Surfclam and Ocean Quahog Quota Specifications for 2005, 2006, and 2007
Including: Draft Environmental Assessment, Regulatory Impact Review, Initial Regulatory Flexibility Analysis, and Essential Fish Habitat Assessment

October 2004

Mid-Atlantic Fishery Management Council

in cooperation with the

National Marine Fisheries Service

Mid-Atlantic Fishery Management Council
Room 2115, Federal Building
300 South New Street
Dover, Delaware 19904-6790
Tel. 302-674-2331
FAX 302-674-4136

Last Revised: October 26, 2004

Executive Summary

This document provides a summary of relevant information for recommending quotas for surfclams (*Spisula solidissima*) and ocean quahogs (*Arctica islandica*) in Federal waters for 2005, 2006 and 2007. 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 1988) 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) implemented a new overfishing definition for ocean quahogs, identified and described essential fish habitat for both species, implemented a framework adjustment process, and required Operator Permits. Amendment 13 (MAFMC 2003) was approved in January 2004 and provided:

- a new surfclam overfishing definition,
- multi-year fishing quotas,
- a mandatory vessel monitoring system (VMS), when such a system is economically viable,
- the ability to suspend or adjust the surfclam minimum size limit through a framework adjustment, and
- an analysis of fishing gear impacts on Essential Fish Habitat (EFH) for surfclams and ocean quahogs

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. With implementation of Amendment 13, the Council can now recommend multi-year quotas to the Secretary of Commerce that will span the upcoming three years. 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 Mid-Atlantic Council recommends maintaining the Federal surfclam quota for the next three years at the maximum OY of 3.4 million bushels, increasing the ocean quahog quota outside Maine by 333,000 bushels annually, maintaining the status quo quota for the Maine ocean quahog management area, and continuing the suspension of the surfclam size limit.

Table 1. Quota Recommendations for 2005, 2006, and 2007

Year	2005	2006	2007
Surfclams	3.400 mil. bu.	3.400 mil. bu.	3.400 mil. bu.
Ocean Quahogs	5.333 mil. bu.	5.666 mil. bu.	6.000 mil. bu.
Maine Ocean Quahogs	100,000 ME bu.	100,000 ME bu.	100,000 ME bu.

Surfclam Overview

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 the preferred harvest 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 have been present in the 3-mile jurisdictions of the States of New Jersey and New York.

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.

Important Changes in the Surfclam Fishery

The most important development in the surfclam fishery over the past several years has been the dramatic reduction in biomass evident in the New Jersey inshore area, and off the coast of the Delmarva peninsula.

The total stock biomass estimates for the last three assessments were 1.15 million mt in 1997, 1.46 million mt in 1999, and 0.80 million mt in 2002. The reduction in biomass between these last two estimates equates to a 45% decline. A portion of the decline can be explained by a change in a key parameter of the assessment model: the dredge efficiency coefficient. However, a substantial portion of the reduction remained unexplained, and could not be accounted for by fishing removals. Attention has been focused on elevated water temperatures as potentially stressing the animals beyond their tolerance levels. The areas with significantly reduced biomass of surfclams corresponds to the warmer inshore and southern areas.

By contrast, the locations where surfclams appear to be thriving are found to the north, off the coast of New York.

Whatever the cause, the results are clear and beyond question. The surfclam resource within New Jersey state waters is the most closely monitored of any on the East Coast. State officials estimate the biomass declined from 17.4 million bushels in 1997 to 2.78 million in 2003. The New Jersey quota was reduced from 600,000 bushels in the 2002-2003 season to 275,000 bushels in the 2003-2004 season. Fishermen were unable to harvest even this reduced amount, and it is possible that the fishery for the upcoming season will be closed altogether.

Recent Fishery Performance - Surfclams in Federal Waters

- The 3.250 million bushel quota for surfclams in Federal waters was fully harvested in 2003, reflecting continued strong demand for clam products. The quota for 2004 was raised 4.6% to the maximum level allowed by the fishery management plan, or 3.40 million bushels.

- The average ex-vessel price of a bushel of surfclams increased a modest 1.6% to $11.39 in 2003. Most trips were reported within a range of $9.50 - $12.90 per bushel, with a small percentage reaching $15.00. The total ex-vessel value of the 2003 Federal harvest was approximately $37.04 million. [Note that price and value statistics presented in this document are those reported by industry processors and dealers. Prior documents relied on values reported by vessels.]

- Hours of fishing effort deployed in the Federal surfclam fishery increased by another 14% in 2003. Following on the heels of major increases in the prior two years, the industry has increased effort by 69% overall since the year 2000.

- Increases in fishing effort have been necessary in order to harvest the 27% increase in the Federal quota since the year 2000, and to offset steady declines in the productivity of effort. As measured by the average number of bushels harvested in an hour of fishing, a fleet-wide calculation of surfclam Landings Per Unit of Effort (LPUE) declined by 7.6% in 2003 to 97 bushels per hour. Looking back across the past 3 years, the average productivity of an hour fished has declined by 25% (Appendix Table 1).

- Preliminary harvest data from the initial months of 2004 indicate a continued erosion in catch rates. Average fleet LPUE fell an additional 10% to 87 bushels per hour on those surfclam trips reported as of May 27, 2004 (Appendix Figure 1).

- A further development of concern in the surfclam fishery is the heightened dependence on a single degree square off New Jersey. The 3973 degree square has long been a mainstay of the fleet, providing between 42% and 62% of all EEZ landings in recent years . In 2003 this dependence increased to 69% of Federal harvests, and in early 2004 jumped to nearly 75%.

Uncertainty and Multi-Year Quotas in the Surfclam Fishery

A request for multi-year quotas was first proposed by industry in the late 1990s as a way to allow for longer planing horizons. Government agencies (MAFMC and NMFS) would also benefit with the reduced workload involved in establishing quotas every three years, as opposed to annually. Resource conditions were considered stable so the Council incorporated multi-year quotas into Amendment 13.

Given the heightened uncertainty in the status of the surfclam resource, the current environment may seem less suited to the application of multi-year quotas. While the government is now obliged to specify quotas for the upcoming three years, the ability to change the quota for years 2 and 3 still exists. The public should be aware of this, and adjust their expectations accordingly.

Ocean Quahog Overview

Ocean quahogs are found in the colder, deeper waters of the shelf 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. The exceedingly slow growth rate has given rise to such descriptions as "living rocks," or "miniature redwood trees." They require between twenty-five and forty 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.

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 ex-vessel price (approximately $6.00 per bushel in 2003 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.

The small-scale fishery for ocean quahogs in Maine provides a stark contrast to the industrial fishery that takes place off the coast of the mid-Atlantic states up to Massachusetts. Small vessels in the 35-45 ft range actively target smaller ocean quahogs for the fresh, half shell market. Most of the catch is trucked directly out of state and brings an ex-vessel price that ranges from $37 - $48 per Maine bushel.

Recent Fishery Performance - Ocean Quahogs - (Excluding Maine fishery)

- The year 2003 saw a continuation of the renewed interest in the ocean quahog fishery, fueled by the sharp price increase of 2001, and the improved efficiency of newly constructed vessels. 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. In 2001 landings jumped almost 17%; in 2002 they increased 4.9%; and in 2003 they rose another 5.3% to 4.08 million bushels.

- A total of 27 vessels participated in the 2003 fishery, a reduction of 13% from the 31 vessels participating in 2002. Several of these vessels are large, new boats that were built since 2000, and their high productivity has contributed substantially to the increase in ocean quahog landings.

- Of the 4.5 million bushel quota for 2003, approximately 12,200 bushels were leased to the Maine fishery, 4.08 million were harvested by the industrial fishery outside of Maine, and approximately 411,000 bushels were left unharvested on the ocean floor.

- The sharp ex-vessel price increase of 2001 has been maintained through 2003. Most trips were reported within a range of $5.00 to $6.10 per bushel, with a small percentage reaching $6.25 per bushel. The average price reported by processors was $5.73 per bushel in 2003, down only a penny from 2002. Verbal reports from industry members have indicated that trucking costs, and whether the vessel owner or processor is responsible for paying them, can significantly influence the price paid to a vessel. The total ex-vessel value of the 2003 Federal harvest outside of Maine was approximately $23.36 million.

- Reported hours of fishing effort deployed in the ocean quahog fishery increased by 12% in 2003. The average number of trips taken per vessel increased from 64 to 72.

- A fleet-wide calculation of LPUE showed that the average number of bushels harvested per hour of fishing decreased by 6.3% from 126 to 118 in 2003 (Appendix Table 2). Examination of a graph of ocean quahog LPUE over the past 20 years looks something like a roller coaster ride, with many peaks and valleys (Appendix Figure 2). Each 'hill' illustrates the pattern of improving productivity as the fleet moves to a new area of virgin biomass, and each valley the decline in productivity as that resource is fished down.

- Preliminary harvest data from the initial months of 2004 indicate an improvement in catch rates. Average fleet LPUE jumped to 133 bushels per hour on those ocean quahog trips reported as of May 27, 2004.

- Harvests of ocean quahogs became slightly more concentrated on the high-yielding degree square off eastern Long Island (4072). Fully 53% of the coastwide quota was taken from this square. The second most heavily fished degree square in 2003 was the adjacent square to the west (4073) off western Long Island (Appendix Figure 3).

- Some fishing for ocean quahogs does persist in the southern waters off Delmarva (3873 and 3874). Roughly 17% of the 2003 catch was taken from these waters, though their average catch rates have continued to decline to below 80 bushels per hour fished.

- 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 since 1990, due to the presence of PSP toxin. Vessels responded to this barrier by pursuing ocean quahogs in the deeper waters farther from shore; however, there are indications that only limited quantities of ocean quahogs are available in these areas.

Key Aspects of the Surfclam and Ocean Quahog Fisheries

There are a number of important aspects of the surfclam and ocean quahog fisheries that distinguish them from most other fisheries in the US, and around the world. In many ways, participants in the clam fisheries are fortunate in their ability to conduct their business operations efficiently and profitably, without many of the complications and liabilities experienced by most other fisheries.

- **<u>Resources Healthy - No Extreme Management Measures Necessary</u>** The surfclam and ocean quahog resources are considered to be in overall good health. This condition negates the need for many of the harshest management measures, which can greatly reduce efficiency and profitability.

- **<u>Single Species Fisheries with No Significant Bycatch</u>** Industry is able to harvest both surfclams and ocean quahogs individually, with no significant bycatch of any other species. This greatly simplifies management and reduces the need for gear restrictions to reduce the harvest of non-target species.

- **<u>No Interactions with Protected Species</u>** The hydraulic dredge is not known to have any impacts on marine mammals, turtles, seabirds or other species protected by law.

- **No Significant Gear Conflicts** There have been no reports of gear conflicts in Federal waters between clam fishermen utilizing hydraulic dredges and other types of fishing gear, whether mobile or stationary.

- **Impacts to Essential Fish Habitat (EFH) are Minimal and Temporary** The prime habitat of surfclams and ocean quahogs consists of sandy substrates with no vegetation or benthic 'structures' that could be damaged by the passing of a hydraulic dredge. In these 'high energy' environments, it is thought that the recovery time following passage of a clam dredge is relatively short. Additionally, the overall area impacted by the clam fisheries is relatively small (approximately 100 square nautical miles), compared to the large area of high energy sand on the continental shelf. Any impacts to EFH are considered temporary and minimal.

- **No Recreational Fisheries** There are no recreational fisheries for either Atlantic surfclams or ocean quahogs. Management efforts focus solely on commercial harvests.

- **Harvests Stable** Quota management utilizing ITQs in the Federal clam fisheries have allowed for relatively stable harvests over time.

- **ITQ Management Promotes Efficiency and Profitability** Managing surfclams and ocean quahogs with tradeable shares of the annual quota has provided industry with enormous flexibility and removed all incentives for derby fishing. Vessel owners can readily plan to harvest their quota at any time throughout the year. Supply disruptions are eliminated when fishermen are no longer faced with closures imposed to prevent a seasonal, group quota from being exceeded. Profitability and efficiency are dramatically enhanced when unneeded vessels can be sold out of a fishery that has adopted ITQ management. Effort management systems which tie harvest rights to individual vessels make it difficult for excess capital to find more productive uses elsewhere in an economy.

- **Reduced Enforcement Costs** A number of benefits were realized in the area of enforcement following the transition to ITQ management in 1990. Major cost savings resulted when enforcement activity shifted from watching vessels at sea with expensive Coast Guard cutters and aircraft to monitoring clam transportation containers on land. Incentives for cheating were drastically reduced once allocation holders were faced with the prospect of forfeiting the allocation itself for repeated violations. Additionally, the improved efficiency derived from ITQ management has improved the profitability of the clam industry as a whole. Consequently, is it less likely that industry members will feel compelled to break the law due to financial stress in their business operations.

Quota Specifications

Table 2. Alternatives for 2005, 2006, and 2007 ITQ Fisheries.				
Surfclams				
	Description	2005 Quota (bu)	2006 Quota (bu)	2007 Quota (bu)
Alt. S1	Min. Allowable	1.850 million	1.850 million	1.850 million
Alt. S2	Slight Decrease	3.250 million	3.250 million	3.250 million
Alt. S3**	Status Quo	3.400 million	3.400 million	3.400 million
Alt. S4	No Action (Quota Removed)	Unlimited	Unlimited	Unlimited
Ocean Quahogs				
	Description	2005 Quota (bu)	2006 Quota (bu)	2007 Quota (bu)
Alt. Q1	Min. Allowable	4.000 million	4.000 million	4.000 million
Alt. Q2	Status Quo	5.000 million	5.000 million	5.000 million
Alt. Q3**	Steady Annual Increase	5.333 million	5.666 million	6.000 million
Alt. Q4	Max. Allowable	6.000 million	6.000 million	6.000 million
Alt. Q5	No Action (Quota removed)	Unlimited	Unlimited	Unlimited
** Recommendation				

Table 3. Alternatives for 2005, 2006, and 2007 Maine Ocean Quahog Fishery				
	Description	2005 Quota	2006 Quota	2007 Quota
Alt. M1	50% of Max. Quota	50,000 Maine Bu.	50,000 Maine Bu.	50,000 Maine Bu.
Alt. M2	Status Quo less Previous Year Quota Overage	92,500 Maine Bu.	Unknown	Unknown
Alt. M3**	Max Allowable - Status Quo	100,000 Maine Bu.	100,000 Maine Bu.	100,000 Maine Bu.
Alt. M4	No Action (Quota removed)	Unlimited	Unlimited	Unlimited
** Recommendation				

Surfclam ITQ Quota Recommendation for 2005, 2006, and 2007: 3.400 million bushels

The Council identified four alternative quotas for the years 2005, 2006, and 2007. Since the 2004 quota of 3.4 million bushels is the maximum OY and the maximum allowable under the FMP, the two alternatives which would decrease the quota correspond to the minimum allowed under the FMP and the 2003 quota of 3.25 million bushels. The Council voted to recommend maintaining the maximum OY quota of 3.4 millions bushels for the following reasons.

The picture we have of the surfclam resource and fishery is complex, and has elements that can and do change from year to year. Yet the bottom line is that the best scientific advice we currently have indicates that maintaining the annual quota at the maximum OY level of 3.4 million bushels is sustainable. Our most recent biological assessment in 2003 indicated that the resource is composed of many age classes, is not overfished, and overfishing is not occurring.

There are a number of factors that argue for a cautious approach in the management of this resource in the years ahead. The most important of these includes the steady decline in fleet LPUE that has accompanied the large, sustained harvests off New Jersey. Additionally, the lack of surfclam recruitment in the warmer inshore waters of New Jersey strongly suggests that future harvests from that resource area will be severely reduced.

There are also significant uncertainties that remain in the biological assessments. Estimates of key parameters have experienced substantial variation between assessments. For example, the estimate of total biomass increased 27% from 1997 to 1999, and then plummeted 45% from 1999 to 2002. Additional data, time, and refinement of methods will be required to reduce that uncertainty in the future.

Finally, there was an industry sponsored survey in cooperation with the NEFSC in the summer of 2004. The focus of this survey was the New Jersey and the Delmarva stock assessment areas and not the entire range of the resource. The reason for this southern focus is the hypothesis that global warming is affecting the surfclam resource on its southern and inshore boundaries. This issue alone may warrant changes in the multi-year quotas as the resource is assessed in the future.

On a more encouraging note, the underutilization of the New York inshore surfclam quota has ended. There have been at least anecdotal reports of new surfclam recruits in a number of areas, particularly off New York, and in deeper waters.

Ocean Quahog ITQ Quota Recommendation for 2005, 2006, and 2007: steady increase during the three years with quotas of 5.333, 5.666, and 6.000 million bushels

The Council identified five alternative ocean quahog quotas and voted to recommend Alternative Q3, with steadily increasing quotas. As with the recommendation for surfclams, the primary reason for the increase is that the best scientific advice currently available to the Council suggests that an increase is sustainable to the maximum OY level allowed by the FMP.

The Council believes that the life history of ocean quahogs warrants a particularly conservative approach in its management, but that increasing the quota is sustainable. As will be discussed in other sections, 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, with many having been aged at over 200 years.

Research indicates that vast quantities of ocean quahogs remain in the ocean, in spite of decades of harvests that have removed many of the densest concentrations. A question that has vexed managers for years is at what point the remaining ocean quahog resources might become uneconomical to harvest, given the lower value they have historically commanded in the marketplace. Recent price increases and the deployment of efficient new vessels have served to allay these concerns.

A final reason for the recommended increase is in response to the expected reduction of the surfclam quota in New Jersey state waters. Current indications are that the reduction may be severe, and the Council wishes to consider supporting increased access to ocean quahogs in an effort to maintain current supplies of clam meats as the industry adjusts to the change.

Maine Ocean Quahog Quota Recommendation for 2005, 2006, and 2007: 100,000 Maine bushels

The Mid-Atlantic Council recommends that the Maine ocean quahog quota remain unchanged for the next three years at the initial maximum quota level of 100,000 Maine bushels (1 bushel = 1.2445 cubic feet). This quota pertains to the zone of both state and Federal waters off the eastern coast of Maine north of 43^{O} $50^{'}$ north latitude. Amendment 10 established management measures for this small artisanal fishery for ocean quahogs and was implemented in 1998.

Until a survey and assessment of the ocean quahog resource off Maine is completed and the maximum quota level adjusted, it is anticipated that some Maine fishermen will rent ITQ allocation after the 100,000 bushel quota is reached. Work on a survey and subsequent assessment has been initiated, and it is hoped that results will be available for setting the quota in the near future after the Maine analyses are peer-reviewed in a SARC. It is likely that a survey in Maine will take two years with an assessment presented to the SARC the next time ocean quahogs are scheduled to be reviewed in 2007.

Surfclam Size Limit Suspension

The Mid-Atlantic Council is recommending that the minimum size limit on surfclams be suspended again for the next three years, as it has been since implementation of Amendment 8 (MAFMC 1990). Current assessment information indicates that the stock is composed primarily of larger, adult clams 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 often damage/destroy undersized clams as it routes them back overboard.

2.0 LIST OF ACRONYMS

ACCSP	Atlantic Coastal Cooperative Statistics Program
B	Biomass
CEQ	Council on Environmental Quality
EA	Environmental Assessment
EEZ	Exclusive Economic Zone
EFH	Essential Fish Habitat
EIS	Environmental Impact Statement
F	Fishing Mortality Rate
FR	Federal Register
FMP	Fishery Management Plan
IRFA	Initial Regulatory Flexibility Analysis
ITQ	Individual Transferrable Quota
M	Natural Mortality Rate
MAFMC	Mid-Atlantic Fishery Management Council
MSY	Maximum Sustainable Yield
mt	metric tons
NEFSC	Northeast Fisheries Science Center
NEPA	National Environmental Policy Act
NERO	Northeast Regional Office
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NOAA AO	National Oceanic and Atmospheric Administration Administrative Order
PRA	Paperwork Reduction Act
PREE	Preliminary Regulatory Economic Evaluation
PSP	Paralytic Shellfish Poison
RIR	Regulatory Impact Review
SARC	Stock Assessment Review Committee
SAV	Submerged Aquatic Vegetation
SAW	Stock Assessment Workshop
SSB	Spawning Stock Biomass
SFA	Sustainable Fisheries Act
VECs	Valuable Environmental Components
VTR	Vessel Trip Report

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APPENDICES

4.0 INTRODUCTION AND BACKGROUND OF SPECIFICATION PROCESS

4.1 Introduction and Purpose and Need for the Action

This document provides a summary of relevant information for recommending quotas for surfclams (*Spisula solidissima*) and ocean quahogs (*Arctica islandica*) in Federal waters for 2005, 2006 and 2007. 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* (MAFMC 1977) and subsequent Amendments to the Plan (MAFMC 1979a, 1979 b, 1981, 1984, 1986, 1987, 1988, 1996, 1998, 1999, and 2003). Amendment 8 (MAFMC 1988) 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 implemented a new overfishing definition for ocean quahogs, identified and described essential fish habitat for both species, implemented a framework adjustment process, and required Operator Permits. Amendment 13 (MAFMC 2003) was implemented in January 2004. Amendment 13 was designed to address the disapproved surfclam overfishing definition, the disapproved fishing gear impacts to essential fish habitat (EFH) discussion, allow for multi-year quotas, allow for a vessel monitoring system (VMS) and add to the list of framework measures the suspension of the surfclam minimum size limit and adjustment of the minimum size.

The primary tool in the management of surfclams and ocean quahogs in Federal waters is the review and specification of quotas, which are allocated to the holders of allocation shares at the beginning of each calendar 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.

Regulations implementing the FMP (50 CFR 648) provide that the Secretary of Commerce (Secretary) will 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.

Beginning in 2005, the amount of surfclams or ocean quahogs that may be caught annually by fishing vessels subject to these regulations will be specified for a 3-year period by the Regional Administrator on or about December 1, 2004 (50 CFR 648.71(a)). The initial 3-year specification will be based on the most recent available survey and stock assessments for Atlantic surfclams and ocean quahogs. Subsequent 3-year specifications of the annual quotas will be accomplished on or about December 1 of the third year of the quota period, unless the quotas are modified in the interim. On an annual basis, MAFMC staff will produce an Atlantic surfclam and ocean quahog annual quota recommendation paper to the MAFMC based on the latest available stock assessment report prepared by NMFS, data reported by harvesters and processors, and other relevant data, as well as the information identified below. 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.

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 1988). 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-Stevens 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 2005, 2006 and 2007 recommendation voted by the Mid-Atlantic Council:

Table 4. Surfclam and Ocean Quahog Past Quotas and Future Recommendations Since Implementation of the ITQ Program in 1990.

	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 Quota	3.250	4.500
2004 Quota	3.400	5.000
2005 Recommendation	**3.400**	**5.333**
2006 Recommendation	**3.400**	**5.666**
2007 Recommendation	**3.400**	**6.000**

4.2 Management Objectives and Management Unit of the FMP

The objectives of the FMP, since implementation of Amendment 8, have been and continue as:

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.

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.*

5.0 MANAGEMENT ALTERNATIVES BEING CONSIDERED

5.1 Surfclam *(Spisula solidissima)* Quota

5.1.1 Preferred Alternative (S3) - 3.400 Million Bushels (Status Quo)

The Council's preferred alternative quota for the next three years for the surfclam fishery is 3.400 million bushels, which is the same as the 2004 quota. This preferred alternative meets the 2003 SAW recommendation: "Although the stock is above B_{MSY}, uncertainty in the current level and future trend in biomass suggest that substantial increases in catch levels are not advised. In addition, because surfclams are sedentary and fishing is concentrated in relatively small areas, it may be advantageous to avoid localized depletions" (USDC 2003).

The three most recent biological assessments (from the 1997, 1999, and 2002 surveys) indicate the resource is healthy, composed of many age classes, and can safely sustain increased harvests. The F in 2003 associated with a quota of 3.25 million bushels was approximately 0.03 and these same quotas may result in an F in 2005, 2006, and 2007 of about 0.04 which is well below the overfishing definition.

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 because of paralytic shellfish poisoning. This area has been closed to the harvest of clams and other shellfish since 1990.

5.1.2 Alternative S1 - 1.850 Million Bushels

The first non-preferred alternative quota for the 2005, 2006, and 2007 surfclam fishery is 1.850 million bushels. This quota is the minimum of the OY range as required by the FMP.

The 1.850 million bushel alternative represents nearly a 50% decline from the 3.4 million bushel quota which had been implemented in 2004. The direct impact would be that surfclam allocation owners would each receive only about half the cage tags that they had in 2004. 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 for the next three years.

In 2003, 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, state landings have increased since 1999.

5.1.3 Alternative S2 -- 3.250 Million Bushels

The second non-preferred alternative quota for 2005, 2006, and 2007 surfclam fishery is the 2003 quota of 3.250 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 2003. This 5% decrease in quota (from 2004) could be constraining on the industry as it has been steadily growing since the 2000 quota of 2.565 million bushels. In 2003, 100% of the EEZ quota was landed.

The direct impact would be that surfclam allocation owners would each receive about five percent less cage tags that they had in 2004. All allocation owners would be affected proportionally (5%) 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 for the next three years. Reducing the quota for the next three years could possibly affect the long-term growth of the industry, if industry is correct and the total demand for both species of clams is growing.

5.1.4 Alternative S4 – No Action (Quota Removed)

Section 5.03 (b) of NOAA Administrative Order 216-6, "Environmental review procedures for implementing the National Environmental Policy Act," states that "an Environmental

Assessment (EA) must consider all reasonable alternatives, including the preferred action and the no action alternative". Consideration of the "no action" alternative is important because it shows what would happen if the proposed action is not taken. Under the no action alternative, the quotas, which determine the maximum amount of landings of surfclams and ocean quahogs would not be implemented for 2005, 2006, or 2007. The implications of the no action alternative are substantial. The no action alternative would not allow NMFS to specify and implement catch limits for these fisheries, as required in the regulations at 50 CFR part 648. Monitoring the landings is essential for these fisheries and forms the backbone of the current management system under the FMP. Implementation of the no action alternative would be inconsistent with the goals and objectives of the FMP and its implementing regulations. The no action alternative, because it would very likely result in overfishing is also inconsistent with National Standard 1 of the Magnuson-Stevens Act. Thus, the no action alternative is not considered to be a reasonable alternative to the preferred action and is not analyzed further in this EA.

5.2 Surfclam Minimum Size Limit

5.2.1 Preferred Alternative 1 (Suspension of Minimum Size – Status Quo)

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 reach 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. The current stock is comprised of large, adult individuals, with few small individuals apparent from landings in most areas (USDC 2003). 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 2005, 2006 and 2007, as has been done every year since 1990. Continuing the suspension will have no impact on the current fishery or resource.

5.2.2 Alternative 2 (No Action)

Alternative 2 would implement the reverse of Alternative 1, and the 4.75 inch minimum surfclam size limit would be implemented. The Hermsen and Witzig 2002 report identifies that only 12 percent of the landed clams were smaller than 4.75 inches. It is believed that there are no current at sea discards. Survival rates of discarded clams are 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 most recent SARC (USDC 2003) considers this resource "is not overfished and overfishing is not occurring".

5.3 Ocean Quahog *(Arctica islandica)* Quota

5.3.1 Preferred Alternative (Q3) -- 5.333 (2005), 5.666 (2006), and 6.0 (2007) Million Bushels

The Council proposes a 2005 ocean quahog quota of 5.333 million bushels, a 2006 quota of 5.666 million bushels, and a 2007 quota of 6.0 million bushels, which is an increase over the 5.0 million bushel 2004 quota. There is no biological reason that the resource can not support this level of quota given the most recent stock assessments (USDC 1998b, 2000b and 2004). 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 previous 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 (MAFMC 2003).

5.3.2 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.

As with the surfclam resource, the vast majority of ocean quahogs which are left unharvested in the next three years 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.

5.3.3 Alternative Q2 - Status Quo - 5.000 Million Bushels

Maintaining the status quo yields a quota of 5.000 million bushels for 2005, 2006, and 2007. 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 past three surveys and 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 grow. They recommended a 2004 quota that allowed the industry to continue to grow. Industry has requested that they be allowed to continue to grow up to the maximum.

As with the surfclam resource, the vast majority of ocean quahogs which are left unharvested in the next three years 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.

5.3.4 Alternative Q4 - 6.000 Million Bushels

This is the maximum of the OY range for ocean quahog quotas and would be a quota increase of 20% above the status quo. Bottom habitat may be more negatively impacted as roughly 20% more ocean quahogs would be removed.

5.3.5 Alternative Q5 - No Action (Quota Removed)

Section 5.03 (b) of NOAA Administrative Order 216-6, "Environmental review procedures for implementing the National Environmental Policy Act", states that "an Environmental Assessment (EA) must consider all reasonable alternatives, including the preferred action and the no action alternative". Consideration of the "no action" alternative is important because it shows what would happen if the proposed action is not taken. Under the no action alternative, the quotas, which determine the maximum amount of landings would not be implemented. The implications of the no action alternative are substantial. The no action alternative would not allow NMFS to specify and implement catch limits, as required in the regulations at 50 CFR part 648. Monitoring the landings is essential for these fisheries and forms the backbone of the current management system under the FMP. Implementation of the no action alternative would be inconsistent with the goals and objectives of the FMP and its implementing regulations. The no action alternative, because it would likely result in overfishing is also inconsistent with National Standard 1 of the Magnuson-Stevens Act. Thus, the no action alternative is not considered to be a reasonable alternative to the preferred action and is not analyzed further in this EA.

5.4 Maine Ocean Quahog (*Arctica islandica)* Quota

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

Four 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 the next three years remain unchanged at the initial maximum quota of 100,000 Maine bushels (1 bushel = 1.2445 cubic ft).

5.4.2 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 2003 and 2002 as well as the 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 ocean quahog is currently unknown, the ocean quahog fishery overall is not overfished and overfishing is not occurring. Therefore, until such time that additional information is provided for this fishery (a stock assessment may be available in three years), it would be constraining to the industry to reduce the harvest significantly below the status quo quota to 50,000 Maine bushels for 2005, 2006, and 2007.

5.4.3 Alternative M2 – 92,500 Maine bushels or whatever the previous years overage is subtracted from the maximum harvest level

Alternative M2 corresponds to the maximum harvest level minus the previous years overage for the next three years, which would result in a reduction of the allowable harvest. There is no real justification in the FMP or the regulations to subtract one year's overage from the next year's level of harvest for this resource. These Maine fishermen have worked hard to build the market, and a stock assessment for this portion of the resource should be available in a few years.

5.4.4 Alternative Q5 - No Action (Quota Removed)

Section 5.03 (b) of NOAA Administrative Order 216-6, "Environmental review procedures for implementing the National Environmental Policy Act", states that "an Environmental Assessment (EA) must consider all reasonable alternatives, including the preferred action and the no action alternative". Consideration of the "no action" alternative is important because it shows what would happen if the proposed action is not taken. Under the no action alternative, the quotas, which determine the maximum amount of landings of surfclams and ocean quahogs would not be implemented for 2005, 2006, or 2007. The implications of the no action alternative are substantial. The no action alternative would not allow NMFS to specify and implement catch limits for these fisheries, as required in the regulations at 50 CFR part 648. Monitoring the landings is essential for these fisheries and forms the backbone of the current management system under the FMP. Implementation of the no action alternative would be inconsistent with the goals and objectives of the FMP and its implementing regulations. The no action alternative, because it would very likely result in overfishing is also inconsistent with National Standard 1 of the Magnuson-Stevens Act. Thus, the no action alternative is not considered to be a reasonable alternative to the preferred action and is not analyzed further in this EA.

6.0 DESCRIPTION OF THE AFFECTED ENVIRONMENT AND FISHERIES

6.1 Description of Surfclam and Ocean Quahog Resources

6.1.1 Surfclam Resource

Surfclams are bivalve mollusks which are distributed in the western North Atlantic from the southern Gulf of St. Lawrence to Cape Hatteras North Carolina. Commercial fisheries have generally concentrated on the populations of surfclams which have flourished in the sandy shallow ocean sediments off the coasts of New Jersey and the Delmarva peninsula. Growth rates are relatively rapid, with surfclams reaching preferable/harvestable size (approximately 5 inches) in about five to 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.

Note: the following "State of the Stock," and "Management Advice," sections are taken directly from the 37th SARC advisory report (Appendix 3), and 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 the Stock: The surfclam stock in the EEZ is not overfished and overfishing is not occurring. Total biomass was estimated at 1.1 million mt in 1997 and 1.5 million mt in 1999, but declined in 2002 to 0.8 million mt (B_{MSY} = 0.7 mmt). Clam catch was not great enough to account for the apparent decline in biomass between 1999 and 2002. The majority of the catch is from Northern New Jersey (NNJ), which contains about 39% of the stock biomass. Annual fishing mortality rates (F) in 1999 and 2002 were 0.02 and 0.03 for the whole resource; 0.02 and 0.05 for the whole resource excluding Georges Bank; 0.03 and 0.05 for the NNJ region; and 0.04 and 0.08 for the southern New Jersey (SNJ) region (FMSY = 0.15).

Management Advice: Although the stock is above B_{MSY}, uncertainty in the current level and future trend in biomass suggests that substantial increases in catch levels are not advised. In addition, because surfclams are sedentary and fishing is concentrated in relatively small areas, it may be advantageous to avoid localized depletion.

6.1.2 Ocean Quahog Resources

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.

Ocean quahogs are one of the longest-living, slowest growing marine bivalves in the world. 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," and "Management Advice," sections are taken directly from the 38th SARC advisory report (Appendix 4), and 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 the 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, current fishing mortality (F= 0.014 for the exploited area, Efficiency-Corrected Swept Area Biomass (ESB) Model is 50% of the target (F0.1= 0.028; note: the value of F0.1, the target F, was recalculated for this assessment). Unlike in most marine populations, which may show large and variable recruitment, annual recruitment is approximately 0-2% of stock biomass. Since the fishery began in the late 1970s, biomass has declined slowly. The percentage of the 1977 biomass remaining in 2002 in the assessed area is 80% (all regions) and 72% (exploited regions only; i.e. all regions except Georges Bank). Biomass and exploitation status of ocean quahog in the Gulf of Maine are unknown because the efficiency of the dredge used to do the Maine survey has not been determined.

Management Advice: Maintaining status quo exploitation rates should result in a sustainable biomass approximately equal to the B_{MSY}. In addition, because ocean quahogs are sedentary and fishing is concentrated in relatively small areas, it may be advantageous to avoid localized depletion.

A thorough description of what is known of the inshore Maine ocean quahog resource in terms of age and growth is provided in Amendment 13 (MAFMC 2003). The State of Maine hired a clam scientist and work on a survey was begun in 2002, but budgetary constrains prevented the continuation of the research after 2003. It is hoped that with the taxes now being dedicated, that actual survey and assessment work can be completed for this resource and the results will be peer-reviewed at the 2006 SARC.

6.2 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. There is no new information to update these sections at this time.

Amendment 12 (MAFMC 1999) identified and described essential fish habitat for surfclams and ocean quahogs in section 2.2.2. No new habitat information is known to exist 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 farther offshore between Cape Cod and Cape Hatteras.

The spatial scale of fishing effort of clam dredges 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 which are not as concentrated off of New Jersey. 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. As a general rule, 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 (Wallace and Hoff 2004a). 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 temporary and minimal impacts associated with hydraulic clam dredges are fully described in section 7.5.5 of this document. 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 degrees 50' 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 fishing effort of the "dry" dredge in the Maine ocean quahog fishery is depicted in Figure 39 of Amendment 13.

6.3 Description of Endangered and other Protected Resources

There are numerous species which inhabit the environment within 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). Sixteen are classified as endangered or threatened under the ESA, while the remainder are protected by the provisions of the MMPA. The Council has determined that the following list of species protected either by the Endangered Species Act of 1973 (ESA), the Marine Mammal Protection Act of 1972 (MMPA), or the Migratory Bird Act of 1918 may be found in the environment utilized by Atlantic surfclam and ocean quahog fisheries:

Cetaceans

Species	Status
Northern right whale (*Eubalaena glacialis*)	Endangered
Humpback whale (*Megaptera novaeangliae*)	Endangered
Fin whale (*Balaenoptera physalus*)	Endangered
Blue whale (*Balaenoptera musculus*)	Endangered
Sei whale (*Balaenoptera borealis*)	Endangered
Sperm whale (*Physeter macrocephalus*	Endangered
Minke whale (*Balaenoptera acutorostrata*)	Protected
Beaked whales (*Ziphius and Mesoplodon spp*.)	Protected
Risso's dolphin (*Grampus griseus*)	Protected
Pilot whale (*Globicephala spp*.)	Protected
White-sided dolphin (*Lagenorhynchus acutus*)	Protected
Common dolphin (*Delphinus delphis*)	Protected
Spotted and striped dolphins (*Stenella spp*.)	Protected
Bottlenose dolphin (*Tursiops truncatus*)	Protected

Sea Turtles

Species	Status
Leatherback sea turtle (*Dermochelys coriacea*)	Endangered
Kemp's ridley sea turtle (*Lepidochelys kempii*)	Endangered
Green sea turtle (*Chelonia mydas*)	Endangered
Hawksbill sea turtle (*Eretmochelys imbricata*)	Endangered
Loggerhead sea turtle (*Caretta caretta*)	Threatened

Fish

Species	Status
Shortnose sturgeon (*Acipenser brevirostrum*)	Endangered
Atlantic salmon (*Salmo salar*)	Endangered
Smalltooth sawfish (*Pristis pectinata*)	Endangered

Birds

Species	Status
Roseate tern (*Sterna dougallii dougallii*)	Endangered
Piping plover (*Charadrius melodus*)	Endangered

Critical Habitat Designations

Species	Area
Right whale	Cape Cod Bay

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.* (2002). 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*, and in Appendix 5 of this document.

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 only gear used for the surfclam and ocean quahog fisheries is clam dredges which are now included in the List of Fisheries for 2004, as a Category III fishery (50 CFR Part 229 -- Final Rule) for the taking of marine mammals by commercial fishing operations under Section 118 of the Marine Mammal Protection Act (MMPA) of 1972. In addition, the proposed actions will not significantly increase fishing effort. As such, minimal interaction is expected between clam dredging gear and protected species. According to the List of Fisheries for 2004, there are no documented interactions/takes in this fishery.

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.

6.4 Description of Fishery and Socio-economic Environment

6.4.1 Port and community description

For Amendment 13 (MAFMC 2003) 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.

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 and Beals Island areas 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.

6.4.2 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 2002, but then returned to more of the previous half dozen years average of 50 vessels in 2003. Of importance in recent years was the loss of four vessels in weather-related accidents in January and February of 1999. During 2002, four vessels of new construction had commenced fishing operations to fill the gap created by the accidents in 1999.

Table 5. Federal Fleet Profile, 1996 through 2003								
Non-Maine Vessels	1996	1997	1998	1999	2000	2001	2002	2003
Harvests BOTH surfclams & ocean quahogs	14	14	8	11	12	14	16	11
Harvests only surfclams	20	19	23	22	19	21	23	23
Harvests only ocean quahogs	22	17	16	12	17	16	15	16
Total Non-Maine Vessels	56	50	47	45	48	51	54	50
Maine Ocean Quahog Vessels	25	34	39	38	34	31	35	37
Source: NMFS Clam Vessel Logbooks								

The major fleet shift which was apparent over the past decade 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 (i.e. those that did not "harvest only surfclams") dropped by more than one-third over the same interval (from 36 to 23 vessels).

6.4.3 Fleet age

At the end of 2003, the average age of a vessel participating in the Federal surfclam fishery was 23.4 years.

Newest = Four Daughters (less than 1 year old - built 2003)
Oldest = Michael Aaron (37 years old - built 1966)

Of those vessels participating in the Federal ocean quahog fishery, the average age was 22.6 years.

Newest = ESS Pursuit (each less than 1 year old - built 2003)
Oldest = Wando River (47 years old - built 1957)

6.4.4 Processing sector

As of 2003 there were a total of 9 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, with plants in Milford, Delaware and New Bedford, Massachusetts. Listed from north to south, the processors are arrayed as follows:

- Massachusetts
  - Fair Tide Shellfish LTD.
  - Sea Watch International, New Bedford Plant
- Rhode Island
  - Blount Seafood Corp.
  - Galilean Seafood Inc.

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

Delaware
- Sea Watch International, Milford Plant

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 as of 2003:

1. A C Inc.
2. Al's Seafood
3. Atlantic Shellfish
4. Beals Lobster Co., 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. Old Salt Seafood

6.4.5 Fisheries for surfclams

6.4.5.1. The New Jersey Inshore Fishery for Surfclams

New Jersey manages one of the two largest state fisheries for surfclams. They conduct a survey every summer and produce a surfclam resource report every three or four years. The total surfclam standing stock for New Jersey territorial waters from Shark River Inlet to Cape May in 2003 was 2.78 million bushels. (Survey work in 2004 has just been completed as of mid-August, but estimated biomass figures have not yet been developed. Unofficially, it appears that the 2004 biomass will be near the 2003 biomass, Normant pers. comm.) Annually, the state surveys about 330 stations. The biomass of inshore New Jersey has fallen precipitously and continuously from the high in 1997 of 17.4 million bushels. The overall length-frequency distributions of the surfclam resource has not changed dramatically, but the mean shell lengths have been steadily increasing since 1993. The mean shell length of surfclams found in 1993 was 3.9 inches and has steadily increased to a mean shell length of 5.5 inches in 2003. The number of clams per bushel has also decreased (from the increase in the mean size) from 202 clams per bushel in 1995 to 90 clams per bushel in 2003. This points out that while the volume (biomass) is down, the actual number of individuals is down even further. The most notable difference recently has been the lack of clams collected that were less than 2.7 inches in the last several years. During the past four completed surveys (2000, 2001, 2002, and 2003), there have been less than 100 total clams collected that were less than the 2.7 inches, whereas during the 1990s there were thousands of small clams collected in each individual survey (Normant pers. comm.).

The majority of the surfclam 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 assessment 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 bushels which was based on the very high biomass estimated from the 1999 survey. With the lack of recent recruitment, the State of New Jersey lowered the quota back to 600,000 bushels for 2002/2003. With the continued decrease in biomass, the State dramatically cut the quota for 2003/2004 to only 275,000 bushels. New Jersey establishes the quota between 250,000 and a million bushels with a constraint that the quota can not exceed 10% of the estimated standing stock. For 2002/2003 the quota was set at the 600,000 bushel level which was approximately 10% of the standing stock. 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.

Table 6. New Jersey Annual Surfclam Fishery Quota and Landings (Bu).

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)	(0.04%)
FY 01/02	700,000	702,257	(2,257)	(0.3%)
FY 02/03	600,000	601,056	(1,056)	(0.2%)
FY 03/04*	275,000	185,088		

* Landings for 2003/2004 not final.

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 recently completed fishing year (2003/2004), it is likely that nearly one third of the quota will be left unharvested. The previous five fishing years represent a significant improvement relative to the prior two seasons, which saw fully 22% of the quota unharvested each year. There are 57 licenses for inshore New Jersey. Up to three licenses can be combined onto one vessel. Each license receives an equal share of the annual quota and those fishermen can fish their quota whenever it is appropriate for them to fish. There is no race to catch these shellfish.

6.4.5.2. 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 landings less than 1000 bushels annually in years prior to 2002. Landings greatly increased in 2002 approaching the 50,000 bushel quota. In 2003, there were 57,000 bushels landed and this fishery was closed in March. In 2004, there were nearly 63,000 bushels landed before the fishery was closed again in March.

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.)

Table 7. New York State Quotas and Landings of Surfclams from the Ocean

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	501,290	0.3% over
2003	500,000	494,051	1.2% under
2004	930,000	334,942 (through May 25)	

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 1970s and 1980s. 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 the market for surfclams began shrinking in the mid 1990s, the black, lower-yielding resource off New York's Atlantic coast most strongly felt the effects.

The New York State Department of Environmental Conservation (DEC) staffer who heads their surfclam program is Maureen Davidson. In a May 2004 contact she emphasized that landings have been increasing steadily for the past five years. Landings are no longer below the annual quota. Landings have been generally restricted by having a weekly boat quota of 21 cages per week, but in 2002 they restricted the boats to 14 cages per week. In the first quarter of 2003, boats were allowed 21 cages initially, but as it became apparent that landings would exceed the quarterly quota, they were reduced to 14 cages per boat per week. In 2004, with the nearly doubling of the quota, boats were allowed to catch 28 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 showed a slight increase to 12.8 million bushels in the survey area. The 2002 survey was conducted by DEC personnel in cooperation with a commercial fishing vessel with the report released in June of 2003. The 2002 population estimate for New York state waters of the Atlantic Ocean is 18.6 million industry bushels of surfclams. Further analysis of the data show an estimated population of 2.6 billion individual clams. Although the bushel count results show a significant increase in biomass when compared to the results of the 1999 survey, the individual clam count indicates a trend of decreasing numbers of clams. The increase in biomass represents an increase in the size of the clams present in the population and not necessarily an increase in the number of clams.

Table 8. New York State Surfclam Landings: First and Second Quarter 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	135,833	243,225
2003	139,734	112,772	252,506
2004	240,273	data not 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-1990s after the three year drop experienced between 1998 and 2000. Davidson (pers. comm.) indicates that fishermen are currently fishing hard and having no difficulty marketing the surfclams they catch. In 2003 there were 19 vessels that fished, and 20 vessels have fished through May 2004.

6.4.5.3. The Federal Surfclam Fishery

The Federal fishery for surfclams was conducted by a total of 34 vessels in 2003, a decrease of five vessels from the number participating in 2002 (Appendix Table 1). The number of vessels in the largest size category jumped from 20 vessels in 2000 to 25 in 2001 to 30 by 2002 and then fell to 27 in 2003. One of these vessels is of new construction, and was launched in 2002.

For a broader perspective of how fleet capacity has changed over time, one may note that the 39 vessels operating in 2002 represent a 70% 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 2003 it was 95,000 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.

- The 3.250 million bushel quota for surfclams in Federal waters was fully harvested in 2003, reflecting continued strong demand for clam products. The quota for 2004 was raised 4.6% to the maximum level allowed by the fishery management plan, or 3.40 million bushels.

- The average ex-vessel price of a bushel of surfclams increased a modest 1.6% to $11.39 in 2003. Most trips were reported within a range of $9.50 - $12.90 per bushel, with a small percentage reaching $15.00. The total ex-vessel value of the 2003 Federal harvest was approximately $37.04 million. [Note that price and value statistics presented in this document are those reported by industry processors and dealers. Prior documents relied on values reported by vessels.]

- Hours of fishing effort deployed in the Federal surfclam fishery increased by another 14% in 2003. Following on the heels of major increases in the prior two years, the industry has increased effort by 69% overall since the year 2000.

- Increases in fishing effort have been necessary in order to harvest the 27% increase in the Federal quota since the year 2000, and to offset steady declines in the productivity of effort. As measured by the average number of bushels harvested in an hour of fishing, a fleet-wide calculation of surfclam Landings Per Unit of Effort (LPUE) declined by 7.6% in 2003 to 97 bushels per hour. Looking back across the past 3 years, the average productivity of an hour fished has declined by 25% (Appendix Table 1).

- Preliminary harvest data from the initial months of 2004 indicate a continued erosion in catch rates. Average fleet LPUE fell an additional 10% to 87 bushels per hour on those surfclam trips reported as of May 27, 2004 (Appendix Figure 1).

- A further development of concern in the surfclam fishery is the heightened dependence on a single degree square of ocean off New Jersey. The 3973 degree square has long been a mainstay of the fleet, providing between 42% and 62% of all EEZ landings in recent years. In 2003 this dependence increased to 69% of all Federal harvests, and in early 2004 jumped to nearly 75%.

6.4.5.4. Economic and social environment of the EEZ surfclam fishery

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.

Ex-vessel 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 2003 ranged from a low of $5.00 per bushel to a high of $18.00 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-2004) are in the neighborhood of $6.25 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 - $18 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 through 2003, and now continues strong into 2004, 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.

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 1970s. For the smaller, less-desirable ocean quahog, the accepted standard is for 1 bushel to produce 10 pounds of meats.

The majority of the industry would like the surfclam quota to continue at the maximum OY allowed by the current regulations, 3.400 million bushels. Industry was just about as unified on the surfclam quota for 2004 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 (2004) surfclam quota recommendation, staff recommended a 5% increase to 3.400 million bushels because of the industry's and Council's previously expressed desire to have a long range plan (5 years) to build to the maximum OY level of 3.400 million bushels.

Industry was unanimous in their support of maintaining the quota at the maximum OY level for the next three years.

6.4.6. Fisheries for ocean quahogs in the ITQ program

Since ocean quahogs typically occur in the deeper waters offshore, virtually the entire fishery is prosecuted in Federal waters, with the exception of the Maine inshore fishery. Landings of ocean quahogs from the high-volume fishery outside the State of Maine totaled 4.077 million bushels in 2003.

6.4.6.1. The Federal ocean quahog ITQ fishery

- The year 2003 saw a continuation of the renewed interest in the ocean quahog fishery, fueled by the sharp price increase of 2001, and the improved efficiency of newly constructed vessels. 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. In 2001 landings jumped almost 17%; in 2002 they increased 4.9%; and in 2003 they rose another 5.3% to 4.08 million bushels.

- A total of 27 vessels participated in the 2003 fishery, a reduction of 13% from the 31 vessels participating in 2002. Several of these vessels are large, new boats that were built since the 2000, and their high productivity has contributed substantially to the increase in ocean quahog landings.

- Of the 4.5 million bushel quota for 2003, approximately 12,200 bushels were leased to the Maine fishery, 4.08 million were harvested by the industrial fishery outside of Maine, and approximately 411,000 bushels were left unharvested on the ocean floor.

- The sharp ex-vessel price increase of 2001 has been maintained through 2003. Most trips were reported within a range of $5.00 to $6.10, with a small percentage reaching $6.25 per bushel. The average price reported by processors was $5.73 in 2003, down only a penny from 2002. Verbal reports from industry members have indicated that trucking costs, and whether the vessel owner or processor is responsible for paying them, can significantly influence the price paid to a vessel. The total ex-vessel value of the 2003 Federal harvest outside of Maine was approximately $23.36 million.

- Reported hours of fishing effort deployed in the ocean quahog fishery increased by 12% in 2003. The average number of trips taken per vessel increased from 64 to 72.

- A fleet-wide calculation of LPUE showed that the average number of bushels harvested per hour of fishing decreased by 6.3% from 126 to 118 in 2003 (Appendix Table 2). Examination of a graph of ocean quahog LPUE over the past 20 years looks something like a roller coaster ride, with many peaks and valleys (Appendix Figure 2). Each 'hill' illustrates the pattern of improving productivity as the fleet moves to a new area of virgin biomass, and each valley the decline in productivity as that resource is fished down.

- Preliminary harvest data from the initial months of 2004 indicate an improvement in catch rates. Average fleet LPUE jumped to 133 bushels per hour on those ocean quahog trips reported as of May 27, 2004.

- Harvests of ocean quahogs became slightly more concentrated on the high-yielding degree square off eastern Long Island (4072). Fully 53% of the coastwide quota was taken from this square. The second most heavily fished degree square in 2003 was the adjacent square to the west (4073) off western Long Island (Appendix Figure 3).

- Some fishing for ocean quahogs does persist in the southern waters off Delmarva (3873 and 3874). Roughly 17% of the 2003 catch was taken from these waters, though their average catch rates have continued to decline to below 80 bushels per hour fished.

- 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 since 1990, due to the presence of PSP toxin. Vessels responded to this barrier by pursuing ocean quahogs in the deeper waters farther from shore; however, there are indications that only limited quantities of ocean quahogs are available in these areas.

6.4.6.2. Economic and social environment for EEZ ocean quahogs

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 ex-vessel price (approximately $6.00 per bushel in 2003 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 2003), 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.

6.4.7. Maine Ocean Quahog *Arctica islandica*

6.4.7.1. Fisheries for Maine ocean quahogs

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 $43^{o}50^{'}$), 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 during the next three years as they have done for the past four 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. Of the 128,574 Maine bushels landed in 2002, 13,231 bushels were leased from the ITQ fishery and the remaining 15,343 bushels represent an overage of the 100,000 bushel quota. Of the 119,798 Maine bushels landed in 2003, 12,213 bushels were leased from the ITQ fishery and the remaining 7,585 bushels represent an overage of 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.

6.4.7.2. Economic and social environment for Maine ocean quahogs

Relative to the Maine ocean quahog resource and PSP, John Hurst (pers. comm.) reports that the summer of 2001 was a very bad year for PSP in Maine waters whereas 2002 and 2003 were not bad. The waters during 2001 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 in 2001. In 2002 there was a PSP closure for mussels and the ocean temperature was again warm in May, but then storms and lower than normal water temperatures minimized the appearance of PSP. Prior to 2001 there had not been any toxins reported in ocean quahogs for the previous four or five years. Maine has a fairly extensive sampling and testing program, which collects samples both at sea and from dealers on shore. In 2004, there had been no PSP closures by early June 2004.

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 the next three years. 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. Work on a survey and subsequent assessment has been initiated, and it is hoped that results will be available for setting the quota in the near future after the Maine analyses are peer-reviewed in a SARC. It is likely that a survey in Maine will take two years with an assessment presented to the SARC the next time ocean quahogs are scheduled to be reviewed in 2007.

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 for 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 is to 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 in 2000 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 seems 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-shelled 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.

7.0 ENVIRONMENTAL CONSEQUENCES -- ANALYSIS OF IMPACTS

7.1 Surfclam *Spisula solidissima* Quota

7.1.1 Impacts of Preferred Alternative S3 (3.400 million bushels) on the Environment

The Council's preferred alternative quotas for 2005, 2006, and 2007 are 3.400 million bushels annually, which is the same quota that was in effect in 2004. This was a 4.6% increase from the 2003 quota of 3.250 million bushels. This preferred alternative meets the 2003 SAW recommendation: "Although the stock is above B_{MSY}, uncertainty in the current level and future trend in biomass suggest that substantial increases in catch levels are not advised."

Summary Justification for Surfclam 3.400 Million Bushel Quota Recommendation

At its June 2004 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 3.4 million bushels, or some other level.

The following points represent the key factors that led the Council to adopt the 3.400 million bushel maximum level for the next three years.

- The 3.250 million bushel quota for surfclams in Federal waters was fully harvested in 2003, reflecting continued strong demand for clam products. The quota for 2004 was raised 4.6% to the maximum level currently allowed by the fishery management plan, or 3.40 million bushels.

- The average ex-vessel price of a bushel of surfclams increased a modest 1.6% to $11.39 in 2003. Most trips were reported within a range of $9.50 - $12.90 per bushel, with a small percentage reaching $15.00. The total ex-vessel value of the 2003 Federal harvest was approximately $37.04 million. [Note that price and value statistics presented in this document are those reported by industry processors and dealers. Prior documents relied on values reported by vessels.]

- Hours of fishing effort deployed in the Federal surfclam fishery increased by another 14% in 2003. Following on the heels of major increases in the prior two years, the industry has increased effort by 69% overall since the year 2000.

- Increases in fishing effort have been necessary in order to harvest the 27% increase in the Federal quota since the year 2000, and to offset steady declines in the productivity of effort. As measured by the average number of bushels harvested in an hour of fishing, a fleet-wide calculation of surfclam Landings Per Unit of Effort (LPUE) declined by 7.6% in 2003 to 97 bushels per hour. Looking back across the past 3 years, the average productivity of an hour fished has declined by 25% (Appendix Table 1).

- Preliminary harvest data from the initial months of 2004 indicate a continued erosion in catch rates. Average fleet LPUE fell an additional 10% to 87 bushels per hour on those surfclam trips reported as of May 27, 2004 (Appendix Figure 1).

- A further development of concern in the surfclam fishery is the heightened dependence on a single degree square of ocean off New Jersey. The 3973 degree square has long been a mainstay of the fleet, providing between 42% and 62% of all EEZ landings in recent years. In 2003 this dependence increased to 69% of all Federal harvests, and in early 2004 jumped to nearly 75%.

7.1.1.1 Biological Impacts

The three most recent biological assessments (from the 1997, 1999, and 2002 surveys) indicate the resource is healthy, composed of many age classes, and can safely sustain increased harvests. The F in 2003 associated with a quota of 3.400 million bushels was approximately 0.03 and these same quotas may result in an F in 2005, 2006, and 2007 of about 0.04 which is well below the overfishing definition fishing mortality threshold of 0.15 (Appendix Table 3). Fishing rates could be increased significantly (as much as fourfold) with the current estimated biomass, without the resource becoming overfished. However, the OY range of the plan was set nearly 25 years ago based on historical landings which collapsed the fishery in the early 1970s. It is the Councils intent to never allow this resource to become overfished again as it was prior to management.

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. `

Under the surfclam overfishing definition recommended by the 2000 SARC, unanimously approved by the Council, and implemented by the Secretary has overfishing for surfclams occurring 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 (Appendix Table 3).

The pre-SFA overfishing definitions for surfclams, as it was 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), 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 described how the Council has prevented overfishing in this species for the past twenty five years of Federal management.

The Council had at least a 10 year supply horizon for surfclams 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 year supply horizon for this species as they are relying on the approved overfishing definition. 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 surfclams for the past 25 years. The Council began management of this resource 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.

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

7.1.1.2 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 in Amendment 13 (MAFMC 2003).

The Council assumed the panel of experts assembled at the fishing gear workshop in October 2001 provided the best synthesis of the existing scientific knowledge and the best 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 (MAFMC 2003). 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 MAFMC 2003).

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 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 resources. 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 that the panel asked was "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 identified workshop (Appendix 4 of MAFMC 2003) 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. For example, hydraulic clam dredges would have a significant impact to a coral reef or a SAV bed if such gear were used in a stable, fragile, structured, environment like one of those environments. However, the clam resources are concentrated in high energy sandy sediment and the fishing gear has evolved over the past five decades to fish most efficiently in this type of sandy sediment. This evolution of the fishing gear has minimized the effect on fishery habitat (Wallace and Hoff 2004a). Natural events have more effect on the benthic community than this type of fishing gear since all of the fishing activity takes place in sandy shallow water. NMFS (2002) describing the October 2001 workshop concluded that hydraulic clam dredges were not a major concern relative to otter trawls and scallop dredges. All of the hydraulic clam dredging for an entire year, would impact about 100 square miles of bottom (Table 2 of MAFMC 2003). In context, this 100 square miles is roughly the area of one ten minute square, and there are over 1200 ten minute squares in the EEZ between Cape Hatteras and Georges Bank. Thus, it does not seem that either surfclam or ocean quahog EFH is effected by fishing gear.

A qualitative EFH vulnerability analysis conducted by Stevenson *et al.* (2003) suggests that the EFH of several species may be vulnerable to impacts associated with the use of hydraulic clam dredges. This includes black sea bass (juveniles and adults), scup (juveniles), ocean pout (all life stages), red hake (juveniles), silver hake (juveniles), winter flounder (juveniles and adults), and juvenile Atlantic sea scallops (section 2.2.5.5.2 of MAFMC 2003).

Based upon existing information, the Council concluded that there may be potential adverse effects on EFH from the hydraulic clam dredge, but concurred with the workshop panel (Appendix 4 of MAFMC 2003). The panel concluded that as the clam fishery is currently prosecuted, in sand habitats, there are potentially large, localized impacts to biological and physical structure; however, the recovery time is relatively short. Since the recovery time is relatively short (hours to months), the adverse impacts to this high energy environment can be considered temporary. The preamble to the EFH Final Rule (50 CFR Part 600) defines temporary impacts as those that are limited in duration and that allow the particular environment to recover without measurable impact. Since these impacts are potentially effecting a relatively small portion (approximately 100 square nautical miles) of the overall large uniform area of high energy sand along the continental shelf (approximately 54,900 square nautical miles), these adverse impacts can be considered minimal. Additionally, the 100 square nautical miles impact each year (approximately 1.5 ten minute squares of latitude and longitude) represents a small fraction of the total EFH of the above listed vulnerable EFH and species. The preamble of the EFH Final Rule defines minimal impacts as those that may result in relatively small changes in the affected environment and insignificant changes in ecological functions.

Although the Council has concluded that the clam fishery has an adverse effect on EFH that is no more than minimal and temporary in nature, there is enough uncertainty to warrant the evaluation of other measures that may be taken in light of this uncertainty. 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 advice 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."

The Council evaluated nine alternatives that focused mostly on closed areas. The fishing gear impacts workshop (Appendix 4 of Amendment 13) concluded that effort reductions (i.e. harvest limits) and gear modifications (i.e. restrictions) were not workable for this fishery and that if the clam dredges were found to have significant adverse effects on EFH, then spatial closures were the only viable alternative to mitigate the adverse effects of this fishing gear. Since surfclams are not overfished and the annual quotas are actually being maintained, it seems to make little sense to restrict harvest limits for EFH reasons; however, there is an alternative 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 alternatives 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 8 of Amendment 13. Landings of the two species in 2000 are shown in Figures 9 and 10 of Amendment 13.

Of the nine alternatives that the Council considered initially relative to fishing gear impacts to EFH, four were thoroughly evaluated for their biological, economic, and social impacts. The Council did not thoroughly evaluate alternatives 5, 7, 8, and 9 for social and economic impacts, because they determined that these closures were not reasonable with all of the data uncertainties associated with each alternative. The Council eliminated alternative 4 for thorough evaluation because it is in shallow water and storm events are much more significant at causing sediment disturbances in those depths than is hydraulic clamming activity.

Based on the conclusions that the impacts of clam dredges are temporary and minimal, the Council has concluded that maintaining the maximum quota minimizes, to the extent practicable, the adverse effects of fishing on EFH as required by section 303 (a) (7) of the MSA.

7.1.1.3 Protected Resources Impacts

The only gear used for the surfclam and ocean quahog fisheries are clam dredges which are now included in the List of Fisheries for 2004, as a Category III fishery (50 CFR Part 229 -- Final Rule) 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. Clam vessels dredge at very slow speeds and healthy animals should have no difficulty avoiding these vessels. As such, minimal interaction is expected between clam dredging gear and protected species. According to the List of Fisheries for 2004, there are no documented interactions/takes in this fishery.

7.1.1.4 Socioeconomic Impacts

The socioeconomic impacts of this alternative are discussed in detail in the Regulatory Impact Review (RIR) Sections RIR 7.1.2 and RIR 8.2.2.1. 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.

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

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

There is no major reason the Council would have considered seriously reducing the next three years of surfclam quota from the 2004, other than to evaluate the full range of alternatives.

7.1.2.1 Biological Impacts

A nearly halving of the quota for the next three years could possibly benefit the long-term sustainability of the resource; however, there is the offsetting argument that the resource is not overfished and overfishing is not occurring. The best estimate of the preferred alternative's fishing mortality rates for 2005, 2006, and 2007 is 0.04. A halving of the catch, as indicated with this minimum OY level, would correspond to an F of around 0.02. The fishing mortality threshold is 0.15 and thus would allow roughly a sevenfold increase over this level before overfishing would occur. The Council would never allow the rate of 0.15 since that would produce landings far in excess of the maximum OY level (the preferred alternative) and likely would result in a resource collapse as occurred prior to management.

Discounting the availability of the resource on Georges Bank, there is sufficient resource in the Northern New Jersey and Long Island 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.

7.1.2.2 Habitat Impacts

This alternative may have a somewhat more beneficial effect on bottom habitat than the preferred alternative. Due to the fact that annual impacts on bottom habitat may be slightly lessened with a reduction in the quota, there would be less fishing effort with this alternative. Regardless of fishing effort, it has been determined that dredge impacts are short-term and minimal. The discussion of the preferred alternative details why the Council concluded that clam fishing gear impacts are temporary and minimal.

7.1.2.3 Protected Resources Impacts

The only gear used for the surfclam and ocean quahog fisheries are clam dredges which are now included in the List of Fisheries for 2004, as a Category III fishery (50 CFR Part 229 -- Final Rule) for the taking of marine mammals by commercial fishing operations under Section 114 of the Marine Mammal Protection Act (MMPA) of 1972. Clam vessels dredge at very slow speeds and healthy animals should have no difficulty avoiding these vessels. As such, minimal interaction is expected between clam dredging gear and protected species. According to the List of Fisheries for 2004, there are no documented interactions/takes in this fishery. Potentially, the less the quota, the less any impact would be.

7.1.2.4 Socioeconomic Impacts

The socioeconomic impacts of this alternative are discussed in detail in the Regulatory Impact Review (RIR) Sections RIR 7.1.3 and RIR 8.2.2.2. 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 per allocation holder by .$215,363.

7.1.3 Impacts of Alternative S2 (3.250 million bushels) on the Environment

The second non-preferred alternative quota for the 2005, 2006, and 2007 surfclam fishery is the quota from 2003 of 3.250 million bushels which would be a slight quota decrease. 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 2003.

7.1.3.1 Biological Impacts

A small decrease in quota from the maximum like this, would not impact the long-term sustainability of the resource. The fishing mortality associated with this level of quota would be 0.04 as it is with the maximum OY level preferred alternative. With the current level of resource being nearly 1.6 billion pounds, a small decrease like this is insignificant and not truly detectable on this large of a resource.

7.1.3.2 Habitat Impacts

The discussion of the preferred alternative details why the Council concluded that clam fishing gear impacts are temporary and minimal. Maintaining the 2003 level of quota for the next three years would result in the same minimal level of impacts as occurred in 2003.

7.1.3.3 Protected Resources Impacts

The only gear used for the surfclam and ocean quahog fisheries are clam dredges which are now included in the List of Fisheries for 2004, as a Category III fishery (50 CFR Part 229 -- Final Rule) for the taking of marine mammals by commercial fishing operations under Section 114 of the Marine Mammal Protection Act (MMPA) of 1972. Clam vessels dredge at very slow speeds and healthy animals should have no difficulty avoiding these vessels. As such, minimal interaction is expected between clam dredging gear and protected species. According to the List of Fisheries for 2004, there are no documented interactions/takes in this fishery. Potentially, the less the quota, the less any impact would be.

7.1.3.4 Socioeconomic Impacts

The socioeconomic impacts of this alternative are discussed in detail in the Regulatory Impact Review (RIR) Sections RIR 7.1.4 and RIR 8.2.2.3. In sum, this alternative is expected to result in a slight decrease in both consumer and producer surplus, and would reduce the average gross value of the harvest per allocation holder by .$20,781.

7.1.4 Impacts of Alternative S4 (No Action - Quota Removed) on the Environment

The third non-preferred alternative quota for the 2005, 2006, and 2007 surfclam fishery is no action, or removal of the quota. This alternative would likely result in landings that are not within the OY range of between 1.850 and 3.400 million bushels as required by the FMP.

7.1.4.1 Biological Impacts

This could be disastrous as overfishing would be likely. There were no quotas for the fishery prior to management in the mid 1970s and the resource was overfished.

7.1.4.2 Habitat Impacts

The discussion of the preferred alternative details why the Council concluded that clam fishing gear impacts are temporary and minimal, however unlimited fishing would likely impact more than the estimated 100 square nautical miles currently fished and could result in a free for all race to fish.

7.1.4.3 Protected Resources Impacts

The only gear used for the surfclam and ocean quahog fisheries are clam dredges which are now included in the List of Fisheries for 2004, as a Category III fishery (50 CFR Part 229 -- Final

Rule) for the taking of marine mammals by commercial fishing operations under Section 114 of the Marine Mammal Protection Act (MMPA) of 1972. Clam vessels dredge at very slow speeds and healthy animals should have no difficulty avoiding these vessels. As such, minimal interaction is expected between clam dredging gear and protected species. According to the List of Fisheries for 2004, there are no documented interactions/takes in this fishery. Probably, the larger the quota, the larger any potential impact would be.

7.1.4.4 Socioeconomic Impacts

The socioeconomic impacts of this alternative are discussed in the Regulatory Impact Review (RIR) Sections RIR 7.1.5 and RIR 8.2.2.4. In sum, the Mid-Atlantic Council is required by 50 CFR part 648 to recommend annual quotas that fall within the optimum yield range for each species. Failure to make a recommendation within these bounds is not a legal option, and would be inconsistent with National Standard 1 of the Magnuson-Stevens Act.

7.2 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. The size limit was initially implemented because it was believed that the size of 4.75 inches maximized the yield per recruit and because the processors wanted larger clams. Since implementation of the ITQ program, the processors pay a price differential for various size/quality clams and the biology is better known today than it was 25 years ago. Thus, there is not the strong necessity for a minimum size limit.

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. Hermsen and Witzig in a September 2002 report entitled: *Estimation of Proportion of Landings of Undersized Surfclams for 2002*, identified the data sources and the procedures used in the 2002 evaluation of the size limit suspension. The Hermsen and Witzig report concluded that for January through mid-August 2002, only 12 percent of the surfclam landings were smaller than 4.75".

The current stock is comprised primarily of large, adult individuals, with few small individuals apparent from landings in most areas (USDC 2003). 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 2005, 2006, and 2007, as has been done every year since 1990. Continuing the suspension will have no impact on the current fishery or resource.

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

7.2.1.1 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 SARC (USDC 2003) which the Council used in its deliberations considers this resource as not overfished with overfishing not occurring.

7.2.1.2 Habitat Impacts

Maintenance of the status quo alternative would result in no change to the essential fish habitat impacts from 2004 over the next three years. Suspension of the size limit will result in the least amount of overall fishing effort and thus the least amount of any potential gear impact to the ocean bottom.

7.2.1.3 Protected Resources Impacts

Maintenance of the status quo alternative will have no different impacts to any protected resource from 2004 over the next three years. Not having a size limit will result in the least amount of overall fishing effort and thus absolutely minimize any potential protected resources impacts.

7.2.1.4 Socioeconomic Impacts

Maintenance of the status quo alternative would result in no change to the socioeconomic aspects of the surfclam fishery during the next three years.

7.2.2 Impacts of Alternative 2 (No Action) on the Environment

7.2.2.1 Biological Impacts

The Hermsen and Witzig 2002 report identifies that only 12 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 2003 SARC (USDC 2003) considers this resource in the EEZ as not overfished with overfishing not occurring.

7.2.2.2 Habitat Impacts

Discarding 12 percent of the landings would cause more fishing effort. Even though the fishing gear is considered as having only temporary and minimal impacts, there would be more effort required and thus potentially more of an impact.

7.2.2.3 Protected Resources Impacts

Discarding 12 percent of the landings would cause more fishing effort. 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.

7.2.2.4 Socioeconomic Impacts

Discarding 12 percent of the landings would increase the cost of harvest and result in longer fishing days and more time at sea for fishermen.

7.3 Ocean Quahog *Arctica islandica* Quota

7.3.1 Impacts of Preferred Alternative Q3 (5.333 million bushels in 2005, 5.666 million bushels in 2006, and 6.000 million bushels in 2007) on the Environment

The Council proposes steadily increasing ocean quahog quotas for the next three years starting at the current level of 5.000 million bushels. There is no biological reason that the resource can not support this level of quota given the most recent stock assessments (USDC 1998b, 2000b and 2004). 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 using MSY.

Summary Justification for the Ocean Quahog Quotas to Steadily Increase During the Next Three Years Recommendation

The following points represent the key factors that led the Council to adopt the steadily increasing quotas.

- The year 2003 saw a continuation of the renewed interest in the ocean quahog fishery, fueled by the sharp price increase of 2001, and the improved efficiency of newly constructed vessels. 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. In 2001 landings jumped almost 17%; in 2002 they increased 4.9%; and in 2003 they rose another 5.3% to 4.08 million bushels.

- A total of 27 vessels participated in the 2003 fishery, a reduction of 13% from the 31 vessels in 2002. Several of these vessels are large, new boats that were built since 2000, and their high productivity has contributed substantially to the increase in ocean quahog landings.

- Of the 4.5 million bushel quota for 2003, approximately 12,200 bushels were leased to the Maine fishery, 4.08 million were harvested by the industrial fishery outside of Maine, and approximately 411,000 bushels were left unharvested on the ocean floor.

- The sharp ex-vessel price increase of 2001 has been maintained through 2003. Most trips were reported within a range of $5.00 to $6.10 per bushel, with a small percentage reaching $6.25 per bushel. The average price reported by processors was $5.73 per bushel in 2003, down only a penny from 2002. Verbal reports from industry members have indicated that trucking costs, and whether the vessel owner or processor is responsible for paying them, can significantly influence the price paid to a vessel. The total ex-vessel value of the 2003 Federal harvest outside of Maine was approximately $23.36 million.

- Reported hours of fishing effort deployed in the ocean quahog fishery increased by 12% in 2003. The average number of trips taken per vessel increased from 64 to 72.

- A fleet-wide calculation of LPUE showed that the average number of bushels harvested per hour of fishing decreased by 6.3% from 126 to 118 in 2003 (Appendix Table 2). Examination of a graph of ocean quahog LPUE over the past 20 years looks something like a roller coaster ride, with many peaks and valleys (Appendix Figure 2) Each 'hill' illustrates the pattern of improving productivity as the fleet moves to a new area of virgin biomass, and each valley the decline in productivity as that resource is fished down.

- Preliminary harvest data from the initial months of 2004 indicate an improvement in catch rates. Average fleet LPUE jumped to 133 bushels per hour on those ocean quahog trips reported as of May 27, 2004.

- Harvests of ocean quahogs became slightly more concentrated on the high-yielding degree square off eastern Long Island (4072). Fully 53% of the coastwide quota was taken from this square. The second most heavily fished degree square in 2003 was the adjacent square to the west (4073) off western Long Island (Appendix Figure 3).

- Some fishing for ocean quahogs does persist in the southern waters off Delmarva (3873 and 3874). Roughly 17% of the 2003 catch was taken from these waters, though their average catch rates have continued to decline to below 80 bushels per hour fished.

- 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 since 1990, due to the presence of PSP toxin. Vessels responded to this barrier by pursuing ocean quahogs in the deeper waters farther from shore; however, there are indications that only limited quantities of ocean quahogs are available in these areas.

7.3.1.1 Biological Impacts

Based on the biological data presented in the three most recent assessments (USDC 1998b, 2000b and 2004), the ocean quahog quota can be increased overall. The Council proposes the next three years of ocean quahog quota based on the analysis of abundance for that species found in the 38th Northeast Regional Stock Assessment Workshop (SAW 38) concluded in December 2003. Similar to surfclams, SAW 38 and the two previous assessments included work to estimate dredge efficiency and showed a significant increase in the estimate of ocean quahog biomass. Although slightly more than a third of the resource is located on Georges Bank, SAW 38 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 72% of the virgin biomass remains after two plus decades of harvesting these long-lived creatures. If Georges Bank is included, then fully 80% of the virgin estimated biomass still exists.

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 2002 quota yielded an F of approximately 0.02 compared to the threshold of 0.04 contained in the overfishing definition. The specific F associated with the quotas for the next three years is expected to be less than 0.03. 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 2003 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 (USDC 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, where MSY is generally considered to occur. 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(MAFMC 2003). Nonetheless, 25 years of harvesting seems 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 this resource for the past 25 years and fully intends to continue doing so.

7.3.1.2 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 (MAFMC 2003). The effect on bottom habitat of the increasing quota from 5.000 to 6.000 million bushel would be only slightly more than what is currently occurring and would still have only temporary and minimal impacts.

The discussion of the preferred alternative for surfclams details why the Council concluded that clam fishing gear impacts are temporary and minimal. Increasing the level of quota for the next three years would result in about the same minimal level of impacts as occurred in 2004.

7.3.1.3 Protected Resources Impacts

The only gear used for the surfclam and ocean quahog fisheries are clam dredges which are now included in the List of Fisheries for 2004, as a Category III fishery (50 CFR Part 229 -- Final Rule) for the taking of marine mammals by commercial fishing operations under Section 114 of the Marine Mammal Protection Act (MMPA) of 1972. Clam vessels dredge at very slow speeds and healthy animals should have no difficulty avoiding these vessels. As such, minimal interaction is expected between clam dredging gear and protected species. According to the List of Fisheries for 2004, there are no documented interactions/takes in this fishery. Even with the small quota increases, there should be no interactions/takes of protected resources.

7.3.1.4. Socioeconomic Impacts

The socioeconomic impacts of this alternative are discussed in the Regulatory Impact Review (RIR) Sections RIR 7.2.1, 7.2.2 and RIR 8.2.3.1. In sum, the impacts of this alternative will depend on whether the industry increases fishing effort to the extent that the quotas are binding on the industry. If a 20% increase in ocean quahog harvests were to occur over the 3-year interval of this specification cycle, it would add 17,832 bushels to the average allocation owner's holdings, with a value of $102,180 at 2003 prices.

Note that it is considered unlikely that the ocean quahog harvest levels will actually reach the 6.000 million bushel mark by 2007.

7.3.2 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, 1999, and 2002 surveys and the 1998, 2000, and 2004 assessments showing that there is sufficient resource, the Council has elected to be slightly increasing the quotas since the minimum level in 1998.

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, which are generally too deep to be harvested with current technology, were included.

The 1998, 2000, and 2004 SAWs (USDC 1998b, 2000b and 2004) 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 the next three years 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.

7.3.2.1 Biological Impacts

The 1998, 2000 and 2004 SAWs (USDC 1998b, 2000b, and 2004) 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. However, there are nearly 3 billion pounds of ocean quahogs in the ocean currently and it seems to make little sense to attempt to significantly reduce the quota.

7.3.2.2 Habitat Impacts

The discussion of the preferred surfclam alternative 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 hydraulic dredging, especially in areas that are deeper.

7.3.2.3 Protected Resources Impacts

The only gear used for the surfclam and ocean quahog fisheries are clam dredges which are now included in the List of Fisheries for 2004, as a Category III fishery (50 CFR Part 229 -- Final Rule) for the taking of marine mammals by commercial fishing operations under Section 114 of the Marine Mammal Protection Act (MMPA) of 1972. Clam vessels dredge at very slow speeds and healthy animals should have no difficulty avoiding these vessels. As such, minimal interaction is expected between clam dredging gear and protected species. According to the List of Fisheries for 2004, there are no documented interactions/takes in this fishery. Potentially, the less the quota, the less any impact would be.

7.3.2.4 Socioeconomic Impacts

The socioeconomic impacts of this alternative are discussed in the Regulatory Impact Review (RIR) Sections RIR 7.2.1, 7.2.2 and RIR 8.2.3.2. In sum, it would reduce the allowable landings by 20% from the current 5.000 million bushel level, costing the average allocation owner approximately $102,180 at 2003 prices. However, the industry has never succeeded in actually taking 5 million bushels in one year's harvest, and only recently did ocean quahog landings inch back above the 4.000 million bushel mark.

7.3.3 Impacts of Alternative Q2 (5.000 million bushels) on the Environment (Status Quo)

This is the current quota and midway in the OY range for ocean quahog quotas. Ex-vessel prices may likely rise as supply may become constraining. 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. Industry now believes that quota increases will be necessary for the next three years.

7.3.3.1 Biological Impacts

Given the current state of the stock, that the ocean quahog resource is “not overfished and overfishing is not occurring”, a slight steady increase in quota would not be at all harmful. There are nearly 3 billion pounds of ocean quahogs in the ocean currently and it seems to make little sense to attempt to actually quantify the differences of harvesting 50 versus 60 million pounds (5 versus 6 million bushels). Harvesting either 50 or 60 million pounds will result in fishing mortality rates of around 0.03 which is below the fishing mortality threshold.

7.3.3.2 Habitat Impacts

The discussion of the preferred surfclam alternative details why the Council concluded that clam fishing gear impacts are temporary and minimal. Maintaining the current quota level would have the same impact on the bottom habitat since the same amount of bottom would be exposed to hydraulic dredging.

7.3.3.3 Protected Resources Impacts

The only gear used for the surfclam and ocean quahog fisheries are clam dredges which are now included in the List of Fisheries for 2004, as a Category III fishery (50 CFR Part 229 -- Final Rule) for the taking of marine mammals by commercial fishing operations under Section 114 of the Marine Mammal Protection Act (MMPA) of 1972. Clam vessels dredge at very slow speeds and healthy animals should have no difficulty avoiding these vessels. As such, minimal interaction is expected between clam dredging gear and protected species. According to the List of Fisheries for 2004, there are no documented interactions/takes in this fishery. Potentially, the less the quota, the less any impact would be.

7.3.3.4 Socioeconomic Impacts

The socioeconomic impacts of this alternative are discussed in the Regulatory Impact Review (RIR) Sections RIR 7.2.1, 7.2.2 and RIR 8.2.3.3. In sum, maintaining the current ocean quahog quota of 5.000 million bushels would result in no change from the status quo. Hence, this alternative would have no impact on revenues, compliance costs, or reporting costs for small entities.

7.3.4 Impacts of Alternative Q4 (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 one million bushels above the status quo. Bottom habitat could potentially be negatively impacted as roughly 20% more ocean quahogs would be removed. Ex-vessel 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. In addition, they supported maintaining the status quo for 2000, 2001, 2002 and 2003, believed a slight quota increase to 5 million bushels would be needed in 2004 with additional increases during the next three years.

7.3.4.1 Biological Impacts

This large of an increase in one year could potentially 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. There are nearly 3 billion pounds of ocean quahogs in the ocean currently so even fishing at the maximum OY level would not likely effect the long-term sustainability of the resource for the next three years.

7.3.4.2 Habitat Impacts

The discussion of the preferred surfclam alternative details why the Council concluded that clam fishing gear impacts are temporary and minimal. A 20% increase of the current quota level may have a slightly higher impact on the bottom habitat since more bottom would be exposed to hydraulic dredging.

7.3.4.3 Protected Resources Impacts

The only gear used for the surfclam and ocean quahog fisheries are clam dredges which are now included in the List of Fisheries for 2004, as a Category III fishery (50 CFR Part 229 -- Final Rule) for the taking of marine mammals by commercial fishing operations under Section 114 of the Marine Mammal Protection Act (MMPA) of 1972. Clam vessels dredge at very slow speeds and healthy animals should have no difficulty avoiding these vessels. As such, minimal interaction is expected between clam dredging gear and protected species. According to the List of Fisheries for 2004, there are no documented interactions/takes in this fishery. Potentially, the more the quota, the more the fishing, the slightly more the minimal adverse impacts realized.

7.3.4.4 Socioeconomic Impacts

The socioeconomic impacts of this alternative are discussed in the Regulatory Impact Review (RIR) Sections RIR 7.2.1, 7.2.2 and RIR 8.2.3.4. In sum, this alternative would move directly to the maximum allowable quota of 6.000 million bushels in 2005, rather than phasing in the increase across three years. As described in Section 8.2.3.1, the gross value of the quota increase would equate to $102,180 per allocation if it were fully utilized.

The Mid-Atlantic Council is not recommending such a rapid increase in the ocean quahog quota due to a number of factors. Primary among them is uncertainty in the recent stock assessment, and the substantial amounts of unutilized quota in recent years. Having a massive surplus of unwanted quota would likely result in a substantial decline in the rental value of ocean quahog tags, and/or result in some individuals not being able to find a market for their ocean quahog tags at all.

7.3.5 Impacts of Alternative Q5 (No Action - Quota Removed) on the Environment

The fourth non-preferred alternative quota for the 2005, 2006, and 2007 ocean quahog fishery is no action or removal of the quota. Unlimited harvests would likely result in landings that are not within the OY range of between 4.000 and 6.000 million bushels as required by the FMP.

7.3.5.1 Biological Impacts

This could be disastrous as overfishing would be likely. There were no quotas for the surfclam fishery prior to management in the mid 1970s and the resource was overfished. It is likely that without quotas for ocean quahogs, that industry would overfish the valuable resource.

7.3.5.2 Habitat Impacts

The discussion of the preferred alternative details why the Council concluded that clam fishing gear impacts are temporary and minimal, however unlimited fishing would likely impact more than the estimated 100 square nautical miles currently fished and could result in a free for all race to fish.

7.3.5.3 Protected Resources Impacts

The only gear used for the surfclam and ocean quahog fisheries are clam dredges which are now included in the List of Fisheries for 2004, as a Category III fishery (50 CFR Part 229 -- Final Rule) for the taking of marine mammals by commercial fishing operations under Section 114 of the Marine Mammal Protection Act (MMPA) of 1972. Clam vessels dredge at very slow speeds and healthy animals should have no difficulty avoiding these vessels. As such, minimal interaction is expected between clam dredging gear and protected species. According to the List of Fisheries for 2004, there are no documented interactions/takes in this fishery. Potentially, the less the quota, the less any impact would be.

7.3.5.4 Socioeconomic Impacts

The socioeconomic impacts of this alternative are discussed in the Regulatory Impact Review (RIR) Sections RIR 7.2.3 and RIR 8.2.3.5. In sum, the Mid-Atlantic Council is required by 50 CFR part 648 to recommend annual quotas that fall within the optimum yield range for each species. Failure to make a recommendation within these bounds is not a legal option, and would be inconsistent with National Standard 1 of the Magnuson-Stevens Act.

7.4 Maine Ocean Quahog *Arctica islandica* Quota

Four 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.

7.4.1 Impacts of Preferred Alternative M3 (100,000 bushels) on the Environment (Status Quo)

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

The Council believes that the 2004 quota will likely be reached and the Regional Administrator will close the fishery in 2004 as she had to do in 2000, 2003, and 2004. It is anticipated that the Regional Administrator will likely also have to close the fishery during the next three years. 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.

7.4.1.1 Biological Impacts

There should be no change in the biological impacts of maintaining the status quo quota for the next three years. Although the condition of the Maine ocean quahog is currently unknown, the ocean quahog fishery overall is not overfished and overfishing is not occurring. It is planned that surveys will be conducted in 2004 and 2005 with an assessment in December 2006, and thus quotas specifically for the Maine stock of ocean quahogs will be able to be based on sound science beginning with the 2007 harvests. There are no known overfishing parameters (either biomass or fishing mortality) for this segment of the resource at this time.

7.4.1.2 Habitat Impacts

The discussion of the preferred surfclam alternative details why the Council concluded that clam fishing gear impacts are temporary 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.

7.4.1.3 Protected Resources Impacts

The only gear used for the surfclam and ocean quahog fisheries are clam dredges which are now included in the List of Fisheries for 2004, as a Category III fishery (50 CFR Part 229 -- Final Rule) for the taking of marine mammals by commercial fishing operations under Section 114 of the Marine Mammal Protection Act (MMPA) of 1972. Clam vessels dredge at very slow speeds and healthy animals should have no difficulty avoiding these vessels. As such, minimal interaction is expected between clam dredging gear and protected species. According to the List of Fisheries for 2004, there are no documented interactions/takes in this fishery. Maintaining the current status quo will not change this minimal impact.

7.4.1.4 Socioeconomic Impacts

The socioeconomic impacts of this alternative are discussed in the Regulatory Impact Review (RIR) Sections RIR 7.2.4.1 and RIR 8.2.4.1. In sum, 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.

7.4.2 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 for the halving of the current quota. There are no know overfishing parameters for this segment of the population at this time.

7.4.2.1 Biological Impacts

It is unknown if a halving of the quota would change the biological impacts for the next three years. While intuitively a reduction in quota would seem to be beneficial, the life history parameters of growth, recruitment and natural mortality are not known precisely and thus the population dynamics of the resource are poorly understood. The impacts of any quota are unknown since no survey and assessment have been conducted on this segment of the ocean quahog resource.

7.4.2.2 Habitat Impacts

The discussion of the preferred surfclam alternative details why the Council concluded that clam fishing gear impacts are temporary and minimal. Halving the current quota level may reduce any impact on the bottom habitat since less bottom would be exposed to the dredging.

7.4.2.3 Protected Resources Impacts

The only gear used for the surfclam and ocean quahog fisheries are clam dredges which are now included in the List of Fisheries for 2004, as a Category III fishery (50 CFR Part 229 -- Final Rule) for the taking of marine mammals by commercial fishing operations under Section 114 of the Marine Mammal Protection Act (MMPA) of 1972. Clam vessels dredge at very slow speeds and healthy animals should have no difficulty avoiding these vessels. As such, minimal interaction is expected between clam dredging gear and protected species. According to the List of Fisheries for 2004, there are no documented interactions/takes in this fishery. Potentially, the less the quota, the less any impact would be.

7.4.2.4 Socioeconomic Impacts

The socioeconomic impacts of this alternative are discussed in the Regulatory Impact Review (RIR) Sections RIR 7.2.4.2 and RIR 8.2.4.2. In sum,.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 35 vessels in the fleet, the average cost per vessel would equal $1,286.

7.4.3 Impacts of Alternative M2 (92,500 bushels -- maximum harvest minus previous year's overage) on the Environment

Alternative M2 corresponds to the maximum harvest level minus the current year's overage. There is no real justification in the FMP or the regulations to subtract one year's overage from the next years' level of harvest. These Maine fishermen have worked hard to build a market and a stock assessment for this portion of the resource should be available in a few years.

7.4.3.1 Biological Impacts

It is unknown if reducing the quota by the overage would change the biological impacts. The impacts of any quota are unknown since no survey and assessment have been conducted on this segment of the ocean quahog resource.

7.4.3.2 Habitat Impacts

The discussion of the preferred surfclam alternative details why the Council concluded that clam fishing gear impacts are temporary and minimal. Reducing the current quota level may reduce any impact on the bottom habitat since less bottom would be exposed to the dredging.

7.4.3.3 Protected Resources Impacts

The only gear used for the surfclam and ocean quahog fisheries are clam dredges which are now included in the List of Fisheries for 2004, as a Category III fishery (50 CFR Part 229 -- Final Rule) for the taking of marine mammals by commercial fishing operations under Section 114 of the Marine Mammal Protection Act (MMPA) of 1972. Clam vessels dredge at very slow speeds and healthy animals should have no difficulty avoiding these vessels. As such, minimal interaction is expected between clam dredging gear and protected species. According to the List of Fisheries for 2004, there are no documented interactions/takes in this fishery. Potentially, the less the quota, the less any impact would be.

7.4.3.4 Socioeconomic Impacts

The socioeconomic impacts of this alternative are discussed in the Regulatory Impact Review (RIR) Sections RIR 7.2.4.3 and RIR 8.2.4.3. In sum,.it is assumed that if the Maine quota were reduced by 7.5% to 92,500 Maine bushels, 90% of the reduction would be replaced by renting allocation from the ITQ fishery. This would equal a total of 6,750 bushels rented, at an estimated $1.00 per bushel. Divided amongst the 35 vessels in the fleet, the average cost per vessel would equal $193.

7.4.4 Impacts of Alternative M4 (No Action -- Quota Removed) on the Environment

The third non-preferred alternative quota for the 2005, 2006, and 2007 Maine ocean quahog fishery is no quota associated with the no action alternative. No quota would likely result in landings that are not restricted by the 100,000 bushels as required by the FMP.

7.4.4.1 Biological Impacts

This could be disastrous as overfishing would be likely. There were no quotas for the surfclam fishery prior to management in the mid 1970s and the resource was overfished. It is likely that without quotas for Maine ocean quahogs, that industry would overfish the valuable resource.

7.4.4.2 Habitat Impacts

The discussion of the preferred alternative details why the Council concluded that clam fishing gear impacts are temporary and minimal, however unlimited fishing could likely impact more bottom than the areas that are currently fished and could result in a free for all race to fish.

7.4.4.3 Protected Resources Impacts

The only gear used for the surfclam and ocean quahog fisheries are clam dredges which are now included in the List of Fisheries for 2004, as a Category III fishery (50 CFR Part 229 -- Final Rule) for the taking of marine mammals by commercial fishing operations under Section 114 of the Marine Mammal Protection Act (MMPA) of 1972. Clam vessels dredge at very slow speeds and healthy animals should have no difficulty avoiding these vessels. As such, minimal interaction is expected between clam dredging gear and protected species. According to the List of Fisheries for 2004, there are no documented interactions/takes in this fishery. Potentially, the less the quota, the less any impact would be.

7.4.4.4 Socioeconomic Impacts

The socioeconomic impacts of this alternative are discussed in the Regulatory Impact Review (RIR) Sections RIR 7.2.4.4 and RIR 8.2.4.4. In sum, the Mid-Atlantic Council is required by 50 CFR part 648 to recommend annual quotas that fall within the optimum yield range for each species. Failure to make a recommendation within these bounds is not a legal option, and would be inconsistent with National Standard 1 of the Magnuson-Stevens Act.

7.5 Cumulative Impacts of Preferred Alternative on Identified VECs

7.5.1 Introduction and Definition of Cumulative Effects

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 from 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)." A formal cumulative impact assessment is not necessarily required as part of an Environmental Assessment under NEPA as long as the significance of cumulative impacts has been considered (U.S. EPA 1999). The following remarks address the significance of the expected cumulative impacts as they relate to the Federally managed surfclam and ocean quahog fisheries.

The cumulative impacts of past, present, and future Federal fishery management actions (including the specification recommendations proposed in this document) should generally be positive. Although past fishery management actions to conserve and protect fisheries resources and habitats may have been more timely, the mandates of the MSFCMA as currently amended by the SFA require the management actions be taken only after consideration of impacts to the biological, physical, economic, and social dimensions of the human environment. It is, therefore, expected that under the current management regime, the totality of Federal fisheries management impacts to the environment will, in general, contribute toward improving the human environment.

Cumulative effects to the physical and biological dimensions of the environment may also come from non-fishing activities. Non-fishing activities, in this sense, relate to habitat loss from human interaction and alteration or natural disturbances. These activities are widespread and can have localized impacts to habitat such as accretion of sediments from at-sea disposal areas, oil and mineral resource exploration, and significant storm events. In addition to guidelines mandated by the MSFMCA, NMFS reviews these types of effects during the review processes required by Section 404 of the Clean water Act and Section 10 of the Rivers and Harbors Act for certain activities that are regulated by Federal, state, and local authorities. The jurisdiction of these activities is in "waters of the United States" and includes both riverine and marine habitats. A database which could facilitate documentation regarding cumulative impacts of non-fishing activities on the physical and biological habitat covered by the surfclam and ocean quahog management unit is not available at this time. The development of a habitat and effect database would accelerate the review processes and outline areas of increased disturbance. Inter-agency coordination would also prove beneficial.

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 that were derived using the best science available at the time) 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 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 13. 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 its 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 (Wallace and Hoff 2004b). Amendment 13 (MAFMC 2003) 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 because of the implementation of ITQs in 1990, but also attributable 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 for the resources.

The cumulative effects of the proposed quotas will be examined for the following five areas: targeted species and resources, non-targeted species or bycatch, protected resources, habitat including the EFH assessment, and communities.

7.5.2 Targeted Fishery and Resources

First and foremost with these two species, 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. Surfclams were overfished prior to management and subsequently rebuilt. Ocean quahogs have never been overfished. Both surfclams and ocean quahogs are in-sediment living animals and are not vulnerable to other types of fishing gear (i.e., they are not captured by otter trawls, pelagic trawls, gill nets or harpoons). Both species are caught by hydraulic clam dredges for the industrial fisheries or by dry dredges in the small artisanal fishery in Maine.

The Council manages these two species only in the EEZ with the exception of the Maine artisanal fishery which occurs in both Federal and state waters. Any zoning type activities in the EEZ that did not consider these two species could impact their populations locally. The Council has commented on anthropogenic projects such as beach replenishment and ocean dumping in the past while raising concerns for the local health of surfclams and ocean quahogs. Since these two species occur over wide areas of the North Atlantic, it is unlikely that any anthropogenic activity could currently significantly impact either population on more than simply a local level.

None of the proposed quotas or suspension of the surfclam minimum size limit would have any significant effect on the target species by itself, or in conjunction with other anthropogenic activities.

7.5.3 Non-target Species or Bycatch

National Standard 9 addresses bycatch in fisheries and these surfclam and ocean quahog fisheries are extremely clean fisheries by their nature. This National Standard requires Councils to consider the bycatch effects of existing and planned conservation and management measures. Bycatch can, in two ways, impede efforts to protect marine ecosystems and achieve sustainable fisheries and the full benefits they can provide to the Nation. First, bycatch can increase substantially the uncertainty concerning total fishing-related mortality, which makes it more difficult to assess the status of stocks, to set the appropriate optimal yield (OY) and define overfishing levels, and to ensure that OYs are attained and overfishing levels are not exceeded. Second, bycatch may also preclude other more productive uses of fishery resources.

The term "bycatch" means fish that are harvested in a fishery, but that are not sold or kept for personal use. Bycatch includes the discard of whole fish at sea or elsewhere, including economic discards and regulatory discards, and fishing mortality due to an encounter with fishing gear that does not result in capture of fish (i.e., unobserved fishing mortality). Bycatch does not include any fish that legally are retained in a fishery and kept for personal, tribal, or cultural use, or that enter commerce through sale, barter, or trade. Bycatch does not include fish released alive under a recreational catch-and-release fishery management program. A catch-and-release fishery management program is one in which the retention of a particular species is prohibited. In such a program, those fish released alive would not be considered bycatch.

None of the management measures proposed in this specification package will promote or result in increased levels of bycatch relative to the no action. An ITQ program, as in these fisheries, reduces the “race to fish” and therefore significantly reduces bycatch of undesirable species.

The surfclam and ocean quahog fisheries are extremely clean, as evidenced by the 1997 NEFSC clam survey species listing (Table 34 of Amendment 13, MAFMC 2003 and Wallace and Hoff 2004b). Surfclams and ocean quahogs comprise well over 80% of the total catch from the survey, with no fish caught. Only sea scallops, representing other commercially desirable invertebrates were caught at around one percent. Commercial operations are certainly even cleaner than the scientific surveys which have liners in the dredges, 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.

Commercial clam dredging vessels dredge at very slow speeds and healthy animals should have no difficulty avoiding these vessels. The realized reduction in the number of fishing vessels resulting from Amendment 8 reduced the potential for the interaction with endangered species from a minimal to a very minimal level. Furthermore, management of these two bivalves are in the EEZ only. Bycatch in the eastern Maine clam dredges of fish species is extremely minimal (Finlayson pers. comm.). Observations made during the PSP sampling program by the Maine Department of Marine Resources indicate negligible bycatch in the Maine fishery (McGowan pers. comm.).

Of course, bycatch in one fishery is another fishery's target. Many fisheries have collapsed their targeted resource and required extensive rebuilding periods. New England groundfish are a present case example of management decisions/indecisions which have allowed the continued overcapitalization of the fisheries and depletion of the resources, both from targeting and non selective fishing practices. The 1996 amendments to the Act have contributed greatly to efforts to rebuild the overfished resources and thus many of the resources that were bycatch problems will be rebuilt in the future.

None of the proposed quotas or suspension of the surfclam minimum size limit would have any effect on non targeted species by itself, or in conjunction with other anthropogenic activities, other than other fisheries which are out of the control of this FMP. An ITQ program, as in these fisheries, reduces the "race to fish" and therefore reduces bycatch of undesirable species.

7.5.4 Protected Resources

There are numerous species which inhabit the environment within 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). Sixteen are classified as endangered or threatened under the ESA, while the remainder are protected by the provisions of the MMPA. The Council examined the list (section 6.3) of species protected either by the Endangered Species Act of 1973 (ESA), the Marine Mammal Protection Act of 1972 (MMPA), or the Migratory Bird Act of 1918 that may be found in the environment utilized by Atlantic surfclam and ocean quahog fisheries.

The only gear used for the surfclam and ocean quahog fisheries are clam dredges which are now included in the List of Fisheries for 2004, as a Category III fishery (50 CFR Part 229 -- Final Rule) for the taking of marine mammals by commercial fishing operations under Section 118 of the Marine Mammal Protection Act (MMPA) of 1972. In addition, the proposed actions will not significantly increase fishing effort. As such, minimal interaction is expected between clam dredging gear and protected species. According to the List of Fisheries for 2004, there are no documented interactions/takes in this fishery.

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 believes that implementation of these quotas will have no 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.

None of the proposed quotas or suspension of the surfclam minimum size limit will have any effect on protected resources by this fishery. Interactions of protected resources with other fisheries and marine traffic can have a significant effect to several of these protected resource populations; however, the fisheries for surfclams and ocean quahogs should not contribute to these cumulative effects. An ITQ program, as in these fisheries, reduces the "race to fish" and therefore also contributes to the care and protection by fishermen of the overall marine environment.

7.5.5 Habitat including EFH Assessment

The Council concluded from the fishing gear impacts workshop (Appendix 4 of MAFMC 2003) 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. For example, hydraulic clam dredges would have a significant impact to a coral reef or an SAV bed if such gear were used in a stable, fragile, structured, environment like one of those environments. However, the clam resources are concentrated in high energy sandy sediment and the fishing gear has evolved over the past five decades to fish most efficiently in this type of sandy sediment. This evolution of the fishing gear has minimized the effect on fishery habitat (Wallace and Hoff 2004a). Natural events have more effect on the benthic community than this type of fishing gear since all of the fishing activity takes place in sandy shallow water. USDC (2002) describing the October 2001 fishing gear impacts workshop concluded that hydraulic clam dredges were not a major concern relative to otter trawls and scallop dredges. All of the hydraulic clam dredging for an entire year, would impact about 100 square miles of bottom (Table 2 of MAFMC 2003). In context, this 100 square miles is roughly the area of one and a half ten minute square, and there are over 1200 ten minute squares in the EEZ between Cape Hatteras and Georges Bank. Thus, it does not seem that either surfclam or ocean quahog EFH is effected by fishing gear.

A qualitative EFH vulnerability analysis conducted by Stevenson *et al.* (2003) suggests that the EFH of several species may be vulnerable to impacts associated with the use of hydraulic clam dredges. This includes black sea bass (juveniles and adults), scup (juveniles), ocean pout (all life stages), red hake (juveniles), silver hake (juveniles), winter flounder (juveniles and adults), and Atlantic sea scallops (section 2.2.5.5.2 of MAFMC 2003).

Based upon existing information, the Council concluded that there may be potential adverse effects on EFH from the hydraulic clam dredge, but concurred with the fishing gear impacts workshop panel (Appendix 4 of MAFMC 2003). The panel concluded that as the clam fishery is currently prosecuted, in sand habitats, there are potentially large, localized impacts to biological and physical structure; however, the recovery time is relatively short. Since the recovery time is relatively short (hours to months) the adverse impacts to this high energy sandy environment can be considered temporary. The preamble to the EFH Final Rule (50 CFR Part 600) defines temporary impacts as those that are limited in duration and that allow the particular environment to recover without measurable impact. Since these impacts are potentially effecting a relatively small portion (approximately 100 square nautical miles) of the overall large uniform area of high energy sand along the U.S. continental shelf (approximately 54,900 square nautical miles), these adverse impacts can be considered minimal. Additionally, the 100 square nautical miles impact each year (approximately 1.5 ten minute squares of latitude and longitude) represents a small fraction of the total EFH of the above listed vulnerable EFH and species. The preamble of the EFH Final Rule defines minimal impacts as those that may result in relatively small changes in the affected environment and insignificant changes in ecological functions.

No other fishing gear (otter trawls, scallop dredges, gill nets, etc.) is known to effect surfclam or ocean quahog EFH. The Council manages these two species only in the EEZ with the exception of the Maine artisanal fishery which occurs in both Federal and state waters. Any zoning type activities in the EEZ that did not consider these two species could impact their populations locally. The Council has commented on anthropogenic projects such as beach replenishment and ocean dumping in the past while raising concerns for the local health of surfclams and ocean quahogs. Since these two species occur over wide areas of the mid and North Atlantic, it is unlikely that any anthropogenic activity could currently significantly impact either population on more than simply a local level.

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. None of the proposed quotas or suspension of the surfclam minimum size limit would have any significant effect on the essential fish habitat for surfclams or ocean quahogs by itself, or in conjunction with other anthropogenic activities.

A very thorough Essential Fish Habitat Assessment was developed for Amendment 13 (MAFMC 2003) and last year's quota paper that will not be reproduced here in its entirety.

7.5.6 Communities

National Standard 8 requires that management measures take into account the fishing communities. For Amendment 13 (MAFMC 2003) to this FMP, the Council hired Dr Bonnie McCay and her associates from Rutgers University to describe the ports and communities that are associated with the surfclam and ocean quahog fisheries. Communities from Maine to Virginia are involved in the harvesting and processing of surfclams and ocean quahogs (section 4.2 of MAFMC 2003).

The ports and communities involved in these fisheries will positively benefit slightly from the increases in the ocean quahog quota and the suspension of the surfclam minimum size limit. With regard to the specific quota recommendations proposed in this document, impact to the affected biological and physical and human environment are described in section 7. Given that no negative impacts are anticipated to result from the preferred alternatives, the synergistic interaction of improvements in the efficiency of the fishery are expected to generate positive impacts overall. These impacts will be felt most strongly in the social and economic dimension of the environment. Direct economic and social benefit from improved fishery efficiency is most likely to affect participants in the harvesting and processing sectors of the surfclam and ocean quahog fisheries. These benefits are addressed in the RIR/IRFA of this document. Indirect benefits of the preferred alternatives are likely to affect consumers and the areas of economic and social environment that interact in various ways with these fisheries.

The proposed actions, together with past and future actions are expected to result in minimal cumulative impacts on the biological, physical, and human components of the environment. These fisheries have been well managed for the past twenty five years and especially since ITQ implementation in 1990. The resources are healthy and the fisheries are sound. As long as management continues to prevent overfishing and prevent the "race to fish", the fisheries and their associated communities will prosper.

7.5.7 Summary/Conclusion

In summary, the proposed actions would maintain the status quo for: 1) the surfclam quota (3.400 million bushels), 2) the suspension of the surfclam minimum size limit, and 3) the Maine ocean quahog quota (100,000 bushels). The ocean quahog quota is to increase from the 2004 level of 5.000 million bushels to 5.333 million bushels (2005), then 5.666 million bushels (2006) then to the maximum OY level of 6.000 million bushels in 2007.

Effective fishery management by the Council and NMFS of surfclams and ocean quahogs has occurred since 1977. First and foremost with these two species, 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. None of the proposed quotas or suspension of the surfclam minimum size limit would have any significant effect on the target species by itself, or in conjunction with other anthropogenic activities.

National Standard 9 requires addressing the bycatch which for the hydraulic clam dredge is minimal based upon the species composition of the research survey (MAFMC 2003, Wallace and Hoff 2004b). An ITQ program, as in these fisheries, reduces the "race to fish" and therefore significantly reduces bycatch of undesirable species.

According to the List of Fisheries for 2004, there are no documented interactions/takes in this fishery. Clam vessels dredge at very slow speeds and healthy animals should have no difficulty avoiding the vessels. None of the proposed quotas or suspension of the surfclam minimum size limit will have any effect on protected resources by this fishery.

The Council concluded from the fishing gear impacts workshop (USDC 2002) 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, as the fishery currently operates, any effects would be temporary and minimal (Wallace and Hoff 2004a).

National Standard 8 requires that management measures take into account the fishing communities. The ports and communities involved in these fisheries will likely positively benefit slightly from the increases in the ocean quahog quotas during the next three years while the management regime maintains the status quo for the other three management measures. The limited positive benefits to the ports and communities will occur assuming the increased ocean quahog quotas will actually be landed.

8.0 APPLICABLE LAW

8.1 Magnuson-Stevens FCMA

Section 301(a) of the MSFCMA states: "Any fishery management plan prepared, and any regulation promulgated to implement such plan pursuant to this title shall be consistent with the following National Standards for fishery conservation and management." The following is a discussion of the National Standards and how this action meets them.

8.1.1 National Standard 1 - Overfishing Definition

"Conservation and management measures shall prevent overfishing while achieving, on a continuous basis, the optimum yield from each fishery for the United States fishing industry."

The Sustainable Fisheries Act (SFA), which reauthorized and amended the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) made a number of changes to the existing National Standards. With respect to National Standard 1, the SFA imposed new requirements concerning definitions of overfishing in U.S. fishery management plans. In order to comply with National Standard 1, the SFA requires that each Council FMP define overfishing as a rate or level of fishing mortality that jeopardizes a fisheries capacity to produce maximum sustainable yield (MSY) on a continuing basis and defines an overfished stock as a stock size that is less than a minimum biomass threshold.

The SFA also requires that each FMP specify objective and measurable status determination criteria for identifying when stocks or stock complexes covered by the FMP are overfished. To fulfill the requirements of the SFA, status determination criteria are comprised of two components: 1) a maximum fishing mortality threshold and 2) a minimum stock size threshold. The maximum F threshold is specified as F_{msy}. The minimum biomass threshold is specified as ½ the MSY level. The overfishing definitions for ocean quahogs was modified and approved in Amendment 12 while the overfishing definition for surfclams was approved in Amendment 13 to comply with the SFA (Appendix Table 3). All of the quotas proposed under the preferred alternatives for the 2005, 2006 and 2007 specifications are consistent with overfishing definitions adopted in Amendments 12 and 13. Therefore, the proposed action is consistent with National Standard 1.

8.1.2 National Standard 2 - Scientific Information

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

The analyses in this proposed action are based on the best scientific information available. The changes to the ocean quahog quota are based upon the winter of 2003 SARC which found that the resource is not overfished and overfishing is not occurring. Therefore, this action is consistent with National Standard 2.

8.1.3 National Standard 3 - Management Units

"To the extent practicable, an individual stock of fish shall be managed as a unit throughout its range, and interrelated stocks of fish shall be managed as a unit or in close coordination."

Each species in the management unit of this FMP is managed as a single unit throughout its range, from Maine through North Carolina. The proposed action does not alter the management unit. Therefore, this proposed action is consistent with National Standard 3.

8.1.4 National Standard 4 - Allocations

"Conservation and management measures shall not discriminate between residents of different states. If it becomes necessary to allocate or assign fishing privileges among various United States fishermen, such allocation shall be (A) fair and equitable to all such fishermen; (B) reasonably calculated to promote conservation; and ©) carried out in such a manner that no particular individual, corporation, or other entity acquires an excessive share of such privileges."

This proposed action is not expected to significantly alter the allocation of any of the resources managed under this FMP. Therefore, the proposed actions are consistent with National Standard 4.

8.1.5 National Standard 5 - Efficiency

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

The management program implemented by the Amendments to the Surfclam and Ocean Quahog FMP are intended to allow the fisheries managed pursuant to this FMP to operate at the lowest possible cost (e.g., fishing effort, administration, and enforcement) given the FMP's objectives. The measures proposed place no restrictions on processing, or marketing and no unnecessary restrictions on the use of efficient techniques of harvesting. Therefore the proposed actions are consistent with National Standard 5.

8.1.6 National Standard 6 - Variations and Contingencies

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

The description of how this National Standard is met by the FMP was described in Amendments 8, 10, 12 and 13. All of the other measures proposed allow for consideration in variations among, and contingencies in, fisheries, fishery resources and catches. Therefore, the proposed action is consistent with National Standard 6.

8.1.7 National Standard 7 - Cost and Benefits

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

The description of how this National Standard is met by the FMP was described in Amendments 8, 10, 12 and 13. This proposed action is not expected to alter the costs of management under this FMP. Therefore, there is no reason to alter the conclusion that the proposed action is consistent with National Standard 7.

8.1.8 National Standard 8 - Communities

"Conservation and management measures shall, consistent with the conservation requirements of the Magnuson-Stevens Act (including the prevention of overfishing and rebuilding of overfished stocks), take into account the importance of fishery resources to fishing communities in order to (A) provide for the sustained participation of such communities, and (B) to the extent practicable, minimize adverse economic impacts on such communities."

National Standard 8 requires that management measures take into account the fishing communities. For Amendment 13 (MAFMC 2003) to this FMP, the Council hired Dr Bonnie McCay and her associates from Rutgers University to describe the ports and communities that are associated with the surfclam and ocean quahog fisheries. Communities from Maine to Virginia are involved in the harvesting and processing of surfclams and ocean quahogs (section 4.2 of MAFMC 2003).

The proper management of the stock complexes managed under this FMP through implementation of the management measures described in recent Amendments have been beneficial to the commercial fishing communities of the Atlantic Coast. By preventing overfishing of the stocks and overcapitalization of the industry, positive benefits to the fishing communities have and will continue to be realized. Therefore, the proposed action is consistent with National Standard 8.

8.1.9 National Standard 9 - Bycatch

"Conservation and management measures shall, to the extend practicable, (A) minimize bycatch and (B) to the extent bycatch cannot be avoided, minimize the mortality of such bycatch."

This national standard requires Councils to consider the bycatch effects of existing and planned conservation and management measures. Bycatch can, in two ways, impede efforts to protect marine ecosystems and achieve sustainable fisheries and the full benefits they can provide to the Nation. First, bycatch can increase substantially the uncertainty concerning total fishing-related mortality, which makes it more difficult to assess the status of stocks, to set the appropriate optimal yield (OY) and define overfishing levels, and to ensure that OYs are attained and overfishing levels are not exceeded. Second, bycatch may also preclude other more productive uses of fishery resources.

The term "bycatch" means fish that are harvested in a fishery, but that are not sold or kept for personal use. Bycatch includes the discard of whole fish at sea or elsewhere, including economic discards and regulatory discards, and fishing mortality due to an encounter with fishing gear that does not result in capture of fish (i.e., unobserved fishing mortality). Bycatch does not include any fish that legally are retained in a fishery and kept for personal, tribal, or cultural use, or that enter commerce through sale, barter, or trade. Bycatch does not include fish released alive under a recreational catch-and-release fishery management program. A catch-and-release fishery management program is one in which the retention of a particular species is prohibited. In such a program, those fish released alive would not be considered bycatch.

As Wallace and Hoff (2004b) identified, there is minimal bycatch in the fisheries for these two species. The authors examined the three most recent clam surveys from the NEFSC and found that of the 1,577 tows completed in the three surveys, there were only 210 fish caught, with the little skate making up over half the catch. Surfclams and ocean quahogs comprise nearly ninety percent of the total number of animals caught in these three surveys when "clappers" (empty clam shells) were counted with the live clams. Only Atlantic sea scallops, representing other commercially desirable invertebrates were caught at one percent. Commercial clam vessels fish cleaner than the scientific surveys gear which has a liner in the dredge in order to collect all animate and inanimate objects encountered.

8.1.10 National Standard 10 - Safety at Sea

"Conservation and management measures shall, to the extent practicable, promote the safety of human life at sea."

The proposed action should not affect the vessel operating environment, gear loading requirements or create derby style fisheries for Atlantic surfclams or ocean quahogs. The Council developed this FMP and subsequent amendments with the consultation of industry advisors to help ensure that this was the case. In summary, the Council has concluded that the proposed action will not impact or affect the safety of human life at sea. Therefore the action is consistent with National Standard 10.

8.2 NEPA

FINDING OF NO SIGNIFICANT IMPACT

National Oceanic and Atmospheric Administration Administrative Order (NAO) 216-6 (revised May 20, 1999) provides nine criteria for determining the significance of the impacts of a final fishery management 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 the next three years 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 2005, 2006, and 2007 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 next three years for 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.

The only gear used for the surfclam and ocean quahog fisheries is clam dredges which are now included in the List of Fisheries for 2004, as a Category III fishery (50 CFR Part 229 -- Final Rule) for the taking of marine mammals by commercial fishing operations under Section 114 of the Marine Mammal Protection Act (MMPA) of 1972. Clam vessels dredge at very slow speeds and healthy animals should have no difficulty avoiding these vessels. As such, minimal interaction is expected between clam dredging gear and protected species. According to the List of Fisheries for 2004, there are no documented interactions/takes in this fishery.

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 (section 7.5). The final 2005, 2006, and 2007 specifications would maintain the status quo level for the 2004 surfclam and the 2004 Maine mahogany ocean quahog fishery. There would be a slight increase annually in the ocean quahog quota. 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 three additional years for the surfclam and the

Maine mahogany quahogs and slightly increase the ocean quahog during the next three years. The most recent assessment for both surfclams and ocean quahog state that each of the resources is not overfished and overfishing is not occurring.

The surfclam and ocean quahog fisheries are extremely clean, as evidenced by the past three clam surveys (Wallace and Hoff 2004b). Surfclams and ocean quahogs comprise over 90% of the total catch from the survey, with only 210 fish caught during the 1.577 survey tows. Only Atlantic sea scallops, representing other commercially desirable invertebrates were caught at around one percent. Commercial operations are certainly even cleaner than the scientific surveys which have liners in the dredges, 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.
The only gear used for the surfclam and ocean quahog fisheries is clam dredges which are now included in the List of Fisheries for 2004, as a Category III fishery (50 CFR Part 229 -- Final Rule) for the taking of marine mammals by commercial fishing operations under Section 114 of the Marine Mammal Protection Act (MMPA) of 1972. Clam vessels dredge at very slow speeds and healthy animals should have no difficulty avoiding these vessels. As such, minimal interaction is expected between clam dredging gear and protected species. According to the List of Fisheries for 2004, there are no documented interactions/takes in this fishery.

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 three years an existing category of vessel permit and modifies catch allowances. Relative to the new approach to fisheries management that is being discussed extensively, ecosystem management, a recent paper by Arnason (1998) suggests that an ITQs system offers a potentially fruitful approach to the problem of ecological fisheries management. All fish stocks and their associated fisheries are embedded in an ecosystem. Therefore, to obtain maximum economic benefits, fisheries management must take due account of the corresponding web of ecological interrelationships. Unfortunately, however, due to the inherent complexity of ecosystems and the scarcity of the relevant empirical information, sensible ecological fisheries management is very difficult to achieve in most cases. According to Arnason (1998) the great advantage of the ITQ regime is that it enlists market forces to bring about the optimal utilization of the ecology.

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

As discussed in Section 7 of this EA, the final specifications for the next three years 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 three additional years for the surfclam and for Maine mahogany ocean quahogs and slightly increase the ocean quahog quota. These quotas will not be controversial and are strongly favored by the industry. Therefore, the measures contained in this action are not expected to be highly controversial.

Finding of No Significant Impact Statement

Having reviewed the Environmental Assessment for the 2005, 2006, and 2007 Surfclam and Ocean Quahog Fishing Quotas and the available information relating to the proposed action and the cumulative effects of the proposed actions, I have determined that there will be no significant environmental impact resulting from the action and that preparation of an environmental impact statement on the action is not required by Section 102(2)©) of the National Environmental Policy Act or its implementing regulations.

___________________________________ _______________

Assistant Administrator for Fisheries, NOAA Date

8.3 Endangered Species Act

The 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) are described in Section 6.3.

8.4 Marine Mammal Protection Act

The numerous species which inhabit the management unit of this FMP that are afforded protection under the Marine Mammal Protection Act of 1972 (MMPA) are described in Section 6.3.

8.5 Coastal Zone Management Act

The Council determined that this action is consistent to the maximum extent practicable with the enforceable provisions of the approved coastal management programs of Maine, New Hampshire, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania, Delaware, Maryland, Virginia, and North Carolina. This determination was submitted for review by the responsible state agencies under section 307 of the Coastal Zone Management Act.

8.6 Administrative Procedures Act

This Environmental Assessment is in compliance with the Administrative Procedures Act.

8.7 Data Quality Act

Utility of Information Product

Explain how the information product meets the standards for utility:

Is the information helpful, beneficial or serviceable to the intended user?

The proposed document includes the surfclam and ocean quahog specification for 2005, 2006, and 2007 and a description of the alternatives considered and the reasons for selecting the proposed management measures. This proposed specifications document implements the FMP's conservation and management goals consistent with the Magnuson-Stevens Act, as well as, all other existing applicable laws.

Is the data or information product an improvement over previously available information? Is it more current or detailed? Is it more useful or accessible to the public? Has it been improved based on comments from or interactions with customers?

This proposed specifications document was developed as a result of a multi-stage process that involved review of the source document (2005, 2006, and 2007 Specifications package) by affected members of the public. The public had the opportunity to review and comment on management measures during the during the MAFMC meeting held on June 23, 2004 in Hershey, Pennsylvania. In addition, the public will have further opportunity to comment on this specifications package once NMFS publishes a request for comments notice on the FR.

What media are used in the dissemination of the information? Printed publications? CD-ROM? Internet? Is the product made available in a standard data format? Does it use consistent attribute naming and unit conventions to ensure that the information is accessible to a broad range of users with a variety of operating systems and data needs?

The FR notice that announces the proposed rule and the implementing regulations will be made available in printed publication and on the website for the Northeast Regional Office. The notice provides metric conversions for all measurements.

Integrity of Information Product

Explain how the information product meets the standards for integrity:

All electronic information disseminated by National Oceanic and Atmospheric Administration (NOAA) adheres to the standards set out in Appendix III, "Security of Automated Information Resources," OMB Circular A-130; the Computer Security Act; and the Government Information Security Reform Act.

If information is confidential, it is safeguarded pursuant to the Privacy Act and Titles 13, 15, and 22 of the U.S. Code (confidentiality of census, business and financial information).

Other/Discussion (e.g., Confidentiality of Statistics of the Magnuson-Stevens Act; NOAA Administrative Order 216-100, Protection of Confidential Fisheries Statistics; 50 CFR 229.11, Confidentiality of information collected under the MMPA).

Objectivity of Information Product

Indicate which of the following categories of information products apply for this product:

- Original Data
- Synthesized Products
- Interpreted Products
- Hydrometeorological, Hazardous Chemical Spill, and Space Weather Warnings, Forecasts, and Advisories
- Experimental Products
- Natural Resource Plans
- Corporate and General Information

Describe how this information product meets the applicable objectivity standards. (See the DQA Documentation and Pre-Dissemination Review Guidelines for assistance and attach the appropriate completed documentation to this form).

What published standard(s) governs the creation of the Natural Resource Plan? Does the Plan adhere to the published standards? (See the NOAA Sec. 515 Information Quality Guidelines, Section II(F) for links to the published standards for the Plans disseminated by NOAA).

In preparing specifications document, the Council must comply with the requirements of the Magnuson-Stevens Act, the National Environmental Policy Act, the Regulatory Flexibility Act, the Administrative Procedure Act, the Paperwork Reduction Act, the Coastal Zone Management Act, the Endangered Species Act, the Marine Mammal Protection Act, the Data Quality Act, and Executive Orders 13132 (Federalism), 12866 (Regulatory Planning), 12630 (Property Rights), and 13158 (Marine Protected Areas).

Was the Plan developed using the best information available? Please explain.

This specification's document has been developed to comply with all applicable National Standards, including National Standard 2. National Standard 2 states that the FMP's conservation and management measures shall be based upon the best scientific information available. Despite current data limitations, the conservation and management measures proposed to be implemented under this specifications document are based upon the best scientific information available. This information includes NMFS dealer weighout, VTR, and logbook data for 2003 which was used to characterize the economic impacts of the management proposals and describe the surfclam and ocean quahog fisheries. The specialists who worked with these data are familiar with the most recent analytical techniques and with the available data and information relevant to the surfclam and ocean quahog fisheries.

Have clear distinctions been drawn between policy choices and the supporting science upon which they are based? Have all supporting materials, information, data and analyses used within the Plan been properly referenced to ensure transparency?

The policy choices (i.e., management measures) proposed to be implemented by this specifications document are supported by the available scientific information and, in cases where information was unavailable, proxy reference points are provided. The management measures contained in the specifications document are designed to meet the conservation goals and objectives of the FMP, and prevent overfishing, while maintaining sustainable levels of fishing effort for to ensure a minimal impact on fishing communities.

The supporting materials and analyses used to develop the measures in the proposed management measures are contained in the specifications document and to some degree on previous specifications and/or FMP as specified in this document.

Describe the review process of the Plan by technically qualified individuals to ensure that the Plan is valid, complete, unbiased, objective and relevant. For example, internal review by staff who were not involved in the development of the Plan to formal, independent, external peer review. The level of review should be commensurate with the importance of the Plan and the constraints imposed by legally enforceable deadlines.

The review process for this specifications package involves the MAFMC, the Northeast Fisheries Science Center, the Northeast Regional Office, and NOAA Fisheries headquarters. The Center's technical review is conducted by senior level scientists with specialties in population dynamics, stock assessment methods, invertebrate resources, population biology, and the social sciences. The Council review process involves public meetings at which affected stakeholders have the opportunity to provide comments on the specifications document. Review by staff at the Regional Office is conducted by those with expertise in fisheries management and policy, habitat conservation, protected species, and compliance with the applicable law. Final approval of the specifications document and clearance of the rule is conducted by staff at NMFS Headquarters, the Department of Commerce, and the U.S. Office of Management and Budget.

8.8 Paperwork Reduction Act

The Paperwork Reduction Act concerns the collection of information. The intent of the Act is to minimize the Federal paperwork burden for individuals, small businesses, 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.

8.9 Impacts of the Plan Relative to Federalism

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

8.10 Environmental Justice

This Executive Order provides that “each Federal agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations. ” E.O. 12898 directs each Federal agency to analyze the environmental effects, including human health, economic, and social effects of Federal actions, including effects on minority populations, low-income populations, and Indian tribes, when such analysis is required by NEPA. Agencies are further directed to “identify potential effects and mitigation measures in consultation with affected communities, and improve the accessibility of meetings, crucial documents, and notices.”

The proposed action under the preferred alternative maintains the status quo in terms of participation in the Atlantic surfclam and ocean quahog fisheries. Since the proposed action represents no change relative to the current level of participation in these fisheries, no negative biological, economic or social effects are anticipated as a result (section 7). Therefore, the proposed action under the preferred alternatives are not expected to cause disproportionately high and adverse human health, environmental or economic effects on minority populations, low-income populations, or Indian tribes.

8.11 Regulatory Flexibility Act/ E.O. 12866

This act and executive order are addressed in the Initial Regulatory Flexibility Analysis, which is attached to the end of this document.

9.0 LIST OF AGENCIES AND PERSONS CONSULTED

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, Invertebrate Subcommittee of the SARC, and the Northeast Region EFH Steering Committee.

10.0 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 three stock assessments for surfclams (USDC 1998a, 2000a and 2003) and ocean quahogs (USDC 1998b, 2000b, and 2004). Clayton E. Heaton of Council staff worked extensively with the economic issues including 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, was 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 Weinberg, Paul Rago, Larry Jacobson, and Steve Murawski have worked extensively on the last six stock assessments (three 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. Both Brian Hooker and Susan A. Murphy, NERO, provided extensive guidance throughout the development of this package.

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Regulatory Impact Review / Initial 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 2001). A "significant regulatory action" means any regulatory action that is likely to result in a rule that meets any of the criteria discussed below.

- **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 adverse impact on the economy as they would allow for future harvests that are either equivalent to or higher than current harvest levels. In no instance would a decline in exvessel revenues be expected.

  Furthermore, based on Federal logbook reports, the total exvessel value of the EEZ surfclam fishery was $37.0 million in 2003, the ocean quahog EEZ ITQ fishery was $23.4 million, and the Maine ocean quahog fishery in Federal waters was $4.9 million. Hence, with a total exvessel value of $65.3 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 a $100 million impact threshold.

  Note that the establishment of annual quotas in these fisheries is necessary to maintain the harvest of surfclams and ocean quahogs at sustainable levels. The proposed actions will not adversely affect, in the long-term, competition, jobs, the environment, public health or safety, or state, local, or tribal government communities.

● **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.

● **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.

● **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 2005, 2006, and 2007 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 4.2 "Management Objectives and Management Unit of the FMP" of this document.

4.0 DESCRIPTION OF THE FISHERY

A description of the all the fisheries impacted by the proposed rules is presented in EA Section 6.4 "Description of the Fishery and Socio-economic Environment." A short discussion of ports and communities, the federal fleet, and the processing sector is provided in EA Sections 6.4.1 through 6.4.4. The state and federal fisheries for surfclams fishery are described in EA Section 6.4.5. The ITQ fishery for ocean quahogs is presented in EA Section 6.4.6. Finally, the small-scale Maine ocean quahog fishery is described in EA Section 6.4.7.

Federal Surfclam & Ocean Quahog Quotas and Landings: 1979 - 2004								
Surfclams (Thou Bushels)					Ocean Quahogs (Thou. Bushels)			
* Georges Bank first closed for PSP in 1990					* Maine ocean quahog fishery excluded 1991 - 2004			
Year	**Landings**	**Quota**	**Percent Harvested**		**Year**	**Landings**	**Quota**	**Percent Harvested**
1979	1,674	1,800	93%		1979	3,035	3,000	101%
1980	1,924	1,825	105%		1980	2,962	3,500	85%
1981	1,976	1,825	108%		1981	2,888	4,000	72%
1982	2,003	2,400	83%		1982	3,241	4,000	81%
1983	2,412	2,450	98%		1983	3,216	4,000	80%
1984	2,967	2,750	108%		1984	3,963	4,000	99%
1985	2,909	3,150	92%		1985	4,570	4,900	93%
1986	3,181	3,225	99%		1986	4,167	6,000	69%
1987	2,820	3,120	90%		1987	4,743	6,000	79%
1988	3,032	3,385	90%		1988	4,469	6,000	74%
1989	2,838	3,266	87%		1989	4,930	5,200	95%
1990*	3,114	2,850	109%		1990	4,622	5,300	87%
1991	2,673	2,850	94%		1991*	4,840	5,300	91%
1992	2,812	2,850	99%		1992*	4,939	5,300	93%
1993	2,835	2,850	99%		1993*	4,812	5,400	89%
1994	2,847	2,850	100%		1994*	4,611	5,400	85%
1995	2,545	2,565	99%		1995*	4,628	4,900	94%
1996	2,569	2,565	100%		1996*	4,391	4,450	99%
1997	2,414	2,565	94%		1997*	4,279	4,317	99%
1998	2,365	2,565	92%		1998*	3,897	4,000	97%
1999	2,538	2,565	99%		1999*	3,770	4,500	84%
2000	2,561	2,565	100%		2000*	3,161	4,500	70%
2001	2,855	2,850	100%		2001*	3,691	4,500	82%
2002	3,113	3,135	99%		2002*	3,871	4,500	86%
2003	3,252	3,250	100%		2003*	4,077	4,500	91%
2004	N/A	3,400	N/A		2004*	N/A	5,000	N/A
Source: NMFS Clam Vessel Logbook Reports, Woods Hole, MA								

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 to the Atlantic Surfclam and Ocean Quahog Fishery Management Plan (MAFMC 2002). 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 4.1.

6.0 DESCRIPTION OF MANAGEMENT ALTERNATIVES

A detailed description of all management alternatives considered in the proposed rule is presented in EA Section 5. The following sections provide a brief overview.

6.1 Quotas for the ITQ Fisheries

Alternatives for 2005, 2006, and 2007 ITQ Fisheries.				
Surfclams				
	Description	2005 Quota (bu)	2006 Quota (bu)	2007 Quota (bu)
Alt. S1	Min. Allowable	1.850 million	1.850 million	1.850 million
Alt. S2	Slight Decrease	3.250 million	3.250 million	3.250 million
Alt. S3**	Status Quo	3.400 million	3.400 million	3.400 million
Alt. S4	No Action (Quota Removed)	Unlimited	Unlimited	Unlimited
Ocean Quahogs				
	Description	2005 Quota (bu)	2006 Quota (bu)	2007 Quota (bu)
Alt. Q1	Min. Allowable	4.000 million	4.000 million	4.000 million
Alt. Q2	Status Quo	5.000 million	5.000 million	5.000 million
Alt. Q3**	Steady Annual Increase	5.333 million	5.666 million	6.000 million
Alt. Q4	Max. Allowable	6.000 million	6.000 million	6.000 million
Alt. Q5	No Action (Quota removed)	Unlimited	Unlimited	Unlimited
** Recommendation				

Four quota alternatives are discussed for the federal surfclam ITQ fishery, and five alternatives are discussed for the ocean quahog ITQ fishery apart from Maine.

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. The current OY range for each fishery is as follows:

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

In addition to quota alternatives falling within the OY range, a brief discussion of the 'no action' alternative will also be included. Consideration of the 'no action' alternative is important because it shows what would happen if the proposed action is not taken. In the case of these ITQ fisheries, the failure to specify annual quotas and issue cage tags would have the draconian impact of nullifying the ITQ system itself and allowing unlimited harvests. Given that this is not currently a legal alternative for the Council to recommend, its treatment will be brief.

For the surfclam fishery, the quota alternatives numbered 1 and 3 correspond to the minimum and maximum allowable quotas specified in the current OY range. For the ocean quahog ITQ fishery, these alternatives are numbered 1 and 4.

Alternatives which would maintain the status quo quotas are always included for consideration in each fishery, and correspond to Alternative S3 for surfclams (3.400 million bushels) and Alternative Q2 for ocean quahogs (5.00 million bushels). As it happens, the 2004 quota for surfclams is already set to the maximum allowable level of 3.400 mill. bushels, so Alternative S3 equates to both the status quo alternative and the maximum allowable alternative.

In the past, the identification of additional quota alternatives beyond the minimum, maximum and status quo levels often took the form of modest increases or decreases from the status quo in the direction deemed most appropriate at the time. However the quota specification process occurring in 2004 is unique in that it will be the first to enable multi-year quotas. Regulations implementing Amendment 13 to the surfclam and ocean quahog fishery management plan published Dec. 16, 2003 required for the first time that quotas for each fishery be specified for a three-year interval. Hence this document recommends quotas for each of the years 2005, 2006, and 2007.

Since resource conditions may potentially change for the worse or the better as time unfolds, flexibility was built into the new regulatory process such that the quotas specified for the second and third year of each 3-year interval can be modified as necessary as they approach. Hence the public is strongly advised to consider the 2006 and 2007 quotas recommended in this process as 'provisional,' and subject to change either up or down as conditions warrant, within the allowable Optimum Yield range in effect at the time.

The recommended alternative for the ocean quahog ITQ fishery is Alternative Q3. It was proposed to the Council by industry, and would increase the quota from the current 5.0 million bushels to 6.0 million by equal increments of 0.333 million bushels each year over the next three years. The actual ocean quahog harvests in recent years have been significantly below their allowable levels. From 1999 through 2003 the ocean quahog quota was set at 4.5 million bushels. During that interval landings ranged from 30% below the quota (3.161 mill. bu. in 2000) to 9% below the quota (4.077 mill. bu. in 2003). For the 2004 fishing year the quota was raised to 5.0 million bushels. Preliminary Dealer landings reports as of Sep. 15, 2004 totaled 2.770 million bushels, or 55.4% of the annual quota, suggesting that the ocean quahog quota will not be fully harvested again in 2004.

The quota decision to be made in the surfclam fishery is surrounded by somewhat different circumstances. The Federal quota has already been increased a total of 33% over the past four years, after remaining constant for the prior six. The quota now stands at the maximum allowable level 3.400 million bushels. Management advice from the most recent Atlantic Surfclam Advisory Report states: "Although the stock is above BMSY, uncertainty in the current level and future trend in biomass suggest that substantial increases in catch levels are not advised. In addition, because surfclams are sedentary and fishing is concentrated in relatively small areas, it may be advantageous to avoid localized depletion." (USDC 2003).

An analysis of the expected impacts of each alternative will be presented in RIR Section 7. After deliberation and the opportunity for public comment, the Council voted at its June 2004 meeting to recommend Alternatives S3 and Q3 to the Secretary of Commerce. S3 would maintain the federal surfclam quota at the current maximum level of 3.400 million bushels for 2005, 2005, and 2007. Q3 would steadily increase the federal ocean quahog quota by 0.333 million bushels each year for the next three years as follows:

Alt Q3. Recommended Quotas for Ocean Quahog ITQ Fishery		
Year	Quota	Percentage Change from Status Quo (5.000 mill. bushels)
2005	5,333 mill. bushels	6.7% Increase
2006	5,666 mill. bushels	13.3% Increase
2007	6.000 mill. bushels	20.0% Increase

6.2 Quotas for the Maine Ocean Quahog Fishery

Alternatives for 2005, 2006, and 2007 Maine Ocean Quahog Fishery				
	Description	2005 Quota	2006 Quota	2007 Quota
Alt. M1	50% of Max. Quota	50,000 Maine Bu.	50,000 Maine Bu.	50,000 Maine Bu.
Alt. M2	Status Quo less Previous Year Quota Overage	92,500 Maine Bu.	Unknown	Unknown
Alt. M3**	Max Allowable - Status Quo	100,000 Maine Bu.	100,000 Maine Bu.	100,000 Maine Bu.
Alt. M4	No Action (Quota removed)	Unlimited	Unlimited	Unlimited
** 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.

Four 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 a formula in which the maximum allowable quota is reduced by the amount of any quota overage that may have occurred in the most recent fishing year. In 2003 the 100,000 bushel quota was exceeded by approximately 7,500 Maine bushels. Hence the 2005 quota would equal 100,000 less 7,500 Maine bushels, or 92,500 Maine bushels. Quotas for 2006 and 2007 would vary depending on whether overages occurred in the 2004 or 2005 fishing years.

Alternative M3 would maintain the Maine quota at the current maximum allowable amount of 100,000 Maine bushels for the next three years. Finally, M4 is the 'no action' alternative representing the what would occur if the quotas were removed and harvests unlimited.

The Council is recommending that the Maine ocean quahog quota remain unchanged at the initial maximum quota level of 100,000 Maine bushels (1 bushel = 1.2445 cubic feet) for 2005, 2006, and 2007 (Alternative M3). As with the ITQ fisheries for surfclams and ocean quahogs, it is important for the public to understand that the Year 2 and Year 3 quotas for Maine ocean quahogs are subject to change in the future if circumstances warrant.

Staff believes that the 2004 quota will likely be reached in the late fall of 2004, and the Regional Administrator will be obliged to close the fishery, as she was in September of 2003 and October of 2002. 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 $43^{o}50^{'}$), 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 2004, as they have for the past several years.

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.

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 was initiated by the State of Maine in 2002. A preliminary report was issued in June of 2003 (Maine Dept. of Marine Resources. 2003) describing the work completed to date. Efforts were halted temporarily due to a shortage of funding, however new funding is anticipated from a redirection in monies generated by the landings tax on ocean quahogs in Maine.

Once the work is completed and peer reviewed, the assessment will be utilized to specify 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 2005, 2006, and 2007. The minimum length for surfclams is 4.75 inches. According to 50 CFR section 648.72 ©): *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.*

7.0 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 2002), 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 for 2005, 2006, and 2007				
	Description	2005 Quota (bu)	2006 Quota (bu)	2007 Quota (bu)
Alt. S1	Min. Allowable	1.850 million	1.850 million	1.850 million
Alt. S2	Slight Decrease	3.250 million	3.250 million	3.250 million
Alt. S3**	Status Quo	3.400 million	3.400 million	3.400 million
Alt. S4	No Action (Quota Removed)	Unlimited	Unlimited	Unlimited
** 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 better than it was thought to be in the mid-to late 1990's. This allowed the Council to recommend increasing the quota to it's maximum level in 2004, 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 S3 - Maximum Allowable / Status Quo Surfclam Quota - 3.400 million bushels

Maintaining the surfclam quota at the current maximum allowable level of 3.400 million bushels for 2005, 2006, and 2007 was the industry and staff recommendation to the Mid-Atlantic Council. After receiving comments from the public, the Council considered the issue and voted to accept the recommendation.

7.1.2.1 Landings

Maintaining the surfclam quota at 3.400 million bushels in 2005, 2006, and 2007 would preserve the status quo and represent no change in landings.

7.1.2.2 Exvessel Prices

Demand for clam products increased steadily following the low point of 1998, such that exvessel prices climbed in spite of the fact that the Federal quota increased 22% from 2000 to 2002. 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 2002 Table 58). Potential quotas evaluated in the analysis included 3.135 million bushels, and 3.4 million bushels. Since that time the Council has considered a number of additional quota levels during the annual quota specification process, therefore extrapolated values were generated for 1.850, 3.250, and 3.325 million bushels and are included in the table below.

Economic Impacts of Proposed Essential Fish Habitat Regulations and New Surfclam Quotas
Excerpt and extrapolation from MAFMC 2002 Table 58.

Surfclams

Quota/Landings	Trips	Price	Revenue	Consumer Surplus	Operating Costs	Producer Surplus	Net Benefits
*1.850 mill. bu.	1,571	9.78	18,877,507	1,693,848	6,747,678	12,129,829	13,823,677
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
*3.325 mill. bu.	2,823	9.23	30,673,739	1,846,079	11,151,154	19,522,584	21,368,664
3.400 mill. bu.	2,887	9.20	31,273,547	1,853,820	11,375,060	19,898,487	21,752,307

* Extrapolated values

The values in this table have not been adjusted for inflation in the intervening years, and as such should only be considered as a guide for the relative magnitude of changes from one quota level to another. Additionally, the prices utilized in the analysis reflect values reported in vessel logbooks as opposed to dealer reports. Dealer reported prices first became available in NMFS databases starting in 2002, and are considered more likely to reflect the full value of the harvest than vessel reports. Vessel captains utilizing ITQ tags owned by the purchasing dealer are more likely to report trips as selling in the $5.00 - $8.00 range, omitting the approximately $5.00 value of the tag that was not a direct part of the transaction.

The average exvessel price of a bushel of surfclams as reported by dealers was $11.39 in 2003, an increase of 1.6% from the 2002 average of $11.21 per bushel.

This alternative would maintain the federal surfclam quota unchanged at the current maximum level of 3.400 million bushels. Hence it would not be expected to have a direct impact on the exvessel price of surfclams.

It is likely, however, that exvessel surfclam prices will rise in the near term due to other market forces. The costs of harvest operations in particular have been increasing due to three major factors: 1) increasing fuel and insurance costs; 2) a decline in the productivity of effort, as the premium New Jersey beds have been fished down; and 3) vessels have been steaming farther offshore to make their catches.

7.1.2.3 Consumer Prices, Consumer Surplus, Producer Surplus, Distributive Impacts, and Cumulative Impacts over Time

Given that this alternative would not change the federal surfclam quota, it should have no impact on consumer prices, consumer surplus, producer surplus, distributive impacts among allocation owners, or cumulative impacts over time.

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.

7.1.2.4 Risk of Biological Overexploitation

The risk of biological overexploitation from maintaining the surfclam quota at the current maximum of 3.400 million bushels would appear to be small, given the information in the latest stock assessment document of September 2003. Nevertheless, the risk does exist. The major area of concern for the stock is the recent decline in biomass in the southern and inshore areas, perhaps due to an increase in average seawater temperature.

As stated previously, the second and third year quotas in this 3-year specification are subject to change, and can be lowered if additional information suggests such an action is necessary.

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 45.6% reduction in landings relative to the status quo.

7.1.3.2 Exvessel Prices

A 45.6% 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. An extrapolation of the analysis conducted in Amendment 13 indicates that consumer surplus would decrease on the order of $160,000 following a quota reduction from 3.400 to 1.850 million bushels (MAFMC 2002 Table 58).

7.1.3.5 Producer Surplus

The benefits to the harvesting sector of higher exvessel prices would be offset by the 45.6% 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 compensate for the lost harvest opportunity, and result in a substantial reduction in producer surplus. The analysis conducted in Amendment 13 suggests that the reduction would be in the neighborhood of $7.8 million (MAFMC 2002 Table 58).

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 45.6% 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 at the current harvest level, the risk of biological overexploitation after a 45.6% reduction should be extremely low.

7.1.4 Alternative S2 - Slight Decrease in Surfclam Quota - 3.250 million bushels

7.1.4.1 Landings

This alternative would return to the quota level that was in effect in 2003, and corresponds to a 4.4% reduction in landings relative to the status quo.

7.1.4.2 Exvessel Prices

A 4.4% decrease in landings from Federal waters would have a minor impact on the market, leading to an small 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. The analysis conducted in Amendment 13 suggests that the reduction would be in the neighborhood of $15,000 (MAFMC 2002 Table 58).

7.1.4.5 Producer Surplus

The benefits to the harvesting sector of higher exvessel prices would be offset by the 4.4% 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. The analysis conducted in Amendment 13 indicates that the reduction would be in the neighborhood of $750,000 (MAFMC 2002 Table 58).

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 4.4% and remain at that level for a number of years, it would likely represent a moderate revenue loss for the industry. Likely impacts include increased harvests of alternative sources of meat, such as ocean quahogs.

7.1.4.8 Risk of Biological Overexploitation

A 4.4% reduction in landings would likely ease pressure slightly 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 7.6% in 2003, following on the heals of an 8.7% decline in 2002. Adoption of this alternative would represent a modest decrease in the risk of biological overexploitation relative to the status quo.

7.1.5 No Action Alternative S4 - Surfclam Quota Removed

A 'no action' alternative is evaluated in the Environmental Assessment portion of this document because the National Environmental Policy Act requires that an EA consider all reasonable alternatives, including the preferred action and the 'no action' alternative.

The Mid-Atlantic Council is required by 50 CFR part 648 to recommend annual quotas that fall within the optimum yield range for each species. Failure to make a recommendation within these bounds is not a legal option, and would be inconsistent with National Standard 1 of the Magnuson-Stevens Act. Hence the 'no action' alternative will not be considered further in this section.

7.1.6 Summary of Surfclam Impacts

Summary of Impacts for Proposed 2005, 2006, and 2007 Surfclam Quota Alternatives Relative to Status Quo Alt. S3: 3.400 million bushels		
Feature	Alt. S1 Min. Allowable 1.850 million bushels	Alt. S2 Slight Decrease 3.250 million bushels
Landings	- 45.6%	-4.4%
Exvessel Prices	Significant +	Slight +
Consumer Prices	Significant +	Slight +
Consumer Surplus	Significant -	Slight -
Harvest Costs	0	0
Producer Surplus	Significant -	Slight -
Enforcement Costs	0	0
Distributive Impacts	0	0
Cumulative Impacts	+	Slight +
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		

7.1.6.1 Summary Justification for Surfclam 3.400 Million Bushel Quota Recommendation

The Council identified four alternative quotas for the years 2005, 2006, and 2007. Since the 2004 quota of 3.4 million bushels is the maximum OY and the maximum allowable under the FMP, the two alternatives which would decrease the quota correspond to the minimum allowed under the FMP and the 2003 quota of 3.25 million bushels. The Council voted to recommend maintaining the maximum OY quota of 3.4 millions bushels for the following reasons.

The picture we have of the surfclam resource and fishery is complex, and has elements that can and do change from year to year. Yet the bottom line is that the best scientific advice we currently have indicates that maintaining the annual quota at the maximum OY level of 3.4 million bushels is sustainable. Our most recent biological assessment in 2003 indicated that the resource is composed of many age classes, is not overfished, and overfishing is not occurring.

There are a number of factors that argue for a cautious approach in the management of this resource in the years ahead. The most important of these includes the steady decline in fleet LPUE that has accompanied the large, sustained harvests off New Jersey. Additionally, the lack of surfclam recruitment in the warmer inshore waters of New Jersey strongly suggests that future harvests from that resource area will be severely reduced.

There are also significant uncertainties that remain in the biological assessments. Estimates of key parameters have experienced substantial variation between assessments. For example, the estimate of total biomass increased 27% from 1997 to 1999, and then plummeted 45% from 1999 to 2002. Additional data, time, and refinement of methods will be required to reduce that uncertainty in the future.

Finally, there was an industry sponsored survey in cooperation with the NEFSC in the summer of 2004. The focus of this survey was the New Jersey and the Delmarva stock assessment areas and not the entire range of the resource. The reason for this southern focus is the hypothesis that global warming is affecting the surfclam resource on its southern and inshore boundaries. This issue alone may warrant changes in the multi-year quotas as the resource is assessed in the future.

On a more encouraging note, the underutilization of the New York inshore surfclam quota has ended. There have been at least anecdotal reports of new surfclam recruits in a number of areas, particularly off New York, and in deeper waters.

7.2 Analysis of Ocean Quahog Alternatives

There are five alternative quota levels considered for the 2005, 2006, and 2007 ocean quahog ITQ fishery:

Alternative Ocean Quahog ITQ Fishery Quotas for 2005, 2006, and 2007				
	Description	2005 Quota (bu)	2006 Quota (bu)	2007 Quota (bu)
Alt. Q1	Min. Allowable	4.000 million	4.000 million	4.000 million
Alt. Q2	Status Quo	5.000 million	5.000 million	5.000 million
Alt. Q3**	Steady Annual Increase	5.333 million	5.666 million	6.000 million
Alt. Q4	Max. Allowable	6.000 million	6.000 million	6.000 million
Alt. Q5	No Action (Quota removed)	Unlimited	Unlimited	Unlimited
** Recommendation				

At the June 2004 Council meeting in Hershey, Pennsylvania, the Mid-Atlantic Council voted to recommend that the ocean quahog ITQ quota outside Maine be increased by 333,000 bushels each year for the next three years as follows:

Alt Q3. Recommended Quotas for Ocean Quahog ITQ Fishery		
Year	Quota	Percentage Change from Status Quo (5.000 mill. bushels)
2005	5,333 mill. bushels	6.7% Increase
2006	5,666 mill. bushels	13.3% Increase
2007	6.000 mill. bushels	20.0% Increase

7.2.1 Summary Evaluation of All Quahog Quota Alternatives (Q1, Q2, Q3, and Q4) - Assumes NONE of the Quota Alternatives Would be Binding on the Industry

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, 72% 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 2002, harvests have not even reached the minimum quota level of 4.0 million bushels. Only in 2003 did harvests inch back above the minimum with total landings of 4.077 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 would be binding on the industry, and hence 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 surplus quota created by the government: greater impacts from larger surpluses, and lesser impacts from smaller surpluses.

A summary of all impacts that can be expected from a repetition of the historical ocean quahog landing pattern in 2005, 2006, and 2007, in which quotas are not binding on the industry, is represented in the following table.

Summary of Impacts for Alternative Ocean Quahog Quota Levels Relative to Status Quo of 5.000 million bushels - Assumes NONE of the Quota Alternatives are Binding on the Industry (Landings Below 4.00 million bushels)				
Feature	**4.000 million bushels** Used by: Alt. Q1 For Years: 2005, 2006, 2007 Min. Allowable	**5.333 million bushels** Used by: Alt. Q3 For Year: 2005 Slight Increase	**5.666 million bushels** Used by: Alt. Q3 For Year: 2006 Significant Increase	**6.000 million bushels** Used by: Alt. Q3 & Q4 For Year: 2007 Max. Allowable
Landings	- 20.0% allowed (assumes less than 4 mill. harvested)	+6.7% allowed (assumes less than 4 mill. harvested)	+ 13.3% allowed (assumes less than 4 mill. harvested)	+ 20.0% allowed (assumes less than 4 mill. harvested)
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 (Q1, Q2, Q3, and Q4) - Assumes Quotas are Binding on the Industry

It should be noted that the potential exists for at least some of the ocean quahog quota alternatives 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. Landings edged higher to 3.871 million bushels in 2002, and cracked the 4 million bushel mark in 2003 with landings of 4.077 million bushels. Current landing trends in 2004 indicate that total landings for the year may exceed the 4.0 million bushel level again, though not reach the 5.0 million bushel level so as to be limited by the 2004 quota. Hopes for major increases in quahog landings were dealt a blow when the new ocean quahog vessel 'Four Daughters' sank in July of 2003. However a new replacement vessel is expected to join the fleet in 2004.

Whether these unusually strong harvest rates will be maintained through 2005 and beyond is uncertain: the dramatic increase in price which spurred them is unprecedented in the recent history of these fisheries. It is likely, however, that the declining availability of surfclams in

New Jersey state waters combined with the overall decline in surfclam biomass will serve to increase fishing pressure on the ocean quahog resource.

With these factors in mind, the Council voted to accept the industry request to increase the ocean quahog quota gradually over the next three years, to 5.333 mill. bu in 2005, 5.666 mill. bu. in 2006, and 6.000 mill. bu. in 2007. Again, it is questionable as to whether the industry will be able to fully utilize each of these increases, however, under the assumption that they might be binding on the industry, the impacts of the proposed quota alternatives can be summarized in the following table.

Summary of Impacts for Alternative Ocean Quahog Quota Levels Relative to Status Quo of 5.000 million bushels - Assumes that ALL of the Quotas would be Binding on the Industry

Feature	**4.000 million bushels** Used by: Alt. Q1 For Years: 2005, 2006, 2007 Min. Allowable	**5.333 million bushels** Used by: Alt. Q3 For Year: 2005 Slight Increase	**5.666 million bushels** Used by: Alt. Q3 For Year: 2006 Significant Increase	**6.000 million bushels** Used by: Alt. Q3 & Q4 For Year: 2007 Max. Allowable
Landings	- 20.0%	+6.7%	+ 13.3%	+ 20.0%
Exvessel Prices	+	Slight -	Small -	-
Consumer Prices	+	Slight -	Small -	-
Consumer Surplus	-	Slight +	Small +	+
Harvest Costs	0	0	0	0
Producer Surplus	-	Slight +	Small +	+
Enforcement Costs	0	0	0	0
Distributive Impacts	0	0	0	0
Cumulative Impacts	0	0	0	?
Risk of Biological Overexploitation	-	Slight +	Small +	+

+ 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 Alternative Q5 - No Action (Ocean Quahog Quota Removed)

A 'no action' alternative is evaluated in the Environmental Assessment portion of this document because the National Environmental Policy Act requires that an EA consider all reasonable alternatives, including the preferred action and the 'no action' alternative.

The Mid-Atlantic Council is required by 50 CFR part 648 to recommend annual quotas that fall within the optimum yield range for each species. Failure to make a recommendation within these bounds is not a legal option, and would be inconsistent with National Standard 1 of the Magnuson-Stevens Act. Hence the 'no action' alternative will not be considered further in this section.

7.2.4 Maine Ocean Quahog Fishery Quota

Alternatives for 2005, 2006, and 2007 Maine Ocean Quahog Fishery				
	Description	2005 Quota	2006 Quota	2007 Quota
Alt. M1	50% of Max. Quota	50,000 Maine Bu.	50,000 Maine Bu.	50,000 Maine Bu.
Alt. M2	Status Quo less Previous Year Quota Overage	92,500 Maine Bu.	Unknown	Unknown
Alt. M3**	Max Allowable - Status Quo	100,000 Maine Bu.	100,000 Maine Bu.	100,000 Maine Bu.
Alt. M4	No Action (Quota removed)	Unlimited	Unlimited	Unlimited
** Recommendation				

7.2.4.1 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 2005, 2006, and 2007 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 2004. Representatives of Maine encouraged the Council to maintain that quota for the coming 3-year quota specification as well.

The issue of greatest concern to the Mid-Atlantic Council has been the substantial quota overages that occurred in 2000 and 2002 due to late reporting. For example, in 2002, total landings for the year reached just over 128,500 bushels. This was comprised of the 100,000 bushel quota for the Maine harvest zone, 13,200 bushels purchased from the ITQ fishery, and a 15,300 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. In 2001 and 2003 the overages were much smaller, amounting to approximately 4,000 and 7,500 bushels respectively.

Preliminary landing statistics as of September 15, 2004 indicated that 71.5% of the Maine ocean quahog quota had been harvested, while approximately 71% 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 2004. 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. A $23,000 grant from the Northeast Consortium was received to fund initial efforts, which took the form of cooperative research using the Maine industry vessel "Whitney and Ashley." It was planned that survey work would continue in 2003, followed by a stock assessment that would be peer reviewed through the SARC/SAW process in December 2003. A shortage of funding caused work to be halted temporarily in 2003, however new funding is anticipated from a redirection in monies generated by the landings tax on ocean quahogs in Maine. The Council is awaiting further news as to when the work will be resumed.

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 43º 50'.

In any regard, this alternative would maintain the status quo quota of 100,000 Maine bushels for 2005, 2006, and 2007, 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 6.7 bushel per hour average in 2003 suggests that the Maine resource availability continues to be above average.

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 the coming 3-year quota interval. Survey and assessment information from the Maine research should be available in the near future, and will provide a more solid basis for increases or decreases in the quota in subsequent years.

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

7.2.4.2.1 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. It is further assumed that if the Maine quota were reduced by 50,000 bushels in a given year, that 90% of the reduction would be replaced by rented allocation from the ITQ fishery, or 45,000 Maine bushels. Total landings would then equal 95,000 Maine bushels.

7.2.4.2.2 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 $40.87 per Maine bushel in 2003, compared with $5.73 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 small exvessel price increase for Maine ocean quahogs.

7.2.4.2.3 Consumer Prices

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

7.2.4.2.4 Consumer Surplus

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

7.2.4.2.5 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.

7.2.4.2.6 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.

7.2.4.2.7 Enforcement Costs

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

7.2.4.2.8 Distributive Impacts

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

7.2.4.2.9 Cumulative Impacts

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

7.2.4.2.10 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.

7.2.4.3 Alternative M2 - 92,500 Maine Bushels (Maximum less Previous Overage)

This alternative would set the 2005, 2006, and 2007 quotas for Maine quahogs to the maximum allowable level of 100,000 Maine bushels less any overage from the prior year. The 2005 quota would be reduced by the 2003 overage to 92,500 Maine bushels.

7.2.4.3.1 Landings

Reducing the Maine quahog quota by the 7,500 Maine bushel overage in 2003 represents an 7.5% 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 rent 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 6,750 Maine bushels. Total landings would then equal 99,250 Maine bushels.

7.2.4.3.2 Exvessel Prices

Given previous landings patterns, a quota of 92,500 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.

7.2.4.3.3 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.

7.2.4.3.4 Consumer Surplus

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

7.2.4.3.5 Harvest Costs

It is expected that vessels would respond to an 7.5% 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 6,750 bushels. At an estimated cost of $1.00 per bushel, this would result in an increase of $6,750 in harvest costs across all vessels.

7.2.4.3.6 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.

7.2.4.3.7 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.

7.2.4.3.8 Distributive Impacts

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

7.2.4.3.9 Cumulative Impacts

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

7.2.4.3.10 Risk of Biological Overexploitation

This analysis assumes that landings would decline by 750 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.

7.2.4.4 Alternative M4 - No Action - Quota Removed

A 'no action' alternative is evaluated in the Environmental Assessment portion of this document because the National Environmental Policy Act requires that an EA consider all reasonable alternatives, including the preferred action and the 'no action' alternative.

The Mid-Atlantic Council is required by 50 CFR part 648 to recommend annual quotas that fall within the optimum yield range for each species. Failure to make a recommendation within these bounds is not a legal option, and would be inconsistent with National Standard 1 of the Magnuson-Stevens Act. Hence the 'no action' alternative will not be considered further in this section.

7.2.4.5 Summary of Maine Ocean Quahog Quota Impacts

Summary of Impacts for Proposed 2005, 2006, and 2007 Maine Ocean Quahog Quota Alternatives Relative to Status Quo Alt M3: 100,000 Maine bushels (Preferred)		
Feature	**50,000 Maine bushels** Used by: Alt. M1 For Years: 2005, 2006, 2007 50% of Maximum Quota	**92,500 Maine bushels** Used by Alt. M2 For Year: 2005 Status Quo less Previous Overage
Landings	-5,000 Maine bu. (assumes 45,000 Maine bushels will be leased from ITQ portion of the fishery)	-750 Maine bu. (assumes that 6,750 Maine bushels will be leased from ITQ portion of the fishery)
Exvessel Prices	Small +	Very Slight +
Consumer Prices	Slight +	0
Consumer Surplus	Slight -	0
Harvest Costs	+ $45,000	+ $6,750
Producer Surplus	Slight -	Slight -
Enforcement Costs	+	Slight +
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 2005, 2006, and 2007

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 2005, 2006, and 2007, 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 2005, 2006, and 2007

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.

©) 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 2003 surfclam logbook data, the average reported discard rate was 2.4%. In the June 2003 SARC, the total non-landed mortality was estimated at 12%. 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 2005, 2006, and 2007, 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. INITIAL REGULATORY FLEXIBILITY ANALYSIS - IMPACTS ON SMALL ENTITIES

8.1 Introduction

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 summaries of surfclam and ocean quahog allocation ownership by state as of September 1, 2004. These are the entities that will be most directly impacted by the setting of annual quotas.

Table 1. Surfclam Allocation Owners by State as of September 1, 2004			
No. of Allocation Holders	**State**	**Total Bushels Held**	**Bu/Holder**
46	NJ	1,547,584	33,643
15	VA	1,000,576	66,705
12	MD	364,576	30,381
9	VAR*	487,424	54,158
Total = 82		**3,400,160**	**41,465**
* Var = CT, MA, NY, RI			

Table 2. Ocean Quahog Allocation Owners as of September 1, 2004			
No. of Allocation Holders	**State**	**Total Bushels Held**	**Bu/Holder**
36	NJ	2,360,192	65,561
7	MD	305,856	43,694
7	VA	1,015,040	145,006
6	VAR*	1,311,968	218,661
Total = 56		**4,993,056**	**89,162**
*Var = GA, ME, 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 2003 Surfclam and non-Maine Ocean Quahog Fisheries	
Species Harvested	**Number of Vessels**
Surfclams only	23
Ocean Quahogs only	16
BOTH Surfclams and Ocean Quahogs	11
TOTAL	**50**

Average 2003 gross income from surfclam trips was $1,089,417 per vessel, and from ocean quahog ITQ trips was $865,204 per vessel. In the small artisanal fishery for ocean quahogs in Maine, 35 vessels reported harvests in the clam logbooks, with an average value of $139,890 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 direct impacts of any quota adjustment would be felt by the 82 entities currently holding surfclam ITQ allocations. The actual number of individuals or businesses holding the 82 registered allocations will be smaller, since each holder will often maintain multiple allocations for accounting, or liability purposes.

8.2.2.1 Preferred Alternative S3 - Status Quo Surfclam Quota - 3.400 million bushels

The recommended surfclam quotas for 2005, 2006, and 2007 are to maintain the status quo at 3.400 million bushels. Hence, adoption of the preferred alternative would have no impact on large or small entities.

There are no other associated impacts 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 - 45.6% Decrease in Surfclam Quota - 1.850 million bushels

A 45.6% decrease in the Federal surfclam quota would subtract 18,908 bushels from the current average allocation of 41,465 bushels. At an average exvessel value of $11.39 per bushel, the gross value of the quota decrease would equal $215,363 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 - 4.4% Decrease in Surfclam Quota - 3.250 million bushels

A 4.4% decrease in the Federal surfclam quota would subtract 1,824 bushels from the current average allocation of 41,465 bushels. At an average exvessel value of $11.39 per bushel, the gross value of the quota decrease would equal $20,781 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.

8.2.2.4 NON-PREFERRED Alternative S4 - No Action (Surfclam Quota Removed)

A 'no action' alternative is evaluated in the Environmental Assessment portion of this document because the National Environmental Policy Act requires that an EA consider all reasonable alternatives, including the preferred action and the 'no action' alternative.

The Mid-Atlantic Council is required by 50 CFR part 648 to recommend annual quotas that fall within the optimum yield range for each species. Failure to make a recommendation within these bounds is not a legal option, and would be inconsistent with National Standard 1 of the Magnuson-Stevens Act. Hence the 'no action' alternative will not be considered further in this section.

8.2.3 Impacts of the Ocean Quahog ITQ Quota Alternatives

Direct impacts of quota adjustments will be felt by the 56 entities currently holding ocean quahog ITQ allocations.

8.2.3.1 Preferred Alt. Q3 - Steady Increase in Ocean Quahog Quota to 5.333 mill. bushels in 2005, 5.666 mill. bushels in 2006, and 6.000 mill. bushels in 2007

The current average allocation in the ocean quahog ITQ fishery equates to 89,162 bushels. A 20% increase in the Federal ocean quahog quota across three years would add 17,832 bushels to each allocation. At the average 2003 exvessel price of $5.73 per bushel, the gross value of the quota increase would equal $102,180 per allocation.

Note that it is unlikely that ocean quahog harvest levels will actually reach the 6.0 million bushel level in 2007. The historical trend has been that industry harvest levels have only rarely approached the ocean quahog quota.

8.2.3.2 NON-PREFERRED Alt. Q1 - 20% Decrease in Ocean Quahog Quota - 4.000 million bushels

A 20.0% decrease in the Federal ocean quahog quota would subtract 17,832 bushels from the current average allocation of 89,162 bushels. At an average exvessel value of $5.73 per bushel, the gross value of the quota decrease would equal $102,180 per allocation.

8.2.3.3 NON-PREFERRED Alt. Q2 - Status Quo Ocean Quahog Quota - 5.000 million bushels

Maintaining the current ocean quahog quota of 5.000 million bushels would result in no change from the status quo. Hence, this alternative would have no impact on revenues, compliance costs, or reporting costs for small entities.

8.2.3.4 NON-PREFERRED Alt. Q4 - 20% Increase to Maximum Ocean Quahog Quota in One Year - 6.000 million bushels

This alternative would move directly to the maximum allowable quota of 6.000 million bushels in 2005, rather than phasing in the increase across three years. As described in Section *8.2.3.1* above, the gross value of the quota increase would equate to $102,180 per allocation if it were fully utilized.

The Mid-Atlantic Council is not recommending such a rapid increase in the ocean quahog quota due to a number of factors. Primary among them is uncertainty in the recent stock assessment, and the substantial amounts of unutilized quota in recent years. Having a massive surplus of unwanted quota would likely result in a substantial decline in the rental value of ocean quahog tags, and/or result in some individuals not being able to find a market for their ocean quahog tags at all.

8.2.3.5 NON-PREFERRED Alt. Q5 - No Action (Ocean Quahog Quota Removed)

A 'no action' alternative is evaluated in the Environmental Assessment portion of this document because the National Environmental Policy Act requires that an EA consider all reasonable alternatives, including the preferred action and the 'no action' alternative.

The Mid-Atlantic Council is required by 50 CFR part 648 to recommend annual quotas that fall within the optimum yield range for each species. Failure to make a recommendation within these bounds is not a legal option, and would be inconsistent with National Standard 1 of the Magnuson-Stevens Act. Hence the 'no action' alternative will not be considered further in this section.

8.2.4 Impacts of the Maine Ocean Quahog Quota Alternatives

The Maine ocean quahog fishery is currently prosecuted by a total of 35 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 2003, a total of 35 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 35 vessels in the fleet, the average cost per vessel would equal $1,286.

8.2.4.3 NON-PREFERRED Alt. M2 - Decrease in Maine Ocean Quahog Quota by Previous Year Overage - 92,500 Maine bu.

This alternative would set the 2005, 2006, and 2007 quotas for Maine ocean quahogs to the maximum allowable level of 100,000 Maine bushels less any overage from the prior year. The 2005 quota would be reduced by the 2003 overage to 92,500 Maine bushels.

It is assumed that if the Maine quota were reduced by 7.5% to 92,500 Maine bushels, 90% of the reduction would be replaced by renting allocation from the ITQ fishery. This would equal a total of 6,750 bushels rented, at an estimated $1.00 per bushel. Divided amongst the 35 vessels in the fleet, the average cost per vessel would equal $193.

8.2.4.4 NON-PREFERRED Alt. M4 - No Action (Maine Ocean Quahog Quota Removed)

A 'no action' alternative is evaluated in the Environmental Assessment portion of this document because the National Environmental Policy Act requires that an EA consider all reasonable alternatives, including the preferred action and the 'no action' alternative.

The Mid-Atlantic Council is required by 50 CFR part 648 to recommend annual quotas that fall within the optimum yield range for each species. Failure to make a recommendation within these bounds is not a legal option, and would be inconsistent with National Standard 1 of the Magnuson-Stevens Act. Hence the 'no action' alternative will not be considered further in this section.

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 2005, 2006, and 2007

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 2005, 2006, and 2007

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.

9.0 REFERENCES

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National Marine Fisheries Service (NMFS). 2001. Guidelines for economic analysis of fishery management actions, (Revised). Silver Spring, MD.

U.S. Department of Commerce (USDC). 2003. 37th Northeast Regional Stock Assessment Workshop. NEFSC Ref. Doc. 03-17.

_____. 2004. 38th Northeast Regional Stock Assessment Workshop. NEFSC Ref. Doc. 04-04.

Appendix Table 1. Surfclam Fishery in the EEZ: Number of Vessels, Trips, Hours at Sea, Hours Fishing, Landings (bushels), Landings per Unit Effort (bu/hour fishing), and Average Landings per Vessel

Year	Class	Vessels	Trips	Hours at Sea	Hours Fishing	Surfclam Landings	LPUE*	Ave. Bu. per Boat
1979	1	26	584	9,080	5,787	103,665	17	3,987
	2	61	1,992	39,369	22,670	484,151	21	7,937
	3	75	2,622	59,298	34,326	1,086,393	32	14,485
	All	162	5,198	107,747	62,783	1,674,209	26	10,335
1980	1	14	406	5,674	3,650	79,621	19	5,687
	2	54	2,164	38,743	23,996	597,646	24	11,068
	3	59	2,323	53,098	31,153	1,246,766	40	21,132
	All	127	4,893	97,515	58,799	1,924,033	32	15,150
1981	1	16	328	4,701	2,927	64,942	22	4,059
	2	48	1,502	25,029	14,507	572,063	37	11,918
	3	59	2,198	47,664	23,555	1,339,433	56	22,702
	All	123	4,028	77,394	40,989	1,976,438	47	16,069
1982	1	15	511	7,535	4,908	97,833	20	6,522
	2	47	2,037	32,906	20,916	614,069	28	13,065
	3	53	2,734	55,855	29,721	1,290,928	42	24,357
	All	115	5,282	96,296	55,545	2,002,830	35	17,416
1983	1	14	408	6,323	4,025	113,753	28	8,125
	2	48	2,035	30,354	19,302	818,966	40	17,062
	3	55	2,341	48,934	25,279	1,479,221	58	26,895
	All	117	4,784	85,611	48,606	2,411,940	48	20,615
1984	1	15	319	4,897	3,142	126,421	40	8,428
	2	50	1,763	27,341	16,755	1,152,763	66	23,055
	3	54	1,638	34,893	16,499	1,687,842	96	31,256
	All	119	3,720	67,131	36,396	2,967,026	77	24,933
1985	1	13	217	2,075	1,089	87,791	78	6,753
	2	49	1,307	15,986	7,415	962,313	122	19,639
	3	68	1,582	32,533	11,840	1,859,226	149	27,342
	All	130	3,106	50,594	20,344	2,909,330	135	22,379
1986	1	13	164	1,986	984	81,895	83	6,300
	2	54	1,037	14,679	6,094	964,583	143	17,863
	3	77	1,540	34,724	10,676	2,134,164	189	27,716
	All	144	2,741	51,389	17,754	3,180,642	167	22,088
1987	1	11	159	2,709	1,234	68,006	55	6,182
	2	54	1,143	17,432	7,771	923,127	113	17,095
	3	77	1,433	31,303	8,840	1,828,686	199	23,749
	All	142	2,735	51,444	17,845	2,819,819	151	19,858
1988	1	10	207	3,466	1,895	93,740	49	9,374
	2	51	1,304	19,392	8,743	1,023,364	106	20,066
	3	73	1,527	33,221	9,487	1,914,577	196	26,227
	All	134	3,038	56,079	20,125	3,031,681	143	22,624

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Appendix Table 1. (continued)

Year	Class	Vessels	Trips	Hours at Sea	Hours Fishing	Surfclam Landings	LPUE*	Ave Bu/Boat
1989	1	9	185	3,148	1,904	87,151	44	9,683
	2	50	1,186	15,481	7,357	947,092	117	18,942
	3	76	1,508	26,324	9,610	1,804,165	182	23,739
	All	135	2,879	44,953	18,871	2,838,408	143	21,025
1990	1	8	237	3,931	2,470	69,376	28	8,672
	2	45	1,086	12,450	6,233	961,195	138	21,360
	3	75	1,636	25,067	11,043	2,083,405	184	27,779
	All	128	2,959	41,448	19,746	3,113,976	150	24,328
1991	1&2	25	971	13,853	6,300	808,893	120	32,356
	3	50	1,470	24,942	12,765	1,864,520	144	37,290
	All	75	2,441	38,795	19,065	2,673,413	136	35,646
1992	1&2	19	834	10,682	4,873	738,640	142	38,876
	3	40	1,747	29,874	17,521	2,073,630	117	51,841
	All	59	2,581	40,556	22,394	2,812,270	123	47,666
1993	1&2	17	770	9,294	4,713	778,766	164	45,810
	3	36	1,697	28,538	16,333	2,055,951	126	57,110
	All	53	2,467	37,832	21,046	2,834,717	134	53,485
1994	1&2	15	808	9,778	5,597	826,366	148	55,091
	3	32	1,668	30,844	17,980	2,020,304	112	63,135
	All	47	2,476	40,622	23,577	2,846,670	121	60,567
1995	1&2	13	793	10,800	5,739	810,125	141	62,317
	3	24	1,453	26,169	15,622	1,735,180	111	72,299
	All	37	2,246	36,969	21,361	2,545,305	119	68,792
1996	1&2	12	892	12,821	7,482	958,937	128	79,911
	3	22	1,286	24,570	15,551	1,610,382	104	73,199
	All	34	2,178	37,391	23,033	2,569,319	112	75,568
1997	1&2	11	803	11,509	6,509	837,198	129	76,109
	3	22	1,316	24,643	15,220	1,576,377	104	71,654
	All	33	2,119	36,152	21,729	2,413,575	111	73,139
1998	1&2	11	736	10,558	5,633	764,551	136	69,505
	3	20	1,340	24,810	15,390	1,600,823	104	80,041
	All	31	2,076	35,368	21,023	2,365,374	113	76,302
1999	1&2	10	671	9,857	4,737	766,833	162	76,683
	3	23	1,484	26,019	15,214	1,771,046	116	77,002
	All	33	2,155	35,876	19,951	2,537,879	127	76,905
2000	1	3	57	979	392	15,869	40	5,290
	2	8	743	11,845	6,155	985,248	160	123,156
	3	20	1,241	21,755	13,360	1,559,904	117	77,995
	All	31	2,041	34,579	19,907	2,561,021	129	82,614

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Appendix Table 1. (continued)

Year	Class	Vessels	Trips	Hours at Sea	Hours Fishing	Surfclam Landings	LPUE*	Ave Bu/Boat
2001	1&2	10	806	12,756	7,181	1,005,617	140	100,562
	3	25	1,584	28,233	17,694	1,849,549	105	73,982
	All	35	2,390	40,989	24,875	2,855,166	115	81,576
2002	1&2	9	850	14,782	8,813	1,055,835	120	117,315
	3	30	1,742	32,349	20,791	2,057,241	99	68,575
	All	39	2,592	47,131	29,604	3,113,076	105	79,822
2003	1&2	7	826	16,548	10,619	1,025,152	97	146,450
	3	27	1,723	36,738	23,003	2,226,840	97	82,476
	All	34	2,549	53,286	33,622	3,251,922	97	95,647

* LPUE values are computed from only those trips which have both Hours Fished and Landings data reported. The Hours Fished and Landings values displayed in this table are gross reported totals, and hence may not be divided to calculate LPUE. Hours Fished values are thought to be under-reported in the Northern New Jersey region between 1986 and 1990, due to strict limits on surfclam fishing time in the management regime prior to Amendment #8.
Source: NMFS Clam Vessel Logbook Files.

Appendix Table 2. Ocean Quahog Fishery in the EEZ: Number of Vessels, Trips, Hours at Sea, Hours Fishing, Landings (bushels), Landings per Unit Effort (bu/hour fishing), and Average Landings per Vessel

Year	Class	Vessels	Trips	Hours at Sea	Hours Fishing	Quahog Landings	LPUE*	Ave Bu. per Boat
1979	1 & 2	22	735	10,325	4,333	477,346	109	21,698
	3	37	1,966	35,635	19,545	2,557,350	127	69,118
	All	59	2,701	45,960	23,878	3,034,696	124	51,436
1980	1 & 2	19	561	7,836	3,528	354,110	95	18,637
	3	33	1,950	39,488	22,025	2,607,679	114	79,021
	All	52	2,511	47,324	25,553	2,961,789	111	56,957
1981	1 & 2	12	399	5,965	2,793	248,498	88	20,708
	3	35	2,011	37,914	20,859	2,639,789	125	75,423
	All	47	2,410	43,879	23,652	2,888,287	121	61,453
1982	1 & 2	12	274	4,414	2,391	187,447	77	15,621
	3	31	2,146	39,956	21,515	3,053,328	136	98,494
	All	43	2,420	44,370	23,906	3,240,775	130	75,367
1983	1 & 2	8	225	3,561	1,936	159,214	81	19,902
	3	29	2,243	40,718	21,072	3,056,426	142	105,394
	All	37	2,468	44,279	23,008	3,215,640	137	86,909
1984	1 & 2	16	467	7,266	3,873	369,529	92	23,096
	3	41	2,738	51,563	26,845	3,593,438	129	87,645
	All	57	3,205	58,829	30,718	3,962,967	124	69,526
1985	1 & 2	17	611	9,352	4,756	483,004	99	28,412
	3	47	3,101	58,462	28,988	4,086,505	138	86,947
	All	64	3,712	67,814	33,744	4,569,509	133	71,399

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Appendix Table 2. (continued)

Year	Class	Vessels	Trips	Hours at Sea	Hours Fishing	Quahog Landings	LPUE*	Ave. Bu. per Boat
1986	1 & 2	16	471	8,795	4,159	441,192	103	27,575
	3	56	2,714	51,648	25,292	3,726,013	146	66,536
	All	72	3,185	60,443	29,451	4,167,205	140	57,878
1987	1 & 2	16	333	7,359	3,405	359,042	105	22,440
	3	55	2,995	59,220	29,482	4,383,983	146	79,709
	All	71	3,328	66,579	32,887	4,743,025	142	66,803
1988	1 & 2	11	221	4,555	2,088	251,674	114	22,879
	3	51	2,818	60,554	31,213	4,217,699	133	82,700
	All	62	3,039	65,109	33,301	4,469,373	132	72,087
1989	1 & 2	13	540	9,823	4,945	650,059	124	50,005
	3	56	3,055	66,364	34,671	4,280,221	121	76,433
	All	69	3,595	76,187	39,616	4,930,280	122	71,453
1990	1 & 2	14	496	11,002	6,470	623,346	96	44,525
	3	42	2,753	62,569	34,614	3,999,071	115	95,216
	All	56	3,249	73,571	41,084	4,622,417	112	82,543
1991 - Excludes Maine Fishery								
	1&2	11	545	11,889	6,343	731,634	115	66,512
	3	38	2,824	68,002	39,531	4,108,190	103	108,110
	All	49	3,369	79,911	45,874	4,839,824	104	98,772
1992 - Excludes Maine Fishery								
	1&2	9	527	11,267	5,464	693,971	127	77,108
	3	34	2,563	61,914	31,678	4,244,729	132	124,845
	All	43	3,090	73,181	37,142	4,938,700	131	114,853
1993 - Excludes Maine Fishery								
	1&2	8	535	12,764	6,442	720,702	112	90,088
	3	28	2,655	67,549	38,860	4,091,239	105	146,116
	All	36	3,190	80,313	45,302	4,811,941	106	133,665
1994 - Excludes Maine Fishery								
	1&2	7	444	10,748	5,580	580,198	104	82,885
	3	29	2,683	65,734	38,764	4,031,197	104	139,007
	All	36	3,127	76,482	44,344	4,611,395	104	128,094
1995 - Excludes Maine Fishery								
	1&2	6	480	12,168	7,116	692,491	97	115,415
	3	30	2,496	60,216	32,752	3,935,832	120	131,194
	All	36	2,976	72,384	39,868	4,628,323	116	128,565
1996 - Excludes Maine Fishery								
	1&2	5	429	11,439	6,026	678,804	113	135,761
	3	31	2,116	52,328	27,104	3,712,624	137	119,762
	All	36	2,545	63,767	33,130	4,391,428	133	121,984

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Appendix Table 2. Continued

Year	Class	Vessels	Trips	Hours at Sea	Hours Fishing	Quahog Landings	LPUE*	Ave. Bu. per Boat
1997 - Excludes Maine Fishery								
	1&2	6	413	12,570	6,860	684,684	100	114,114
	3	25	1,881	52,535	27,154	3,594,375	132	143,775
	All	31	2,294	65,105	34,014	4,279,059	126	138,034
1998 - Excludes Maine Fishery								
	1&2	5	375	11,491	6,371	587,228	92	117,446
	3	19	1,582	49,236	25,331	3,310,259	131	174,224
	All	24	1,957	60,727	31,702	3,897,487	123	162,395
1999 - Excludes Maine Fishery								
	1&2	5	382	10,817	5,952	559,200	94	111,840
	3	18	1,696	50,612	25,748	3,211,088	125	178,394
	All	23	2,078	61,429	31,700	3,770,288	119	163,926
2000 - Excludes Maine Fishery								
	1&2	6	270	7,933	4,330	429,686	99	71,614
	3	23	1,541	48,369	24,110	2,730,963	113	118,738
	All	29	1,811	56,302	28,440	3,160,649	111	108,988
2001 - Excludes Maine Fishery								
	1&2	6	454	13,588	7,183	778,469	108	129,745
	3	24	1,654	51,637	26,702	2,912,538	109	121,356
	All	30	2,108	65,225	33,885	3,691,007	109	123,034
2002 - Excludes Maine Fishery								
	1&2	6	428	12,589	6,644	712,243	107	118,707
	3	25	1,559	49,424	23,979	3,158,407	132	126,336
	All	31	1,987	62,013	30,623	3,870,650	126	124,860
2003 - Excludes Maine Fishery								
	1&2	6	473	15,168	8,648	803,552	93	133,925
	3	21	1,472	50,890	25,764	3,273,324	127	155,873
	All	27	1,945	66,058	34,412	4,076,876	118	150,995

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Appendix Table 2. Continued

Maine Ocean Quahog Fishery

Year	Class	Vessels	Trips	Hours at Sea	Hours Fishing	Quahog Landings	LPUE*	Ave. Bu. per Boat
1991	All	45	2,221	23,465	17,162	36,679	2.0	815
1992	All	53	1,677	17,711	13,469	24,839	1.8	469
1993	All	33	685	9,732	5,748	17,144	3.0	520
1994	All	30	792	7,189	5,102	21,480	4.2	716
1995	All	30	1,052	8,233	5,747	37,912	6.6	1,264
1996	All	25	1,374	11,811	8,483	47,025	5.5	1,881
1997	All	34	1,945	16,285	11,829	72,706	6.1	2,138
1998	All	39	1,820	18,452	11,777	72,466	6.2	1,858
1999	All	38	1,998	16,188	11,455	93,938	8.2	2,472
2000	All	34	2,197	18,015	12,739	120,767	9.5	3,552
2001	All	31	2,040	18,250	13,350	108,500	8.1	3,500
2002	All	35	2,604	23,724	16,967	128,574	7.6	3,674
2003	All	35	2,674	24,370	17,855	119,798	6.7	3,423

NOTE 1: This table includes ocean quahog landings records from the Clam logbooks ONLY, and does NOT include landings submitted in the Multispecies logbooks until 1998.
NOTE 2. The bushel unit used in the Maine fishery measures 1.2445 cubic feet. The standard bushel unit used in the industrial ITQ fishery outside Maine is 1.88 cubic feet.
* LPUE values are computed from only those trips which have both Hours Fished and Landings data reported. The Hours Fished and Landings values displayed in this table are gross reported totals, and hence may not be divided to calculate LPUE.
Source: NMFS Clam Vessel Logbook Files

Appendix Table 3. Surfclam and Ocean Quahog Overfishing Definitions with Reference Points, Basis, and Estimated Value for each Reference Point.

Reference Point	Basis	Estimated Value
Surfclams		
Biomass Target	½ Current (1999) Biomass (proxy for B_{MSY})	1.4 billion pounds
Biomass Threshold	½ Proxy for B_{MSY}	700 million pounds
Fishing Mortality Target	$F_{target} < F_{threshold}$	Set by Council selected quota
Fishing Mortality Threshold	F = M	0.15
Current F		0.03
Ocean Quahogs		
Biomass Target	½ Virgin Biomass	2 billion pounds
Biomass Threshold	1/4 Virgin Biomass	1 billion pounds
Fishing Mortality Target	$F_{o.1}$	0.028
Fishing Mortality Threshold	$F_{25\%MSP}$	0.042
Current F, exploited areas		0.021

Appendix Table 4. 2003 vs. 2002 Surfclam Landings by Degree Square

For ALL Vessels - Not just Class 3

Degree Square	2002 Surfclam Bushels	2003 Surfclam Bushels	% Change	2002 LPUE	2003 LPUE	% Change	2003 % of Catch	2003 Landings Ranking
3675	10,240	2,688	-74%	85	168	99%	**0.1%**	
3773	0	2,976			186		**0.1%**	
3774	294,158	47,072	-84%	109	75	-31%	**1.4%**	
3775	8,576	0	-100%	143			**0.0%**	
3871	4,192	0	-100%	94			**0.0%**	
3873	10,088	5,152	-49%	87	76	-13%	**0.2%**	
3874	**610,872**	**159,456**	**-74%**	**104**	**75**	**-28%**	**4.9%**	**#3**
3972	4,672	13,632	192%	87	96	10%	**0.4%**	
3973	**1,334,516**	**2,237,336**	**68%**	**111**	**101**	**-9%**	**68.8%**	**#1**
3974	**333,021**	**157,664**	**-53%**	**91**	**75**	**-18%**	**4.8%**	**#4**
4070	1,344	0	-100%	112			**0.0%**	
4071	3,648	960	-74%	99	96	-3%	**0.0%**	
4072	2,912	16,960	482%	116	102	-12%	**0.5%**	
4073	**486,197**	**557,152**	**15%**	**102**	**96**	**-7%**	**17.1%**	**#2**
4074	3,392	4,416	30%	87	100	15%	**0.1%**	
4169	1,696	33,536	1877%	130	203	55%	**1.0%**	
4173	3,552	12,992	266%	71	114	60%	**0.4%**	
Total	3,113,076	3,251,992	4%	105	97	-8%	**100.0%**	

Appendix Table 5. 2003 vs. 2002 Ocean Quahog Landings by Deg. Square

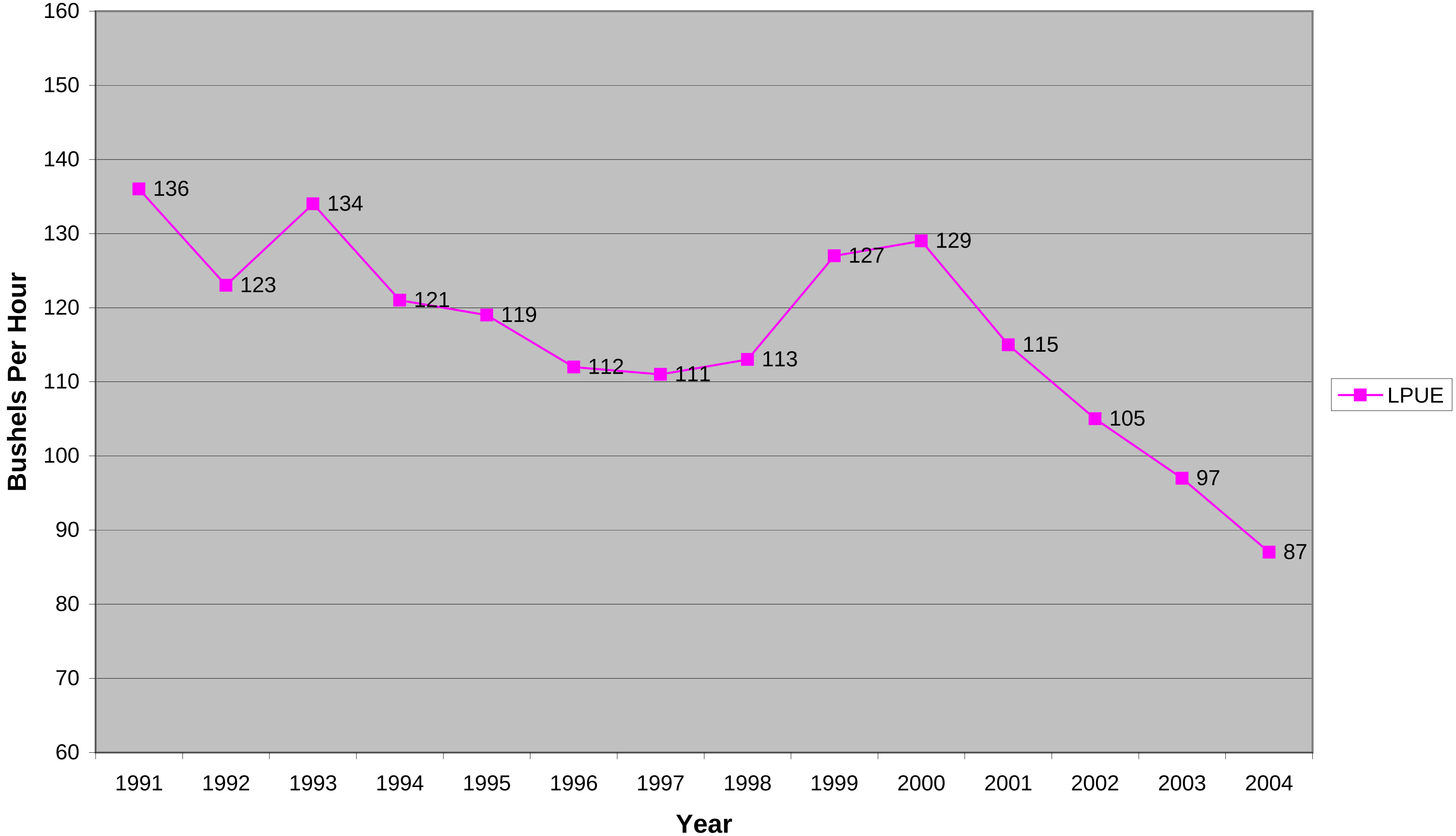
For ALL Vessels - Not just Class 3

Excludes Maine Fishery

Degree Square	2002 Quahog Bushels	2003 Quahog Bushels	% Change	2002 LPUE	2003 LPUE	% Change	2003 % of Catch	2003 Landings Ranking
3674	11168			136			**0.0%**	
3773	0	9,024			86		**0.2%**	
3774	144,156	26,944	-81%	89	79	-11%	**0.7%**	
3872	4,160		-100%	166			**0.0%**	
3873	**302,944**	**387,072**	**28%**	**87**	**72**	**-17%**	**9.5%**	**#3**
3874	**300,864**	**308,940**	**3%**	**82**	**66**	**-20%**	**7.6%**	**#4**
3972	19,264	23,488	22%	116	158	35%	**0.6%**	
3973	193,972	154,144	-21%	110	98	-11%	**3.8%**	
3974	6,592	4,672	-29%	91	99	9%	**0.1%**	
4069	2,880	48,992	1601%	127	120	-5%	**1.2%**	
4070	214,964	136,000	-37%	98	116	18%	**3.3%**	
4071	580,999	291,904	-50%	122	104	-15%	**7.2%**	
4072	**1,897,327**	**2,172,992**	**15%**	**176**	**159**	**-10%**	**53.3%**	**#1**
4073	**97,920**	**420,544**	**329%**	**110**	**136**	**24%**	**10.3%**	**#2**
4170	65,632	34,080	-48%	75	73	-3%	**0.8%**	
4171	27,808	41,888	51%	103	98	-5%	**1.0%**	
4172		16192			150		**0.4%**	
Total	3,870,650	4,076,876	5%	126	118	-6%	**100.0%**	

Appendix Figure 1: Surfclam Landings Per Unit of Effort: 1991 - 2004*

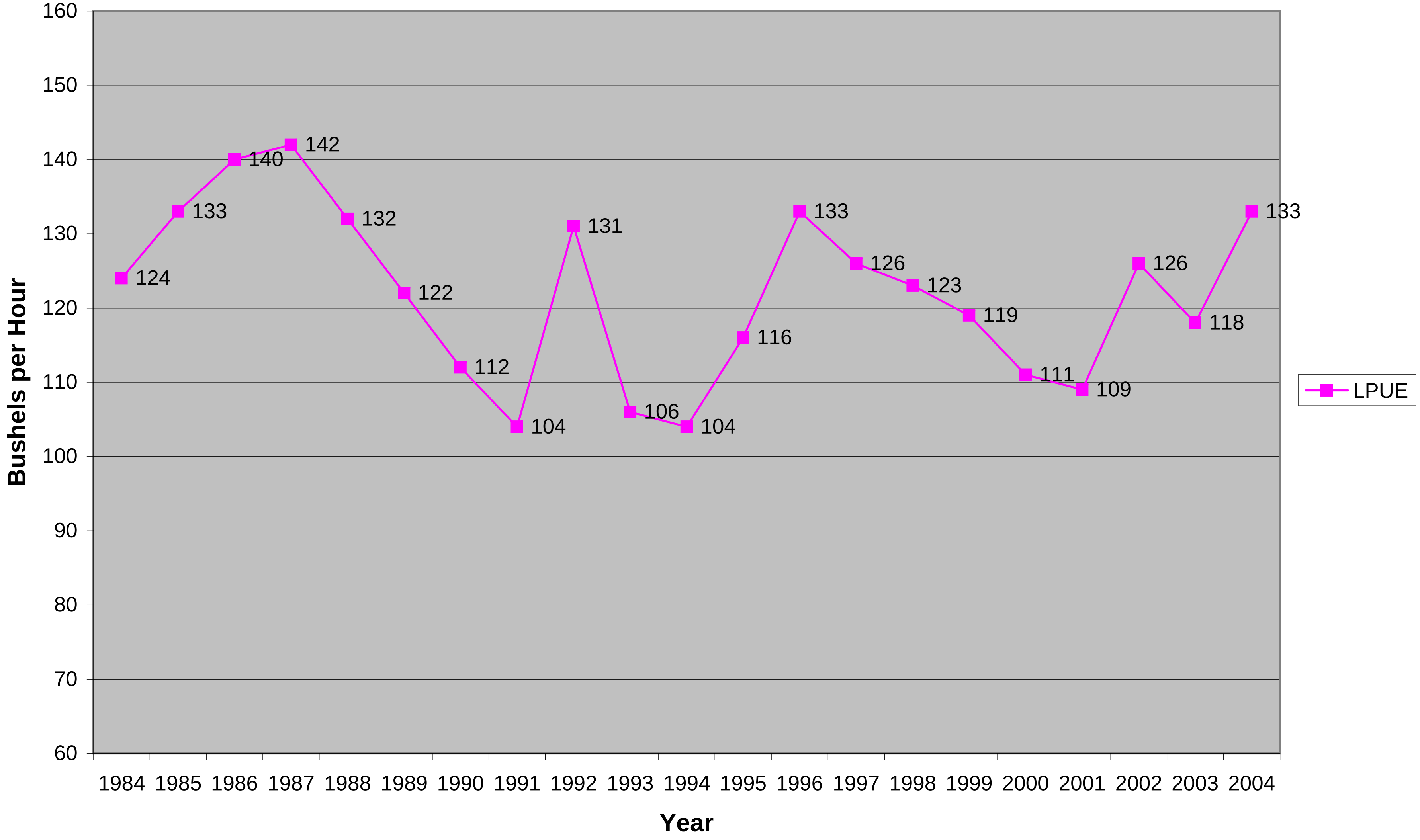
All Vessel Classes



* 2004 = Trips reported through May 27, 2004 only

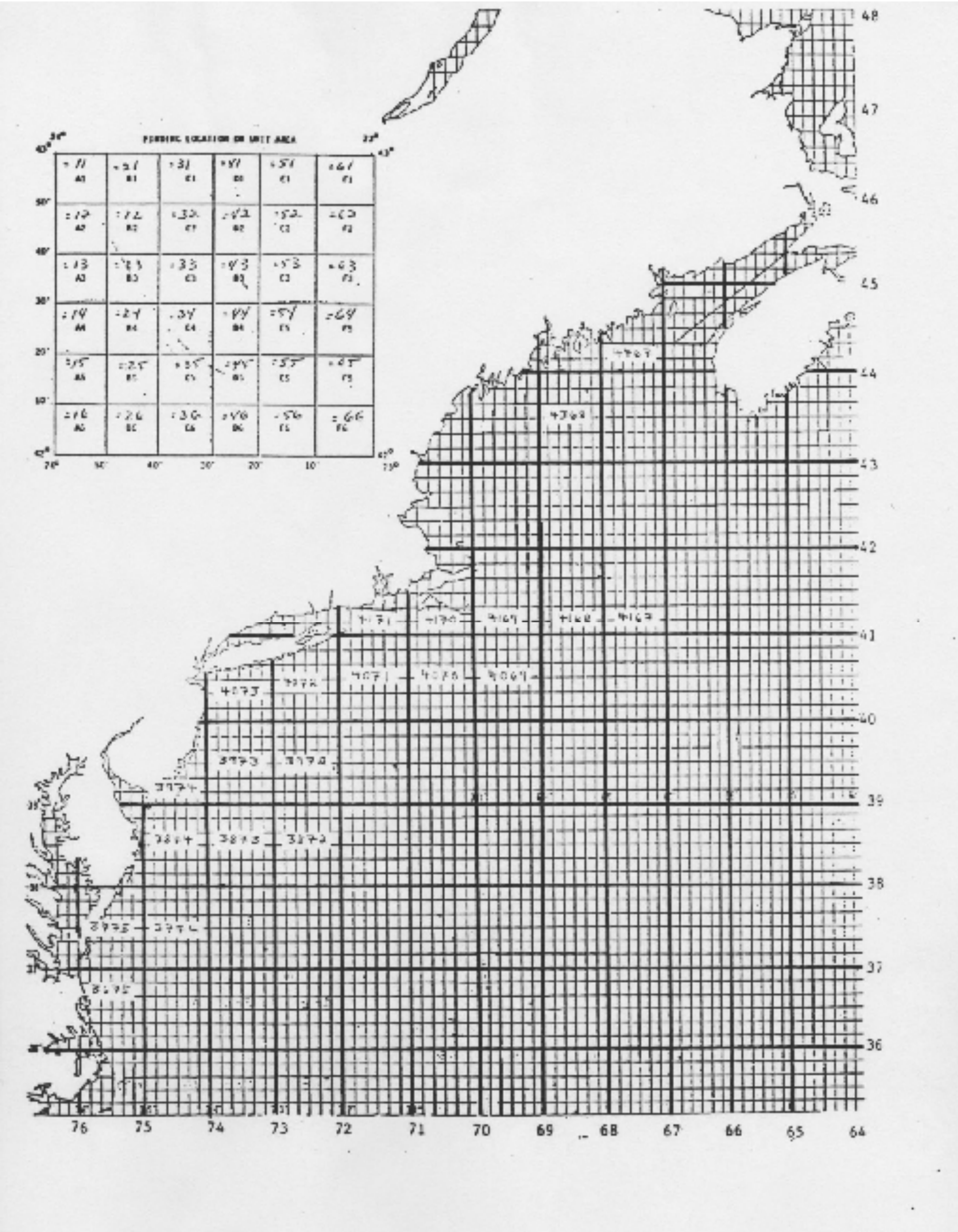
App. Figure 2: Ocean Quahog Landings per Unit of Effort: 1984 - 2004*

All Vessel Classes - Excludes Maine Fishery



2004* = Trips reported through May 27, 2004 only

Appendix Figure 3. Map of Northeast Coast from Nova Scotia to Cape Hatteras Indicating Degree Squares



C. ATLANTIC SURFCLAM ADVISORY REPORT

State of Stock: The surfclam stock in the EEZ is not overfished and overfishing is not occurring (Figure C6). Total biomass was estimated at 1.1 million mt in 1997, and 1.5 million mt in 1999 but declined in 2002 to 0.8 million mt (B_{MSY} = 0.7 mmt). Clam catch was not great enough to account for the apparent decline in biomass between 1999 and 2002. The majority of the catch is from Northern New Jersey (NNJ), which contains about 39% of the stock biomass. Annual fishing mortality rates (F) in 1999 and 2002 were 0.02 and 0.03 for the whole resource; 0.02 and 0.05 for the whole resource excluding Georges Bank; 0.03 and 0.05 for the NNJ region; and 0.04 and 0.08 for the southern New Jersey (SNJ) region (F_{MSY} = 0.15).

Management Advice: Although the stock is above B_{MSY}, uncertainty in the current level and future trend in biomass suggest that substantial increases in catch levels are not advised. In addition, because surfclams are sedentary and fishing is concentrated in relatively small areas, it may be advantageous to avoid localized depletion.

Forecasts: Projections assume a constant negative instantaneous rate of surplus production (0.051 y^{-1}) during 2002-2005, use reported catch in 2002 and predicted catch during 2003-2005 equal to the quota for 2003, all increased by + 12% (the maximum adjustment for incidental mortality), and prorated by region. Total biomass for 2002 is from a regression model used to smooth original efficiency-corrected swept area biomass (ESB) estimates. For the total stock, projections through 2006 suggest there will be a small increase in fishing mortality rate accompanied by a moderate decrease in biomass (approximately -8% per year).

Short term projections:

Year	2003	2004	2005
Biomass[1]	849	780	714
Catch[2]	28.07	28.07	28.07
Fishing Mortality	0.034	0.038	0.041

1. on 1 January, in 1,000s of mt
2. Catch = landings + 12% discard, in 1000s of mt

Catch and Status Table (weights in '000 mt): Surfclams

Year	1994	1995	1996	1997	1998	1999	2000	2001	2002	[1]Min	[1]Avg	[1]Max
Quota:												
EEZ	22.0	19.8	19.8	19.8	19.8	19.8	19.8	22.0	24.2	-	-	-
Landings:												
EEZ	21.9	19.6	19.8	18.6	18.2	19.6	19.8	22.0	23.8	18.2	20.4	23.8
NNJ	17.8	15.7	16.1	14.1	13.1	14.4	13.7	16.1	14.9	13.1	15.1	17.8
SNJ	0.7	0.7	1.3	2.9	3.6	4.3	3.6	1.2	2.8	0.7	2.3	4.3
DMV	3.5	2.8	2.2	1.5	0.4	0.7	2.0	3.2	4.5	0.4	12.5	25.2
Other (EEZ)	0.1	0.4	0.1	0.1	1.1	0.2	0.5	1.5	1.6	0.1	3.4	11.6
State	9.1	9.4	9.0	7.7	6.3	7.1	11.3	9.2	-	1.4	7.4	11.7

Year	1997	1999	2002
[2]Biomass:			
EEZ	1,146	1,460	803
NNJ	485	487	315
SNJ	37	116	42
DMV	292	317	143
Other (EEZ)	332	540	303
[2]Recruitment:			
EEZ	163	174	60
NNJ	51	29	15
SNJ	4	40	3
DMV	46	53	10
Other (EEZ)	62	52	32
[3]Fishing Mortality Rate (F):			
EEZ	0.018	0.015	0.033
NNJ	0.032	0.033	0.053
SNJ	0.089	0.041	0.076
DMV	0.006	0.002	0.035
Other (EEZ)	0.000	0.000	0.006

[1]Reported landings from the period 1978-2002. [2]Biomass (of fully recruited clams) and recruitment for the last 3 surveys are based on efficiency-corrected swept-area survey data. "Recruitment" includes 120-129 mm in NNJ and SNJ and 100-112 mm in other areas. [3]F is based on reported landings plus a 12% maximum adjustment for indirect mortality. Discards were near zero since 1992.

Stock Distribution and Identification: The Atlantic surfclam occurs from the subtidal zone to 50 m depth. Its range includes state waters and the US EEZ along the Atlantic seaboard from Maine through North Carolina. Surfclam larvae are planktonic for 2-3 weeks and may disperse sufficiently to cause gene flow throughout their geographical range.

Catches: Since 1978, total EEZ annual landings of surfclams have varied between 13,200 mt and 24,500 mt (meat weight) (Figure C1). The fishery is managed with an annual catch quota, which has constrained catches in most years. Since 1983, 90% -100% of the EEZ landings have been taken from the Mid-Atlantic region. During 1986-2002, 64% -91% of the Mid-Atlantic landings came from the Northern New Jersey region, 1%-19% came from the Delmarva region, and 0% -22% came from the Southern New Jersey region (SNJ). Catches in SNJ have increased since 1995. Catches in DMV increased after 1999. Discarding reached substantial levels (e.g., 33% by weight of the total catch in the NJ region) in the early 1980s because of minimum size limits, declined through the mid- to late-

1980s, and has been low in the 1990s when minimum size limits were absent. The most recent (2002) pattern of landings is shown in Figure C2.

Data and Assessment: Surfclams were last assessed in 1999 (SAW30). The present assessment used efficiency corrected swept area biomass estimates based on clam survey data from the EEZ in 1997, 1999 and 2002. Fishing mortality rates were computed by dividing annual catches by annual efficiency-adjusted swept area biomass estimates. A biomass dynamics model (KLAMZ) used discard, landings per unit effort (LPUE), region specific growth curves and shell length-meat weight relationships, and research survey data to estimate surfclam biomass, recruitment biomass and fishing mortality rates during 1978-2002. A maximum adjustment for indirect mortality was assumed equal to 12% of landings (by weight) in all analyses.

Biological Reference Points: Based on age and growth studies, SARC 30 adopted M = 0.15. The current best proxy for F_{MSY} is F = M = 0.15 y^{-1} (Figure C5). SARC 30, which reviewed data through 1999, stated "the current total biomass can be used as a lower bound estimate for the carrying capacity, and half the total current biomass can serve as a proxy for B_{MSY}." The estimate of B_{1999} was 1,268,500 mt based on the KLAMZ model (SARC 30). The value of B_{1999} was re-estimated for the present assessment (SARC 37) as 1,460,500 mt, based on efficiency-corrected swept area biomass from the 1999 NMFS survey. Although these two point estimates of B_{1999} differ by about 15%, the difference is not statistically significant.

SFA Control Rule: Overfishing occurs whenever the fishing mortality rate on the entire stock is larger than $F_{THRESHOLD}$ (0.15). The stock will be declared overfished if total biomass falls below $B_{THRESHOLD}$ (estimated as $B_{MSY}/2$). The proxy for B_{MSY} is $B_{1999}/2$. When stock biomass is less than the biomass threshold, the fishing mortality rate threshold is reduced from F_{MSY} in a linear fashion to zero (Figure C6).

Fishing Mortality: Based on the catch-swept area model for the entire EEZ stock, F_{2002} = 0.03, with an 80% confidence interval of 0.02 - 0.05. For the entire EEZ stock excluding Georges Bank, F_{2002} = 0.05 (80% confidence interval 0.03 - 0.07). For the Northern New Jersey region, F_{2002} = 0.05; for Southern New Jersey F_{2002} = 0.08; for Delmarva, F_{2002} = 0.04. Other regions, which are largely unfished, had lower estimated recent Fs.

Recruitment: Survey data from 1978 – 2002 were used to track trends in abundance of recruits. In the NNJ and DMV regions, and in the stock as a whole, survey recruitment indices were low in 1999 and 2002 (Figure C4).

Stock Biomass: Biomass and 80% confidence intervals (CI) for 2002 were 315,000 mt (163,000-607,000) in the Northern New Jersey region, 143,000 mt (74,000-275,000) in the Delmarva region, 236,000 mt (107,000-521,000) on Georges Bank, 36,000 mt (18,000-72,000) in Southern New England, 42,000 mt (19,000-93,000) in Southern New Jersey, 12,000 mt (5,000-29,000) off Long Island, and 18,000 mt (8,000-43,000) off Southern Virginia - North Carolina. Clams included in the biomass estimates were 120 mm+ shell length for NNJ and SNJ, and 100 mm+ elsewhere. For the Delmarva region in 2002, the KLAMZ model biomass estimate was higher (272,000 mt) than that from the catch-swept area model.

Special Comments: Biomass is estimated using efficiency-adjusted swept area calculations from dredge surveys. Estimates of dredge efficiency were obtained using a variety of co-operative sampling studies and state-of-the-art dredge efficiency sensor equipment during a joint NMFS-industry research program conducted in 1997, 1999 and 2002. There appear to be differences in the dredge efficiency in these three years. However, the experimental data allow the uncertainty in the efficiency estimates to be properly incorporated into the uncertainty of the biomass estimates.

There is evidence of increased surfclam mortality recently in the inshore, southern regions of the research survey. This might be due to elevated sea temperature. The future impact on the population cannot be predicted.

Commercial catch rates (LPUE) have declined in most of the harvested regions during the last 10 years. This is likely due to the "fishing down" of dense patches of clams (Figure C3).

Although the stock consists of at least 20 year classes, recruitment to the fishery is expected to be below average in the next 2 years.

The projection results do not incorporate information about age structure and thus should be considered only in general terms.

Sources of Information: 26th Northeast Regional Stock Assessment Workshop (26th SAW), Stock Assessment Review Committee (SARC) Consensus Summary of Assessments, NEFSC Ref. Doc. 98-03; 30th Northeast Regional Stock Assessment Workshop (30th SAW), Stock Assessment Review Committee (SARC) Consensus Summary of Assessments, NEFSC Ref. Doc. 00-03; 30th Northeast Regional Stock Assessment Workshop (30th SAW), Public Review Workshop, NEFSC Ref. Doc. 00-04; Weinberg, J.R. 1998. Density-dependent growth in the Atlantic Surfclam, *Spisula solidissima*, off the coast of the Delmarva Peninsula, USA. Mar. Biol. 130:621-630; Weinberg, J.R. 1999. Age-structure, recruitment, and adult mortality in populations of the Atlantic Surfclam, *Spisula solidissima*, from 1978 to 1997. Mar. Biol. 134:113-125; Weinberg, J. R., T.G. Dahlgren, and K. M. Halanych. 2002. Influence of rising sea temperature on commercial bivalve species of the U.S. Atlantic coast. Amer. Fish. Soc. Symp. 32:131-140; MAFMC, Amendment 13 to the Atlantic surfclam and ocean quahog fishery management plan. April 2003.

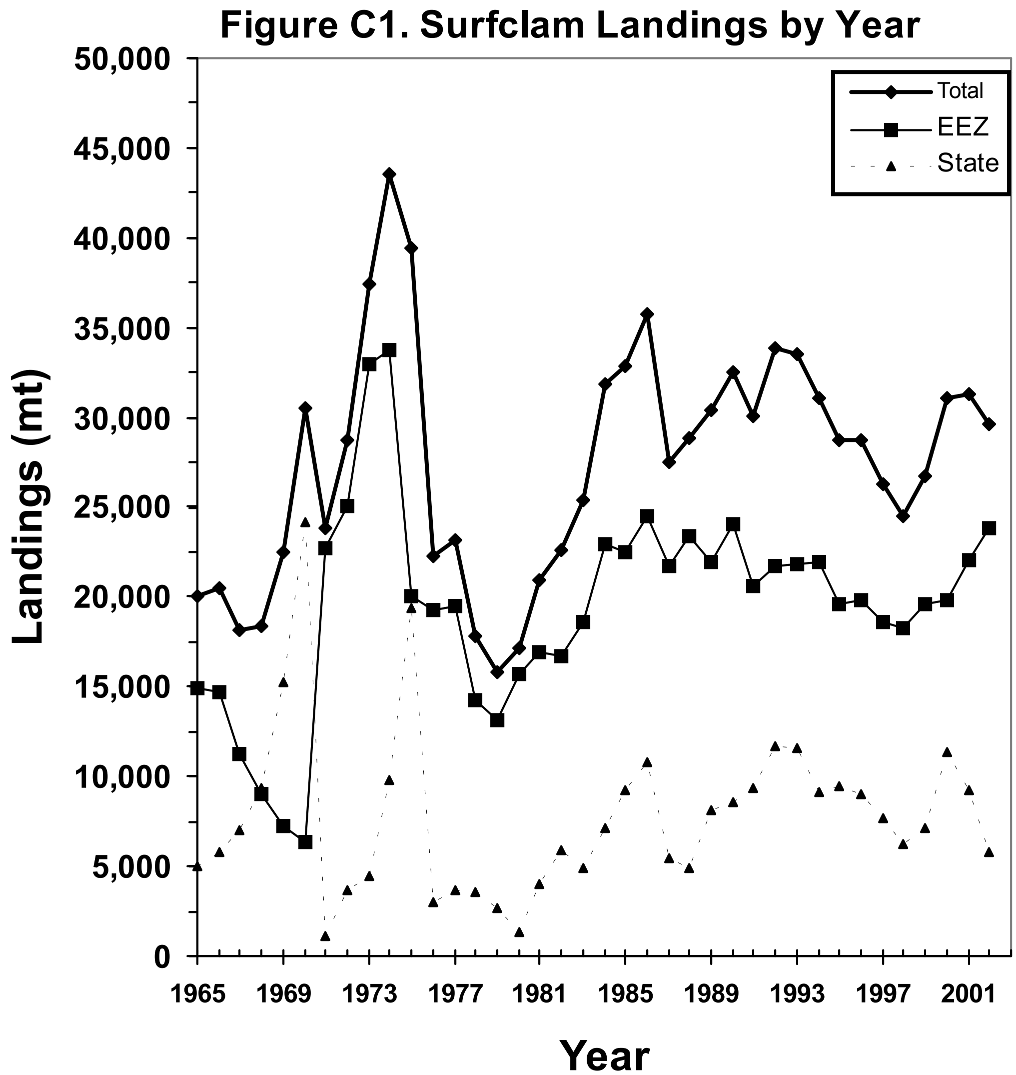


Figure C1. Surfclam Landings by Year
Landings (mt)
50,000
45,000
40,000
35,000
30,000
25,000
20,000
15,000
10,000
5,000
0
1965
1969
1973
1977
1981
1985
1989
1993
1997
2001
Year
Total
EEZ
State

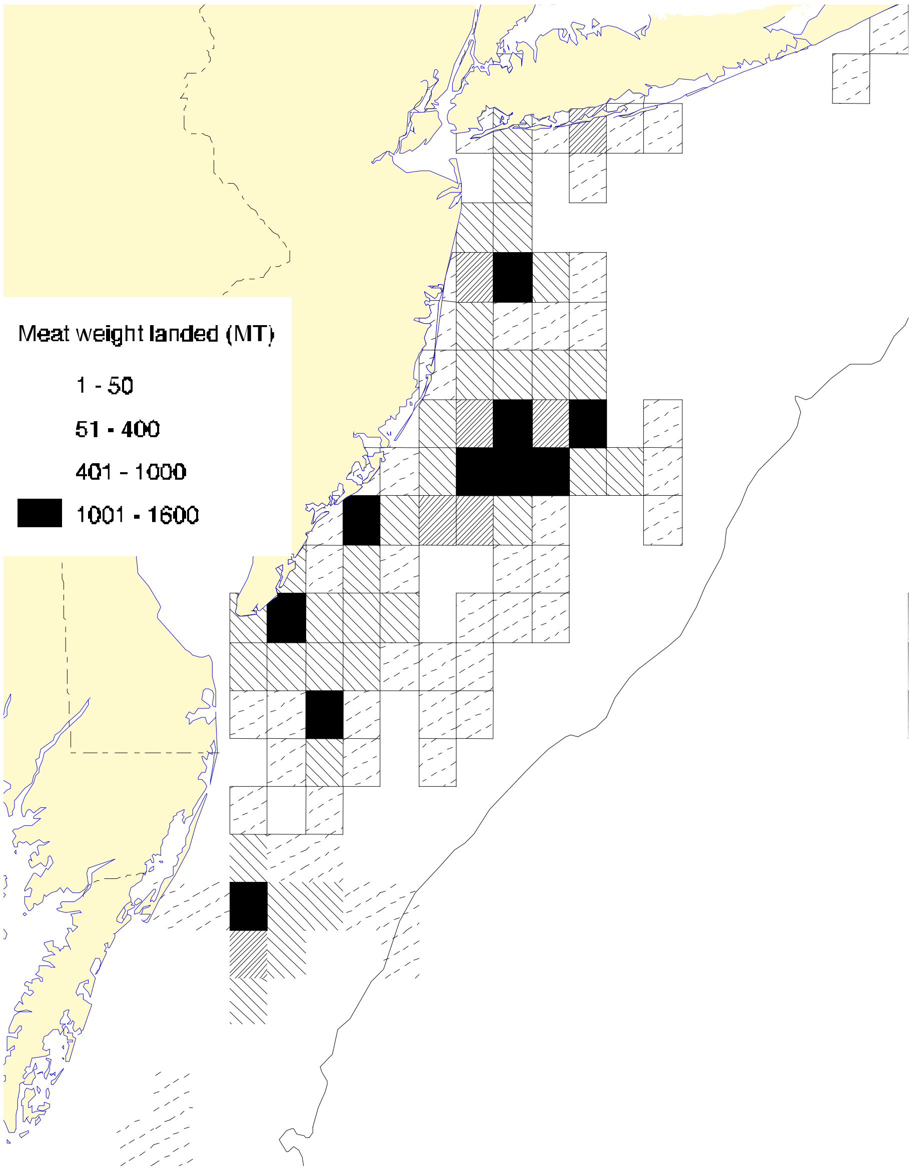


Figure C2. Distribution of surfclam landings during 2002 by ten-minute square

Figure C3. Surfclam Catch Rates for Medium and Large Vessels, by Region

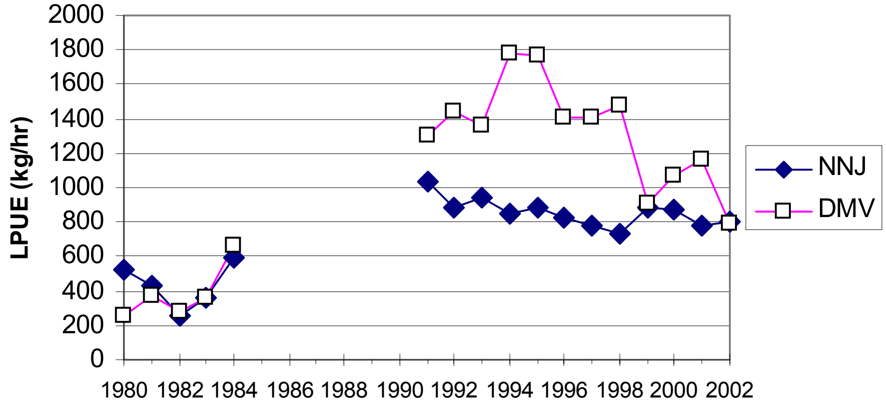


Figure C4. Surfclam Survey Recruit indices (88-119mm) by Region

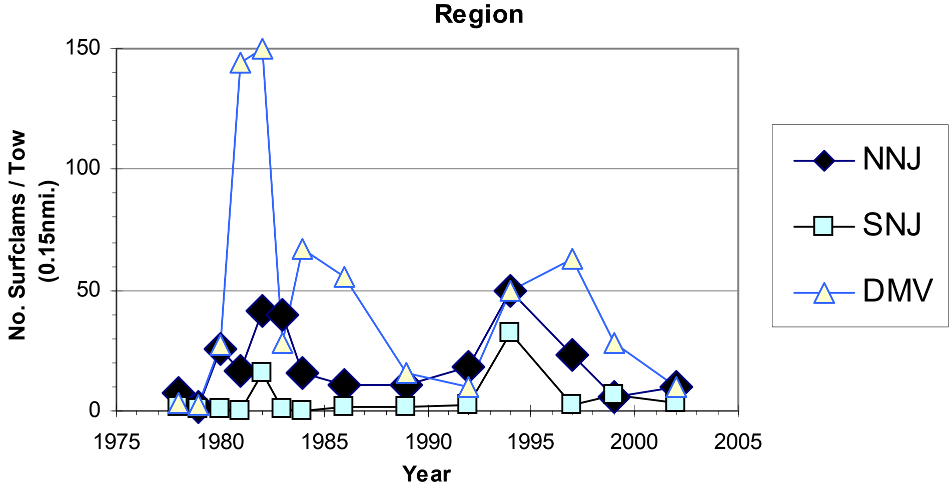


Figure C5. Yield per Recruit, NNJ (M=0.15, Recruit at 120 mm)

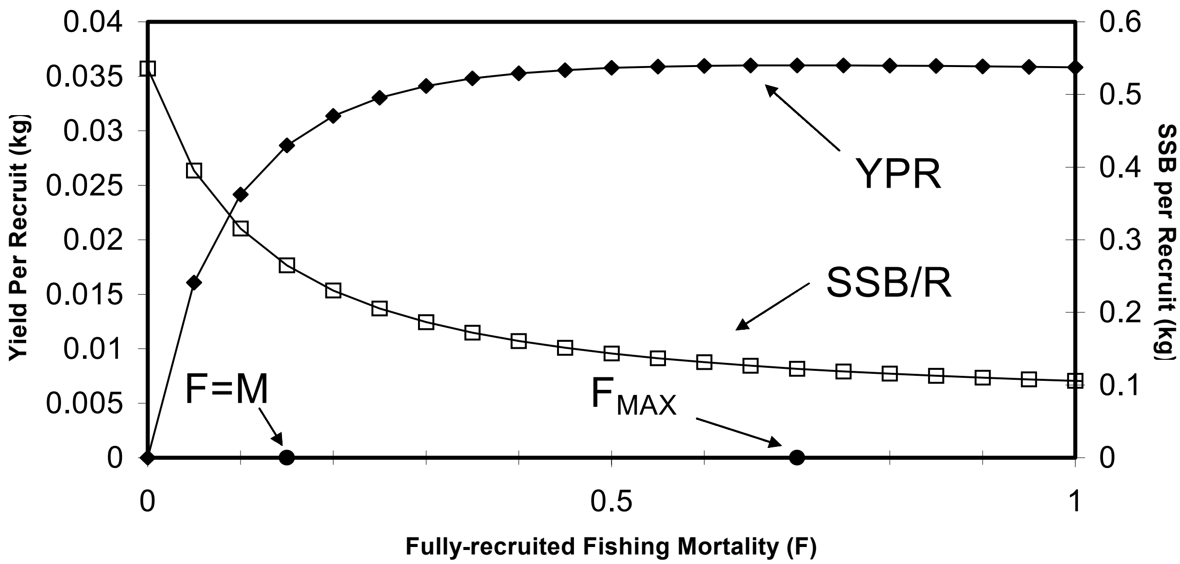
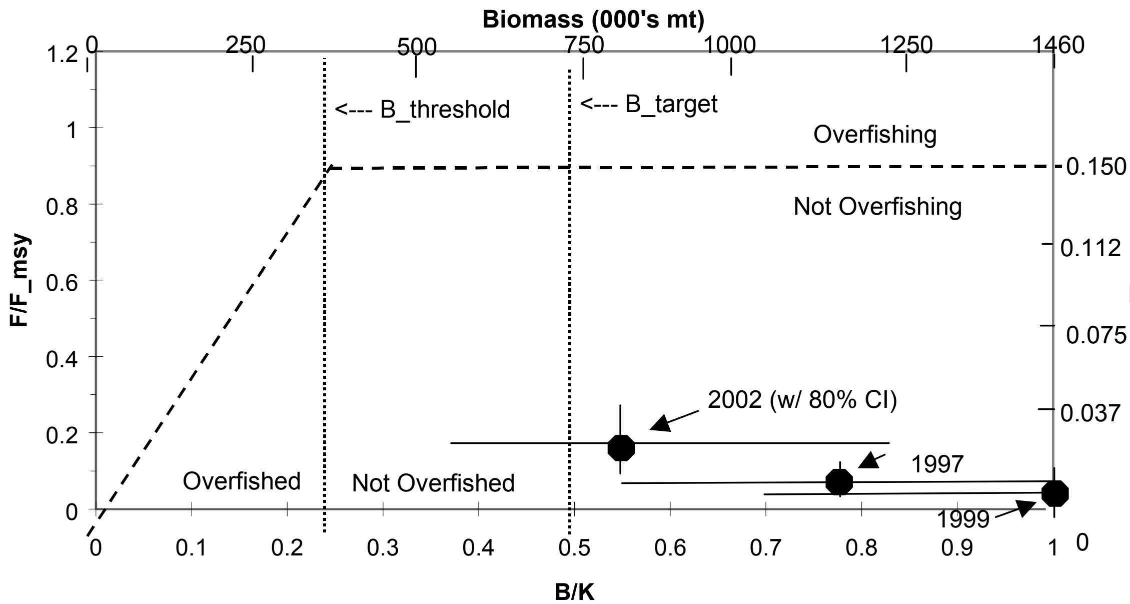


Figure C6. Surfclam Control Rule and Stock Status



A. OCEAN QUAHOG ADVISORY REPORT

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 (Figures A1, A2), current fishing mortality (F= 0.014 for the exploited area, Efficiency-Corrected Swept Area Biomass (ESB) Model) is 50% of the target ($F_{0.1}$= 0.028; note: the value of $F_{0.1}$, the target F, was recalculated for this assessment). Unlike in most marine populations, which may show large and variable recruitment, annual recruitment is approximately 0-2% of stock biomass. Since the fishery began in the late 1970s, biomass has declined slowly (Figures A1, A2, A5). The percentage of the 1977 biomass remaining in 2002 in the assessed area is 80% (all regions) and 72% (exploited regions only; i.e. all regions except Georges Bank). Biomass and exploitation status of ocean quahog in the Gulf of Maine are unknown because the efficiency of the dredge used to do the Maine survey has not been determined. Stock status relative to Biological Reference Points is shown in Figure A5.

Management Advice: Maintaining status quo exploitation rates should result in a sustainable biomass approximately equal to the BMSY. In addition, because ocean quahogs are sedentary and fishing in concentrated in relatively small areas, it may be advantageous to avoid localized depletion.

Projections: At current catch and F (based on KLAMZ time series table), biomass is projected to decline gradually over the next decade.

Stock projections for ocean quahog during 2003-2007 based on assumptions about *F* or landings. Projected landings do not include a 5% allowance for incidental mortality used in calculations.					
Year	**Biomass All Regions (1000 mt)**	**Biomass less GBK (1000 mt)**	**Landings (1000 mt)**	***F* All Regions (y^{-1})**	***F* less GBK (y^{-1})**
	Status-quo Catch				
2003	1,825	1,182	18	0.010	0.016
2004	1,794	1,164	18	0.010	0.016
2005	1,764	1,146	18	0.010	0.016
2006	1,733	1,128	18	0.011	0.016
2007	1,704	1,110	18	0.011	0.017
	Status-quo F				
2003	1,826	1,183	16	0.009	0.015
2004	1,796	1,167	16	0.009	0.015
2005	1,767	1,150	16	0.009	0.015
2006	1,739	1,134	15	0.009	0.015
2007	1,711	1,118	15	0.009	0.015
	Catch = Quota				
2003	1,825	1,182	18	0.010	0.016
2004	1,791	1,161	20	0.012	0.018
2005	1,755	1,138	23	0.014	0.021
2006	1,720	1,114	23	0.014	0.021
2007	1,684	1,091	23	0.014	0.022
	$F = F_{0.1}$ in exploited regions (F=0 for GBK)				
2003	1,811	1,168	30	0.018	0.028
2004	1,767	1,137	29	0.018	0.028
2005	1,724	1,106	29	0.018	0.028
2006	1,682	1,077	28	0.018	0.028
2007	1,641	1,048	27	0.018	0.028

Catch and Status Table (weights in '000 mt meats): Ocean Quahogs

[1]1980-2002. [2]Values are reported landings not adjusted for indirect mortality.

Year :	1994	1995	1996	1997	1998	1999	2000	2001	2002	[1]Max	[1]Min	[1]Mean
Quota:												
EEZ	24.5	22.2	20.2	19.6	18.1	20.4	20.4	20.4	20.4	--	--	--
[2]Landings:												
SVA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	<0.1
DMV	1.0	0.7	0.7	1.1	1.4	1.1	1.0	0.9	1.7	11.7	0.7	4.0
NJ	7.0	5.4	4.9	4.2	2.7	3.0	3.3	4.5	2.8	15.6	2.7	7.7
LI	12.0	9.5	5.9	5.1	6.6	6.3	4.7	5.7	9.1	12.0	0.0	3.9
SNE	1.0	5.4	8.3	9.0	6.4	6.6	5.1	4.7	3.9	9.0	0.0	2.6
GBK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other (in EEZ)	0.1	0.2	0.3	0.3	1.0	0.4	0.7	1.4	0.6	2.0	0.0	0.6
EEZ	21.0	21.2	20.1	19.7	18.0	17.5	14.9	17.2	18.1	22.5	13.1	18.8

Biomass and Mortality Estimates, Efficiency-Corrected Swept Area Biomass (ESB)

Year :	1997	1998	1999	2000	2001	2002
Biomass, '000 mt (ESB):						
SVA	<0.1	--	<0.1	--	--	<0.1
DMV	65	--	58	--	--	71
NJ	277	--	194	--	--	330
LI	505	--	422	--	--	454
SNE	249	--	416	--	--	428
GBK	447	--	686	--	--	833
EEZ Less GBK	1097	--	1090	--	--	1283
EEZ	1544	--	1776	--	--	2116
[1]Annual Fishing Mortality Rate (ESB):						
SVA	0.000	--	0.000	--	--	0.000
DMV	0.017	--	0.020	--	--	0.026
NJ	0.016	--	0.016	--	--	0.009
LI	0.011	--	0.016	--	--	0.021
SNE	0.038	--	0.017	--	--	0.010
GBK	0.000	--	0.000	--	--	0.000
EEZ Less GBK	0.019	--	0.016	--	--	0.014
EEZ	0.013	--	0.010	--	--	0.009

KLAMZ time series table

Year	SVA	DMV	NJ	LI	SNE	GBK	Total less GBK	Total
		[1] Model (scenario #)						
	VPA	KLAMZ 5	KLAMZ 3	VPA	KLAMZ 3	Aver. ESB	NA	NA
	Biomass ('000s mt)							
1977	0.297	298	455	534	386	655	1,674	2,329
1978	0.297	289	448	534	387	655	1,659	2,315
1979	0.297	281	442	534	388	655	1,645	2,300
1980	0.297	268	436	534	388	655	1,626	2,282
1981	0.297	257	428	534	389	655	1,608	2,264
1982	0.241	247	419	534	390	655	1,590	2,246
1983	0.235	236	411	534	391	655	1,572	2,227
1984	0.235	225	403	534	391	655	1,552	2,208
1985	0.229	212	394	534	390	655	1,531	2,186
1986	0.069	200	384	534	390	655	1,508	2,163
1987	0.069	187	375	534	390	655	1,486	2,141
1988	0.069	172	367	532	390	655	1,461	2,117
1989	0.027	156	361	532	390	655	1,438	2,094
1990	0.027	146	347	531	390	655	1,414	2,069
1991	0.013	138	333	530	389	655	1,391	2,046
1992	0.013	130	319	529	389	655	1,367	2,023
1993	0.013	125	314	517	389	655	1,344	1,999
1994	0.013	120	305	508	388	655	1,321	1,976
1995	0.013	116	300	496	388	655	1,299	1,955
1996	0.013	112	296	487	383	655	1,278	1,933
1997	0.013	109	293	481	376	655	1,258	1,913
1998	0.013	105	290	476	367	655	1,238	1,893
1999	0.013	101	289	469	362	655	1,221	1,876
2000	0.013	97	288	463	356	655	1,204	1,860
2001	0.013	94	286	468	352	655	1,201	1,856
2002	0.013	91	284	478	349	655	1,201	1,856
	Fishing Mortality (y^{-1})							
1977	0.000	0.003	0.014	0.000	0.000	0.000	0.004	0.003
1978	0.000	0.005	0.014	0.000	0.000	0.000	0.005	0.003
1979	0.000	0.020	0.014	0.000	0.000	0.000	0.007	0.005
1980	0.188	0.016	0.018	0.000	0.000	0.000	0.008	0.005
1981	0.021	0.014	0.020	0.000	0.000	0.000	0.008	0.005
1982	0.000	0.019	0.021	0.000	0.000	0.000	0.008	0.006
1983	0.026	0.023	0.020	0.000	0.002	0.000	0.009	0.007
1984	0.690	0.033	0.022	0.000	0.002	0.000	0.011	0.008
1985	0.000	0.035	0.028	0.000	0.002	0.000	0.012	0.009
1986	0.000	0.042	0.024	0.001	0.001	0.000	0.012	0.009
1987	0.608	0.059	0.025	0.002	0.002	0.000	0.015	0.010
1988	0.000	0.071	0.019	0.001	0.002	0.000	0.014	0.010
1989	0.501	0.043	0.040	0.001	0.003	0.000	0.016	0.011
1990	0.000	0.026	0.046	0.001	0.002	0.000	0.015	0.010
1991	0.000	0.036	0.045	0.003	0.002	0.000	0.016	0.011
1992	0.000	0.019	0.022	0.023	0.003	0.000	0.017	0.011
1993	0.000	0.016	0.033	0.017	0.003	0.000	0.016	0.011
1994	0.000	0.008	0.023	0.024	0.002	0.000	0.016	0.011
1995	0.000	0.006	0.018	0.019	0.014	0.000	0.016	0.011
1996	0.000	0.007	0.017	0.012	0.022	0.000	0.016	0.010
1997	0.000	0.010	0.015	0.011	0.024	0.000	0.016	0.010
1998	0.000	0.013	0.009	0.014	0.018	0.000	0.014	0.009
1999	0.000	0.011	0.011	0.014	0.019	0.000	0.014	0.009
2000	0.000	0.011	0.012	0.010	0.014	0.000	0.012	0.008
2001	0.000	0.010	0.016	0.012	0.013	0.000	0.013	0.009
2002	0.000	0.019	0.010	0.019	0.011	0.000	0.015	0.009

[1]From KLAMZ delay-difference model (for quahog 70+mm length), ESB, and VPA models, as indicated in table. The VPA is a cumulative catch model. "Aver. ESB" for GBK based on 1997, 1999, 2002. For DMV, KLAMZ3 and KLAMZ5 result were the same.

Stock Distribution and Identification: Ocean quahogs are distributed on both sides of the North Atlantic. They occur from Norway to Spain, intermittently across the North Atlantic and southward along the North American coast to Cape Hatteras. Commercial concentrations occur on the continental shelf off the coast of Maine and between Georges Bank and the Delmarva Peninsula (Figure A4), to at least 90 m. The assessment and management regime assumes a unit stock off the northeast US coast.

Catches: EEZ landings generally account for about 95-100% of total US landings. Annual EEZ quotas have been set since 1978. EEZ landings increased from 0 in 1975 to 14 thousand mt (meats) in 1979, and peaked at 23 thousand mt in 1992 (Figure A3). The spatial distribution of fishing effort has changed markedly over last two decades (Figure A3) in response to a variety of factors, including reductions in local catch rates and relocation of processing plants. The fishery was concentrated off Delmarva and Southern New Jersey from the 1970s to mid-1980s. During the late 1980s and early 1990s, the fishery expanded northward into the Northern New Jersey and Long Island regions. In 1995, it expanded to the Southern New England region. In 2001 and 2002, landings from Long Island fishery predominated, accounting for 33 and 50%, respectively of the landings from the EEZ. Total annual landings off the coast of Maine ranged from 92,000-129,000 "Maine" bushels (= 1 US Standard bushel = 1.2448 cu ft).

Data and Assessment: Ocean quahogs were last assessed in 2000 (SAW-31). The present assessment uses efficiency-corrected swept area biomass (ESB) estimates for the EEZ from the 1997, 1999 and 2002 surveys. The catch-swept area assessment model estimates fishing mortality rates by dividing landings by biomass. The Delay-difference model (KLAMZ) used efficiency-corrected swept area biomass estimates from 1997, 1999, 2002, a von Bertalanffy growth curve, shell length-meat weight relationships, and long-term research survey data to estimate ocean quahog biomass, mean annual recruitment biomass and fishing mortality rates during 1977-2002. Discards were assumed to be zero in all analyses. Indirect mortality from commercial dredging was assumed equal to 5% of the landings by weight. A cumulative catch model was also used in some cases to estimate historical biomass.

Biological Reference Points: Reference points were recalculated for this assessment to be consistent with the assumed 70mm knife-edge selection used in the KLAMZ model. The new estimates are $F_{MAX}= 0.18\ y^{-1}$, $F_{0.1}= 0.028\ y^{-1}$ and $F_{25\%MSP} = 0.08\ y^{-1}$(Figure A5). These estimates assumed $M = 0.02\ y^{-1}$, recruitment to the fishery occurred at 70mm (Age 26), and all fully recruited animals are considered to be sexually mature.

The present management "targets" are one-half of the virgin biomass and the $F_{0.1}$ fishing mortality in the exploited region (which excludes Georges Bank). The present "thresholds" are one quarter of the total virgin biomass and $F_{25\%MSP}$.

Based on the F_{MSY} proxy ($F_{25\%MSP} = 0.08\ y^{-1}$) and the revised estimate of one-half virgin biomass (1.2 million mt), the MSY catch would be about 96,000 mt meats y^{-1} for the whole stock (see Special Comments).

Fishing Mortality: Based on the ESB Model, F for 2002 was estimated to be 0.014 y^{-1} for the EEZ excluding GBK and the Gulf of Maine (Figure A5) (80% confidence interval 0.009 - 0.022 y^{-1}). The stockwide estimate (excluding Gulf of Maine) of F is 0.009 (80% confidence interval 0.006 - 0.013 y^{-1}). Recent observed Fs do not exceed the overfishing threshold ($F_{25\%MSP}$ = 0. 08y^{-1}) or target ($F_{0.1}$ = 0.028). Uncertainty in estimated fishing mortality rates is shown in Figure A6. Fishing mortality estimates from the KLAMZ model were similar (Figure A5).

Recruitment: Mean annual recruitment to the whole stock was small, 0-2% of stock biomass depending on the region. In the 2002 NMFS survey, the greatest numbers of small (<70mm shell length) ocean quahogs per tow were collected in the GBK and LI regions. For projections regional recruitment was assumed to be 0-1.7% of biomass in 2002.

Stock Biomass: Biomass for 2002 was estimated to be 1.3 million mt (ESB model) for the EEZ excluding GBK and the Gulf of Maine (Figure A5) (80% confidence interval 0.8 – 2.0 million mt). Stockwide estimate of biomass, (including Georges Bank but excluding the Gulf of Maine) is 2.1 million mt (80% confidence interval 1.4 – 3.1 million mt). Uncertainty in ESB biomass estimates is shown in Figure A7. Biomass estimates from the KLAMZ model were similar (Figure A5).

In the previous quahog assessment (NEFSC 2000a, b), stock biomass in 1976 (unfished stock) was 1.5 million mt (excluding GBK), and 2.1 million mt (including GBK). New estimates of the prefished stock biomass in 1977 were computed in the present assessment. They are 1.7 million mt (excluding GBK), and 2.3 million mt (including GBK)

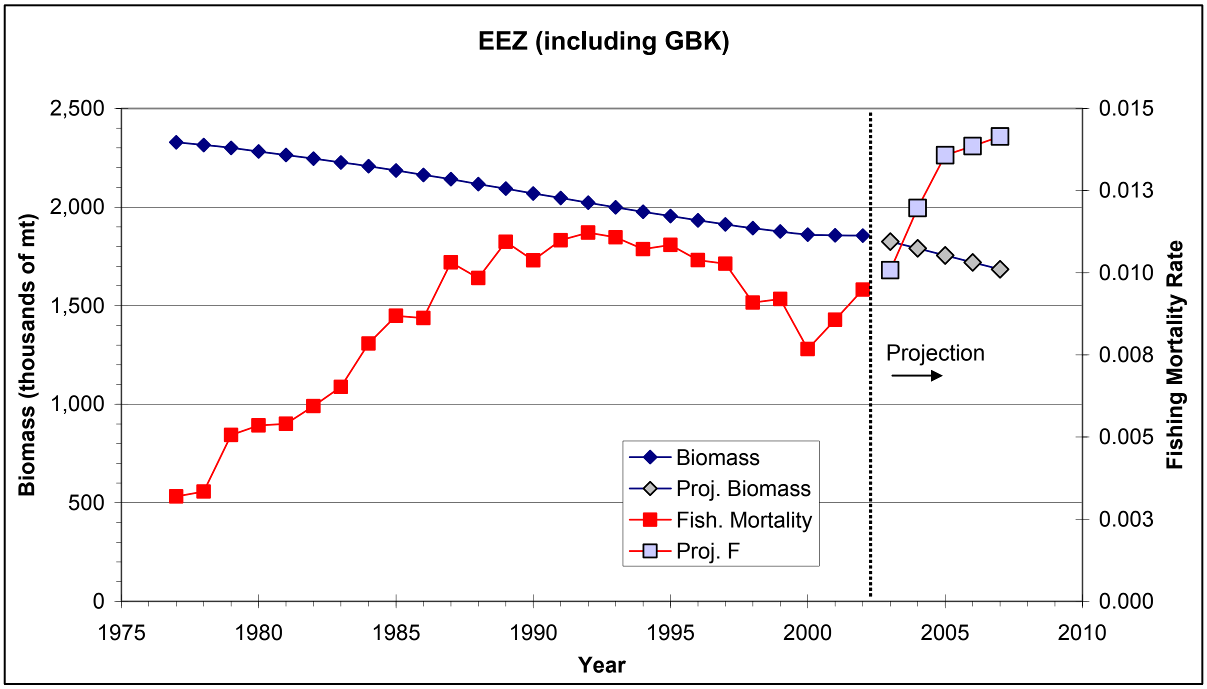
Special Comments: A major effort was made by NMFS, academia and industry collaborators from 1997-2002 to estimate the efficiency of the NMFS survey clam dredge. Nevertheless, a key source of uncertainty in the assessment is the survey dredge efficiency. The assumption that indirect mortality due to fishing is 5% is also a source of uncertainty.

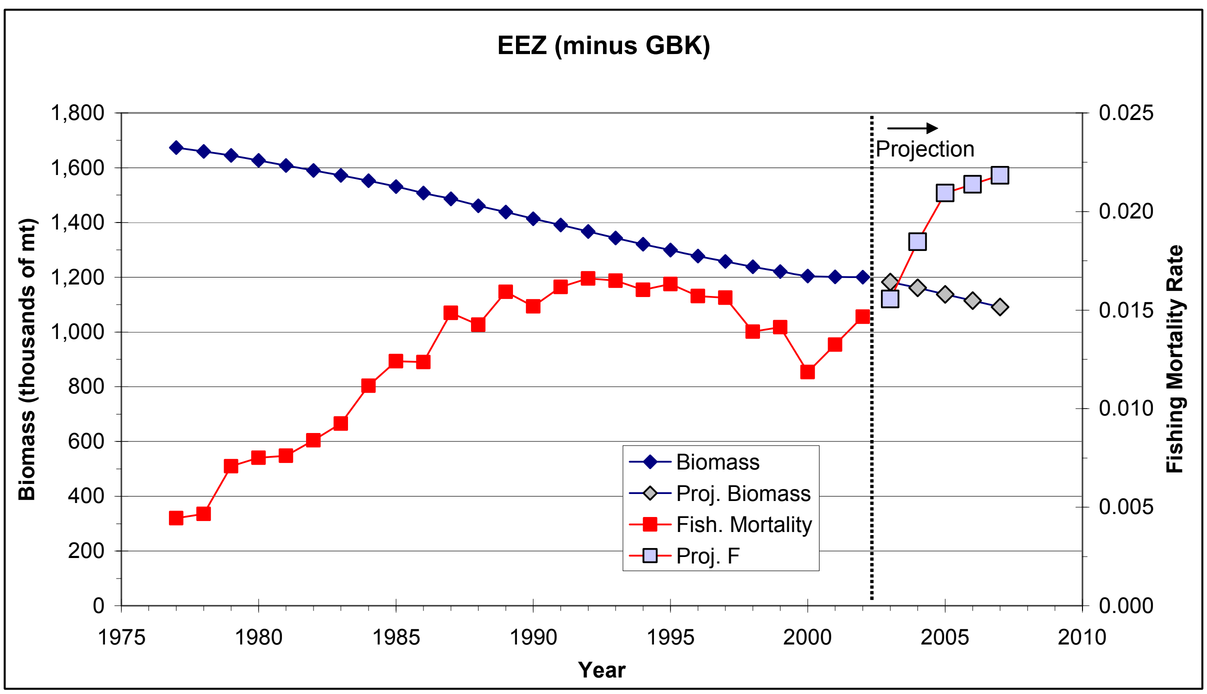
The results of a recent genetic study (Dahlgren *et al*., 2000) are consistent with the assumption that ocean quahogs throughout the EEZ are a single population.

The Surfclam-Ocean Quahog FMP currently utilizes a maximum fishing mortality threshold for ocean quahog based on the fishing mortality rate that generates 25% of the maximum spawning stock potential ($F_{25\%\ MSP}$). Based on more recent research on the use of such proxies for other resources, and concerns regarding the long term sustainability of the quahog resource, it is recommended that proxy MSP values be re-evaluated when this assessment is next updated.

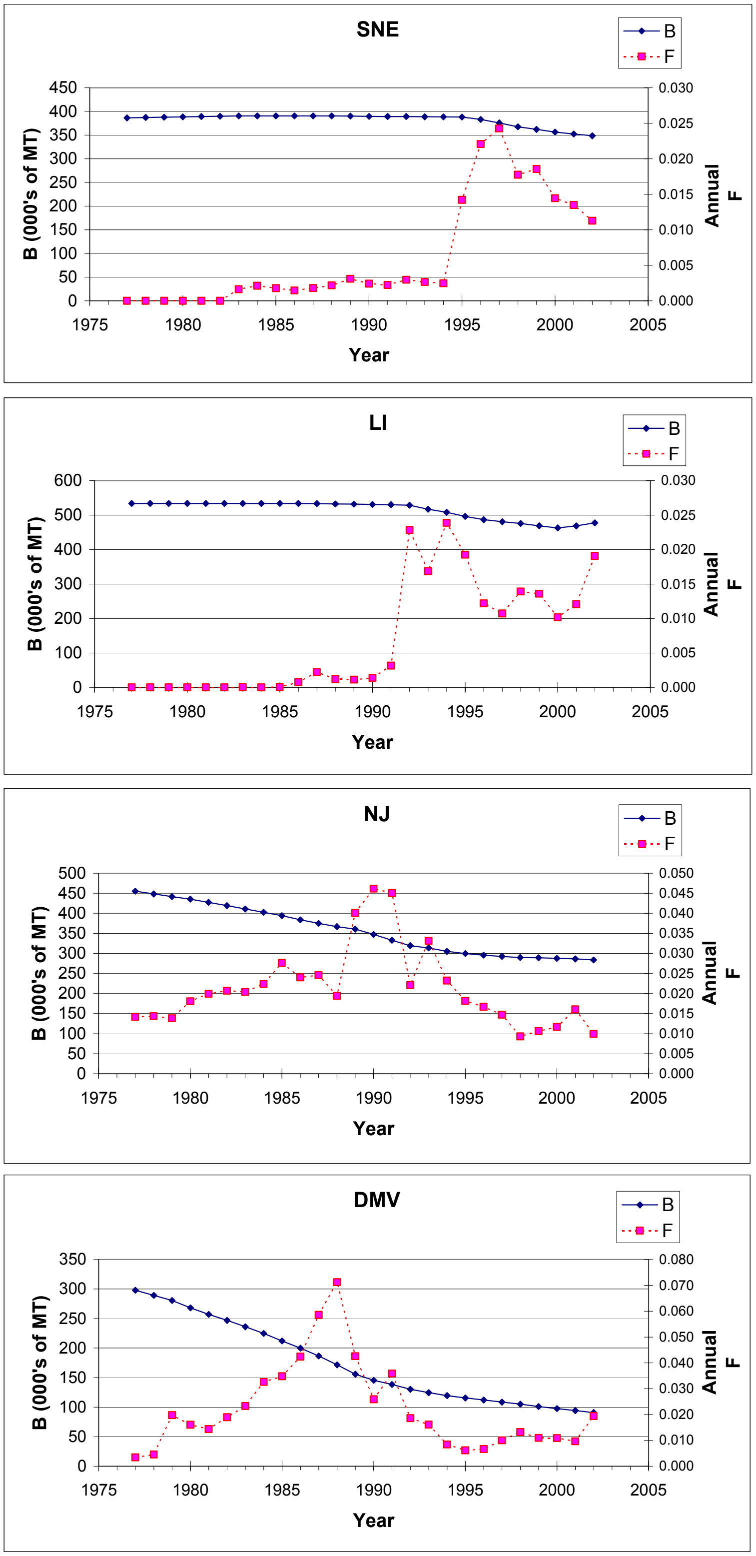
Sources of Information: Murawski, S.A., J.W. Ropes and F.M. Serchuk. 1982. Growth of the ocean quahog, *Arctica islandica*, in the Middle Atlantic Bight. Fishery Bulletin 80(1):21-34.
Dahlgren, T, J. Weinberg, and K. Halanych. 2002. Phylogeography of the ocean quahog (*Arctica islandica*): influences of paleoclimate on genetic diversity and species range. Mar. Biol. 137: 487-495.
NEFSC, 2000a. 31st Northeast Regional Stock Assessment Workshop (31st SAW). Public Review Workshop. C. Ocean quahog Advisory Report pp 24-32.
NEFSC Ref. Doc. 00-14. NEFSC, 2000b. 31st Northeast Regional Stock Assessment Workshop (31st SAW). Consensus Summary of Assessments. C. Ocean quahog. pp 172-304. NEFSC Ref. Doc. 00-15.

A1. Estimated and projected ocean quahog biomass and fishing mortality rate over time. Projections assume future catches = annual quotas.

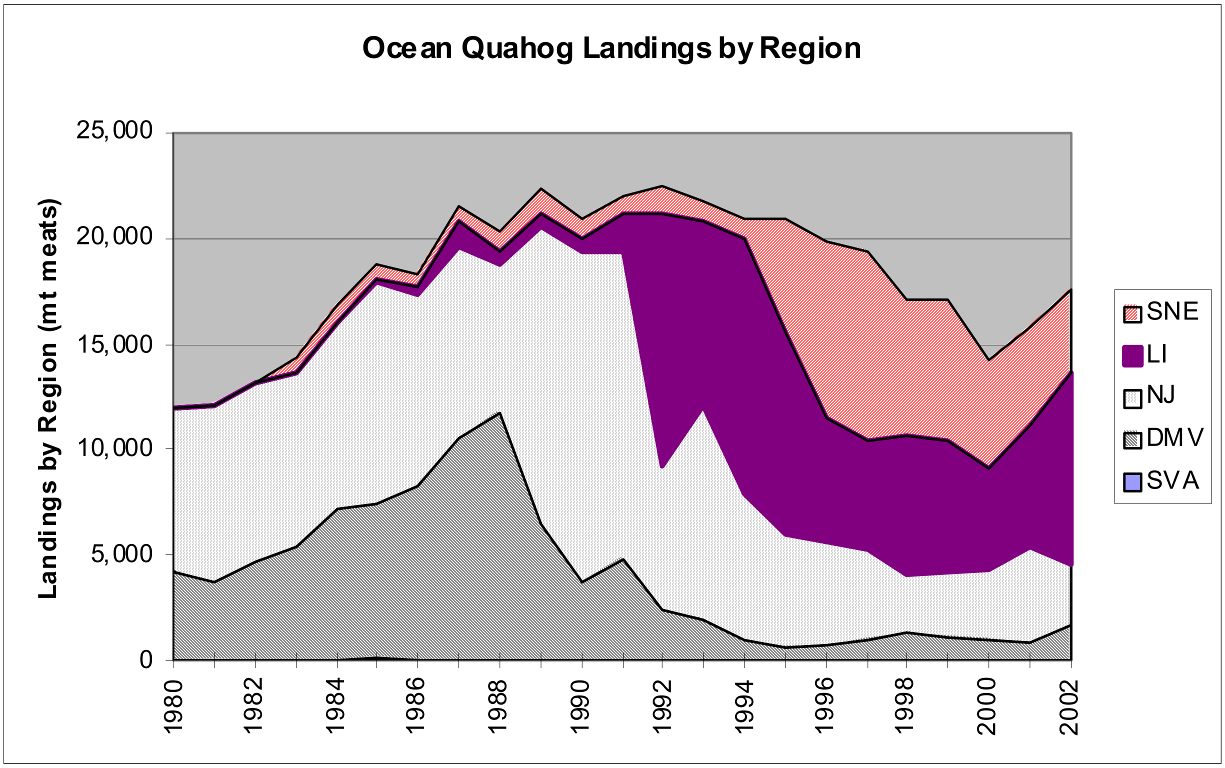




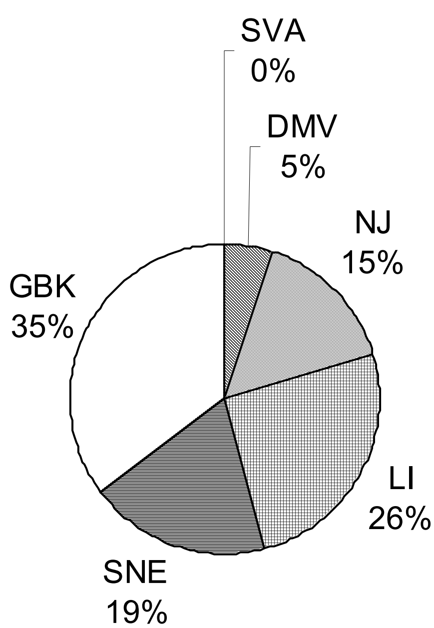
A2. Ocean quahog biomass and fishing mortality rate over time, by region.



A3. Ocean Quahog landings by region, 1980-2002.

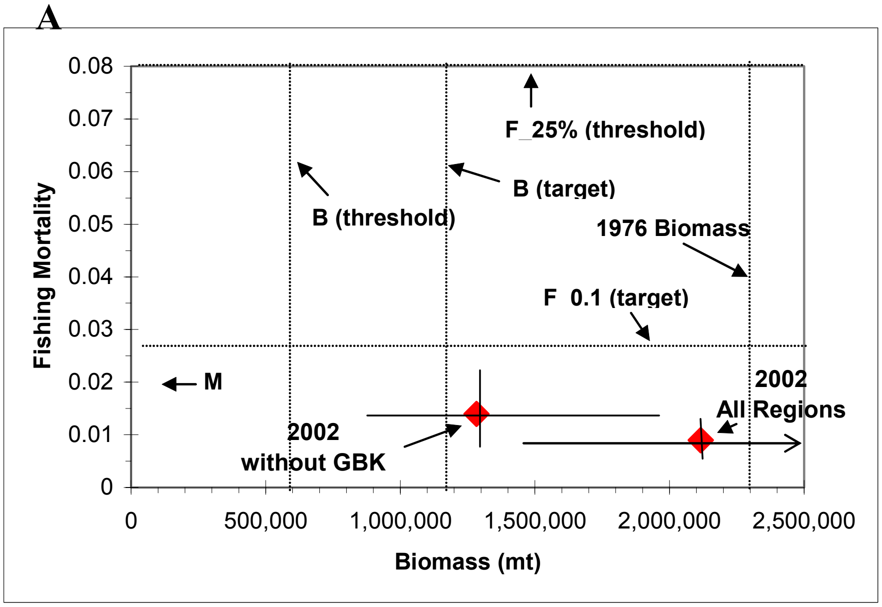


A4. Percentage of ocean quahog biomass by region, 2002.

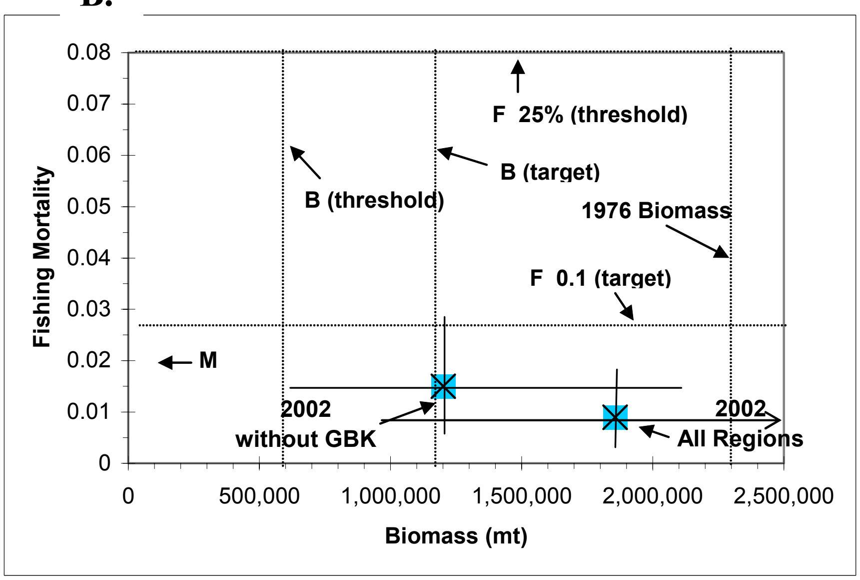


A5. Biological reference points for ocean quahogs, and estimates with 80% confidence intervals of recent biomass and annual fishing mortality rate. A ESB model or B KLAMZ model .

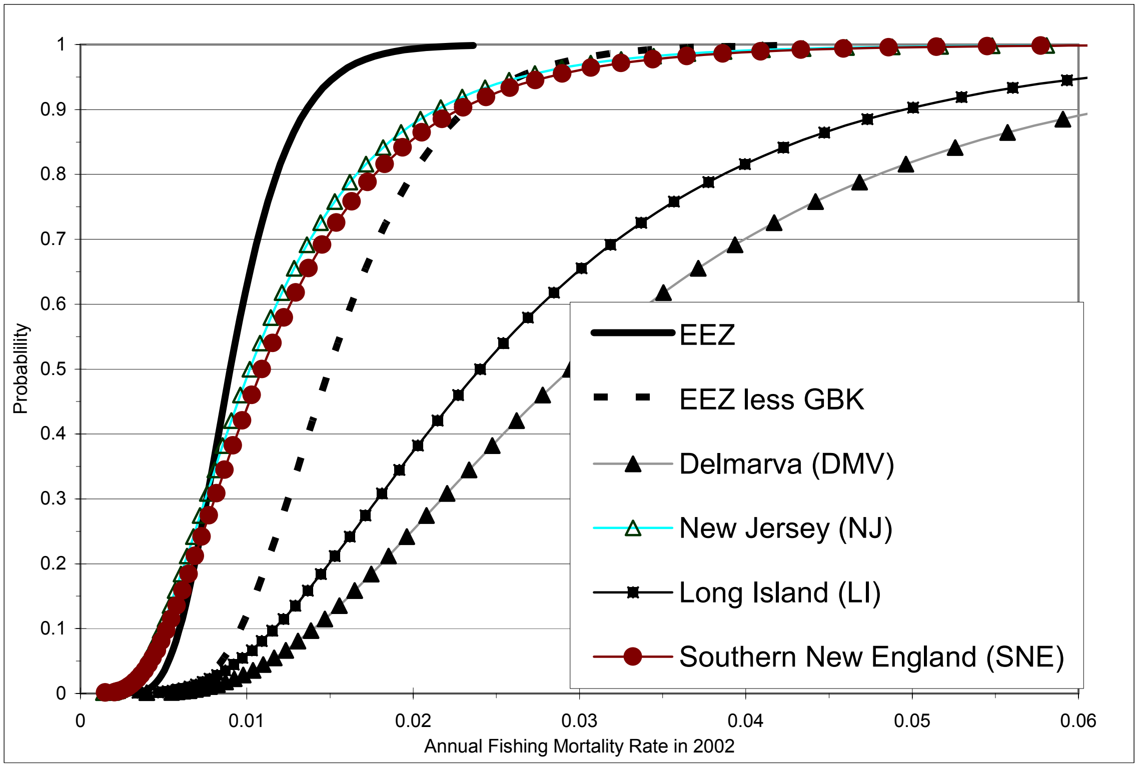
A



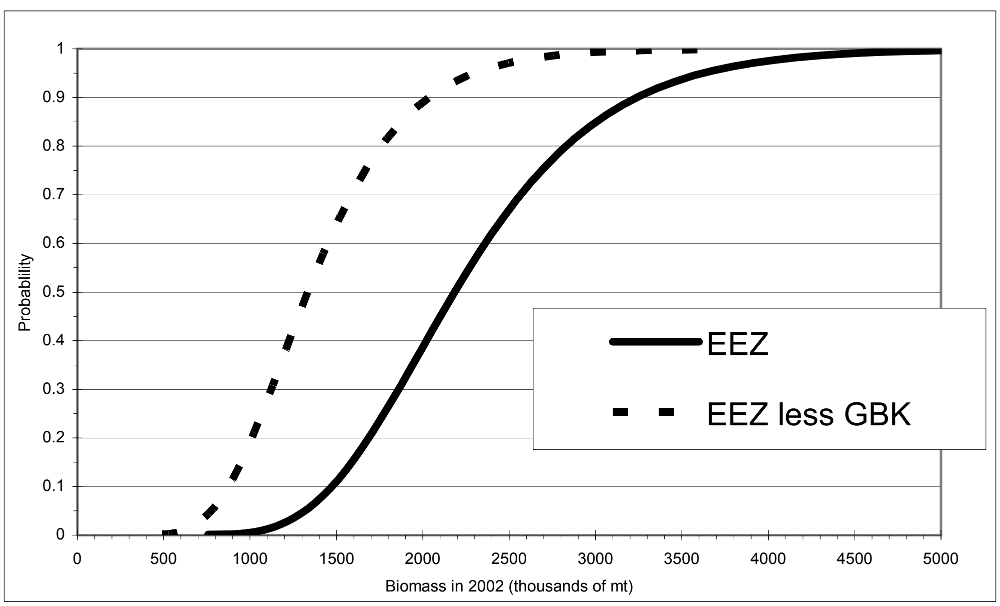
B.



A6. Uncertainty in ocean quahog fishing mortality estimates for 2002.



A7. Uncertainty in ocean quahog biomass estimates for 2002.



Protected Resources Stock Assessment Background Information

4.3 Description of Protected Resources

There are numerous species which inhabit the environment within 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. The Council has determined that the following list of species protected either by the Endangered Species Act of 1973 (ESA), the Marine Mammal Protection Act of 1972 (MMPA), or the Migratory Bird Act of 1918 may be found in the environment utilized by Atlantic surfclam and ocean quahog fisheries:

Cetaceans

Species	Status
Northern right whale (*Eubalaena glacialis*)	Endangered
Humpback whale (*Megaptera novaeangliae*)	Endangered
Fin whale (*Balaenoptera physalus*)	Endangered
Blue whale (*Balaenoptera musculus*)	Endangered
Sei whale (*Balaenoptera borealis*)	Endangered
Sperm whale (*Physeter macrocephalus*	Endangered
Minke whale (*Balaenoptera acutorostrata*)	Protected
Beaked whales (*Ziphius and Mesoplodon spp*.)	Protected
Risso's dolphin (*Grampus griseus*)	Protected
Pilot whale (*Globicephala spp*.)	Protected
White-sided dolphin (*Lagenorhynchus acutus*)	Protected
Common dolphin (*Delphinus delphis*)	Protected
Spotted and striped dolphins (*Stenella spp*.)	Protected
Bottlenose dolphin (*Tursiops truncatus*)	Protected

Sea Turtles

Species	Status
Leatherback sea turtle (*Dermochelys coriacea*)	Endangered
Kemp's ridley sea turtle (*Lepidochelys kempii*)	Endangered
Green sea turtle (*Chelonia mydas*)	Endangered
Hawksbill sea turtle (*Eretmochelys imbricata*)	Endangered
Loggerhead sea turtle (*Caretta caretta*)	Threatened

Fish

Species	Status
Shortnose sturgeon (*Acipenser brevirostrum*)	Endangered
Atlantic salmon (*Salmo salar*)	Endangered

Birds

Species	Status
Roseate tern (*Sterna dougallii dougallii*)	Endangered
Piping plover (*Charadrius melodus*)	Endangered

Critical Habitat Designations

Species	Area
Right whale	Cape Cod Bay

Description of Species Listed as Endangered which inhabit the management unit of the FMP

North Atlantic Right Whale

Right whales have occurred historically in all the world's oceans from temperate to subarctic latitudes. NMFS recognizes three major subdivisions of right whales: North Pacific, North Atlantic, and Southern Hemisphere. NMFS further recognizes two extant subunits in the North Atlantic: eastern and western. A third subunit may have existed in the central Atlantic (migrating from east of Greenland to the Azores or Bermuda), but this stock appears to be extinct (Waring *et al.* 2002).

The north Atlantic right whale has the highest risk of extinction among all of the large whales in the worlds oceans. The scarcity of right whales is the result of an 800-year history of whaling that continued into the 1960s (Klumov 1962). Historical records indicate that right whales were subject to commercial whaling in the North Atlantic as early as 1059. Between the 11^{th} and 17^{th} centuries, an estimated 25,000-40,000 right whales may have been harvested. The size of the western north Atlantic right whale population at the termination of whaling is unknown, but the stock was recognized as seriously depleted as early as 1750. However, right whales continued to be taken in shore-based operations or opportunistically by whalers in search of other species as late as the 1920's. By the time the species was internationally protected in 1935, there may have been fewer than 100 western north Atlantic right whales in the western Atlantic (Hain 1975; Reeves *et al.* 1992; Waring *et al.* 2002).

Right whales appear to prefer shallow coastal waters, but their distribution is also strongly correlated to the distribution of their prey (zooplankton). In both the northern and southern hemispheres, right whales are observed in the lower latitudes and more coastal waters during winter where calving takes place, and then tend to migrate to higher latitudes during the summer. The distribution of right whales in summer and fall in both hemispheres appears linked to the distribution of their principal zooplankton prey (Winn *et al.* 1986). They generally occur in Northwest Atlantic waters west of the Gulf Stream and are most commonly associated with cooler waters (21° C). They are not found in the Caribbean and have been recorded only rarely in the Gulf of Mexico.

Right whales feed on zooplankton through the water column, and in shallow waters may feed near the bottom. In the Gulf of Maine they have been observed feeding on zooplankton, primarily copepods, by skimming at or below the water's surface with open mouths (NMFS 1991b; Kenney *et al.* 1986; Murison and Gaskin 1989; and Mayo and Marx 1990). Research suggests that right whales must locate and exploit extremely dense patches of zooplankton to feed efficiently (Waring *et al.* 2000). New England waters include important foraging habitat for right whales and at least some portion of the North Atlantic right whale population is present in these waters throughout most months of the year. They are most abundant in Cape Cod Bay between February and April (Hamilton and Mayo 1990; Schevill *et al.* 1986; Watkins and Schevill 1982) and in the Great South Channel in May and June (Payne *et al.* 1990) where they have been observed feeding predominantly on copepods, largely of the genera *Calanus* and *Pseudocalanus* (Waring *et al.* 2002). Right whales also frequent Stellwagen Bank and Jeffrey's Ledge, as well as Canadian waters including the Bay of Fundy and Browns and Baccaro Banks, in the spring and summer months. Mid-Atlantic waters are used as a migratory pathway from the spring and summer feeding/nursery areas to the winter calving grounds off the coast of Georgia and Florida.

NMFS designated right whale critical habitat on June 3, 1994 (59 FR 28793) to help protect important right whale foraging and calving areas within the U.S. These include the waters of Cape Cod Bay and the Great South Channel off the coast of Massachusetts, and waters off the coasts of southern Georgia and northern Florida. In 1993, Canada's Department of Fisheries declared two conservation areas for right whales; one in the Grand Manan Basin in the lower Bay of Fundy, and a second in Roseway Basin between Browns and Baccaro Banks (Canadian Recovery Plan for the North Atlantic Right Whale 2000).

The northern right whale was listed as endangered throughout it's range on June 2, 1970 under the ESA. The current population is considered to be at a low level and the species remains designated as endangered (Waring *et al.* 2002). A Recovery plan has been published and currently is in effect (NMFS 1991). This is a strategic stock because the average annual fishery-related mortality and serious injury from all fisheries exceeds the Potential Biological Removal (PBR).

The western North Atlantic population of right whales was estimated to be 291 individuals in 1998 (Waring *et al.* 2002). The current population growth rate of 2.5% as reported by Knowlton *et al.* (1994) suggests the stock may be showing signs of slow recovery. The best available information makes it reasonable to conclude that the current death rate exceeds the birth rate in the western North Atlantic right whale population. The nearly complete reproductive failure in this population from 1993 to 1995 and again in 1998 and 1999 suggests that this pattern has continued for almost a decade, though the 2000/2001 season appears the most promising in the past 5 years, in terms of calves born. Because no population can sustain a high death rate and low birth rate indefinitely, this combination places the North Atlantic right whale population at high risk of extinction. Coupled with an increasing calving interval, the relatively large number of young right whales (0-4 years) and adults that are killed, by human-related factors, the likelihood of extinction is high. The recent increase in births gives rise to optimism, however these young animals must be provided with protection so that they can mature and contribute to future generations in order to be a factor in stabilizing of the population.

Right whales may be adversely affected by habitat degradation, habitat exclusion, acoustic trauma, harassment, or reduction in prey resources due to trophic effects resulting from a variety of activities including the operation of commercial fisheries. However, the major known sources of anthropogenic mortality and injury of right whales clearly are ship strikes and entanglement in commercial fishing gear. Waring *et al. (* 2002) give a detailed description of the annual human related mortalities of right whales.

Humpback Whale

The humpback whale was listed as endangered throughout it's range on June 2, 1970. This species is the fourth most numerically depleted large cetacean worldwide. Humpback whales calve and mate in the West Indies and migrate to feeding areas in the northwestern Atlantic during the summer months. Six separate feeding areas are utilized in northern waters after their return (Waring *et al.* 2002). Only one of these feeding areas, the GOM, lies within U.S. waters and is within the action area of this consultation. Most of the humpbacks that forage in the GOM visit Stellwagen Bank and the waters of Massachusetts and Cape Cod Bays. Sightings are most frequent from mid-March through November between 41º N and 43º N, from the Great South Channel north along the outside of Cape Cod to Stellwagen Bank and Jeffreys Ledge (CeTAP 1982), and peak in May and August. Small numbers of individuals may be present in this area year-round. They feed on a number of species of small schooling fishes, particularly sand lance and Atlantic herring, by targeting fish schools and filtering large amounts of water for their associated prey. Humpback whales have also been observed feeding on krill (Wynne and Schwartz 1999).

Various papers (Barlow & Clapham 1997; Clapham *et al.* 1999) summarized information gathered from a catalogue of photographs of 643 individuals from the western North Atlantic population of humpback whales. These photographs identified reproductively mature western North Atlantic humpbacks wintering in tropical breeding grounds in the Antilles, primarily on Silver and Navidad Banks, north of the Dominican Republic. The primary winter range also includes the Virgin Islands and Puerto Rico (Waring *et al.* 2002). In general, it is believed that calving and copulation take place on the winter range. Calves are born from December through March and are about 4 meters at birth. Sexually mature females give birth approximately every 2 to 3 years. Sexual maturity is reached between 4 and 6 years of age for females and between 7 and 15 years for males. Size at maturity is about 12 meters.

Humpback whales use the mid-Atlantic as a migratory pathway, but it may also be an important feeding area for juveniles. Since 1989, observations of juvenile humpbacks in the mid-Atlantic have been increasing during the winter months, peaking January through March (Swingle *et al.* 1993). Biologists speculate that non-reproductive animals may be establishing a winter feeding range in the mid-Atlantic since they are not participating in reproductive behavior in the Caribbean. Swingle *et al.* (1993) identified a shift in distribution of juvenile humpback whales in the nearshore waters of Virginia, primarily in winter months. Those whales using this mid-Atlantic area that have been identified were found to be residents of the GOM and Atlantic Canada (Gulf of St. Lawrence and Newfoundland) feeding groups, suggesting a mixing of different feeding stocks in the mid-Atlantic region. A shift in distribution may be related to winter prey availability. Studies conducted by the Virginia Marine Science Museum indicate that these whales are feeding on, among other things, bay anchovies and menhaden. In concert with the increase in mid-Atlantic whale sightings, strandings of humpback whales have increased between New Jersey and Florida since 1985. Strandings were most frequent during September through April in North Carolina and Virginia waters, and were composed primarily of juvenile humpback whales of no more than 11 meters in length (Wiley *et al.* 1995). Six of 18 humpbacks for which the cause of mortality was determined were killed by vessel strikes. An additional humpback had scars and bone fractures indicative of a previous vessel strike that may have contributed to the whale's mortality. Sixty percent of those mortalities that were closely investigated showed signs of entanglement or vessel collision.

New information has recently become available on the status and trends of the humpback whale population in the North Atlantic. Although current and maximum net productivity rates are unknown at this time, the population is apparently increasing. It has not yet been determined whether this increase is uniform across all six feeding stocks (Waring *et al.* 2002). For example, the overall rate of increase has been estimated at 9.0% (CV=0.25) by Katona and Beard (1990), while a 6.5% rate was reported for the Gulf of Maine by Barlow and Clapham (1997) using data through 1991. The rate reported by Barlow and Clapham (1997) may roughly approximate the rate of increase for the portion of the population within the action area.

Estimating abundance for the Gulf of Maine stock has proved problematic. Three approaches have been investigated: mark-recapture estimates, minimum population size, and line-transect estimates. Most of the markrecapture estimates were affected by heterogeneity of sampling, which was heavily focused on the southwestern Gulf of Maine. However, an estimate of 652 (CV=0.29) derived from the more extensive and representative YONAH sampling in 1992 and 1993 was probably less subject to this bias. The second approach uses photo-identification data to establish the minimum number of humpback whales known to be alive in a particular year, 1997. By determining the number of identified individuals seen either in that year, or in both a previous and subsequent year, it is possible to determine that at least 497 humpbacks were alive in 1997. This figure is also likely to be negatively biased, again because of heterogeneity of sampling. A similar calculation for 1992 (which would correspond to the YONAH estimate for the Gulf of Maine) yields a figure of 501 whales (Waring *et al.* 2002).

In the third approach, data were used from a 28 July to 31 August 1999 line-transect sighting survey conducted by a ship and airplane covering waters from Georges Bank to the mouth of the Gulf of St. Lawrence. Total track line length was 8,212 km. However, in light of the information on stock identity of Scotian Shelf humpback whales noted above, only the portions of the survey covering the Gulf of Maine were used; surveys blocks along the eastern coast of Nova Scotia were excluded. Shipboard data were analyzed using the modified direct duplicate method (Palka 1995) that accounts for school size bias and g(0), the probability of detecting a group on the track line. Aerial data were not corrected for g(0) (Palka 2000). These surveys yielded an estimate of 816 humpbacks (CV = 0.45). However, given that the rate of exchange between the Gulf of Maine and both the Scotian Shelf and mid-Atlantic region is not zero, this estimate is likely to be somewhat conservative. Accordingly, inclusion of data from 25% of the Scotian Shelf survey area (to reflect the match rate of 25% between the Scotian Shelf and the Gulf of Maine) gives an estimate of 902 whales (CV=0.41). Since the mark-recapture figures for abundance and minimum population size given above falls above the lower bound of the CV of the line transect estimate, and given the known exchange between the Gulf of Maine and the Scotian Shelf, we have chosen to use the latter as the best estimate of abundance for Gulf of Maine humpback whales (Waring *et al.* 2002).

The minimum population estimate is the lower limit of the two-tailed 60% confidence interval of the lognormally distributed best abundance estimate. This is equivalent to the 20th percentile of the log-normal distribution as specified by Wade and Angliss (1997). The best estimate of abundance for Gulf of Maine humpback whales is 902 (CV=0.41). The minimum population estimate for this stock is 647 (Waring *et al.* 2002).

As detailed below, current data suggest that the Gulf of Maine humpback whale stock is steadily increasing in size. This is consistent with an estimated average trend of 3.2% (SE=0.005) in the North Atlantic population overall for the period 1979–1993 (Stevick *et al.* 2001), although there are no other feeding-area-specific estimates. Barlow and Clapham (1997) applied an interbirth interval model to photographic mark-recapture data and estimated the population growth rate of the Gulf of Maine humpback whale stock at 6.5% (CV=0.012). Maximum net productivity is unknown for this population, although a theoretical maximum for any humpback population can be calculated using known values for biological parameters (Brandão *et al.* 2000, Clapham *et al.* 2001b). For the Gulf of Maine, data supplied by Barlow and Clapham (1997) and Clapham *et al.* (1995) gives values of 0.96 for survival rate, 6y as mean age at first parturition, 0.5 as the proportion of females, and 0.42 for annual pregnancy rate. From this, a maximum population growth rate of 0.072 is obtained according to the method described by Brandão et al. (2000). This suggests that the observed rate of 6.5% (Barlow and Clapham 1997) was close to the maximum for this stock. Clapham *et al.* (2001a) updated the Barlow and Clapham (1997) analysis using data from the period 1992 to 2000. The estimate was either 0% (for a calf survival rate of 0.51) or 4.0% (for a calf survival rate of 0.875). Although confidence limits are not available (because maturation parameters could not be estimated), both estimates of population growth rate are outside the 95% confidence intervals of the previous estimate of 6.5% for the period 1979 to 1991 (Barlow and Clapham 1997). It is unclear whether this apparent decline is an artifact resulting from a shift in distribution; indeed, such a shift occurred during exactly the period (1992-95) in which survival rates declined. It is possible that this shift resulted in calves born in those years imprinting on (and thus subsequently returning to) areas other than those in which intensive sampling occurs. If the decline is a real phenomenon it may be related to known high mortality among young-of-the-year whales in the waters of the U.S. mid-Atlantic states. However, calf survival appears to have increased since 1996, presumably accompanied by an increase in population growth. In light of the uncertainty accompanying the more recent estimate of population growth rate for the Gulf of Maine, for purposes of this assessment the maximum net productivity rate was assumed to be the default value for cetaceans of 0.04 (Barlow et al. 1995). Current and maximum net productivity rates are unknown for the North Atlantic population overall (Waring *et al.* 2002). As noted above, Stevick et al. (2001) calculated an average population growth rate of 3.2% (SE=0.005) for the period 1979–1993.

Potential Biological Removal (PBR) is the product of minimum population size, one-half the maximum productivity rate, and a “recovery” factor (MMPA Sec. 3. 16 U.S.C. 1362; Wade and Angliss 1997). The minimum population size is 647 . The maximum productivity rate is the default value of 0.04. The “recovery” factor, which accounts for endangered, depleted, threatened stocks, or stocks of unknown status relative to optimum sustainable population (OSP) is assumed to be 0.10 because this stock is listed as an endangered species under the Endangered Species Act (ESA). PBR for the Gulf of Maine humpback whale stock is 1.3 whales (Waring *et al.* 2002).

The major known sources of anthropogenic mortality and injury of humpback whales include entanglement in commercial fishing gear and ship strikes. Based on photographs of the caudal peduncle of humpback whales, Robbins and Mattila (1999) estimated that at least 48% --- and possibly as many as 78% --- of animals in the Gulf of Maine exhibit scarring caused by entanglement. Several whales have apparently been entangled on more than one occasion. These estimates are based on sightings of free-swimming animals that initially survive the encounter. Because some whales may drown immediately, the actual number of interactions may be higher. In addition, the actual number of species-gear interactions is contingent on the intensity of observations from aerial and ship surveys.

For the period 1996 through 2000, the total estimated human-caused mortality and serious injury to the Gulf of Maine humpback whale stock is estimated as 3.0 per year (USA waters, 2.4;

Canadian waters, 0.6). This average is derived from two components: 1) incidental fishery interaction records, 2.8 (USA waters, 2.2; Canadian waters, 0.6); and 2) records of vessel collisions, 0.2 (USA waters, 0.2; Canadian waters, 0). There were additional humpback mortalities and serious injuries that occurred in the southeastern and mid-Atlantic states that could not be confirmed as involving members of the Gulf of Maine stock (Waring *et al.* 2002). These records represent an additional minimum annual average of 1.6 human-caused mortalities and serious injuries to humpbacks over the time period, of which 1.0 per year are attributable to incidental fishery interactions and 0.6 per year are attributable to vessel collisions (Waring *et al.* 2002).

As with right whales, human impacts (vessel collisions and entanglements) are factors which may be slowing recovery of the humpback whale population. There is an average of four to six entanglements of humpback whales a year in waters of the southern Gulf of Maine and additional reports of vessel-collision scars (unpublished data, Center for Coastal Studies). Of 20 dead humpback whales (principally in the mid-Atlantic, where decomposition did not preclude examination for human impacts), Wiley et al. (1995) reported that 6 (30%) had major injuries possibly attributable to ship strikes, and 5 (25%) had injuries consistent with possible entanglement in fishing gear. One whale displayed scars that may have been caused by both ship strike and entanglement. Thus, 60% of the whale carcasses which were suitable for examination showed signs that anthropogenic factors may have contributed to, or been responsible for, their death. Wiley et al. (1995) further reported that all stranded animals were sexually immature, suggesting a winter or migratory segregation and/or that juvenile animals are more susceptible to human impacts.

An updated analysis of humpback whale mortalities from the mid-Atlantic states region has recently been produced by Barco *et al.* (2001). Between 1990 and 2000, there were 52 known humpback whale mortalities in the waters of the U.S. mid-Atlantic states (summarized by Barco *et al.* 2001). Length data from 48 of these whales (18 females, 22 males and 8 of unknown sex) suggested that 39 (81.2%) were first-year animals, 7 (14.6%) were immature and 2 (4.2%) were adults. However, sighting histories of 5 of the dead whales indicate that some were small for their age, and histories of live whales further indicate that the population contains a greater percentage of mature animals than is suggested by the stranded sample. In their study of entanglement rates estimated from caudal peduncle scars, Robbins and Mattila (2001) found that males were more likely to be entangled than females. The scarring data also suggested that yearlings were more likely than other age classes to be involved in entanglements. Finally, female humpbacks showing evidence of prior entanglements produced significantly fewer calves, suggesting that entanglement may significantly impact reproductive success. Humpback whale entanglements also occur in relatively high numbers in Canadian waters. Reports of collisions with fixed fishing gear set for groundfish around Newfoundland averaged 365 annually from 1979 to 1987 (range 174-813). An average of 50 humpback whale entanglements (range 26-66) were reported annually between 1979 and 1988, and 12 of 66 humpback whales that were entangled in 1988 died (Lien et al. 1988). Volgenau et al. (1995) also summarized existing data and concluded that in Newfoundland and Labrador, cod traps caused the most entanglements and entanglement mortalities (21%) of humpbacks between 1979 and 1992. They also reported that gillnets are the gear that has been the primary cause of entanglements and entanglement mortalities (20%) of humpbacks in the Gulf of Maine between 1975 and 1990.

Humpback whales may also be adversely affected by habitat degradation, habitat exclusion, acoustic trauma, harassment, or reduction in prey resources due to trophic effects resulting from a variety of activities including the operation of commercial fisheries.

Fin Whale

Fin whales inhabit a wide range of latitudes between 20-75˚ N and 20-75˚ S (Perry *et al.* 1999). Fin whales spend the summer feeding in the relatively high latitudes of both hemispheres, particularly along the cold eastern boundary currents in the North Atlantic and North Pacific Oceans and in Antarctic waters (IWC 1992). Most migrate seasonally from relatively high-latitude Arctic and Antarctic feeding areas in the summer to relatively low-latitude breeding and calving areas in the winter (Perry *et al.* 1999).

As in the case of right and humpback whales, fin whale populations were heavily affected by commercial whaling. However, commercial exploitation of fin whales occurred much later than for right and humpback whales. Although some fin whales were taken as early as the 17th century by the Japanese using a fairly primitive open-water netting technique (Perry *et al.* 1999) and were hunted occasionally by sailing vessel whalers in the 19th century (Mitchell and Reeves 1983), wide-scale commercial exploitation of fin whales did not occur until the 20th century when the use of steam power and harpoon- gun technology made exploitation of this faster, more offshore species feasible. In the southern hemisphere, over 700,000 fin whales were landed in the 20th century. More than 48,000 fin whales were taken in the North Atlantic between 1860 and 1970 (Perry *et al.* 1999). Fisheries existed off of Newfoundland, Nova Scotia, Norway, Iceland, the Faroe Islands, Svalbard (Spitsbergen), the islands of the British coasts, Spain and Portugal. Fin whales were rarely taken in U.S. waters, except when they ventured near the shores of Provincetown, MA, during the late 1800's (Perry *et al.* 1999).

Various estimates have been provided to describe the current status of fin whales in western North Atlantic waters. Based on the catch history and trends in Catch Per Unit Effort, an estimate of 3,590 to 6,300 fin whales was obtained for the entire western North Atlantic (Perry *et al.* 1999). Hain *et al.* (1992) estimated that about 5,000 fin whales inhabit the Northeastern United States continental shelf waters. The latest (Waring *et al.* 2002) SAR gives a best estimate of abundance for fin whales of 2,814 (CV = 0.21). The minimum population estimate for the western North Atlantic fin whale is 2,362. This is currently an underestimate, as too little is known about population structure, and the estimate is derived from surveys over a limited portion of the western North Atlantic. There is also not enough information to estimate population trends.

In the North Atlantic today, fin whales are widespread and occur from the Gulf of Mexico and Mediterranean Sea northward to the edges of the arctic pack ice (Waring *et al.* 2002). A number of researchers have suggested the existence of fin whale subpopulations in the North Atlantic. Mizroch *et al.* (1984) suggested that local depletions resulting from commercial overharvesting supported the existence of North Atlantic fin whale subpopulations. Others have used genetics information to provide support for the belief that there are several subpopulations of fin whales in the North Atlantic and Mediterranean (Bérubé *et al.* 1998). In 1976, the IWC's Scientific Committee proposed seven stocks for North Atlantic fin whales. These are: (1) North Norway; (2) West Norway-Faroe Islands; (3) British Isles-Spain and Portugal; (4) East Greenland-Iceland; (5) West Greenland; (6) Newfoundland-Labrador; and (7) Nova Scotia (Perry *et al.* 1999). However, it is uncertain whether these stock boundaries define biologically isolated units (Waring *et al.* 2002). The NMFS has designated one stock of fin whale for U.S. waters of the North Atlantic where the species is commonly found from Cape Hatteras northward.

During 1978-1982 aerial surveys, fin whales accounted for 24% of all cetaceans and 46% of all large cetaceans sighted over the continental shelf between Cape Hatteras and Nova Scotia (Waring *et al.* 1998). Underwater listening systems have also demonstrated that the fin whale is the most acoustically common whale species heard in the North Atlantic (Clark 1995). The single most important area for this species appeared to be from the Great South Channel, along the 50 meter isobath past Cape Cod, over Stellwagen Bank, and past Cape Ann to Jeffrey's Ledge (Hain *et al.* 1992).

Despite our broad knowledge of fin whales, less is known about their life history as compared to right and humpback whales. Age at sexual maturity for both sexes ranges from 5-15 years. Physical maturity is reached at 20-30 years. Conception occurs during a 5 month winter period in either hemisphere. After a 12 month gestation, a single calf is born. The calf is weaned between 6 and 11 months after birth. The mean calving interval is 2.7 years, with a range of between 2 and 3 years (Agler *et al.* 1993). Like right and humpback whales, fin whales are believed to use northwestern North Atlantic waters primarily for feeding and migrate to more southern waters for calving. However, the overall pattern of fin whale movement consists of a less obvious north-south pattern of migration than that of right and humpback whales. Based on acoustic recordings from hydrophone arrays, Clark (1995) reported a general pattern of fin whale movements in the fall from the Labrador/Newfoundland region, south past Bermuda, and into the West Indies. However, evidence regarding where the majority of fin whales winter, calve, and mate is still scarce. Some populations seem to move with the seasons (e.g., one moving south in winter to occupy the summer range of another), but there is much structuring in fin whale populations that what animals of different sex and age class do is not at all clear. Neonate strandings along the U.S. mid-Atlantic coast from October through January suggest the possibility of an offshore calving area.

The overall distribution of fin whales may be based on prey availability. This species preys opportunistically on both invertebrates and fish. The predominant prey of fin whales varies greatly in different geographical areas depending on what is locally available. In the western North Atlantic fin whales feed on a variety of small schooling fish (i.e., herring, capelin, sand lance) as well as squid and planktonic crustaceans. As with humpback whales, fin whales feed by filtering large volumes of water for their prey through their baleen plates. Photo identification studies in western North Atlantic feeding areas, particularly in Massachusetts Bay, have shown a high rate of annual return by fin whales, both within years and between years (Seipt *et al.* 1990).

As discussed above, fin whales were the focus of commercial whaling, primarily in the 20th century. The IWC did not begin to manage commercial whaling of fin whales in the North Atlantic until 1976. In 1987, fin whales were given total protection in the North Atlantic with the exception of a subsistence whaling hunt for Greenland. The IWC set a catch limit of 19 whales for the years 1995-1997 in West Greenland. All other fin whale stocks had a zero catch limit for these same years. However, Iceland reported a catch of 136 whales in the 1988/89 and 1989/90 seasons, and has since ceased reporting fin whale kills to the IWC (Perry *et al.* 1999). In total, there have been 239 reported kills of fin whales from the North Atlantic from 1988 to 1995.

The major known sources of anthropogenic mortality and injury of fin whales include ship strikes and entanglement in commercial fishing gear. However, many of the reports of mortality cannot be attributed to a particular source. Of 18 fin whale mortality records collected between

1991 and 1995, four were associated with vessel interactions, although the proximal cause of mortality was not known. The following injury/mortality events are those reported from 1996 to the present for which source was determined. These numbers should be viewed as absolute minimum numbers; the total number of mortalities and injuries cannot be estimated but is believed to be higher since it is unlikely that all carcasses will be observed. In general, known mortalities of fin whales are less than those recorded for right and humpback whales. This may be due in part to the more offshore distribution of fin whales where they are either less likely to encounter entangling gear, or are less likely to be noticed when gear entanglements or vessel strikes do occur. Fin whales may also be adversely affected by habitat degradation, habitat exclusion, acoustic trauma, harassment, or reduction in prey resources due to trophic effects resulting from a variety of activities including the operation of commercial fisheries. The fin whale was listed as endangered throughout it's range on June 2, 1970 under the ESA.
Hain *et al.* (1992) estimated that about 5,000 fin whales inhabit the northeastern United States continental shelf waters. Waring *et al.* 2002 present a more recent estimate of 2,814 (CV=0.21) fin whales based on aerial and shipboard surveys of the area from Georges Bank to the mouth of the Gulf of S. Lawrence in 1999.

Sei Whale

Sei whales are a widespread species in the world's temperate, subpolar and subtropical and even tropical marine waters. However, they appear to be more restricted to temperate waters than other balaenopterids (Perry *et al.* 1999). The IWC recognized three stocks in the North Atlantic based on past whaling operations as opposed to biological information: (1) Nova Scotia; (2) Iceland Denmark Strait; (3) Northeast Atlantic (Donovan 1991 *in* Perry *et al.* 1999). Mitchell and Chapman (1977) suggested that the sei whale population in the western North Atlantic consists of two stocks, a Nova Scotian Shelf stock and a Labrador Sea stock. The Nova Scotian Shelf stock includes the continental shelf waters of the northeastern United States, and extends northeastward to south of Newfoundland. The IWC boundaries for this stock are from the U.S. east coast to Cape Breton, Nova Scotia and east to longitude 42˚ (Waring *et al.* 2002). This is the only sei whale stock within the action area.

Sei whales became the target of modern commercial whalers primarily in the late 19th and early 20th century after stocks of other whales, including right, humpback, fin and blues, had already been depleted. Sei whales were taken in large numbers by Norway and Scotland from the beginning of modern whaling. More than 700 sei whales were killed off of Norway in 1885, alone. Small numbers were also taken off of Spain, Portugal and in the Strait of Gibraltar beginning in the 1920's, and by Norwegian and Danish whalers off of West Greenland from the 1920's to 1950's (Perry *et al.* 1999). In the western North Atlantic, sei whales were originally hunted off of Norway and Iceland, but from 1967-1972, sei whales were also taken off of Nova Scotia (Perry *et al.* 1999). A total of 825 sei whales were taken on the Scotian Shelf between 1966-1972, and an additional 16 were taken from the same area during the same time by a shore based Newfoundland whaling station (Perry *et al.* 1999). The species continued to be exploited in Iceland until 1986 even though measures to stop whaling of sei whales in other areas had been put into place in the 1970's (Perry *et al.* 1999). There is no estimate for the abundance of sei whales prior to commercial whaling. Based on whaling records, approximately14,295 sei whales were taken in the entire North Atlantic from 1885 to 1984 (Perry *et al.* 1999).

Sei whales winter in warm temperate or subtropical waters and summer in more northern latitudes. In the northern Atlantic, most births occur in November and December when the whales are on the wintering grounds. Conception is believed to occur in December and January. Gestation lasts for 12 months and the calf is weaned at 6-9 months when the whales are on the summer feeding grounds. Sei whales reach sexual maturity at 5-15 years of age. The calving interval is believed to be 2-3 years (Perry *et al.* 1999).

Sei whales occur in deep water throughout their range, typically over the continental slope or in basins situated between banks. In the northwest Atlantic, the whales travel along the eastern Canadian coast in autumn, June and July on their way to and from the Gulf of Maine and Georges Bank where they occur in winter and spring. Within the action area, the sei whale is most common on Georges Bank and into the Gulf of Maine/Bay of Fundy region during spring and summer, primarily in deeper waters. Individuals may range as far south as North Carolina. It is important to note that sei whales are known for inhabiting an area for weeks at a time then disappearing for year or even decades; this has been observed all over the world, including in the southwestern GOM in 1986. The basis for this phenomenon is not clear.

Although sei whales may prey upon small schooling fish and squid in the action area, available information suggests that calanoid copepods and euphausiids are the primary prey of this species. There are occasional influxes of sei whales further into Gulf of Maine waters, presumably in conjunction with years of high copepod abundance inshore. Sei whales are occasionally seen feeding in association with right whales in the southern Gulf of Maine and in the Bay of Fundy. However, there is no evidence to demonstrate interspecific competition between these species for food resources. There is very little information on natural mortality factors for sei whales. Possible causes of natural mortality, particularly for young, old or otherwise compromised individuals are shark attacks, killer whale attacks, and endoparasitic helminths. Baleen loss has been observed in California sei whales, presumably as a result of an unknown disease (Perry *et al.* 1999).

There are insufficient data to determine trends of the sei whale population. Because there are no abundance estimates within the last 10 years, a minimum population estimate cannot be determined for NMFS management purposes (Waring *et al.* 2002). Abundance surveys are problematic not only because this species is difficult to distinguish from the fin whale but more significant is that too little is known of the sei whale's distribution, population structure and patterns of movement; thus survey design and data interpretation are very difficult.

Few instances of injury or mortality of sei whales due to entanglement or vessel strikes have been recorded in U.S. waters. Entanglement is not known to impact this species in the U.S. Atlantic, possibly because sei whales typically inhabit waters further offshore than most commercial fishing operations, or perhaps entanglements do occur but are less likely to be observed. A small number of ship strikes of this species have been recorded. The most recent documented incident occurred in 1994 when a carcass was brought in on the bow of a container ship in Charlestown, Massachusetts. Other impacts noted above for other baleen whales may also occur. Due to the deep-water distribution of this species, interactions that do occur are less likely to be observed or reported than those involving right, humpback, and fin whales that often frequent areas within the continental shelf (Waring *et al.* 2002).

Blue Whale

Like the fin whale, blue whales occur worldwide and are believed to follow a similar migration pattern from northern summering grounds to more southern wintering areas (Perry *et al.* 1999). Three subspecies have been identified: *Balaenoptera musculus musculus*, *B.m. intermedia*, and *B.m. brevicauda* (Waring *et al.* 2002). Only *B. musculus* occurs in the northern hemisphere. Blue whales range in the North Atlantic extends from the subtropics to Baffin Bay and the Greenland Sea . The IWC currently recognizes these whales as one stock (Perry *et al.* 1999).

Blue whales were intensively hunted in all of the world's oceans from the turn of the century to the mid-1960's. Blue whales were occasionally hunted by sailing vessel whalers in the 19th century. However, development of steam-powered vessels and deck-mounted harpoon guns in the late 19th century made it possible to exploit them on an industrial scale. Blue whale populations declined worldwide as the new technology spread and began to receive widespread use (Perry *et al.* 1999). Subsequently, the whaling industry shifted effort away from declining blue whale stocks and targeted other large species, such as fin whales, and then resumed hunting for blue whales when the species appeared to be more abundant (Perry *et al.* 1999). The result was a cyclical rise and fall, leading to severe depletion of blue whale stocks worldwide (Perry *et al.* 1999). In the North Atlantic, Norway shifted operations to fin whales as early as 1882 due to the scarcity of blue whales (Perry *et al.* 1999). In all, at least 11,000 blue whales were taken in the North Atlantic from the late 19th century through the mid-20th century. Blue whales were given complete protection in the North Atlantic in 1955 under the International Convention for the Regulation of Whaling. However, Iceland continued to hunt blue whales until 1960. There are no good estimates of the pre-exploitation size of the western North Atlantic blue whale stock but it is widely believed that this stock was severely depleted by the time legal protection was introduced in 1955 (Perry *et al.* 1999). Mitchell (1974) suggested that the stock numbered in the very low hundreds during the late 1960's through early 1970's (Perry *et al.* 1999). Photo-identification studies of blue whales in the Gulf of St. Lawrence from 1979 to 1995 identified 320 individual whales. The NMFS recognizes a minimum population estimate of 308 blue whales for the western North Atlantic (Waring *et al.* 2002).

Blue whales are only occasional visitors to east coast U.S. waters. They are more commonly found in Canadian waters, particularly the Gulf of St. Lawrence where they are present for most of the year, and other areas of the North Atlantic. It is assumed that blue whale distribution is governed largely by food requirements. In the Gulf of St. Lawrence, blue whales appear to predominantly feed on *Thysanoessa raschii* and *Meganytiphanes norvegica*. In the eastern North Atlantic, *T. inermis* and *M. norvegica* appear to be the predominant prey.

Compared to the other species of large whales, relatively little is known about this species. Sexual maturity is believed to occur in both sexes at 5-15 years of age. Gestation lasts 10-12 months and calves nurse for 6-7 months. The average calving interval is estimated to be 2-3 years. Birth and mating both take place in the winter season, but the location of wintering areas is speculative (Perry *et al.* 1999). In 1992 the U.S. Navy and contractors conducted an extensive blue whale acoustic survey of the North Atlantic and found concentrations of blue whales on the Grand Banks and west of the British Isles. One whale was tracked for 43 days during which time it traveled 1,400 nautical miles around the general area of Bermuda (Perry *et al.* 1999).

There is limited information on the factors affecting natural mortality of blue whales in the North Atlantic. Ice entrapment is known to kill and seriously injure some blue whales, particularly along the southwest coast of Newfoundland, during late winter and early spring. Habitat degradation has been suggested as possibly affecting blue whales such as in the St. Lawrence River and the Gulf of St. Lawrence where habitat has been degraded by acoustic and chemical pollution. However, there is no data to confirm that blue whales have been affected by such habitat changes (Perry *et al.* 1999).

Entanglement in fishing gear and ship strikes are believed to be the major sources of anthropogenic mortality and injury of blue whales. However, confirmed deaths or serious injuries from either are few. In 1987, concurrent with an unusual influx of blue whales into the Gulf of Maine, one report was received from a whale watch boat that spotted a blue whale in the southern Gulf of Maine entangled in gear described as probable lobster pot gear. A second animal found in the Gulf of St. Lawrence apparently died from the effects of an entanglement. In March 1998, a juvenile male blue whale was carried into Rhode Island waters on the bow of a tanker. The cause of death was determined to be due to a ship strike, although not necessarily caused by the tanker on which it was observed, and the strike may have occurred outside the U.S. EEZ (Waring *et al.* 2002). No recent entanglements of blue whales have been reported from the U.S. Atlantic. Other impacts noted above for other baleen whales may occur.

Sperm Whale

Sperm whales inhabit all ocean basins, from equatorial waters to the polar regions (Perry *et al.* 1999). In the western North Atlantic they range from Greenland to the Gulf of Mexico and the Caribbean. The sperm whales that occur in the western North Atlantic are believed to represent only a portion of the total stock (Blaylock *et al.* 1995). Total numbers of sperm whales off the USA or Canadian Atlantic coast are unknown, although eight estimates from selected regions of the habitat do exist for select time periods. The best estimate of abundance for the North Atlantic stock of sperm whales is 4,702 (CV=0.36) (Waring *et al.* 2002). The minimum population estimate for the western North Atlantic sperm whale is 3,505 (CV=0.36). Sperm whales present in the Gulf of Mexico are considered by some researchers to be endemic, and represent a separate stock from whales in other portions of the North Atlantic. However, NMFS currently uses the IWC stock structure guidance which recognizes one stock for the entire North Atlantic (Waring *et al.* 2002).

The International Whaling Commission estimates that nearly a quarter-million sperm whales were killed worldwide in whaling activities between 1800 and 1900 (IWC 1971). However, estimates of the number of sperm whales taken during this time are difficult to quantify since sperm whale catches from the early 19th century through the early 20th century were calculated on barrels of oil produced per whale rather than the actual number of whales caught (Perry *et al.* 1999). With the advent of modern whaling the larger rorqual whales were targeted. However as their numbers decreased, greater attention was paid to smaller rorquals and sperm whales. From 1910 to 1982 there were nearly 700,000 sperm whales killed worldwide from whaling activities (Clarke 1954). Whale catches for the southern hemisphere is 394,000 (including revised Soviet figures). Sperm whales were hunted in America from the 17th century through the early 20th century. In the North Atlantic, hunting occurred off of Iceland, Norway, the Faroe Islands, coastal Britain, West Greenland, Nova Scotia, Newfoundland/Labrador, New England, the Azores, Madeira, Spain, and Spanish Morocco (Waring *et al.* 1998). Some whales were also taken off the U.S. Mid-Atlantic coast (Reeves and Mitchell 1988; Perry *et al.* 1999), and in the northern Gulf of Mexico (Perry *et al.* 1999). There are no catch estimates available for the number of sperm whales caught during U.S. operations (Perry *et al.* 1999). Recorded North

Atlantic sperm whale catch numbers for Canada and Norway from 1904 to 1972 total 1,995. All killing of sperm whales was banned by the IWC in 1988. However, at the 2000 meetings of the IWC, Japan indicated it would include the take of sperm whales in its scientific research whaling operations. Although this action was disapproved of by the IWC, Japan has reported the take of 5 sperm whales from the North Pacific as a result of this research.

Sperm whales generally occur in waters greater than 180 meters in depth. While they may be encountered almost anywhere on the high seas, their distribution shows a preference for continental margins, sea mounts, and areas of upwelling, where food is abundant (Leatherwood and Reeves 1983). Sperm whales in both hemispheres migrate to higher latitudes in the summer for feeding and return to lower latitude waters in the winter where mating and calving occur. Mature males typically range to much higher latitudes than mature females and immature animals but return to the lower latitudes in the winter to breed (Perry *et al.* 1999). Waring *et al.* (2002) suggest sperm whale distribution is closely correlated with the Gulf Stream edge. Like swordfish, which feed on similar prey, sperm whales migrate to higher latitudes during summer months, when they are concentrated east and northeast of Cape Hatteras. In the U.S. EEZ, sperm whales occur on the continental shelf edge, over the continental slope, and into the mid-ocean regions , and are distributed in a distinct seasonal cycle; concentrated east-northeast of Cape Hatteras in winter and shifting northward in spring when whales are found throughout the mid-Atlantic Bight. Distribution extends further northward to areas north of Georges Bank and the Northeast Channel region in summer and then south of New England in fall, back to the mid-Atlantic Bight (Waring *et al.* 2002).

Sperm whale distribution may be linked to their social structure as well as distribution of their prey (Waring *et al.* 2002). Sperm whale populations are organized into two types of groupings: breeding schools and bachelor schools. Older males are often solitary (Best 1979). Breeding schools consist of females of all ages, calves and juvenile males. In the Northern Hemisphere, mature females ovulate April through August. During this season one or more large mature bulls temporarily join each breeding school. A single calf is born after a 15-month gestation. A mature female will produce a calf every 4-6 years. Females attain sexual maturity at a mean age of nine years, while males have a prolonged puberty and attain sexual maturity at about age 20 (Waring *et al.* 2002). Bachelor schools consist of maturing males who leave the breeding school and aggregate in loose groups of about 40 animals. As the males grow older they separate from the bachelor schools and remain solitary most of the year (Best 1979). Male sperm whales may not reach physical maturity until they are 45 years old (Waring *et al.* 2002). The sperm whales prey consists of larger mesopelagic squid (e.g., *Architeuthis* and *Moroteuthis*) and fish species (Perry *et al.* 1999). Sperm whales, especially mature males in higher latitude waters, have been observed to take significant quantities of large demersal and mesopelagic sharks, skates, and bony fishes (Clarke 1962, 1980).

Few instances of injury or mortality of sperm whales due to human impacts have been recorded in U.S. waters. Because of their generally more offshore distribution and their benthic feeding habits, sperm whales are less subject to entanglement than are right or humpback whales. Documented takes primarily involve offshore fisheries such as the offshore lobster pot fishery and pelagic driftnet and pelagic longline fisheries. The NMFS Sea Sampling program recorded three entanglements (in 1989, 1990, and 1995) of sperm whales in the swordfish drift gillnet fishery prior to permanent closure of the fishery in January 1999. All three animals were injured, found alive, and released. However, at least one was still carrying gear. Opportunistic reports of sperm whale entanglements for the years 1993-1997 include three records involving offshore lobster pot gear, heavy monofilament line, and fine mesh gillnet from an unknown source. Sperm whales may also interact opportunistically with fishing gear. Observers aboard Alaska sablefish and Pacific halibut longline vessels have documented sperm whales feeding on longline caught fish in the Gulf of Alaska (Perry *et al.* 1999). Behavior similar to that observed in the Alaskan longline fishery has also been documented during longline operations off South America where sperm whales have become entangled in longline gear, have been observed feeding on fish caught in the gear, and have been reported following longline vessels for days (Perry *et al.* 1999).

Sperm whales are also struck by ships. In May 1994 a ship struck sperm whale was observed south of Nova Scotia (Waring *et al.* 2002). A sperm whale was also seriously injured as a result of a ship strike in May 2000 in the western Atlantic. Due to the offshore distribution of this species, interactions that do occur are less likely to be reported than those involving right, humpback, and fin whales that more often occur in nearshore areas. Other impacts noted above for baleen whales may also occur.

Due to their offshore distribution, sperm whales tend to strand less often than, for example, right whales and humpbacks. Preliminary data for 2000 indicate that of ten sperm whales reported to the stranding network (nine dead and one injured) there was one possible fishery interaction, one ship strike (wounded with bleeding gash on side) and eight animals for which no signs of entanglement or injury were sighted or reported. No sperm whales have stranded or been reported to the stranding network as of February 2001.

Loggerhead Sea Turtle

The loggerhead turtle was listed as "threatened" under the ESA on July 28, 1978, but is considered endangered by the World Conservation Union (IUCN) and under the Convention on International Trade in Endangered Species of Flora and Fauna (CITES). Loggerhead sea turtles are found in a wide range of habitats throughout the temperate and tropical regions of the Atlantic. These include open ocean, continental shelves, bays, lagoons, and estuaries (NMFS& FWS 1995). In the management unit of this FMP they are most common on the open ocean in the northern Gulf of Maine, particularly where associated with warmer water fronts formed from the Gulf Stream. The species is also found in entrances to bays and sounds and within bays and estuaries, particularly in the Mid-Atlantic.

Since they are limited by water temperatures, sea turtles do not usually appear on the summer foraging grounds in the Gulf of Maine until June, but are found in Virginia as early as April. They remain in these areas until as late as November and December in some cases, but the large majority leave the Gulf of Maine by mid-September. Loggerheads are primarily benthic feeders, opportunistically foraging on crustaceans and mollusks (NMFS & FWS 1995). Under certain conditions they also feed on finfish, particularly if they are easy to catch *(e.g.,* caught in gillnets or inside pound nets where the fish are accessible to turtles).

A Turtle Expert Working Group (TEWG 2000), conducting an assessment of the status of the loggerhead sea turtle population in the Western North Atlantic (WNA), concluded that there are at least four loggerhead subpopulations separated at the nesting beach in the WNA (TEWG 1998). However, the group concluded that additional research is necessary to fully address the stock definition question. The four nesting subpopulations include the following areas: northern North Carolina to northeast Florida, south Florida, the Florida Panhandle, and the Yucatan

Peninsula. Genetic evidence indicates that loggerheads from Chesapeake Bay southward to Georgia appear nearly equally divided in origin between South Florida and northern subpopulations. Additional research is needed to determine the origin of turtles found north of the Chesapeake Bay.

The TEWG (1998) analysis also indicated the northern subpopulation of loggerheads may be experiencing a significant decline (2.5% - 3.2% for various beaches). A recovery goal of 12,800 nests has been assumed for the Northern Subpopulation, but TEWG (1998) reported nest number at around 6,200 (TEWG 1998). More recently, the addition of nesting data from the years 1996, 1997 and 1998, did not change the assessment of the TEWG that the number of loggerhead nests in the Northern Subpopulation is stable or declining (TEWG 2000). Since the number of nests have declined in the 1980's, the TEWG concluded that it is unlikely that this subpopulation will reach this goal given this apparent decline and the lack of information on the subpopulation from which loggerheads in the WNA originate. Continued efforts to reduce the adverse effects of fishing and other human-induced mortality on this population are necessary.

The most recent 5-year ESA sea turtle status review (NMFS & USFWS 1995) highlights the difficulty of assessing sea turtle population sizes and trends. Most long-term data comes from nesting beaches, many of which occur extensively in areas outside U.S. waters. Because of this lack of information, the TEWG was unable to determine acceptable levels of mortality. This status review supports the conclusion of the TEWG that the northern subpopulation may be experiencing a decline and that inadequate information is available to assess whether its status has changed since the initial listing as threatened in 1978. NMFS & USFWS (1995) concluded that loggerhead turtles should remain designated threatened but noted that additional research will be necessary before the next status review can be conducted.

Leatherback Sea Turtle

Leatherback turtles are widely distributed throughout the oceans of the world, and are found in waters of the Atlantic, Pacific, Caribbean, and the Gulf of Mexico (Ernst and Barbour 1972). The leatherback sea turtle is the largest living turtle and ranges farther than any other sea turtle species, exhibiting broad thermal tolerances (NMFS and USFWS, 1995). Evidence from tag returns and strandings in the western Atlantic suggests that adults engage in routine migrations between boreal, temperate and tropical waters (NMFS and USFWS, 1992). In the U.S., leatherback turtles are found throughout the action area of this consultation. Located in the northeastern waters during the warmer months, this species is found in coastal waters of the continental shelf and near the Gulf Stream edge, but rarely in the inshore areas. However, leatherbacks may migrate close to shore, as a leatherback was satellite tracked along the mid-Atlantic coast, thought to be foraging in these waters. A 1979 aerial survey of the outer Continental Shelf from Cape Hatteras, North Carolina to Cape Sable, Nova Scotia showed leatherbacks to be present throughout the area with the most numerous sightings made from the Gulf of Maine south to Long Island. Shoop and Kenney (1992) also observed concentrations of leatherbacks during the summer off the south shore of Long Island and off New Jersey. Leatherbacks in these waters are thought to be following their preferred jellyfish prey. This aerial survey estimated the leatherback population for the northeastern U.S. at approximately 300-600 animals (from near Nova Scotia, Canada to Cape Hatteras, North Carolina).

Compared to the current knowledge regarding loggerhead populations, the genetic distinctness of leatherback populations is less clear. However, genetic analyses of leatherbacks to date indicate female turtles nesting in St. Croix/Puerto Rico and those nesting in Trinidad differ from each other and from turtles nesting in Florida, French Guiana/Suriname and along the South African Indian Ocean coast. Much of the genetic diversity is contained in the relatively small insular subpopulations. Although populations or subpopulations of leatherback sea turtles have not been formally recognized, based on the most recent reviews of the analysis of population trends of leatherback sea turtles, and due to our limited understanding of the genetic structure of the entire species, the most conservative approach would be to treat leatherback nesting populations as distinct populations whose survival and recovery is critical to the survival and recovery of the species. Further, any action that appreciably reduced the likelihood for one or more of these nesting populations to survive and recover in the wild, would appreciably reduce the species' likelihood of survival and recovery in the wild.

Leatherbacks are predominantly a pelagic species and feed on jellyfish (i.e., *Stomolophus*, *Chryaora*, and *Aurelia* (Rebel 1974)), cnidarians (medusae, siphonophores) and tunicates (salps, pyrosomas). Time-Depth-Recorder data recorded by Eckert *et al.* (1998b) indicate that leatherbacks are night feeders and are deep divers, with recorded dives to depths in excess of 1000 meters. However, leatherbacks may come into shallow waters if there is an abundance of jellyfish nearshore. Leary (1957) reported a large group of up to 100 leatherbacks just offshore of Port Aransas, Texas associated with a dense aggregation of Stomolophus. Leatherbacks also occur annually in places such as Cape Cod and Narragansett Bays during certain times of the year, particularly the fall.

Although leatherbacks are a long lived species (> 30 years), they are somewhat faster to mature than loggerheads, with an estimated age at sexual maturity reported as about 13-14 years for females, and an estimated minimum age at sexual maturity of 5-6 years, with 9 years reported as a likely minimum (Zug and Parham 1996) and 19 years as a likely maximum (NMFS 2001). In the U.S. and Caribbean, female leatherbacks nest from March through July. They nest frequently (up to 7 nests per year) during a nesting season and nest about every 2-3 years. During each nesting, they produce 100 eggs or more in each clutch and thus, can produce 700 eggs or more per nesting season (Schultz 1975). The eggs will incubate for 55-75 days before hatching. The habitat requirements for post-hatchling leatherbacks are virtually unknown (NMFS and USFWS 1992).

Anthropogenic impacts to the leatherback population are similar to those discussed above for the loggerhead sea turtle, including fishery interactions as well as intense exploitation of the eggs (Ross 1979). Eckert (1996) and Spotila *et al.* (1996) record that adult mortality has also increased significantly, particularly as a result of driftnet and longline fisheries. Zug and Parham (1996) attribute the sharp decline in leatherback populations to the combination of the loss of long-lived adults in fishery related mortality, and the lack of recruitment stemming from elimination of annual influxes of hatchlings because of intense egg harvesting.

Poaching is not known to be a problem for U.S. nesting populations. However, numerous fisheries that occur in both U.S. state and Federal waters are known to negatively impact juvenile and adult leatherback sea turtles. These include incidental take in several commercial and recreational fisheries. Fisheries known or suspected to incidentally capture leatherbacks include those deploying bottom trawls, off-bottom trawls, purse seines, bottom longlines, hook and line, gill nets, drift nets, traps, haul seines, pound nets, beach seines, and surface longlines (NMFS and USFWS 1992). At a workshop held in the Northeast in 1998 to develop a management plan for leatherbacks, experts expressed the opinion that incidental takes in fisheries were likely higher than is being reported.

Leatherback interactions with the southeast shrimp fishery are also common. Turtle Excluder Devices (TEDs), typically used in the southeast shrimp fishery to minimize sea turtle/fishery interactions, are less effective for the large-sized leatherbacks. Therefore, the NMFS has used several alternative measures to protect leatherback sea turtles from lethal interactions with the shrimp fishery. These include establishment of a Leatherback Conservation Zone (60 FR 25260). NMFS established the zone to restrict, when necessary, shrimp trawl activities from off the coast of Cape Canaveral, Florida to the Virginia/North Carolina Border. It allows the NMFS to quickly close the area or portions of the area to the shrimp fleet on a short-term basis when high concentrations of normally pelagic leatherbacks are recorded in more coastal waters where the shrimp fleet operates. Other emergency measures may also be used to minimize the interactions between leatherbacks and the shrimp fishery. For example, in November 1999 parts of Florida experienced an unusually high number of leatherback strandings. In response, the NMFS required shrimp vessels operating in a specified area to use TEDs with a larger opening for a 30-day period beginning December 8, 1999 (64 FR 69416) so that leatherback sea turtles could escape if caught in the gear.

Leatherbacks are also susceptible to entanglement in lobster and crab pot gear, possibly as a result of attraction to gelatinous organisms and algae that collect on buoys and buoy lines at or near the surface, attraction to the buoys which could appear as prey, or the gear configuration which may be more likely to wrap around flippers. The total number of leatherbacks reported entangled from New York through Maine from all sources for the years 1980 - 2000 is 119; out of this total, 92 of these records took place from 1990-2000. Entanglements are also common in Canadian waters where Goff and Lien (1988) reported that 14 of 20 leatherbacks encountered off the coast of Newfoundland/Labrador were entangled in fishing gear including salmon net, herring net, gillnet, trawl line and crab pot line. It is unclear how leatherbacks become entangled in such gear. Prescott (1988) reviewed stranding data for Cape Cod Bay and concluded that for those turtles where cause of death could be determined (the minority), entanglement in fishing gear is the leading cause of death followed by capture by dragger, cold stunning, or collision with boats.

Spotila *et al.* (1996) describe a hypothetical life table model based on estimated ages of sexual maturity at both ends of the species' natural range (5 and 15 years). The model concluded that leatherbacks maturing in 5 years would exhibit much greater population fluctuations in response to external factors than would turtles that mature in 15 years. Furthermore, the simulations indicated that leatherbacks could maintain a stable population only if both juvenile and adult survivorship remained high, and that if other life history stages (i.e., egg, hatchling, and juvenile) remained static. Model simulations indicated that an increase in adult mortality of more than 1% above background levels in a stable population was unsustainable. As noted, there are many human-related sources of mortality to leatherbacks; a tally of all leatherback takes anticipated annually under current biological opinions completed for the NMFS June 30, 2000, biological opinion on the pelagic longline fishery projected a potential for up to 801 leatherback takes, although this sum includes many takes expected to be nonlethal. Leatherbacks have a number of pressures on their populations, including injury or mortality in fisheries, other Federal activities (e.g., military activities, oil and gas development, etc.), degradation of nesting habitats, direct harvest of eggs, juvenile and adult turtles, the effects of ocean pollutants and debris, lethal collisions, and natural disturbances such as hurricanes (which may wipe out nesting beaches).

Spotila *et al.* (1996) recommended not only reducing mortalities resulting from fishery interactions, but also advocated protection of eggs during the incubation period and of hatchlings during their first day, and indicated that such practices could potentially double the chance for survival and help counteract population effects resulting from adult mortality. They conclude, "stable leatherback populations could not withstand an increase in adult mortality above natural background levels without decreasing . . . the Atlantic population is the most robust, but it is being exploited at a rate that cannot be sustained and if this rate of mortality continues, these populations will also decline. "

Estimated to number approximately 115,000 adult females globally in 1980 (Pritchard 1982) and only 34,500 by 1995 (Spotila *et al.* 1996), leatherback populations have been decimated worldwide, not only by fishery related mortality but, at least historically, primarily due to intense exploitation of the eggs (Ross 1979). On some beaches nearly 100% of the eggs laid have been harvested (Eckert 1996). Eckert (1996) and Spotila *et al.* (1996) record that adult mortality has also increased significantly, particularly as a result of driftnet and longline fisheries. Spotila (2000) states that a conservative estimate of annual leatherback fishery-related mortality (from longlines, trawls and gillnets) in the Pacific during the 1990s is 1,500 animals. He estimates that this represented about a 23% mortality rate (or 33% if most mortality was focused on the East Pacific population).

Nest counts are currently the only reliable indicator of population status available for leatherback turtles. The status of the leatherback population in the Atlantic is difficult to assess since major nesting beaches occur over broad areas within tropical waters outside the United States. Recent information suggests that Western Atlantic populations declined from 18,800 nesting females in 1996 (Spotila *et al.* 1996) to 15,000 nesting females by 2000. Eastern Atlantic (i.e., off Africa, numbering ~ 4,700) and Caribbean (4,000) populations appear to be stable, but there is conflicting information for some sites and it is certain that some nesting populations (e.g., St. John and St. Thomas, U.S. Virgin Islands) have been extirpated (NMFS and USFWS 1995). It does appear, however, that the Western Atlantic portion of the population is being subjected to mortality beyond sustainable levels, resulting in a continued decline in numbers of nesting females.

Kemp's Ridley Sea Turtle

The Kemp's ridley is probably the most endangered of the world's sea turtle species. The only major nesting site for ridleys is a single stretch of beach near Rancho Nuevo, Tamaulipas, Mexico (Carr 1963). Estimates of the adult population reached a low of 1,050 in 1985, but increased to 3,000 individuals in 1997. First-time nesting adults have increased from 6% to 28% from 1981 to 1989, and from 23% to 41% from 1990 to 1994, indicating that the ridley population may be in the early stages of growth (TEWG 1998). More recently the TEWG (2000) concluded that the Kemp's Ridley population appears to be in the early stages of exponential expansion. While the number of females nesting annually is estimated to be orders of magnitude less than historical levels, the mean rate of increase in the annual number of nests has accelerated over the period 1987-1999. Preliminary analyses suggest that the intermediate recovery goal of 10,000 nesting females by 2020 may be achievable (TEWG 2000).

Juvenile Kemp's ridleys inhabit northeastern US coastal waters where they forage and grow in shallow coastal during the summer months. Juvenile ridleys migrate southward with autumnal cooling and are found predominantly in shallow coastal embayments along the Gulf Coast during the late fall and winter months.

Ridleys found in mid-Atlantic waters are primarily post-pelagic juveniles averaging 40 cm in carapace length, and weighing less than 20 kg. After loggerheads, they are the second most abundant sea turtle in Virginia and Maryland waters, arriving in there during May and June and then emigrating to more southerly waters from September to November. In the Chesapeake Bay, ridleys frequently forage in shallow embayments, particularly in areas supporting submerged aquatic vegetation (Lutcavage and Musick 1985). The juvenile population in Chesapeake Bay is estimated to be 211 to 1,083 turtles.

The model presented by Crouse *et al.* (1987) illustrates the importance of subadults to the stability of loggerhead populations and may have important implications for Kemp's ridleys. The vast majority of ridleys identified along the Atlantic Coast have been juveniles and subadults. Sources of mortality in this area include incidental takes in fishing gear, pollution and marine habitat degradation, and other man-induced and natural causes. Loss of individuals in the Atlantic, therefore, may impede recovery of the Kemp's ridley sea turtle population. Sea sampling data from the northeast otter trawl fishery and southeast shrimp and summer flounder bottom trawl fisheries has recorded takes of Kemp's ridley turtles.

Green Sea Turtle

Green sea turtles are more tropical in distribution than loggerheads, and are generally found in waters between the northern and southern 20°C isotherms. In the wester Atlantic region, the summer developmental habitat encompasses estuarine and coastal waters as far north as Long Island Sound, Chesapeake Bay, and the North Carolina sounds, and south throughout the tropics (NMFS 1998). Most of the individuals reported in U.S. waters are immature (NMFS 1998). Green sea turtles found north of Florida during the summer must return to southern waters in autumn or risk the adverse effects of cold temperatures.

There is evidence that green turtle nesting has been on the increase during the past decade. For example, increased nesting has been observed along the Atlantic coast of Florida on beaches where only loggerhead nesting was observed in the past (NMFS 1998). Recent population estimates for the western Atlantic area are not available. Green turtles are threatened by incidental captures in fisheries, pollution and marine habitat degradation, destruction/disturbance of nesting beaches, and other sources of man-induced and natural mortality.

Juvenile green sea turtles occupy pelagic habitats after leaving the nesting beach. At approximately 20 to 25 cm carapace length, juveniles leave pelagic habitats, and enter benthic foraging areas, shifting to a chiefly herbivorous diet (NMFS 1998). Post-pelagic green turtles feed primarily on sea grasses and benthic algae, but also consume jellyfish, salps, and sponges. Known feeding habitats along U.S. coasts of the western Atlantic include shallow lagoons and embayments in Florida, and similar shallow inshore areas elsewhere (NMFS 1998).

Sea sampling data from the scallop dredge fishery and southeast shrimp and summer flounder bottom trawl fisheries have recorded incidental takes of green turtles

Shortnose Sturgeon

Shortnose sturgeon occur in large rivers along the western Atlantic coast from the St. Johns River, Florida (possibly extirpated from this system), to the Saint John River in New Brunswick, Canada. The species is anadromous in the southern portion of its range *(i.e.,* south of Chesapeake Bay), while northern populations are amphidromous (NMFS 1998). Population sizes vary across the species' range with the smallest populations occurring in the Cape Fear and Merrimack Rivers and the largest populations in the Saint John and Hudson Rivers (Dadswell 1979; NMFS 1998).

Shortnose sturgeon are benthic and mainly inhabit the deep channel sections of large rivers. They feed on a variety of benthic and epibenthic invertebrates including molluscs, crustaceans (arnphipods, chironomids, isopods), and oligochaete worms (Vladykov and Greeley 1963; Dadswell 1979). Shortnose sturgeon are long-lived (30 years) and mature at relatively old ages. In northern areas, males reach maturity at 5-10 years, while females reach sexual maturity between 7 and 13 years.

In the northern part of their range, shortnose sturgeon exhibit three distinct movement patterns that are associated with spawning, feeding, and overwintering periods. In spring, as water temperatures rise above 8° C, pre-spawning shortnose sturgeon move from overwintering grounds to spawning areas. Spawning occurs from mid/late April to mid/late May. Post-spawned sturgeon migrate downstream to feed throughout the summer.

As water temperatures decline below 8° C again in the fall, shortnose sturgeon move to overwintering concentration areas and exhibit little movement until water temperatures rise again in spring (NMFS 1998). Young-of-the-year shortnose sturgeon are believed to move downstream after hatching (NMFS 1998) but remain within freshwater habitats. Older juveniles tend to move downstream in fall and winter as water temperatures decline and the salt wedge recedes. Juveniles move upstream in spring and feed mostly in freshwater reaches during summer.

Shortnose sturgeon spawn in freshwater sections of rivers, typically below the first impassable barrier on the river *(e.g.,* dam). Spawning occurs over channel habitats containing gravel, rubble, or rock-cobble substrates (NMFS 1998). Additional environmental conditions associated with spawning activity include decreasing river discharge following the peak spring freshet, water temperatures ranging from 9 -12 C, and bottom water velocities of 0.4 - 0.7 m/sec (NMFS 1998).

Atlantic salmon

The recent ESA-listing for Atlantic salmon covers the wild population of Atlantic salmon found in rivers and streams from the lower Kennebec River north to the U.S.-Canada border. These include the Dennys, East Machias, Machias, Pleasant, Narraguagus, Ducktrap, and Sheepscot Rivers and Cove Brook. Atlantic salmon are an anadromous species with spawning and juvenile rearing occurring in freshwater rivers followed by migration to the marine environment. Juvenile salmon in New England rivers typically migrate to sea in May after a two to three year period of development in freshwater streams, and remain at sea for two winters before returning to their U.S. natal rivers to spawn from mid October through early November. While at sea, salmon generally undergo an extensive northward migration to waters off Canada and Greenland. Data from past commercial harvest indicate that post-smolts overwinter in the southern Labrador Sea and in the Bay of Fundy. The numbers of returning wild Atlantic salmon within the Gulf of Maine Distinct Population Segment (DPS) are perilously small with total run sizes of approximately 150 spawners occurring in 1999 (Baum 2000). Although capture of Atlantic salmon has occurred in commercial fisheries (usually otter trawl or gillnet gear) or by research/survey, no salmon have been reported captured in the Atlantic mackerel, squid and butterfish fisheries.

Seabirds

Most of the following information about seabirds is taken from the Mid-Atlantic Regional Marine Research Program (1994) and Peterson (1963). Fulmars occur as far south as Virginia in late winter and early spring. Shearwaters, storm petrels (both Leach's and Wilson's), jaegers, skuas, and some terns pass through this region in their annual migrations. Gannets and phalaropes occur in the Mid-Atlantic during winter months. Nine species of gulls breed in eastern North America and occur in shelf waters off the northeastern US. These gulls include: glaucous, Iceland, great black-backed, herring, laughing, ring-billed, Bonaparte's and Sabine's gulls, and black-legged caduceus. Royal and sandwich terns are coastal inhabitants from Chesapeake Bay south to the Gulf of Mexico. The Roseate tern is listed as endangered under the ESA, while the Least tern is considered threatened (Safina pers. comm.). In addition, the bald eagle is listed as threatened under the ESA and is a bird of aquatic ecosystems.

Like marine mammals, seabirds are vulnerable to entanglement in commercial and recreational fishing gear. The interaction has not been quantified in the recreational fishery, but impacts are not considered significant. Human activities such as coastal development, habitat degradation and destruction, and the presence of organochlorine contaminants are considered the major threats to some seabird populations.

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