procedures established in the FMP and is divided into quarterly quotas, with the first and fourth quarters (January-March and October-December) each allocated 10% of the annual quota and the second and third quarters (April-June and July-September) each allocated 40% of the annual quota. If the actual catch of surf clams in any quarterly period falls more than 5,000 bushels short of the specified quarterly quota, the Regional Director will add the amount of the shortfall to the succeeding quarterly quota. If the actual catch of surf clams exceeds the quarterly quota, the Regional Director will subtract the amount of the excess from the succeeding quarterly quota. The Regional Director shall publish a notice in the Federal Register whenever any quarterly quota for surf clams is adjusted as described above. The shortfall or excess will carry over from the last quarter of one year to the first quarter of the next year except that no more than 10% of the annual quota may be carried over to the next year.

Management of the Mid-Atlantic Area is based on the current FMP, except that the effort limitations are modified by this Amendment to add the provision that vessels may land surf clams

only one time during an authorized fishing period.

The surf clam minimum size limit applies in all three Areas.

The permit eligibility requirements for the New England Area continue unchanged for both the Nantucket Shoals and Georges Bank Areas; specifically, vessels with permits issued pursuant to the moratorium on entry of vessels into the surf clam fishery and vessels with permits to fish only in the New England Area may both fish in both the Nantucket Shoals and Georges Bank Areas. However, it is the Council's intent that vessels with permits to fish only in the New England Area accrue no rights to participate in any future vessel allocation system that may be developed to replace or supplement the moratorium on entry of vessels into the surf clam fishery as a consequence of such vessels fishing in the New England Area.

Vessel owners or operators must notify NMFS in advance if they intend to fish for surf clams in a Notification Zone. For vessels authorized to fish in both the Mid-Atlantic and New England Areas (i.e., with permits issued pursuant to the moratorium) with home ports in the Mid-Atlantic Area, the Nantucket Shoals or Georges Bank Areas are Notification Zones. For vessels authorized to fish in both the Mid-Atlantic and New England Areas (i.e., with permits issued pursuant to the moratorium) with home ports in the New England Area, the Mid-Atlantic or Georges Bank Areas are Notification Zones. For vessels authorized to fish only in the New England Area, the Georges Bank Area is a Notification Zone. Home port is that specified on the vessel's permit application. Vessels may not fish in more than one Area on any day. If an operator intends to change the vessel's Area of fishing, NMFS must be notified in advance.

III. ALTERNATIVES

This section contains a description and evaluation of the alternatives, presented for public hearings, considered but not adopted for Amendments #4 and #6 to the Surf Clam and Ocean Quahog FMP.

AMENDMENT #4 ALTERNATIVES

1. TAKE NO ACTION AT THIS TIME

Description

No action would mean that the Nantucket Area maximum quota would be 100,000 bu.

Analysis of Beneficial and Adverse Impacts

As a consequence of the existing management structure in the New England Area and the current low exploitation rate, the objectives of the FMP are not being fully achieved in the New England Area. In particular, displaced fishing effort in 1983 into the New England Area from the Mid-Atlantic Area effectively preempted a year-round fishery by New England operators and resulted in economic dislocation, contrary to the intent of objective #2.

Finally, the low exploitation rate commensurate with a maximum 100,000 bu quota, coupled with the age composition of the stock decrease yield per recruit. In keeping with objective #5, recent analysis (Murawski and Serchuk, 1983a) of the the New England Area resource indicates that an exploitation rate consistent with a 100,000 to 237,000 bu maximum quota is appropriate. As a consequence of the foregoing, the intent of this amendment is to remedy those aspects of the management program which are inconsistent with the attainment of the FMP objectives in the New England Area. Therefore, the Council rejects the alternative of not taking action to amend the FMP in view of the management issues raised above.

2. QUOTA DISTRIBUTION

Description

Quotas are now used for the New England and Mid-Atlantic Areas, and for other fisheries, to

control total fishery removals.' As an ultimate control of fishing mortality, they have value. Changes in resource abundance can be reflected if, as is now the case, quotas are adjustable within ranges defined for the fisheries. Distribution of the quota over the fishing year can also serve the goal of avoiding lengthy closures and thus effectively addresses the potential closure problem of the New England Area. Quotas are usually administered and enforced through some form of effort restriction, such as fishing time, trip limits, vessel allocations, or closure.

Analysis of Beneficial and Adverse Impacts

This alternative management program provides, if correctly administered, sufficient control mechanisms to prevent the fishery from exceeding the annual quota.

The principal economic impact of the existing management program was felt severely in 1983 when the fishery was closed for six months. Extended closures such as the one which occurred in 1983 are clearly unacceptable to local operators and processors. Only operators who can move to other fisheries or other Areas can operate under such a regime. Surf clam vessels are not readily adaptable to other fisheries, and the limited entry program in the Mid-Atlantic allows only historical participants the opportunity to shift Areas.

Distributing the annual quota across quarters, two-month periods or monthly would reduce the length of the closures to some period of time within the desired distribution mode.

Managers are no happier imposing lengthy closures than fishermen are in the fishery being closed. Closures increase the risk of political intervention to reopen the fishery, thus voiding credibility and conservation objectives. Closures also increase the probability that operators will violate the program to maintain some income flow, increasing the cost of enforcement. Although any of the identified selected modes of quota distributions will reduce the length of closures compared to 1983, distributing the quota alone could still result in numerous, relatively shorter closures which are costly to industry and to the government.

3. QUOTA DISTRIBUTION, AND TIME RESTRICTIONS

Description

Quotas are now used for the New England and Mid-Atlantic Areas, and for other fisheries, to control total fishery removals. As an ultimate control of fishing mortality, they have value. Changes in resource abundance can be reflected if, as is now the case, quotas are adjustable within ranges defined for the fisheries. Distribution of the quota over the fishing year can also serve the goal of avoiding lengthy closures and thus effectively addresses the potential closure problem of the New England Area. Quotas are usually administered and enforced through some form of effort restriction, such as fishing time, trip limits, vessel allocations, or closure.

Current regulations in the Mid-Atlantic fishery require restricting the number of allowable working hours per week so that quotas will not be exceeded. In the New England Area, fishing time restrictions under the original FMP have been optional for the Regional Director, although the fishery must close when the quota is caught. Under fishing time restrictions, differences among operators and vessel capabilities can lead to differences in total harvest, thus allowing for some incentives. However, restricting fishing time creates incentives to increase harvesting capacity to maximize potential revenues. Since fishing time provides an indirect linkage to total removals, control of the fishery within quotas is complicated. Enforcement of fishing time must be done by continual monitoring of at sea activity. This is costly and frequently frustrated. In the New England Area, where long steaming times and unpredictable weather are common, controlling fishing time leads, as it did in 1983, to an untenable operating climate. Another dimension which must be considered in the New England Area which makes fishing time restrictions particularly troublesome is that, unlike the Mid-Atlantic Area, the location and extent of surf clam populations are still not fully known and some fishermen find it necessary to spend considerable time searching.

Analysis of Beneficial and Adverse Impacts

This alternative management program provides, if correctly administered, sufficient control

mechanisms to prevent the fishery from exceeding the annual quota.

The addition of fishing time effort restrictions to any selected quota distribution period would not necessarily decrease the number or length of necessary closures. There are practical limitations to the use of fishing time restrictions in the New England Area stemming from the need to allow for an economic trip for vessels, and this problem is made more difficult by the existence of vessels within the fishery with dramatically different performance capabilities. Experience from 1983 in the New England Area demonstrates that even a severe time restriction such as 12 hours per week is not effective in constraining the harvest given a relatively small annual quota and performance capabilities of some vessels.

The possibility of numerous closures results in the potential for continuing unnecessary high costs to government and industry. Further, a very high level of monitoring, data collection and projection analysis would be necessary to implement an equitable fishing time restriction program.

AMENDMENT #6 ALTERNATIVES

1. TAKE NO ACTION AT THIS TIME

Description

No action would mean that the FMP would make no provision for fishing for surf clams on the Georges Bank beds separate from the provisions in effect for the New England Area. The problem concerning multiple landings on one day in the Mid-Atlantic Area would continue.

Analysis of Beneficial and Adverse Impacts

Maintaining the status quo would mean that any fishing on Georges Bank would count against the New England Area quota. The New England Area OY and, consequently, quota were developed from data primarily from Nantucket Shoals. Hence, catches from Georges Bank, when added to catches from Nantucket Shoals, could reach levels that would trigger effort limitations on the entire area when such measures might not be justified based on catches from Nantucket Shoals alone. Such effort restrictions could be a disincentive to fishing on Georges Bank as a result of the cost of fishing operations on Georges Bank.

No action would also mean that the maximum allowable surf clam quota would be less than that which is biologically acceptable based on the best available scientific information. That is, the surf clams now known to exist on Georges Bank would not be accounted for in the New England Area quota. The effect would be that the maximum allowable catch would be between 25,000 and 300,000 bu (the Georges Bank Area OY) less than biologically allowable, which in turn would mean that potential income to fishermen would be reduced by the value of the Georges Bank OY. The Nantucket Area OY is 25,000-200,000 bu and the Mid-Atlantic Area OY is 1.8-2.9 million bu, so the total OY (including the Georges Bank Area) is 1.85-3.40 million bu, with the Georges Bank Area contributing 1.4%-8.8% of the total. At the 1984 average ex-vessel price of \$.49/lb (\$8.29/bu), the value of the Georges Bank OY would be \$208,000-\$2,499,000.

Not addressing the problem of multiple landings on a given day in the Mid-Atlantic Area would maintain one factor contributing to reduced fishing times and would also make enforcement more difficult.

2. DIVIDE THE NEW ENGLAND AREA INTO THE NANTUCKET AND GEORGES BANK AREAS WITHOUT MONTHLY OR QUARTERLY QUOTAS FOR THE GEORGES BANK AREA

Description

This alternative is the same as the proposed Amendment except that there would be no quarterly quotas for the Georges Bank Area; i.e., there would only be an annual quota.

Analysis of Beneficial and Adverse Impacts

The impacts of this alternative would be the same as those of the proposed Amendment (Section XII.B.) except for the difference between quarterly and only an annual quota for the Georges Bank Area.

Using the quarterly price model discussed in Section IX.A.4, with the assumptions set forth in Table 30, and assuming the entire Georges Bank quota could be taken in one quarter, the surf clam price would be \$8.11/bu at the low end of the OY (25,000 bu) with an ex-vessel value of \$8,808,166; \$7.70/bu at the current New England Area quota (100,000 bu) with an ex-vessel value of \$8,934,069, and \$6.59/bu at the high end of the OY (300,000 bu) with an ex-vessel value of \$8,965,111. That compares to the base case (no landings from the Nantucket Shoals or Georges Bank Areas) which produces a price of \$8.25/bu and an ex-vessel value of \$8,753,250 (Table 30).

It is not unreasonable to assume that the entire maximum annual Georges Bank quota could be taken in one quarter since the catch from that Area was 266,528 bu (Table 9) during the third quarter of 1984. Landings from the Georges Bank Area averaged about 20,000 bu/week while the fishery was operating at its peak during 1984 (July through September). During that period landings from the Mid-Atlantic FCZ Area were 518,000 bu (compared to a total during the period of 253,000 from Georges Bank) and the Mid-Atlantic Area was closed for three weeks.

Using proposed 1985 quotas as an example, the Georges Bank quota represents 9% of the combined Mid-Atlantic, Nantucket, and Georges Bank quotas (2,650,000, 200,000, and 300,000 bu, respectively). On an annual basis, it is unlikely that the Georges Bank quota would negatively impact prices in the other two Areas. However, preliminary 1984 data through October indicate that landings from the Mid-Atlantic Area averaged about 216,000 bu/month. If the entire 300,000 bu maximum Georges Bank quota were taken in one month (or even a substantial portion of 300,000 bu), it is possible that prices to the fishermen could be depressed throughout the entire fishery.

3. DIVIDE THE NEW ENGLAND AREA INTO THE NANTUCKET AND GEORGES BANK AREAS WITH MONTHLY QUOTAS FOR THE GEORGES BANK AREA

Description

This alternative is the same as Alternative 2, but no more than 100,000 bu could be harvested from the Georges Bank Area in any one month. The Regional Director would be required to close the surf clam fishery in the Georges Bank Area for the remainder of any month during which 100,000 bu was harvested and when the annual quota was harvested.

Analysis of Beneficial and Adverse Impacts

This alternative is intended to address possible impacts that unconstrained fishing on Georges Bank could have on the surf clam market. Landings from the Georges Bank Area averaged about 20,000 bu/week while the fishery was operating at its peak during 1984. During that period (June through September) landings from the Mid-Atlantic Area were 518,000 bu (compared to a total during the period of 253,000 from Georges Bank) and the Mid-Atlantic Area was closed for three weeks.

The tradeoff associated with this alternative is to keep management associated costs to the industry as low as possible to minimize disincentives to fishing in the Georges Bank Area while reducing the chances of the Georges Bank fishery impacting negatively on fishermen who cannot or do not participate in it.

This alternative is based on the concept that adding a maximum monthly catch limit to the regime is preferable to a situation that could possibly depress ex-vessel prices. The price impact would likely be temporary, with the degree and duration dependent on the extent to which the market was oversupplied relative to overall demand. However, it is unlikely that any ex-vessel price reduction generated by large short term catches would significantly change final produce prices.

It also assumes that the 100,000 bu/month maximum catch, when added to the potential maximum catch from the Nantucket Area, could supply processor demand during any period when the Mid-

Atlantic Area might be closed. During the two week closure during September 1984 the Georges Bank catch was about 43,000 bu, when there were no limits except the research design on the Georges Bank fishery.

A statistically acceptable monthly surf clam price model has not been developed. However, if the quarterly model (Sections XII.A.4, XII.B., and above, and Table 30) is applied to this alternative along with the assumption that the maximum allowed catch (100,000 bu) is taken for three successive months (thus equalling 300,000 bu), the outcome is the same as for alternative 2.

IV. ENVIRONMENTAL IMPACTS

The environmental impacts of the management regime instituted in the original FMP were described in the Environmental Impact Statement accompanying the FMP, and in the Supplemental Environmental Impact Statements or Environmental Assessments accompanying the Amendments.

Dividing the Areas

Dividing the New England Area into the Nantucket Shoals and Georges Bank Areas would mean that fishing in the Nantucket Shoals Area could continue without any negative impacts from fishing in the Georges Bank Area, and vice versa. The management systems in the two Areas are different because of the different management objectives of the two Areas. The Nantucket Shoals Area is being managed to keep the fishery open for as much of the year as possible. The Georges Bank Area is managed to achieve a compromise between keeping the fishery open for as much of the year as possible, consistent with safety, while also providing an area where fishing may occur with minimal controls during periods when the Nantucket Shoals or Mid-Atlantic Areas may be either closed or operating under severe restrictions. The positive impact of the division is that the level of regulation imposed on the fishermen will be no greater than that considered necessary for each Area.

If the division were not implemented it can be assumed that the entire New England Area would be controlled either by the rules proposed for the Nantucket Shoals Area or the rules proposed for the Georges Bank Area; in which event the Georges Bank Area would be subjected to more regulation than is considered necessary or the Nantucket Shoals Area would be subjected to less. Both of these situations have negative impacts. Application of the Nantucket Shoals Area rules throughout the entire New England Area would mean fishermen in the Georges Bank Area would be subject to different quarterly quotas and potentially to trip limits. Conversely, application of the proposed Georges Bank rules to the entire New England Area would mean the entire Area would be subject to different quarterly quotas and no limitations short of closure, potentially leading to outcomes not consistent with the objectives for the Area. Additionally, allowing the combined OYs to be harvested from either area could lead to excessive harvests from one of the areas; i.e., if the divided Areas were not specified but the OY increased as proposed, the annual quota could be as great as 500,000 bu, which could legally be taken from Nantucket Shoals (where the maximum catch should only be 200,000 bu) or from Georges Bank (where the maximum catch should be only 300,000 bu).

It is not possible to quantify the costs and benefits of dividing the Area. However, some qualitative observations may be made.

1. If the entire New England Area were operated under the Nantucket Shoals Area rules, the OY and quota range would be 50,000-500,000 bu. Since most of the harvest of the Nantucket Shoals resource occurred in 1983 and for the Georges Bank fishery in 1984, it is not possible to directly compare potential harvest patterns with historical performance. However, in 1984 the Georges Bank fishery alone took almost 90,000 bu per month for three months (Table 9), a harvest rate that would trigger trip limits even at the maximum quota level. Hence, it is not unreasonable to conclude that applying the Nantucket Shoals Area rules to the entire New England Area would very likely lead to an excessive level of regulation on the fishery in the Georges Bank Area, with resultant increased costs to industry and government to operate under and administer, respectively, the increased level of control.

2. If the entire New England Area were operated under the Georges Bank Area rules the OY range

would again be 50,000-500,000 bu, with a quarterly quota distribution of 10%, 40%, 40%, and 10% of the annual quota. At the minimum quota level the quarterly quotas would be 5,000 bu, 20,000 bu, 20,000 bu, and 5,000 bu. At the current level the quarterly quotas would be 10,000 bu, 40,000 bu, 40,000 bu, and 10,000 bu. At the maximum rate the quarterly quotas would be 50,000 bu, 200,000 bu, 200,000 bu, and 50,000 bu. Given the problems in combining historical statistics for the Nantucket Shoals and Georges Bank Areas and recognizing that the Georges Bank fishery operated for only one complete quarter in 1984 (during which the catch was 266,538 bu; Table 9), closures might be expected if the July-September 1984 performance is repeated. While closures are contemplated for the Georges Bank Area, they should be seen as negative impacts vis-a-vis the Nantucket Shoals Area.

3. The price impacts of various quota levels with separate and joint Areas using the price equation discussed in Section IX and assuming a catch absent the Nantucket Shoals and Georges Bank Areas quotas equal to the average quarterly catch for the first three quarters of 1984 (1,061,000 bu), and a per capita disposable income equal to that of the third quarter of 1984 (\$4,961), suggest a price decrease and gross revenue increase for any catch over the base level (Table 30). If the minimum catch in the lowest quarter for the Georges Bank Area (2,500 bu) and no catch from the Nantucket Shoals Area is assumed, the price is predicted by the model to decrease by \$.01/bu and ex-vessel value to increase by about \$10,000 relative to those quantities in the absence of any catch from either Nantucket Shoals or Georges Bank. At the other extreme, if it is assumed that the New England Area is not divided and the proposed Georges Bank rules apply, at the maximum quarterly quota level (200,000 bu), the surf clam price would be \$7.14/bu and ex-vessel value would be \$9,004,990. That range of prices is not considered significant since actual quarterly prices have ranged from \$6.68 to \$8.84/bu during 1983 and 1984. Any price impact of the Georges Bank catch would decrease as the Mid-Atlantic Area quota and catch increase and as a greater portion of the Nantucket Shoals Area quota is landed. It must also be noted that the Georges Bank catch during the third quarter of 1984 was more than double the maximum quarterly quota and the third quarter price was \$8.46/bu.
4. Government costs would increase because of creating the two Areas as a result of the need to know where vessels were fishing. Knowledge of the Area in which fishing is occurring is necessary to assure the reliability of catch statistics so that appropriate measures could be implemented as required to avoid overfishing.

OY for the Nantucket Shoals Area

Quotas established for the New England Area in previous iterations of the FMP were based on limited survey information and a lack of significant fishing activity, which made it difficult to assess the potential commercial yield from the fishery.

During the last quarter of 1982 and the beginning of 1983 fishing activities increased substantially. Resource distribution and abundance was traced, survey data were collected and analysed, and a stock assessment was produced during the summer of 1983 (Murawski and Serchuk, 1983a). The survey, conducted in the Nantucket Shoals area, concluded that about 10% of the total surf clam resource biomass and 5% of the numbers was located in that Area. Applying the 10% figure to the biomass in the Mid-Atlantic, and basing a quota on the same assumptions used to fix the quota in the Mid-Atlantic, results in a conclusion that the upper bound of the OY range for the Nantucket Shoals Area may safely be established as 200,000 bu. The resource in the Nantucket Shoals Area is somewhat different from that in the Mid-Atlantic because the rough bottom topography, shallow depths, and strong currents complicate fishing activity. The current resource is generally older, slightly faster growing, and yields slightly more meat for similar sized clams than in the Mid-Atlantic. There has been essentially no recruitment during the last five to six years.

The effect of doubling the allowable quota should be significant to the few FCZ fishermen who are permitted to fish only in the New England Area, in that it will significantly increase possible fishing opportunities. The economic effect of the increased quota on the surf clam industry is likely to be far less significant. The maximum Nantucket Shoals Area annual quota (200,000 bu) is only 6.8% of the maximum Mid-Atlantic Area quota. If the Georges Bank maximum annual quota is added to the maximum Mid-Atlantic Area annual quota, then the maximum Nantucket Shoals Area

annual quota is only 6.2% of the total.

Nantucket Shoals Area Quarterly Quotas

Quotas are now used for the New England and Mid-Atlantic surf clam fisheries, and in other fisheries, to control total fishery removals. As an ultimate control of fishing mortality, they have value. Changes in resource abundance can be reflected if quotas are adjustable within ranges defined for the fisheries. Distribution of the quota over the fishing year can also serve the goal of avoiding lengthy closures and thus effectively addresses the potential closure problem of the New England fishery. Quotas are usually administered and enforced through some form of effort restriction, such as fishing time, trip limits, vessel allocations, or closure.

Nantucket Shoals Area Control Measures

The Amendment replaces the control of fishing time with trip landing limits for the Nantucket Shoals Area. Control of fishing time is used in the Mid-Atlantic Area. Control of fishing time was not effective in 1983 as a means of slowing harvest to avoid lengthy closures in the New England Area because the FMP did not allow imposition of limits until half of the quota had been taken and, given the small maximum quota (100,000 bu), there was not enough quota left to allow reasonable fishing periods once the half way point had been reached. In 1983, fishing time was restricted on 1 April to 12 hours per week after over 64,000 bu (logbook data) of the 100,000 bu annual quota was taken. Despite this time reduction over 24,000 bu (logbook data) were taken during the next quarter, leading to a closure of the fishery effective 1 July and lasting for the next six months. The logbook data cited above do not sum to the 100,000 bu quota because of incomplete reporting; however, the actual catch was far in excess of 100,000 bu.

Additional problems with fishing time include the difficulty of monitoring at sea activity for enforcement purposes. Fishing time must be enforced by vessel inspection or overflight. With small amounts of available time, and with so much of the New England fishery occurring near State waters, detection and confirmation of violations is difficult. Weather conditions in New England are subject to rapid changes. Vessels fishing in the area work out of ports which require steaming times of as much as 12 hours each way to the grounds and back. Reduction of time to 12 hours increases the probability that fishermen will not be able to complete a trip because bad weather intervenes. Operators who must steam 24 hours round trip for only 12 hours of fishing are understandably frustrated.

Landing limits can be enforced at the dock by inspection. Operators gain latitude in deciding when to fish, and how many trips to take. Trip limits also act as a direct translation between the quota, which is established in bushels, and a control mechanism, also stated in bushels. The indirect linkage between bushels and fishing time is avoided, increasing the possibility that management action may have its desired control effect.

The management strategy for the Nantucket Shoals Area is intended to increase the probability of spreading catch throughout the fishing year. The bimonthly quotas have been established, and will be reviewed by the Council annually to make clams available at times and places when the industry has indicated demand will be greatest.

The ratio between the trip limits, i.e., 1.0 for Class 1, 1.8 for Class 2, and 3.4 for Class 3 were the average relative fishing power for Mid-Atlantic Area surf clam vessels based on logbook data for 1982 and 1983. It was necessary to use Mid-Atlantic Area data because of the extremely limited amount of Nantucket Area logbook data.

Very limited logbook data also make it difficult to evaluate the minimum trip (not less than 224 bu/trip for Class 1, not less than 416 bu/trip for Class 2, and not less than 768 bu/trip for Class 3 vessels) landing limits. Analysis by class is not possible because of the limited data.

These minimums were established in recognition that closure of the fishery may be preferable to leaving the fishery technically open, but with harvest restrictions so stringent as to preclude an economically viable fishery. The proposed minimum values were proposed by industry representatives. Since cost data are not available, it is impossible to assess whether the proposed

minimums would, in fact, assure profitable operations.

Trip limits, determined relative to vessel class, can be fixed at a level to spread catch out over time. Operators gain flexibility to take trips as weather permits, and to take as many trips as they can. The minimum trip limits by vessel class are established at levels where performance is profitable to ensure that operators do not suffer through periods of de-facto closure, where the costs of operation cannot be defrayed by the expected returns. Like other alternatives, economic performance is limited by the total quota.

Quarterly Quotas for the Georges Bank Area

The quarterly quotas are intended to distribute fishing in the Georges Bank Area through as much of the year as feasible in light of the steaming distance to the fishing grounds coupled with weather conditions. The concept of keeping the fishery operating throughout the year has been a key consideration in the FMP since its inception. This is considered a desirable goal in order to stabilize employment for fishermen and processing plant workers and to provide for an uninterrupted supply of product to processors in both New England and the Mid-Atlantic.

The quarterly quotas represent a compromise position between monthly quotas and only an annual quota. Monthly quotas would theoretically allow harvesting over a longer portion of the year, which might not be desirable in the Georges Bank Area because of weather conditions. With only an annual quota, stability in terms of landings from one period to the next would be reduced.

The allocation distribution (10% each for the first and fourth and 40% each for the second and third quarters) is designed to avoid fishing during months when weather conditions are likely to be adverse (thus make it more difficult to catch the last of the quota) while still distributing the catch throughout the year as much as possible. Using the limits of the OY range, the first and fourth quarter quotas would be 2,500-30,000 bu and the second and third quarter quotas would be 10,000-120,000 bu. A Class 3 vessel can carry 60-100 cages, or 1,920 -3,200 bu. Based on available assessment information (Murawski and Serchuk, 1984b), the most likely quota for the Georges Bank Area is at the maximum end of the OY, i.e., 300,000 bu. At that quota, and assuming only Class 3 vessels fished and they had an average capacity of 80 cages (2,560 bu), during the first and fourth quarters they could make twelve trips and during the second and third quarters they could make 47 trips.

Unconstrained fishing on Georges Bank theoretically could have negative impacts on the surf clam market. Landings from the Georges Bank Area averaged about 20,000 bu/week while the fishery was operating at its peak during 1984 (July-September). During that period landings from the Mid-Atlantic FCZ Area were 518,000 bu (compared to a total during the period of 253,000 from Georges Bank) and the Mid-Atlantic Area was closed for three weeks. The average price was \$8.62/bu during the second quarter (when only 90,000 bu were landed from Georges Bank) and \$8.46/bu during the third quarter.

Using the price equation discussed in Section IX and assuming a catch absent the Georges Bank quota equal to the average quarterly catch for the first three quarters of 1984 (1,061,000 bu), a per capita disposable income equal to that of the third quarter of 1984 (\$4,961), and adding the maximum Georges Bank quarterly quota (120,000 bu), the equation predicts a price of \$7.58/bu and ex-vessel value of \$8,957,117. If the Georges Bank catch is excluded the predicted price is \$8.25/bu and ex-vessel value is \$8,753,250. At the smallest quarter at the lower end of the quota range with price would be \$8.24/bu with ex-vessel value equal to \$8,763,240 (Table 30). That range of prices is not considered significant since actual quarterly prices have ranged from \$6.68 to \$8.84/bu during 1983 and 1984. Any price impact of the Georges Bank catch would decrease as the Mid-Atlantic Area quota and catch increase and as a greater portion of the Nantucket Shoals Area quota is landed. It must also be noted that the Georges Bank catch during the third quarter of 1984 was more than double the maximum quarterly quota and the overall third quarter price was \$8.46/bu (Table 29).

Notification Requirement

The FMP contains no declaration requirement. Emergency regulations implementing the provisions

of Amendment #4 were put into effect on 1 July 1984 for a period of 180 days. The emergency regulations included a requirement that owners or operators of vessels intending to fish in the New England Area notify NMFS in writing of such intention before they intend to begin fishing (49 FR 27157). This Amendment would reinstitute that provision in a modified form consistent with the three defined Areas. The impact of the proposed declaration requirement is minimized relative to the impacts of the lapsed emergency provision by the exceptions based on permit type and home port. The exceptions are based on the assumption that most Mid-Atlantic based vessels will fish in the Mid-Atlantic Area most if not all of the time and that most of the New England based vessels will fish in the Nantucket Shoals Area most if not all of the time. Therefore, declarations must be made only for the exceptions to those situations.

While it is impossible to estimate the number of declarations that might be made, it is possible to outline some parameters of possible declarations. There are 148 vessels permitted pursuant to the moratorium and 362 vessels permitted to fish only in the New England Area (Table 13). In 1983, 113 vessels made at least one trip for surf clams in the Mid-Atlantic Area, 57 of them Class 3 and 43 Class 2 (Table 8). While data are not available on the number of New England only vessels that have actually fished, logbook data indicate that only twelve vessels in 1983 and ten vessels in 1984 fished in the Nantucket Shoals Area. During both years only two vessels that did not have permits to fish in the Mid-Atlantic Area filed logbooks (a requirement for fishing in the FCZ). Seventeen vessels, fifteen from the Mid-Atlantic, participated in the Georges Bank fishery during 1984 (with about 400,000 bu of landings). The pattern has been that the Mid-Atlantic vessels go to Nantucket Shoals or Georges Bank and fish for a time, then return to the Mid-Atlantic, but do not frequently shuttle back and forth. It is expected that this pattern will continue in the near future because of the distances involved and the location of processing plants. As long as the current time based regime continues in the Mid-Atlantic Area and assuming current stock conditions and demand, the Mid-Atlantic Area will be operating under severe effort limitations, which may provide an incentive for more Mid-Atlantic based vessels to fish in the Nantucket Shoals and Georges Bank Areas at least during some portion of the year. Therefore, the experience during the recent past could be considered the lower limit of possible declarations. Theoretically, the upper limit is the entire Mid-Atlantic fleet, but such an event is virtually impossible because: (1) it is unlikely that the Class 1 vessels could travel to and consistently fish in the Georges Bank Area, (2) the cost of travel between the Mid-Atlantic Area and the Nantucket Shoals and Georges Bank Areas, (3) the need to find and availability of dock space in New England, (4) and the cost of transporting the clams from New England to Mid-Atlantic processing plants.

The number of closures in the Mid-Atlantic Area will be the most likely incentive for interest in Mid-Atlantic based vessels fishing in the Nantucket Shoals and Georges Bank Areas. Reduced allowed time in the Mid-Atlantic Area coupled with sustained demand will probably lead to more intensive use of vessels in the Mid-Atlantic Area during the times when fishing is allowed, with vessels making the trip to the Nantucket Shoals and Georges Bank Areas primarily to assure that the processors have a supply of clams if the Mid-Atlantic Area fishery is closed even with reduced allowed times.

The emergency regulations provided in part that all vessel owners or operators had to declare their intent to fish in the New England Area. Since New England based vessels generally do not file logbooks, there are no data on where the New England vessels fish. According to NMFS records only five vessels (all Mid-Atlantic based) filed letters of intent to fish in the New England Area as of 14 November 1984 (excluding letters of intent that were filed to fish under the special research program on Georges Bank) under the emergency regulations. However, it is understood that most New England based vessels fish in the Nantucket Shoals Area if they fish in the FCZ. Only six New England vessels have permits to fish in the Mid-Atlantic Area. Two New England vessels fished on Georges Bank during 1984. Therefore, it seems reasonable to conclude that the declaration requirement will have a positive impact on New England fishermen relative to the emergency regulations.

The Amendment's requirement that Mid-Atlantic based vessel operators declare their intent to fish in the Nantucket Shoals and Georges Bank Areas represents no change from the provisions of the emergency regulations that operators declare their intent to fish in the New England Area. However, this Amendment adds the requirement that they also declare when they return. The tradeoff associated with this Amendment is to keep management associated costs to the industry

as low as possible to minimize disincentives to fishing in the Georges Bank Area while reducing the chances of the Georges Bank fishery impacting negatively on fishermen who cannot or do not participate in it.

It must be remembered that the entire management system requires accurate reporting of catch by Area. The system is designed to meet the needs of each of the Areas by changing restrictions to meet current conditions; e.g., varying allowed fishing times in the Mid-Atlantic, trip landing limits for Nantucket Shoals, and no limitations but closure for Georges Bank. Timely catch data assignable to each Area are critical to making this system work. The notification requirement is designed to facilitate enforcement and reporting by providing a mechanism for checking a vessel's logbook reports against information on where the vessel was supposed to be fishing and informing enforcement officers of which rules a vessel is fishing under on a given day. No negative impacts are anticipated from the notification requirements.

Mid-Atlantic Area Landing Restriction

Effort limitations in the Mid-Atlantic Area are currently in terms of the number of hours a vessel may fish during a specified time period and in practice have been a certain number of hours each week (although the FMP allows hours per month and hours per quarter). Catch rates during 1984 led to closures in June, July, September, and December and a reduction from twelve hours per week to six hours every other week effective 18 November. Certain vessels that fish beds close to shore (generally off New Jersey) have reportedly been making more than one trip during a twelve hour day, which is considered a significant factor contributing to the reduction to six hours every other week. Multiple landings on one day complicate enforcement and may result in a more rapid harvest rate, leading to decreased allowed fishing time or closures, thereby negatively impacting vessels that do not operate out of ports close enough to the beds to enable them to make more than one trip per day as well as the vessels that can make multiple landings. This problem was also identified by the United Shellfishermen's Association through comments made at the hearings on Amendment #5 and by the National Fisheries Institute at the September 1984 meeting of the Council. Hence, this Amendment adds the provision that vessels may land surf clams only one time during an authorized time period. More than one landing per period tends to make enforcement more difficult because it encourages violations of the fishing hour limitations. The fishery has been operating at six or twelve hours of fishing per period (Table 17) and it is unlikely that this situation will change in the foreseeable future. In order to increase harvests it is possible that fishermen will land more than one time during a period by beginning earlier than allowed and/or fishing later than allowed. Enforcing fishing time is extremely expensive since it requires at sea effort, but must be done rigorously to insure the integrity of the FMP. The possibility of legal multiple landings would increase the enforcement cost because of the greater probability of violations of the starting and ending times. Clams landed illegally have a negative impact throughout the fishery since they accelerate the rate at which the quota is harvested, leading to further reductions of allowed fishing time. Evidence of infringement on starting and stopping times was presented to the Regional Director in 1984 when dual landings were being made.

In addition, the limitation of one landing per fishing period should allow the Regional Director to establish longer fishing periods. This should not increase the rate at which the quota is harvested while providing the fishermen the time they need to be more selective in the beds they fish, thus tending to decrease the capture (landing or discard) of sublegal clams. This is true if it is assumed that vessels are currently landing their carrying capacity at allowed fishing times which have not exceeded six hours since November 1984. If the boats are being filled in six hours or less, then extending the allowed time to, for example, twelve hours, while allowing only one landing would double the time available to fish for the same quantity of clams, thereby providing the opportunity for fishermen to be more selective in their fishing areas, hence reducing discards and the landing of sublegal clams.

Surf Clam Minimum Size Limit

There were two actions (Amendments #4 and #6) which had the effect of extending the surf clam minimum size limit throughout the entire management area. The surf clam minimum size limit was to be extended to the New England Area pursuant to Amendment #4 and was part of that Amendment when it was taken to public hearings and when it was finally adopted by both the Mid-

Atlantic and New England Councils.

Amendment #5, and the regulations implementing it, included a mechanism for adjusting the surf clam minimum size limit and were written to apply to the entire management area, i.e., both the Mid-Atlantic and New England Areas.

The draft of Amendment #6 also stated that the size limit would be in effect in the New England Area as a result of Amendment #4 and contemplated that the limit would, therefore, apply to the Nantucket Shoals and Georges Bank Areas created in that Amendment within the New England Area. However, after the hearings on Amendment #6 it was determined appropriate to combine Amendments #4 and #6. It was also determined that the size limit would be a part of Amendment #6 as Amendments #4 and #6 were merged. Amendment #6 was adopted by the Mid-Atlantic Council on that basis on 7 March 1985.

According to vessel operators and to resource surveys conducted in the Nantucket Shoals and Georges Bank Areas, most of the surf clams which have been harvested and which are available for harvest are of sizes greater than 5.25". Very few surf clams smaller than 4.75" were captured, indicating that recruitment in the past 5 to 6 years has been relatively poor (Murawski and Serchuk, 1983a). Over an extended period of time, as exploitation rates increase and recruitment occurs, a greater proportion of the resource may be below the current minimum size. It is impossible to predict when this will occur. If recruitment does not occur, the resource will eventually be depleted. With the current size distribution of clams in the Areas, imposing the size limit in the Nantucket Shoals and Georges Bank Areas should have a negligible effect on landings in the present or immediate future. The measure will protect any small clams which might be produced, enhancing their yield and ensuring that they can spawn a number of times before they are harvested.

Management Costs

The Amendment makes three changes to the FMP: it establishes a management regime for the Nantucket Shoals Area; it establishes a management regime for the Georges Bank Area; and it adds the trip restriction to the Mid-Atlantic Area surf clam fishery.

Management costs will increase as a function of administering the quarterly quota system with trip limits in the Nantucket Shoals Area relative to the effort limitations previously in effect. However, the quarterly quota system should achieve the objective of keeping the fishery open year round, whereas the annual quota and effort limitations did not.

Management costs will increase simply as a function of the need to manage the new Georges Bank fishery. The issue is whether the proposed regime results in the smallest possible cost increase given the objectives of the FMP and the benefits that accrue from the Georges Bank fishery. The incremental increase in government administrative costs relative to setting quotas and monitoring the fishery should be insignificant. The declaration system will add administrative costs, but they must be compared to the enforcement advantage that results from the system, since without the declaration system enforcement would be virtually impossible.

The trip limitation in the Mid-Atlantic Area surf clam fishery should not increase costs but rather increase enforcement effectiveness. The provision clearly adds another requirement, but the result is that all of the landing related regulations (especially the size limit) are easier to enforce.

Tradeoffs Between the Beneficial and Adverse Impacts of the Proposed Amendment

The benefits of the proposed Amendment are:

1. The maximum quantity of surf clams that may be landed is increased by 400,000 bu (100,000 bu as a result of the OY increase for the Nantucket Shoals Area and 300,000 bu as a result of the OY for the Georges Bank Area). Fishermen's revenues would increase by the value of that catch, which at the average 1984 price would be nearly \$3.3 million.
2. Dividing the New England Area into the Nantucket Shoals and Georges Bank Areas enables the

surf clam fishery on Georges Bank to be carried out with fewer regulations than those that may be imposed on the Nantucket Shoals Area as a result of this Amendment.

3. The surf clam landing restriction in the Mid-Atlantic Area (one landing per authorized fishing period) should improve enforcement effectiveness.⁶
4. The Amendment should not increase administrative costs because data collection and fishing permits all exist under the current FMP. However, enforcement of the quarterly landing limit in the Nantucket Shoals Area and the Georges Bank Area regime may increase costs that cannot be presently estimated.

The adverse impacts include:

1. The surf clam landing restriction in the Mid-Atlantic Area may result in negative impacts on those fishermen who have been landing more than one time during an authorized fishing period. No data are available to identify how many fishermen have been operating in this fashion. However, virtually the entire industry has requested this provision.⁷

Effect on Endangered Species and on the Coastal Zone

Neither the Amendment or the alternative would constitute an action that "may affect" endangered or threatened species or their habitat within the meaning of the regulations implementing Section 7 of the Endangered Species Act of 1973. Thus, consultation procedures under Section 7 will not be necessary on the Amendment.⁸

Also, the Amendment will be conducted in a manner consistent, to the maximum extent practicable, with the Coastal Zone management Programs within the meaning of Section 307(c)(1) of the Coastal Zone Management Act of 1972 and its implementing regulations. A determination that this action is consistent with the approved State coastal zone management programs has been prepared by the Council and submitted for review to each of the State coastal zone management agencies.

Effects on Flood Plains or Wetlands

The Amendment or its alternative will not adversely affect flood plains or wetlands, and trails and rivers listed or eligible for listing on the National Trails and Nationwide Inventory of Rivers.⁹

List of Agencies and Persons Consulted in Formulating the Proposed Action

In preparing Amendment #4, the New England Council consulted with NMFS Northeast Regional Office, NMFS Northeast Fisheries Center, the Mid-Atlantic Council, Maine State Planning Office, Massachusetts Executive Office of Environmental Affairs, New Hampshire Office of State Planning, Connecticut Coastal Zone Management Program, Virginia Council on the Environment, North Carolina Office of Coastal Management, Maryland Department of Natural Resources, Delaware Department of Natural Resources and Environmental Control, Rhode Island Coastal Resources Management Council, New York Division of Local Government and Community Services, and New Jersey Department of Environmental Protection. Individuals contacted were Ted Blount, Warren, RI; Ben Brayton, Kenyon, RI; Roger L. Brayton, Bradford, RI; Robert Frost, Warren, RI; Harry Livingston, Wellfleet, MA; Francis Manchester, Tiverton, RI; Alexander Smith, Westport, MA.

In preparing Amendment #6, the Council consulted with NMFS, the Fish and Wildlife Service, the Department of State, and the States of New York, New Jersey, Pennsylvania, Delaware, Maryland, and Virginia through their membership on the Council. In addition to the States that are members of the Council, Maine, New Hampshire, Massachusetts, Rhode Island, and Connecticut will be consulted through the Coastal Zone Management Program consistency process. A list of the agencies and persons sent copies of the Amendment, including the EA and RIR, and notice of the public hearings is Exhibit A to this EA.

List of Preparers of Environmental Assessment and Plan Amendment

Amendment #4 was prepared by a team of fishery managers and scientists with special expertise in the surf clam resource. The need for management and range of alternative solutions was determined from a variety of sources including NEFC assessments and several NEFMC Surf Clam Oversight Committee meetings during the last several months. The Surf Clam/Ocean Quahog Oversight Committee was Robert Smith, James Costakes, and William Lund. Assisting the Committee was Guy Marchesseault, NEFMC Staff; Sharon Lake, NEFMC Staff; Richard Ruais, NEFMC Staff; Louis Goodreau, NEFMC Staff; Salvatore Testaverde, NMFS, Northeast Regional Office; and Steven Murawski, NMFS, Northeast Fisheries Center

Findings of No Significant Environmental Impact

For the reasons discussed above, it is hereby determined that neither approval and implementation of the proposed action nor the alternative would affect significantly the quality of the human environment, and that the preparation of an environmental impact statement on the Amendment is not required by Section 102(2)(c) of the National Environmental Policy Act nor its implementing regulations.

Assistant Administrator for Fisheries, NOAA

Date

APPENDIX III. PUBLIC HEARING SUMMARIES AND PUBLIC COMMENTS

AMENDMENT #4

21 March 1984, Wakefield, RI

Mr. Cronan called the meeting to order at 7:10 pm after distribution of the summary document describing the proposed draft Amendment. Also present were Mark Blake (CT Dept. of Marine Fisheries), Clay T. Jester (American Original Corp.), Roger Brayton (F/V Ellie B), Ben Brayton (F/V Joyce Judith), Scott Fryer (F/V Mark & Bruce), Frederick Blount (Blount Seafood Corp.), P. J. George (F/V Nancy Ann), Richard Allen, Alexander Smith (F/V Sherry Ann Dale), and John Gates (URI Dept. of Resource Economics).

Attorney Clay T. Jester read the comments of the American Original Corporation (copy attached) who felt that the notice of the public hearing in the 7 March 1984 edition of the Federal Register did not provide adequate advance notification regarding the measures subject to consideration to allow for public response. Mr. Jester also commented that any trip catch limits or weekly catch limits subject to consideration must be adjusted to take into account vessel characteristics and historical participation of vessels in the fishery.

Mr. Ted Blount, a major New England surf clam processor and member of the New England Surf Clam Advisory Panel, stated his total support of the proposed amendment and noted that it seems to be a start in the right direction.

Mr. Roger Brayton, Captain of the surf clamming vessel Ellie B and New England Surf Clam Advisory Panel member, echoed Mr. Blount's support of the proposed Amendment. Mr. Brayton does not believe that this Amendment answers all the problems of the New England surf clam fishery, but he feels that it is the best management program presented to date.

Mr. Ben Brayton, Captain of the surf clamming vessel Joyce Judith and New England Surf Clam Advisory Panel member, also stated that this proposed management program is the best he has seen so far.

Mr. Richard Allen, a Rhode Island fisherman and representative of the Atlantic Offshore Fishermen's Association, voiced his opinion that through its history the Surf Clam and Ocean Quahog Fishery Management Plan has been one of the biggest disgraces of the Councils. Mr. Allen suggested that the Councils consider no quota management but rather use other measures such as a minimum size.

Mr. Blount commented that the culling measure in the Surf Clam Plan is the biggest anti-conservation method we could have and that it is a terrible waste of the resource.

The meeting was adjourned at 8:00 pm.

22 March 1984, Dover, DE

A public hearing was held on Amendment #4 to the Fishery Management Plan for Surf Clams and Ocean Quahogs on 22 March 1984. The hearing was held in the Federal Building, Dover, Delaware. The hearing officer, Harry M. Keene (MAFMC member) convened the hearing at approximately 10:07 am. Also present were Charlie Frisbie (Maryland Tidewater Administration), Bill Brey (NMFS), and staff members John Bryson, David Keifer, Steven Freese, and Nancy Weis. Six members of the public were present: F. Michael Parkowski (American Original Corporation), John Devnew (Sea Harvest, Inc./ISTC), Clay T. Jester (American Original Corporation), Robert M. Fidler (Atlantic Clam Corp.), Ann P. Marvin (American Original Corporation), and David H. Wallace (Wallace and Associates).

Mr. Keifer summarized the Amendment.

Mr. Parkowski read a statement into the record (attached). He also stated he had not received the Amendment for prior review. He asked what were the reported landings from vessels other than

the Mid-Atlantic vessels in the New England Area for 1982 and 1983. Mr. Brey replied in 1983 there was a total of about 114,000 bushels reported and about 79,000 bushels were from Mid-Atlantic boats. He did not remember the 1982 figures. Mr. Parkowski asked if the balance reported was from boats only with New England licenses. Mr. Brey replied yes.

Mr. Wallace asked what the procedures were for implementation of this proposed Amendment, from the public hearing through implementation and if there was any accelerated schedule proposed. Mr. Bryson replied he did not know what agreements may have been made with NMFS. Mr. Wallace asked if it was logical to presume that the New England fishery will operate under the basic assumptions it did last year with the one possible change that they will set effort restrictions in the Region almost immediately if there is any effort. Mr. Bryson replied he could not answer the question.

Mr. Parkowski asked what was the rationale for the break down in numbers for the periods. Mr. Keifer replied the Amendment stated it was divided to reflect historical seasonal removals. Mr. Brey commented 1983 was the first year it was tracked. Mr. Parkowski commented generally there seemed to be a lack of information on catch throughout the year. Mr. Brey stated New England was reluctant to make reports. Mr. Parkowski asked how could this be based on historical information when there was none.

Mr. Keene closed the hearing at 10:21 am.

11 December 1984, Danvers, MA

Mr. Robert Smith opened the public hearing on Amendment #4 to the Surf Clam and Ocean Quahog FMP at 11:30 am. Amendment #4 would more specifically define the New England Area as Southern New England/Nantucket Shoals, west of 69° latitude, for the purpose of the 200,000 bu quota in that Area. Little comment was received since the industry was in agreement that this was the way to proceed. The hearing was closed at 11:36 am.

AMENDMENT #6

18 February 1985, Salisbury, MD

The hearing began at 7:05 pm. Vice Chairman Ricks Savage, MAFMC, was the moderator. John Bryson, David Keifer, and Thomas Hoff of the MAFMC staff were present along with Bill Brey of NMFS and 11 members of the public.

Messrs. Savage and Keifer reviewed the Surf Clam and Ocean Quahog Amendment #6 and the procedures for the hearing.

David Wallace, representing United Shellfishermen's Association, summarized a prepared statement (attached), which supported Amendment #6 and expressed their concern over the presently rapidly developing over-capitalization of the quahog industry. They wish to see no new additional vessels allowed into the fishery. They would like a quahog vessel moratorium incorporated into Amendment #6 if possible.

Sam Quillen of Nanticoke Seafood Corporation supported the position of the United Shellfishermen's Association.

Donald Leonard of D.J. Leonard & Sons also supported the position taken by the United Shellfishermen's Association. Additionally, he recommended withdrawal of permits on a progressive scale for flagrant violation of time fished or working in closed areas, not for undersized clams.

Ann Marvin, American Original, made a statement by telephone that she represented 33 boats, all of which supported the preferred alternative to Amendment #6.

Vice Chairman Savage officially closed the hearing at 7:35 pm. Five Hearing Attendance Records were completed; all favored the preferred alternative.

19 February 1985, Cape May Courthouse, NJ

The hearing began at 7:15 pm. Captain David Hart, MAFMC, was the moderator. Thomas Hoff and Deborah Hill of the MAFMC staff were present, along with 15 members of the public.

Messrs. Hart and Hoff reviewed the Surf Clam and Ocean Quahog Amendment #6 and the procedures for the hearing.

Robert Nicholson of Doxsee Food Corporation stated that he would like to see a moratorium on quahog boats.

Rick Traber, President of United Shellfishermen's Association, read a prepared statement (attached) which supported Amendment #6 and expressed their concern over the presently rapidly developing gross over-capitalization of the quahog industry. They wish to see no new additional vessels allowed into the fishery.

F. Michael Parkowski, representing American Original, expressed their support for the preferred alternative and expressed the hope that the time required to notify NMFS of a change in area fished be reasonable, perhaps a 48 hour notice rather than weeks or months.

Two representatives of Shoffler & Sons expressed their opinion that the one trip/time period was not fair, and that there should be a vessel allocation system with equal quota for each boat.

Charles McCall of the Tammy Dee/Gulf Ranger stated that he would like to see a solution to the effort restrictions which would provide safer circumstances in which to fish.

Eirik Kirkeberg of Eirik's Dock supported the preferred alternative and stated he would not like to see equal per boat quotas.

Captain Hart officially closed the hearing at 7:45 pm. Five Hearing Attendance Records were completed with three respondents favoring the preferred alternative and two supporting taking no action at this time.

19 February 1985, Galilee, RI

The public hearing was called to order at approximately 7:00 pm by Council member Harry M. Keene. Others present were Mr. Rich Ruais, New England Council staff; Mr. Robert Smith, New England Council representative; Mr. Roger L. Brayton, F/V Ellie B; Mr. George Richardson, Blount Seafood Corporation; Mr. Clay Jester, American Original; Mr. David Wallace, United Shellfishermen's Association; and Mr. David Keifer and Ms. Carol Stevenson, Mid-Atlantic Council staff.

Mr. Keifer briefly summarized Amendment #6.

Mr. Jester stated that American Original supported Amendment #6 and in addition urges that the Amendment be enacted as an emergency measure in order to avoid the possibility of a closure as a result of the existing quota system.

Mr. Smith stated that the New England Council endorsed Amendment #6.

Mr. Wallace read a statement into the record proposing a moratorium on the ocean quahog fishery and certain permit requirements (See Attachment).

Mr. Ruais provided New England Council staff's comments and stated that even though the New England Council had been involved in the decision to split the New England resource area into 2 areas, and also in the decision that established the 300,000 bushel quota for 1985, they didn't want this to prejudice the Council's ability to work with the Mid-Atlantic Council through Amendment #7 to develop a more appropriate long term management system for Georges Bank and Nantucket. He stated that the New England Council had a long term position that had been on the record for some time and did not want anybody to think that they are prejudicing that by agreeing to

Amendment #6 at this time.

He further stated that it was the staff's views regarding the way the notification system was set up, that if a New England vessel was fishing on Georges Bank and decided to go to the Nantucket Area, they would then not be allowed to return to Georges Bank to fish during the remainder of any one month. They do not feel that it is appropriate given their proximity to both areas and stated that it wouldn't be unreasonable for a New England vessel to even fish both Areas in a given day. He said they didn't feel any reason for New England vessels to be precluded from fishing on Georges Bank should they decide to make a trip closer to home for whatever reason.

Mr. Ruais stated that in the Amendment the notification requirement said that you had to notify "prior to beginning fishing" and that he thought it was an actual 7 days notification period. He said that then you wouldn't need to worry about any type of reporting problems with the New England vessels and that it would clearly limit the number of times they could switch between Areas.

He then commented that New England vessels that have permits to fish in both the New England and Mid-Atlantic Areas, that the Mid-Atlantic Area becomes the Notification Area for those vessels and said that it may be redundant with the requirement that New England vessels that wanted to fish in the Mid-Atlantic had to seek an authorized fishing period.

Mr. Ruais concluded his comments by saying that the staff would like to see some flexibility provided within the Amendment should improved assessment information show that it was necessary to increase the quota beyond 300,000 bushels without having to use the amendment approach. He also stated that on establishing the annual quota for the Georges Bank Area, that the New England Council should be given an appropriate formal consultation role and that it should be so stated in the Amendment.

The hearing was concluded at approximately 7:30 pm. There were 4 attendance records collected at the hearing, all of which favored the preferred alternative.

PUBLIC HEARING
Dover, Delaware
March 22, 1984

Surf Clam/Ocean Quahog Fishery Management Plan --
Plan Amendment No. 4

Comments of the American Original Corporation

The American Original Corporation has a substantial interest in matters involving the Surf Clam/Ocean Quahog Fishery Management Plan as it affects the New England area in that the company through its subsidiaries holds twenty (20) New England Surf Clam licenses for its vessels which engage in surf clam fishing.

Notice of this public hearing was provided in the March 7, 1984 edition of the Federal Register. The information provided regarding the proposed amendment set forth only one specific fact, namely that the maximum quota was proposed to be increased from 100,000 bushels to 200,000 bushels. The balance of the information indicated only generally that some unspecified management measures would be adjusted to control harvest rate to remain in line with some unexplained "traditional New England fishery practices". These indefinite and unspecified measures purportedly are for the purpose of preventing an extended closure of the fishery. Some contemplated measures identified are trip catch limits or weekly catch limits. This vague summary in no way provides adequate notification of the contemplated measures which would allow for reasoned public response. Likewise, the informa-

tion provided does not allow for any reasonable opportunity for the public to determine the environmental, resource, and socio-economic impacts of the measures being contemplated by the agency. Accordingly, objection is hereby made that this proceeding is a nullity in that adequate advance notification has not been provided regarding the measures subject to consideration.

Notwithstanding the foregoing, it is noted for the record that the Mid-Atlantic Fishery Management Council at its January 11-12, 1984 meeting held in Easton, Maryland, adopted a recommendation that the annual quota for surf clams in the New England area be increased from 100,000 bushels to 200,000 bushels with such catch to be distributed throughout the calendar year in six bi-monthly periods. No mention was made in the recommendation for use of trip catch limits or weekly catch limits.

With respect to any trip catch limits or weekly catch limits which "may" be subject to consideration the following information is provided regarding American Original vessels which participated in the New England surf clam fishery during calendar years 1982 and 1983.

From the period May 1982 through October 1982 five different vessels fished for surf clams. The amount of catch taken by these vessels ranged from approximately 600 bushels per trip for the smaller vessels to approximately 2,000 bushels per trip for the largest vessel. In the period between February 1983 to May 1983 seven different vessels were involved in surf clam fishing and experienced catches which ranged from approximately 550 bush-

els per trip to approximately 2,200 bushels per trip. These varying catch levels reflect such factors as vessel size, dredge size, pump capacity, carrying capacity, vessel maintenance, crew performance and skill of the vessel master. The level of catch achieved can be further related to the amount of capitalization and operating costs associated with the vessel. In effect, it is necessary for more capital intensive vessels with higher operating costs to have a larger catch rate in order to economically survive. Thus, any trip catch limits or weekly catch limits subject to consideration must be adjusted appropriately to take into account vessel characteristics and historical participation of vessels in the fishery.

It is important to note that with respect to the New England surf clam fishery substantially all of the reported landing in the FCZ during 1982 and 1983 resulted from fishing activities conducted by vessels primarily located in the Mid-Atlantic Region. In effect, the traditional New England surf clam fishery in reality consists of vessels from the Mid-Atlantic Region. Although the information provided in the notice of proposed plan amendment is too vague to adequately determine the measures subject to consideration, conversations at management council meetings and surf clam committee meetings clearly suggest that an attempt is being made to preclude larger vessels in the Mid-Atlantic Region from participating in the New England fishery to the benefit of a few New England based vessels which heretofore have not reported catch in the FCZ. Prior correspondence dated December 8, 1983

directed to the NMFS Northeast Regional Office which addressed these concerns is attached hereto. Any measures adopted which would have the effect of preventing a vessel with a New England licence from economically participating in the fishery because of its size clearly would be in violation of the national standards set forth in the Magnuson Act. Under 16 U.S.C.S. §1851(a)(5) it is clearly set forth that:

"Conservation and management measures shall, where practicable, promote efficiency in the utilization of fishery resources; except that no such measure shall have economic allocation as its sole purpose . . ."

Likewise, uniform trip catch limits or weekly catch limits for all vessels which disregard vessel characteristics and historical catch would violate the provisions of 16 U.S.C.S. §1851(a)(4) which read as follows:

"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 fishermen; (B) reasonably calculated to promote conservation; and (C) carried out in such manner that no particular individual, corporation, or other entity acquires an excessive share of such privileges."

On the basis of the foregoing, it is submitted that there has been a failure in the referenced notice to adequately identify and explain the measures subject to consideration to allow for reasoned public comment. In any event, the historical participation of vessels such as those of the American Original fleet cannot be ignored and any measures adopted cannot arbitrarily discriminate against such larger vessels in favor of smaller vessels based in the New England area which vessels heretofore have not reported catch landings from the FCZ.

LAW OFFICES
PARKOWSKI, NOBLE & GUERKE
PROFESSIONAL ASSOCIATION
116 WEST WATER STREET
P.O. BOX 308
DOVER, DELAWARE 19903

F. MICHAEL PARKOWSKI
JOHN W. NOBLE
I. BARRY GUERKE
CLAY T. JESTER
BONNIE M. BENSON

302-678-3262

December 8, 1983

James E. Douglas, Jr., Acting Director
Northeast Region
National Marine Fisheries Service
14 Elm St.
Gloucester, Massachusetts 01930

Re: Surf Clam Management Plan -
New England Area

Dear Jim:

In recent months a number of proposals have been suggested with respect to Surf Clam Management in the New England area. At the last meeting of the Mid-Atlantic Council held on November 16-17, considerable discussion took place at both the Surf Clam Committee level and the Council level regarding proposals for adoption on an emergency basis of certain restrictions pertaining to surf clam fishing in the New England area. Further discussions and proposals on the matter were also addressed on December 5th at a joint meeting of Council representatives held in Boston. With respect to the various control measures which have been discussed, several proposals would have the effect of prohibiting outright or preventing from a practical standpoint the participation of vessels in the American Original fleet which have been involved in fishing activities in the New England area during 1982 and 1983.

Within the referenced timeframe, seven different vessels in the American Original fleet engaged in fishing for surf clams in New England, which fishing represents a significant portion of the overall historical catch. In disregard of such established fishing interest and participation, several proposals recently made have been designed exclusively for the purpose of preventing fishing activities by these vessels either through outright restriction or practical limitation. For example, one proposal involved the establishment of a dredge size limit which would have the effect of preventing all of the referenced vessels from fishing in the New England area. A second suggestion

James E. Douglas, Jr.
December 8, 1983
Page Two

involved the establishment of a trip limit or a per vessel quota which completely disregards such obvious factors as vessel capitalization, harvesting capability, vessel master skill, operating expense, and, most importantly, historical catch. It is particularly disturbing to note that these proposals are being discussed openly in terms of attempting to preserve the New England fishery exclusively for the benefit of a select few New England based vessels and processors which heretofore have had a lesser involvement in the fishery than the American Original fleet and processing facilities.

With respect to the proposal dealing with gear restrictions, it should be noted that no resource benefit would derive from such action. Under the national standards for fishery conservation and management as set forth in 16 USCS §1851(a)(5), it is clearly set forth that:

"Conservation and management measures shall, where practicable, promote efficiency in the utilization of fishery resources; except that no such measure shall have economic allocation as its sole purpose..."

The proposal to establish an arbitrary dredge limit size for the purpose of precluding an historical participant in the fishery violates both the efficiency standard and the economic purpose restriction of the referenced provision.

With respect to the imposition of a per vessel allocation system or trip limit which is not based on historical catch, it is clear that any such measure would violate the national standard as set forth in 16 USCS §1851(a)(4), which provides as follows:

"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 manner that no particular individual, corporation, or other entity acquires an excessive share of such privileges."

The imposition of trip limits or per vessel allocations which are not

James E. Douglas, Jr.
December 8, 1983
Page Three

historically based and which are biased in favor of small New England vessels would represent a prohibitive form of discrimination. In addition, such allocation or assignment of fishing privileges would not be fair and equitable, would not be designed to promote conservation, and would have the effect of carrying out or shifting an excessive share of the fishing privilege from larger more efficient vessels to smaller vessels.

With respect to the foregoing, it is also important to emphasize that these proposals take the form of a request for Secretarial emergency action under the provisions of 16 USCS §1855(e). Under such provision, emergency action can only be taken when:

"...an emergency exists involving any fishery..."

Under any conceivable set of existing facts, it is clear that an emergency does not exist with respect to the surf clam resource in the New England area. It is also important to emphasize that the Mid-Atlantic Fishery Council will not even be in a position to consider this matter until its January meeting, at which time the closure of the New England area will cease and fishing again will be able to be undertaken by those dissatisfied with the closure. Certainly no justification exists for avoidance of the normal plan amendment procedure with respect to these controversial and legally challengeable proposals.

It has been indicated that the objective with respect to the New England surf clam fishery is to allow the fishery to remain open throughout the year. Such objective could be readily achievable through adoption of an overall quota broken into quarterly or other periodic amounts with the ability reserved to the National Marine Fisheries Service to impose effort restrictions if warranted by the rate of catch. In effect, it seems entirely possible to adopt for New England a management approach which is compatible to that being exercised in the Mid-Atlantic region, thereby avoiding the controversy and challenge which is sure to surround any exclusionary measure. The American Original Corporation would not be opposed to the development of a reasonable system which allowed the fishery to be open throughout the year and which did not exclude either outright or from a practical standpoint the simple opportunity to participate in fishing activities.

James E. Douglas, Jr.
December 8, 1983
Page Four

It is hoped that in addressing these issues both the affected Councils and the National Marine Fisheries Service will put this matter in perspective and recognize that the New England surf clam resource has heretofore not been appreciably harvested and that controlled harvesting on a fair and equitable basis is something which should be promoted. It is submitted that if the American Original fleet had not utilized the available New England surf clam resource in the past two years, substantial portions of the quota would have gone unharvested without deriving economic benefit to anyone.

Your consideration of the foregoing stated concerns and objections to certain of the proposals would be appreciated as these matters come before you and the Councils in the near future.

Sincerely yours,

F. Michael Parkowski

FMP/phb

cc: William Gordon, Assistant Administrator for Fisheries
Joel MacDonald, Esq., General Counsel
John Bryson, Executive Director, Mid-Atlantic Fisheries Council
Douglas Marshall, Executive Director New England Fisheries Management Council
John M. Cronin, New England Fishery Management Council
Robert Smith, New England Fishery Management Council
Russell Cookingham, Chairman, Surf Clam Committee, Mid-Atlantic Fisheries Council
David Hart, Member, Surf Clam Committee
George Krantz, Member, Surf Clam Committee
Rick E. Savage, Vice Chairman, Mid-Atlantic Fishery Management Council
William Pruitt, Member, Surf Clam Committee
Robert T. Cooper, Member, Surf Clam Committee
Richard H. Schaefer, National Marine Fisheries Service

bcc: Ann Marvin, President, The American Original Corporation

United Shellfishermen's Association

February 18, 1985

Mr. John Bryson, Executive Director
Mid Atlantic Fisheries Management Council
Federal Building, Room 2115
300 S. New St.
Dover, Delaware 19901

Dear Sir;

United Shellfishermen's Association wishes to express its support of Amendment #6 to the Surf Clam and Ocean Quahog Management Plan. It is our hope that this amendment can be put into effect as soon as possible. Amendment #6 appears fair and equitable given the nature and scope of fishing for surf clams on Georges Bank.

There is another major issue which concerns our Association that is not being addressed by Amendment #6, but should be a part of it at this time. This issue is the rapid expansion of the ocean quahog fleet. It is our opinion that a moratorium on the entrance of new vessels into the quahog fishery is necessary immediately so as to prevent gross over-capitalization of the industry. It should be stressed that presently there are more vessels in the quahog industry than are necessary to catch the entire quota.

We recommend that no additional vessels be allowed to enter the ocean quahog fishery and that a moratorium be placed on the number of vessels that already have a permit to fish in the FCZ.

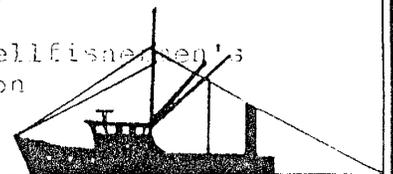
It is also our opinion that any vessel that lands surf clams or ocean quahogs from the FCZ and fails to report them for 52 consecutive weeks have its permit withdrawn. It is also suggested that all ocean quahog vessels (those fishing exclusively for quahogs) must land and report at least 5000 bushels of quahogs per year to retain a permit.

We hope that our recommendations are considered and included at this time in Amendment #6.

Sincerely,

United Shellfishermen's
Association

P.O. Box 51
Ocean City, Maryland 21842



APPENDIX IV. REGULATORY IMPACT REVIEW

I. INTRODUCTION

A. Purpose

The purpose of this document is to present an analysis of the proposed regulations for Amendment #6 (Amendment) to the Surf Clam and Ocean Quahog Fishery Management Plan (FMP). This document has been prepared in compliance with the procedures of the National Marine Fisheries Service (NMFS) to implement Executive Order (E.O.) 12291. The document also contains an analysis of the impacts of the Plan relative to the Regulatory Flexibility Act and the Paperwork Reduction Act of 1980.

The original FMP was approved in November 1977 for the period through September 1979. Amendment #1 extended it through 31 December 1979. Amendment #2 extended it through the end of 1981. Amendment #3, approved 13 November 1981, extended the FMP indefinitely.

Amendment #4 was initiated in response to a closure of the New England Area to surf clam fishing during the second half of 1983. On 21 July 1983 the New England Council sent a letter to Secretary of Commerce Malcolm Baldrige requesting Secretarial action to reopen the New England Area surf clam fishery. The Mid-Atlantic Council passed a motion in August 1983 recommending that the Secretary not accept the proposal of the New England Council. After receiving a letter from Secretary Baldrige on 6 September 1983 denying implementation of emergency action to reopen the surf clam fishery in the New England Area, work was begun to investigate methods for avoiding an extended closure in 1984. In November 1983 the Mid-Atlantic Council passed a motion authorizing work with the New England Council "... to accomplish a management system for the New England Area involving trip limits, quarterly quotas, or similar strategies to insure fishing throughout the year ...". A proposed Amendment #4 was drafted by the New England Council staff in cooperation with NMFS staff and hearings were held on 21 and 22 March 1984 (see Appendix III for summaries). At a joint meeting of the New England and Mid-Atlantic Councils in May 1984 representatives of the surf clam industry from both New England and the Mid-Atlantic presented revisions to the proposed regime. The Mid-Atlantic Council passed a motion to "adopt Amendment #4 to the Surf Clam and Ocean Quahog FMP as amended to provide that any unharvested portion of a bimonthly allocation be added to the immediately following bimonthly allocation rather than being pro rated over all remaining bimonthly periods and that trip and weekly limits be by vessel classes based on relative fishing power using the following ratios: Class 1 = 1.0, Class 2 = 1.8, and Class 3 = 3.4, and that NMFS use a rulemaking procedure to implement the Amendment on an emergency basis." The New England Council voted at the same meeting to adopt the Amendment.

The provisions of Amendment #4 were implemented on an emergency basis for 180 days beginning 1 July 1984, during which time the Amendment was finalized by the New England Council and submitted for Secretarial approval. However, it was determined that the document was not structurally complete for review.

Amendment #5, approved 28 February 1985, revised the surf clam minimum size limit provisions, extended the size limit throughout the entire fishery, and instituted a requirement that cages be tagged.

This Amendment (#6) was begun in October 1985 following an exploratory fishery conducted on Georges Bank as a result of emergency regulations published 2 August 1984 (49 FR 30946-30948), primarily to address problems associated with the development of a surf clam fishery on Georges Bank (Section IV.B.2). At its October 1984 meeting the Council voted to divide the New England Area into the Nantucket Shoals and Georges Bank Areas, the dividing line being 69 degrees longitude. At the same meeting the Council voted to approve revising Amendment #4 so its provisions applied to that portion of the New England Area west of 69 degrees longitude.

In response to the Council's recommendation that Amendment #4 be revised to apply only to that portion of the New England Area west of 69 degrees, the New England Council held a hearing on 11 December 1984 (Appendix III).

At its December 1984 meeting the Council adopted the provisions of Amendment #6. The Amendment was adopted by the Council for hearings in January 1985, with hearings held 18 and 19 February 1985 (Appendix III). The Council adopted Amendment #6 for Secretarial approval at its March 1985 meeting. At that time Amendment #4 had still not been found structurally complete. Given the relationship between the provisions of Amendments #4 and #6, the decision was made to abandon Amendment #4 and combine the provisions of Amendment #4 with Amendment #6 in this document. The combination of Amendments #4 and #6 did not change any substantive provisions of either Amendment.

In order to facilitate documentation, the rejected alternatives for both Amendments are presented separately in Appendix I and the public hearing summaries are presented separately in Appendix III.

The Council was notified via a letter of 25 July 1985 that NMFS had partially approved Amendment #6. The letter from Acting Regional Director Richard H. Schaefer to Council Chairman Robert L. Martin stated in part:

"The measures in Amendment 6 that I disapproved are the Nantucket Shoals Area bimonthly quota guidelines and effort control measures, the one landing per day restriction applying to the Mid-Atlantic Area, the provision prohibiting the Regional Director from subdividing allowable fishing hours when the hours are set at 12 or less, and the portion of the notification provision prohibiting vessels that have fished in a notification zone from returning to fish in the same notification zone within that calendar month. The disapproval of the bimonthly guidelines for Nantucket Shoals removed the basis for adjusting the quotas between bimonthly periods when harvest either exceeds or falls short of quota. Therefore, this provision, while not specifically disapproved, can not be implemented on Nantucket Shoals at this time."

This revised version of Amendment #6 replaces the bimonthly quotas with quarterly quotas and eliminates the weekly landing limits for the Nantucket Shoals Area. It clarifies the quota adjustment provisions for the Nantucket Shoals and Georges Bank Areas. Finally, it presents additional justification for the one landing per trip provision. The other disapproved provisions (prohibition on subdividing allowed fishing times under certain conditions and portions of the notification system) have been deleted from the Amendment.

The management unit is maintained as all surf clams (Spisula solidissima) and all ocean quahogs (Arctica islandica) in the Atlantic FCZ.

B. Description of User Groups

The fishery is described in Sections VIII and IX of the Amendment.

C. Problems Addressed by the Amendment

The problems to be addressed are discussed in Section IV of the Amendment.

D. Management Objectives

The objectives of the FMP are:

1. Rebuild the surf clam populations to allow eventual harvest approaching the 50 million pound level, which is the estimate of maximum sustainable yield over the range of the resource, based on the average yearly catch from 1960 to 1976.
2. Minimize economic dislocation to the extent possible consistent with objective 1 and encourage efficiency in the fishery.
3. Prevent the harvest of ocean quahogs from exceeding maximum sustainable yield and direct the fishery toward achieving Optimum Yield.
4. Provide the greatest degrees of freedom and flexibility to all harvesters of these resources consistent with the attainment of the other objectives of this Plan.

5. Optimize yield per recruit.
6. Increase understanding of the conditions of the stocks and fishery.

E. Provisions of the Amendment

The FMP currently contains two management areas for surf clams: the Mid-Atlantic Area and the New England Area. The dividing line between the Mid-Atlantic and New England Areas is the line that begins at 41°18'16.249" north latitude and 71°54'28.477" west longitude and proceeds S 37°22'32.75" E to the point of intersection with the outward boundary of the FCZ. The Amendment defines the Nantucket Shoals Area as that portion of the New England Area west of 69° and the Georges Bank Area as that portion of the New England Area east of 69°.

The New England Area was originally delineated to gather information on the surf clam resource in the absence of comprehensive research data gathered by the Northeast Fisheries Center (NEFC). It was decided that the delineation of an area with no limitation on entry and with a quota and management measures separate from those operating in the Mid-Atlantic Area would encourage fishing in the New England Area and that such fishing would supply information on the extent of the surf clam resource in the New England Area. A fishery was initiated and NEFC prepared a stock assessment (Murawski and Serchuk, 1983a) concentrating on the western portion of the area (Nantucket Shoals). This assessment resulted in the specification of OY in the Nantucket Shoals Area as 25,000 - 200,000 bushels (bu), an increase over the 25,000 -100,000 bu specified for the New England Area. The annual quota is set following the procedures established in the FMP (MAFMC, 1981).

Management of the Nantucket Shoals Area is based on dividing the annual quota into quarterly quotas as follows: 20% for January through March, 30% for April through June, 30% for July through September, and 20% October through December. If the actual catch of surf clams in any quarterly period falls more than 5,000 bushels short of the specified quarterly quota, the Regional Director will add the amount of the shortfall to the succeeding quarterly quota. If the actual catch of surf clams exceeds the quarterly quota, the Regional Director will subtract the amount of the excess from the succeeding quarterly quota. The Regional Director shall publish a notice in the Federal Register whenever any quarterly quota for surf clams is adjusted as described above. The shortfall or excess will carry over from the last quarter of one year to the first quarter of the next year except that no more than 10% of the annual quota may be carried over to the next year. No catch restrictions shall be applied to the fishery until 50% of the quarterly quota has been landed. The Regional Director will monitor landings from the Nantucket Shoals Area and will determine either when the 50% point has been reached or when that point will likely be reached. The Regional Director will thereupon consult with the Councils in the selection of trip limits to control catch adequately to keep the fishery open for the balance of the quarter. Trip limits will be established by vessel class as follows: for Class 1 vessels, trip limits may not be less than 224 bu/trip; for Class 2 vessels, trip limits may not be less than 416 bu/trip for Class 2, and for Class 3 vessels, trip limits may not be less than 768 bu/trip. Trip limits must maintain a fixed ratio of 1.0: 1.8: 3.4 for Class 1, 2, and 3, respectively. In the event that trip limits are not sufficient to keep landings to within the quota levels, the Regional Director may close the fishery until the beginning of the next quota period. Once initial trip limits have been established in consultation with the Councils, the Regional Director will notify the Councils in advance of any proposed action to further specify trip limits or close the fishery. The Regional Director will consider any comments received by the Councils or the public before implementing any adjustments in the Nantucket Shoals management program.

During 1984 vessels began a surf clam fishery on Georges Bank. This led to research using NMFS and commercial vessels that resulted in a stock assessment (Murawski and Serchuk, 1984b) for Georges Bank which suggested a maximum annual catch of 300,000 bu. The surf clam fishing grounds on Georges Bank are a substantial distance from shore. If the New England Area OY were increased to reflect the Georges Bank assessment, it is probable that all of the increased catch would come from Nantucket Shoals, leading to over fishing in that Area. Hence, it is necessary to partition the New England Area.

The OY for the Georges Bank Area is 25,000 to 300,000 bu. The annual quota is set following the

procedures established in the FMP and is divided into quarterly quotas, with the first and fourth quarters (January-March and October-December) each allocated 10% of the annual quota and the second and third quarters (April-June and July-September) each allocated 40% of the annual quota. If the actual catch of surf clams in any quarterly period falls more than 5,000 bushels short of the specified quarterly quota, the Regional Director will add the amount of the shortfall to the succeeding quarterly quota. If the actual catch of surf clams exceeds the quarterly quota, the Regional Director will subtract the amount of the excess from the succeeding quarterly quota. The Regional Director shall publish a notice in the Federal Register whenever any quarterly quota for surf clams is adjusted as described above. The shortfall or excess will carry over from the last quarter of one year to the first quarter of the next year except that no more than 10% of the annual quota may be carried over to the next year.

Management of the Mid-Atlantic Area is based on the current FMP, except that the effort limitations are modified by this Amendment to add the provision that vessels may land surf clams only one time during an authorized fishing period.

The surf clam minimum size limit applies in all three Areas.

The permit eligibility requirements for the New England Area continue unchanged for both the Nantucket Shoals and Georges Bank Areas; specifically, vessels with permits issued pursuant to the moratorium on entry of vessels into the surf clam fishery and vessels with permits to fish only in the New England Area may both fish in both the Nantucket Shoals and Georges Bank Areas. However, it is the Council's intent that vessels with permits to fish only in the New England Area accrue no rights to participate in any future vessel allocation system that may be developed to replace or supplement the moratorium on entry of vessels into the surf clam fishery as a consequence of such vessels fishing in the New England Area.

Vessel owners or operators must notify NMFS in advance if they intend to fish for surf clams in a Notification Zone. For vessels authorized to fish in both the Mid-Atlantic and New England Areas (i.e., with permits issued pursuant to the moratorium) with home ports in the Mid-Atlantic Area, the Nantucket Shoals or Georges Bank Areas are Notification Zones. For vessels authorized to fish in both the Mid-Atlantic and New England Areas (i.e., with permits issued pursuant to the moratorium) with home ports in the New England Area, the Mid-Atlantic or Georges Bank Areas are Notification Zones. For vessels authorized to fish only in the New England Area, the Georges Bank Area is a Notification Zone. Home port is that specified on the vessel's permit application. Vessels may not fish in more than one Area on any day. If an operator intends to change the vessel's Area of fishing, NMFS must be notified in advance.

II. REGULATORY IMPACT ANALYSIS

II.A. Dividing the Areas

Dividing the New England Area into the Nantucket Shoals and Georges Bank Areas would mean that fishing in the Nantucket Shoals Area could continue without any negative impacts from fishing in the Georges Bank Area, and vice versa. The management systems in the two Areas are different because of the different management objectives of the two Areas. The Nantucket Shoals Area is being managed to keep the fishery open for as much of the year as possible. The Georges Bank Area is managed to achieve a compromise between keeping the fishery open for as much of the year as possible, consistent with safety, while also providing an area where fishing may occur with minimal controls during periods when the Nantucket Shoals or Mid-Atlantic Areas may be either closed or operating under severe restrictions. The positive impact of the division is that the level of regulation imposed on the fishermen will be no greater than that considered necessary for each Area.

If the division were not implemented it can be assumed that the entire New England Area would be controlled either by the rules proposed for the Nantucket Shoals Area or the rules proposed for the Georges Bank Area; in which event the Georges Bank Area would be subjected to more regulation than is considered necessary or the Nantucket Shoals Area would be subjected to less. Both of these situations have negative impacts. Application of the Nantucket Shoals Area rules throughout the entire New England Area would mean fishermen in the Georges Bank Area would be subject to

different quarterly quotas and potentially to trip limits. Conversely, application of the proposed Georges Bank rules to the entire New England Area would mean the entire Area would be subject to different quarterly quotas and no limitations short of closure, potentially leading to outcomes not consistent with the objectives for the Area. Additionally, allowing the combined OYs to be harvested from either area could lead to excessive harvests from one of the areas; i.e., if the divided Areas were not specified but the OY increased as proposed, the annual quota could be as great as 500,000 bu, which could legally be taken from Nantucket Shoals (where the maximum catch should only be 200,000 bu) or from Georges Bank (where the maximum catch should be only 300,000 bu).

It is not possible to quantify the costs and benefits of dividing the Area. However, some qualitative observations may be made.

1. If the entire New England Area were operated under the Nantucket Shoals Area rules, the OY and quota range would be 50,000-500,000 bu. Since most of the harvest of the Nantucket Shoals resource occurred in 1983 and for the Georges Bank fishery in 1984, it is not possible to directly compare potential harvest patterns with historical performance. However, in 1984 the Georges Bank fishery alone took almost 90,000 bu per month for three months (Table 9), a harvest rate that would trigger trip limits even at the maximum quota level. Hence, it is not unreasonable to conclude that applying the Nantucket Shoals Area rules to the entire New England Area would very likely lead to an excessive level of regulation on the fishery in the Georges Bank Area, with resultant increased costs to industry and government to operate under and administer, respectively, the increased level of control.
2. If the entire New England Area were operated under the Georges Bank Area rules the OY range would again be 50,000-500,000 bu, with a quarterly quota distribution of 10%, 40%, 40%, and 10% of the annual quota. At the minimum quota level the quarterly quotas would be 5,000 bu, 20,000 bu, 20,000 bu, and 5,000 bu. At the current level the quarterly quotas would be 10,000 bu, 40,000 bu, 40,000 bu, and 10,000 bu. At the maximum rate the quarterly quotas would be 50,000 bu, 200,000 bu, 200,000 bu, and 50,000 bu. Given the problems in combining historical statistics for the Nantucket Shoals and Georges Bank Areas and recognizing that the Georges Bank fishery operated for only one complete quarter in 1984 (during which the catch was 266,538 bu; Table 9), closures might be expected if the July-September 1984 performance is repeated. While closures are contemplated for the Georges Bank Area, they should be seen as negative impacts vis-a-vis the Nantucket Shoals Area.
3. The price impacts of various quota levels with separate and joint Areas using the price equation discussed in Section IX and assuming a catch absent the Nantucket Shoals and Georges Bank Areas quotas equal to the average quarterly catch for the first three quarters of 1984 (1,061,000 bu), and a per capita disposable income equal to that of the third quarter of 1984 (\$4,961), suggest a price decrease and gross revenue increase for any catch over the base level (Table 30). If the minimum catch in the lowest quarter for the Georges Bank Area (2,500 bu) and no catch from the Nantucket Shoals Area is assumed, the price is predicted by the model to decrease by \$.01/bu and ex-vessel value to increase by about \$10,000 relative to those quantities in the absence of any catch from either Nantucket Shoals or Georges Bank. At the other extreme, if it is assumed that the New England Area is not divided and the proposed Georges Bank rules apply, at the maximum quarterly quota level (200,000 bu), the surf clam price would be \$7.14/bu and ex-vessel value would be \$9,004,990. That range of prices is not considered significant since actual quarterly prices have ranged from \$6.68 to \$8.84/bu during 1983 and 1984. Any price impact of the Georges Bank catch would decrease as the Mid-Atlantic Area quota and catch increase and as a greater portion of the Nantucket Shoals Area quota is landed. It must also be noted that the Georges Bank catch during the third quarter of 1984 was more than double the maximum quarterly quota and the third quarter price was \$8.46/bu.
4. Government costs would increase because of creating the two Areas as a result of the need to know where vessels were fishing. Knowledge of the Area in which fishing is occurring is necessary to assure the reliability of catch statistics so that appropriate measures could be implemented as required to avoid overfishing.

II.B. OY for the Nantucket Shoals Area

Quotas established for the New England Area in previous iterations of the FMP were based on limited survey information and a lack of significant fishing activity, which made it difficult to assess the potential commercial yield from the fishery.

During the last quarter of 1982 and the beginning of 1983 fishing activities increased substantially. Resource distribution and abundance was traced, survey data were collected and analysed, and a stock assessment was produced during the summer of 1983 (Murawski and Serchuk, 1983a). The survey, conducted in the Nantucket Shoals area, concluded that about 10% of the total surf clam resource biomass and 5% of the numbers was located in that Area. Applying the 10% figure to the biomass in the Mid-Atlantic, and basing a quota on the same assumptions used to fix the quota in the Mid-Atlantic, results in a conclusion that the upper bound of the OY range for the Nantucket Shoals Area may safely be established as 200,000 bu. The resource in the Nantucket Shoals Area is somewhat different from that in the Mid-Atlantic because the rough bottom topography, shallow depths, and strong currents complicate fishing activity. The current resource is generally older, slightly faster growing, and yields slightly more meat for similar sized clams than in the Mid-Atlantic. There has been essentially no recruitment during the last five to six years.

The effect of doubling the allowable quota should be significant to the few FCZ fishermen who are permitted to fish only in the New England Area, in that it will significantly increase possible fishing opportunities. The economic effect of the increased quota on the surf clam industry is likely to be far less significant. The maximum Nantucket Shoals Area annual quota (200,000 bu) is only 6.8% of the maximum Mid-Atlantic Area quota. If the Georges Bank maximum annual quota is added to the maximum Mid-Atlantic Area annual quota, then the maximum Nantucket Shoals Area annual quota is only 6.2% of the total.

II.C. Nantucket Shoals Area Quarterly Quotas

Quotas are now used for the New England and Mid-Atlantic surf clam fisheries, and in other fisheries, to control total fishery removals. As an ultimate control of fishing mortality, they have value. Changes in resource abundance can be reflected if quotas are adjustable within ranges defined for the fisheries. Distribution of the quota over the fishing year can also serve the goal of avoiding lengthy closures and thus effectively addresses the potential closure problem of the New England fishery. Quotas are usually administered and enforced through some form of effort restriction, such as fishing time, trip limits, vessel allocations, or closure.

II.D. Nantucket Shoals Area Control Measures

The Amendment replaces the control of fishing time with trip limits for the Nantucket Shoals Area. Control of fishing time is used in the Mid-Atlantic Area. Control of fishing time was not effective in 1983 as a means of slowing harvest to avoid lengthy closures in the New England Area because the FMP did not allow imposition of limits until half of the quota had been taken and, given the small maximum quota (100,000 bu), there was not enough quota left to allow reasonable fishing periods once the half way point had been reached. In 1983, fishing time was restricted on 1 April to 12 hours per week after over 64,000 bu (logbook data) of the 100,000 bu annual quota was taken. Despite this time reduction over 24,000 bu (logbook data) were taken during the next quarter, leading to a closure of the fishery effective 1 July and lasting for the next six months. The logbook data cited above do not sum to the 100,000 bu quota because of incomplete reporting; however, the actual catch was far in excess of 100,000 bu.

Additional problems with fishing time include the difficulty of monitoring at sea activity for enforcement purposes. Fishing time must be enforced by vessel inspection or overflight. With small amounts of available time, and with so much of the New England fishery occurring near State waters, detection and confirmation of violations is difficult. Weather conditions in New England are subject to rapid changes. Vessels fishing in the area work out of ports which require steaming times of as much as 12 hours each way to the grounds and back. Reduction of time to 12 hours increases the probability that fishermen will not be able to complete a trip because bad weather intervenes. Operators who must steam 24 hours round trip for only 12 hours of fishing are understandably frustrated.

Landing limits can be enforced at the dock by inspection. Operators gain latitude in deciding when to fish, and how many trips to take. Trip limits also act as a direct translation between the quota, which is established in bushels, and a control mechanism, also stated in bushels. The indirect linkage between bushels and fishing time is avoided, increasing the possibility that management action may have its desired control effect.

The management strategy for the Nantucket Shoals Area is intended to increase the probability of spreading catch throughout the fishing year. The bimonthly quotas have been established, and will be reviewed by the Council annually to make clams available at times and places when the industry has indicated demand will be greatest.⁶

The ratio between the trip limits, i.e., 1.0 for Class 1, 1.8 for Class 2, and 3.4 for Class 3 were the average relative fishing power for Mid-Atlantic Area surf clam vessels based on logbook data for 1982 and 1983. It was necessary to use Mid-Atlantic Area data because of the extremely limited amount of Nantucket Area logbook data.

Very limited logbook data also make it difficult to evaluate the minimum trip (not less than 224 bu/trip for Class 1, not less than 416 bu/trip for Class 2, and not less than 768 bu/trip for Class 3 vessels) landing limits. Analysis by class is not possible because of the limited data.

These minimums were established in recognition that closure of the fishery may be preferable to leaving the fishery technically open, but with harvest restrictions so stringent as to preclude an economically viable fishery. The proposed minimum values were proposed by industry representatives. Since cost data are not available, it is impossible to assess whether the proposed minimums would, in fact, assure profitable operations.

Trip limits, determined relative to vessel class, can be fixed at a level to spread catch out over time. Operators gain flexibility to take trips as weather permits, and to take as many trips as they can. The minimum trip limits by vessel class are established at levels where performance is profitable to ensure that operators do not suffer through periods of de-facto closure, where the costs of operation cannot be defrayed by the expected returns. Like other alternatives, economic performance is limited by the total quota.⁷

II.E. Quarterly Quotas for the Georges Bank Area

The quarterly quotas are intended to distribute fishing in the Georges Bank Area through as much of the year as feasible in light of the steaming distance to the fishing grounds coupled with weather conditions. The concept of keeping the fishery operating throughout the year has been a key consideration in the FMP since its inception. This is considered a desirable goal in order to stabilize employment for fishermen and processing plant workers and to provide for an uninterrupted supply of product to processors in both New England and the Mid-Atlantic.

The quarterly quotas represent a compromise position between monthly quotas and only an annual quota. Monthly quotas would theoretically allow harvesting over a longer portion of the year, which might not be desirable in the Georges Bank Area because of weather conditions. With only an annual quota, stability in terms of landings from one period to the next would be reduced.

The allocation distribution (10% each for the first and fourth and 40% each for the second and third quarters) is designed to avoid fishing during months when weather conditions are likely to be adverse (thus make it more difficult to catch the last of the quota) while still distributing the catch throughout the year as much as possible. Using the limits of the OY range, the first and fourth quarter quotas would be 2,500-30,000 bu and the second and third quarter quotas would be 10,000-120,000 bu. A Class 3 vessel can carry 60-100 cages, or 1,920 -3,200 bu. Based on available assessment information (Murawski and Serchuk, 1984b), the most likely quota for the Georges Bank Area is at the maximum end of the OY, i.e., 300,000 bu. At that quota, and assuming only Class 3 vessels fished and they had an average capacity of 80 cages (2,560 bu), during the first and fourth quarters they could make twelve trips and during the second and third quarters they could make 47 trips.

Unconstrained fishing on Georges Bank theoretically could have negative impacts on the surf clam

market. Landings from the Georges Bank Area averaged about 20,000 bu/week while the fishery was operating at its peak during 1984 (July-September). During that period landings from the Mid-Atlantic FCZ Area were 518,000 bu (compared to a total during the period of 253,000 from Georges Bank) and the Mid-Atlantic Area was closed for three weeks. The average price was \$8.62/bu during the second quarter (when only 90,000 bu were landed from Georges Bank) and \$8.46/bu during the third quarter.

Using the price equation discussed in Section IX and assuming a catch absent the Georges Bank quota equal to the average quarterly catch for the first three quarters of 1984 (1,061,000 bu), a per capita disposable income equal to that of the third quarter of 1984 (\$4,961), and adding the maximum Georges Bank quarterly quota (120,000 bu), the equation predicts a price of \$7.58/bu and ex-vessel value of \$8,957,117. If the Georges Bank catch is excluded the predicted price is \$8.25/bu and ex-vessel value is \$8,753,250. At the smallest quarter at the lower end of the quota range with price would be \$8.24/bu with ex-vessel value equal to \$8,763,240 (Table 30). That range of prices is not considered significant since actual quarterly prices have ranged from \$6.68 to \$8.84/bu during 1983 and 1984. Any price impact of the Georges Bank catch would decrease as the Mid-Atlantic Area quota and catch increase and as a greater portion of the Nantucket Shoals Area quota is landed. It must also be noted that the Georges Bank catch during the third quarter of 1984 was more than double the maximum quarterly quota and the overall third quarter price was \$8.46/bu (Table 29).

II.F. Notification Requirement

The FMP contains no declaration requirement. Emergency regulations implementing the provisions of Amendment #4 were put into effect on 1 July 1984 for a period of 180 days. The emergency regulations included a requirement that owners or operators of vessels intending to fish in the New England Area notify NMFS in writing of such intention before they intend to begin fishing (49 FR 27157). This Amendment would reinstitute that provision in a modified form consistent with the three defined Areas. The impact of the proposed declaration requirement is minimized relative to the impacts of the lapsed emergency provision by the exceptions based on permit type and home port. The exceptions are based on the assumption that most Mid-Atlantic based vessels will fish in the Mid-Atlantic Area most if not all of the time and that most of the New England based vessels will fish in the Nantucket Shoals Area most if not all of the time. Therefore, declarations must be made only for the exceptions to those situations.

While it is impossible to estimate the number of declarations that might be made, it is possible to outline some parameters of possible declarations. There are 148 vessels permitted pursuant to the moratorium and 362 vessels permitted to fish only in the New England Area (Table 13). In 1983, 113 vessels made at least one trip for surf clams in the Mid-Atlantic Area, 57 of them Class 3 and 43 Class 2 (Table 8). While data are not available on the number of New England only vessels that have actually fished, logbook data indicate that only twelve vessels in 1983 and ten vessels in 1984 fished in the Nantucket Shoals Area. During both years only two vessels that did not have permits to fish in the Mid-Atlantic Area filed logbooks (a requirement for fishing in the FCZ). Seventeen vessels, fifteen from the Mid-Atlantic, participated in the Georges Bank fishery during 1984 (with about 400,000 bu of landings). The pattern has been that the Mid-Atlantic vessels go to Nantucket Shoals or Georges Bank and fish for a time, then return to the Mid-Atlantic, but do not frequently shuttle back and forth. It is expected that this pattern will continue in the near future because of the distances involved and the location of processing plants. As long as the current time based regime continues in the Mid-Atlantic Area and assuming current stock conditions and demand, the Mid-Atlantic Area will be operating under severe effort limitations, which may provide an incentive for more Mid-Atlantic based vessels to fish in the Nantucket Shoals and Georges Bank Areas at least during some portion of the year. Therefore, the experience during the recent past could be considered the lower limit of possible declarations. Theoretically, the upper limit is the entire Mid-Atlantic fleet, but such an event is virtually impossible because: (1) it is unlikely that the Class 1 vessels could travel to and consistently fish in the Georges Bank Area, (2) the cost of travel between the Mid-Atlantic Area and the Nantucket Shoals and Georges Bank Areas, (3) the need to find and availability of dock space in New England, (4) and the cost of transporting the clams from New England to Mid-Atlantic processing plants.

The number of closures in the Mid-Atlantic Area will be the most likely incentive for interest in

Mid-Atlantic based vessels fishing in the Nantucket Shoals and Georges Bank Areas. Reduced allowed time in the Mid-Atlantic Area coupled with sustained demand will probably lead to more intensive use of vessels in the Mid-Atlantic Area during the times when fishing is allowed, with vessels making the trip to the Nantucket Shoals and Georges Bank Areas primarily to assure that the processors have a supply of clams if the Mid-Atlantic Area fishery is closed even with reduced allowed times.

The emergency regulations provided in part that all vessel owners or operators had to declare their intent to fish in the New England Area. Since New England based vessels generally do not file logbooks, there are no data on where the New England vessels fish. According to NMFS records only five vessels (all Mid-Atlantic based) filed letters of intent to fish in the New England Area as of 14 November 1984 (excluding letters of intent that were filed to fish under the special research program on Georges Bank) under the emergency regulations. However, it is understood that most New England based vessels fish in the Nantucket Shoals Area if they fish in the FCZ. Only six New England vessels have permits to fish in the Mid-Atlantic Area. Two New England vessels fished on Georges Bank during 1984. Therefore, it seems reasonable to conclude that the declaration requirement will have a positive impact on New England fishermen relative to the emergency regulations.

The Amendment's requirement that Mid-Atlantic based vessel operators declare their intent to fish in the Nantucket Shoals and Georges Bank Areas represents no change from the provisions of the emergency regulations that operators declare their intent to fish in the New England Area. However, this Amendment adds the requirement that they also declare when they return. The tradeoff associated with this Amendment is to keep management associated costs to the industry as low as possible to minimize disincentives to fishing in the Georges Bank Area while reducing the chances of the Georges Bank fishery impacting negatively on fishermen who cannot or do not participate in it.

It must be remembered that the entire management system requires accurate reporting of catch by Area. The system is designed to meet the needs of each of the Areas by changing restrictions to meet current conditions; e.g., varying allowed fishing times in the Mid-Atlantic, trip landing limits for Nantucket Shoals, and no limitations but closure for Georges Bank. Timely catch data assignable to each Area are critical to making this system work. The notification requirement is designed to facilitate enforcement and reporting by providing a mechanism for checking a vessel's logbook reports against information on where the vessel was supposed to be fishing and informing enforcement officers of which rules a vessel is fishing under on a given day. No negative impacts are anticipated from the notification requirements.

II.G. Mid-Atlantic Area Landing Restriction

Effort limitations in the Mid-Atlantic Area are currently in terms of the number of hours a vessel may fish during a specified time period and in practice have been a certain number of hours each week (although the FMP allows hours per month and hours per quarter). Catch rates during 1984 led to closures in June, July, September, and December and a reduction from twelve hours per week to six hours every other week effective 18 November. Certain vessels that fish beds close to shore (generally off New Jersey) have reportedly been making more than one trip during a twelve hour day, which is considered a significant factor contributing to the reduction to six hours every other week. Multiple landings on one day complicate enforcement and may result in a more rapid harvest rate, leading to decreased allowed fishing time or closures, thereby negatively impacting vessels that do not operate out of ports close enough to the beds to enable them to make more than one trip per day as well as the vessels that can make multiple landings. This problem was also identified by the United Shellfishermen's Association through comments made at the hearings on Amendment #5 and by the National Fisheries Institute at the September 1984 meeting of the Council. Hence, this Amendment adds the provision that vessels may land surf clams only one time during an authorized time period. More than one landing per period tends to make enforcement more difficult because it encourages violations of the fishing hour limitations. The fishery has been operating at six or twelve hours of fishing per period (Table 17) and it is unlikely that this situation will change in the foreseeable future. In order to increase harvests it is possible that fishermen will land more than one time during a period by beginning earlier than allowed and/or fishing later than allowed. Enforcing fishing time is extremely expensive since it requires at sea

effort, but must be done rigorously to insure the integrity of the FMP. The possibility of legal multiple landings would increase the enforcement cost because of the greater probability of violations of the starting and ending times. Clams landed illegally have a negative impact throughout the fishery since they accelerate the rate at which the quota is harvested, leading to further reductions of allowed fishing time. Evidence of infringement on starting and stopping times was presented to the Regional Director in 1984 when dual landings were being made.

In addition, the limitation of one landing per fishing period should allow the Regional Director to establish longer fishing periods. This should not increase the rate at which the quota is harvested while providing the fishermen the time they need to be more selective in the beds they fish, thus tending to decrease the capture (landing or discard) of sublegal clams. This is true if it is assumed that vessels are currently landing their carrying capacity at allowed fishing times which have not exceeded six hours since November 1984. If the boats are being filled in six hours or less, then extending the allowed time to, for example, twelve hours, while allowing only one landing would double the time available to fish for the same quantity of clams, thereby providing the opportunity for fishermen to be more selective in their fishing areas, hence reducing discards and the landing of sublegal clams.

XII.B.8. Surf Clam Minimum Size Limit

There were two actions (Amendments #4 and #6) which had the effect of extending the surf clam minimum size limit throughout the entire management area. The surf clam minimum size limit was to be extended to the New England Area pursuant to Amendment #4 and was part of that Amendment when it was taken to public hearings and when it was finally adopted by both the Mid-Atlantic and New England Councils.

Amendment #5, and the regulations implementing it, included a mechanism for adjusting the surf clam minimum size limit and were written to apply to the entire management area, i.e., both the Mid-Atlantic and New England Areas.

The draft of Amendment #6 also stated that the size limit would be in effect in the New England Area as a result of Amendment #4 and contemplated that the limit would, therefore, apply to the Nantucket Shoals and Georges Bank Areas created in that Amendment within the New England Area. However, after the hearings on Amendment #6 it was determined appropriate to combine Amendments #4 and #6. It was also determined that the size limit would be a part of Amendment #6 as Amendments #4 and #6 were merged. Amendment #6 was adopted by the Mid-Atlantic Council on that basis on 7 March 1985.

According to vessel operators and to resource surveys conducted in the Nantucket Shoals and Georges Bank Areas, most of the surf clams which have been harvested and which are available for harvest are of sizes greater than 5.25". Very few surf clams smaller than 4.75" were captured, indicating that recruitment in the past 5 to 6 years has been relatively poor (Murawski and Serchuk, 1983a). Over an extended period of time, as exploitation rates increase and recruitment occurs, a greater proportion of the resource may be below the current minimum size. It is impossible to predict when this will occur. If recruitment does not occur, the resource will eventually be depleted. With the current size distribution of clams in the Areas, imposing the size limit in the Nantucket Shoals and Georges Bank Areas should have a negligible effect on landings in the present or immediate future. The measure will protect any small clams which might be produced, enhancing their yield and ensuring that they can spawn a number of times before they are harvested.

II.H. Management Costs

The Amendment makes three changes to the FMP: it establishes a management regime for the Nantucket Shoals Area; it establishes a management regime for the Georges Bank Area; and it adds the trip restriction to the Mid-Atlantic Area surf clam fishery.

Management costs will increase as a function of administering the quarterly quota system with trip limits in the Nantucket Shoals Area relative to the effort limitations previously in effect. However, the quarterly quota system should achieve the objective of keeping the fishery open year

round, whereas the annual quota and effort limitations did not.

Management costs will increase simply as a function of the need to manage the new Georges Bank fishery. The issue is whether the proposed regime results in the smallest possible cost increase given the objectives of the FMP and the benefits that accrue from the Georges Bank fishery. The incremental increase in government administrative costs relative to setting quotas and monitoring the fishery should be insignificant. The declaration system will add administrative costs, but they must be compared to the enforcement advantage that results from the system, since without the declaration system enforcement would be virtually impossible.

The trip limitation in the Mid-Atlantic Area surf clam fishery should not increase costs but rather increase enforcement effectiveness. The provision clearly adds another requirement, but the result is that all of the landing related regulations (especially the size limit) are easier to enforce.

III. Discussion of the Benefits and Costs of the Amendment

E.O. 12291 requires that a benefit-cost analysis of all proposed regulations be performed.

III.A. Costs

Management costs are discussed above in section II.H. The only fishery cost that has been identified is that associated with the notification system, which, as discussed in section II.F should be minimal in the aggregate because of the small number of vessels likely to be involved and which should be insignificant individually since, while the system has not been designed as yet, at least it would involve only two telephone calls per trip to a Notification Zone and at worst it would involve two letters per trip to a Notification Zone.

III.B. Benefits

The benefits of the Amendment are discussed in section II. The Amendment increases the maximum allowable surf clam catch by up to 300,000 bu which would yield a revenue increase of about \$2.5 million at 1984 prices and allow fishermen to catch that increased quota with minimal regulations (quarterly quotas and the notification requirement). The notifications requirement and Mid-Atlantic Area surf clam landing restriction should improve enforcement and administrative effectiveness.

III.C. Benefit - Cost Conclusion

The benefits of the proposed Amendment are:

1. The maximum quantity of surf clams that may be landed is increased by 400,000 bu (100,000 bu as a result of the OY increase for the Nantucket Shoals Area and 300,000 bu as a result of the OY for the Georges Bank Area). Fishermen's revenues would increase by the value of that catch, which at the average 1984 price would be nearly \$3.3 million.
2. Dividing the New England Area into the Nantucket Shoals and Georges Bank Areas enables the surf clam fishery on Georges Bank to be carried out with fewer regulations than those that may be imposed on the Nantucket Shoals Area as a result of this Amendment.
3. The surf clam landing restriction in the Mid-Atlantic Area (one landing per authorized fishing period) should improve enforcement effectiveness.
4. The Amendment should not increase administrative costs because data collection and fishing permits all exist under the current FMP. However, enforcement of the quarterly landing limit in the Nantucket Shoals Area and the Georges Bank Area regime may increase costs that cannot be presently estimated.

The adverse impacts include:

1. The surf clam landing restriction in the Mid-Atlantic Area may result in negative impacts on

those fishermen who have been landing more than one time during an authorized fishing period. No data are available to identify how many fishermen have been operating in this fashion. However, virtually the entire industry has requested this provision.

The Council has concluded that the benefits outweigh the costs.

IV. Other E.O. 12291 Requirements

E.O. 12291 requires that the following three issues be considered:

1. Will the Plan have an annual effect on the economy of \$100 million or more.
2. Will the Plan lead to an increase in the costs or prices for consumers, individual industries, Federal, State, or local government agencies or geographic regions.
3. Will the Plan have significant adverse effects on competition, employment, investment, productivity, innovation, or on the ability of US based enterprises to compete with foreign based enterprises in domestic or export markets.

The Amendment should not have an annual effect of \$100 million or more since the total fishery had a value of only \$25 million in 1983 and since 1950 has never exceeded \$27 million.

The Amendment should not lead to an increase in the costs or prices for consumers, individual industries, Federal, State, or local government agencies or geographic regions. It is expected that the governmental costs of implementing the Amendment will be similar to those experienced in enforcing the current FMP. Council and NMFS administrative costs would increase slightly because of the need to set quotas for three rather than two Areas. NMFS enforcement costs should increase because of the need to monitor three rather than two Areas, but the amount of the increase is reduced through the notification requirement. Enforcement costs should decrease (or at least effectiveness improve) through the surf clam landing restriction in the Mid-Atlantic Area. Industry costs should increase slightly as a result of the notification requirement, but this cost is minimal relative to the potential value of the increased quota.

The Amendment should not have significant adverse effects on competition, employment, investment, productivity, innovation, or on the ability of US based enterprises to compete with foreign based enterprises in domestic or export markets. It should have no impact on competition, employment, investment, innovation, or foreign competition. It should have a positive impact on productivity because of the increased allowable catch.

V. Impacts of the Plan relative to the Regulatory Flexibility Act and the Paperwork Reduction Act of 1980.

The Regulatory Flexibility Act requires the examination of the impacts on small businesses, small organizations, and small jurisdictions. The impacts of the Amendment do not favor large businesses over small businesses. Both large and small businesses can benefit from the delineation of the Georges Bank Area and the Mid-Atlantic Area surf clam landing restriction and equally share the costs of the notification system and any costs that may result from the Mid-Atlantic Area surf clam landing restriction.

The Paperwork Reduction Act concerns the collection of information. The intent of the Act is to minimize the Federal paperwork burden for individuals, small business, State and local governments, and other persons as well as to maximize the usefulness of information collected by the Federal government. This Amendment does not change the FMP's permitting and reporting requirements and, therefore, has no impact relative to the Paperwork Reduction Act from that standpoint. The notification system has not been designed in detail, so paperwork impacts cannot be specifically identified. However, in the aggregate they cannot be significant because of the probable small number of vessels involved (RIR section II.F). Impacts on individual vessel owners or operators involve notifying NMFS twice each time they fish a Notification Area, which at least would mean two telephone calls and at most mean two letters.

DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration
50 CFR Part 652
[Docket No.]
ATLANTIC SURF CLAM AND OCEAN QUAHOG FISHERIES

AGENCY: National Marine Fisheries Service (NMFS, NOAA, Commerce).

ACTION: Proposed rule.

SUMMARY: NOAA issues a proposed rule to implement conservation and management measures as prescribed in the proposed Amendment #6 (Amendment) to the Fishery Management Plan for the Atlantic Surf Clam and Ocean Quahog Fisheries (FMP). The rule establishes quarterly quotas and effort control measures for the Nantucket Shoals Area. The rule also adds a requirement in the Mid-Atlantic Area surf clam fishery that surf clams may be landed only one time during an authorized fishing period.

DATE: Comments on the proposed rule must be received on or before [insert date 30 days after publication in the FEDERAL REGISTER].

ADDRESSES: Comments on the proposed rule, the Amendment, or supporting documents should be sent to Mr. Richard Schaefer, Acting Regional Director, National Marine Fisheries Service, Northeast Regional Office, 14 Elm Street, Gloucester, MA 01930-3799. Mark the outside of the envelope "Comments on Surf Clam and Ocean Quahog Plan."

Copies of the Amendment, the environmental assessment, and the draft regulatory impact review/initial regulatory flexibility analysis are available from Mr. John C. Bryson, Executive Director, Mid-Atlantic Fishery Management Council, Room 2115 Federal Building, 300 South New Street, Dover, DE 19901.

FOR FURTHER INFORMATION CONTACT: Bruce Nichols, (617) 281-3600, ext. 273.

SUPPLEMENTARY INFORMATION:

BACKGROUND

The Amendment was prepared by the Mid-Atlantic Fishery Management Council (Council) in consultation with the New England Fishery Management Council. A notice of availability for the proposed Amendment was published in the FEDERAL REGISTER on April 25, 1985 (50 FR 16326). The proposed rule with request for comments was published in the FEDERAL REGISTER on May 29, 1985 (50 FR 21910). A final rule implementing those portions of the Amendment approved by the Secretary of Commerce were published in the FEDERAL REGISTER on August 14, 1985 (50 FR 32707). Copies of the Amendment are available from the Council upon request at the address given above. The Amendment revises management measures for surf clams.

This proposed rule would implement provisions of the Amendment that were not implemented previously.

The regulations implementing Amendment 6 to the FMP were published on August 14, 1985 (50 FR 32707). The regulations contain at 652.21 provisions that establish surf clam quotas for the Nantucket Shoals Area and at 652.22 provisions for management of the surf clam fishery in the Nantucket Shoals Area. The quota range for the Nantucket Shoals Area is 25,000 to 200,000 bu. The annual quotas are

set following the procedures established in 652.21 paragraph (a)(1).

The proposed rule will divide the annual quota for the Nantucket Shoals Area into quarterly quotas with trip landing limits imposed by the Regional Director after fifty percent of a quarterly harvest quota has been caught in order to minimize the chances of closures. The first and fourth quarters (January-March and October-December) are each allocated 20% of the annual quota and the second and third quarters (April-June and July-September) are each allocated 30% of the annual quota. The unused portion of any quarterly quota is transferred into the next quarter, except no more than ten percent of the annual quota may be carried over from one year to the next if it has not been harvested.

Management of the Mid-Atlantic Area surf clam fishery is based on the current FMP except that 652.7 is revised to add the provision that vessels may land surf clams only one time during an authorized fishing period.

CLASSIFICATION

Section 304(a)(1)(C)(ii) of the Magnuson Act, as amended by Pub. L. 97-453, requires the Secretary of Commerce (Secretary) to publish regulations proposed by a Council within 30 days of receipt of the FMP and proposed regulations. At this time the Secretary has not determined that the FMP these rules would implement is consistent with the national standards, other provisions of the Magnuson Act, and other applicable law. The Secretary, in making that determination, will take into account the information, views, and comments received during the comment period.

The Council prepared an environmental assessment (EA) for this Amendment which analyzes the consequences of this action. The Assistant Administrator concluded that there will be no significant impact on the human environment. A copy of the EA is available from the Council at the address listed above.

The NOAA Administrator determined that this proposed rule is not a "major rule" requiring a regulatory impact analysis under Executive Order 12291. This determination is based on the draft regulatory impact review (RIR) prepared by the Council which demonstrates positive net short-term and long-term economic benefits to the fishery under the proposed management measures. A copy of this review may be obtained from the Council at the address listed above.

This proposed rule is exempt from the procedures of E.O. 12291 under Section 8(a)(2) of that order. Deadlines imposed under the Magnuson Act, as amended by Pub. L. 97-453, require the Secretary to publish this proposed rule 30 days after its receipt. The proposed rule is being reported to the Director of the Office of Management and Budget with an explanation of why it is not possible to follow review procedures of the order.

The Council prepared an initial regulatory flexibility analysis as part of the regulatory impact review which concludes that this proposed rule, if adopted, would not have a significant effect on small entities. A copy of this analysis may be obtained from the Council at the address listed above.

This proposed rule does not contain a collection of information requirement subject to the Paperwork Reduction Act.

The Council determined that this rule will be implemented in a manner that is consistent to the maximum extent practicable with the approved coastal zone management (CZM) programs of Maine, New Hampshire, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania, Delaware, and Maryland. This determination has been submitted for review to the responsible State agencies under Section 307 of the Coastal Zone Management Act.

List of Subjects in 50 CFR Part 652

Administrative practice and procedure, Fish, Fisheries, Reporting requirements.

Dated:

Signature Block

For the reasons set out in the preamble, NOAA proposes to amend 50 CFR Part 652 as set forth below:

PART 652 — [AMENDED]

1. The authority citation for Part 652 reads as follows:
AUTHORITY: 16 U.S.C. 1801 et seq.

2. Section 652.7 is amended by revising subparagraphs (a)(3) and (a)(4) and adding (a)(5), paragraph (n) is redesignated as (o), and a new paragraph (n) is added to read as follows:

§652.7 Prohibitions.

(a) * * *

(3) On days of the week in which fishing for these species is not authorized;

(4) Without having provided the notice required by §652.5(b)(7); or

(5) In excess of applicable trip landing limits.

* * * * *

(n) No person or vessel may land surf clams more than one time during an authorized period in the Mid-Atlantic Area.

5. In §652.21, paragraphs (b) and (c) are revised by adding the following sentences to the ends thereof:

§652.21 Catch quotas.

* * * * *

(b) * * * This annual quota will be divided into quarterly quotas, the quarters and proportion of the quota being January 1 – March 31, 20 percent; April 1 – June 30, 30 percent; July 1 – September 30, 30 percent; and October 1 – December 31, 20 percent. Each fishing quarter will begin on the first Sunday of the new calendar quarter. If the actual catch of surf clams falls more than 5,000 bushels short of a quarterly quota, the Secretary will add the amount of the shortfall to the succeeding quarterly quota. If the actual catch of surf clams exceeds a quarterly quota, the Secretary will subtract the amount of the excess from the succeeding quarterly quota. The last quarterly period would be carried over to the first quarterly period of the next year except that no more than 10 percent of the annual quota may be carried over into the next year.

(c) * * * If the actual catch of surf clams falls more than 5,000 bushels short of a quarterly quota, the Secretary will add the amount of the shortfall to

the succeeding quarterly quota. If the actual catch of surf clams exceeds a quarterly quota, the Secretary will subtract the amount of the excess from the succeeding quarterly quota. The last quarterly period would be carried over to the first quarterly period of the next year except that no more than 10 percent of the annual quota may be carried over into the next year.

* * * * *

5. In §652.22 paragraph (b)(2) is revised to read as follows:

§652.22 Effort restrictions.

(b) Surf clams: Nantucket Shoals Area.

* * * * *

(2) Management measure adjustments. (i) The Regional Director will monitor the rate of harvest using logbook and other available information. If the Regional Director determines that harvests will remain within the quarterly quotas, no action will be taken. When harvest reaches, or is likely to reach, 50 percent of any quarterly quota, the Regional Director will consult with the Councils to determine the range of trip landing limits to control catch adequately to keep the fishery open for the balance of the quarter. The Secretary may impose trip landing limits, provided those limits are not less than the following:

(A) Vessels between 0 and 50 gross registered tons (Class I), 224 bushels/trip.

(B) Vessels between 51 and 100 gross registered tons (Class II), 416 bushels/trip.

(C) Vessels greater than 101 gross registered tons (Class III), 768 bushels/trip.

(ii) The closure provisions specified in paragraph (d) below may be invoked by the Secretary, as required, without consulting the Council.

(iii) Once initial trip limits have been established in consultation with the Councils, the Regional Director will notify the Councils in advance of any proposed action to further specify trip limits or close the fishery.

(iv) The Regional Director will consider any comments received from the Councils or the public before implementing any adjustments in the management program.

APPENDIX VI. ABBREVIATIONS AND DEFINITIONS OF TERMS

Act (MFCMA) - the Magnuson Fishery Conservation and Management Act of 1976, as amended, 16 USC 1801 et seq.

bushel (bu) - a standard unit of measure presumed to hold 1.88 cubic feet of surf clams or ocean quahogs in the shell (1 bu. of offshore surf clams = 17 lbs. of meats) (1 bu. of ocean quahogs = 10 lbs. of meats).

cage - a standard unit of measure presumed to hold 32 bu. of surf clams or ocean quahogs in the shell. The outside dimensions of a standard cage generally are 3' wide, 4' long, and 5' high.

CFR - Code of Federal Regulations.

Council (MAFMC) - the Mid-Atlantic Fishery Management Council.

CPUE - catch per unit of effort.

Fishery Conservation Zone (FCZ) - the zone contiguous to the territorial sea of the US, the inner boundary of which is a line coterminous with the seaward boundary of each of the coastal States and the outer boundary of which is a line drawn in such a manner that each point on it is 200 nautical miles from the baseline from which the territorial sea is measured.

Georges Bank Area - that portion of the New England Area east of 69° W. longitude.

GRT - gross registered ton.

Mid-Atlantic Area - that portion of the FCZ south of the line that begins at 41°18'16.249" north latitude and 71°54'28.477" west longitude and proceeds S 37°22'32.75" E to the point of intersection with the outward boundary of the FCZ.

MSY - maximum sustainable yield. The largest average catch of yield that can continuously be taken from a stock under existing environmental conditions.

Nantucket Area - that portion of the New England Area west of 69° W. longitude.

natural mortality - deaths from all causes except fishing, including predation, senility, epidemics, pollution, etc.

NEFC - the Northeast Fisheries Center of the NMFS.

New England Area - that portion of the FCZ north of the line that begins at 41°18'16.249" north latitude and 71°54'28.477" west longitude and proceeds S 37°22'32.75" E to the point of intersection with the outward boundary of the FCZ.

NMFS - the National Marine Fisheries Service of the National Oceanic and Atmospheric Administration (NOAA).

Notification Area - an Area within which a vessel may not fish for surf clams prior to the vessel's owner or operator notifying the Regional Director pursuant to this FMP.

OY - Optimum Yield.

Regional Director (RD) - the Regional Director, Northeast Region, NMFS.

stock assessment - the NMFS yearly biological assessment of the status of the resources. This document provides the official estimates of stock size, spawning stock size, fishing mortalities, recruitment, and other parameters used in this Plan. The data from these assessments shall constitute the "best scientific information currently available" as required by the Act.

Territorial Sea - marine waters from the shoreline to 3 miles seaward.

USDC - US Department of Commerce.

year-class - the fish spawned or hatched in a given year.

yield per recruit (YPR) - the expected yield in weight from a single recruit.