Surfclam and Ocean Quahog Quota Specifications for 2003 Including: Environmental Assessment, Regulatory Impact Review, Final Regulatory Flexibility Analysis, and Essential Fish Habitat Assessment

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MID-ATLANTIC FISHERY MANAGEMENT COUNCIL

Room 2115, Federal Building
300 South New Street
Dover, Delaware 19904-6790
Tel. 302-674-2331
FAX 302-674-5399

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ENVIRONMENTAL ASSESSMENT

1.0 ANNUAL SPECIFICATION PROCESS

1.1 Introduction

This document provides a summary of relevant information for recommending quotas for surfclams (*Spisula solidissima*) and ocean quahogs (*Arctica islandica*) in Federal waters for 2003. Management responsibility for these two species resides with the Mid-Atlantic Fishery Management Council, based in Dover, Delaware. The management regime is detailed in the *Fishery Management Plan (FMP) for the Atlantic Surfclam and Ocean Quahog Fishery* and subsequent Amendments to the Plan. Amendment 8 (MAFMC 1990) provided the most substantial change in the management regime through introduction of Individual Transferable Quotas (ITQs), which replaced a complex system of time and effort restrictions. Amendment 10 (MAFMC 1998) was approved by the National Oceanic and Atmospheric Administration (NOAA) in May 1998, and provided more appropriate management measures for the small, artisanal fishery for ocean quahogs operating off of the northeast coast of Maine. Amendment 12 (MAFMC 1999) was partially approved in April 1999 and implements a new overfishing definition for ocean quahogs, identifies and describes essential fish habitat for both species, implements a framework adjustment process, and requires Operator Permits. Amendment 13 (MAFMC 2002c) was approved by the Council for public hearings at their April 2002 Council meeting and is designed to address the disapproved surfclam overfishing definition, the disapproved fishing gear impacts to EFH discussion, potentially allow for multi-year quotas, potentially allow for a vessel monitoring system (VMS) and potentially reverse the requirement for regulatory action to suspend the surfclam minimum size limit.

The primary tool in the management of surfclams and ocean quahogs in Federal waters is the specification of annual quotas, which are allocated to the holders of allocation shares at the beginning of each calendar year. The Mid-Atlantic Council is required to make recommendations to Secretary of Commerce on the appropriate quotas for the upcoming year. This document provides a summary of the most recent information available concerning the biological status of these natural resources, and the commercial fisheries which utilize them. Several alternative quota scenarios for each species are proposed and evaluated. The Council recommends maintaining the status quo levels of 2002 for both the regular ocean quahog and the Maine ocean quahog management areas, increasing the surfclam quota by roughly 4% to 3.25 million bushels, and continuing the suspension of the surfclam size limit.

This environmental assessment is undertaken to establish quotas for the 2003 Atlantic surfclam and ocean quahog fisheries. Biological assessments of these resources are conducted by the NMFS Northeast Region's Stock Assessment Workshop (SAW), which evaluates biological parameters such as overall population size, geographic distribution, age structure, and mortality rates from both natural causes and fishing activities. The most recent complete assessment was published in the Report of the 30th Northeast Regional Stock Assessment Workshop (USDC 2000a) for surfclams and the 31st Northeast Regional Stock Assessment Workshop (USDC 2000b) for ocean quahogs. These two assessments are based on the 1999 clam research survey. Copies of the 2000 assessments are available from the NEFSC. A clam survey was completed in July 2002 and assessments for surfclams (June 2003) and ocean quahogs (December 2003) are scheduled.

1.2 Purpose and Need

The purpose for the action is to establish landing quotas for 2003 for both surfclams and ocean quahogs. Regulations implementing the FMP (50 CFR 648) provide that the Secretary of Commerce (Secretary) will annually specify the quotas. The quota range for surfclams is between 1,850,000 bushels and 3,400,000 bushels. The quota range for ocean quahogs is between 4,000,000 bushels and 6,000,000 bushels. The quota range for the Maine ocean quahog area (both state and Federal waters off the eastern coast of Maine north of 43º 50' north latitude) is between 17,000 and 100,000 bushels.

Prior to the beginning of each year, the Council, following an opportunity for public comment, recommends to the Secretary quotas within the ranges specified. In selecting the quotas the Council must consider current stock assessments, catch reports, and other relevant information concerning: exploitable and spawning biomass relative to the optimum yield; fishing mortality rates relative to the optimum yield; magnitude of incoming recruitment; projected effort and corresponding catches; geographical distribution of the catch relative to the geographical distribution of the resource; and status of areas previously closed to surfclam or ocean quahog fishing that are to be opened during the year.

At the March 2000 Council meeting, the Council (after reviewing the 2000 surfclam assessment, USDC 2000a) passed a motion that, "given the recent stock assessment, we consider an increase in quota to the 3.4 million bushel OY over the next 5 years with a 10% increase the first year."

The quota is set at that amount which is most consistent with the objectives of Amendment 8 of the Fishery Management Plan for the Atlantic Surfclam and Ocean Quahog Fishery (MAFMC 1990). The Secretary may set quotas at quantities different from the Council's recommendations only if he can demonstrate that the Council's recommendations violate the National Standards of the Magnuson Act and the objectives of the Atlantic Surfclam and Ocean Quahog Fishery Management Plan.

The following table presents surfclam and ocean quahog quotas since 1990 and the year 2003 recommendation voted by the Mid-Atlantic Council in June 2002:

	Surfclams (million bushels)	Ocean Quahogs (million bushels)
1990 Quota	2.850	5.300
1991 Quota	2.850	5.300
1992 Quota	2.850	5.300
1993 Quota	2.850	5.400
1994 Quota	2.850	5.400
1995 Quota	2.565	4.900
1996 Quota	2.565	4.450
1997 Quota	2.565	4.317
1998 Quota	2.565	4.000
1999 Quota	2.565	4.500
2000 Quota	2.565	4.500
2001 Quota	2.850	4.500
2002 Quota	3.135	4.500
2003 Recommendation	**3.250**	**4.500**

1.3 Management Objectives

The objectives of the FMP, since implementation of Amendment 8 (MAFMC 1990), have been and continue to be:

1. Conserve and rebuild Atlantic surfclam and ocean quahog resources by stabilizing annual harvest rates throughout the management unit in a way that minimizes short term economic dislocations.

2. Simplify to the maximum extent the regulatory requirement of surfclam and ocean quahog management to minimize the government and private cost of administering and complying with regulatory, reporting, enforcement, and research requirements of surfclam and ocean quahog management.

3. Provide the opportunity for industry to operate efficiently, consistent with the conservation of surfclam and ocean quahog resources, which will bring harvesting capacity in balance with processing and biological capacity and allow industry participants to achieve economic efficiency including efficient utilization of capital resources by the industry.

4. Provide a management regime and regulatory framework which is flexible and adaptive to unanticipated short term events or circumstances and consistent with overall plan objectives and long term industry planning and investment needs.

1.4 Management Unit

The management unit is all Atlantic surfclams (*Spisula solidissima*) and ocean quahogs (*Arctica islandica*) in the Atlantic EEZ. In 1988 the American Malacological Union officially changed the common name of "surf clam" to the one word name "surfclam". This was published in the American Fisheries Society special publication 16 entitled *Common and Scientific Names of Aquatic Invertebrates from the United States and Canada: Mollusks* (AFS 1988). The ocean quahogs managed in this FMP include a small-scale fishery in eastern Maine that harvests small ocean quahogs which are generally sold for the half-shell market. Locally these small ocean quahogs off the coast of Maine are known as "mahogany quahogs" and have been under Council management since implementation of Amendment 10 (MAFMC 1998). There is no scientific question that the small scale Maine fishery occurs on *Arctica islandica.*

2.0 METHODS OF ANALYSIS

The basic approach adopted in this analysis is an assessment of various quotas and management measures from the standpoint of determining the impacts upon the environment. In order to conduct a more complete analysis, impacts were examined for the three quotas (surfclams, ocean quahogs, and Maine ocean quahogs) and for suspension of the minimum size limit for surfclams. The preferred alternatives examine the measures adopted by the Council in June 2002. Status quo alternatives were evaluated for all three quotas, as was the minimum and maximum allowed by the regulations. A full description of the alternatives is presented is section 3.0.

Proposed 2003 Quota Alternatives			
Surfclam			
	Description	Quota (bushels)	% Change from 2002
Alt. S1	Min. Allowable	1.850 million	41% Decrease
Alt. S2	Slight Decrease	2.850 million	9% Decrease
Alt. S3	Status Quo	3.135 million	No Change
Alt. S4**	Slight Increase	3.25 million	4% Increase
Alt. S5	Max. Allowable	3.400 million	8% Increase
** Council Recommendation			
Ocean Quahog			
Alt. Q1	Min. Allowable	4.000 million	11% Decrease
Alt. Q2	Partial Reduction	4.250 million	6% Decrease
Alt. Q3**	Status Quo	4.500 million	No Change
Alt. Q4	Slight Increase	4.750 million	6% Increase
Alt. Q5	Max. Allowable	6.000 million	33% Increase
** Council Recommendation			
Maine Ocean Quahog			
Alt. M1	50% of Max. Quota	50,000 Maine Bu.	50% Decrease
Alt. M2	1998 Harvest Level	72,466 Maine Bu.	28% Decrease
Alt. M3**	Max Allowable - Status Quo	100,000 Maine Bu.	No Change
** Council Recommendation			

3.0 DESCRIPTION OF ALTERNATIVES BEING CONSIDERED

3.1 Surfclam *(Spisula solidissima)* Quota

3.1.1 Preferred Alternative (S4) - 3.250 Million Bushels

The Council's preferred alternative quota for the 2003 surfclam fishery is 3.25 million bushels, which is a 4% increase from the 2002 quota of 3.135 million bushels. This preferred alternative meets the 2000 SAW recommendation: "Fishing mortality can be increased for the surfclam resource taken as a whole. However, it may be advantageous to avoid localized depletion."

The most recent biological assessments (from both the 1997 and 1999 surveys) indicate the resource is healthy, composed of many age classes, and can safely sustain increased harvests. Sufficient recruitment is also evident and thus this level of quota will not harm the long-term sustainability of the

resource. The F in 1999 (the last time it was measured at a peer-reviewed

SARC) associated with a quota of 2.565 million bushels was approximately 0.02 and this quota increase may increase the F in 2003 to about 0.03.

The proposed quota takes into account analysis of surfclam abundance that was part of the 30th Northeast Regional Stock Assessment Workshop (SAW 30). SAW 30 utilized data from the 1999 surfclam survey, which included work to estimate dredge efficiency. Results from the 1999 survey and assessment corroborate those of the 1997 survey and assessment and provided the Council the opportunity to safely increase the quota. The Council has tentatively agreed with industry's request to continue increasing the quota up to the maximum optimum yield (3.4 million bushels) level set by the Plan. The Council will continue to perform its annual review of the fishery, but wanted industry to understand that should future assessments continue to indicate the healthy status of the resource that the industry can plan for steady growth to its maximum optimum yield level.

The Council continues to assume that none of the Georges Bank resource (approximately twenty percent of the total resource) will be available in the near future for harvesting because of paralytic shellfish poisoning. This area has been closed to the harvest of clams and other shellfish since 1990, and the Council and NMFS have no reason to believe that it will reopen in the near future.

The Sustainable Fisheries Act (SFA) of 1996 significantly altered the requirement of FMPs to address habitat issues. The SFA contains provisions for the identification and protection of habitat essential to the production of Federally managed species. The Act requires FMPs to include identification and description of essential fish habitat (EFH), description of non-fishing and fishing threats, and to suggest conservation and enhancement measures. These new habitat requirements, including what is known about clam gear impacts to the bottom, were addressed in Amendment 12 (MAFMC 1999) and more thoroughly in Amendment 13 (MAFMC 2002c) which is available for public comment and which should be submitted to the Secretary in early 2003.

3.1.2 Alternative S1 - 1.850 Million Bushels

The first non-preferred alternative quota for the 2003 surfclam fishery is1.850 million bushels. This quota is within the OY range of between 1.850 and 3.400 million bushels as required by the FMP.

The 1.850 million bushel alternative for 2003 represents a decrease of 41% from the 3.135 million bushel quota which had been implemented in 2002. The direct impact would be that surfclam allocation owners would each receive 41% fewer cage tags than they had in 2002. All allocation owners would be affected proportionally the same, since the harvest right which each individual entity owns is actually a percentage share of the annual quota. If all other aspects of the surfclam fishery were to remain constant, such as ex-vessel prices and the quantity of surfclams supplied from state waters, then the major human consequence of the quota reduction is the near-term decrease in revenues which occurs from postponing a portion of the harvest of surfclams to a later year. It is unlikely, however that all the other conditions which held true previously will pertain again in 2003.

There is no major reason the Council would have considered seriously reducing the 2003 quota from the 2002, other than to evaluate the full range of alternatives.

In 2001, 100% of the EEZ quota was landed. Prior to 1997 the previous five years of the ITQ

program landed between 99 and 100% of the quota annually, but during both 1997 and 1998 more than 5% of the quota was not landed. With the EEZ quota at a constant 2.565 million bushels for both 1997 and 1998, it is believed that market forces were the primary reason behind the EEZ landing decline. Also contributing to the conclusion for 1997 and 1998, that market demand was off was the fact that inshore New York and New Jersey landings were significantly below their quotas, however landings in New Jersey and New York have increased significantly since 1999 (MAFMC 2002a).

A 41% reduction in quota for 2003 could possibly benefit the long-term sustainability of the resource, however there is the offsetting argument that the resource is considered under-exploited and the slow growing clams off of Delmarva may need to be thinned in order to be more productive. (The 1998 assessment (USDC 1998a) states: "It is unclear to what degree this is due to density dependence or environmental effects. Therefore, it is unclear whether reducing the density through fishing would improve growth and condition.") The annual impacts on bottom habitat may be slightly lessened with a reduction in quota.

Discounting the availability of the resource on Georges Bank there is sufficient resource in the Northern New Jersey and Delmarva areas to maintain a quota significantly above this level. The biology of the resource does not warrant constraining the industry to this level at this time. This level of quota may not have significantly different effects on the resource (since more may die of natural mortality), but may have a somewhat more beneficial effect on bottom habitat than the preferred alternative. There would be less fishing effort with this alternative, but it has been determined that dredge impacts are short-term and minimal.

3.1.3 Alternative S2 - 2.850 Million Bushels

The second non-preferred alternative quota for the 2003 surfclam fishery is the quota from 2001of 2.850 million bushels. This quota is within the OY range of between 1.850 and 3.400 million bushels as required by the FMP. This alternative would maintain the surfclam quota at the level it was in 2001 (MAFMC 2002a).

The 2.850 million bushel recommendation for 2003 represents the return to the 2001 quota and a decrease of 9% from 2002. The direct impact would be that surfclam allocation owners would continue to each receive the same number of cage tags they had in 2001. All allocation owners would be affected proportionally the same, since the harvest right which each individual entity owns is actually a percentage share of the annual quota. If all other aspects of the surfclam fishery were to remain constant, such as ex-vessel prices and the quantity of surfclams supplied from state waters, then there would be no major human consequences. It is unlikely, however that all the other conditions which held true in 2001 will pertain again in 2003.

The major reason the Council considered the status quo for the 2003 quota from the 2001 quota was in order to comply with Council policy about setting the quota to consider net economic benefits over time to consumers and producers, within the framework of greatest national benefit. Landings relative to quota (and showing significant amounts unused) for inshore New York were presented in the Quota Recommendation paper (MAFMC 2002a).

However, in 2000, 100% of the EEZ quota was landed. Prior to 1997 the previous five years of the

ITQ program landed between 99 and 100% of the quota annually, but during both 1997 and 1998 more than 5% of the quota was not landed. With the EEZ quota at a constant 2.565 million bushels for each of those years, it is believed that market forces were the primary reason behind the EEZ landing decline. Also contributing to the conclusion that market demand was off was the fact that inshore New York and New Jersey landings were significantly below their quotas, however landings in New Jersey and New York both increased significantly since 1999 (MAFMC 2002a).

Returning to the quota level of 2001 could possibly affect the long-term growth of the industry, if industry is correct and the demand is growing. There is the argument that the slow growing clams off of Delmarva may need to be thinned in order to be more productive or may never become more productive. (The assessment (USDC 1998a) states: "It is unclear to what degree this is due to density dependence or environmental effects. Therefore, it is unclear whether reducing the density through fishing would improve growth and condition.") The annual impacts on bottom habitat would be the same with maintaining the quota. This level of quota could maintain exvessel prices, *ceteris paribus* (MAFMC 2002b).

3.1.4 Alternative S3 - Status Quo - 3.135 Million Bushels

The third non-preferred alternative quota for the 2003 surfclam fishery is the status quo of 3.135 million bushels. This quota is within the OY range of between 1.850 and 3.400 million bushels as required by the FMP. This alternative would maintain the surfclam quota at the level it was in 2002 (MAFMC 2002a).

The 3.135 million bushel alternative for 2003 represents the status quo. The direct impact would be that surfclam allocation owners would continue to each receive the same number of cage tags they had the year before. All allocation owners would be affected proportionally the same, since the harvest right which each individual entity owns is actually a percentage share of the annual quota. If all other aspects of the surfclam fishery were to remain constant, such as ex-vessel prices and the quantity of surfclams supplied from state waters, then there would be no major human consequence of the status quo. It is unlikely, however that all the other conditions which held true in 2002 will pertain again in 2003.

The major reason the Council considered the status quo for the 2003 quota from the 2002 quota was in order to comply with Council policy about setting the quota to consider net economic benefits over time to consumers and producers, within the framework of greatest national benefit. Landings relative to quota (and showing significant amounts unused) for inshore New York were presented in the Quota Recommendation paper (MAFMC 2002a).

However, in 2000, 100% of the EEZ quota was landed. Prior to 1997 the previous five years of the ITQ program landed between 99 and 100% of the quota annually, but during both 1997 and 1998 more than 5% of the quota was not landed. With the EEZ quota at a constant 2.565 million bushels for each of those years, it is believed that market forces were the primary reason behind the EEZ landing decline. Also contributing to the conclusion that market demand was off was the fact that inshore New York and New Jersey landings were significantly below their quotas, however landings in New Jersey and New York both increased significantly since 1999 (MAFMC 2002a).

Maintaining the status quo quota for 2003 could possibly affect the long-term growth of the industry, if industry is correct and the demand is growing. There is the argument that the slow growing clams off of Delmarva may need to be thinned in order to be more productive or may never become more productive. (The assessment (USDC 1998a) states: "It is unclear to what degree this is due to density dependence or environmental effects. Therefore, it is unclear whether reducing the density through fishing would improve growth and condition.") The annual impacts on bottom habitat would be the same with maintaining the quota. This level of quota would maintain exvessel prices, *ceteris paribus* (MAFMC 2002b).

3.1.5 Alternative 4 - 3.400 Million Bushels

The maximum quota allowed under the FMP is 3.400 million bushels and would represent an 8% increase above the 2002 quota. This level of quota may require that the risk of paralytic shellfish poisoning from surfclams harvested on Georges Bank would be mitigated by employment of a dockside test for the toxin. The Council assumed none of the surfclam resource on Georges Bank would be available, and thus this quota could possibly be viewed as excessive and somewhat risky. Given the current condition of the resource this level of quota should not adversely affect the long-term sustainability of the stock. Increased pressure on bottom habitat could also possibly cause some additional limited adverse effects.

3.2 Surfclam Minimum Size Limit

3.2.1 Preferred Alternative 1 (no action)

The Surfclam and Ocean Quahog FMP includes a provision for a minimum size limit of 4.75 inches on surfclams, which may be used to protect new year classes from harvest before they have reached an optimal size. This provision is written such that the 4.75 inch minimum size will automatically be in effect unless the Council and NMFS take the active step of suspending it each year. The current stock is comprised primarily of large, adult individuals, with few small individuals apparent from landings in most areas (USDC 2000a). Reinstating a minimum size under these conditions would result in greater harm than benefit, as it would require the industry to use "sorting" machines which will often damage undersized clams as it routes them back overboard.

It is, therefore, the Council's recommendation that the surfclam minimum size limit be suspended for 2003, as has been done every year since 1990. Continuing the suspension will have no impact on the current fishery or resource.

3.2.2 Alternative 2 (No suspension)

Alternative 2 would implement the reverse of Alternative 1, whereby there would be no provision to suspend the minimum surf clam size limit of 4.75 inches for surf clams. The Witzig 2001 report identifies that only 2 percent of the landed clams were smaller than 4.75 inches. It is believed that there is no current at sea discards. Survival rates of discarded clams is greater than 50 percent, so even if all the clams smaller than 4.75 inches were discarded, the result would only be about one percent of the annual landings. The recent SARC (USDC 2000a) considers this resource as under-utilized.

3.3 Ocean Quahog *(Arctica islandica)* Quota

3.3.1 Preferred Alternative (Q3) -- Status Quo -- 4.500 Million Bushels

The Council proposes a 2003 ocean quahog quota of 4.500 million bushels, the same as 1999, 2000, 2001 and 2002. There is no biological reason that the resource can not support this level of quota given the most recent stock assessments (USDC 1998b and 2000b). The 1997 (4.317 million bushels) and 1998 (4.000 million bushels) reductions were based on evaluation of the harvest level which would satisfy the Council policy of a harvest level which could be maintained for at least 30 years given the information prior to the 1998 assessment (USDC 1998b).

The Sustainable Fisheries Act (SFA) of 1996 significantly altered the requirement of FMPs to address habitat issues. The SFA contains provisions for the identification and protection of habitat essential to the production of Federally managed species. The Act requires FMPs to include identification and description of essential fish habitat (EFH), description of non-fishing and fishing threats, and suggest conservation and enhancement measures. These new habitat requirements, including what little is known about clam gear impacts to the bottom, were addressed in Amendment 12 (MAFMC 1999) and the new Amendment 13 (USDC 2002c) that is out for public review. The effect on bottom habitat of the 4.500 million bushel quota would be the same as is currently occurring. This level of quota will not effect the exvessel market, *ceteris paribus*.

Based on the biological data presented in the most recent assessments (USDC 1998b and 2000b) the ocean quahog quota could have been increased overall. The Council proposed a 2003 ocean quahog quota based on the analysis of abundance for that species found in the 31st Northeast Regional Stock Assessment Workshop (SAW 31) concluded in August 2000. Similar to surfclams, SAW 31 and the assessment from the 1997 survey (SAW 27) included work to estimate dredge efficiency and showed a significant increase in the estimate of ocean quahog biomass. Although 36 percent of the resource is located on Georges Bank, SAW 31 did not question whether Georges Bank would ever be reopened. It is estimated the even excluding the ocean quahog resource portion on Georges Bank, that fully 82% of the virgin biomass remains after two plus decades of harvesting these long-lived creatures.

Although SAW 31 showed that the ocean quahog quota could have been increased beyond the 4.5 million bushel level, the Council did not recommend any change for 2003 because of four major factors: (1) the 2001 quota was not constraining to industry; (2) nearly all industry members supported the 4.500 million bushel harvest level; (3) repeated concern was expressed by industry over the continued lack of apparent ocean quahog recruitment south of Georges Bank; and (4) unless prices or technology changes significantly in the near future, it is unlikely that the ocean quahog fishery inexpensive extractions in the past are sustainable because those extractions have been dependent on rich virgin beds.

The Secretary approved Amendment 12 (MAFMC 1999) with its new overfishing definition in April 1999. The new definition has: a "biomass target" = ½ virgin biomass, "fishing mortality target" = $F_{0.1}$, "biomass threshold" = ½ biomass target, and a "fishing mortality threshold" = to $F_{25\%}$ MSP level yielding F = 0.04. The 1999 quota yielded an F (the last time it was measured at a peer-reviewed SARC) of approximately 0.02 compared to the threshold of 0.04 contained in the overfishing definition. The specific F associated with the 2003 quota is expected to be close to the F in 1999, because a

similar proportion of the biomass remains unexploited compared to 1999. Therefore, the proposed quota is below the approved overfishing definition for fishing mortality.

The 4.5 million bushel recommendation for 2003 is the same as the previous four years, but represented an increase of 13% from the 4 million bushel quota of 1998. If accepted by the National Marine Fisheries Service (NMFS), the direct impact would be a maintenance of the status quo allocation issued to each allocation owner for 2002. There should be no change in economic impacts since the status quo is maintained.

Maintaining the ocean quahog quota at the 4.500 million bushel level relaxes the binding constraint which existed on the ocean quahog supply for 1997 and 1998 and places it at a level which industry members have stated will meet their needs. Given the reassuring news resulting from the latest stock assessments, many would find it unreasonable to restrain the supply of ocean quahogs at a time when the industry has a market for them, and both harvesting and processing capacity are not being fully utilized (MAFMC 2002b).

3.3.2 Alternative Q1 - 4.000 Million Bushels

The minimum quota allowed under the FMP's OY definition is the alternative for 4.000 million bushels, which was not chosen by the Council because it would be constraining to industry and there is no biological reason to constrain industry at this time. The 4.000 million bushel level is the level the Council selected in 1998 and was a reduction of 7.3 percent from 1997. With the 1997 and 1999 surveys and the 1998 and 2000 assessments showing that there is sufficient resource, the Council elected to have a slight increase for 1999 and maintain that level for 2000, 2001, 2002 and 2003.

The quota reductions which the Council recommended in 1997 and 1998 were in part due to questions about the validity of assuming that all of the Georges Bank biomass would become available to the fishery over the course of the 30 year harvest period. In 1996 when the Council made the assumption of a reopening occurring on Georges Bank, the Council stated that additional quota reductions would be necessary in the future if demonstrable progress was not made toward a reopening of Georges Bank in the near future. The 1996 SAW did not provide any forecast for ocean quahogs and only provided the management advice that a 30 - year supply is possible only if the biomass on Georges Bank and in areas off Southern New England and Long Island, generally too deep to be harvested with current technology, were included.

The 1998 and 2000 SAWs (USDC 1998b and 2000b) did not question whether Georges Bank would ever be opened. Fully more than a third of the resource is located on Georges Bank. The resource is of sufficient size overall that the third that is on Georges Bank is not necessary to meet the Council's former 30 supply year policy. This policy has now been replaced with the overfishing definition which is based on MSY and a supply that is sustainable indefinitely.

As with the surfclam resource, the vast majority of ocean quahogs which are left unharvested in 2003 will still be available to the same allocation holders in subsequent years. Earnings are simply deferred rather than lost, with the ocean quahogs being stored in the ocean rather than in refrigerated containers or cans.

This level of quota may have a slight beneficial effect on the resource since major recruitment incidents have not been identified for the ocean quahog stock, and these animals may take up to 20 years to reach marketable size depending upon environmental conditions. A return to the 1998 quota level may have a slight beneficial effect on the bottom habitat since less bottom would be exposed to the hydraulic dredging, especially in areas that have been heavily fished, however, it has been determined that clam dredge impacts are short-term and minimal. This level of quota will not likely effect the exvessel market, *ceteris paribus*.

3.3.3 Alternative Q2 - 4.250 Million Bushels

Splitting the difference between the minimum allowable quota under the OY range and the current quota of 4.500 million bushels, yields a quota of 4.250 million bushels. This is a quota reduction of 6%. This level was not chosen by the Council because it could be constraining to industry and there is no biological reason to constrain industry at this point. With the 1997 and 1999 surveys and 1998 and 2000 assessments showing that there is sufficient resource, the Council elected to have a slight increase for 1999, and maintain that level for 2000, 2001, 2002, and 2003, in order to allow the industry to slightly grow.

The quota reductions which the Council recommended in 1997 and 1998 were in part due to questions about the validity of assuming that all of the Georges Bank biomass would become available to the fishery over the course of the 30 year harvest period. In 1996 when the Council made the assumption of a reopening occurring on Georges Bank, the Council stated that additional quota reductions would be necessary in the future if demonstrable progress was not made toward a reopening of Georges Bank in the near future. The 1996 SAW did not provide any forecast for ocean quahogs and only provided the management advice that a 30 - year supply is possible only if the biomass on Georges Bank and in areas off Southern New England and Long Island, generally too deep to be harvested with current technology, are included.

The 1998 and 2000 SAWs (USDC 1998b and 2000b) did not question whether Georges Bank would ever be opened. Fully a third of the resource is located on Georges Bank. The resource is of sufficient size overall that the third that is on Georges Bank is not necessary to meet the Council's former 30 supply year policy, which has been supplanted by the new overfishing definition based on MSY.

As with the surfclam resource, the vast majority of ocean quahogs which are left unharvested in 2003 will still be available to the same allocation holders in subsequent years. Earnings are simply deferred rather than lost, with the ocean quahogs being stored in the ocean rather than in refrigerated containers or cans.

This level of quota may have a slight beneficial effect on the resource since major recruitment incidents have not been identified for the ocean quahog stock, and these animals may take up to 20 years to reach marketable size depending upon environmental conditions. A return to a level near the 1997 quota level may have a slightly higher beneficial effect on the bottom habitat since less bottom would be exposed to the hydraulic dredging, especially in areas that have been heavily fished. This level of quota will not likely effect the exvessel market, *ceteris paribus*.

3.3.4 Alternative Q4 - 4.750 Million Bushels

This is a 6% increase over the current quota and near the mid-point of the OY range for ocean quahog quotas. An increase in quota of this amount was favored by a few processors in the industry but as a whole industry was willing to maintain the status quo. Bottom habitat may be slightly negatively impacted as more ocean quahogs would be removed.

3.3.5 Alternative Q5 - 6.000 Million Bushels

This is the maximum of the OY range for ocean quahog quotas and would be a quota increase of 33% above the status quo. Bottom habitat may be more negatively impacted as roughly 33% more ocean quahogs would be removed.

3.4 Maine Ocean Quahog (*Arctica islandica)* Quota

3.4.1 Preferred Alternative (M3) – Status Quo -- 100,000 Maine bushels

Three alternative quotas are presented for the Maine ocean quahog fishery. Alternative M3 would maintain the status quo quota at the maximum allowable level of 100,000 Maine bushels.

The Council recommends that the Maine ocean quahog quota for 2003 remain unchanged at the initial maximum quota of 100,000 Maine bushels (1 bushel = 1.2445 cubic feet).

The 2002 quota was projected to be reached by October 24, 2002, and the Regional Administrator closed this fishery on October 24, 2002, as she did for the 2000 Maine Mahogany fishery in November of 2000. It is anticipated that the Regional Administrator will likely also have to close the fishery in 2003. The Maine fishery was not closed in 2001 because of the quota being reached but was closed for nearly a month in the summer due to PSP. It is likely that this PSP closure during the peak of the season precluded a closure attributable to exceeding the annual quota.

According to 50 CFR section 648.76 (2)(b)(iv): *The Regional Administrator will monitor the quota based on dealer reports and other available information and shall determine the date when the quota will be harvested. NMFS shall publish notification in the Federal Register advising the public that, effective upon a specific date, the Maine mahogany quahog quota has been harvested and notifying vessel and dealer permit holders that no Maine mahogany quahog quota is available for the remainder of the year.*

It must also be remembered that according to 50 CFR section 648.76 (2)(b)(iii): *All mahogany quahogs landed by vessels fishing in the Maine mahogany quahog zone for an individual allocation of quahogs under section 648,70 will be counted against the ocean quahog allocation for which the vessel is fishing.* In other words, even after the initial maximum quota of 100,000 Maine bushels is harvested from the Maine mahogany ocean quahog zone (north of 43°50'), vessels could obtain/use ITQ allocation and continue to fish in this zone. It is anticipated that some Maine fishermen will again rent ITQ allocation after the 100,000 bushel quota is reached in 2002 and 2003 as they have done for the past two years. More than half (4,530 bushels) of the 8,500 bushels that were above the 100,000 quota in 2001 were landed with an ITQ allocation. In 2000, there were 5,821 bushels landed with ITQ shares of the 20,767 bushels that exceeded the 100,000 bushel quota. There were no quota overages prior to 2000. Since implementation of Amendment 10 in 1998,

approximately 70 % of the average annual landings have been reported as coming from state waters and 30% from Federal waters.

Amendment 10 (MAFMC 1998) emphasized that there had been no comprehensive, systematic survey or assessment of the ocean quahog resource in eastern Maine. It also emphasized that a full stock assessment of the Maine resource should be a priority to ensure that this segment of the fishery would have a sustainable future. The initial maximum quota for the Maine zone was to remain in effect until a resource survey and assessment was completed. The agreement at the time of Amendment 10 was that the State of Maine was to initiate a survey once the initial maximum quota of 100,000 bushels became constraining. There is an effort within the State of Maine to initiate an ocean quahog survey in 2002. Scott Feindel has been hired and is currently working with a commercial fishermen to survey the distribution of the resource along the Maine coast.

3.4.2 Alternative M1 – 50,000 Maine bushels

Alternative M1 corresponds to a 50% reduction from the maximum allowable quota under the current management plan. The status quo quota of 100,000 bushels was attained in both the 2002 and 2000 fishing years, and likely would have been attained in the 2001 fishing year had there been no closure due to PSP. Although the condition of the Maine Mahogany quahog is currently unknown, the ocean quahog fishery overall is not overfished and overfishing is not occuring. Therefore, until such time that additional information is provided for this fishery (a stock assessment should be available in two years), it would be constraining to the industry to reduce the harvest significantly below the status quo quota as proposed by this alternative.

3.4.3 Alternative M2 – 72,466 Maine bushels

Alternative M2 corresponds to the harvest level actually attained in 1998, though it would reduce the allowable harvest by 28%. There is no real justification to returning to the 1998 level of harvest as these Maine fishermen have worked hard to build the market and a stock assessment for this portion of the resource should be available in two years.

4.0 DESCRIPTION OF THE AFFECTED ENVIRONMENT

4.1 Description and Identification of Essential Fish Habitat (EFH)

According to section 600.815 (a)(1), FMPs must describe EFH in text and with tables that provide information on the biological requirements for each life history stage of the species. These tables should summarize all available information on environmental and habitat variables that control or limit distribution, abundance, reproduction, growth, survival, and productivity of the managed species. The surfclam and ocean quahog EFH background documents (Appendices 5 and 6 of Amendment 13) are considered the best scientific information available for EFH in order to meet National Standard 2 of the MSFCMA and were relied upon heavily in this section of Amendment 12.

As defined in section 3 (10) of the MSFCMA, EFH is "those waters and substrate necessary to fish for spawning, breeding, feeding or growth to maturity." NMFS interprets "waters" to include aquatic areas

and their associated physical, chemical, and biological properties that are used by fish and may include aquatic areas historically used by fish where appropriate; "substrate" includes sediment, hard bottom, structures underlying the waters, and associated biological communities; "necessary" means the habitat required to support a sustainable fishery and the managed species' contribution to a healthy ecosystem; and "spawning, breeding, feeding, or growth to maturity" covers a species' full life cycle.

Matrices of habitat parameters (i.e. temperature, salinity, light, etc.) for eggs/larvae and juveniles/adults were developed in the surfclam and ocean quahog EFH background documents and included in Amendment 13 as Tables 11and 12.

Amendment 12 (MAFMC 1998) identified and described essential fish habitat for surfclams and ocean quahogs in section 2.2.2. No new information exists that would provide the basis for changing the EFH identification and description that was developed in Amendment 12.

Surfclams

> **Juveniles and adults:** Throughout the substrate, to a depth of three feet below the water/sediment interface, within Federal waters from the eastern edge of Georges Bank and the Gulf of Maine throughout the Atlantic EEZ, in areas that encompass the top 90% of all the ranked ten-minute squares for the area where surfclams were caught in the NEFSC surfclam and ocean quahog dredge surveys (Figures 30 and 31 of Amendment 13). Surfclams generally occur from the beach zone to a depth of about 200 feet, but beyond about 125 feet abundance is low.

Ocean quahogs

> **Juveniles and adults:** Throughout the substrate, to a depth of three feet below the water/sediment interface, within Federal waters from the eastern edge of Georges Bank and the Gulf of Maine throughout the Atlantic EEZ, in areas that encompass the top 90% of all the ranked ten-minute squares for the area where ocean quahogs were caught in the NEFSC surfclam and ocean quahog dredge surveys (Figures 32 and 33 of Amendment 13). Distribution in the western Atlantic ranges in depths from 30 feet to about 800 feet. Ocean quahogs are rarely found where bottom water temperatures exceed 60 ^{o}F, and occur progressively further offshore between Cape Cod and Cape Hatteras.

Since the NEFSC clam survey only briefly (no stratified random design) surveyed the Gulf of Maine twice in the early 1990s, no attempt is currently made to designate EFH for the small artisanal fishery that occurs north of 43^{o} 50' north latitude at this time. The State of Maine is desirous of sampling this resource to quantify its extent, however no definitive plans are yet in place. It was identified in Amendment 12 that although no data exist to map even the presence or absence of the resource reliably (i.e., there is “Level 0" data), the habitat supports a resource that sustains a small fishery and thus it would seem worthwhile to attempt to identify valuable habitat areas through discussions with the fishing industry to designate EFH in the Gulf of Maine. No comments were received from Maine fishermen or State representatives that would provide useful anecdotal information. The Council has determined that when Maine performs a survey and has useful quantitative data to designate EFH, the information will be supplied to the Habitat Monitoring Committee for their review.

According to section 600.815 (a)(8), FMPs should identify habitat areas of particular concern (HAPC) within EFH where one or more of the following criteria must be met: (I) ecological function, (ii) sensitive to human-induced environmental degradation, (iii) development activities stressing, or (iv) rarity of habitat.

The MAFMC did not recommend any portions of EFH as HAPC for surfclams or ocean quahogs in Amendment 12 and has no new information to warrant a change at this time. This is because no strong associations between habitat type or location and recruitment for these species have been identified in the EFH background documents (Amendment 13). The information in the EFH background documents appear inadequate at this time to put a high priority on any specific habitat.

4.2 Port and Community Description

For Amendment 13 (MAFMC 2002c) to this FMP, the Council hired Dr. Bonnie McCay and her associates at Rutgers University to describe the ports and communities that are associated with the surfclam and ocean quahog fisheries. The researchers did an extensive job of characterizing the three main fisheries and their results will not be detailed here. Please see Amendment 13 (MAFMC 2002c) for specific details on all of the fisheries or the quota recommendation paper (MAFMC 2002a) for details on the Maine ocean quahog fishery.

Communities from Maine to Virginia are involved in the harvesting and processing of surfclams and ocean quahogs. Ports in New Jersey and Massachusetts handle the most volume and value, particularly Atlantic City, Point Pleasant, New Bedford, and Cape May/Wildwood. There are also significant landings in Ocean City, Maryland, Warren, Rhode Island, and the Jonesport/Beals Island area of Maine. The Maine fishery is entirely for ocean quahogs, which are sold as shellstock for the half-shell market. The other fisheries are industrialized ones for surfclams and ocean quahogs, which are hand shucked or steam-shucked and processed into fried, canned, and frozen products. Processing plants are therefore major components of the fishery, and the communities in which they are found must be described as well as the port towns. Some of them meet the definition of "fishing community" found in the Sustainable Fisheries Act of 1996: "[t]he term "fishing community" means a community which is substantially dependent on or substantially engaged in the harvest or processing of fishery resources to meet social and economic needs, and includes fishing vessel owners, operators, and crew and United States fish processors that are based in such community." The McCay team characterizations of the ports and communities are based on government census and labor statistics and on observations and interviews carried out during the late 1990s and in the fall of 2001.

4.3 Federal Fleet Profile

The total number of vessels participating in the surfclam and ocean quahog fishery outside the State of Maine increased by 3 vessels in 2001. In addition to the overall trend of reducing vessel numbers through consolidating fishing operations on to fewer vessels, the current vessel count includes the loss of four vessels in weather-related accidents in January of 1999.

Federal Fleet Profile						
Non-Maine Vessels	1996	1997	1998	1999	2000	2001

Harvests BOTH surfclams & ocean quahogs	14	14	8	11	12	14
Harvests only surfclams	20	19	23	22	19	21
Harvests only ocean quahogs	22	17	16	12	17	16
Total Non-Maine Vessels	56	50	47	45	48	51
Maine Ocean Quahog Vessels	25	34	39	38	34	31
Source: NMFS Clam Vessel Logbooks						

The major fleet shift which was apparent over time was the reduction in numbers of vessels participating in the fishery for ocean quahogs. While the total number of vessels in the Federal surfclam and ocean quahog fleet declined 20% from 1996 to 1999 (from 56 to 45 vessels), that portion which participated in the harvest of ocean quahogs dropped by more than one-third over the same interval (from 36 to 23 vessels). This trend reversed slightly in 2000 as 6 additional vessels made trips for ocean quahogs outside the State of Maine. In 2001 it reversed further with the net addition of one more vessel, and is expected to continue as new vessels make their way out of construction yards in 2002 (MAFMC 2002a).

In the year 2002, the average age of a vessel participating in the Federal surfclam fishery was 26.4 years.

Newest = John N (13 years old - built 1989)
Oldest = Sebonac (59 years old - built 1943)

Of those vessels participating in the Federal ocean quahog fishery, the average age was 25.8 years.

Newest = E S S Pride (2 years old - built 2000)
Oldest = Wando River (45 years old - built 1957)

4.4 Processing Sector

In 2001 there were a total of 13 companies which were reported as having made purchases of surfclams or ocean quahogs outside the State of Maine. Dealer reports are required of all entities receiving Federal harvests of these two species managed under the ITQ system.

The largest processor is Sea Watch International, based in Milford, Delaware. Listed from north to south, the processors are arrayed as follows:

Massachusetts
- Atlantic Coast Seafood, Inc.
- Cape Cod Bay Fisheries
- Fair Tide Shellfish LTD.

Rhode Island
- Blount Seafood Corp.
- Galilean Seafood Inc.

New Jersey
- Atlantic Capes Fisheries, Inc.
- Cape May Fisheries CO-OP Inc.
- Cape May Foods (prior name "Cape May Canners, Inc.")
- Point Pleasant Packing, Inc.
- Surfside Products Inc.

Delaware
- Sea Watch International

Virginia
- Eastern Shore Seafood Products
- J H Miles & Company Inc.

There has been an increasing trend toward vertical integration, where companies own both vessels and processing facilities. An example is the merger of Sea Watch International and the Truex fleet of vessels in the summer of 1999.

There were a total of 10 entities in the State of Maine to whom vessels reported selling ocean quahogs in 2001:

1. Al's Seafood
2. Atlantic Shellfish

3. Beals Lobster Co., Inc.
4. Carver Shellfish, Inc.
5. CNW Seafood
6. D C Air & Seafood Inc.
7. Kip's Seafood Co.
8. Maine's Best Seafood, Inc.
9. Moosabec Mussels, Inc.
10. North Atlantic, Inc.

5.0 DESCRIPTION OF THE RESOURCES AND THE FISHERIES

5.1 Surfclam *Spisula solidissima*

5.1.1 Status of the Stock

Surfclams are bivalve mollusks which are distributed in the western North Atlantic from the southern Gulf of St. Lawrence to Cape Hatteras. Commercial fisheries have generally concentrated on the populations of surfclams which have flourished in the sandy ocean sediments off the coast of New Jersey and the Delmarva peninsula. Growth rates are relatively rapid, with clams reaching preferable/harvestable size (approximately 5 inches) in about six years. Maximum size is about 9 inches in length, though individuals larger than 8 inches are rare. They have a longevity of approximately 35 years, and while some individuals reach sexual maturity within three months, most spawn by the end of their second year.

In the Mid-Atlantic region, surfclams are found in the relatively shallow waters from the beach zone to a depth of about 180 feet. Substantial fisheries exist in the 3-mile jurisdictions of the States of New Jersey and New York.

Note: the following "State of the Stock," "Management Advice," and "Forecast" sections are taken directly from the SARC advisory report (March 2000), and therefore are expressed in metric units (1 kg = 2.205 lbs, there are 17 lbs/bushel for surfclams and 10 lbs/bushel for ocean quahogs).

State of Stock: The EEZ surfclam stock (animals in waters beyond 3 mile state limits) is at a high level of biomass and under-exploited. Surfclams in state waters were not assessed. Fishing mortality is low. Estimated mean annual fishing mortality rates (F) from 1997-1999 were 0.02 for the entire EEZ resource, 0.03 – 0.04 for the northern New Jersey (NNJ) region, and 0.04 - 0.07 for the southern New Jersey (SNJ) region. The majority of the catch is derived from NNJ, which contains about 39% of the stock biomass. Recent F's are less than the current overfishing definition ($F_{20\%}$ = 0.18, estimated in the previous assessment assuming M=0.05) or a new overfishing definition recommended by the SARC (an F_{MSY} proxy of F=M=0.15).

Management Advice: Fishing mortality can be increased for the surfclam resource taken as a whole. However, it may be advantageous to avoid localized depletion.

Forecasts: Short term deterministic projections for 1999-2002 were performed using recent catch

(average 1997-1999) with 20% non-catch mortality from fishing, recent recruitment levels (average 1997-1999) and assuming M=0.15 y^{-1}. Projections suggest little change (4%) in total clam biomass during 1999-2002, although larger changes in some regions are possible.

Stock Assessment Region[1,2]	Biomass 1999	CV	Recent Mean Catch+ 20%	Recent Mean Recruitment	Biomass 2002	% Change in Biomass
SVA	2,500	71%	2	0	1,600	-36%
DMV	320,000	52%	900	23,000	331,000	3%
SNJ	68,000	114%	4,000	12,000	81,000	19%
NNJ	480,000	26%	16,000	42,000	441,000	-8%
LI	47,000	72%	100	3,000	48,000	1%
SNE	84,000	40%	90	4,900	82,000	-3%
GBK	265,000	34%	0	29,000	334,000	26%
Total	1,268,000	19%	21,000	114,000	1,319,000	4%

[1] SVA = southern Virginia, DMV = Delmarva, NNJ = Northern New Jersey, SNJ= Southern New Jersey, LI = Long Island, SNE = southern New England, GBK = Georges Bank

[2] Source: KLAMZ assessment model, USDC 2000a.

5.1.2 Fisheries

Surfclam Landings: Both State and Federal Waters					
Region	2000			2001	
	Bushels	Value		Bushels	Value
New England States	43,180	$581,102		31,699	$470,049
Mid-Atlantic States	3,969,062	$36,477,136		4,018,930	$39,085,194
Total	4,012,242	$37,058,238		4,050,629	$39,555,243
Source: NMFS Unpublished Landings Data, Woods Hole, MA					

Coastwide landings of surfclams totaled 4.05 million bushels (bu) in 2001, an increase of 1% from the 4.01 million bushels landed in 2000. This continues a recovering trend which saw landings increase by 9.7% in 1999. The prior two years had experienced a decrease in landings of 5% and 11.2%. Reported exvessel value increased 6.7% in 2001 from $37.1 million to $39.6 million dollars. The improvement in the fortunes of surfclam fishermen is due largely to two factors: 1) the industry has been substituting surfclams for ocean quahogs as ocean quahog meats have become more expensive to produce, and 2) processors have had greater success in selling surfclam products relative to previous years. Industry has reported some success in marketing a thick, new "super-strip" product that is generated mainly from hand-shucked clams.

In recent years, surfclams have been harvested from four different jurisdictional areas: the Federal EEZ, and the state waters of New Jersey, New York, and Massachusetts. All but Massachusetts have established management regimes which include annual quotas and harvest limits for individual vessels. In 2001, quotas were fully harvested from New Jersey and Federal waters for the third year in a row, while New York retained a small surplus.

The New Jersey Inshore Fishery for Surfclams

New Jersey manages the largest state fishery for surfclams. They conduct a survey every summer and produce a resource report every three years. According to their *Inventory of New Jersey surfclam (Spisula solidissima) resource* report (NJ Fish and Wildlife 2000) the total surfclam standing stock for New Jersey territorial waters from Shark River Inlet to Cape May in 1999 was 24 million bushels. The 1999 survey sampled 330 stations. The overall length-frequency distributions have not changed dramatically, but the mean shell lengths have been steadily increasing since 1993. The mean shell lengths of surfclams found in 1993 was 3.9 inches and has steadily increased to a mean shell length of 4.8 inches. The most notable difference was the lack of clams collected that measured less than 2.7 inches in the last several years. The majority of the resource is harvested from the territorial sea adjacent to the Federal northern NJ assessment region, however in recent years the harvest from areas adjacent to the Federal southern NJ region have increased dramatically for the first time since the early 1970s.

A constant annual quota of 600,000 bushels had been maintained for years until the 1999/2000 season, when the quota was increased to 700,000. New Jersey is unique in defining a season which begins in October of one calendar year and closes at the end of May in the next.

New Jersey Surfclam Fishery

Season (Oct - May)	Quota (bu)	Landings (bu)	Bushels Unharvested	Percent Unharvested
FY 95/96	600,000	566,120	33,880	6%
FY 96/97	600,000	468,377	131,623	22%
FY 97/98	600,000	467,569	132,431	22%
FY 98/99	600,000	570,852	29,148	5%
FY 99/00	700,000	699,649	351	.05%
FY 00/01	700.000	700,256	(256)	(0.4%)
FY 01/02*	700,000	685,885	14,115	2.0%

* Landings for 2002 are through May 18, two weeks remaining in season, all quota likely will be taken.

Source: New Jersey Division of Fish and Wildlife

Many vessels in the New Jersey inshore fishery for surfclams also participate in the Federal fishery. For the nearly completed fishing year (May 2002), it is likely that none of the quota will be left unharvested. The past four fishing years represent a significant improvement relative to the prior two seasons, which saw fully 22% of the quota unharvested each year. Fortunately, vessels experienced virtually no problems in selling their catches in the recently completed fishing year. There are 57 licenses for inshore New Jersey. Up to three licenses can be combined onto one vessel.

The New York Inshore Fishery for Surfclams

New York inshore waters are divided into two segments: Long Island Sound and Atlantic Ocean

waters out to three miles. While there are approximately 100 permits for the Long Island Sound area, the quantity of surfclams landed from that area is small. With attractive shells of a golden-brown color, these surfclams are often harvested by hand, and sold fresh into sushi and premium bait markets.

The vast majority of New York state waters' harvest is from the Atlantic Ocean area, for which there are currently 23 moratorium vessel permits, held by 17 owners (Davidson pers. comm.). When a moratorium and quota management were instituted in 1994, there were a total of 25 moratorium vessel permits issued. Two of these permits were canceled for failing to meet the minimum harvest requirement of 5,000 bushels per year. (This requirement has since been repealed.)

New York Inshore Quotas and Landings of Surfclams

Year	Quota (bu)	Harvest (bu)	Percent Over or Under Quota
1990	(none)	720,473	
1991	(none)	713,019	
1992	(none)	719,351	
1993	(none)	856,366	
1994	500,000	523,281	5 % over
1995	500,000	420,855	16 % under
1996	500,000	451,492	10 % under
1997	500,000	389,014	22 % under
1998	500,000	227,000	55% under
1999	500,000	266,795	47% under
2000	500,000	339,142	32% under
2001	500,000	443,859	11% under
2002	500,000	107,392 (through March)	86% of quarterly quota

Source: NY Dept. of Environmental Conservation

The average catch from New York waters was approximately 173,000 bushels annually for the 20-year period spanning the 1970's and 1980's. Catches soared in 1990 with implementation of ITQ management in the Federal fishery, as surplus vessels sought alternative areas to fish.

Harvests peaked in 1993 at just over 850,000 bushels, trended downward through 1998 and have since been increasing steadily. As of May 2002, seventeen of the 23 vessel fleet were fishing this year (Davidson pers. comm.).

The New York State Department of Environmental Conservation staffer who heads New York's surfclam program is Maureen Davidson. In a May 2002 contact she emphasized the fact that landings have been increasing steadily for the past five years. Landings are still somewhat below the annual quota but this is not due to any problems associated with resource availability. It is likely that landings are restricted by the fact that New York has a weekly boat quota of 21 cages per week. Not all of the

23 vessels fish every week and if they did the result could be closures at the end of each quarterly period. The vessels that fish generally land their 21 cages per week.

The New York surfclam survey that was completed in the summer of 1999 indicated there are "clams everywhere," an outcome which is similar to what their 1996 survey found. The 1996 estimate indicated there were 12.2 million bushels of surfclams in the 163 square mile area that is New York's Territorial Sea (Davidson pers. comm.). The 1999 survey data are still being analyzed, with the report yet to be finalized by State University of New York personnel, but preliminary estimates show a slight increase to 12.8 million bushels in the survey area. The 2002 survey will be conducted this summer by DEC personnel in cooperation with a commercial fishing vessel.

NY Atlantic Surfclam Landings: Jan through June Comparison

Year	First Quarter	Second Quarter	Half-Year Total
1994	119,623	119,251	238,874
1995	106,689	105,063	211,752
1996	117,738	119,053	236,791
1997	112,196	109,928	222,124
1998	76,003	59,339	135,342
1999	63,460	63,445	126,905
2000	75,070	76,980	152,050
2001	102,072	118,614	220,686
2002	107,392	no data yet available	

Source: NY Dept. of Environmental Conservation

A comparison of the landings for the first half of each year since 1994 indicates that landings are returning to the levels experienced in the mid-1990's after the three year drop experienced between 1996 and 1998. Davidson (pers. comm.) indicates that fishermen are currently fishing hard and having little difficulty marketing the surfclams they catch.

The Federal Surfclam Fishery

The Federal fishery for surfclams was conducted by a total of 35 vessels in 2001, an increase of four vessels from the number participating in 2000 (Table 1). This number alone understates the increase in harvest capacity which occurred in 2001. The count of vessels in the smallest size category actually declined by two vessels that had made modest harvests of the State of Massachusetts. The number of vessels in the larger Class 2 and Class 3 categories increased by a total of 6 vessels.

For a broader perspective of how fleet capacity has changed over time, one may note that the 35 vessels operating in 2001 represent a 73% reduction from the 128 vessels reporting harvests of surfclams at the initiation of the ITQ program in 1990. The desired results of reducing overcapitalization and increasing efficiency in the fishery are readily observed by noting that the average

annual catch per vessel in 1990 was 24,000 bushels, while in 2001 it surpassed 81,000 bushels per vessel. To the industry as a whole, this represents an enormous savings on the costs of maintaining vessels that were simply not needed to perform the function of harvesting the annual quota in the most efficient manner possible.

- All of the 2.850 million bushel quota was harvested from Federal waters in 2001, reflecting the continued strong resurgence of demand for clam products following the lull that occurred in 1997 and 1998. Processors report an inability to fill all orders due to a lack of clams.
- Exvessel prices increased again in 2001, with one-third of the trips reporting prices of $11.00 per bushel and above, compared with 7% of trips in 2000. Verbal reports from industry members indicate that prices have increased further in 2002, with the majority of trips selling at $12.00 per bushel.

- Hours of fishing effort deployed in the Federal surfclam fishery increased by a massive 25% in 2001, augmented by the participation of four additional vessels.

- A fleet-wide calculation of Landings Per Unit of Effort (LPUE) declined 11% to 115 bushels per hour fished in 2001 (Table 1). Stated alternatively, a 25% increase in fishing effort was used by the industry to harvest an 11% increase it the Federal surfclam quota.

- Harvests continue to be heavily concentrated off the coast of New Jersey, with 52% of the coast-wide catch coming from the "New Jersey Nearshore" (3973) degree square (Table 4). Average LPUE of all vessels decreased 7% in this square, while the total harvest increased by 14% to 1.5 million bushels.

- The second most intensively fished degree square in 2001 was off Northern New Jersey and western Long Island (4073), followed by the southern New Jersey inshore square (3974). Catches increased by 60% and 18% respectively, while LPUE declined by 10% and 26% respectively.

5.1.3 Economic and Social Environment

Traditionally, surfclams' dominant use has been in the "strip market" to produce fried clams. In recent years, however, they have increasingly been used in chopped or ground form for other products, such as high-quality soups and chowders.

Exvessel prices for surfclams can vary considerably depending on the quality and meat yield of surfclams from a particular area. Surfclam beds in New York state waters and off the Delmarva peninsula tend to have lower meat weights and command lower prices. Prices will also depend on the nature and terms of contracts which fishermen and allocation holders enter into with processors. The markets for surfclams and ocean quahogs have varied over time, and individual fishermen may have chosen to accept a lower price for an allocation of one species in return for assurances that the processor will purchase his allocation of the other species.

A trend evident over the past several years is one of increasing ties between the harvesting and processing sectors, which help assure each party that their needs will be met.

The reported prices in fishermen's logbooks for 2001 ranged from a low of $5.00 per bushel to a high of $14.50 per bushel for surfclams. Unfortunately, pricing data as it is currently collected is ambiguous for both surfclams and ocean quahogs. Under an individual allocation system, there are two components to the value of any particular harvest: 1) the actual cost of vessel and crew services in harvesting the catch, or "harvest services," and 2) the limited access or lease value which is created when only a limited number of individuals are granted legal access to a public resource. An ITQ system allows individuals the flexibility to harvest their annual share of the quota themselves, or to "lease" a portion or all of their harvest rights to others. Current lease prices for surfclams (as of mid-2002) are in the neighborhood of $6.00 per bushel.

Reported prices in fishermen's logbooks, however, do not specifically indicate whether a particular sale price includes the value of the lease, or not. If a vessel was fishing for a processor using allocation that was owned by the processor, then the vessel will receive a much lower price which reflects harvest services only (currently in the $5.00 - $6.00 range). If a vessel owns its own allocation, then the price for a good-quality bushel of Federal surfclams will be in the $8.00 - $13.00 range. Only the largest, premium surfclams fetch prices in the $14 - $15 range.

Prices for surfclams fell substantially from 1997 to 1998 under slack demand, causing the median price to drop from $12.00 to $10.00 per bushel. In 1999 the price continued to edge downward until stabilizing in the latter part of the year. The demand for surfclams increased in 2000 and 2001, and now continues strong into 2002, leading prices back up to the vicinity of $12.00 per bushel. A significant component of this trend has been due to the widespread substitution of surfclams for ocean quahogs in the marketplace, which had become comparatively unattractive to harvesters because of their lesser value and increasing costs of harvest. The recent price increases for ocean quahogs has helped to increase their desirability to harvesters.

While many vessels will harvest both surfclams and ocean quahogs in a given year, surfclams have always been the preferred catch due to the higher price which they command. While meat yields can vary substantially with geographic location and from year-to-year, the standard government conversion factor is for 1 bushel of surfclams to yield 17 pounds of meats, and has been in use since the 1970's. For the smaller, less-desirable ocean quahog, the accepted standard is for 1 bushel to produce 10 pounds of meats.

For Amendment 13 to this FMP (MAFMC 2002c), the Council hired Dr. Bonnie McCay and her associates at Rutgers University to describe the ports and communities that are associated with the surfclam and ocean quahog fisheries. The researchers did an extensive job of characterizing the surfclam fishery, and the specific details can be viewed in Amendment 13 (MAFMC 2002c).

The majority of the industry would like the surfclam quota to rise to the maximum OY allowed by the current regulations, 3.4 million bushels. Industry was just about as unified on the surfclam quota for 2003 as they had been on any management item in the past 20 years. During the past three years, as staff has developed the recommendation papers for 2001, 2002 and 2003, nearly everyone that staff spoke with was pleased with the Council's motion from March 2000 to "consider an increase in quota to the 3.4 million bushel OY over the next 5 years with a 10% increase in the first year." Staff incorporated the intent of the March 2000 motion (actually an 11% increase rather than the 10% increase in order to return to the quota levels that existed from 1990 through 1994) into their

recommendation for the 2001 specification package and that staff recommendation was welcomed warmly by industry. Industry espoused this long range plan (5 years) during the 2001 quota setting and they all seemed pleased by the Council's action in March of 2000.

For last year's (2002) surfclam quota recommendation, staff recommended a 5% increase to 3.0 million bushels because of the industry and Council's previously expressed desire to have a long range plan (5 years) to build to the maximum OY level of 3.4 million bushels. Industry was not as unified last year as they were for the 2001 recommendations. Some industry advisors were satisfied with the proposed 5% increase, while several wanted a 10% increase and there was even some sentiment to go all the way to the maximum OY level for 2002. At last June's quota

setting meeting, industry reached a consensus for a 10% increase, which the Council approved and recommended to the Secretary.

Relative to the surfclam quota for 2003, there was some sentiment for an alternative between the 3.135 million bushel current quota and the maximum of 3.4 million bushels. However, the vast majority believe the 3.4 million quota should be available next year for the industry. Industry's reasoning is that: 1) the last SAW lists surfclams as "under-exploited," 2) all the New Jersey inshore resource has been taken for this fishing year, 3) the vast majority of New York inshore clams are anticipated to be landed in 2002, and 4) the industry has been growing the demand steadily for their product. The Council agreed to build to the 3.4 million bushel maximum at their March 2000 meeting (after reviewing the most recent assessment). One issue is that they specified the achievement of the maximum quota be in five years, and if the 3.4 million is recommended for 2003, then it will have been only 3 rather than 5 years.

5.1.4 Description of the Areas Fished for EFH and Protected Resources

Note: Dave Stevenson (NERO) produced most of the following analyses for the fishing gear impacts workshop of October 2001. In general, the summary conclusions presented here, are attributable to that workshop.

Numbers of fishing trips made by Federal vessel permit holders in the northeast United States (North Carolina - Maine) during the period 1995 - 2000 were aggregated for 18 individual gear types and 3 major gear categories (Table 16 of Amendment 13), assigned to 10 minute "squares" of latitude and longitude, and plotted to show spatial distribution patterns. Logbook data included in the analysis are currently provided by vessels operating in Federal waters and participating in the following fisheries: northeast multispecies; sea scallops; surfclams and ocean quahogs; monkfish; summer flounder, scup, and black sea bass; squid, mackerel, and butterfish; spiny dogfish; bluefish; Atlantic herring; and tilefish. Logbook data provided by ocean quahog and surfclam dredge vessels are archived in a separate database and were analyzed separately. Data for lobster pots were provided by vessels with multispecies permits. Vessels that operate strictly within state waters (0-3 miles from shore) are not required to have a Federal permit and therefore do not submit logbooks. For this reason, fishing trips in nearshore 10 minute squares that include a significant proportion of state water were under-represented.

Permit holders are required to submit a vessel trip report each time they make a fishing trip. A trip is defined as a single departure and return to port. Actual fishing time could not be computed because the only temporal datum that was common to all gear types was total trip duration. Although some additional information is available (the number of hauls and average duration of each haul) which could possibly be used to obtain more precise estimates of fishing time for mobile gear types such as bottom trawls and dredges, it is not reported for all trips and is meaningless when applied to stationary gear types such as pots and gill nets. No attempt was made to estimate fishing time for this analysis. Therefore, the results presented here are not intended to represent the spatial distribution of fishing effort.

Permit holders are given the option of reporting the location of a trip as a point (latitude and longitude or Loran bearings) or inside a statistical area. Only trips which were reported as a point location and

therefore could be assigned to a 10 minute square were included in this analysis. Trips made south of 35º N latitude (Cape Hatteras) or north of 45º N latitude

(U.S.-Canada border in the Bay of Fundy) were excluded from this analysis. Each ten minute square covers an area of 100 square miles or 259 square kilometers.

Plots of the cumulative number of fishing trips by ten minute square were made for each gear type using ArcView. Data were classified using a statistical formula (Jenk's optimization) that identifies natural breakpoints between classes. This is the default classification method used in ArcView. It provided more demonstrable groupings of the data than the other classification methods that were available. For gear types or groups with >150,000 trips, all 10 minute squares with <10 trips were eliminated in order to "clean up" the distribution plots. For gear types with 20,000-70,000 trips, all 10 minute squares with <5 trips were eliminated from the plots; for gears with 4,000-15,000 trips, squares with only a single trip were eliminated; and for gears with <4,000 trips, all trips were used. The number of trips noted at the top of each plot (N) is the number of trips represented in the plot, not (in most cases) the total number of trips.

Overall, 752,681 trips were included in the analysis, representing 79.5% of all trip reports submitted during the six-year period for these 18 gear types (Table 16 of Amendment 13). Most (98.4%) of these trip reports were included in the GIS plots. For individual gears, the "coverage" varied from 30.8 to 100%, with Danish seines ranking the lowest and hydraulic and non-hydraulic clam dredges ranking the highest. For the major gear types (gears with >4,000 analyzed trips), the percentages of reported trips that were analyzed ranged from 72.8 to 100%.

The spatial scale of fishing effort varies depending on which species is the target: surfclams are harvested primarily in a small area off the New Jersey coast whereas ocean quahogs are harvested over a larger area that includes offshore waters. Areas with denser concentrations of clams would presumably be dredged more intensively, i.e., a higher percentage of the bottom would be affected. Since surfclams are concentrated in a very defined area off the New Jersey coast where the bottom is so homogeneous, a high proportion of the bottom over this large contiguous area is affected by dredging. Surfclams grow much more rapidly than ocean quahogs and surfclam beds are dredged every few years. Ocean quahogs are much more likely to be dredged from a number of more or less discrete patches that are surrounded by undisturbed areas. It was noted, as a general rule, that once 50% of the harvestable clams are removed from an area, the catch rates drop to a point where it is no longer economically feasible for fishing to continue there.

In Federal waters, the amount of bottom area directly impacted by the hydraulic clam dredge fleet in 2000 was about 110 square miles (Amendment 13). An additional 15 square miles were dredged in State waters of New Jersey, New York, and Massachusetts. The predominant substrate on the southern New England/Mid-Atlantic Bight shelf is sand. Thus, during any given year, this fishery is conducted in a very small proportion of a habitat type that characterizes most of the 40,000 square miles of continental shelf between the Virginia/North Carolina border and Nantucket Island (69/ W longitude). The Georges Bank region has been closed to clam harvesting since 1990 because of the potential of paralytic shellfish poisoning.

Trips reported by vessels using hydraulic clam dredges during 1991-2000 were made over a broad area of the continental shelf from Cape Cod to the Delmarva peninsula (Figures 37 and 38 of Amendment 13). Areas where fishing with this gear type was concentrated (235 trips per 100 mi2) were located off the New Jersey coast and south of Long Island. Dredging in southern New England

was less intense.

Actual distribution of the surfclam resource can be seen in Figure 1. Review of Figure 6 and Tables 4 and 6 denote the location of recent landings.

5.2 Ocean Quahog *Arctica islandica*

5.2.1 Status of the Stock

Ocean quahogs are found in the colder waters on both sides of the North Atlantic. Off the United States and Canada, they range from Newfoundland to Cape Hatteras at depths from 25 feet to 750 feet. Industry has been pressing the limits of current technology in harvesting ocean quahogs as deep as 300 feet in the waters off southern New England. As one progresses northward, ocean quahogs inhabit waters closer to shore, such that the State of Maine has a small commercial fishery which includes beds within the State's 3-mile zone.

Ocean quahogs are one of the longest-living, slowest growing marine bivalves in the world. Under normal circumstances, they live to more than 100 years old. Ocean quahogs have been aged in excess of 200 years. They require roughly twenty years to grow to the sizes currently harvested by the industry (approximately 3 inches), and reach sexual maturity between 5 and 10 years of age.

Note: the following "State of the Stock," "Management Advice," and "Projections" sections are taken directly from the SARC draft advisory report (August 2000), and therefore are expressed in metric units (1 kg = 2.205 lbs, there are 17 lbs/bushel for surfclams and 10 lbs/bushel for ocean quahogs).

State of Stock: The ocean quahog resource in EEZ waters from Southern New England (SNE) to Southern Virginia (SVA) is not overfished and overfishing is not occurring. The current biomass is high with current catches near MSY. Annual recruitment is approximately 1-2% of stock biomass and lower or roughly equal to the rate of natural mortality. Since the fishery began in the late 1970s, biomass has declined slowly from virgin levels. At current catch levels biomass is projected to decline gradually over the next decade. The percentage of virgin biomass in the assessed area remaining in 1997-1999 is 88% (all regions) and 82% (all regions less Georges Bank). The stock off the coast of Maine continues to be harvested, but the condition of the resource there is unknown.

Management Advice: Current fishing mortality is near F_{target} for the resource taken as a whole. However, it may be advantageous to avoid localized depletion.

Projections (weights in mt of meats):

	SVA[1]	DMV	NJ	LI	SNE	GBK	EEZ
Estimated Biomass in 1999 (000 mt meats)[2]	0.079	60	260	530	330	620	1,800
CV[3]	10%	18%	24%	17%	13%	37%	14%
Projected Recruitment (000 mt meats)[2,4]	0.0035	1.5	3.9	6.5	4.1	6.8	23
Projected Catch (000 mt meats)[5]	0.0	1.2	3.3	6.0	7.3	0.0	18
Projected Biomass in 2002 (000 mt meats)[2]	0.089	62	250	512	310	620	1,760
% Change	12%	0%	-1%	-3%	-6%	0%	-2%

[1]Estimates for SVA not reliable. [2]From KLAMZ delay-difference biomass dynamics model for quahog 70+ mm shell length. [3]Bootstrap, 500 iterations. [4]Constant over time. [5]Mean 1997-1999.

5.2.2 Fisheries

Ocean Quahog Landings: Both State and Federal Waters (Excludes Maine fishery)					
Region	2000			2001	
	Bushels	Value		Bushels	Value
New England States	1,413,635	$6,051,262		1,208,857	$6,385,499
Mid-Atlantic States	1,747,014	$7,603,510		2,482,150	$13,981,056
Total	3,160,649	$13,654,772		3,691,007	$20,366,555
Source: NMFS Unpublished Landings Data, Woods Hole, MA					

Landings of ocean quahogs from the high-volume fishery outside the State of Maine totaled 3.691 million bushels in 2001, an increase of 16.8% from 2000. This surge followed on the heels of declines of 16.2%, 3.6%, and 8.6% in the preceding three years. The 2001 rebound in the fishery was spurred by a major increase in exvessel prices offered by processors. Reported exvessel value soared 49% from $13.7 million dollars to $20.4 million in 2001.

The Federal Ocean Quahog Fishery

- The year 2001 saw a resurgence of the ocean quahog fishery, driven by strong demand for clam products and a sharp increase in exvessel prices. Landings jumped by over one-half million bushels to a total of 3.691 million, or 82% of the annual quota in the ITQ fishery. Landings had been on a declining trend from the 4.9 million bushel peak in 1992. The 2000 harvest of ocean quahogs was the lowest in two decades, with fully 30% of the Federal quota left unharvested on the ocean floor. This compares with 16% of the quota unharvested in 1999. In 1996 and 1997 the quota had been binding on the industry, so the Mid-Atlantic Council recommended the quota be raised from 4.0 to 4.5 million bushels in 1999. As of mid-2002, this increase had not yet been tapped by the industry, though the addition of several new boats to the fleet will likely narrow the gap.

- A total of 30 vessels participated in the 2001 fishery for ocean quahogs in Federal waters apart from Maine.

- Industry members have reported that market demand for ocean quahog products remains strong. The decline in harvests is due to three principal factors:

  1) The productivity of existing ocean quahog beds has declined steadily, as dense beds have been fished down over the past three decades. Only recently has there been anecdotal evidence of some new recruitment of this very long-lived species.

  2) The exvessel price of ocean quahogs was increasingly seen has inadequate by vessel owners. Low profit margins were squeezed even tighter in recent years as fuel prices increased. The harvest of ocean quahogs requires more fuel than surfclams, since they are farther offshore.

  3) The gradual consolidation of surfclam and ocean quahog quota onto fewer vessels in the fleet appears to have reached its' maximum point, such that increasing harvests will require new vessels. The quahog fleet lost two vessels in weather-related accidents during January 1999. Construction of new vessels is underway.

- Exvessel prices increased sharply in 2001, with the median price climbing to $5.60 per bushel from $4.25. This represents a startling 32% rise in a single year. Prices ranged from a low of 3.45 per bushel to a high of $7.00. Verbal reports from industry members indicate that prices in 2002 have been in the vicinity of $6.00 per bushel for product landed in New Jersey, or higher if landed in New Bedford to compensate for trucking fees.

- The total number of ocean quahog trips taken in 2001 increased by 16%, with the average number of trips taken per vessel increasing to 70 per year from 62.

- A fleet-wide calculation of LPUE showed that average yield continued to decline by a modest 1.8% in 2001, compared to a 6.7% decline in 2000 (Table 2).

- Harvests of ocean quahogs continue to be distributed over a larger geographic area than surfclams, although almost one-third of the 2001 catch came from the degree square off of eastern Long Island (4072) (Table 5). Average LPUE actually increased 7% to 162 bushels per hour in this square, with industry likely encountering some new, unfished beds. Unfortunately, the majority of alternative fishing grounds are yielding less than 100 bushels per hour of fishing.

- Limits on further movement of the fleet to the east were imposed by the closure of surfclam and ocean quahog beds east of the 69/ line in 1990, due to the presence of PSP toxin. Vessels responded to this barrier by pursuing ocean quahogs in the deeper waters further from shore, however there are indications that only limited quantities of ocean quahogs are available in these areas.

- The concern for the ocean quahog fishery is economic, not biological. Its vast size and very slow rate of replacement (i.e. it is renewable, but on a long term basis) can be likened to a large oil field, where most of the easy extractions have been made. Large deposits of oil may remain, but when

the rate of production falls below an economic threshold, a well will be capped and the rigs will move elsewhere. Improvements in technology and increases in price can lower the threshold and make sparser resources viable again. However the risk that these factors will not improve sufficiently over a 10 to 20 year time horizon are real, and must be taken into consideration when annual quotas are set that are intended to sustain the resource and a fishery.

5.2.3 Economic and Social Environment

Traditionally, the dominant use of ocean quahogs has been in such products as soups, chowders, and white sauces. Their small meat has a sharper taste and darker color than surfclams, which has not permitted their use in strip products or the higher-quality chowders. With their lower exvessel price (approximately $6.00 per bushel in 2001 for the full "lease plus harvest" value), ocean quahogs have historically been a bulk, low- priced food item. As in other fisheries such as Atlantic mackerel, the industrial ocean quahog fishery has only been viable when large quantities could be harvested quickly and efficiently. When catch rates fell below a certain point, vessels tended to shift their effort to higher-yielding areas.

As will be discussed in more detail in the following sections, there had been a shift toward greater utilization of the lower-priced ocean quahog meats in the years 1997 and 1998. Both years saw almost all of the ocean quahog quota harvested, while surfclam quota was left unharvested on the ocean floor. However this trend reverted back to the historical norm in 1999 as fuel prices spiked, and it became relatively more expensive to harvest ocean quahogs which are found farther offshore. Higher fuel prices combined with the increasing scarcity of dense ocean quahog beds have resulted in an overall decline in ocean quahog harvests. Industry focus returned to surfclams and they harvested nearly all of the Federal 1999 surfclam quota, while leaving 16% of the ocean quahog quota unharvested.

The trend became even stronger in the year 2000, which saw ocean quahog harvests (apart from Maine) plummet 16% to 3.161 million bushels, a level not seen in two decades. Again, the principal reason behind the fall is not a lack of demand, as demand is currently strong for both surfclams and ocean quahogs. The continued thinning of ocean quahog beds that have required decades to develop has combined with low dockside prices to the point where processors had great difficulty in convincing vessels to fish for them. A resurgence of interest occurred in 2001 as buyers increased prices dramatically to the $6.00 - $7.00 per bushel level, and vessels concentrated their efforts on some of the few remaining high-yield areas.

For Amendment 13 to this FMP (MAFMC 2002c), the Council hired Dr. Bonnie McCay and her associates at Rutgers University to describe the ports and communities that are associated with the surfclam and ocean quahog fisheries. The researchers did an extensive job of characterizing the ocean quahog fishery, and the specific details can be viewed in Amendment 13.

The majority of industry that staff spoke with felt that the ocean quahog quota should be maintained at the 2002 quota level (4.5 million bushels). Several participants (both fishermen and processors) raised the concern that has been raised the past few years, that all the easily accessible, virgin, ocean quahog beds had been fished and the current price per bushel is constraining to fishing less-dense/less-desirable beds of ocean quahogs. A representative of the processing sector again stated that the group he represented was nearly desperate to find boats willing to fish for ocean quahogs. Four new clam

vessels will be added to the fleet in 2002 (Attachment 3, National Fisherman article from June 2002). Three of these new vessels are 116 feet long and carry 112 cages of clams. Several industry members believe that these new vessels will go far in helping the industry land the 4.5 million quota for 2002 and that if they do land the full 4.5 million bushel quota for 2002, then there would need to be an increase for 2003. Some in industry argue that: 1) based on the last SAW, ocean quahogs are not "overfished and overfishing is not occurring," 2) nearly all the surfclam meats (both inshore and EEZ) will be taken in 2002 as occurred in 2001, and 3) the new vessels will be fishing in 2002.

5.2.4 Description of the Areas Fished for EFH and Protected Resources

Note: Dave Stevenson (NERO) produced most of the following analyses for the fishing gear impacts workshop of October 2001. In general the summary conclusions presented here are attributable to that workshop. Please see section 5.1.4 for a full description of Dave Stevenson's analyses.

The spatial scale of fishing effort varies depending on which species is the target: surfclams are harvested primarily in a small area off the New Jersey coast whereas ocean quahogs are harvested over a larger area that includes offshore waters. Areas with denser concentrations of clams would presumably be dredged more intensively, i.e., a higher percentage of the bottom would be affected. Because surfclams are concentrated in a very defined area off the New Jersey coast where the bottom is so homogeneous, a high proportion of the bottom over this large contiguous area is affected by dredging. Surfclams grow much more rapidly than ocean quahogs and surfclam beds are dredged every few years. Areas dredged for ocean quahogs are left untouched for many years. Ocean quahogs are much more likely to be dredged from a number of more or less discrete patches that are surrounded by undisturbed areas. It was noted, as a general rule, that once 50% of the harvestable clams are removed from an area, the catch rates drop to a point where it is no longer economically feasible for fishing to continue there.

In Federal waters, the amount of bottom area directly impacted by the hydraulic clam dredge fleet in 2000 was about 110 square miles (Amendment 13). An additional 15 square miles were dredged in State waters of New Jersey, New York, and Massachusetts. The predominant substrate on the southern New England/Mid-Atlantic Bight shelf is sand. Thus, during any given year, this fishery is conducted in a very small proportion of a habitat type that characterizes most of the 40,000 square miles of continental shelf between the Virginia/North Carolina border and Nantucket Island (69/ W longitude). The Georges Bank region has been closed to clam harvesting since 1990 because of the potential of paralytic shellfish poisoning.

Trips reported by vessels using hydraulic clam dredges during 1991-2000 were made over a broad area of the continental shelf from Cape Cod to the Delmarva peninsula (Figures 37 and 38 of Amendment 13). Areas where fishing with this gear type was concentrated (235 trips per 100 square miles) were located off the New Jersey coast and south of Long Island. Dredging in southern New England was less intense.

Actual distribution of the ocean quahog resource can be seen in Figure 2. Review of Figure 6 and Tables 5 and 7 denote the location of recent landings.

5.3 Maine Ocean Quahog *Arctica islandica*

5.3.1 Status of the Stock

The NMFS collected non-random samples from the coast of Maine with the 1992 and 1994 research surveys in order to map the distribution (MAFMC 1998) of ocean quahogs and to examine the population size frequency distributions. Within the 50 fathom range, ocean quahogs appear to be restricted to a patch centered between 67º and 68º W longitude. Tows were taken to the east and west of the patch to attempt to define the limits. The location of the patch, as defined by survey data, agrees well with the location of recent landings. Maine is the only area with any evidence of substantial recruitment of small quahogs or of growth by medium-sized ocean quahogs in any region (USDC 1995).

In the Maine area, the population consists of two length modes (MAFMC 1998). The larger group is centered between 50 and 54 mm (25 mm = 1 inch) shell length. Most clams in the smaller group measured 20-29 mm in July 1992, and 30-39 mm in August 1994. Work is currently in progress to section these shells and estimate age and growth. Based on the work of Kraus *et al*. (1992) the 50-54 mm long clams would be 35-43 years of age. The smaller group, 30-39 mm long, would be 15-20 years of age (USDC 1995). However, information from Maine ocean quahog fishermen indicates that growth rates may be greater than that calculated by Kraus *et al*. (1992) and this should be the subject of further research.

The 1994 assessment (USDC 1995) states that given the problems with the 1994 survey, it would be inappropriate to use the two surveys to make inferences about changes in population size, because those samples were from nonrandom locations. It is extremely difficult to fish these small concentrated beds of ocean quahogs with a vessel the size used by NMFS because of bottom obstructions.

The ocean quahog is among the longest-lived and slowest growing of marine bivalves worldwide. Growth studies indicate that ages in excess of 100 years are common and longevity past 200 years is documented. There is contradictory evidence about growth rates for ocean quahogs in this area. Recent growth studies conducted off eastern Maine (Kraus *et al*. 1992) indicated a maximum age of 66, but substantially slower rates of growth than for Mid-Atlantic Bight individuals (MAFMC 1998).

Studies of growth in ocean quahogs (Murawski *et al*. 1982; Ropes and Pyoas 1982; and Kraus *et al*. 1992) reveal strong regional differences in the relationship between shell length and age (MAFMC 1998). In their natural environment, quahogs off the coast of Maine grow slower than quahogs from the south. For example, at a length of 40 mm (1.5"), which is the typical size at which this species matures, clams from Maine, Long Island, and Georges Bank would be approximately 23, 8, and 5 years old, respectively (MAFMC 1998). Kraus *et al*. (1992) demonstrated that quahogs from Maine grew as fast as those from southern regions when they were raised in the laboratory (MAFMC 1998). Lutz *et al*. (1983) found similar results. These studies demonstrate the potential for ocean quahogs from Maine to grow more rapidly, and they demonstrate that growth is limited by conditions in their natural environment.

In the absence of a formal stock assessment or even a survey of abundance, it is impossible to quantify the stock status of ocean quahogs off of the coast of Maine. However, there are a

number of other sources of information from which one can derive a qualitative understanding of the stock's status.

Since the fishery's inception in the late 1970's, fishing activity has remained focused on a few well-known beds of ocean quahogs. The center of effort shifts no more than a mile or two from year to year. Since landings in this fishery are believed to be driven by market demand (they are demand-limited not resource-limited, see section 7 for details), interannual changes in total landings are not reliable indicators of abundance. A better proxy is catch-per-unit-effort (CPUE). Logbook data show a general increase from approximately two bushels per hour fished at the inception of the experimental fishery in 1991 to over seven bushels per hour fished in 1995 (MAFMC 1998).

Unlike the mid-Atlantic portion of the ocean quahog resource, the ocean quahog resource off of eastern Maine produces strong year classes of settled spat and new recruits. Harvesters report that portions of a bed which have been fished down are quickly repopulated with spat and produce new populations of commercial-sized clams (1.5 inches) in fishable abundance in as little as seven years (but note that this differs from the results reported by Kraus *et al*. 1992 above). Since the market for eastern Maine ocean quahogs will not take a clam over 2 - 2.5 inches , the most productive segment of the spawning stock enjoys *de facto* protection and is returned to the beds. These two points are probably related. Additionally, some of the fishermen regularly engage in informal restocking experiments; retaining all the oversized clams from a day's fishing and moving them to more inshore areas which they believe should support a quahog population and a safer winter fishery (Finlayson pers. comm.).

Amendment 10 (MAFMC 1998) emphasized that there had been no comprehensive, systematic survey or assessment of the ocean quahog resource in eastern Maine. It also emphasized that a full stock assessment of the Maine resource should be a priority to ensure that this segment of the fishery would have a sustainable future. The initial maximum quota for the Maine zone was to remain in effect until a resource survey and assessment was completed. The agreement at the time of Amendment 10 was that the State of Maine was to initiate a survey once the initial maximum quota of 100,000 bushels became constraining. There is an effort within the State of Maine to initiate an ocean quahog survey in 2002. Scott Feindel has been hired and is currently working with a commercial fishermen to survey the distribution of the resource along the Maine coast.

5.3.2 Fisheries

According to 50 CFR section 648.76 (2)(b)(iv): *The Regional Administrator will monitor the quota based on dealer reports and other available information and shall determine the date when the quota will be harvested. NMFS shall publish notification in the Federal Register advising the public that, effective upon a specific date, the Maine mahogany quahog quota has been harvested and notifying vessel and dealer permit holders that no Maine mahogany quahog quota is available for the remainder of the year.*

It must also be remembered that according to 50 CFR section 648.76 (2)(b)(iii): *All mahogany quahogs landed by vessels fishing in the Maine mahogany quahog zone for an individual allocation of quahogs under section 648,70 will be counted against the ocean quahog allocation for which the vessel is fishing.* In other words, even after the initial maximum quota of 100,000 Maine bushels is harvested from the Maine mahogany ocean quahog zone (north of 43°50'), vessels

could obtain/use ITQ allocation and continue to fish in this zone. It is anticipated that some Maine fishermen will again rent ITQ allocation after the 100,000 bushel quota is reached in 2002 and 2003 as they have done for the past two years. More than half (4,530 bushels) of the 8,500 bushels that were above the 100,000 quota in 2001 were landed with an ITQ allocation. In 2000, there were 5,821 bushels landed with ITQ shares of the 20,767 bushels that exceeded the 100,000 bushel quota. There were no quota overages prior to 2000. Since implementation of Amendment 10 in 1998, approximately 70 % of the average annual landings have been reported as coming from state waters and 30% from Federal waters.

5.3.3 Economic and Social Environment

Relative to the Maine ocean quahog resource and PSP, John Hurst reports that the summer of 2001 was a very bad year for PSP in Maine waters. The waters last summer were warm and there was low freshwater flow from precipitation. Maine waters were totally closed for nearly four weeks and some areas were closed for as long as six weeks. Already in 2002 (as of May 10) there has been a PSP closure for mussels and the ocean temperature is again warm. Prior to last summer there had not been any toxins reported in ocean quahogs for the past four or five years. Maine has a fairly extensive sampling and testing program, which collects samples both at sea and from dealers on shore.

Amendment 10 implemented management of the Maine ocean quahog fishery in May 1998. The initial quota was set at 100,000 bushels and was again set at that level every year since. Representatives of Maine all encouraged the Council to maintain that quota for 2003. Issues of under-reporting of the catches have apparently improved since 1998, when Maine wrote all their permit holders explaining that they needed to report the landings to NMFS. It is hoped that ACCSP will also help improve any misreporting of data. The State of Maine has recently hired a biologist, Scott Feindel, who is currently conducting a preliminary ocean quahog survey with a hired commercial vessel. It is planned that Maine surveys will be conducted in 2002 and 2003 followed by a stock assessment that will be peer-reviewed through the SARC/SAW process with the December 2003 regular ocean quahog assessment that follows this summer NMFS clam survey. The state researchers, as well as nearly everyone associated with the clam industry, would like to see a Maine survey and assessment so that the Maine ocean quahog quotas could be based on better biological information. Landings of Maine ocean quahogs in 2001 were 108,498 bushels, with about half of the amount over the 100,000 bushel quota being ocean quahogs that were landed with ITQs associated.

For Amendment 13 to this FMP (MAFMC 2002c), the Council hired Dr. Bonnie McCay and her associates at Rutgers University to describe the ports and communities that are associated with the surfclam and ocean quahog fisheries. The researchers did an extensive job of characterizing the Maine ocean quahog fishery, and while all their findings are not included here, the following paragraphs in this section add significantly to the knowledge that was available previously.

Thirty-three vessels with Maine ownership reported ocean quahog landings in 2000, a marked decline from the 82 vessels licensed in 1996. These vessels harvested approximately 120,000 bushels. This is more than the Maine ITQ allocation. The additional landings were possible through the leasing of allocation from other companies holding ITQ shares. Some informants indicate that leasing is essential to their business. This is especially true for those vessel owners who do not participate in other local fisheries and for vessel owners who are also dealers. Dealers must have a continuous supply to their

markets or else their markets will look elsewhere for product. Others in the Maine fishery do not lease allocation from outside ITQ holders, because doing so represents a risk they feel they cannot afford to take. Leased allocation is relatively expensive and if not used by the end of the year is lost. A common alternative to leasing quota, many individuals rely on other fisheries (mainly urchins and scallops) when the Maine quota allocation has been reached.

Approximately 76 percent of the Federally-permitted, Maine vessels that landed ocean quahogs in 2000 listed addresses in the towns of Addison, Beals Island, and Jonesport. The remaining vessels came from Machiasport, Roque Bluffs, Steuben, Winter Harbor, Columbia Falls, Harrington, and Cutler. In 2000, over two-thirds of the ocean quahogs were landed in Jonesport. Other towns with recorded landings were Steuben, Addison, South Addison, Eastern Harbor, Beals Island, and Bucks Harbor.

Official statistics and published data on this fishery do not exist beyond permit lists and aggregate landings reports. Based on interviews done in November 2001, it appears that typical vessels are owner operated. However, some individuals own up to four ocean quahog boats. Some vessels are owned by dealers who hire captains to operate them. In general, each vessel has a crew of 3-4 men (including the captain). The crewmembers are generally hired locally. Some crewmembers come and go while others have fished for the same boat (or boat owner) for several years. In general, vessel owners do not have trouble finding good crew, but some report that when they find good, reliable crew, they do what they can to keep them. Many vessels also participate in other fisheries such as lobster, scallops, mussels, urchins, and periwinkles. Several vessels rely solely on ocean quahogs, often because they do not hold permits in other fisheries.

In 2000, 9 dealers purchased ocean quahogs. As expected, most of the dealers are located in or around Jonesport and nearby Beals Island. Other dealers purchasing ocean quahogs in Maine listed addresses in Machias, Cushing, Stonington, Brooklin, and Bucks Harbor. In general, dealers tend to rely on a few "core" vessels and purchase from other vessels on a sporadic basis. Owning vessels is another strategy utilized by several dealers. This ensures them a continuous supply to send to their markets. Most dealers also buy and sell a variety of other fishery products, such as lobsters, scallops, mussels, soft-shell clams, crabs, and periwinkles. Some companies handle only ocean quahogs. Generally, each dealer employs between 1-3 individuals (in addition to vessel crew).

Generally, the Maine ocean quahog is destined for the fresh, half shell market. The ocean quahogs, therefore, are also trucked to markets, mostly outside of Maine. Some of the ocean quahogs are sent to other dealers in Maine, but most are shipped out of state directly. Several dealers send trucks to different ports to pick up ocean quahogs. There are several local trucking companies that ship the ocean quahogs to market and some dealers also own their own trucks.

In Jonesport, the center of the fishery, there are four main wharves that handle ocean quahogs, including the public marina. However, several of these simply represent space leased out to vessel owners. The vessel owners hire their own crew and independently handle their own operations. Other vessel owners moor their vessels in other ports and land their vessels at the wharves utilized by the dealers to whom they sell.

5.3.4 Description of the Areas Fished for EFH and Protected Resources

Note: Dave Stevenson (NERO) produced most of the following analyses for the fishing gear impacts workshop of October 2001. In general the summary conclusions presented here are attributable to that workshop. Please see section 5.1.4 for a full description of Dave Stevenson's analyses.

The dry dredge used in the Maine fishery is a cage with wide skis and a series of teeth about 6 inches long in the front. These dredges are used on smaller boats (about 30 to 40 feet long) and are pulled through the seabed using the boat's engine. The cutter bar is limited to a width of 36 inches by State law. This fishery takes place in small areas of sand and sandy mud found among bedrock outcroppings in depths of 30 to > 250 ft in state and Federal coastal waters north of 43 ° 20' N latitude. The dredges scoop up clams and sediment, and the vessel's propeller wash is used to clean out the sand and mud.

The concentration of the "dry" dredge in the Maine ocean quahog fishery is depicted in Figure 39 of Amendment 13.

6.0 ENVIRONMENTAL IMPACTS OF THE ALTERNATIVES

6.1 Surfclam *Spisula solidissima* Quota

6.1.1 Impacts of Preferred Alternative (3.250 million bushels) on the Environment

The Council's preferred alternative quota for the 2003 surfclam fishery is 3.25 million bushels, which is a 4% increase from the 2002 quota of 3.135 million bushels. This preferred alternative meets the 2000 SAW recommendation: "Fishing mortality can be increased for the surfclam resource taken as a whole. However, it may be advantageous to avoid localized depletion."

Summary Justification for Surfclam 3.25 Million Bushel Quota Recommendation

At its June 2002 meeting on the surfclam quota for the coming year, the Mid-Atlantic Council hosted extensive public debate on the issue of whether the quota should be set at 3.25 million bushels, or the maximum currently allowed by the FMP of 3.4 million bushels.

The following points represent the key factors that led the Council to adopt the more conservative posture of 3.25 million bushels for 2003.

- In 2001 the industry required a 25% increase in fishing effort to harvest an 11% increase in the Federal quota. This represented a substantial decrease in the productivity of effort.

- Industry members as well as state biologists have indicated concern for the apparent lack of new surfclam recruitment, with the exception of New York state waters.

- The State of New Jersey in particular has expressed concerns on the lack of recruitment evident in their surveys, which are conducted every year. On September 5, 2002, New Jersey officially

REDUCED the coming fishing year's state quota for surfclams by 14%, from 700,000 bushels to 600,000. This event had not yet occurred when the Council made its recommendation in June; however New Jersey had made its concerns public at the time, and this further substantiates the Council's position.

- Due to the availability of high-quality clams and close proximity to shore processing facilities, industry has become heavily dependent on the surfclam resource off New Jersey. Seventy-eight percent of the coast-wide 2001 Federal quota was harvested from the three degree squares surrounding this one state.

  In many ways, New Jersey represents the heartland of the surfclam fishery. The consequences of fishing down its resources are greater, since the alternative fishing grounds are less attractive. The 1999 survey indicated that 43% of the surfclam biomass was off New Jersey, 21% on Georges Bank, and 25% off Delmarva. The relative importance of New Jersey is heightened as one recognizes that the Georges Bank resource remains closed due to the presence of PSP toxin, and the Delmarva resource currently has a much lower meat yield.

- The Mid-Atlantic Council has effectively managed the surfclam resource in Federal waters with quotas ranging between 1.800 and 3.385 million bushels for the past quarter century. It should be noted that the more conservative recommendation of 3.25 million bushels is still the third-highest quota of all-time.

- The surfclam resource is not considered to be overfished, and overfishing is not occurring, based on the Stock Assessment Review Committee (SARC) 30 (USDC 2000a) recommendation and the unanimous Council-approved overfishing definition. However, Amendment 13 with the new surfclam overfishing definition has not yet been approved by the Secretary.

- There is an extensive list of "Sources of Uncertainties" in the 2000 SARC (USDC 2000a). Between the 1998 and the 2000 assessments, the dredge efficiency estimate was reduced by half (60% to 30%), and natural mortality was increased three-fold. These alterations produced no change in the standing stock biomass estimate, however wide swings in key population parameters strongly suggest the need for more than the two point estimates currently relied upon.

- Following a presentation of the 30th SARC results in March 2000, the Council adopted a management approach that allowed for steady increases in the surfclam quota to the maximum over five years. If the quota is increased to 3.4 million in 2003, it would equate to a very substantial increase in the overall quota of 33% in only 3 years.

- Full information from the survey of 2002 and subsequent assessment in 2003 will not be available for the purposes of setting the Federal surfclam quota until 2004. Hence any changes in course which it might recommend will not be able to take effect until 2005.

Biological Impacts

The most recent biological assessments (from both the 1997 and 1999 surveys) indicate the resource is healthy, composed of many age classes, and can safely sustain increased harvests. Sufficient

recruitment is also evident and thus this level of quota will not harm the long-term sustainability of the resource. The F in 1999 (the last time it was measured at a peer-reviewed

SARC) associated with a quota of 2.565 million bushels was approximately 0.02 and this quota increase may increase the F in 2003 to about 0.03.

The proposed quota takes into account analysis of surfclam abundance that was part of the 30th Northeast Regional Stock Assessment Workshop (SAW 30). SAW 30 utilized data from the 1999 surfclam survey, which included work to estimate dredge efficiency. Results from the 1999 survey and assessment corroborate those of the 1997 survey and assessment and provided the Council the opportunity to safely increase the quota. The Council has tentatively agreed with industry's request to continue increasing the quota up to the maximum optimum yield (3.4 million bushels) level. The Council will continue to perform its annual review of the fishery, but wanted industry to understand that should future assessments continue to indicate the healthy status of the resource that the industry can plan for steady growth to its maximum optimum yield level.

The Council continues to assume that none of the Georges Bank resource (approximately twenty percent of the total resource) will be available in the near future for harvesting because of paralytic shellfish poisoning. This area has been closed to the harvest of clams and other shellfish since 1989, and the Council and NMFS have no reason to believe that it will reopen in the near future.

Amendment 12 (MAFMC 1999) proposed an ocean quahog overfishing definition based on MSY that encompassed the entire resource within the US EEZ. This definition (Table 1) included both biomass and fishing mortality threshold and target estimates. This definition was approved by the Secretary with his approval of that Amendment. The proposed surfclam overfishing definition in Amendment 12 was conservative but was not certifiable by the NEFSC and thus not approved by the Secretary because the definition was based only on the fished proportion of the surfclam population rather than all the surfclam resource in the US EEZ. The new proposed definition in Amendment 13 (Table 1) is similar to the one for ocean quahogs in that it is global, MSY based, and has both biomass and fishing mortality threshold and target estimates. Both definitions have control rules (Figure 1 for surfclams and Figure 22 for ocean quahogs of Amendment 13).

Under the definition recommended by the 2000 SARC and unanimously approved by the Council, overfishing for surfclams occurs whenever F exceeds the threshold fishing mortality rate. The threshold fishing mortality rate is F_{MSY}, but reduced in a linear fashion towards zero when stock biomass falls below the biomass threshold value ($1/2B_{MSY}$). The surfclam stock is overfished whenever stock biomass falls below the biomass threshold level. Estimates of fishing mortality and biomass thresholds and the biomass target based on MSY can be expected to change in each assessment as data accumulate and models improve.

The pre-SFA overfishing definitions for surfclams and ocean quahogs, as they were defined in Amendment 9 (MAFMC 1996) needed revision because those definitions were based on a fishing mortality rate that minimizes the potential for recruitment overfishing ($F_{20\%MSP}$=0.18 for surfclams and $F_{25\%MSP}$=0.042 for ocean quahogs), rather than an MSY strategy. Section 2.1.4 of Amendment 12 on maximum sustainable yield summarized the history of MSY calculations for surfclams and ocean quahogs and described how the Council has prevented overfishing in these two species for the past twenty years of Federal management.

The Council has had at least a 10 year supply horizon for surfclams and at least a 30 year supply horizon for ocean quahogs as its policy for annual quota setting for nearly a decade. The overfishing level defined in Amendment 9 was a "threshold" beyond which the long-term productive capability of the stock is jeopardized. It was concluded in Amendment 9 that the Council's quota setting process is more conservative than the rate-based overfishing levels, given the current resource conditions. The Council is no longer focused on the 10 and 30 year supply horizons for these two species as they are relying on the approved overfishing definition for ocean quahogs and the proposed definition for surfclams. The Council used these benchmarks for their annual quota setting since the 2000 stock assessments (USDC 2000a and 2000b) were completed.

It must be remembered that there has been effective management of both surfclams and ocean quahogs for the past 25 years. The Council began management of these two resources with the FMP in 1977. (It was the first FMP in the country under the 1976 Magnuson Fishery Conservation and Management Act.) The surfclam resource had collapsed from overfishing (landings plummeted from 96 million pounds in 1974 to 35 million pounds in 1979; Table 1 of Amendment 8) and there was serious Council consideration given to closing the fishery for a few years entirely. A low quota was implemented and by the mid 1980s the resource was rebuilt and the quotas were increased to near what they are today. The original FMP had an MSY estimate of 50 million pounds of meats. This is near the top of the FMP's OY range of 58 million pounds.

The EEZ surfclam resource is where the vast amount of landings come from annually (Table 33 of Amendment 13), however all three areas (EEZ, New Jersey Territorial Sea, and New York Territorial Sea) have roughly the same exploitation rate. It appears that all three areas are currently managed on a sustainable level.

In summary, the Council has prevented overfishing of these two resources for the past 25 years and fully intends to continue doing so.

Socioeconomic Impacts

The socioeconomic impacts of this alternative are discussed in detail in the Regulatory Impact Review (RIR) Section RIR 7.1.2. and RIR 8.2.2. In sum, this alternative is expected to result in a slight increase in both consumer and producer surplus, and would increase the average gross value of the harvest to allocation holders by $15,201.

Essential Fish Habitat Impacts

The Sustainable Fisheries Act (SFA) of 1996 significantly altered the requirement of FMPs to address habitat issues. The SFA contains provisions for the identification and protection of habitat essential to the production of Federally managed species. The Act requires FMPs to include identification and description of essential fish habitat (EFH), description of non-fishing and fishing threats, and to suggest conservation and enhancement measures. These new habitat requirements, including what is known about clam gear impacts to the bottom, were addressed in Amendment 12 (MAFMC 1999) and more thoroughly in Amendment 13 which is available for public comment.

A fishing gear impacts workshop was held in Boston in October 2001. That panel of experts agreed that hydraulic dredges have important habitat effects, but even in a worse case scenario, where there were known to be severe biological impacts, only a small area is affected and therefore this gear type is less important than other gear types like bottom trawls and scallop dredges which affect much larger areas. It was also pointed out, however, that even though the effects of dredging (at least for surfclams) are limited to a relatively small area, localized effects of dredging on EFH could be very significant if the dredged area is a productive habitat for one or more managed fish resource. The same would be true if dredging in a particular area coincided with a strong settlement of larval fish. A major question for this gear is "what are its long-term biological impacts" *i.e*., how, and to what extent, are benthic communities altered in heavily dredged areas, particularly the prey organisms, and how long does it take for them to recover once dredging ceases?

The Council concluded from the above mentioned workshop that there is sufficient information that clam dredges could have an effect on EFH if the gear is fished improperly or in the wrong sediment type. However, the clam resources are concentrated in sandy sediment and the fishing gear has evolved over the past five decades to fish most efficiently in sandy sediment. It does not appear that either surfclam or ocean quahog EFH is effected by fishing gear. Then the other question is whether hydraulic clam dredging is affecting other species?

While the Council could not conclude that there are no identifiable effects of clam dredges on EFH, they concurred with the panel that as the fishery is currently prosecuted any impacts were temporary and minimal since the worst case scenario would indicate that any impacts to the habitat are spread over a large uniform area while the fishery is effecting a relatively small area overall. A NEPA analysis was conducted in Amendment 13 in order to verify the any adverse effects from clam dredging were minimized to the extent practicable. Based upon guidance from the Assistant Administrator (January 22, 2001), if information is inconclusive, a NEPA analysis should examine alternatives that could be taken in the face of uncertainty. For NEPA purposes, the guidance from the Assistant Administrator stated that the analysis of alternatives needs to consider explicitly a range of management measures for minimizing potential adverse effects, and the practicability and consequences of adopting those measures. The advise from Dr. Hogarth continues: "In other words, if there is evidence that a fishing practice may be having an identifiable adverse effect on EFH, even if there is no conclusive proof of adverse effects, it is not sufficient to conclude *prima facie* that no new management measures are necessary without first conducting a reasonably detailed alternatives analysis."

This NEPA analysis is detailed in section 7 (Essential Fish Habitat Assessment) of this EA, based on the conclusions that the impacts are short-term and minimal. The Council has concluded that any small quota increase minimizes, to the extent practicable, the adverse effects of fishing on EFH as required by section 303 (a) (7) of the MSA.

Protected Resources Impacts

Numerous species of marine mammals and sea turtles occur in the northwest Atlantic Ocean. The most comprehensive survey in this region was done from 1979-1982 by the Cetacean and Turtle Assessment Program (CETAP), at the University of Rhode Island (University of Rhode Island 1982), under contract to the Minerals Management Service (MMS), Department of the Interior. The following is a summary of the information gathered in that study, which covered

the area from Cape Sable, Nova Scotia, to Cape Hatteras, North Carolina, from the coastline to 5 nautical miles seaward of the 1,000 fathom isobath.

Four hundred and seventy one large whale sightings, 1547 small whale sightings and 1172 sea turtles were encountered in the surveys. The "estimated minimum population number" for each mammal and turtle in the area, as well as those species currently included under the Endangered Species Act, were also tabulated (Table 36 of Amendment 13).

CETAP concluded that both large and small cetaceans were widely distributed throughout the study area in all four seasons, and grouped the 13 most commonly seen species into three categories, based on geographical distribution. The first group contained only the harbor porpoise, which is distributed only over the shelf and throughout the Gulf of Maine, Cape Cod, and Georges Bank, but probably not southwest of Nantucket. The second group contained the most frequently encountered baleen whales (fin, humpback, minke, and right whales) and the white-sided dolphin. These were found in the same areas as the harbor porpoise, and also occasionally over the shelf at least to Cape Hatteras or out to the shelf edge. The third group indicated a "strong tendency for association with the shelf edge" and included the grampus, striped, spotted, saddleback, and bottlenose dolphins, and the sperm and pilot whales.

There are numerous species which inhabit the management unit of this FMP that are afforded protection under the Endangered Species Act (ESA) of 1973 (i.e., for those designated as threatened or endangered) and/or the Marine Mammal Protection Act of 1972 (MMPA). Eleven are classified as endangered or threatened under the ESA, while the remainder are protected by the provisions of the MMPA. Marine mammals include the northern right whale, humpback whale, fin whale, minke whale, harbor porpoise, white-sided dolphin, bottlenose dolphin, common dolphin, harp seal, harbor seal and gray seal. The status of these and other marine mammal populations inhabiting the Northwest Atlantic has been discussed in detail in the U.S. Atlantic and Gulf of Mexico Marine Mammal Stock Assessments. Initial assessments were presented in Blaylock *et al.* (1995) and are updated in Waring *et al.* (1999). The most recent information on the stock assessment of various mammals can be found at: *www.nmfs.noaa.gov/prot_res/PR2/Stock_Assessment_program/sars.html.*

The only gear used for the surfclam and ocean quahog fisheries is clam dredges which are not included in the final List of Fisheries for 2000 for the taking of marine mammals by commercial fishing operations under Section 114 of the Marine Mammal Protection Act (MMPA) of 1972. In addition, the proposed actions will not increase fishing effort. As such, minimal interaction is expected between clam dredging gear and protected species.

The protected species found in New England and Mid-Atlantic waters are listed below.

Endangered: Right whale *(Eubalaena glacialis),* Humpback whale *(Megaptera novaeangliae),* Fin whale *(Balaenoptera physalus),* Sperm whale *(Physeter macrocephalus),* Blue whale *(Balaenoptera musculus),* Sei whale *(Balaenoptera borealis),* Kemp's ridley *(Lepidochelys kempi),* Leatherback turtle *(Dermochelys coriacea),* Green sea turtle *(Chelonia mydas),* Shortnose sturgeon *(Acipenser brevirostrum),* and the Gulf of Maine distinct population segment (DPS) of Atlantic salmon .

Threatened: Loggerhead turtle *(Caretta caretta)*

Other marine mammals: Other marine mammals likely to occur in the management unit include; harbor porpoise: *(Phocoena phocoena),* minke whale *(Balaenoptera acutorostrata),* white-sided dolphin *(Lagenorhynchus acutus),* white-beaked dolphin *(Lagenorhynchus albirostris),* bottlenose dolphin *(Tursiops truncatus),* [coastal stock listed as depleted under the MMPA], pilot whale *(Globicephala melaena),* Risso's dolphin *(Grampus griseus),* common dolphin *(Dephinis delphis),* spotted dolphin (Stenella spp.), striped dolphin *(Stenella coeruleoalba),* killer whale *(Orcinus orca),* beluga whale *(Delphinapterus leucas),* Northern bottlenose whale *(Hyperoodon ampullatus),* goosebeaked whale *(Ziphius cavirostris)* and beaked whale (Mesoplodon spp.). Pinnipeds species include harbor *(Phoca vitulina)* and gray seals *(Halichoerus grypus)* and less commonly, hooded *(Cystophora cristata)* harp *(Pagophilus groenlandicus)* and ringed seals *(Phoca hispida).*

Two other useful websites on marine mammals are:
www.nmfs.noaa.gov/prot_res/PR3/recovery.html and
http://spo.nwr.noaa.gov/mfr611/mfr611.htm.

The range of surfclams, ocean quahogs, and the above marine mammals and endangered species overlap to a large degree, and there always exists some very limited potential for an incidental kill. Except in unique situations (e.g., tuna-porpoise in the central Pacific), such accidental catches should have a negligible impact on marine mammal/endangered species abundances. The Council does not believe that implementation of these quotas will have any adverse impact upon these populations. While marine mammals and endangered species may occur near surfclam and ocean quahogs beds, it is highly unlikely any significant conflict between the fishermen managed by this FMP and these species would occur. Clam vessels dredge at very slow speeds and healthy animals should have no difficulty avoiding these vessels. Additionally, surfclams and ocean quahogs are benthic organisms, while marine mammals and marine turtles are mostly pelagic and spend nearly all of their time up in the water column or near the surface as do, of course, seabirds.

6.1.2 Impacts of Alternative S1 (1.850 million bushels) on the Environment

The first non-preferred alternative quota for the 2003 surfclam fishery is1.850 million bushels. This quota is within the OY range of between 1.850 and 3.400 million bushels as required by the FMP. This alternative would reduce the surfclam quota by 41% from 2002 (MAFMC 2002a).

There is no major reason the Council would have considered seriously reducing the 2003 quota from the 2002, other than to evaluate the full range of alternatives.

Biological Impacts

A 41% reduction in quota for 2003 could possibly benefit the long-term sustainability of the resource, however there is the offsetting argument that the slow growing clams off of Delmarva may need to be thinned in order to be more productive. (The 1998 assessment (USDC 1998a) states: “It is unclear to what degree this is due to density dependence or environmental effects. Therefore, it is unclear whether reducing the density through fishing would improve growth and condition.”) The annual impacts on bottom habitat may be slightly lessened with a reduction in quota.

Discounting the availability of the resource on Georges Bank there is sufficient resource in the Northern New Jersey and Delmarva areas to maintain a quota significantly above this level. The biology of the resource does not warrant constraining the industry to this level at this time. This level of quota may not have significantly different effects on the resource (since more may die of natural mortality), but may have a somewhat more beneficial effect on bottom habitat than the preferred alternative, since there would be less fishing effort.

Socioeconomic Impacts

The socioeconomic impacts of this alternative are discussed in detail in the Regulatory Impact Review (RIR) Section RIR 7.1.3. and RIR 8.2.2. In sum, this alternative is expected to result in a significant decrease in both consumer and producer surplus, and would reduce the average gross value of the harvest to allocation holders by $155,808.

Essential Fish Habitat Impacts

The discussion of the preferred alternative (section 3.1.1 essential fish habitat impacts) details why the Council concluded that clam fishing gear impacts are short-term and minimal. Potentially, the less the quota, the less the short-term and minimal impacts realized.

Protected Resources Impacts

The discussion of the preferred alternative (section 3.1.1 protected resources impacts) details why the Council concluded that clam fishing will have minimal adverse impacts to protected species. Potentially, the less the quota, the less the fishing, the even less the minimal adverse impacts realized.

6.1.3 Impacts of Alternative S2 (2.850 million bushels) on the Environment

The second non-preferred alternative quota for the 2003 surfclam fishery is the quota from 2001of 2.850 million bushels. This quota is within the OY range of between 1.850 and 3.400 million bushels as required by the FMP. This alternative would maintain the surfclam quota at the level it was in 2001 (MAFMC 2002a).

Biological Impacts

Returning to the quota level of 2001could possibly affect the long-term growth of the industry, if industry is correct and the demand is growing. There is the argument that the slow growing clams off of Delmarva may need to be thinned in order to be more productive or may never become more productive. (The assessment (USDC 1998a) states: “It is unclear to what degree this is due to density dependence or environmental effects. Therefore, it is unclear whether reducing the density through fishing would improve growth and condition.”)

Socioeconomic Impacts

The socioeconomic impacts of this alternative are discussed in detail in the Regulatory Impact Review (RIR) Section RIR 7.1.4. and RIR 8.2.2. In sum, this alternative is expected to result in a decrease in

both consumer and producer surplus, and would reduce the average gross value of the harvest to allocation holders by $34,200.

Essential Fish Habitat Impacts

The discussion of the preferred alternative (section 3.1.1 essential fish habitat impacts) details why the Council concluded that clam fishing gear impacts are short-term and minimal. Potentially, the less the quota, the less the short-term and minimal impacts realized.

Protected Resources Impacts

The discussion of the preferred alternative (section 3.1.1 protected resources impacts) details why the Council concluded that clam fishing will have minimal adverse impacts to protected species. Potentially, the less the quota, the less the fishing, the even less the minimal adverse impacts realized.

6.1.4 Impacts of Alternative S3 (3.135 million bushels) on the Environment

The third non-preferred alternative quota for the 2003 surfclam fishery is the status quo of 3.135 million bushels. This quota is within the OY range of between 1.850 and 3.400 million bushels as required by the FMP. This alternative would maintain the surfclam quota at the level it was in 2002 (MAFMC 2002a).

Biological Impacts

Maintaining the status quo quota for 2003 could possibly affect the long-term growth of the industry, if industry is correct and the demand is growing. There is the argument that the slow growing clams off of Delmarva may need to be thinned in order to be more productive or may never become more productive. (The assessment (USDC 1998a) states: "It is unclear to what degree this is due to density dependence or environmental effects. Therefore, it is unclear whether reducing the density through fishing would improve growth and condition.")

Socioeconomic Impacts

The socioeconomic impacts of this alternative are discussed in detail in the Regulatory Impact Review (RIR) Section RIR 7.1.5. and RIR 8.2.2. In sum, this alternative is expected to result in no change in consumer or producer surplus, or in the average gross value of the harvest to allocation holders.

Essential Fish Habitat Impacts

The discussion of the preferred alternative (section 3.1.1 essential fish habitat impacts) details why the Council concluded that clam fishing gear impacts are short-term and minimal. Maintaining the status quo level of quota for 2003 would result in the same minimal level of impacts as occurred in 2002.

Protected Resources Impacts

The discussion of the preferred alternative (section 3.1.1 protected resources impacts) details why the

Council concluded that clam fishing will have minimal adverse impacts to protected species. Maintaining the status quo level of quota for 2003 would result in the same minimal level of impacts as occurred in 2002.

6.1.5 Impacts of Alternative S5 (3.400 million bushels) on the Environment

The maximum quota allowed under the FMP is 3.400 million bushels and would represent an 8% increase above the 2002 quota. The Council assumed none of the surfclam resource on Georges Bank would be available. Given the current condition of the resource this level of quota should not adversely affect the long-term sustainability of the stock. Increased pressure on bottom habitat could possibly cause some additional limited adverse effects.

Biological Impacts

Given that surfclams are currently under-exploited, this slight increase would not be detrimental.

Socioeconomic Impacts

The socioeconomic impacts of this alternative are discussed in detail in the Regulatory Impact Review (RIR) Section RIR 7.1.6. and RIR 8.2.2. In sum, this alternative is expected to result in an increase in both consumer and producer surplus, and would increase the average gross value of the harvest to allocation holders by $30,396.

Essential Fish Habitat Impacts

The discussion of the preferred alternative (section 3.1.1 essential fish habitat impacts) details why the Council concluded that clam fishing gear impacts are short-term and minimal. Increasing the quota slightly for 2003 would result in at most a slight minimal level of increased impacts.

Protected Resources Impacts

The discussion of the preferred alternative (section 3.1.1 protected resources impacts) details why the Council concluded that clam fishing will have minimal adverse impacts to protected species. Increasing the quota slightly for 2003 would result in at most a slight minimal level of increased impacts.

6.2 Surfclam Minimum Size Limit Suspension

The Surfclam and Ocean Quahog FMP includes a provision for a minimum size limit of 4.75 inches on surfclams, which may be used to protect new year classes from harvest before they have reached an optimal size. The provision is written such that a minimum size will automatically be in effect unless the Council and NMFS take the active step of suspending it each year.

Regulations for surfclams require that gear restrictions be applied if the proportion of clams smaller than 4.75 inches landed exceeds 30% of the total landings for the entire coast wide stock. Dr. John Witzig in a September 2001 report entitled: *Estimation of Proportion of Surfclam Landings by Size Class*, identified the data sources and the procedures used in last years evaluation of the size limit suspension.

This is an issue for Amendment 13 and it is hoped that this annual effort including the *Federal Register* notice can be reversed so that not as much administrative time is spend on this topic. The Witzig report concluded that for January through

mid-August 2001, there was only 2 percent of the surfclam landings that were smaller than 4.75 inches.

The current stock is comprised primarily of large, adult individuals, with few small individuals apparent from landings in most areas (USDC 2000a). Reinstating a minimum size under these conditions would result in greater harm than benefit, as it would require the industry to use "sorting" machines which will often damage undersized clams as it routes them back overboard.

It is, therefore, the Council's recommendation that the surfclam minimum size limit be suspended for 2003, as has been done every year since 1990. Continuing the suspension will have no impact on the current fishery or resource.

6.2.1 Impacts of Preferred Alternative (Status Quo) on the Environment

Biological Impacts

There should be no biological impact of the status quo alternative. All clams that are caught are landed resulting in no waste of the resource. The most recent SARC (USDC 2000a) considers this resource as under-utilized.

Socioeconomic Impacts

Maintenance of the status quo alternative would result in no change to the socioeconomic aspects of the surfclam fishery in 2003.

Essential Fish Habitat Impacts

Maintenance of the status quo alternative would result in no change to the essential fish habitat impacts from 2002 to 2003. Suspension of the size limit will result in the least amount of any potential gear impact to the ocean bottom.

Protected Resources Impacts

Maintenance of the status quo alternative will have no different impacts to any protected resource from 2002 to 2003. Not having a size limit will result in the least amount of overall fishing effort and thus absolutely minimize any potential protected resources impacts.

6.2.2 Impacts of Alternative 2 (No suspension) on the Environment

Biological Impacts

The Witzig 2001 report identifies that only 2 percent of the landed clams were smaller than 4.75 inches. It is believed that there is no current at sea discards. Survival rates of discarded clams is greater than 50 percent, so even if all the clams smaller than 4.75 inches were discarded, the result would only be about one percent of the annual landings. The recent SARC (USDC 2000a) considers this resource as under-utilized.

Socioeconomic Impacts

Discarding 2 percent of the landings would increase the cost of harvest and result in longer fishing days and more time at sea for fishermen.

Essential Fish Habitat Impacts

Discarding 2 percent of the landings would cause more fishing effort and even though the fishing gear is considered as having only short-term and minimal impacts, there would be more effort required and thus potentially more of an impact.

Protected Resources Impacts

Discarding 2 percent of the landings would cause more fishing effort and even though the fishing gear is considered as having only minimal adverse impacts to protected resources, there would be more effort required and thus potentially more of an impact.

6.3 Ocean Quahog *Arctica islandica* Quota

6.3.1 Impacts of Preferred Alternative (4.500 million bushels) on the Environment

The Council proposes a 2003 ocean quahog quota of 4.500 million bushels, the same as 1999, 2000, 2001 and 2002. There is no biological reason that the resource can not support this level of quota given the most recent stock assessments (USDC 1998b and 2000b). The 1997 (4.317 million bushels) and 1998 (4.000 million bushels) reductions were based on evaluation of the harvest level which would satisfy the former Council policy of a harvest level which could be maintained for at least 30 years given the information prior to the 1998 assessment (USDC 1998b). The Council currently bases their recommendations on a harvest policy based on MSY.

Biological Impacts

Based on the biological data presented in the most recent assessments (USDC 1998b and 2000b) the ocean quahog quota could have been increased overall. The Council proposed a 2003 ocean quahog quota based on the analysis of abundance for that species found in the 31st Northeast Regional Stock Assessment Workshop (SAW 31) concluded in August 2000. Similar to surfclams, SAW 31 and the assessment from the 1997 survey (SAW 27) included work to estimate dredge efficiency and showed a significant increase in the estimate of ocean quahog biomass. Although 36 percent of the resource is located on Georges Bank, SAW 31 did not question whether Georges Bank would ever be reopened. It is estimated the even excluding the ocean quahog resource portion on Georges Bank, that fully 82% of the virgin biomass remains after two plus decades of harvesting these long-lived creatures.

The Secretary approved Amendment 12 (MAFMC 1999) with its new overfishing definition in April 1999. The new definition has: a "biomass target" = ½ virgin biomass, "fishing mortality target" = $F_{0.1}$, "biomass threshold" = ½ biomass target, and a "fishing mortality threshold" = to $F_{25\%}$ MSP level yielding F = 0.04. The 1999 quota yielded an F (the last time it was measured at a peer-reviewed SARC) of approximately 0.02 compared to the threshold of 0.04 contained in the overfishing definition.

The specific F associated with the 2003 quota is expected to be close to the F in 1999, because a similar proportion of the biomass remains unexploited compared to 1999. Therefore, the proposed quota is below the approved overfishing definition for fishing mortality.

The Amendment 12 overfishing definition for ocean quahogs is MSY based, since it is generally assumed that MSY for harvested populations occurs at one-half the virgin biomass. The 1997 surveyed biomass estimate (roughly 3 billion pounds of meats) is at about 80% of the virgin biomass (roughly 4 billion pounds of meats) and exploitation rates are below $F_{0.1}$, $F_{25\%}$, and F_{max}. The combination of current biomass and F is highly unlikely to represent overfishing, as defined by the current SFA guidelines (NEFSC 1998b). There is however, significant time to determine the exact nature of the sustainability of the resource, since total removals (which have averaged about 40 million pounds/year) over the past two decades have only reduced the virgin biomass by about 20%.

The current biomass is less than the likely carrying capacity (K) of the resource, but well above K/2. Moreover, the current fishing mortality rates are well below existing fishing mortality rate thresholds. Current status of the ocean quahog resource is schematically depicted in Figure 22 of Amendment 13. The 1997 surveyed biomass estimate (roughly three billion pounds) is at about 80% of the virgin biomass (roughly four billion pounds). This figure suggests that fishing mortality rates are below two alternative action levels and that overall population biomass exceeds levels which would require rebuilding. Nonetheless, 25 years of harvesting appear to have reduced the population in some areas. It is not yet possible to characterize the dynamic response of the population to these decreases in density. In many instances, the recruits that might have been produced as a result of prior reductions are only now becoming vulnerable to the survey dredge.

In summary, the Council has prevented overfishing of these two resources for the past 25 years and fully intends to continue doing so.

Socioeconomic Impacts

The socioeconomic impacts of this alternative are discussed in detail in the Regulatory Impact Review (RIR) Sections RIR 7.2.1., 7.2.2. and RIR 8.2.3. In sum, this alternative is expected to result in no change in consumer or producer surplus, or in the average gross value of the harvest to allocation holders.

Essential Fish Habitat Impacts

The Sustainable Fisheries Act (SFA) of 1996 significantly altered the requirement of FMPs to address habitat issues. The SFA contains provisions for the identification and protection of habitat essential to the production of Federally managed species. The Act requires FMPs to include identification and description of essential fish habitat (EFH), description of non-fishing and fishing threats, and suggest conservation and enhancement measures. These new habitat requirements, including what little is known about clam gear impacts to the bottom, were addressed in Amendment 12 (MAFMC 1999) and the new Amendment 13 that is out for public review. The effect on bottom habitat of the 4.500 million bushel quota would be the same as is currently occurring.

The discussion of the preferred alternative for surfclams (section 3.1.1 essential fish habitat impacts)

details why the Council concluded that clam fishing gear impacts are short-term and minimal. Maintaining the status quo level of quota for 2003 would result in the same minimal level of impacts as occurred in 2002.

Protected Resources Impacts

The discussion of the preferred alternative for surfclams (section 3.1.1 protected resources impacts) details why the Council concluded that clam fishing will have minimal adverse impacts to protected species. Maintaining the status quo level of quota for 2003 would result in the same minimal level of impacts as occurred in 2002.

6.3.2 Impacts of Alternative Q1 (4.000 million bushels) on the Environment

The minimum quota allowed under the FMP's OY definition is the alternative for 4.000 million bushels, which was not chosen by the Council because it would be constraining to industry and there is no biological reason to constrain industry at this time. The 4.000 million bushel level is the level the Council selected in 1998 and was a reduction of 7.3 percent from 1997. With the 1997 and 1999 surveys and the 1998 and 2000 assessments showing that there is sufficient resource, the Council elected to have a slight increase for 1999 and maintain that level for 2000, 2001, 2002 and 2003.

The quota reductions which the Council recommended in 1997 and 1998 were in part due to questions about the validity of assuming that all of the Georges Bank biomass would become available to the fishery over the course of the 30 year harvest period. In 1996 when the Council made the assumption of a reopening occurring on Georges Bank, the Council stated that additional quota reductions would be necessary in the future if demonstrable progress was not made toward a reopening of Georges Bank in the near future. The 1996 SAW did not provide any forecast for ocean quahogs and only provided the management advice that a 30 - year supply is possible only if the biomass on Georges Bank and in areas off Southern New England and Long Island, generally too deep to be harvested with current technology, were included.

The 1998 and 2000 SAWs (USDC 1998b and 2000b) did not question whether Georges Bank would ever be opened. Fully more than a third of the resource is located on Georges Bank. The resource is of sufficient size overall that the third that is on Georges Bank is not necessary to meet the Council's former 30 supply year policy. This policy has now been replaced with the overfishing definition which is based on MSY and a supply that is sustainable indefinitely.

As with the surfclam resource, the vast majority of ocean quahogs which are left unharvested in 2003 will still be available to the same allocation holders in subsequent years. Earnings are simply deferred rather than lost, with the ocean quahogs being stored in the ocean rather than in refrigerated containers or cans.

This level of quota may have a slight beneficial effect on the resource since major recruitment incidents have not been identified for the ocean quahog stock, and these animals may take up to 20 years to reach marketable size depending upon environmental conditions. A return to the 1998 quota level may have a slight beneficial effect on the bottom habitat since less bottom would be exposed to the hydraulic dredging, especially in areas that have been heavily fished, however, it has been determined that clam

dredge impacts are short-term and minimal.

Biological Impacts

The 1998 and 2000 SAWs (USDC 1998b and 2000b) did not question whether Georges Bank would ever be opened. Fully more than a third of the resource is located on Georges Bank. The resource is of sufficient size overall that the third that is on Georges Bank is not necessary to meet the Council's former 30 supply year policy. This policy has now been replaced with the overfishing definition which is based on MSY and a supply that is sustainable indefinitely.

This level of quota may have a slight beneficial effect on the resource since major recruitment incidents have not been identified for the ocean quahog stock, and these animals may take up to 20 years to reach marketable size depending upon environmental conditions.

Socioeconomic Impacts

The socioeconomic impacts of this alternative are discussed in detail in the Regulatory Impact Review (RIR) Section RIR 7.2.1., 7.2.2. and RIR 8.2.3. In sum, the impacts this alternative would have depend largely on whether landings follow historical trends, or the more recent, accelerated trend. If the recent trend holds, then this alternative is expected to result in a significant decrease in both consumer and producer surplus, and would reduce the average gross value of the harvest to allocation holders by $51,420.

Essential Fish Habitat Impacts

The discussion of the preferred surfclam alternative (section 3.1.1 essential fish habitat impacts) details why the Council concluded that clam fishing gear impacts are short-term and minimal. A return to the 1998 quota level may have a slightly higher beneficial effect on the bottom habitat since less bottom would be exposed to the hydraulic dredging, especially in areas that are deeper.

Protected Resources Impacts

The discussion of the preferred surfclam alternative (section 3.1.1 protected resources impacts) details why the Council concluded that clam fishing will have minimal adverse impacts to protected species. Potentially, the less the quota, the less the fishing, the even less the minimal adverse impacts realized.

6.3.3 Impacts of Alternative Q2 (4.250 million bushels) on the Environment

Splitting the difference between the minimum allowable quota under the OY range and the current quota of 4.500 million bushels, yields a quota of 4.250 million bushels. This is a quota reduction of 6%. This level was not chosen by the Council because it could be constraining to industry and there is no biological reason to constrain industry at this point. With the 1997 and 1999 surveys and 1998 and 2000 assessments showing that there is sufficient resource, the Council elected to have a slight increase for 1999, and maintain that level for 2000, 2001, 2002, and 2003, in order to allow the industry to slightly grow.

The quota reductions which the Council recommended in 1997 and 1998 were in part due to questions about the validity of assuming that all of the Georges Bank biomass would become available to the fishery over the course of the 30 year harvest period. In 1996 when the Council made the assumption

of a reopening occurring on Georges Bank, the Council stated that additional quota reductions would be necessary in the future if demonstrable progress was not made toward a reopening of Georges Bank in the near future. The 1996 SAW did not provide any forecast for ocean quahogs and only provided the management advice that a 30 - year supply is possible only if the biomass on Georges Bank and in areas off Southern New England and Long Island, generally too deep to be harvested with current technology, are included.

Biological Impacts

The 1998 and 2000 SAWs (USDC 1998b and 2000b) did not question whether Georges Bank would ever be opened. Fully a third of the resource is located on Georges Bank. The resource is of sufficient size overall that the third that is on Georges Bank is not necessary to meet the Council's former 30 supply year policy, which has been supplanted by the new overfishing definition.

As with the surfclam resource, the vast majority of ocean quahogs which are left unharvested in 2003 will still be available to the same allocation holders in subsequent years. Earnings are simply deferred rather than lost, with the ocean quahogs being stored in the ocean rather than in refrigerated containers or cans.

This level of quota may have a slight beneficial effect on the resource since major recruitment incidents have not been identified for the ocean quahog stock, and these animals may take up to 20 years to reach marketable size depending upon environmental conditions.

Socioeconomic Impacts

The socioeconomic impacts of this alternative are discussed in detail in the Regulatory Impact Review (RIR) Section RIR 7.2.1., 7.2.2. and RIR 8.2.3. In sum, the impacts this alternative would have depend largely on whether landings follow historical trends, or the more recent, accelerated trend. If the recent trend holds, then this alternative is expected to result in a decrease in both consumer and producer surplus, and would reduce the average gross value of the harvest to allocation holders by $25,710.

Essential Fish Habitat Impacts

The discussion of the preferred surfclam alternative (section 3.1.1 essential fish habitat impacts) details why the Council concluded that clam fishing gear impacts are short-term and minimal. A reduction of the current quota level may have a slightly higher beneficial effect on the bottom habitat since less bottom would be exposed to the hydraulic dredging, especially in areas that are deeper.

Protected Resources Impacts

The discussion of the preferred surfclam alternative (section 3.1.1 protected resources impacts) details why the Council concluded that clam fishing will have minimal adverse impacts to protected species. Potentially, the less the quota, the less the fishing, the even less the minimal adverse impacts realized.

6.3.4 Impacts of Alternative Q4 (4.750 million bushels) on the Environment

This is a 6% increase over the current quota and near the mid-point of the OY range for ocean quahog quotas. An increase in quota of this amount was favored by a few processors in the industry but as a whole, industry was willing to maintain the status quo. Bottom habitat may be slightly more negatively impacted as more ocean quahogs would be removed. Exvessel prices would likely fall somewhat as supply would probably exceed demand. For 1999, industry requested the Council raise the quota to 4.500 million bushels as that is what they expected to be able to sell in 1999 and, in general, they have supported maintaining the status quo for 2000, 2001, 2002, and 2003.

Biological Impacts

Given the current state of the stock, that the ocean quahog resource is "not overfished and overfishing is not occurring", a slight increase in quota would not be at all harmful.

Socioeconomic Impacts

The socioeconomic impacts of this alternative are discussed in detail in the Regulatory Impact Review (RIR) Section RIR 7.2.1., 7.2.2. and RIR 8.2.3. In sum, the impacts this alternative would have depend largely on whether landings follow historical trends, or the more recent, accelerated trend. If the recent trend holds, then this alternative is expected to result in an increase in both consumer and producer surplus, and would increase the average gross value of the harvest to allocation holders by $25,710.

Essential Fish Habitat Impacts

The discussion of the preferred surfclam alternative (section 3.1.1 essential fish habitat impacts) details why the Council concluded that clam fishing gear impacts are short-term and minimal. A slight increase of the current quota level may have a slightly higher impact on the bottom habitat since more bottom would be exposed to the hydraulic dredging.

Protected Resources Impacts

The discussion of the preferred surfclam alternative (section 3.1.1 protected resources impacts) details why the Council concluded that clam fishing will have minimal adverse impacts to protected species. Potentially, the more the quota, the more the fishing, the slightly more the minimal adverse impacts realized.

6.3.5 Impacts of Alternative Q5 (6.000 million bushels) on the Environment

This is the maximum of the FMP's OY range for ocean quahog quotas and would be a quota increase of 33% above the status quo. Bottom habitat could potentially be negatively impacted as roughly 33% more ocean quahogs would be removed. Exvessel prices likely would fall as supply would greatly exceed demand. For 1999, industry requested the Council raise the quota to 4.5 million bushels as that is what they expected to be able to sell in 1999 and they supported maintaining the status quo for 2000, 2001, 2002 and 2003.

Biological Impacts

This large of an increase in one year could have some slight biological impact. Annual fishing mortality would likely go from 2% to near 3% and thus would be between the target and threshold level of overfishing.

Socioeconomic Impacts

The socioeconomic impacts of this alternative are discussed in detail in the Regulatory Impact Review (RIR) Section RIR 7.2.1., 7.2.2. and RIR 8.2.3. In sum, the impacts this alternative would have depend largely on whether landings follow historical trends, or the more recent, accelerated trend. If the recent trend holds, then this alternative is expected to result in a significant increase in both consumer and producer surplus, and could increase the average gross value of the harvest to allocation holders by as much as $141,408.

Note that it is very unlikely industry would be able to increase harvests by such a large amount in a single year.

Essential Fish Habitat Impacts

The discussion of the preferred surfclam alternative (section 3.1.1 essential fish habitat impacts) details why the Council concluded that clam fishing gear impacts are short-term and minimal. A 33% increase of the current quota level may have a slightly higher impact on the bottom habitat since more bottom would be exposed to the hydraulic dredging.

Protected Resources Impacts

The discussion of the preferred surfclam alternative (section 3.1.1 protected resources impacts) details why the Council concluded that clam fishing will have minimal adverse impacts to protected species. Potentially, the more the quota, the more the fishing, the slightly more the minimal adverse impacts realized.

6.4 Maine Ocean Quahog *Arctica islandica* Quota

Three alternative quotas are presented for the Maine ocean quahog fishery. Alternative M3 would maintain the status quo quota at the maximum allowable level of 100,000 Maine bushels.

6.4.1 Impacts of Preferred Alternative (100,000 bushels) on the Environment

The Council recommends that the Maine ocean quahog quota for 2003 remain unchanged at the initial maximum quota of 100,000 Maine bushels (1 bushel = 1.2445 cubic feet).

The Council believes that the 2002 quota will likely be reached and the Regional Administrator will close the fishery in 2002 as she had to do in November of 2000. It is anticipated that the Regional Administrator will likely also have to close the fishery in 2003. The Maine fishery was not closed in 2001 because of the quota being reached but was closed for nearly a month in the summer due to PSP.

It is likely that this PSP closure during the peak of the season precluded a closure attributable to exceeding the annual quota.

According to 50 CFR section 648.76 (2)(b)(iv): *The Regional Administrator will monitor the quota based on dealer reports and other available information and shall determine the date when the quota will be harvested. NMFS shall publish notification in the Federal Register advising the public that, effective upon a specific date, the Maine mahogany quahog quota has been harvested and notifying vessel and dealer permit holders that no Maine mahogany quahog quota is available for the remainder of the year.*

It must also be remembered that according to 50 CFR section 648.76 (2)(b)(iii): *All mahogany quahogs landed by vessels fishing in the Maine mahogany quahog zone for an individual allocation of quahogs under section 648,70 will be counted against the ocean quahog allocation for which the vessel is fishing.* In other words, even after the initial maximum quota of 100,000 Maine bushels is harvested from the Maine mahogany ocean quahog zone (north of 43°50'), vessels could obtain/use ITQ allocation and continue to fish in this zone. It is anticipated that some Maine fishermen will again rent ITQ allocation after the 100,000 bushel quota is reached in 2002 and 2003 as they have done for the past two years. More than half (4,530 bushels) of the 8,500 bushels that were above the 100,000 quota in 2001 were landed with an ITQ allocation. In 2000, there were 5,821 bushels landed with ITQ shares of the 20,767 bushels that exceeded the 100,000 bushel quota. There were no quota overages prior to 2000. Since implementation of Amendment 10 in 1998, approximately 70 % of the average annual landings have been reported as coming from state waters and 30% from Federal waters.

Amendment 10 (MAFMC 1998) emphasized that there had been no comprehensive, systematic survey or assessment of the ocean quahog resource in eastern Maine. It also emphasized that a full stock assessment of the Maine resource should be a priority to ensure that this segment of the fishery would have a sustainable future. The initial maximum quota for the Maine zone was to remain in effect until a resource survey and assessment was completed. The agreement at the time of Amendment 10 was that the State of Maine was to initiate a survey once the initial maximum quota of 100,000 bushels became constraining. There is an effort within the State of Maine to initiate an ocean quahog survey in 2002. Scott Feindel has been hired and is currently working with a commercial fishermen to survey the distribution of the resource along the Maine coast.

Biological Impacts

There should be no change in the biological impacts of maintaining the status quo quota for 2003. Although the condition of the Maine Mahogany quahog is currently unknown, the ocean quahog fishery overall is not overfished and overfishing is not occuring. It is planned that surveys will be conducted in 2002 and 2003 with an assessment in December 2003, and thus quotas specifically for the Maine stock of ocean quahogs will be able to be based on sound science beginning with the 2005 harvests.

Socioeconomic Impacts

The socioeconomic impacts of this alternative are discussed in detail in the Regulatory Impact Review (RIR) Sections RIR 7.2.3. and RIR 8.2.4. In sum, this alternative is expected to result in no change in

consumer or producer surplus, or in the average gross value of the harvest.

Essential Fish Habitat Impacts

The discussion of the preferred surfclam alternative (section 3.1.1 essential fish habitat impacts) details why the Council concluded that clam fishing gear impacts are short-term and minimal. Maintaining the current quota level will not change the impact on the bottom habitat since no more bottom would be exposed to the dredging.

Protected Resources Impacts

The discussion of the preferred surfclam alternative (section 3.1.1 protected resources impacts) details why the Council concluded that clam fishing will have minimal adverse impacts to protected species. Maintaining the current status quo will not change this minimal impact.

6.4.2 Impacts of Alternative M1 (50,000 bushels) on the Environment

Alternative M1 corresponds to a 50% reduction from the maximum allowable quota under the current management plan. There is no real justification to the halving of the current quota.

Biological Impacts

It is unknown if a halving of the quota would change the biological impacts for 2003. The impacts of any quota are unknown since no survey and assessment have been conducted on this segment of the ocean quahog resource. It is planned that surveys will be conducted in 2002 and 2003 with an assessment in December 2003.

Socioeconomic Impacts

The socioeconomic impacts of this alternative are discussed in detail in the Regulatory Impact Review (RIR) Section RIR 7.2.3. and RIR 8.2.4. In sum, this alternative is expected to result in a slight decrease in both consumer and producer surplus, and would increase harvest costs to vessels by an average of $1,395.

Essential Fish Habitat Impacts

The discussion of the preferred surfclam alternative (section 3.1.1 essential fish habitat impacts) details why the Council concluded that clam fishing gear impacts are short-term and minimal. Halving the current quota level may reduce any impact on the bottom habitat since less bottom would be exposed to the dredging.

Protected Resources Impacts

The discussion of the preferred surfclam alternative (section 3.1.1 protected resources impacts) details why the Council concluded that clam fishing will have minimal adverse impacts to protected species. Halving the current quota level may reduce any impact to protected resources since less fishing effort

would be exerted.

6.4.3 Impacts of Alternative M2 (72,466 bushels) on the Environment

Alternative M2 corresponds to the harvest level actually attained in 1998, though it would reduce the allowable harvest by 28%. There is no real justification to returning to the 1998 level of harvest as these Maine fishermen have worked hard to build the market and a stock assessment for this portion of the resource should be available in two years.

Biological Impacts

It is unknown if reducing the quota would change the biological impacts for 2003. The impacts of any quota are unknown since no survey and assessment have been conducted on this segment of the ocean quahog resource. It is planned that surveys will be conducted in 2002 and 2003 with an assessment in December 2003.

Socioeconomic Impacts

The socioeconomic impacts of this alternative are discussed in detail in the Regulatory Impact Review (RIR) Section RIR 7.2.3. and RIR 8.2.4. In sum, this alternative is expected to result in no change in consumer surplus, and a slight decrease in producer surplus. It is estimated that harvest costs to would increase by an average of $888 per vessel.

Essential Fish Habitat Impacts

The discussion of the preferred surfclam alternative (section 3.1.1 essential fish habitat impacts) details why the Council concluded that clam fishing gear impacts are short-term and minimal. Reducing the current quota level may reduce any impact on the bottom habitat since less bottom would be exposed to the dredging.

Protected Resources Impacts

The discussion of the preferred surfclam alternative (section 3.1.1 protected resources impacts) details why the Council concluded that clam fishing will have minimal adverse impacts to protected species. Reducing the current quota level may reduce any impact to protected resources since less fishing effort would be exerted.

6.5 Research Set Aside

There is no research set aside for either of these species. Industry works very well with the NEFSC, academics and managers to obtain the necessary science and information.

6.6 Cumulative Impacts of Preferred Alternative

A cumulative impact analysis is required by the Council on Environmental Quality's (CEQ) regulation for implementation of NEPA. Cumulative effects are defined under NEPA as "the impact on the

environment which results form the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other action (40 CFR section 1508.7)."

Effective fishery management by the Council and NMFS of surfclams and ocean quahogs has occurred since 1977. This was the first fishery management plan in the country under the Fishery Conservation and Management Act of 1976. The surfclam resource had been grossly overfished prior to management and within a few years after implementation of management measures was rebuilt and sustaining healthy fisheries. The two resources have always had reasonable quotas (initially based on MSY estimates) which have prevented overfishing. Secondary effort restrictions to allow year round harvest became rather draconian on the

fishermen during the 1980s. Implementation of the ITQ program (first in country) in 1990 allowed fishermen much more flexibility and improved safety.

The cumulative impacts of this FMP were last fully addressed in the EIS for Amendment 8 (MAFMC 1990) and are currently fully addressed in the draft Amendment 13 which should have public hearings scheduled in September or October 2002. Both species in the management unit are managed primarily via annual quotas to control fishing mortality. This FMP requires a specifications process which allows for the review and modifications to management measures specified in the FMP on an annual basis. In addition, the Council added a framework adjustment procedure in Amendment 12 (MAFMC 1999) which allows the Council to add or modify management measures through a streamlined public review process. As noted above, the cumulative impact of this FMP and annual specification process has been positive since it's implementation after passage of the Magnuson Act. Neither species has been overfished since the rebuilding of surfclams after the initial management.

Through development of the FMP and the subsequent annual specification process, the Council continues to manage these resources in accordance with the National Standards required under the Magnuson-Stevens Act. First and foremost the Council has met the obligations of National Standard 1 by adopting and implementing conservation and management measures that have prevented overfishing, while achieving, on a continuing basis, the optimum yield for the two species and the United States fishing industry. The Council uses the best scientific information available (National Standard 2) and manages these two resources throughout their range (National Standard 3). The management measures do not discriminate between residents of different states (National Standard 4), they do not have economic allocation as its sole purpose (National Standard 5), the measures account for variations in fisheries (National Standard 6), avoid unnecessary duplication (National Standard 7), they take into account the fishing communities (National Standard 8) and promote safety at sea (National Standard 10). Finally, National Standard 9 addresses bycatch in fisheries and these fisheries are extremely clean fisheries by their nature. Amendment 13 (MAFMC 2002c) fully addresses how the management measures implemented to successfully manage these two species comply with the National Standards. Amendment 13 also addresses the fishing gear impacts to essential fish habitat which is also positive, partly with the implementation of ITQs in 1990, but also to successful management during the past 25 years.

By continuing to meet the National Standards requirements of the Magnuson-Stevens Act through future FMP Amendments and actions, the Council will insure that cumulative impacts of these actions will remain overwhelmingly positive for the ports and communities that depend on these fisheries, the Nation as a whole, and certainly the resources.

7.0 ESSENTIAL FISH HABITAT ASSESSMENT

Introduction

This Essential Fish Habitat (EFH) Assessment is provided pursuant to 50 CFR 600of the Essential Fish Habitat Final Rule of January 17, 2002 for the Council to initiate EFH consultation with the National Marine Fisheries Service.

EFH Assessment

Surfclams and ocean quahogs have EFH designated in many of the same bottom habitats that have been designated as EFH for most of the MAFMC managed species of summer flounder/scup/black sea bass, squid/mackerel/butterfish, bluefish, tilefish, and dogfish, as well as the NEFMC species of groundfish within the Northeast Multispecies FMP, including: Atlantic cod, haddock, monkfish, ocean pout, American plaice, pollock, redfish, white hake, windowpane flounder, winter flounder, witch flounder, yellowtail flounder, Atlantic halibut and Atlantic sea scallops. Numerous species within the NMFS Highly Migratory Species Division and the SAFMC have EFH identified in areas also identified as EFH for surfclams and ocean quahogs. Broadly, EFH is designated as the bottom habitats within the Gulf of Maine, Georges Bank, and the continental shelf off southern New England and the mid-Atlantic south to Cape Hatteras for the juveniles and adults of these two species. Specifically the definitions as approved in Amendment 12 (MAFMC 1999) are:

Surfclams

> **Juveniles and adults:** Throughout the substrate, to a depth of three feet below the water/sediment interface, within Federal waters from the eastern edge of Georges Bank and the Gulf of Maine throughout the Atlantic EEZ, in areas that encompass the top 90% of all the ranked ten-minute squares for the area where surfclams were caught in the NEFSC surfclam and ocean quahog dredge surveys. Surfclams generally occur from the beach zone to a depth of about 200 feet, but beyond about 125 feet abundance is low.

Ocean quahogs

> **Juveniles and adults:** Throughout the substrate, to a depth of three feet below the water/sediment interface, within Federal waters from the eastern edge of Georges Bank and the Gulf of Maine throughout the Atlantic EEZ, in areas that encompass the top 90% of all the ranked ten-minute squares for the area where ocean quahogs were caught in the NEFSC surfclam and ocean quahog dredge surveys. Distribution in the western Atlantic ranges in depths from 30 feet to about 800 feet. Ocean quahogs are rarely found where bottom water temperatures exceed 60º F, and occur progressively further offshore between Cape Cod and Cape Hatteras.

Any mobile gear that comes into contact with the seafloor in surfclam and ocean quahog EFH may potentially have an impact to these immobile benthic organisms (MAFMC 1999). The gears expected to have the most adverse impact to the EFH of these two species are hydraulic clam dredges and the scallop dredges.

Hydraulic dredges are used to extract clams from the sediment. In hydraulic dredging, high pressure water jets ahead of the rake teeth or blade are used to scour out the shells which are then dug up by the blades and passed back into the bag. High pressure water is supplied to the jets through a hose from the operating vessel by a diesel pump.

In the Atlantic surfclam (*Spisula solidissima*) fishery, large vessels (>30 m), tow dredges up to 4.5 m in width slowly across the seabed. The vessels are equipped with large pumps, connected to the dredges via flexible hoses, that use water and inject it into the sediment through a manifold with multiple

nozzles, ahead of the blade of the dredge. The dredge must be towed slowly so as to not exceed the liquefaction rate. These dredges, operated correctly, are highly efficient, taking as much as 90% of clams in their path. A secondary species that is also harvested in this fishery is the ocean quahog, *Arctica islandica*.

A fishing gear impacts workshop was held in Boston in October 2001 that reviewed and discussed exactly how the hydraulic and nonhydraulic (Maine ocean quahog fishery) clam dredges operate and what their potential impacts could be. The panelists heard presentations and had discussions on: 1) the actual fishery descriptions, 2) the effects of the fishery on the environment, 3) the strength of the evidence of those effects, and 4) what potential management implications were possible. The full discussion of the clam dredge analyses from the workshop is presented here and the full workshop report evaluating all gear is included in Amendment 13 as Appendix 4.

Mr. Dave Wallace (Wallace and Associates) presented a thorough description of the evolution and current use of the hydraulic clam dredge for the surfclam and ocean quahog fisheries. A brief discussion of "dry dredges" used in the Maine "mahogany" ocean quahog fishery was led by Wallace with contributions from the workshop panelists. Subsequent to the workshop, Wallace (pers. comm.) has additionally estimated that the average hydraulic clam dredge takes about 600 man-hours to build and constitutes an investment of almost $30,000 (without hoses and pumps). Thus, industry is quite leery of hanging the dredge up and potentially losing it. This section of the report summarizes his presentation and the panel discussion.

Hydraulic clam dredges have been used in the surfclam fishery for over five decades and in the ocean quahog fishery since its inception in the early 1970s. These dredges are highly sophisticated and are designed to: 1) be extremely efficient (80 to 95% capture rate); 2) produce a very low bycatch of other species; and 3) retain very few undersized clams.

The typical dredge is 12 feet wide and about 22 feet long and uses pressurized water jets to wash clams out of the seafloor. Towing speed at the start of the tow is 2.5 knots and declines as the dredge accumulates clams. The dredge is retrieved once the vessel speed drops below 1.5 knots, which can be only a few minutes in very dense beds. However, a typical tow lasts about 15 minutes. The water jets penetrate the sediment in front of the dredge to a depth of about 8 - 10 inches, depending on the type of sediment and the water pressure. The water pressure that is required to fluidize the sediment varies from 50 pounds per square inch (psi) in coarse sand to 110 psi in finer sediments. The objective is to use as little water as possible since too much pressure will blow sediment into the clams and reduce product quality. The "knife" (or "cutting bar") on the leading bottom edge of the dredge opening is 5.5 inches deep for surfclams and 3.5 inches for ocean quahogs. The knife "picks up" clams that have been separated from the sediment and guides them into the body of the dredge ("the cage"). If the knife size is not appropriate, clams can be cut and broken, resulting in significant mortality of clams left on the bottom. The downward pressure created by the runners on the dredge is about 1 psi.

It was pointed out by a panel member that the high water pressure associated with the hydraulic dredge can cause damage to the flora and fauna associated with bottom habitats. However, water pressure greater than that required for harvesting will reduce the quality of the clams by loading them with sand and increase the rate of clam breakage. Therefore, water pressure is usually self regulated.

There are currently two types of hydraulic dredges used in the fishery, stern rig dredges and side rig dredges. The chain bag on a side rig dredge drags behind the dredge and helps smooth out the trench created by the dredge. The chain bag results in significantly more damage to small clams and other bycatch than occurs with the stern rig dredge. With the stern rig dredge, which is basically a giant sieve, small clams and bycatch fall through the bottom of the cage into the trench and damage or injury is minimal. Improvements in gear efficiency have reduced bottom time and helped to limit the harvest of surfclams to a relatively small area in the mid-Atlantic Bight.

Prior to 1990, the resource was managed by controlling the number of hours a vessel could fish. Consequently, towing speeds were maximized to catch as many clams as possible regardless of the damage done to the clams or the habitat. Cutting and breakage of discarded clams were estimated to be as high as 90% in some locations and under some conditions decomposition of dead clams caused reduced oxygen concentrations in sediments to the point that clams were killed. Incidental mortality is currently estimated to be well under 10% because quota management has removed the need for vessels to catch as many clams as possible as quickly as possible.

Concurrent with the change in harvesting practices that occurred after 1990, there has also been a significant reduction in fishing effort and a shift to stern rig dredges. About 60 side-rig vessels pulling 80 dredges were taken out of the fishery after 1990. The number of surfclam vessels decreased from 128 in 1990 to 31 in 2000, while the number of vessels that landed ocean quahogs (excluding the Maine fishery) dropped from 56 in 1990 to 29 in 2000. Currently there are only 4 side rig vessels pulling five dredges left in the fleet.

Surfclams live mostly in sand which is disturbed and re-suspended by storms and, in some locations, by strong bottom currents. Ocean quahogs live at greater depths, mostly in finer sand and silt/clay substrates which are less affected by natural physical disturbances. Surfclams and ocean quahogs are not found in commercial quantities in gravel or mud habitats or in depths greater than 300 feet.

Hydraulic clam dredges can be operated in areas of large grain sand, fine sand, sand and small grain gravel, sand and small amounts of mud, and sand and very small amounts of clay. Most tows are made in large grain sand. Dredges are not fished in clay, mud, pebbles, rocks, coral, large gravel greater than one half inch, or seagrass beds. Boat captains will not dredge in areas with very soft or hard substrate where they run the risk of losing or damaging the gear. The fishery is also limited to sandy sediment because the processors do not want mud blown into the clam bodies by the dredge.

The spatial scale of fishing effort varies depending on which species is the target: surfclams are harvested primarily in a small area off the New Jersey coast whereas ocean quahogs are harvested over a larger area that includes offshore waters. Areas with denser concentrations of clams would presumably be dredged more intensively, i.e., a higher percentage of the bottom would be affected. Because surfclams are concentrated in a very defined area off the New Jersey coast where the bottom is so homogeneous, a high proportion of the bottom over this large contiguous area is affected by dredging. Surfclams grow much more rapidly than ocean quahogs and surfclam beds are dredged every few years. Areas dredged for ocean quahogs are left untouched for many years. Ocean quahogs are much more likely to be dredged from a number of more or less discrete patches that are surrounded by undisturbed areas. It was noted, as a general rule, that once 50% of the harvestable clams are removed from an area, the catch rates drop to a point where it is no longer economically

feasible for fishing to continue there.

In Federal waters, the amount of bottom area directly impacted by the hydraulic clam dredge fleet in 2000 was about 110 square miles (Table 2 of Amendment 13). An additional 15 square miles were dredged in State waters of New Jersey, New York, and Massachusetts. The predominant substrate on the southern New England/Mid-Atlantic Bight shelf is sand. Thus, during any given year, this fishery is conducted in a very small proportion of a habitat type that characterizes most of the 40,000 square miles of continental shelf between the Virginia/North Carolina border and Nantucket Island (69/ W longitude). The Georges Bank region has been closed to clam harvesting since 1990 because of the potential of paralytic shellfish poisoning.

The dry dredge used in the Maine fishery is a cage with wide skis and a series of teeth about 6 inches long in the front. These dredges are used on smaller boats (about 30 to 40 feet long) and are pulled through the seabed using the boat's engine. The cutter bar is limited to a width of 36 inches by State law. This fishery takes place in small areas of sand and sandy mud found among bedrock outcroppings in depths of 30 to > 250 ft in state and Federal coastal waters north of 43 ° 20' N latitude. The dredges scoop up clams and sediment, and the vessel's propeller wash is used to clean out the sand and mud.

Trips reported by vessels using hydraulic clam dredges during 1991-2000 were made over a broad area of the continental shelf from Cape Cod to the Delmarva peninsula (Figures 37 and 38 of Amendment 13). Areas where fishing with this gear type was concentrated (235 trips per 100 mi2) were located off the New Jersey coast and south of Long Island. Dredging in southern New England was less intense. The concentration of the "dry" dredge in the Maine ocean quahog fishery is depicted in Figure 39 of Amendment 13.

Hydraulic clam dredges - impacts and recovery

Sand and mud (Mid-Atlantic): Murawski and Serchuk (1989) reported that hydraulic dredges in the Mid-Atlantic penetrate deeper into the sediments and result in greater short-term disruption of the benthic community and underlying sediments than scallop dredges. In coarse gravel, the sides of the dredge-created trench soon collapsed, leaving little evidence of dredge passage. There was also a transient increase in bottom water turbidity. In finer-grained, hard-packed sediments, tracks persisted several days after dredging. Non-harvested organisms (e. g., sand dollars, crustaceans, worms) were significantly disrupted by the dredge. Sand dollar assemblages appeared to recover quickly, but short-term reductions in infaunal biomass were considered likely. Starfish and benthic feeding fish were abundant in dredge tracks, probably feeding on exposed infauna. Recent stock assessments indicate that non-harvest mortality of ocean quahogs was negligible (USDC 2000b) while non-harvest mortality for surfclams was 20% (USDC 2000a). Murawski and Serchuk (1989) noted that clam dredgers report heavily dredged beds often accumulate large amounts of clam tissue. The excess decaying clam biomass creates biological oxygen demand which can lead to "sour bottom", with localized hypoxia and (in extreme cases) mortality of otherwise healthy clams [and presumably other species]. This comment on the souring of bottom was quite true prior to implementation of the ITQ program in 1990, but has since become uncommon as fishermen no longer have to "race to fish" on the highest density beds. Observations after dredging indicated numerous fish and invertebrate predators were consuming broken quahogs, which reduces the potential for hypoxia effects.

Silty sand (Long Island, New York) : Meyer *et al.* (1981) used SCUBA to observe effects of a small (4 foot wide) hydraulic clam dredge at 36 foot depth in a surfclam bed. The dredge formed trenches which were initially rectangular, as wide as the dredge, and approximately 9inches deep. Mounds of sand were formed on either side of the trenches. The dredge raised a cloud of silt, which settled within 4 minutes. Two hours after dredging, slumping of the trench walls had rounded the depression. After 24 hours the dredge track was less distinct, appearing as a series of shallow depressions, and was difficult to recognize. The dredging attracted predators, with lady and rock crab preying on damaged clams, and starfish, horseshoe crabs and moon snails attacking exposed but undamaged clams. By 24 hours after dredging, the abundance of predators appeared to have returned to normal, and the most obvious evidence of dredging was whole and broken clam shells without meat.

Sand (southern New Jersey): MacKenzie (1982) sampled benthic invertebrate assemblages in three ocean quahog beds with contrasting fishing histories: one had never been fished, one was actively fished for the two years prior to the October 1978 sampling, and one had been fished for about a year but then abandoned in May-June 1978. All three beds were in sandy sediments in approximately 120 foot depths off southern New Jersey. No statistically significant differences were found among the areas in numbers of invertebrate individuals or species. There were also no clear differences in species composition. Hydraulic dredging thus did not appear to alter the invertebrate populations in these beds. Polychaetes and bivalves exposed by the dredging were presumed to be able to reburrow and survive.

Muddy sand (Delaware Bay): Experimental dredging conducted in Delaware Bay, NJ, in muddy sand decreased median grain size at one site, as fines were brought to the surface, but grain size increased at another site where fines were presumably washed away. Sorting coefficient increased at both sites. In addition, dredging lowered the average density of benthic fauna (by 59%), and decreased the number of species present (Ismail 1985). The two species that disappeared, however, were found infrequently and only in low numbers before the experimental fishing. Within 3-6 months the number of species returned to pre-dredging and within 3-10 months diversity and total abundance recovered.

Hydraulic dredges penetrate mud sediments up to 30 cm, flatten natural mounds and topography, and leave troughs in their path that have been shown to last anywhere from a few hours to 6 months (Connor and Simon 1979, Meyer *et al.* 1981). As the dredge moves along the seafloor, it also creates a turbidity plume behind the dredge that extends up to 1-2 m into the water column. These plumes can have sediment concentrations that are orders of magnitude higher than background levels, or equivalent to or greater than levels generated by storms, and persist from minutes up to hours (Ruffin 1995, Kaiser *et al.* 1996). Dredging also breaks down the cohesive bonds in the sediment, thus increasing the likelihood of resuspension in the future. The immediate resuspension of sediments and increased likelihood of resuspension with future disturbances can lead to large scale redistribution of fine sediments and resorting of sediments by grain size (Pranovi and Giovanardi 1994, Ruffin 1995, Kaiser *et al.* 1996).

Scallop dredges

Scallop dredges are discussed in detail in the NMFS report (USDC 2001) that is appended (Appendix 3) to Amendment 13. The panel determined that the effects of scallop dredging were of greatest concern in the following three habitat types: high and low energy sand and high energy gravel. Surfclams and ocean quahogs are found in sandy sediment. Low energy sand habitat occurs in deeper

water where the bottom is unaffected by tidal currents and where the only natural disturbance is caused by occasional storm currents. In high energy sand habitat, effects on biological structure were considered to be low, since organisms in this environment would be adapted to a high degree of natural disturbance. It is unlikely that either surfclams or ocean quahogs would be significant since the gear rides on the surface and the surfclams and ocean quahogs are buried in the sediment.

Otter trawls

Otter trawls are discussed in detail in the NMFS report (USDC 2001) that is appended (Appendix 3) to Amendment 13. The panel concluded that the greatest impacts from otter trawls occur in low and high energy gravel habitats and in hard clay outcroppings. Both surfclams and ocean quahogs occur almost exclusively in sandy habitat.

Other gears

Gear other than hydraulic clam dredges, scallop dredges and otter trawls are discussed in some detail in the NMFS report (USDC 2001) that is Appendix 3 to Amendment 13. The panel concluded that the degree of impact caused by pots and traps to biological and physical structure and to benthic prey in mud, sand and gravel habitats was low. The panel concluded that sink gill nets and longlines cause some low degree impacts in mud, sand, and gravel habitats. Finally, the panel concluded that no management measures were necessary for beam trawls or pelagic gear because there were no impacts at this time.

Council determination of fishing impacts to surfclam and ocean quahog EFH

Any mobile gear that comes into contact with the seafloor in surfclam and ocean quahog EFH may potentially have an impact to these immobile benthic organisms (MAFMC 1999). The gears expected to have the most adverse impact are hydraulic clam dredges and the scallop dredges (MAFMC 1999). EFH for surfclams and ocean quahogs is defined in section 2.2.3 of Amendment 13 and can be seen in Figures 30 and 31 for surfclams and 32 and 33 for ocean quahogs of Amendment 13.

Section 2.2.5.4.3.2 of Amendment 13 discusses the impacts and recovery from hydraulic clam dredges. The Council considered the numerous studies identified above and the fact that the surfclam and ocean quahog fisheries are ITQ fisheries. As ITQ fisheries there is no reason that fishermen have a "rush to fish." One of the great benefits of ITQ fisheries from around the world is that it instills the sense of private property rights and ownership in the resource. Fishermen in these fisheries understand that they are not time driven to rape the resource and that by protecting the resource and its environment they are protecting their long term livelihoods. Unquestionably, ITQs and the way clams are now fished alleviate some environmental damage (Wallace pers. comm.)

The numbers of surfclam and ocean quahog fishermen have also decreased significantly with the implementation of ITQs. In 1979 there were 162 permitted surfclamming vessels. That number had fallen to 135 vessels the year before (1989) implementation of the ITQ program, and by 2000 the number was only 19. For ocean quahogs the number of vessels were: 59 in 1979, 69 in 1989 and 17 in 2000. Many vessels fish for both surfclams and ocean quahogs and in fact the

total number of vessels that fished in 1997 was only 12. Most of these current vessels also use sorting machines which make it possible to harvest broken clams which are now not discarded.

A brief discussion on the concept of reserves, or areas where clam dredging would not be allowed, occurred at the June 1998 SARC. The idea of reserves was dismissed at this time by the SARC when it was quickly calculated that the greatest possible impact to the bottom, of all the clam dredging for an entire year, would be less than 100 square miles per year. Putting this in context, this 100 square miles is roughly the area of one ten minute by ten minute square. There are over 1200 ten minute squares in the EEZ between Cape Hatteras and Georges Bank.

Dr. James Weinberg (Northeast Fisheries Science Center - NEFSC) led the discussion at the fishing gear impacts workshop (Appendix 4 of Amendment 13) of the direct physical and biological effects of hydraulic clam dredging, and Dr. Roger Mann (Virginia Institute of Marine Science - VIMS) led the discussion on the available evidence. Most of the evidence for dredging impacts that was considered by the panel was from the Northeast U.S., but there are studies from other areas that show the same effects. It was noted that early studies done in the Northeast region were conducted during development of the fishery, when clam dredging was more damaging to the habitat than it is now.

According to these studies, the direct physical effects of hydraulic clam dredging are basically two-fold. First, a trench about 8 inches deep is left behind the dredge and windrows of sediment and organisms are formed on either side of the trench. The second direct physical effect is the resuspension of sediment. If a dredge goes through silt or loose sediment, it produces a sediment cloud. In the panel's judgement, fine sediment may take as long as 24 hours to resettle and would end up outside the trench, while heavier particles would settle much more rapidly, primarily back into the trench. The evidence for physical effects (trench, windrows, and sediment re-suspension) is strong because these effects are so obvious.

Physical impacts to bottom habitat last longer (months) in low energy environments than in high energy environments (hours). In sand, the sides of the trench start to erode as soon as it is cut; this happens more rapidly when bottom currents are strong. The rate at which it fills in depends on the grain size of the sediment, water depth, and the strength and frequency of storms and bottom currents. It was noted that there are permanent, longshelf, sand ridges with low elevation off the New Jersey coast, but there is no evidence to indicate that clam dredges remove them, even though they may be towed through them.

The direct biological effects of hydraulic dredges vary, depending on whether organisms are hard-bodied like clams or soft-bodied like amphipods or polychaetes. What happens when a clam dredge goes through an area is not fully known and more study is needed. It was noted that structure-forming epifauna such as anemones and sponges would clearly be removed. Emergent epifauna growing on shell beds in the mid-Atlantic Bight is known to provide cover for juvenile fish species like black sea bass. Removal of these organisms, or their burial by re-suspended sediments, could therefore cause the loss of habitat for some species of juvenile fish.

It is not clear what happens to soft-bodied organisms that are moved by the dredge or pass through the trench and are deposited back on the seafloor. Often, after an area is dredged, scavengers move in rapidly and eat broken clams and soft-bodied organisms that are removed from the substrate.

However, the panel considered that evidence for effects on infaunal prey organisms was weak because there aren't many studies that link changes in benthic community structure in dredged areas to the food supply for fish, and those that do exist do not show definitive results. The panel concluded that infaunal communities would be likely to recover more quickly than emergent epifauna, and therefore removal of structure-forming organisms was judged to be more of a concern. However, one panelist noted that the potential loss of secondary production of benthic invertebrates which are prey for bottom-feeding fish is the effect that is least understood, and that any reduction in prey abundance – if it occurs – would not necessarily be limited to the dredge tracks themselves, but would affect the entire dredged area. Moreover, the effects of fluidizing the sediment on benthic infauna are unknown and may be important.

The panel noted that there may be cumulative physical and biological effects in areas that are dredged several times annually. As previously stated, surfclams grow much more rapidly than ocean quahogs and surfclam beds are dredged every few years, whereas areas dredged for ocean quahogs are left untouched for many years. It was also noted that benthic organisms that occupy muddy bottom in deep water are less adapted to physical disturbance and therefore would presumably take longer to recover from dredging than organisms in sandy bottom areas in shallower water.

The panel concluded that the habitat effects of hydraulic dredging were limited to sandy substrates, since the gear is not used in gravel and mud habitats (Table 3 of Amendment 13). Two effects - changes in physical and biological structure – were determined to occur at high levels. The evidence cited for these two effects was a combination of peer-reviewed scientific literature, gray literature, and professional judgement. There are no effects of hydraulic dredges on major physical features in sandy habitat because, in the panel's view, there are no such features on sandy bottom. Panel members evaluated changes to benthic prey as unknown.

The temporal scale of the effects varies depending on the background energy of the environment. Recovery of physical structure can range from days in high energy environments to months in low energy environments, whereas biological structure can take months to years to recover from dredging, depending on what species are affected.

The panel agreed that hydraulic dredges have important habitat effects, but even in a worse case scenario, where there were known to be severe biological impacts, only a small area is affected and therefore this gear type is less important than other gear types like bottom trawls and scallop dredges which affect much larger areas. It was also pointed out, however, that even though the effects of dredging (at least for surfclams) are limited to a relatively small area, localized effects of dredging on EFH could be very significant if the dredged area is a productive habitat for one or more managed fish resource. The same would be true if dredging in a particular area coincided with a strong settlement of larval fish. A major question for this gear is "what are its long-term biological impacts" *i.e.*, how, and to what extent, are benthic communities altered in heavily dredged areas, particularly the prey organisms, and how long does it take for them to recover once dredging ceases?

The Council concurs with the fishing gear workshop panel in that there may be some impacts but that they are short term and minimal.

There is minimal bycatch in the surfclam and ocean quahog fisheries (section 3.1.9 of Amendment 13). From the 1997 NEFSC clam survey species listing (Table 34 of Amendment 13), surfclams and ocean

quahogs comprise well over 80% of the total caught in the scientific survey. Commercial operations are certainly even cleaner than the scientific surveys (as the surveys use liners to collect all animals), as all animate and inanimate objects except for surfclams and ocean quahogs are discarded quickly before the resource is placed in the cages. The processors reduce their payments if "things" other than surfclams or ocean quahogs are in the cages.

Given that (1) MacKenzie (1982) showed not pattern of any relationship of numbers of species or their abundance, (2) that these fisheries are ITQ fisheries and as such there was not reason for fishermen to "rush to fish", (3) that the number of vessels has significantly decreased from 168 to less than 50 vessels during the ITQ decade and (4) that abiotic waves are formed frequently during high storm events as deep as 200 to 250 feet (Auster and Langton 1998), the Council proposes no specific management measures at this time. The Council will solicited public input on clam dredge gear impact during the public hearing process. The Council concurs with the 2001 Boston fishing gear impacts workshop that any impacts to EFH would be minimal and short-term, and thus they have concluded that there is not an adverse effect to other Federally managed species.

Two additional sources of evidence have just recently been received that also support the findings of the workshop and the concurrence of the Council. First, the National Research Council (2002) just completed a report entitled *Effects of Trawling and Dredging on Seafloor Habitat.* In addition, the Council's former Executive Director John Bryson also provided some personal thoughts from observations from the Johnson Sea Link submersible. Bryson (pers. comm.) reported that the substrate where clams are harvested tends to resettle quickly and in many areas this can be minutes not days. He also reports that he did not observe the large sediment cloud nor the deep track some authors report.

The NRC report upon review of what the Council's did to address fishing gear impacts after SFA in 1996 stated: "The regional councils found it difficult to develop criteria for designating EFH due to gaps in existing knowledge on the distribution of benthic life stages of fishes and other species and the physical and biological characteristics of the seafloor. Similarly, the councils struggled with the requirement to assess the effects of bottom trawling and dredging because they had insufficient data on the spatial scale and extent of bottom fishing effort and lacked guidelines for generalizing the results of research on specific gears and habitats. The NRC (2002) report concludes that in less consolidated coarse sediments (sandy areas where clams inhabit) in areas of high natural disturbance there are few initial effects.

Other species

Any species that could potentially be impacted by these management measures are considered part of the affected environment. General faunal assemblages specific to north and mid-Atlantic habitat types are described in Appendix 3of Amendment 13. Species potentially impacted by this FMP can be described through predator/prey relationships, species with overlapping EFH, bycatch species of these fisheries, and marine mammals, sea turtles, and seabirds.

Predator/prey and other ecological relationships

Species that are in predator/prey and other ecological relationships with surfclams and ocean quahogs are fully described in section 2.1.3 of Amendment 13.

Bycatch

An analysis of bycatch is one way of determining other species that could be affected by this FMP. Section 3.1.9 of Amendment 13 includes a detailed description of the minimal bycatch of the surfclam and ocean quahog fisheries.

Marine mammals, sea turtles, and seabirds

Marine mammals, sea turtles, and seabirds that could have interactions with surfclam and ocean quahog fisheries are fully described in section 3.3 of Amendment 13. Any impacts that the management alternatives could have on these species are described in section 3.3 of Amendment 13, where applicable.

Options for Managing Adverse Effects from Fishing

According to section 600.815 (a)(2), fishery management options may include, but are not limited to: (A) fishing equipment restrictions, (B) time/area closures, and (C) harvest limits.

According to section 600.815(a)(2)(ii) that deals with minimizing adverse effects: Each FMP must minimize to the extent practicable adverse effects from fishing on EFH, including EFH designated under other Federal FMPs. Councils must act to prevent, mitigate, or minimize any adverse effects from fishing, to the extent practicable, if there is evidence that a fishing activity adversely affects EFH in a manner that is more than minimal and not temporary in nature, based on the evaluation conducted pursuant to paragraph (a)(2)(i) of this section and/or the cumulative impacts analysis conducted pursuant to paragraph (a)(5) of this section. In such cases, FMPs should identify a range of potential new actions that could be taken to address adverse effects on EFH, include an analysis of the practicability of potential new actions, and adopt any new measures that are necessary and practicable. Amendments to the FMP or to its implementing regulations must ensure that the FMP continues to minimize4 to the extent practicable adverse effects on EFH caused by fishing. FMPs must explain the reasons for the Council's conclusions regarding the past and/or new actions that minimize to the extent practicable the adverse effects of fishing on EFH.

The Council is assuming that the panel of experts assembled at the fishing gear workshop that was held in Boston in October of 2001 has provided the best synthesis of the existing scientific knowledge and the soundest management recommendations. The workshop panel concluded that the habitat effects of hydraulic dredging were limited to sandy substrates, since the gear is not used in gravel and mud habitats (Table 3of Amendment 13). Two effects -changes in physical and biological structure – were determined to occur at high levels. The evidence cited for these two effects was a combination of peer-reviewed scientific literature, gray literature, and professional judgement. There are no effects of hydraulic dredges on major physical features in sandy habitat because, in the panel's view, there are no such features on sandy bottom. Panel members evaluated changes to benthic prey as unknown.

Dr. William DuPaul (VIMS) led the discussion at the fishing gear impacts workshop on the types of management actions that could be taken to minimize adverse impacts of hydraulic dredging to benthic habitat. The following two paragraphs are taken from that report (Appendix 4 of Amendment 13).

The effectiveness of the Individual Transferable Quota (ITQ) management program since 1990 and the opinion that the two resources are underfished, led the panel to conclude that reductions in effort are probably not practicable. Nor is it likely that gear substitutions or modifications are practical since the current gear is highly efficient at harvesting clams. Therefore spatial area management seems to be the only practicable approach to minimizing gear impacts, if necessary.

It was emphasized that hydraulic dredges are designed to operate in sandy substrate. This gear could be very destructive if fished in the wrong sediment type or in structured environments like gravel beds or tilefish pueblo villages. The panel emphasized the gear should not be used in sediment types where it would cause more damage. Areas of known structure-forming biota should be mapped and set aside as a priority. It was emphasized that since we really do not know what the effect of this gear is to soft-bodied benthic organisms, a possible precautionary measure would be to restrict the fishery to areas of high clam productivity. Seasonal closures were mentioned if times and areas of high recruitment could be detected.

The temporal scale of the effects varies depending on the background energy of the environment. Recovery of physical structure can range from days in high energy environments to months in low energy environments, whereas biological structure can take months to years to recover from dredging, depending on what species are affected.

The workshop panel agreed that hydraulic dredges have important habitat effects, but even in a worse case scenario, where there were known to be severe biological impacts, only a small area is affected and therefore this gear type is less important than other gear types like bottom trawls and scallop dredges which affect much larger areas. It was also pointed out, however, that even though the effects of dredging (at least for surfclams) are limited to a relatively small area, localized effects of dredging on EFH could be very significant if the dredged area is a productive habitat for one or more managed fish resource. The same would be true if dredging in a particular area coincided with a strong settlement of larval fish. A major question for this gear is "what are its long-term biological impacts" *i.e*., how, and to what extent, are benthic communities altered in heavily dredged areas, particularly the prey organisms, and how long does it take for them to recover once dredging ceases?

The Council concluded from the above mentioned workshop that there is sufficient information that clam dredges could have an effect on EFH if the gear is fished improperly or in the wrong sediment type. However, the clam resources are concentrated in sandy sediment and the fishing gear has evolved over the past five decades to fish most efficiently in sandy sediment. It does not appear that either surfclam or ocean quahog EFH is effected by fishing gear. Then the other question is whether hydraulic clam dredging is affecting other species?

While the Council could not conclude that there are no identifiable effects of clam dredges on EFH, they concurred with the panel that as the fishery is currently prosecuted any impacts were temporary and minimal since the worst case scenario would indicate that any impacts to the habitat are spread over a large uniform area while the fishery is effecting a relatively small area overall. A NEPA analysis was conducted in Amendment 13 in order to verify the any adverse effects from clam dredging were minimized to the extent practicable. Based upon guidance from the Assistant Administrator (January 22, 2001), if information is inconclusive, a NEPA analysis should examine alternatives that could be taken in the face of uncertainty. For NEPA purposes, the guidance from the Assistant Administrator

stated that the analysis of alternatives needs to consider explicitly a range of management measures for minimizing potential adverse effects, and the practicability and consequences of adopting those measures. The advise from Dr. Hogarth continues: "In other words, if there is evidence that a fishing practice may be having an identifiable adverse effect on EFH, even if there is no conclusive proof of adverse effects, it is not sufficient to conclude *prima facie* that no new management measures are necessary without first conducting a reasonably detailed alternatives analysis."

In Amendment 13 the Council evaluated nine alternatives that focused mostly on closed areas. The fishing gear impacts workshop concluded that effort reductions (i.e. harvest limits) and gear modifications (i.e. restrictions) were not workable and that if the clam dredges were found to have significant identifiable adverse effects on EFH, then spatial closures were the only viable alternative to mitigate the adverse effects of this fishing gear. Since surfclams are underfished and the annual quotas are actually being increased, it seems to make little sense to restrict harvest limits for EFH reasons, however there is an option for analysis where the ocean quahog optimum yield range would be reduced to trade off against an increase in surfclam quota. Finally, seven potential closed area options were identified. These closed areas are being considered to be closed to clam dredging for 5 years. The distribution of the surfclam and ocean quahog resources based on the 1999 survey are depicted in Figures 5 through 8of Amendment 13. Landings of the two species in 2000 are shown in Figures 9 and 10 of Amendment 13.

According to the EFH Final Rule [50 CFR Section 600.815 (2)(ii)], "...FMPs should identify a range of potential new actions that could be taken to address adverse effects on EFH, include an analysis of the practicability of potential new actions, and adopt any new measures that are necessary and practicable...." Thus, a "Practicability Analysis" was added as a subsection to each of these EFH alternatives in Amendment 13.

Section 600.815(2)(iii) states that "In determining whether it is practicable to minimize an adverse effect from fishing, Councils should consider the nature and extent of the adverse effect on EFH and long-term and short-term costs and benefits of potential management measures to EFH, associated fisheries, and the nation, consistent with National Standard 7...."

In general, bottom tending mobile gear can reduce habitat complexity and change benthic communities. Available research indicates that the effects of mobile gear are cumulative and are a function of the frequency and intensity with which an area is fished, the complexity of the benthic habitat (structure), energy of the environment (high energy and variable or low energy and stable), and ecology of the community (long-lived versus short lived). As such, one can postulate that the extent of an adverse impact cannot be determined because there are no high resolution data on the location of fishing effort by gear and the location of specific seafloor habitats. Thus, the extent of the impact caused by each gear type used to fish in different habitats cannot be judged. Without being able to put these two pieces of the puzzle together (type of habitat in an area and the type of fishing gear used in that area) it is impossible to predict the extent of an adverse impact. Studies provide some basic information regarding impacts but they are limited to discrete areas, and the results are not necessarily applicable to all similar habitats, since the impact of the gear depends on the gear configuration, towing speed, and water depth, just to name a few factors.

Even less understood is the relationship between the adverse impacts from trawling and dredging on

habitat and the impact on any species ability to spawn, breed, feed, and grow to maturity, i.e., the sustainability of a fishery. Currently, growth and productivity information as it relates to specific habitat type are not available for most stock in the Northeast Region. For most stocks, there are no indications that poor habitat conditions caused by fishing gear contribute to overfishing or to the overfished status of the stock. In cases where this information does exist, area closures have been implemented, e.g., New England groundfish.

Under the current management regime, surfclams and ocean quahogs are well managed and certainly not near overfished. This indicates that a sustainable fishery is possible without creating additional measures to protect EFH, i.e., the measures that are currently in place are certainly sufficient to achieve a sustainable fishery.

Many MAFMC, NEFMC, SAFMC, and HMS FMPs for several overfished species include management actions that would effectively reduce gear impacts to bottom habitats by reducing the harvest of the managed species. This reduction in harvesting effort may indirectly benefit EFH by creating an overall reduction of disturbance by a gear type that impacts bottom habitats. Other management actions already in place should control redirection of effort into other bottom habitats. These proposed quotas for 2003 are identical to those for 2002 for ocean quahogs and Maine "mahogany" ocean quahogs, with only a slight increase in the surfclam quota, and therefore should cause little change in any impacts. The action will have no more than minimal adverse effects on EFH in the context of the fishery as a whole, therefore an abbreviated consultation with NMFS is necessary. Based upon the rationale provided above, the MAFMC has determined that this action minimizes, to the extent practicable, the adverse effects of fishing on EFH as required by section 303 (a) (7) of the Magnuson-Stevens Act.

8.0 LIST OF AGENCIES AND PERSONS CONSULTED

The proposed quota recommendations were submitted to the National Marine Fisheries Service (NMFS) by the Mid-Atlantic Fishery Management Council. The Council on June 12, 2002, unanimously (with RA abstaining) approved the staff recommendation for the 4% increase in surfclam quota, unanimously (with RA abstaining) approved the staff recommendation for the continuation of the surfclam minimum size limit, unanimously (with RA abstaining) approved the staff recommendation for maintenance of the ocean quahog quota at 4.5 million bushels, and unanimously (with RA abstaining) approved the staff recommendation for maintenance of the Maine ocean quahog quota at 100,000 bushels.

In preparing these recommendations, the Council consulted with the NMFS, the New England Fishery Management Council, the Fish and Wildlife Service, the Department of State, and the States of New York, New Jersey, Pennsylvania, Delaware, Maryland, Virginia, and North Carolina through their membership on the Council and the following committees - MAFMC Surfclam and Ocean Quahog Committee, Mid-Atlantic EFH Technical Committee, Northeast Region Steering Committee, MAFMC Habitat Committee, and MAFMC Habitat Advisory Panel.

9.0 LIST OF PREPARERS OF THE ENVIRONMENTAL ASSESSMENT

The majority of the environmental assessment was prepared by Dr. Thomas B. Hoff of the Mid-Atlantic Council staff and is significantly based on information provided by the Northeast Fisheries Science Center through the most recent two stock assessments for surfclams (USDC 1998a and 2000a) and ocean quahogs (USDC 1998b and 2000b). Clayton E. Heaton of Council staff worked extensively with the economic issues including the PREE of the EA and the RIR, as well as with the logbook data and their analyses. The economic analyses in section 4 of Amendment 13 which was used as background information was conducted by Drs. James Kirkley (VIMS), Rob Hicks (VIMS) and Ivar Strand (University of Maryland) under contract to the Council. The social analyses (section 5) and port and community description (section 2.3.3) of Amendment 13 which was also used as background information were conducted by a team of researchers from Rutgers University headed by Dr. Bonnie McCay under contract to the Council. The members of Dr. McCay's social team were: Doug Wilson, Teresa Johnson, Kevin St. Martin, Johnelle Lamarque, Eleanor Bochenek, and Giovani Graziosi. In addition NEFSC scientific personnel, Drs. James Wienberg, Paul Rago, Larry Jacobson, and Steve Murawski have worked extensively on the last four new stock assessments (two each on surfclams and ocean quahogs). Lou Chiarella, NERO, provided extensive help on the fishing gear impact section and was the individual mostly responsible for the fishing gear impacts workshop in Boston in October 2001.

10.0 FINDINGS OF NO SIGNIFICANT ENVIRONMENTAL IMPACT

National Oceanic and Atmospheric Administration Order (NAO) 216-6 (revised May 20, 1999) provides nine criteria for determining the significance of the impacts of a final action. These criteria are discussed below:

1. Can the final action be reasonably expected to jeopardize the sustainability of any target species that may be affected by the action?

None of the final specifications for 2003 are expected to jeopardize the sustainability of any target species affected by the action. All of the final quota specifications under the preferred alternatives for each species are consistent with the FMP overfishing definitions. This action will protect the long-term sustainability of the surfclam and ocean quahog stocks.

2. Can the final action be reasonably expected to allow substantial damage to the ocean and coastal habitats and/or EFH as defined under the Magnuson-Stevens Act and identified in FMPs?

The area affected by the final specifications in the surfclam and ocean quahog fisheries has been identified as EFH for the above mentioned species as well as Northeast Multispecies; Atlantic Sea Scallop; Summer Flounder, Scup, and Black Sea Bass; Atlantic Mackerel, Squid, and Butterfish; Bluefish; Atlantic Billfish; and Atlantic Tunas, Swordfish and Shark Fishery Management Plans. The preferred alternatives for the final 2003 specifications will have no more than minimal adverse impact on EFH. Because the potential of minimal adverse impact on EFH is not substantial, NMFS conducted an abbreviated EFH consultation pursuant to 50 CFR 600.920(h) and prepared an EFH Assessment that incorporates all of the information required in 50 CFR 600.920(g)(2).

3. Can the final action be reasonably expected to have a substantial adverse impact on public health or safety?

The final action is not expected to have a substantial adverse impact on public health or safety. None of the measures alters the manner in which the industry conducts fishing activities for the target species, therefore, there is no change in fishing behavior that would affect safety. None of the measures has any impact on public health.

4. Can the final action be reasonably expected to have an adverse impact on endangered or threatened species, marine mammals, or critical habitat of these species?

The specifications for the 2003 ocean quahog and surfclam fishery are not expected to alter fishing methods or activities. Therefore, this action is not expected to affect endangered or threatened species or critical habitat in any manner not considered in previous consultations on the fisheries. It has been determined that fishing activities conducted under this final rule will have no adverse impacts on marine mammals. None of the measures alters fishing methods or activities.

5. Can the final action be reasonably expected to result in cumulative adverse effects that could have a substantial effect on the target species or non-target species?

The final action is not expected to result in cumulative effects on target or non-target species. The final 2003 specifications would increase the surfclam quota by 4 percent form the 2002 status quo level and maintain the status quo levels for the 2003 Maine mahogany quahog and ocean quahog fisheries. As such, the final measures are not expected to result in any cumulative effects on target or non-target species.

6. Can the final action be reasonably expected to jeopardize the sustainability of any non-target species?

The final action is not expected to jeopardize the sustainability of any non-target species. The final measures maintain the specifications for an additional year for ocean quahogs and Maine mahogany quahogs and slightly increases the surf clam quota by 4 percent. The most recent assessment for surfclams (SAW 30) indicated that the resource is at a high level of biomass, is under-exploited, and can safely sustain increased harvests. The ocean quahog resource is not overfished and overfishing is not occurring. Based on advice from SAW 31 and the Council's recommendation, this action proposes to maintain the ocean quahog quota for 2003 at the 2002 level of 4.50 million bushels.

7. Can the final action be expected to have a substantial impact on biodiversity and ecosystem function within the affected area (e.g., benthic productivity, predator-prey relationships, etc.)?

The final action is not expected to have a substantial impact on biodiversity and ecosystem function within the affected area because the final action measures merely continue for a year an existing category of vessel permit, modifies catch allowances, and revises the annual specifications process.

8. Are significant social or economic impacts interrelated with significant natural or physical environmental effects?

As discussed in Section 6.0 of this EA, the final specifications for 2003 are not expected to result in significant social or economic impacts, or significant natural or physical environmental effects not already analyzed. Therefore, there are no significant social or economic impacts interrelated with significant natural or physical environmental impacts.

9. To what degree are the effects on the quality of the human environment expected to be highly controversial?

The final measures maintain the specifications for an additional year for ocean quahogs and Maine mahogany quahogs and slightly increases the surf clam quota by 4 percent. Therefore, the measures contained in this action are not expected to be highly controversial.

Having reviewed the Environmental Assessment For the 2002 Surfclam and Ocean Quahog Fishing Quotas and the available information relating to the proposed action, I have determined that there will be no significant adverse environmental impact resulting from the action and that preparation of an environmental impact statement on the action is not required by Section 102(2)(c) of the National Environmental Policy Act or its implementing regulations.

_____ _____

Assistant Administrator for Fisheries, NOAA

Date

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Other Applicable Laws

1.0 PAPERWORK REDUCTION ACT OF 1995

The Paperwork Reduction Act concerns the collection of information. The intent of the Act is to minimize the Federal paperwork burden for individuals, small business, state and local governments, and other persons as well as to maximize the usefulness of information collected by the Federal government.

The Council is not proposing measures under this regulatory action that will involve increased paper work and consideration under this Act.

2.0 RELEVANT FEDERAL RULES

This action will not duplicate, overlap, or conflict with any other Federal rules.

Regulatory Impact Review / Final Regulatory Flexibility Analysis

1.0 INTRODUCTION

The National Marine Fisheries Service (NMFS) requires the preparation of a Regulatory Impact Review (RIR) for all regulatory actions that either implement a new Fishery Management Plan (FMP) or significantly amend an existing plan or regulation. The RIR is part of the process of preparing and reviewing FMPs and provides a comprehensive review of the changes in net economic benefits to society associated with proposed regulatory actions. The analysis also provides a review of the problems and policy objectives prompting the regulatory proposals and an evaluation of the major alternatives that could be used to solve the problems. The purpose of the analysis is to ensure that the regulatory agency systematically and comprehensively considers all available alternatives so that the public welfare can be enhanced in the most efficient and cost-effective way.

The RIR addresses many items in the regulatory philosophy and principles of Executive Order (E.O.) 12866. The RIR also serves as the basis for determining whether any proposed regulation is a "significant regulatory action" under certain criteria provided in E.O. 12866.

2.0. EVALUATION OF E.O. 12866 SIGNIFICANCE

If a proposed action is determined to be significant under E.O. 12866, the analysis undergoes further scrutiny by the Office of Management and Budget (OMB) to ensure that it meets the requirements of E.O. 12866 (NMFS 2000). A "significant regulatory action" means any regulatory action that is likely to result in a rule that meets any of the criteria discussed below.

Ž **Have an annual effect on the economy of $100 million or more or adversely affect in a material way the economy, a sector of the economy, productivity, competition, jobs, the environment, public health or safety, or State, local, or tribal governments or communities;**

The proposed rules will not have an annual effect on the economy of more than $100 million. Based on federal logbook reports, the total exvessel value of the EEZ surfclam fishery was $26.4 million in 2001, the ocean quahog EEZ ITQ fishery was $20.4 million, and the Maine ocean quahog fishery in federal waters was $0.98 million. Hence, with a total exvessel value of $47.8 million between the three fisheries, it is difficult to conceive of any regulation that the federal government might issue which would have secondary or cumulative impacts that would exceed the $100 million impact threshold.

The rules proposed for 2003 would increase the surfclam quota in the EEZ by a modest 4%, and leave the quotas for the ITQ and Maine ocean quahog fisheries unchanged. Assuming a typical value of $12.00 per bushel for surfclams, the 115,000 bushel increase in 2003 would have a gross exvessel value of $1.38 million. Following the dockside product further through the processing sector will see value added such that there will be an additional small, positive impact on the economy, but it will not reach the $100 million threshold required for a "significant" impact.

The proposed actions are necessary to maintain the harvest of surfclams and ocean quahogs at sustainable levels. The proposed action will not adversely affect, in the long-term, competition, jobs, the environment, public health or safety, or state, local, or tribal government communities.

Ž Create a serious inconsistency or otherwise interfere with an action taken or planned by another agency;

The proposed actions will not create a serious inconsistency or otherwise interfere with an action taken or planned by another agency. No other agency has indicated that it plans an action that will affect the Atlantic surfclam or ocean quahog fisheries in the EEZ.

Ž Materially alter the budgetary impact of entitlements, grants, user fees, or loan programs or the rights and obligations of recipients thereof;

The proposed actions will not impact entitlements, grants, user fees, or loan programs or the rights and obligations of their participants.

Ž Raise novel legal or policy issues arising out of legal mandates, the President's priorities, or the principles set forth in the Executive Order.

The proposed actions support and maintain the fisheries management program implemented by the Surfclam and Ocean quahog Fishery Management Plan and subsequent Amendments. The Individual Transferrable Quota system instituted in the fall of 1990 has been largely credited with successfully addressing the problems of overcapitalization and inefficiency inherent in many effort-based management systems. It has provided a high level of stability, efficiency, and improved profitability to the utilization of these resources. As such, the proposed actions do not raise novel legal or policy issues arising out of legal mandates, the President's priorities, or the principles set forth in the Executive Order.

The benefits of a stable, ITQ management program are additionally evident from the absence of constant legal challenge, which many of the alternative management programs in the country have become subject to.

2.1. Significance Conclusion

Due to the lack of meeting any of the four criteria described above, it is determined that the proposed 2003 quotas for the surfclam and ocean quahog fisheries do not constitute a "significant" regulatory action.

3.0. DESCRIPTION OF MANAGEMENT OBJECTIVES

A description of the management objectives of the Surfclam and Ocean Quahog FMP are presented in the Environmental Assessment (EA) Section 1.3 "Management Objectives" of this document.

4.0. DESCRIPTION OF THE FISHERY

A description of the surfclam fishery is presented in EA Section 5.1.2 "Fisheries" and EA 5.1.3 "Economic and Social Environment." The ocean quahog ITQ fishery is discussed in the parallel sections EA 5.2.2. and EA 5.2.3. The small-scale Maine ocean quahog fishery is described in sections EA 5.3.2. and 5.3.3. Finally, a brief description of the processing sector is in section EA 4.4.

5.0. PROBLEM STATEMENT

The need for federal regulation of fisheries has at its core the tendency for common property resources to become degraded through overuse, and the potential benefits to society dissipated. These issues were addressed in the surfclam and ocean quahog fisheries off the Atlantic coast through implementation of an Individual Transferable Quota (ITQ) management program in September of 1990. Industry participants benefit from a high degree of flexibility in their fishing operations, as government regulation is basically reduced to quota holders not exceeding their individual allowances. Industry members are free to trade quota amongst themselves as best suits their individual business needs. Costs to society are minimized and efficiency greatly enhanced when the use of effort limitation and closed seasons to limit total annual harvests can be avoided. These tools have the unfortunate side effect of overcapitalizing fisheries with unneeded vessels that are obliged to operate inefficiently, dramatically reducing the net income that a society might have earned from its fishery resources.

The surfclam and ocean quahog fisheries are two out of a handful of fisheries around the United States that have been able to successfully implement ITQ management programs, providing substantial benefits to fishery participants and the nation at large. A continuing task remains, however, in monitoring the status of these living resources and determining the maximum quantity that can be safely removed from them each year, without damaging their health or the health of the ecosystem in which they reside.

The information available to fishery managers and the public in making these annual quota decisions is incomplete and subject to uncertainty. Key biological information on life history and the actual numbers of these animals hidden beneath the waves must be estimated rather than known with certainty.

Important information on the human side of the equation is also missing, including comprehensive data on the costs of harvest and processing, as well as estimates of the industry supply and demand functions at the exvessel, wholesale, and retail product levels.

Regardless, an extensive economic analysis was conducted using the available data as part of Amendment 13 (Draft) to the Atlantic Surfclam and Ocean Quahog Fishery Management Plan (MAFMC 2002c). Quantitative results of the analysis relative to different quota alternatives are presented in this document where applicable. Qualitative results and professional judgement are presented when quantitative information is unavailable.

Further information on the purpose and need for the annual quota specification process can be found in EA Section 1.2.

6.0. DESCRIPTION OF MANAGEMENT ALTERNATIVES

A detailed description of all management alternatives considered in the proposed rule is presented in EA Section 3. The following sections provide a brief overview.

6.1. Quotas for the ITQ Fisheries

Proposed 2003 Quota Alternatives			
Surfclams			
	Description	Quota (bushels)	% Change from 2002
Alt. S1	Min. Allowable	1.850 million	41% Decrease
Alt. S2	Slight Decrease	2.850 million	9% Decrease
Alt. S3	Status Quo	3.135 million	No Change
Alt. S4**	Slight Increase	3.250 million	4% Increase
Alt. S5	Max. Allowable	3.400 million	8% Increase
Ocean Quahogs			
Alt. Q1	Min. Allowable	4.000 million	12% Decrease
Alt. Q2	Partial Reduction	4.250 million	6% Decrease
Alt. Q3**	Status Quo	4.500 million	No Change
Alt. Q4	Slight Increase	4.750 million	6% Increase
Alt. Q5	Max. Allowable	6.000 million	33% Increase
** Council Recommendation			

Five alternative quota levels were identified for consideration in each of the two fisheries. The Council's choice was bounded by minimum and maximum quota levels that are specified as the Optimum Yield (OY) range in the Surfclam and Ocean Quahog Fishery Management Plan, and may not be exceeded in either direction without an amendment to the Plan.

For each fishery, the quota alternatives numbered 1 and 5 correspond to the minimum and maximum allowable quotas specified in the current OY range:

Surfclams	1.850 million to 3.400 million bushels
Ocean Quahogs	4.000 million to 6.000 million bushels

Alternatives which would maintain the status quo are also included for each fishery, and correspond to Alternatives S3 for surfclams (3.135 million bushels) and Alternative Q3 for ocean quahogs (4.500 million bushels). Maintaining the status quo harvest for ocean quahogs in 2003 has been recommended by both the Council and staff as the preferred alternative.

The remaining two alternatives proposed for ocean quahogs were intended to give the Council flexibility in adjusting the quota by a modest amount in either direction. Alternative Q2 would decrease the quota by 6% to 4.250 million bushels, and Alternative Q4 would increase the quota by 6% to 4.750 million bushels. The actual ocean quahog harvests for the past two years have been far below their allowable levels: the 2000 harvest (3.161 mill. bu.) was fully 30% below the 4.500 million bushel quota, and the 2001 harvest (3.691 mill. bu.) was 18% below the 2001 quota. Harvests at these levels are not currently valid quota options because they lie below the minimum OY range point of 4 million bushels. In order to address this disparity, part of the reasoning behind the 4.250 million bushel alternative was that it allows the ocean quahog quota to move closer to the harvest level which industry actually utilized in recent years, but moderates the adjustment to a 6% change rather than the full 12% decrease represented by the minimum OY level.

The quota decision to be made in the surfclam fishery is surrounded by different circumstances. The federal quota has already been increased by 22% over the past two years, after remaining constant for the prior six. Existing scientific advice states that the quota could be safely increased further without harming the resource, yet that information is becoming dated, and is subject to a number of sources of uncertainty. Given the current survey and assessment schedule, any changes in course recommended by the next assessment will not be able to take effect until 2005.

An analysis of the expected impacts of each alternative will be presented in RIR Section 7. After lengthy deliberation and opportunity for public comment, the Council voted to recommend a 4% increase in the surfclam quota to 3.250 million bushels in 2003.

6.2. Quotas for the Maine Ocean Quahog Fishery

Alternative 2003 Quotas for the Maine Quahog Fishery			
Alt. M1	50% of Max. Quota	50,000 Maine Bu.	50% Decrease
Alt. M2	1998 Harvest Level	72,466 Maine Bu.	28% Decrease
Alt. M3**	Max Allowable - Status Quo	100,000 Maine Bu.	No Change
** Council Recommendation			

The Maine ocean quahog fishery is distinct in several key respects. First, it is a small-scale fishery that produces high-value product for the fresh, half-shell market. No formal scientific assessment has yet been completed which estimates the size of the local beds, or what would constitute sustainable harvest levels. Amendment 10 to the FMP defined a Maine ocean quahog management zone with a maximum annual quota of 100,000 Maine bushels, which may not be increased until a formal, peer-reviewed assessment of the zone is completed. The Maine quota is open to all vessels holding Maine ocean quahog permits, and is not subdivided into individual allocation shares. Finally, the Maine fishing grounds are actively monitored for PSP toxin, and have experienced closures in recent years.

Three alternative quotas were identified for the Maine ocean quahog fishery. Alternative M1 corresponds to a 50% reduction from the maximum allowable quota under the current management plan. Alternative M2 corresponds to the harvest level actually attained in 1998, though it would reduce the allowable harvest by 28%. Finally, Alternative M3 would maintain the status quo quota at the maximum allowable level of 100,000 Maine bushels.

The Council recommends that the Maine ocean quahog quota for 2003 remain unchanged at the initial maximum quota of 100,000 Maine bushels (1 bushel = 1.2445 cubic feet).

Staff believes that the 2002 quota will be reached late in the fall of 2002, and the Regional Administrator will be obliged to close the fishery, as she was in November of 2000. No quota closure occurred in 2001, largely because discovery of PSP toxin halted landings for a portion of the peak summer season, to the point where an overage of the annual quota was not forecast.

According to 50 CFR section 648.76 (2)(b)(iv): *The Regional Administrator will monitor the quota based on dealer reports and other available information and shall determine the date when the quota will be harvested. NMFS shall publish notification in the Federal Register advising the public that, effective upon a specific date, the Maine mahogany quahog quota has been harvested and notifying vessel and dealer permit holders that no Maine mahogany quahog quota is available for the remainder of the year.*

It must also be remembered that according to 50 CFR section 648.76 (2)(b)(iii): *All mahogany quahogs landed by vessels fishing in the Maine mahogany quahog zone for an individual allocation of quahogs under section 648,70 will be counted against the ocean quahog allocation for which the vessel is fishing*. In other words, even after the initial maximum quota of 100,000 Maine bushels is harvested from the Maine mahogany ocean quahog zone (north of 43°50'), vessels could obtain/use ITQ allocation and continue to fish in this zone. It is anticipated that some Maine fishermen will again rent ITQ allocation after the 100,000 bushel quota is reached in 2002, as they did in 2000 when over 120,000 bushels were landed.

Amendment 10 (MAFMC 1998) emphasized that there had been no comprehensive, systematic survey or assessment of the ocean quahog resource in eastern Maine. It also emphasized that a full stock assessment of the Maine resource should be a priority to ensure that this segment of the fishery would have a sustainable future. The initial maximum quota for the Maine zone was to remain in effect until a resource survey and assessment was completed. The agreement at the time of Amendment 10 was that the State of Maine was to initiate a survey once the initial maximum quota of 100,000 bushels became constraining.

The Council recommended that the Maine ocean quahog quota remain unchanged from the 2002 quota level at 100,000 Maine bu (35,240 hL) for 2003. No additional information on the impacts of the quahog quota is available at this time that would allow a more in-depth analysis of the stock and therefore allow the quota to be increased beyond the current maximum level of 100,000 Maine bu (35,240 hL). A scientific survey and assessment of the Maine resource is currently under way by the State of Maine, and will be utilized when specifying future quotas for the Maine harvest zone. From the information currently available, maintaining the quota at its current level for another year will not seriously constrain the fishery or endanger the resource.

6.3. Surfclam Size Limit Suspension

The Council recommends that the surfclam minimum size limit remain suspended in 2003. The minimum length for surfclams is 4.75 inches. According to 50 CFR section 648.72 (c): *Upon the recommendation of the MAFMC, the Regional Administrator may suspend annually, by publication in the Federal Register, the minimum shell-height standard, unless discard, catch, and survey data indicate that 30 percent of the surfclams are smaller than 4.75 inches (12.065 cm) and the overall reduced shell height is not attributable to beds where the growth of individual surfclams has been reduced because of density dependent factors.*

7. ANALYSIS OF ALTERNATIVES

The objective of this analysis is to describe clearly and concisely the economic effects of the various alternatives. The types of effects that should be considered include the following:

- Changes in net benefits within a benefit-cost framework.
- Changes in the distribution of benefits and costs among groups.
- Changes in income and employment in fishing communities.
- Cumulative impacts of regulations.

A more detailed description of the economic concepts involved can be found in "Guidelines for Economic Analysis of Fishery Management Actions" (NMFS 2000), as only a brief summary of key concepts will be presented here.

Benefit-cost analysis is conducted to evaluate the net social benefit arising from changes in consumer and producer surpluses that are expected to occur upon implementation of a regulatory action. Total

Consumer Surplus (CS) is the difference between the amounts consumers are willing to pay for products or services and the amounts they actually pay. Thus CS represents net benefits to consumers. When the information necessary to plot the supply and demand curves for a particular commodity is available, consumer surplus is represented by the area that is below the demand curve and above the market clearing price where the two curves intersect. A substantial empirical analysis was conducted as part of Amendment 13 to the Surfclam and Ocean quahog FMP (MAFMC 2002c), which estimated changes in benefits and costs at two alternative levels of the surfclam quota. Where applicable, the results of that analysis will be included here. For those alternatives for which quantitative estimates are not available, a qualitative approach to the economic assessment was adopted.

An evaluation of consumer surplus for surfclams and ocean quahogs is further complicated by the fact that there are few retail markets for either species outside of Maine. All of the landings from the ITQ fisheries are sold to processors who then add value by processing them into a variety of product forms. Boxes of frozen, breaded surfclam strips, cans of "clamato" juice, or chopped "clam meats" are the more common items that may be found on retail grocer's shelves. The majority of production is sold at the wholesale level to restaurants or other processors in the food industry that use them as ingredients in chowders and sauces.

Net benefit to producers is producer surplus (PS). Total PS is the difference between the amounts producers actually receive for providing goods and services and the economic cost producers bear to do so. Graphically, it is the area above the supply curve and below the market clearing price where supply and demand intersect. Economic costs are measured by the opportunity cost of all resources including the raw materials, physical and human capital used in the process of supplying these goods and services to consumers.

One of the more visible costs to society of fisheries regulation is that of enforcement. From a budgetary perspective, the cost of enforcement is equivalent to the total public expenditure devoted to enforcement. However, the economic cost of enforcement is measured by the opportunity cost of devoting resources to enforcement vis à vis some other public or private use and/or by the opportunity cost of diverting enforcement resources from one fishery to another.

7.1. Analysis of Surfclam Alternatives

Surfclam Quota Alternatives			
	Description	Quota (bushels)	% Change from 2002
Alt. S1	Min. Allowable	1.850 million	41% Decrease
Alt. S2	Status Quo	2.850 million	9% Decrease
Alt. S3	Slight Increase	3.135 million	No Change

Alt. S4**	Larger Increase	3.25 million	4% Increase
Alt. S5	Max. Allowable	3.400 million	8% Increase
** Council Recommendation			

7.1.1. Areas of Impact that Do Not Change Regardless of the Alternative

7.1.1.1. Harvest Costs (All alternatives)

In specifying an annual quota for the federal surfclam fishery, the government is placing a cap on total removals from the resource located in federal waters. No companion regulations that would impact the type, quantity, or method of gear utilization in the fishery are in effect at this time. Adoption of ITQ management in the surfclam and ocean quahog fisheries has negated the need for most gear and effort regulations, which have the greatest impact on the efficiency and costs of harvest operations.

Allowing the industry to trade allocation among its members enables businesses to adjust capital, labor, and output to the levels that maximize profitability, and minimize costs.

The two remaining management tools in the FMP that have the potential to increase harvest costs directly are closed areas and the minimum size limit for surfclams. Closing nursery areas or creating "sanctuaries" to protect living resources and habitat in a specific area will typically oblige fishermen to limit their operations to areas which are less productive or more distant, thereby driving up costs.

Use of the surfclam minimum size restriction in the past has motivated vessels to install "sorters" which cull out smaller individuals and then route them back overboard. In addition to slowing the harvest process, sorters will add to the damage inflicted by dredging, resulting in substantial mortality to those small clams that are returned to the ocean.

Fortunately, recent assessment work has suggested that the overall health of the surfclam resource is substantially better than previously thought. This has allowed the Council to recommend increasing the quota again in 2003, and again forego the use of the two management tools which have the greatest negative side effects associated with them.

For these reasons, it is considered that none of the surfclam quota alternatives presented in this document will have the effect of significantly altering harvest costs.

7.1.1.2. Enforcement Costs (All alternatives)

Adoption of ITQ management in the surfclam and ocean quahog fisheries has allowed enforcement officials to focus attention on a limited number of shoreside processing plants, as opposed to large expanses of the ocean to monitor effort restrictions. Instead of ensuring that vessels were operating only on their allowed fishing days, which required the use of expensive Coast Guard cutters and aircraft, enforcement officials can restrict their efforts to the accounting task of ensuring that all clam shipping containers bear an official government "tag." Once a tag is attached to a "cage" full of surfclams or ocean quahogs, it cannot be removed without destroying it. This prevents tags from being reused, and the annual quota from being exceeded.

Compliance with the regulations under the ITQ system is widely thought to be high. Perhaps the most significant reason for this is that the harvest rights represented by an allocation are valuable, and could be forfeit if repeated violations of the law are uncovered. This fact alone creates a situation where violators have much more to loose than gain by failing to place tags on a shipment of surfclams.

A second factor relates to the question of who is thought to be harmed by a violation. In a fishery managed as an open pool, violators may well feel they are only cheating "the government." In an ITQ managed fishery, the fishermen themselves are more highly vested in a fishery, and are more likely to view cheaters as stealing from themselves, rather than the government. Hence they are more likely to report violations they witness.

None of the management alternatives under consideration for surfclams would alter this enforcement dynamic, and therefore are not identified as leading to a change in enforcement costs.

7.1.2. Preferred Alternative S4 - Slight Increase in Surfclam Quota - 3.250 million bushels

Increasing the surfclam quota by a modest 4% in 2003 was the staff recommendation to the Mid-Atlantic Council. It attempts to balance the potential benefits of increased harvests with the risks of overexploitation that might occur over time if the recent stock assessments were proven to be overly optimistic. After lengthy debate and consideration, the Council agreed and chose to recommend a 4% increase for 2003.

7.1.2.1. Landings

Changing the surfclam quota to 3.250 million bushels in 2003 would represent a 4% increase in landings relative to the status quo.

7.1.2.2. Exvessel Prices

Demand for clam products has been building steadily over 2001 and 2002, such that exvessel prices have been increasing in spite of the fact that the federal quota has increased 22% over the same period.

An economic analysis conducted in Amendment 13 estimated the changes in exvessel prices, revenue, consumer surplus, operating costs, producer surplus, and net benefits from changes in the annual quota (MAFMC 2002c Table 58). Potential quotas evaluated in the analysis included 3.135 million bushels, and 3.4 million bushels. The 3.25 million bushel level lies between these two points, and was not directly evaluated, however estimates for a 3.25 million bushel quota were generated from the surrounding values as follows.

Economic Impacts of Proposed Essential Fish Habitat Regulations and New Surfclam Quotas

Excerpt and extrapolation from MAFMC 2002c Table 58.

Surfclams

Quota/Landings	Trips	Price	Revenue	Consumer Surplus	Operating Costs	Producer Surplus	Net Benefits
3.135 mill. bu.	2,662	9.30	29,154,224	1,826,470	10,583,927	18,570,297	20,396,767
*3.250 mill. bu.	2,760	9.26	30,073,930	1,838,339	10,927,249	19,146,681	20,985,020
3.400 mill. bu.	2,887	9.20	31,273,547	1,853,820	11,375,060	19,898,487	21,752,307

* Estimate

Based on the above table, exvessel price would decline by $0.04 following an increase in quota from 3.135 million bushels to 3.25 million. However, given the increased demand expected for surfclams in 2003, an increase of only 4% in the quota would likely lead to a modest bidding up of exvessel prices. Note that this increase would be less than that which would result under the status quo alternative.

7.1.2.3. Consumer Prices

It is expected that some portion of an increase in exvessel prices would be passed along to consumers. The most noticeable cases would be in those products which contain a high proportion of surfclam meat. Note that the magnitude of such an increase would be less than would occur if the status quo were maintained in 2003.

7.1.2.4. Consumer Surplus

Consumer surplus is expected to be larger under this alternative than the status quo, as consumers will be able to purchase 4% more surfclam product at prices lower than under the status quo. An estimate based on the Amendment 13 analysis indicates that consumer surplus would increase by $11,869 (MAFMC 2002c Table 58).

Note that the major changes in the surfclam market since 1997 are likely to be the result of actual shifts in the industry demand curve, rather than movements along the curve. The curve moved inward in

1997 and 1998 as interest shifted away from higher-priced surfclam-based products, and more toward lower-priced ocean quahog products. This market contraction lasted until 1999, when producers started introducing new products ("super-strips" and soup brands) with new advertising campaigns. These efforts were largely successful in rekindling consumer interest, to the extent that demand has shifted back to the right, with consumers purchasing larger quantities of surfclam products across multiple price points.

7.1.2.5. Producer Surplus

Industry participants have stated that a quota increase of 4% would still be insufficient to meet market demands in 2003. Hence, it is likely that producers would receive the benefits of selling the additional quota, while still obtaining a modestly higher price for their catch. This would result in an increase in producer surplus, estimated to equal $576,384 (MAFMC 2002c Table 58).

7.1.2.6. Distributive Impacts

Given that a quota increase would impact all allocation holders proportionally, and that all of the increase could be sold, it is not considered that this alternative would disproportionally advantage or disadvantage any particular sector.

7.1.2.7. Cumulative Impacts Over Time

There are no obvious negative impacts that would accumulate over time following adoption of this alternative. Its primary objective was to allow for modest growth of the fishery while maintaining a conservative posture on removals from the stock until it is verified that such levels are sustainable.

Fishery managers are constantly faced with making management decisions with incomplete information. Professional judgement must be exercised in weighing the risks of over-harvesting a resource, which would reduce the amount of future rents generated, versus under-harvesting a resource, which would needlessly forego near-term benefits. For those species managed by the Mid-Atlantic Fishery Management Council, such decisions are reviewed and adjusted on an annual basis. Hence, course corrections can be made in fairly short order if new information suggests that quotas could be increased, or should be lowered.

7.1.2.8. Risk of Biological Overexploitation

The risk of biological overexploitation from a 4% increase in the surfclam quota is thought to be small, though it must be considered slightly higher than the status quo.

7.1.3. Alternative S1 - Minimum Allowable Surfclam Quota - 1.850 million bushels

7.1.3.1. Landings

Changing the surfclam quota to the minimum allowable under the existing management plan represents a 41% reduction in landings relative to the status quo.

7.1.3.2. Exvessel Prices

A 41% decrease in landings from federal waters would have a significant impact on the market, and would most certainly lead to an increase in exvessel prices.

7.1.3.3. Consumer Prices

It is likely that some of the increase in exvessel price will be passed along to consumers. Those products that contain a high proportion of surfclam meat, such as the new fried clam "super-strips," would probably increase the most. Chowders and soups would likely be less affected.

7.1.3.4. Consumer Surplus

The consumer price increases that would result from adoption of this alternative would lead to a decrease in consumer surplus.

7.1.3.5. Producer Surplus

The benefits to the harvesting sector of higher exvessel prices would be offset by the 41% decrease in federal surfclam harvests that could be sold. Whether a net increase or decrease in producer surplus would result depends on the magnitude of the exvessel price increase. In this analysis, it is assumed that the price increase would not fully compensate for the lost harvest opportunity, and result in a reduction in producer surplus.

7.1.3.6. Distributive Impacts

Given that a quota reduction would impact all allocation holders proportionally, it is not considered that this alternative would disproportionally advantage or disadvantage any particular sector.

7.1.3.7. Cumulative Impacts over Time

If the federal surfclam harvest were to be reduced by 41% and remain at that level for a number of years, it would represent an enormous revenue loss for the industry as a whole. Likely impacts include the failure of businesses with tighter profit margins. Efforts to finalize the PSP testing protocol for Georges Bank would likely accelerate, in order to permit vessels to harvest surfclams and ocean quahogs from this area that is currently closed.

7.1.3.8. Risk of Biological Overexploitation

Given that the federal surfclam resource is thought to be healthy and underexploited at the current harvest level, the risk of biological overexploitation after a 41% reduction should be extremely low.

7.1.4. Alternative S2 - Slight Decrease in Allowable Surfclam Quota - 2.850 million bushels

7.1.4.1. Landings

This alternative would return to the quota level that was in effect in 2001, and corresponds to a 9% reduction in landings relative to the status quo.

7.1.4.2. Exvessel Prices

A 9% decrease in landings from federal waters would have a moderate but noticeable impact on the market, leading to an increase in exvessel price relative to the status quo.

7.1.4.3. Consumer Prices

It is likely that a portion of the increase in exvessel prices will be passed along to consumers.

7.1.4.4. Consumer Surplus

The consumer price increases that would result from adoption of this alternative would lead to a decrease in consumer surplus.

7.1.4.5. Producer Surplus

The benefits to the harvesting sector of higher exvessel prices would be offset by the 9% decrease in federal surfclam harvests that could be sold. In this analysis, it is assumed that the price increase would not fully compensate for the lost harvest opportunity, and result in a reduction in producer surplus.

7.1.4.6. Distributive Impacts

Given that a quota reduction would impact all allocation holders proportionally, it is not considered that this alternative would disproportionally advantage or disadvantage any particular sector.

7.1.4.7. Cumulative Impacts over Time

If the federal surfclam harvest were to be reduced by 9% and remain at that level for a number of years, it would likely represent a significant revenue loss for the industry. Likely impacts include increased harvests of alternative sources of meat, such as ocean quahogs and the lower-quality surfclams in New York inshore waters.

7.1.4.8. Risk of Biological Overexploitation

A 9% reduction in landings would likely ease pressure somewhat on the heavily exploited areas off the coast of New Jersey. Landings per Unit of Effort (LPUE) for the federal surfclam fleet as a whole declined 10.9% in 2001. The most recent scientific advice available suggests that the quota can be safely increased, though it may be desirable to avoid localized depletion. Adoption of this alternative would represent a decrease in the risk of biological overexploitation relative to the status quo.

7.1.5. Status Quo Alternative S3 - Surfclam Quota - 3.135 million bushels

The 2002 federal surfclam quota of 3.135 million bushels is the status quo alternative, and represents the baseline against which all other alternatives will be measured.

7.1.6. Alternative S5 - Maximum Allowable Surfclam Quota - 3.400 million bushels

7.1.6.1. Landings

Increasing the federal surfclam quota to 3.400 million bushels would correspond to an 8% increase in landings from the status quo. Federal landings have not approached this level in recent decades, and there is some uncertainty as to whether an 8% increase would be fully harvested in a single year. The State of New Jersey has seen a lack of new surfclam recruitment in their resource, and is considering lowering their annual quota in the future. If this were to occur in 2003, then it is very likely that an 8% increase in the federal surfclam quota would be fully harvested.

Given the strength of recent market demand, and the fact that new vessel capacity is being added to the clam fleet in 2002, this analysis will assume that an 8% increase in the federal quota would be fully harvested in 2003.

7.1.6.2. Exvessel Prices

An 8% increase in quota would have a moderate impact on the market, and likely lead to a small decrease in exvessel prices. The analysis in Amendment 13 estimates a decrease in price of $0.10 per bushel (MAFMC 2002c Table 58).

7.1.6.3. Consumer Prices

It is possible that some of the decrease in exvessel price would be passed along to consumers. Those products that contain a high proportion of surfclam meat, such as the new fried clam "super-strips,"

would probably decrease the most.

7.1.6.4. Consumer Surplus

The consumer price decreases that would result from adoption of this alternative would lead to an increase in consumer surplus. The analysis in Amendment 13 estimates an increase of $27,350 following an increase in quota from 3.135 million bushels to 3.400 million (MAFMC 2002c Table 58).

7.1.6.5. Producer Surplus

This analysis assumes that the entire 8% increase in quota will be harvested and successfully marketed. The analysis in Amendment 13 estimates that the lion's share of the benefits will be retained by producers, resulting in an increase in producer surplus of $1.328 million (MAFMC 2002c Table 58).

7.1.6.6. Distributive Impacts

Given that a quota increase would impact all allocation holders proportionally, and that all of the increase could be sold, it is not considered that this alternative would disproportionally advantage or disadvantage any particular sector.

7.1.6.7. Cumulative Impacts Over Time

A 3.4 million bushel federal quota may produce cumulative negative impacts over time if it ultimately proves to be unsustainable. It is not possible to predict whether such an eventuality would come to pass at this point in time.

7.1.6.8. Risk of Biological Overexploitation

This alternative presents the highest risk of biological overexploitation relative to the status quo. The nature of the risk is simply that recent assessment work may have overestimated the current stock size, making this maximum level of harvest unsustainable. The uncertainty will be reduced as results are borne out over time.

7.1.7. Summary of Surfclam Impacts

Summary of Impacts for Proposed 2003 Surfclam Quota Alternatives Relative to Status Quo Alt. S3: 3.135 million bushels (Assumes a modest increase in demand in 2003)

Feature	Alt. S1 Min. Allowable 1.850 million bushels	Alt. S2 Slight Decrease 2.850 million bushels	Alt. S4 (Preferred) Slight Increase 3.250 million bushels	Alt. S5 Max. Allowable 3.400 million bushels
Landings	- 41%	- 9%	+ 4%	+ 8%(?)
Exvessel Prices	Significant +	+	Slight -	-
Consumer Prices	Significant +	+	Slight -	-
Consumer Surplus	Significant -	-	Slight +	+
Harvest Costs	0	0	0	0
Producer Surplus	Significant -	-	Slight +	+
Enforcement Costs	0	0	0	0
Distributive Impacts	0	0	0	0
Cumulative Impacts	+	Slight +	0	(?)
Risk of Biological Overexploitation	Significant -	-	Slight +	+
+ indicates an increase relative to the status quo; - indicates a decrease relative to the status quo; 0 indicates no change; ? indicates unknown				

7.1.7.1. Summary Justification for Surfclam 3.25 Million Bushel Quota Recommendation

At its June 2002 meeting on the surfclam quota for the coming year, the Mid-Atlantic Council hosted extensive public debate on the issue of whether the quota should be set at 3.25 million bushels, or the maximum currently allowed by the FMP of 3.4 million bushels.

The following points represent the key factors that led the Council to adopt the more conservative posture of 3.25 million bushels for 2003.

- In 2001 the industry required a 25% increase in fishing effort to harvest an 11% increase in the Federal quota. This represented a substantial decrease in the productivity of effort.

- Industry members as well as state biologists have indicated concern for the apparent lack of new surfclam recruitment, with the exception of New York state waters.

- The State of New Jersey in particular has expressed concerns on the lack of recruitment evident in their surveys, which are conducted every year. On September 5, 2002, New Jersey officially REDUCED the coming fishing year's state quota for surfclams by 14%, from 700,000 bushels to 600,000. This event had not yet occurred when the Council made its recommendation in June;

however New Jersey had made its concerns public at the time, and this further substantiates the Council's position.

- Due to the availability of high-quality clams and close proximity to shore processing facilities, industry has become heavily dependent on the surfclam resource off New Jersey. Seventy-eight percent of the coast-wide 2001 Federal quota was harvested from the three degree squares surrounding this one state.

  In many ways, New Jersey represents the heartland of the surfclam fishery. The consequences of fishing down its resources are greater, since the alternative fishing grounds are less attractive. The 1999 survey indicated that 43% of the surfclam biomass was off New Jersey, 21% on Georges Bank, and 25% off Delmarva. The relative importance of New Jersey is heightened as one recognizes that the Georges Bank resource remains closed due to the presence of PSP toxin, and the Delmarva resource currently has a much lower meat yield.

- The Mid-Atlantic Council has effectively managed the surfclam resource in Federal waters with quotas ranging between 1.800 and 3.385 million bushels for the past quarter century. It should be noted that the more conservative recommendation of 3.25 million bushels is still the third-highest quota of all-time.

- The surfclam resource is not considered to be overfished, and overfishing is not occurring, based on the Stock Assessment Review Committee (SARC) 30 (USDC 2000a) recommendation and the unanimous Council-approved overfishing definition. However, Amendment 13 with the new surfclam overfishing definition has not yet been approved by the Secretary.

- There is an extensive list of "Sources of Uncertainties" in the 2000 SARC (USDC 2000a). Between the 1998 and the 2000 assessments, the dredge efficiency estimate was reduced by half (60% to 30%), and natural mortality was increased three-fold. These alterations produced no change in the standing stock biomass estimate, however wide swings in key population parameters strongly suggest the need for more than the two point estimates currently relied upon.

- Following a presentation of the 30th SARC results in March 2000, the Council adopted a management approach that allowed for steady increases in the surfclam quota to the maximum over five years. If the quota is increased to 3.4 million in 2003, it would equate to a very substantial increase in the overall quota of 33% in only 3 years.

- Full information from the survey of 2002 and subsequent assessment in 2003 will not be available for the purposes of setting the Federal surfclam quota until 2004. Hence any changes in course which it might recommend will not be able to take effect until 2005.

7.2. Analysis of Ocean Quahog Alternatives

There are five alternative quota levels considered for the 2003 ocean quahog fishery:

Ocean Quahog Quota Alternatives			
Alt. Q1	Min. Allowable	4.000 million	12% Decrease
Alt. Q2	Partial Reduction	4.250 million	6% Decrease
Alt. Q3**	Status Quo	4.500 million	No Change
Alt. Q4	Slight Increase	4.75 million	6% Increase
Alt. Q5	Max. Allowable	6.000 million	33% Increase
** Council Recommendation			

7.2.1. Summary Evaluation of All Quahog Quota Alternatives - Assumes Historical Landings Pattern

Historically, the ocean quahog fishery outside of Maine has played a supplementary role to the surfclam fishery. The ocean quahog fishery was first initiated in 1976 by surfclam vessels in response to a major decline in the availability of surfclams. With a smaller meat and sharper flavor than surfclams, it commanded less than half the price in the marketplace. Ocean quahog beds were also located further offshore than surfclams, such that the added fuel costs were an additional damper on the profitability of ocean quahog trips. Processors could still make a profit on ocean quahogs, and would often cajole captains and crews into making more quahog trips by assuring them they would purchase all their surfclam harvests at an acceptable price.

The advantage that ocean quahogs have had are the massive, dense beds that have developed across decades or even centuries of time. Vessels have been able to harvest the long-lived animals in large quantities, very quickly. The resource off the Atlantic coast has supported intense harvests for over two and one-half decades, and scientists believe that even when the closed portions of the resource are excluded, 82% of the virgin biomass remains untouched.

For this reason, the annual quotas for ocean quahogs have generally been set substantially higher than the levels industry has chosen to harvest. From 1998 through 2001, harvests have not even reached the minimum quota level of 4.0 million bushels. The optimum yield range currently specified in the surfclam and ocean quahog FMP is between 4.0 and 6.0 million bushels. Hence the quota alternatives which the Council may recommend to the Secretary of Commerce must all fall within that allowable range. When industry harvests do not even reach the relevant quota range, none of the alternatives are expected to have any impact on the following areas:

Landings

Exvessel prices

Consumer prices

Consumer surplus

Harvest costs

Producer surplus

Enforcement costs

Risk of biological overexploitation

7.2.1.1. Distributive and Cumulative Impacts

Given the situation in which ocean quahog harvest levels to not reach any of the quota alternative levels, the only areas of potential impact are distributive and cumulative in nature. Quota shares in the ITQ fisheries for surfclams and ocean quahogs are held by large corporations as well as small, independent fishermen. One concern that has been raised is that when large amounts of quota are not utilized by industry, the revenue losses from unsold quota may fall disproportionally on independent fishermen with lesser access to a market. If these losses fall repeatedly on the same individuals over a period of years, they may be forced to cease operations, or sell their quota allocations at a loss. The relative size of any such impacts would be expected to be proportional to the amount of the quota selected by government: greater impacts the larger the quota, and lesser impacts for smaller quotas.

A summary of all impacts that can be expected from a repetition of the historical ocean quahog landing pattern in 2003 is represented in the following table.

Summary of Impacts for Proposed 2003 Ocean Quahog Quota Alternatives Relative to Status Quo Alt Q3: 4.500 million bushels (Preferred) - <u>Assumes Historical Landings Pattern</u>				
Feature	Alt. Q1 Min. Allowable 4.000 million bushels	Alt. Q2 Slight Decrease 4.250 million bushels	Alt. Q4 Slight Increase 4.750 million bushels	Alt. Q5 Max. Allowable 6.000 million bushels
Landings	- 12% allowed (less than 4 mill. expected)	- 6% allowed (less than 4 mill. expected)	+ 6% allowed (less than 4 mill. expected)	+ 33% allowed (less than 4 mill. expected)
Exvessel Prices	0	0	0	0
Consumer Prices	0	0	0	0
Consumer Surplus	0	0	0	0
Harvest Costs	0	0	0	0
Producer Surplus	0	0	0	0
Enforcement Costs	0	0	0	0
Distributive Impacts	-	-	+	+
Cumulative Impacts	-	-	+	+
Risk of Biological Overexploitation	0	0	0	0
+ indicates an increase relative to the status quo; - indicates a decrease relative to the status quo; 0 indicates no change; ? indicates unknown				

7.2.2. Summary Evaluation of All Quahog Quota Alternatives - Assumes Current Landings Pattern

It should be noted that the potential exists for the 2003 ocean quahog quota to be limiting on the industry. The surge in demand for clam meats in 2001 could not be met with surfclams alone, and obliged the processing sector to raise the price of ocean quahogs dramatically. A steady decline in the productivity of dense ocean quahog beds was not being offset with a compensating increase in exvessel price. Median price had remained steady at $4.25 per bushel for years, and an increasing number of vessels were refusing to fish for them.

In 2001, processors relented and a majority of ocean quahog landings were purchased at prices ranging between $5.00 and $6.10 per bushel. This spurred a 17% increase in ocean quahog landings to 3.691 million bushels in 2001. Preliminary landings of ocean quahogs in 2002 indicate that 2.131 million bushels had been purchased by dealers through July 15th, or 47% of the current annual quota of 4.5 million bushels. Whether these unusually strong harvest rates will be maintained through the rest of

2002 and into 2003 is uncertain: the dramatic increase in price which spurred them is unprecedented in the recent history of these fisheries. However, if these recent trends persist, the impacts of the proposed quota alternatives for 2003 can be summarized in the following table.

Summary of Impacts for Proposed 2003 Ocean Quahog Quota Alternatives Relative to Status Quo Alt Q3: 4.500 million bushels (Preferred) - Assumes Current Landings Pattern

Feature	Alt. Q1 Min. Allowable 4.000 million bushels	Alt. Q2 Slight Decrease 4.250 million bushels	Alt. Q4 Slight Increase 4.750 million bushels	Alt. Q5 Max. Allowable 6.000 million bushels
Landings	- 12%	- 6%	+ 6%	+ 33%
Exvessel Prices	+	Slight +	Slight -	-
Consumer Prices	+	Slight +	Slight -	-
Consumer Surplus	-	Slight -	Slight +	+
Harvest Costs	0	0	0	0
Producer Surplus	-	Slight -	Slight +	+
Enforcement Costs	0	0	0	0
Distributive Impacts	0	0	0	0
Cumulative Impacts	0	0	0	?
Risk of Biological Overexploitation	-	Slight -	Slight +	+

+ indicates an increase relative to the status quo; - indicates a decrease relative to the status quo; 0 indicates no change; ? indicates unknown

7.2.3. Maine Ocean Quahog Fishery Quota

7.2.3.1. Preferred Alternative M3 - Max Allowable - 100,000 Maine Bu. (Status Quo)

The Council voted to recommend that the Maine ocean quahog quota remain unchanged for 2003 at the initial maximum quota level of 100,000 bushels. This quota pertains to the zone of both state and federal waters off the eastern coast of Maine north of 43 degrees 50 minutes north latitude. Amendment 10 established management measures for this small artisanal fishery in May of 1998, and specified an initial maximum quota of 100,000 bushels. This same level has been maintained each year through 2002. Representatives of Maine encouraged the Council to maintain that quota for 2003 as well. Issues of under-reporting of the catches have improved since the fall of 1998, when Maine sent letters to all their permit holders explaining the need to report their landing to NMFS.

The issue of concern to the Mid-Atlantic Council in 2000 was that of late reporting. Total landings for the year reached just over 120,700 bushels. This was comprised of the 100,000 bushel quota for the Maine harvest zone, 5,800 bushels purchased from the ITQ fishery, and a 14,900 bushel quota overage. The overage occurred because the fishery was not closed early enough to halt landings at the 100,000 bushel mark, given the lag time which occurs between the time harvests actually take place, and the time landing reports are submitted to NMFS and keyed into the landings database.

Maine quahog landings in 2001 totaled 108,500 Maine bushels. Of the 8,500 bushels harvested above the 100,000 bushel quota, 4,530 bushels were rented from the ITQ ocean quahog fishery, and the remaining 3,970 bushels comprised a small overage of the annual quota. It was not anticipated that a fishery closure would be required in 2001 for the purpose of not exceeding the quota, because the State of Maine was obliged to close a number of shellfish fisheries during the peak summer season for PSP toxin, including both ocean quahogs and mussels.

Preliminary landing statistics as of July 15, 2002 indicated that 62% of the Maine ocean quahog quota had been harvested, while approximately 54% of the year had passed by. Landings tend to taper off after the Labor Day holiday weekend, however late reporting makes it likely that the 100,000 bushel quota will be reached again in 2002. If fishermen wish to continue harvesting after this quota is reached, they must again purchase allocation from the ITQ portion of the ocean quahog fishery. One impact of this "maximum allowable" quota alternative is that it would minimize the costs of ITQ purchases from the other sector of the fishery.

Specification of a sustainable harvest limit for the Maine fishery remains problematic for two principal reasons. First and foremost, because a survey and assessment of the resource off Maine is not yet complete. The State of Maine started field work on an ocean quahog survey in the spring of 2002. It is planned that survey work will continue in 2003, followed by a stock assessment that will be peer reviewed through the SARC/SAW process in December 2003.

The second issue involves public safety closures for PSP toxin. Due to the health risks associated with toxins that may appear in a number of shellfish species on this portion of the coast, Maine officials only allow fishing to occur in those areas that are being actively monitored. Other areas may contain ocean quahogs, but remain unavailable to fishermen due to the lack of sampling coverage. This raises the question as to whether a sustainable harvest limit should pertain to only those areas that are typically open to fishing, or to the entire Maine ocean quahog fishery zone above 43^{o} 50'.

In any regard, this alternative would maintain the status quo quota of 100,000 Maine bushels for another year, and represents the baseline against which all other quota alternatives will be measured. An examination of the available fishery performance data for the Maine fishery indicate that Landings Per Unit of Effort have ranged from a low of 1.8 bushels per hour in 1992, to a peak of 9.5 bushels per hour in 2000. The 8.1 bushel per hour average in 2001 remains at the upper end of the range, suggesting that the Maine resource availability continues to be good.

Given the stability that has been apparent in the Maine fishery in recent years, the Mid-Atlantic Council does not feel there is justification for reducing the Maine quota below the current 100,000 bushel maximum for 2003. Survey and assessment information from the Maine research should be available within two years, and will provide a more solid basis for increases or decreases in the quota in subsequent years.

7.2.3.2. Alternative M1 - 50% of Maximum Quota - 50,000 Maine Bu.

7.2.3.2.1. Landings

Reducing the Maine ocean quahog quota to 50% of the maximum allowable under the existing management plan represents a 50% reduction in potential landings versus the status quo. However, it is assumed that once the "free" quota assigned to the Maine fishery is harvested, Maine fishermen would rent ocean quahog quota from the ITQ fishery to replace it.

For the purposes of this analysis, it is assumed that the rental price will be $1.00 per bushel in mid-2003. It is further assumed that if the 2003 Maine quota were reduced by 50,000 bushels, that 90% of the reduction would be replaced by rented allocation from the ITQ fishery.

7.2.3.2.2. Exvessel Prices

A reduction in the "free" quota available to Maine quahog fishermen will oblige them to replace it with rented quota from the ITQ fishery. Rented quota, therefore, will simply become an additional variable cost of harvest operations.

Without knowledge of the elasticities of demand and supply in the fresh, half-shell market, it is difficult to predict changes in exvessel prices. However, a 50% reduction in the Maine quota would be a significant event for the Maine fishery, given that more than the 100,000 bushel quota is now being utilized. The Maine quota would likely be exhausted in mid-year, when most of the Maine vessels are still participating in the fishery. Most of the vessels, therefore, would be obliged to rent quota from the ITQ fishery. The additional $1.00 per bushel cost would be minimal considering the much higher value which Maine quahogs command, when compared to landings from the ITQ fishery. The average exvessel price for Maine ocean quahogs was $32.34 per Maine bushel in 2001, compared with $5.52 per bushel in the ITQ fishery.

It is expected that Maine fishermen would be able to pass along a portion of their increased costs from renting quota, resulting in a slightly higher exvessel price for Maine ocean quahogs.

7.2.3.2.3. Consumer Prices

With exvessel prices expected to increase slightly under this alternative, prices to consumers may increase very slightly.

7.2.3.2.4. Consumer Surplus

Assuming that consumers would pay a slightly higher retail price for Maine ocean quahogs, consumer surplus would decrease slightly.

7.2.3.2.5. Harvest Costs

After the free Maine ocean quahog quota is exhausted, fishermen are expected to rent quota from the ITQ fishery. The cost per ITQ bushel is estimated at $1.00. Assuming that the 90% of the quota reduction of 50,000 bushels is replaced, the increased harvesting costs would equal $45,000 across all vessels.

7.2.3.2.6. Producer Surplus

It is expected that producers (vessels) will be obliged to absorb a portion of the increased costs of harvest that would result from renting ITQ quota. Producer surplus would correspondingly decrease slightly.

7.2.3.2.7. Enforcement Costs

With the widespread use of ITQ quota in Maine that this alternative envisions, the costs of tracking and enforcing it would increase.

7.2.3.2.8. Distributive Impacts

No significant distributive impacts are foreseen from adoption of this alternative.

7.2.3.2.9. Cumulative Impacts

No significant cumulative impacts are foreseen from adoption of this alternative.

7.2.3.2.10. Risk of Biological Overexploitation

The risk of localized overexploitation exists in all of the management alternatives currently available for the Maine ocean quahog fishery. From a coast-wide perspective, there is little risk to the ocean quahog resource from the total allowable harvest of the combined ITQ and Maine ocean quahog quotas.

This alternative estimates that landings would drop by 5,000 Maine bushels in response to the additional expense of renting 45,000 from the ocean quahog ITQ fishery. Hence, the risk of biological overexploitation would be slightly lower than under the status quo, preferred alternative.

Recent communications with the Maine Department of Marine Resources indicate that work on an assessment of the ocean quahog resource in the Gulf of Maine commenced in the spring of 2002 (Mercer, pers. comm). A $23,000 grant from the Northeast Consortium was received to fund initial efforts, which will take the form of cooperative research using the Maine industry vessel "Whitney and Ashley." While currently there is no funding committed to recurring sampling across time, the Department is optimistic that both State and industry support for the program will increase and allow research efforts to continue.

7.2.3.3. Alternative M2 - 1998 Harvest Level - 72,466 Maine Bu.

7.2.3.3.1. Landings

Reducing the Maine quahog quota to the 1998 harvest level of 72,466 Maine bushels represents a 28% reduction in potential landings versus the status quo. However, it is again assumed that once the "free"

quota assigned to the Maine fishery is harvested, fishermen would simply ocean quahog quota from the ITQ fishery to replace it. For the purposes of this analysis, it is assumed that 90% of the reduction would be replaced through rentals, or 24,781 bushels. Total landings would then equal 97,247 Maine bushels.

7.2.3.3.2. Exvessel Prices

Given the landings pattern exhibited in 2001, a quota of 72,466 Maine bushels should sustain the fishery through the peak summer months. This would limit the additional costs of renting ITQ to only those vessels active in the final few months of the year. As with the prior alternative, it is expected that vessels will be able to recoup a portion of the added costs through slightly higher exvessel prices.

7.2.3.3.3. Consumer Prices

The magnitude of the increase in exvessel prices under this alternative is considered to be so small that is it unlikely to have a discernable impact on consumer prices.

7.2.3.3.4. Consumer Surplus

With consumer prices expected to remain constant under this alternative, no changes in consumer surplus would result.

7.2.3.3.5. Harvest Costs

It is expected that vessels would respond to a 28% decrease in the Maine quota by renting back 90% of the loss from the ITQ portion of the fishery. This would entail a purchase of 24,781 bushels. At an estimated cost of $1.00 per bushel, this would result in an increase of $24,781 in harvest costs across all vessels.

7.2.3.3.6. Producer Surplus

It is expected that producers (vessels) will be obliged to absorb a portion of the increased costs of harvest that would result from renting ITQ quota. Producer surplus would correspondingly decrease slightly.

7.2.3.3.7. Enforcement Costs

With the need to administer and track the use of ITQ quota in the Maine fishery, enforcement costs

would increase. However, with utilization limited to only those vessels remaining active in the final months of the year, the costs would be less than those resulting from the prior (50% of Maximum Quota) alternative.

7.2.3.3.8. Distributive Impacts

No significant distributive impacts are foreseen from adoption of this alternative.

7.2.3.3.9. Cumulative Impacts

No significant cumulative impacts are foreseen from adoption of this alternative.

7.2.3.3.10. Risk of Biological Overexploitation

This analysis assumes that landings would decline by 2,753 Maine bushels due to the added costs of renting ITQ allocation. Hence, there would be a very slight decrease in the risk of biological overexploitation of the Maine ocean quahog resource relative to the status quo alternative.

7.2.3.4. Summary of Maine Ocean Quahog Quota Impacts

Summary of Impacts for Proposed 2003 Maine Ocean Quahog Quota Alternatives Relative to Status Quo Alt M3: 100,000 Maine bushels (Preferred)		
Feature	Alt. M1 50% of Maximum Quota 50,000 Maine bushels	Alt. M2 1998 Harvest Level 72,466 Maine bushels
Landings	-5,000 (assumes 45,000 Maine bushels will be leased from ITQ portion of the fishery)	-2,753 (assumes that 24,781 Maine bushels will be leased from ITQ portion of the fishery)
Exvessel Prices	Slight +	Very Slight +
Consumer Prices	Slight +	0
Consumer Surplus	Slight -	0
Harvest Costs	+ $45,000	+ $24,781
Producer Surplus	Slight -	Slight -
Enforcement Costs	+	+
Distributive Impacts	0	0
Cumulative Impacts	0	0
Risk of Biological Overexploitation	Slight -	Very Slight -
+ indicates an increase relative to the status quo; - indicates a decrease relative to the status quo; 0 indicates no change; ? indicates unknown		

7.3. Other Management Actions: Suspend Minimum Size Restriction on Surfclams for 2003

The Surfclam and Ocean Quahog FMP includes a provision for a minimum size limit of 4.75 inches on surfclams, which may be used to protect new year classes from harvest before they have reached an optimal size. The provision is written such that a minimum size will automatically be in effect unless the Council takes the active step of suspending it each year.

The current stock is comprised primarily of large, adult individuals, with few small individuals apparent from landings in most areas. Reinstating a minimum size under these conditions would result in greater harm than benefit, as it would require the industry to use "sorting" machines which will often damage undersized clams as it routes them back overboard.

It is, therefore, the Council's recommendation that the surfclam minimum size limit be suspended for 2003, as has been done since 1990. Continuing the suspension will have no impact on the current fishery.

7.3.1. The Alternative of Allowing the Surfclam Minimum Size Limit to take Effect in 2003

Each year the Council must take the active step of suspension, or a minimum size of 4.75 inches will automatically go into effect as of January 1. The current regulations read as follows:

§ 648.72 Minimum surf clam size.

(a) Minimum length. The minimum length for surf clams is 4.75 inches (12.065 cm).

(b) Determination of compliance. No more than 50 surf clams in any cage may be less than 4.75 inches (12.065 cm) in length. If more than 50 surf clams in any inspected cage of surf clams are less than 4.75 inches (12.065 cm) in length, all cages landed by the same vessel from the same trip are deemed to be in violation of the minimum size restriction.

(c) Suspension. Upon the recommendation of the MAFMC, the Regional Administrator may suspend annually, by publication in the Federal Register, the minimum shell-height standard, unless discard, catch, and survey data indicate that 30 percent of the surf clams are smaller than 4.75 inches (12.065 cm) and the overall reduced shell height is not attributable to beds where the growth of individual surf clams has been reduced because of density dependent factors.

(d) Measurement. Length is measured at the longest dimension of the surf clam shell.

The minimum size provision for the surfclam fishery is a measure that is most appropriate when a large proportion of the resource is comprised of smaller, younger surfclams. Its application can help ensure the continued viability of a young, or recovering resource by delaying their harvest until they have had multiple opportunities to spawn. It is also intended to improve the overall meat yield from a fishery by postponing harvest until after the rapid growth phase which occurs in the adolescence of most species.

The condition of having a large portion of the resource in an immature state occurred in the surfclam fishery following the anoxia event in the summer of 1976. Low levels of dissolved oxygen in the water off the coast of New Jersey killed large portions of the surfclam resource available at the time. In the subsequent years the Mid-Atlantic Council implemented a series of management measures for surfclams. These included quarterly harvest quotas, a moratorium on new vessels entering the fishery, effort limitations, reporting requirements, closed areas, and an initial minimum size limit of 5.5 inches.

Unfortunately, in addition to the desired effect, each of these measures also produced some negative side effects. Quarterly quotas that were shared among all vessels still motivated a race to fish as vessels sought to harvest as much as possible before the quota was reached and the fishery closed. The vessel moratorium made the replacement of ageing vessels difficult and contentious. Effort limitations which limited the amount of time a vessel could operate were expensive to enforce and costly to vessel owners in the forced down-time of their vessels. Closed nursery areas were very expensive to enforce because they required the use of Coast Guard cutters or surveillance aircraft, and it is considered likely that the stunting of the surfclam resource off Chincoteague, Virginia was contributed to by the area closure.

Minimum size limits are also subject to their share of unintended consequences. The minimum size for surfclams was generally favored by processors because it obliged fishermen to bring them the most profitable, high-yielding clams. However, vessel owners were subject to fines if their catches were found to be in violation, and resource benefits are muted when captains are unable to avoid small individuals, and are forced to discard them.

The culling out of small clams is most often accomplished with sorting machines, which will direct clams across a series of parallel metal rollers, allowing the smaller individuals to fall between the rollers and be shunted back overboard. Fracture of the clam shell during this process is common, and a significant portion of the animals returned to the ocean will not survive.

In the 2001 surfclam logbook data, the average reported discard rate was 2.8%, and the highest reported rate was 15%. In the last assessment, gear mortality was assumed to be 10% of landings (animals killed from the dredge passing over them), and discard mortality an additional 10% of landings. Numbers of this magnitude are not suggestive of a population dominated by small individuals. Moreover, assessment figures continue to indicate that the stock is comprised primarily of large, adult individuals. Reinstating a minimum size under these conditions would result in greater harm than benefit, because it would result in higher discard mortality through the expanded use of sorters, as vessel owners seek to minimize the risk of fines.

It is, therefore, the Council's recommendation that the surfclam minimum size limit be suspended for 2003, as has been done since 1990. Continuing the suspension will provide substantial benefits through maintaining a low discard mortality rate, while giving up little in the way of increased survival of juveniles.

8.0. FINAL REGULATORY FLEXIBILITY ANALYSIS - IMPACTS ON SMALL ENTITIES

8.1. Introduction

In September 2002, an Initial Regulatory Flexibility Analysis (IRFA) was prepared for the 2003 surfclam and ocean quahog specifications. No comments were received on the IRFA nor were any comments received on the economic impacts of the proposed action.

The purpose of the Regulatory Flexibility Act (RFA) is to minimize the adverse impacts from burdensome regulations and record keeping requirements on small businesses, small organizations, and small government entities. The category of small entities likely to be affected by the proposed plan is that of Individual Transferrable Quota (ITQ) holders and fishermen in the commercial Atlantic surfclam

and ocean quahog fishery. The impacts of the proposed action on the fishing industry and the economy as a whole were discussed above. The following discussion of impacts centers specifically on the effects of the proposed actions on the mentioned small business entities.

The Small Business Administration (SBA) defines a small business in the commercial fishing sector as a firm with receipts (gross revenues) of up to $3.0 million. The Northeast Regional Office of the National Marine Fisheries Service maintains current ownership records of surfclam and ocean quahog allocation holders. Tables 1 and 2 contain listings of surfclam and ocean quahog allocation holders respectively as of July 30, 2002. These are the entities that will be most directly impacted by the setting of annual quotas.

Table 1. Surfclam Allocation Owners as of July 30, 2002			
No. of Allocation Holders	**State**	**Total Bushels Held**	**Bu/Holder**
61	NJ	1,403,936	23,015
16	VA	951,456	59,466
11	MD	270,048	24,550
11	VAR*	509,760	46,342
Total = 99		**3,135,200**	**31,669**
* Var = CT, FL, MA, NY, RI			

Table 2. Ocean Quahog Allocation Owners as of July 30, 2002			
No. of Allocation Holders	**State**	**Total Bushels Held**	**Bu/Holder**
42	NJ	2,112,480	50,297
8	MD	291,520	36,440
7	VA	913,824	130,546
6	VAR*	1,181,536	196,923
Total = 63		**4,499,360**	**71,418**
*Var = FL, GA, NY, RI			

Table 3 lists the number of vessels active in harvesting surfclams and ocean quahogs in the non-Maine fisheries. Some of these vessels may not hold allocations. Depending on the regulations promulgated, the population affected by the regulation may change, i.e. if, for example, an area is closed, both holders and service providing vessels may be affected, while with a quota change, only holders may appropriately be affected and service providers impacted.

Table 3. Vessel Participation in the 2001 Surfclam and non-Maine Ocean Quahog Fisheries	
Species Harvested	**Number of Vessels**
Surfclams only	21
Ocean Quahogs only	16

BOTH Surfclams and Ocean Quahogs	14
TOTAL	**51**

Average 2001 gross income for surfclam vessels was $753,682 per vessel, and for ocean quahog ITQ vessels was $678,885. In the small artisanal fishery for ocean quahogs in Maine, 31 vessels reported harvests in the clam logbooks, with an average value of $113,181 per boat. All of these vessels readily fall within the definition of small businesses.

8.2. Analysis of the Impacts of Alternatives

8.2.1. Impacts on the Recreational Sector of All Alternatives

Atlantic surfclams and ocean quahogs are harvested exclusively by the commercial entities. None of the proposed alternatives will have any impact on the recreational sector.

8.2.2. Impacts of the Surfclam Quota Alternatives

The impacts of adjustments to the federal quota for surfclams on small businesses is exceptionally straightforward to assess. Both the surfclam and ocean quahog fisheries are single-species fisheries, with almost no bycatch of other commercially-valuable or protected species. Vessels are able to effectively target each species individually, without the risk of needing permits for other species, or running afoul of closed seasons or minimum sizes. The 2003 specifications establish a 4-percent increase in the surfclam quota and continue the ocean quahog and Maine mahogany quahog quota without change from the 2002 quotas. Since 2001 harvest levels of 2.855 and 3.691 million bu (1.520 and 1.965 million hL) for surfclams and ocean quahogs, respectively, were below the 2003 quotas implemented by this action, NMFS and the Council believe that the 2003 quotas may yield a surplus quota available to vessels participating in all these fisheries. This is especially likely to occur in the ocean quahog fishery. In the case of a surplus quota, vessels would not be constrained from harvesting additional product, thus allowing them to increase their revenues.

Direct impacts of quota adjustments will be felt by the 99 entities currently holding surfclam ITQ allocations. The actual number of individuals or businesses holding the 99 registered allocations will be smaller, since each holder will often maintain multiple allocations for accounting, or liability purposes.

8.2.2.1 Preferred Alternative S4 - 4% Increase in Surfclam Quota - 3.250 million bushels

The average surfclam quota allocation currently equals 31,669 bushels. A 4% increase would add 1,227 bushels to each. At an average exvessel value of $12.00 per bushel, the gross value of the quota increase would equal $15,201 per allocation.

There are no other significant impacts of the proposed action on small entities. Reporting costs and compliance costs would not change as a result of the proposed action.

8.2.2.2 NON-PREFERRED Alternative S1 - 41% Decrease in Surfclam Quota - 1.850 million bushels

A 41% decrease in the federal surfclam quota would subtract 12,984 bushels from the current average allocation of 31,669 bushels. At an average exvessel value of $12.00 per bushel, the gross value of the quota decrease would equal $155,808 per allocation.

Such a large reduction in the quota would have a major impact on small entities, and is not recommended by the Council.

8.2.2.3 NON-PREFERRED Alternative S2 - 9% Decrease in Surfclam Quota - 2.850 million bushels

A 9% decrease in the federal surfclam quota would subtract 2,850 bushels from the current average allocation of 31,669 bushels. At an average exvessel value of $12.00 per bushel, the gross value of the quota decrease would equal $34,200 per allocation.

Given the current biological status of the stock, the Council does not believe a quota reduction is warranted at this time, and hence this alternative is not recommended for adoption in 2003.

8.2.2.4 NON-PREFERRED Alternative S3 - Status Quo Surfclam Quota - 3.135 million bushels

Maintaining the current surfclam quota of 3.135 million bushels would result in no change from the status quo.

8.2.2.5 NON-PREFERRED Alternative S5 - 8% Increase in Surfclam Quota - 3.400 million bushels

An 8% increase in the federal surfclam quota would add 2,533 bushels to the current average allocation of 31,669 bushels. At an average exvessel value of $12.00 per bushel, the gross value of the quota

increase would equal $30,396 per allocation.

The Mid-Atlantic Council is not recommending a quota increase of this magnitude at this time, due to uncertainties in the stock assessment.

8.2.3. Impacts of the Ocean Quahog ITQ Quota Alternatives

Direct impacts of quota adjustments will be felt by the 63 entities currently holding ocean quahog ITQ allocations.

8.2.3.1 Preferred Alt. Q3 - Status Quo Ocean Quahog Quota - 4.500 million bushels

Maintaining the current ocean quahog quota of 4.500 million bushels would result in no change from the status quo. Hence, the preferred alternative would have no impact on revenues, compliance costs, or reporting costs for small entities.

8.2.3.2 NON-PREFERRED Alt. Q1 - 12% Decrease in Ocean Quahog Quota - 4.000 million bushels

A 12% decrease in the federal ocean quahog quota would subtract 8,570 bushels from the current average allocation of 71,418 bushels. At an average exvessel value of $6.00 per bushel, the gross value of the quota decrease would equal $51,420 per allocation.

If this quota alternative were adopted for 2003, it is unclear whether it would have any impact in practice. Landings in recent years have been less than the entire optimum yield range in the current FMP. Hence, quota specifications would have only distributional impacts on those entities that were unable to sell their surplus allocation over a period of time.

An alternative scenario would play out only if the recent accelerated landings trend continued, and the quota became binding on industry. In either case, the Council does not believe that a reduction in the quota is warranted at this time.

8.2.3.3 NON-PREFERRED Alt. Q2 - 6% Decrease in Ocean Quahog Quota - 4.250 million bushels

A 6% decrease in the federal ocean quahog quota would subtract 4,285 bushels from the current average allocation of 71,418 bushels. At an average exvessel value of $6.00 per bushel, the gross value of the quota decrease would equal $25,710 per allocation.

8.2.3.4 NON-PREFERRED Alt. Q4 - 6% Increase in Ocean Quahog Quota - 4.750 million bushels

A 6% increase in the federal ocean quahog quota would add 4,285 bushels to the current average allocation of 71,418 bushels. At an average exvessel value of $6.00 per bushel, the gross value of the quota increase would equal $25,710 per allocation.

The Mid-Atlantic Council is not recommending a quota increase for the ocean quahog fishery at this time due to a number of factors. Primary among them is uncertainty in the recent stock assessment, and substantial amounts of unutilized quota in recent years.

8.2.3.5 NON-PREFERRED Alt. Q5 - 33% Increase in Ocean Quahog Quota - 6.000 million bushels

A 33% increase in the federal ocean quahog quota would add 23,568 bushels to the current average allocation of 71,418 bushels. At an average exvessel value of $6.00 per bushel, the gross value of the quota increase would equal $141,408 per allocation.

In practice, it is unlikely that the industry would be able to harvest such a large increase in quota in the short run.

8.2.4. Impacts of the Maine Ocean Quahog Quota Alternatives

The Maine ocean quahog fishery is currently prosecuted by a total of 31 small vessels. The annual quota pertains to the Maine ocean quahog zone, and is not allocated to individual allocation holders as is the case outside of Maine. Once the Maine quota is harvested, fishing may only proceed if quota is rented from the ITQ fishery outside of Maine.

8.2.4.1 Preferred Alt. M3 - Status Quo Maine Ocean Quahog Quota - 100,000 Maine bu.

Maintaining the current Maine ocean quahog quota of 100,000 Maine bushels would result in no

change from the status quo. Hence, the preferred alternative would have no impact on revenues, compliance costs, or reporting costs for small entities.

8.2.4.2 NON-PREFERRED Alt. M1 - 50% Decrease in Maine Ocean Quahog Quota - 50,000 Maine bu.

In 2001, a total of 31 vessels participated in the Maine ocean quahog fishery. It is assumed that if the Maine quota were reduced by 50% to 50,000 Maine bushels, 90% of the reduction would be replaced by renting allocation from the ITQ fishery. This would equal a total of 45,000 bushels rented, at an estimated $1.00 per bushel. Divided amongst the 31 vessels in the fleet, the average cost per vessel would equal $1,395.

8.2.4.3 NON-PREFERRED Alt. M2 - 28% Decrease in Maine Ocean Quahog Quota - 72,466 Maine bu.

It is assumed that if the Maine quota were reduced by 28% to 72,466 Maine bushels, 90% of the reduction would be replaced by renting allocation from the ITQ fishery. This would equal a total of 27,534 bushels rented, at an estimated $1.00 per bushel. Divided amongst the 31 vessels in the fleet, the average cost per vessel would equal $888.

8.2.5. Impacts of the Suspending the Surfclam Minimum Size Limit Alternatives

8.2.5.1 Preferred Alt. - Status Quo - Maintain Surfclam Size Limit Suspension in 2003

Maintaining the suspension of the surfclam minimum size limit would result in no change from the status quo. Hence, the preferred alternative would have no impact on revenues, compliance costs, or reporting costs for small entities.

8.2.5.2 NON-PREFERRED Alt. Allow Surfclam Size Limit to Take Effect in 2003

The current stock is comprised primarily of large, adult individuals, with few small individuals apparent from landings in most areas. Reinstating a minimum size under these conditions would result in greater harm than benefit, as it would require the industry to use "sorting" machines which will often damage undersized clams as it routes them back overboard.

It is expected that adopting this alternative would result in substantial costs to small business entities, without producing a significant compensating benefit to the surfclam resource. Hence, the Mid-Atlantic Council does not recommend adoption of this alternative in 2003.

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