

AMENDMENT NO. 2 FOR THE
SURF CLAM AND OCEAN QUAHOG FISHERY MANAGEMENT PLAN
AND
FINAL SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT

August, 1979

Mid-Atlantic Fishery Management Council
in cooperation with the
National Marine Fisheries Service
and the
New England Fishery Management Council

Final FMP/SEIS approved by Council: August 9, 1979



AUG 30 1979

Dear Reviewer:

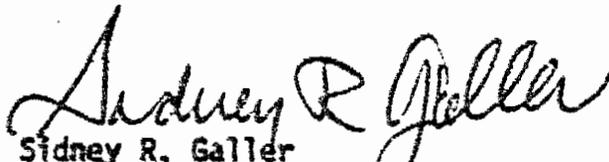
In accordance with the provisions of Section 102(2)(C) of the National Environmental Policy Act of 1969, we are enclosing for your review and consideration the final supplemental environmental impact statement/fishery management plan, amendment no. 2 prepared jointly by the National Marine Fisheries Service of the National Oceanic and Atmospheric Administration and the Mid-Atlantic Fishery Management Council on the Surf Clam and Ocean Quahog Fisheries of the Northwest Atlantic Ocean.

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

Mr. Allen E. Peterson, Jr., Director
Northeast Regional Office
National Marine Fisheries Service
14 Elm Street, Federal Building
Gloucester, Massachusetts 01930
Telephone: 617/281-3600

Thank you for your cooperation in this matter.

Sincerely,


Sidney R. Galler
Deputy Assistant Secretary
for Environmental Affairs

Enclosure

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ABBREVIATIONS AND DEFINITIONS USED IN THIS DOCUMENT

bushel - 1.88 cubic feet
CFR - Code of Federal Regulations
cm - centimeter
cu. - cubic
EIS - Environmental Impact Statement
fathom - 6 feet
FCMA - Fishery Conservation and Management Act
FCZ - Fishery Conservation Zone
FMP - Fishery Management Plan
g - gram
GRT - gross registered ton
ICNAF - International Commission for the Northwest Atlantic Fisheries
in - inch
km - kilometer
knot - a unit of speed of one nautical mile (about 1.1 statute miles) per hour
m - meter
mm - millimeter
mt - metric ton = 2204.5 pounds
NMFS - National Marine Fisheries Service
NOAA - National Oceanic and Atmospheric Administration
OY - Optimum Yield
PMP - Preliminary Management Plan
SA - Subarea or Statistical Area
Secretary - Secretary of Commerce
TALFF - Total Allowable Level of Foreign Fishing
1 bushel of offshore surf clams = 17 pounds of meats
1 bushel of ocean quahog = 10 pounds of meats
< - less than
<= - less than or equal to
> - greater than
>= - greater than or equal to

ACKNOWLEDGEMENTS

The Council wishes to acknowledge the assistance of the Surf Clam and Ocean Quahog Subcommittee of the Scientific and Statistical Committee and the Surf Clam and Ocean Quahog Advisory Subpanel in the preparation of this amended FMP. In addition, Steven Murawski of the Northeast Fisheries Center, Joseph J. Mueller and Bruce Nicholls of the NMFS, and Joel MacDonald of the NOAA Office of General Counsel rendered significant assistance to the preparation of this FMP.

II. SUMMARY

The original management plan for the surf clam and ocean quahog fisheries of the northwestern Atlantic Ocean was approved by the Secretary of Commerce in November, 1977, for the period through September, 1979. Amendment #1 to the FMP extended it through December 31, 1979, and revised reporting requirements to bring them in compliance with the amended FCMA. This Amendment #2 would extend the FMP through the end of calendar year 1981.

The objectives of the FMP remain unchanged as a result of Amendment #2 and are to:

1. Rebuild the declining surf clam populations to allow eventual harvesting approaching the 50 million pound level, which is the present best estimate of the maximum sustainable yield (MSY), based on the average yearly catch from 1960 to 1976.
2. Minimize short-term economic dislocations to the extent possible consistent with objective 1.
3. Prevent the harvest of ocean quahog from exceeding maximum sustainable yield and direct the fishery toward maintaining optimum yield.

The management unit for this FMP remains unchanged and is all surf clams (Spisula solidissima) and all ocean quahogs (Arctica islandica) in the Atlantic FCZ.

Based on a review of comments made at the public hearings and letters received during the review period, and on the recommendations of the Council's Surf Clam and Ocean Quahog Advisory Subpanel and Scientific and Statistical Committee, the Council has adopted the following measures for Amendment #2 to the Surf Clam and Ocean Quahog FMP:

1. Extend the FMP through calendar year 1981;
2. Establish two management areas for the surf clam fishery: the New England Area and the Mid-Atlantic Area. The dividing line between the areas would be the established dividing line between the New England and Mid-Atlantic Fishery Management Councils. The dividing line begins at the intersection point of Connecticut, Rhode Island, and New York at 41°18'16.249" latitude and 71°54'28.477" longitude and proceeds S 37°22'32.75" E to the point of intersection with the outward boundary of the FCZ (50 CFR 601.12(a), Federal Register, Vol. 42, No. 137, July 18, 1977, page 36980).
3. The following quantities (in millions of bushels) would apply annually:

	<u>Optimum Yield (OY)</u>	<u>Domestic Annual Harvest (DAH)</u>	<u>Domestic Annual Processing (DAP)</u>	<u>Quota</u>	<u>TALFF</u>
Surf Clams					
New England	0.025	0.025	0.025	0.025	0
Mid-Atlantic	1.800	1.800	1.800	1.800	0
Ocean Quahogs					
1980	3.500	3.500	3.500	3.500	0
1981	4.000	4.000	4.000	4.000	0

For the Mid-Atlantic Area the surf clam OY, DAH, DAP and quota of 1.8 million bushels (approximately 30 million pounds of meats) are continued unchanged as are the provisions to allocate the quota by quarters and regulate fishing effort by restricting days fished. However, the quarterly quotas for surf clams are revised to be 400,000 bushels for October through December and January through March, and 500,000 bushels for April through June and July through September.

While the DAP is shown separately in the above table for the New England and Mid-Atlantic Areas, the separate management areas do not apply to the processing sector.

4. A fishing week of no more than four days, Monday through Thursday, is continued. To help spread the quarterly catch evenly throughout the entire quarter, each vessel will be restricted to 24 hours of fishing per week at the beginning of each quarter. If the Regional Director of the NMFS determines that the quarterly quota will not be harvested, the weekly hours of fishing may be increased. The Regional Director may prohibit fishing if it is likely that the quarterly quota will be exceeded. Vessels would be required to stop fishing at 5:00 pm with the fishing week changed from 12:01 am Monday - 11:59 pm Thursday to 5:00 pm Sunday - 5:00 pm Thursday. During the months of December, January, February, and March, a make-up day for bad weather would be permitted on the fishing day following the fishing day during which the bad weather condition existed.

In the New England Area, there would be no effort restrictions until half of the 25,000 bushel quota is harvested, at which time the effort restrictions operating in the Mid-Atlantic Area would be imposed.

5. The provisions of the original FMP regarding ocean quahogs are continued unchanged except that the OY, DAH, DAP, and annual quota for ocean quahogs are increased as shown in the above table.

6. The prohibition on the entry of additional vessels into the surf clam fishery is continued in the Mid-Atlantic Area. The moratorium is lifted in the New England Area. Vessels with permits issued pursuant to the moratorium in both New England and the Mid-Atlantic may fish in both areas on both quotas. Vessels entering the fishery in New England that do not meet the moratorium conditions may not fish south of the dividing line. The moratorium does not preclude replacement of vessels involuntarily leaving the fishery during the time when the moratorium is in effect.

7. The provision to close surf clam beds to fishing wherein over 60% of the clams are under 4 1/2 inches in length and less than 15% are over 5 1/2 inches in length is continued. It is recommended that special measures be instituted to manage such closed areas when they are reopened to insure that such openings do not lead to premature closures in the fishery and to prevent overfishing of the newly opened beds.

8. A surf clam minimum size limit of 4 1/2 inches is imposed.

9. The licensing provisions of the original FMP are continued. The reporting requirements are continued with minor revisions.

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IV. INTRODUCTION

IV-1. Development of the Plan

This amended management plan for the surf clam and ocean quahog fisheries was prepared by the Mid-Atlantic Fishery Management Council in cooperation with the New England and South Atlantic Fishery Management Councils. It contains management measures to regulate fishing for surf clam and ocean quahog and an Environmental Assessment prepared in accordance with the National Environmental Policy Act of 1969 (P.L. 91-190).

This amended FMP, once approved and implemented by the Secretary of Commerce, will amend regulations on harvesting surf clam and ocean quahog within the FCZ that were established by the FMP currently in effect.

IV-2. Overall Management Objectives

The Mid-Atlantic Council adopted the following goals to guide management and development of the surf clam and ocean quahog fisheries in the northwestern Atlantic. They are:

1. Rebuild the declining surf clam populations to allow eventual harvest approaching the 50 million pound level, which is the present best estimate of the maximum sustainable yield (MSY), based on the average yearly catch from 1960 to 1976.
2. Minimize short-term economic dislocations to the extent possible consistent with objective 1.
3. Prevent the harvest of ocean quahog from exceeding maximum sustainable yield and direct the fishery toward maintaining optimum yield.

These objectives are the same as those in the original Surf Clam and Ocean Quahog FMP.

The management unit for this amended FMP is the same as that of the original Surf Clam and Ocean Quahog FMP, specifically, all surf clam (Spisula solidissima) and all ocean quahog (Arctica islandica) in the Atlantic FCZ.

V. DESCRIPTION OF THE STOCKS

V-1. Introduction

The following Section contains the most recent biological assessments of the surf clam and ocean quahog resources.^{1,2} It supplements and updates the presentations given in Section IV, Description of the Stocks Comprising the Management Unit in the 1977 Surf Clam and Ocean Quahog FMP.

(1) Murawski, S. A., and F. M. Serchuk. April, 1979a. An assessment of offshore surf clam, Spisula solidissima, populations off the Middle Atlantic coast of the United States. NMFS, Woods Hole Laboratory Reference No. 79-13: 36 p.

(2) Murawski, S. A., and F. M. Serchuk. April, 1979b. Dynamics of ocean quahog, Arctica islandica, populations off the Middle Atlantic coast of the United States. NMFS, Woods Hole Laboratory Reference No. 79-16: 24 p.

Surf Clam¹

Summary

Total 1978 landings of surf clam (*Spisula solidissima*) from the Middle Atlantic FCZ were 31.4 million pounds of meat, or a 27% decline from 1977. The sharp decline in landings was recommended in the Surf Clam and Ocean Quahog FMP. Approximately 92% of the 1978 catch was taken off the Delmarva Peninsula, with 8% taken off New Jersey, and 0.2% off southern Virginia - North Carolina.

Stratified mean catch per tow indices from NMFS shellfish surveys during January and December, 1978, indicated no significant change in resource abundance of harvestable (>12 cm shall length) clams off Delmarva, northern New Jersey, or southern New Jersey. Pre-recruit indices (i.e., mean catch per tow of clams <11.9 cm) increased dramatically off Delmarva and northern New Jersey during 1978.

Commercial catch/effort (bushels/hour) data from logbook records further suggest relative resource stability as quarterly mean catch per effort indices for the three vessel classes (0-50, 51-100, 101+ gross registered tons) varied only slightly within offshore areas throughout 1978.

Average recruitment to the fishery should be maintained during the next several years. Accordingly, if the distribution and level of annual Middle Atlantic landings in 1979 and 1980 approximate those in 1978, commercially exploitable biomass should not change markedly in the immediate future. A significant increase in population size of harvestable clams should occur in 1981-1982 if natural mortality remains constant and fishing mortality remains minimal until then on pre-recruits sampled off Delmarva and northern New Jersey.

Introduction

Offshore surf clam populations in the US Atlantic Fishery Conservation Zone have been managed since 17 November, 1977, by a Fishery Management Plan (FMP) for the surf clam and ocean quahog fisheries developed by the Mid-Atlantic Fishery Management Council and implemented by the US Department of Commerce through the NMFS. A principal objective of the FMP is first to stabilize the abundance of recently declining Middle Atlantic surf clam populations and then to rebuild these populations to levels that would sustain total annual harvests of 50 million pounds of meats. To achieve this objective, the FMP established a variety of regulations including an annual total landings quota of 1.8 million bushels (approximately 30 million pounds of meats). As a result, the total Middle Atlantic surf clam catch from the FCZ declined 27% between 1977 and 1978 (43.0 to 31.4 million pounds)(Table 1).

In this report, the effects of the 1978 surf clam harvest are examined relative to population abundance and size composition of offshore (FCZ) Middle Atlantic surf clam resources. Data analyzed include: (1) research vessel survey results, 1976-1978; (2) commercial fishery vessel logbook records required by the FMP, 1978; (3) dockside NMFS commercial surf clam vessel Middle Atlantic trip interview records, 1978; and (4) commercial length-frequency samples of surf clams collected during 1976-1978. The present report updates and expands commercial and research data previously presented (Brown et al., 1977²; Serchuk et al., 1979).

- (1) The following discussion, figures, and tables are taken from Murawski and Serchuk, 1979a, op. cit.
- (2) Presented in the 1977 FMP.

Table 1. Total Middle Atlantic Surf Clam Landings, Landings from the FCZ, and Percentage of Total Landings Taken in the FCZ (thousands of pounds)

<u>Year</u>	<u>Total</u>	<u>FCZ</u>	<u>Percent Caught in the FCZ</u>
1965	44,087	33,000	74.85
1966	45,078	32,400	71.88
1967	45,943	24,700	53.76
1968	40,534	20,000	49.34
1969	49,562	15,900	32.08
1970	67,155	14,100	21.00
1971	52,362	50,053	95.59 ^a
1972	63,310	55,272	87.30 ^a
1973	82,308	72,579	88.18 ^a
1974	96,069	74,430	77.48 ^a
1975	86,880	44,270	50.96 ^a
1976	49,023	42,558	86.80 ^a
1977	51,200	42,968	83.92 ^a
1978 ^c	38,657 ^c	31,399 ^b	81.22 ^c

(a) Prorations for 1971-1977 based on data presented in the series Fisheries of the United States, published annually by the US Fish and Wildlife Service, and in later years by the NMFS. Earlier data based on interview information collected by the bureau of Commercial fisheries.

(b) Summation of logbook reports; includes landings of approximately 27,200 pounds of meats by vessels registered in New England ports.

(c) Preliminary

Historical Perspective

Although the commercial harvest of surf clam began around 1870, as a bait fishery, the modern food fishery originated in the 1940s in response to wartime demands for shellfish and other protein foods (Westman and Bidwell, 1946). Between 1944 and 1945, total landings increased four-fold (1.2 to 4.8 million pounds), with virtually all of the catch taken from inshore beds off Long Island. In 1950, extensive offshore New Jersey beds, more dense and yielding more meat per bushel than the Long Island beds, were discovered which subsequently sustained average annual landings of 10 million pounds during 1950-1959 (Lyles, 1969), and served as the major fishery resource base until the early 1970s. In this early period, production increases were also influenced by improvements in harvesting efficiency and steady increases in fleet size (Serchuk et al., 1979).

Until the mid-1960s, the offshore beds off northern New Jersey (those near Pt. Pleasant) were the mainstay of the surf clam fishery. As these beds became depleted, the inshore surf clam resources off southern New Jersey (near Cape May and Wildwood) were more heavily fished. Between 1965-1970, the percentage of the total Middle Atlantic surf clam landings from the FCZ decreased from 75% to 21% (Table 1), while the inshore landings increased nearly five-fold (11.1 million pounds in 1964 to 53.1 million pounds in 1970). This trend was strikingly reversed in 1971 by the discovery and beginning of fishing on abundant offshore surf clam beds off southern Virginia - North Carolina; from 1971-1974, total Middle Atlantic landings were

dominated by catches from this area. The subsequent collapse of the Virginia fishery stimulated a northward return of the fleet. Since 1976, the bulk of the Middle Atlantic landings have been from the offshore Delmarva region (near Ocean City, Maryland).

Research Vessel Survey Results

Distribution and relative abundance of Middle Atlantic surf clam populations have been evaluated through federal research vessel survey cruises conducted since 1965 (Ropes, 1979; Serchuk et al., 1979). Results of research cruises from 1965-1977 have been previously summarized in Brown et al. (1977) and Serchuk et al. (1979).

The most recent continuous annual surf clam research vessel survey series commenced in 1976. Four Middle Atlantic surveys were conducted between 1976 and 1978 (Table 2) with the R/V DELAWARE II employing a 121.92 cm (48 in) wide hydraulic dredge. The 1976 and 1977 surveys used a grid-type survey sampling design, with stations spaced approximately 10 nautical miles apart along 10 nautical mile transect intervals. In the two 1978 cruises, a stratified random sampling scheme was employed; thus, the Middle Atlantic survey area was stratified into relatively homogeneous geographical zones on the basis of depth, bottom type, and general ecological conditions (Figure 1). Strata groupings corresponding to previously established surf clam assessment offshore fishing areas (Brown et al., 1977; Serchuk et al., 1979) are:

Northern New Jersey (NNJ): Strata 21, 25 and 88-90
 Southern New Jersey (SNJ): Strata 17 and 87
 Delmarva (DMV): Strata 9, 10, 13, 14, and 82-86.

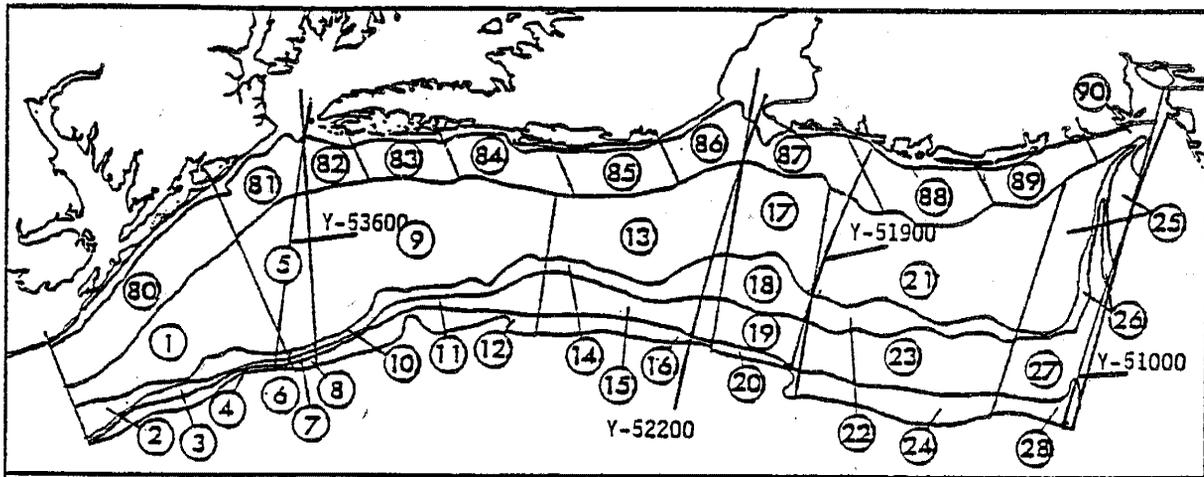
Table 2. Ocean Shellfish Research Cruises Used in the Analysis of Surf Clam Populations

<u>Cruise Dates</u> <u>(month/year)</u>	<u>Research Vessel</u>	<u>Time of Tow</u> <u>(minutes)</u>	<u>Knife Width</u> <u>(inches)</u>
12/78 (78-07)	DELAWARE II	4	48
1-2/78 (78-01)	DELAWARE II	4	48
1-3/77 (77-01)	DELAWARE II	4	48
4-5/76 (76-01)	DELAWARE II	4	48

Figure 1

Ocean Shellfish Survey Strata Off The Atlantic Coast,
New Jersey To Cape Hatteras.

Loran C-Y Bearings Delineating Surf Clam Assessment Areas Are Also Given



Offshore

Strata Number	Square Miles	Depth (fms)	Strata Number	Square Miles	Depth (fms)	Strata Number	Square Miles	Depth (fms)
1	1163	15-25	10	152	25-30	19	274	30-40
2	175	25-30	11	229	30-40	20	120	40-60
3	126	30-40	12	204	40-60	21	1650	15-25
4	117	40-60	13	1127	15-25	22	312	25-30
5	453	15-25	14	219	25-30	23	714	30-40
6	62	25-30	15	394	30-40	24	476	40-60
7	46	30-40	16	211	40-60	25	648	15-25
8	74	40-60	17	749	15-25	26	188	25-30
9	2171	15-25	18	249	25-30	27	451	30-40
						28	149	40-60

Inshore

80	767	5-15	84	417	5-15	88	578	5-15
81	360	5-15	85	382	5-15	89	382	5-15
82	180	5-15	86	203	5-15	90	182	5-15
83	241	5-15	87	479	5-15			

Sampling stations were allocated to strata roughly in proportion to each stratum area and assigned to specific locations within strata at random. Additional random samples were also allotted to strata possessing known large concentrations of surf clams. A 4 minute tow was taken at each station, after which volume and numbers captured, shell-length, and other relevant data were recorded.

To compare the 1976 and 1977 results with the later surveys, station data from the 1976 and 1977 surveys were post-stratified before analysis into the sampling strata used in 1978.

Following procedures given by Cochran (1977), stratified mean catch, in numbers, per tow for strata groupings (NNJ, SNJ, and DMV) was calculated by

$$\bar{Y}_{st} = \sum_{h=1}^L (N_h \bar{Y}_h)$$

where \bar{Y}_{st} = stratified mean catch, in numbers, per tow

N_h = area of the hth stratum

\bar{Y}_h = mean catch, in numbers, per tow of the hth stratum, and

L = number of strata in the strata grouping

Individual strata catch length frequencies were prorated from measured subsamples, and then the stratified mean catches partitioned into 1 cm length intervals. Relative abundance catch (numbers) per tow indices were derived for pre-commercial sized clams (i.e., pre-recruits, <11.9 cm shell length), commercial sized clams (>12.0 cm shell length), and total clams caught per tow.

Research Vessel Relative Abundance Indices

Research vessel relative abundance indices (stratified mean number per tow) obtained from the 1976-1978 Middle Atlantic shellfish assessment cruises are presented by offshore surf clam fishery areas (NNJ, SNJ, and DMV) in Table 3. Results derived from each of these areas are separately discussed.

Table 3. Summary of Stratified Mean Catch per Tow Data for Surf Clams during Shellfish Assessment Cruises, 1976-1978

Area	Cruise	Total Number per Tow	Number per Tow <119 mm	Number per Tow >120 mm
Northern New Jersey	78-07	28.77	27.80	0.97
	78-01	1.32	0.85	0.47
	77-01	1.57	0.86	0.71
	76-01	8.27	1.02	7.25
Southern New Jersey	78-07	5.54	2.00	3.54
	78-01	9.56	1.59	7.97
	77-01	1.44	0.78	0.66
	76-01	3.33	0.24	3.09
Delmarva	78-07	398.37	394.23	4.14
	78-01	7.44	2.57	4.87
	77-01	7.29	1.45	5.84
	76-01	14.06	3.50	10.56

Northern New Jersey

All northern New Jersey relative abundance indices declined sharply between 1976 and 1977, primarily due to population losses caused by anoxic bottom water conditions during the summer of 1976. Total numbers per tow declined 81% (8.27 to 1.57); pre-recruit and commercial-size indices declined 16% and 90%, respectively (Table 3). Significantly, the relative effects of the anoxia and fishing mortality during the year were more severe on harvestable sized clams than on pre-recruits (Figures 2 and 3).

Between 1977 and December, 1978, (Cruise 78-07), the commercial-sized relative abundance indices remained at relatively low levels (0.47 to 0.97 clams per tow). Pre-recruit indices, however, stable in 1977 and January, 1978, (Cruise 78-01), increased 33 fold in the December, 1978, survey, with the latter value (27.80) being the highest in the 1976-1978 period. Due to this successful recruitment, the total number per tow index in December, 1978, was 28.77, 22 times larger than in January, 1978, and 3.5 fold greater than the 1976 value.

Southern New Jersey

Total and commercial-sized relative abundance indices in southern New Jersey exhibited no apparent trends between 1976 and 1978 (Figures 4 and 5), fluctuating between 1.44-9.56 and 0.66-7.97 respectively, (Table 3). Pre-recruit indices, however, steadily increased from 0.24 clams per tow in 1976 to 2.00 clams per tow in December, 1978 (Figure 5).

The southern New Jersey commercial-sized catch per tow indices reflect, in part, the differential geographic effects of the 1976 bottom water anoxia in offshore New Jersey; the 1976 index of recruit sizes was about half that obtained in northern New Jersey (3.09 vs 7.25), but 6 times greater in 1978 than the corresponding 1978 northern New Jersey commercial-size index (3.54 vs 0.97)(Table 3). In any case, the fluctuations in catch per tow in southern New Jersey were much less drastic than in the northern New Jersey area.

Delmarva

All Delmarva relative abundance indices declined by greater than 44% between 1976 and 1977 (pre-recruit: -59%; commercial size: -45%; total: -48% (Table 3, Figures 6 and 7). Since 1977, the commercial size indices have annually trended slightly downward (5.84 in 1977; 4.14 in December, 1978), although this decline is probably not significant given the sampling variability associated with the shellfish surveys. Contrariwise, the marked increase in the pre-recruit index in December, 1978, (394.23) from the previous values observed during 1976 - January, 1978, (3.50, 1.45, and 2.57) implies a recent significant increase in the abundance of pre-recruit clams in the Delmarva region. Large catches of pre-recruit individuals in the December, 1978, survey in stratum 85 (off Ocean City, Maryland) and stratum 9 indicated a wide-spread distribution of small clams in offshore waters from Chincoteague to Cape Charles, Virginia.

Preliminary analysis of the January, 1979, shellfish research vessel survey cruise, conducted with a 152.40 cm (60 in) wide hydraulic clam dredge equipped with a submersible pumping system, corroborated the December, 1978, pre-recruit findings since the increased abundance of small clams in both Delmarva and northern New Jersey was noted in this latest survey as well.

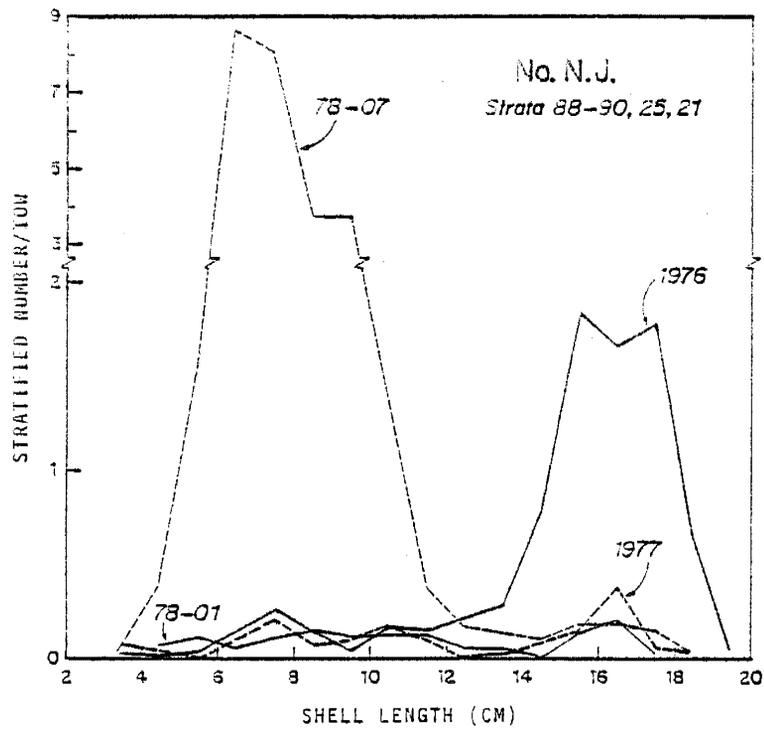


Figure 2
 Stratified Mean Number Of Surf Clams Taken Per 4 Minute Tow With 48 Inch
 Survey Dredge In Each 1 cm Shell Length Group,
 From Northern New Jersey, 1976-1978

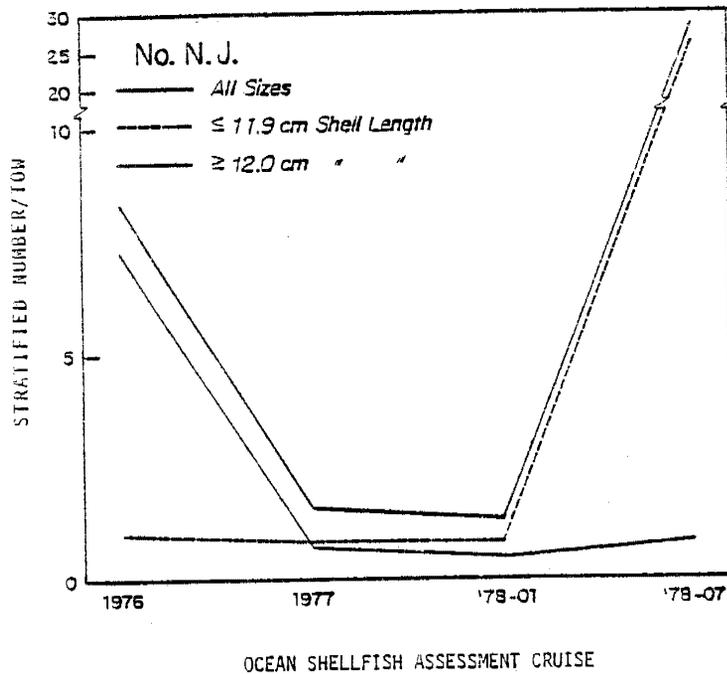


Figure 3
 Stratified Mean Number Of Surf Clams Taken Per 4 Minute Tow
 With 48 Inch Survey Dredge Off Northern New Jersey, 1976-1978.
 Values Given For All Sizes, Pre-Recruits (≤ 11.9 cm Shell Length),
 and Harvestable Sizes (≥ 12.0 cm Shell Length).

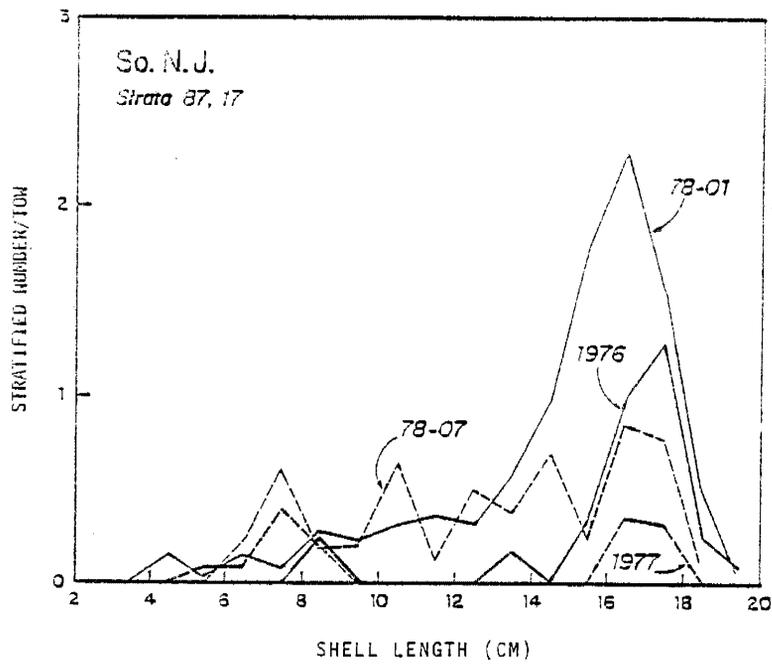


Figure 4
Stratified Mean Number Of Surf Clams Taken Per 4 Minute Tow
With 48 Inch Survey Dredge In Each 1 cm Shell Length Group,
From Southern New Jersey, 1976-1978.

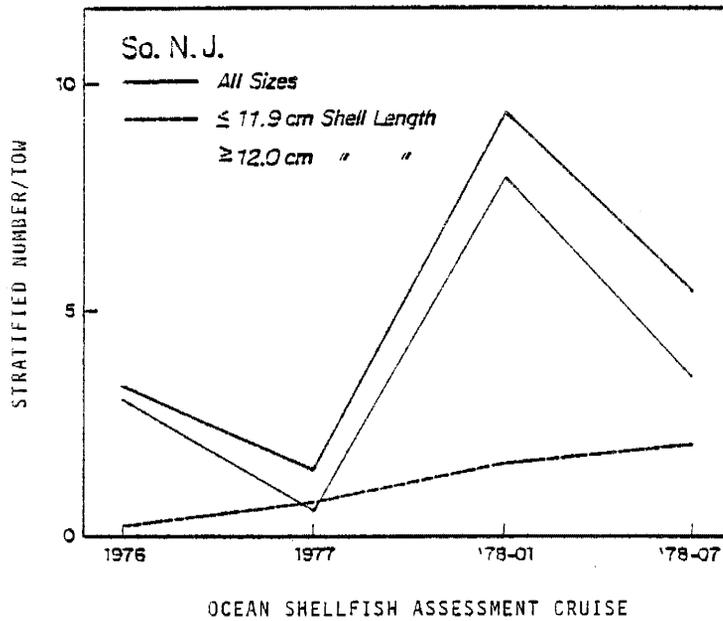
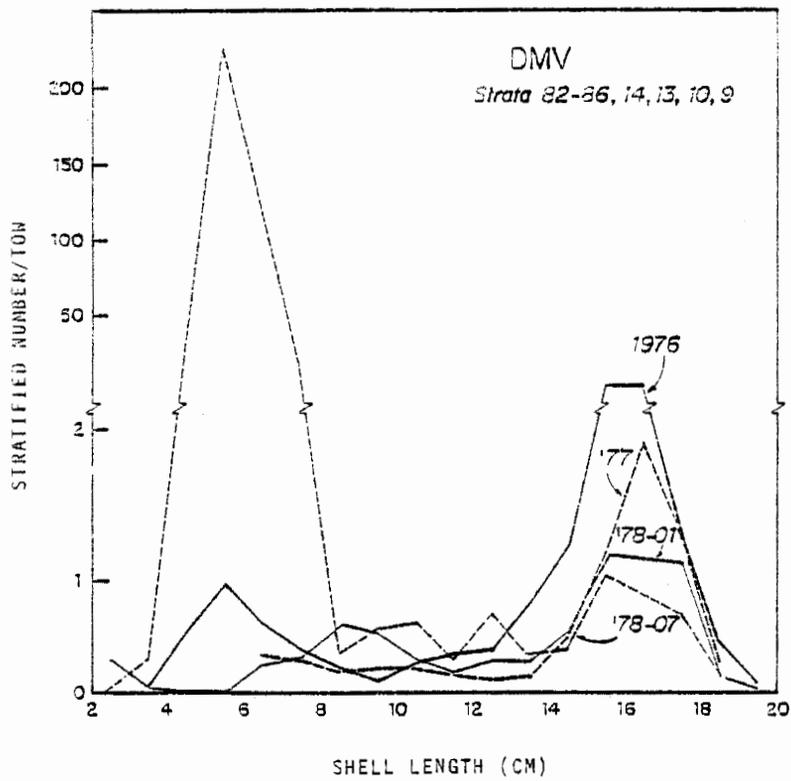
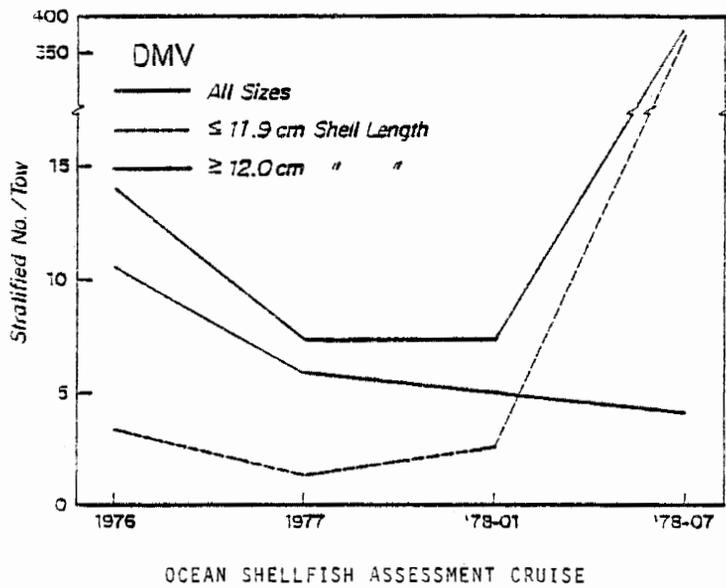


Figure 5
Stratified Mean Number Of Surf Clams Taken Per 4 Minute Tow
With 48 Inch Survey Dredge Off Southern New Jersey, 1976 - 1978.
Values Given For All Sizes, Pre-Recruits (≤ 11.9 cm Shell Length),
And Harvestable Sizes (≥ 12.0 cm Shell Length).



Stratified Mean Number Of Surf Clams Taken Per 4 Minute Tow With 48 Inch Survey Dredge In Each 1 cm Shell Length Group, From Delmarva, 1976-1978.

Figure 6



Stratified Mean Number Of Surf Clams Taken Per 4 Minute Tow With 48 Inch Survey Dredge Off Delmarva, 1976-1978. Values Given For All Sizes, Pre-Recruits (≤ 11.9 cm Shell Length), And Harvestable Sizes (≥ 12.0 cm Shell Length).

Figure 7

Commercial Catch Per Effort

Relative abundance indices for Middle Atlantic surf clam populations during 1978 were also derived from commercial catch per unit effort data (bushels landed per hour fished). Commercial logbook records, mandated by the FMP, were examined for individual trip information on catch (bushels), hours fished, catch location (LORAN bearings, or latitude-longitude designation), date of catch, and vessel size. Since three vessel tonnage size classes are recognized in the FMP, catch per effort indices were calculated separately for each vessel class. These classes are:

<u>Vessel Class</u>	<u>Gross Registered Tonnage (GRT)</u>	<u>Number of Vessels</u>
1	1-50	20
2	51-100	58
3	101+	74

Each vessel trip record that possessed complete or sufficient data for analysis was assigned to a principal assessment - offshore fishery area (NNJ, SNJ, or DMV) based on supplied catch location information. LORAN C-Y bearings demarcating these major areas are provided in Figure 1. Catch and effort data were further categorized temporally by calendar quarter. Mean catch per hour was computed, by area and calendar quarter, for each vessel class by

$$M_{c/f} = \frac{1}{n} \sum_{i=1}^n \frac{c_i}{f_i}$$

where $M_{c/f}$ = mean catch (bushels) per hour fished
 c_i = catch in bushels in trip i
 f_i = number of hours fished in trip i , and
 n = total number of trips

Standard deviations and standard errors were also computed for each of the mean catch per hour estimates (Cochran, 1977).

Commercial Abundance Indices in 1978

Catch and effort statistics derived from vessels operating in the Middle Atlantic surf clam fishery during 1978 are summarized by major area fished, vessel class and calendar quarter in Table 4 and Figures 8-10. Results from each are discussed separately below.

Northern New Jersey

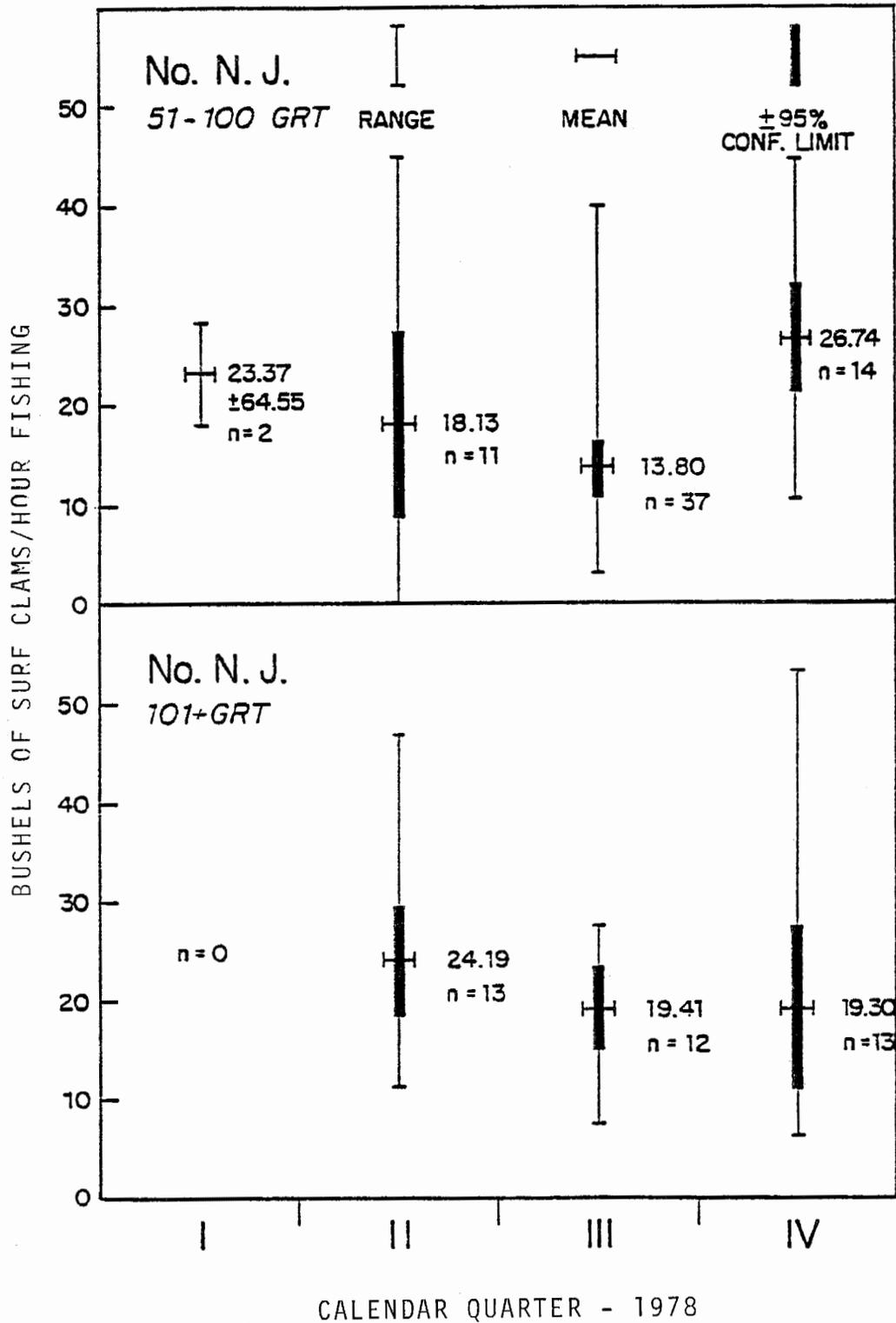
A total of 102 trip records from the offshore northern New Jersey area were amenable to analysis. No Class 1 vessels reported sufficient data for deriving abundance indices for any calendar quarter during 1978. Catch per hour fished for vessels in Classes 2 and 3 varied considerably both within and between quarters during the year (Figure 8), although no significant differences were detected in vessel class mean catch per effort values among calendar quarters. Mean quarterly catch per hour for Class 2 vessels ranged from 13.80 bushels per hour (Quarter 2) to 26.74 bushels per hour (Quarter 4) (Table 4). For Class 3 vessels, seasonal mean catch rates varied between 19.30 bushels per hour (Quarter 4) and 24.19 bushels per hour (Quarter 2). Overall, the weighted mean catch per hour for Class 2 and 3 vessels was 17.67 and 21.01 bushels, respectively, implying that Class 3 vessels operating in northern New Jersey caught 19% more per hour than Class 2 vessels in this region. This difference, however, is not statistically significant.

Table 4. Commercial Catch/Effort Data for Surf Clam Vessels Operating in the FCZ Off New Jersey and Delmarva in 1978

Area & Tonnage Class	Quarter	Total Bushels Clams	Total Hours Fished	Mean Bushels /Hour	SD(a) Bushels /Hour	SE(b) Bushels /Hour	Minimum Bushels /Hour	Maximum Bushels /Hour	Number of Trips
NORTHERN NEW JERSEY									
1 - 50	1	0	0.00	-	-	-	-	-	0
	2	0	0.00	-	-	-	-	-	0
	3	0	0.00	-	-	-	-	-	0
	4	0	0.00	-	-	-	-	-	0
51 - 100	1	384	16.00	23.37	7.18	5.08	18.29	28.44	2
	2	1,782	104.00	18.13	13.58	4.09	0.63	45.00	11
	3	4,774	385.50	13.80	8.19	1.35	3.75	40.00	37
	4	2,290	79.00	26.74	9.22	2.47	11.00	44.80	14
101+	1	0	0.00	-	-	-	-	-	0
	2	6,517	270.50	24.19	8.79	2.44	11.58	46.83	13
	3	3,370	159.00	19.41	5.96	1.72	7.50	27.29	12
	4	3,217	167.00	19.30	13.51	3.75	6.44	53.33	13
SOUTHERN NEW JERSEY									
1 - 50	1	258	22.00	11.73	0.00	0.00	11.73	11.73	1
	2	1,243	77.00	14.42	10.69	4.78	6.58	32.90	5
	3	2,628	238.50	11.10	6.93	1.33	1.72	24.00	27
	4	2,585	199.00	13.19	6.85	1.40	3.60	28.67	24
51 - 100	1	2,354	157.00	14.92	3.49	1.10	8.73	22.86	10
	2	8,464	542.00	15.46	3.15	0.51	8.20	24.00	38
	3	6,720	344.50	19.57	12.33	2.18	6.67	53.00	32
	4	7,806	360.00	22.69	14.87	2.51	0.75	75.83	35
101+	1	3,841	205.30	17.82	4.62	1.39	12.80	25.14	11
	2	14,862	760.50	20.11	13.55	2.29	3.13	63.30	35
	3	9,714	398.00	23.98	12.10	2.29	7.00	46.94	28
	4	15,910	561.00	27.52	17.81	2.63	0.33	73.14	46
DELMARVA									
1 - 50	1	1,173	82.50	13.74	3.42	1.53	9.20	16.70	5
	2	16,152	1044.00	16.73	14.76	1.74	6.67	130.67	72
	3	17,454	1022.00	17.03	6.03	0.65	5.40	32.50	85
	4	9,347	592.80	16.32	5.79	0.77	7.11	41.00	56
51 - 100	1	10,165	485.25	22.23	7.82	1.41	9.75	37.58	31
	2	107,092	5359.75	20.28	7.02	0.37	3.75	69.33	357
	3	91,566	4601.70	19.88	6.98	0.36	1.33	45.33	380
	4	80,159	3961.10	20.04	5.99	0.34	6.50	40.00	319
101+	1	47,827	1632.50	28.15	16.36	1.94	8.67	89.90	71
	2	282,544	10511.15	27.46	13.82	0.61	1.04	90.67	509
	3	256,737	8451.75	31.24	17.10	0.68	0.22	117.33	641
	4	216,309	7302.50	30.31	17.36	0.75	2.67	121.50	536

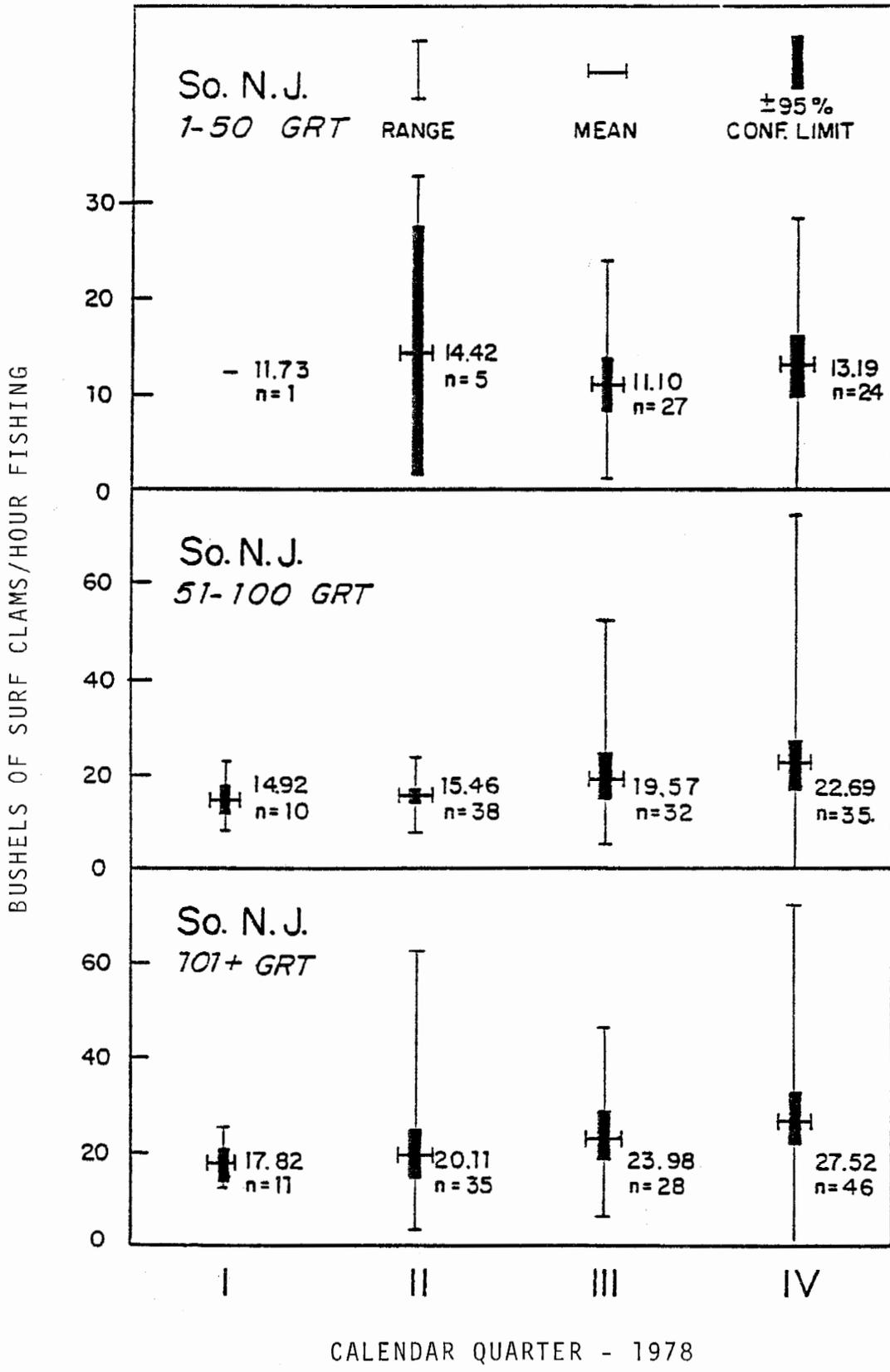
(a) Std. Dev. = Standard Deviation

(b) SE = Standard Error

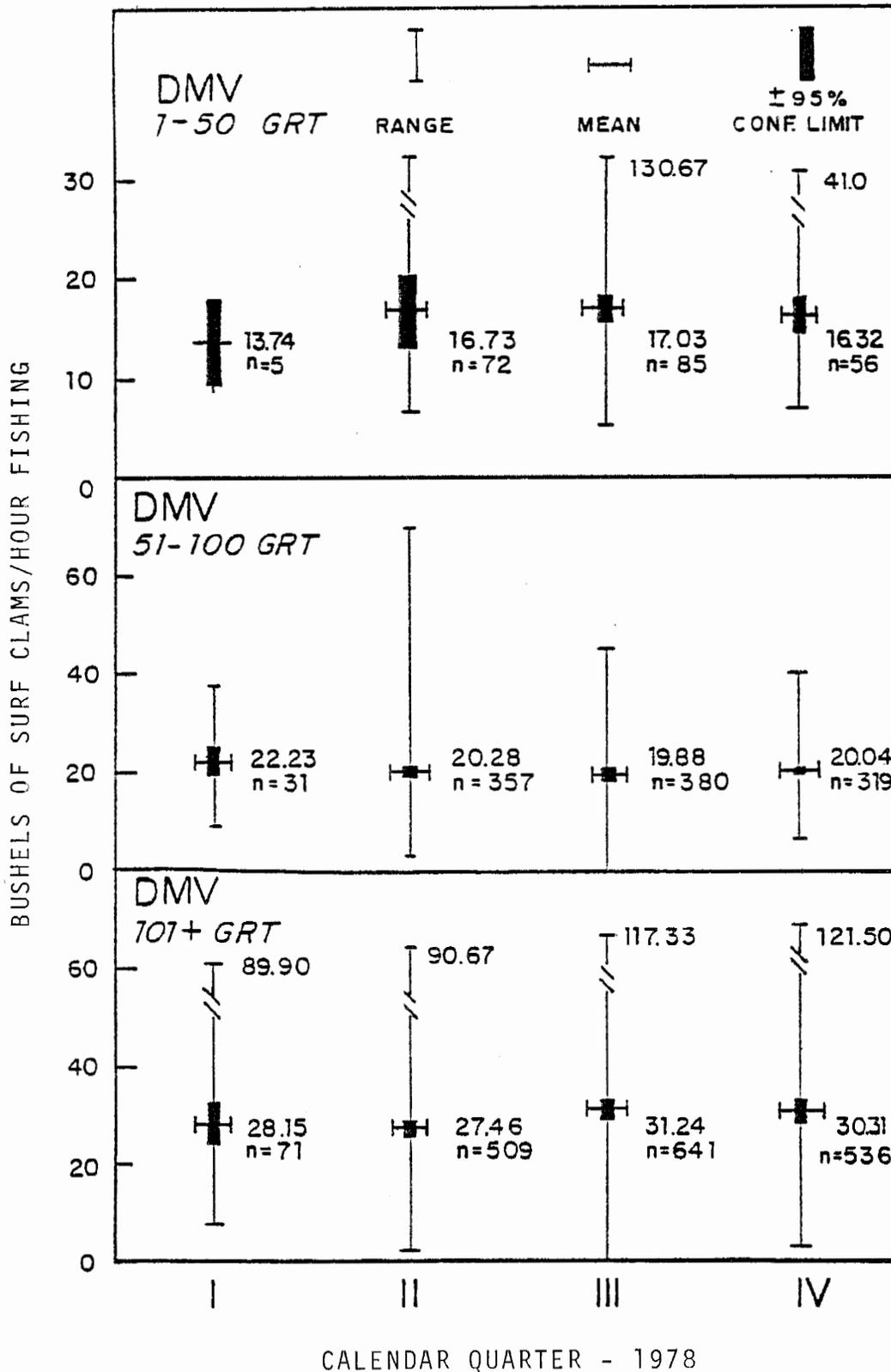


Commercial Catch Per Effort Data For Vessels Operating Off Northern New Jersey During 1978. Values Expressed As Bushels Of Surf Clams Per Hour Fishing.

Figure 8



Commercial Catch Per Effort Data For Vessels Operating Off Southern New Jersey During 1978. Values Expressed As Bushels Of Surf Clams Per Hour Fishing.



Commercial Catch Per Effort Data For Vessels Operating Off Delmarva During 1978. Values Expressed As Bushels Of Surf Clams Per Hour Fishing.

Figure 10

Southern New Jersey

Vessels operating during 1978 in offshore southern New Jersey completed 292 trips amenable for catch and effort analysis (Class 1: 57 trips, Class 2: 115 trips; Class 3: 120 trips). In every quarter, mean catch per effort was highest for Class 3 vessels and lowest for Class 1 vessels (Figure 9; Table 4). Within a vessel class, no significant differences in quarterly mean catch rates were detected. The lack of significant declines in catch per hour throughout the year suggests no significant reduction in the abundance of southern New Jersey surf clams if effort was proportional to fishing mortality rates.

Mean quarterly catch rates for Class 1 vessels ranged from 11.10 - 13.19 bushels per hour. Class 2 quarterly mean catch per tow values varied between 14.92 and 22.69 bushels per hour, while Class 3 quarterly mean catch per effort indices ranged between 17.82 and 27.52 bushels per hour. Yearly weighted mean catch rates for vessel Classes 1, 2, and 3 were 12.28, 18.76 and 23.64, respectively. The mean catch rates for vessel Classes 2 and 3 in southern New Jersey were thus slightly greater than corresponding values for northern New Jersey.

Delmarva

A total of 3,062 trips during 1978 in offshore Delmarva were analyzed for commercial catch per effort data (Class 1: 218 trips; Class 2: 1,087 trips; Class 3: 1,757 trips). Delmarva vessel trip records comprised 89% of the total Middle Atlantic offshore logbook records sufficiently detailed for 1978 commercial catch/effort analysis.

Temporal patterns in Delmarva surf clam catch rates, both within and between vessel class groupings, were similar to those noted in southern New Jersey, viz: within each calendar quarter, Class 3 vessels exhibited the highest mean catch per hour and Class 1 vessels the lowest, and within each vessel class, seasonal mean catch rates exhibited little fluctuation throughout the year (Table 4; Figure 10).

Mean quarterly catch per effort values within any of the three vessel classes in Delmarva never varied over time by more than 3.3 bushels per hour. Average overall catch rates for the three tonnage classes were 16.67, 20.13, and 29.74 bushels per hour, respectively, and hence were higher than corresponding vessel class catch rates in either northern or southern New Jersey.

Yield Per Recruit

Yield per recruit analyses for Middle Atlantic surf clam were accomplished using Paulik and Gales' (1964) model with $W_{\infty} = 174.8$ g, $k = 0.3189$, $t_0 = 0.1874$ years, $t_r = 0.25$ years, $M = 0.25$ (slightly greater than the total mortality rate of unexploited Canadian surf clam populations sampled by Caddy and Billard (1976)), $t_{\lambda} = 16.0$ years, $F = 0.1-2.0$, and $t_c = 0.25-8.0$ years. Growth relationships (von Bertalanffy growth-in-length equation; shell length-drained meat weight equation) and associated growth parameters were determined from commercial surf clam samples taken off the Delmarva Peninsula (Table 5, Figure 11).

Maximum yield per recruit (F_{max}) occurs at an age of first capture (t_c) of 4.5 years and an instantaneous fishing mortality of $F = 2.0$ (Table 6, Figure 12). Under these conditions, the mean shell length at first capture is 12.5 cm.

For almost all F values, conditional maximum yield per recruit increases as age at first capture is increased until age 4 (about 11.8 cm shell length). At F levels less than 1.5, yield per recruit decreases when age at first capture is increased

beyond age 4.

If high fishing mortality rates (i.e., >1.5) are maintained, few individuals >12 cm in shell length survive to spawn, and thus reproduction may be dependent on recent year classes of small individuals. Moderate fishing levels support a heterogeneous age structure in the spawning population, that may be necessary when several poor year classes occur in succession.

Table 5. Calculated Mean Shell Lengths and Meat Weights at Age for Surf Clams from Offshore Waters of the Middle Atlantic

Age	Shell Length ¹		Meat Weight ²	
	(millimeters)	(inches)	(grams)	(ounces) (CF)
1	38.17	1.50	3.63	0.13
2	73.40	2.89	20.18	0.71
3	99.01	3.90	44.25	1.56
4	117.63	4.63	69.52	2.45
5	131.17	5.16	92.51	3.26
6	141.01	5.55	111.84	3.94
7	148.16	5.83	127.33	4.49
8	153.36	6.04	139.38	4.92
9	157.14	6.19	148.57	5.24
10	159.89	6.30	155.49	5.48
11	161.88	6.37	160.62	5.67
12	163.33	6.43	164.42	5.80
13	164.39	6.47	167.23	5.90
14	165.16	6.50	169.29	5.97
15	165.72	6.52	170.80	6.02
16	166.12	6.54	171.88	6.06

(1) Computed from $\ell_t = 167.20 [1 - e^{-0.3189(t-0.1874)}]$

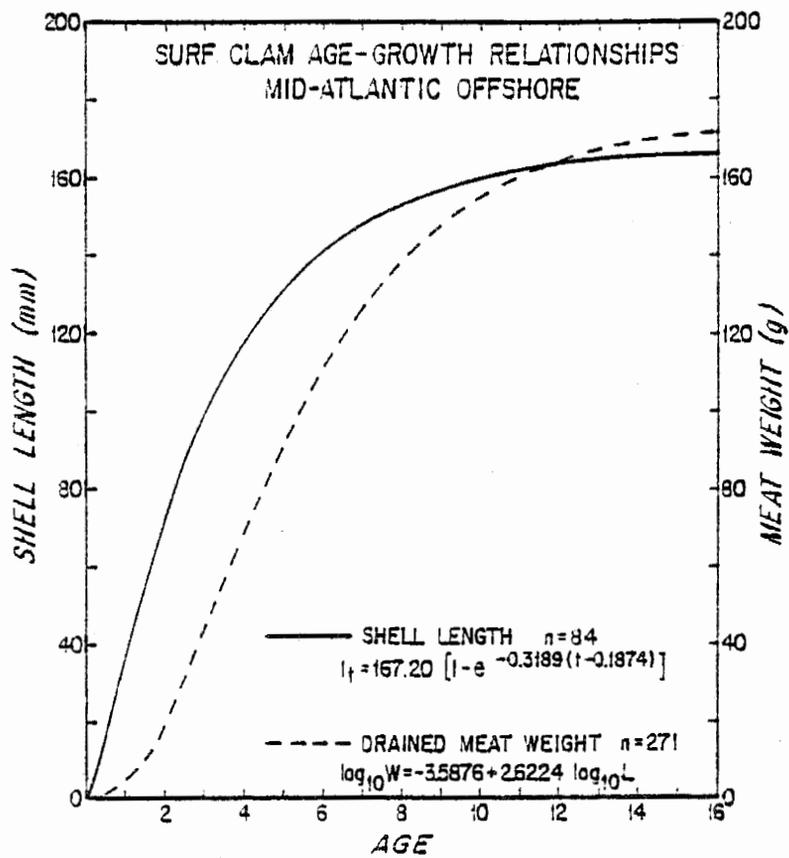
Source: NMFS commercial samples

(2) Computed from $\log_{10}W = 3.5876 + 2.6224 \log_{10}L$

Source: NMFS commercial samples

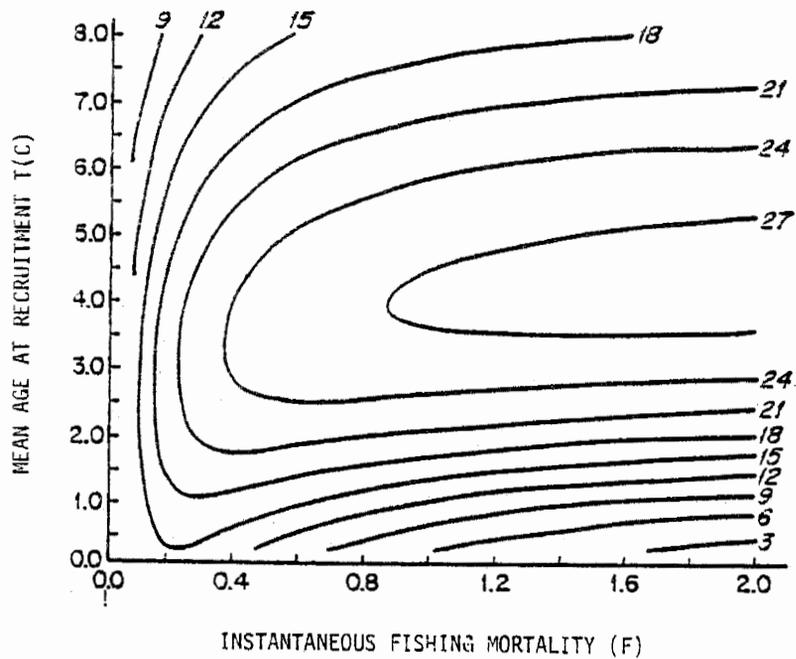
Table 6. Yield per Recruit (g) for Middle Atlantic Offshore Surf Clams with Various Instantaneous Rates of Fishing Mortality (F) and Age at First Selection (t_c)
 Natural Mortality (M) = 0.25 and Age at Recruitment = 0.25
 Shell Lengths (mm) Corresponding to Various Ages in Parentheses

F	Age at Entry (Length at Entry)							
	2.0 (73.40)	2.5 (87.23)	3.0 (99.01)	3.5 (109.06)	4.0 (117.63)	4.5 (124.94)	5.0 (131.17)	5.5 (136.48)
0.1	14.13	14.06	13.74	13.22	12.55	11.77	10.92	10.05
0.2	19.46	19.87	19.84	19.41	18.69	17.73	16.63	15.44
0.3	21.46	22.41	22.77	22.59	21.99	21.06	19.89	18.59
0.4	22.07	23.52	24.26	24.35	23.92	23.07	21.92	20.58
0.5	22.09	23.96	25.03	25.38	25.12	24.37	23.27	21.93
0.6	21.84	24.07	25.43	26.01	25.90	25.26	24.21	22.89
0.7	21.48	24.00	25.62	26.39	26.43	25.88	24.90	23.60
0.8	21.08	23.85	25.69	26.63	26.80	26.35	25.42	24.15
0.9	20.68	23.66	25.69	26.78	27.07	26.69	25.82	24.58
1.0	20.29	23.56	25.64	26.87	27.26	26.96	26.13	24.92
1.1	19.92	23.24	25.57	26.92	27.40	27.17	26.39	25.20
1.2	19.57	23.04	25.49	26.94	27.51	27.33	26.59	25.44
1.3	19.25	22.84	25.40	26.95	27.59	27.47	26.77	25.63
1.4	18.96	22.64	25.31	26.94	27.64	27.58	26.91	25.80
1.5	18.68	22.46	25.21	26.92	27.69	27.67	27.03	25.94
1.6	18.43	22.29	25.12	26.90	27.72	27.74	27.14	26.07
1.7	18.20	22.13	25.03	26.87	27.74	27.80	27.23	26.18
1.8	17.98	21.98	24.95	26.84	27.76	27.86	27.31	26.27
1.9	17.78	21.84	24.86	26.81	27.77	27.90	27.37	26.36
2.0	17.59	21.71	24.78	26.78	27.78	27.94	27.43	26.43



Age-Growth Relationships For Surf Clams From Offshore Waters Of The Mid-Atlantic. Shell Lengths Expressed In Millimeters, Meat Weights In Grams.

Figure 11



Yield Per Recruit Isopleth For Offshore Mid-Atlantic Surf Clams.

Figure 12

Commercial Catch Size Composition

Shell length-frequency distributions of commercial landings of surf clams from the principal Middle Atlantic assessment-offshore fishery areas (NNJ, SNJ, and DMV) during 1976-1978 are presented in Figures 13-15. Length-frequency samples were obtained from dockside catch sampling in which typically five subsamples of six clams were measured from a trip landing. Overall offshore areal commercial size composition was derived by weighting each sample length frequency distribution by the total catch in bushels taken during the trip and then summing over all sampled trips during the year. Surf clam catches in depths of less than 10 fathoms were excluded from analysis since these would normally not be from the offshore populations.

Commercial length-frequency distributions in all three of the major offshore regions during 1976-1978 are similar (Figures 13-15). Modal size values occurred at 16-17 cm shell length with clams larger than 20 cm or smaller than 12 cm rarely present in the sampled landings. The virtual absence of clams smaller than 12 cm implies size selectivity in the fishery since research vessel survey size-frequency distributions in 1976-1978 indicated significant segments of the Middle Atlantic populations to be smaller than 12 cm (Table 3). The commercial catch composition hence reflects culling practices or the concentration of harvests on beds of predominantly large surf clams. Since maximum yield per recruit occurs at a size at first capture of about 12 cm, there appears little need to implement a minimum size restriction in the current fishery to increase potential biological yield. Future changes in cull sizes or significant dredge-induced mortality on pre-recruit clams, however, may necessitate reevaluation of size at first capture considerations if yield per recruit is to be maximized.

Current Status and Future Outlook of Middle Atlantic Surf Clam Populations

In 1978, total surf clam landings from offshore Middle Atlantic populations were 31.4 million pounds (Table 1). Of this total, approximately 28.8 million pounds were taken from the Delmarva area (92% of 1978 FCZ landings), 2.5 million pounds from offshore New Jersey (8%), and less than 60,000 pounds from southern Virginia-North Carolina (0.2%).

Research vessel survey relative abundance indices during 1978 indicated no significant declines in commercial size (>12 cm shell length) surf clam abundance in any of the three major offshore fishery areas during the year. Commercial quarterly mean catch per effort indices varied only slightly within offshore areas throughout 1978 further suggesting relative resource stability.

Survey catch per tow indices for immediate sized surf clams (9-11 cm shell length) have not fluctuated greatly since 1976, particularly off southern New Jersey and Delmarva. Hence, average recruitment to the fishery should be maintained during the next several years. Accordingly, if the distribution and level of annual Middle Atlantic landings in 1979 and 1980 approximate those in 1978, the commercially exploitable biomass should not change markedly in the immediate future. However, if total surf clam catches from the Middle Atlantic assessment areas greatly exceed the 30 million pound level in 1979 or 1980, accelerated declines in the abundance of clams >12 cm shell length will probably result. Growth rate analyses (Figure 11) (Jones et al., 1978) imply that the widespread pre-recruit resources, indicated during the December, 1978, and January, 1979, research vessel surveys off Delmarva and northern New Jersey will recruit to the fishery by 1981 or 1982. Significant increases in population size of harvestable clams should occur in these years if natural mortality remains constant and fishing mortality remains minimal on these pre-recruit clams until then. Future research vessel survey monitoring of the

relative abundance of pre-recruits in 1980 and 1981 should more precisely establish the relative size and impact of these surf clams on harvestable resource abundance.

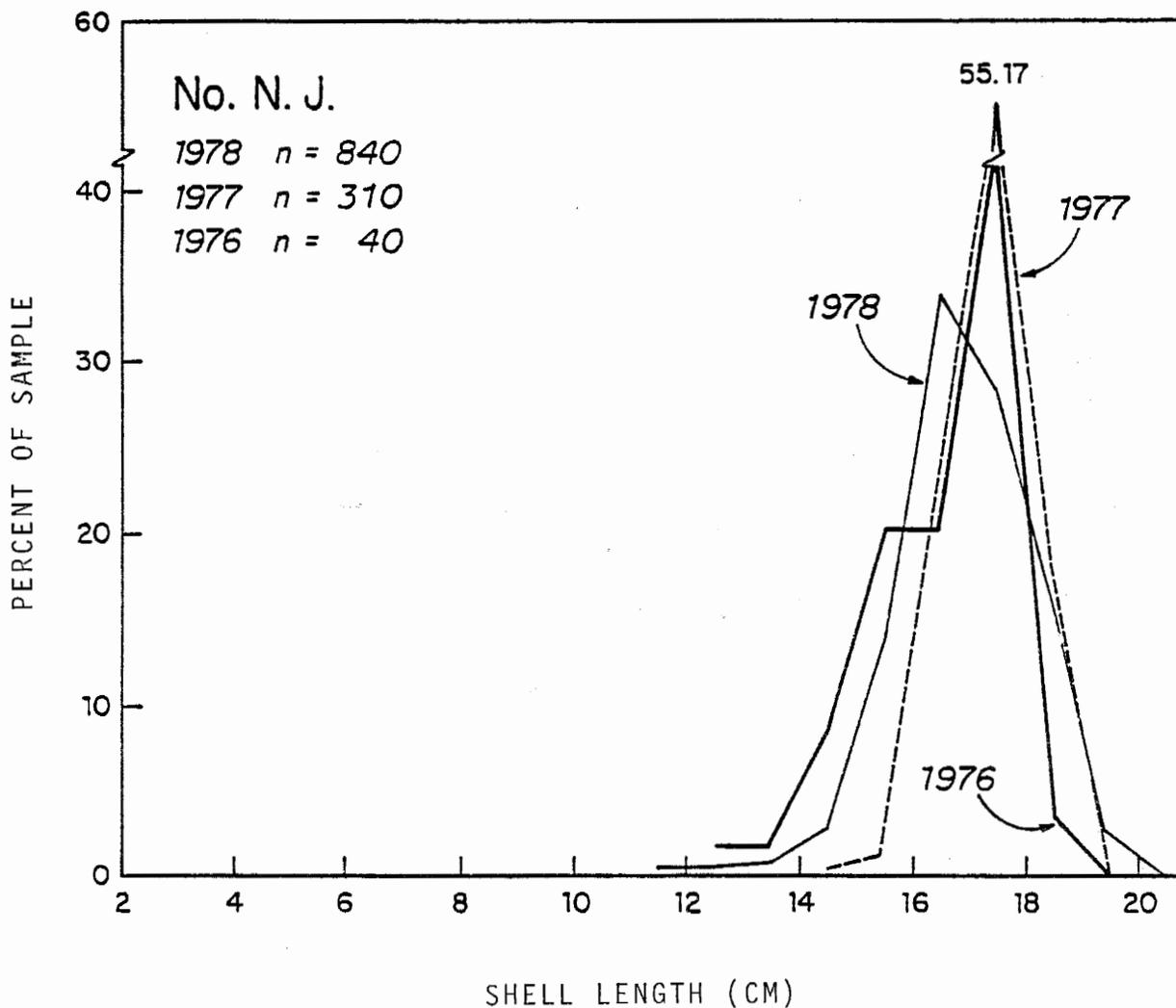
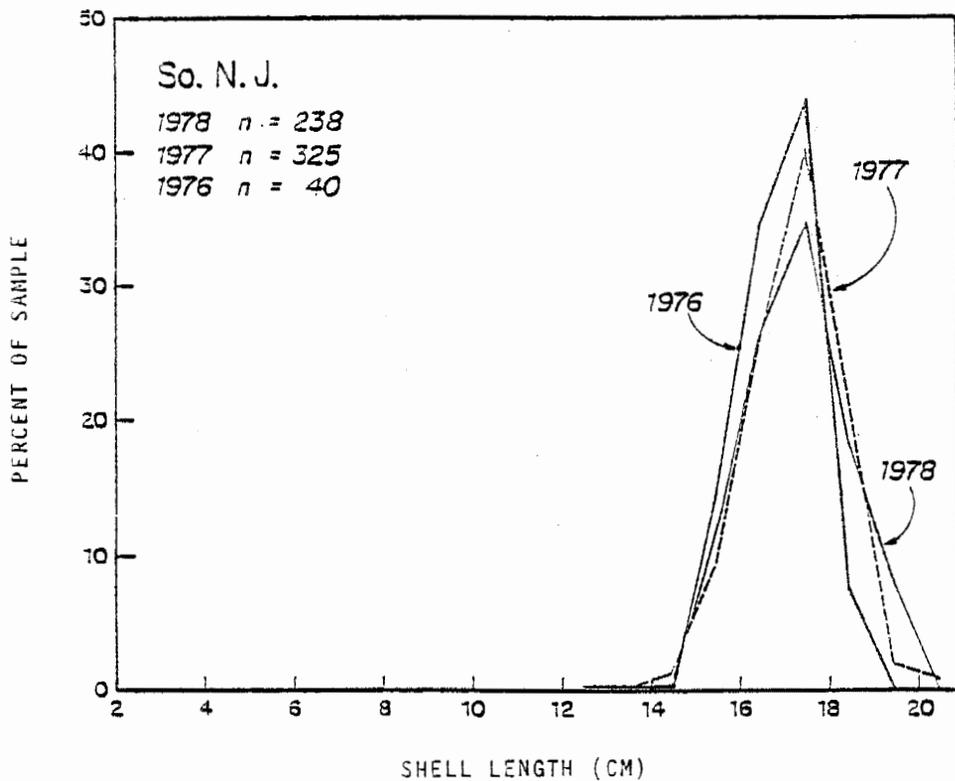


Figure 13

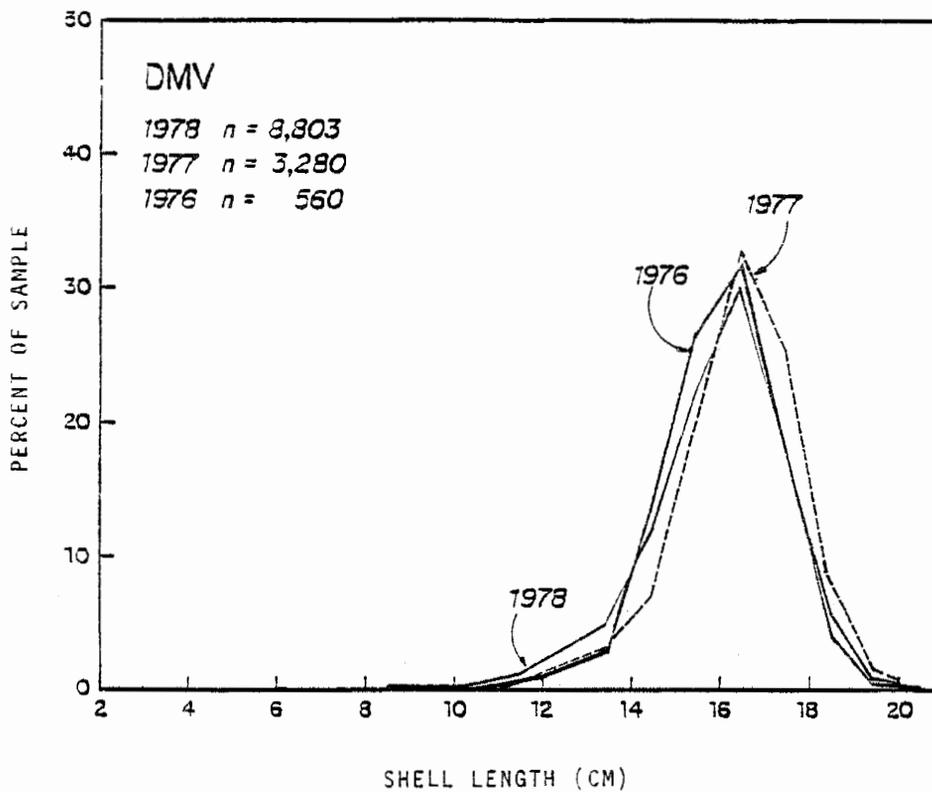
Length Frequency Composition Of Offshore Commercial Surf Clam Catches Off Northern New Jersey Sampled From 1976 Through 1978.



SHELL LENGTH (CM)

Length Frequency Composition Of Offshore Commercial Surf Clam Catches Off Southern New Jersey Sampled From 1976 Through 1978.

Figure 14



SHELL LENGTH (CM)

Length Frequency Composition Of Offshore Commercial Surf Clam Catches Off Delmarva Sampled From 1976 Through 1978.

Figure 15

Ocean Quahog¹

Introduction

Commercial utilization of Middle Atlantic (Cape Cod to Cape Hatteras) ocean quahog populations has increased rapidly in recent years. Total US landings in 1977 were 18.5 million pounds, a 235% increase from 1976 and 12-fold greater than the 1967-1976 average annual catch of 1.5 million pounds (Table 7). Landings from the FCZ during 1978 were about 20.2 million pounds, a 26% increase from 1977. Prior to 1976, virtually all US landings were derived from a small fishery off Rhode Island (Merrill et al., 1969; Parker and McRae, 1970; Serchuk et al., 1979a). The development of a fishery off New Jersey in 1976 and the Delmarva Peninsula in 1977 resulted in a sharp increase in annual landings; catches from these areas comprised 0% of the US total in 1975 but accounted for 87% in 1977. Population declines in Middle Atlantic surf clams exacerbated in 1976 by a massive kill of the clam stocks in the traditional New Jersey fishing grounds stimulated increased fishing for ocean quahogs (Ropes et al., 1979). The implementation of management measures enacted to conserve and rebuild offshore surf clam populations (Mid-Atlantic Fishery Management Council 1977; Murawski and Serchuk, 1979a; Serchuk et al., 1979b) further encouraged continued expansion of the Middle Atlantic ocean quahog fishery.

Table 7. Landings of Ocean Quahogs (thousands of pounds of meat) from State Waters and the Fishery Conservation Zone (FCZ), 1967-1978

<u>Year</u>	<u>State Waters</u>	<u>FCZ</u>	<u>Total</u>
1967	44.1(1)	-	44.1
1968	224.9(1)	-	224.9
1969	639.3(1)	-	639.3
1970	1,746.0(1)	-	1,746.0
1971	2,030.3(1)	-	2,030.3
1972	1,399.9(1)	-	1,399.9
1973	1,457.2(1)	-	1,457.2
1974	804.6(1)	-	804.6
1975	1,254.4(1)	-	1,254.4
1976	1,446.2(1)	4,089.2	5,544.3
1977	2,464.6(2)	16,081.8(2)	18,544.3
1978		20,199.8(3)	

(1) Landings from Rhode Island, principally derived from within 3 miles of the coast.

(2) Data presented in "Fisheries of the United States, 1977", Current Fisheries Statistics No. 7200.

(3) Based on logbook records submitted to NMFS.

Studies of ocean quahog population dynamics, resource abundance and distribution, and life history are generally lacking. Merrill and Ropes (1969; 1970), Parker and McRae (1970) and Merrill et al. (1969) summarized Middle Atlantic research vessel survey cruise data collected by the Bureau of Commercial Fisheries (BCF) during 1963-1967; however, quahog data obtained from the synoptic research surveys conducted during 1965-1977 have not been heretofore quantitatively analyzed. In

(1) The following discussions, figures, and tables are taken from Murawski and Serchuk, 1979c, op. cit.

this section recent research and commercial information on the distribution, relative abundance, and size composition of Middle Atlantic ocean quahog populations are reviewed. In addition, estimates of resource equilibrium yields are derived from data on population biomass, age and growth, and assumptions of the rates of natural and fishing induced mortality.

Survey Design and Sampling Procedures

Ocean shellfish research vessel surveys were initiated in 1963 by the National Marine Fisheries Service's predecessor, the Bureau of Commercial Fisheries, primarily to elucidate the distribution and production potential of offshore Middle Atlantic surf clam populations. However, complete region-wide cruises were not begun until 1965 (Parker, 1966; Merrill and Ropes, 1969). Sufficient ocean quahog samples were taken in seven cruises from 1965-1977 which were useful for population assessment (Table 8).

Table 8. Ocean Shellfish Survey Cruises Used in the Analysis of the Dynamics of Ocean Quahog Populations

Year	Cruise Dates (Month/Day)	Research Vessel	Dredge Knife Width (in)	Minutes Per Tow	Ring Size or Cage Bar Space (in)	Minimum Shell Length at Full Selection (in)
1977	1/26-3/17	DELAWARE II	48	4	1.18 ^b	2.76
1976	4/6-5/13	DELAWARE II	48	4	1.18 ^b	2.76
1970 ^a	8/13-8/24	DELAWARE II	48	4	1.18 ^b	2.76
1969	6/20-7/2	ALBATROSS IV	30	5	2.00 ^c	2.48
1966	8/14-8/27	ALBATROSS IV	30	5	2.00 ^c	2.48
1965(2)	10/27-11/14	UNDAUNTED	30	5	2.00 ^c	2.48
1965(1)	5/26-6/23	UNDAUNTED	30	5	2.00 ^c	2.48

^a Submersible pumping system used.

^b Terminal cage used.

^c Terminal ring bag used.

A grid-type sampling design was employed during all seven surveys with pre-determined dredge stations located at either 9 or 19 km (5 or 10 nautical mile) intervals along transects coinciding with either LORAN lines or latitude-longitude bearings. Stations deeper than 80 m (43.7 fathoms) were rarely occupied due to gear limitations and sampling emphasis on shallow-water surf clam beds. Standard tow data were post-stratified to appropriate area and 20 m (10.9 fathoms) depth strata (Figure 16). Survey strata were designed to represent relatively homogeneous areas of bottom type, depth, and ecological conditions (Emery and Uchupi, 1972). For the analyses in this paper, grid samples within these strata were treated as if they were random since quahog beds within these zones were not thought to be systematically aggregated.

During most cruises survey coverage extended from Long Island through Delmarva; in some cruises southern Virginia-North Carolina and southern New England waters were also sampled. The southern-most boundary of the southern Virginia-North Carolina strata (not illustrated in Figure 16) extends southeast from Cape Hatteras to the 100 m (54.7 fathoms) isobath.

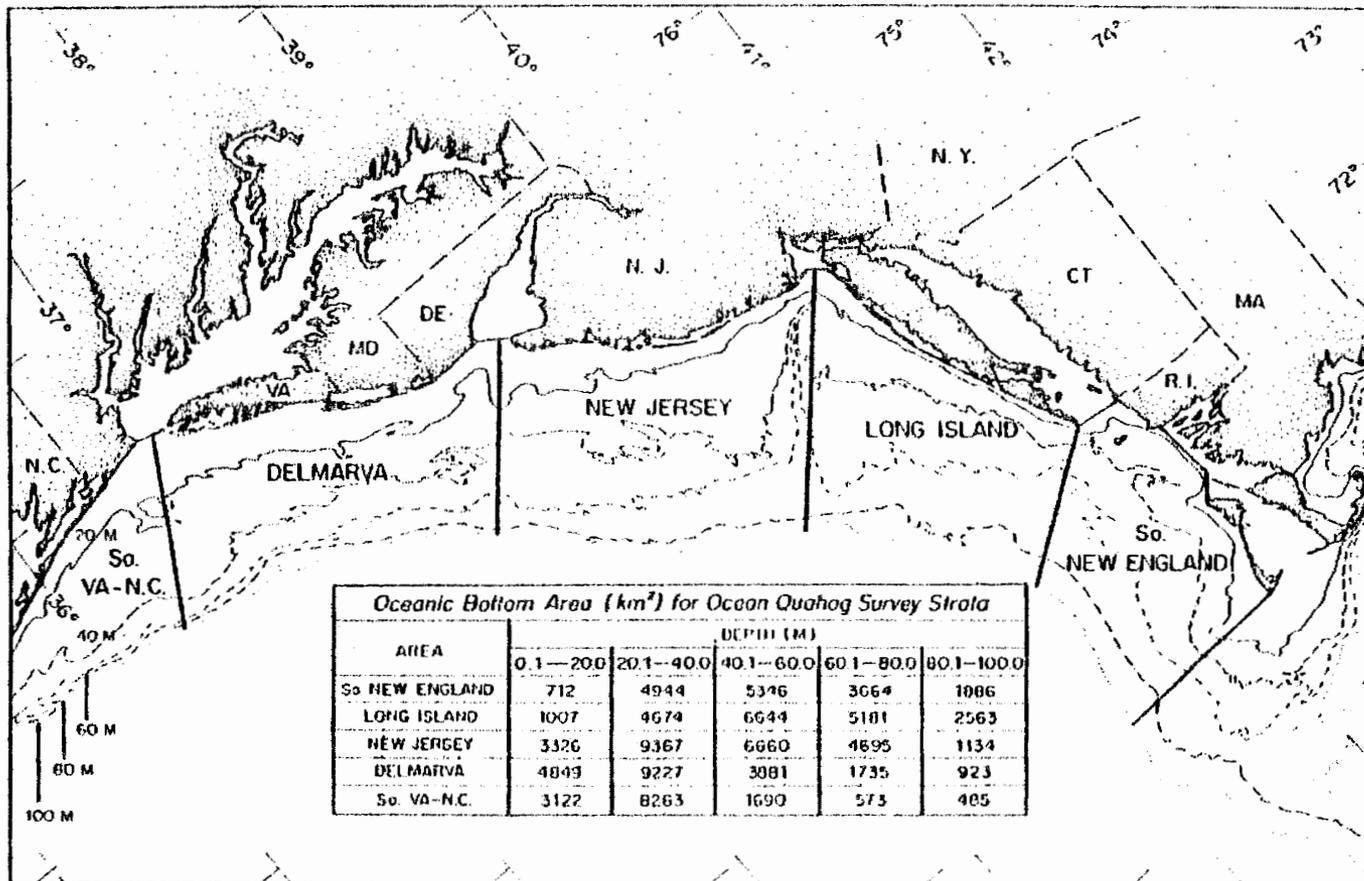


Figure 16. Ocean Quahog Survey Strata and Associated Bottom Areas in the Middle Atlantic

Research vessels and sampling gear used in each of the recent surveys are listed in Table 8. In the first four surveys (1965-1973) an hydraulic clam dredge with a 30 inch wide knife was used while the latter three cruises used a 48 inch wide dredge. Details of the construction and operation of the dredges are described and illustrated in Parker (1966; 1971), Standley and Parker (1967), Ropes et al. (1969), and Parker and McRae (1970).

After each tow, contents of the dredge were dumped, sorted by species and enumerated. Volume determinations were made if the catch exceeded 1 bushel. The usual practice was to take a 1 bushel subsample for length frequency analysis. Total shell length (longest dimension) was recorded to the nearest cm for quahogs that were whole or broken but measurable. Total live weight of the catch was not routinely recorded because of the variability in weights of quahogs due to contamination with substrate from the dredging process. Hence, catch weights were derived by applying appropriate areal length-weight equations (Table 9; Murawski and Serchuk, 1979b) to the prorated length frequency distribution of each tow, viz:

$$\hat{B} = \sum_{L=1}^{15} cL_i^b N_i$$

- where \hat{B} = total calculated catch in weight per tow
 L_i = mean shell length of quahogs in 10 mm size groups i , expressed as the mid point of the size group (i.e., for size groups 0-9, 10-19, ... 140-149 mm, $L_i = 4.5, 14.5, \dots, 144.5$ mm).
 N = total number of quahogs caught within size group i
 b = slope of the appropriate areal length weight equation (Table 9)
 c = antilog of the intercept of the appropriate areal length weight equation (Table 9).

Table 9. Statistics Describing Regression Equations Between Shell Length (mm) and Drained Meat Weight (g) for Ocean Quahogs

Area	Intercept (a)	Slope (b)	Standard Error of b	Correlation Coefficient (r)
Southern New England - Long Island	-9.124283	2.774989	0.0199	0.9670
New Jersey	-9.847183	2.949540	0.0294	0.9546
Delmarva - North Carolina	-9.042313	2.787987	0.0800	0.9172

Source: Murawski and Serchuck, 1979b

The prorated length frequency distribution of each tow was derived from the measured subsamples by multiplying the number of quahogs in each size group by the ratio of the total number caught to the total number measured. For tows in which no length samples were taken, the appropriate strata cumulative length frequency distributions were applied to catch.

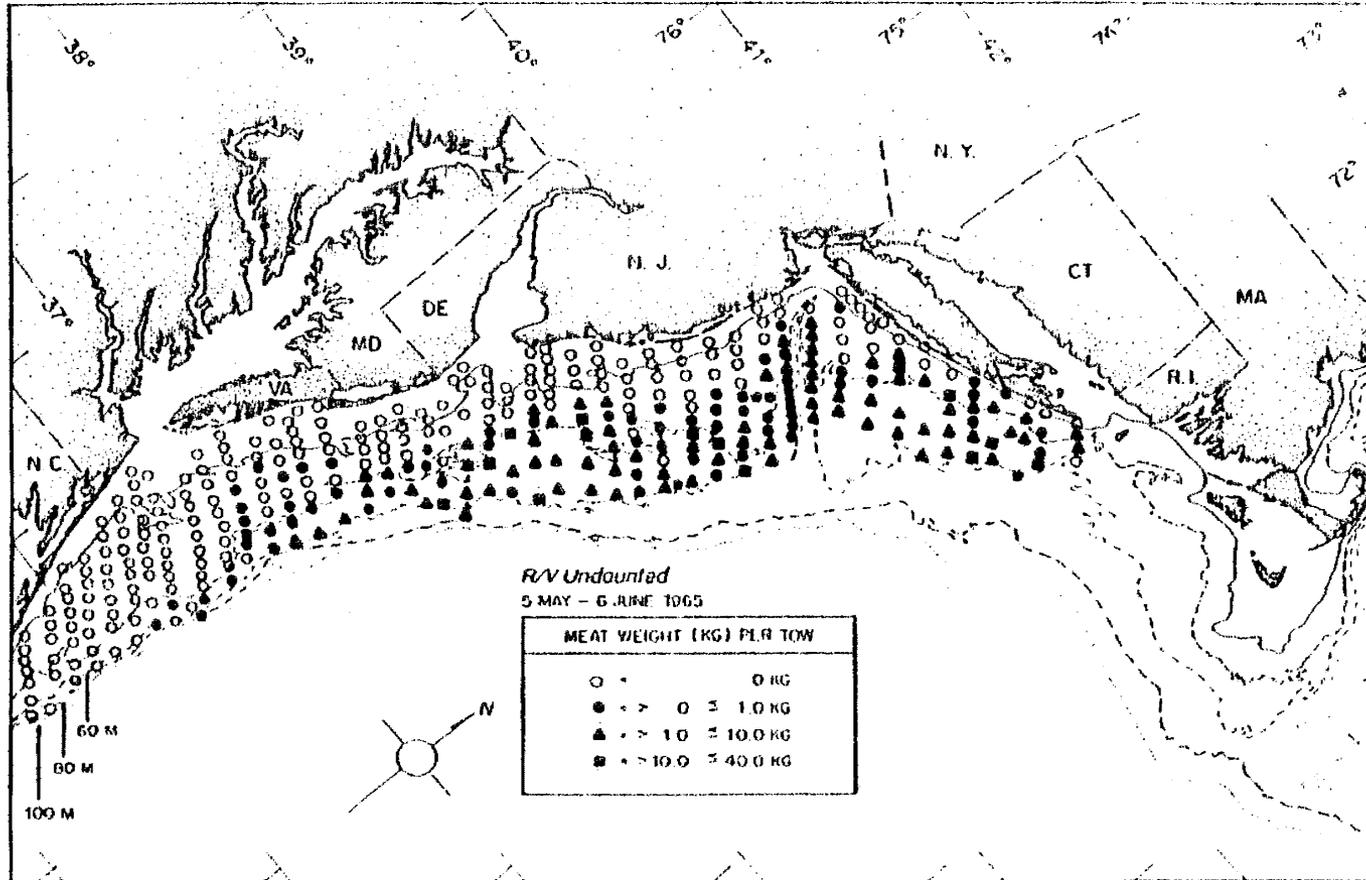


Figure 17. Station Locations and Catches in Meat Weight (Kg) During the R/V UNDAUNTED Cruise, 5 May - 6 June, 1965. Several Stations Near Cape Hatteras in Which No Quahogs Were Taken are Not Illustrated

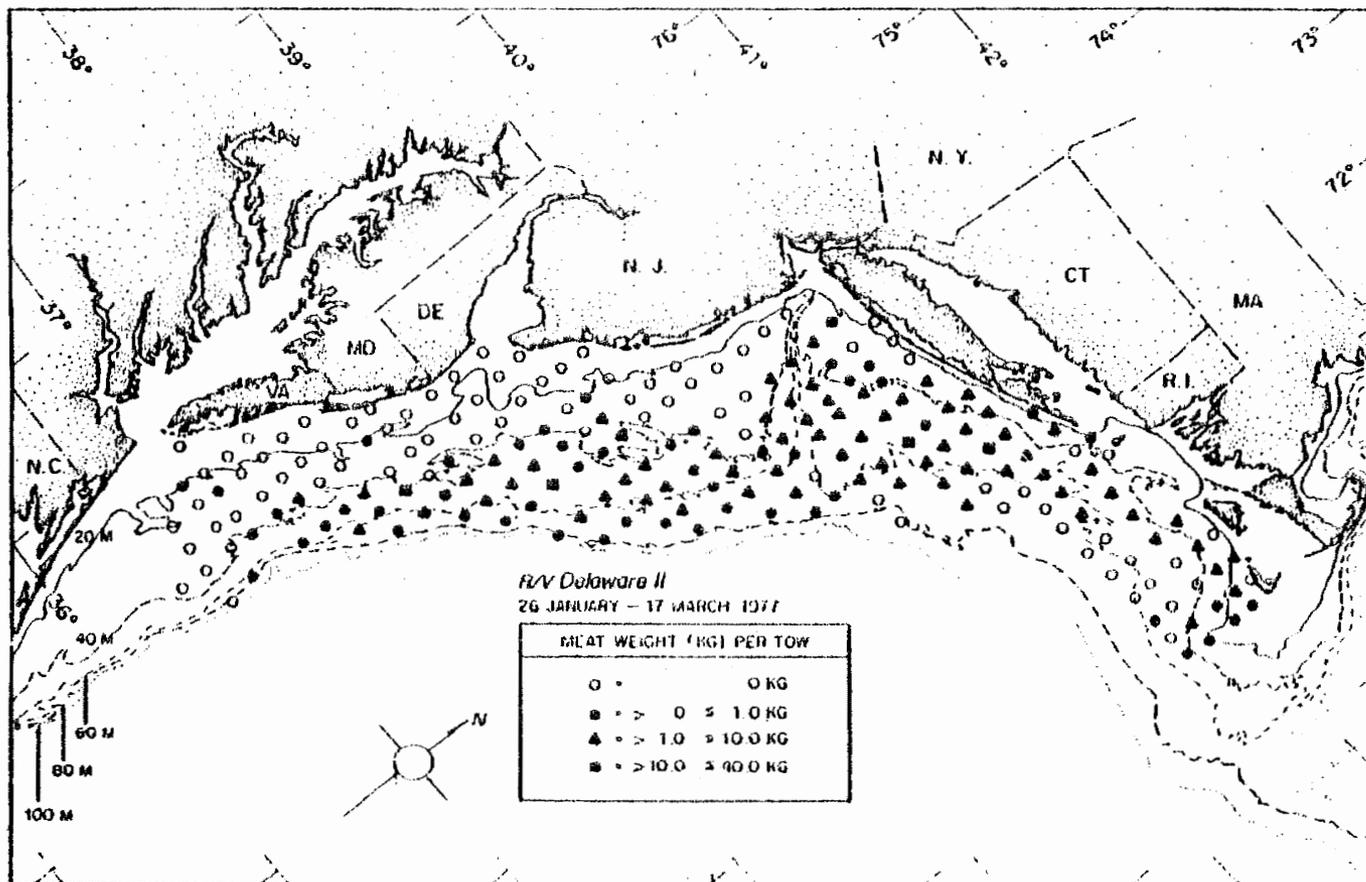


Figure 18. Station Locations and Catches in Meat Weight (Kg) During the R/V DELAWARE II Cruise, 26 January - 17 March, 1977

Since tow duration and gear varied slightly between survey cruises, individual tow catches (numbers and weight) were standardized to a 48 in. wide dredge and four minute tow. Thus, the 1965-1969 tow data were multiplied by 1.28; the product of the linear correction factors; 1.6 (the ratio 48/30), and 0.8 (the ratio 4 minutes/5 minutes). Odometer readings (n = 217) from the 1965 and 1969 surveys indicated that during a five minute tow an average of 64.74 m² of bottom was covered by the 30 in. wide dredge. Thus, approximately 82.87 m² was sampled during a standardized tow.

Abundance Indices

Standardized mean catch per tow data (numbers and meat weight) of ocean quahogs, by area/depth strata, for the 1965-1977 shellfish surveys are presented in Table 10. The relative distribution of biomass from the 1965 (spring) and 1977 surveys (Figures 17 and 18) are indicative of the time series of data.

Table 10. Catch per Tow Data of Ocean Quahogs, by Area/Depth Strata for Ocean Shellfish Surveys, 1965-1977*

<u>Area</u>	<u>Cruise</u>	<u>Number of Tows</u>	<u>Catches in Numbers</u>		<u>Catches in Meat Weight (kg)</u>	
			<u>Mean</u>	<u>Standard Deviation</u>	<u>Mean</u>	<u>Standard Deviation</u>
Southern New England						
20.1-40.0	1977	11	20.00	34.83	0.5326	0.9315
	1970	4	183.50	337.03	4.5183	8.2074
40.1-60.0	1977	15	77.87	97.10	1.7288	2.2351
60.1-80.0	1977	10	15.80	37.14	0.3615	0.8231
Long Island						
0.1-20.0	1977	2	0.00	0.00	0.0000	0.0000
	1976	6	4.00	9.80	0.0785	0.1923
	1970	4	8.00	16.00	0.1940	0.3880
	1969	4	0.64	1.28	0.0246	0.0492
	1966	3	0.00	0.00	0.0000	0.0000
	1965(2)	17	0.00	0.00	0.0000	0.0000
	1965(1)	10	0.13	0.40	0.0031	0.0098
20.1-40.0	1977	14	32.64	48.21	0.9444	1.2397
	1976	26	103.72	185.80	2.9419	5.2644
	1970	14	265.36	320.49	6.3862	7.2196
	1969	25	149.20	242.99	3.5362	5.2225
	1966	21	130.07	266.08	3.5116	7.0453
	1965(2)	20	139.71	320.66	3.3973	7.4062
	1965(1)	29	114.45	215.13	2.8899	5.7174
40.1-60.0	1977	17	243.24	171.43	5.2236	3.3971
	1976	36	293.54	206.08	6.1944	4.2529
	1970	21	214.81	203.15	5.2784	5.2987
	1969	23	136.63	197.19	2.9080	3.9825
	1966	1	0.00	0.00	0.0000	0.0000
	1965(1)	26	208.29	179.88	4.9551	4.8447
60.1-80.0	1977	15	134.40	195.73	2.6715	4.2497
	1976	18	100.83	169.15	2.2175	3.7895
	1970	6	13.17	20.59	0.1925	0.2415
	1969	21	39.13	104.30	0.8946	2.4139
80.1-100.0	1976	2	0.00	0.00	0.0000	0.0000

Table 10 (continued).

New Jersey						
0.1-20.0	1977	7	0.00	0.00	0.0000	0.0000
	1976	12	0.00	0.00	0.0000	0.0000
	1970	11	0.18	0.40	0.0048	0.0115
	1969	12	0.00	0.00	0.0000	0.0000
	1966	17	0.00	0.00	0.0000	0.0000
	1965(2)	23	0.11	0.53	0.0032	0.0156
	1965(1)	19	0.00	0.00	0.0000	0.0000
	20.1-40.0	1977	24	24.62	63.79	0.8451
1976		34	55.53	186.12	1.6464	4.4192
1970		45	28.69	72.11	1.7182	4.3060
1969		52	51.15	229.65	1.2896	4.5480
1966		82	30.02	103.60	1.1279	3.4761
1965(2)		49	5.12	10.15	0.1933	0.3682
1965(1)		58	67.82	278.01	1.7108	5.1558
40.1-60.0	1977	26	114.00	190.43	3.4920	5.7138
	1976	20	146.55	261.82	4.3251	7.5912
	1970	23	148.04	160.00	7.5929	8.3864
	1969	14	65.92	78.73	1.8244	2.1585
	1966	29	116.17	203.41	4.2543	7.0372
	1965(2)	3	322.56	527.84	8.6975	13.9972
	1965(1)	33	179.86	232.02	5.1960	6.9847
60.1-80.0	1977	12	49.92	74.97	1.3656	2.2556
	1976	9	71.56	69.96	2.1488	2.2201
	1970	4	307.75	263.91	8.9548	7.6338
	1969	17	98.03	191.75	2.3772	3.9401
80.1-100.0	1977	1	8.00	0.00	0.1441	0.0000
	1976	6	1.67	2.58	0.0572	0.0888
	1969	1	2.56	0.00	0.1067	0.0000
Delmarva						
0.1-20.0	1977	9	0.00	0.00	0.0000	0.0000
	1976	13	0.00	0.00	0.0000	0.0000
	1970	13	0.00	0.00	0.0000	0.0000
	1969	23	0.00	0.00	0.0000	0.0000
	1966	14	0.00	0.00	0.0000	0.0000
	1965(2)	27	0.00	0.00	0.0000	0.0000
	1965(1)	21	0.00	0.00	0.0000	0.0000
20.1-40.0	1977	32	0.75	3.71	0.0360	0.1795
	1976	31	9.16	35.84	0.3269	1.2531
	1970	34	1.79	5.45	0.0838	0.2706
	1969	48	2.32	12.23	0.0787	0.4176
	1966	63	1.85	6.23	0.0674	0.2318
	1965(2)	41	1.65	6.74	0.0592	0.2318
	1965(1)	64	3.18	9.31	0.0890	0.2581
40.1-60.0	1977	11	137.73	351.38	3.6329	8.2199
	1976	13	38.23	42.77	1.4657	1.4248
	1970	9	105.78	242.62	2.4654	4.4750
	1966	11	69.35	87.64	2.8033	3.6442
	1965(2)	4	7.36	11.37	0.2124	0.2579
	1965(1)	30	125.65	222.56	3.1341	4.5993

Table 10 (continued)

60.1-80.0	1977	6	51.00	49.67	1.3620	1.1011
	1976	9	48.44	80.56	1.4827	1.8768
	1970	4	17.75	30.40	0.6263	1.0347
	1969	19	6.20	12.48	0.2145	0.4296
	1965(1)	2	14.72	19.01	0.4570	0.6007
80.1-100.0	1977	1	0.00	0.00	0.0000	0.0000
Southern VA-						
N. Carolina						
0.1-20.0	1976	6	0.00	0.00	0.0000	0.0000
	1970	5	0.80	1.79	0.0069	0.0153
	1969	5	0.00	0.00	0.0000	0.0000
	1965(2)	9	0.00	0.00	0.0000	0.0000
	1965(1)	6	0.00	0.00	0.0000	0.0000
20.1-40.0	1976	18	0.33	1.41	0.0128	0.0544
	1970	5	0.20	0.45	0.0101	0.0226
	1969	13	0.00	0.00	0.0000	0.0000
	1965(2)	16	1.04	3.54	0.0320	0.0991
	1965(1)	59	0.00	0.00	0.0000	0.0000
40.1-60.0	1970	1	8.00	0.00	0.3077	0.0000
	1969	1	3.84	0.00	0.1202	0.0000
	1965(2)	6	6.19	6.60	0.1692	0.1809
	1965(1)	15	4.01	11.01	0.1520	0.4418
60.1-80.0	1970	2	5.50	7.78	0.1728	0.2444
	1965(2)	2	0.00	0.00	0.0000	0.0000
	1965(1)	2	0.00	0.00	0.0000	0.0000

* Standardized to catch of 48 in. wide dredge, towed for 4 minutes.

A total of 10% (171) of the stations sampled between 1965 and 1977 were located within the southern Virginia - North Carolina area. Yearly strata catch per tow indices exhibited marked variation reflecting the sporadic distribution of quahogs in this region. However, 95% confidence limits about the mean catches per tow $(\pm 2\sqrt{\sigma^2}/\sqrt{n})$ suggest that differences over time within strata were not significant. Abundance indices for southern Virginia - North Carolina were the lowest of all areas for each depth range from 20.1-80.0 m (11 - 43.7 fathoms).

The ocean quahog resource off the Delmarva Peninsula occurs in waters deeper than 20 m (11 fathoms). Survey indices for depths greater than 20 m were significantly higher than corresponding strata to the south. The 40.1-60.0 m (22 - 32.8 fathoms) strata usually exhibited the highest relative abundance of quahogs. Differences in catch per tow values over time were generally not significant, although means were highly variable, particularly in the 40.1-60.0 m interval. Approximately 31% (552) of the stations sampled during the period were from this area.

The relative abundance of quahogs off New Jersey in waters greater than 40.0 m deep was similar to that off Delmarva. However, indices for the 20.1-40.0 m depth stratum were significantly greater than off Delmarva. The largest percentage (36%) of the stations sampled during the period were off New Jersey.

Average catch rates from Long Island strata were generally greater than corresponding strata in other areas. The 40.1-60.0 m depths exhibited the highest

mean catches per tow, consistent with trends for southern Virginia - North Carolina, Delmarva, and New Jersey. Abundance indices did not apparently vary significantly during the time period. The increased shoreward abundance of quahogs off Long Island may reflect generally cooler waters there than further to the south especially during the summer. A total of 22% of the stations were located off Long Island.

Limited data for the southern New England area were collected during cruises in 1970 and 1977. The lack of an extensive time series precludes assessment of the significance of changes in abundance over time. Data for the 1977 survey do, however, indicate that trends in relative abundance by depth are consistent with other areas.

Size Composition

Survey catches of ocean quahogs were comprised of individuals ranging in size from 2-14 cm (0.75" - 5.5") shell length (longest dimension). Dredge specifications and shell morphometry data indicate that minimum shell lengths at full selection ranged from 6-7 cm for the two survey dredges used (Table 8). Shell length frequency distributions for most area/depth strata were unimodal; modal sizes usually ranged from 6-10 cm. Little change in frequency distributions within strata occurred during 1965-1977, suggesting relative resource stability. Substantial differences in length composition, however, were evident between strata and areas. The largest quahogs sampled were from off New Jersey with few individuals greater than 11.9 cm (4.7") taken off southern New England, Long Island, Delmarva, or southern Virginia - North Carolina. Most of the New Jersey quahogs greater than 12 cm were from 20.1-40.0 m depths, with progressively fewer large quahogs in deeper waters. The greatest proportion of small quahogs (<5 cm) were from Long Island with fewer small quahogs in other areas. Individuals less than 4 cm were rarely taken from depths shallower than 40 cm in any area, perhaps indicating poor recruitment to those strata during the study period.

Minimum Population Size

Statistical analyses of relative abundance indices (Table 10) revealed little significant change in quahog populations over time. Stable population size is further suggested by the lack of significant fluctuation in length frequency composition, and the relative scarcity of small individuals. Hence, catch per tow data for all years were combined to compute single indices for those area/depth strata with sufficient information (Long Island-Delmarva). The highest abundance in numbers and meat weight per tow was in waters 40.1-60.0 m deep off Long Island and New Jersey (Table 11).

Estimates of population density - the absolute number and weight per m^2 - were calculated assuming the dredge sampled an average of 82.87 m^2 per tow. These estimates must be considered minimum because the dredge is not thought to be 100% efficient in sampling clam populations. Also, only clams above a certain size will be fully retained by the dredge. Population size estimates were derived for quahogs of all sizes taken in the research sampling. Estimated densities ranged from 0.02 - 2.70 individuals and 0.02 - 60.18 g/ m^2 .

The minimum population size of quahogs inhabiting the area from Long Island through Delmarva was computed utilizing minimum density calculations and corresponding stratum areas (Figure 16). Population size for each stratum was derived by multiplying number and weight per m^2 by the number of m^2 of ocean bottom in each. Total population size is hence the sum of the strata estimates (Table 11). A total Middle Atlantic resource of 56.6 billion quahogs and 1.5 million mt of meat was estimated. The distribution of total biomass was greatest off Long Island (46%)

followed by New Jersey (44%) and Delmarva (10%). Average meat weights were largest off New Jersey (32 g) (about 1 ounce) followed by Delmarva (28 g) and Long Island (23 g).

Table 11. Mean Catches per Tow, Average Densities, and Minimum Population Size Estimates for Ocean Quahogs from Long Island - Delmarva Sampled During NMFS Shellfish Surveys, 1965-1977

Area and Depth (m)	Number of Tows	Average Catch/Tow		Average Density (m ²)		Minimum Population Size Estimate	
		Numbers	Meat Weight (kg)	Numbers	Meat Weight (g)	Numbers	Meat Weight (mil. lb.)
Long Island							
0.1- 20.0	46	1.30	0.0300	0.02	0.3611	15,809,900	0.8
20.1- 40.0	149	129.65	3.3089	1.57	39.9288	7,312,331,312	411.4
40.1- 60.0	124	223.96	4.9868	2.70	60.1762	17,956,052,870	881.4
60.1- 80.0	60	78.86	1.6655	0.95	20.0977	4,930,390,147	229.5
80.1-100.0	2	0.00	0.0000	0.00	0.0000	0	0
New Jersey							
0.1- 20.0	101	0.05	0.0013	0.00	0.0151	1,792,174	0.1
20.1- 40.0	344	38.01	1.2262	0.46	14.7967	4,296,491,970	305.6
40.1- 60.0	148	138.48	4.7190	1.67	56.9446	11,129,064,200	836.1
60.1- 80.0	42	98.59	2.6657	1.19	32.1673	5,585,360,331	332.9
80.1-100.0	8	2.57	0.0743	0.03	0.8960	35,202,305	2.2
Delmarva							
0.1- 20.1	120	0.00	0.0000	0.00	0.0000	0	0
20.1- 40.0	313	2.77	0.0968	0.03	1.1681	308,736,895	23.7
40.1- 60.0	78	96.49	2.6527	1.16	32.0104	4,518,622,965	273.9
60.1- 80.0	40	24.00	0.7253	0.29	8.7523	502,578,436	33.5
80.1-100.0	1	0.00	0.0000	0.00	0.0000	0	0
TOTAL						56,592,433,505	3,331.1

Equilibrium Yields

The amount of resource available for sustainable harvesting has been generally thought of as the production in excess of that needed to maintain the population at a certain stock size, and has thus been termed surplus production (Schaefer, 1954; Gulland, 1971; Sissenwine, 1978). For populations exhibiting logistic growth, the point of maximum surplus production occurs at the inflection of the population growth function, corresponding to a level of 50% of the virgin stock size (Schaefer 1954). Methodologies to compute surplus production are based on historical catch and effort data for established fisheries; however, the available data for the Middle Atlantic ocean quahog resource are not sufficient for these purposes. Gulland (1971) proposed a simplistic model for calculating maximum sustainable yield (MSY) when adequate data for more sophisticated analyses are lacking. Maximum sustainable catch (C_{max}) is related to the optimum relative stock size ($X = 1/2$ virgin stock size, B_0) and the instantaneous natural mortality rate (M) by:

$$C_{max} = (X) (M) (B_0)$$

It is recognized that the actual population will not follow the formula precisely but it is likely some deviations may compensate each other (Gulland, 1971). An additional term has been included in this formula to reflect fishing mortality caused by the dredge damaging quahogs that are not harvested. The actual rate of additional mortality is not precisely known but has been tentatively estimated at between 40 and 60% of the amount harvested (Mid-Atlantic Fishery Management Council, 1977). Calculations of the natural mortality rate of ocean quahogs have not been reported. However, recent studies (Dr. I. Thompson, Princeton University, personal communication) have suggested that a significant proportion of the resource may live longer than 100 years. Values have been incorporated of the instantaneous natural mortality rate (M) into the calculations of MSY ranging from 0.01 (36.8% of the population living to 100 years) to 0.10 (<0.1% of the population living to 100 years). The latter value is similar to the calculated mortality rate of the sea scallop, Placopecten magellanicus, which inhabits much of the quahog's range in the Middle Atlantic (Merrill and Posgay, 1964).

Calculations of MSY for the ocean quahog resource from Long Island - Delmarva are presented in Table 12. Estimates of virgin biomass are those expanded from stratified catch per tow information from surveys, and therefore, must be considered minimum. Values of MSY vary considerably depending primarily on the assumed natural mortality rate. The natural mortality rate of quahogs is probably less than that of scallops considering the more dynamic nature of the sea scallop resource (Serchuk et al., 1979c). If $M < 0.05$ for quahogs (>0.7% survive to 100 years), then MSY for the area Long Island - Delmarva would be expected to be less than 50.7 million pounds per year. The ocean quahog fishery operating in the FCZ harvested 15.0 million pounds in 1977, and an estimated 20.2 million pounds in 1978. However, most of the offshore Middle Atlantic landings were derived from the New Jersey and Delmarva areas, which account for 54% of the total calculated biomass from Long Island - Delmarva. Thus, if the relative areal distribution of landings does not change, MSY for the area being fished is probably less than 27.0 million pounds (50.0 X 0.54).

Further refinement of MSY estimates will be possible as additional information on age and growth, breakage of unharvested quahogs and catch/effort data become available. However, it should be noted that the Schaefer model implies that maximum surplus production will occur when the standing stock is reduced to one-half of the virgin level. Therefore, harvests above MSY in the initial fishing years should not cause irreparable harm to the resource. If, however, subsequent evidence suggests rapid resource depletion and little concurrent recruitment to the population, appropriate constraints on the fishery should be considered.

Table 12. Calculations of Maximum Sustainable Yield (MSY) for Ocean Quahogs from Long Island - Delmarva

(M = instantaneous natural mortality rate, B_0 = biomass in meat weight available to the fishery, X = proportion of virgin stock size for MSY from Schaefer yield model, P = amount of additional biomass lost from dredge mortality of unharvested quahogs expressed as proportion of amount caught)

(weights in thousands of pounds)

(M)	(B_0)	X	P	MSY
0.01(a)	3,331,127	0.5	0.4	9,993
			0.5	8,329
			0.6	6,662
0.02(b)	3,331,127	0.5	0.4	19,986
			0.5	16,655
			0.6	13,324
0.027(c)	3,331,127	0.5	0.4	26,983
			0.5	22,486
			0.6	17,989
0.05(d)	3,331,127	0.5	0.4	49,967
			0.5	41,639
			0.6	33,312
0.10(e)	3,331,127	0.5	0.4	99,934
			0.5	83,279
			0.6	66,622

- (a) Equivalent to 36.8% of the population living to 100 years.
 (b) Equavalent to 13.5% of the population living to 100 years.
 (c) Equivalent to 6.7% of the population living to 100 years.
 (d) Equivalent to 0.7% of the population living to 100 years.
 (e) Equivalent to <0.1% of the population living to 100 years.

Offshore New England Surf Clam Resources¹

Introduction

Surf clams occur on the northwest Atlantic continental shelf from the southern Gulf of St. Lawrence to Cape Hatteras, North Carolina. Numerous studies have alluded to the general distribution of surf clams (Merrill and Ropes, 1969; Merrill and Webster, 1964; Ropes et al., 1969) and the fishery potential in various localities (Belding, 1910; Caddy and Billard, 1976; Schneider et al., 1977; Serchuk et al., 1979; Murawski and Serchuk, 1979). Research vessel clam survey cruises conducted by the NMFS occupied sampling stations in southern New England as well as Middle Atlantic Bight waters during several years. This discussion considers data derived from various sources on the distribution, relative abundance, and fishery potential

¹ The following discussion and figures are taken from:
 Murawski, S. A. 1979. On the question of offshore surf clam,
Spisula solidissima, resources off New England, NMFS,
 Woods Hole Laboratory Reference No. 79-22: 15 p.

of surf clams, particularly as they relate to offshore (beyond 3 miles) waters east of Montauk Point, New York.

Distribution

Merrill and Ropes (1969) charted the locations of surf clam occurrence from Cape Hatteras to Nova Scotia (Figure 19). These distribution records were derived from: (1) records of the US National Museum, (2) the Museum of Comparative Zoology at Harvard University, (3) sea scallop dredge samples from a Middle Atlantic cruise of the R/V DELAWARE I (Merrill, 1962), (4) Campbell grab samples from cruises of the R/V GOSNOLD (Emery et al., 1965; Wigley and Emery, 1968), (5) surf clam dredge samples from the 1965 cruises of the R/V UNDAUNTED, and (6) miscellaneous records of bottom samples by the R/V ALBATROSS.

Distribution records are most numerous for the Middle Atlantic areas west of Montauk Pt., due in part to the emphasis on sampling of the most productive commercial clamming areas (Figure 19). East of Hudson Canyon records of occurrence indicate the resource is concentrated inshore. The distribution of surf clams in waters greater than 20 m deep from Long Island to Georges Bank is sporadic. In contrast, from New Jersey to Cape Hatteras clams are distributed much more evenly over the continental shelf (Figure 19). Records of occurrence for ocean quahog, also presented by Merrill and Ropes (1969), suggest that this species is widely distributed in offshore waters from Long Island to Georges Bank. Thus, the paucity of surf clam samples from the same area implies they are relatively scarce.

Most records of occurrence off New England are from inshore Rhode Island and Massachusetts waters. Surf clam occurrences are numerous in inshore waters from Cape Cod to Cape Ann. Off northern New England and Nova Scotia surf clams appear to be scarce.

The factors that control larval settling and recruitment to the adult surf clam populations are poorly understood. Nevertheless, distribution is probably in part controlled by depth and sediment characteristics.

Merrill and Ropes (1969) report the maximum depth at which live surf clams were sampled as 66 m. The average depth of surf clam occurrence in Middle Atlantic waters, during transect sampling, was 29 m, however, few clams were taken at depths greater than 40 m. Substrate characteristics may also be important as a factor influencing the success of larval settlements. The distribution of median sediment diameters of surface samples from the Atlantic shelf (Emery and Uchupi, 1972) is presented in Figure 20. Interestingly, areas where median grain size exceeds 4ϕ appear virtually devoid of surf clams (Figures 19 and 20).

Relative Abundance

Belding (1910) commented on the distribution of surf clams off the Massachusetts coast by posing the question "What is the present extent of the sea clam beds in Massachusetts?" He continued:

No large beds, as formerly existed at Dennis, Nantucket, and Chatham are known to the fishermen, although sea clams are found in more or less abundance at several places along the Massachusetts Coast. The largest bed at the present time is at Monomoy Point, Chatham. In Plum Island Sound and Ipswich Bay sea clams are found on the low flats, but the fishing is limited to the low-course tides. Off Nahant, Hull and Winthrop are scattered beds of these large clams, which are occasionally washed ashore after storms. Sea clams are gathered off Plymouth by the fishermen. The numerous bars off Barnstable, Yarmouth, and Dennis on

the north side of the Cape furnish all extensive territory, while along the inner side of the Cape small beds are located at Wellfleet, Truro, and Brewster. At Provincetown the fishermen thoroughly dredge the beds at Wood End in their search for bait."

"On the outside of the Cape many shells are found on the beaches, showing that beds exist on the ocean side. At Chatham there is a fine bed at the present time. The south shore of Dennis formerly was a great locality for this mollusk, but few are now found. At Nantucket sea clams are now gathered in many parts of the harbor, principally from a large bed on Hussey shoal. Sea clams are also found near Cape Poge and on the shores of Martha's Vineyard. In certain waters of the Commonwealth the shells of this mollusk form the greater part of the shell deposits on the ocean bed. The principal fisheries are at Chatham, Provincetown, and Plymouth."

Belding's observations are in general agreement with distribution records plotted by Merrill and Ropes (1969). Distribution maps recently issued by the Massachusetts Executive Office of Environmental Affairs confirm the earlier observations. Locations of greatest abundance off Massachusetts are apparently near Horseneck Beach in Westport, the South Beach of Martha's Vineyard, and west of Nantucket. Extensive inshore beds are also located in Wellfleet Harbor, and along the shore of the outer Cape.

Limited sampling of the offshore bivalve resource off southern New England was accomplished during R/V DELAWARE II shellfish assessment surveys in 1977 and 1978. Relative abundance of surf clams was monitored during these surveys, and samples were taken with a 48-inch wide hydraulic shellfish dredge. Stations were either randomly selected within strata (1978), or located along transects and post-stratified (1977) (Figures 1 and 21).

In the area from Montauk Pt. to Nantucket, surf clams were taken at 19% (7/37) of the stations in 1977, and 6% (2/35) in 1978. In contrast, the Delmarva Peninsula area, which supports the bulk of the offshore commercial fishery, yielded surf clams at 56% of the stations occupied in 1977. Most of the New England surf clam catches during the two surveys were derived from strata 95 and 41 (Figure 21). The largest single survey catch from the New England stations was 220 individuals.

Shell length frequency distributions of surf clams sampled from southern New England, New Jersey, and Delmarva during the 1977 and 1978 surveys are presented in Figures 22 and 23. A significant proportion of the clams sampled from New England waters were greater than 12 cm shell length, which appears to be the minimum shell size normally taken in the Middle Atlantic offshore fishery (Murawski and Serchuk, 1979). However, the modal length of clams > 12 cm long was generally smaller off southern New England than farther to the south.

Fishery Potential

The first organized fishery for surf clams began in the 1870s off Cape Cod. The meats were used primarily for bait in the handline fishery for cod and haddock. However, the clam resource in the Cape Cod region was severely depleted after the turn of the century (Ropes et al., 1969). Belding (1910) commented on the variability of the Massachusetts fishery:

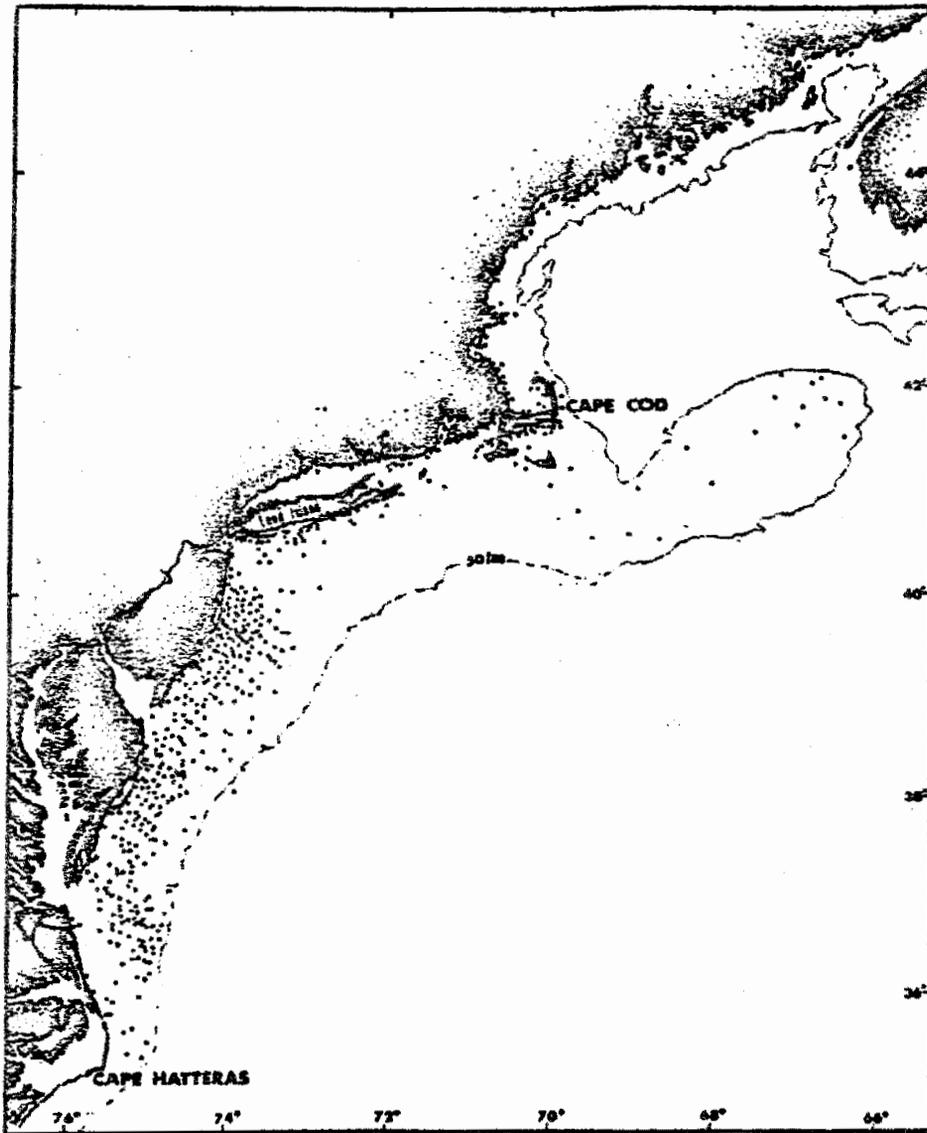
"If reliance can be placed on historical writing, the present generation perhaps is witnessing the passing of the sea clam. While it is indeed true that the large beds, which once made Chatham, Dennis and Nantucket famous for their bait fishery, have passed away, the lack of authentic

statistical figures for the past years, and the erratic nature of the fishery, large beds appearing first in one locality and then in another, lasting only a few years before they become exhausted, render any conclusions indefinite. Comparing the yield of 1907 and 1877 for Cape Cod, as given by E. Ingersoll, we would find a decrease from three thousand barrels to a few hundred, which would imply a serious decline, were it not known that in 1877 the large bed at Dennis was in a flourishing condition. Nevertheless, it has been clearly demonstrated that whenever a large bed in any locality has been discovered it has been depleted in the course of seven years by overfishing. There are several specific examples of the depletion of large natural beds by ill-advised methods of fishing, which have contributed to the decline of the fishery."

Total New England surf clam landings are presented in Table 13. From 1950-1978 annual New England landings averaged 136,000 pounds, and 0.4% of the US total. The preponderance of distribution data herein reviewed suggests that most of the New England surf clam resource exists in inshore areas (less than 3 miles from shore), thus, it is probable that virtually all New England catches were derived from within State waters. Offshore landings from New England waters during 1978 were reported to be 27,000 pounds, although the accuracy of these figures is unknown (Murawski and Serchuk, 1979). Thus, offshore landings may have been but 3% of the region's 1978 total of 812,000 pounds.

Research survey data suggest that abundance of surf clams may be relatively high in some offshore locations south of Cape Cod. Surf clams from these areas are of a commercially usable size (greater than 12 cm), although modal sizes of harvestable clams are smaller off southern New England than in the traditional offshore surf clam beds off New Jersey and the Delmarva Peninsula. Although some survey stations exhibited relatively high densities, the frequency of occurrence of surf clams in dredge samples off southern New England was less than in the commercial fishing areas off New Jersey and Delmarva. Long-term landings from southern New England offshore waters will probably not approach those from traditional offshore fishing grounds due to the relatively high risk of damaging harvesting gear and the sporadic distribution and ephemeral nature of the surf clam resource in this area (Belding, 1910). The bottom topography of New England waters north of Cape Cod clearly obviates large-scale dredging operations with traditional surf clam gear used in the Middle Atlantic fishery (Emery and Uchupi, 1972; Dept. of Commerce, 1971). Although few survey data exist for offshore waters north of Cape Cod, the probability of a significant harvestable resource in this area is remote (Merrill and Ropes, 1969). The magnitude of the surf clam resource on Georges Bank is presently unknown.

Figure 19



Distribution Of Surf Clams In The Middle Atlantic Bight
And Gulf Of Maine (From Merrill And Ropes, 1969)

Figure 20

Distribution Of Median Diameters Of Total Sediment (Including Gravel Fraction) Of Surface Samples From Atlantic Continental Margin. Median Diameters Are Expressed In Phi Units - Negative Logarithm To Base 2 Of Diameter In Millimeters (From Emery And Uchupi, 1972).

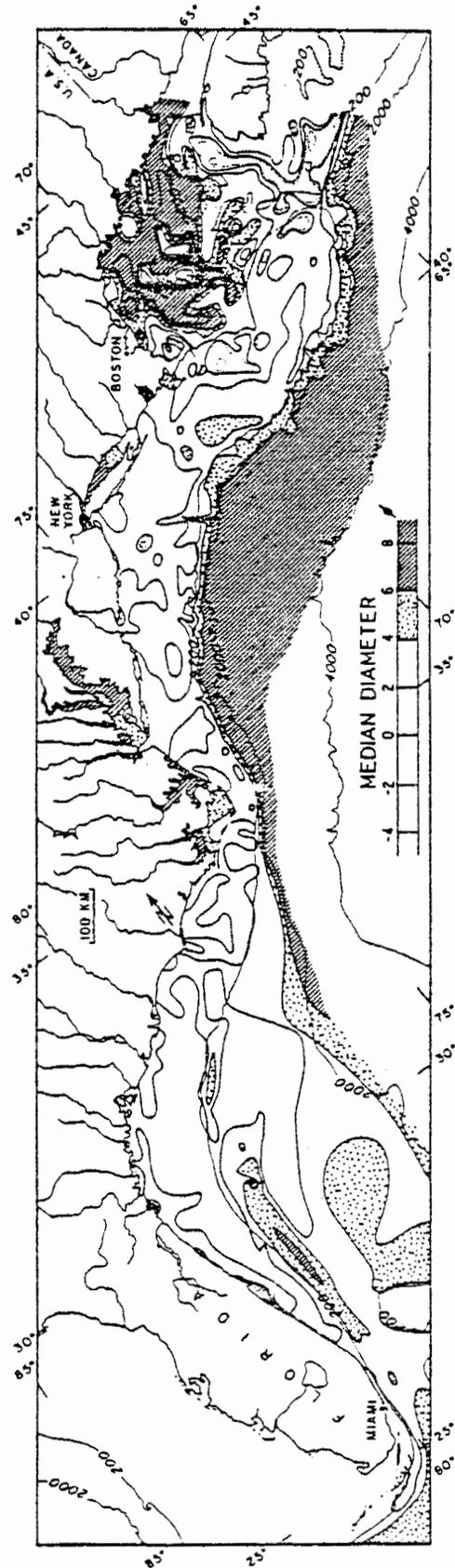
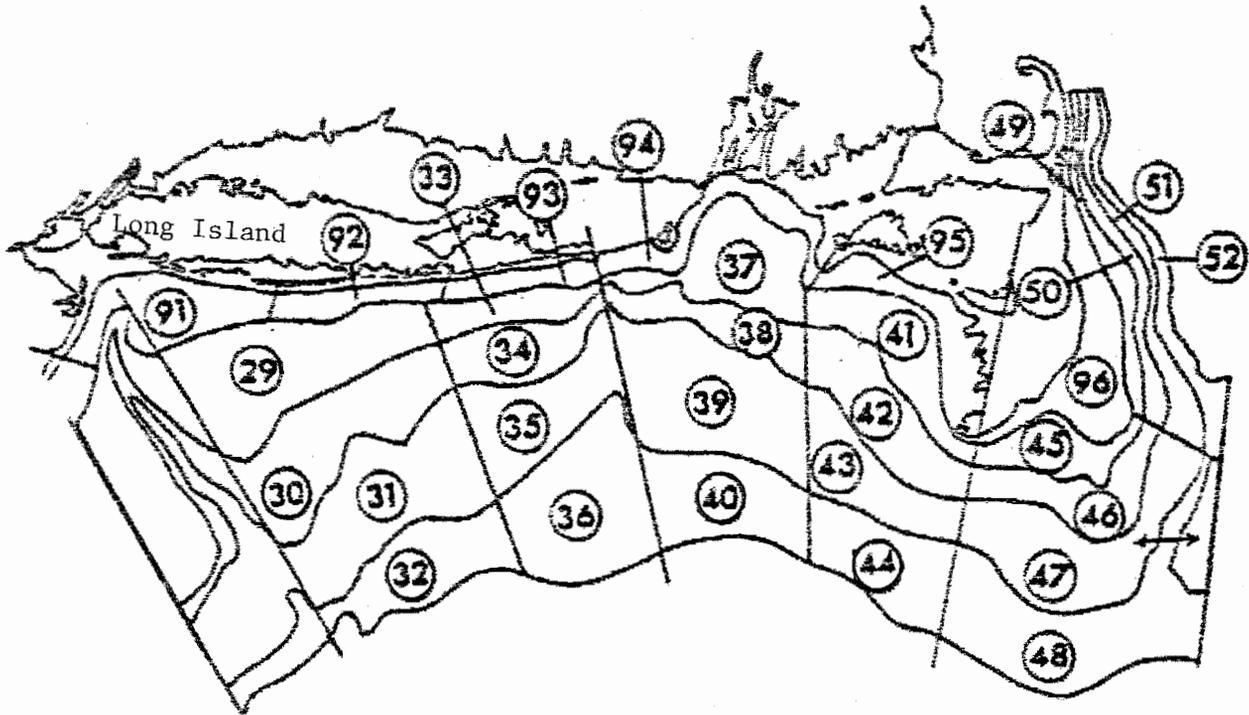


Figure 21

Ocean Shellfish Survey Strata, Hudson Canyon To Western Georges Bank



Offshore

Strata Number	Square Miles	Depth (fms)	Strata Number	Square Miles	Depth (fms)	Strata Number	Square Miles	Depth (fms)
29	1096	15-25	37	672	15-25	45	392	15-25
30	669	25-30	38	280	25-30	46	416	25-30
31	932	30-40	39	967	30-40	47	871	30-40
32	627	40-60	40	513	40-60	48	1109	40-60
33	363	15-25	41	602	15-25	49	244	15-25
34	203	25-30	42	343	25-30	50	150	25-30
35	601	30-40	43	432	30-40	51	139	30-40
36	694	40-60	44	383	40-60	52	307	40-60

Inshore

91	340	5-15
92	191	5-15
93	83	5-15
94	229	5-15
95	446	5-15
96	495	5-15

Figure 22

Shell Length Frequency Distributions (%) Of Surf Clams Sampled From Southern New England, New Jersey, And Delmarva Waters During January - March 1977

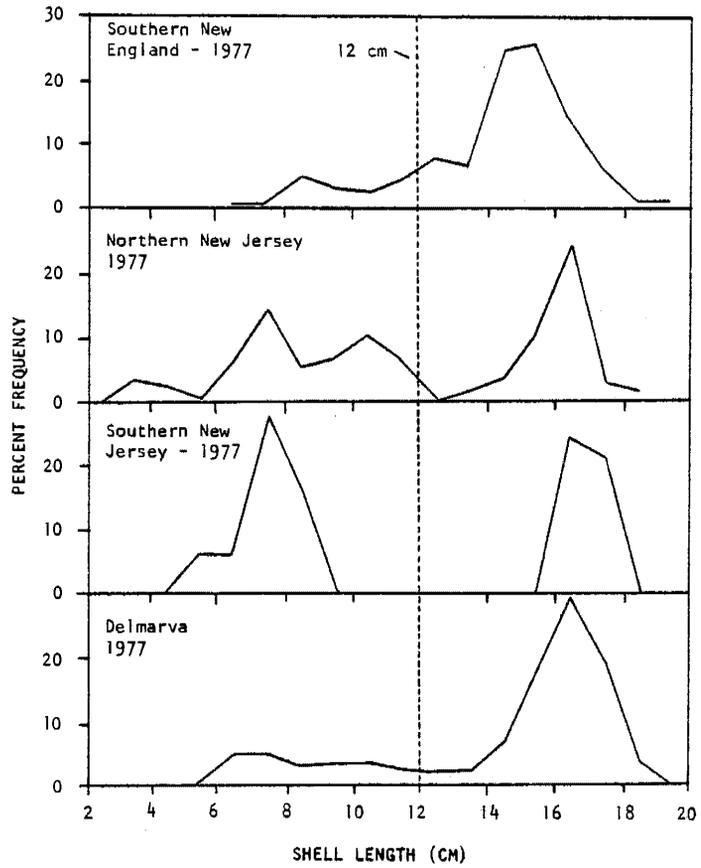
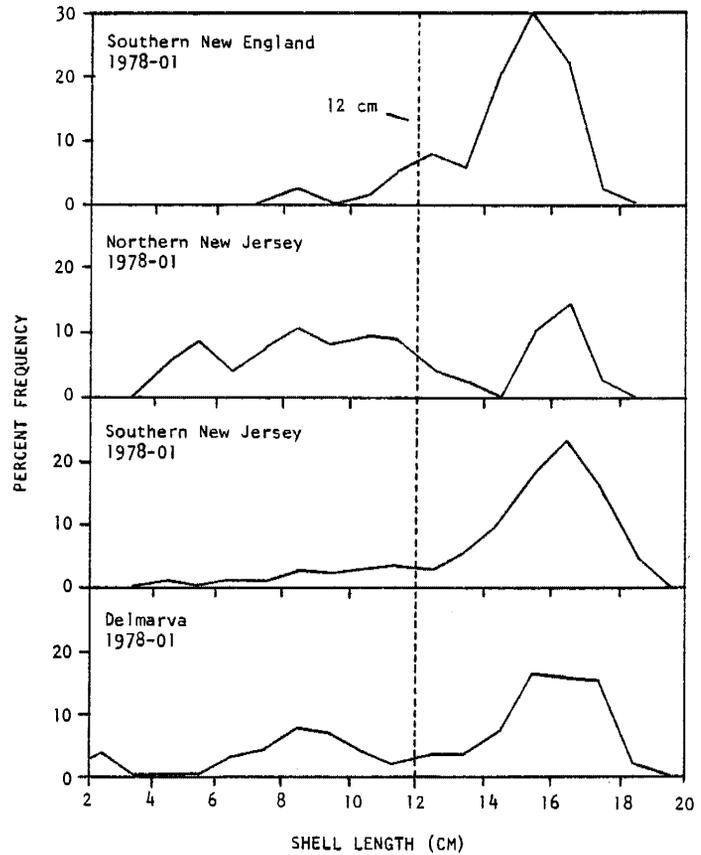


Figure 23

Shell Length Frequency Distributions (%) Of Surf Clams Sampled From Southern New England, New Jersey, And Delmarva Waters During January - February 1978



VI. DESCRIPTION OF HABITAT

VI-1. Condition Of The Habitat

No scientific information has been produced since the 1977 FMP was promulgated which would necessitate the revision or updating of this section.

VI-2. Habitat Areas Of Particular Concern

No scientific information has been produced since the 1977 FMP was promulgated which would necessitate the revision or updating of this section. However, the Environmental Protection Agency has requested that no fishing be permitted between 38°20'00"N to 38°25'00"N and 74°10'00"W to 74°20'00"W because the area is a sewage disposal area and between 38°40'00"N to 39°00'00"N and 72°00'00"W to 72°30'00"W because it is a toxic industrial waste site (W. E. Stickney, EPA, personal communication).

VI-3. Habitat Protection Programs

No special habitat protection programs exist in the habitat of the surf clam and ocean quahog species that are the subjects of this plan. Sampling for pollution is carried out by both the NMFS and the Environmental Protection Agency and within the territorial sea by various state agencies. Habitat protection programs are administered by a variety of Federal agencies including the Bureau of Land Management of the Interior Department, the Coast Guard, and the Environmental Protection Agency. The States in the region with approved Coastal Zone Management Programs are Maine, Massachusetts, Rhode Island, part of New Jersey, Maryland, and North Carolina.

Studies on the effects of ocean dumping are recommended in Section XVI.

VII. FISHERY MANAGEMENT JURISDICTION, LAWS, AND POLICIES

VII-1. Management Institutions

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

VII-2. Treaties And International Agreements

No treaties of international agreements exist relative to surf clam or ocean quahog.

VII-3. Federal Laws, Regulations, And Policies

The only known Federal law that regulates the management of the surf clam and ocean quahog fisheries is the FCMA. The Water Pollution Control Act, as amended, is important in maintaining the habitat of surf clam and ocean quahog. Federal law provides for financial assistance for commercial fisheries. Part 251, Title 50, Code of Federal Regulations, sets forth this program as operated by the NMFS. On July 12, 1977, the NMFS issued a final rulemaking establishing conditional fisheries status in the surf clam fishery. This means that financial assistance in that fishery will be limited to that which does not significantly increase harvesting capacity. No Indian treaty rights are known to exist relative to this fishery.

VII-4. State Laws, Regulations, And Policies

The State of New Jersey has managed its surf clam resources within its territorial sea since 1975. These regulations, as modified in 1976, are discussed in Section VIII-2, and a copy of these regulations appears in Appendix II of this amended FMP.

The State of New York has many regulations governing the harvest and disposition of clams in general from its territorial sea, and the New York State Department of Environmental Conservation has proposed a management plan specifically for inshore surf clams. This proposal is discussed in Section VIII-2.

Several New England States have statutes that empower towns to regulate the harvest of shellfish to the limit of their territorial seas. The details of these statutes are not available at this time. None of these towns, however, has promulgated regulations which constitute "management plan" for either surf clam or ocean quahog. In addition, all states within the range of either species have various statutes or regulations governing the harvesting, disposition, etc., of shellfish in general within state waters. These regulations are principally concerned with the prohibition of taking shellfish from polluted waters and time and location limitations on fishing to help enforce these regulations.

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

Information on the New England town laws that regulate shellfish harvesting to the limit of the territorial sea is not available at this time (see Section VII-4). No other local or other laws, regulations, or policies which specifically address the surf clam or ocean quahog fisheries are known to exist.

VIII. DESCRIPTION OF FISHING ACTIVITIES

VIII-1. History Of Exploitation

Overview of the Surf Clam Industry¹

As early as 1634 it is reported that American Indians roasted surf clams that washed ashore on Virginia beaches. Clams were also used as livestock feed and fertilizer by the early English settlers. The surf clam industry began around 1870 as a New England bait fishery which supplied the groundfish fleet.

Production between the 1870s and 1929 did not exceed 3,000 barrels of salted surf clams per year. In 1929 power boat dredging with scrape type dredges began, and from that date through 1942 landings did not exceed 2 million pounds of meats per year.

Increased demand for food during World War II led to the use of surf clam meats for human consumption. An early constraint to increasing this market was the inability of processors to remove sand from surf clam meats. The development of an effective drum washer in 1943 solved this problem.

Harvesting efficiency was improved with the development of the hydraulic jet cage dredge in 1945. Apparently, most of the surf clam industry entered the field of food processing around 1946. Hand methods of processing surf clam continued until the development of automatic shucking machines in the early 1970s. The machines supplemented hand processing and streamlined the harvesting, processing, and marketing sectors of the industry.

Surf clam harvests in the 1940s began off New York and concentrated in this area from 1945 through 1954 (Figure 20). Surf clam meat was much cheaper and more readily obtainable than hard- or soft-shelled clam meat, and surf clam had better consumer acceptance than ocean quahog meat. The major producers of prepared clam products began to utilize surf clam meat exclusively, and the major surf clam processing companies began to increase their own production of prepared clam products.

Of particular significance to the industry was the discovery of extensive and densely populated surf clam beds off the New Jersey coast around 1950 (Figure 20). A few surf clams were also landed from beds off Delaware and Maryland during 1951 to 1960, but until 1966 the New Jersey beds provided the resource base for the industry. During this period, gear modifications and improvements increased harvesting efficiency and thus clam yield, to a point where daily vessel quotas were imposed by processing plants whose capacities were limited.

Overview of the Ocean Quahog Industry

The ocean quahog resource is considered large, but until recent years was virtually ignored by domestic commercial fishermen. The ocean quahog industry began in Rhode Island around 1943 when the war food program attempted to develop red meat substitutes. After the war, ocean quahog meats were used as inexpensive substitutes for more expensive hard and soft shelled clam meats, but the dark color and strong flavor of the meats proved to be major deterrents to successful marketing. After the Rhode Island fishery landed 1.5 million pounds of meats in 1946, this industry declined to low levels due to increased production in the surf clam fishery.

(1) The historical overview draws on a study of the US clam industries by T. Ritchie, University of Delaware.

In the early 1970s, ocean quahog landings accounted for only about 1% of the total weight and less than 1% of the total ex-vessel value, annually, of all clams landed in the US. Since 1976, however, landings of ocean quahog have increased dramatically. This increase is directly related to (a) the decline of surf clam abundance, coupled with the effects of federal quota management, (b) significantly increased price of surf clam meats, and (c) technological advances in the processing industry which have reduced marketing problems associated with the flavor and color of quahog meats. It is estimated that the 1977 commercial harvest of ocean quahog accounted for almost 20% by weight and 7.5% by ex-vessel value of all clams harvested commercially in the US.

VIII-2. Domestic Commercial And Recreational Fishing Activities

Surf Clam

Table 13 shows the weight and Table 14 the ex-vessel value of surf clam landings by state from 1950-1978. In most cases, these data were originally collected as bushels of clams landed and were converted to pounds of meats based on a factor of 17 pounds per bushel. Surf clam landings in New England have traditionally been converted to pounds of meats using a factor of 11 pounds/bushel. (The larger factor approximates the weight of the complete shucked meats; the smaller factor approximates the meat weight per bushel which is used by the processing plants.) In Table 13, therefore, New England surf clam landings are given in 17 pounds per bushel form, in order to facilitate comparisons with the Mid-Atlantic fishery.

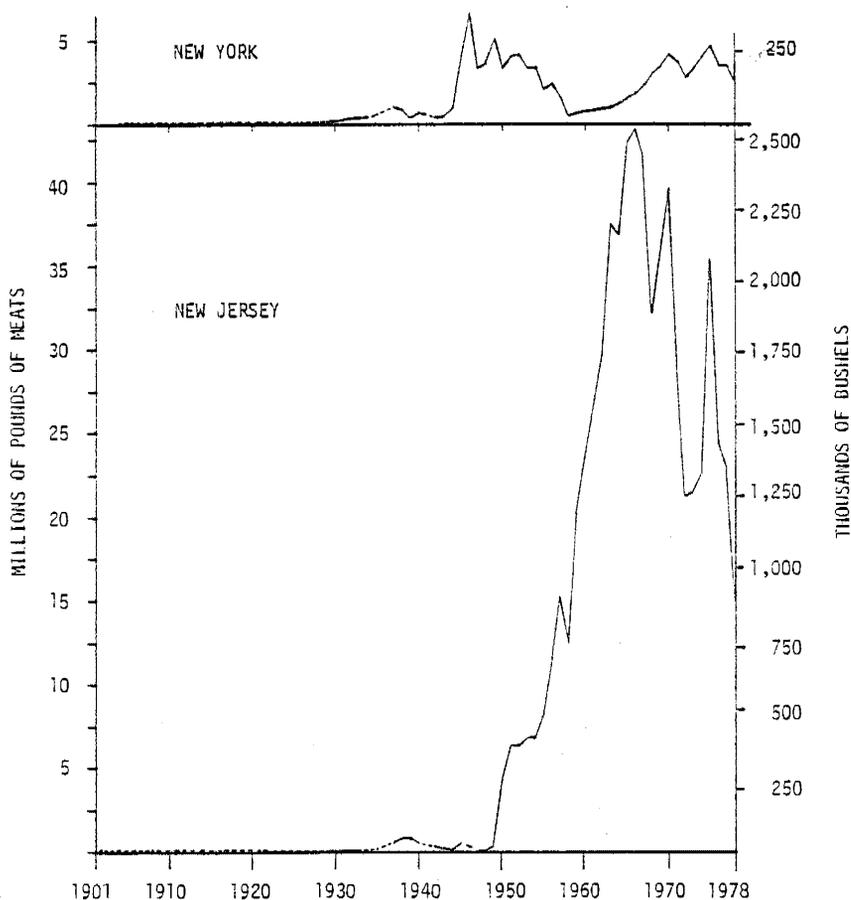
Some gross trends in the fishery evident from Tables 13, 14, and 16, and Figures 24, 26, and 27 are the growth of the fishery in the New York Bight (New York and New Jersey landings), the shift in effort to beds off Virginia, the decline in New Jersey landings in recent years, and the steep increase in value of surf clam since 1976.

The surf clam fleet has usually concentrated its efforts in one area until the catch rate began to decline, and then has moved to more productive grounds. The decreasing abundance of surf clam off New Jersey and the 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, which greatly increased the capacity of processing plants, coupled with the expansion of the fishing grounds, resulted in ever-increasing surf clam landings beginning around 1970. A peak catch of over 96 million pounds of meats (roughly, 5,647,060 bushels) was recorded in 1974, about 2.5 times the weight landed only a decade earlier.

After 1974, surf clam landings began to decline rapidly, to approximately 49 million pounds in 1976, the last full year without federal management of the offshore resource and fishery. The Surf Clam and Ocean Quahog FMP was implemented by the Secretary of Commerce in November, 1977, and the slight increase in total surf clam landings that year, to about 52 million pounds, was undoubtedly due at least in part to greatly increased effort by the industry (aggravated by the significant increase in the number of vessels which entered the fishery that year) in anticipation of the stringent quota management and the vessel moratorium imposed by the FMP.

The Surf Clam and Ocean Quahog FMP stipulated an Optimum Yield of 1.8 million bushels (about 30 million pounds of meats) for calendar year 1978 in the Fishery Conservation Zone. Actual reported landings in 1978 totalled about 39.5 million pounds (preliminary estimate). The difference between actual landings and the quota is attributable to surf clam landings in the territorial sea (i.e., 4+ million pounds from inshore New Jersey waters, 2.4 million pounds from inshore New York waters, and about 800,000 pounds from inshore New England waters) and inadvertent overruns of the quota in the FCZ fishery.

Surf clam (and ocean quahog) landings data presented in this FMP do not include, to any reliable extent, catches by gear other than dredges. As discussed below, those states which have significant surf clam beds within their territorial seas have relatively small but traditional hand gear (i.e., tongs, rakes, etc.) fisheries for surf clam. Such fisheries exist mainly in New York and New England. It is possible that almost all of this catch is used for bait, although documentation of the magnitude and disposition of these catches is largely nonexistent. It is highly probable, however, that the landings by these local fisheries are negligible in comparison with those by the dredge fleet.



Reported Surf Clam Landings In New York And New Jersey, 1901-1978
 (Dashed Lines Indicate Missing Data Years)
 (From McHugh and Williams, 1976, and NMFS statistics)

Figure 24

Table 13. Surf Clam Landings by State
(Thousands of Pounds of Meat)

<u>Year</u>	<u>New York</u>	<u>New Jersey</u>	<u>Delaware</u>	<u>Maryland</u>	<u>Virginia</u>	<u>New England</u>	<u>Total#</u>
1950	3286	4298		130		43	7757
1951	4046	6420		1532		34	12032
1952	4138	7418		1089		5	12650
1953	3345	6578		2454			12377
1954	3360	6877		1346		359	11942
1955	2026	8278		1695		36	12035
1956	2368	11583	2	1850		190	15993
1957	1599	15224	192	934		6	17955
1958	429	12462	780	792		2	14665
1959	514	20164	1705	850		3	23236
1960	722	23448	478	420		5	25073
1961	722	26697		71		19	27509
1962	840	29830	99	75		15	30859
1963	974	37548		64			38586
1964	1218	36875		38		20	38151
1965	1505	42307		275		1	44088
1966	1840	43174		64		55	45133
1967	2305	41589		1149		25	45068
1968	3008	32181		5328	17	28	40562
1969	3431	36039	2757	7127	208	20	49582
1970	4182	39669	8734	13681	889	253	67408
1971	3688	28721	7694	7752	4507	268	52630
1972	2713	21332	8551	7330	23384	249	63559
1973	3319	21588	6630	7448	43323	96	82404
1974	3951	22657	5817	5426	58219	63	96133
1975	4580	35550	2315	5351	39088	110	86994
1976	3455	24378		7135	14064	165	49217
1977	3425	23130		8393	15791	1055	51794
1978*	2399	15133		8367	12758	812	39469

Source: Fishery Statistics of the US and unpublished NMFS Data

* Preliminary

Includes Any Unallocated Catches

Note: FMP in effect during 1978.

Table 14. Ex-Vessel Value of Surf Clam Landings
(Thousands of Dollars)

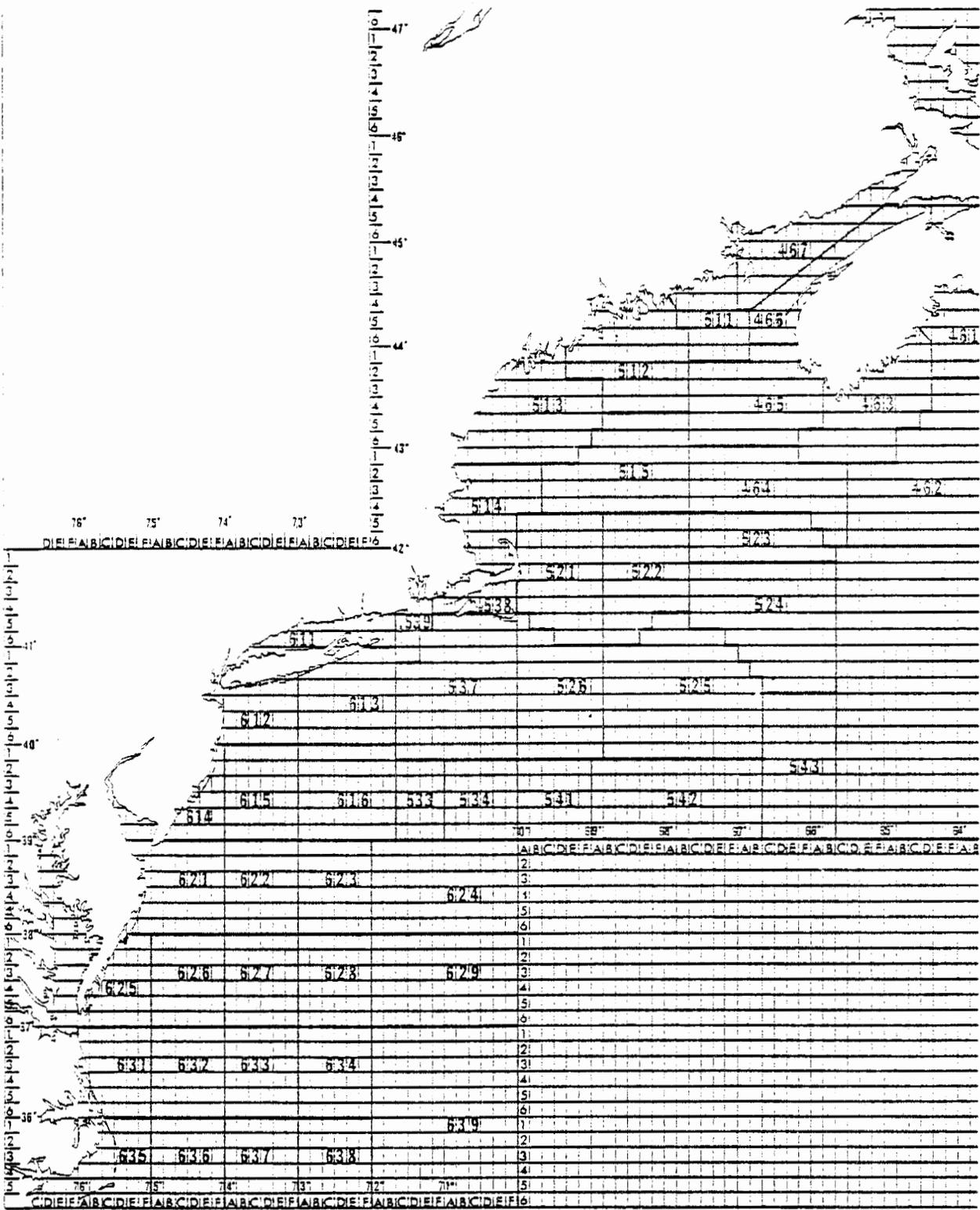
<u>Year</u>	<u>New York</u>	<u>New Jersey</u>	<u>Delaware</u>	<u>Maryland</u>	<u>Virginia</u>	<u>New England</u>	<u>Total#</u>
1950	331	416		11		8	766
1951	422	622		138		6	1188
1952	431	802		174		1	1408
1953	418	790		204			1412
1954	420	844		168		26	1458
1955	253	967		141		4	1365
1956	306	1277	(1)	173		26	1782
1957	220	1867	18	134		1	2240
1958	69	1317	93	93		(1)	1572
1959	61	1622	170	70		1	1924
1960	85	1546	48	34		(1)	1713
1961	65	1693		6		2	1766
1962	76	1917	9	6		2	2010
1963	91	2580		5			2676
1964	109	2504		3		3	2619
1965	127	3048		22		(1)	3197
1966	148	3714		6		8	3876
1967	190	4051		106		5	4352
1968	295	3299		536	2	5	4137
1969	390	4278	324	894	24	3	5913
1970	490	4685	935	1475	110	35	7730
1971	438	3877	1030	981	527	38	6891
1972	313	2780	1132	1151	2528	37	7941
1973	413	2709	780	1167	4777	20	9866
1974	719	2948	770	939	6836	13	12225
1975	768	4721	362	1011	5682	26	12570
1976	1089	10819		3829	7545	64	23355
1977	1108	11784		4703	8684	455	26735
1978*	776	7503		4914	7384	unknown	20577+

Source: Fishery Statistics of the United States, and unpublished NMFS data.

Includes any unallocated catches

(1) Less than \$500

* Preliminary estimates



Partial Illustration Of NMFS Statistical Water Areas
 For The Northwest Atlantic Ocean (See Table 15)

Figure 25

Table 15. Surf Clam Catches By Water Area¹, 1974-1977
(Pounds of Meats)

<u>Water Area (Name or Coded Area)</u>	<u>1974</u>	<u>1975</u>	<u>1976</u>	<u>1977</u>
Inshore Massachusetts Waters ²	20,700	47,000	68,057	299,035
Atlantic Ocean Off Massachusetts ³	-	-	17,325	185,284
Inshore Rhode Island Waters ⁴	20,200	24,000	21,100	198,200
Area 612	4,314,700	4,705,300	3,573,600	3,680,000
Area 614	11,930,500	32,986,900	13,376,400	7,277,000
Area 615	3,054,200	1,839,500	2,288,400	423,500
Area 621	18,552,100	8,263,100	15,728,900	23,567,100
Area 625	860,800	650,100	1,730,500	11,481,200
Area 626	-	-	298,100	3,377,400
Area 631	57,358,600	38,438,200	12,035,600	932,500
Atlantic Ocean (unspecified)	-	-	20,400	-
Total	96,111,800	86,954,100	49,158,482	51,421,219

Source: NMFS Unpublished Statistics

(1) See Figure 25

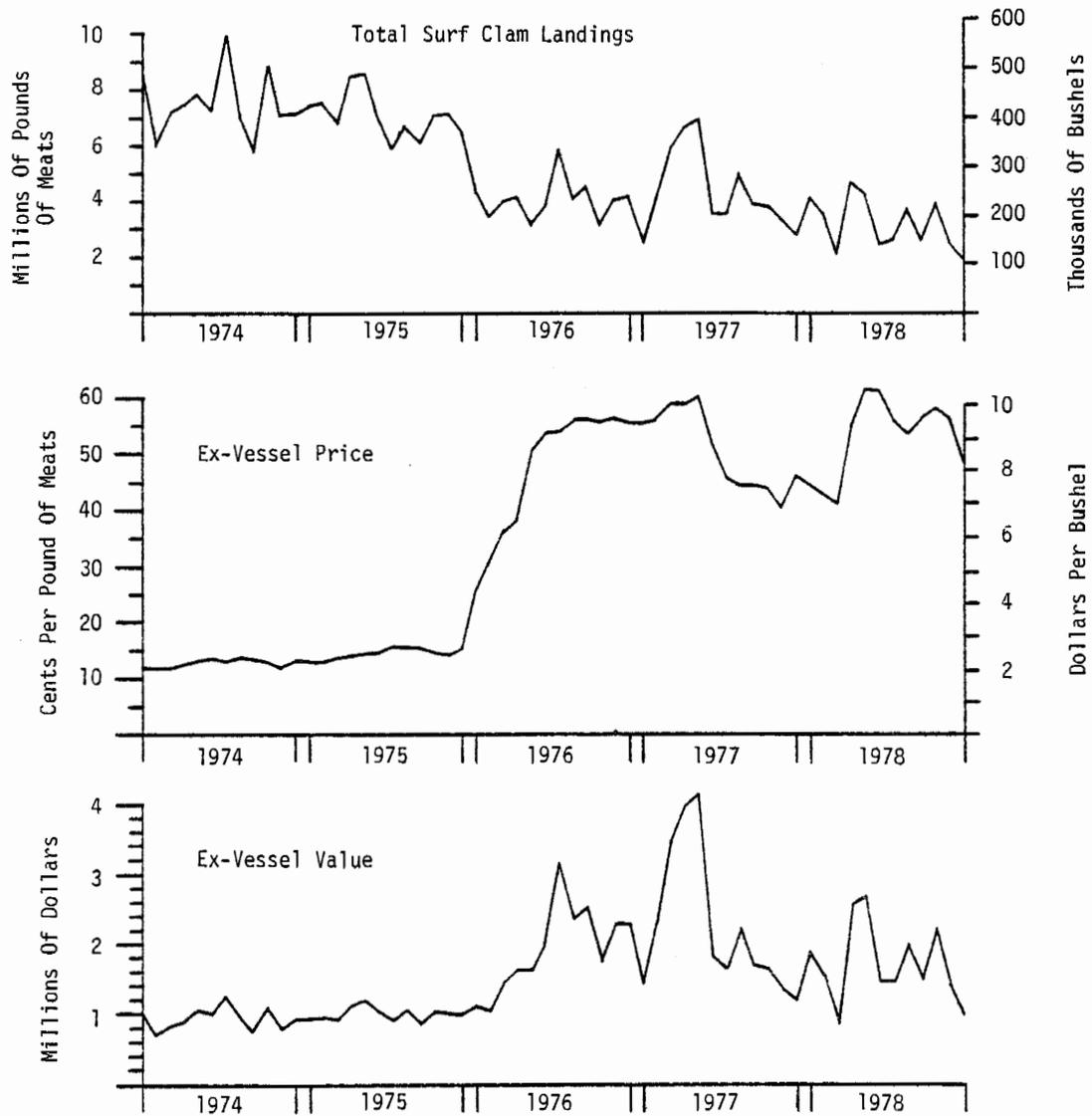
(2) Includes Buzzards Bay, Cape Cod Bay, Nantucket Sound and Vineyard Sound

(3) Atlantic Ocean waters within the territorial sea in 1976, and beyond the territorial sea in 1977

(4) Includes Block Island Sound, Long Island Sound, Sakonnet Point, and Atlantic Ocean waters within the territorial sea.

Table 16. Surf Clam Landings by State and Water Area, 1974 - 1977
(Landings in Pounds of Meats)

<u>Year</u>	<u>Territorial Sea</u>	<u>Conservation Zone</u>	<u>Total</u>	<u>Average \$/lb.</u>
MASSACHUSETTS				
1974	31,991	-	31,991	0.27
1975	72,636	-	72,636	0.27
1976	131,954	-	131,954	0.41
1977	462,145	286,348	748,493	0.46
RHODE ISLAND				
1974	31,218	-	31,218	0.13
1975	37,091	-	37,091	0.18
1976	32,764	-	32,764	0.29
1977	306,309	-	306,309	0.37
NEW YORK				
1974	3,951,200	-	3,951,200	0.18
1975	4,579,600	-	4,579,600	0.17
1976	3,454,800	-	3,454,800	0.32
1977	3,425,000	-	3,425,000	0.32
NEW JERSEY				
1974	12,165,300	10,491,500	22,656,800	0.13
1975	28,745,800	6,804,100	35,549,900	0.13
1976	3,038,800	21,338,900	24,377,700	0.44
1977	4,345,300	18,784,400	23,129,700	0.51
DELAWARE				
1974	-	5,817,400	5,817,400	0.13
1975	1,712,100	602,500	2,314,500	0.16
1976	-	-	-	-
1977	-	-	-	-
MARYLAND				
1974	-	5,426,100	5,426,100	0.17
1975	-	5,350,700	5,350,700	0.19
1976	-	7,134,800	7,134,800	0.54
1977	-	8,392,900	8,392,900	0.56
VIRGINIA				
1974	5,524,600	52,694,800	58,219,400	0.12
1975	7,575,500	31,512,800	39,088,300	0.15
1976	-	14,064,200	14,064,200	0.54
1977	-	15,791,100	15,791,100	0.55
NORTH CAROLINA				
1974	-	-	-	-
1975	-	-	-	-
1976	-	20,400	20,400	0.47
1977	-	-	-	-



Total Landings, Average Ex-Vessel Price, And Total Ex-Vessel Value
 Of Surf Clam By Month, 1974-1978 (Excluding Massachusetts)
 (One Bushel = 17 Pounds Of Meats)

Figure 26

Surf Clam Landings By State By Month, 1974-1978

(One Bushel = 17 Pounds Of Meats)

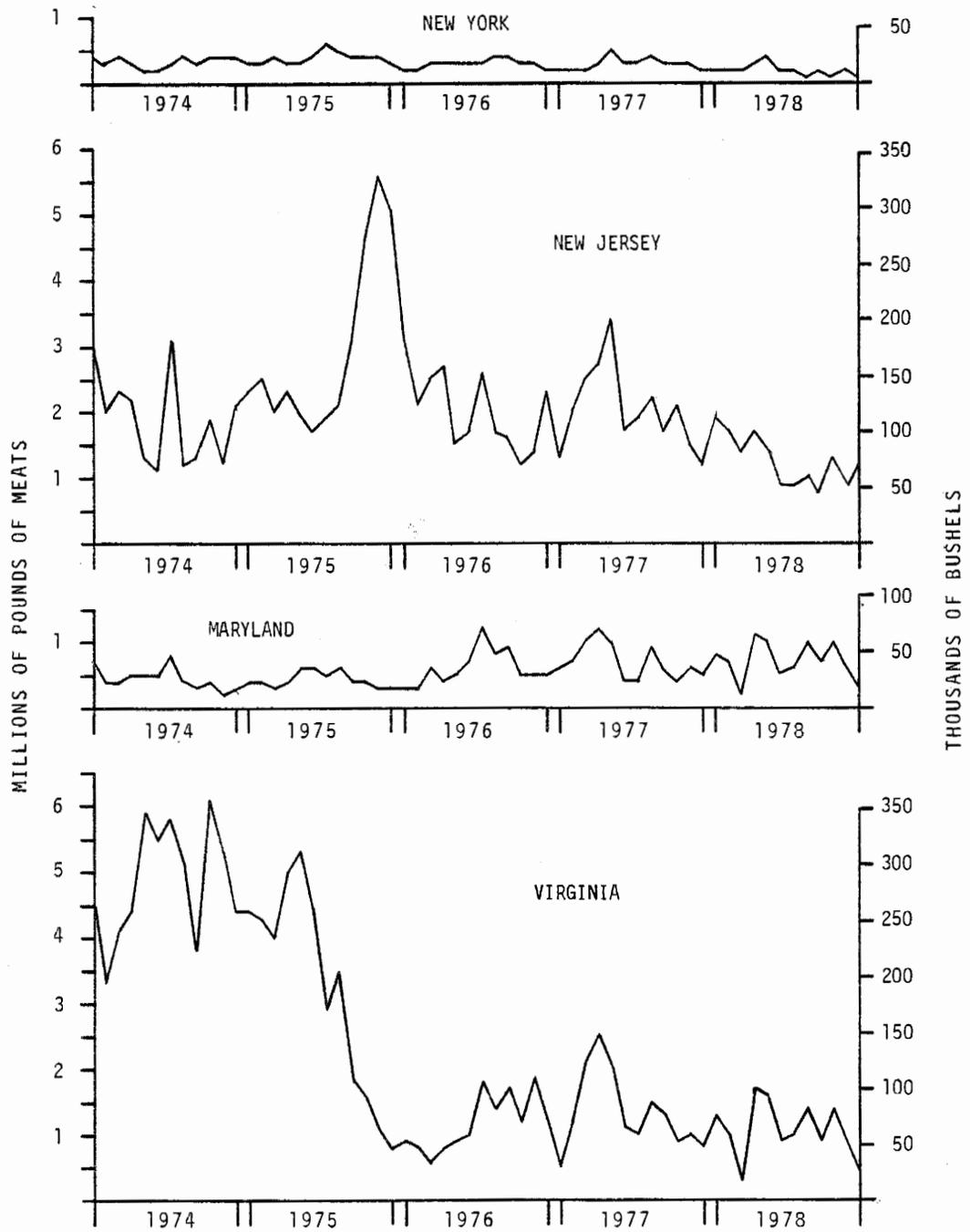


Figure 27

Territorial Sea Surf Clam Fisheries

New York State Surf Clam Fishery

The fishery for surf clam in New York is similar in many respects to the fishery in New England. Almost all surf clams landed in New York are taken in the territorial sea and an unknown, but probably significant, fraction of the catch is used for bait.

Surf clams are landed in Kings (Brooklyn), Nassau, and Suffolk Counties, although no catch statistics are available for the Suffolk fishery. The fishery in Brooklyn harvests surf clams from uncertified (i. e., not approved for the taking of shellfish for human consumption) waters for use as bait, primarily to supply the party and charter boats in that area.

Four boats in Nassau County supply surf clams that are processed into products for human consumption. Landing statistics for this component of the State fishery are unavailable. A total of five boats in Brooklyn and Nassau are licensed by the State for the harvesting of bait clams from uncertified waters. At least several of these vessels (in the bait and food fisheries) possess federal permits for the FCZ fishery.

In 1978, 12 vessels (19 in 1977) were permitted by the New York State Department of Environmental Conservation (NYS DEC) to harvest surf clam by "mechanical means" in non-Atlantic Ocean waters (i. e., Gardiners and Peconic Bays, Long Island Sound, etc.). These are mostly small vessels (e.g., 30 to 40 feet in length) which harvest surf clam with hydraulic bucket dredges on a seasonal basis. The average blade length for this gear is probably no greater than 20 inches. Probably all of the surf clam catch taken by these vessels is sold for bait, although the DEC does not forbid the use of these clams for human food. The vessels probably are active in the surf clam fishery only during those months when demand for bait is strong. The number of vessels which participate in this fishery is probably dependent on the price and availability of surf clam relative to that for finfish. None of these vessels harvests surf clam in the FCZ, and few, if any, possess a federal permit for the FCZ fishery at present (NYS DEC, personal communication).

An unknown number of State residents harvest an unknown quantity of surf clams with hand gear (tongs) in Suffolk County. This catch is undoubtedly used entirely for bait, and most of it is sold to local bait dealers (NYS DEC, personal communication).

The New York State DEC is currently developing a management plan for its inshore surf clam (Spisula solidissima and Spisula polynyma) fishery. The proposed regulations, if adopted, will not set a territorial sea optimum yield or other quota, but specify (among other provisions) that:

- (a) No person shall fail to land surf clams in the State of New York when such surf clams were harvested from shellfish lands in the marine district.
- (b) No person shall use a dredge for the harvesting of surf clams in the marine district unless both the blade and the manifold of such dredge have lengths of 72 inches or less.
- (c) No person engaged in the harvesting of surf clams in the marine district shall fail to maintain a complete, accurate, and up to date log.

While no controls on entry into the State fishery are proposed, provision (b) above should discourage the development of a large scale fishery in State waters. The largest dredge size currently in use in the New York territorial sea (the marine

district) is 72 inches.

New Jersey Inshore Surf Clam Fishery

Figure 28 shows estimated landings of surf clam from the New Jersey territorial sea versus total New Jersey surf clam landings from 1965 - 1977. Over this period, about 31% of State surf clam landings have come from within three miles of shore. Surf clam from these inshore areas, however, have traditionally been valued less than offshore surf clam (primarily because of the smaller size and meat yield per bushel of inshore clam). From 1974 - 1977 (the only years for which these data are available), inshore New Jersey clam accounted for 46% by weight and 25% by ex-vessel value of the total State surf clam landings. In 1977, the average dockside prices per bushel for inshore and offshore surf clams in New Jersey were about \$6.32 and \$9.20, respectively.

In 1976, the State of New Jersey initiated a comprehensive management plan for its inshore surf clam fishery, the only state to do so to date. This fishery is regulated under New Jersey Administrative Code 725-12.1, under the authority of New Jersey Statutes Annotated 50:2-6.3 (Appendix II). This management program provides for separate but complementary regulation of the two components of this fishery, the bait fishery (i.e., for surf clams from waters not certified for the taking of shellfish for human consumption) and the "commercial" (i.e., food) fishery.

The most important features of the New Jersey management program for the "commercial" clam fishery (by far the biggest component of the inshore industry, although comparative landings data are unavailable) are (1) a ceiling on the number of vessels licensed to harvest surf clam, (2) a seasonal (December-April) quota of 250,000 bushels, (3) a weekly catch limitation per vessel of 500 bushels, and (4) a dredge size limitation of 60 inches. No limitation is placed on the number of vessels which may fish bait clam, nor are there seasonal or weekly catch restrictions on such harvests. Regulations which apply to both segments of the inshore industry include (1) a landings tax of \$0.05 per bushel, (2) logbook reporting requirements, and (3) a yearly license fee of \$5.00 per gross ton of vessel. New Jersey does not require reporting by surf clam processors.

Virtually all of the vessels licensed for the inshore New Jersey fishery possess federal permits for the FCZ surf clam fishery. Based on the number of licensed (as opposed to active) vessels, the inshore New Jersey fleet accounts for about one-third by number of all vessels licensed for the FCZ surf clam fishery. Table 18 gives physical characteristics of the inshore New Jersey fleet (compare to Table 25).

Two provisions of the New Jersey management program which may have significant economic impacts on the overall State fishery are the fishing season and the dredge size limitation. Taken together, these provisions probably favor small vessels (e.g., less than 50 tons) operators, since a small vessel (1) is less able than a large vessel to fish offshore areas during winter (bad weather) months, (2) can most likely operate a 60 inch dredge more economically than a large vessel (which should have greater fixed and variable costs and which may be forced to change dredges frequently, depending on intent to work inshore or offshore beds), and (3) is guaranteed that large vessels will not harvest the inshore quota at a rate significantly greater than 500 bushels per week per boat. Data in Chapter IX illustrate the relative performance of the inshore New Jersey fleet in the FCZ surf clam and ocean quahog fisheries.

Table 17. New Jersey Inshore Surf Clam Licenses, 1974-1979

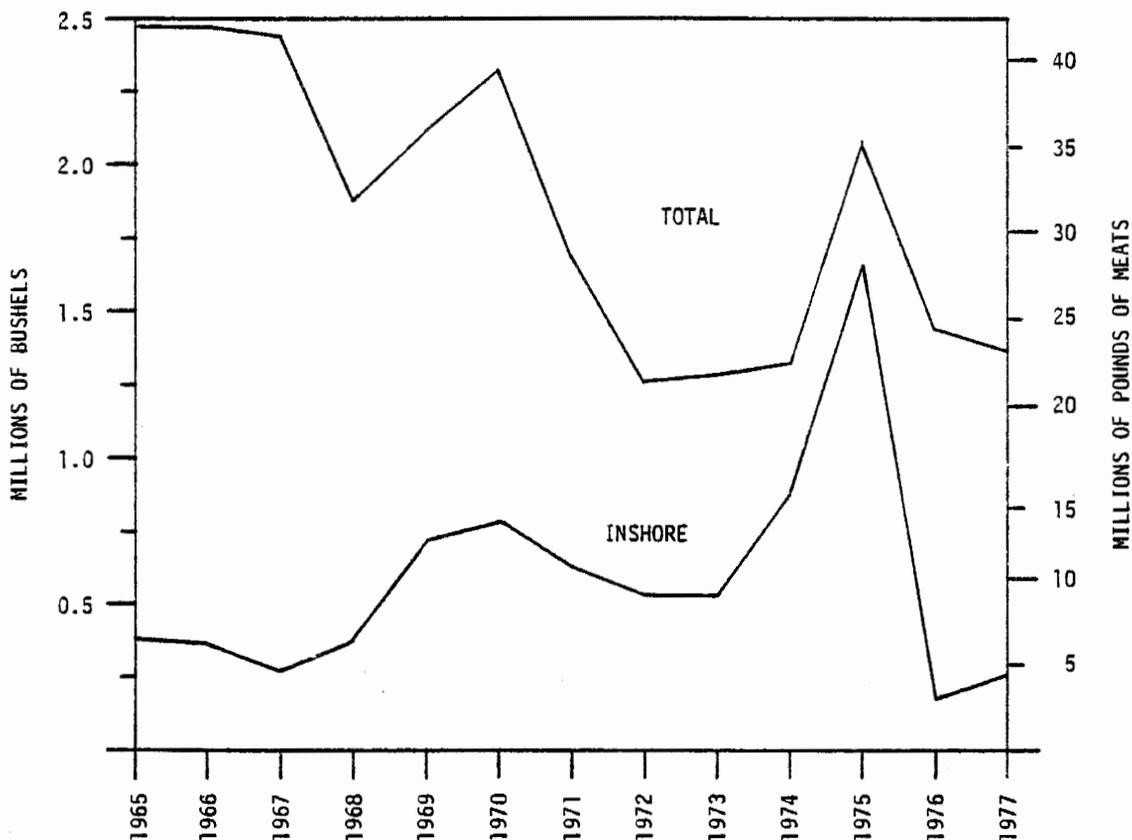
<u>Year</u>	<u>Commercial</u>	<u>Bait</u>	<u>Commercial and Bait</u>	<u>Total</u>
1974	44	3	0	47
1975	54	11	0	63
1976	48	19	2	67
1977	51	4	2	57
1978	60	5	3	63
1979	56	6	4	61

Table 18. Size Distribution of Vessels Licensed for the Inshore New Jersey Surf Clam Fishery, 1979, By Tonnage Class (Food Fishery Only)

	<u>Class I (0-50 GRT)</u>	<u>Class II (50-100 GRT)</u>	<u>Class III (101+ GRT)</u>
Number	15	29	11
% of Total	27	53	20
Average Tonnage	39	78	131
Average Tonnage, Fleet		78	

Figure 28

New Jersey Surf Clam Landings By Water Area, 1965-1977
(One Bushel = 17 Pounds Of Meats)



New England Surf Clam Fishery

Reported landings of surf clams in New England by weight and ex-vessel value are given in Tables 13 and 14. Since 1950, reported New England landings have accounted, on average, for less than 1% of the total weight and ex-vessel value of total US surf clam landings (varying from 0.3% to 3.0%, by weight, over that period). The New England fishery is conducted almost entirely within the territorial sea (Table 15) (as is the New England ocean quahog fishery), and, as a significant dredge fishery, exists only in Massachusetts and Rhode Island (Table 16). From 1964-1978, reported surf clam landings in Massachusetts and Rhode Island have averaged just over 100,000 pounds of meats per year in each State, although the Rhode Island fishery did not begin until 1970.

Table 19 gives the reported landings in these States by fishing gear from 1964-1974 (the latest year for which these data are available). Only surf clams taken by dredges have been reported in official fishery statistics for Rhode Island, although it is quite possible that small amounts are also taken by hand (i. e., rakes, hoes, etc.) gear. Surf clams caught by dredges and landed in Rhode Island are used almost entirely for products for human consumption.

From 1964-1974, approximately 16%, on average, of the reported landed weight of surf clams in Massachusetts has been taken by hand fishing gear. This figure may be an underestimate, however, since catches by such gear cannot easily be documented by NMFS port agents. It is probable that almost all of the surf clams taken with this kind of equipment is used for bait.

Surf clams are also harvested with hand fishing gear, in unknown quantities, in the other New England States, but these catches have never been recorded in official fishery statistics, and are undoubtedly negligible compared to reported New England landings. A small-scale dredge fishery for surf clams was begun in Maine in 1978, but this must, at the present time, be regarded as an experimental venture.

Landings by the New England surf clam dredge fishery have increased greatly in the last few years, and this is undoubtedly due at least in part to the significant increase in the price of surf clams over the same period, although the average ex-vessel price in New England is significantly less than in the mid-Atlantic offshore fishery. As Table 16 indicates, the average ex-vessel price per pound for New England surf clams (overall) is similar to that for inshore surf clams in New York and that paid for surf clams from inshore New Jersey beds (Section VIII-2).

As Table 13 indicates, surf clam landings in New England have fluctuated proportionately more than landings by the mid-Atlantic surf clam fishery. This is undoubtedly due at least partially to the fact that many New England fishermen are active in the surf clam fishery on a seasonal or part-time basis only. Fluctuations in New England landings may not reflect surf clam abundance or availability so much as they do availability of other species. Most of the New England vessels which harvest surf clams are small vessels (compared to the mid-Atlantic fleet), and many are inshore lobster vessels, especially in Massachusetts. It is unknown at the present time how many vessels harvest surf clam or ocean quahog in inshore New England waters, but less than 20 New England vessels currently have permits for the fishery in the FCZ (i. e., about 10% of all permitted vessels).

The New England surf clam resource and fishery are clearly distinct from those in the mid-Atlantic. No significant (i. e., commercially exploitable) beds of surf clams have ever been found in offshore New England waters, and it is extremely unlikely that beds large enough to sustain a fishery at all comparable in magnitude to the mid-Atlantic fishery, even for a few years, exist.

Table 19. Reported New England Surf Clam Landings by State by Gear
1964-1977

(Rounded to the nearest hundred pounds, ten dollars,
and one cent, where appropriate)

Year		Massachusetts				Rhode Island
		Total	Dredges	Rakes	Hoes	Total
1964	Pounds	20,200	16,800	3,400	-	-
	Dollars	2,780	2,480	300	-	-
	\$/Pound	0.14	0.15	0.09	-	-
1965	Pounds	900	-	-	900	-
	Dollars	150	-	-	150	-
	\$/Pound	0.16	-	-	-	-
1966	Pounds	54,600	53,600	-	900	-
	Dollars	8,030	7,880	-	150	-
	\$/Pound	0.15	0.15	-	0.17	-
1967	Pounds	24,700	24,700	-	-	-
	Dollars	4,500	4,500	-	-	-
	\$/Pound	0.18	0.18	-	-	-
1968	Pounds	28,300	18,100	-	10,200	-
	Dollars	5,060	2,660	-	2,400	-
	\$/Pound	0.18	0.15	-	0.24	-
1969	Pounds	20,200	18,100	1,900	300	-
	Dollars	3,150	2,660	440	50	-
	\$/Pound	0.16	0.15	0.23	0.17	-
1970	Pounds	133,700	121,500	-	12,200	119,000
	Dollars	18,970	16,070	-	2,900	15,840
	\$/Pound	0.14	0.13	-	0.24	0.13
1971	Pounds	28,300	15,000	3,100	10,200	239,200
	Dollars	5,420	2,270	840	2,310	32,260
	\$/Pound	0.19	0.15	0.27	0.23	0.13
1972	Pounds	47,000	40,400	2,300	4,300	202,300
	Dollars	10,140	8,400	770	980	27,270
	\$/Pound	0.22	0.21	0.33	0.23	0.13
1973	Pounds	69,400	48,500	1,200	19,600	26,400
	Dollars	16,690	10,650	320	5,710	3,610
	\$/Pound	0.24	0.22	0.27	0.29	0.14
1974	Pounds	32,000	31,100	900	-	31,200
	Dollars	8,650	8,380	280	-	3,920
	\$/Pound	0.27	0.27	0.31	-	0.13

Ocean Quahog

The ocean quahog fishery was traditionally a small industry operated out of Rhode Island ports. The Mid-Atlantic ocean quahog fishery began in 1976 (in New Jersey) and has grown rapidly since that date (Tables 20 and 21 and Figure 29). The development of the fishery in this area is attributable to declining surf clam abundance, advances in ocean quahog processing technology, the relatively high value of surf clam, the effects of surf clam quota management under the Surf Clam and Ocean Quahog FMP, and the excess harvesting capacity of the Mid-Atlantic surf clam fleet. The 1978 total catch of ocean quahog, about 23 million pounds, was about 27 times greater than the catch five years earlier, and about 88% of the 1978 harvest was landed in Mid-Atlantic ports.

The New England ocean quahog fishery has been conducted almost entirely within the territorial sea, and only began to expand into offshore waters in 1977. About 88% of the 1977 New England quahog catch was taken in inshore waters. The New England fishery remains dominated by its Rhode Island component, which has been responsible for about 95%, on average, of all New England ocean quahog landings from 1973-1978.

Vessels from New Jersey dominate the Mid-Atlantic ocean quahog fishery. Ocean quahog fisheries are presently developing in Maryland and Virginia, but not in New York, which has never recorded any landings of this species. The Mid-Atlantic fishery has relied exclusively on offshore quahog beds.

The surf clam industry has created a strong market demand for prepared clam products. The supply of surf clam meat has decrease significantly in recent years, and the cost of surf clam meat has remained high (over \$10.00 per bushel, ex-vessel, during some months in 1978) despite the great increase in ocean quahog landings during the same period. The average dockside price for Mid-Atlantic ocean quahog in 1978 was just under \$3.00 per bushel. Processors are increasingly utilizing ocean quahog to the extent technically feasible in prepared clam products, although it is clear from the difference in value of the two species and from information from industry members that ocean quahog is not now (and may never be) completely substitutable for surf clam. Ultimately, the development of this industry will largely depend on future advances in processing technology, and the availability and relative costs of other clam meats from the east coast surf clam fishery and other areas.

Table 20. Ocean Quahog Landings (Pounds of Meats) by Distance from Shore
(water area)

	1977	1976	1975	1974
Landings 0-3 mi. (lbs.)	2,509,000	1,497,400	1,296,700	838,300
Ex-vessel value, 0-3 mi. \$	711,338	378,977	248,385	145,933
Landings FCZ (lbs.)	15,893,590	4,103,700	-	-
Ex-vessel value, FCZ \$	4,860,219	1,237,894	-	-

Table 21. Volume, Ex-Vessel Value, and Average Ex-Vessel Price Per Pound¹ of Reported Ocean Quahog Landings, By Region, 1973-1978 (Thousands of Dollars and Thousands of Pounds of Meats)

	<u>1973</u>	<u>1974</u>	<u>1975</u>	<u>1976</u>	<u>1977</u>	<u>1978²</u>
<u>New England³</u>						
Quantity	1457.0	838.3	1296.7	1501.5	3015.7	2832.5
Value	250.0	146.0	248.4	379.8	857.8	817.9
\$/Pound	0.17	0.17	0.19	0.25	0.28	0.29
<u>Mid Atlantic⁴</u>						
Quantity	-	-	-	4099.6	15745.3	19987.4
Value	-	-	-	1237.0	4729.2	5845.4
\$/Pound	-	-	-	0.30	0.30	0.29
<u>Total</u>						
Quantity	1457.0	838.3	1296.7	5601.1	18761.0	22819.9
Value	250.0	146.0	248.4	1616.9	5587.0	6663.3
\$/Pound	0.17	0.17	0.19	0.29	0.30	0.29

(1) To obtain the average ex-vessel price per bushel, multiply the average price per pound by 10.

(2) Preliminary data

(3) Maine through Connecticut

(4) New York through Virginia.

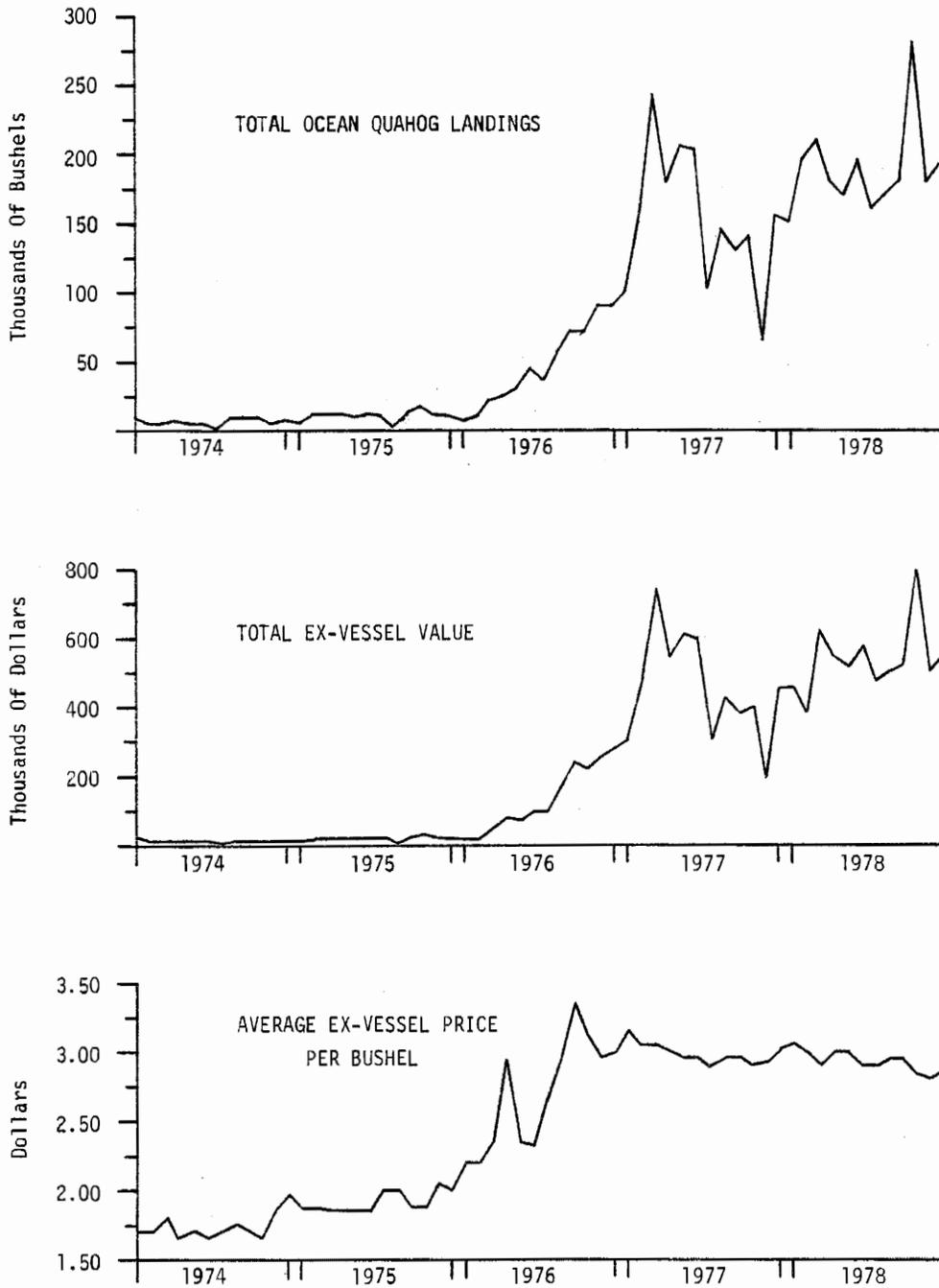
VIII-3. Foreign Fishing Activities

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

VIII-4. 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.

Figure 29



Total Landings, Total Ex-Vessel Value, And Average Ex-Vessel Price
Of Ocean Quahog By Month, 1974-1978 (Excluding Massachusetts)
(One Bushel = 10 Pounds Of Meats)

IX. DESCRIPTION OF ECONOMIC CHARACTERISTICS OF THE FISHERY

IX-1. Domestic Harvesting Sector

Relative Significance of Surf Clam to US Industry

In terms of total weight of clam meats landed annually, the surf clam is the most significant commercial clam industry in the US. Surf clam has accounted for 69% of all commercially caught clam meats in the US, and 25% of the ex-vessel value of clams during the past 10 years.

Relative Importance of the Surf Clam Harvest in the Principal States

Table 22 presents a summary of the ex-vessel value of surf clam landings for three principal surf clam landing states; New Jersey, Maryland and Virginia. Surf clam landings have constituted a very significant percentage of the total value of all landings in these states.

Table 22. Contribution of Surf Clam Landings To State Fisheries
By Percentage of Total Ex-Vessel Values, 1965-1977
(Millions of Dollars)

Year	New Jersey		Maryland		Virginia	
	Total Ex-Vessel Value	% From Surf Clam Landings	Total Ex-Vessel Value	% From Surf Clam Landings	Total Ex-Vessel Value	% From Surf Clam Landings
1965	12	25	13	*	27	-
1966	10	37	14	*	21	-
1967	11	37	17	*	18	-
1968	10	33	16	3	21	*
1969	11	39	18	5	18	*
1970	13	36	19	8	22	*
1971	12	33	20	5	22	2
1972	14	20	19	6	27	9
1973	18	15	21	6	41	12
1974	17	17	22	5	36	17
1975	20	24	23	4	33	17
1976	35	30	31	2	43	16
1977	38	31	unknown	unknown	unknown	unknown

Source: Fisheries Statistics of the United States, and unpublished NMFS data

* = less than 1%

Table 23 presents surf clam landings for 1977 by county. From the data in the table the concentration of the harvesting sector is obvious. Five counties accounted for almost 90% of all surf clam landings. Cape May County, New Jersey, alone accounted for 32.08% of all surf clam landings and for that County, surf clam accounted for 33.29% of all landings in quantity and 42.52% of all landings in value.

Table 23. 1977 Surf Clam Landings by County
(quantity in thousands of pounds, value in thousands of dollars)

State	County	Surf Clam		Total		Cumulative Share of Total Landings
		Quantity	Value	Quantity	Value	
NJ	Cape May	16,497.3	8,996.2	49,561.1	21,155.4	32.08%
		32.08%	33.65%	33.29%	42.52%	
VA	Northampton	8,637.5	4,848.6	14,803.6	6,742.9	48.88%
		16.80%	18.14%	58.35%	71.91%	
MD	Wocrester	8,392.9	4,702.7	12,422.0	6,482.2	65.20%
		16.32%	17.59%	67.56%	72.55%	
VA	Accomack	7,153.6	3,835.6	17,674.3	6,950.9	79.11%
		13.91%	14.35%	40.47%	55.18%	
NJ	Atlantic	4,657.6	1,954.9	7,116.1	3,588.2	88.17%
		9.06%	7.31%	65.45%	54.48%	
NY	Nassau	3,275.1	1,059.6	4,549.5	2,490.0	94.54%
		6.37%	3.96%	71.99%	42.55%	
NJ	Ocean	1,786.2	792.6	17,742.1	7,295.1	98.01%
		3.47%	2.96%	10.07%	10.86%	
MA	Bristol	253.0	184.0	NA	NA	98.50%
		0.49%	0.69%	NA	NA	
MA	Barnstable	218.3	150.0	NA	NA	98.92%
		0.42%	0.56%	NA	NA	
RI	Washington	197.2	112.2	46,845.3	9,067.1	99.30%
		0.38%	0.42%	0.42%	1.24%	
NJ	Monmouth	188.6	40.8	102,349.9	4,859.3	99.67%
		0.37%	0.15%	0.18%	0.84%	
NY	Kings	149.9	48.5	1,690.9	525.6	99.96%
		0.29%	0.18%	8.87%	9.22%	
MA	Dukes	13.0	8.9	NA	NA	99.99%
		0.03%	0.03%	NA	NA	
RI	Newport	1.0	.4	23,610.5	11,244.5	99.99%
		<0.01%	<0.01%	<0.01%	<0.01%	
Total		51,421.2	26,734.7			100.00%

< = less than

NA = data not available

Ocean quahog landings by county are presented in Table 24. This fishery is even more concentrated than the surf clam fishery, with four counties accounting for 90.15% of all landings. Cape May County, New Jersey was again first in quantity and value of landings in 1977. Except for Washington County, Rhode Island, the counties that ranked high in ocean quahog landings were similar to those that ranked high in surf clam landings.

Vessel Data

The number of vessels in the surf clam fishery gradually increased from 68 in 1965 to 104 in 1970. The number of vessels then declined slightly from 1970 to 1975. The fleet has increased to a 1978 total of 157 active vessels, that is, vessels that filed logbook reports indicating surf clams has been landed.

The vessels in the surf clam fleet vary tremendously with respect to their physical characteristics. In 1978 the tonnage per vessel ranged from 1 to 306 tons, with an

average of 110 tons. Vessel length ranged from 18 to 146 feet, with an average of 81 feet. The horsepower of the surf clam vessels ranged from 70 to 1750, with an average of 428. Crew size ranged from 2 to 7 men, with an average of 3 men. The size of the dredge ranged from 22 to 240 inches with an average length of 88 inches. These data are summarized in Table 25. Table 26 contains data on the size distribution of these vessels.

Table 24. 1977 Ocean Quahog Landings by County
(quantity in thousands of pounds, value in thousands of dollars)

State	County	Ocean Quahog		Total		Cumulative Share of Total Landings
		Quantity	Value	Quantity	Value	
NJ	Cape May	12,615.0	3,794.3	49,561.1	21,155.4	
		67.43%	68.10%	25.45%	17.94%	67.43%
RI	Washington	2,714.4	767.1	46,845.3	9,067.1	
		14.51%	13.77%	5.79%	8.46%	81.94%
NJ	Atlantic	876.0	264.7	7,116.1	3,588.2	
		4.68%	4.75%	12.31%	7.38%	86.62%
MD	Worcester	660.5	196.2	12,422.0	6,482.2	
		3.53%	3.52%	5.32%	3.03%	90.15%
VA	Northampton	658.1	197.5	14,803.6	6,742.9	
		3.52%	3.54%	4.45%	2.93%	93.67%
NJ	Ocean	625.5	184.4	17,742.1	7,295.1	
		3.34%	3.31%	3.53%	0.25%	97.01%
VA	Accomack	310.2	92.0	17,674.3	6,950.9	
		1.66%	1.65%	1.76%	1.32%	98.67%
MA	Barnstable	114.2	33.0	NA	NA	
		0.61%	0.59%	NA	NA	99.28%
RI	Bristol	79.2	25.4	515.3	594.7	
		0.42%	0.46%	15.37%	4.27%	99.70%
MA	Bristol	50.8	15.2	NA	NA	
		0.27%	0.27%	NA	NA	99.97%
RI	Newport	5.1	1.5	23,610.5	11,244.5	
		0.03%	0.03%	0.02%	0.01%	100.00%
MA	Dukes	.6	.2	NA	NA	
		<0.01%	<0.01%	NA	NA	
Total		18,709.6	5,571.6			100.00%

< = less than

NA = data not available

Table 25. Physical Characteristics of Surf Clam Vessels, 1978

	Length (feet)	Gross Tonnage	Dredge Blade (inches)	Horsepower	Crew Size
Minimum	18	1	22	70	2
Maximum	146	306	240*	1750	7
Average	83	110	88**	428	3

* represents double 120" dredges; largest single dredge was 200"

** the most commonly used dredge size was 60"

Table 26. Estimated Vessel Distribution by Tonnage Class in the Surf Clam Fishery, 1965 - 1977

<u>Year</u>	<u>Total Vessels</u>	<u>Class 1 (0-50 tons)</u>	<u>Class 2 (51-100 tons)</u>	<u>Class 3 (101+ tons)</u>
1965	68	33	33	2
1966	74	34	34	6
1967	91	40	40	11
1968	86	38	42	6
1969	92	32	56	4
1970	104	33	59	12
1971	92	28	46	18
1972	90	29	44	17
1973	93	32	44	17
1974	98	35	46	17
1975	99	35	46	18
1976	122	33	55	34
1977*	155	22	56	77
1978**	157	21	58	78

* Licenses issued as of December 31, 1977

** Vessels active in the fleet as of December 31, 1978, based on logbook reports

Vessel Performance - 1978

This section contains information on the performance of the vessels in the surf clam and ocean quahog harvesting sector during 1978, the first full year of the plan. The data summarized in this section were collected through the mandatory vessel log book system.

Table 27 contains information on overall industry performance during 1978. The data cover the harvesting activities of 153 of the 157 active vessels (there were incomplete records for 4 vessels). Since some of the vessels are actively engaged in the inshore New Jersey surf clam fishery (which does not fall under the purview of this plan) in addition to the offshore fisheries, in order to properly evaluate the overall performance of the industry these inshore activities must be included. In 1978, total ex-vessel revenues generated at the harvesting sector level were about \$25 million, of which 71%, 6%, and 23% were from FCZ surf clam, inshore New Jersey surf clam, and FCZ ocean quahogs respectively.

Table 27. 1978 Industry Performance Summaries

	<u>Offshore Clams (FCZ)</u>	<u>Inshore Clams (N.J.)</u>	<u>Ocean Quahogs (FCZ)</u>
Total Landings (bushels)	1,779,287	248,038	1,930,900
Average Price/Bushel	\$9.96	\$6.00	\$3.00
Total Revenues	\$17,721,706	\$1,488,230	\$5,792,701
Grand Total		\$25,002,637	
% By Species	71%	6%	23%

Table 28 contains information on the distribution of these revenues among the 153 vessels in the fleet. These vessels were divided into three different groups, depending on the gross registered tonnage (GRT) of the vessels. These were the three vessel classes utilized in the Plan for analyses. Class 1 vessels are less

than 50 GRT, Class 2 vessels are between 51 to 100 GRT, and Class 3 vessels are greater than 100 GRT. Of the 153 vessels examined here, there were 21 Class 1 vessels (13% of total), 56 Class 2 vessels (37%), and 76 Class 3 vessels (50%). Class 3 vessel harvesting activities generated 66% of the total industry revenues, Class 2 vessels generated 29% of the total industry revenues, and Class 1 generated about 5% of the total revenues. On a species basis, Class 3 vessels generated about 66% of the FCZ clam revenues, 17% of the inshore clam revenues and 79% of the quahog revenues. Class 2 vessels accounted for 28% of the FCZ clam revenue, 61% of the inshore clam revenues, and 21% of the quahog revenues. Class 1 vessels accounted for 5% of the FCZ surf clam revenue, 22% of the inshore clam revenues, and 0% of the quahog revenues.

Table 28. Distribution of Revenues by Vessel Class

	<u>Class 1</u> <u>(0-50 GRT)</u>	<u>Class 2</u> <u>(51-100 GRT)</u>	<u>Class 3</u> <u>(100+ GRT)</u>
# of Active Vessels	21	56	76
% of Total Vessels	13%	37%	50%
% of Total Revenues	5%	29%	66%
% of FCZ Clam Revenues	5%	28%	66%
% of Inshore Clam Revenues	22%	61%	17%
% of Quahog Revenues	0%	21%	79%

Figure 30: shows the average catch of surf clam from the FCZ per trip by vessel class for 1978.

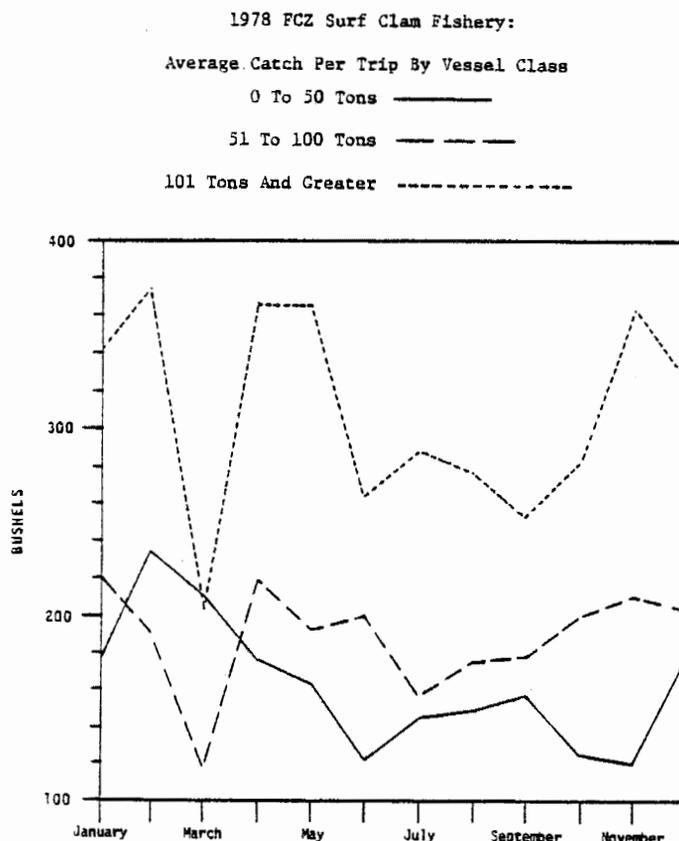


Figure 30

Tables 29, 30 and 31 contain information on the concentration of the catch among the vessels in the fleet, irrespective of tonnage size. Not all of the vessels were engaged in harvesting all of the species. Specifically, in 1978, 152 of the 153 vessels recorded at least a bushel of FCZ clams, but only 51 vessels were active in the quahog fishery, and only 47 vessels were active (due to entry restrictions) in the inshore New Jersey clam fishery.

One fact that is clearly illustrated in these tables is that of fleet specialization. For example, in Table 29 it can be seen that 50 vessels (33% of the total harvesting any FCZ clams) harvested 70% of the surf clams but these same vessels accounted for only 22% of the quahog revenues and 3% of the inshore clam revenues. In Table 30, it can be seen that 21 vessels accounted for 90% of the total quahog revenues but only 11.5% of the FCZ clams and 4% of the inshore clams. Similarly in Table 31, it can be seen that 34 vessels accounted for 90% of the inshore clam revenues but only 8% and 11% of the FCZ clam and FCZ quahog revenues.

Table 29. Concentration of FCZ Surf Clam Catch

<u>% Surf Clam Catch</u>	<u># of Vessels</u>	<u># of Vessels (Cumulative)</u>	<u>% of Total Vessels Landing FCZ Clam</u>	<u>% of Quahogs (Cumulative)</u>	<u>% of Inshore Clams (Cumulative)</u>
10	4	4	3	0	0
20	4	8	5	8	0
30	6	14	9	11	0
40	7	21	14	14	0
50	9	30	20	18	0
60	9	39	26	21	3
70	11	50	33	22	3
80	15	65	43	23	6
90	22	87	57	32	26
100	65	152	100	98	99

Table 30. Concentration of Quahog Catch

<u>% of Quahog Catch</u>	<u># of Vessels</u>	<u># of Vessels (Cumulative)</u>	<u>% of Total Vessels Landing Quahog</u>	<u>% of FCZ Clams (Cumulative)</u>	<u>% of Inshore Clams (Cumulative)</u>
10	1	1	2	0	0
20	1	2	4	2.5	0
30	4	4	8	3.0	0
40	2	6	12	3.0	0
50	2	8	16	3.5	0
60	2	10	20	4.5	0
70	3	13	26	6.0	0
80	3	16	32	6.0	0
90	5	21	42	11.5	4
100	30	51	100	28.0	55

Table 31. Concentration of Inshore Clams

<u>% Inshore Clam Catch</u>	<u># of Vessels</u>	<u># of Vessels (Cumulative)</u>	<u>% of Total Vessels Landing Inshore Clam</u>	<u>% of FCZ Clams (Cumulative)</u>	<u>% of FCZ Quahogs (Cumulative)</u>
10	2	2	4	0.5	0
20	5	5	11	1.0	1
30	3	8	17	2.0	2
40	4	12	26	3.0	4
50	4	16	34	4.0	5
60	4	20	46	5.0	5
70	4	24	51	5.5	6
80	5	29	62	6.5	8
90	5	34	72	8.0	11
100	13	47	100	12.0	12

Table 32 contains information on the average gross revenues of the vessels. The average gross revenue of the 21 Class 1 vessels was \$61,358 per vessel, the average gross revenue of the 56 Class 2 vessels was \$128,352 per vessel, and the average gross revenue of the Class 3 vessels was \$217,453. While the averages are interesting in their own right, it is more meaningful to examine the distribution of the average gross revenues within a vessel class.

Table 32. Performance of Permitted Vessels in Surf, Quahog and Inshore Combined

<u>Vessel Class</u>	<u># Vessels</u>	<u>Average Gross Revenues</u>
0-50	21	\$ 61,358
51-100	56	\$128,352
101-500	76	\$217,453

Tables 33, 34 and 35 present detailed performance profiles for each of the vessel classes.

The data in Table 33 are for the 21 Class 1 vessels. These 21 vessels were divided into four arbitrary groups (chosen by computer analysis) depending on the average gross revenues. Three of these 21 vessels were barely active at all (average gross revenue of \$583). For the more active vessels, the range of the gross stocks was from \$39,154 (7 vessels) to \$139,613 (3 vessels). One fact that is illustrated in Tables 33, 34, and 35 is that the more productive vessels in any vessel class were generally less involved in the inshore clam fishery and apparently spent more hours in offshore activities. Further, those groups within the vessel classes that spent more total hours in the offshore fisheries were also generally more productive in terms of revenues generated per hour of time fishing. These facts are illustrated in the Class 1 profile.

It should be noted that the data in Tables 33, 34, and 35 for productivity per hour fished refers to only those hours for which both catch and hours fished were reported. Generally, the majority of the total catch data had associated data on hours fished.

Table 33. Performance Profile 1, Class 1*

	<u>I</u>	<u>II</u>	<u>III</u>	<u>IV</u>	<u>Group Ave.</u>
Number of Vessels	3	7	8	3	21
Avg Gross Revenue(\$)	583	39,154	74,230	139,613	61,357
Offshore Clam Revenue(\$)	583	16,210	58,634	120,203	44,990
Quahog Revenue (\$)	0	1,260	0	0	425
Inshore Clam Revenue(\$)	0	21,684	15,596	19,410	15,942
*Avg Hours Clam Fishing		197	397	584	301
*\$/Hr Clam Fishing		\$79	\$134	\$196	\$139
*Avg Hrs Quahog Fishing		-----Trace-----			
\$/Hr Quahog Fishing		-----Trace-----			

* Only for those catches for which time fished was reported.

The vessels in Group IV spent 196% and 47% more hours fishing for the FCZ clam than Groups II and III, respectively, and were 148% and 46% more productive on an hourly basis, respectively. While not presented in this table, average dredge size, and horsepower of the vessels generally increase from Groups II to IV. A subsequent section presents a production function for these vessels that references these facts.

Table 34 contains the performance profile for Class 2 vessels. Based on the range of gross revenues, 5 groups were selected for comparative purposes. The average gross stocks of the groups range from \$34,548 (5 vessels) in Group I to \$255,172 in Group IV (7 vessels). The highliners (Groups IV and V) had little involvement in the inshore clam fishery, spent more hours in the offshore clam and quahog fisheries, and were more productive on an hourly basis. Further (not presented in the table), the average dredge sizes and the horsepowers of the highliners were greater than Groups I to III. One interesting fact that is presented in Tables 34 and 35 is that the revenues per hour of reported quahog fishing were, except for Class III - Group II, larger than the revenues per hour of FCZ clam fishing. It should be remembered, however, that for the vessels, the average total revenues from quahog fishing were substantially less than the average total revenues from FCZ clam fishing.

Table 34. Performance Profile 1, Class 2

	<u>I</u>	<u>II</u>	<u>III</u>	<u>IV</u>	<u>V</u>	<u>Group Ave.</u>
Number of Vessels	5	15	16	13	7	56
Ave. Gross Revenue (\$)	35,548	78,586	116,669	167,569	255,172	128,350
Offshore Clam Revenue (\$)	17,188	48,061	80,497	141,428	158,628	90,068
Quahog Revenue (\$)	0	4,108	15,124	19,753	96,543	22,073
Inshore Clam Revenue (\$)	18,360	26,417	21,046	6,387	0	16,211
Avg Hrs Clam Fishing Reported	137	279	431.4	613	588	426
Avg \$/Hr Clam Fishing	122	155	168	210	232	190
Avg Hrs Quahog Fishing Reported	0	12.8	71.78	75.7	190	65
\$/Hr Quahog Fishing	0	316	199.66	248	465	317

Table 35 contains the performance profile for Class 3 vessels. The 76 vessels in this class were also divided into 5 groups. The average gross revenues ranged from \$36,452 (20 vessels) in Group I to \$606,365 (4 vessels) in Group V. It is interesting to note that the 21 Class 1 vessels outperformed the 20 Class III - Group I vessels by 68%. The conclusion reached for Class II vessels is the same here also: Groups IV and V vessels spent more hours fishing for FCZ clams and quahogs and were more productive on an hourly basis. Further, the average dredge sizes of Groups IV and V were larger than the other groups.

Table 35. Performance Profile 1 Class 3

	I	II	III	IV	V	Group Ave.
Number of Vessels	20	19	16	17	4	76
Avg. Gross Revenues(\$)	36,452	155,762	239,999	389,652	606,365	217,453
Offshore Clam Revenues	36,003	130,876	161,871	262,478	389,652	154,383
Quahog Revenues(\$)	234	17,219	72,143	127,083	237,781	59,838
Inshore Clam Revenues(\$)	214	7,667	5,981	0	0	3,232
Avg Hrs Clam Fishing Reported	187.5	571.2	572.25	676.38	611.3	496
Avg \$/Hr Repted Clam Fishing	164	206	252	335	525.8	273
Avg Hrs Quahog Fishing Rprtd	1.9	89.49	180.78	269.2	363.8	140
Avg \$/Hr Rprtd Quahog Fishing	235	154	361.5	428	569.0	386

Summary of Key Vessel Groups

Table 36 is provided so as to enable the reader to link the previous information on catch concentration to the various vessel class-group constellations. For example, just considering the harvesting activities of the 4 vessels in Class III - Group V (in the table this is "C3-V"), we pick up 9.7% of the total revenues from all species. The groups themselves were ranked in this basis of the average total revenue generated per vessel in the group. Thus, we see that by examining the activities of only 57 vessels or about 37% of the 153 vessels examined, we can account for about two-thirds of the FCZ clam revenues and 90% of the quahog revenues.

Table 36. Summary of Key Vessel Groups

Group Rank	Group	Number of Vessels	Cumu- lative Number of Vessels	Cumu- lative % of Total Vessels	Cumu- lative % of Total Revenue	Cumu- lative % of Offshore Clam Revenue	Cumu- lative % of Inshore Clam Revenue	Cumu- lative % of Quahog Revenue
1	C3-V	4	4	2.6	9.7	8.3	0	16.4
2	C3-IV	17	21	13.7	36.1	33.4	0	53.7
3	C2-V	7	28	18.3	43.8	36.6	0	65.3
4	C3-III	16	44	28.7	59.1	54.2	6.4	85.2
5	C2-IV	13	57	37.2	67.8	60.5	11.9	89.6
6	C3-II	19	76	49.6	79.6	78.7	21.6	95.2

Vessel Production Function

A vessel production function is the technical relationship between inputs and outputs. A production function is useful in the determination of which physical and operating characteristics of the vessels are useful for "explaining" variations in the outputs generated by the vessels (since there are two outputs considered, it is more relevant to use revenues as the output variable). For the vessels, the general functional form specified was:

$$Y = f(X_1, X_2, X_3, X_4, X_5)$$

where Y = Total revenues from FCZ surf clam and ocean quahog

X_1 = Dredge size (inches)

X_2 = Gross Registered Tonnage (tons)

X_3 = Horsepower

X_4 = Hours Surf Clam Fishing

X_5 = Hours Quahog Fishing

The equation was estimated in a linear form. The data that were utilized were from the 1978 license and logbook files. The estimation procedure utilized was ordinary least squares.

Because of the high degree of correlation among the physical characteristics of the vessels and its associated problem of multicollinearity, the specification that provided the "best fit" in terms of the standard statistical tests was:

$$Y = f(X_1, X_4, X_5)$$

The results are presented in Table 37. The coefficient of determination (R^2) is equal to about 80%, indicating that 80% of the variation in the revenues among the vessels can be "explained" by usage of this equation.

This equation could be useful for the prediction of the impact on the existing fleet of new vessels coming into the fishery. It is interesting to note that the regression coefficient for "quahog hours fishing" is larger than that for "FCZ clam hours fishing". This is reflective of the comments presented earlier. The coefficient for the dredge size was 1495, which suggest that, all other factors held constant, a vessel would be expected to generate an additional \$1,495 in total revenues as the size of the dredge is increased by one inch.

Table 37. Surf Clam and Ocean Quahog Vessel Production Function

Dependent Variable: Total FCZ Clam and Ocean Quahog Revenues

<u>Variables</u>	<u>Coefficient</u>	<u>T Statistic</u>
Constant	-122,354	- 8.388
Dredge Size (inches)	1,495	8.758
Clam Hours Fishing	220	11.33
Quahog Hours Fishing	388	16.43

$R^2 = .7907$, Durbin Watson = 1.97, F Value = 170.3

Vessels Net Revenues

All of the previous information presented is in terms of gross revenues and does not address the issues of net income to the vessels, crew shares, return on investment, etc. Basically, this is due to the fact that no cost data were required to be provided in the logbooks, only gross revenue information.

Actual Versus Forecasted Performance For Harvesting Sector

The original Surf Clam and Ocean Quahog FMP contained forecasts of the economic impact on the harvesting sector and processing sector due to the imposition of the quotas. However, the actual regulations that were in place during 1978 differed substantially from those regulations that were originally contemplated, namely the four day fishing week, which constituted some of the assumptions behind the economic analyses. compare the previous data presented to those in the original FMP. Thus, any comparisons are rather tenuous. Also, the number of vessels actually registered and active in each tonnage class differed from the numbers that were believed to be in the industry in 1978. Nevertheless, it is useful to examine some aggregate performance comparisons in terms of total production, prices, and revenues.

Domestic Harvesting Capacity

Appendix I contains a review of possible harvesting capacity for surf clam and ocean quahog. Based on the above and on the analysis in Appendix I, US harvesting capacity for surf clam is at least equal to the quotas proposed in the FMP for surf clam (1,800,000 bushels) and ocean quahog (4,000,000 bushels).

IX-2. Domestic Processing Sector

This section attempts to provide a descriptive analysis of the surf clam and ocean quahog processing sectors during the 1971-1977 period. This section does not contain an estimate of the impact of the FMP on the processing sector during 1978 since 1978 data are not available at this time.

Number of Plants

Surf clam based products have historically comprised the vast majority of the total US production of canned clam chowders, whole and minced clams, breaded clam products, and canned sauces and juices. These four product groups are the principal finished product lines for all clam products. In 1977, however, quahog based finished products comprised about 12% of the value of all clam finished product production compared with an average of less than 1% during the 1971 to 1976 period.

Surf clam and ocean quahog are processed in the New England, Middle Atlantic, and Chesapeake Bay regions. Table 38 presents data on the number of surf clam and ocean quahog processing plants by state for the years 1971 to 1977. As can be seen from Table 38, there has been little change in the total number of clam plants since 1972 nor have any significant changes occurred within any particular state. During the period 1973-1976, essentially all of the quahog processed production was generated from plants in Rhode Island. These plants also produced trivial amounts of surf clam based products. However, in 1977 the production of finished quahog products increased dramatically with 8 plants in Delaware, New Jersey, and Maryland generating about \$11.00 million of finished product production. These same plants also produced surf clam products.

Historically, the plants in Rhode Island have reported the vast amount of their production to be shucked output only, which is typically an intermediate product.

Table 38. Number of Plants by State

<u>Year</u>	<u>ME</u>	<u>MA</u>	<u>RI</u>	<u>NY</u>	<u>NJ</u>	<u>PA</u>	<u>DE</u>	<u>MD</u>	<u>VA</u>	<u>Total</u>
1971	1	7	5*	5	16	2	3	9	7	55
1972	1	5	5*	4	14	2	3	8	8	50
1973	1	6	3*	4	15	2	3	7	6	47
1974	1	6	4*	4	15	2	3	7	7	49
1975	1	7	6*	4	13	2	3	7	7	50
1976	1	6	5*	3	15	2	3	6	8	49
1977	1	5	4*	3	13	3	3**	7	8	47

*Of these total number of plants in Rhode Island, some of them processed only quahogs. The number of plants that produced only quahogs were: 1971 - 3, 1972 - 4, 1973 - 1, 1974 - 1, 1975 - 3, 1976 - 3, and 1977 - 1.

** one of these plants produced only quahogs.

Production

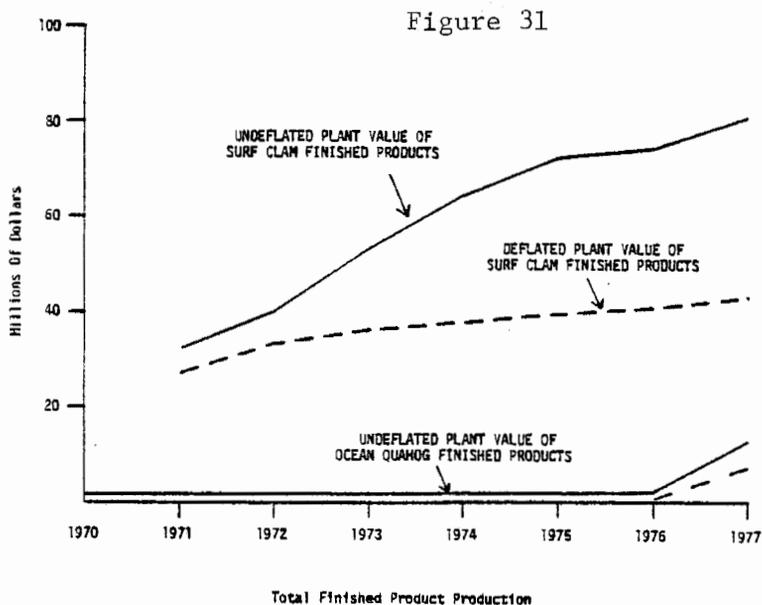
The output of the surf clam and ocean quahog plants listed in Table 38 include both intermediate and final products. The intermediate products are fresh and frozen

shucked surf clam and ocean quahog meats. These meats are typically then further processed into a variety of finished product forms. These include canned clam chowder, canned whole and minced clams, canned sauces, canned juices, and breaded products. Generally, quahog have not been successfully utilized in the breaded strip lines.

The method of raw material acquisition differs among those plants that produce finished products. Some finished product plants produce their own shucked output which is consumed in their own finished product forms. Some of the same plants also offer some of this shucked output for sale to other finished product plants. On the other hand, some finished product plants apparently acquire all of their shucked raw material from those plants that produce only shucked output and those that produce both finished and shucked output. In short, there are a variety of practices extant regarding raw material acquisition.

In order to avoid problems of double counting, it is more meaningful to examine finished product production only, rather than total production (which includes the intermediate product). Since the finished products are measured in a large variety of ways, i.e., gallons, various sizes of cases, and pounds, it is more useful to examine the trends in production in terms of total value overall and by-product groups during this period. These trends are depicted in Figures 31 and 32.

As can be seen from Figure 31, until 1977 surf clam based finished products comprised essentially all of clam processed production when, as stated previously, quahogs comprised above 12% of the total value. The undeflated value of finished product production has more than doubled during this period. Specifically, the undeflated value of surf clam finished product production has increased from about \$32 million in 1971 to about \$82 million in 1977, a compound growth rate of about 17%. The deflated value or value of real surf clam output increased from \$28 million to \$43 million, a growth rate of about 8%. Undeflated finished product quahog production increased from trivial levels to \$11 million in 1977. Again, these are production data and not sales data. There are currently no data available on sales and inventories. It is assumed that production reflects sale.



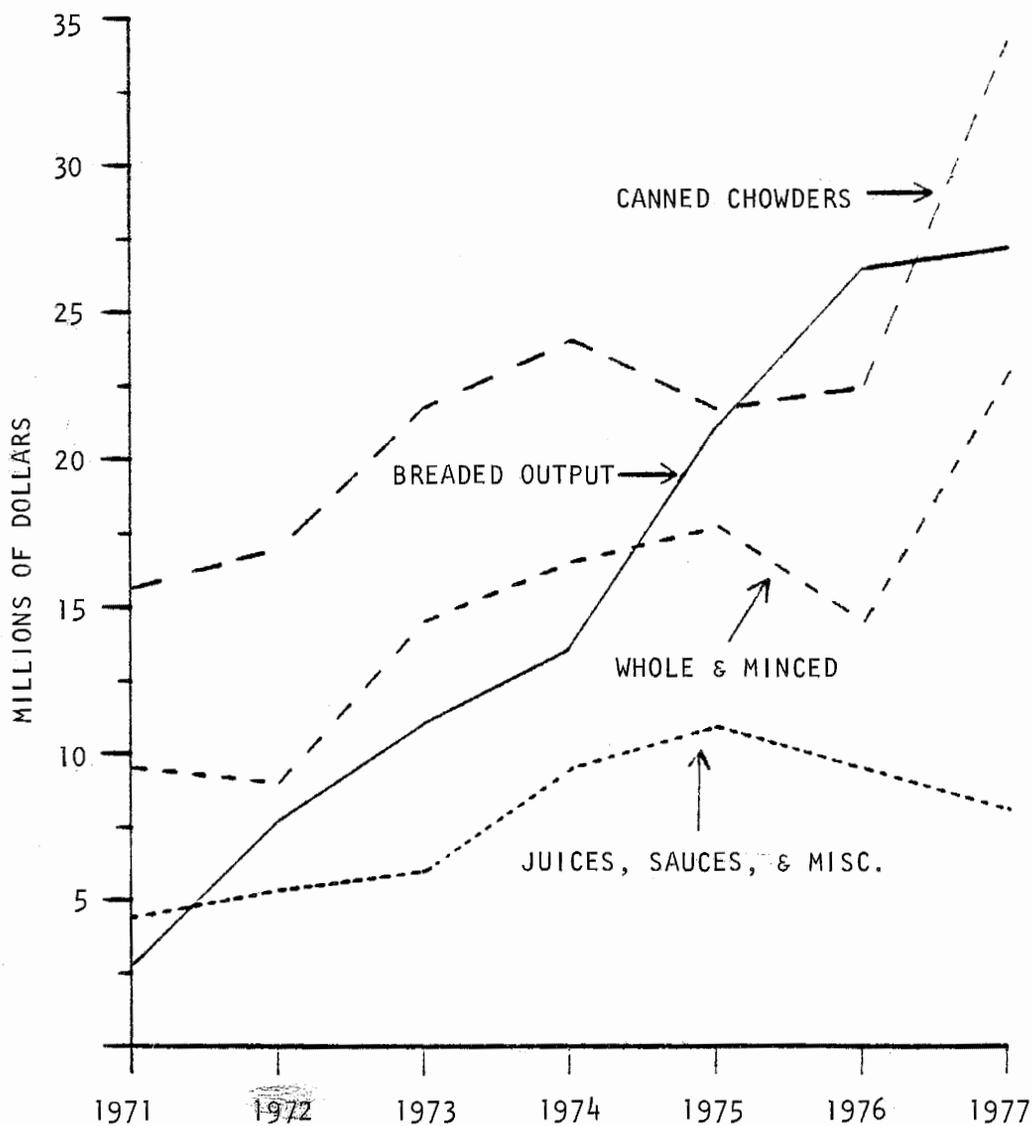


Figure 32

Undeclared Wholesale Value Of Finished Surf Clam Production

(Includes ocean quahog production in 1977 data.
Ocean quahog product production data unavailable for prior years.)

While the total finished product production grew considerably during this period, it was at an uneven rate for the various product groups. This fact is illustrated in Figure 32. As can be seen from Figure 32, the product line that exhibited the greatest compound growth (in terms of undeclared value) throughout this period was for breaded production. Canned chowders and canned whole and minced clams had peaks in the 1974-1975 period. Both lines declined in apparent sales in 1976 relative to their earlier peaks before increasing again in 1977 to new highs. For the canned sauces line, the period was one of slow growth.

The relative compound growth rates that occurred during this period are listed in Table 39. They range from 10% for sauces and juices to 45% for breaded output in regards to undeclared value. The deflated growth values ranged from 1% for canned sauces and juices to 34% for breaded output.

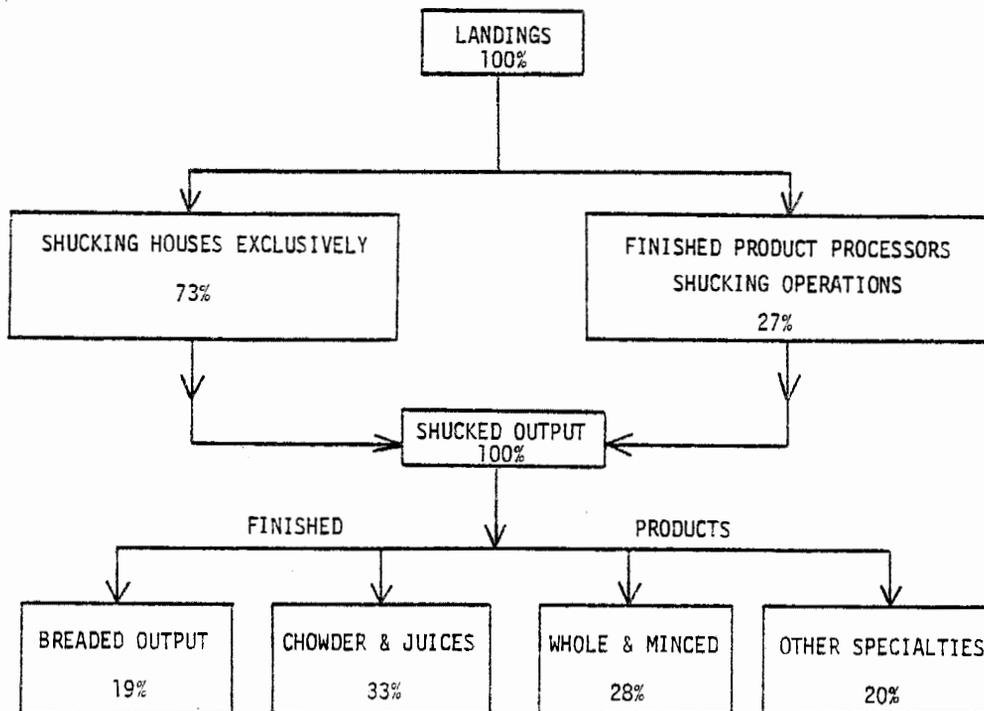
Table 39. Relative Compound Growth Rates of Undeﬂated and Deﬂated Value of Production for Clam Based Finished Products

	<u>Undeﬂated</u>	<u>Deﬂated</u>
Canned Chowder	14%	4.8%
Canned Whole & Minced	16%	6.5%
Canned Juices & Sauces	10%	1.0%
Breaded	45%	34.0%
Total Finished Production	17%	8.0%

Meat Weight Flow

Figure 33 contains a schematic that attempts to present an approximation to the physical meat weight flow of surf clams through the intermediate and final product stages. The numbers presented within the final product line boxes represent the approximate surf clam meat weight content of the products produced by these sectors in 1977. These numbers should, at this time, be considered only approximations due to the variability of the meat weight content of the same product by various producers. An attempt is currently underway to develop more precise estimates on this matter.

Figure 33



Surf Clam Meat Weight Flow - 1977

Employment - Surf Clam Plants

Table 40 contains information on the approximate surf clam related employment in 1977. Since many of these plants produce other products that are not clam based and since the plants do not report employment by product line, these figures are only an approximation. Further, the data reported to NMFS does not distinguish between office and plant employment.

There are a variety of approaches available to attempt to allocate the employment data between product lines. One approach is to allocate employment based on the relative total values of the product lines. This is the approach taken in the data presented in Table 40. The plants in 1977 were categorized into four groups depending on the product line mix. The first category is the group of plants that only produced shucked output. The second group is the group of plants that only produced breaded products. The third group only produced canned products. The fourth group produced a variety of products. It is estimated, by using this approach, that the surf clam related employment in 1977 was 1,938 man years.

Another approach is to estimate an employment response function for these plants. This attempts to empirically relate changes in the volume (product weight) of various product lines and associated changes in employment. The approach is also useful for developing an estimate of probable changes in employment associated with changing quotas (with associated changes in the volume of finished product line output). The general functional form specified was:

$$Y = f(X_1, X_2, X_3, X_4, X_5)$$

- where Y = total employment in the plant (man years)
- X₁ = volume of shucked output in the plant (lbs.)
- X₂ = volume of breaded output in the plant (lbs.)
- X₃ = volume of canned output in the plant (lbs.)
- X₄ = volume of total clam output in the plant (lbs.)
- X₅ = volume of other than clam output in the plant (lbs.)

The specific functional form specified varied for the four different plant types, with only the relevant input variables selected. The data that were utilized were from the 1977 annual NMFS survey of processing plants. The estimation procedure utilized was ordinary least squares.

Table 41 presents the results of the cross sectional employment response function analysis by plant type. One interprets the results in the following fashion: the value of the regression coefficient for shucked output is .000024. Thus, for every 1/.000024 or 41,666 pounds of shucked output, it would be expected that there would be a change in employment of one man year. The other coefficients are interpreted in a similar fashion.

Table 40. Surf Clam Processing Sector Employment Summary - 1977

Plant Type	# of Plants	Total Employment	Clam Related Employment*
Shucking Plants Only	21	1,332	1,215
Breaded Output Only	7	1,056	109
Canned Output Only	8	485	254
Mixed Production	9	526	360
Total	46	3,399	1,938

*Based on the relative value of clam production.

Table 41. Results of Employment Response Function Analysis

	Plant Type			
	Shucking House	Breeding Plant	Canning Plant	Mixed Output Plant
Constant	14.86	27.18	26.54	22.00
Shucked Output Coefficient	.000024 (t=7.3)*	-	-	-
Breaded Output Coefficient	-	.00005 (t=1.78)**	-	-
Canned Output Coefficient	-	-	.000005 (t=2.08)*	-
Total Clam Output Coefficient	-	-	-	.000013 (t=9.5)
Other Production	.000029 (t=1.4)**	.000007 (t=10.79)*	****	***
# of Obs.	21	9	8	7
R2	.796	.96	.42	.94

* Significant at 5% level

** Significant at 10% level

*** Not Significant

**** Dropped due to multicollinearity problem.

Industry Structure

There is an ongoing study on the structure of the processing sector. The results of this analysis will be included in later amendments of this FMP.

Financial Performance

There are currently no published or unpublished data available to determine the financial performance of the firms in the processing sector in terms of traditional indicators, namely, net income, return on assets, return on equity, return on sales, etc. The only data that are available are the value of production data utilized previously. The distribution of the value of production among the plants in the industry is addressed in the next section.

Size Distribution, Dependency, and Product Lines of Surf Clam Plants

This section examines the data on a plant basis for both intermediate and finished product plants. Figure 34 presents the size distribution of the value of clam related production by plant for 1976. As can be seen from Figure 34, 25 of the plants in 1976 had surf clam related production of \$2.0 million or less. Of these 25 plants, 10 were plants whose clam production consisted of shucked output exclusively. The remaining 15 plants were relatively minor (in the sense the % of total production in any product line) of a variety of finished products and produced some shucked output.

There were 14 plants that had sales of between \$2.0 and \$5.0 million. Eleven of these 14 plants were exclusively engaged in shucked output production and they included the major producers in this product sector. Of the remaining 3 firms, they produced a variety of shucked, breaded and canned output. Some of these firms were among the principal producers of breaded output production and canned production.

Finally, there were 7 plants whose value of production was greater than \$5.0 million. These included those plants that dominated the canned clam chowders and

canned whole and minced, and breaded output sectors.

For the industry as a whole, there have not been any dramatic shifts during the 1971 to 1976 period in terms of the distribution of the percent of total gross revenues derived from surf clams. This is illustrated in Table 42. During this period on the average about 56% of the plants derived more than 90% of their total gross revenues from surf clam related activities. About 12% of the plants derived between 61 to 90% of their revenues from clam production. Of the remaining 32% of the plants, about 14% of the plants derived between 30 to 60 percent of their revenues from clam, with the remaining 18% of the plants deriving less than 30%.

For the top seven plants, four of the plants derived over 90% of their total plant production from clam products, two of the plants derived over 80% of their production from clam, while 1 derived about 25% of its total revenues from clams.

For the 14 middle sized plants, 11 derived 100% of their income, 1 derived over 80%, 1 derived 70%, and 1 derived about 10% of its total value of plant production from surf clams.

While the value of shucked and final product production accounted for by the smallest 25 plants was only a small percentage of the total, their clam related production was extremely important to some of them. For 10 of these plants, their total revenues were 100% from clams: five of these 10 plants produced shucked output only. Of the remaining 15 plants, 10 had dependency ratios of less than 50%, and 5 had ratios between 50% and 90%.

In summary, those plants that are the major finished product producers were generally the largest plants overall, and were extremely dependent on clam production. Of the middle tier of plants, there were generally extremely dependent on clam production. Finally, about 40% of the smallest 25 plants were extremely dependent on clam, while about 43 percent of these small plants were some of the least dependent.

1976 SIZE DISTRIBUTION OF SURF CLAM PLANTS
BY VALUE OF CLAM RELATED PRODUCTION

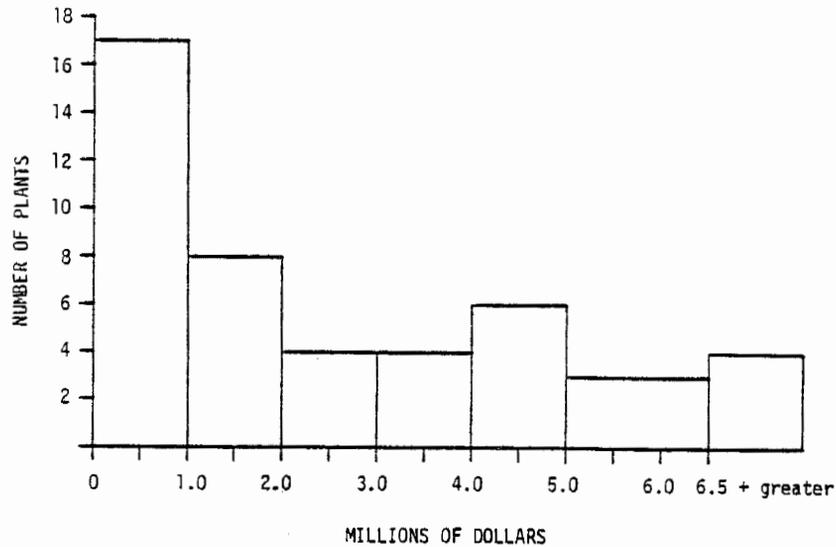


Figure 34

Prices

An analysis is currently ongoing to develop an econometric market model of the surf clam and ocean quahog sectors. This model will be utilized in the 1980 impact assessment.

Table 42. Dependency of Those Plants Producing Surf Clam on Surf Clam Revenues*

% of Gross Revenue	Number of Plants					
	1976	1975	1974	1973	1972	1971
0-10	4	3	4	2	1	6
11-20	3	1	2	3	2	4
21-30	2	4	3	2	4	1
31-40	1	2	0	2	2	2
41-50	2	4	3	2	1	6
51-60	2	1	4	1	2	2
61-70	2	4	0	4	3	2
71-80	0	2	0	1	2	0
81-90	5	2	5	0	1	1
91-100	<u>25</u>	<u>24</u>	<u>26</u>	<u>29</u>	<u>28</u>	<u>28</u>
Total	<u>46</u>	<u>47</u>	<u>47</u>	<u>46</u>	<u>46</u>	<u>52</u>

* Does not include data for those firms producing only quahog.

Processing Sector Capacity

Based on the above data and the review of harvesting sector capacity, it seems reasonable to conclude that processing capacity is at least equal to the quotas for surf clam and ocean quahog proposed in this FMP amendment.

IX-3. International Trade

Data are not available to specifically identify the international trade in surf clam and ocean quahog.

X. DESCRIPTIONS OF THE BUSINESSES, MARKETS, AND ORGANIZATIONS
ASSOCIATED WITH THE SURF CLAM AND OCEAN QUAHOG FISHERY

X-1. Relationship Among Harvesting and Processing Sectors

The information for this analysis is not available.

X-2. Fishery Cooperatives Or Associations

The information for this analysis is not available for ports in the Mid-Atlantic region. Data for selected ports in New England are presented in Table 43.

Table 43. 1976 Labor Force Characteristics For Offshore Fishermen
In New England Ports

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

Source: Smith and Peterson (1977).

X-3. Labor Organizations Concerned With Surf Clam and Ocean Quahog

The information for this analysis is not available for ports in the Mid-Atlantic region. Data for selected ports in New England are presented in Table 43.

X-4. Foreign Investment In The Domestic Surf Clam and Ocean Quahog Fishery

The information for this analysis is not available.

XI. DESCRIPTION OF SOCIAL AND CULTURAL FRAMEWORK OF
DOMESTIC SURF CLAM AND OCEAN QUAHOG FISHERMEN AND THEIR COMMUNITIES

Uniform socio-economic data on fishing communities are not available. Certain information is available from the federal census on a county basis. Therefore, surf clam and ocean quahog landings were tabulated by county and analyzed to identify those counties with a significant involvement in these fisheries (Tables 44 and 45).

Atlantic and Cape May, New Jersey, Northampton and Accomack, Virginia, and Worcester, Maryland, were selected as being relatively important.

Table 44. Surf Clam and Total Landings, by County, 1977
(landings in thousands of pounds)

State	County	Surf Clam	Total	Surf Clam Share of County Total	Dist. of Surf Clam	Cumulative Share of Total Landings
NJ	Cape May	16,497.3	49,561.1	33.29%	32.08%	32.08%
VA	Northampton	8,637.5	14,803.6	58.35	16.80	48.88
MD	Worcester	8,392.9	12,422.0	67.56	16.32	65.20
VA	Accomack	7,153.6	17,674.3	40.47	13.91	79.11
NJ	Atlantic	4,657.6	7,116.1	65.45	9.06	88.17
NY	Nassau	3,275.1	4,549.5	71.99	6.37	94.54
NJ	Ocean	1,786.2	17,742.1	10.07	3.47	98.01
MA	Bristol	253.0	-	-	0.49	98.50
MA	Barnstable	218.3	-	-	0.42	98.92
RI	Washington	197.2	46,845.3	0.42	0.38	99.30
NJ	Monmouth	188.6	102,349.9	0.18	0.37	99.67
NY	Kings	149.9	1,690.9	8.87	0.29	99.96
MA	Dukes	13.0	-	-	0.03	99.99
RI	Newport	1.0	23,610.5	<0.01	<0.01	<99.99
Total		514,212.3			100.00%	100.00%

< = less than

Table 45. Ocean Quahog and Total Landings, by County, 1977
(landings in thousands of pounds)

State	County	Ocean Quahog	Total	Ocean Quahog Share of County Total	Dist. of Ocean Quahog	Cumulative Share of Quahog Landings
NJ	Cape May	12,615.0	49,561.1	25.45%	67.43%	67.43%
RI	Washington	2,714.4	46,845.3	5.79	14.51	81.94
NJ	Atlantic	876.0	7,116.1	12.31	4.68	86.62
MD	Worcester	660.5	12,422.0	5.32	3.53	90.15
VA	Northampton	658.1	14,803.6	4.45	3.52	93.67
NJ	Ocean	625.5	17,742.1	3.53	3.34	97.01
VA	Accomack	310.2	17,674.3	1.76	1.66	98.67
MA	Barnstable	114.2	-	-	0.61	99.28
RI	Bristol	79.2	515.3	15.37	0.42	99.70
MA	Bristol	50.8	-	-	0.27	99.97
RI	Newport	5.1	23,610.5	0.02	0.03	100.00
MA	Dukes	.6	-	-	<0.01	-
Total		18,709.6			100.00%	100.00%

< = less than

Data from the census are presented in Table 46. Data on fisheries employment are not available on the county level. The general condition of the economies of Northampton and Accomack Counties can be observed from Table 46, perhaps leading to the conclusion that stabilization of processing sector employment is an important consideration in this FMP. Income levels in all of the counties is below the

national median.

Table 46. Selected 1970 Population and Economic Characteristics for Counties with Significant Surf Clam and Ocean Quahog Landings

	<u>US</u>	<u>Atlantic</u>	<u>Cape May</u>	<u>Northampton</u>	<u>Worcester</u>	<u>Accomack</u>
<u>Population</u>						
Total (000)	203,212	175	60	14	24	29
US rank		210	567	1,871	1,276	1,104
Per sq. mi.	57	308	223	66	51	61
% Change, 60-70	13.3	8.8	22.7	-14.9	3.0	-5.3
% Net mig. 60-70	1.7	4.8	21.9	-21.5	-5.5	-9.4
% Female	51.3	53.4	51.3	52.7	52.0	52.2
% Urban	73.5	81.1	61.8	-	14.6	-
% Under 5 yrs.	8.4	7.5	6.6	7.3	8.1	7.2
% 18 yrs. & over	65.6	68.6	71.7	65.1	65.2	67.8
% 65 yrs. & over	9.9	16.3	20.0	14.3	12.9	15.5
Median age	28.3	35.5	38.9	33.7	31.9	35.0
<u>Over 25, median school yrs. completed</u>						
	12.1	11.2	11.3	9.2	10.2	9.5
<u>Labor force</u>						
Total (000)	82,049	70	21	6	10	11
Civilian (000)	80,051	69	20	6	10	11
% Fem./w husb.	57.0	51.6	54.8	56.6	60.1	59.7
% Unemployed	4.4	5.7	6.5	12.4	3.2	6.3
% Emp. in mfg.	25.9	16.5	11.4	14.9	22.3	23.7
% Emp. outside county	17.8	14.6	15.8	9.1	18.1	20.7
% Families with female head	10.8	14.7	10.1	15.4	11.9	13.3
<u>Median family income (\$)</u>						
	9,586	8,757	8,295	4,777	7,386	5,670
% Families low income	10.7	9.9	8.9	32.2	17.3	25.2
<u>Mfg. estab.</u>						
Total	311,140	248	52	17	50	56
% 20-99 emp.	24.3	27.4	26.9	17.6	34.0	10.7
% 100 or more emp.	11.2	10.1	5.8	11.8	14.0	5.4
% Change, value added, 63-67	36.4	53.8	42.8	7.3	39.5	18.4
<u>Retail sales</u>						
% of total in eating & drinking places						
	7.7	16.4	19.6	4.8	12.2	5.1
<u>Selected services</u>						
% Receipts, hotels, etc.						
	11.6	53.8	58.3	D	51.2	D
% Receipts, amusements						
	13.7	20.9	18.1	D	27.3	D

D = Data not reported

Source: County and City Data Book, 1972.

XII. DETERMINATION OF OPTIMUM YIELD

XII-1. Specific Management Objectives

The Mid-Atlantic Council adopted the following objectives to guide management and development of the surf clam and ocean quahog fishery in the northwestern Atlantic.

1. Rebuild the declining surf clam populations to allow eventual harvesting approaching the 50 million pound level, which is the present best estimate of the maximum sustainable yield (MSY), based on the average yearly catch from 1960 to 1976.
2. Minimize short-term economic dislocations to the extent possible consistent with objective 1.
3. Prevent the harvest of ocean quahog from exceeding maximum sustainable yield and direct the fishery toward achieving optimum yield.

XII-2. Description of Alternatives

The alternatives that could be applied to the surf clam fishery, the ocean quahog fishery, or both may be categorized as conservation alternatives, allocation alternatives, access control alternatives, and management unit alternatives. The conservation alternatives are: no FMP, annual quotas, quarterly quotas, size limits, and gear restrictions. Allocation alternatives are: no explicit allocation system, allocations to individual fleet sectors, individual vessel quotas, and stock certificates. Access control alternatives are: no access control, a moratorium on the entry of new vessels, and permit limitations. Management unit alternatives include: the resource in the northwest Atlantic FCZ, the resource in the northwest Atlantic FCZ and territorial sea, and the resource in the mid-Atlantic FCZ.

The above alternatives can be applied in various combinations to the species that are the subject of this FMP. It must also be noted that the alternatives are not mutually exclusive and that a particular alternative, while it has been assigned to a particular category for descriptive purposes, may, in fact, have impacts on other categories, e.g., gear restrictions, while defined as a conservation alternative, may also have impacts on allocations.

XII-3. Analysis of Beneficial and Adverse Impacts of Potential Management Options

Conservation Alternatives

1. No FMP: With no plan, the surf clam fishery would probably be severely depressed, dislocating participants in all segments, and allowing only a small number of participants to make a living. It could also significantly alter the structure of the industry. Without management, it is likely that expansion of the quahog fishery would result in over-exploitation on a scale similar to that which occurred in the surf clam fishery.
2. Annual Quotas: Annual quotas should assure the preservation of the resources. The quotas could be set at various levels depending, in the case of surf clam, on the desired rate of rebuilding of the resource relative to the associated level of impact on the industry, and, in the case of ocean quahog, on the desired level of protection of the resource relative to the rate of expansion of the fishery. Annual quotas with no other management measures could lead to significant economic hardship in the surf clam industry. Establishment of lower allowable harvest levels would provide better protection of the quahog resource and accelerate the recovery of the surf clam fishery but at a higher short-term economic cost to those presently in the surf clam and ocean quahog fisheries.

3. Quarterly Quotas: Quarterly quotas would have the same conservation attributes as an annual quota but could serve to lessen economic hardship in the surf clam industry. The need for quarterly quotas varies with the allocation system adopted. In the surf clam fishery they would probably be necessary for all allocation alternatives except individual vessel allocations. The quarterly quotas proposed in Amendment #2 differ somewhat from the quarterly quotas established in the original FMP. The primary reason for the shift is to increase the size of the two winter quarter quotas to reflect the possible increase in the level of fishing effort that will be caused by the bad weather make-up day provision of Amendment #2. The original FMP had quarterly quotas of 350,000 bu. for the winter months and 550,000 bu. for the good weather months and the possibility of a four day fishing week, with reductions to the fishing week to minimize the need for closures. Soon in the operation of that FMP it became clear that, given available harvesting capacity, a fishing week of no more than 24 hours per vessel was generally adequate to spread the harvest throughout the quarters. Vessels were required to identify the days of the week during which they would be fishing (in 12 hour increments) prior to the beginning of each quarter and changes during the quarter are not permitted. Therefore, if weather conditions are such that fishing is not possible, particularly for the smaller vessels, the affected vessels lose the opportunity to fish. Since there may be extended periods of bad weather during the months of December through March, it has been demonstrated that certain vessels may not have the opportunity to fish for a relatively extended period of time. To address this problem, the concept of a bad weather make-up day was developed. There are several alternative approaches to the bad weather make-up day included in Amendment #2. The Mid-Atlantic Council has recommended a make-up day of the same duration as the day missed to be taken on the fishing day following the day missed. The effect of this provision would be to increase the probability of more vessels fishing during the December - March period than without the provision. Therefore, in order to provide the make-up day, which increases the ability of certain vessels to fish at all during the bad weather months, it was considered necessary to adjust the quarterly quotas to minimize the possibility of closures during the winter quarters. It is recognized that this reduces the quotas for the good weather quarters, but, if the quota for the January - March quarter is not harvested, the surplus may be transferred to the April - June quarter. Therefore, the combination of the adjusted quarterly quotas combined with the bad weather make-up day should provide the opportunity for all vessels to fish at some time throughout the year and still minimize the possibility of closures.

4. Size Limits: The imposition of a size limit for surf clams is considered necessary at this time because of the survey cruise report of a substantial number of pre-recruit surf clams and because of the great incentive to harvest surf clams of any size to maximize catches. It is also considered necessary to maintain the provision of closing areas in order to protect pre-recruit clams. The size limit of 4.5" is in conformity with general industry practice, which discourages the harvest of clams under 4.5". The Council is proposing an allowance of 800 clams of under 4.5" per standard 32 bushel cage (60.16 cu. ft.). Enforcement would be facilitated through the use of a table that would convert the 800 undersize clams per 60.16 cu. ft. into the appropriate number of undersize clams for cages of other than 32 bu. capacity or for partially full cages. The allowance is based on a standard of approximately 20% undersize clams. Discards should not be a significant problem given the undersize allowance since surf clams are generally not mixed by size in the beds, so that a fisherman can move to another area if he discovers that he is in an area with a significant number of undersize clams.

5. Gear Restrictions: It would be possible to limit dredge size, pump size, and possibly other gear. Such limits would be designed to curtail effort, either in lieu of or in conjunction with other management measures. Such measures would probably be effective in the short-run. However, experience with similar measures in other fisheries has shown that, in the long-run, they are ineffective because

fishermen's ingenuity has proven adequate to negate the effects of the measures. Therefore, the only real effect of such measures is to increase inefficiency. It is likely that such measures would have high enforcement costs.

Allocation Alternatives

1. No Explicit Allocation System: Under this alternative, the annual species quotas would be established with no explicit user-group allocation made. Quarterly divisions of the quotas could be made in order to ensure some spread of harvests over the year. In addition, fishing time restrictions could be superimposed over this. This system is used in the current Surf Clam and Ocean Quahog FMP.
2. Allocations to Individual Fleet Sectors: Under this alternative a limited number of vessel groups would be recognized for explicit allocations. Annual and quarterly allocations to these user-groups could be made, probably based on historical aggregate catch performance of the groups. This is essentially the system used in the Groundfish FMP.
3. Individual Vessel Quotas: Under this system each individual vessel in the fleet would be allocated a share of the overall annual quota. These shares would be established on a percentage basis so that the value of the shares would vary as the size of the quota varies from year to year. The basis for the initial distribution could reflect historical participation. By defining those who at any point are permitted to share in the resource the system is a form of access control. The quotas could be transferable and thus could be considered as marketable certificates. A new fisherman would, therefore, not be prohibited from entering the fishery, but would have to purchase share(s) from existing participants in order to do so. A limit on the number of shares that any single individual or corporation would be allowed to hold could be applied in order to prevent an undesirable concentration of shares. This alternative could take the form of an individual allocation to each vessel or a number of smaller allocations to each vessel, each equalling the vessel quota. If the large number of smaller allocations were adopted, it would be a stock certificate program. Given the large number of vessels which entered the surf clam fishery since 1977, the surf clam formula would probably need to take into account catch levels since the implementation of the current FMP.

Vessel quotas would be equitable if the initial allocation formula was equitable. It would have lower enforcement costs than the current FMP since most enforcement would be from shore. There would be no need to regulate fishing time, so operations would be more efficient than under the current FMP. If the quotas were transferable, it would permit new entrants.

Under a stock certificate program the number of shares would be greater than the number of vessels currently in the fishery. The initial allocation of shares could be determined as described above. Such a system could be equitable to the extent that the formula used to make the initial allocation was equitable. There would be low enforcement costs since most enforcement would be from shore. There would be no need to regulate fishing days or times. There would be a lower cost to new entrants than with a vessel quota since a new entrant would only need to acquire as many shares as necessary to make an initial operation profitable. It would allow for the traditional method of entering the fishery. It would allow for economies of scale and for an operator to make micro-adjustments of scale by buying and selling shares to optimize individual operations. It would result in more accounting problems than a vessel quota since more shares would be involved.

Direct allocations might create some unemployment in the harvesting sector, since it could lead to the aggregation of the allocations of several vessels to one vessel and the retirement from the fishery of the other vessels. It could also lead to vessel equipment changes since the present regime leads to a harvester equipping his vessel to harvest the maximum volume of clams in a fixed time period whereas a

direct allocation would permit the harvester to maximize efficiency.

A modification of stock certificate or vessel quota systems could be effort quotas. In such a system the allocation to the vessel would be made in terms of fishing effort, probably fishing days. These could be calculated from records of catch per unit of effort. The allocations could be made for a year or on a quarterly basis. Since there are many factors that influence catch per unit of effort, such a system would probably need to be combined with gear restrictions. In addition, such a system would probably require quarterly allocations of the annual quota and possible closures because the imprecise nature of the effort allocations could lead to overfishing if effort limits were used alone.

Access Control Alternatives

1. No Access Control: This alternative would probably result in a significant adverse impact on economics in the surf clam fishery. The harvesting capacity of the existing fleet significantly exceeds the MSY and quotas likely in the next few years. Even though the surf clam fishery is a conditional fishery for purposes of federal financial assistance for vessel construction, it is probable that new vessels would enter the fishery if there were no access control. No access control seems to be needed in the ocean quahog fishery at this time, although an allocation system might be desirable during the life of this amended FMP.

2. Moratorium on the Entry of New Vessels: The current Surf Clam and Ocean Quahog FMP includes a moratorium on the entry of new vessels into the surf clam fishery in the FCZ. A moratorium would not be necessary with a vessel allocation or stock certificate program.

3. Permit Limitations: It would be possible to develop a system for the allocation of permits to participants in the surf clam and/or ocean quahog fisheries. In the surf clam fishery this would be a modification of the vessel moratorium that could provide for a specified number of new entrants annually if the condition of the stock improved to a predetermined level. In the ocean quahog fishery such a system could be used to control the rate of expansion of the fleet to guard against overcapitalization of the fishery in lieu of a moratorium at this time or in lieu of vessel allocations. Such a system would not be necessary with individual vessel allocations or with a stock certificate program.

Management Unit Alternatives

A variety of management units could be considered for this FMP. The management unit for the current FMP is the range of both species in the northwestern Atlantic FCZ. Alternatives could be surf clam and ocean quahog in the mid-Atlantic FCZ, or the range of both species in the FCZ and the territorial sea in the Atlantic. Sound management requires that a species should be managed throughout its range. However, New Jersey, which is the location of the most significant inshore surf clam fishery, has regulations which are not inconsistent with the objectives of this FMP. New York is developing regulations. The ocean quahog fishery, except in parts of New England, is an FCZ fishery. Therefore, although the management unit of the FMP does not manage the resources throughout their ranges, it provides for effective management working in conjunction with the State programs and should not be changed from what it is in the basic Surf Clam and Ocean Quahog FMP.

A possible consideration relative to management unit definition is the difference in character of the surf clam fishery in the Mid-Atlantic as opposed to the character of the fishery in New England. However, because of the mobility of the fleet and the enforcement problems inherent in significantly different management regimes in adjacent areas, it would probably be more effective to address these problems through other management measures rather than address these problems through management unit definition. In other words, the management unit could be defined as

including the entire resource in the northwestern Atlantic but different management regimes could be developed to take into consideration the differences in the several fisheries. The inshore areas would be managed by the States. In addition, it would be possible to divide the surf clam fishery in New England from the surf clam fishery in the mid-Atlantic with differing management regimes for each management area. Several alternative dividing lines for this purpose have been suggested including 41° latitude, 71° longitude, and the dividing line between the jurisdictions of the New England and Mid-Atlantic Fishery Management Councils. The dividing line begins at the intersection point of Connecticut, Rhode Island, and New York at 41°18'16.249" latitude and 71°54'28.477" longitude and proceeds S 37°22'32.75" E to the point of intersection with the outward boundary of the FCZ (50 CFR 601.12(a), Federal Register, Vol. 42, No. 137, July 18, 1977, page 36980).

Impacts of Alternative Allocation Strategies

Harvesting sector: The benefits and costs to the harvesting sector are likely to vary significantly between strategies. Specifically, one would expect the total costs of harvesting the quota to be lower under a system of individual vessel quotas or stock certificates than under other systems.

Under a system of annual vessel quotas or stock certificates the fisherman would have the opportunity to harvest his share of the OY in a manner most appropriate to him. The vessel owner would not need to worry about being preempted in securing his catch, as would be the case under the other two strategies. Rather, he would apply his capital and labor most efficiently so as to reduce his costs of harvesting. Technological innovations would be adopted given the incentive to reduce costs and maximize profits. An unknown amount of unemployment could be created in the harvesting sector through direct allocations since vessel operators could accumulate shares and retire vessels, leading to unemployment of crew members. Under both other strategies harvesting costs would rise as a result of a race between vessel operators to secure as large a share as possible of the annual or quarterly vessel group or industry quota before any closure or lower catch per unit effort restrictions would be enforced. The additional capital and labor that would likely be employed by the individual vessels in this race would increase the costs per unit of resource landed and result in economic inefficiency.

The nature and extent of fluctuations in ex-vessel prices under the three systems could vary with the pattern and variations in landings. In the New England area, under a system of vessel group allocations in the Groundfish FMP, prices to fishermen during late 1977 and 1978 were severely depressed during periods of open fishing followed by exceptionally high prices during periods of closures or restrictive trip limitations.

Under the individual vessel quota system, it is expected that prices would be relatively stable throughout the year as fishermen would be able to rationally respond to changing supply-demand conditions. Certainty of their own catches would allow the fishermen to play the market and would ensure more stable production and less fluctuation in prices to fishermen. The implication of price stabilization on total revenues to the fishermen would depend on the nature and share of the ex-vessel demand equation.

The above observations relative to costs and revenues in the harvesting sector suggest that net income to fishermen from harvesting a given quota could be greater under a system of individual vessel allocations or stock certificates than it would be under the other two options for allocations.

Processing Sector: Just as prices in the absence of an individual vessel quota system would fluctuate more over the season so would employment. Under a system of vessel group allocations employment in the processing sector could continue to be characterized by strong seasonal movements similar to those in landings caused by

opening and closing of the fisheries or changes in regulations of catch per unit effort within vessel groups. This presents severe planning problems in the processing sector by creating uncertainties over raw material flow. Furthermore, it could increase the cost per pound processed during glut periods because marginal facilities would have to be placed in operation, additional shifts would be required, and overtime would have to be paid to process the clams. Increased storage costs occur as a result of excess supply in the distribution system.

Under a system of annual vessel quotas, with the expected reduction in fluctuations in landings, employment in the processing sector should be more stable throughout the year. Processors could rationally plan their operations and finances. It would also allow employees of processing plants to have more certainty over the flow of income throughout the year.

Prevention of Abrupt Changes in the Relative Shares of Individual User-Groups:

The potential for abrupt changes in the relative shares of various harvesting user-groups appears to be greatest under a system of no explicit allocations. The surf clam fleet has demonstrated that its harvesting capacity exceeds the quotas prescribed so far. With only an annual quota competition between vessel groups for the quota is likely to favor the larger and more mobile vessels.

An allocation of quotas by vessel groups which uses current or recent catch performance by user-groups as criteria for deciding on the relative magnitude of the allocations is explicitly directed to preserve the relative shares of these user-groups over time. Competition within user-groups for the available group allocation might, however, result in changes over time in the relative shares of subgroups. The fewer the number of vessel classes recognized in a scheme of this nature the greater we may expect the heterogeneity among vessels in each group to be. In such cases, it is likely that during periods when the harvesting capacity of the group far outweighs the catch allocation of the group and when the race for the allocation is not restricted by trip limits, the relative shares of the vessels within an individual group may change in favor of the larger vessels. This effect might, however, be mitigated in situations where maximum catch limits per trip or week for all vessels in a given vessel class are set at a level which is significantly below the average catch per trip that the larger vessels in the group are capable of achieving.

Under the individual vessel quota or stock certificate systems, the initial distribution of the shares could be based on recent historic relative catch performance by individual vessels in the fleet. Thus, there would be no abrupt changes in the traditional pattern of fishing or in shares of vessel groups. However, if an individual vessel operator wished to expand or contract the scale of his operations, he could achieve this through the purchase or sale of certificates.

Freedom of Choice and Decision-Making and Extent and Complexity of Regulations:

A reasonable interpretation of this management consideration is that minimization of the number of constraints on fishermen is desirable. It becomes important, therefore, to look at the implications of the three allocation systems relative to the extent and complexity of management regulations.

The complexity of current regulations has effectively served to restrict the fishermen's freedom to decide where and when to fish. Under a system of annual individual vessel quotas a fisherman would be free to choose within the limits of his individual catch quota the most efficient and convenient times, places and methods for harvest.

This advantage, however, must be weighed against the inherent drawback of any direct catch allocation system: these systems (as opposed to effort allocation systems) remove a large degree of competition from the fishery. That is, they greatly reduce the ability of an individual fisherman to improve his performance relative to others

in the fishery by eliminating the possibility of increasing his catch through improved fishing ability.

Inducement of Diversification in Harvesting Sector: Inducement of effort away from surf clam stocks and towards the less intensely utilized quahog stocks may come from several sources. Among these are relative prices and costs. Stability in prices, the extent of freedom of decision-making and flexibility in planning harvesting operations would appear to be additional factors contributing to induced diversification. Specifically, the more freedom the vessel operator has in choosing his own strategy for harvesting surf clam, the greater would be the opportunities for becoming involved in the quahog fishery without being preempted from his historic share in the surf clam fishery. The individual vessel allocation system, by virtue of providing the greatest freedom in individual management of fishing efforts, appears to be more conducive to achieving species diversification than the vessel group allocation system with its auxiliary regulatory components. It should be recognized, however, that the sum of the surf clam and ocean quahog quotas is less than the demonstrated harvesting capacity of the surf clam fleet alone. It is virtually certain, therefore, that the overall fleet would have to operate at less than full capacity regardless of the degree of effort withdrawn from the surf clam fishery to the quahog fishery. In other words, effort and/or catch restrictions will be necessary on either the surf clam fishery, the ocean quahog fishery, or both, regardless of the degree of diversification in the overall sea clam industry.

Management Costs (Including Enforcement): Any scheme which assigns property rights, as would the individual vessel allocations or stock certificate schemes, would be expensive to initially design, implement and monitor relative to a system of implementing an overall catch limitation with no explicit allocation mechanism. It can also be expected that the information, research and administration costs associated with the individual vessel quota system would be higher than under a system of vessel group allocations. This is a consequence of the need to monitor each individual vessel's catch. Periodic audits of vessel catches could, however, easily be developed using adequate computerized routines. These audits would employ the same catch data base that would be used for monitoring catches by vessel groups.

Under these systems, an individual vessel would cease fishing for surf clam once its annual allocation is reached. The implication is that closures are self-imposed by individual fishermen rather than determined by the activities of the entire fishing fleet. As a result the need for regulation of vessel catch rates would be non-existent. This would substantially lower total management and enforcement costs relative to the current system of enforcing overall and group catch quotas, although NMFS enforcement costs may not decrease.

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

Introduction

There are a large number of possible combinations of the alternatives outlined above. The following measures were proposed in the public hearing draft of this Amendment:

1. The annual surf clam quota of 1.8 million bushels (approximately 30 million pounds of meats) would be continued unchanged as would be the provisions to allocate the quota by quarters and regulate fishing effort by restricting days fished. However, Amendment #2 would revise the quarterly quotas for surf clams to be 400,000 bushels for October through December and January through March, and 500,000 bushels for April through June and July through September. A fishing week of no more than four days, Monday through Thursday, will be continued. To help spread the quarterly catch evenly throughout the entire quarter, each vessel will be restricted to 24 hours of fishing per week at the beginning of each quarter. If the Regional

Director of the NMFS determines that the quarterly quota will not be harvested, the weekly hours of fishing may be increased. The Regional Director may prohibit fishing if it is likely that the quarterly quota will be exceeded. Vessels would be required to start and stop fishing at uniform hours. A make-up day for bad weather would be permitted on the fishing day following the fishing day during which the bad weather condition existed. The make-up day provision would be in effect only during the months of December, January, February, and March.

2. Amendment #2 would continue the provisions of the original FMP regarding ocean quahogs except that the annual quota for ocean quahogs would be increased to 4.0 million bushels (approximately 40 million pounds of meats).

3. The prohibition on the entry of additional vessels into the surf clam fishery would be continued by Amendment #2. The moratorium would not preclude replacement of vessels involuntarily leaving the fishery during the time when the moratorium is in effect.

4. The provision to close surf clam beds to fishing wherein over 60% of the clam are under 4.5 inches in length and less than 15% are over 5.5 inches in length is continued in Amendment #2. It is recommended that special measures be instituted to manage such closed areas when they are reopened to insure that such openings do not lead to premature closures in the fishery and to prevent overfishing of the newly opened beds.

5. Dredge size and number are to be limited by Amendment #2 to such equipment on board and in use on the effective date of Amendment #2. A minimum size limit of 4.5 inches would be imposed, at least during 1980. The primary reason for these measures is to take into account the possible impacts of using 1980 as a base year for measuring harvesting sector performance upon which to base, at least in part, a possible future direct allocation system for the surf clam fishery. The dredge freeze was recommended by the Council's Surf Clam and Ocean Quahog Advisory Subpanel primarily to minimize changes from historical relative harvesting capacity during the base period. The surf clam size limit was recommended by the Subpanel in order to minimize the harvest of pre-recruit surf clams during the base period when there would be a great incentive to harvest the maximum volume of clams in order to improve harvesting performance. Council may amend the FMP by removing the moratorium on the entry of new vessels into the surf clam fishery and replacing it with some type of vessel allocation system beginning with calendar year 1981. In the event that such a system is instituted, and, to the extent that an allocation formula could be based on performance, 1980 would be the base period for at least a portion of such calculations.

6. The licensing provisions of the original FMP are continued in Amendment #2. The reporting requirements are continued with minor revisions.

7. The Council has been considering the recommendation of the New England Fishery Management Council that a special regime be established for the surf clam fishery in New England. There has been much discussion since the original FMP was developed relative to the New England surf clam fishery, whether it differed enough from the Mid-Atlantic fishery to warrant a separate regime, and if so, what form that separate regime should take. After much consideration, the Mid-Atlantic Council has developed an alternative for the management of the surf clam fishery in New England. The alternative provides for the establishment of a separate management regime in New England, that is, the area north of the dividing line between the Mid-Atlantic and New England Fishery Management Councils. In the northern area the moratorium on entry of vessels into the surf clam fishery and the effort and gear restrictions would not be in effect. A quota of 200,000 pounds of surf clams would be set for that area. The New England quota would be in addition to the quota for approximately 30 million pounds of surf clams set in the amended FMP in the Mid-Atlantic. When half of that quota would be caught, the effort restrictions

operating in the Mid-Atlantic area would be imposed. Any harvest of surf clams from the northern area would not be charged against the Mid-Atlantic surf clam quota. Vessels entering the New England fishery under this special provision would not be entitled to fish in the Mid-Atlantic area and would not accrue any rights to a future direct allocation system that might be established. Vessels with permits issued pursuant to the moratorium established by the original Surf Clam and Ocean Quahog FMP would be permitted to fish in the northern area, but their landings would be reported separate from their Mid-Atlantic landings and would not count toward any possible future direct allocation system base calculation.

8. Another combination of management measures was proposed for consideration during the public review process for this amendment by the Council's Surf Clam and Ocean Quahog Advisory Subpanel. That alternative would extend the FMP to the end of 1981 with annual and quarterly quotas for surf clams and an annual quota for ocean quahogs identical to those in the Council's recommended alternative. Dredge size and number would be limited to that on board and in use as of January 1, 1980. The bad weather make-up day provisions are the same in the Subpanel's alternative as those in the Council's recommended alternative, except that the make-up day would be limited to one twelve hour period per week. The moratorium on entry of vessels into the surf clam fishery would also be extended.

Preferred Management Option

Based on a review of comments made at the public hearings and letters received during the review period, and on the recommendations of the Council's Surf Clam and Ocean Quahog Advisory Subpanel and Scientific and Statistical Committee, the Council has adopted the following measures for Amendment #2 to the Surf Clam and Ocean Quahog FMP:

1. Extend the FMP through calendar year 1981;
2. Establish two management areas for the surf clam fishery: the New England Area and the Mid-Atlantic Area. The dividing line between the areas would be the established dividing line between the New England and Mid-Atlantic Fishery Management Councils. The dividing line begins at the intersection point of Connecticut, Rhode Island, and New York at 41°18'16.249" latitude and 71°54'28.477" longitude and proceeds S 37°22'32.75" E to the point of intersection with the outward boundary of the FCZ (50 CFR 601.12(a), Federal Register, Vol. 42, No. 137, July 18, 1977, page 36980).
3. The following quantities (in millions of bushels) would apply annually:

	Optimum Yield (OY)	Domestic Annual Harvest (DAH)	Domestic Annual Processing (DAP)	Quota	TALFF
Surf Clams					
New England	0.025	0.025	0.025	0.025	0
Mid-Atlantic	1.800	1.800	1.800	1.800	0
Ocean Quahogs					
1980	3.500	3.500	3.500	3.500	0
1981	4.000	4.000	4.000	4.000	0

For the Mid-Atlantic Area the surf clam OY, DAH, DAP and quota of 1.8 million bushels (approximately 30 million pounds of meats) are continued unchanged as are the provisions to allocate the quota by quarters and regulate fishing effort by restricting days fished. However, the quarterly quotas for surf clams are revised

to be 400,000 bushels for October through December and January through March, and 500,000 bushels for April through June and July through September. While the DAP is shown separately in the above table for the New England and Mid-Atlantic Areas, the separate management areas do not apply to the processing sector.

4. A fishing week of no more than four days, Monday through Thursday, is continued. To help spread the quarterly catch evenly throughout the entire quarter, each vessel will be restricted to 24 hours of fishing per week at the beginning of each quarter. If the Regional Director of the NMFS determines that the quarterly quota will not be harvested, the weekly hours of fishing may be increased. The Regional Director may prohibit fishing if it is likely that the quarterly quota will be exceeded. Vessels would be required to stop fishing at 5:00 pm. The fishing week is changed from 12:01 am Monday - 11:59 pm Thursday to 5:00 pm Sunday - 5:00 pm Thursday. During the months of December, January, February, and March, a make-up day for bad weather is permitted on the fishing day following the fishing day lost due to bad weather. In the New England Area, there would be no effort restrictions until half of the 25,000 bushel quota is harvested, at which time the effort restrictions operating in the Mid-Atlantic Area would be imposed.

5. The provisions of the original FMP regarding ocean quahogs are continued unchanged except that the OY, DAH, DAP, and annual quota for ocean quahogs are increased as shown in the above table.

6. The prohibition on the entry of additional vessels into the surf clam fishery is continued in the Mid-Atlantic Area. The moratorium is lifted in the New England Area. Vessels with permits issued pursuant to the moratorium in both New England and the Mid-Atlantic may fish in both areas on both quotas. Vessels entering the fishery in New England that do not meet the moratorium conditions may not fish south of the dividing line. The moratorium does not preclude replacement of vessels involuntarily leaving the fishery during the time when the moratorium is in effect.

7. The provision to close surf clam beds to fishing wherein over 60% of the clam are under 4.5 inches in length and less than 15% are over 5.5 inches in length is continued. It is recommended that special measures be instituted to manage such closed areas when they are reopened to insure that such openings do not lead to premature closures in the fishery and to prevent overfishing of the newly opened beds.

8. A surf clam minimum size limit of 4.5 inches is imposed.

9. The licensing provisions of the original FMP are continued. The reporting requirements are continued with minor revisions.

The final recommended regime adopted by the Mid-Atlantic Council for 1980-1981 differs from the recommended regime in the public hearing draft for Amendment #2 in several important ways. These revisions were made because of substantial public comment.

Base Year - Vessel Allocations

There was almost universal opposition to the concept of a direct vessel allocation system with allocations based at least in part on performance during a base year. Much of the opposition seemed to be directed toward utilizing data from a future base year, with concern relative to changes in actual harvesting patterns that would follow from the pressure on the fleet to maximize surf clam harvests during the base year. Given the fact that the proposed dredge freeze would not have taken effect until January 1, 1980, it was felt by persons commenting on the draft that massive changes in dredges would take place prior to that date, significantly altering historical shares in the surf clam fishery, to the detriment of those vessels that could not increase dredge size or number prior to that date, either for technical or

financial reasons. There was also concern that vessels which have transferred effort into the ocean quahog fishery would be required to return to the surf clam fishery to establish a base record, having the effect to accelerating the harvest of the surf clam quota and also substantially decreasing the supply of ocean quahogs at the very time that the ocean quahog fishery is beginning to develop.

The general recommendation from the public was to extend the moratorium on the entry of new vessels into the surf clam fishery (except in the New England area) for at least two years. This extension of the moratorium was objected to by several small surf clam processors who are concerned that their supply of surf clams could be cut off if the vessels that have traditionally been supplying them were to sell to other processors. The Council recognized this potential problem but, given the problems associated with the base year and the opposition to it, decided to extend the moratorium for two more years and attempt to find an acceptable replacement to the moratorium during that time. It must be recognized that the basic factors that led to the moratorium in the surf clam fishery as recommended in the original FMP have not changed. The quota remains the same. There are more vessels licensed for the fishery than were estimated to be in the fishery when the moratorium was originally proposed.

Given the problems associated with the establishment of a freeze on dredge size and number at a future time (i.e., the effective date of Amendment #2), and given the substantial public opposition to such a freeze, the Council decided to eliminate that measure in the final version of Amendment #2.

New England Management Area

There was no opposition to the alternative surf clam management regime for the New England Area. There was concern that, while the line proposed to separate the New England and Mid-Atlantic Areas in the hearing draft was acceptable for the surf clam fishery, it could create problems if it were used in the future in the ocean quahog or other fisheries. The Council decided that it would use the proposed line in the final version of Amendment #2, since it seemed appropriate for the surf clam fishery, with the understanding that it is not the Council's intent to use that line in any other fishery.

There was also concern about the proposed quota for the New England Area, since reported landings in Massachusetts alone from the FCZ in 1977 totalled 286,000 pounds of meats whereas the proposed quota for 1980 for all of New England was 200,000 pounds of meats. The Council, recognizing that biological data on the surf clam resource in the New England FCZ is extremely limited, decided to specify an MSY, OY, and quota for surf clams in the New England Area of 25,000 bushels for 1980 and 1981. This amount should provide an incentive to develop the New England fishery. If surf clams in amounts approaching the quota are actually harvested, it would provide evidence of a substantial stock of surf clams in the area and serve as the basis for a formal survey and stock assessment prior to the next updating of this FMP.

Revised Fishing Week

During the review period, the concept of ending all surf clam fishing at a uniform time was supported and 5:00 pm was supported as an ending time. However, since the original FMP specified a fishing week of 12:01 am Monday through 11:59 pm Thursday, it was necessary to revise the fishing week to permit vessels fishing for periods greater than 12 hours to fish on Monday. The Council resolved this issue by redefining the surf clam fishing week to be 5:00 pm Sunday through 5:00 pm Thursday.

Surf Clam Size Limit

The surf clam size limit (4.5") was proposed in the hearing draft of Amendment #2

primarily as part of the base year alternative. There was much support for a size limit in the hearing and review process as a conservation measure to decrease the probability of fishing in closed areas and to permit clams in other areas to grow to commercial sizes. Therefore, the Council decided to keep the 4.5" minimum size limit in the final version of Amendment #2. The Council recognized that it is impossible to limit catches to only clams over 4.5" and also recognized the high mortality of discarded surf clams. Therefore, the Council proposed an allowance of 800 undersize clams per 32 bushel standard cage.

Ocean Quahog Quota

There was general support for the increase in the OY and quota for ocean quahogs. There was concern that the increase from the 3.0 million bushels in the original FMP to the 4.0 million bushels proposed in the draft of Amendment #2 might be too rapid, both because of the limited knowledge of the resource and because of possible effects on the overall market for clam products. Because of these factors and based on the recommendation of the Council's Surf Clam and Ocean Quahog Advisory Subpanel, the Council decided to increase the OY and quota for ocean quahogs to 3.5 million bushels in 1980 and 4.0 million bushels in 1981. Based on an informal survey of ocean quahog processors and comments made during the hearing and review process, the Council believes that the capacity and intent of US harvestors to harvest ocean quahogs and the capacity and intent of US processors to process ocean quahogs is at least equal to the OYs and quotas specified for 1980 and 1981. The Council is aware of the distribution of fishing effort relative to the distribution of the ocean quahog resource (see p. 40). However, it does not believe that this constitutes a problem, at this time, that necessitates the development of management measures that would distribute fishing effort.

XII-5. Specification of Optimum Yield

The Mid-Atlantic Fishery Management Council has determined that the annual optimum yield of surf clams should be 1.8 million bushels (approximately 30 million pounds of meats at 17 pounds of meats per bushel) for the Mid-Atlantic Area and 25,000 bushels for the New England Area. For ocean quahog the annual optimum yield for the entire area should be 3.5 million bushels in 1980 and 4.0 million bushels (35 and 40 million pounds of meats, respectively, at conversion factor of 10 pounds of meats per bushel). These optimum yields are subject to review and adjustment by the Council if the NMFS survey data analyzed after release of this plan indicates changes in OYs to be necessary. The capacity of US fishermen to harvest, and their intent to use that capacity, (i.e., DAH) for surf clams in the Mid-Atlantic Area is equal to the OY, as is the DAH for the New England Area. The capacity of US processors, and their intent to use that capacity (i.e., DAP) for ocean quahogs is equal to OY. Therefore, the TALFF is 0.

Table 47. MSY, OY, DAH, DAP, and TALFF
(millions of bushels)

<u>Species</u>	<u>Maximum Sustainable Yield</u>	<u>Optimum Yield</u>	<u>DAH</u>	<u>DAP</u>	<u>TALFF</u>
Surf Clams					
New England	.025	.025	.025	.025	0
Mid-Atlantic	2.900	1.800	1.800	1.800	0
Ocean Quahogs					
1980	4.300	3.500	3.500	3.500	0
1981	4.300	4.000	4.000	4.000	0

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

XIII-1. Permits and Fees

It is recommended that the permit requirements of the current Surf Clam and Ocean Quahog FMP continue and that permits currently issued remain in effect without reapplication, provided eligibility is established as provided below. Those requirements provide that 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 parts thereof caught within the FCZ. Two types of permits should be provided in the surf clam fishery: Type A permits issued pursuant to the initial moratorium, the eligibility criteria for which are described (as revised by Amendment #2) in the following paragraph; and Type B permits issued to vessels operating in the New England Area that do not meet the eligibility criteria for Type A permits. Vessels with Type A permits would be permitted to fish for surf clams in both the New England and Mid-Atlantic Management Areas. Vessels with Type B permits would be permitted to fish only in the New England Management Area.

A vessel would be eligible for a surf clam permit if it met any of the following criteria: the vessel has landed surf clams in the course of conducting a directed fishery for surf clams between November 18, 1976, and November 17, 1977; or the vessel was under construction for, or was being re-rigged for, use in the directed fishery for surf clams on November 17, 1977. "Under construction" means that the keel had been laid, and "being re-rigged" means physical alteration of the vessel or its gear had begun to transform the vessel into one capable of fishing commercially for surf clams. Applications for permits must be received by the NMFS no later than February 15, 1980, and the vessel for which such a permit is applied for must be in operation and have landed at least 500 bushels of surf clams from the FCZ by no later than April 15, 1980, in order to qualify for a permit under the vessel moratorium in the surf clam fishery. This latter provision is recommended to insure that only vessels that are entitled to permits in the surf clam fishery pursuant to the vessel moratorium receive such permits. Permits in the surf clam fishery may be granted to a vessel that is replacing a vessel which involuntarily left the surf clam fishery during the moratorium, and both the entering and replaced vessels are owned by the same person and have similar surf clam harvesting capacities.

Permit applications should be processed by the Regional Director of the Northeast Region of the NMFS. It is recommended that the application form require provision of the following information: names, addresses, and telephone numbers of the owner and operator; the name of the vessel; the vessel's United States Coast Guard documentation number or State license number; engine and pump horsepower; home port of the vessel; directed fishery or fisheries; fish hold capacity (in "cages" or bushels), dredge size; amounts of surf clams and ocean quahogs landed in the past year (in bushels, if applicable); number of fishing trips in the past year; and date of beginning of construction or re-rigging (if applicable).

It is recommended that there be no fee for the initial permit but that a lost or mutilated permit be replaced at a cost of \$25. Any applicant denied a permit by the Regional Director should be allowed to appeal to the Assistant Administrator.

A permit should be valid only for the vessel for which it is issued. The permit should be carried, at all times, on board the vessel for which it is issued, and should be maintained in legible condition. The permit, the vessel, its gear and catch should be subject to inspection by any authorized official.

A permit should expire when the owner or operator retires the vessel from the

fishery. Failure to land any surf clams from the FCZ for 52 consecutive weeks should constitute retirement from the fishery.

XIII-2. Catch Limitations

Foreign Fishing

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

Domestic Catch Quotas

Surf clams: It is recommended that the annual quota for surf clams equals the optimum yield. The New England Management Area annual quota is 25,000 bushels. The Mid-Atlantic Management Area annual quota is 1,800,000 bushels divided into quarterly quotas as follows:

January 1 - March 31	400,000 bushels
April 1 - June 30	500,000
July 1 - September 30	500,000
October 1 - December 31	400,000
ANNUAL QUOTA	1,800,000

In the Mid-Atlantic Management Area, if the actual catch of surf clams in any one quarter falls more than 5,000 bushels short of the specified quarterly quota, the Regional Director should 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 should subtract the amount of the excess from the next succeeding quarterly quota. The Assistant Administrator should publish a notice in the Federal Register whenever the Regional Director adjusts the quarterly quota.

In the New England Management Area, when half of the annual quota has been harvested, the Regional Director shall impose effort restrictions similar to those operating in the Mid-Atlantic Management Area. The Assistant Administrator should publish a notice in the Federal Register whenever the Regional Director adjusts allowable fishing effort.

Ocean Quahogs: The annual quota for ocean quahogs should equal the optimum yield which for 1980 is 3,500,000 bushels and for 1981 is 4,000,000 bushels. If necessary, the Regional Director may establish quarterly quotas for ocean quahog, and, in that event, the Assistant Administrator should publish notice of such quarterly quotas in the Federal Register.

Closure: If the Regional Director determines (based on logbook reports, processor reports, vessel inspections, or other information), that the quota for surf clams or ocean quahogs for any time period will be exceeded, the Assistant Administrator should 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 should send notice of the action, by certified mail, to each surf clam or ocean quahog processor and to each surf clam or ocean quahog vessel owner or operator.

XIII-3. Restrictions

It is recommended that a minimum size of 4.5 inches be established to minimize the harvest of pre-recruit surf clams.

It is recommended that no person should catch and retain on board any surf clams or ocean quahogs during closed seasons, in closed areas, or on days of the week in

which fishing for these species is not permitted.

No person should catch and retain on board any surf clams on other than an authorized surf clam fishing trip.

Presence of any part of a vessel's gear in the water later than one-half hour after the end of that vessel's authorized fishing period should be prima facie evidence that the operator of that vessel is fishing in violation of the FMP and its regulations.

Presence of surf clams or ocean quahogs aboard any permitted fishing vessel engaged in those fisheries and any part of the vessel's fishing gear in the water in closed areas should be prima facie evidence that such clams or quahogs were taken in violation of the provisions of the Act and the regulations. Presence of surf clams or ocean quahogs aboard any permitted fishing vessel engaged in those fisheries and any part of the vessel's fishing gear in the water more than 12 hours after a fishery closure announcement becomes effective should be prima facie evidence that such clams or quahogs were taken in violation of the provisions of the Act and the regulations.

Possession of surf clams, by any person aboard any fishing vessel engaged in the surf clam fishery, more than 12 hours after a weekly closure occurs should be prima facie evidence that such surf clams were taken in violation of the Act and the regulations.

No person should possess, have custody of or control of, ship, transport, offer for sale, deliver for sale, sell, purchase, import, export, or land, any surf clam, ocean quahog, or part thereof, which were 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 should 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 should:

- (1) refuse to permit an authorized officer to board a fishing vessel subject to such a 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;
- (2) forcibly assault, resist, oppose, impede, intimidate or interfere with any authorized officer in the conduct of any search or inspection;
- (3) resist a lawful arrest for any act prohibited by the regulations; or
- (4) 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.

Any person or vessel found to be in violation of these regulations, including the logbook and other reporting requirements, should 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. This is recommended to assist in resolving what are apparently significant enforcement problems with the current FMP by providing appropriate penalties that are known in advance. 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-4. Effort Restrictions

Surf Clams

Fishing for surf clams should be permitted only during the period beginning 5:00 PM Sunday and ending 5:00 PM Thursday and be conducted during this period only at the times and under the conditions authorized by the Regional Director.

Each quarter should begin with each vessel limited to 24 hours of fishing time to allow fishing for surf clams to be conducted throughout the entire quarter without exceeding the allocation for that quarter. Vessels should be required to start and stop fishing at uniform hours.

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

It is recommended that provision be made for an alternate fishing day in the event of unsafe weather conditions on a vessel's specified fishing day. A fisherman could only claim a weather day if small craft warnings were posted at the port from which the vessel operates, or the closest port thereto if warnings are not normally posted at the port from which the vessel operates, and if the fisherman notified the Coast Guard of his intent to claim a weather day within four hours of his official starting time for fishing and if he landed no clams on that day. The make-up day would be the next fishing day and would amount to the same number of hours as the fisherman would normally have on a fishing day. A fisherman would 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 would be in effect only for the months of December, January, February, and March.

Ocean Quahogs

Fishing for ocean quahogs should be permitted seven days per week.

When 50 percent of the quota of ocean quahogs for any time period has been caught, the Regional Director should determine whether the total catch of ocean quahogs during the applicable time period will exceed the quota for that time period. If the Regional Director determines that the quota probably will be exceeded, he may reduce the number of days per week during which fishing for ocean quahogs is permitted for the remainder of the time period.

The Assistant Administrator should publish a notice in the Federal Register of any reduction in days per week during which fishing for ocean quahogs is permitted. The reduction should be effective immediately upon publication in the Federal Register. The Regional Director should also send notice of any reduction by certified mail to each surf clam or ocean quahog processor in the fishery and to each surf clam or

ocean quahog vessel owner or operator.

XIII-5. Closed Areas

It should be unlawful to fish for surf clams or ocean quahogs in any designated closed surf clam or ocean quahog area. The following areas should be closed to fishing based on the request of the Environmental Protection Agency (see Section VI-2):

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

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

Areas may be closed to surf clam and ocean quahog fishing upon a determination by the Regional Director (based on logbook entries, processors' reports, survey cruises, or other information) that the area contains surf clams of which 60 percent or more are smaller than 4.5 inches in size and not more than 15 percent are larger than 5.5 inches in size. Sizes should be measured at the longest dimension of the surf clam.

The Regional Director should publish notice of any closed area in the Federal Register. The Regional Director should send notice of the closed area, by certified mail, to each surf clam or ocean quahog processor and to each surf clam or ocean quahog vessel owner or operator. Specific regulations should be developed for the reopening of each area closed to assure that overfishing does not occur in the area. The regulations should provide for the equitable allocation of the surf clam resource in the reopened area, should consider the impact of surf clams harvested in the reopened area on the rate of harvesting the overall surf clam quota, and should make the resource in the reopened area available to fishermen on an equitable basis. The projected harvest from the reopened area would be deducted from the overall quota. It is recommended that the NMFS, in consultation with the Mid-Atlantic Fishery Management Council, propose regulations for fishing in reopened areas and that public hearings be held on these regulations before they are implemented.

XIII-6. Vessel Moratorium

The moratorium that became effective on November 17, 1977, prohibiting the entry of additional vessels into the surf clam fishery, should remain in effect at least until December 31, 1981. The Mid-Atlantic Fishery Management Council desires to remove this moratorium as soon as practical, but believes that at least two additional years of the moratorium are necessary in order to prepare the necessary analyses and provide for adequate public review of any possible alternatives to the moratorium.

XIII-7. Vessel Identification

Each fishing vessel 25 feet in length or greater subject to these regulations should display its official number on both sides of the deckhouse or hull, and on an appropriate weather deck. Vessels under 25 feet in length do not need to display any number. The official number is that number issued by the US Coast Guard associated with the documentation of the fishing vessel or the official number issued by a State or the US Coast Guard for undocumented vessels.

Such markings should be at least eighteen (18) inches in height and be legibly painted in a contrasting color.

The operator of each vessel should keep the required markings clearly legible and in good repair and insure that no part of the vessel, its rigging or its fishing gear

obstructs the view of the markings from an enforcement vessel or aircraft.

Vessels licensed under state law should use the appropriate vessel identification markings established by that state.

XIII-8. Facilitation of Enforcement

The owner or operator of any vessel subject to these regulations should immediately comply with instructions issued by authorized officers to facilitate boarding and inspection of the vessel for the purpose of enforcing the Act and the regulations.

Upon being approached by a Coast Guard cutter or aircraft, or other vessel or aircraft authorized to enforce the Act, the vessel should be alert for signals conveying enforcement instructions. Standard signals and requirements should be developed and implemented by regulation.

XIII-9. Management Areas

It is recommended that two management areas be created in the surf clam fishery: the New England Management Area and the Mid-Atlantic Management Area. The dividing line between the areas would be the established dividing line between the New England and Mid-Atlantic Fishery Management Councils. The dividing line begins at the intersection point of Connecticut, Rhode Island, and New York at 41°18'16.249" latitude and 71°54'28.477" longitude and proceeds S 37°22'32.75" E to the point of intersection with the outward boundary of the FCZ (50 CFR 601.12(a), Federal Register, Vol. 42, No. 137, July 18, 1977, page 36980).

XIII-10. Habitat Preservation, Protection and Restoration

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

XIII-11. Development of Fishery Resources

No government action is needed at this time.

XIII-12. Management Costs and Revenues

Management costs should be essentially the same with Amendment #2 as with the original FMP except for the cost of enforcing the minimum size limit and the waiver of the moratorium in the surf clam fishery in the New England Area. Both of these measures could increase enforcement costs. However, both measures are necessary.

XIV. SPECIFICATIONS AND SOURCES OF PERTINENT FISHERY DATA

XIV-1. General

The following are recommended in order for the Fishery Management Councils and the NMFS to acquire accurate data on the surf clam and ocean quahog catch, disposition of such catch, effort in the fishery, and importance of surf clams and ocean quahogs to fishermen relative to all other species caught. They are modifications of the requirements set forth in §652.13 to implement the original Surf Clam/Ocean Quahog FMP. These data reporting requirements are necessary to manage the fishery for the maximum benefit of the United States. It is necessary that reporting be as comprehensive as possible. The following suggestions are designed to meet this need.

XIV-2. Reports and Records

Dealers

All persons who buy surf clams and ocean quahogs from vessels engaged in the surf clam or ocean quahog fishery should provide at least the following information to the Regional Director on a weekly basis on forms supplied by the Regional Director: dates of purchases; number of bushels purchased, by species; name and permit number of the vessel from which surf clams or ocean quahogs are landed or received; price per bushel, by species; mailing address of dealer or processing plant; and meat yield per bushel by species.

All persons required to submit reports under the above paragraph should also be required to submit at least the following information to the Regional Director on an annual basis on forms supplied by the Regional Director: number of dealer or processing plant employees, by month; number of employees processing surf clam and ocean quahog, by species, by month; total payroll for surf clam and ocean quahog processing, by month; capacity to process surf clams and ocean quahogs, by species; and projected capacity to process surf clams and ocean quahogs, by species, for the following year.

All persons purchasing or receiving any surf clams or ocean quahogs at sea for transport to any port of the US should maintain and provide to the Regional Director records identical to those required under the above paragraphs.

Violations of these requirements should be subject to the penalties provided for in the FCMA.

Owners and Operators

The owner or operator of any vessel with a permit in the surf clam or ocean quahog fisheries should maintain on a daily basis on board the vessel an accurate log for each fishing trip, on forms supplied by the NMFS showing at least: name and permit number of the vessel; total amount in bushels of each species taken; date(s) caught; time at sea; duration of fishing time; locality fished; crew size; crew share by percentage; landing port date sold; price per bushel; buyer; and size distribution of surf clams and ocean quahogs sold, by species, on a percentage basis.

The owner or operator should make the log available for inspection by an authorized official at any time during or after a trip.

The owner or operator should keep each logbook for one year after the date of the last entry in the log.

The owner or operator should submit copies of logbook forms weekly to the Regional

Director.

All persons required to submit reports under the above paragraphs should submit annually to the Regional Director on forms supplied by the Regional Director at least the following information relating to vessel characteristics: name of the vessel, vessel's US Coast Guard documentation number or State license number, engine and pump horsepower, homeport of vessel, hold capacity (in bushels or cages), and dredge size and number of dredges.

The Assistant Administrator should revoke, modify, or suspend the permit of a vessel whose owner or operator falsifies or fails to submit the records and reports prescribed by this section.

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

XV-1. Fishery Management Plans

This amended Surf Clam and Ocean Quahog FMP is related to other FMPs and PMPs as follows:

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

XV-2. Treaties or International Agreements

No treaties or international agreements relate to this fishery.

XV-3. Federal Laws and Policies

The only Federal law that controls the fisheries covered by this FMP is the FCMA.

Marine Sanctuary and Other Special Management Systems

The USS Monitor Marine Sanctuary was officially established on January 30, 1975, under the Marine Protection, Research, and Sanctuaries Act of 1972. Rules and regulations have been issued for the Sanctuary (15 CFR Part 924). They prohibit deploying any equipment in the Sanctuary, fishing activities which involve "anchoring in any manner, stopping, remaining, or drifting without power at any time" (924.3(a)), and "trawling" (924.3(h)). The Sanctuary's position off the coast of North Carolina at 35°00'23" N latitude - 75°24'32" W longitude is located in the FMP's designated management area. The Monitor Marine Sanctuary is clearly designated on all National Ocean Survey (NOS) charts by the caption "protected area". This minimizes the potential for damage to the Sanctuary by fishing operations.

Marine Mammals and Endangered Species

The provisions of this amended FMP should have no impact on marine mammals or endangered species, either through harvesting and processing operations for surf clams and ocean quahogs, or through the availability of surf clams and ocean quahogs as possible food items for 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, we are unable to specify the relationship of both programs without site specific development information. Certainly, the potential for conflict exists if communication between interests is not maintained or appreciation of each other's efforts is lacking. Potential conflicts include, from a fishery management position: (1) exclusion areas, (2) adverse impacts to sensitive, biologically important areas, (3) oil contamination, (4) substrate hazards to conventional fishing gear, and (5) competition for crews and harbor space. We are not aware of pending deep water port plans which would directly impact offshore fishery management goals in the areas under consideration, nor are we aware of potential effects of FMPs upon future development of deep water port facilities.

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

State laws regulating this fishery are discussed in Section VII-4 of the FMP. No other State or local laws are known to control the fisheries that are the subject of this FMP.

State Coastal Zone Management (CZM) Programs

The proposed action entails management of surf clam and ocean quahog stocks in an effort to ensure sustained productivity at some optimum level. In order to achieve this goal, all FMPs must incorporate means to achieve integrity of fish stocks, related food chains, and habitat necessary for this integrated biological system to function effectively. Inasmuch as CZM plans are presently in the developmental stages, we are not aware of specific measures on the part of the individual states which would ultimately impact this FMP. However, the CZM Act of 1972, as amended, is primarily protective in nature, and provides measures for ensuring stability of productive fishery habitat within the coastal zone. Therefore, each State's CZM plan will probably assimilate the ecological principles upon which this particular FMP is based. It is recognized that responsible long-range management of both coastal zones and fish stocks must involve mutually supportive goals. Thus, when details are forthcoming, specific state CZM plan elements related to fishery concerns will be evaluated for possible inclusion in future amendments of this FMP. States in the region with approved CZM Programs are Maine, Massachusetts, Rhode Island, part of New Jersey, Maryland, and North Carolina.

XVI. COUNCIL REVIEW AND MONITORING OF THE PLAN

The Council will review the FMP each year.

Section 304(e) of the FCMA requires that the Secretary initiate and maintain a comprehensive program of fishery research to carry out the purposes, policies, and provisions of the Act. In order for the Council to monitor and predict biological and socioeconomic impacts of management decisions cited in this FMP, certain basic data must be provided on a continuing basis. Some of these data will be obtained through the recordkeeping provisions outlined in this FMP. However, much of the biological as well as socioeconomic information needed by the Council to address and resolve problems will not be available from those sources. Therefore, the Council

recommends to the Secretary the following areas of research as being of high priority and requests that a comprehensive program of research be initiated or incorporated into ongoing research and survey efforts.

1. Biological Research and Monitoring

- a. Assessments of distribution, density, population structure, and abundance of resources throughout their geographic ranges in the FCZ.
- b. Estimation of year-class strengths and recruitment successes.
- c. Determination of reproduction potential relative to clam sizes and densities.
- d. Studies of the biology of ocean quahog, especially age at sexual maturity, natural mortality, yield per recruit, and estimation of MSY.

Suggested form of study/results: On-going studies with annual reports as appropriate.

2. Fishery Research and Monitoring

- a. Evaluation of incidental mortalities caused by fishing relative to various gear, vessel, and fishing technique characteristics.
- b. Determination of catch/effort by vessel, vessel tonnage, area fished, and gear characteristics.

Suggested form of study/results: One time study of a. Quarterly compilation of b with an annual report.

3. Processing Sector Research and Monitoring

- a. Continuous monitoring of size frequencies of catch, costs and means of production, and wholesale and retail prices.
- b. Examination of species and product diversity in production by plant.

Suggested form of study/results: Quarterly compilations and reports.

4. Environmental Research and Monitoring

- a. Assessment of hydrographic influences on reproductive and recruitment success, and transport and setting success.
- b. Estimation of impacts of ocean dumping, dredging, and other coastal activities on resources; prediction of probable impacts on resources from these operations in short and long-term.

Suggested form of study/results: One time study and report on a. On-going study and monitoring of b, with annual reports. Especially important is the capability for short-notice intense assessments on an emergency basis, to predict impacts of transient acute phenomena, e. g., anoxic conditions similar to those observed in summer, 1976.

5. Socioeconomic Research and Monitoring

- a. Compilation of vessel earnings and profits, employment (fishery/industry) profiles.
- b. Analysis of demographic characteristics of affected communities and industries.

c. Analysis of degrees of interaction between clam and other fisheries with regard to shifts (and ability to shift) in employment, opportunity costs, shifts in effort as functions of earnings, etc.

Suggested form of study/results: Quarterly compilation and yearly reports on
a. One-time baseline studies and bi-annual (or as needed) updates on b and c.

6. Other

Assess potential of aquaculture to augment natural supply of the clam.

Suggested form of study/results: One time cost/benefit and feasibility study, review of state-of-the-art.

Research priorities are: 1a, 1b, 1d, 2b, 5a, 3a, 3b, 1c, 2a, 3b, 5c, 4a, 5b, 6b, and 7.

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APPENDIX I: HARVESTING CAPACITY

Introduction

The FCMA requires that estimates be made of the harvesting capacity and the extent to which the capacity will be utilized during the relevant time period. The following section presents an estimate of the "specification" of capacity. This is followed by a discussion in regards to the extent to which the previously estimated capacity will be utilized, given the regulatory measures set out in the document.

Potential Capacity Section

Approaches For Measuring Capacity

A. Definitional Problems

Measuring the harvesting capacity of a fishing fleet is difficult because of the volatile nature of certain fisheries. On one hand, the biological or engineering capacity shows the short-run ability of the industry to produce regardless of economic considerations. This was the common capacity measure used during World War II. Most US fishing fleets, however, are composed of a great number of different types of boats and gears that often compete at similar tasks. Their harvesting capabilities have, for the most part, been adapted to cope with many government regulations, wide price fluctuations, and declining stocks that have characterized modern US fishing effort. Because fishing efficiency is so largely determined by these external elements, any index of current physical capacity (based upon such traditional factors as capital invested or labor supply) would show an incomplete and probably biased picture of the industry.

An alternate to physical capacity is the concept of economic capacity, which is generally defined as the level at which producers do not have a profit incentive to either increase or decrease production. Marginal revenues equal marginal costs, and profits are at a maximum. Unfortunately, the fishing industry presents a host of peculiar problems. First, fisheries are highly interdependent with one type of boat often used to catch several different species, depending on the availability of stocks and profitability of each. Second, the high risk factor exists because catch per unit effort and revenues per unit effort can vary substantially depending on weather, stock availability, or just plain luck. Finally, the third and most critical problem is that the bulk of economic costs and wages go to the owners and crew who operate on a share basis. If the revenues per unit effort are highly erratic or if there is a blurry definition between costs or revenues, the purely economic methodology cannot be accurately applied.

The alternative, used in this report, defines capacity by measuring the observed relationship between catch and fleet size. An index is constructed so that when a full utilization is observed, the index is set to 100 percent. Intervening periods are calculated as percentage of the full utilization rate, with an adjustment for productivity changes.

B. The Peak-to-Peak Methodology

Without a survey or with limited data, it is difficult to estimate capacity using the first two definitions listed above. The "peak-to-peak" method deals with these problems. It is called "peak-to-peak" because the periods of full utilization, called peaks, are used as the primary reference point for the capacity index. We start by first identifying the years that a particular fishery operated at full capacity. Peaks are defined as years that the industry was recognized as achieving

the maximum sustainable output in the short run. In practice, a peak year is often identified on the basis of having a yield per producing unit that is significantly higher than both the preceding and following years. These years have then had a 100 percent capacity utilization rate. From this we interpret the trend of "potential" capacity. By adjusting the catch trend to reflect the changes in fleet size (usually tonnage or operating units, but may be any relevant short-term constraint to expanding the catch), we get the adjusted trend of historical catch rates. We then compare the catch per ton of both peak and nonpeak years and adjust for productivity changes to obtain the historical capacity utilization rate.

Briefly, this method is a direct and simple measurement of the institutionalized or observed response by the industry to changes in demand. It is generally not considered to be as reliable as a survey, but it is a practical technique when a survey does not exist. It is extremely limited because one must assume that the basic technology is the same between peaks and, moreover, the further one gets between peaks the less reliable the results will be.*

Note that in the discussion, technology refers to the method of production, not the productivity.

Theoretical Basis for Measuring Capacity

A. Type 1: Peak-to-Peak

As with many other capacity studies, we have started by defining a production function that is Cobb-Douglas, or first-degree homogeneous. This is shown by:

$$Q_t = A L_t^a K_t^B T_t \quad (1)$$

Here, the output, Q_t , which can be produced in the current time period t , is determined by the available labor inputs, L_t , and capital inputs, K_t , and adjusted by a technology trend, T_t , and a constant or alining coefficient, A . To adapt our methodology to the available data, a second constraining relationship is added. This is shown by:

$$Q_t = A_t V_t T_t \quad , \quad (2)$$

where

$$V_t = L_t^a K_t^B \quad . \quad (3)$$

In eq. (2), the labor and capital inputs have been combined into a single production unit, V_t . This structure in effect limits the factor inputs of labor and capital to about constant proportions. The inputs would always be applied in the same proportions if $a = B$. For the analysis discussed in section VII, we use the relationship of eqs. (2) to (3) to circumvent the need for labor and capital data, as neither are adequately available in fisheries.

The specification used in the empirical analysis is a modified version of eq. (2):

$$\frac{Q_t}{V_t} = A T_t \quad . \quad (2a)$$

* For a further discussion on "peak-to-peak" methodology and results for other industries see Klein & Summers (1966).

In eq. (2a) we have modified the original relationship of eq. (3) so that we are now dealing with measurable phenomena. Output per producing unit is the dependent variable, and a technology trend is the main independent variable. This is the final relationship used to determine the capacity potential.

To estimate the technology trend, we apply the "peak-to-peak" methodology discussed in section III. Here, the level of technology in a particular time period, t , is determined by the average rate of change in productivity between peak years.

$$T_t = T_{t-m} + \frac{\frac{Q_{t+n} - Q_{t-m}}{V_{t+n}} - \frac{Q_{t-m}}{V_{t-m}}}{\frac{n+m}{m}} \quad (4)$$

Relative to a particular year, t , the values of m and n correspond to the length of time from the previous and following peak years.

Interpreting The Results

Listed below are some important caveats in the interpretation of the results:

A. A capacity rate of 50 percent in a given year does not necessarily imply that either there are 50 percent too many boats or that the fleet would be more economically efficient if there were fewer. The only conclusion that can be drawn from these figures is that the potential exists for a greater catch without the necessity of major expenditures or new capital or equipment.

To draw conclusions about the efficiency or desirability of a high-capacity utilization rate requires an examination of the market structure of the industry, stability factors, and any monetary and social costs involved. In addition, an analysis of the industry's pricing and profitability structure must determine whether the fishermen would use the excess capacity to catch more fish if given the opportunity.

B. This paper's methodology implicitly implies stable weather and biological (resource) conditions. Major fluctuations in either of these two factors will usually lead to the exaggeration of the potential catch capabilities of the fleet because during the best or peak years the resource might be easier to harvest than normally expected. An abnormally high peak alternatively dictates that nonpeak years will seem overly depressed.

The potential catch capabilities of the fleet will be underestimated if there are embedded or "hidden" technological or regulatory constraints on the fishery. For example, in the highly regulated salmon fishery, over 50 years of regulations have affected the type of boats, gear, and attitudes of the fishermen. Thus, the measured peak may still be below the potential peak if the resource were more available and the regulations or constraints relaxed.

C. In eqs. (3) and (5) we refer to the variable "T" as a technology trend. In practice, however, this variable is a catchall that accounts for all phenomena except capital use because no other variables are explicitly considered. Changes in regulatory policy, biological availability, or the application of skilled labor would, for example, affect the estimation of the "T" trend.

Results for the Surf Clam and Quahog Fleets

Table HC1 contains information on the number and size distribution of vessels in the surf clam and ocean quahog fleet during the 1965 to 1978 period. Table HC2 contains

information on the fishing effort units in these fisheries during the same period. These were derived by multiplying the number of vessels in each tonnage class by a relevant fishery power index. The indices used are an average of the indices reported by Visgillio (1973) and Mueller (1976). By summing across tonnage classes in a particular year, the total fishery effort units for the industry was obtained.

Table HC3 contains the data on catch, effort, actual observed catch per unit of effort, calculated potential catch per unit of effort, and the capacity utilization rate. The latter two series were generated by using the methodology stated previously.

As can be seen from the Table, the capacity utilization rate in 1978 was estimated to be approximately 20%. This implies, given the total effort units active in 1978, a total potential capacity for harvesting clam and quahog meats of about 247,000,000 pounds. This represents about 136% increase over the maximum total landing ever harvested. Obviously, this is due to the tremendous increase in fishery effort units that have occurred since 1976. The data in Table HC3 are depicted in graphical form in Figure HC1. Again, this potential capacity rate: ignores changes in the condition of the resources, assumes that demand is not a constraining factor, and ignores the profitability of operating at such a level. In short, it simply states that if biologic abundance, demand condition, and cost factors were not constraining, the industry has the potential to harvest at a significantly higher level than current harvest rates.

Table HC1. Estimated Vessel Distribution by Tonnage Class in the Surf Clam Fishery and Ocean Quahog Fishery - 1965-1978

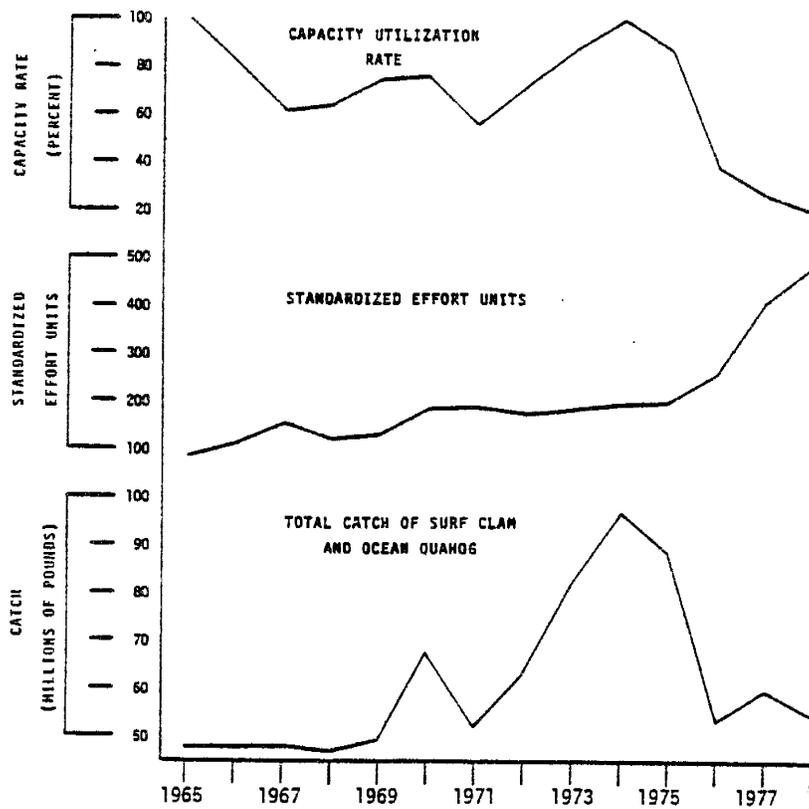
<u>Year</u>	<u>Total Vessels</u>	<u>No. In Class 1</u>	<u>No. In Class 2</u>	<u>No. In Class 3</u>
1965	68	33	33	2
1966	74	34	34	6
1967	91	40	40	11
1968	86	38	42	6
1969	92	32	56	4
1970	104	33	59	12
1971	92	28	46	18
1972	90	29	44	17
1973	93	32	44	17
1974	98	35	46	17
1975	99	35	46	18
1976	125	46	50	29
1977	162	38	65	59
1978	158	21	58	78

Table HC2. Estimated Fishing -- Surf Clam Fishery, 1965-1978

Year	Class 1	Class 2	Class 3	Total
1965	33	48.0	9.4	90.9
1966	34	50.0	28.3	112.3
1967	40	58.8	51.8	150.6
1968	38	61.7	28.3	128.0
1969	32	82.3	18.8	133.1
1970	33	86.7	56.5	176.2
1971	28	67.6	84.8	180.4
1972	29	64.7	80.1	173.8
1973	32	64.7	80.1	176.8
1974	35	67.6	80.1	182.7
1975	35	67.6	84.8	187.4
1976	46	73.5	136.6	256.1
1977	38	95.5	277.9	411.4
1978	21	85.2	367.38	473.58

Fishing Powers* 1.0 1.47 4.71

*Average of Mueller (1976) and Visgilio (1973)



Capacity Data For Surf Clam And Ocean Quahog Vessels

Figure HC 1

Table HC3. Estimated Catch-Effort in the Surf Clam Fishery, 1965-1978

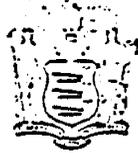
<u>Year</u>	<u>Catch</u> (1000 lbs)	<u>Effort</u>	<u>Potential</u> <u>Catch/Effort</u> (1000 lbs)	<u>Actual</u> <u>Catch/Effort</u> (1000 lbs)	<u>Capacity</u> <u>Rate</u> Percent
1965	44,088	90.9	485.0	485*	100.00
1966	45,113	112.3	489.0	402	82.2
1967	45,100	150.6	494.0	299	60.5
1968	40,552	128.0	498.0	317	63.6
1969	49,575	133.1	503.0	372	73.9
1970	67,318	176.2	507.0	382	75.3
1971	52,535	180.4	512.0	291	56.8
1972	63,471	173.8	516.0	365	70.7
1973	82,308	176.8	521.0	465	89.2
1974	96,069	182.7	525.0	525*	100.0
1975	88,000	187.4	525.0	470	88.6
1976	54,500	256.1	525.0	213	39.8
1977	66,000	411.4	525.0	146	27.0
1978	52,000	473.58	525.0	110	22.0

* Peak Years

Extent to Which the Potential Capacity Will Be Utilized

The plan suggests that OY's of 30 million pounds of surf clam meats and 40 million pounds of ocean quahog meats be established for 1980 for a total of 70 million pounds of clam meats. During 1978 approximately 30 million pounds of surf clam meats and 20 million pounds of quahog meats were harvested. The surf clam harvest was less than a third of previous catch levels at a time when there were far fewer effort units in the fishery. Clearly, there is no doubt that the expected domestic catch (or the extent to which the capacity will be utilized) on surf clams will be 30 million pounds. In regards to quahogs, the 1977 and 1978 catches of 18.3 and 22.7 million pounds respectively represent tremendous increases over previous levels. This increase in quahog production was in response to two factors. First, there was the need to generate an alternate raw material source to supplement the declining availability of surf clams and second, there were technological successes achieved in the ability to utilize quahog meats in various finished clam products, namely canned chowders and canned whole and minced clam. Clearly, the extent to which the vessels utilize portions of their "potential" capacity to harvest surf clams is largely a function of the processing sector's ability to integrate even greater amounts of quahog meats into formerly surf clam based products. As will be discussed in the processing sector section, there are indications that this growth will continue.

Given the scenario depicted in that section, it is assumed that the expected catch of quahogs will continue to increase over the historic levels achieved recently and that the entire OY of 40 million pounds should be set aside for exclusive US allocation. This total of 70 million pounds would still result in only a capacity utilization rate of about 28%, and that assumes that no additional effort units enter this fishery.



State of New Jersey
DEPARTMENT OF ENVIRONMENTAL
PROTECTION
TRENTON

OFFICE OF THE COMMISSIONER

PLEASE ADDRESS REPLY TO

RULES FOR THE PRESERVATION OF THE SEA CLAM RESOURCE

Docket No. DEP 049-78-10

Daniel J. O'Hern, Commissioner of the Department of Environmental Protection hereby adopts rules for the preservation of the sea clam resource substantially as proposed at 10 N.J.R. 474. These rules were the subject of a public hearing at Stockton State College, Pomona, N.J. on November 16, 1978.

Comments received at the hearing resulted in the addition of Loran A and Loran C bearings to the text, a change in the gallonage/bushel conversion figure for those persons who shuck their clams at sea, deletion of the requirement to report the catch buyer's name, and addition of the state's commitment to furnish sea clam license holders with statements of weekly harvest totals. The substantive changes from the rules as proposed are not detrimental to the public.

These regulations resulted from determinations of the Department, considering the data, views and interests of all segments of the sea claming industry; and they constitute an equitable conservation plan. Accordingly, I adopt these rules effective December 1, 1978.

Date

12/5/78



Daniel J. O'Hern, Commissioner

a) Scope.

These regulations are intended to limit the harvest of sea clams from New Jersey waters in an effort to protect, conserve, manage and improve the sea clam resource and industry pursuant to legislative mandate. This is accomplished by a limitation on a number of available licenses, by limiting the weekly harvest, by limiting the total season harvest, specifying fishing times and areas, and other control methods.

b) Exemptions.

Nothing in this regulation shall exempt or exclude any person from compliance with the shellfish regulations adopted by this department pursuant to Chapter 14, Title 24, New Jersey Statutes Annotated, or any other regulation of any department of state government or any federal agency necessary to protect the public health.

c) General.

i. Authority

This regulation is adopted pursuant to the specific legislative authority in N.J.S.A. 50:2-6.1; N.J.S.A. 50:2-6.2 and N.J.S.A. 50:2-6.3 (L. 1975 c. 398). Violations shall be prosecuted pursuant to N.J.S.A. 50:2-6.4 (L. 1975 c. 398 § 4).

ii. Judicial Notice; Codification

The Administrative Procedure Act, N.J.S.A. 52:14B-5(d) provides that judicial notice shall be taken of the text of each rule filed with the Secretary of State, Division of Administrative Procedure. The publication of this regulation in the New Jersey Administrative Code compilation has been suspended by the Director of Administrative Procedure pursuant to the authority of N.J.S.A. 52:14B-7(c) in that this regulation is of temporary duration (one year unless extended). Subchapter 12 of chapter 25 of Title 7 of the New Jersey Administrative Code has been reserved for this regulation and the citations assigned. Copies of this regulation may be obtained from the Department of Environmental Protection, Division of Fish, Game and Shellfisheries, Box 1809, Trenton, N.J. 08625.

iii. This regulation, when adopted and when effective shall supersede the provisions of the 1977-78 Sea Clam Regulations.

iv. The terms "person" or "vessel" as used in this regulation shall include the captain, owner, or other person responsible for the operation of the vessel.

v. Bushel.

A bushel for the purpose of this regulation shall be defined as 1.88 cu. ft. of clams within the shell or 3.25 gallons of shucked clams.

vi. Enforcement.

These regulations may be enforced by any and all enforcement personnel designated by the Commissioner.

vii. Exception.

Nothing in this regulation shall apply to research, inventory or educational activities being conducted under permit of the department.

d) Harvest Limitations.

i. Weekly Limitations.

Vessels licensed to take sea clams in the waters of this State shall not harvest more than 500 bushels per week from said waters for the period beginning December 1, 1978 through April 30, 1979, or until the season is otherwise terminated.

ii. When, at any time during the period December 1, 1978 through April 30, 1979, the department has determined that 250,000 bushels have been harvested from the waters of this state, the department shall close the State's waters to any further harvesting upon two days public notice. Said notice may be accomplished by publication in newspapers circulating in Monmouth, Ocean, Salem, Cumberland, Burlington, Atlantic and Cape May Counties, and by certified mail to each licensee.

iii. Season.

Except for bait purposes as hereafter provided, the season for taking sea clams (Spisula solidissima) on the waters of the state shall extend from December 1, 1978 through and including April 30, 1979, unless the season is earlier terminated if the season limit is reached.

iv. Prohibited Fishing Areas.

Including any areas which may be condemned for the harvest of shellfish without a special permit, the areas in which sea clams may not be taken are limited to those waters enclosed within the following description:

From the house on the bay side of Little Beach,

longitude 74° 19.70'W
latitude 39° 28.29'N

Thence seaward 90.8'T on a line which passes through the buoy BW(LE)

longitude 74° 15.90'W
latitude 39° 28.26'N

Loran A 3H5 - 3176
3H4 - 3980.8

Loran C 99304 - 51644
99302 - 700712.2

3.25 nautical miles to a point;
longitude 74° 14.39'W
latitude 39° 28.23'N

Loran A 3H4 - 3986.8
3H5 - 3171.1

Loran C 99304 - 51634.4
99302 - 70074.2

and thence south following the line of the beach 3 nautical miles off-shore to a point:

longitude 74° 27.9'W
latitude 39° 16.9'N

Loran A 3H4 - 3812.8
3H5 - 3179.2

Loran C 99304 - 51818.4
99302 - 70111.2

thence to the shore 268°T to the watertank in Ocean City located at Haven Avenue between 7th and 8th Streets with a

longitude 74° 34.6'W
latitude 39° 16.9'N

and the sanctuary area off Hereford Inlet described as

longitude 74° 47.5'W
latitude 39° 00.2'N

Loran A 3H4 - 3562
3H5 - 3185.5

Loran C 9930 - W - 16370.9
9930 - Y - 52087.5
9930 - Z - 70168

119°T, d. 3 mi. to:

longitude 74° 43.9'W
latitude 38° 58.7'N

Loran A 3H4 - 3563.5
3H5 - 3174

Loran C 9930 - W - 16368.9
9930 - Y - 52079.5
9930 - Z - 70187

029°T, d. 2.25 mi. to:

longitude 74° 42.7'W
latitude 39° 00.7'N

Loran A 3H4 - 3589
3H5 - 3176

Loran C 9930 - W - 16368.9
9930 = Y - 52054
9930 - Z - 70177

299°T, d. 3 mi. to:
longitude 74° 46.1'W
latitude 39° 02.3'N

Loran A 3H4 - 3588
3H5 - 3188

Loran C 9930 - W - 16371
9930 - Y - 52062
9930 - Z - 70158

209°T, d. 2.25 mi. to start.

e) General Control Methods.

i. For the purpose of calculating the harvest limit, any licensee fishing at any time in the state's waters on any given day shall have his entire catch for that day counted as part of the harvest limitation.

ii. No licensed vessel shall transfer sea clams to a nonlicensed vessel. A nonlicensed vessel shall not receive sea clams from a licensed vessel. All sea clams harvested in New Jersey waters shall be landed in New Jersey.

iii. Marking.

The top and sides of the licensed vessel shall be marked with the license number which numbers shall be at least 18 inches in size, clearly legible, in good repair and with no obstruction to view.

iv. Notification.

Licensed vessels, shall each day, notify the New Jersey Marine Police of their intended fishing location. The notification may be by phone or marine radio to the Atlantic City station of the New Jersey Marine Police. The Marine Police shall note such notification in their official log.

v. Seaward Boundary.

Where the lines describing areas open for fishing pass through a sanctuary or condemned waters as delineated by the department, the line be deemed to conform to the seaward boundaries of said area.

vi. Time.

Except for bait purposes as hereinafter provided, sea clams shall be harvested from the waters of this state on Monday through Saturday between sunrise and 4 p.m.

f) Licensing.

i. General.

Licenses shall be issued pursuant to N.J.S.A. 50:2-6.1 et. seq. (L. 1975,c.398). A license year shall be the calendar year.

ii. Issuance.

An applicant may be issued a license if he had a license in one of the two preceding license years.

iii. Transfer of Ownership.

A person transferring ownership of his licensed vessel may:

- a. be issued a new license within two years of December 31 of the year for which his former vessel was licensed,
- b. file a notarized Statement of Intent with the department indicating that he will not apply for a replacement license, or,
- c. wait the two year period at which time his option to re-license shall expire. The Department shall issue a license to the new owner of the transferred licensed vessel if the former owner has filed said Statement of Intent. The filing of a Statement of Intent shall not extend the two year option period. The new owner shall meet all statutory criteria for licensing.

iv. Casualty Loss.

A replacement license for any licensed vessel which may be lost or destroyed or disabled shall be issued only to the former vessel owner at any time within two years of December 31 of the year for which the disabled, destroyed or lost vessel was licensed.

v. Specific Conditions for License Renewal.

License renewal is specifically conditioned on the continuing conformance of the licensee with all the requirements of this regulation. No license shall be issued for vessels that have not filed the required reports or paid the required landing fee.

g) Miscellaneous Provisions.

i. Bait Clams.

- 1) License and permit required.

A license for the taking of sea clams shall also be required for

the taking of bait clams. In addition, the special permit issued pursuant to Chapter 14, Title 24 of the New Jersey Statutes Annotated from the Division of Water Resources shall be required.

2) Area.

Bait clam licensees shall harvest only in waters designated as condemned or specially restricted or otherwise specially designated for bait clam purposes by the Division of Water Resources.

3) Season & Time.

Except for Sundays, the season for taking of bait clams only shall extend throughout the year. The time for taking bait clams shall be Monday through Saturday between sunrise and 4 p.m. from October 1 to April 30 and from 1/2 hour before sunrise to 4 p.m. during the period May 1 through September 30.

ii. Rebuttable Presumptions.

The presense of a dredge overboard at any other time or in any of the prohibited ocean areas or both shall be rebuttable evidence of a violation of the provisions of this regulation. Any malfunctions of gear causing the dredge to be left overboard in prohibited areas or at prohibited times or both, shall be reported immediately to the New Jersey Marine Police, Atlantic City Station, who shall log such report.

iii. Dredge Size.

No vessel shall use in the waters of this state more than a single dredge at any time in any boat, and such dredge shall not exceed 60 inches in length of cutting bar as measured from the inside of the upright frames.

iv. Shucked Clams.

All sea clams shall be landed in their shell, except that shucked clams may be landed pursuant to an applicable permit from the New Jersey Department of Health. For shucked clams, the equivalent weekly harvest limit shall apply.

v. Tagging.

Each cage or container of sea clams, whether in the shell or shucked, landed in New Jersey shall be tagged with the name of the harvesting vessel and the date the clams were harvested. Such cage or container shall remain so tagged until empty when the tag shall be removed.

h) Reports.

- i. All licensed vessels that land any sea clams including bait clams in this state shall provide to the Director, Division of Fish, Game and Shellfisheries:

Weekly sea clam catch reports (forms to be supplied by the division) which specify the vessel name, sea clamming license number, and home port; and for each date, the time at sea, the latitude and longitude or loran hearings of all locations fished; and for catch location fished, the depth, the time fished, the number of tows per hour, and the catch in bushels; and for each landing, the port, the date the clams were sold, whether they were bait or edible clams. All reports are to have the name and signature of the captain attesting to the validity of the report. The reports shall be mailed to the Division of Fish, Game and Shellfisheries, P. O. Box 1809, Trenton, New Jersey 08625, together with check or money order in proper amount, made payable to the "Treasurer, State of New Jersey" no more than five working days after the weeks end.

- ii. Division will furnish weekly catch totals to all licensees as soon as is practicable after compilation.
- iii. Except for the catch in bushels, all information provided on the weekly sea clam catch reports shall not be available for public inspection.

i) Fees.

Licensees shall pay a fee of five cents \$0.05, for each bushel, or its equivalent, of sea clams harvested from the waters of this state. The Department shall use such monies for the conservation, protection, management, and improvement of the sea clams resource and industry.

- j) If any provision of these regulations or their application to any person or circumstance is held invalid, the remainder of the regulations and the application of such provisions to person or circumstances other than those to which it is held invalid shall not be affected thereby.
- k) Notice is hereby given that the Department may deny the license application for or suspend the license, or deny the landing privileges of any person who violates the provisions of these regulations until said person appears personally or by counsel before the Commissioner or his designee to show cause why such suspension or denial should not be continued. Such action shall take effect upon eight (8) days notice to the violator, within that time, he personally or by counsel contacts the Department to request a hearing; in which case the action of the Department shall be suspended pending the outcome of the hearing.

APPENDIX III: DRAFT SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT
FOR AMENDMENT #2 TO THE FISHERY MANAGEMENT PLAN FOR THE
SURF CLAM AND OCEAN QUAHOG FISHERIES OF THE NORTHWEST ATLANTIC OCEAN

Responsible Federal Agency:

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

Jurisdiction Where the Action is Applicable:

The Fishery Conservation Zone in the northwest Atlantic Ocean

For Further Information Contact:

John C. Bryson, Executive Director
Mid-Atlantic Fishery Management Council
Federal Building, Room 2115
North and New Streets, Dover, Delaware 19901
Telephone 302-674-2331

Abstract of Statement:

The statement relates to Amendment #2 to the Surf Clam and Ocean Quahog Fishery Management Plan. That FMP took effect November 17, 1977. The purpose of the amendment is to extend the FMP through 1980 and incorporate necessary changes to quotas and other provisions in the FMP.

Comments Must be Received by:

July 22, 1979

SUMMARY

Description of the Action

The Fishery Conservation and Management Act of 1976 (FCMA), enacted and signed into law on April 13, 1976, established a Fishery Conservation Zone and provided exclusive US regulation over all fishery resources except highly migratory species (i. e., tuna) within the FCZ. The original FMP for the Surf Clam and Ocean Quahog Fisheries of the Northwestern Atlantic Ocean was approved by the Secretary of Commerce in November, 1977, for the period through September, 1979. An EIS was prepared in conjunction with the original FMP. Amendment #1 to the FMP extended it through December 31, 1979 and revised reporting requirements to bring them in compliance with the amended FCMA. This Amendment #2 would extend the FMP through the end of calendar year 1980.

The objectives of the FMP remain unchanged as a result of Amendment #2 and are to:

1. Rebuild the declining surf clam populations to allow eventual harvesting approaching the 50 million pound level, which is the present best estimate of the maximum sustainable yield (MSY), based on the average yearly catch from 1960 to 1976.
2. Minimize short-term economic dislocations to the extent possible consistent with objective 1.
3. Prevent the harvest of ocean quahog from exceeding maximum sustainable yield and direct the fishery toward maintaining optimum yield.

The management unit for this FMP remains unchanged and is all surf clams (Spisula solidissima) and all ocean quahogs (Arctica islandica) in the Atlantic FCZ.

Based on a review of comments made at the public hearings and letters received during the review period, and on the recommendations of the Council's Surf Clam and Ocean Quahog Advisory Subpanel and Scientific and Statistical Committee, the Council has adopted the following measures for Amendment #2 to the Surf Clam and Ocean Quahog FMP:

1. Extend the FMP through calendar year 1981;
2. Establish two management areas for the surf clam fishery: the New England Area and the Mid-Atlantic Area. The dividing line between the areas would be the established dividing line between the New England and Mid-Atlantic Fishery Management Councils. The dividing line begins at the intersection point of Connecticut, Rhode Island, and New York at 41°18'16.249" latitude and 71°54'28.477" longitude and proceeds S 37°22'32.75" E to the point of intersection with the outward boundary of the FCZ (50 CFR 601.12(a), Federal Register, Vol. 42, No. 137, July 18, 1977, page 36980).

3. The following quantities (in millions of bushels) would apply annually:

	<u>Optimum Yield (OY)</u>	<u>Domestic Annual Harvest (DAH)</u>	<u>Domestic Annual Processing (DAP)</u>	<u>Quota</u>	<u>Total Allowable Level of Foreign Fishing</u>
Surf Clams					
New England	0.025	0.025	0.025	0.025	0
Mid-Atlantic	1.800	1.800	1.800	1.800	0
Ocean Quahogs					
1980	3.500	3.500	3.500	3.500	0
1981	4.000	4.000	4.000	4.000	0

For the Mid-Atlantic Area the surf clam OY, DAH, DAP and quota of 1.8 million bushels (approximately 30 million pounds of meats) are continued unchanged as are the provisions to allocate the quota by quarters and regulate fishing effort by restricting days fished. However, the quarterly quotas for surf clams are revised to be 400,000 bushels for October through December and January through March, and 500,000 bushels for April through June and July through September.

While the DAP is shown separately in the above table for the New England and Mid-Atlantic Areas, the separate management areas do not apply to the processing sector.

4. A fishing week of no more than four days, Monday through Thursday, is continued. To help spread the quarterly catch evenly throughout the entire quarter, each vessel will be restricted to 24 hours of fishing per week at the beginning of each quarter. If the Regional Director of the NMFS determines that the quarterly quota will not be harvested, the weekly hours of fishing may be increased. The Regional Director may prohibit fishing if it is likely that the quarterly quota will be exceeded. Vessels would be required to stop fishing at 5:00 pm with the fishing week changed from 12:01 am Monday - 11:59 pm Thursday to 5:00 pm Sunday - 5:00 pm Thursday. During the months of December, January, February, and March, a make-up day for bad weather would be permitted on the fishing day following the fishing day during which the bad weather condition existed.

In the New England Area, there would be no effort restrictions until half of the 25,000 bushel quota is harvested, at which time the effort restrictions operating in the Mid-Atlantic Area would be imposed.

5. The provisions of the original FMP regarding ocean quahogs are continued unchanged except that the OY, DAH, DAP, and annual quota for ocean quahogs are increased as shown in the above table.

6. The prohibition on the entry of additional vessels into the surf clam fishery is continued in the Mid-Atlantic Area. The moratorium is lifted in the New England Area. Vessels with permits issued pursuant to the moratorium in both New England and the Mid-Atlantic may fish in both areas on both quotas. Vessels entering the fishery in New England that do not meet the moratorium conditions may not fish south of the dividing line. The moratorium does not preclude replacement of vessels involuntarily leaving the fishery during the time when the moratorium is in effect.

7. The provision to close surf clam beds to fishing wherein over 60% of the clam are under 4.5 inches in length and less than 15% are over 5.5 inches in length is continued. It is recommended that special measures be instituted to manage such closed areas when they are reopened to insure that such openings do not lead to

premature closures in the fishery and to prevent overfishing of the newly opened beds.

8. A surf clam minimum size limit of 4.5 inches is imposed.

9. The licensing provisions of the original FMP are continued. The reporting requirements are continued with minor revisions.

Summary of Impact

The measures recommended in the amended plan will provide for the long term viability of the surf clam and ocean quahog resources while minimizing negative impacts on the surf clam fishery and permitting and encouraging the ocean quahog fishery to develop fully.

Alternatives

The alternative measures available with which to manage the surf clam fishery, the ocean quahog fishery, or both, may be categorized as conservation alternatives, allocation alternatives, access control alternatives, and management unit alternatives. The conservation alternatives are: no FMP, annual quotas, quarterly quotas, size limits, and gear restrictions. The allocation alternatives are: no explicit allocation system, allocations to individual fleet sectors, and individual vessel quotas. Access control alternatives are: no access control, a moratorium on the entry of new vessels, and license limitations. Management unit alternatives include: the resource in the northwest Atlantic FCZ, the resource in the northwest Atlantic FCZ and territorial sea, and the resource in the mid-Atlantic FCZ.

The above alternatives can be applied in various combinations to the species that are the subject of this FMP. These alternatives are discussed and evaluated in Section XII of this FMP amendment.

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PURPOSE OF AND NEED FOR THE PROPOSED ACTION

The Mid-Atlantic Fishery Management Council has prepared these amendments to the Surf Clam and Ocean Quahog FMP to incorporate in that FMP the results of new stock assessments for surf clams and ocean quahogs. Quotas for those resources have been developed based on these revised assessments. It was also necessary to revise certain management measures to improve implementation of the FMP.

ALTERNATIVES INCLUDING THE PROPOSED ACTION

The alternatives including the proposed action are listed in Section XII-2 of the amended FMP. They are analyzed in Sections XII-3 and XII-4 of the amended FMP.

AFFECTED ENVIRONMENT

The environment affected by this amended FMP is the FCZ of the northwestern Atlantic Ocean. It is described in Section VI of the amended FMP and Section V of the original FMP.

ENVIRONMENTAL CONSEQUENCES

Direct Effects and Their Significance

The proposed optimum yields of surf clams and ocean quahogs that will be established by this action are based on recent estimates of stock size and estimates of the level of fishing mortality that will result in the maximum sustainable yield assuming a moderately strong stock-recruitment relationship. Therefore, no significant adverse long-term effect on the stocks of surf clams and ocean quahogs is expected as a result of this action, but it must be noted that sufficient data are not available to support a high degree of confidence in this statement. Thus, continued monitoring and assessment of this stock is critical so that better assessments can be made. New information may be required and modifications of the management plan may be necessary. The data are tenuous and modifications of the estimated yields in response to fluctuations in stock size can be expected.

This plan should induce no significant adverse impact on the environment. It is designed to optimize (maximize) long-term yield recognizing the great importance of surf clams and ocean quahogs and thereby contributing to the overall productivity of the ecosystem.

There will be an economic impact on the fishery because of the reduced level of surf clam landings from historic levels but no significant impact based on the levels set by the initial Surf Clam and Ocean Quahog FMP. This impact will be less in the long-run because of the anticipated stabilization of the clam populations. In other words, the negative economic impact of no plan would be much greater over time than the negative economic impact of the plan.

The proposed management measures contained in this plan are designed to accomplish two goals: (1) provide for a sustained optimum yield of biomass based on stable stock levels (recognizing, of course, the natural fluctuations in stock production and abundance), and (2) provide long-term economic stability in the fisheries. The process, if successful, will require short-term local sacrifices in terms of harvesting surf clams at a level below full fishing capacity. The relationship between the short-term use of the environment and the promise of long-term viability through stock population stabilization is a strong and necessary bond. Prudent and responsible utilization of the resources requires no less.

In essence, the purpose of the plan is to reduce the surf clam harvest mortality to permit long-term population stability, to limit the exploitation of the quahog

resource, thus insuring its long-term productivity, and to control the development of the ocean quahog fishery so that species is not over-exploited.

Indirect Effects and Their Significance

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

No irreversible commitments of resources will result from the implementation of this amended FMP. Implicit in the implementation of the FMP is the periodic monitoring of the catch to provide data for management decisions.

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

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

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

Short-term irretrievable commitments of public funds, however, can be identified.

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

Possible Conflicts Between the Proposed Action and the Objectives of Federal, Regional, State, and Local Land Use Plans, Policies, and Controls

Fishery Management Plans and Preliminary Management Plans

This amended Surf Clam and Ocean Quahog FMP is related to other FMPs and PMPs as follows:

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

Marine Sanctuary and Other Special Management Systems

The USS Monitor Marine Sanctuary was officially established on January 30, 1975 under the Marine Protection, Research, and Sanctuaries Act of 1972. Rules and regulations have been issued for the Sanctuary (15 CFR Part 924). They prohibit deploying any equipment in the Sanctuary, fishing activities which involve "anchoring in any manner, stopping, remaining, or drifting without power at any time" (924.3(a)) and "trawling" (924.3(h)). The Sanctuary's position off the coast of North Carolina at 35°00'23" N latitude - 75°24'32" W longitude is located in the plan's designated management area. The Monitor Marine Sanctuary is clearly designated on all National Ocean Survey (NOS) charts accompanied by the caption "Protected area". This minimizes the potential for damage to the Sanctuary by fishing operations. In addition, the area is not known to contain clams.

State Coastal Zone Management Programs

Since CZM plans are presently in the developmental stages, we are not aware of specific measures on the part of individual states which would ultimately impact this fishery management plan. However, the CZM Act of 1972, as amended, is primarily protective in nature and provides measures for ensuring stability of productive fishery habitat within the coastal zone. Therefore, each state's CZM plan will probably include the ecological principles upon which this particular FMP is based. It is recognized that responsible long-range management of both coastal zones and fish stocks must involve mutually supportive goals. When details are forthcoming on specific state CZM plan elements relating to fishery concerns, they will be evaluated for possible inclusion in future amendments of this plan. States in the region with approved Coastal Zone Management Programs are Maine, Massachusetts, Rhode Island, part of New Jersey, Maryland, and North Carolina.

Oil, Gas, Mineral, and Deep Water Port Developments

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

Environmental Effects of Alternatives Including the Proposed Action

The only alternative that would have a negative effect on the natural environment would be no action since no control would lead to overfishing of the surf clam resource and an excessively rapid expansion of the ocean quahog fishery. The other alternatives have varying economic impacts on the harvesting and processing sectors. The environmental impacts of the proposed action should not differ significantly from the impacts of the current FMP for the following reasons:

1. the surf clam quota remains unchanged;
2. the ocean quahog quota, while increased, is well within standing stock and MSY estimates;
3. the adjustment of the quarterly quotas for surf clams bring these quotas more closely into line with historic practices in the fishery while striving to continue a proper balance between vessels of various sizes through a

moderate difference in the sizes of the Spring and Summer quotas over the Fall and Winter quotas coupled with a bad weather make-up day provision during December, January, February, and March.

4. The alternative management regime for the New England area should have a minimal impact. The quota is relatively small so it should not significantly impact the resource, even though there is a very limited amount of information available about the size of the resource throughout the New England area. If the moratorium of entry of vessels into the surf clam fishery in New England is removed, it should have a positive impact on those harvestors who are not eligible for a permit under the moratorium, but could have a negative impact on New England based harvestors who qualify for permits under the moratorium as it now exists, since, without the moratorium, other fishermen would be permitted to participate in the fishery.

The alternatives, including the proposed action, are discussed in Sections XII-3 and XII-4 of the amended FMP.

Energy Requirements and Conservation Potential of Various Alternatives

The alternatives of no action and of direct allocations would be the most energy efficient relative to the harvesting sector since they would generally permit vessels in the surf clam fleet to operate in a more efficient manner than the recommended alternative which includes limitations on fishing days and times. However, the Council, as discussed in Section XII-4 of the amended FMP, believes that the no action alternative is totally unacceptable and that additional analyses must be made prior to development and implementation of any type of direct allocation system.

None of the alternatives appear to have particular energy impacts greater or less than any other on the processing sector.

Urban Quality, Historic, and Cultural Resources, and the Design of the Built Environment Including the Reuse and Conservation Potential of Various Alternatives and Mitigation Measures

These considerations do not appear to be significant relative to the amended FMP.

LIST OF PREPARERS

The following members of the Mid-Atlantic Fishery Management Council staff contributed to the preparation of the amended FMP and SEIS:

John C. Bryson, P.E., Executive Director, MS, BS
David R. Keifer, AIP, Planning and Administrative Officer, MBA, BS
Anne D. Williams, Statistician, MS, BS

The following employees of NOAA and NMFS contributed to the preparation of the amended FMP and SEIS:

Joseph J. Mueller, Economist, MBA, MS, BS
Bruce Nichols, Industry Economist, AB
Joel MacDonald, Staff Attorney, Office of General Council, Northeast Region, LLM, LLB, BS
Stephen Murawski, Fishery Biologist (Research), MS, BS

LIST OF AGENCIES, ORGANIZATIONS AND PERSONS TO WHOM COPIES
OF THE STATEMENT ARE SENT

Mr. Ralph Abala, Ex. Dir.
Pennsylvania Fish Commission
P.O. Box 1673
Harrisburg, PA 17120

Mr. Edgar Bowen
SRS
Northwest Fish Center
Cooke's Hole, MA 02543

Mr. James E. Douglas, Jr.
Commissioner, Marine Res.
P.O. Box 756
Newport News, VA 23607

Ms. Nancy Goeldi, Zone Dir.
Co. for Am. South Fork
Box 569
Bridgehampton, NY 11932

Dr. Robert V. Renke, Acting RD
Northeast Region, NRE
14 Elm Street
Gloucester, MA 01930

Capt. Melvin Hallack
3rd Coast Guard District
Governors Island
New York, NY 10004

Mr. Allan W. Haynie, Chairman
Zapata-Haynie Corporation
P.O. Box 175
Roadville, VA 22859

Ms. Pam Lunsford
Dept. of Natural Resources
Natural Resource Bldg.
Annapolis, MD 21401

Mr. Edward Miller
Pennsylvania Fish Commission
Robinson Lane
Pallisades, PA 16823

Vice Adm. Robert Price
CGR. (A) 3rd Coast Guard Dist.
Governors Island
New York, NY 10004

Mr. Eicks E. Swasey
Route 2
Box 212
Berlin, MD 21811

Mr. Irwin Alperin
Ac. Str. Marine Fish. Comm.
1717 Mass. Ave., NW
Washington, D. C. 20036

Mr. Norman Chapp
U.S. Fish & Wildlife Service
100 Chestnut Street
Harrisburg, PA 17102

William H. Reinberg, Esquire
534 Broadway
Bayonne, NJ 07002

Killet J. Goldman, Esquire
4138 Residential Drive
Lafayette Hill, PA 19444

Mr. Frank Orice
1411 N.W. Fish. Serv.
State Fish Bldg.
Gloucester MA 01930

Captain David R. Hart
Chairman, MARC
P.O. Box 453
Cape May, NJ 08204

Ms. Sam Jolley
OS/OF/FA
Dept. of State
Washington, DC 20520

Mr. Joel Macdonald
NRS
14 Elm St.
Gloucester, MA 01920

Mr. William E. Fell, III
Pell's Fish Dock
Box 341
Greenville, NY 11944

Mr. Allan J. Ristort
2 Vermont Court
Lake Hiwassee, NJ
07034

Mr. Russell Short
Marine Resources Commission
P. O. Box 756
Newport News, VA 23607

Dr. Herbert Austin
U.S. Inst. of Marine Science
Gloucester Pt., VA
23062

Mr. Russell Cookingham, Dir.
Div. of Fish, Game, & Shellfish
P. O. Box 1809
Trenton, NJ 08623

Mr. Robert Flacke
Dept. of Env. Conservation
50 Wolf Road
Albany, NY 12233

Mr. Douglas Gordon
ASFC
1717 Mass. Ave., NW
Washington, DC 20036

Mr. Bruce Higgins
Marine Creek Research Lab.
Star Route
Aberdeen, MD 08241

Dr. William J. Hargis, Jr.
Director, VIMS
Gloucester Pt. VA
23062

Captain David R. Hart
Chairman, MARC
P.O. Box 453
Cape May, NJ 08204

Ms. Sam Jolley
OS/OF/FA
Dept. of State
Washington, DC 20520

Mr. Joel Macdonald
NRS
14 Elm St.
Gloucester, MA 01920

Mr. William E. Fell, III
Pell's Fish Dock
Box 341
Greenville, NY 11944

Mr. Allan J. Ristort
2 Vermont Court
Lake Hiwassee, NJ
07034

Mr. Russell Short
Marine Resources Commission
P. O. Box 756
Newport News, VA 23607

Mr. Richard St. Pierre
U.S. Fish & Wildlife Serv.
100 Chestnut Street, Room
Harrisburg, PA 17102

Mr. Donald Yallman
OS/OS/SA
Dept. of State
Washington, DC 20520

Dr. Lee Anderson
College of Marine Studies
University of Delaware
Newark, DE 19711

Mr. Paul Ruser
Marine Creek Res. Sta.
Star Route
Aberdeen, NJ 08201

Dr. Dennis J. McGay
Dept. of Biomechanics
Cort College P.O. Box 23
New Brunswick, NJ 08903

Mr. Stuart Hillk
JOM/NE/NEFC
Sandy Hook Lab
Highlands, NJ 07732

Capt. Fred Ardolino
2343 Knapp Street
Brooklyn, NY 11229

Mr. Peck Barrack
Marine Sci. Research Ctr.
590 Rec 70
Briarcliff, NY 08723

Mr. Scott R. Bennett
Box 41
Newagawatt, NY 11930

Capt. Howard Hogan
32 Crescent Dr.
Bridalie, NJ
08730

Mr. John Brown
5740 Ashbury Avenue
Ocean City, NJ
08225

Mr. Anthony Teorina, Dir.
Marine & Coastal Resources
Bldg./AO State U. of N.Y.
Stony Brook, NY 11794

Mr. Donald Zaccas
Bldg. 40, SUNY
Stony Brook, NY
11794

Dr. Herb Austin
VIMS
Gloucester Pt., VA
23062

Dr. William J. Hargis, Jr.
Director, VIMS
Gloucester Pt., VA
23062

Dr. Virgil Norton
Dept. of Agriculture & Res. Eco.
Univ. of MD
College Park, MD 20740

Mr. Ray Adell
300 Walt Whitman Road
Burlington, NY
11744

Mr. Bill Backus
180 Alhambra Road
Newburgh, NY
07130

Mr. Tom Becker
Tampa III Fishing Corp.
86-70 Shore Parkway
Howard Beach, NY 11414

Capt. Ben Betts, Sr.
Box 202
Fredonia, DE
19946

Mr. Charles Brandt
Suite 3441, Rozaki Assoc.
One World Trade Center
New York, NY 10048

Mr. Bill Burton
178 Park Rd.
Riviera Beach, MD
21122

Mr. Emory Anderson
National Marine Fisheries
Service
Hoods Hole, MA 02543

Dr. Robert Forate
Nat'l Res. Group Tetra Tech, Inc.
1911 Fort Myer Drive
Arlington, VA 22209

Dr. Harold Haslin
Rangers U., Busch Campus
P. O. Box 1039
Piscataway, NJ 08854

Dr. Susan Peterson
MCI
Hoods Hole, MA 02543

Mr. Charles Amy
L. D. Amy Seafood Co.
101 South King Street
Hampton, VA 23669

Mr. Herb Blackwell
951 Romney Avenue
Trenton, NJ
08623

Derry Bennett
Am. Littoral Soc.
Sandy Hook
Highlands, NJ 07732

Mr. Bob Blake
655 E. 228th St.
Brook, NY
10466

Mr. David Bromhall
407 Ocean Ave.
Sea Girt, NJ
08750

Axel Carlson, Jr.
62 N. Main Street
Manasquan, NJ 08736

Jack Casey
Harragansett Mar. Lab.
Rural Route 7
Harragansett, RI 02882

R. Peter Connolly, Esq.
Garway I, Suite 1600
Newark, NJ
07102

Mr. John P. Donovan, Jr.
Box 325
Fredericks, DE
19946

Mr. Robert Dumas, Jr.
P.O. Box 7
Point Lookout, NY
11569

Jim Farlow
Jrd & St. Louis Avenue
Ocean City, MD 21842

Mr. John Gosman
Box 627
Newark, NY
11954

Mr. Willie Hand
514 Crawford Avenue
Dover, DE
19901

Mr. Luther Jafferys
101 Harringside Drive
Millville, NJ
08332

Mr. Richard Kack
911 Savannah Rd.
Lebanon, DE
19958

Dr. John Kingsbury
202 Plant Science Bldg.
Cornell Univ.
Ithaca, NY 14853

Mr. Ben Kosare
473 W. Marshall St.
W. Chester, PA
19380

Mr. Tom Coffield
489 Locust Lane
Cape May Court House, NJ
08210

Mr. Robert Cooper
Carpanter Street
Greensport, LI, NY
11944

Mr. John Doody
105 Birch Circle
Absecon, NJ
08201

Mr. Vernon Drewser Jr.
Saxis, VA 23417

L. Lule Fass
48 Water Street
Hampton, VA 23663

Capt. Warren Hader
P.O. Box 508
Montauk, N.Y. 11954

Mr. William Hastings, Sr.
Box 214
Omar Road
Dagsboro, DE 19939

Mr. Joe Julian
Julian's Bait Co., Rt. 36
Atlantic Highlands, NJ
07716

Mr. Harold B. Kasmirly, Jr.
Box A
Monticello, MD
21840

Erik Kitzberg
Tacony Road
Wildwood, NJ 08260

Capt. Lorry Erin
170 Jeffrey Street
Brooklyn, NY
11235

Max Cohen
489 Locust Lane
Cape May Court House, NJ
08210

Mr. Edmund Miles Davis
R. D. 2, Box 258
Leeds, DE
19958

Mr. Robert Dorman
R. D. 2, Box 258
Leeds, DE
19958

Bob Duffey
330 Prospect Avenue
Neptune, NJ 07753

Mr. Paul Forstberg
Viking Fishing Fleet
Box 497
Montauk, NY 11954

Mr. Wayne Halbruner
RD 2, Box 100
Cape May, NJ 08204

Mr. Harry J. Huston
7411 Pacific Ave.
Wildwood Crest, NJ
08260

Nicholas Karas
11 Red Oak Road
St. James, NY 11780

Jerry Kenney
110 Glenwood Avenue
Jersey City, NJ
07306

Mr. Sigmund Kisicowski
1827 Latenvon Avenue
Septima, NJ
07753

David P. Kruse
Box 311 B
East Lane Drive
Montauk, NY 11954

Mr. Harry Luchbore
10 Moorhill Ave.
Leeds, DE
19958

Mr. Donald Leonard
P.O. Box 173
Chiltonsgrove, VA 23336

Dr. Roger R. Locondero
Eutiger U. Cook Col.
Admiral Bldg.
New Brunswick, NJ 08903

Dr. Robert Dorman
R. D. 2, Box 258
Leeds, DE
19958

Bob Duffey
330 Prospect Avenue
Neptune, NJ 07753

Mr. Paul Forstberg
Viking Fishing Fleet
Box 497
Montauk, NY 11954

Mr. Wayne Halbruner
RD 2, Box 100
Cape May, NJ 08204

Mr. Harry J. Huston
7411 Pacific Ave.
Wildwood Crest, NJ
08260

Nicholas Karas
11 Red Oak Road
St. James, NY 11780

Jerry Kenney
110 Glenwood Avenue
Jersey City, NJ
07306

Mr. Sigmund Kisicowski
1827 Latenvon Avenue
Septima, NJ
07753

David P. Kruse
Box 311 B
East Lane Drive
Montauk, NY 11954

Mr. James T. Lambie
6 Ripley Lane
S. Belmar, NJ
07719

Mr. Bob Lick
304 King Ave.
Chilingswood, NJ
08108

Costa Lovgren
214 Funtillon Avenue
Point Pleasant, NJ 08742

Mr. John Marvin
American Signal
P.O. Box 789
Seaford, DE 19773

Dr. Ronnie J. McKay
Cook College, Rutgers U.
P.O. Box 231
New Brunswick, NJ 08903

Mr. James McHugh, Sepsac Group
28 Research Dr.
P.O. Box 7033
Hampton, VA 23666

John B. Miles
J.H. Miles & Company, Inc.
Box 178
Norfolk, VA 23501

Joe Moskley
P.O. Box 816
East Quogue, NY
11954

Mr. Frank Mundus
P.O. Box 667
Montauk, NY
11954

Mr. George Olds
Old Salt Packing Company
P.O. Box 439
Easton, MD 21601

Allan Paschall
2137 E. Admiral Drive
Virginia Beach, VA 23451

Mr. Frank Miller, Sr.
Wood Ring Drive P.O. Box 243
Amagansett, LI., N.Y.
11958

Dr. Roy G. Morris
Dept. of Food Science
Rutgers U. Cook Col.
New Brunswick NJ 08903

John Murray, Jr.
P.O. Box 347
Ariella, NJ 08730

Mr. Charles Parker
Davis & Lynch Fish Co.
Ocean City, MD
21842

James L. Pearson
882 Linden Street
Cape May County
Eranis, NJ 08209

Mr. Julian A. Penello
 2928 Replica Lane
 Portsmouth, VA
 23703

Mr. Ronald Pieper
 285 W. Torquay Rd.
 Cape Isle of Light
 Ocean City, MD 21842

Mr. Keith Forrer
 c/o Mactra Advertising
 P.O. Box 188
 Newport News, VA 23607

Mr. Jeff Reichle Inc.
 Lord's Fisheries Inc.
 997 Ocean Drive
 Cape May, NJ 08204

Mr. Claude Rogers, Jr.
 Dept. of Com. & Econ. Dev.
 25th St. & Pacific Ave.
 Virginia Beach, VA 23461

Hank Schaefer
 218 Valley Road
 Neptune, NJ 07753

L.K. Shackelford, Jr.
 P.O. Box 38
 Gloucester Point, VA
 23062

Vincent Squarano
 17 Manning Drive
 Fairfield, NJ 07006

Ms. Gale Steves
 400 E. 58th St.
 New York, NY
 10022

John F. Summers
 12 Highland Avenue
 Summit, NJ 07760

Mr. William Tully
 39 Canoe Place Rd.
 Hampton Bays, NY
 11946

Dr. Richard Peoples
 P. O. Box 398
 Bathany Beach, DE
 19930

Mr. John Plock
 945 Robert Road
 Southold, NY 11971

Mr. William E. Priar
 Box 1034
 Easton, MD
 21801

Mr. Thomas Reynolds, Dir.
 1108 17th St., NW
 Washington, DC 20036

Mr. Richard Perry
 239 Brookwood Ave.
 Easton, MD 21601

Mr. Chester Fodd
 76 Victor Lane
 Easton, MD
 07724

Dr. Richard E. Raush
 35 Steamboat Ave.
 Wickford, RI
 02831

Louis A. Rodis, Jr.
 Box 305
 Cape May Cr. Hse.
 NJ 08210

Mr. Joe Saunders, President
 Mr. Prosty Seafoods, Inc.
 Box 316
 Newport News, VA 23607

Howard Soyars
 Univ. of Del.
 P.O. Box 286
 Lewes, DE 19958

Mr. Kenneth A. Slepier
 11 Venetian Drive
 Rehoboth Beach, DE
 19971

Ms. Barbara Stevenson
 R. D. 2, Box 91A
 Dagsboro, DE
 19939

Mr. Richard Stroud
 SPT, Suite 801
 608 13th St., NW
 Washington, DC 20005

Carl W. Swanson
 1201 Ocean Avenue
 Apartment 78
 Sea Bright, NJ 07760

John Venziani
 Fishery Council
 118 South Street
 New York, NY 10038

Mr. John Adams
 Nat. Res. Defense Council
 917 15th Street, NW
 Washington, DC 20005

Mr. Joseph Almeida
 MA Shellfish Offshore Assoc.
 5 Center Street
 S. Dartmouth, MA 02748

Mr. Theodore B. Bayton
 Dept. of Env. Prot.
 State Office Building
 Hartford, Conn. 06155

Mr. Huey Barthman, Pres.
 American Shrimp Canners Ass'n
 P.O. Box 50774
 New Orleans, LA 70150

Charles B. Balt, Chairman
 Marine Resources Committee
 233 Broadway
 New York, N.Y. 10007

Mr. Jack Borgum, Mar. Mammal
 News, Ocean Science News
 1056 National Press Bldg
 Washington, DC 20043

Mr. Joe Browder
 Env. Policy Ctr.
 317 Penna. Ave., SE
 Washington, DC 20003

Embassy of Belgium
 2100 16th Street, NW
 Washington, DC
 20036

Mr. Emory Castle
 Resources For The Future
 1735 Mass. Ave., NE
 Washington, DC 20036

Librarian
 Colorado State University
 Fort Collins, Colorado
 80523

Embassy of Cuba Comm. Attache
 Embassy of Czechoslovakia
 3900 Wisconsin Ave., NW
 Washington, DC 20008

Director
 NW Fisheries Center, NMFS
 2725 Montlake Blvd., E
 Seattle, WA 98112

Mr. James Ackert
 Sec. Div. - The Gordon Group
 327 Main Street
 Gloucester, MA 01930

Ms. Vickie A. Allis
 Office of Ocean Mgt., NOAA
 2001 Wisconsin Ave., NW
 Washington, DC 20235

Nat'l Parks and Cons.
 Association
 1701 18th St., NW
 Washington, DC 20009

Dr. Gilbert Bane
 Director of Marine Science
 Univ. of North Carolina
 Wilmington, DE 28406

Mr. Bruce Blanchard
 Office of Env. Project Review
 Department of Interior
 Washington, D.C. 20240

Mr. Allan Branch
 R.F.D. 1, Box 212
 Midway, Georgia 31120

Mr. Bruce Blanchard
 Office of Env. Project Review
 Dept. of Interior
 Washington, D.C. 20240

Mr. Bill Butler
 Env. Defense Fund, Inc.
 1525 18th St., NW
 Washington, DC 20036

Mr. Lou Clapper
 National Wildlife Federation
 1412 18th St., NW
 Washington, DC 20036

Mr. John Cronan
 Dept. of Nat. Res.
 83 Park St.
 Providence, RI 02903

Dr. Robert Edwards, Director
 NE Fisheries Center
 NMFS
 Woods Hole, MA 02543

Mr. John Adams
 Nat. Res. Defense Council
 917 15th Street, NW
 Washington, DC 20005

Mr. Joseph Almeida
 MA Shellfish Offshore Assoc.
 5 Center Street
 S. Dartmouth, MA 02748

Mr. Theodore B. Bayton
 Dept. of Env. Prot.
 State Office Building
 Hartford, Conn. 06155

Mr. Huey Barthman, Pres.
 American Shrimp Canners Ass'n
 P.O. Box 50774
 New Orleans, LA 70150

Charles B. Balt, Chairman
 Marine Resources Committee
 233 Broadway
 New York, N.Y. 10007

Mr. Jack Borgum, Mar. Mammal
 News, Ocean Science News
 1056 National Press Bldg
 Washington, DC 20043

Mr. Joe Browder
 Env. Policy Ctr.
 317 Penna. Ave., SE
 Washington, DC 20003

Embassy of Belgium
 2100 16th Street, NW
 Washington, DC
 20036

Mr. Emory Castle
 Resources For The Future
 1735 Mass. Ave., NE
 Washington, DC 20036

Librarian
 Colorado State University
 Fort Collins, Colorado
 80523

Embassy of Cuba Comm. Attache
 Embassy of Czechoslovakia
 3900 Wisconsin Ave., NW
 Washington, DC 20008

Director
 NW Fisheries Center, NMFS
 2725 Montlake Blvd., E
 Seattle, WA 98112

Mr. James Ackert
 Sec. Div. - The Gordon Group
 327 Main Street
 Gloucester, MA 01930

Ms. Vickie A. Allis
 Office of Ocean Mgt., NOAA
 2001 Wisconsin Ave., NW
 Washington, DC 20235

Nat'l Parks and Cons.
 Association
 1701 18th St., NW
 Washington, DC 20009

Dr. Gilbert Bane
 Director of Marine Science
 Univ. of North Carolina
 Wilmington, DE 28406

Mr. Bruce Blanchard
 Office of Env. Project Review
 Department of Interior
 Washington, D.C. 20240

Mr. Allan Branch
 R.F.D. 1, Box 212
 Midway, Georgia 31120

Mr. Bruce Blanchard
 Office of Env. Project Review
 Dept. of Interior
 Washington, D.C. 20240

Mr. Bill Butler
 Env. Defense Fund, Inc.
 1525 18th St., NW
 Washington, DC 20036

Mr. Lou Clapper
 National Wildlife Federation
 1412 18th St., NW
 Washington, DC 20036

Mr. John Cronan
 Dept. of Nat. Res.
 83 Park St.
 Providence, RI 02903

Dr. Robert Edwards, Director
 NE Fisheries Center
 NMFS
 Woods Hole, MA 02543

Mr. John Adams
 Nat. Res. Defense Council
 917 15th Street, NW
 Washington, DC 20005

Mr. Joseph Almeida
 MA Shellfish Offshore Assoc.
 5 Center Street
 S. Dartmouth, MA 02748

Mr. Theodore B. Bayton
 Dept. of Env. Prot.
 State Office Building
 Hartford, Conn. 06155

Mr. Huey Barthman, Pres.
 American Shrimp Canners Ass'n
 P.O. Box 50774
 New Orleans, LA 70150

Charles B. Balt, Chairman
 Marine Resources Committee
 233 Broadway
 New York, N.Y. 10007

Mr. Jack Borgum, Mar. Mammal
 News, Ocean Science News
 1056 National Press Bldg
 Washington, DC 20043

Mr. Joe Browder
 Env. Policy Ctr.
 317 Penna. Ave., SE
 Washington, DC 20003

Embassy of Belgium
 2100 16th Street, NW
 Washington, DC
 20036

Mr. Emory Castle
 Resources For The Future
 1735 Mass. Ave., NE
 Washington, DC 20036

Librarian
 Colorado State University
 Fort Collins, Colorado
 80523

Embassy of Cuba Comm. Attache
 Embassy of Czechoslovakia
 3900 Wisconsin Ave., NW
 Washington, DC 20008

Director
 NW Fisheries Center, NMFS
 2725 Montlake Blvd., E
 Seattle, WA 98112

Mr. James Ackert
 Sec. Div. - The Gordon Group
 327 Main Street
 Gloucester, MA 01930

Ms. Vickie A. Allis
 Office of Ocean Mgt., NOAA
 2001 Wisconsin Ave., NW
 Washington, DC 20235

Nat'l Parks and Cons.
 Association
 1701 18th St., NW
 Washington, DC 20009

Dr. Gilbert Bane
 Director of Marine Science
 Univ. of North Carolina
 Wilmington, DE 28406

Mr. Bruce Blanchard
 Office of Env. Project Review
 Department of Interior
 Washington, D.C. 20240

Mr. Allan Branch
 R.F.D. 1, Box 212
 Midway, Georgia 31120

Mr. Bruce Blanchard
 Office of Env. Project Review
 Dept. of Interior
 Washington, D.C. 20240

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 Env. Defense Fund, Inc.
 1525 18th St., NW
 Washington, DC 20036

Mr. Lou Clapper
 National Wildlife Federation
 1412 18th St., NW
 Washington, DC 20036

Mr. John Cronan
 Dept. of Nat. Res.
 83 Park St.
 Providence, RI 02903

Dr. Robert Edwards, Director
 NE Fisheries Center
 NMFS
 Woods Hole, MA 02543

Mr. John Adams
 Nat. Res. Defense Council
 917 15th Street, NW
 Washington, DC 20005

Mr. Joseph Almeida
 MA Shellfish Offshore Assoc.
 5 Center Street
 S. Dartmouth, MA 02748

Mr. Theodore B. Bayton
 Dept. of Env. Prot.
 State Office Building
 Hartford, Conn. 06155

Mr. Huey Barthman, Pres.
 American Shrimp Canners Ass'n
 P.O. Box 50774
 New Orleans, LA 70150

Charles B. Balt, Chairman
 Marine Resources Committee
 233 Broadway
 New York, N.Y. 10007

Mr. Jack Borgum, Mar. Mammal
 News, Ocean Science News
 1056 National Press Bldg
 Washington, DC 20043

Mr. Joe Browder
 Env. Policy Ctr.
 317 Penna. Ave., SE
 Washington, DC 20003

Embassy of Belgium
 2100 16th Street, NW
 Washington, DC
 20036

Mr. Emory Castle
 Resources For The Future
 1735 Mass. Ave., NE
 Washington, DC 20036

Librarian
 Colorado State University
 Fort Collins, Colorado
 80523

Embassy of Cuba Comm. Attache
 Embassy of Czechoslovakia
 3900 Wisconsin Ave., NW
 Washington, DC 20008

Director
 NW Fisheries Center, NMFS
 2725 Montlake Blvd., E
 Seattle, WA 98112

Mr. James Ackert
 Sec. Div. - The Gordon Group
 327 Main Street
 Gloucester, MA 01930

Ms. Vickie A. Allis
 Office of Ocean Mgt., NOAA
 2001 Wisconsin Ave., NW
 Washington, DC 20235

Nat'l Parks and Cons.
 Association
 1701 18th St., NW
 Washington, DC 20009

Dr. Gilbert Bane
 Director of Marine Science
 Univ. of North Carolina
 Wilmington, DE 28406

Mr. Bruce Blanchard
 Office of Env. Project Review
 Department of Interior
 Washington, D.C. 20240

Mr. Allan Branch
 R.F.D. 1, Box 212
 Midway, Georgia 31120

Mr. Bruce Blanchard
 Office of Env. Project Review
 Dept. of Interior
 Washington, D.C. 20240

Mr. Bill Butler
 Env. Defense Fund, Inc.
 1525 18th St., NW
 Washington, DC 20036

Mr. Lou Clapper
 National Wildlife Federation
 1412 18th St., NW
 Washington, DC 20036

Mr. John Cronan
 Dept. of Nat. Res.
 83 Park St.
 Providence, RI 02903

Dr. Robert Edwards, Director
 NE Fisheries Center
 NMFS
 Woods Hole, MA 02543

Mr. John Adams
 Nat. Res. Defense Council
 917 15th Street, NW
 Washington, DC 20005

Mr. Joseph Almeida
 MA Shellfish Offshore Assoc.
 5 Center Street
 S. Dartmouth, MA 02748

Mr. Theodore B. Bayton
 Dept. of Env. Prot.
 State Office Building
 Hartford, Conn. 06155

Mr. Huey Barthman, Pres.
 American Shrimp Canners Ass'n
 P.O. Box 50774
 New Orleans, LA 70150

Charles B. Balt, Chairman
 Marine Resources Committee
 233 Broadway
 New York, N.Y. 10007

Mr. Jack Borgum, Mar. Mammal
 News, Ocean Science News
 1056 National Press Bldg
 Washington, DC 20043

Mr. Joe Browder
 Env. Policy Ctr.
 317 Penna. Ave., SE
 Washington, DC 20003

Embassy of Belgium
 2100 16th Street, NW
 Washington, DC
 20036

Mr. Emory Castle
 Resources For The Future
 1735 Mass. Ave., NE
 Washington, DC 20036

Librarian
 Colorado State University
 Fort Collins, Colorado
 80523

Embassy of Cuba Comm. Attache
 Embassy of Czechoslovakia
 3900 Wisconsin Ave., NW
 Washington, DC 20008

Director
 NW Fisheries Center, NMFS
 2725 Montlake Blvd., E
 Seattle, WA 98112

Mr. James Ackert
 Sec. Div. - The Gordon Group
 327 Main Street
 Gloucester, MA 01930

Ms. Vickie A. Allis
 Office of Ocean Mgt., NOAA
 2001 Wisconsin Ave., NW
 Washington, DC 20235

Nat'l Parks and Cons.
 Association
 1701 18th St., NW
 Washington, DC 20009

Dr. Gilbert Bane
 Director of Marine Science
 Univ. of North Carolina
 Wilmington, DE 28406

Mr. Bruce Blanchard
 Office of Env. Project Review
 Department of Interior
 Washington, D.C. 20240

Mr. Allan Branch
 R.F.D. 1, Box 212
 Midway, Georgia 31120

Mr. Bruce Blanchard
 Office of Env. Project Review
 Dept. of Interior
 Washington, D.C. 20240

Mr. Bill Butler
 Env. Defense Fund, Inc.
 1525 18th St., NW
 Washington, DC 20036

Mr. Lou Clapper
 National Wildlife Federation
 1412 18th St., NW
 Washington, DC 20036

Mr. John Cronan
 Dept. of Nat. Res.
 83 Park St.
 Providence, RI 02903

Dr. Robert Edwards, Director
 NE Fisheries Center
 NMFS
 Woods Hole, MA 02543

Mr. John Adams
 Nat. Res. Defense Council
 917 15th Street, NW
 Washington, DC 20005

Mr. Joseph Almeida
 MA Shellfish Offshore Assoc.
 5 Center Street
 S. Dartmouth, MA 02748

Mr. Theodore B. Bayton
 Dept. of Env. Prot.
 State Office Building
 Hartford, Conn. 06155

Mr. Huey Barthman, Pres.
 American Shrimp Canners Ass'n
 P.O. Box 50774
 New Orleans, LA 70150

Charles B. Balt, Chairman
 Marine Resources Committee
 233 Broadway
 New York, N.Y. 10007

Mr. Jack Borgum, Mar. Mammal
 News, Ocean Science News
 1056 National Press Bldg
 Washington, DC 20043

Mr. Joe Browder
 Env. Policy Ctr.
 317 Penna. Ave., SE
 Washington, DC 20003

Embassy of Belgium
 2100 16th Street, NW
 Washington, DC
 20036

Mr. Emory Castle
 Resources For The Future
 1735 Mass. Ave., NE
 Washington, DC 20036

Librarian
 Colorado State University
 Fort Collins, Colorado
 80523

Embassy of Cuba Comm. Attache
 Embassy of Czechoslovakia
 3900 Wisconsin Ave., NW
 Washington, DC 20008

Director
 NW Fisheries Center, NMFS
 2725 Montlake Blvd., E
 Seattle, WA 98112

Mr. James Ackert
 Sec. Div. - The Gordon Group
 327 Main Street
 Gloucester, MA 01930

Ms. Vickie A. Allis
 Office of Ocean Mgt., NOAA
 2001 Wisconsin Ave., NW
 Washington, DC 20235

Nat'l Parks and Cons.
 Association
 1701 18th St., NW
 Washington, DC 20009

Dr. Gilbert Bane
 Director of Marine Science
 Univ. of North Carolina
 Wilmington, DE 28406

Mr. Bruce Blanchard
 Office of Env. Project Review
 Department of Interior
 Washington, D.C. 20240

Mr. Allan Branch
 R.F.D. 1, Box 212
 Midway, Georgia 31120

Mr. Bruce Blanchard
 Office of Env. Project Review
 Dept. of Interior
 Washington, D.C. 20240

Mr. Bill Butler
 Env. Defense Fund, Inc.
 1525 18th St., NW
 Washington, DC 20036

Mr. Lou Clapper
 National Wildlife Federation
 1412 18th St., NW
 Washington, DC 20036

Mr. John Cronan
 Dept. of Nat. Res.
 83 Park St.
 Providence, RI 02903

Dr. Robert Edwards, Director
 NE Fisheries Center
 NMFS
 Woods Hole, MA 02543

Mr. John Adams
 Nat. Res. Defense Council
 917 15th Street, NW
 Washington, DC 20005

Mr. Joseph Almeida
 MA Shellfish Offshore Assoc.
 5 Center Street
 S. Dartmouth, MA 02748

Mr. Theodore B. Bayton
 Dept. of Env. Prot.
 State Office Building
 Hartford, Conn. 06155

Mr. Huey Barthman, Pres.
 American Shrimp Canners Ass'n
 P.O. Box 50774
 New Orleans, LA 70150

Charles B. Balt, Chairman
 Marine Resources Committee
 233 Broadway
 New York, N.Y. 10007

Mr. Jack Borgum, Mar. Mammal
 News, Ocean Science News
 1056 National Press Bldg
 Washington, DC 20043

Mr. Joe Browder
 Env. Policy Ctr.
 317 Penna. Ave., SE
 Washington, DC 20003

Embassy of Belgium
 2100 16th Street, NW
 Washington, DC
 20036

Mr. Emory Castle
 Resources For The Future
 1735 Mass. Ave., NE
 Washington, DC 20036

Librarian
 Colorado State University
 Fort Collins, Colorado
 80523

Embassy of Cuba Comm. Attache
 Embassy of Czechoslovakia
 3900 Wisconsin Ave., NW
 Washington, DC 20008

Director
 NW Fisheries Center, NMFS
 2725 Montlake Blvd., E
 Seattle, WA 98112

Director
 SW Fisheries Center, NMFS
 P. O. Box 271
 LaJolla, CA 92038

Mr. Ted Dinceman
 1337 Longworth
 Merchant Mar. & Fish. Com.
 Washington, DC 20513

Regional Director
 EPA - Region 2, Room 1009
 26 Federal Plaza
 New York, NY 10007

Chief of Engineers
 Department of the Army
 Washington, D. C. 20314

Mr. August Falando
 Amer. Tuna Boat Ass'n
 1 Tuna Lane
 San Diego, CA 92101

Mr. George E. Filialis, Jr.
 Ocean County Est. Service
 Route 327 - Agr. Center
 Toms River, NJ 08723

Embassy of German Demo. Rep.
 Altin Harold Schrickel
 1717 Mass. Ave., SE
 Washington, DC 20036

Mr. Ray Gerson
 Fisheries Development Corp.
 39 Gramercy Park
 New York, NY 10010

Mr. John S. Gottschalk
 1412 16th St., NW
 Washington, DC 20036

Mr. Douglas Gregory
 P. O. Box 2183
 Key West, FL
 33040

Mr. Marcia J. Hamlin, Act. IE
 711 J. Clyde Morris Blvd.
 Newport News, VA
 23601

Mr. Edward J. Dalkon, Director
 Par. - Int'l Multifoods Corp.
 1200 Multifoods Bldg.
 Minneapolis, MN 55402

Mr. Frank Duffy
 85 Jedwood Road
 Valley Stream, NY
 11581

Regional Director
 EPA - Region 3
 Sixth & Walnut Streets
 Philadelphia, PA 19106

Mr. Ned P. Everett, Counsel
 Merchant Mar. & Fish Com
 U.S. House of Rep.
 Washington, D. C. 20513

Mr. Eugene E. Fidell
 Ledouff, Lamb, Leiby & Macrae
 1757 N St., NW
 Washington, DC 20036

Mr. Mary Fountain
 8 Compton Place
 Scotia, New York
 12302

Embassy of German Fed. Republic
 4645 Masservoir Road, NW
 Washington, DC
 20007

Mr. David E. Getchell, Editor
 National Fisherman
 21 Elm Street
 Camden, ME 04843

Mr. David H. C. Gould
 Dept. of Nat. Res.
 P.O. Box 1976
 Brunswick, GA 31520

Dr. John E. Greenfield, NMFS
 Boral Bldg., 9450 Gandy Blvd.
 St. Petersburg, FL
 33702

Mr. Elwood K. Harry
 Int'l Game Fish Association
 3000 E. Los Olivos Blvd.
 Ft. Lauderdale, FL 33316

Mr. Edward J. Dalkon, Director
 Par. - Int'l Multifoods Corp.
 1200 Multifoods Bldg.
 Minneapolis, MN 55402

Regional Director
 EPA - Region 1
 JFK Bldg., Room 2203
 Boston, MA 02203

Regional Director
 EPA - Region 4
 1421 Peachtree Street, N
 Atlanta, GA 30309

Mr. Louis Fawc
 Fawc Brothers, Inc.
 P.O. Box 3552
 Hampton, VA 23663

Mr. Eugene E. Fidell
 Ledouff, Lamb, Leiby & Macrae
 1757 N St., NW
 Washington, DC 20036

Mr. Mary Fountain
 8 Compton Place
 Scotia, New York
 12302

Embassy of German Fed. Republic
 4645 Masservoir Road, NW
 Washington, DC
 20007

Mr. David E. Getchell, Editor
 National Fisherman
 21 Elm Street
 Camden, ME 04843

Mr. David H. C. Gould
 Dept. of Nat. Res.
 P.O. Box 1976
 Brunswick, GA 31520

Dr. John E. Greenfield, NMFS
 Boral Bldg., 9450 Gandy Blvd.
 St. Petersburg, FL
 33702

Mr. Elwood K. Harry
 Int'l Game Fish Association
 3000 E. Los Olivos Blvd.
 Ft. Lauderdale, FL 33316

Mr. Law L. Hartwell, Librarian
 Mr. Jay Hastings
 Rice Marine Laboratory
 1600 City Island Park
 Sarasota, Florida. 33577

Raymond C. Hubley, Jr.
 Office of Fisheries Assistance
 U.S. Fish & Wildlife
 Washington, D.C. 20240

Inc'l Fisheries Directorate
 Document Centre
 240 Sparks Street
 Ottawa, Ontario K1P 6C9

Embassy of Japan, Chancery
 Attn: Kazuo Moriya
 2520 Mass. Ave., N.W.
 Washington, DC 20008

Mr. Sumner Kallens
 Box 621
 Pleasanton, CA
 94563

Korean Embassy, Chancery
 Attn: Mr. Han Ho Kim
 2328 Mass. Ave., NW
 Washington, DC 20008

Mr. Keith Gardner, Editor
 Fishing World Magazine
 51 Atlantic Avenue
 Floral Park, NY 11001

Mr. Bob Goidan
 Rutgers University
 P.O. Box 1179
 Piscataway, NJ 08854

Mr. Gardner Graml, Pres.
 Federation of Fly Fishermen
 200 Harnscomck Avenue
 White Plains, NY 10601

Mr. Jack Grimes
 Asst. Inst. of Biological Sci.
 1401 Wilson Blvd.
 Arlington, VA 22209

Mr. Peter Harnik
 1346 Comm. NW
 Washington, DC 20036

Mr. Lewis J. Harkin, Act. IE
 711 J. Clyde Morris Blvd.
 Newport News, VA
 23601

Mr. Sarah L. Hartwell, Librarian
 Mr. Jay Hastings
 Rice Marine Laboratory
 1600 City Island Park
 Sarasota, Florida. 33577

Raymond C. Hubley, Jr.
 Office of Fisheries Assistance
 U.S. Fish & Wildlife
 Washington, D.C. 20240

Inc'l Fisheries Directorate
 Document Centre
 240 Sparks Street
 Ottawa, Ontario K1P 6C9

Embassy of Japan, Chancery
 Attn: Kazuo Moriya
 2520 Mass. Ave., N.W.
 Washington, DC 20008

Mr. Sumner Kallens
 Box 621
 Pleasanton, CA
 94563

Korean Embassy, Chancery
 Attn: Mr. Han Ho Kim
 2328 Mass. Ave., NW
 Washington, DC 20008

Mr. Keith Gardner, Editor
 Fishing World Magazine
 51 Atlantic Avenue
 Floral Park, NY 11001

Mr. Bob Goidan
 Rutgers University
 P.O. Box 1179
 Piscataway, NJ 08854

Mr. Gardner Graml, Pres.
 Federation of Fly Fishermen
 200 Harnscomck Avenue
 White Plains, NY 10601

Mr. Jack Grimes
 Asst. Inst. of Biological Sci.
 1401 Wilson Blvd.
 Arlington, VA 22209

Mr. Peter Harnik
 1346 Comm. NW
 Washington, DC 20036

Mr. Lewis J. Harkin, Act. IE
 711 J. Clyde Morris Blvd.
 Newport News, VA
 23601

Mr. Edwin B. Joseph
 S.C. Wild & Mar. Res. Dept.
 P.O. Box 12559
 Charleston, SC 29412

Christopher Koch
 Professional Staff Member
 Senate Commerce Com.
 Washington, D.C. 20510

Mr. Alfred Kuhnle
 117-76 228th Street
 Cambria Hgts., NY
 11411

Mr. Harold E. Loban
 Fishermen's Terminal
 Box 232, Bldg. C
 Seattle, WA 98119

Mr. Dave Luks
 US Chamber of Commerce
 1615 H. St., NW
 Washington, DC 20042

Mr. Joel Macdonald
 NMFS
 14 Elm St.
 Gloucester, MA 01930

Mr. Frank A. Manno
 5812 Gollings Drive
 Virginia Beach, VA
 23462

National Maritime & Maritime, Ltd
 Counselors at Law - Suite 200
 310 Market St., East
 Philadelphia, PA 19106

Mr. David M. Kinsey, Chief
 Dir. of Coastal Zone Mgt.
 P.O. Box 1889
 Trenton, NJ 08625

Mr. Gerald J. Kovach
 Commerce Committee
 U. S. Senate
 Washington, D. C. 20510

Mr. Lawrence Lester, Jr.
 37 Bayview Add.
 Ashland, Kentucky
 41101

Mr. Peter Larkin
 30 Bayonna Drive
 Hewitt, NJ
 07421

Mr. John Lorenz
 Irak Walton League of America
 1800 N. Kent St., Su 378
 Arlington, VA 22209

Charles B. Lyles, Exec. Dir.
 Gulf States Marine Fish. Com.
 P.O. Box 726
 Ocean Springs, MS 39564

Mr. Edward MacArthur
 Marine Technological Society
 1720 M. St., NW
 Washington, DC 20036

Mr. George J. Hannina
 Mar. Mar. & Fish. Com.
 U. S. House of Rep.
 Washington, D. C. 20515

Mr. Peter Larkin
 30 Bayonna Drive
 Hewitt, NJ
 07421

Mr. John Lorenz
 Irak Walton League of America
 1800 N. Kent St., Su 378
 Arlington, VA 22209

Charles B. Lyles, Exec. Dir.
 Gulf States Marine Fish. Com.
 P.O. Box 726
 Ocean Springs, MS 39564

Mr. Edward MacArthur
 Marine Technological Society
 1720 M. St., NW
 Washington, DC 20036

Mr. George J. Hannina
 Mar. Mar. & Fish. Com.
 U. S. House of Rep.
 Washington, D. C. 20515

Mr. Edwin B. Joseph
 S.C. Wild & Mar. Res. Dept.
 P.O. Box 12559
 Charleston, SC 29412

Christopher Koch
 Professional Staff Member
 Senate Commerce Com.
 Washington, D.C. 20510

Mr. Alfred Kuhnle
 117-76 228th Street
 Cambria Hgts., NY
 11411

Mr. Harold E. Loban
 Fishermen's Terminal
 Box 232, Bldg. C
 Seattle, WA 98119

Mr. Dave Luks
 US Chamber of Commerce
 1615 H. St., NW
 Washington, DC 20042

Mr. Joel Macdonald
 NMFS
 14 Elm St.
 Gloucester, MA 01930

Mr. Frank A. Manno
 5812 Gollings Drive
 Virginia Beach, VA
 23462

National Maritime & Maritime, Ltd
 Counselors at Law - Suite 200
 310 Market St., East
 Philadelphia, PA 19106

Mr. David M. Kinsey, Chief
 Dir. of Coastal Zone Mgt.
 P.O. Box 1889
 Trenton, NJ 08625

Mr. Gerald J. Kovach
 Commerce Committee
 U. S. Senate
 Washington, D. C. 20510

Mr. Lawrence Lester, Jr.
 37 Bayview Add.
 Ashland, Kentucky
 41101

Mr. Peter Larkin
 30 Bayonna Drive
 Hewitt, NJ
 07421

Mr. John Lorenz
 Irak Walton League of America
 1800 N. Kent St., Su 378
 Arlington, VA 22209

Charles B. Lyles, Exec. Dir.
 Gulf States Marine Fish. Com.
 P.O. Box 726
 Ocean Springs, MS 39564

Mr. Edward MacArthur
 Marine Technological Society
 1720 M. St., NW
 Washington, DC 20036

Mr. George J. Hannina
 Mar. Mar. & Fish. Com.
 U. S. House of Rep.
 Washington, D. C. 20515

Mr. Robert G. Havemann
Shrimp Assn. of the Americas
P.O. Box 1666
Brownsville, TX 78520

Mr. Mark Hurdman
University of Rhode Island
2 Kingsdown, RI
02852

Mr. Lee Morgan
NMFS
1700 Westlake Ave.
Seattle, WA 98109

Natl. Assn. of Eng. & Boat Mfg
P.O. Box 3335
Grand Central Station
New York, NY 10017

Mr. William Mablett
Natl. Shrimp Congress
P.O. Box 431
Laymont, FL 33040

Ms. Kathy Nordstrom
Natl. Chambers Association
1133 20th St., NW
Washington, DC 20006

Dean Parsons, RLM
26 Federal Plaza
Rm. 12-170, Federal Bldg
New York, NY 10007

Mr. Bill Perry
239 Brookwood Avenue
Easton, MD
21601

Mr. Dan Poole
Wildlife Management Institute
1200 Vermont Ave., NW
Washington, DC 20005

REGIONAL DIRECTOR
ALASKA REGION, NMFS
P. O. Box 1668
Juneau, AK 99802

RD, SW REGION, NMFS
300 S. Ferry Street
Terminal Island, CA
90701

Mr. Steve Hayer
Tri-County Council for South, MD
P.O. Box 301
Welford, MD 20601

Mr. James W. Norton
Coastal Resources Specialist
162 Washington Avenue
Albany, New York 12231

Mr. John Mallicky
Dept. of Fisheries
P.O. Box 2223
Hailfies, Nova Scotia

The Mac'I Guss Fish Assn.
300 E. Las Olas Blvd.
Ft. Lauderdale, FL
33316

Anthony V. Niregich, Director
Government and Industry Relations
Starwest Foods, Inc.
Terminal Island, CA 90731

Mr. Virgil Norton
Dept. of Agr. & Resource Econo.
University of Maryland
College Park, MD 20740

Honorable Edward J. Patton
House of Representatives
Washington, D.C. 20515

Mr. Allen E. Pacarson, Jr.
Dept. of Fish, Wildl., & SW
100 Cambridge St.
Boston, MA 02202

Office of Env. Proj., USDI
Office of the Sec.
Room 4246
Washington, D.C. 20240

REGIONAL DIRECTOR
NM Region, NMFS
1700 Westlake Ave., N
Seattle, WA 98109

Mr. Roy W. Wafer
Natural Resources Police
Taxes St.-Of. Bldg., Room B
Annapolis, MD 21401

Mr. Edward G. McCoy
N.C. Dept. of W.R. & C.D.
Box 769
Horseshoe City, NC 28557

Mr. James W. Norton
Coastal Resources Specialist
162 Washington Avenue
Albany, New York 12231

Mr. John Mallicky
Dept. of Fisheries
P.O. Box 2223
Hailfies, Nova Scotia

The Mac'I Guss Fish Assn.
300 E. Las Olas Blvd.
Ft. Lauderdale, FL
33316

Anthony V. Niregich, Director
Government and Industry Relations
Starwest Foods, Inc.
Terminal Island, CA 90731

Mr. Virgil Norton
Dept. of Agr. & Resource Econo.
University of Maryland
College Park, MD 20740

Honorable Edward J. Patton
House of Representatives
Washington, D.C. 20515

Mr. Allen E. Pacarson, Jr.
Dept. of Fish, Wildl., & SW
100 Cambridge St.
Boston, MA 02202

Office of Env. Quality
Env., Safety, & Con. Affairs
Dept. of Transportation
Washington, DC 20590

RD, SE REGION, NMFS
Deval Bldg., 9450 Gandy Blvd.
St. Petersburg, FL
33701

Embassy of Romania
Chauncy
1607 23rd St., NW
Washington, DC 20008

William C. Salecio
Salmon Association
1111 W. 43rd Street
Seattle, WA 98107

Mr. Hanson V. Shields
Dept. of Nat'l Resources
202 Stout St.
Tallahassee, Fla. 32304

Mr. Lucy Sloan
Nat'l Federation of Fishermen
38 Green Street
Cambridge, MA 02139

Mr. Scott Stearns
5381 Ballard Ave. N.W.
Seattle, Wash. 98107

Mr. Michael W. Street
Division of Marine Fisheries
P.O. Box 769
Northeast City, NC 28557

Mr. Tim Sullivan, Atlantic Ed.
National Fisherman
185 Main Street
Gloucester, MA 01930

Mr. Jim Trumala
273 Chestnut Ave.
Jamaica Plain, MA
02130

Mr. James P. Walsh
Prof. Staff Member
Commerce Comm. U.S. Senate
Washington, D.C. 20510

Ms. Ann Mickham
Friends of the Earth
620 O Street, SE
Washington, DC 20003

Mr. Kenneth Allen
448 E. Connecticut Avenue
Atlantic City, NJ
08401

Mr. R. E. Alquist
Tracor Jitco Inc.
1776 East Jefferson St.
Rockville, MD 21842

Mr. Tom Schaefer
AFPA, 20 W. Wacker Drive
Chicago, IL
60606

Mr. Marvin Shutt
Natl. Sporting Goods Ass'n.
717 E. Michigan Street
Chicago, IL 60611

Rodney R. Smith, Mgr.
Cape May Fisheries Corp
Box 71
Cape May, NJ 08209

Mr. Bob Steis
Natl. Inst. for Env. & Dev.
1525 BR Avenue, NW
Washington, DC 20036

Mr. Albert Stoutement
Chicago, Buff. & Paul
1730 Park Ave., NW
Washington, DC 20006

Mr. Carl Sullivan
American Fisheries Society
2419 Grosvenor Lane
Bethesda, MD 20814

Mr. Broderick Townes
Natl. Fisherman
21 Elm Street
Canaan, NH 04943

Embassy of the USSR
Street N. Zamoskoly
1125 16th St. NW
Washington, DC 20036

Mr. Christopher M. Weid
18th Flr, 100 Federal St
Boston, MA 02110

Mr. W. V. Yorker, Exec. V.P.
Assn. of Pacific Fisheries
1600 S. Jackson Street
Seattle, WA 98144

Mr. Leonard Alfonso
P.O. Box 295
North Dartmouth, MA
02747

Mr. Gerald Anderson
243 W. Juniper Avenue
Willowood, NJ
08260

Mr. Leonard Alfonso
P.O. Box 295
North Dartmouth, MA
02747

Mr. Warren Alexander
R.D. 2, Box 1598
Cape May, NJ
08204

Mr. Pete Ameriggi
Ameriggi Sea Foods, Inc.
6 Bowen Street
Johnston, RI 02919

Norman Hunt, Inc.
Tacony Road
Wildwood, NJ
08260

Mr. J. M. Assou
20 Decatur Street
Cape May, NJ
08204

Mr. John H. Robinson, Pres.
AMI Corp., P.O. Box 5475
North Wildwood, NJ
08260

Mr. John H. Robinson, Pres.
212 Washington Avenue
Towson, MD 21284

Atlantic Bait Corporation
2828 Brooper Avenue
Bricktown, NJ
08723

Mr. James S. Baker
Wachepreage, VA
23480

Mr. Thomas J. Beccie
Villias, NJ
08251

Mr. George P. Barty
8 S. Temperance Street
Fort Morris, NJ
08349

Mr. Frederick Blount
P.O. Box 34
283 Water Street
Warren, RI 02883

Mr. John E. P. Borden
The Cotton Group
127 Main Street
Gloucester, MA 01930

Mr. Willard Burnright
200 Apple Blossom Drive
Cape May, NJ
08204

Mr. Harold C. Carlson, Pres.
Carlson Impact Extractor, Inc.
8806 Pacific Avenue
Wildwood, NJ 08260

Wyers Clam Co., Inc.
27th and Blvd.
Barnegat Light, NJ
08006

Mr. Kenneth Coons
RI Seafood Council
#1 Tower Hill Offc. Bldg.
Wakefield, RI 02880

Wilton W. Corporation
Barnegat Light, NJ
08006

Mr. Charles B. Belt, Chairman
Marine Resources Commission
233 Broadway
New York, NY 10007

Mr. F. Nelson Blount, Inc.
Tacony Road
Wildwood, NJ
08260

Mr. Stanley Bodnar
105 Mila Avenue
Villias, NJ
08251

Mr. William C. Brunell
Breaker Road
Eram, NJ

Mr. H. Arnold Gort
MA Dept. of Sea's Res.
100 Cambridge Street
Boston, MA 02135

Freeport Sea Clam Co., Inc.
225 Nassau Avenue
Freeport, NY
11520

Norman D., Inc.
300 E. 11th Avenue
North Wildwood, NJ
08260

Histy Dawn, Inc.
Box 98
Tavernacle Road
Cape May, NJ 08204

Mr. Mad Doughty
C & D Seafood Company
Oyster, VA
23949

Mr. Gerald Engle
VIMS
Foot of Main Street
Fort Morris, NJ
08349

Funny Face, Inc.
RD 1, Box 30
Cape May, NJ
08204

H. A. Ferracane Fishing Corp.
52 Cedar St.
6600 Avenue, MA
20796

Mr. Rich Fisher
Box 33
Cape May, NJ
08210

Double W Food Corporation
148 Mallock Avenue
Port Jefferson, NY
11776

Mr. John Gaiser
Evening Press
Asbury, NJ
07712

Mr. William Gramu
701 W. Bark Avenue
Box 34
Wildwood, NJ 08260

Ottawa Harbor Clam, Inc.
Burt Avenue & Tacony Road
Wildwood, NJ
08260

Mr. John H. Gowan
Dept. of Nat. Res.
83 Park St.
Providence, RI 02903

Mr. Herman Daniels
141 East Road
Howell, NJ
07731

Teresa & Dawn Fish & Clam Co.
Bay View Avenue
Ocean City, MD
21842

Mr. Robert L. Downes, Pres.
L.I. Sea Clam Corporation
P.O. Box F, Bayside Dr.
Point Lookout, NY 11569

Mr. Stan Engel
Campbell Soap Corp
Campbell Place
Camden, NJ 08101

Mr. Robert J. Farmer
1507 Sunset Avenue
Monmouth, NJ
08742

Greenville Fisheries
P.O. Box 24
Camden, DE
19333

Ocean City Fisheries, Inc.
2700 Anbury Avenue
Ocean City, NJ
08226

Mr. Richard Caskill
Willis Wharf, VA
23486

Mr. William J. Gifford
212 Dennis Drive
Abacoan, NJ
08201

Mr. Douglas Halstead
R. D. 1, Box 71
Cold Spring
Cape May, NJ 08204

High Seas Harvesters
Georgetown, DE
19947

Dr. Arnold I. Epstein, Pres.
Borden Foods-Jones Food Pr., Div.
Brdn, Inc, 180 E Broad St.
Columbus, OH 43215

Mr. J. W. Ferguson, Sr., Pres.
J. W. Ferguson Seafood Co., Inc.
Beaick, VA
23175

Mr. Lance G. Fisher, Pres.
Lance G. Fisher Dyster Co.
RFD 695
Sarnford, VA 23426

Consolidated Sea Food Corp.
Miller Avenue
Fort Morris, NJ
08349

Mr. Earl K. Geinder
Box 89
Wildwood, NJ
08260

Mr. Eugene B. Goldenberg
DeLancey Seafood, Inc.
39-41 Seaford Street
Philadelphia, PA 19148

Mr. Ken Hand
7712 Pacific Ave.
Wildwood, NJ
08260

B. J. Haines Company
1062 Progress Street
Pittsburgh, PA
15212

Mr. Harry O. Higgins
Fortecaqua, NJ
08321

Mr. Charles W. Hober
Trojdon, Inc.
R.F.D. 2, Box 80
Cape May, NJ 08204

Mr. Jeffrey L. Howe
U. of RI, Marine Adv. Svc.
Narragansett Bay Campus
Narragansett, RI 02882

Mr. Charles W. Hober
Trojdon, Inc.
R.F.D. 2, Box 80
Cape May, NJ 08204

Mr. John David Martin
Martin Fish Co., Inc.
P.O. Box 51
Ocean City, MD 21842

Mr. Howard Matthews
R.F.D. 1, Box 1640
Cape May, NJ
08204

Mr. Edward G. McCoy
N.C. Mat. Res., Div. of Marine
Fish., P.O. Box 769
Morehead City, NC 28557

Mr. Franklin F. McGinnies, Pres.
Virginia Seafoods, Inc.
P.O. Box 207, Seafood Ln
Irvington, VA 22480

Mr. John E. Miles, Vice Pres.
J H Miles & Co Inc., Foot of
Schepers Ave, P.O. Box 178
Norfolk, VA 23501

Mr. James Byrce
Sea Prize, Inc.
128 West 2nd Avenue
North Willwood, NJ 08260

Mr. Erik Nelson
Mrs. Paul's Kitchens
3830 Henry Avenue
Philadelphia, PA 19128

Mr. Howard Mickerson
H.E. Fiberglass Steering Com.
P. O. Box 54091
New Bedford, MA 02741

Mr. Gary Omandeen
5 Cresset Street
Rio Grande, NJ
08242

Mr. Jack Patterson
Parraman, Inc.
P.O. Box 332, 3 E. 8th St
Barnegat Light, NJ 08006

Mr. P. Huat, Inc.
800 S. Amistead Avenue
Rampoon, VA
23369

American Importers Assn., Inc.
420 Lexington Avenue
New York, NY
10007

Northam Inc.
1906 Baltimore Avenue
Ocean City, MD
21842

Mr. Kristian Isaksen
13 N. 8th Street
Del Haven, NJ
08251

Mr. George J. Jarvis
Habor Shalifish, Inc.
RFD Rt. 2
Slocum, RI 02877

Capt. James Jordan, Sr.
R.D. 2, Box 222R
Cape May, NJ
08204

Mr. Hugh Kelly
Howard Johnsons
220 Forbes Rd
Brentree, MA 02184

Mr. Sig Kidowski
1827 Lancaster Avenue
Neptune, NJ

Mr. Gus A. Larson
535 W. Montgomery Avenue
Willwood, NJ
08260

Capt. Calum T. Lilliston
Class Post Matricula
P.O. Box 215
Ocean City, MD 21842

Mr. Richard Loring, Vice Pres.
Cultured Clam Corp.
P.O. Box 597
Dennis, MA 02628

Mr. E. L. Jarrall
Jarrall & Roe, Inc.
1422 Swallow Street
Pittsburgh, PA 15222

Mr. Morris Johnson, Jr.
MA Shellfish Officers Ass'n.
176 Village Gray Road
West Yarmouth, MA 02673

Mr. Paul's Kitchens
5830 Henry Avenue
Philadelphia, PA 19128

Abel Kin, Inc.
Rio Grande, NJ
08242

Mr. Charles Lambros, V.P.
Tom's Ipswich Clam Co., Inc.
5 Willow Court
Ipswich, MA 01938

Mr. Horton C. Lisherman, V.P.
Atlantic Fish Market, Inc.
3433 S. Lancaster Street
Philadelphia, PA 19146

Mr. Joseph E. Lora
Main Street
Newport, NJ
08345

Mr. Frank Martina
103 Teal Road
810 Grande, NJ
08242

Mr. Elmer W. Mathews
Deep Hole Road
Chincoteague, VA
21336

Mr. Donald McClellan
Albama Corporation
84 Long Point Drive
Bricktown, NJ 08723

Mr. Donald McDaniel
39 Shierpke Road
Cape May, NJ
08204

Mr. Thomas McVay
R.F.D. 1, Box 80
Cape May, NJ
08204

Mr. John Hollenkopf
1151 Pine Bluff Avenue
Pt. Pleasant, NJ
08742

Mr. James E. Navarre, Sr. V.P.
New England Fish Company
4th & Vintu Blvd.
Seattle, WA 98121

Mr. Edwin Nichols
1116 New Brunswick Avenue
Haddonfield, NJ
08736

Mr. Brian O'Donnoghue, Pres.
The Chesapeake Fish Market, Inc.
235 Woodcliff Avenue
Freeport, NY 11220

Mr. Sig Omandeen
411 Marine Highway
704 W. Montgomery Avenue
Willwood, NJ 08260

Mr. Ronald Pearson
301 E. Lavender Road
Willwood, NJ
08260

Mr. C. Madson
911 Madison Avenue
Cape May, NJ
08204

Mr. W. F. Marx, Plant Mgr.
Clasco Corporation
Miller Avenue
Fort Morris, NJ 08149

Mr. William F. Matthews
503 5th Avenue
Bradley Beach, NJ
07720

Mr. Donald McDaniel
406 Adriatic Ave.
North Cape May, NJ
08204

Mr. Edward McVay
106 W. 17th Avenue
Willwood, NJ
08260

Mr. Albert Hollenkopf
1151 Pine Bluff Avenue
Pt. Pleasant, NJ
08742

Mr. Jim Nash
P.O. Box 233
Cape May Courthouse
Cape May, NJ 08210

Mr. George Newell
249 Dodd Street
East Orange, NJ
07017

Mr. Robert H. Nicholson
Dumas Food Corporation
P.O. Box 28
Laves, DE 19958

Mr. Joseph Omandeen
Rt. 529, Dora Creek Road
Cape May Courthouse, NJ
08210

Mr. Margaret Pearson
Trojdon, Inc.
301 East Lavender Road
Willwood, NJ 08260

Mr. Patrick L. Rosen
U. of RI, Marine Adv. Svc.
Narragansett Bay Campus
Narragansett, RI 02882

Mr. John David Martin
Martin Fish Co., Inc.
P.O. Box 51
Ocean City, MD 21842

Mr. Howard Matthews
R.F.D. 1, Box 1640
Cape May, NJ
08204

Mr. Edward G. McCoy
N.C. Mat. Res., Div. of Marine
Fish., P.O. Box 769
Morehead City, NC 28557

Mr. Franklin F. McGinnies, Pres.
Virginia Seafoods, Inc.
P.O. Box 207, Seafood Ln
Irvington, VA 22480

Mr. John E. Miles, Vice Pres.
J H Miles & Co Inc., Foot of
Schepers Ave, P.O. Box 178
Norfolk, VA 23501

Mr. James Byrce
Sea Prize, Inc.
128 West 2nd Avenue
North Willwood, NJ 08260

Mr. Erik Nelson
Mrs. Paul's Kitchens
3830 Henry Avenue
Philadelphia, PA 19128

Mr. Howard Mickerson
H.E. Fiberglass Steering Com.
P. O. Box 54091
New Bedford, MA 02741

Mr. Gary Omandeen
5 Cresset Street
Rio Grande, NJ
08242

Mr. Jack Patterson
Parraman, Inc.
P.O. Box 332, 3 E. 8th St
Barnegat Light, NJ 08006

Mr. Jeffrey L. Howe
U. of RI, Marine Adv. Svc.
Narragansett Bay Campus
Narragansett, RI 02882

Mr. Charles W. Hober
Trojdon, Inc.
R.F.D. 2, Box 80
Cape May, NJ 08204

Mr. John David Martin
Martin Fish Co., Inc.
P.O. Box 51
Ocean City, MD 21842

Mr. Howard Matthews
R.F.D. 1, Box 1640
Cape May, NJ
08204

Mr. Edward G. McCoy
N.C. Mat. Res., Div. of Marine
Fish., P.O. Box 769
Morehead City, NC 28557

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Virginia Seafoods, Inc.
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Irvington, VA 22480

Mr. John E. Miles, Vice Pres.
J H Miles & Co Inc., Foot of
Schepers Ave, P.O. Box 178
Norfolk, VA 23501

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Sea Prize, Inc.
128 West 2nd Avenue
North Willwood, NJ 08260

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Mrs. Paul's Kitchens
3830 Henry Avenue
Philadelphia, PA 19128

Mr. Howard Mickerson
H.E. Fiberglass Steering Com.
P. O. Box 54091
New Bedford, MA 02741

Mr. Gary Omandeen
5 Cresset Street
Rio Grande, NJ
08242

Mr. Jack Patterson
Parraman, Inc.
P.O. Box 332, 3 E. 8th St
Barnegat Light, NJ 08006

Mr. Jeffrey L. Howe
U. of RI, Marine Adv. Svc.
Narragansett Bay Campus
Narragansett, RI 02882

Mr. Charles W. Hober
Trojdon, Inc.
R.F.D. 2, Box 80
Cape May, NJ 08204

Mr. John David Martin
Martin Fish Co., Inc.
P.O. Box 51
Ocean City, MD 21842

Mr. Howard Matthews
R.F.D. 1, Box 1640
Cape May, NJ
08204

Mr. Edward G. McCoy
N.C. Mat. Res., Div. of Marine
Fish., P.O. Box 769
Morehead City, NC 28557

Mr. Franklin F. McGinnies, Pres.
Virginia Seafoods, Inc.
P.O. Box 207, Seafood Ln
Irvington, VA 22480

Mr. John E. Miles, Vice Pres.
J H Miles & Co Inc., Foot of
Schepers Ave, P.O. Box 178
Norfolk, VA 23501

Mr. James Byrce
Sea Prize, Inc.
128 West 2nd Avenue
North Willwood, NJ 08260

Mr. Erik Nelson
Mrs. Paul's Kitchens
3830 Henry Avenue
Philadelphia, PA 19128

Mr. Howard Mickerson
H.E. Fiberglass Steering Com.
P. O. Box 54091
New Bedford, MA 02741

Mr. Gary Omandeen
5 Cresset Street
Rio Grande, NJ
08242

Mr. Jack Patterson
Parraman, Inc.
P.O. Box 332, 3 E. 8th St
Barnegat Light, NJ 08006

Mr. A. Peterson
NA Dept of Mar Res, Div of MRM
Fish., 100 Cambridge St
Boston, MA 02113

Mr. Alfred Russell
Box 37
Fortresses, NJ
08321

Mr. John Raphael
1759 Bay Ridge Avenue
Brooklyn, NY
11201

Mr. William H. Riggin, Pres.
W. P. Riggin & Son, Inc.
Port Norris, NJ
08349

Lil' Robin, Inc.
Box 119 North Harbor Road
Ocean City, MD
21842

Buoni Sauce Factory
450 Huyler
S. Hackensack, NJ
07606

Mr. Fred L. Seaga
Ocean City, MD
21842

Steyron's Seafood
325 Water Street
Hampton, VA
02369

Mr. Charles Shuckelford
Great Ac. & Pac. Ice Co.
131 Northern Avenue
Boston, MA 02210

Mr. Nils Stetson
Oyster, VA
23419

Mr. A. K. Plock
Shelcar Island Oyster Co.
Box 153, Seaville Ave.
Greenville, NC 11944

Mr. Frank Quigley
Dept. of Ewe, Pecten, Div of Fish
Game & Shell, P.O. Box 1809
Trenton, NJ 08625

Mr. Alfred B. Russell
P.O. 6
Hampton, NJ
08087

Mr. Bruce Reinerman
P.O. Box 1562
Pt. Pleasant, NJ
08742

Mr. John Roberts
Box 98
Tabernacla Road
Cape May, NJ 08204

Mr. Walter Russell Fish
Chincoteague, VA
23336

Mr. J. O. Saunders, Pres.
Mr. Frosty Seafoods Inc., Box 216
800 Jefferson Avenue
Newport News, VA 23607

Mr. Tom Sawyer
c/o Borden, Inc.
Box 89
Wilmington, NJ 08260

Hampton Seafood Corporation
45 S. King Street
Hampton, VA
23369

Calvert's Shellfish Company
Greensville, MD
21638

Mr. Allan H. Smith
Allan H. Smith, Inc.
Sydney, VA
23419

Comp Sea Processors
1630 Lakeland Avenue
Berkeley, CA
94716

Mr. Samuel M. Quillen, Pres.
Maritime Seafood Co., Inc.
400 Harbor Road
Santitago, MD 21840

Mr. Kristian Laakson
13 N. 8th Street
Oak Haven, NJ
08251

Mr. George Richardson
1 Blount Seafood Corporation
383 Water Street
Warren, NJ 07885

Mr. Leon Robbins, Jr.
Robbins Bros., Inc.
Landing Road
Port Norris, NJ 08349

Mr. Richard Rydar
33 Teal Road
Bic Grande, NJ
08242

Mr. Carl Savage
Hammond Street
Rowley, MA
01969

Mr. Roy Scott
Dept. of Nat'l Res.
Bldg C2, 380 Taylor Ave
Annapolis, MD 21401

Mr. E. H. Selbert
Hanks Seafood Co., Inc.
P.O. Box 70
Easton, MD 21601

Mr. B. Gray Simpson, Jr.
N.C. Nat. Res., Div. of Marine
Fish., P O Box 769
Northhead City, NC 28557

Mr. Stanley Smith
Box 119
Ocean City, MD
21842

Mr. Harold F. Snow
Snow Food Products, P.O. Box F
Old Orchard Beach, ME
04064

Mr. John Starynski
194 Townsend Road
Irma, NJ

Mr. Harry B. Taylor
Rt. 9, R.F.D. 1
Cape May, NJ
08204

East Coast Trimming & Dock Co.
Box 205
Leesburg, NJ
08227

Atlantic Vessels, Inc.
P.O. Box 178
Norfolk, VA
23501

Mr. Richard Walsh
108 Woodcrest Avenue
Absecon, NJ
08201

Mr. John Wheaton
546 Maple Avenue
Wilmington, NJ
08260

Isles of Tort, Inc.
870 1, Box 291A
Ocean City, MD
21842

Stewen E. Willes
1222 Bay Avenue
Bay Head, N.J. 08742.

Mr. William Smith
Seaview North
P. O. Box 184
Barnegat Light, NJ 0800

Mr. George J. Spazio
Clam Corp., Div. of Progresso
Route 1, P.O. Box 509, Seaside Rd
Pittsboro, NJ 08340

Mr. George H. Strat
301 Lincoln Blvd.
Marick, NJ
11566

Mr. Fred Trebas, Jr.
515 W. Magnolia Avenue
West Willwood, NJ
08260

Mr. Clifford V. Varin, Pres.
Fire Island Sea Clam Co., Inc.
P.O. Box 85
West Sayville, NY 11796

Mr. Charles B. Walker
Rt. 2
Cape May, NJ
08204

Mr. Ed Watson
28 E. Atlantic Avenue
Villas, NJ
08251

Mr. W. P. Woodbridge, Jr.
Willwood Clam Co., Inc.
707 West Buck Avenue
Willwood, NJ 08260

Donald Webster
Marine Advisory Agent
UNCRES Box 775
Cambridge, MD 21613

Curie Ziegler
114 Old Tavern Road
Beverly, NJ
07706

APPENDIX IV: LIST OF PUBLIC MEETINGS, SUMMARY OF PROCEEDINGS,
AND SUMMARY OF WRITTEN COMMENTS AND RESPONSES

<u>Location</u>	<u>Date</u>	<u>Number of Public Attending*</u>
New Bedford, MA	July 10, 1979	4
Galilee, RI	July 11, 1979	7
Pomona, NJ	July 12, 1979	3
Cape May, NJ	July 17, 1979	10
Ocean City, MD	July 18, 1979	13
Norfolk, VA	July 19, 1979	14

*Does not include State and Federal government representatives.

July 10, 1979, New Bedford, MA

The hearing began at 7:15 p.m. Paul Hamer (MAFMC) was the moderator. Others present were Steven Murawski (Northeast Fisheries Center, NMFS), Bruce Nichols (Northeast Regional Office, NMFS), Philip G. Coates, David L. Chadwick, and David E. Pierce (MA Division of Marine Fisheries), and David R. Keifer (MAFMC staff). Four members of the public were present.

Mr. Hamer reviewed Amendment #2 to the Surf Clam and Ocean Quahog FMP and the procedural rules for the hearing.

Mr. Coates read a letter outlining the position of the Commonwealth of Massachusetts (Attachment A).

The size of the quota for New England (200,000 pounds of meats) was questioned (how it was developed and why it was so low).

The 24 hour fishing week for surf clams was questioned relative to the distribution of the resource and weather conditions in New England.

The potential problem of erroneous reporting of landings from one side of the dividing as coming from the other side of the line was raised.

It was suggested that the quarterly quotas should be equal, particularly in light of the bad weather make-up day. The 15% of clams 5 1/2 inches or greater was questioned as possibly being too high (beds that should be closed may be forced to remain open).

Uniform starting and stopping times were questioned relative to the recent regulation changes.

The provision of the bad weather make-up day of small craft warnings being posted in the vessels port when such warnings are not posted at all ports (there are ports without a Coast Guard Station) should be revised.

The hearing was closed at approximately 8:45 p.m.

July 11, 1979, Galilee, RI

The hearing began at 7:10 p.m. Paul Hamer (MAFMC) was the moderator. Others present were Steven Murawski (Northeast Fisheries Center, NMFS), Bruce Nichols (Northeast Regional Office, NMFS), Eric M. Smith (CT Dept. of Environmental

Protection), David Borden (RI Fish and Wildlife), and David R. Keifer (MAFMC staff). Seven members of the public were present.

Mr. Hamer reviewed Amendment #2 to the Surf Clam and Ocean Quahog FMP and the procedural rules for the hearing.

The size of the quota for New England (200,000 pounds of meats) was questioned (how it was developed and why it was so low). Why was it less than the 286,000 pounds reported as landed from the FCZ off Massachusetts in 1977?

The reason for the 4 1/2 inch minimum size limit was questioned. Why should the size limit be imposed in New England if New England vessels may not qualify for stock certificates?

Ken Coons presented a statement on behalf of the Rhode Island Seafood Council (Attachment B).

It was recommended that the dividing line be 71° 50'. One of the concerns in this regard is the possible future application of this line to the ocean quahog or other fisheries.

It was suggested that New England vessels with permits issued pursuant to the moratorium should be allowed to fish on both sides of the line and accrue rights to future allocations the same as Mid-Atlantic vessels. Opposition to direct allocations was indicated.

It was suggested that the quarterly quotas should be equal, particularly in light of the bad weather make-up day. The 15% of clams 5 1/2 inches or greater was questioned as possibly being too high (beds that should be closed may be forced to remain open).

Uniform starting and stopping times were questioned relative to the recent regulation changes.

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

July 12, 1979, Pomona, NJ

The hearing began at 7:15 p.m. Paul Hamer (MAFMC) was the moderator. Others present were Bruce Nichols (Northeast Regional Office, NMFS), Thomas J. McCloy (NJ Division of Fish, Game, and Shellfisheries), Dr. Harold H. Haskin (Rutgers University and MAFMC S & S Committee), and David R. Keifer (MAFMC staff). Three members of the public were present.

Mr. Hamer reviewed Amendment #2 to the Surf Clam and Ocean Quahog FMP, the procedural rules for the hearing, and comments made at the New Bedford and Galilee hearings.

It was suggested that the dividing line be a southeasterly line beginning at Montauk.

It was suggested that the New England quota be 300,000 pounds of meats (to reflect the 286,000 pounds reported as landed from the FCZ off Massachusetts in 1977). New England vessels not permitted under the moratorium would fish on the 300,000 pound quota. New England and Mid-Atlantic vessels permitted under the moratorium would be allowed to fish anywhere on the 1.8 million bushel quota using that regime and fish in the New England on the 300,000 pounds using whatever regime was operating on that quota.

Opposition to the base year and direct allocations were indicated.

It was suggested that provision should be made to increase the surf clam quota when closed areas are reopened.

The provision to replace vessels involuntarily leaving the fishery was discussed. There was an indication that the provision that replacement vessels have a similar capacity to the vessel being replaced should be continued.

The conflict between the fishing week set forth in Amendment #2, the starting and stopping times in Amendment #2, and the recent regulations published by the NMFS were identified.

It was suggested that the quarterly quotas should be equal, particularly in light of the bad weather make-up day. The 15% of clams 5 1/2 inches or greater was questioned as possibly being too high (beds that should be closed may be forced to remain open).

The hearing was closed at approximately 8:45 p.m.

July 17, 1979, Cape May, New Jersey

The hearing began at 7:10 P.M. Council Chairman David H. Hart was the moderator. Also present were John C. Bryson (MAFMC Staff), Bruce Nichols (National Marine Fisheries Service), Dr. Harold H. Haskin (MAFMC S & S Committee), and Nancy Weis served as recording secretary. Ten members of the public were present.

Mr. Bryson reviewed Amendment #2 to the Surf Clam and Ocean Quahog FMP.

Mr. Cohen asked what happens to a boat fishing for only ocean quahogs during 1980, in establishing their allocation for surf clams. Mr. Bryson replied a method to solve this problem has not yet been established.

Mr. Wallace suggested the plan be extended throughout 1982 or elimination of a time frame be put in the plan and when another alternative to the moratorium is decided upon, the plan can be amended.

Dr. Haskin reported areas now closed off of Maryland and New Jersey are currently being surveyed and may be reopened during 1981.

Mr. Cohen discussed disregarding size limits on clams. Dr. Haskin reported there is a 50% chance for survival for small clams returned to the water at sea. He felt areas with an extensive amount of small clams should be closed.

Mr. Osmundsen favored a per boat quota being established at this time instead of basing the quota on historical data.

Mr. Pearson stated better than 20% of the clams caught are under 4 1/2 inches and if this alternative is put into effect, there will be no place to fish. He suggested a figure of approximately 30% would be more realistic.

Mr. Wallace advocated that January and February should be the only months a make-up day is allowed and one uniform starting time throughout the year.

The hearing was closed at approximately 9:10 P.M.

July 18, 1979, Ocean City, Maryland

The hearing began at 7:30 P.M. Council member Robert Rubelmann was the moderator. Also present were John C. Bryson (MAFMC Staff), Bruce Nichols (National Marine Fisheries Service), Pamela Lunsford (Maryland Fisheries Administration), and Nancy Weis served as recording secretary. Thirteen members of the public were present.

Mr. Rubelmann reviewed Amendment #2 to the Surf Clam and Ocean Quahog FMP and the procedural rules for the hearing.

Mr. Bryson reviewed comments received at the hearings previously held.

Mr. Drewer read a letter outlining his position (Attachment C).

Mr. Fox felt the raising of the ocean quahog quota to 4 million bushels would not be in the best interest of the industry since the salvage product is presently being overproduced. He will submit historic data on the salvage market. Expansion of the quahog industry would have an unfavorable effect on the economics of the plan.

Mr. Kennerly agreed that an increase in the ocean quahog quota will ruin the salvage market.

Mr. Shields felt the moratorium system is working as a conservation measure, and does not want a change as proposed in Alternative #5. Any reference to an allocation program should be dropped, and if it is used, it should not be announced and imposed retroactively. The only way to achieve enforcement is to put a law officer on each boat.

Mr. Shields views the problem of an increase in the quahog quota as an economic dislocation that by virtue of the limits on surf clams, the price has increased so it cannot compete with the price of quahogs which are now produced in an acceptable quality for the consumer.

Mr. Wallace approves of the present plan as it has relatively well protected all in the industry and should be extended throughout 1981. He does not feel there must be a per boat quota and in order to maintain a viable industry, the moratorium must be maintained. The increase in the ocean quahog quota allows for additional development of an underutilized species and gives the consumer the benefit of a choice of reasonable products. The economics of the industry can survive the production of quahogs. There should be one set of fixed hours. A size limit of 4 1/2 inches should be put in place with no amount greater than 20% of clams under 4 1/2 inches in a given measure. Areas with small clams should be closed and maintained closed until they reach a harvestable size. Equal quarters should be used to develop an even amount throughout the year to equal production to the sales. January and February should be the only months in which a make-up day is allowed.

Mr. Lang stated he will submit his comments (Attachment D).

The hearing was closed at 8:45 P.M.

July 19, 1979, Norfolk, Virginia

The hearing began at 7:15 P.M. Russell Short was the moderator. Also present were John C. Bryson (MAFMC Staff) and Bruce Nichols (National Marine Fisheries Service). Fourteen members of the public were present.

Mr. Short reviewed Amendment #2 to the Surf Clam and Ocean Quahog FMP and the procedural rules for the hearing.

Mr. Bryson reviewed comments received at the hearing previously held.

Mr. Leonard commented that the make-up day be at least for the four months suggested and should be extended throughout the year if possible. He favored the historical catch period and asked to be allowed to take the chance under private enterprise and not have to go out of business with the help of the government. He opposed the moratorium.

Mr. Dawley proposed a dredge size of 100 inches for the 1980 plan.

Mr. Doxsee opposed the per boat allocation and asked that the quarterly system be returned.

Mr. Davis commented for the Delmarva Fisheries Association, Inc., who favored the annual quota, quarterly proposal, fishing week, a make-up day throughout the year, although they felt four months was fair, abolishment of the moratorium, no dredge size freeze, and closure of areas with small clams.

Mr. Rubin read his position into the record (Attachment E).

Mr. Fisher opposed the increase in the quahog quota. He supported abolishment of the moratorium, no per boat quota, 4 1/2 inch size limit, and closure of areas with small clams.

Mr. Barnhardt favored size limits. He was opposed to governmental regulations covering any aspect of the fishery.

Mr. Wallace felt a make-up day during four months of the year would result in a closure during March, which is detrimental to the processors, and suggested January and February be the only months in which an alternate day is allowed. The quarterly allocation is satisfactory but the quota during each quarter should be 450,000. He further commented that the fishing day starting time should be standard throughout the year, favored the increase of the ocean quahog quota, supported the 4 1/2 inch size limit, supported area closures, supported 15% level which could even drop to 10% for clams over 5 1/2 inches, and the plan should run to at least December 31, 1981, if not longer.

Mr. Layne favored no restriction on dredge size, no control on size of clams, and a year-round alternate day.

Russell Fish Co., Inc., favored a dredge limit of 100 inches and a make-up day.

Mr. McCoy read a statement for Congressman Paul Trible (Attachment F).

The hearing was closed at approximately 9:15 P.M.



~~Walter R. Robinson~~
Director

The Commonwealth of Massachusetts
Division of Marine Fisheries
Leverett Saltonstall State Office Building
100 Cambridge Street, Boston 02202

Philip G. Coates

July 9, 1979

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

Dear John:

The Massachusetts Division of Marine Fisheries on behalf of the fishermen of our state wishes to comment on the Draft Amendment No. 2 to the Surf Clam and Ocean Quahog Industries Fishery Management Plan.

From the outset, we wish to compliment the Mid-Atlantic Council and Staff for your steadfast pursuit of successful ways to manage the surf clam/ocean quahog fishery of the mid-Atlantic and New England regions in an equitable manner. We fully appreciate the difficult problems which you face and strive to overcome. Whether it be difficulties with enforcement and accurate reporting or legal and procedural hindrances, we are sympathetic since our association with the New England Council has exposed us to similar frustrations. It is not easy to develop a plan for an overcapitalized fishery without imposing unpalatable restrictions. In fact, your willingness to invoke a moratorium on fishing effort illustrates the severity of your management problems.

We support the alternative which provides for the establishment of a separate management regime in New England specifically the abolition of the moratorium on entry of vessels into the surf clam fishery and the effort and gear restrictions. We et al have sought this sort of regime since 1977 and are gratified to finally acquire your concurrence. The rationale for two proposals of the regime needs further elaboration, however.

First, what is the basis for the 200,000 lbs. quota (11,765 bushels) of surf clam meats for the New England area? It is cited in the Plan Amendment No. 2 that there is no traditional offshore fishery for surf clams in New England and that Fishery Conservation Zone surf clam catch landed in Massachusetts was 286,358 lbs. of meat in 1977; therefore, why restrict

the fishery to 200,000 lbs. of meat? If it can be assumed that the same vessels expend similar effort in 1980 and are as successful, the quota provides no incentive for fishermen to further develop the surf clam fishery in New England. This quota, as does the present moratorium, serves to discourage interest in the fishery. The imposition of the fishing effort restrictions when one half of that quota is caught compounds the disincentive. At this time we do not see the need for a quota.

Secondly, why will New England vessels, which will enter the fishery under this scheme, be prohibited from fishing in mid-Atlantic waters, yet mid-Atlantic vessels can fish in New England waters? The latter case sets up a situation in which the proposed 200,000 lbs. of meat quota can be exhausted through false reporting. Note the situation with the 69° W. longitude division for yellowtail flounder. It is common for vessels fishing west of the line to claim their catches from the east thereby prolonging the west of 69° quota. It is reasonable to assume that without a mutual exclusion provision similar behavior will be demonstrated by mid-Atlantic fishermen. Human nature will likely be true to form. Moreover, if good beds of surf clams are found in the New England area, mid-Atlantic vessels may actually shift their efforts to New England and exhaust the quota.

The intent to establish in 1981 a system of individual vessel allocations in the form of stock certificates is evident in the amendment. It is stated that vessels licensed in the New England surf clam fishery pursuant to the proposed separate management scheme would accrue no rights to 1981 vessel allocations in the mid-Atlantic. How will the New England vessels currently licensed to fish in the surf clam fishery be treated? Will they also fail to accrue rights? The Council's intent is not clear. Also, will this public hearing be the last opportunity for New England comment on the stock certificate program? We ask this in response to the statement on page 100 of the Plan Amendment No. 2, "It is recommended that this alternative", (i.e., New England lack of rights to the 1981 vessel allocations in the mid-Atlantic), "be included in the amended FMP for public hearing purposes. In that way, the Council can develop a solution for the New England fishery without additional public hearings".

The Plan Amendment sets to limit dredge size and number to that on board and in use as of January 1, 1980. Is it the Council's judgement that present dredge sizes and number used in the fishery do not present management problems? Is the Council willing to accept the status quo? We were under the impression that the size and number of dredges have escalated over the past year and a half thus increasing effort and negating benefits of the moratorium.

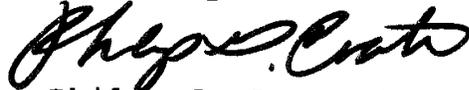
Mr. John Bryson

-3-

July 9, 1979

In summary, we appreciate the Mid-Atlantic Council's efforts to accomodate New England interests; however, the 200,000 lbs. of meat quota and possible usurption of that quota by mid-Atlantic vessels are particularly disturbing. We recommend that you do not establish a surf clam quota for New England waters since it is not necessary and that if you must set a quota, mid-Atlantic vessels should be prevented from decreasing it through real or deceptive catches.

Sincerely,



Philip G. Coates
Director

cc. Douglas Marshall
Allen E. Peterson, Jr.



July 11, 1979

Statement at Public Hearing re: Surf Clam
Ocean Quahog FMP Amendment # 2

1. Once again, there has been inadequate notice provided for this hearing. After two letters to Mr. Hanks of N.M.F.S., the Council received official word of this hearing by phone from N.M.F.S. Northeast Region on Friday July 6. We also received a call from the M.A.R.F.M.C. that day stating that it had been the responsibility of the N.E.R.F.M.C. to provide notice of these hearings in New England. Notice was published in the July issue of " Maine Commercial Fisheries " which arrived by mail today July 11.
2. Our members favor delimitation of New England as a separate management area from the Mid-Atlantic because of the development stage the Surf Clam/ Ocean Quahog fishery is in; the limited fishing effort; the lack of resource assessment and lack of any evidence that the New England stocks are depleted.
3. We feel the delimiting line should include areas traditionally fished for the past 30 years. A line running South from the Thames River, New London would be reasonable.
4. The vessel moratorium on Surf Clams is inappropriate for the New England fishery and should be removed. Because of the concern in the Mid-Atlantic area regarding possible new vessel entries, we will agree not to fish any new vessels for Surf Clams in the Mid-Atlantic area.

5. One of our members is Co-chairman of the Sea Clam/Ocean Quahog Committee of the Shellfish Institute of North America. In interviewing industry members in both New England and Mid Atlantic areas, there is virtually no industry support for a " stock certificate " program. In our view, this would only concentrate fishing power in the hands of the clamming companies that now dominate the fishery and would force all license holders to maximize fishing effort to document as large a " base " as possible.

6. We feel any management plan should include dredge size restrictions since the moratorium has been largely negated by the increase in size and number of dredges employed by existing license holders.

7. We will not repeat the litany of misinformation and obfuscation which has destroyed the credibility of the management process in the eyes of the New England industry starting with the original hearings held in Newport, R.I. approximately two years ago.



Ken Coons R.I. Seafood Council

H. V. DREWER & SON, INC.

Planters and Packers of

Pocomoke Sound and Chesapeake Bay

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SAXIS, VIRGINIA 23427

*Mid Atlantic Fisheries Council
Public Hearing on Draft Fishery Management
Amendment No. 2 for Surf Clam and Ocean Quahogs
July 18, 1979
Sheraton-Fontainebleau Inn, Ocean City, Maryland*

After carefully studying this amendment, I find dangerous proposals that will be detrimental to the small independent processor and harvester.

One being the alternative to replace the moratorium, that being the boat allocation, and the boat allocation being derived from historical catch data, which could be allocated based on the individual boat catches as reported on the log books on the 1980 base period, based on reference from page 98 your plan top paragraph. The dangers are already in existence by certain company owned vessels having been geared to top harvesting efficiency with two 120 inch dredges, catching a large quantity which could be determined as seed clams in order to stimulate their particular catch data.

After carefully reascerching, I have found that from the time of Amendment No.1 went into affect through the last quarter June 30, 1979 this company has controlled 56% of the catch quota. Beginning with the first of this quota July 1, 1979, if this company continues their present rate of harvesting, using the smaller clam they will have controlled 76% of the total quota by the end of 1980. Therefore, it only leaves the rest of the industry 24%. Which means at that particular time as a small independent processor and boat owner we will be destroyed. I would like to make referance to page 99 paragraph 2 where the advisory sub panel recommended to the council to use 2 years as a base and even though they were unwilling to agree to a allocation or stock certificate at that time, they recognized that it would take 2 years to complete the race to up grade equipment which would change their allocations. But, as I have just pointed out the race has already started with one of the major companies.

At one of the meetings in Philadelphia the law enforcement division of the National Marine Fisheries stated at the public meeting that under the provisions of Plan No. 1 they could not enforce the regulations. I have not found in Plan No.2. any measures to up grade the enforcement of this amendment.

One of the largest dangers of this amendment as Plan No. 1 makes no provisions to protect the independent processor. If the council is so concerned as they say they are about protecting the individual boat owner then why shouldn't they be equally concerned to protect the independent processor. The minutes of pervious meetings will show that I have bought this before the council

time and time again to no avail. As a small independent processor I am not after my equal share of the clams on the ocean bottom but, for every bushel caught off the ocean bottom means that there is a bushel coming over the dock to be processed. This is where I feel that we as independent processors should have our equal fair share. How you would go about putting a scheme such as this together is beyond my mental capability. I have thought this thing through and have yet come up with a solution. With this in mind I think to protect the small independent processor you the council have one alternative and that is to keep the present quota at a 1.8 million bushels on the present quarterly system, but abolish the vessel moratorium and vessel allocations.

Speaking for myself, I am sure the few small independent processors left feel the same as I do. We are not asking this council for help to meet our competitions on a business basis. I think any of us can handle that. What we are asking is that you please don't legislate us out of business. With this proposed plan you are putting the noose around our neck and if you let it become law then it will be nothing but strangulation.

Walter C. Green - J

MID-ATLANTIC SEAFOODS

Crisfield, MD 21817

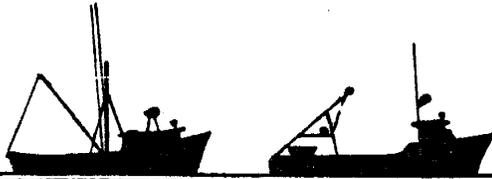
P. O. Box 710

(301) 968-2765

Freeport, Long Island, NY 11520

296 Woodcleft Avenue

(516) FR9-0615



MID-ATLANTIC FISHERY MANAGEMENT COUNCIL

ATTN: Mr. John C. Bryson, Ex. Director

Rm. 2115 , Federal Building

North and New Streets

Dover, Delaware 19901

Certified P104786506SPECIAL DELIVERY

(for del.pre-27 July)

Dear Sir:

I hereby enclose comments on proposed Ammendment II to Surf Clam-Quahog FMP, as stated at Hearing at Ocean City, that I would do.

1. RE: PROPOSED "TIME-LIMIT" to have "Reserved" Permits Operational-

It is the apparent intent of that portion of the proposed ammendment II to the Surf Clam- Quahog FMP to impose a NEW, ALMOST IMMEDIATE AFTER "ADOPTION" (IF INCLUDED) UNREALISTIC "TIME-LIMIT" within which a "Reserved" or "Pending" (Vessels as were under New Const- ruction or being "Re-Rigged" prior to 17 Nov.1977 as "Surf Clammers") Surf Clam Fishing (VESSEL) Permit must be "Operational" by. No "Time Limit" to complete vessels and start clamming has ever been previously implied, mentioned or stated to the Writers, who have been in such a catagory since inception of the FMP.

WE HEREBY OPPOSE INCLUSION OF ANY SUCH "TIME-LIMIT" in AMMENDMENT II AS STRONGLY AS POSSIBLE, as the only apparent purpose of such Time-Limit is to EXCLUDE "Reserved Permitees" of their fair share of the Surf Clam Harvest and to give UNFAIR ADVANTAGE to those permit holders NOT IN THIS RESERVED CATAGORY, who would actually be "Stealing" the future allotments and profits of the "Reserved Permits" by this Overt, Deliberate attempt to apparently placate Special Interests. Any such adoption would deprive "Reserved" or "Pending" Permitees of their (CONSIDERABLE) investment, all Futures and Profits in the Trade, create Undue Hardships, and also deprive them of their (Constutional and other) Rights, if unable to operate for any reason within said "Time-Limit".

Cont:

No "Time-Limit" whatsoever has ever been incorporated by any Govt. process on any Building (Construction) Permit, ONCE CONSTRUCTION IS STARTED, and for good reason. This Section of Ammendment II will serve one sector of the Trade at the expense of another, is unfair, and should be stricken from proposed Ammendment II before submission to the Sectary of Commerce.

2. RE: "DREDGE FREEZE" & 4 $\frac{1}{2}$ " MINIMUM SIZE LIMIT

This proposition of Ammendment II to FMP is in Direct Opposition to the origional intent and character of the FMP, see: Federal Reg. Nov, 1977, Page 118 "Quote" BECAUSE OF LIMITED INFORMATION ON DREDGE EFFECTIVENESS, RELATIONSHIP OF DREDGE SIZE TO HP & INCIDENTAL CLAM MORTAURY RELATIVE TO DREDGE SIZE AND TYPE, THE FINAL PLAN INCLUDES NO GEAR OR VESSEL RESTRICTIONS-"Unquote" This "Freeze" of Dredge and Clam Size apparently only serves a "Special Interest" sector of the Surf Clam Trade, is in restraint of free trade, deprives participants of the Trade of Constutional Rights, normal expansion and progress, and is in DIRECT OPPOSITION to the apparent intent as stated of the FMP, to " Rebuild (Allegedly) declining Stocks", WHEREAS, by imposition of a 4 $\frac{1}{2}$ " Minimum Limit, as against the 3" Minimum limit determined as absolutely satisfactory to assure continued propogation of stocks, N.Y. State, Stony Brook, LI, NY, and is part of the oldest Surf Clam legislation(NY), Government and Council intervention will have the effect of serving only another "Special Interest" sector of the industry, the alleged 17% of total usage requiring 4 $\frac{1}{2}$ " + stock for the "Strip Clam" or Breaded Trade, to the detriment and loss of the Minced trade, which is in the majority. It is proposed that THERE BE NO VESSEL OR GEAR RESTRICTIONS WHATSOEVER, and the MINIMUM SIZE OF SURF CLAMS BE SET AT 3"(SAME AS N.Y.STATE) and let the TRADE, and not the GOVT. "Cull" and "PRICE" the clams. If such is done, the price for "Strip Clams" (4 $\frac{1}{2}$ " and larger) and Minced Clams will "Float", and minced can compete against Quahogs. The 4 $\frac{1}{2}$ " (Minimum) limit will DEPRESS the price to LOWER PRICES on Surf Clams, and all 3" to 4 $\frac{1}{2}$ " clams WASTED BY HIGH MORTALITY RETURNING TO THE BEDS AFTER CULLING, to SERVE A MINORITY SECTION(17%) of the Trade.

END OF COMMENTS ON PROPOSED AMMENDMENT II

Respectfully Submitted,

 Ted Lang

CHINCOTEAGUE SEAFOOD CO., INC.

NORTH MAIN STREET

P. O. BOX 21

CHINCOTEAGUE, VIRGINIA 23336

804-336-5622
336-5623

July 19, 1979

Mr. John Bryson
Mid-Atlantic Fishery Mgt. Council
Room 2115 Federal Building
Dover, Delaware 19901

Dear Mr. Bryson:

We operate a surf clam packing house, Chincoteague Seafood Co., Inc. in Chincoteague, Virginia, which employs 80 people on a year-round basis. We are at the present time finishing up a new and separate plant facility for processing ocean quahogs at the same location. We anticipate hiring an additional 30 people for operating this facility. We would like to express our view of the proposed 1980 clam management plan.

Firstly, we believe a basic management plan is needed to conserve future stocks of both surf clams and ocean quahogs. We would however, strongly urge that some of the proposed regulations be changed for the 1980 plan.

A. Maintain present quota of 30 million pounds of quahog meats. Our reason for this request is two-fold. Although we will be entering the processing sector of this fishery placing additional fishing effort on the stocks, we feel that the stocks should be protected for the future of all concerned.

B. The economics of the marketing structure of the industry which is overburdened with the supply of meats from the quahog fishery as well as surf clam salvage at the present time with the quota of quahogs at 30 million pounds, dictate the need for containing the ocean quahog quota at its present level and not increasing same.

C. Vessel Moritorium. Remove same from proposed 1980 clam plan. We wish to explain our request as follows. In the past, we have supported this moritorium as necessary due to the cutback in allocation in harvesting clams per your management plan. However, it is clear that the continuation of same presents eminent danger to the future survival of our clam plant and other small independent processors which depend upon independent vessels for their subsistent supply. Specifically, one large firm in

our industry through the process of double-rigging all suitable vessels in its fleet during the past few months has made it clear that by the end of 1980 there will be very little quota left for small independent vessels on which we rely.

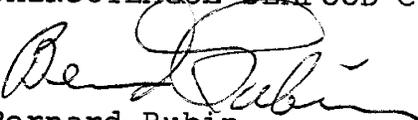
I, as a member of the Surf Clam Advisory Sub-Panel had urged in the past that gear restriction including no further double-rigging be initiated as of July 1, 1979 as an emergency regulation. However, we were informed this would require an amendment and plan change and could not be an emergency regulation. This in turn resulted in the amendment for the 1980 plan in which clam gears are to be frozen as of January 1, 1980. This has created a six month period for a race for those people who wish to double-rig, to do so through this technical loop-hole per the above.

The average small independent surf clam vessel owner/operator who for many many years has been the backbone of this industry cannot afford the 80 to 100 thousand dollars it costs to quickly double-rig to beat the January 1 deadline. In addition, many of the small independent vessels which supply our plant are too small physically to safely double-rig. The end result of this race to double-rig will mean that on or before January 1, 1982, many of the same small vessels like those which supply us will be forced from the industry because they will not be allowed to catch enough clams to meet their bills and make a fair profit. This being the case, we thus feel the need for finding a means for providing a subsistent supply to replace the vessels which will be forced out of the industry for our own survival. If the moratorium is removed we would thus have the alternative option to replace the above stated vessels with others at our own cost and risk.

In summary, it seems plain common sense to this writer that the choices for the Mid-Atlantic Council boil down to these two: To deal with a few large firms who hold a monopoly in our industry after eliminating the smaller processors, or remove the moratorium and thus give us the chance to protect in the future the investments we have made in our plants over the past years. Rather than have no moratorium, we would prefer to have no management plan at all and then we will compete with the gigantic monopolistic firms on a free enterprise supply and demand basis, and let the chips fall where they may and take our chances.

Respectfully,

CHINCOTEAGUE SEAFOOD CO., INC.


Bernard Rubin
President

BR/cm

cc: Congressman Paul Tribble and E. Almer Ames

RECEIVED

JUL 23 1979

MID ATLANTIC COUNCIL

STATEMENT OF CONGRESSMAN PAUL TRIBLE
FOR PRESENTATION AT MID ATLANTIC FISH-
ERY MANAGEMENT COUNCIL PUBLIC HEARING
IN NORFOLK, VIRGINIA , JULY 19, 1979

A number of surf clam processors in the First District of Virginia have expressed their concern that their livelihoods will be adversely affected by the adoption of #2 Amendment dealing with future per boat quotas and allocations based on a designated reporting period.

It is suggested that future boat allocations will unduly favor certain segments of the industry because of deliberate harvesting of clams under $4\frac{1}{2}$ inches to increase figures that will be used in establishing future allocations.

A reduction in the allocation for smaller independent boats could well jeopardize the economic future of many processing plants.

I urge the committee to seriously study this matter and consider alternatives to the provisions in #2 Amendment. It has been suggested that alternatives could include the abolition of the moratorium on entry into the market, a pro plant allocation process, and/or the use of an earlier allocation period. I appreciate your giving this matter every proper consideration.

In addition to the public hearing comments and the letters submitted in conjunction with the public hearings, a number of letters were also submitted to the Council during the review of the draft of Amendment #1. These letters are reproduced on the following pages. The comments in these letters are generally the same as those made during the public hearings and they are addressed to the revisions to the Amendment made following the review process. The revisions are discussed in Section XII of Amendment #2.

The Coast Guard's comments on enforcement can best be addressed by coordination between the Coast Guard and the NMFS during their review of the final version of Amendment #2 and the publication of draft regulations to implement Amendment #2 in the Federal Register. The Council recognizes the enforcement and reporting problems associated with the bad weather make-up day provision of Amendment #2, but believes that it is absolutely necessary to provide a make-up day. The size limit provisions have been changed slightly to clarify that the enforcement of the size limit should be done at dockside.

The provisions that vessels must actually be in operation by a specific date is felt to be a necessary adjunct of the surf clam vessel moratorium (see Attachment D to hearing summary). The original FMP provided that vessels under construction on the effective date of the moratorium could enter the fishery when completed. The Council believes that the length of time between the initiation of the moratorium (November, 1977) and the date for the beginning of operations provided in Amendment #2 is adequate to complete the construction or re-rigging of a vessel.

The Council is also aware of the problems of small processors relative to their supply of surf clams. However, the Council believes that the overall industry will benefit more from the continuation of the moratorium until a reasonable, generally acceptable replacement for the moratorium can be developed than from the removal of the moratorium at this time. It must also be noted that the surf clam harvesting sector in the Mid-Atlantic supported the continuation of the moratorium, as did the Council's Surf Clam and Ocean Quahog Advisory Subpanel.



DEPARTMENT OF TRANSPORTATION
UNITED STATES COAST GUARD

MAILING ADDRESS

Commander (A01)
Atlantic Area, USCG
Governors Island
New York, NY 10004

16214

8 August 1979

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

Dear Mr. Bryson;

My staff has reviewed the Draft Fishery Management Plan Amendment No. 2 for the Surf Clam and Ocean Quahog Industries of the Northwest Atlantic Ocean and Draft Supplemental Environmental Impact Statement with the enclosed Draft Surf Clam and Ocean Quahog regulations. Comments on this document are enclosed.

D. L. MUIR
Deputy

Enclosure (1) Comments on Draft FMP/EIS Amendment No. 2 and Draft Regulations for the Surf Clam and Ocean Quahog Industries of the Northwest Atlantic Ocean

Copy to:
COMDT (G-000, G-WEP)
CCGDONE (o, dpl)
CCGDTHREE (o, dpl)
CCGDFIVE (o, dpl)
NE REGION NMFS
NERFMC

U. S. Coast Guard
Commander Atlantic Area Comments

DRAFT FMP/EIS and Proposed Regulations Amendment No. 2 for the Surf Clam and Ocean Quahog Industries of the Northwest Atlantic Ocean

p 102-103 Section XIII-3 RESTRICTIONS

1. The recommended minimum size for surf clams of 4 ½ inches (as explained in section XII-3 Size Limits) will be unenforceable at sea. It would not be readily apparent that a surf clam is undersized without actually measuring it. Considering the quantity of surf clams per bushel and the estimated 32 bushels of surf clams per cage it would be impractical for an enforcement official to measure 20 % of each cage for undersize clams. There will not be sufficient time or resources to conduct such measurements at sea. Therefore, although we support the minimum size limit for conservation of the resource it should be stressed that this restriction can only be enforced during a shoreside inspection.

2. The inclusion of the provision making the presence of any part of a vessel's gear in the water later than one-half hour after the end of that vessel's authorized fishing period prima facie evidence that the vessel is fishing in violation of the Act will considerably improve the enforceability of this FMP and the regulations particularly at sea. There is, however, a considerable problem at present with vessels commencing their fishing operations before their authorized fishing period. Therefore a statement should be added to this part which would make the presence of any part of a vessel's gear in the water more than one-half hour prior to that vessel's authorized fishing period prima facie evidence that the vessel is fishing in violation of the Act.

3. The statements concerning possession of surf clams or ocean quahogs more than 12 hours after a closure announcement of closed areas or surf clams more than 12 hours after the weekly closure being prima facie evidence that the catch was taken in violation of the Act will considerably increase the enforceability of this FMP particularly at sea.

p 104 Section XIII-4 EFFORT RESTRICTION - Surf Clams

The proposed alternative fishing day which was explained in Section XII-4 on page 98 of the Draft plan presents some difficult problems in implementation, some of which are outlined as follows:

(1) The "Port from which a vessel normally operates" is not defined in either this plan, the regulations, or on the NMFS permit application forms used for this fishery. Without definition this "port" could be interpreted to mean homeport, the port where the vessel normally moors, the port where the vessel lands its catch, etc. It is possible that a vessel could be registered in one port, maintain a mooring in a second port, and land its catch in a third port. Without a definition for "Port from which a vessel normally operates" this vessel operator could claim an alternate fishing day if small craft warnings were posted in any one of these ports, even if weather conditions were suitable for fishing in the other two port areas.

(2) Coast Guard stations are not at every port or inlet where the Surf Clam fleets moor. Which Coast Guard station should the vessel operators refer to for information on small craft warnings when there is no Coast Guard station for a particular port.

(3) There is a possible enforcement loophole in the use of the following language: "if the fishermen notified the Coast Guard of his intent to claim a weather day within four hours of his official starting time ... and if he landed no clams that day." There is an eight hour spread (four hours prior to the authorized commence time and four hours after the commence time) within which a vessel could claim a weather day. By this the vessel could actually fish for four hours and then claim a weather day. The word "landed" is not defined in the plan or the regulations, however it has been used in other regulations and is implied in this plan to mean a vessel landing his catch in port to a dealer or processor. Since the vessel could fish for four hours after his authorized commence time before claiming an alternate fishing day, as long as he stored his catch for that day without transferring it to a processor or dealer he could circumvent the regulation. The result could be vessels actually fishing for 28 hours in a week.

(4) There are several problems associated with having the vessels report their claim of a weather alternate fishing day to the Coast Guard. This plan and the proposed regulations do not specify which Coast Guard command/s would be responsible for receiving reports from fishermen claiming weather days nor do they address the method for dissemination of this information once received. Difficulties which could be expected with reporting to the various levels of Coast Guard units are as follows:

(a) Group Offices/Local Stations: The primary difficulty of requiring the local stations and Group offices to take these reports is that they are insufficiently manned to assume this additional responsibility. In addition, reporting to several different stations and groups would not be as efficient as having all reports handled by a centralized reporting facility. There would be a considerable amount of training involved to familiarize all personnel from the various Groups and Stations with the reporting system. A centralized reporting facility would present much less of a training problem and would allow for a uniform method of handling these reports. Another problem with requiring the groups and stations to handle these reports is that they would receive a low priority in relation to Search and Rescue and other urgent operations by watch personnel. If actually involved in a SAR incident or other urgent operation, duty personnel may not be available to take these reports.

(b) District/Area Commands: Though there would not be a problem with timely retransmittal of information, or doubt as to which units were in need of this information, the District and Area offices are insufficiently manned to assume this responsibility. In addition if these reports were made to the District/Area operations centers, personnel may not be available to take these reports if they were involved in a Search and Rescue incident or other urgent operation.

(5) For a system of this type to work it is necessary to have a central reporting facility to receive the calls. The National Marine Fisheries Service would be the more logical recipient of these reports because they would be the primary users of this information. It would be possible to establish a Toll Free telephone number for fishermen to make reports and a procedure could be established whereby Coast Guard Group Commands could notify this facility by phone or message when small craft warnings have been issued. Information on those vessels claiming alternate fishing days could then be disseminated to other entities in NMFS and the Coast Guard from this central point.

(6) Another problem associated with receiving claims of an alternate fishing day is that there is no means by which the Coast Guard or NMFS can actually verify that the vessel is in fact not fishing aside from actually sighting the vessel.

(7) The use of the term "small craft warnings" implies that this provision is only applicable to the smaller Surf Clam vessels. Though the plan does not specifically limit the size of the vessel which can claim a weather day in practicality the larger vessels may be treated unequally by this provision.

p 104-105 Section XIII-5 CLOSED AREAS

There should be a section of the plan which outlines the pollution hazards mentioned by EPA, why this pollution would require closing the area, and when the projected reopening for the area would be. In essence there should be some scientific data to back the closure of these areas. The provision for these closed areas was omitted from the draft Squid regulations essentially for the above mentioned reasons. Other closed areas which may be considered and which would also need similar justification are those areas issued as advisories to Harvesters by the Food and Drug Administration's Shellfish Sanitation Branch.

p 106 Section XIII-9 NEW ENGLAND AREA.

We support the creation of an alternate New England management area. Development of this area via regulation should prevent overfishing or the resource while still permitting the development of the fishery.

p 92 Section XII-3 ANALYSIS OF BENEFICIAL AND ADVERSE IMPACTS OF POTENTIAL MANAGEMENT OPTIONS.

1. Section 5- Gear Restrictions: Gear restrictions would probably be an effective management measure. I tend to disagree that they would be ineffective in the long term. During our country's participation in ICNAF gear restrictions were an effective enforcement and management tool in the groundfish and scallop fisheries. The negating of gear restrictions under the FCMA regime of enforcement in the groundfish fishery is more a result of language in the regulations which links use of the gear to the landing of the catch making these provisions unenforceable than in actual ingenuity on the part of the fishermen. Effective gear regulations can be written which would eliminate loopholes and provide for proper management.

p 92 ALLOCATION ALTERNATIVES

1. Section 2. Allocations to Individual Fleet Sectors.

This method of allocation has not been successful in the Groundfish fishery. Prior to implementing such a system in the Surf Clam and Ocean Quahog fishery the problems encountered in the enforcement of the Groundfish FMP should be evaluated.

2. Section 3. Individual Vessel Quotas.

Though this system would probably be the easiest, in terms of enforcement, to manage, there are several problems which may be associated with it.

(a) It would be difficult to develop a truly equitable system of allocation, (b) By establishing these quotas the vessel owner/operator would be frozen into a certain income bracket which would probably not respond to the rise of inflation, and (c) Such a system would be contrary to the free enterprise system whereby those who are willing to work harder would normally realize an increase in profits.

GENERAL COMMENTS ON THE DRAFT FISHERY MANAGEMENT PLAN

P 99. The Department of Commerce and the Council should further investigate the suggested development of an observer program and the use of electronic monitoring devices as enforcement tools for this plan.

APPENDIX V DRAFT PROPOSED REGULATIONS

p DPR 2 Section 652.2. Definitions.

1. Add a definition for "Port from which vessel normally operates".

2. Definition for Vessel of the United States. As presently written this definition could possibly exclude some vessels which may be involved in the fishery. Recommend that subparagraph (2) be changed to read: " A vessel, under 5 net tons or which is not required to be documented with the Coast Guard under title 46 of the United States Code, which is registered under the laws of any State."

3. Add a definition for "landing".

p DPR 3 Section 652.4. Restrictions.

1. Paragraph (b). Refer to comments on Section XIII-3 of the FMP.

2. Paragraph (e). It is recommended that a provision be added which would make the presence of any part of a vessel's gear in the water more than one-half hour prior to that vessel's authorized fishing period prima facie evidence that the operator of that vessel is fishing in violation of this part. Refer to comments on Section XIII-3 of the FMP.

3. Paragraph (j). Refer to comments on Section XIII-3 of the FMP.

p DPR 5 Section 652.7 (a) (5).

Refer to comments concerning Section XIII-4 Effort Restrictions - Surf Clams of the FMP. This section will not work as presently written for reasons previously outlined. Recommend the procedure be evaluated for practicality and responsible units to receive these reports be identified before any attempts to implement this requirement.

p DPR 6 Section 652.8 (a).

Refer to comments concerning Section XIII-5 of the FMP.

LAW OFFICES
PARKOWSKI, NOBLE & GUERKE
116 WEST WATER STREET
DOVER, DELAWARE 19901

F. Michael Parkowski
John W. Noble
I. Barry Guerke

August 1, 1979

302-678-3262

Hand Delivered

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

Re: Amendment No. 2 - Surf Clam and
Ocean Quahog Management Plan

Dear John:

This letter is being directed to your office on behalf of the American Original Corporation.

After receiving input from public hearings and the Surf Clam Advisory Subpanel, the American Original Corporation endorses the proposed amendments to the Surf Clam Plan with the following exceptions:

1. It is suggested that the plan continue for a two year period and that any reference to development of a per boat quota be deleted.

2. It is recommended that the ocean quahog quota be maintained at the proposed level of four million bushels. At the Advisory Subpanel meeting, the measure to reduce the level of catch to 3.5 million bushels was approved by a one vote margin which in turn reflects considerable controversy regarding the catch limit. It is important to note that those who opposed the four million bushel level are not involved in the quahog industry which in turn suggests that the proposed production is motivated more by economic considerations than conservation. From the data set forth in the draft plan and impact statement, it is clear that from a resource standpoint the four million bushel level is more than justified. In addition, discussion at the Advisory Subpanel meeting indicated an increased level of effort with respect to quahog fishing. Accordingly, it is recommended that the proposed four million bushel level for quahog be adopted in the new plan.

John C. Bryson, Executive Director
August 1, 1979
Page Two

3. Although a future limitation on dredge size had previously been endorsed by the company, it is recommended at this time that no dredge size limitation be imposed.

4. It is recommended that Section 652.4(b)(1) of the proposed regulations to implement the amendments be modified since such provision currently prohibits steaming through a closure area with clams or quahogs on board. It would seem that mere possession of clams or quahogs in such areas is too severe a restriction in that some form of fishing activity should be involved before a violation occurs.

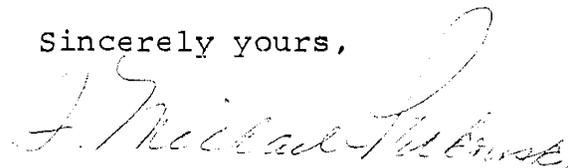
5. It is recommended that Section 652.4(j) be amended to indicate that it is a violation if more than 800 clams less than four and one-half inches in length are contained in a standard cage of surf clams. This change would be in lieu of the 20% limitation previously stated. In addition, it should be clear that responsibility for compliance with the size limitation be on the vessel operator at dock side and not with the processing segment of the industry. In such regard, your attention is further directed to Section 652.4(g) which also should be modified to assure that the processing segment is not charged with a violation for the mere possession of illegally landed clams.

6. It is recommended that the time for fishing during a given fishing week commence as of 5 p.m. Sunday to allow twenty-four hour boats a greater opportunity to fish during a given week. This change is desirable since a standard quitting time is also being adopted.

Your favorable consideration of the foregoing recommendations would be greatly appreciated. In the event you should have any questions regarding any of the matters addressed herein, please do not hesitate to contact me.

Please accept the appreciation of the American Original Corporation regarding the overall effort exerted regarding the subject plan amendment. In particular, the efforts exerted to obtain and utilize industry input are commendable.

Sincerely yours,



F. Michael Parkowski

(Dictated by but not read)

FMP/phd
cc: John Marvin
David Wallace



Sea Watch International, LTD

REC-1
JUL 23
MID ATLANTIC

July 24, 1979

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

Dear Mr. Bryson:

This letter reflects the thinking of Sea Watch International which is in the business of canning chopped clams and products made from chopped clams and its wholly owned subsidiary, H. Allen Smith, Inc., in Oyster, Virginia, which furnishes it with its surf clam salvage.

We are firmly opposed to Amendment Two of the Management Plan which would increase the quota of quahogs from 30,000,000 pounds a year to 40,000,000 pounds a year.

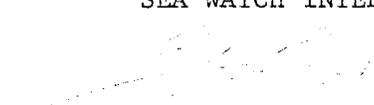
In the mid 1970's the catch of surf clams, under conditions of over fishing, reached a record high 96,000,000 pounds. This produced approximately 48,000,000 pounds of salvage for chopped meat production, representing substantial over production. Now there is a controlled fishery which allows approximately 15,000,000 pounds of surf clam salvage to be produced a year. This, however, is presently supplemented by 30,000,000 pounds of quahogs, all of which are used as chopped product. So, we have a total of 45,000,000 pounds of salvage, and as a result the chopped surf clam market is very depressed. Before the government started pushing the use of the inferior quahog, approximately one and a half years ago, the market for surf clams (12/51 oz. cans) was \$62.00 a case. Now, with the flooding of the market, with quahogs selling at approximately \$43 a case, the market on surf clams has sympathetically dropped to \$48 a case, this in spite of higher packaging costs and high acquisition costs for surf clams.

Mr. John Bryson
July 24, 1979
Page 2

In light of the above, it is incredible to conceive that the government would consider raising the quota of quahogs by 10,000,000 pounds, a move that would create complete economic chaos for surf clam packers and the vessels that supply them.

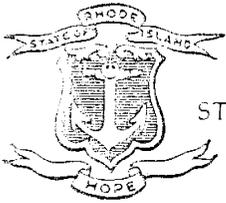
Very truly yours,

SEA WATCH INTERNATIONAL, LTD.



Frederick B. Fox

FBF:mg



STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS

Department of Environmental Management
DIVISION OF FISH AND WILDLIFE
Washington County Government Center
Tower Hill Road
Wakefield, R. I. 02879

RECEIVED
JUL 23 1979

July 23, 1979

MID ATLANTIC

Mr. John Bryson
Executive Director
Mid-Atlantic Fishery Mgt. Council
Federal Bldg., Rm. 2115
North and New Sts.
Dover, Delaware 19901

Dear John:

On behalf of the R. I. Division of Fish and Wildlife, I would like to thank you, your staff, and the members of the Mid-Atlantic Council for conducting two recent surf clam hearings in the New England area. I believe that the attending Mid-Atlantic Council representatives gained valuable first hand experience into the objections being voiced in the New England area, over the current and proposed regulations. Although a member of my staff attended the Pt. Judith meeting and gave testimony on the major concerns of the R. I. segment of the industry, I would also like to comment on the proposal. The major concerns of the R. I. surf clam-ocean quahog industry relate to the moratorium, the separation line, the proposed quota of 200,000 lbs. of surf clam meats, and the proposed effort restrictions.

1. Moratorium: The R. I. Division of Fish and Wildlife and members of the R. I. clam industry continue to oppose any form of surf clam-ocean quahog license limit in the N. E. area. The existing license moratorium was implemented in order to freeze effort in the clam fishery. The only conclusion one can draw about the existing moratorium is that it has been a dismal failure in halting the increase in effort in the fishery. The existing moratorium froze licenses while harvesting capacity in the Fishery was allowed to expand, i.e. increases in dredge size and number, etc.

The proposed amendment attempts to eliminate the moratorium in the N. E. area; in fact, it does not. The quota on surf clams of 200,000 lbs., and the gear and effort restriction which become effective when the N. E. industry reaches the 100,000 lbs. level, effectively constitute a de facto closure. Industry expansion under this type of regulatory format would be quite impossible.

2. Separation Line: The R. I. Division of Fish and Wildlife endorses the concept of a line of demarcation, north and east of which the industry would be allowed to operate under a non-restrictive vessel entry and catch quota basis. The proposed lines of 41° latitude, 71° longitude, and the demarcation line between the Councils are totally unacceptable. The line proposed by the National Marine Fisheries Service is also unacceptable, but preferable compared to the other three alternatives. As a preferred option, I would propose the line of 71°50' or 72° longitude. Although R. I. ocean quahog vessels presently utilize the area which is south and west of 71°50', the line would more closely parallel existing industry harvesting practices, and therefore be preferable to all of the proposed options.

3. N. E. Alternative - Proposed Quota of 200,000 lbs. of Surf Clam Meat

The proposed quota of 200,000 lbs. constitutes a substantial disincentive for potential expansion of the N. E. surf clam fleet. During 1977, the State of Massachusetts alone landed 286,000 lbs. of surf clams from the FCZ. The present allocation would constitute a reduced quota based upon the historical performance of the industry. In addition, the lack of an adequate survey in the N. E. area focuses attention on the subject of a fair and equitable distribution of the surf clam resource. The quota of 200,000 lbs. is clearly inconsistent with Section 301 (a) (4) of the FCMA, which states that:

"Conservation and management measures shall not discriminate between residents of different states. If it becomes necessary to allocate or assign fishing privileges among various U. S. fishermen, such allocation shall be:

- A. fair and equitable to all U. S. fishermen. . . and
- B. reasonable calculated to promote conservation
- C. carried out in such a manner that no particular individual, corporation, or other entity acquires an excessive share of such privileges."

The allocation of 200,000 lbs. equals two-thirds of one percent of the allocation to the Mid-Atlantic area. Since the allocation was not derived from survey data, it is in no way fair or equitable, and it clearly allocates an excessive share to the Mid-Atlantic area.

Effort Restriction:

The question of imposing effort restrictions, i.e. a freeze on dredge size, adoption of a minimum size, limits on the days fished, etc. establishes a substantial disincentive for expansion of the surf clam fleet in the N. E. area. Although the plan amendment gives the impression of

Mr. John Bryson

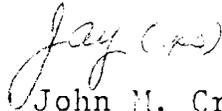
-3-

July 23, 1979

removing the restrictions in the N. E. area, in actuality, it does not. When the N. E. industry reaches the 100,000 landing level, all of the effort restrictions become effective. Implementation of the amendment will unnecessarily regulate and restrict the N. E. industry for a period in excess of one half of each year.

In summary, the R. I. Division of Fish and Wildlife proposes that the area north 72^o longitude be managed on a free entry-no quota management basis. If the surf clam-ocean quahog fishery develops to a substantial degree, then it obviously will be necessary to impose catch and/or effort restrictions, but not until there is substantial development above present levels.

Sincerely,



John M. Cronan
Chief

JMC:ps

WACHAPREAGUE SEAFOOD CO., INC.
MADDOX BLVD.
P.O. BOX 94
CHINCOTEAGUE, VA. 23336
PHONE: 804-336-5357

July 19, 1979

Mid Atlantic Council

To Whom It May Concern:

We are opposed to allocation of bushels per boat.
We are **also** opposed to a moratorium on boats.
We are in favor of present allocation of 1,800,000 bushels per year.

The small boats and small processing plants are going to be put out of business by the double dredging of the larger boats. The major Company which is presently doing this has controlled approximately 55% of the catch to date - July 1979. If this continues the small boats and small plants will be forced to cease operation.

If we cannot arrive at a working factor in favor of everyone's equal share then we had rather the Government lift all restrictions and let Supply and Demand control the industry.

RECEIVED
JUL 26 1979
MID ATLANTIC COUNCIL

Respectfully yours,



John J. Baker

LONG ISLAND SEA CLAM CORP.

POINT LOOKOUT, N. Y. 11569

July 23, 1979

John C. Bryson , P.E.
Executive Director

Mid-Atlantic Fishery Management Council
Room 2115 Federal Building
North & New Streets
Dover , Delaware 19901

RECEIVED
JUL 25 1979

Dear Mr. Bryson:

I am Robert Doxsee , president of Long Island Sea Clam Corp. of Point Lookout, N.Y.

My company has been engaged in surf clam processing since 1944. I am a direct decendent of a nineteenth century canner of clam products whose name appears on the label of a major clam packer to this day.

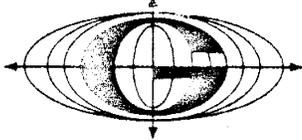
In spite of what I regard as a legitimate right to operate a clam business, I forsee small companies such as mine being cut off from their source of supply . Even now, more and more control over the source is in the hands of fewer people. The dredge size and number freeze has not worked and a direct per boat allocation would give one or two groups a dangerously high percentage of the quota to the exclusion of others.

I am opposed to a per boat allocation for this reason and would prefer the quarterly allocation system left as is. Thank you.

Respectfully,

Long Island Sea Clam Corp.

RLD/cx.



THE GORTON GROUP / GLOUCESTER, MASSACHUSETTS 01930

AREA CODE 617 283-3000

CABLE ADDRESS GORTONS

Copy to file
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JUL 20 1979
MID ATLANTIC COUNCIL

July 18, 1979

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

Dear John:

Inasmuch as I will be unable to attend the public hearings on the Surf Clam and Ocean Quahog Management Plan, I would like to make a written statement on behalf of The Gorton Group, General Mills, Inc., who is a major processor of these clams through its Riggins and Robbins Division.

Enclosed is a resolution of the Board of Directors of the Shellfish Institute of North America passed at its June 1979 meeting. We thoroughly endorse this resolution. In particular, we are very concerned with the possible implementation of a stock certificate plan and the possible use of the July 1, 1979 through June 30, 1980 period as the basis for each boat's certificate. The current Surf quota, the moratorium, simple economics and a desire for conservation has produced a good result for reducing the Surf catch. In fact, it is highly doubtful that the industry will utilize this year's quota on Surfs unless you people force it through regulation encouraging the catching of Surfs. If you establish a stock certificate plan utilizing a pre-determined fishing period you will completely distort the industry economics and force them to catch Surfs at the expense of Quahogs. This will greatly penalize those who are traditionally in the Quahog fishery and those who have spent great time and money converting plant equipment to be able to handle Quahogs.

We sincerely submit that the current quota, moratorium and limited fishing days has accomplished the conservation objective fairly.

Sincerely

John E. P. Borden
John E. P. Borden
Vice President Operations

hg
Enc.

SHELLFISH INSTITUTE OF NORTH AMERICA
212 Washington Avenue
Baltimore, Maryland. 21204

RESOLUTION
of the
BOARD OF DIRECTORS
of the
SHELLFISH INSTITUTE OF NORTH AMERICA
JUNE 1979

SURF CLAM/QUAHOG FISHERIES

WHEREAS; the Shellfish Institute of North America recognizes the objectives of Fisheries Management Plan amendment #2 for the surf clam and ocean quahog: to rebuild the surf clam stocks, to minimize short-term economic dislocation, and to direct the ocean quahog fishery toward maintaining optimum yield;

WHEREAS; the present management plan has been successful in that the surf clam harvest has been stabilized and the ocean quahog fishery has developed in an orderly manner;

WHEREAS; a vessel allocation system established from a base period might very well bring short-term economic dislocation to the industry and destruction to the clam beds with more vessels making more effort to preserve their surf clam fishing rights. Because of the above and the enforcement problems of such a large fleet a base year concept is inappropriate and unenforceable;

BE IT RESOLVED; that any vessel allocation plan be put off indefinitely and that the present Fisheries Management Plan be extended through 1981, maintaining the moratorium in the mid-Atlantic region to preserve the integrity of the fishery;

SURF CLAM/QUAHOG FISHERIES -- 2

BE IT FURTHER RESOLVED; that more effort and emphasis be placed on area closures and that more stringent size limit guidelines be established. Better research and data gathering techniques must be instituted so that these areas can be identified and closed until they satisfy the size limits.

* * * * *



PROGRESSO QUALITY FOODS
500 Elmer Road, Vineland, New Jersey 08360

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JUL 27 1979
MID ATLANTIC COUNCIL



July 26, 1979

Mr. John Bryson
Executive Director
Mid-Atlantic Fisheries Council
Room 2115 Federal Building
N & New Street
Dover, Delaware 19901

Dear Mr. Bryson:

My name is Thomas M. Karwacki and I am Manager of Operations for Clamco Corporation. My purpose in writing is to make comment to major issues relating to the proposed amendment #2 of the surf clam and ocean quahog industry FMP.

1. We are pleased to see the addition of the bad weather make-up day during the months of December through March on surf clams.
2. Being not only involved in harvesting, but also in the processing of clams, we feel it would be extremely beneficial to move the starting day for the harvesting of surf clams to 12:01 a.m. Sunday, and completion on Wednesday. This would allow for shucking operations on Monday (currently a void day) and more importantly, for shucking to be completed on Thursday, allowing the final processor Friday to can or freeze the product. Currently, product harvested on Thursday is shucked on Friday, and has to be canned either Friday night or Saturday at a penalty to the processor.
3. We are in favor of the increase to 4.0 million bushels on quahogs. We feel the increase has a favorable economic impact on vessel operation and this additional quantity of clams helps relieve the pressure on surf clams.

4. We feel that clarification is needed regarding what constitutes "involuntarily leaving the fishery". Also, what limitations exist in replacing such vessels.
5. We are in agreement with NMFS's recommendation for establishing an equitable line in which New England will fall under a separate allocation on surf clams over and above the 1.8 million bushels for the Mid-Atlantic region.
6. We understand the need for establishing a minimum limit of surf clams under $4\frac{1}{2}$ " per cage. We, however, do not feel that 20% is a realistic number. We would recommend that 40% under $4\frac{1}{2}$ " per cage be allowed.
7. We thoroughly object to the thought that 1980 be used as a base year for any future vessel allocations. With the past announcement of possible dredge limits being established, the thought of "minimizing changes from historical relative harvesting capacity" has been completely negated. With the gear limitation announcement, segments of the industry have virtually doubled their harvesting capacity. Any future harvesting period to be used as a base would have no historical relationship. We understand that the reason for the vessel allocation is to relieve the moratorium of new vessels entering the business. Considering historical data such as 88,000,000 pounds of meat caught with 80 some vessels, frankly, we do not see a need to consider new vessel entry. Currently, there are 167 vessels with a harvest capacity much greater than when the regulation came into effect, with an allowable harvest of only 30,000,000 pounds of meat. By using a future base period, it is quite likely that a monopolistic situation can develop. Many small operations and independents may be (a) forced to harvest quantities above their normal marketing capabilities and sell their product at a reduced cost to create a market; or (b) more importantly, be forced to restrict their harvesting due to major factors flooding the market as noted above. In either case, it would bring about certain economic hardships or unfair allocations for future marketing capabilities. In essence, remove competitiveness from the harvesting sector.

It is felt that it would be in the best interest of all harvesters and processors to manage the allowable harvest as presently done. Our present plan allows for pure competitiveness by all segments of the industry.

Very truly yours,

Thomas M. Karwacki
Clamco Manager

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JUL 21 1979

MID ATLANTIC COUNCIL

July 21, 1979

Dear Mr. Bryson:

The following are my comments relative to amendment 2 Surf Clam Fisheries Management Plan.

#1 - As you know, the alternate day provision was included in the plan as a result of a long, hard fight and finally approved by the sub panel and recommended to the Mid-Atlantic Council as a result of a compromise upon the insistence of Mr. Marvin. Needless to say, I am discouraged that Mr. Marvin is attempting to further cut the alternate day to two months instead of the four which he agreed upon as a member of the sub-panel. As you said and contrary to Mr. Wallace's claim that the alternate day is the equivalent of expanding the 24 hour work period to 36 hours which will result in early closure of his plants, the alternate day doesn't insure that one will be able to work every week as prolonged weather conditions within a week nullifies the effect of the alternate day for many weeks. Secondly, the Director has the prerogative to adjust the hours per week up or down to help prevent early closure of the quarter. Not having an alternate day contributed to the closure of most all plants on the eastern shore of Virginia last winter for nine weeks.

#2.- There is a grave question in my mind relative to the effect of so much double dredging and the impact it will have on the class 1 and 2 vessels. If class 3 vessels presently catch 66% of the quota, what will their catch be after the double dredging is completed? The increased catch capacity of the class 3 vessels will further reduce the allotted work time per week to 18 or less. I just don't think there are many class 1 or 2 vessels that can survive with less than 24 hours work time per week. To further compound the problem there are many plants in this area who depend on the class 1 and 2 vessels for their supply. The picture looks as dim for these plants who depend on the small independent boats as it does for the vessels. The failure of these plants not only has a harsh economic impact on the areas that depend on them for work. It removes the competition within the industry which tends to maintain the price per bushel and might ultimately reduce those who process clams to very few.

It was my understanding that the prime objective of the management plan was to prevent over fishing of the species; secondly to prevent over capitalization of the industry. The present proposal to allow individuals or corporations to double dredge until January 1, 1980 leaves me in a quandry.

First, as I understand it the amendment is in effect a proposal and subject to deletions or alterations. If I were sure the provision which allows double dredging until January 1, 1980 would be enacted, it would leave me no alternative but to double dredge; however under the circumstances it's sort of like playing roulette. While it's one thing to expend 50 to 100 thousand in order to compete in the industry, it's quite another to expend such an amount on a government proposal which may or may not become law.

A good number of people in the industry have been requesting a dredge size limit for two years to no avail. The present proposal is causing a mad rush to maximize dredge size which can only lead to curtains for most class 1 and 2 vessels if it becomes law or to those who expend those funds for double dredging if the allocation or per boat quota is based on vessel class (3, 4 & 5 hundred bushels per week) as has been requested by some.

While it's nothing new to be faced with such an expenditure in order to compete in an industry, it is a new experience for me to be faced with an expenditure of such magnitude based on a decision of government which may or may not become law. Personally, I don't feel it is the function of a governing body to create such a quandry. After the fact is one thing; investing such sums before the fact is something else.

Finally, I can appreciate the concern of many of the processors who depend on the smaller vessels for their product. I can understand their preference of "No Plan" as opposed to one which will surely send them down the tube. With "No Plan" they feel they have a fighting chance of survival. With the plan as proposed there is no way to go except under.

The rule of the survival of the fittest will probably ultimately prevail; however, I sort of feel like the man who was treed by a bear when he spoke to the Lord saying, "Lord, if you can't help me, please don't help that bear" - (in this case, the bear being the giants and the Lord being the regulating agency).

Sincerely,


DONALD J. LEONARD

P. O. Box 173
Chincoteague, Virginia 23336



Rhode Island Seafood Council

RECEIVED

JUL 30 1979

MID ATLANTIC C

P. O. Box 219
Narragansett, R. I. 02882

(401) 783-4200

July 25, 1979

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

Dear Mr. Bryson:

The following statement reflects the unanimous views of the major clamming vessel operators and Surf Clam/Ocean Quahog processors in Rhode Island regarding Amendment #2 of the Management Plan presented by your council for industry comment.

A signature sheet is attached along with the industry affiliation of each of the industry members whose views are reflected here. We intend this to be a further clarification of the views expressed at the public hearing July 11.

1. Demarcation Line

It has been our consistent belief that there should be a separate management regime established for New England since we have a developing fishery for Surf Clams and Ocean Quahogs in New England waters.

We propose a demarcation line at 72 deg. Longitude running South from Fisher's Island. This will retain in the New England area, grounds which have been traditionally fished by the Rhode Island fleet over a 30 year period. (Both the 41 deg. Latitude line and the "Line of Council Authority" shown on the charts distributed at the July 11 hearing, would cut off traditional New England fishing areas and would exclude productive areas within 2½ hours steaming time from Pt. Judith, R.I.)

2. Quotas

We support a 40,000,000 lb (meats) quota for Ocean Quahogs as proposed in the draft amendment #2. We don't feel that the 200,000 lb (meats) quota for Surf Clams proposed for New England is appropriate. Until adequate survey data in the New England FCZ and/or evidence of overfishing are in hand, we feel there should be no quota for Surf Clams in New England.

Office: Room 1, Tower Hill Office Building, Wakefield, R. I.

3. Gear Restrictions

We favor the proposed gear restriction in the Mid-Atlantic management area but do not feel it is appropriate in New England since there is no overfishing problem here and the large knife sizes and multiple gear employed in the Mid Atlantic have not been used here. At this point, gear restrictions in New England would unfairly stifle innovation and efficiency, in our view.

4. Moratorium

We do not feel the Surf Clam moratorium is appropriate in New England. We also favor free and open access to fishing areas by all licensed vessels. However, if necessary to secure relief from the moratorium, we will agree that new entrants, not present Surf Clam license holders, could be excluded from fishing Surf Clams in the Mid-Atlantic area

5. Vessel Allocation System

We are strongly opposed to the imposition of a stock certificate type of vessel allocation system. We feel it would further concentrate economic power in the fishery and would encourage chaotic conditions during the base period which would damage the resource.

Yours very truly,

Frederick N. Blount

Blount Seafood Corporation

Robt W. Frost

F.V. Wanda River (W.R. Inc.)

Sam Lamon

Harbor Shellfish Co.

Walter J. Lamon Jr.

F.V. Lonely Man
(Exeter Calm Co.)

Kenneth W. Lamon

R.I. Seafood Council

Arthur A. Lamon

Quito Shellfish Co.
F.V. Albert Quito
F.V. Elisa Anne

Gilbert D. Lamon

Gilbert's Seafood Co

Gilbert & Paul Lamon

F.V. Second Wind

Anthony Amoriggi

Amoriggi Seafoods, Inc (by phone)

Francis Manchester

Manchester Seafoods Co.(by phone)

THE MARTHA'S VINEYARD COMMISSION

BOX 1447
OAK BLUFFS
MASSACHUSETTS
02557
617-693-3453

JUL 25 1979

MID ATLANTIC COUNCIL
July 19, 1979

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

Dear Mr. Bryson:

The Martha's Vineyard Commission herein submits its formal testimony on the Draft Amendment No. 2 of the Surf Clam and Ocean Quahog Industries Fishery Management Plan. The Martha's Vineyard Commission, created by a special act of the Massachusetts State Legislature in 1974, has been committed to planning and development of the Island's fisheries since its inception. The following comments are based on local efforts and concern regarding the further development of an ocean shellfish fishery within our municipal waters. Management activities within the Fishery Conservation Zone has and will continue to have a direct impact on these local efforts and further, the prospects of developing a surf clam fishery in New England.

The Commission supports the alternative which provides for the establishment of a separate management regime in New England. The Commission also supports the lifting of the moratorium on entry of vessels into the surf clam fishery. This restriction has posed obvious constraints for developing a surf clam fishery within this region. However, considering your proposed quota of 200,000 pounds and the prospect of continued pressure by the mid-Atlantic fleet in New England waters, this Commission questions whether, in fact, there is any gain or incentive from being able to enter this fishery. This combination of regulations including the restriction of New England vessels entering the fishery in mid-Atlantic waters and the imposition of fishing effort restrictions when only half of this limited quota is achieved, seems more of a "concession" to New England interests rather than a sound management strategy for this region.

We agree with the New England Management Council that there may be as yet undiscovered surf clam beds in the New England FCZ. This seems to be the basis of your response to the New England Council

(see page 99, DFMP Amendment No. 2). Our interest is simply to have a reasonable opportunity to find and develop those potential stocks.

Clearly, the capabilities of New England fishermen are hardly of the magnitude of the mid-Atlantic fleet. There is a traditional preference in New England for vessel diversity diminishing the prospect of intense pressure from a directed fishery. By your own assessment our surf clam fishermen are generally part-timers (see page 64.) Even including the six Rhode Island vessels presently committed to the Ocean Quahog Fishery, the total present and potential fishing effort that could influence this fishery in New England must be considered minimal. Therefore, a 200,000 pound quota based on fishing effort in New England including consideration of the undetermined stock potential seems unjustifiable even as strictly a conservation measure. Similarly, restricting New England from the mid-Atlantic based on the premise, we assume, of avoiding more effort in your region seems unrealistic and a weak premise for raising the specter of unequal restriction of inter-state, management area fishing.

We understand the migratory nature of this fishery, a result, no doubt, of years of no management and over-capitalization. We generally admire your efforts to secure, through management, some stabilizing factors regarding an extensive fishery and associated industry so important to your region. However, in the furtherance of stability in your region as well as providing opportunities for fishing this resource in New England, we submit that separate management regimes must be more equitably drawn including either a mutual exclusion provision and/or a quota allocation that provides some incentive for New England fishermen.

If the present management trends continue, especially the prospect of vessel allocations in the form of stock certificates established in 1981, we fear that New England fishermen will be in essence "cut-off" from this potential fishery and you will be generating management measures approximating economic allocation as its sole purpose (see Public Law 94-265 Section 301-4,5).

In order to illustrate our local efforts regarding this fishery we have attached "Ocean Shellfish: A Regional Management Proposal for Dukes County". Please be advised that our primary objective in this proposal is to promote the coordination of regulations and enforcement between separate town jurisdictions within the waters of the Commonwealth of Massachusetts.

Presently, our proposed regulations are tentative. We too must deal with undetermined stock potential. Please note, however, our proposed quota of between 100-250 bushels per day. This quota range was presented to provide incentive for our fishermen understanding clearly other constraints such as cost of gear and re-rigging, some market variations and items mentioned above in this testimony. It is also assumed that if commercial beds were located and fished within the waters of Dukes County, quotas could be adjusted to more clearly reflect optimum yield capability. It is interesting to speculate that if several of our fishermen entered the surf clam fishery here part-time on a per-day quota of say 150

bushels that with relatively good fishing over a year they could achieve a sizable percentage of the 11,765 bushel quota that you have offered for the entire FCZ in New England.

We hope this testimony is helpful. If you have any further questions please feel free to call our fisheries planner, Michael Wild, at the above number.

Very truly yours,



Benjamin C. Moore, Chairman

BCM/jr

cc: Douglas Marshall, New England Fisheries Management Council
Allen E. Peterson, Jr., NMFS
David Pierc, MDMF
Arne Carr, MDMF
Pat Hughes, CZM
Dan Arnold, Mass. Inshore Draggermen's Association

APPENDIX V. DRAFT PROPOSED REGULATIONS

Note: This section is based on the final regulations implemented pursuant to the original Surf Clam and Ocean Quahog FMP which were published as 50 CFR Part 652. The Federal Register publication date was February 17, 1978. They are the Councils suggestions to implement the provisions of Amendment #2 to the Surf Clam and Ocean Quahog FMP. Following Secretarial approval of Amendment #2, the National Marine Fisheries Service will publish draft regulations to implement Amendment #2.

§652.1 Purpose.

This Part regulates fishing for surf clams (Spisula solidissima) and ocean quahogs (Arctica islandica) in the Atlantic Ocean Fishery Conservation Zone.

§652.2 Definitions.

In addition to the definitions in the Act, and unless the context requires otherwise, the terms used in this Part shall have the following meaning (some definitions in the Act have been repeated here to aid fishermen in understanding the regulations).

(a) Act means the Fishery Conservation and Management Act of 1976, 16 U.S.C. 1801 et seq. as amended.

(b) Assistant Administrator means Assistant Administrator for Fisheries, National Oceanic and Atmospheric Administration, 3300 Whitehaven Street NW., Washington, D.C. 20235

(c) Authorized official means:

(1) Any commissioned, warrant, or petty officer of the Coast Guard;

(2) Any certified Enforcement or Special Agent of the NMFS;

(3) Any officer designated by the head of any Federal or State agency which has entered into an agreement with the Secretary of Commerce or the Commandant of the Coast Guard to enforce the provisions of the Act; or

(4) Any Coast Guard personnel accompanying and acting under the direction of any person described in subparagraph (1) of this paragraph.

(d) Bushel means a standard unit of measure presumed to hold 1.88 cubic feet of surf clams or ocean quahogs in the shell.

(e) Cage means a standard unit of measure presumed to hold 32 bushels 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.

(f) Directed fishery means with respect to any species, a fishery conducted for the purpose of catching that species.

(g) New England Area means that portion of the FCZ north of the line that begins at 41°18'16.249" latitude and 71°54'28.477" longitude and proceeds S 37°22'32.75" E to the point of intersection with the outward boundary of the FCZ.

(h) Fish means any finfish, mollusks (including surf clams and ocean quahogs), crustaceans, and all other forms of marine animal and plant life other than marine mammals, birds, and highly migratory species.

(i) Fishery Conservation Zone (FCZ) means the zone contiguous to the territorial sea of the US, the inner boundary of which is a line conterminous 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.

(j) Fishing means:

- (1) The catching, taking or harvesting of fish;
- (2) The attempted catching, taking or harvesting of fish;
- (3) Any other activity which can reasonably be expected to result in the catching, taking or harvesting of fish; or
- (4) Any operations at sea in support of, or in preparation for, any activity described in subparagraphs (1) through (3).

The term "fishing" does not include any scientific research activity which is conducted by a scientific research vessel.

(k) Fishing trip means a departure from port, transit to the fishing grounds, fishing, and discharge of any part of the catch on board.

(l) Fishing vessel means any vessel, boat, ship, or other craft which is used for, equipped to be used for, or of a type which is normally used for:

- (1) Fishing; or
- (2) Aiding or assisting one or more vessels at sea in the performance of any activity relating to fishing, including, but not limited to, preparation, supply, storage, refrigeration, transportation or processing.

(m) Mid-Atlantic Area means that portion of the FCZ south of the line that begins at 41°18'16.249" latitude and 71°54'28.477" longitude and proceeds S 37°22'32.75" E to the point of intersection with the outward boundary of the FCZ.

(n) NMFS means the National Marine Fisheries Service of the National Oceanic and Atmospheric Administration.

(o) Operator means with respect to any vessel, the master or other person in charge of that vessel.

(p) Owner means with respect to any vessel, any person who owns that vessel, or any charterer, whether bareboat, time, or voyage; or any person who acts in the capacity of a charterer, including but not limited to parties to a management agreement, operating agreement, or any similar agreement that bestows control over the destination, function or operation of the vessel.

(q) Person means any individual, corporation, partnership, association, or other entity.

(r) Regional Director means the Regional Director, Northeast Region, NMFS, Federal Building, 14 Elm Street, Gloucester, MA 01930, telephone 617-281-3600.

(s) Secretary means the Secretary of Commerce or the designee of the Secretary.

(t) Vessel of the United States means:

- (1) A vessel documented or numbered by the Coast Guard under US law; or

(2) A vessel, under five net tons, which is registered under the laws of any State.

§652.3 Foreign Fishing.

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

§652.4 Restrictions.

- (a) No person shall catch and retain on board any surf clams or ocean quahogs:
- (1) during closed seasons; or
 - (2) in closed areas as specified in these regulations; or
 - (3) on days of the week in which fishing for these species is not permitted.
- (b) (1) Presence of surf clams or ocean quahogs aboard any permitted fishing vessel engaged in those fisheries and the presence of any part of the vessel's gear in the water in closed areas shall be prima facie evidence that such clams or quahogs were taken in violation of the provisions of the Act and these regulations. Presence of surf clams or ocean quahogs aboard any permitted fishing vessel and the presence of any part of the vessel's gear in the water more than 12 hours after a fishery closure announcement becomes effective pursuant to the provisions of section 652.6(c) shall be prima facie evidence that such clams or quahogs were taken in violation of the provisions of the Act and these regulations.
- (2) Possession of surf clams, by any person aboard any fishing vessel engaged in the surf clam fishery, more than 12 hours after a weekly closure occurs under the provisions of section 652.7(a) shall be prima facie evidence that such surf clams were taken in violation of the Act and these regulations.
- (c) No person shall fish for surf clams beyond the authorized time period(s) assigned to the vessel he is operating.
- (d) No person shall catch and retain on board any surf clams on other than an authorized surf clam fishing trip.
- (e) Presence of any part of a vessel's gear in the water later than one-half hour after the end of that vessel's authorized fishing period shall be prima facie evidence that the operator of that vessel is fishing in violation of this Part.
- (f) 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 quahog, or part thereof, which was taken in violation of the Act, these regulations, or any other regulations issued under the Act.
- (g) 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 section 652.13.
- (h) No person shall:
- (1) refuse to permit an authorized officer to board a fishing vessel subject to such a 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, these regulations, or any other regulations issued under the Act;

(2) forcibly assault, resist, oppose, impede, intimidate or interfere with any authorized officer in the conduct of any search or inspection described in sub-paragraph (1) of this paragraph;

(3) resist a lawful arrest for any act prohibited by these regulations; or

(4) 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 these regulations.

(i) No person shall land or offer to sell a cage of surf clams that contains more than eight hundred (800) surf clams less than 4 1/2 inches in length, measured at the longest dimension on the surf clam. For cages with less than 32 bushels, the proportional number of undersized clams will constitute a violation.

§652.5 Penalties.

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.

§652.6 Catch quotas.

(a) Surf clams:

Mid-Atlantic Area:

January 1 - March 31	400,000 bushels
April 1 - June 30	500,000
July 1 - September 30	500,000
October 1 - December 31	400,000
ANNUAL QUOTA	1,800,000

New England Area:

ANNUAL QUOTA 25,000 bushels

(1) If the actual catch of surf clams in the Mid-Atlantic Area in any one quarter falls more than 5,000 bushels 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.

(2) The Assistant Administrator shall publish a notice in the Federal Register whenever the Regional Director adjusts the quarterly quota of surf clams under subparagraph (1).

(3) When one-half of the annual quota for the New England Area is harvested, the Regional Director shall implement in the New England Area the effort restrictions established for the Mid-Atlantic Area.

(4) The Assistant Administrator shall publish a notice in the Federal Register whenever the Regional Director establishes effort restrictions in the

New England Area.

(b) Ocean Quahog. The annual quota for ocean quahogs is 3,500,000 bushels for 1980 and 4,000,000 bushels for 1981. If necessary, the Regional Director may establish quarterly quotas for ocean quahog, and, in that event, the Assistant Administrator shall publish notice of such quarterly quota in the Federal Register. In the event that the Regional Director establishes quarterly quotas for ocean quahogs, if the actual catch of ocean quahogs falls more than 5,000 bushels 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 ocean quahogs in any quarter exceeds the specified quarterly quota, the Regional Director shall subtract the amount of the excess from the next succeeding quarterly quota.

(c) Closure. If the Regional Director determines (based on logbook reports, processor reports, vessel inspections, or other information), that the quota for surf clams or ocean quahogs for any time period indicated in §652.6 will be exceeded, the Assistant Administrator 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, by certified mail, to each surf clam or ocean quahog processor and to each surf clam or ocean quahog vessel owner or operator.

§652.7 Effort restrictions.

(a) Surf clams.

(1) Fishing for surf clams shall be permitted only during the period beginning 5:00 PM Sunday and ending 5:00 PM Thursday. Such fishing shall be conducted during this period only at the times and under those conditions authorized by the Regional Director.

(2) Each quarter will begin with each vessel limited to 24 hours of fishing time to allow fishing for surf clams to be conducted throughout the entire quarter without exceeding the allocation for that quarter (as adjusted under §652.6(a)(1)). All fishing periods will end at 5:00 PM.

(3) If the Regional Director determines during the quarter that the quarterly allocation will be (will not be) exceeded, he shall reduce (increase) the number of hours per week 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).

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

(5) During December, January, February, and March, fishermen may claim a weather day if small craft warnings were posted at the port from which the vessel operates, or the closest port thereto if such warnings are not normally posted at the port from which the vessel operates, and if the fisherman notified the Coast Guard of his intent to claim a weather day within four hours of his official starting time for fishing and if he landed no clams on that day. The make-up day is the fishing day following the bad weather day

and equals the same number of hours as the fisherman would normally have on a fishing day.

(b) Ocean Quahogs.

(1) Fishing for ocean quahogs shall be permitted seven days per week.

(2) When 50 percent of the quota of ocean quahogs for any time period indicated in section 652.6(b) above has been caught, the Regional Director shall determine whether the total catch of ocean quahogs during the applicable time period will exceed the quota for that time period. If the Regional Director determines that the quota probably will be exceeded, he may reduce the number of days per week during which fishing for ocean quahogs is permitted for the remainder of the time period.

(3) The Assistant Administrator shall publish a notice in the Federal Register of any reduction in days per week during which fishing for ocean quahogs is permitted. The reduction shall be effective immediately upon publication in the Federal Register. The Regional Director shall also send notice of any reduction by certified mail to each surf clam or ocean quahog processor in the fishery and to each surf clam or ocean quahog vessel owner or operator.

§652.8 Closed Areas.

(a) It shall be unlawful to fish for surf clams or ocean quahogs in any designated closed surf clam or ocean quahog area. The following areas are closed to fishing based on the request of the Environmental Protection Agency and not in accordance with the criteria of §652.8(b):

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

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

(b) Areas may be closed to surf clam and ocean quahog fishing upon a determination by the Regional Director (based on logbook entries, processors' reports, survey cruises, or other information) that the area contains surf clams of which:

(1) 60 percent or more are smaller than 4 1/2 inches in size; and

(2) not more than 15 percent are larger than 5 1/2 inches in size. (Sizes shall be measured at the longest dimension of the surf clam.)

The Regional Director shall publish notice of any closed area in the Federal Register. The Regional Director shall send notice of the closed area, by certified mail, to each surf clam or ocean quahog processor and to each surf clam or ocean quahog vessel owner or operator.

(c) Regulations for the reopening of each area closed pursuant to §652.8(b):
Reserved

§652.9 Vessel moratorium.

The moratorium that became effective on November 17, 1977, prohibiting the the entry of additional vessels into the surf clam fishery, shall remain in effect in the Mid-Atlantic Area at least until December 31, 1981. No moratorium shall be in effect in the New England Area.

§652.10 Vessel permits.

(a) A vessel owner or operator must obtain a permit in order to:

- (1) Conduct a directed fishery for surf clams or ocean quahogs within the FCZ, or
- (2) Land or transfer to another vessel any surf clams or ocean quahogs or part thereof caught within the FCZ.

(b) A vessel is eligible for a surf clam permit pursuant to the moratorium if it meets any of the following criteria:

- (1) The vessel has landed surf clams in the course of conducting a directed fishery for surf clams between November 18, 1976, and November 17, 1977; or
- (2) The vessel was under construction for, or was being re-rigged for, use in the directed fishery for surf clams on November 17, 1977. For the purpose of this subparagraph, "under construction" means that the keel had been laid, and "being re-rigged" means physical alteration of the vessel or its gear had begun to transform the vessel into one capable of fishing commercially for surf clams.
- (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.
- (4) The criteria set forth in subparagraphs (1), (2), and (3) to not apply to vessels seeking permits to fish in the New England Area.

(c) Applications for permits made pursuant to §652.10(b)(1) and (2) must be received by the NMFS no later than February 15, 1980 and the vessel for which such a permit is applied for must be in operation and have landed at least 500 bushels of surf clams from the FCZ by no later than April 15, 1980.

(d) Permit applications may be obtained by contacting the Regional Director. The owner or operator may apply for a permit by submitting in duplicate an application form supplied by the Regional Director containing the following information:

- (1) Names, addresses, and telephone numbers of the owner and operator;
- (2) The name of the vessel;
- (3) The vessel's United States Coast Guard documentation number or State license number;
- (4) Engine and pump horsepower;
- (5) Homeport of the vessel;
- (6) Directed fishery or fisheries;
- (7) Fish hold capacity (in "cages" or bushels),
- (8) Dredge size;
- (9) Amount of surf clams and ocean quahogs landed in the past year (in bushels, if applicable);
- (10) Number of fishing trips in the past year; and
- (11) Date of beginning of construction or re-rigging (if applicable).

The Regional Director shall issue a permit to each eligible vessel for which an application is submitted. The eligibility of a vessel to fish for surf clams will be determined consistent with this subsection. There will be no fee for the initial permit. A lost or mutilated permit will be replaced at a cost of \$25.

(f) Any applicant denied a permit by the Regional Director may appeal to the Assistant Administrator for review of the denial. Any of the following grounds may

form the basis for review:

- (1) applicant believes denial was in error;
 - (2) applicant was prevented by circumstances beyond his control from meeting relevant criteria;
 - (3) applicant has new or additional information which might change the initial decision; or
 - (4) applicant can show that significant and unusual hardship will result from the denial.
- (g) The appeal may be presented, at the option of the applicant, at a hearing before a person appointed by the Assistant Administrator to hear the appeal.
- (h) The decision of the Assistant Administrator shall be the final decision of the Department of Commerce.
- (i) A permit is valid only for the vessel for which it is issued. The permit must be carried, at all times, on board the vessel for which it is issued, and must be maintained in legible condition. The permit, the vessel, its gear and catch shall be subject to inspection by any authorized official.
- (j) A permit shall expire when the owner or operator retires the vessel from the surf clam fishery. It shall be a rebuttable presumption that failure to land any surf clams from the FCZ for 52 consecutive weeks constitutes retirement from the fishery.

§652.11 Vessel Identification.

- (a) Each fishing vessel 25 feet in length or greater subject to these regulations shall display its official number on both sides of the deckhouse or hull, and on an appropriate weather deck. Vessels under 25 feet in length do not need to display any number. The official number is that number issued by the US Coast Guard associated with the documentation of the fishing vessel or the official number issued by a State or the Coast Guard for undocumented vessels.
- (b) Such markings shall be at least eighteen (18) inches in height and be legibly painted in a contrasting color.
- (c) The operator or each vessel shall:
- (1) keep the required markings clearly legible and in good repair; and
 - (2) insure that no part of the vessel, (b) above, vessels licensed under New Jersey law may use the appropriate vessel identification markings established by that State.

§652.12 Facilitation of Enforcement

- (a) The owner or operator of any vessel subject to these regulations shall immediately comply with instructions issued by authorized officers to facilitate boarding and inspection of the vessel for purposed of enforcing the Act and these regulations.
- (b) Upon being approached by a Coast Guard cutter or aircraft, or other vessel or aircraft authorized to enforce the Act, the vessel shall be alert for signals conveying enforcement instructions. The following signals extracted from the International Code of Signals are among those which may be used:

- (1) "L" meaning "You should stop your vessel instantly";
- (2) "SQ3" meaning "You should stop or heave to; I am going to board you";
- (3) "AA AA AA etc." which is the call to an unknown station; to which the signalled and lay to or maneuver in such a way as to permit the authorized officer and his party to come aboard;
- (2) provide a ladder for the authorized officer and his party;
- (3) when necessary to facilitate the boarding, provide a man rope, safety line and illumination for the ladder; and
- (4) take such other actions as necessary to ensure the safety of the authorized officer and his party and to facilitate the boarding.

§652.13 Reports and Records

(a) Dealers.

(1) All persons who buy surf clams and ocean quahogs from vessels engaged in the surf clam or ocean quahog fishery shall provide at least the following information to the Regional Director on a weekly basis on forms supplied by the Regional Director:

- (i) dates of purchases;
- (ii) number of bushels purchased, by species;
- (iii) name and permit number of the vessel from which surf clams or ocean quahogs are landed or received;
- (iv) price per bushel, by species;
- (v) mailing address of dealer or processing plant; and
- (vi) meat yield per bushel by species.

(2) All persons required to submit reports under subparagraph (a)(1) are also required to submit at least the following information to the Regional Director on an annual basis on forms supplied by the Regional Director:

- (i) number of dealer or processing plant employees by month;
- (ii) number of employees processing surf clams and ocean quahogs, by species, by month;
- (iii) total payroll for surf clam and ocean quahog processing, by month;
- (iv) capacity to process surf clams and ocean quahogs, by species; and
- (v) projected capacity to process surf clams and ocean quahogs, by species, for the following year.

(3) All persons purchasing or receiving any surf clams or ocean quahogs at sea for transport to any port of the US must maintain and provide to the Regional Director records identical to those required under subparagraphs (1) and (2) of this paragraph (a).

(4) Violations of this section are subject to the penalties provided for in the FCMA.

(b) Owners and operators

(1) The owner or operator of any vessel with a permit in the surf clam or ocean quahog fisheries must maintain on a daily basis on board the vessel an accurate on board log for each fishing trip, on forms supplied by the NMFS

showing at least:

- (i) name and permit number of the vessel;
- (ii) total amount in bushels of species taken;
- (iii) date(s) caught;
- (iv) time at sea;
- (v) duration of fishing time;
- (vi) locality fished;
- (vii) crew size;
- (viii) crew share by percentage
- (ix) landing port
- (x) date sold;
- (xi) price per bushel;
- (xii) buyer; and
- (xiii) size distribution of surf clams and ocean quahogs sold, by species, on a percentage basis.

(2) Owners or operators shall fill out such logbooks to the extent possible prior to landing any surf clams or ocean quahogs at the end of any fishing trip. In any event, all logbook information required in paragraph (b)(1) must be filled in for the previous fishing trip prior to the next fishing trip.

(3) The owner or operator shall make the logbook available for inspection by an authorized official at any time during or after a trip.

(4) The owner or operator shall keep each logbook for one year after the date of the last entry in the log at the owner or operator's principal place of business.

(5) The owner or operator shall submit copies of logbook forms weekly to the Regional Director.

(6) All persons required to submit reports under paragraph (b)(1) shall submit annually to the Regional Director on forms supplied by the Regional Director at least the following information relating to vessel characteristics: name of the vessel, vessel's US Coast Guard documentation number or State license number, engine and pump horsepower, homeport of vessel, hold capacity (in bushels or cages), and dredge size and number of dredges.

(7) The Assistant Administrator may revoke, modify, or suspend the permit of a vessel whose owner or operator falsifies or fails to submit the records and reports prescribed by this section, in accordance with the provisions of 50 CFR Part 621.

FINAL REGULATORY ANALYSIS
OF THE SURF CLAM
AND OCEAN QUAHOG
FISHERY MANAGEMENT PLAN

Jointly Prepared by the
National Marine Fisheries Service
and the Mid-Atlantic Fishery Management Council

December 1979

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I. INTRODUCTION

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

A. Management Unit

The management unit for this FMP remains the same as in the original FMP and includes all surf clams (Spisula solidissima) and all ocean quahogs (Artica islandica) in the Atlantic Fishery Conservation Zone.

B. Statement of the Problems Addressed by the FMP

The original FMP addressed a number of problems bearing on the maintenance and enhancement of the resources and the industry for Surf Clams and Ocean Quahogs.

When the original FMP was being prepared in 1977, the surf clam stocks were declining, and there was significantly greater capacity to harvest and process surf clams than could be actively employed without threatening the long term yield from the fishery. Because of this, restrictions were placed on the level of removals from the surf clam stocks and no further entrants were allowed into the surf clam harvesting sector. Quahogs, which are now extensively used as a substitute for surf clam meats in finished product production, were just beginning to be utilized. However, because the

biological information concerning the ocean quahog is extremely limited, the Council decided to manage the two species jointly so as to prevent excessive exploitation of the quahog resources from the effort transfers from the surf clam fleet. Thus, a precautionary quota was also placed on the total quahog landings.

Amendment #2 to the original FMP, which is the subject of this Regulatory Analysis, is intended to refine and continue the Council's management program which has been developed to address the problems.

C. Specific Objectives of this Amendment

The objectives of the amended FMP remain unchanged from the original FMP and are to:

1. Rebuild the declining surf clam populations to allow eventual harvesting approaching the 50 million pound level, which is the present best estimate of the maximum sustainable yield (MSY), based on the average yearly catch from 1960 to 1976. (At the present time a target year has not been established by the Council for reaching this goal.)
2. Minimize the short-term economic dislocations to the extent possible, consistent with objective 1. (This objective relates to the continuation of the moratorium.)
3. Prevent the harvest of ocean quahogs from exceeding maximum sustainable yield and direct the fishery toward maintaining optimum yield.

D. The Measures Recommended in this FMP

The FMP recommends the following management measures:

1. The annual surf clam quota would continue unchanged at 1.8 million bushels. The quota would be allocated by quarter, and fishing effort would be regulated by restricting days and hours fished.
 - a. The quarterly quotas would be revised to become 400,000 bushels for the quarters October through December (1979 and 1980) and January through March (1980, 1981), and 500,000 bushels for the quarters April through June (1980, 1981), and July through September (1980, 1981). If a quarterly quota would be exceeded under the time allotment, the Regional Director of the NMFS may prohibit fishing.
 - b. The fishing week will be restricted to four days.
 - c. Fishing time will be restricted to 24 hours per week unless the Regional Director determines that the quarterly quota will not be harvested. A make-up day for bad weather will be permitted on the fishing day following the fishing day during which the bad weather condition existed, but only during the period from December through March.
 - d. Vessels will start and stop fishing at uniform hours. All authorized surf clam fishing periods will end at 5:00 p.m.
2. All aspects of ocean quahog management would remain the same as in this FMP except that the annual quota would be increased to 3.5 million bushels in 1980 and 4.0 million bushels in 1981 from the existing quota of 3.0 million bushels in 1979.
3. The prohibition on the entry of additional vessels into the surf clam fishery would be continued. The moratorium would not preclude

replacement of vessels involuntarily leaving the fishery during the time when the moratorium is in effect.

4. The provision to close surf clam beds to fishing wherein over 60% of the clams are under 4 1/2 inches in length and less than 15% are over 5 1/2 inches in length is continued. It is recommended that special measures be instituted to manage such closed areas when they are re-opened to ensure that such openings do not lead to premature closures of the fishery, and to prevent overfishing of newly opened beds.
5. A minimum landing size for surf clams of 4 1/2 inches is imposed.
6. The licensing and reporting requirements of the original FMP are continued. Vessels must meet certain criteria of eligibility to receive surf clam permits and must submit fishing reports on a weekly basis.
7. The New England surf clam fishery, defined as that portion of the fishery conducted northeastward of the dividing line between the New England and Mid-Atlantic Fishery Management Councils, will be managed separately by the Mid-Atlantic Council. Separate MSY, OY, and quota of 25,000 bushels will be established. There will be no moratorium on entry into the New England fishery. However, vessels entering the fishery in New England which do not qualify under the moratorium may not fish outside of New England, and must cease fishing entirely when the 25,000 bushel quota has been taken. There will be no restrictions on fishing effort until half of the 25,000 bushel quota has been taken, at which time effort restrictions as on the fishery in the Mid-Atlantic may, if necessary, be imposed.

Elaboration of Measures

Objective #1, the rebuilding of surf clam populations, is served by restricting the surf clam catch to 1.8 million bushels, providing for the closure of beds of small clams until they have reached the appropriate harvesting size, and limiting the harvest of small clams. Objective #2, minimizing short-term economic dislocations, is served by restricting additional entry into the fishery via the moratorium, by the imposition of effort controls, by the establishment of quarterly allocations to avoid disruptive closures, by providing for fishing opportunity and development of the resource in New England, and by allowing for an alternate weather day to promote safety and reduce the possibility of long periods of weather-enforced inactivity to certain fleet sectors with associated reduction in income. Objective #3, the prevention of excess ocean quahog harvests is achieved by the quahog quota. In addition, the needs of effective management in terms of enforcement and monitoring of the program, are served through establishing uniform fishing hours, the requiring licensing of participants, and the reporting of certain information on a continuing basis.

E. Alternative Measures Considered

The principal alternative measures considered to those stated in Section D were to:

1. Maintain the quahog quota at 3.00 million bushels.
2. Eliminate the moratorium.
3. Not allow for a bad weather makeup day.
4. Establish an individual vessel allocation system.
5. No FMP. (Allow to lapse)
6. Impose gear restrictions.

The impacts of adopting alternative 2 and 3 are presented in this document relative to the impacts of the recommended measures. Alternative #1 was discussed and considered as unacceptable by the Council since it was not justifiable on biologic grounds, and the Council felt that it could be construed as restraint of trade. Thus, the impact of adopting alternative 1 is not addressed here.

Alternative #4 was not pursued by the Council, due to the overwhelming opposition expressed towards it during the public review process. The lack of support for this alternative was due to an inability of the Council to arrive at an appropriate procedure for making the initial distribution of the vessel shares. The Council plans to pursue this idea in the future when more data is available through the logbook system on historic catches. No further analysis in this alternative is presented here.

Alternative 5 was analyzed in the original FMP. The reasons that it was found to be then and continues to be now unacceptable were detailed in that document and are relevant here. This approach would lead to overexploitation (in a biologic sense), further overcapitalization, reduced earnings in the harvesting and processing sector, and higher consumer prices.

The Council considered imposing gear restrictions on dredge size on the vessels in the fleet. However, experience with similar measures in other fisheries has shown that, in the long run, they are ineffective because the fishermen's ingenuity has proven adequate to negate the effects of the measures. Therefore, the only real effect of such measures is to increase inefficiency, and, thus, the cost per pound landed. The Council decided not to consider such measures further and no analysis of this alternative is presented here.

II. ECONOMIC IMPACT ANALYSIS

A. Structure for Estimating Economic Impact

The overall objective of the regulatory analysis is to quantitatively ascertain the impact of the recommended measures and the alternative contained in the FMP in the industry. Various economic performance indicators were selected to measure the impact.

The performance indicators that will be utilized in the analysis are indicated in Figure 1. These are general economic performance indicators that are useful for examining the economic "well being" of the surf clam and ocean quahog industry.

FIGURE 1

SELECTED PERFORMANCE INDICATORS

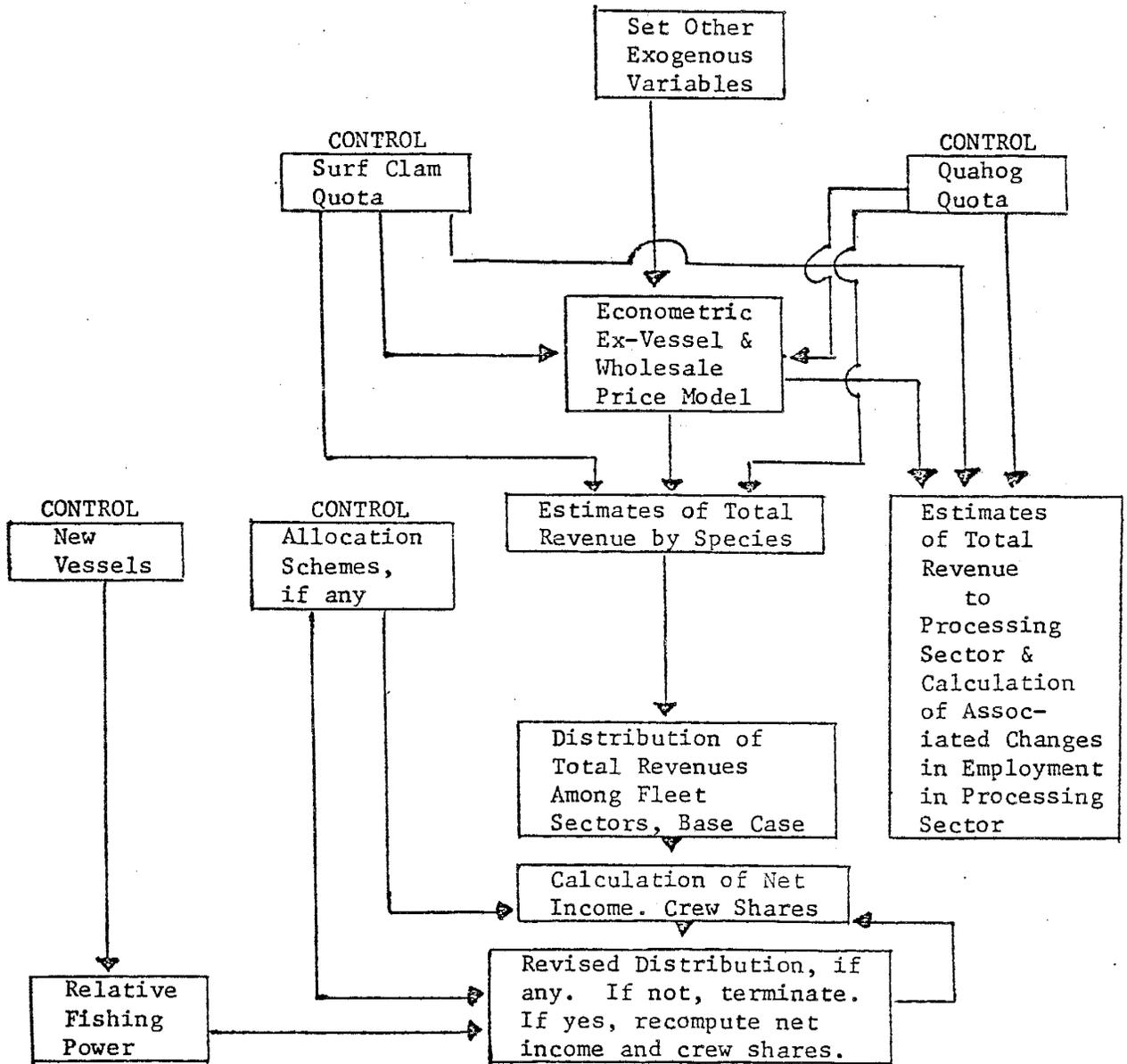
FOR IMPACT ANALYSIS OF THE SURF CLAM AND OCEAN QUAHOG FMP

- . Total U.S. catches by species
- . Ex-vessel prices by species
- . Total gross revenues by species to harvesting sectors
- . Total gross revenues from all species to harvesting sectors
- . Distribution of total species revenues among various vessel class configurations
- . Crew shares by vessel class
- . Wholesale prices (processor prices) for finished products
- . Finished product production
- . Total revenues to processing sector
- . Changes in employment in processing sector

A schematic overview or flow chart of the principal steps in the analysis appears in Figure 2. In Figure 2, the boxes labeled control are those actions that can be taken by the Council. For example, there are recommendations in the FMP regarding the appropriate surf clam and ocean quahog quotas. Controls on new entrants are recommended. Also, a bad weather makeup day is recommended that will affect the income distribution at the harvesting sector level. In order to link these actions to the performance indicators previously listed, the analytic model was developed. The overall model includes an econometric exvessel and wholesale price submodel, a surf clam meat weight shares estimate for the processing sector, an employment response function submodel for the processing sector, an initial distribution of harvests among the harvesting sector, and a routine for computing the additional fishing power units of new entrants.

All of the submodels are contained in the appendices.

Figure 2. CLAM INDUSTRY
Single Time Frame Impact Model



B. Estimated Economic Impacts of Recommended Measures

The economic impacts of some of these measures were addressed in the original Regulatory Analysis (November 1977). The measures that were addressed were the:

Surf Clam Quota of 1.8 million bushels.

Imposition of the Moratorium.

Reduced work week (effort control). Originally a 48 hour work week was established; however, in order to prevent closures the work week had to be reduced to 24 hours.

The Council has decided to continue the above measures in this FMP because they felt they were contributing to achieving the objective. The additional measures that are recommended that will require analysis are:

Increase in quahog quota.

Establishment of an alternative fishing day for the December-March period.

Establishment of a minimum size on surf clams.

Establishment of a separate management regime for New England.

The impacts of the measures will first be examined for the harvesting sector and secondly for the processing sector. The processing sector analysis will be limited in scope due to the fact that the major expansion of this sector in their utilization of quahogs has occurred the last two years, and the available data are extremely limited.

1. Harvesting Sector

A. Surf Clam and Ocean Quahog Catches

The only alternative annual harvest level considered for the surf clam stocks

for 1980 and 1981 is 1.8 million bushels (about 30 million pounds) from the FCZ. A harvest of 7.8 million pounds is expected from State territorial waters. The total legal supply (37.8 million pounds) from the two areas would represent a slight reduction from the 1978 catch of 39.4 million pounds. Given the existing data, the Council feels that this level of removals allows for some stock rebuilding. Whether or not this harvest strategy is optimal in the sense of the maximum present value of net benefits over time is unknown, for a long-term bioeconomic model of this fishery has not been developed that addresses the issue of: given that it is an objective to rebuild the surf clam stocks to such a level that will allow sustainable levels of harvest of 50 million pounds, what are the optimum intertemporal level of harvests to reach this objective. Optimum here is defined in terms of net economic benefits subject to some industry cash flow constraints. A multiple time period model is under development by the NMFS.

Given the historic catches in this fishery, it is clear that this surf clam OY will be entirely harvested by the U.S. fleet.

The recommended harvest levels for 1980 and 1981 for the quahog resource are 3.5 and 4.0 million bushels, respectively. An alternative to these levels was to maintain the level of removals at the existing 3.0 million bushel level.

A time series model was specified (Appendix 1) that forecasts the quahog landings in the absence of controls to be about 3.35 and 3.95 million bushels, respectively, in 1980 and 1981. Industry spokesmen have corroborated the direction of these forecasts, and have indicated that they feel that the entire 3.5 and 4.0 million bushel quota will probably be harvested. Thus, since this biologic evidence suggests that such a level of removals will not result in any deleterious effects on the stocks and since a decision not to

increase the quota would probably result in closures, the Council proposed that the higher figures be adopted as the relevant OY's. Further, it is expected that the U.S. fleet harvest will approximate these quahog OY's.

B. Exvessel Prices

In Appendix 3, an exvessel price model is presented for quahogs and surf clams. Incorporating the above expected U.S. catches for surf clams and quahogs together with 1980 forecasts for total U.S. disposable income, the U.S. population, and the producer price index, expected exvessel prices for these species were generated. It should be stressed that if the overall inflationary rate increases at a rate faster than that forecast by the trend equation (which included some years when the rate of growth in the PPI was less than in recent years) then the prices below could be biased.

These forecasts are summarized below* together with 1978 actual values.

1980 PRICE FORECASTS AND 1978 ACTUAL VALUES

	1980 Forecast	1978 Actual	1980 Forecast	1978 Actual
	<u>Surf Clams</u>	<u>Surf Clams</u>	<u>Quahogs</u>	<u>Quahogs</u>
Weighted Average				
Price*	\$10.00/bu.	\$8.69/bu.	\$3.27/bu.	\$2.92/bu.
FCZ Price**	\$10.86/bu.	\$9.35/bu.	N.A.	N.A.
Inshore Price	\$ 6.72/bu.	\$6.00/bu.	N.A.	N.A.

*Only impact analysis for 1980 is presented. While the Plan and the provisions are for two years, the general conclusions contained herein for 1980 are applicable for 1981.

**The price for FCZ clams is higher than the inshore clams due to the higher meat yield per bushel.

C. Exvessel Revenues

Applying the forecasted prices to the assumed total landings level in 1980 results in the following revenue estimates. Actual values for 1978 are presented below for comparative purposes.

	SURF CLAMS		QUAHOGS	
	<u>1980 Forecast</u>	<u>1978 Actual</u>	<u>1980 Forecast</u>	<u>1978 Actual</u>
FCZ	\$19,548,000	\$17,769,562	\$11,445,000	\$6,663,000
Inshore	\$ 3,142,941	\$ 2,807,438		
Total	\$22,690,941	\$20,577,000	\$11,445,000	\$6,663,000

D. Distribution of Revenues

This section will provide an estimate of the distribution of the total harvesting sector revenues by vessel class for 1980. The base case (a continuation of the present regime with no makeup weather day) will assume the actual distribution which is based on the vessel logbooks for 1979. This distribution, with associated average gross revenue estimates per vessel in 1980, will be compared to the distribution resulting from the adoption of a "bad weather makeup day."

In order to place the 1980 estimate in perspective, it is useful to examine the 1978 performance. Due to incomplete logbooks and other incomplete State records, the performance profiles presented in the FMP and which are repeated in the appendix are themselves incomplete. An updated version utilizing a more complete data base appear below:

1978 Average Vessel Performance by Vessel Class*

	<u>Class 1</u>	<u>Class 2</u>	<u>Class 3</u>
FCZ Clam Revenue	\$45,185	\$89,894	\$155,085

Inshore Clam

Revenue	\$29,411	\$30,581	\$ 6,279
Quahog Revenue	<u>0</u>	<u>\$24,986</u>	<u>\$ 69,260</u>
Average Per Vessel			
Total Revenue	\$74,596	\$145,461	\$230,624

*The 1980 forecast appears on page 21. While a complete cost model of the clam fleet is unavailable due to a lack of data, it is understood that the crew shares are, on the average, about one-third of the gross revenues. Further, it is assumed here that the average number of crew members per vessel for Classes 1, 2, and 3 vessels are 3, 4, and 5, respectively. Applying these assumptions to the previous data results in the following earnings per crew member.

1978 Average Crew Earnings

	<u>Class 1 Vessels</u>	<u>Class 2 Vessels</u>	<u>Class 3 Vessels</u>
	(0-50 GRT)	(51-100 GRT)	(101+ GRT)
Number of Vessels	21	56	76
Average Gross Revenue	\$74,596	\$145,461	\$230,624
Total Crew Share	\$24,616	\$ 48,002	\$ 76,105
Number of Crew	3	4	5
Average Crew Share	\$ 8,205	\$ 12,000	\$ 15,221

The range of actual earnings within any particular vessel class is quite large. It is expected that the actual distribution of earnings around the average above is comparable to the distribution shown in the appendix on the partial data base.

In order to proceed with the analysis of the impact of the bad weather day, a base case must be established in terms of FCZ surf clam catch distribution.

The projected total surf clam harvests (from the FCZ only) on a vessel class basis are presented below for the base case. These data reflect the 1979 catch patterns, which differ from the 1978 distribution and assume the continuation of the moratorium.

Projected Quarterly Harvest by Vessel Class for 1980

Under Present Management Regime (Base Case)

(Bushels)

Vessel Class	Quarter				Total
	<u>I</u>	<u>II</u>	<u>III</u>	<u>IV</u>	
0-50	21,000	33,000	33,000	21,000	108,000
51-100	70,000	148,000	149,000	70,000	437,000
101-500	<u>259,000</u>	<u>369,000</u>	<u>368,000</u>	<u>259,000</u>	<u>1,255,000</u>
Total	350,000	550,000	550,000	350,000	1,800,000

In order to assess the impact of the makeup weather day on the catch distribution, a considerable amount of speculation is involved. The relative average number of hours fished per vessel, on a vessel class basis, differs considerably among the quarters of the year. Specifically, during the January-March quarter 1980, the average number of hours fished per Class 1 vessel relative to the Class 2 and 3 vessels is considerably poorer than during the April-June period. This is as would be expected, and is, of course, the reason for the proposal.

Obviously, there is no priority basis for determining exactly how the relative performance would change with the adoption of such a measure. Clearly, however, it would be expected that the relative hours fished under the scheme for the Class 1 vessels and Class 2 vessels would move in the direction of the relationship that prevailed during the spring quarter. A projection is

presented below that weights the hours fished, by vessel class, during the first quarter by two-thirds and the hours fished during the second quarter by one-third in order to develop a weighted average relationship. This makeup weather day is also applicable to December.

The fourth quarter performance will, it is assumed, reflect the current relationship between vessel classes in that quarter, modified by a factor equal to 1/3 of the increased fishing opportunity projected for the first quarter. It is assumed that the productivity per hour fished (which is a function of the stock abundance) remains unchanged.

While all vessel classes will be able to generate more hours fished, the Class 1 vessels gain the most, in a relative sense, because they lose so much now during the bad weather. The assumed resultant distribution, together with the incorporated minor redistribution of quarterly quotas, appears below:

Projected Quarterly Harvest by Vessel Class for 1980

With Makeup Weather Day (Proposed Measure)

(Bushels)

Vessel Class	Quarter				Total
	<u>I</u>	<u>II</u>	<u>III</u>	<u>IV</u>	
0-50	28,000	30,000	30,000	28,000	116,000
51-100	88,000	135,000	135,000	84,000	442,000
101-500	<u>284,000</u>	<u>335,000</u>	<u>335,000</u>	<u>288,000</u>	<u>1,242,000</u>
Total	400,000	500,000	500,000	400,000	1,800,000

Note that as part of the proposal, the first and fourth quarter quotas were increased by 50,000 bushels (which were deducted from the second and third quarter quotas). This provision was included so as to minimize the possibility of closures (which the Council deemed to be undesirable) during

the first and fourth quarters due to the expected increase in effort associated with the makeup day. The actual third quarter harvests during 1978 and the second quarter harvest during 1979 provide indication that this reallocation should not result in any "shortages" during these periods.

The makeup day results in a redistribution of the quarterly quotas among vessel classes during the first and fourth quarters.

Utilizing the adjusted forecasted price of \$10.86 per bushel of FCZ surf clams results in the following difference in total revenues by vessel class for surf clams.

Estimated Distribution of Surf Clam* Revenues from the FCZ in 1980

	<u>Class 1</u>	<u>Class 2</u>	<u>Class 3</u>
Base Case	\$1,172,880	\$4,745,820	\$13,629,300
Proposed (Makeup Weather Day)	<u>\$1,259,760</u>	<u>\$4,800,120</u>	<u>\$13,488,120</u>
Gain (Loss)	\$ 86,880	\$ 54,300	(\$ 141,180)
%	+7.4%	+1.1%	-1.2%

For the entire year, the small class will add 7.4% to its FCZ clam revenues, with the medium vessels gaining 1%. This comes at the expense of a 1% loss on the part of the large vessels. A significant increase in harvest can accrue to the smaller classes, at relatively little cost to the larger vessels, principally because there are fewer small vessels than large ones and their average catch is, in most cases, a fraction of that of the larger vessels.

Assuming that the same number of vessels are operative in 1980 as were in 1978, the average gross revenues per vessel from FCZ surf clams would be:

	<u>Class 1</u>	<u>Class 2</u>	<u>Class 3</u>
# of Vessels	21	56	76

Average FCZ Surf Clam

Revenues with Makeup

Weather Day	\$59,988	\$87,716	\$177,475
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Average FCZ Surf Clam

Revenues for Base Case	<u>\$55,851</u>	<u>\$84,747</u>	<u>\$179,332</u>
	+\$ 4,137	+\$ 969	(\$ 1,857)

If it is further assumed that the 1980 distribution pattern of landings for quahogs and inshore clams is reflective of 1978, then the additional revenues per vessel class under either the base case or the makeup day would be:

1980 FORECAST OF AVERAGE SURF CLAM REVENUES PER VESSEL

	Class 1	Class 2	Class 3
Total Inshore			
Clams	\$691,446	\$1,917,192	\$ 534,293
Total Quahogs	<u>0</u>	<u>\$2,403,450</u>	<u>\$9,041,550</u>
Total	\$691,446	\$4,320,642	\$9,575,843

The resultant average revenues per vessel from all species under the proposed and under the base case would then be:

1980 FORECAST OF AVERAGE REVENUES PER VESSEL - ALL SPECIES

	<u>Class 1</u>		<u>Class 2</u>		<u>Class 3</u>	
	<u>Proposed</u>	<u>Base</u>	<u>Proposed</u>	<u>Base</u>	<u>Proposed</u>	<u>Base</u>
Average Per Vessel-						
Inshore Clams	\$ 32,926	\$ 32,926	\$ 34,235	\$ 34,235	\$ 7,030	\$ 7,030
Average Per Vessel-						
Quahogs	-	-	\$ 42,918	\$ 42,918	\$ 118,967	\$118,967
Average Per Vessel						

FCZ Clams	\$ 59,988	\$ 55,851	\$ 85,716	\$ 85,747	\$ 177,475	\$179,322
Total Average						
Gross Revenue	\$ 92,914	\$ 88,777	\$162,869	\$161,900	\$ 303,472	\$305,329

The earnings by the crew can be calculated from the gross earnings based on the same assumptions stated previously. These would be as follows:

	<u>Class 1</u>		<u>Class 2</u>		<u>Class 3</u>	
	Proposed	Base	Proposed	Base	Proposed	Base
Total Crew						
Share	\$30,661	\$29,296	\$53,746	\$53,427	\$100,145	\$100,758
Individual						
Share	\$10,220	\$ 9,765	\$13,436	\$13,356	\$ 20,029	\$ 20,151

It is clear that if the assumption made herein regarding:

the relative gain in fishing hours by vessel class due to the makeup day,

the increased quahog harvests,

and the price forecasts

are reasonably accurate, then the redistribution of income associated with the "mix" of proposals recommended by the Council is relatively insignificant to the Class 3 vessels, yet provides the small number of Class 1 vessels with an overall gain of 4.7% in gross revenues. When the revenues from the other species are considered, the largest gain in 1980 revenues/versus the 1978 performance are forecasted for the Class 3 vessels. This is due of course to the assumed increase in quahog landings. If these increased catches transpire, then the loss of FCZ clams to the Class 3 vessels is rather insignificant. It is true that not all of the Class 3 vessels harvest quahogs in the same

proportion as the average vessel in the class, and the loss to these vessels would be relatively greater. To the extent that the assumptions imbedded in the analysis are incorrect, the conclusion would be changed accordingly. For example, if the increase in time fished is more appropriately reflected by weight of 50% for the winter quarter and 50% for the spring quarter, then the gains above to the small vessels and the losses to the large vessels would be understated. Further, if the increases forecasted in quahog catches do not transpire, then the relative loss of FCZ clam revenues to the Class 3 vessels take on a greater importance.

E. The Moratorium

This section presents an estimate of the impact on the fleet from a relaxation of the restriction on new entrants into the surf clam fishery.

The moratorium on new entry into the surf clam fishery was imposed to restrict the increase of harvesting capacity and to preserve economic status of the extant harvesting sector to the extent possible. At intervals over the past two years, projections of the impact on the average gross revenue per vessel from surf clams with the addition of new vessels have been made. The average relative fishing power of vessels by tonnage class is 1.00, 1.42 and 2.95 for class 0-50, 51-100 and 101-500 ton vessels based on the adjusted weather day. There have been 21 class 0-50 vessels, 56 class 51-100 and 76 class 101-500 ton vessels active the last two years. By multiplying the vessels by the relative fishing power, there are 324.7 potential fishing power units currently in the fishery. The addition of a vessel will result in the addition of fishing power units in proportion to its class. Since it is assumed that the OY's will be caught already with no addition to capacity, then the limited harvest must be shared by an increasing number of units and

the return per power unit will decline. The projected reduction of average gross revenues for FCZ clams if a vessel of a given tonnage class enters the fishery is shown below.

<u>Vessel Class</u>	<u># Vessels</u>	<u>Relative Fishing Power</u>	Average Gross Revenue
			Reduction To All Vessels Due To a New Entrant From <u>Each Class</u>
0-50	21	1.00	.31%
51-100	56	1.42	.44%
101-500	76	2.95	1.0 %

Under the present conditions of excess technical capacity, addition of vessels to the fishery would only result in lower average gross (and net) revenues for the fleet. At the present time, because of the absence of complete cost data, it is not possible to indicate the magnitude of the impact on net earnings.

It should be noted that some of the smaller intermediate product processors, that are not vertically integrated, have expressed concern over continuation of the moratorium. They have argued that the larger processors (who produce both intermediate and finished product production) are able to maintain a level of price to the vessels during periods of slack demand that the smaller processors cannot sustain. They fear they would lose their raw material supply unless they are able to pay such prices. Further, they are also concerned over the ability of the large processors to undersell the intermediate product processors on intermediate product lines. In essence, they allege they are caught in a cost-price squeeze. These processors would presumably like to allow the moratorium to lapse so they would be able to bring some of their own vessels into the industry and become vertically integrated themselves. However, the Council recognized that although such a

strategy could result in some benefits to these smaller processors, it would largely be at the expense of the independent vessel owners. The increased capitalization of the fleet would probably not result in any increased production, and would result in lower average earnings per vessel.

Clearly, the current structure of the industry is not a result of this FMP. As is indicated in Appendix B, the finished product processing sector has been extremely concentrated among a few firms at least since 1970, well before this Plan was conceived and/or implemented. Further, these finished product processors have also historically sold shellfish stock during periods when their available raw material was in excess of their desired levels of finished product production. In essence, the problems that the smaller processors face are largely a result of historic developments in this industry, in terms of the relative ability of larger firms to prosecute various strategies, rather than as a result of the moratorium itself.

Whether or not the processing sector would become more concentrated at the intermediate product level as a result of the moratorium is impossible to determine at this time.

F. The New England Separate Management Unit

A separate management unit has been proposed to address the concerns of fishermen and others in New England that their inclusion under the entire present management program is inappropriate to the developing nature of the fishery in their area. The management regime proposed for their area will not have the restrictions on fishing time and licensing that apply in the Mid-Atlantic, until half of the pre-emptive quota of 25,000 bushels has been taken. The 25,000 bushel quota is about twice as great as any historical

annual landings from the New England FCZ. However, the quota is expected to encourage the exploration and development of the resource. The quota is in addition to the allocations provided in the Mid-Atlantic region. The addition of 25,000 bushels, or about 1% to the allowable harvest supply) of surf clams should have little if any effect on the exvessel price of surf clams. The additional vessels which will be permitted will also have no impact on those vessels fishing in the Mid-Atlantic, since they will be prohibited from fishing in the Mid-Atlantic and their harvests will come from a separate allocation. Vessels fishing in New England with licenses under the present system will have new competition. However, the Council felt that there is no justification for restricting fishing capacity in their area at the present time. The increased freedom to explore and develop the resource is expected to provide these fishermen with greater benefits than does the restraint of new entrants in their area.

2. Processing Sector

The analytic framework for the processing sector "keys off" of changes in the raw material supply. The only regulated change in the supply is a positive one, namely, the increase in the allowable harvests of quahogs. Unfortunately for analytical purposes, the processing sector has begun to use quahogs in products that were formerly based exclusively on surf clams only the last few years. Since there is a lag of approximately two years in securing the requisite processed production data in usable forms, the information necessary to forecast the expected change in processed output and prices, is essentially non-existent. For changes in employment, only crude approximations can be made based on the surf clam employment response function. Such approximations are presented below.

A. Surf Clam Output, Prices and Revenues

In the case of surf clams, the official FCZ quota for 1980 is unchanged from 1979, thus no incremental analysis is required. Nevertheless, some forecasts were prepared and appear below for expected output, prices, and revenues to the processing industry from the major product groups.

A processed product price forecast model was developed and appears in the appendix. The model is a cost markup model driven by changes in the price of surf clam material and other factor input prices, as measured by the PPI (Producer Price Index).

Utilizing the model and given various assumptions regarding the raw material shares by product group (see Appendix C), the following forecasts were made:

1980 Forecasts*

	<u>Breaded Output</u>	<u>Whole and Minced</u>	<u>Chowder & Juices</u>
Surf Clam Meats to Each Product Sector (Million pounds)	11.00	10.15	10.98
Finished Product Production	16.66 mill lbs.	392,143 standard cases	1,015,000 standard cases
Forecasted Price	\$1.62/lb.	\$35.72/ standard case	\$19.98/ standard case
Revenues (\$million)	\$26.98	\$14.00	\$20.28

*1978 figures are not available for comparative purposes

The revenue from the chowder and juice group no doubt understates what will actually transpire. This is due to the fact that the 1977 actual price was

\$19.92, which was an increase over the 1976 price of 52%. The specified equation for this group incorporates this observation, but clearly predicts a low estimate for 1980. Other caveats regarding these forecasts appear in Appendix C.

B. Quahog Employment

As was stated previously, for quahogs, only employment changes can be currently estimated.

In the processing sector, it is expected that the increased quahog harvests will result in added employment. The processing operation consists of two steps, frequently carried out in separate plants by separate firms. The first step of processing, the shucking operation, is highly automated. It is estimated that a change in output of 90,000 pounds of shucked meat is associated with one man-year of employment. This is slightly more than double the output associated with a change in surf clam shucked output as estimated by the employment response functions which appear in appendix 2. This is based on conversations with various processors and reflects the more capital intensive nature of the quahog process. Thus, an increase in output of 5,000,000 pounds would increase employment by about 56 man-years in the shucking plants. It is estimated that a change in final product (canned minced, chowder, stuffed) output of 77,000 pounds, which is $1/0.000013$ or the coefficient for mixed output plants, of final product is associated with one man-year of employment. If the present final product mix prevails, and an additional 5,000,000 pounds of shucked meat are input to that sector, final product output weight would be expected to rise by about 6,160,000 pounds. The 6,160,000 considers wastage of portions of the raw material supply in processing (weight loss), but includes the weight of potatoes, fluids, etc.

(weight gain). The resultant increase in employment is estimated at 80 man-years for 1980. The total increase for the processing sector is estimated at 136 man-years of employment in each of the two years following implementation of the amendment. Much of this employment increase may occur as increased working hours, overtime, or diversion of employees from other tasks. Thus, the increase in allocations may not result in the hiring of 136 workers for 1980. The net result, however, should be a significant increase in employment opportunity and income.

C. A Minimum Landing Size for Surf Clams

The establishment of a minimum surf clam landing size was intended to prevent the excessive harvests of immature small clams. The minimum size has been justified on the basis that it helps maximize the yield per recruit, aids continued spawning success, and represents an accepted market size limit now in general practice in the industry. The prevailing market clam size is 4 1/2 inches and up. Surf clams below that size must be handled with automated equipment because labor costs for manual shucking of large numbers of low-yielding clams would be unacceptable. The meat from these smaller clams cannot be used to produce the same product mix as larger clams. The small clams can only be ground, chopped or minced. Product flow analysis prepared and incorporated in the analysis illustrates the general shift of the surf clam industry towards the relative increased production of breaded surf clam products for which the chopped or minced raw material is inappropriate. At the time of preparation of the original FMP, 17% of the surf clam final product production for which processors accounted in the voluntary NMFS survey was in the form of breaded strips. At the time of preparation of this amendment, the breaded strip share had increased to 22% of the final product

accounted for, and projections for 1980 suggested a further increase to 25.8%.

Thus, this measure should, in addition to its biologic benefits, assist in maintaining a suitable raw material supply for the expanding breaded clam market.

No estimate has been made of the portion of the clam catch currently landed less than 4 1/2 inches. Most harvestors try to avoid landing small clams, both because they view it as a poor conservation practice and because processors are reluctant or unwilling to buy small clams, or may discount the price. Most vessels that take the small clams apparently do so as a matter of last resort, to boost landings for the short term or if bad weather has cut income off for a long time. There is no evidence that any particular group within the harvesting sector either relies on or harvests small clams to any great extent. However, it is said that small vessels may take more small clams when they would otherwise have no trip, as in prolonged periods of bad weather.

3. Summary

In summary, it appears that the measures recommended by the Council will be biologically beneficial to the surf clam stocks, and assist in the further development of the quahog fishery. The negative redistributive income aspects of the bad weather day on the large vessels appears to be marginal, yet should be helpful to the smaller vessels.

APPENDIX

DESCRIPTION OF THE SURF CLAM AND OCEAN QUAHOG INDUSTRIES

- A. HARVESTING SECTOR
- B. PROCESSING SECTOR
- C. EX-VESSEL AND WHOLESALE PRICE FORECASTING EQUATIONS
AND 1980 FORECASTS

APPENDIX A. HARVESTING SECTOR

Vessel Performance - 1978 [Partial Data Only]

This section contains information on the performance of the vessels in the surf clam and ocean quahog harvesting sector during 1978, the first full year of the plan. The data summarized in this section were collected through the mandatory vessel logbook system.

Table A-1 contains information on overall industry performance during 1978. Since some of the vessels are actively engaged in the inshore New Jersey surf clam fishery (which does not fall under the purview of this plan) in addition to the offshore fisheries, in order to properly evaluate the overall performance of the industry these inshore activities must be included. In 1978, total ex-vessel revenues generated at the harvesting sector level were about \$25 million, of which 71%, 6%, and 23% were from FCZ surf clam, inshore New Jersey surf clam, and FCZ ocean quahogs respectively.

Table A-2 contains information on the distribution of these revenues among the 153 vessels in the fleet. These vessels were divided into three different groups, depending on the gross registered tonnage (GRT) of the vessels. These were the three vessel classes utilized in the Plan for analyses. Class 1 vessels are less than 50 GRT, Class 2 vessels are between 51 to 100 GRT, and Class 3 vessels are greater than 100 GRT. Of the 153 vessels examined here, there were 21 Class 1 vessels (13% of total), 56 Class 2 vessels (37%), and 76 Class 3 vessels (50%). Class 3 vessel harvesting activities generated 66% of the total industry revenues, Class 2 vessels generated 29% of the total industry revenues, and Class 1 generated about 5% of the total revenues. On a species basis, Class 3 vessels generated about 66% of the FCZ clam revenues, 17% of the inshore clam revenues and 79% of the quahog revenues. Class 2 vessels accounted for 28% of the FCZ clam revenue, 61% of the inshore clam revenues, and 21% of the quahog revenues. Class 1 vessels accounted for 5% of the FCZ surf clam revenue, 22% of the inshore clam revenues, and 0% of the quahog revenues.

Figure A-1 shows the average catch of surf clam from the FCZ per trip by vessel class for 1978.

Tables A-3, A-4, and A-5 contain information on the concentration of the catch among the vessels in the fleet, irrespective of tonnage size. Not all of the vessels were engaged in harvesting all of the species. Specifically, in 1978, 152 of the 153 vessels recorded at least a bushel of FCZ clams, but only 51 vessels were active in the quahog fishery, and only 47 vessels were active (due to entry restrictions) in the inshore New Jersey clam fishery.

One fact that is clearly illustrated in these tables is that of fleet specialization. For example, in Table A-3 it can be seen that 50 vessels (33% of the total harvesting any FCZ clams) harvested 70% of the surf clams but these same vessels accounted for only 22% of the quahog revenues and 3% of the inshore clam revenues. In Table A-4, it can be seen that 21 vessels accounted for 90% of the total quahog revenues but only 11.5% of the FCZ clams and 4% of the inshore clams. Similarly in Table A-5, it can be seen that 34 vessels accounted for 90% of the inshore clam revenues but only 8% and 11% of the FCZ clam and FCZ quahog revenues.

Table A-1. 1978 Industry Performance Summaries

	Offshore Clams <u>(FCZ)</u>	Inshore Clams <u>(N.J.)</u>	Ocean Quahogs <u>(FCZ)</u>
Total Landings (bushels)	1,779,287	248,038	1,930,900
Average Price/Bushel	\$9.96	\$6.00	\$3.00
Total Revenues	\$17,721,706	\$1,488,230	\$5,792,701
Grand Total		\$25,002,637	
% By Species	71%	6%	23%

Table A-2. Distribution of Revenues by Vessel Class

	Class 1 <u>(0-50 GRT)</u>	Class 2 <u>(51-100 GRT)</u>	Class 3 <u>(100+ GRT)</u>
# of Active Vessels	21	56	76
% of Total Vessels	13%	37%	50%
% of Total Revenues	5%	29%	66%
% of FCZ Clam Revenues	5%	28%	66%
% of Inshore Clam Revenues	22%	61%	17%
% of Quahog Revenues	0%	21%	79%

1978 FCZ Surf Clam Fishery:
 Average Catch Per Trip By Vessel Class

0 To 50 Tons —————
 51 To 100 Tons — — — — —
 101 Tons And Greater - - - - -

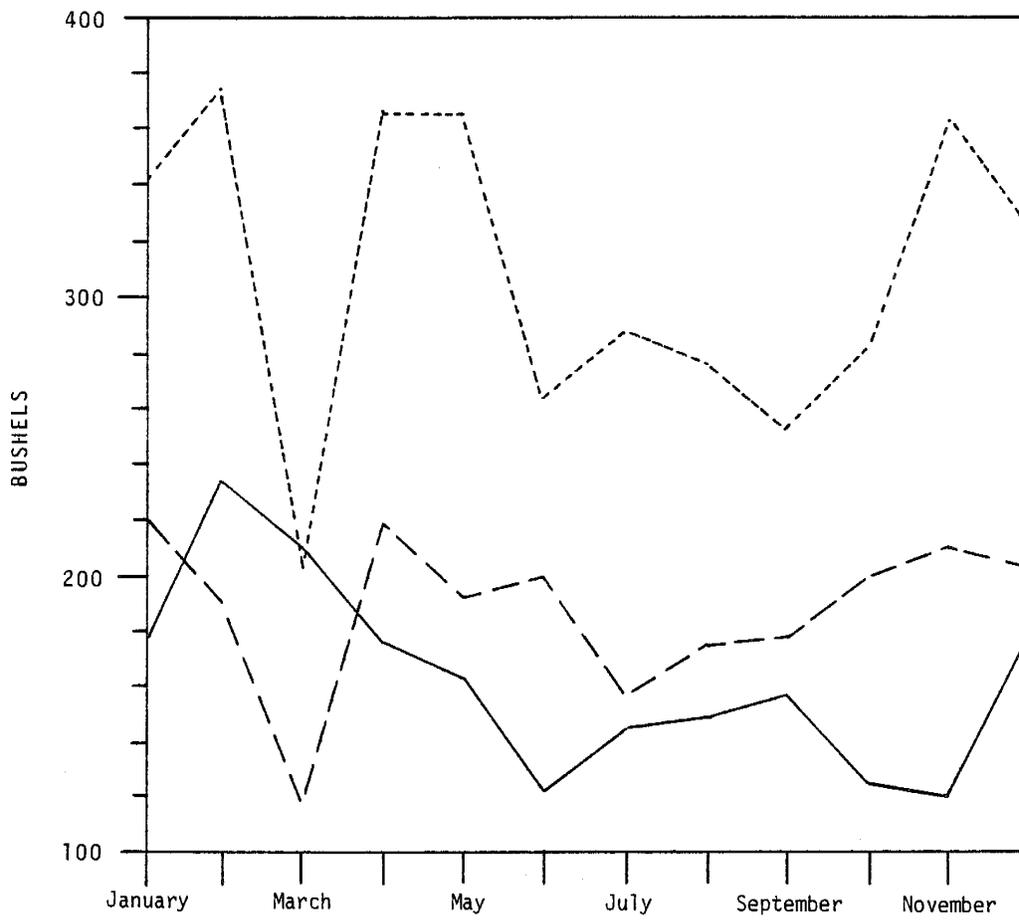


Figure A-1

Table A-3. Concentration of FCZ Surf Clam Catch - 1978

%	% of Total				
	Vessels		Landing		
Surf Clam Catch	# of Vessels	# of Vessels (Cumulative)	FCZ Clam	% of Quahogs (Cumulative)	% of Inshore Clams (Cumulative)
10	4	4	3	0	0
20	4	8	5	8	0
30	6	14	9	11	0
40	7	21	14	14	0
50	9	30	20	18	0
60	9	39	26	21	3
70	11	50	33	22	3
80	15	65	43	23	6
90	22	87	57	32	26
100	65	152	100	98	99

Table A-4. Concentration of Quahog Catch - 1978

% of Quahog Catch	# of Vessels	% of Total		# of Vessels	% of FCZ Clams (Cumulative)	% of Inshore Clams (Cumulative)
		# of Vessels (Cumulative)	% of Landing Quahog			
10	1	1	2	1	0	0
20	1	2	4	2	2.5	0
30	4	4	8	4	3.0	0
40	2	6	12	6	3.0	0
50	2	8	16	8	3.5	0
60	2	10	20	10	4.5	0
70	3	13	26	13	6.0	0
80	3	16	32	16	6.0	0
90	5	21	42	21	11.5	4
100	30	51	100	51	28.0	55

Table A-5. Concentration of Inshore Clams - 1978

%	Inshore	% of Total			
		# of	Landing	% of	% of
Clam	# of	# of	Inshore	FCZ Clams	FCZ Quahogs
<u>Catch</u>	<u>Vessels</u>	<u>Vessels</u>	<u>Clam</u>	<u>(Cumulative)</u>	<u>(Cumulative)</u>
		(Cumulative)			
10	2	2	4	0.5	0
20	5	5	11	1.0	1
30	3	8	17	2.0	2
40	4	12	26	3.0	4
50	4	16	34	4.0	5
60	4	20	46	5.0	5
70	4	24	51	5.5	6
80	5	29	62	6.5	8
90	5	34	72	8.0	11
100	13	47	100	12.0	12

Table A-6. contains information on the average gross revenues of the vessels. The average gross revenue of the 21 Class 1 vessels was \$61,358 per vessel, the average gross revenue of the 56 Class 2 vessels was \$128,352 per vessel, and the average gross revenue of the Class 3 vessels was \$217,453. While the averages are interesting in their own right, it is more meaningful to examine the distribution of the average gross revenues within a vessel class.

Table A-6. Performance of Permitted Vessels in Surf, Quahog and
Inshore Combined

<u>Vessel Class</u>	<u># Vessels</u>	<u>Average Gross Revenues</u>
0-50	21	\$ 61,358
51-100	56	\$128,352
101-500	76	\$217,453

Tables A-7, A-8, and A-9 present detailed performance profiles for each of the vessel classes.

The data in Table A-7 are for the 21 Class 1 vessels. These 21 vessels were divided into four arbitrary groups (chosen by computer analysis) depending on the average gross revenues. Three of these 21 vessels were barely active at all (average gross revenue of \$583). For the more active vessels, the range of the gross stocks was from \$39,154 (7 vessels) to \$139,613 (3 vessels). One fact that is illustrated in Tables A-7, A-8, and A-9 is that the more productive vessels in any vessel class were generally less involved in the inshore clam fishery and apparently spent more hours in offshore activities. Further, those groups within the vessel classes that spent more total hours in the offshore fisheries were also generally more productive in terms of revenues generated per hour of time fishing. These facts are illustrated in the Class 1 profile.

It should be noted that the data in Tables A-7, A-8, and A-9 for productivity per hour fished refers to only those hours for which both catch and hours fished were reported. Generally, the majority of the total catch data had associated data on hours fished.

The vessels in Group IV spent 196% and 47% more hours fishing for the FCZ clam than Groups II and III, respectively, and were 148% and 46% more productive on an hourly basis, respectively. While not presented in this table, average dredge size, and horsepower of the vessels generally increase from Groups II to IV. A subsequent section presents a production function for these vessels that references these facts.

Table A-8 contains the performance profile for Class 2 vessels. Based on the range of gross revenues, 5 groups were selected for comparative purposes. The average

gross stocks of the groups range from \$34,548 (5 vessels) in Group 1 to \$255,172 in Group IV (7 vessels). The highliners (Groups IV and V) had little involvement in the inshore clam fishery, spent more hours in the offshore clam and quahog fisheries, and were more productive on an hourly basis. Further (not presented in the table), the average dredge sizes and the horsepowers of the highliners were greater than Groups I to III. One interesting fact that is presented in Tables A-8 and A-9 is that the revenues per hour of reported quahog fishing were, except for Class III - Group II, larger than the revenues per hour of FCZ clam fishing. It should be remembered, however, that for the vessels, the average total revenues from quahog fishing were substantially less than the average total revenues from FCZ clam fishing.

Table A-9 contains the performance profile for Class 3 vessels. The 76 vessels in this class were also divided into 5 groups. The average gross revenues ranged from \$36,452 (20 vessels) in Group I to \$606,365 (4 vessels) in Group V. It is interesting to note that the 21 Class 1 vessels outperformed the 20 Class III - Group I vessels by 68%. The conclusion reached for Class II vessels is the same here also: Groups IV and V vessels spent more hours fishing for FCZ clams and quahogs and were more productive on an hourly basis. Further, the average dredge sizes of Groups IV and V were larger than the other groups.

Table A-7. Performance Profile 1, Class 1*

	<u>I</u>	<u>II</u>	<u>III</u>	<u>IV</u>	<u>Group Ave.</u>
Number of Vessels	3	7	8	3	21
Avg Gross Revenue(\$)	583	39,154	74,230	139,613	61,357
Offshore Clam Revenue(\$)	583	16,210	58,634	120,203	44,990
Quahog Revenue (\$)	0	1,260	0	0	425
Inshore Clam Revenue(\$)	0	21,684	15,596	19,410	15,942
*Avg Hours Clam Fishing		197	397	584	301
*\$/Hr Clam Fishing		\$79	\$134	\$196	\$139
*Avg Hrs Quahog Fishing		-----Trace-----			
\$/Hr Quahog Fishing		-----Trace-----			

* Only for those catches for which time fished was reported.

Table A-8. Performance Profile 1, Class 2

	<u>I</u>	<u>II</u>	<u>III</u>	<u>IV</u>	<u>V</u>	<u>Group Ave.</u>
Number of Vessels	5	15	16	13	7	56
Ave. Gross Revenue (\$)	35,548	78,586	116,669	167,569	255,172	128,350
Offshore Clam Revenue (\$)	17,188	48,061	80,497	141,428	158,628	90,068
Quahog Revenue (\$)	0	4,108	15,124	19,753	96,543	22,073
Inshore Clam Revenue (\$)	18,360	26,417	21,046	6,387	0	16,211
Avg Hrs Clam Fishing Reported	137	279	431.4	613	588	426
Avg \$/Hr Clam Fishing	122	155	168	210	232	190
Avg Hrs Quahog Fishing Reported	0	12.8	71.78	75.7	190	65
\$/Hr Quahog Fishing	0	316	199.66	248	465	317

Table A-9. Performance Profile 1 Class 3

	<u>I</u>	<u>II</u>	<u>III</u>	<u>IV</u>	<u>V</u>	<u>Group Ave.</u>
Number of Vessels	20	19	16	17	4	76
Avg. Gross Revenues(\$)	36,452	155,762	239,999	389,652	606,365	217,453
Offshore Clam Revenues	36,003	130,876	161,871	262,478	389,652	154,383
Quahog Revenues(\$)	234	17,219	72,143	127,083	237,781	59,838
Inshore Clam Revenues(\$)	214	7,667	5,981	0	0	3,232
Avg Hrs Clam Fishing Reported	187.5	571.2	572.25	676.38	611.3	496
Avg \$/Hr Repted Clam Fishing	164	206	252	335	525.8	273
Avg Hrs Quahog Fishing Rprtd	1.9	89.49	180.78	269.2	363.8	140
Avg \$/Hr Rprtd Quahog Fishing	235	154	361.5	428	569.0	386

Summary of Key Vessel Groups

Table A-10 is provided so as to enable the reader to link the previous information on catch concentration to the various vessel class-group constellations. For example, just considering the harvesting activities of the 4 vessels in Class III - Group V (in the table this is "C3-V"), we pick up 9.7% of the total revenues from all species. The groups themselves were ranked in this basis of the average total revenue generated per vessel in the group. Thus, we see that by examining the activities of only 57 vessels or about 37% of the 153 vessels examined, we can account for about two-thirds of the FCZ clam revenues and 90% of the quahog revenues.

Table A-10. Summary of Key Vessel Groups

Rank	Group	Number of Vessels	Cumu- lative Number of Vessels	Cumu- lative % of Total Vessels	Cumu- lative % of Total Revenue	Cumu- lative % of Offshore Clam Revenue	Cumu- lative % of Inshore Clam Revenue	Cumu- lative % of Quahog Revenue
1	C3-V	4	4	2.6	9.7	8.3	0	16.4
2	C3-IV	17	21	13.7	36.1	33.4	0	53.7
3	C2-V	7	28	18.3	43.8	36.6	0	65.3
4	C3-III	16	44	28.7	59.1	54.2	6.4	85.2
5	C2-IV	13	57	37.2	67.8	60.5	11.9	89.6
6	C3-II	19	76	49.6	79.6	78.7	21.6	95.2

Vessel Production Function

A vessel production function is the technical relationship between inputs and outputs. A production function is useful in the determination of which physical and operating characteristics of the vessels are useful for "explaining" variations in the outputs generated by the vessels (since there are two outputs considered, it is more relevant to use revenues as the output variable). For the vessels, the general functional form specified was:

$$Y = f(X_1, X_2, X_3, X_4, X_5)$$

where Y = Total revenues from FCZ surf clam and ocean quahog

X₁ = Dredge size (inches)

X₂ = Gross Registered Tonnage (tons)

X₃ = Horsepower

X₄ = Hours Surf Clam Fishing

X₅ = Hours Quahog Fishing

The equation was estimated in a linear form. The data that were utilized were from the 1978 license and logbook files. The estimation procedure utilized was ordinary least squares.

Because of the high degree of correlation among the physical characteristics of the vessels and its associated problem of multicollinearity, the specification that provided the "best fit" in terms of the standard statistical tests was:

$$Y = f(X_1, X_4, X_5)$$

The results are presented in Table A-11. The coefficient of determination (R²) is equal to about 80%, indicating that 80% of the variation in the revenues among the vessels can be "explained" by usage of this equation.

This equation could be useful for the prediction of the impact on the existing fleet of new vessels coming into the fishery. It is interesting to note that the regression coefficient for "quahog hours fishing" is larger than that for "FCZ clam hours fishing". This is reflective of the comments presented earlier. The coefficient for the dredge size was 1495, which suggest that, all other factors held constant, a vessel would be expected to generate an additional \$1,495 in total revenues as the size of the dredge is increased by one inch.

Table A-11. Surf Clam and Ocean Quahog Vessel Production Function

Dependent Variable: Total FCZ Clam and Ocean Quahog Revenues

<u>Variables</u>	<u>Coefficient</u>	<u>T Statistic</u>
Constant	-122,354	- 8.388
Dredge Size (inches)	1,495	8.758
Clam Hours Fishing	220	11.33
Quahog Hours Fishing	388	16.43

R2 = .7907, Durbin Watson = 1.97, F Value = 170.3

Vessels Net Revenues

All of the previous information presented is in terms of gross revenues and does not address the issues of net income to the vessels, crew shares, return on investment, etc. Basically, this is due to the fact that no cost data were required to be provided in the logbooks, only gross revenue information.

Harvesting Capacity

Introduction

The FCMA requires that estimates be made of the harvesting capacity and the extent to which the capacity will be utilized during the relevant time period. The following section presents an estimate of the "specification" of capacity. This is followed by a discussion in regards to the extent to which the previously estimated capacity will be utilized, given the regulatory measures set out in the document.

Potential Capacity Section

Approaches For Measuring Capacity

A. Definitional Problems

Measuring the harvesting capacity of a fishing fleet is difficult because of the volatile nature of certain fisheries. On one hand, the biological or engineering capacity shows the short-run ability of the industry to produce regardless of economic considerations. This was the common capacity measure used during World War II. Most US fishing fleets, however, are composed of a great number of different types of boats and gears that often compete at similar tasks. Their harvesting capabilities have, for the most part, been adapted to cope with many government regulations, wide price fluctuations, and declining stocks that have characterized modern US fishing effort. Because fishing efficiency is so largely determined by these external elements, any index of current physical capacity (based upon such traditional factors as capital invested or labor supply) would show an incomplete and probably biased picture of the industry.

An alternate to physical capacity is the concept of economic capacity, which is generally defined as the level at which producers do not have a profit incentive to either increase or decrease production. Marginal revenues equal marginal costs, and profits are at a maximum. Unfortunately, the fishing industry presents a host of peculiar problems. First, fisheries are highly interdependent with one type of boat often used to catch several different species, depending on the availability of stocks and profitability of each. Second, the high risk factor exists because catch per unit effort and revenues per unit effort can vary substantially depending on weather, stock availability, or just plain luck. Finally, the third and most critical problem is that the bulk of economic costs and wages go to the owners and crew who operate on a share basis. If the revenues per unit effort are highly erratic or if there is a blurry definition between costs or revenues, the purely economic methodology cannot be accurately applied.

The alternative, used in this report, defines capacity by measuring the observed relationship between catch and fleet size. An index is constructed so that when a full utilization is observed, the index is set to 100 percent. Intervening periods are calculated as percentage of the full utilization rate, with an adjustment for productivity changes.

B. The Peak-to-Peak Methodology

Without a survey or with limited data, it is difficult to estimate capacity using the first two definitions listed above. The "peak-to-peak" method deals with these problems. It is called "peak-to-peak" because the periods of full utilization, called peaks, are used as the primary reference point for the capacity index. We start by first identifying the years that a particular fishery operated at full capacity. Peaks are defined as years that the industry was recognized as achieving the maximum sustainable output in the short run. In practice, a peak year is often identified on the basis of having a yield per producing unit that is significantly higher than both the preceding and following years. These years have then had a 100 percent capacity utilization rate. From this we interpret the trend of "potential" capacity. By adjusting the catch trend to reflect the changes in fleet size (usually tonnage or operating units, but may be any relevant short-term constraint to expanding the catch), we get the adjusted trend of historical catch rates. We then compare the catch per ton of both peak and nonpeak years and adjust for productivity changes to obtain the historical capacity utilization rate.

Briefly, this method is a direct and simple measurement of the institutionalized or observed response by the industry to changes in demand. It is generally not considered to be as reliable as a survey, but it is a practical technique when a survey does not exist. It is extremely limited because one must assume that the basic technology is the same between peaks and, moreover, the further one gets between peaks the less reliable the results will be.*

Note that in the discussion, technology refers to the method of production, not the productivity.

Theoretical Basis for Measuring Capacity

A. Type 1: Peak-to-Peak

As with many other capacity studies, we have started by defining a production function that is Cobb-Douglas, or first-degree homogeneous. This is shown by:

$$Q_t = A L_t^a K_t^B T_t \quad (1)$$

Here, the output, Q_t , which can be produced in the current time period t , is determined by the available labor inputs, L_t , and capital inputs, K_t , and adjusted by a technology trend, T_t , and a constant or alining coefficient, A . To adapt our methodology to the available data, a second constraining relationship is added. This is shown by:

$$Q_t = A_t V_t T_t \quad , \quad (2)$$

where

$$V_t = L_t^a K_t^B \quad . \quad (3)$$

In eq. (2), the labor and capital inputs have been combined into a single production unit, V_t . This structure in effect limits the factor inputs of labor and capital to about constant proportions. The inputs would always be applied in the same proportions if $a = B$. For the analysis discussed in section VII, we use the

* For a further discussion on "peak-to-peak" methodology and results for other industries see Klein & Summers (1966).

relationship of eqs. (2) to (3) to circumvent the need for labor and capital data, as neither are adequately available in fisheries.

The specification used in the empirical analysis is a modified version of eq. (2):

$$\frac{Q_t}{V_t} = A T_t . \quad (2a)$$

In eq. (2a) we have modified the original relationship of eq. (3) so that we are now dealing with measurable phenomena. Output per producing unit is the dependent variable, and a technology trend is the main independent variable. This is the final relationship used to determine the capacity potential.

To estimate the technology trend, we apply the "peak-to-peak" methodology discussed in section III. Here, the level of technology in a particular time period, t , is determined by the average rate of change in productivity between peak years.

$$T_t = T_{t-m} + \frac{\frac{Q_{t+n}}{V_{t+n}} - \frac{Q_{t-m}}{V_{t-m}}}{\frac{n+m}{m}} \quad (4)$$

Relative to a particular year, t , the values of m and n correspond to the length of time from the previous and following peak years.

Interpreting The Results

Listed below are some important caveats in the interpretation of the results:

A. A capacity rate of 50 percent in a given year does not necessarily imply that either there are 50 percent too many boats or that the fleet would be more economically efficient if there were fewer. The only conclusion that can be drawn from these figures is that the potential exists for a greater catch without the necessity of major expenditures or new capital or equipment.

To draw conclusions about the efficiency or desirability of a high-capacity utilization rate requires an examination of the market structure of the industry, stability factors, and any monetary and social costs involved. In addition, an analysis of the industry's pricing and profitability structure must determine whether the fishermen would use the excess capacity to catch more fish if given the opportunity.

B. This paper's methodology implicitly implies stable weather and biological (resource) conditions. Major fluctuations in either of these two factors will usually lead to the exaggeration of the potential catch capabilities of the fleet because during the best or peak years the resource might be easier to harvest than normally expected. An abnormally high peak alternatively dictates that nonpeak years will seem overly depressed.

The potential catch capabilities of the fleet will be underestimated if there are embedded or "hidden" technological or regulatory constraints on the fishery. For example, in the highly regulated salmon fishery, over 50 years of regulations have affected the type of boats, gear, and attitudes of the fishermen. Thus, the measured peak may still be below the potential peak if the resource were more available and the regulations or constraints relaxed.

C. In eqs. (3) and (5) we refer to the variable "T" as a technology trend. In practice, however, this variable is a catchall that accounts for all phenomena

except capital use because no other variables are explicitly considered. Changes in regulatory policy, biological availability, or the application of skilled labor would, for example, affect the estimation of the "T" trend.

Results for the Surf Clam and Quahog Fleets

Table A-12 contains information on the number and size distribution of vessels in the surf clam and ocean quahog fleet during the 1965 to 1978 period. Table A-13 contains information on the fishing effort units in these fisheries during the same period. These were derived by multiplying the number of vessels in each tonnage class by a relevant fishery power index. The indices used are an average of the indices reported by Visgillio (1973) and Mueller (1976). By summing across tonnage classes in a particular year, the total fishery effort units for the industry was obtained.

Table A-14 contains the data on catch, effort, actual observed catch per unit of effort, calculated potential catch per unit of effort, and the capacity utilization rate. The latter two series were generated by using the methodology stated previously.

As can be seen from the Table, the capacity utilization rate in 1978 was estimated to be approximately 20%. This implies, given the total effort units active in 1978, a total potential capacity for harvesting clam and quahog meats of about 247,000,000 pounds. This represents about 136% increase over the maximum total landing ever harvested. Obviously, this is due to the tremendous increase in fishery effort units that have occurred since 1976. The data in Table A-14 are depicted in graphical form in Figure A-2. Again, this potential capacity rate: ignores changes in the condition of the resources, assumes that demand is not a constraining factor, and ignores the profitability of operating at such a level. In short, it simply states that if biologic abundance, demand condition, and cost factors were not constraining, the industry has the potential to harvest at a significantly higher level than current harvest rates.

Table A-12. Estimated Vessel Distribution by Tonnage Class in the Surf Clam Fishery and Ocean Quahog Fishery - 1965-1978

<u>Year</u>	<u>Total Vessels</u>	<u>No. In Class 1</u>	<u>No. In Class 2</u>	<u>No. In Class 3</u>
1965	68	33	33	2
1966	74	34	34	6
1967	91	40	40	11
1968	86	38	42	6
1969	92	32	56	4
1970	104	33	59	12
1971	92	28	46	18
1972	90	29	44	17
1973	93	32	44	17
1974	98	35	46	17
1975	99	35	46	18
1976	125	46	50	29
1977	162	38	65	59
1978	158	21	58	78

Table A-13. Estimated Fishing -- Surf Clam Fishery, 1965-1978

<u>Year</u>	<u>Class 1</u>	<u>Class 2</u>	<u>Class 3</u>	<u>Total</u>
1965	33	48.0	9.4	90.9
1966	34	50.0	28.3	112.3
1967	40	58.8	51.8	150.6
1968	38	61.7	28.3	128.0
1969	32	82.3	18.8	133.1
1970	33	86.7	56.5	176.2
1971	28	67.6	84.8	180.4
1972	29	64.7	80.1	173.8
1973	32	64.7	80.1	176.8
1974	35	67.6	80.1	182.7
1975	35	67.6	84.8	187.4
1976	46	73.5	136.6	256.1
1977	38	95.5	277.9	411.4
1978	21	85.2	367.38	473.58

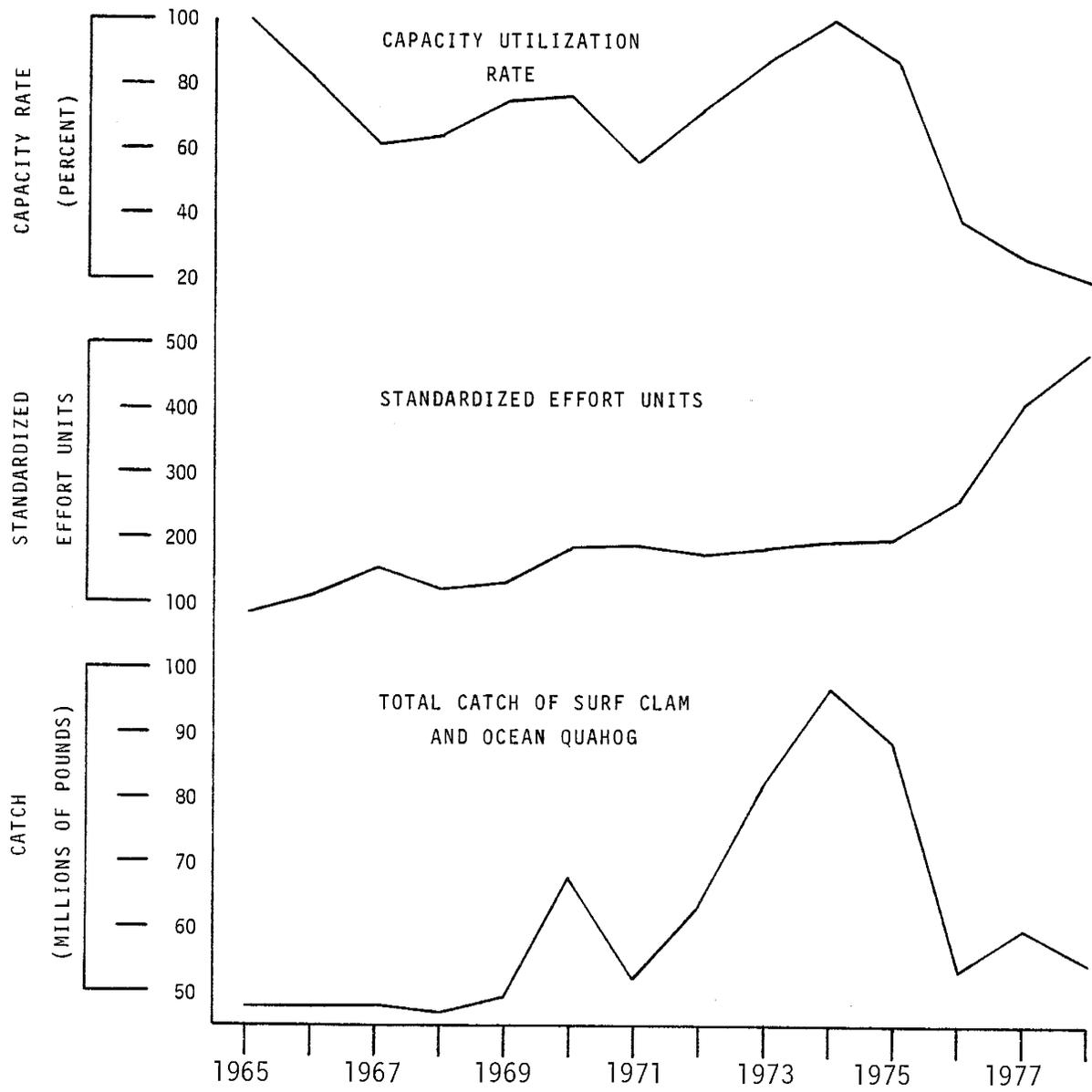
Fishing Powers* 1.0 1.47 4.71

*Average of Mueller (1976) and Visgilio (1973)

Table A-14. Estimated Catch-Effort in the Surf Clam Fishery, 1965-1978

Year	Catch (1000 lbs)	Effort	Potential	Actual	Capacity
			Catch/Effort (1000 lbs)	Catch/Effort (1000 lbs)	Rate Percent
1965	44,088	90.9	485.0	485*	100.00
1966	45,113	112.3	489.0	402	82.2
1967	45,100	150.6	494.0	299	60.5
1968	40,552	128.0	498.0	317	63.6
1969	49,575	133.1	503.0	372	73.9
1970	67,318	176.2	507.0	382	75.3
1971	52,535	180.4	512.0	291	56.8
1972	63,471	173.8	516.0	365	70.7
1973	82,308	176.8	521.0	465	89.2
1974	96,069	182.7	525.0	525*	100.0
1975	88,000	187.4	525.0	470	88.6
1976	54,500	256.1	525.0	213	39.8
1977	66,000	411.4	525.0	146	27.0
1978	52,000	473.58	525.0	110	22.0

* Peak Years



Capacity Data For Surf Clam And Ocean Quahog Vessels

Figure A-2

Extent to Which the Potential Capacity Will Be Utilized

The plan suggests that OY's of 30 million pounds of surf clam meats and 35 million pounds of ocean quahog meats be established for 1980 for a total of 65 million pounds of clam meats. During 1978 approximately 30 million pounds of surf clam meats and 22 million pounds of quahog meats were harvested. The surf clam harvest was less than a third of previous catch levels at a time when there were far fewer effort units in the fishery. Clearly, there is no doubt that the expected domestic catch (or the extent to which the capacity will be utilized) on surf clams will be 30 million pounds. In regards to quahogs, the 1977, 1978, and assumed 1979 catches of 18.3, 22.7, and 27.0 million pounds respectively represent tremendous increases over previous levels. This increase in quahog production was in response to two factors. First, there was the need to generate an alternate raw material source to supplement the declining availability of surf clams and second, there were technological successes achieved in the ability to utilize quahog meats in various finished clam products, namely canned chowders and canned whole and minced clam. Clearly, the extent to which the vessels utilize portions of their "potential" capacity to harvest surf clams is largely a function of the processing sector's ability to integrate even greater amounts of quahog meats into formerly surf clam based products. A trend equation was estimated for the period 1970-1979 for quahog landings to assist in generating a quahog catch forecast.

The trend line estimated was

$$QQt = -8168.6 + 5964 \cdot T$$

$$R^2 = .9359 \quad D.w = 2.06$$

where

QQt = Predicted quahog catch in year T (1000 lbs.)

T = Time, 1974 = 1, 1979 = 6

If it is assumed that this growth pattern would continue for the next two years, the estimated catches in 1980 (T=7) and 1981 (T=8) would be:

$$Q_{1980} = -8168.6 + 5964 (7) = 33,580 (1,000 \text{ lbs.})$$

$$Q_{1981} = -8168.6 + 5964 (8) = 39,544 (1,000 \text{ lbs.})$$

These forecasted harvests are clearly in line with the suggested OYs for the two years of 35 and 40 million pounds respectively. The total clam landings for the 1980 and 1981 period would be 65 and 70 million pounds respectively, which are still considerably below the total peak clam landings of 96 million pounds when the fleet was considerably smaller. Thus, it is concluded that the entire OYs for both species should be set aside for exclusive US exploitation.

APPENDIX B. PROCESSING SECTOR

This section attempts to provide a descriptive analysis of the surf clam and ocean quahog processing sectors during the 1971-1977 period.

Number of Plants

Surf clam based products have historically comprised the vast majority of the total US production of canned clam chowders, whole and minced clams, breaded clam products, and canned sauces and juices. These four product groups are the principal finished product lines for all clam products. In 1977, however, quahog based finished products comprised about 12% of the value of all clam finished product production compared with an average of less than 1% during the 1971 to 1976 period.

Surf clam and ocean quahog are processed in the New England, Middle Atlantic, and Chesapeake Bay regions. Table B-1 presents data on the number of surf clam and ocean quahog processing plants by state for the years 1971 to 1977. As can be seen from Table B-1, there has been little change in the total number of clam plants since 1972 nor have any significant changes occurred within any particular state. During the period 1973-1976, essentially all of the quahog processed production was generated from plants in Rhode Island. These plants also produced trivial amounts of surf clam based products. However, in 1977 the production of finished quahog products increased dramatically with 8 plants in Delaware, New Jersey, and Maryland generating about \$11.00 million of finished product production. These same plants also produced surf clam products.

Historically, the plants in Rhode Island have reported the vast amount of their production to be shucked output only, which is typically an intermediate product.

Table B-1. Number of Plants by State

<u>Year</u>	<u>ME</u>	<u>MA</u>	<u>RI</u>	<u>NY</u>	<u>NJ</u>	<u>PA</u>	<u>DE</u>	<u>MD</u>	<u>VA</u>	<u>Total</u>
1971	1	7	5*	5	16	2	3	9	7	55
1972	1	5	5*	4	14	2	3	8	8	50
1973	1	6	3*	4	15	2	3	7	6	47
1974	1	6	4*	4	15	2	3	7	7	49
1975	1	7	6*	4	13	2	3	7	7	50
1976	1	6	5*	3	15	2	3	6	8	49
1977	1	5	4*	3	13	3	3**	7	8	47

*Of these total number of plants in Rhode Island, some of them processed only quahogs. The number of plants that produced only quahogs were: 1971 - 3, 1972 - 4, 1973 - 1, 1974 - 1, 1975 - 3, 1976 - 3, and 1977 - 1.

** one of these plants produced only quahogs.

Reported Production*

The reported output of the surf clam and ocean quahog plants listed in Table B-1 include both intermediate and final products. The intermediate products are fresh and frozen shucked surf clam and ocean quahog meats. These meats are typically then further processed into a variety of finished product forms. These include canned clam chowder, canned whole and minced clams, canned sauces, canned juices, and breaded products. Generally, quahog have not been successfully utilized in the breaded strip lines.

The method of raw material acquisition differs among those plants that produce finished products. Some finished product plants produce their own shucked output which is consumed in their own finished product forms. Some of the same plants also offer some of this shucked output for sale to other finished product plants. On the other hand, some finished product plants apparently acquire all of their shucked raw material from those plants that produce only shucked output and those that produce both finished and shucked output. In short, there are a variety of practices extant regarding raw material acquisition.

In order to avoid problems of double counting, it is more meaningful to examine reported finished product production only, rather than reported total production (which includes the intermediate product). Since the finished products are measured in a large variety of ways, i.e., gallons, various sizes of cases, and pounds, it is more useful to examine the trends in production in terms of total value overall and by-product groups during this period. These trends are depicted in Figures B-1 and B-2.

As can be seen from Figure B-1, until 1977 surf clam based finished products comprised essentially all of clam processed production when, as stated previously, quahogs comprised above 12% of the total value. The undeflated value of reported finished product production has more than doubled during this period. Specifically, the undeflated value of reported surf clam finished product production has increased from about \$32 million in 1971 to about \$82 million in 1977, a compound growth rate of about 17%. The deflated value or value of real surf clam output increased from \$28 million to \$43 million, a growth rate of about 8%. Undeflated finished product quahog production increased from trivial levels to \$11 million in 1977. Again, these are reported production data and not sales data. There are currently no data available on sales and inventories. It is assumed that reported production reflects sale.

While the reported total finished product production grew considerably during this period, it was at an uneven rate for the various product groups. This fact is illustrated in Figure B-2. As can be seen from Figure B-2, the product line that exhibited the greatest compound growth (in terms of undeflated value) throughout this period was for breaded production. Canned chowders and canned whole and minced clams had peaks in the 1974-1975 period. Both lines declined in apparent sales in 1976 relative to their earlier peaks before increasing again in 1977 to new highs.

* It should be stressed that the data base that was used in generating this section and the subsequent section on the processing sector was based on the results of the NMFS annual processing surveys completed during the 1970-1977 period. Since these were voluntary surveys, the possibility for incomplete reporting exists. Indeed, for a few years during this period, the apparent meat weight content represented by the reported finished production, particularly in 1974 and 1975, is considerably below the reported landings. Thus, "production" here really means reported production.

For the canned sauces line, the period was one of slow growth.

The relative compound growth rates that occurred during this period are listed in Table B-2. They range from 10% for sauces and juices to 45% for breaded output in regards to undeflated value. The deflated growth values ranged from 1% for canned sauces and juices to 34% for breaded output.

Figure B-1

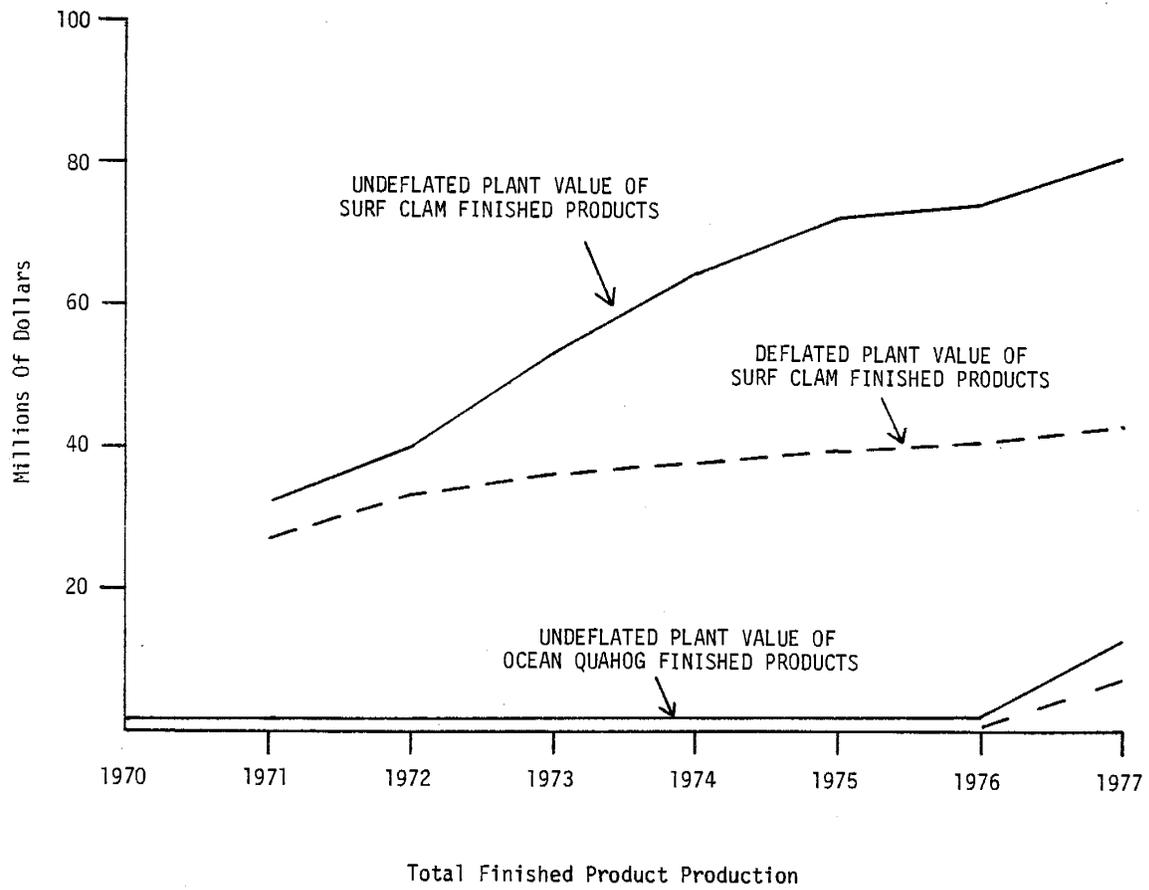
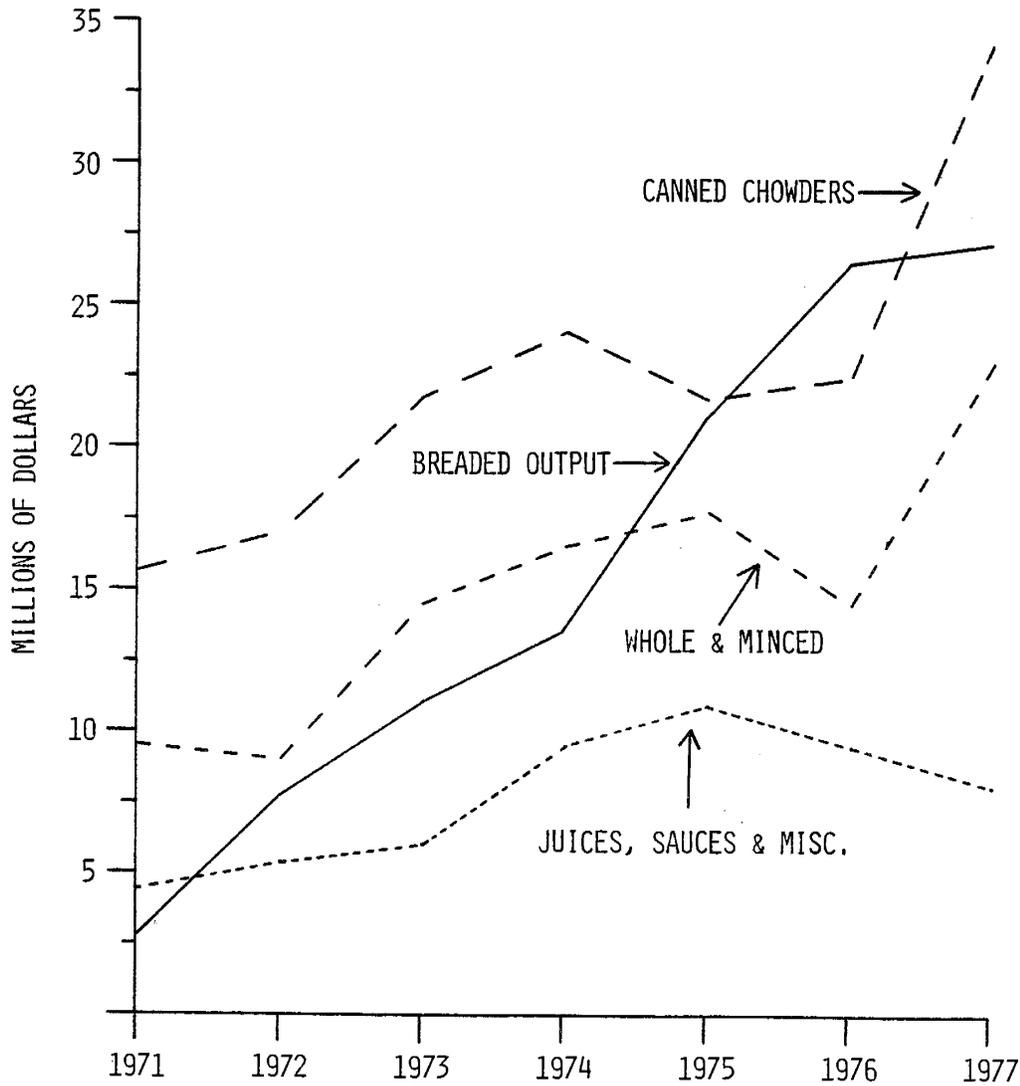


Figure B-2



Undeflated Wholesale Value Of Finished Surf Clam Production

(Includes ocean quahog production in 1977 data.
Ocean quahog product production data unavailable for prior years.)

Table B-2. Relative Compound Growth Rates of Undeﬂated and
 Deﬂated Value of Production for Clam Based Finished Products

	<u>Undeﬂated</u>	<u>Deﬂated</u>
Canned Chowder	14%	4.8%
Canned Whole & Minced	16%	6.5%
Canned Juices & Sauces	10%	1.0%
Breaded	45%	34.0%
Total Finished Production	17%	8.0%

Percentage of Reported Apparent Total Clam Sales by Product Line

While it is not known to what degree consumers of clam based products view them as close substitutes and thus as one general market, it is interesting to note the increase in the percentage of reported total final clam production that has been accounted for by the breaded product line. Table B-3 contains data on the percentage of reported total clam product sales by the clam based product lines. These percentages clearly illustrate again the relative strength of the breaded product line during this period, growing from a 8.9% share in 1971 to a peak of a 36.4% share in 1976, before declining to a 29% level in 1977. In terms of actual dollars, production increased from about \$2.9 million in 1971 to \$26 million in 1977. The canned chowder line increased from about \$16+ million in 1971 to \$34+ million in 1977. Canned whole and minced increased from \$9+ million in 1971 to \$23+ million in 1977.

Table B-3. Percentage of Total Clam Product Sales by Product Line*

(Percents)

	<u>1971</u>	<u>1972</u>	<u>1973</u>	<u>1974</u>	<u>1975</u>	<u>1976</u>	<u>1977</u>
Canner Chowder	47.9	43.0	40.8	37.8	30.2	31.0	36.5
Canned Whole & Minced	29.0	23.0	27.3	26.0	25.0	20.0	25.0
Juices	2.1	1.2	1.9	2.1	2.8	2.0	2.5
Breaded	8.9	19.7	21.0	21.1	29.5	36.4	28.0
Misc. & Canned,							
Including Sauces	11.7	12.4	9.3	12.4	12.4	10.9	7.3

*Calculated by dividing a product line production by the total final product line production for the same year. For the years 1971-1976, there was little or no final product production of quahog based products reported. In 1977 there was a substantial increase in final product production of quahog based items. These are included in the 1977 data.

Meat Weight Flow

Figure B-3 contains a schematic that attempts to present an approximation to the physical meat weight flow of clams through the intermediate and final product stages. The numbers presented within the final product line boxes represent the approximate surf clam meat weight content of the products produced by these sectors in 1977. These numbers should, at this time, be considered only approximations due to the variability of the meat weight content of the same product by various producers and the high probability of unreported production. An attempt is currently underway to develop more precise estimates on this matter.

Employment - Surf Clam Plants

Table B-4 contains information on the approximate surf clam related employment in 1977. Since many of these plants produce other products that are not clam based and since the plants do not report employment by product line, these figures are only an approximation. Further, the data reported to NMFS does not distinguish between office and plant employment.

There are a variety of approaches available to attempt to allocate the employment data between product lines. One approach is to allocate employment based on the relative total values of the product lines. This is the approach taken in the data presented in Table B-4. The plants in 1977 were categorized into four groups depending on the product line mix. The first category is the group of plants that only produced shucked output. The second group is the group of plants that only produced breaded products. The third group only produced canned products. The fourth group produced a variety of products. It is estimated, by using this approach, that the surf clam related employment in 1977 was 1,938 man years.

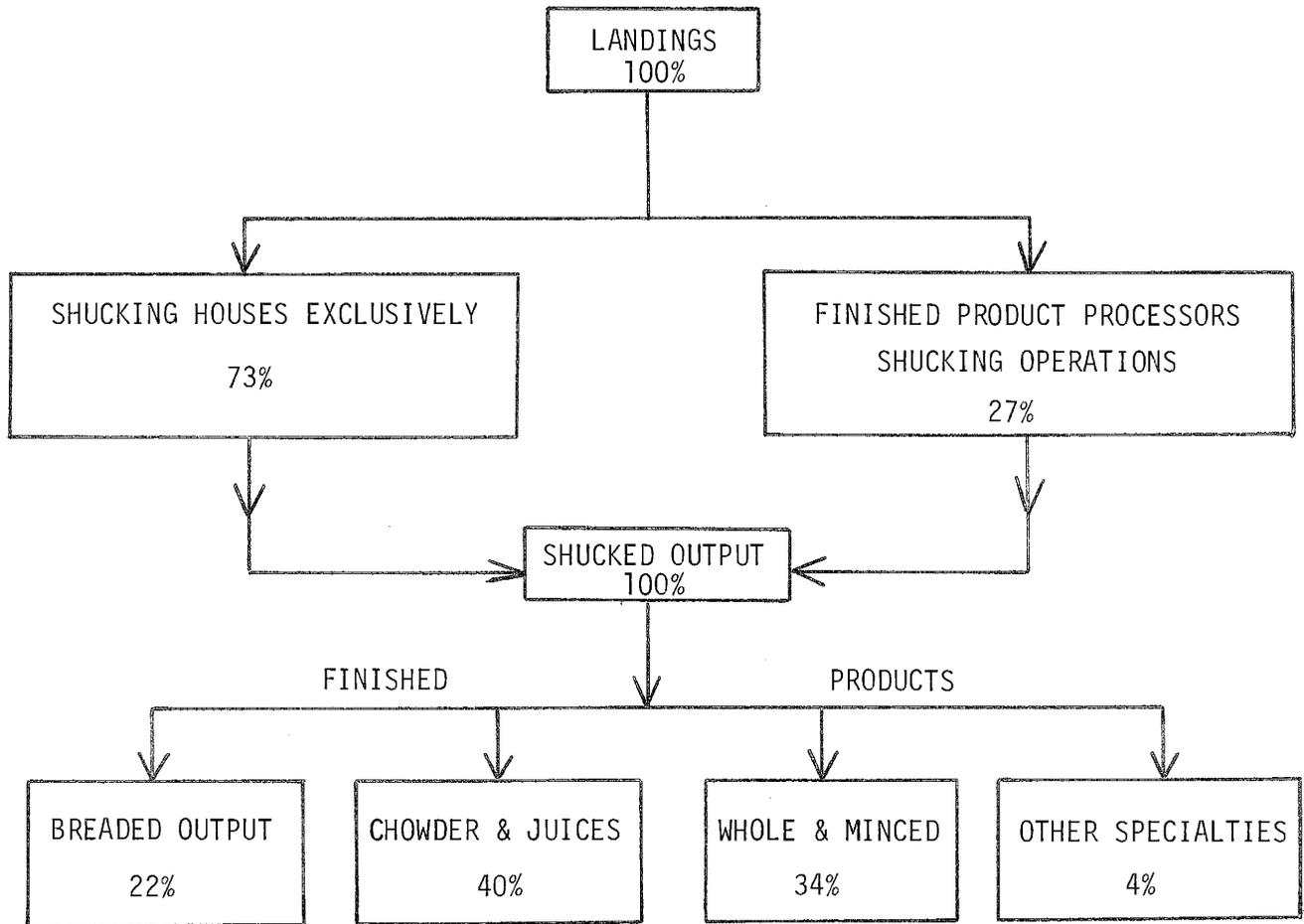
Another approach is to estimate an employment response function for these plants. This attempts to empirically relate changes in the volume (product weight) of various product lines and associated changes in employment. The approach is also useful for developing an estimate of probable changes in employment associated with changing quotas (with associated changes in the volume of finished product line output). The general functional form specified was:

$$Y = f(X_1, X_2, X_3, X_4, X_5)$$

where Y = total employment in the plant (man years)
 X_1 = volume of shucked output in the plant (lbs.)
 X_2 = volume of breaded output in the plant (lbs.)
 X_3 = volume of canned output in the plant (lbs.)
 X_4 = volume of total clam output in the plant (lbs.)
 X_5 = volume of other than clam output in the plant (lbs.)

The specific functional form specified varied for the four different plant types, with only the relevant input variables selected. The data that were utilized were from the 1977 annual NMFS survey of processing plants. The estimation procedure utilized was ordinary least squares.

Table B-5 presents the results of the cross sectional employment response function analysis by plant type. One interprets the results in the following fashion: the value of the regression coefficient for shucked output is .000024. Thus, for every 1/.000024 or 41,666 pounds of shucked output, it would be expected that there would be a change in employment of one man year. The other coefficients are interpreted in a similar fashion. Again, it should be stressed that unreported production by some of the plants could bias the results.



Surf Clam Meat Weight Flow - 1977

Figure B-3

Table B-4. Surf Clam Processing Sector Employment Summary - 1977

<u>Plant Type</u>	<u># of Plants</u>	<u>Total Employment</u>	<u>Clam Related Employment*</u>
Shucking Plants Only	21	1,332	1,215
Breaded Output Only	7	1,056	109
Canned Output Only	8	485	254
Mixed Production	<u>9</u>	<u>526</u>	<u>360</u>
Total	46	3,399	1,938

*Based on the relative value of clam production.

Table B-5. Results of Employment Response Function Analysis

	Plant Type			
	Shucking House	Breeding Plant	Canning Plant	Mixed Output Plant
Constant	14.86	27.18	26.54	22.00
Shucked Output Coefficient	.000024 (t=7.3)*	-	-	-
Breaded Output Coefficient	-	.000005 (t=1.78)**	-	-
Canned Output Coefficient	-	-	.000005 (t=2.08)*	-
Mixed Clam Output Coefficient	-	-	-	.000013 (t=9.5)
Other Production	.000029 (t=1.4)**	.000007 (t=10.79)*	****	***
# of Obs.	21	9	8	7
R2	.796	.96	.42	.94

* Significant at 5% level

** Significant at 10% level

*** Not Significant

**** Dropped due to multicollinearity problem.

Industry Structure

Market structure is defined as the strategic elements in the environment of an industry that influences and are influenced by the conduct and performance of the industry in the market in which it operates.

Bain (1951) has stated it is generally recognized that the four basic aspects of market structure are (1) the degree of seller concentration, (2) the degree of buyer concentration, (3) the degree of product differentiation, and (4) conditions to entry.

Concentration

Perhaps the best known and most often used static indication of market structure, concentration, is defined as the number and size distribution of sellers in the marketplace. The concentration ratio used here will be based on the percentage of the value of production accounted for by the top four firms in the industry, by product line. It should be noted that this is based on the firm and not the plant, thus accounting for multi-plant firms.

Another commonly used static measure is a Lorenz curve. While the concentration ratio provides absolute measures of concentration, the Lorenz curve shows relative equality or inequality of the distribution of production among firms, whether they be numerous or not.

As stated previously, both the concentration ratios and Lorenz curves are on a product line basis. The product lines examined are the major ones only and include canned chowders, canned whole and minced clams, and breaded clam production. Again, for these canned product lines, quahogs were only introduced in 1977 (based on NMFS data). The analysis in this section is on the basis of the firm rather than the plant.

Canned Chowders

During the 1971 to 1977 period there were 8 firms that reported production of canned chowder based on surf clams and ocean quahogs. Table B-6 presents the concentration ratios during this period for the top four firms based on the reported production of all the firms.

Generally an industry is considered to be a concentrated industry if the four firm concentration ratio is above 50% and/or the eight firm ratio is above 75%. While recognizing that we are examining a product line, based on these generally accepted definitions, this product sector is highly concentrated.

Figure B-4 contains a Lorenz curve depicting the relative equality of the canned chowder sector for 1977. The dotted line in Figure B-2 would depict a situation where an equal percentage of firms produces an equal percentage of production. The area to the left of the dotted line depicts a situation of inequality in sales among the firm. It can be seen from the figure that this sector was characterized by considerable inequality in the distribution of the total production among the relevant firms.

Canned Whole and Minced

During the 1971 to 1977 period there were 12 firms that reported any amounts of whole and minced production. However, two of these have not produced any whole or minced products since 1971. Further, in 1977 there were only 7 firms reporting any

production. The concentration ratios at the four firm level are presented in Table B-7. Based on the definition presented previously, this sector would be considered as highly concentrated in an absolute sense, since the concentration ratios are in excess of .92% with the 1977 figure being 95%.

Figure B-5 contains Lorenz curves for canned whole and minced clams for 1977. This figure depicts a situation of significant inequality in the distribution of production among the relevant firms in 1977.

Breaded Production

During the 1971 to 1977 period there were 10 firms that reported any significant amounts of breaded output based on surf clam raw material. The concentration ratios at the four firm level are presented in Table B-8. Based on the definition presented previously, this sector is also concentrated in an absolute sense, since during the 1971 to 1977 period the concentration ratio was in excess of 70% being 78.8% in 1977.

Figure B-6 contains Lorenz curves for this sector for 1977, illustrating a relatively concentrated sector.

Vertical Integration

Firms involved both as harvestors and processors of fish products are referred to as vertically integrated. In 1978 there were 8 firms engaged in harvesting activities that were also involved in processing activities. (The 1978 data was obtained from the vessel logbooks required by the Surf Clam Plan.) These 8 firms include some of those that were in top 4 in canned chowder, canned whole and minced, and breaded output sector in 1977. The percentage of the harvests captured by vessels owned by these firms is summarized in Table B-9.

As can be seen from this Table, it is clear that the relative amount of clam raw material captured by these few firms was significant.

Table B-6. Concentration Ratios for Canned Chowders

<u>Year</u>	<u>Four Firm Concentration Ratio</u>
1971	.873
1972	.887
1973	.864
1974	.894
1975	.911
1976	.876
1977	.850

Table B-7. Concentration Ratios for Canned Whole and Minced Clams

<u>Year</u>	<u>Four Firm Concentration Ratio</u>
1971	92.7
1972	94.8
1973	96.9
1974	95.7
1975	95.1
1976	95.0
1977	95.0

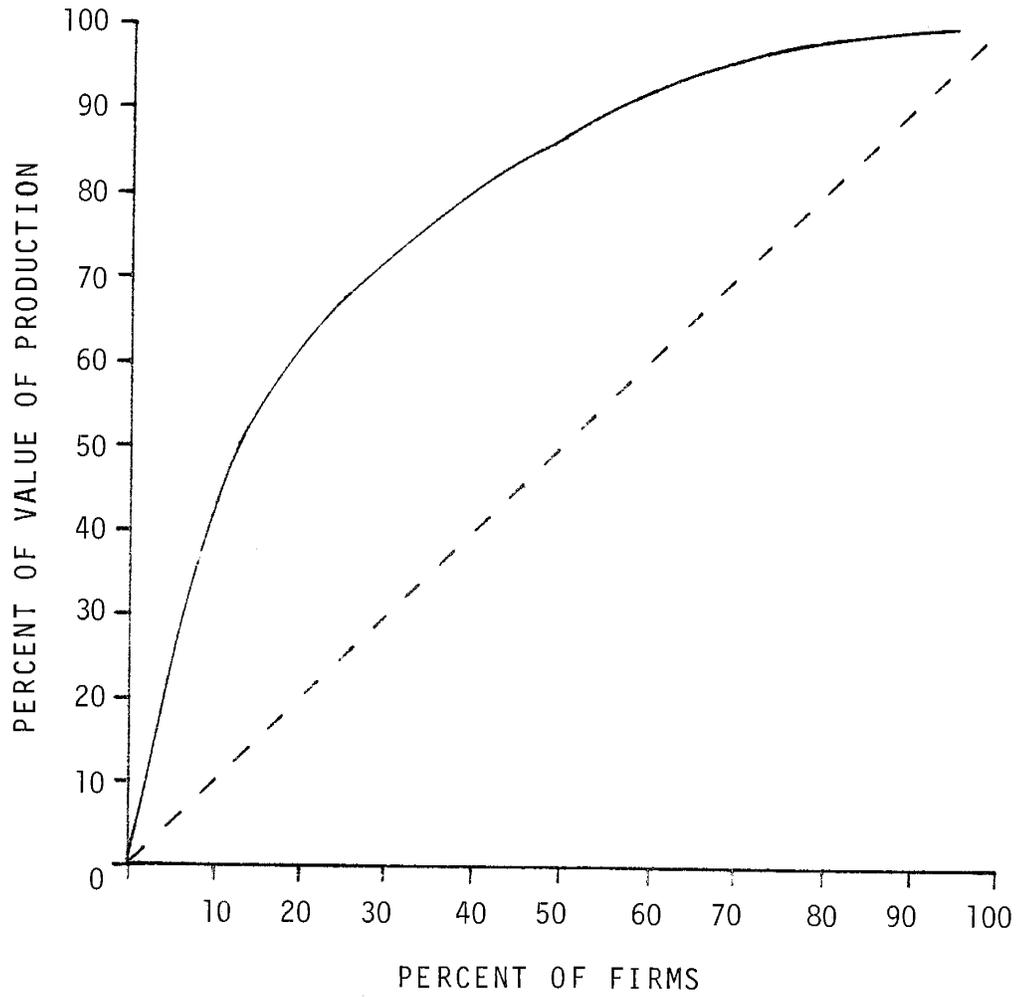
Table B-8. Concentration Ratio for Breaded Output

<u>Year</u>	<u>Four Plant Concentration Ratios</u>
1971	86.3
1972	72.8
1973	71.1
1974	71.6
1975	75.5
1976	74.1
1977	78.8

Table B-9. Processing Sectors' Harvesting Activities - 1978

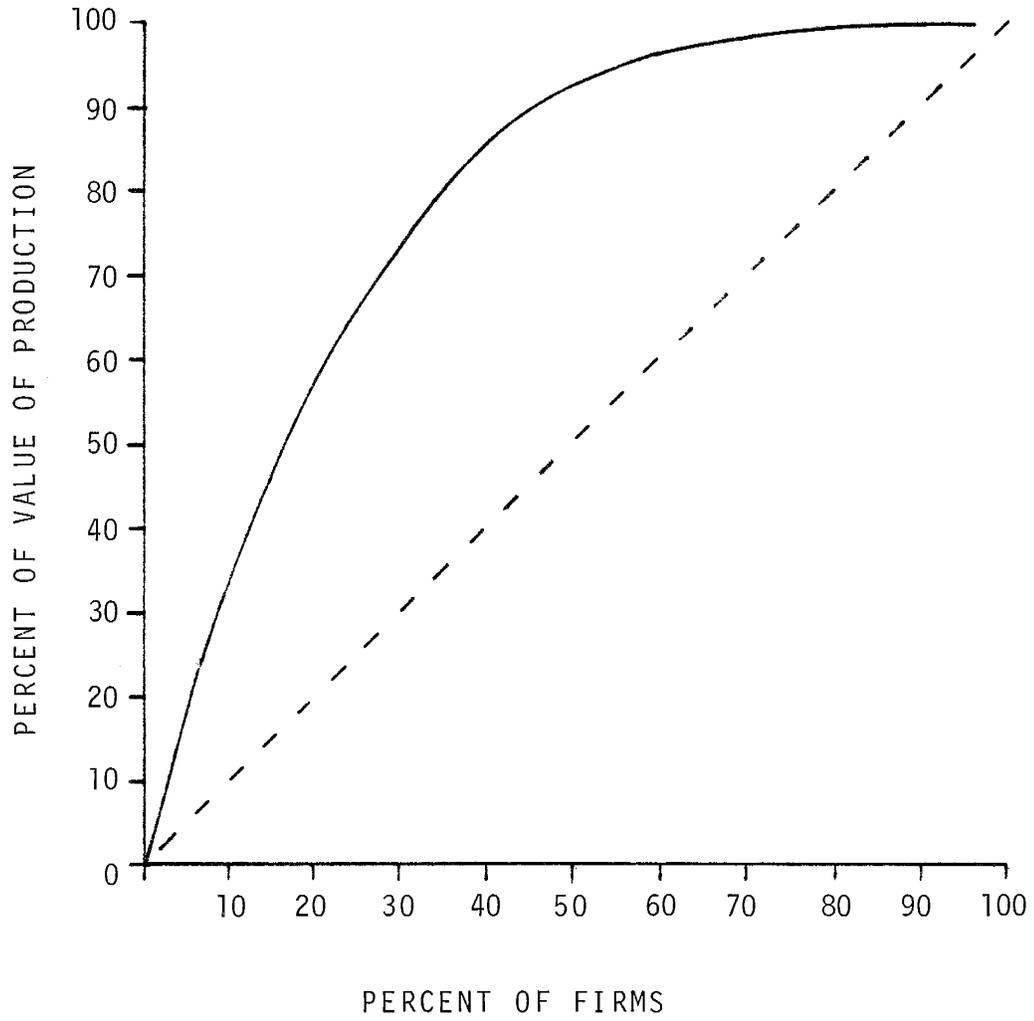
		% Of Total Industry	% Of Industry	% Of Industry	% Of Industry
	# Of	Harvest	FCZ Clam	Quahog	Inshore Clam
<u>Firms</u>	<u>Vessels</u>	<u>Revenues</u>	<u>Revenues</u>	<u>Revenues</u>	<u>Revenues</u>
Top 4	44	32.3%	30.5%	46.4%	39.5%
All 8	53	36.0%	32.0%	50.0%	40.0%

Figure B-4



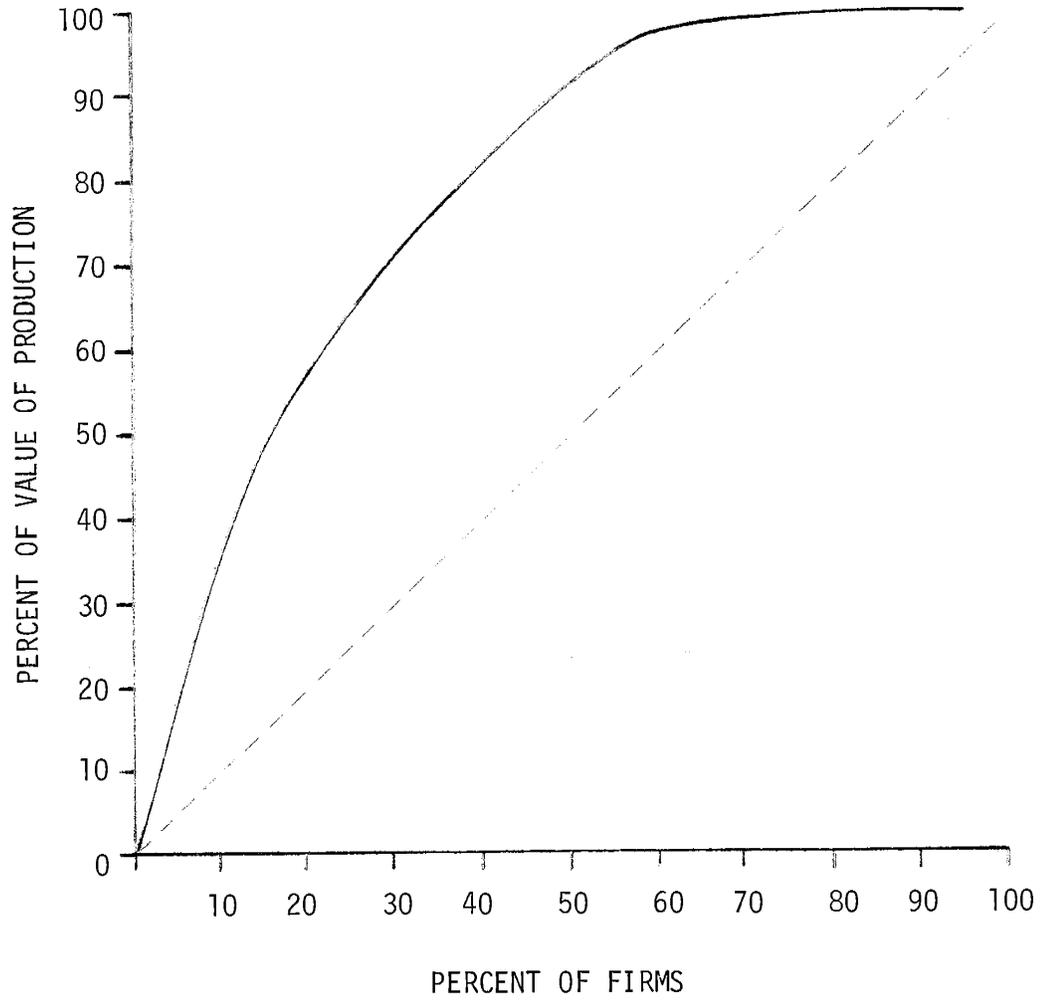
Lorenz Curve For Canned Chowders - 1977

Figure B-5



Lorenz Curve For Whole And Minced Clams - 1977

Figure B-6



Lorenz Curve For Breaded Output - 1977

Implications of Industry Structure and Vertical Integration Information^{1/}

The type of market structure that is suggested by the preceding information would be an oligopolistic one.

The distinguishing feature of oligopolistic markets is interdependence among sellers. The seller is not the sole producer of the product nor does his action go unnoticed by his rivals. For this reason the range of choices open to the oligopolists is extensive and depends on the responsiveness of competitors to his actions.

The early (historically) oligopolistic theories implied that the equilibrium price and quality depended in part on the number of firms in the industry. They suggested the fewer firms in an industry would result in a higher equilibrium price than if there were many firms in the industry.

In reviewing the modern oligopolistic theories, one can trace an inverse relationship between the number of firms in the industry and the price level. Chamberlin's theory hypothesizes that the larger the number of oligopolistic firms in the industry, the closer will the industry price correspond to a competitive price. Bain's barriers to entry model is a function of the number of oligopolistic firms. The success of collusive activity in raising prices or limiting output diminishes as the number of firms increases. Furthermore, there is a greater variation in cost structures as numbers of firms increases and so the amount of price-cutting activity will increase.

The fundamental doctrine that higher concentration yields high profits and its implied corollary that high concentration and high profits indicate misallocation of resources was generally accepted (as a result of some of these studies) until the late sixties. Brozen and Demestz were the first to question not only the existence of a continued positive correlation between concentration and profits but also the merits of deconcentration as a government guideline. The first of two articles by Brozen (1970) reworked the studies of Bain (1956) and Mann (1966) to see if high profit levels still correspond with highly concentrated industries for later years (1953-1957 and 1962-1966). Using the original Bain industries for his sample, Brozen detected a "lack of persistence of high rates of return in highly concentrated industries" (Brozen, 1970, p. 272). His reasoning was that the market conditions determined the appropriate structure for each industry. A concentrated industry was so because that was how it could achieve its lowest costs of production. In less concentrated markets cost advantages or scale economies don't exist.

Weiss dismisses Brozen's unorthodox results by stating, "One thing that seems quite certain to me is that there was a significant positive simple correlation between profits and margins...whether or not Brozen could find it..." (Weiss, 1973, p. 221). Businessmen sometimes assume that higher profit rates accompany higher market shares. Findings based on the material made available to the Harvard Business School by the Strategic Planning Institute seem to show that market shares and profit rates are positively related. The assumption that unit costs decline as market shares rise, thus improving profits. Prices of the firms in question were

^{1/} There have been a number of empirical studies available that have examined the structure performance issue. (Bain, 1951) (Mann, 1966), (Hall and Weis, 1967) (Kamershen, 1969) (FTC, 1969) (Imel & Helmberger, 1971), (Brozen, 1970), (Demestz, 1973) (Rhodes, 1973), (Weiss, 1973), (Buzzel, Gale and Sultan, 1975).

similar (see Buzzel, Gale and Sultan, 1975, Harvard Business Review).

Thus, while Brozen's studies have been challenged, they remain as indication that one cannot casually expect a positive and significant relationship between concentration and profit levels.

In summary, the literature contains somewhat of a mixed bag in terms of the relationship between concentration and various performance indicators. It is not the purpose of the analysis here to draw any conclusions on this matter, relative to the clam industry, but merely to point out the existence of the situation. Clearly however, such a situation, when combined with a situation of significant vertical integration by some of these same firms, should have a bearing on future deliberations of alternative allocation schemes. That is, under such a situation as this, the potential for even greater concentration in the future, under certain allocation systems, becomes of concern.

Financial Performance

There are currently no published or unpublished data available to determine the financial performance of the firms in the processing sector in terms of traditional indicators, namely, net income, return on assets, return on equity, return on sales, etc. The only data that are available are the value of production data utilized previously. The distribution of the value of production among the plants in the industry is addressed in the next section.

Size Distribution, Dependency, and Product Lines of Surf Clam Plants

This section examines the data on a plant basis for both intermediate and finished product plants. Figure B-7 presents the size distribution of the value of reported clam related production by plant for 1976. As can be seen from Figure B-7, 25 of the plants in 1976 had surf clam related production of \$2.0 million or less. Of these 25 plants, 10 were plants whose clam production consisted of shucked output exclusively. The remaining 15 plants were relatively minor (in the sense the % of total production in any product line) of a variety of finished products and produced some shucked output.

There were 14 plants that had sales of between \$2.0 and \$5.0 million. Eleven of these 14 plants were exclusively engaged in shucked output production and they included the major producers in this product sector. Of the remaining 3 firms, they produced a variety of shucked, breaded and canned output. Some of these firms were among the principal producers of breaded output production and canned production.

Finally, there were 7 plants whose value of production was greater than \$5.0 million. These included those plants that dominated the canned clam chowders and canned whole and minced, and breaded output sectors.

For the industry as a whole, there have not been any dramatic shifts during the 1971 to 1976 period in terms of the distribution of the percent of total gross revenues derived from surf clams. This is illustrated in Table B-10. During this period on the average about 56% of the plants derived more than 90% of their total gross revenues from surf clam related activities. About 12% of the plants derived between 61 to 90% of their revenues from clam production. Of the remaining 32% of the plants, about 14% of the plants derived between 30 to 60 percent of their revenues from clam, with the remaining 18% of the plants deriving less than 30%.

For the top seven plants, four of the plants derived over 90% of their total plant production from clam products, two of the plants derived over 80% of their production from clam, while 1 derived about 25% of its total revenues from clams.

For the 14 middle sized plants, 11 derived 100% of their income, 1 derived over 80%, 1 derived 70%, and 1 derived about 10% of its total value of plant production from surf clams.

While the value of shucked and final product production accounted for by the smallest 25 plants was only a small percentage of the total, their clam related production was extremely important to some of them. For 10 of these plants, their total revenues were 100% from clams: five of these 10 plants produced shucked output only. Of the remaining 15 plants, 10 had dependency ratios of less than 50%, and 5 had ratios between 50% and 90%.

In summary, those reporting plants that are the major finished product producers were generally the largest plants overall, and were extremely dependent on clam production. Of the middle tier of plants, there were generally extremely dependent on clam production. Finally, about 40% of the smallest 25 plants were extremely dependent on clam, while about 43 percent of these small plants were some of the least dependent.

1976 SIZE DISTRIBUTION OF SURF CLAM PLANTS
BY VALUE OF CLAM RELATED PRODUCTION

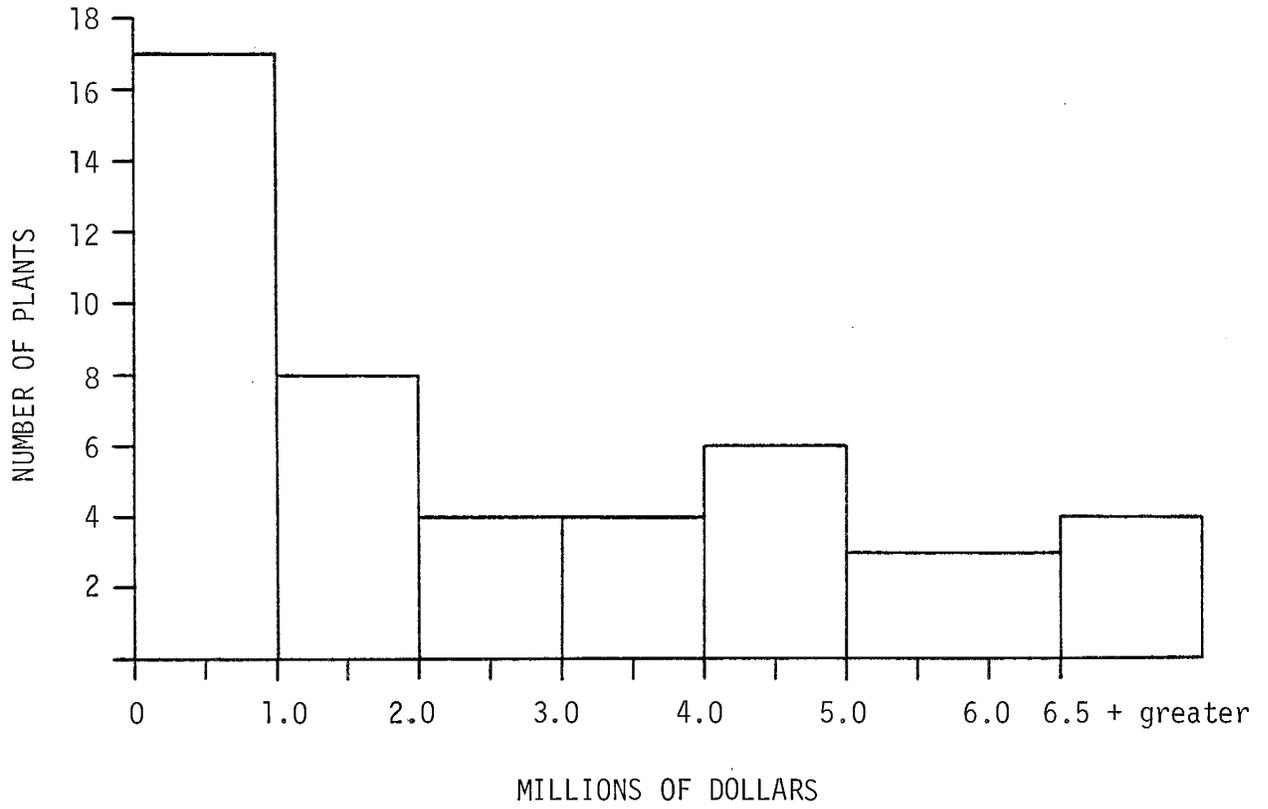


Figure B-7

Table B-10. Dependency of Those Plants Producing Surf Clam
on Surf Clam Revenues*

% of Gross Revenue	Number of Plants					
	<u>1976</u>	<u>1975</u>	<u>1974</u>	<u>1973</u>	<u>1972</u>	<u>1971</u>
0-10	4	3	4	2	1	6
11-20	3	1	2	3	2	4
21-30	2	4	3	2	4	1
31-40	1	2	0	2	2	2
41-50	2	4	3	2	1	6
51-60	2	1	4	1	2	2
61-70	2	4	0	4	3	2
71-80	0	2	0	1	2	0
81-90	5	2	5	0	1	1
91-100	<u>25</u>	<u>24</u>	<u>26</u>	<u>29</u>	<u>28</u>	<u>28</u>
Total	46	47	47	46	46	52

* Does not include data for those firms producing only quahog.

APPENDIX C. EX-VESSEL AND WHOLESALE PRICE FORECASTING EQUATIONS
AND 1980 FORECASTS

Ex-vessel Price Model

Presented in Table C-1 are the estimated ex-vessel price equations and associated statistics for surf clams and ocean quahogs. These equations were used for predicting ex-vessel prices in 1980. They were based on applying ordinary least squares regression to time series observations for the years 1960-1978. The dependent or endogenous variable was the actual ex-vessel price of each species deflated by a wholesale price index. The independent or exogenous variables were considered to be per capita supply of surf clams, per capita supply of quahogs, deflated disposable income, and a dummy variable used to isolate the effects of previous management. The dummy variable was equal to 0 for the years 1960-1975 and to 1 for the remaining years.

The estimated surf clam equation explained approximately 99% of the variation in the deflated ex-vessel price, and the quahog equation explained approximately 78% of the deflated price. Estimated coefficients were of the expected sign and statistically significant at the levels specified in Table C-1. The Durbin Watson statistic rejected any evidence of serial correlation.

Ex-vessel Price and Revenue Forecasts for 1980

Based on the price equations in Table C-1, the deflated and nominal or actual ex-vessel prices for surf clams and quahogs were forecasted and are presented in Table C-2. Using the nominal prices per pound and the quotas, the total actual revenues to the harvesting sector are projected to be \$22,699,941 for surf clams; and \$11,445,000 for quahogs, respectively.

Wholesale Price Model

A wholesale price model could only be estimated for surf clams; appropriate data for quahogs were unavailable. With respect to surf clams, it was necessary to estimate wholesale price equations by product form in order to appropriately analyze the effects of management in 1980. (The time series data on wholesale prices was based on reported production data and thus may be somewhat in error to the extent of the incompleteness of the reporting.) Thus, three wholesale price equations were estimated for surf clams: a whole and minced price equation, a chowder and juices price equation, and a breaded product price equation. These equations expressed the dependent-variable, nominal wholesale price, by product form, as a linear function of an intercept, nominal ex-vessel price per pound of surf clams, and the wholesale price index. Thus, the wholesale price equations were markup equations which attempted to account for changes in inflation by including the wholesale price index. These equations were estimated by applying ordinary least squares regression to the time series observations for the years 1966-1977. The estimated equations and associated statistical results are presented in Table C-3.

As indicated by the results in Table C-3, all the coefficient signs are as expected; the parameters are statistically significant at the 20% level of significance using a two-tailed test, and the Durbin Watson statistic (DW) does not indicate serial correlation; however, it should be noted that these estimates ignore systems interactions and the total derived demand phenomena, but this should not cause an analytical problem because markup equations are generally accepted as appropriate for estimating different market level prices.

Wholesale Price, Revenue and Market Share Forecasts by Product Form

Wholesale Prices

Utilizing the wholesale price equations (Table C-3) and 1980 projections of the ex-vessel price of surf clams (\$.60 per pound) and the wholesale price index (2.41), the 1980 wholesale prices by product form were projected to be as follows: (1) whole and minced -- \$35.72 per case; (2) chowder and juices -- \$19.98 per case; and (3) breaded products -- \$1.62 per pound.

A number of caveats must be pointed out regarding these forecasts:

- 1) Some of the processors have indicated that the time series of wholesale prices, particularly those observations during the 1975-1977 period appear to be low; thus the above forecasts, based on those data would be low.
- 2) It is very probable that the price forecast for chowder and juices (\$19.98) is too low. The 1977 price was \$19.92, which was a \$6.82 increase over the 1976 price. While the fitted equation explained about 89% of the overall variation in the wholesale price, it was not entirely successful in picking up the magnitude of the increase in 1977. Thus the 1980 forecast is probably too low also.
- 3) Since no time series exist on quahog processed output of whole and minced clams and chowders and juices, the depressing cross price effect at the wholesale level could not be quantified directly. While it is true the indirect impact was picked up at the ex-vessel level; that is, the increased quahog landings affecting the surf clam price, and the surf clam ex-vessel price affecting the processed surf clam product price, ideally the cross effects would be explicitly modeled at the wholesale level also.
- 4) Finally, if the rate of overall inflation is higher than forecasts by the trend equation (1980 WPI = 2.41), then price will be higher.

In summary, there are factors which could result in some of these forecasts being too low (items #1 and 2), and other factors which could result in them being too high (items #3 and 4).

Revenues

In order to project the 1980 revenue, it is necessary to first determine the raw material shares by product forms.

Based on discussions with processors, and recent trends in production by product line, it is assumed that overall about 85% of the meat weight landings will be usable for supporting finished product production. It is recognized that there is considerable variation between the percent usable by area of capture (inshore versus offshore) and by product line. This would mean that about 25.5 million pounds of FCZ meats would be available as will about 6.63 million pounds of inshore meats, for a total of 32.13 million pounds. Of this it is assumed that about 11 million pounds will go to the breaded output line, which will result in production of 16.66 million pounds of breaded output, worth \$26.98 million. Of the remaining 21.13 million pounds, it is estimated that 10.98 million pounds will go to the chowder and juice group and 10.15 million pounds to the whole and minced group. This would result in an output of 392,143 standard cases of whole and minced clams worth \$14.00 million and 1,015,000 standard cases of chowders and juices worth \$20.28 million.

No estimate can currently be generated for the quahog production. The data used in the above analysis appear in Table C-4.

Table C-1. Summary of Ex-vessel Price Analysis

Dependent Variable	Regression-Coefficients						
	Constant	PCQ	PQQ	DPY	D	R ²	D-W
DQP	.005	-.11391 (-2.77)*	-.288 (-1.57)**	55.0 (5.51)*	.016 (1.53)**	.786	1.87
DCP	-.0226	-.10114 (-3.5)*	-.18006 (-1.4)	50.9 (7.26)*	.159 (16.17)*	.99	1.95

where DQP = deflated ex-vessel quahog price (\$/lb.);
 DCP = deflated ex-vessel surf clam price (\$/lb.);
 PQQ = per capita quahog supply (lbs.);
 PCQ = per capita surf clam supply (lbs.);
 DPY = deflated per capita income (\$mill); and
 D1 = dummy variables were 1960-1975 = 0 and 1976-1978 = 1.

** significant at the 10% level (one tailed test)

significant at the 20% level (two tailed tests)

* significant at the 5% level (one and two tailed tests)

Table C-2. Projected Deflated and Nominal Ex-vessel Prices for Surf Clams and Quahogs in 1980

<u>SPECIES</u>	<u>DEFLATED</u>	<u>NOMINAL</u>	
	Dollars	Dollars	Bushel
	per	per	per
	Pound	Pound	Bushel
Surf Clams	.2501 ^{1/}	.602 ^{2/}	10.003 ^{3/}
Quahogs	.1360 ^{1/}	.3272 ^{2/}	3.273 ^{3/}

^{1/} Fitted values from ex-vessel price equations which assume per capita supply of surf clams (.17 lbs.) and quahogs (.16) are equal to the quotas (37.8 million for surf clams and 35 million for quahogs) divided by a projected 1980 population of 222 million; deflated (by the WPI) per capita disposable income of \$3281, and the dummy variable set to 1. Actual total disposable income was assumed to increase by 10% per year for 1979 and 1980.

^{2/} Derived by multiplying a projected 1980 wholesale price index (2.41) by the projected 1980 deflated prices. The WPI was forecast based on a time trend equation:

$$\text{WPI} = .90429 + .16821 \cdot \text{Time} \\ (\text{t}=18.76)$$

(1972 = 1, 1978 = 7, 1980 = 9)

^{3/} Obtained by multiplying projected nominal price per pound by the factors for converting pounds to bushels. The factor was derived by dividing 30 million pounds by 1.8 million bushels = 16.66 lb./bu. A factor of 10 lbs. per bushel was used for quahogs.

Table C-3. Estimated Wholesale Price Equations
For Surf Clams and Statistical Results

Dependent Variable ^{1/}	Regression Coefficients			R ²	D-W
	Intercept	Ex-vessel Price	Wholesale Price Index		
WPWM	4.21	.25 (4.61)	6.85 (3.26)	.955	1.47
WPCJ	.4368	.10282 (2.12)	5.55 (2.99)	.898	2.40
WPBP	67.50	.90 (3.27)	16.82 (1.59)	.890	1.23

1/ The dependent variables are the nominal wholesale prices per pound of whole and minced products (WPWM), chowder and juices (WPCJ), and breaded products (WPBP).

Numbers in parentheses are T-ratios. All are significant at the 5% level except for the coefficient 16.82 for equation 3. That is significant at the 20% level.

Table C-4. Production and Prices of Major Surf Clam Finished Products

Year	1966-1977								
	Breaded			Whole and Minced			Chowders and Juices		
	1,000 lb*	\$1,000	\$ Price /lb.	1,000 Std. Cases**	\$1,000	\$/Case	1,000 Std. Cases***	\$1,000	\$/Case
1966	1,544	1,638	1.06	587	7,254	12.35	2,300	12,774	6.33
1967	1,839	1,839	1.0	689	8,951	12.99	1,847	12,774	6.92
1968	6,295	5,129	.81	508	6,725	13.23	1,807	13,718	7.59
1969	8,844	7,840	.89	432	6,958	16.10	1,881	15,088	8.02
1970	5,273	5,109	.97	580	10,242	17.66	1,893	15,419	8.15
1971	4,141	4,147	1.00	634	9,796	15.45	2,049	16,548	8.08
1972	9,784	9,472	.97	704	9,274	13.17	2,161	17,989	8.32
1973	11,677	11,438	.98	925	14,725	15.92	2,563	23,377	9.12
1974	13,471	14,063	1.04	887	16,949	19.10	2,499	26,157	10.46
1975	19,096	21,537	1.13	904	17,854	19.75	2,081	23,918	11.50
1976	18,712	26,500	1.42	501	14,350	28.64	1,816	23,800	13.10
1977	17,160	26,109	1.52	488	15,827	32.45	1,618	32,241	19.92

* For breaded products, it is assumed that 50% prerepresents surf clam raw meats.

** A standard case of whole or minced clams contains forty-eight 5 ounce cans drained weight. the internal surf clam meat weight per standard case is 28 pounds.

*** A standard case of chowder contains forty-eight 10 ounce cans. The internal meat weight is 10 lbs.